
R G U H S · M O D E L A N S W E R B A N K

The questions RGUHS repeats — fully answered

RGUHS MS Obstetrics & Gynaecology — 2016-2026



R E C U R R I N G - Q U E S T I O N A N S W E R B A N K

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*671 recurring topics · textbook-verified · guideline-current (ACOG · RCOG · FOGSI · FIGO · NICE) · cited
Recent Advances*

G R O U N D E D I N :

Williams Obstetrics 26e — obstetrics spine text
Berek & Novak's Gynecology 16e — gynaecology spine text
Speroff's Clinical Gynecologic Endocrinology & Infertility 9e — reproductive endocrinology & infertility
Te Linde's Operative Gynecology 13e — operative gynaecology
DC Dutta's Obstetrics 9e & Gynaecology 7e — Indian standard texts
Current guidelines: ACOG · RCOG (Green-top) · FOGSI · FIGO · NICE
Cited Recent Advances: PubMed + landmark obstetric & gynaecological trials
Arias' High-Risk Pregnancy 5e — obstetric high-risk spine
Munro Kerr's Operative Obstetrics 13e — operative obstetrics spine
Jeffcoate's Principles of Gynaecology 9e (2019) — gynaecology spine (clean HELINET text)



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Paper III — Gynaecology

Benign gynaecology

♦ ♦ ♦

47-year-old woman with protein S deficiency scheduled for hysterectomy — perioperative complications and management

Asked in: Paper III May 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Protein S is a vitamin K-dependent plasma glycoprotein that acts as a cofactor for activated protein C in inactivating clotting factors Va and VIIIa; its deficiency (inherited, autosomal dominant, or acquired) produces a hypercoagulable state with a several-fold increase in venous thromboembolism (VTE) risk. Major pelvic surgery such as hysterectomy is itself at least a moderate-risk procedure for VTE, so an inherited thrombophilia combined with surgery is synergistic — the whole perioperative plan (preoperative, intraoperative, postoperative) must be built around aggressive VTE prevention in addition to the routine complications of hysterectomy.

Preoperative assessment, complications and management

Issue	Management
Confirming true deficiency	Protein S falls physiologically in pregnancy, oestrogen/OCP use, acute thrombosis, liver disease, nephrotic syndrome and on warfarin — repeat assay when the patient is off anticoagulants and >6 weeks from any acute event before labelling permanent deficiency
VTE risk stratification	Score by the Caprini Risk Score (adopted by the American College of Chest Physicians, ACCP/CHEST, 9th ed. 2012 guidelines): this patient scores age 41–60 y (1) + congenital thrombophilia (3) + major open surgery >45 min (2) = $\geq 6 \rightarrow$ high-risk category , mandating combined mechanical + pharmacological prophylaxis with extended duration
Haematology referral	Confirm whether she has had a prior VTE (dictates bridging) versus asymptomatic carrier state; plan the anticoagulation strategy jointly
Bridging (if on chronic warfarin for prior VTE)	Stop warfarin ~5 days pre-op, bridge with therapeutic-dose low-molecular-weight heparin (LMWH); stop LMWH 24 hours (therapeutic dose) or 12 hours (prophylactic dose) before surgery

Issue	Management
Neuraxial anaesthesia timing	If spinal/epidural planned, time the first prophylactic LMWH dose to avoid epidural haematoma — hold ≥ 12 hours after a prophylactic dose, ≥ 24 hours after a therapeutic dose
Mechanical prophylaxis	Fit graduated compression stockings/intermittent pneumatic compression (IPC) device preoperatively; start before induction
Routine work-up	Haemoglobin, blood grouping and cross-match, renal function (LMWH is renally cleared), coagulation profile, ECG, informed consent (including disposition of ovaries), correction of anaemia

Intraoperative complications and management

- ▶ **Haemorrhage** — from uterine/ovarian pedicles or vaginal angle; controlled by meticulous pedicle ligation, and if uncontrolled, ligation of the anterior division of the internal iliac artery or hysterectomy conversion to laparotomy for haemostasis.
- ▶ **Visceral injury**
 - *Bladder* — recognised by extravasation of urine/dye; repaired in two layers with continuous bladder drainage for 10–14 days.
 - *Ureter* — injured at the infundibulopelvic ligament, beside the cervix (cardinal ligament clamping), or at the vaginal angle; managed by immediate intraoperative repair over a stent (ureteroureterostomy or ureteric reimplantation) if recognised, or by ureteric stenting/nephrostomy if diagnosed late.
 - *Bowel* — primarily repaired in layers; diversion if gross contamination.
- ▶ **Anaesthetic hazards** — atelectasis, aspiration, hypotension, pulmonary/air embolism.
- ▶ **VTE-specific intraoperative measures** (the added risk from protein S deficiency) — IPC device switched on before induction and continued throughout surgery, minimising operative time and prolonged lithotomy/Trendelenburg positioning, avoiding intraoperative hypotension and dehydration, and gentle tissue handling to limit the surgical hypercoagulable trigger.

Postoperative complications and management

Immediate

Complication	Management
Hypovolaemic (haemorrhagic) shock	IV crystalloid/blood resuscitation, re-exploration if ongoing bleeding

Complication	Management
Urinary retention / anuria	Catheterisation; anuria may be prerenal (inadequate fluid replacement) or postrenal (ureteric obstruction) — assess accordingly
Deep vein thrombosis / pulmonary embolism	The pivotal risk in this patient — see below

DVT/PE prevention and treatment (drug doses)

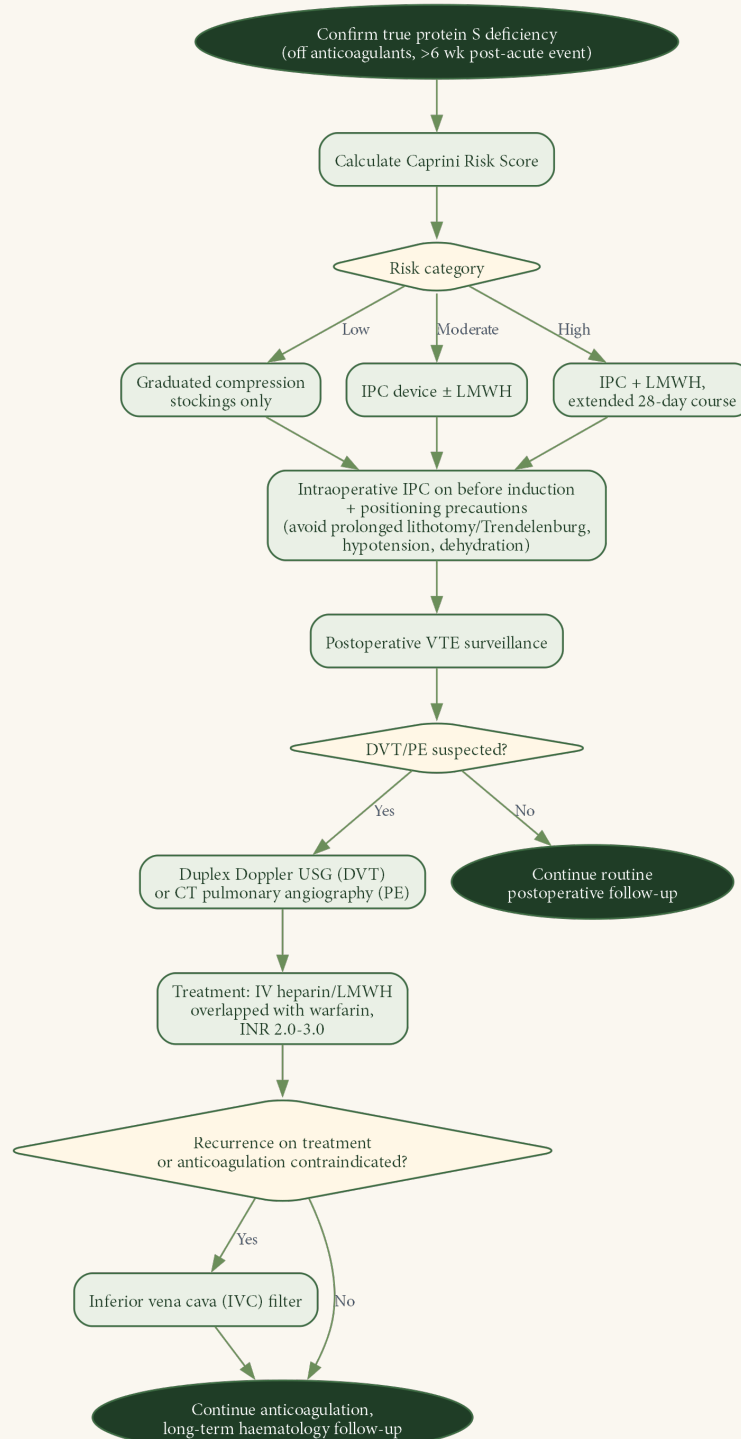
- ▶ Prophylaxis: LMWH (e.g., dalteparin 2500 units subcutaneously once daily) or low-dose unfractionated heparin 5000 units subcutaneously every 12 hours, started 1–2 hours before surgery and continued for 5–7 days; in this **high-Capri-score** patient, prophylaxis should be combined with mechanical IPC and, per ACCP guidance for major open/cancer-type surgery, extended to 28 days postoperatively.
- ▶ Diagnosis if suspected: B-mode/duplex Doppler ultrasound for DVT; for PE — arterial blood gas, D-dimer, ventilation-perfusion scan or spiral CT pulmonary angiography.
- ▶ Treatment of confirmed VTE: intravenous unfractionated heparin (bolus 80 U/kg, then infusion, APTT kept 1.5–2.5× control) or therapeutic LMWH, overlapped with oral warfarin from day 1, keeping INR 2.0–3.0 for at least 2 days before stopping heparin; oral factor Xa/direct thrombin inhibitors are alternatives to warfarin (no antidote, avoid if urgent reversal may be needed).
Massive PE: thrombolysis, pulmonary embolectomy, or an inferior vena cava filter if anticoagulation is contraindicated or VTE recurs on treatment.

Late

Complication	Management
Pyrexia (cystitis, wound infection, vault cellulitis/haematoma, thrombophlebitis, pulmonary infection)	Identify source, targeted antibiotics, drain large haematomas
Secondary haemorrhage (day 7–14, due to sepsis)	Vaginal vault suture under general anaesthesia; laparotomy if intraperitoneal source
Wound dehiscence / necrotising fasciitis	Debridement, broad-spectrum antibiotics, resuturing
Paralytic ileus vs mechanical obstruction	Distinguish by onset, bowel sounds and imaging; ileus is managed conservatively (nasogastric suction, IV fluids), obstruction may need surgery
Vesicovaginal/ureterovaginal fistula (necrosis 7–14 days post-op)	Confirm by dye test/imaging; delayed surgical repair after inflammation settles
Incontinence (overflow/stress/true)	Catheter care, urodynamic evaluation, fistula repair if true incontinence from injury

Remote — vault granulation, vault prolapse, incisional hernia, prolapse of fallopian tube through the vault, depression/psychiatric symptoms, and sexual dysfunction. Given the confirmed thrombophilia, arrange long-term haematology follow-up: if a perioperative VTE occurs, anticoagulation duration and intensity are individualised (often longer than for provoked VTE without thrombophilia), and future surgery/pregnancy/hormone use need pre-planned thromboprophylaxis.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Perioperative VTE-risk-stratified pathway for a thrombophilic patient posted for hysterectomy.

High-yield exam pointers

- Protein S = cofactor for activated protein C (inactivates Va, VIIIa); repeat assay only when off anticoagulants and away from an acute thrombotic event/pregnancy/OCP.

- ▶ **Caprini score:** thrombophilia = 3 points, major open surgery >45 min = 2 points, age 41–60 y = 1 point → score >4 = high risk → IPC + LMWH ± extended 28-day prophylaxis.
- ▶ Prophylactic dose: LMWH (dalteparin) 2500 U SC OD, or unfractionated heparin 5000 U SC 12-hourly, started 1–2 hours pre-op.
- ▶ Treatment dose: IV heparin bolus 80 U/kg then infusion, APTT 1.5–2.5× control; warfarin overlap till INR 2–3 for ≥2 days.
- ▶ Bridging: stop warfarin 5 days pre-op, LMWH bridge, hold LMWH 24 h (therapeutic)/12 h (prophylactic) before surgery.
- ▶ Commonest sites of ureteric injury in hysterectomy: infundibulopelvic ligament, cardinal ligament clamp beside the cervix, vaginal angle.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Gynaecology states warfarin is continued for only 4–6 weeks after a confirmed DVT/PE; current standard practice (Berek & Novak 16e; ACCP/CHEST guidelines) recommends a minimum of 3–6 months of anticoagulation, and in a patient with confirmed inherited thrombophilia such as protein S deficiency, extended or indefinite anticoagulation is often individualised because the underlying risk factor persists — follow the current standard, not the shorter textbook figure.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (Caprini Risk Score and VTE prophylaxis/treatment regimens; perioperative checklist for hysterectomy; ACCP/CHEST 9th ed. 2012 guideline citation); DC Dutta's Textbook of Gynaecology 7e (complications of hysterectomy by phase; ureteric injury sites; DVT/PE prophylaxis and treatment doses).



A 26-year-old hirsute, obese, nulliparous lady with infrequent cycles is anxious to conceive. Transvaginal sonography reveals bilaterally enlarged ovaries with peripherally arranged small follicles. What are the investigations to be done and discuss the management?

Asked in: Paper III 30-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — This vignette is a classic presentation of polycystic ovary syndrome (PCOS) with anovulatory infertility. The **Rotterdam (ESHRE/ASRM 2003) criteria** require any two of three features — oligo-/anovulation, clinical or biochemical hyperandrogenism, and polycystic ovarian (PCO)

morphology on ultrasound — after excluding other causes of hyperandrogenism or anovulation. This patient already fulfils all three: infrequent cycles, hirsutism, and bilaterally enlarged ovaries with peripherally arranged small follicles (the classic "string of pearls" appearance).

Investigations

Category	Test	Purpose / expected finding
Confirm anovulation	Menstrual/basal body temperature (BBT) chart; mid-luteal (day 21) serum progesterone	Low mid-luteal progesterone confirms anovulatory cycles
Clinical hyperandrogenism	Modified Ferriman–Gallwey score (9 androgen-sensitive body areas, each scored 0–4)	Score ≥ 8 = hirsutism
Biochemical hyperandrogenism	Serum total/free testosterone, dehydroepiandrosterone sulphate (DHEAS)	Mildly-moderately raised in PCOS; markedly high testosterone (>2 ng/mL) with normal DHEAS suggests an androgen-secreting ovarian tumour instead
Exclude mimics (mandatory before labelling PCOS)	Morning 17-hydroxyprogesterone (17-OHP), serum prolactin, thyroid-stimulating hormone (TSH)	17-OHP >8 ng/mL = late-onset congenital adrenal hyperplasia (CAH); raised prolactin or TSH point to hyperprolactinaemia or thyroid dysfunction as the true cause
Gonadotropins	Serum luteinising hormone (LH), follicle-stimulating hormone (FSH), LH:FSH ratio	Elevated LH with normal FSH (ratio $>2:1$) is supportive but not part of the Rotterdam criteria
Ovarian morphology	Transvaginal sonography (TVS) — already done	≥ 12 subcentimetre (2–9 mm) peripheral follicles and/or ovarian volume >10 mL in either ovary
Metabolic/insulin-resistance screen	75 g oral glucose tolerance test (OGTT), fasting lipid profile, fasting insulin	Impaired glucose tolerance/type 2 diabetes and dyslipidaemia occur in a large proportion of obese PCOS women and must be screened before/alongside fertility treatment
General	Body mass index (BMI), waist circumference, blood pressure	Documents obesity and metabolic syndrome; baseline for weight-reduction counselling

Category	Test	Purpose / expected finding
Couple/infertility baseline	Semen analysis of husband	Anovulation is only one factor in a couple wanting to conceive; a male-factor screen is mandatory before ovulation-induction therapy

Management — general measures

- **Lifestyle modification (first step, always):** diet and structured exercise aiming at 5–10% reduction in body weight; this alone restores spontaneous ovulation in a substantial proportion of obese PCOS women and improves the response to subsequent drug therapy.
- **Correct metabolic abnormalities:** treat dyslipidaemia; if OGTT shows impaired glucose tolerance/diabetes, manage with diet or antidiabetic drugs before/along with ovulation induction.
- **Insulin sensitisation: metformin** 500 mg once daily, stepped up to 500 mg three times daily as tolerated — reduces hyperinsulinaemia and hyperandrogenaemia; most useful as an adjuvant in obese (BMI >25), insulin-resistant women.
- **Correct associated endocrinopathy if present:** bromocriptine/cabergoline for hyperprolactinaemia; thyroxine for subclinical hypothyroidism — both can independently cause anovulation.

Management — ovulation induction (drug ladder)

Step	Drug	Dose/regimen	Key point
First-line (current evidence)	Letrozole (aromatase inhibitor)	2.5–5 mg orally once daily for 5 days, starting day 2–5 of cycle	Meta-analyses show higher ovulation, pregnancy and live-birth rates than clomiphene with a lower multiple-pregnancy rate; used off-label (FDA-approved only for breast cancer)

Step	Drug	Dose/regimen	Key point
Traditional first-line	Clomiphene citrate (selective oestrogen-receptor modulator)	50 mg daily for 5 days from day 2–5; increase in 50 mg steps each subsequent cycle to a maximum of 250 mg/day if anovulation persists; up to 6 cycles	Blocks hypothalamic oestrogen receptors, raising gonadotropin-releasing hormone (GnRH) pulsatility; side effects — hot flushes, visual symptoms (stop the drug), ~7% multiple pregnancy (mostly twins)
Adjuvant	Metformin + clomiphene	500 mg thrice daily	Combination increases ovulation rate over clomiphene alone in obese, insulin-resistant women
Second-line	Injectable gonadotropins (human menopausal gonadotropin/FSH)	Low-dose step-up, starting ~75 IU/day, continued 7–10 days	For clomiphene/letrozole failure; requires TVS + serum oestradiol monitoring to reduce risk of ovarian hyperstimulation syndrome (OHSS) and multiple pregnancy
Second-line (surgical)	Laparoscopic ovarian drilling (LOD)	Multiple puncture (4–6 sites per ovary) by diathermy or laser	For clomiphene-resistant, hyperandrogenic anovulatory women; lowers intraovarian/systemic androgen and permits spontaneous ovulation without the OHSS/multiple-pregnancy risk of gonadotropins
Assisted reproduction	In-vitro fertilisation (IVF)	—	Reserved for failed ovulation induction or when additional infertility factors coexist

Adjuvant measures used alongside clomiphene in specific settings: dexamethasone 0.5 mg at bedtime for raised androgens; thyroxine for subclinical hypothyroidism; human chorionic gonadotropin (hCG) 5000 IU to trigger ovulation once a lead follicle of 18–20 mm is confirmed on monitoring.

Because this patient is actively trying to conceive, **antiandrogens (spironolactone, cyproterone acetate) and combined oral contraceptives used for hirsutism/cycle regulation are withheld** — they are teratogenic and contraceptive, and are reserved for symptom control once childbearing is complete or not immediately desired.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 29.4 — Laparoscopic view of polycystic changes (PCOS) of the ovary. Multiple small peripheral cysts (DC Dutta's Gynaecology 7e, p.398)

High-yield exam pointers

- ▶ **Rotterdam 2003 criteria** — 2 of 3: oligo-/anovulation + clinical/biochemical hyperandrogenism + PCO morphology; always exclude CAH, hyperprolactinaemia, thyroid dysfunction and androgen-secreting tumours first.
- ▶ **PCO morphology on TVS**: ≥ 12 follicles of 2–9 mm and/or ovarian volume > 10 mL — "string of pearls"/necklace sign.
- ▶ **Clomiphene citrate**: 50 mg Day 2–5 $\times 5$ days; step up by 50 mg to a max of 250 mg/day.
- ▶ **Letrozole**: 2.5–5 mg OD $\times 5$ days — current first-line by evidence, but off-label use.
- ▶ **Metformin**: 500 mg TDS — insulin sensitiser, best combined with clomiphene in obese/insulin-resistant PCOS.
- ▶ **Laparoscopic ovarian drilling**: 4–6 punctures/ovary — reserved for clomiphene-resistant cases.
- ▶ **Untreated long-term risk**: type 2 diabetes, dyslipidaemia, hypertension, endometrial carcinoma, obstructive sleep apnoea.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Classical Indian teaching (DC Dutta's Gynaecology) still lists clomiphene citrate as the standard first-choice ovulation-induction drug, whereas current comparative-effectiveness evidence summarised in Berek & Novak's Gynecology favours letrozole for higher live-birth rates; both drugs remain acceptable first-line options in practice.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group (2003).

♦ ♦ ♦

A 30-year-old woman presents with a 2-year history of menorrhagia and deep dyspareunia. Discuss the management options

Asked in: Paper III 23-Nov-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Heavy menstrual bleeding (menorrhagia) combined with chronic deep dyspareunia of 2 years' duration in a reproductive-age woman most often reflects **adenomyosis, endometriosis, chronic pelvic inflammatory disease (PID) or a uterine fibroid**. Because treatment differs by cause, management is a stepwise pathway — confirm the underlying pathology, correct anaemia, then escalate from medical therapy through conservative (fertility/uterus-sparing) surgery to definitive surgery, guided by the woman's age, fertility wish, symptom severity and response to treatment.

Reaching a working diagnosis before treating

Likely cause	Key distinguishing feature
Adenomyosis	Uniformly enlarged, soft, tender uterus (rarely beyond a 12–14-week size); menorrhagia in ~70%, dyspareunia from the tender bulky uterus
Endometriosis	Fixed retroverted uterus, tender nodular uterosacral ligaments/pouch of Douglas; classic triad of dysmenorrhoea–dyspareunia–infertility, menorrhagia mainly if adenomyosis coexists
Chronic PID	Bilateral adnexal tenderness/thickening, history of infection or intrauterine device use; deep dyspareunia from pelvic adhesions
Submucous/intramural fibroid	Menorrhagia dominant; dyspareunia only if the fibroid is large, cervical, or in the broad ligament
Pelvic congestion syndrome	Dull dyspareunia worse premenstrually/late in the day; menorrhagia less prominent

Investigation	Purpose
Complete blood count	Quantifies anaemia from 2 years of menorrhagia
Transvaginal sonography (TVS) with colour Doppler	First-line — adenomyosis (subendometrial halo, myometrial cysts), fibroid, ovarian endometrioma
MRI pelvis	When TVS is equivocal, for deep infiltrating endometriosis or junctional-zone thickness in adenomyosis
Diagnostic hysteroscopy + endometrial biopsy	Confirms a submucous fibroid and excludes endometrial pathology/genital tuberculosis before starting hormonal therapy

Investigation	Purpose
Diagnostic laparoscopy	Gold standard for endometriosis and PID-related adhesions; allows simultaneous operative treatment
FIGO PALM-COEIN classification of abnormal uterine bleeding (FIGO/ACOG, 2011)	Separates structural causes (polyp, adenomyosis, leiomyoma, malignancy) from non-structural causes — guides whether a surgical-first or medical-first approach is likely to succeed

Principles guiding the choice of management

- ▶ Confirm the underlying cause (table above) before committing to any specific therapy — treatment differs substantially between adenomyosis, endometriosis, fibroid and chronic PID.
- ▶ Correct the menorrhagia-related anaemia first — oral/parenteral iron, or blood transfusion if the haemoglobin is very low or the patient is symptomatic.
- ▶ Individualise the plan by age, parity and fertility wish, severity of bleeding and pain, the specific pathology found, and response to any prior treatment.
- ▶ Follow a **step-up ladder** — medical therapy first, then conservative (uterus/fertility-preserving) surgery, reserving definitive surgery for failure of the above or a completed family.
- ▶ Treat the dyspareunia specifically — controlling menstrual blood loss does not guarantee pain relief when deep endometriosis or pelvic adhesions are the actual cause of the pain.

Medical management options

Measure	Regimen	Role
Haematinics ± transfusion	Oral/IV iron; blood transfusion if haemoglobin <7 g/dL or symptomatic	Corrects menorrhagia-related anaemia — first step regardless of cause
Mefenamic acid (NSAID)	250–500 mg orally every 8 hours during bleeding	Reduces blood loss by ~20–25% and relieves dysmenorrhoea; first-line, but does not relieve dyspareunia
Tranexamic acid (antifibrinolytic)	1.3 g orally 3 times a day for 3–5 days during menses	Reduces menstrual blood loss by up to 50%; non-hormonal, fertility-preserving second-line option; avoid with a history of thromboembolism
Combined oral contraceptive pills	Cyclic or continuous	Reduces menorrhagia, suppresses endometriotic/adenomyotic activity, provides contraception

Measure	Regimen	Role
Levonorgestrel intrauterine system (LNG-IUS)	52 mg device releasing levonorgestrel 20 µg/day, licensed 5 years	"Medical hysterectomy" for adenomyosis-related menorrhagia; first choice if fertility is not immediately desired; avoid if the cavity is distorted
Cyclic progestogens	Norethisterone 5 mg or medroxyprogesterone acetate 10 mg, day 5–25 of the cycle	Controls bleeding, especially with an anovulatory component
Danazol	200–400 mg/day in divided doses × 3 months	Antigonadotropic — reduces blood loss and produces amenorrhoea; androgenic side effects limit long-term use
GnRH agonist ± add-back	Leuprorelin acetate 3.75 mg or goserelin 3.6 mg depot monthly, for 3–6 months; add-back norethindrone acetate if continued beyond 6 months	Induces hypo-oestrogenic amenorrhoea and shrinks adenomyotic/endometriotic tissue — relieves both menorrhagia and dyspareunia; used short-term as a bridge to surgery or for symptom control
Targeted antibiotics	Broad-spectrum cover for <i>Chlamydia</i> and anaerobes	If chronic/recurrent PID is confirmed as the cause

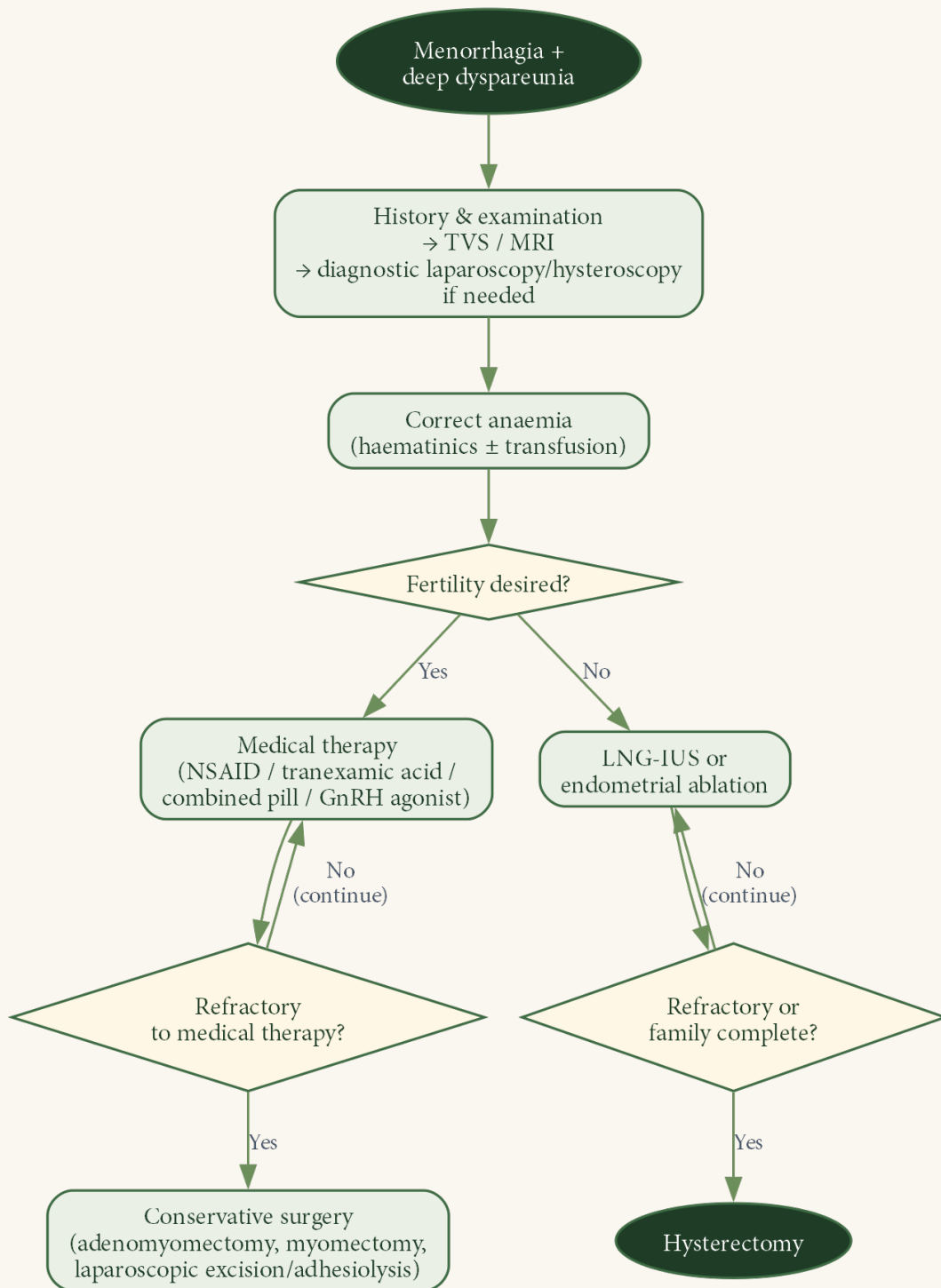
Conservative (fertility/uterus-preserving) surgical options

- ▶ **Diagnostic-cum-operative laparoscopy** — combines diagnosis with treatment: excision/ablation of endometriotic implants, adhesiolysis for PID-related adhesions and dyspareunia, cystectomy for an endometrioma.
- ▶ **Adenomyomectomy** — excision of a focal adenomyoma with myometrial reconstruction; uterus- and fertility-preserving.
- ▶ **Myomectomy** (open, laparoscopic or hysteroscopic) — for a fibroid responsible for the menorrhagia.
- ▶ **Endometrial ablation** — for menorrhagia refractory to medical therapy when the cavity is undistorted and fertility is not desired; does not relieve deep adenomyosis or dyspareunia.
- ▶ **Uterine artery embolisation (UAE)** — occludes the blood supply to diffuse adenomyosis or a fibroid, reducing bleeding; an alternative to surgery, though pregnancy after UAE carries added obstetric risk.
- ▶ **Presacral neurectomy / laparoscopic uterosacral nerve ablation (LUNA)** — adjuncts for midline pain at the time of laparoscopy; evidence of benefit over laparoscopy alone is weak.

Definitive management

Hysterectomy (with or without bilateral salpingo-oophorectomy) is the only definitive cure. It is offered once childbearing is complete, when conservative measures have failed, or when symptoms are severe enough to warrant it; the vaginal or laparoscopic route is preferred over the abdominal route where feasible. In a 30-year-old woman, hysterectomy is deferred unless the family is explicitly complete and conservative options have already failed, because preserving fertility remains the priority at this age.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Management pathway for menorrhagia with deep dyspareunia — step-up ladder branching on fertility wish.

High-yield exam pointers

- ▶ Two symptoms together (menorrhagia + deep dyspareunia, no infertility mentioned) point first to **adenomyosis**; add nodular uterosacral ligaments/fixed retroverted uterus and the differential shifts toward **endometriosis**.
- ▶ FIGO PALM-COEIN (FIGO/ACOG 2011) is the current classification of abnormal uterine bleeding — structural vs non-structural.
- ▶ **Tranexamic acid 1.3 g orally 3 times/day for 3–5 days** during menses — the number to write for medical HMB control.
- ▶ **LNG-IUS**: 52 mg device, releases 20 µg/day, licensed 5 years — called a "medical hysterectomy."
- ▶ **GnRH agonist**: leuporelin 3.75 mg or goserelin 3.6 mg monthly depot, optimal duration 3 months, add-back beyond 6 months.
- ▶ Step-up ladder: medical → conservative (fertility-sparing) surgery → hysterectomy, chosen by age/fertility wish/severity.
- ▶ Hysterectomy route preference: vaginal/laparoscopic over abdominal, offered only once family is complete.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Some textbook passages describe tranexamic acid loosely as "a second-line antifibrinolytic," while Berek & Novak's Gynecology 16e gives the specific dosage (1.3 g three times a day for 3–5 days) used above; the two are consistent, the numeric regimen is simply the more precise current statement.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; FIGO/American College of Obstetricians and Gynecologists (ACOG) PALM-COEIN classification of abnormal uterine bleeding (2011).



Adnexal mass

Asked in: Paper III Nov 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — An adnexal mass is any swelling arising in the region of the uterine adnexa — the ovary, fallopian tube, and adjacent broad ligament/parametrial tissue — that is palpable on bimanual pelvic examination or detected on imaging as separate from the uterus. Causes range from physiological/functional cysts and benign neoplasms to ectopic pregnancy, inflammatory masses, and

malignancy; the central clinical task is to exclude ovarian malignancy while avoiding unnecessary surgery for benign disease.

Causes / Differential Diagnosis

Origin	Common causes	Notes
Ovarian	Functional cyst (follicular, corpus luteal, theca lutein), benign neoplasm (serous/mucinous cystadenoma, mature cystic teratoma/dermoid), endometrioma, fibroma/thecoma, malignant neoplasm (epithelial, germ cell, sex cord-stromal)	Commonest group overall; dermoid and functional cysts predominate in reproductive age
Tubal	Hydrosalpinx, tubo-ovarian abscess (pelvic inflammatory disease), ectopic pregnancy, paratubal/paraovarian cyst ($\approx 10\text{--}20\%$ of adnexal masses), rare tubal neoplasm	Ectopic pregnancy must always be excluded in reproductive-age women
Uterine	Pedunculated subserosal fibroid mimicking an adnexal mass	Moves with the cervix on bimanual examination
Gastrointestinal/genitourinary	Appendicular mass/abscess, diverticular mass, pelvic kidney	Consider when the mass feels retroperitoneal or fixed to bowel
Non-pathological mimics	Full bladder, pregnancy	Must always be excluded first (empty bladder before examination; urine pregnancy test)

Age-related emphasis: in children/adolescents, germ cell tumours (dermoid) and functional cysts predominate and a solid mass raises concern for a germ cell malignancy; in reproductive age, functional cysts, dermoid, endometrioma, tubo-ovarian abscess, and ectopic pregnancy are most frequent; in postmenopausal women, any new adnexal mass carries a higher pre-test probability of malignancy and must be triaged accordingly.

Clinical Evaluation

- **History** — menstrual history (unaffected in ovarian tumour), pain (acute onset suggests torsion/rupture/haemorrhage; chronic dull ache suggests neoplasm/endometrioma), pressure symptoms, possibility of pregnancy, family history of breast/ovarian/colorectal cancer, menopausal status.
- **Abdominal examination** — a slow-growing, cystic-to-solid swelling with well-defined margins (lower pole may not be reached); ascites may coexist.

- **Bimanual pelvic examination** — key discriminating findings:
- Mass **separate from and mobile independent of** the uterus → ovarian/tubal origin.
 - Mass **in continuity with the uterus**, moves with cervical traction → uterine (subserosal fibroid).
 - **Bilateral, tender, fixed, boggy mass** → tubo-ovarian abscess/pelvic inflammatory disease.
 - **Solid, fixed, nodular, with nodules in the pouch of Douglas** → suspect malignancy or severe endometriosis.
 - **Cystic/tense-cystic, mobile, unilateral** → benign functional or neoplastic cyst.
 - Coexisting ascites with a solid ovarian tumour and right hydrothorax = ***Meigs' syndrome*** (fibroma, thecoma, Brenner tumour, granulosa cell tumour) — resolves after tumour removal.

Investigations

Investigation	Purpose / finding
Urine/serum β -hCG	Exclude pregnancy and ectopic pregnancy first
Transvaginal sonography (TVS) — first-line	Simple vs complex; uni-/multilocular; septal thickness; solid components/papillary projections; bilaterality; ascites; colour Doppler resistive/pulsatility index
CT / MRI	Second-line when TVS equivocal; differentiates bowel loop, dermoid, fibroid; used for staging if malignancy suspected
Tumour markers	CA-125 — epithelial ovarian tumour (>35 U/mL suggestive, but non-specific — also raised in endometriosis, fibroids, PID); AFP, LDH, β -hCG — germ cell tumours (dysgerminoma, yolk sac/endodermal sinus tumour); Inhibin — granulosa cell tumour; CA19-9/CEA — mucinous tumour or gastrointestinal origin; HE4 combined with CA-125 (Risk of Ovarian Malignancy Algorithm, ROMA) is an emerging adjunct
Diagnostic laparoscopy	In selected cases with benign-appearing features, both diagnostic and potentially therapeutic

Risk of Malignancy Index (RMI-I) (Jacobs et al.; adopted by the NICE guideline on ovarian cancer, CG122, 2011):

Component	Scoring
Ultrasound score (U)	1 point each for: multilocular cyst, solid areas, bilateral lesions, ascites, metastases → U = 0 (score 0), U = 1 (score 1), U = 3 (score 2–5)

Component	Scoring
Menopausal status (M)	Premenopausal = 1; postmenopausal = 3
Serum CA-125	Absolute value in U/mL
$RMI = U \times M \times CA-125$	Low risk <25 · Moderate risk 25–250 · High risk >250

IOTA (International Ovarian Tumour Analysis) simple rules — an ultrasound-based alternative to RMI:

Feature	B-rules (favour benign)	M-rules (favour malignant)
Consistency	Unilocular	Irregular solid tumour
Largest solid component	<7 mm	≥7 mm
Ascites	Absent	Present
Acoustic shadowing	Present	Absent
Papillary structures	<4	≥4
Surface	Smooth	Irregular
Diameter	<100 mm	≥100 mm
Blood flow (Doppler)	Absent	Very strong

Management

Management is guided by the **risk of malignancy** (RMI/IOTA), **age/menopausal status**, **size**, and **symptoms**:

- **Expectant (conservative) management** — for a mass that is asymptomatic, unilateral, unilocular, <8 cm, without solid areas or papillary projections, with normal CA-125 and no ascites: repeat TVS and CA-125 at 3–6 months; up to 50% of such (usually functional) cysts resolve spontaneously.
- **Laparoscopic surgery** — appropriate for **moderate-risk** masses (RMI 25–250) or IOTA-benign features: **cystectomy** in young women (fertility preservation) or **oophorectomy** in postmenopausal women; patients must be counselled pre-operatively that conversion to a full staging laparotomy may be required if intra-operative findings suggest malignancy.
- **Laparotomy with staging** — indicated for **high-risk** masses (RMI >250), IOTA M-rule-positive masses, or a positive laparoscopic/frozen-section finding, ideally at a specialist gynaecological-oncology centre: midline incision → peritoneal washings for cytology → systematic staging and biopsies → total abdominal hysterectomy + bilateral salpingo-oophorectomy + infracolic omentectomy (± selective pelvic/para-aortic lymphadenectomy) (RCOG).

- ▶ **Emergency surgery** — for acute complications of an adnexal mass: **torsion** (detorsion with cystectomy/oophoropexy if viable, salpingo-oophorectomy if gangrenous), **rupture** with haemoperitoneum, **haemorrhage** into the cyst, or a **tubo-ovarian abscess** failing intravenous antibiotics.
- ▶ **Aspiration** of a cyst for cytology is discouraged, especially in postmenopausal women, because of the risk of intraperitoneal spread of malignant cells.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 9.12 — Identification of an adnexal mass in bimanual examination (DC Dutta's Gynaecology 7e, p.107)

High-yield exam pointers

- ▶ $RMI = U \times M \times CA-125$; risk bands <25 **low** / 25–250 **moderate** / >250 **high** (Jacobs RMI-I; NICE CG122, 2011).
- ▶ **IOTA simple rules**: benign (B) features vs malignant (M) features on ultrasound — solid component ≥ 7 mm, ascites, ≥ 4 papillae, irregular surface, diameter ≥ 100 mm, strong Doppler flow all favour malignancy.
- ▶ **Tumour marker pairing to memorise**: CA-125 $\rightarrow$ epithelial; AFP + LDH + β -hCG $\rightarrow$ germ cell; Inhibin $\rightarrow$ granulosa cell; CA19-9 $\rightarrow$ mucinous.
- ▶ **Conservative criteria**: asymptomatic + unilateral + unilocular + <8 cm + normal CA-125 + no ascites $\rightarrow$ recheck TVS/CA-125 at 3–6 months.
- ▶ ***Meigs' syndrome*** = benign solid ovarian tumour (fibroma) + ascites + right hydrothorax, resolving after tumour removal.
- ▶ **Staging laparotomy sequence**: washings $\rightarrow$ staging/biopsies $\rightarrow$ TAH + BSO + infracolic omentectomy $\pm$ lymphadenectomy.
- ▶ Always exclude a **full bladder** and **pregnancy** before labelling a pelvic swelling as an adnexal mass.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Gynaecology cites the Royal College of Obstetricians and Gynaecologists (RCOG) for the staging-laparotomy protocol described above; current RCOG practice for triaging suspected ovarian/adnexal masses is set out in separate Green-top Guidelines for premenopausal and postmenopausal women, used alongside the NICE CG122 (2011) RMI pathway cited in the corpus — the principles (RMI-based triage, referral to a gynaecological-oncology centre for high-risk masses) are unchanged.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Jeffcoate's Principles of Gynaecology 9e; National Institute for Health and Care Excellence (NICE) clinical guideline 122 (2011) on ovarian cancer recognition and initial management; Royal College of Obstetricians and Gynaecologists (RCOG) guidance on management of suspected ovarian/adnexal masses.



Antiandrogens

Asked in: Paper III 17-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Antiandrogens are agents that block the peripheral action of androgens at the receptor and/or reduce androgen synthesis. In gynaecological practice they are used to control clinical hyperandrogenism — **hirsutism**, **acne** and **androgenic alopecia** — most often in polycystic ovary syndrome (PCOS) or idiopathic hirsutism.

Classification and mechanism of action

Class	Drug	Mechanism
Steroidal, androgen-receptor blocker + antimineralocorticoid	Spironolactone	Competitive androgen-receptor antagonist; inhibits ovarian and adrenal androgen biosynthesis; weak inhibition of 5 α -reductase; aldosterone antagonist
Antiandrogenic progestogen (17-hydroxyprogesterone derivative)	Cyproterone acetate (CPA)	Competitive inhibition of testosterone and dihydrotestosterone (DHT) at the androgen receptor; suppresses gonadotropin (LH) secretion; induces hepatic enzymes $\rightarrow$ $\uparrow$ metabolic clearance of plasma androgens; also a potent progestogen (agonist at progesterone receptor)
Non-steroidal androgen-receptor blocker	Flutamide	Pure non-steroidal antiandrogen; blocks nuclear binding of androgens in target tissue; weak inhibitor of testosterone biosynthesis

Class	Drug	Mechanism
5 α -reductase inhibitor	Finasteride	Inhibits type 2 5 α -reductase $\rightarrow$ $\downarrow$ conversion of testosterone to DHT in the pilosebaceous unit; does not block the androgen receptor itself
Steroidogenic-enzyme inhibitor (adjunct)	Ketoconazole	Inhibits enzymes of androgen synthesis

Combined oral contraceptive pills (COCs) and dexamethasone are hormonal-suppression agents used alongside antiandrogens (COC for ovarian-source, dexamethasone for adrenal-source excess) but are not themselves antiandrogens.

Dose, duration and clinical use

Drug	Dose	Duration	Remarks
Spironolactone	50–100 mg twice daily (range 25–150 mg/day)	Minimum 6 months; maximal benefit by 6–12 months	First-line antiandrogen, particularly for idiopathic (peripheral-source) hirsutism; often combined with a COC
Cyproterone acetate	Low-dose regimen: CPA 2 mg + ethinyl estradiol 35 μ g daily, day 5 for 21 days (as in a combined pill). Severe hirsutism/acne: reverse-sequential regimen — CPA 100 mg/day on cycle days 5–15 plus ethinyl estradiol 30–50 μ g/day on days 5–26	$\geq$ 6 months	Not FDA-approved in the USA (hepatic-tumour signal in animal studies); used in other countries including India
Flutamide	250 mg once to three times daily (lower doses of 62.5–125 mg/day also used to reduce hepatotoxicity risk)	$\geq$ 3–6 months	Current guidance (Endocrine Society) does not recommend it as first-line — use the lowest effective dose with liver-function monitoring
Finasteride	5 mg/day	$\geq$ 6 months	Does not affect ovulation or the menstrual cycle
Ketoconazole (adjunct)	200 mg/day	—	Reduces circulating androgen level

Indications

- ▶ **Hirsutism** — idiopathic (peripheral androgen excess, normal testosterone/dehydroepiandrosterone sulfate [DHEA-S], raised 3 α -androstenediol glucuronide) and PCOS-related hirsutism unresponsive to a COC alone.
- ▶ **Acne vulgaris** driven by hyperandrogenism (commonly with PCOS).
- ▶ **Androgenic (male-pattern) alopecia** in women.
- ▶ Adjunct in the medical management of PCOS symptom control, alongside weight reduction, a COC and/or metformin.
- ▶ Non-gynaecological uses (for completeness): finasteride in benign prostatic hyperplasia and male-pattern baldness; flutamide in advanced prostate cancer.

Contraindications and side effects

Drug	Contraindications/precautions	Important side effects
Spironolactone	Renal insufficiency, hyperkalaemia, pregnancy	Menstrual irregularity/metrorrhagia (>50% at 200 mg/day), mastalgia, fatigue, hyperkalaemia; feminises a male fetus if conception occurs
Cyproterone acetate	Age >35 years, heavy smoker, adrenal insufficiency, concurrent corticosteroid therapy, pregnancy, liver disease	Weight gain, loss of libido, mastalgia, fatigue, nausea, headache
Flutamide	Pregnancy/desire for pregnancy, hepatic impairment	Dose-related hepatotoxicity (rare fulminant liver failure), dry skin, blue-green urine discolouration, nausea
Finasteride	Pregnancy (teratogenic — feminises a male fetus)	Generally well tolerated

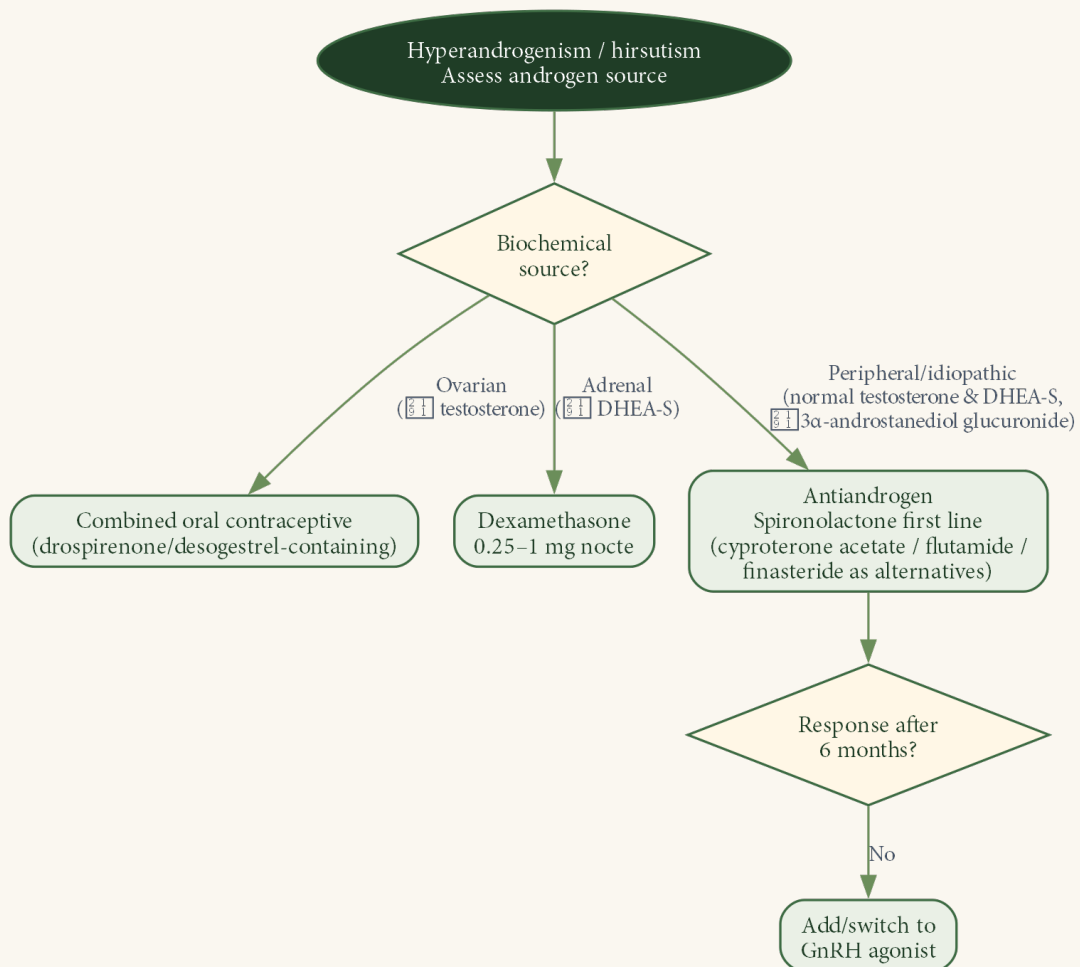
All antiandrogens are **teratogenic** — they can feminise the external genitalia of a male fetus if the patient conceives while on treatment. Effective contraception is therefore mandatory throughout therapy, and antiandrogens are conventionally combined with a COC.

Monitoring and practical points

- ▶ Spironolactone >100 mg/day — check baseline and periodic serum potassium and creatinine.
- ▶ Flutamide and cyproterone acetate — baseline and periodic liver function tests.
- ▶ Ensure effective contraception (usually a combined pill) for the entire treatment course.
- ▶ Clinical response is slow — related to the hair growth cycle; continue a minimum of 6 months before judging efficacy.

- ▶ Antiandrogens arrest growth of **new** hair follicles but do **not** remove hair already present; combine with mechanical hair removal (electrolysis, laser) after 9–12 months of drug therapy.
- ▶ Drug choice follows the source of excess androgen: ovarian (raised testosterone) → COC ± antiandrogen; adrenal (raised DHEA-S) → dexamethasone; peripheral/idiopathic (normal testosterone and DHEA-S) → antiandrogen, spironolactone being first choice.
- ▶ A gonadotropin-releasing hormone (GnRH) agonist is reserved for cases failing other antiandrogens, by selectively suppressing ovarian steroidogenesis.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Drug selection in hyperandrogenism by biochemical source, with escalation to a GnRH agonist for peripheral/idiopathic disease failing 6 months of antiandrogen therapy.

High-yield exam pointers

- ▶ Four antiandrogens to name: **spironolactone, cyproterone acetate, flutamide, finasteride** (+ ketoconazole as an enzyme-inhibitor adjunct).
- ▶ Spironolactone dose to write: **50–100 mg twice daily**; monitor **K⁺/creatinine** above 100 mg/day.

- ▶ Cyproterone acetate is combined with **ethinyl estradiol** (2 mg CPA + 35 µg EE) — reverse-sequential higher-dose regimen for severe cases.
- ▶ Finasteride **5 mg/day** — inhibits **5α-reductase**; no effect on ovulation/cycle.
- ▶ Golden rule: **all antiandrogens are teratogenic** → mandatory contraception, usually a combined pill.
- ▶ Minimum treatment duration before assessing response: **6 months** (hair growth cycle).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Flutamide dosing varies across sources (100 mg to 250 mg two-to-three-times-daily regimens have all been described); current teaching favours the lowest effective dose because of dose-related hepatotoxicity, and it is not recommended as first-line therapy.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e (2008 Endocrine Society clinical practice guideline referenced therein for hirsutism management).



Aromatase inhibitors

Asked in: Paper I 19-Nov-2020 · Paper III Apr 2008 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Aromatase inhibitors (AIs) are drugs that block the cytochrome P450 enzyme **aromatase** (gene *CYP19A1*, also called P450arom), which catalyses the final, rate-limiting step of oestrogen biosynthesis — conversion of androgens (androstenedione, testosterone) to oestrogens (oestrone, oestradiol) in ovarian granulosa cells, adipose tissue, breast, and other peripheral sites. By producing a profound fall in circulating and tissue oestrogen, they are used in benign gynaecology (anovulatory infertility, endometriosis) and in hormone-receptor-positive breast cancer.

Classification

Generation	Type	Drug(s)	Feature
1st	Non-selective, steroidal	Aminoglutethimide	Also blocks adrenal steroidogenesis (cholesterol → pregnenolone); needs glucocorticoid cover; obsolete
2nd	Non-steroidal, more selective	Fadrozole	Investigational; not in routine use

Generation	Type	Drug(s)	Feature
3rd — Type II (reversible, competitive, non-steroidal)	Bind reversibly at the enzyme's active site	Anastrozole, Letrozole	Highly selective; do not affect adrenal/thyroid steroidogenesis
3rd — Type I (irreversible "suicide inactivator", steroidal)	Androgen-substrate analogue that permanently inactivates the enzyme	Exemestane	Effect outlasts drug clearance (enzyme must be re-synthesised)

Mechanism of action

AIs inhibit peripheral and ovarian aromatase, so androgen substrate is no longer converted to oestrogen — circulating and local tissue oestradiol/oestrone fall sharply. Two downstream effects are exploited clinically:

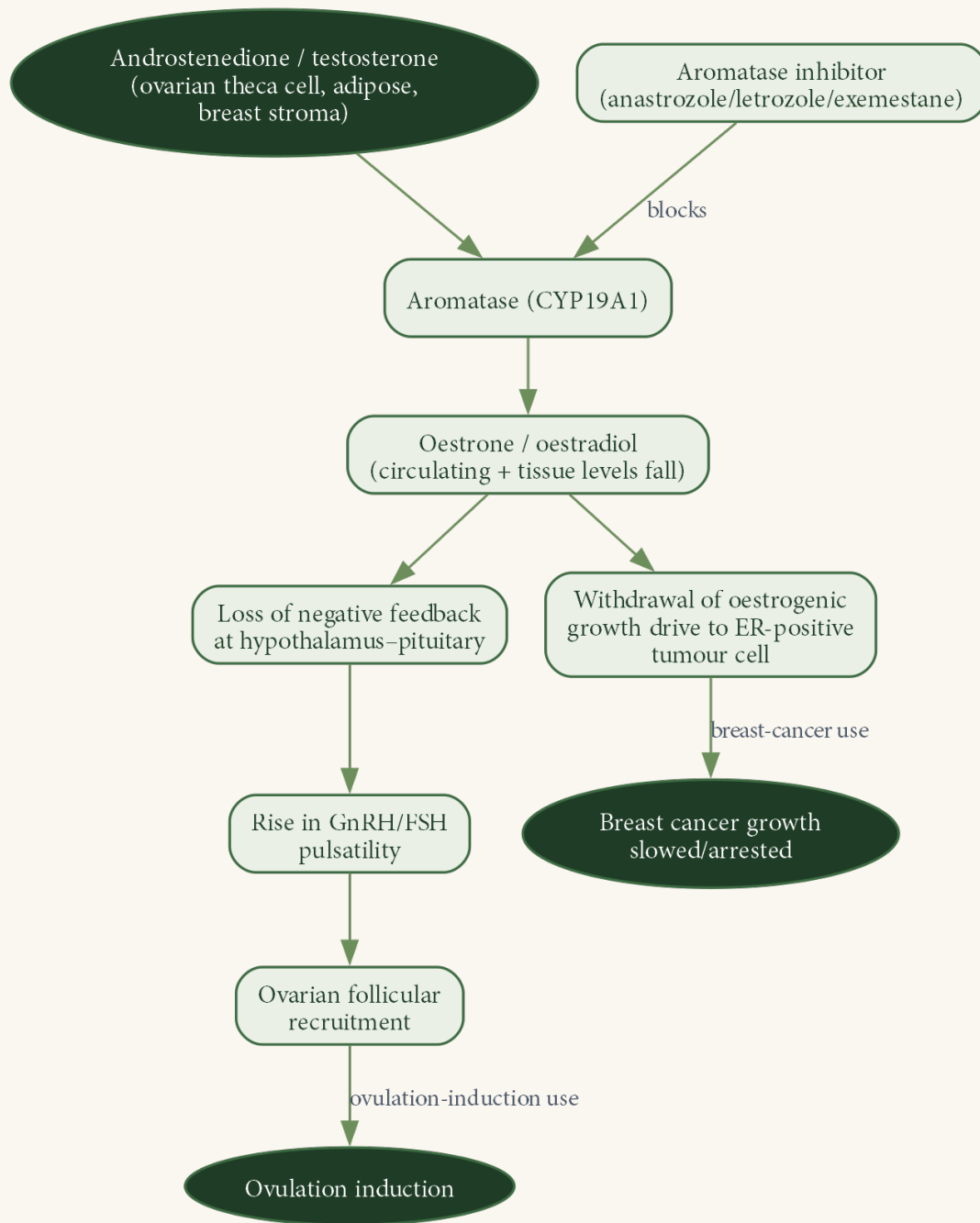
- ▶ **Ovulation induction:** loss of oestrogenic negative feedback at the hypothalamus–pituitary raises endogenous FSH secretion, recruiting ovarian follicles — analogous to clomiphene's effect but through a different mechanism.
- ▶ **Breast cancer:** withdrawal of oestrogen drive to oestrogen-receptor-positive tumour cells slows/arrests tumour growth. AIs are effective **only** when ovarian oestrogen synthesis has stopped (postmenopausal) or has been chemically/surgically suppressed — an intact, cycling ovary otherwise compensates with a reflex gonadotropin rise and restores oestrogen output.

Feature	Clomiphene citrate (SERM)	Letrozole (aromatase inhibitor)
Site of action	Competitively occupies hypothalamic oestrogen receptors	Blocks aromatase enzyme; receptors untouched
Half-life	Long (weeks)	Short (~48 h)
Endometrium/cervical mucus	Antiestrogenic — thins endometrium, hostile mucus	No peripheral antiestrogenic effect — endometrium preserved
Multiple pregnancy	~8%, mostly twins	Low (monofollicular development favoured)
Regulatory status for ovulation induction	Approved	Off-label in most jurisdictions

Indications and dosing

Indication	Drug & regimen	Key evidence/point
Anovulatory infertility (PCOS, off-label first line)	Letrozole 2.5 mg/day for 5 days , started cycle day 3–5 (i.e., day 3–7 of cycle); if no ovulation, increase by 2.5 mg increments each subsequent cycle to a maximum of 7.5 mg/day × 5 days	<i>PPCOS II</i> RCT (Legro et al.): cumulative live-birth 27.5% (letrozole) vs 19.1% (clomiphene), RR 1.44 (95% CI 1.10–1.87); ovulation 88.5% vs 76.6%. Benefit greatest in obese (BMI >30) PCOS women
Endometriosis — refractory pelvic pain (adjunct)	Anastrozole 1 mg/day or letrozole 2.5 mg/day , always combined with a combined oral contraceptive, progestin, or GnRH agonist	AI monotherapy in a premenopausal woman stimulates ovulation and functional ovarian cysts (loss of feedback) — must co-administer an ovarian-suppressive agent; systematic-review data show reduced pain scores and lesion size only with combination therapy
Breast cancer — adjuvant, hormone-receptor-positive, postmenopausal	Anastrozole 1 mg OD / Letrozole 2.5 mg OD / Exemestane 25 mg OD, for 5–10 years	Superior disease-free survival vs tamoxifen (ATAC, BIG 1-98 trials); premenopausal women require concurrent ovarian suppression (GnRH agonist) or oophorectomy before an AI is used
Breast cancer — metastatic, HR-positive, postmenopausal	AI + CDK4/6 inhibitor (palbociclib/ribociclib)	Current first-line regimen; improves progression-free survival
Uterine leiomyoma	Investigational adjunct	Reduces fibroid volume in small studies; not a standard indication

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Aromatase-inhibitor mechanism: blockade of androgen-to-oestrogen conversion branches into ovulation-induction and breast-cancer therapeutic pathways.

Adverse effects and contraindications

- **Musculoskeletal symptoms/arthritis** and **accelerated bone loss/osteoporosis** — more frequent than with tamoxifen; baseline and periodic bone density (DEXA), calcium/vitamin D supplementation, ± bisphosphonate.

- ▶ **Vasomotor symptoms** (hot flushes), vaginal dryness/genitourinary syndrome of menopause — but fewer thromboembolic events and less endometrial stimulation than tamoxifen.
- ▶ Hyperlipidaemia.
- ▶ **Ineffective (and not to be used) as monotherapy in a premenopausal woman with an intact, cycling ovary** — the ovary compensates with a reflex gonadotropin/oestrogen rise unless combined with ovarian suppression.
- ▶ **Off-label** for ovulation induction in most regulatory systems; counsel and document informed consent — comparative data (letrozole vs clomiphene) show no increase in fetal congenital anomalies, but authentication by larger prospective trials is still awaited.
- ▶ Avoid in pregnancy.

High-yield exam pointers

- ▶ Enzyme blocked = **aromatase (CYP19A1/P450arom)**: androgen → oestrogen, last step of steroidogenesis.
- ▶ Steroidal/irreversible = **exemestane**; non-steroidal/reversible = **anastrozole, letrozole**.
- ▶ **PPCOS II**: letrozole 2.5 mg cycle day 3–7 beats clomiphene for live birth in PCOS (27.5% vs 19.1%).
- ▶ Letrozole half-life ~48 h vs clomiphene's weeks; no endometrial thinning.
- ▶ Endometriosis: AI **must** be combined with an OC/progestin/GnRH agonist to prevent ovulation/cyst formation.
- ▶ Postmenopausal AI = preferred over tamoxifen for HR-positive breast cancer; premenopausal AI needs ovarian suppression first.
- ▶ Chief toxicity to remember: **bone loss/arthritis** (vs tamoxifen's endometrial cancer/thromboembolism risk).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Aromatase-inhibitor use for ovulation induction remains an off-label indication in most countries despite strong trial evidence and its adoption as a practical first-line option for PCOS-associated infertility.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e.



Bacterial vaginosis

Asked in: Paper III 30-May-2025 · Paper III Sep 2007 · Paper III May 2007 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — Bacterial vaginosis (BV) is a polymicrobial clinical syndrome resulting from a shift in normal vaginal flora — loss of hydrogen-peroxide-producing *Lactobacillus* species with a 100- to 1000-fold overgrowth of anaerobic and facultative organisms, chiefly *Gardnerella vaginalis*, *Mycoplasma hominis*, *Bacteroides* species, *Prevotella*, and *Mobiluncus*. The term "vaginosis" (not vaginitis) is used deliberately, as there is little or no vaginal inflammation. It is the most common cause of abnormal vaginal discharge in women of reproductive age.

Aetiology and pathogenesis

Factor	Role
Loss of H ₂ O ₂ -producing lactobacilli	Removes the principal inhibitory mechanism against anaerobic overgrowth; once lost, normal flora is difficult to re-establish, and recurrence is common
<i>Gardnerella vaginalis</i> + anaerobes (<i>Bacteroides</i> , <i>Prevotella</i> , <i>Mobiluncus</i> , <i>M. hominis</i>)	Polymicrobial synergistic overgrowth forming an adherent biofilm on the vaginal epithelium
Repeated vaginal alkalisation	Frequent coitus (alkaline semen) or vaginal douching is postulated to disturb the normal acidic milieu
Risk factors	Multiple/new sexual partners, no condom use, douching, smoking, copper intrauterine device use

BV is associated with sexual activity but is not classified as a sexually transmitted infection — it also occurs in women who have never had intercourse, and treating the male partner does not reduce recurrence.

Clinical features

- Thin, homogeneous, grey-white vaginal discharge, adherent to the vaginal walls.
- Characteristic **fishy (amine) odour**, typically more noticeable after coitus (alkaline semen) and during menses.
- **No** significant vulval/vaginal pruritus, burning, dyspareunia, or erythema — the absence of inflammatory symptoms distinguishes BV from candidiasis or trichomoniasis.
- Asymptomatic in a large proportion of affected women, who are detected only on screening or incidental examination.

Diagnosis

Feature	Trichomoniasis	Candidiasis	Bacterial vaginosis	Normal discharge
Discharge	Greenish-yellow, frothy	Curdy white	Grey-white, thin, homogeneous	White, clear
pH	≥ 4.5	< 4.5	> 4.5 (usually 4.7–5.7)	< 4.5
Whiff test (KOH)	Negative	Negative	Positive (fishy amine odour)	Negative
Microscopy	Motile trichomonads, ↑ leucocytes	Budding yeast/pseudohyphae	Clue cells (> 20% of epithelial cells), leucocytes conspicuously absent	—
Pruritus	+++	++	Absent/minimal	Absent

Amsel's diagnostic criteria — clinical diagnosis requires 3 of the following 4:

- ▶ Homogeneous, thin, grey-white discharge coating the vaginal walls.
- ▶ Vaginal pH > 4.5.
- ▶ Positive **whiff test** — fishy, amine-like odour on adding 10% KOH to the discharge.
- ▶ **Clue cells** on saline wet-mount microscopy — vaginal epithelial cells so heavily studded with coccobacilli that the cell border is obscured/stippled (> 20% of epithelial cells).

Gram-stained smear scoring (**Nugent score**, 0–10, based on relative morphotypes of lactobacilli, *Gardnerella/Bacteroides*, and *Mobiluncus*) is the laboratory/research gold standard: 0–3 normal, 4–6 intermediate, ≥ 7 diagnostic of BV. Culture of *G. vaginalis* is not used diagnostically as it lacks specificity (found in many normal women).

Complications

- ▶ Pelvic inflammatory disease, including post-abortion PID.
- ▶ Post-operative vaginal cuff cellulitis after hysterectomy — perioperative metronidazole reduces this risk in BV-positive women.
- ▶ Abnormal cervical cytology.
- ▶ In pregnancy: preterm premature rupture of membranes, preterm labour and birth, chorioamnionitis, post-caesarean/postpartum endometritis, and second-trimester pregnancy loss.
- ▶ Increased susceptibility to HIV and other sexually transmitted infections.

Management

Regimen	Dose
Metronidazole (oral) — first-line	500 mg orally twice daily × 7 days
Metronidazole vaginal gel 0.75%	One applicator (5 g) intravaginally once daily × 5 days
Clindamycin vaginal cream 2%	One applicator (5 g) intravaginally at bedtime × 7 days
Clindamycin ovules 100 mg	Intravaginally once at bedtime × 3 days
Clindamycin (oral) — alternative	300 mg orally twice daily × 7 days
Tinidazole (oral) — alternative	2 g once daily × 2 days, or 1 g once daily × 5 days

- ▶ Cure rates with the standard regimens are 75–85%; recurrence within 3–12 months is common (up to 50%).
- ▶ **Recurrent BV** (≥ 3 episodes/year): repeat an approved regimen, then suppressive metronidazole gel twice weekly for 4–6 months; vaginal boric acid may be added as an adjunct in refractory cases.
- ▶ **Partner treatment is not recommended** — it does not improve cure rates or reduce recurrence.
- ▶ **In pregnancy**: routine screening of asymptomatic, low-risk pregnant women is **not recommended**, as treatment has not been shown to reduce preterm birth in this group; symptomatic BV, or BV in women at high risk of preterm birth, is treated with the same oral metronidazole regimen, which is considered safe throughout pregnancy.
- ▶ Avoid alcohol during oral metronidazole therapy and for 24 hours after, to prevent a disulfiram-like reaction.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 12.1 — Clue cells (DC Dutta's Gynaecology 7e, p.145)

High-yield exam pointers

- ▶ BV = **vaginosis, not vaginitis** — minimal inflammation, no significant pruritus.
- ▶ **Amsel's criteria** — 3 of 4: thin grey-white discharge, pH > 4.5, positive whiff test, clue cells > 20%.
- ▶ **Nugent score**: 0–3 normal, 4–6 intermediate, ≥ 7 = BV (Gram-stain gold standard).
- ▶ First-line drug: **metronidazole 500 mg PO BID × 7 days** (or intravaginal gel 0.75% OD × 5 days).
- ▶ **Partner treatment not indicated**; recurrence is common because lactobacilli are hard to re-establish.
- ▶ Obstetric triad to recall: **preterm labour, PROM, chorioamnionitis**.

- Perioperative metronidazole in BV-positive women undergoing hysterectomy/abortion reduces post-operative pelvic infection.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e prints an older CDC 2010-era oral regimen (metronidazole 200 mg thrice daily); the current CDC/ACOG-endorsed standard reproduced above is metronidazole 500 mg twice daily for 7 days.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 12 — Sexually Transmitted Infections; Ch. 13 — Infections of the Individual Pelvic Organ); Berek & Novak's Gynecology 16e (Vaginal Infections — Bacterial Vaginosis); CDC Sexually Transmitted Infections Treatment Guidelines (current edition, aligned with the regimens in Berek & Novak 16e); ACOG guidance on BV screening in pregnancy.



Best practices for safe abortion

Asked in: Paper IV 25-Nov-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Safe abortion is termination of pregnancy carried out by a trained provider, using a method appropriate to the gestational age, in an adequately equipped facility, within the law. The World Health Organization (WHO) frames safety around three pillars: (1) a method matched to gestational age, (2) a provider with the requisite skill, and (3) a facility with the equipment and referral back-up needed if complications occur. In India, safe abortion is governed by the Medical Termination of Pregnancy (MTP) Act, 1971, as amended in 2021.

Legal framework — MTP Act, 1971 (amended 2021) and Rules, 2021

Gestational age	Opinion required	Who is eligible
Up to 20 weeks	1 registered medical practitioner (RMP)	Any woman

Gestational age	Opinion required	Who is eligible
20–24 weeks	2 RMPs	Only specified categories (Rule 3B): survivors of sexual assault/rape/incest; minors; change of marital status during pregnancy (widowhood, divorce); women with physical disability; mentally ill women; fetal malformation with substantial risk of being incompatible with life or of serious handicap if born; women in humanitarian/disaster/emergency settings notified by government
Beyond 24 weeks	State-level Medical Board (gynaecologist + radiologist/sonologist + paediatrician + others notified)	Only substantial fetal abnormality — no upper gestational limit for this indication

Additional statutory points:

- ▶ Only the pregnant woman's written consent is required — the husband's/partner's consent is **not** mandatory.
- ▶ For a minor (< 18 years) or a mentally ill woman, consent of a guardian is additionally required.
- ▶ The provider must keep the woman's identity confidential and disclose it only to a person authorised by law (Section 5A).
- ▶ "Failure of contraceptive" as a ground for termination now applies to **any woman or her partner** — extending eligibility to unmarried women on the same footing as married women.
- ▶ Termination must be performed only by an RMP trained per the Act (assisted in ≥ 25 MTPs at an approved centre, or completed 6 months' house-job in obstetrics & gynaecology, or holds a postgraduate degree/diploma in the specialty), at a government or government-approved facility, and reported confidentially to the state Director of Health Services.

Pre-abortion assessment and counselling

- ▶ Confirm pregnancy and gestational age by last menstrual period; use ultrasonography (USG) if the dates and uterine size disagree or gestation exceeds 9 weeks.
- ▶ Exclude ectopic pregnancy in any woman with pain, bleeding, or a uterus smaller than dates.
- ▶ Determine blood group and Rh status; check haemoglobin.
- ▶ Counsel on all options (continuation, adoption, termination) and, once termination is chosen, on the medical and surgical methods suited to her gestational age, with expected success, side effects, and need for follow-up.

- ▶ Obtain voluntary, informed, written consent — free of mandatory waiting periods or third-party authorisation beyond the statutory requirement.
- ▶ Screen for reproductive tract/sexually transmitted infection where indicated, but do not make this a prerequisite for the procedure.

Methods of termination, by gestational age

Gestation	Medical method (dose)	Surgical method
First trimester (up to 12 weeks)	Mifepristone 200 mg orally (day 1) followed by misoprostol 400 µg orally or 800 µg vaginally 24–48 hours later (combipack; Drugs Controller General of India–approved up to 63 days/9 weeks); success 95–100%	Manual/electric vacuum aspiration (MVA/EVA) up to 12 weeks — negative pressure 600–660 mm Hg, 5–15 minutes, 98–100% success, minimal cervical dilatation; suction evacuation and curettage; dilatation and evacuation (D&E) for incomplete/missed abortion
Second trimester (13–20/24 weeks)	Mifepristone 200 mg orally, then misoprostol 800 µg vaginally after 36–48 hours, followed by 400 µg orally every 3 hours (up to 4 doses) — success ~97%; alternative: misoprostol alone 400 µg vaginally/sublingually every 3 hours (up to 5 doses)	D&E with cervical priming (osmotic dilators or misoprostol) for 13–14 weeks; extra-/intra-amniotic instillation methods and hysterotomy are now rarely used

Contraindications to mifepristone include age > 35 years with heavy smoking and long-term corticosteroid use. Complications are lowest (about 5%) when termination is done before 8 weeks by MVA or suction evacuation, and roughly five-fold higher with mid-trimester methods.

Post-abortion care

- ▶ **Anti-D immunoglobulin** to every Rh-negative, unsensitised woman within 72 hours — 50 µg (250 IU) is adequate for surgical evacuation before 12 weeks; 100–300 µg (500–1500 IU) is used for termination at or beyond 12 weeks.
- ▶ **Contraception counselling and same-visit provision**, including immediate post-abortion intrauterine contraceptive device (IUCD) or implant, to prevent repeat unwanted pregnancy.
- ▶ **Follow-up visit at 1–2 weeks** to confirm complete abortion clinically, by urine human chorionic gonadotropin (hCG), or by USG.
- ▶ Watch for and treat the **post-abortal triad** (pain, bleeding, low-grade fever) suggesting retained products — antibiotics and repeat evacuation as needed; monitor for haemorrhage, sepsis, and uterine perforation.
- ▶ Link the woman to comprehensive reproductive health services — anaemia correction, cervical cancer screening, and involvement of the male partner in counselling.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 16.4 — A. Manual vacuum aspiration syringe. The arrow indicates the "pinch valves" on the syringe (Te Linde 13e, p.835)

Recent advances [RA]

- ▶ **MTP (Amendment) Act, 2021 and MTP Rules, 2021** raised the upper limit for specified categories of women from 20 to 24 weeks (two-RMP opinion), created a state-level Medical Board for termination beyond 24 weeks for substantial fetal abnormality, and extended the contraceptive-failure ground to unmarried women.
- ▶ **Supreme Court of India, X v. Principal Secretary, Health & Family Welfare Department, NCT of Delhi (2022):** held that unmarried and married women have equal rights to abortion up to 24 weeks under Rule 3B, and that "rape" under the MTP Act includes marital rape for the purpose of seeking termination.
- ▶ **WHO Abortion Care Guideline (2022):** recommends *against* mandatory waiting periods, mandatory second/third-party authorisation, and routine pre-procedure ultrasound; recommends task-sharing (nurses, midwives, and trained pharmacy workers providing medical abortion) and **self-management** of medical abortion — self-assessment of eligibility and gestational age, self-administration of mifepristone–misoprostol, and self-assessment of completeness — with access to accurate information and a health worker if needed.
- ▶ **Telemedicine-assisted medical abortion**, scaled up after the COVID-19 pandemic, has been shown safe and effective up to 9–10 weeks of gestation and improves access in underserved areas.
- ▶ **FOGSI Good Clinical Practice Recommendations on MTP** endorse the combipack, MVA training at the primary health centre level, and post-abortion contraception–family planning (PAC-FP) linkage as quality markers of comprehensive abortion care (CAC).

High-yield exam pointers

- ▶ WHO's three pillars of safe abortion: **correct method for gestational age + skilled provider + equipped facility.**
- ▶ MTP Act timeline: **1971 Act → 2021 Amendment:** ≤ 20 weeks (1 RMP) / 20–24 weeks (2 RMPs, Rule 3B categories only) / > 24 weeks (Medical Board, fetal anomaly only, no upper limit).
- ▶ Combipack dose: **mifepristone 200 mg + misoprostol 800 µg**, DCGI-approved up to **63 days (9 weeks).**
- ▶ MVA: up to **12 weeks**, negative pressure **600–660 mm Hg**, **98–100%** success.
- ▶ **Husband's consent is NOT required;** only the woman's written consent.
- ▶ **Anti-D within 72 hours** to every Rh-negative unsensitised woman.
- ▶ **Post-abortal triad** = pain + bleeding + fever → think retained products of conception.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Obstetrics 9e predates the MTP (Amendment) Act 2021 and WHO's 2022 Abortion Care Guideline, so the current legal gestational limits and WHO self-management recommendations above are drawn from the amended Act/Rules, the cited Supreme Court judgment, and the current WHO guideline rather than the textbook.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Induction of Abortion/MTP chapter; Operative Obstetrics chapter — D&E, suction evacuation, menstrual regulation, vacuum aspiration); Te Linde's Operative Gynecology 13e (Fig 16.4, manual vacuum aspiration); Medical Termination of Pregnancy (Amendment) Act, 2021 and MTP Rules, 2021; Supreme Court of India, *X v. NCT of Delhi* (2022); WHO Abortion Care Guideline (2022); FOGSI Good Clinical Practice Recommendations on Medical Termination of Pregnancy.



Causes and management of metrorrhagia

Asked in: Paper III 19-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Metrorrhagia is irregular, acyclic uterine bleeding occurring at unpredictable intervals with variable amount, unrelated to the normal cyclical menstrual pattern; strictly it denotes uterine bleeding, but clinically the term is extended to irregular bleeding from any part of the genital tract, including postcoital (contact) bleeding and intermenstrual bleeding in an otherwise normal cycle. When the bleeding is so irregular and excessive that discrete periods can no longer be identified, it is called **menometrorrhagia**. Most metrorrhagia is related to a surface lesion of the cervix or uterine cavity, so a genital-tract lesion must always be actively looked for.

Causes

Category	Causes
Cervical (contact bleeding)	Carcinoma cervix; cervical mucous/fibroid polyp; vascular ectopy of the cervix (especially in pregnancy and combined-pill users); cervicitis (chlamydial, tubercular)
Uterine body — structural (AUB-P/L/M)	Submucous fibroid or fibroid polyp (ulcerated/infected); endometrial polyp; adenomyosis; endometrial hyperplasia or carcinoma

Category	Causes
Anovulatory/functional (AUB-O, "DUB")	Unopposed-oestrogen effect of anovulatory cycles — commonest around adolescence, post-partum/post-abortion period, and the perimenopause
Ovarian	Hormone-secreting tumour (granulosa cell tumour) causing erratic oestrogenic stimulation of the endometrium
Iatrogenic (AUB-I)	IUCD in situ; breakthrough bleeding on combined pills or progestin-only methods; erratic/missed pill intake
Systemic/coagulopathy (AUB-C)	Idiopathic thrombocytopenic purpura, leukaemia, von Willebrand disease, hypo-/hyperthyroidism, chronic liver dysfunction
Physiological	Mid-cycle ovulation ("ovular") bleeding
Pregnancy-related — exclude first	Threatened/incomplete abortion, ectopic pregnancy, gestational trophoblastic disease
Other genital-tract	Urethral caruncle, vaginal lesions, foreign body

Diagnostic evaluation

- **History:** age, exact bleeding pattern (contact vs intermenstrual vs continuous), contraceptive/IUCD use, possibility of pregnancy, drug history (anticoagulants, hormones), associated pain or discharge.
- **Examination:** general survey for pallor, thyroid enlargement; per-speculum visualisation of the cervix (polyp, growth, erosion — take a **Pap smear**); bimanual examination for uterine size/mobility and adnexal masses.

Investigation	Purpose / finding
Urine/serum β -hCG	Excludes a pregnancy-related cause first
Complete haemogram, platelet count, PT/APTT	Anaemia; screens for a coagulopathy (mandatory in adolescents)
Thyroid profile (TSH)	Hypo-/hyperthyroidism as a systemic cause
Pap smear $\pm$ colposcopy-directed biopsy	Cervical intraepithelial neoplasia/carcinoma cervix
Transvaginal sonography (TVS)/saline-infusion sonography (SIS)	Endometrial thickness, polyp, submucous fibroid, adnexal mass; SIS is superior to TVS for intracavitary lesions

Investigation	Purpose / finding
Hysteroscopy + directed endometrial biopsy	Gold standard — direct visualisation, higher yield than blind dilatation and curettage (D&C misses lesions in 10–20% of women); mandatory in women ≥ 45 years or with risk factors for endometrial pathology, and doubles as therapeutic polypectomy

Management

General principles

- ▶ Correct anaemia first — haematinics, or blood transfusion if severe.
- ▶ Always exclude pregnancy and genital malignancy before starting hormonal therapy, particularly in the perimenopausal woman or one with contact bleeding.
- ▶ Definitive treatment is directed at the underlying cause, once identified.

Cause-directed treatment

Cause	Treatment
Cervical polyp	Avulsion/polypectomy with cauterisation of the base; specimen sent for histopathology
Cervical erosion/ectopy	Treat any infection; cryotherapy or cauterisation if persistently symptomatic
Carcinoma cervix	FIGO-staged and managed with surgery and/or chemoradiation as per stage
Endometrial polyp	Hysteroscopic polypectomy
Submucous fibroid	Hysteroscopic myomectomy (transcervical resection); myomectomy, uterine artery embolisation, or hysterectomy for larger/refractory lesions
Endometrial hyperplasia (no atypia)	Cyclical progestogen — medroxyprogesterone acetate or norethisterone
Atypical hyperplasia/endometrial carcinoma	Hysterectomy is the definitive treatment
IUCD-related bleeding	Antifibrinolytic (tranexamic acid) as first measure; remove the device if bleeding persists
Hormone-secreting ovarian tumour	Surgical removal (salpingo-oophorectomy)
Coagulopathy	Correct the underlying defect (haematology referral, factor/platelet support); tranexamic acid is useful adjunctively

Medical control of anovulatory/functional bleeding

- ▶ **To arrest an acute episode:** oral progestogen — norethisterone or medroxyprogesterone acetate **5 mg thrice daily**, continued until bleeding stops (usually 3–7 days); in severe acute bleeding, parenteral conjugated oestrogen **25 mg IV** is more effective for haemostasis in the early reproductive years.
- ▶ **To regulate the cycle after control:** cyclical progestogen (medroxyprogesterone acetate 10 mg or norethisterone 5 mg) given from day 5 to day 25 of the cycle for 3 cycles, or a combined oestrogen-progestogen pill.
- ▶ **Non-hormonal adjuncts:** antifibrinolytic — tranexamic acid (reduces menstrual blood loss by about 50%; particularly useful in IUCD-related bleeding); prostaglandin-synthetase inhibitor — mefenamic acid **250–500 mg 8-hourly**.
- ▶ **Refractory cases:** danazol or a GnRH analogue may be used short-term when surgery is contraindicated or deferred.

Surgical options (medical therapy failed, or family completed)

- ▶ Diagnostic D&C — also arrests an acute bleeding episode when medical treatment fails.
- ▶ Endometrial ablation/transcervical resection of endometrium (TCRE) — suitable beyond age 35 with no significant endometrial pathology (overall success 70–80%: amenorrhoea in 30–40%, reduced flow in 50%, 10% need a repeat procedure or hysterectomy).
- ▶ Hysterectomy — definitive option when conservative treatment fails/is contraindicated, or when endometrial hyperplasia with atypia is present; route (vaginal/abdominal/laparoscopic-assisted) chosen on uterine size, mobility, descent and comorbidity.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 15.1 — Metrorrhagia due to a cervical polyp (DC Dutta's Gynaecology 7e, p.173)

High-yield exam pointers

- ▶ Metrorrhagia = irregular, **acyclic** bleeding (any amount); menorrhagia = cyclic, excessive amount/duration; menometrorrhagia = both irregular and excessive, periods unidentifiable.
- ▶ Mostly due to a **surface lesion** — cervical polyp is the classic exam picture.
- ▶ Rule out **pregnancy** and **malignancy** before hormone therapy, especially with contact bleeding or age ≥ 40.
- ▶ Hysteroscopy + biopsy > blind D&C (D&C misses lesions in 10–20%).
- ▶ Arrest-bleeding doses: norethisterone/MPA **5 mg TDS**; conjugated oestrogen **25 mg IV**; mefenamic acid **250–500 mg 8-hourly**; tranexamic acid cuts blood loss ~50%.
- ▶ Endometrial biopsy is mandatory if age ≥ 45 before starting hormonal treatment.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The current FIGO/ACOG nomenclature (PALM-COEIN, 2011) replaces older descriptive terms — menorrhagia, metrorrhagia, polymenorrhoea — with "abnormal uterine bleeding" classified into structural (Polyp, Adenomyosis, Leiomyoma, Malignancy/hyperplasia) and non-structural (Coagulopathy, Ovulatory dysfunction, Endometrial, Iatrogenic, Not-yet-classified) causes; "dysfunctional uterine bleeding" is likewise being phased out in favour of AUB-O/AUB-E, though Indian exam texts (and this question) still use the classical terms.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 15, Abnormal Uterine Bleeding); Berek & Novak's Gynecology 16e (Ch. 10); FIGO PALM-COEIN classification system, Munro MG et al., *Int J Gynaecol Obstet* 2011;113(1):3–13 (endorsed by ACOG).



Cervical cytology

Asked in: Paper III May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Cervical cytology (the **Papanicolaou** or "**Pap**" smear/test) is an exfoliative-cytology screening test in which cells shed from the cervical **transformation zone (TZ)** — the junction between native squamous and columnar epithelium — are collected, fixed, stained and microscopically examined to detect premalignant and malignant change before it becomes clinically apparent. It is the cornerstone of organised cervical cancer screening and has reduced the incidence of invasive cervical cancer by about 80% and mortality by about 70% where practised consistently.

Technique of collection

- ▶ **Position/exposure** — patient in lithotomy position; cervix exposed with a **Cusco's bivalve speculum without lubricant** (lubricant distorts cell morphology) before bimanual examination.
- ▶ **Ectocervical/TZ sampling** — **Ayre's spatula** (wood or plastic) rotated through 360° at the external os to scrape the entire squamocolumnar junction (SCJ).
- ▶ **Endocervical sampling** — **cytobrush** or moist cotton-tip applicator, combined with the spatula sample, to capture endocervical/metaplastic cells (essential for TZ representation).
- ▶ **Conventional smear** — material is spread thinly and evenly on a glass slide and **immediately fixed in 95% ethyl alcohol** (before air-drying, which distorts nuclear detail); stained by **Papanicolaou's or Short's method** and read by a cytopathologist.
- ▶ **Liquid-based cytology (LBC)** — the sampling device is rinsed into a liquid preservative vial instead of smearing a slide; cells are separated by centrifugation/filtration and a thin, even

monolayer is prepared (e.g., ThinPrep). LBC reduces obscuring blood/mucus/inflammatory debris, cuts the unsatisfactory-sample rate by 70–90%, and the same vial can be used for **reflex high-risk HPV (hrHPV) testing**.

- **Patient preparation** — avoid intercourse, douching, vaginal medication/lubricants for 24–48 hours before the test; avoid sampling during heavy menstruation.

Reporting — the Bethesda System

Papanicolaou's original 5-class grading and the WHO dysplasia/CIN grading have been superseded by the **Bethesda System** (Bethesda, Maryland; introduced 1988, revised 2001, last updated 2014), which reports specimen adequacy and a descriptive diagnosis rather than a numeric class.

Bethesda component	Categories
Specimen type	Conventional Pap smear · Liquid-based cytology
Specimen adequacy	Satisfactory for evaluation · Unsatisfactory for evaluation
General categorisation	Negative for intraepithelial lesion or malignancy (NILM) · Epithelial cell abnormality · Other
NILM — organisms/other findings	<i>Trichomonas vaginalis</i> , <i>Candida</i> spp., shift in flora (bacterial vaginosis), <i>Actinomyces</i> , herpes simplex/CMV changes; reactive changes (inflammation, radiation, IUCD); atrophy; benign glandular cells post-hysterectomy
Squamous cell abnormality	Atypical squamous cells (ASC) — of undetermined significance (ASC-US) or cannot exclude HSIL (ASC-H); low-grade squamous intraepithelial lesion (LSIL) (HPV effect/CIN 1); high-grade squamous intraepithelial lesion (HSIL) (CIN 2/3, CIS); squamous cell carcinoma (SCC)
Glandular cell abnormality	Atypical glandular cells (AGC — endocervical/endometrial/not otherwise specified); AGC favour neoplastic; endocervical adenocarcinoma-in-situ (AIS); adenocarcinoma

The older nuclear-morphology description of **dyskaryosis** (mild/moderate/severe, corresponding roughly to CIN I/II/III) and **koilocytosis** (perinuclear halo of HPV cytopathic effect) is still used descriptively but has been folded into the LSIL/HSIL categories above.

Cervical cancer screening guidelines

Age group	Current recommended schedule
< 21 years	No screening, regardless of age at coitarche

Age group	Current recommended schedule
21–29 years	Cytology (conventional or LBC) alone every 3 years
30–65 years	Co-testing (cytology + hrHPV) every 5 years, or primary hrHPV testing every 5 years, or cytology alone every 3 years
> 65 years	Stop screening if 3 consecutive negative cytology results (or 2 negative co-tests) in the preceding 10 years, most recent within 5 years, and no CIN 2+/cancer history
Post-hysterectomy (benign cause, cervix removed, no CIN 2+ history)	Discontinue screening
High-risk (HIV-positive/immunosuppressed, DES exposure, prior CIN 2+/cancer)	Annual screening for at least 20 years after treatment

Accuracy, advantages and limitations

Parameter	Value/comment
Sensitivity of a single smear	~50–60%; false-negative rate up to 15–25%
False-negative rate after 3 consecutive negative smears	<1%
Causes of false negatives	Sampling error (TZ not scraped), poor fixation, obscuring blood/mucus/inflammation, cytologist misinterpretation
LBC vs conventional smear	LBC gives a thin, even, less-obscured monolayer; cuts unsatisfactory rate 70–90%; allows reflex hrHPV testing from the same vial; conventional smear is cheaper and equally sensitive when well taken
hrHPV co-testing	Combined negative cytology + negative hrHPV has a negative predictive value approaching 100% for CIN 2+/3

Management of an abnormal report

- ▶ **ASC-US** → reflex hrHPV testing (preferred): hrHPV-positive → colposcopy; hrHPV-negative → routine screening interval. If HPV testing unavailable, repeat cytology at 12 months.
- ▶ **LSIL** → colposcopy (standard, all ages); in women 21–24 years, conservative repeat cytology at 12 months is acceptable given high spontaneous regression.
- ▶ **ASC-H / HSIL / SCC** → direct colposcopy with directed biopsy ± endocervical curettage (ECC); a "see-and-treat" excisional procedure (LLETZ/LEEP) is acceptable for HSIL when colposcopy is unavailable or follow-up is unreliable.

- ▶ **AGC / AIS / adenocarcinoma** → colposcopy + ECC + endometrial biopsy (mandatory if age ≥ 35 years or risk factors for endometrial neoplasia), given the higher risk of an underlying glandular or endometrial lesion.
- ▶ Where colposcopy is unavailable, **visual inspection with acetic acid (VIA)** or Lugol's iodine (VILI) with "screen-and-treat" is the WHO-endorsed low-resource alternative.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 9.14A–C — Collection of cervical smear: using Ayre's spatula from the squamocolumnar junction, cytobrush for endocervical sampling, and wooden spatula from the lateral vaginal fornix (DC Dutta's Gynaecology 7e, p.109)

High-yield exam pointers

- ▶ Sample from the **squamocolumnar junction/transformation zone** — spatula + endocervical brush, never omit either.
- ▶ Bethesda categories to write verbatim: **ASC-US, ASC-H, LSIL, HSIL, SCC** (squamous); **AGC, AGC-favour-neoplastic, AIS, adenocarcinoma** (glandular).
- ▶ Numbers to reproduce: Pap smear cuts cervical cancer **incidence by 80%, mortality by 70%**; single-smear sensitivity ~60%; false-negative after 3 negatives <1%.
- ▶ Screening schedule ladder: <21 nil → 21–29 cytology q3y → 30–65 co-test/hrHPV q5y or cytology q3y → >65 stop if adequate prior negatives.
- ▶ ASC-US triage mnemonic: "**reflex HPV — positive-colposcopy, negative-routine.**"
- ▶ LBC advantage in one line: **monolayer + fewer unsatisfactory smears + same-vial hrHPV testing.**

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e prints the 2001 Bethesda table and an ACOG-2009-based screening schedule (start at 21, biennial 21–29, triennial ≥30); the schedule and Bethesda categories above reflect the current 2014 Bethesda update and the ACOG/ASCCP/USPSTF-endorsed screening intervals — cite the current version in the exam and mention the textbook version only if specifically asked to compare.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 9 — Examination of a Gynecological Patient and Diagnostic Procedures); Berek & Novak's Gynecology 16e (Ch. 16 — Preinvasive Disease of the Cervix, Vagina and Vulva); Jeffcoate's Principles of Gynaecology 9e (Epithelial Abnormalities of the Genital Tract); current ACOG/ASCCP cervical cancer screening guidance; The Bethesda System 2014 (Nayar & Wilbur).

**Cervical insufficiency**

Asked in: Paper IV 22-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — Cervical insufficiency (previously called *incompetent cervix*) is the inability of the uterine cervix to retain a pregnancy to term in the absence of perceived uterine contractions, characterised by painless dilatation and effacement of the cervix in the second trimester. This is followed by prolapse and ballooning of the amniotic membranes into the vagina, spontaneous rupture of membranes, and painless expulsion of an immature fetus — a sequence that recurs, often at a progressively earlier gestational age, in subsequent pregnancies. It is a clinical diagnosis of exclusion, now regarded as one phenotype within the broader "spontaneous preterm birth syndrome" rather than a fixed anatomical defect.

Aetiology

Category	Causes
Congenital	Müllerian duct anomalies (bicornuate/septate uterus), congenital cervical hypoplasia, in-utero diethylstilbestrol (DES) exposure, connective-tissue disorders (<i>Marfan</i> , <i>Ehlers-Danlos</i> syndrome)
Acquired (traumatic)	Dilatation & curettage; dilatation & evacuation/induced abortion; forceful mechanical dilatation for operative vaginal delivery through an undilated cervix; cone biopsy/LEEP or trachelectomy for cervical intraepithelial neoplasia; cervical amputation
Functional / associated	Multifetal gestation; prior spontaneous preterm birth — cervical insufficiency is considered a biological continuum of the spontaneous preterm birth syndrome

Clinical features & diagnosis

- ▶ **Classic history** — recurrent, painless mid-trimester cervical dilatation without felt contractions, followed by rupture of membranes and rapid, painless expulsion of a previable fetus; each successive loss tends to occur at an earlier gestational age.
- ▶ **Interconceptional (non-pregnant) examination** — cervix admits a no. 6–8 Hegar dilator beyond the internal os without resistance or pain, and without the normal "snap" on withdrawal (rarely used now); premenstrual hystercervicography shows a funnel-shaped internal os.
- ▶ **During pregnancy** — clinical: painless cervical shortening/dilatation on speculum or digital examination, ± visible bulging membranes. Transvaginal sonography (TVS): cervical length <25 mm before 24 weeks and/or funnelling of the internal os >1 cm, with the internal os changing from the normal T-shape through Y- and V- to a U-shape as funnelling progresses.

Basis for cerclage	Criteria	Timing
History-indicated (prophylactic)	Classic history of painless 2nd-trimester loss/cervical insufficiency, no other identifiable cause	Elective, 12–14 weeks
Ultrasound-indicated (therapeutic)	Singleton pregnancy + prior spontaneous preterm birth + TVS cervical length <25 mm before 24 weeks	On diagnosis, up to ~24 weeks
Physical examination-indicated (rescue/emergency)	Painless cervical dilatation ± bulging membranes found on examination	Emergency, up to 23–24 weeks

Associated work-up: pelvic ultrasonography (uterine anomaly), hysterosalpingography in the secretory phase (cervical incompetence, synechiae, uterine malformation), hysteroscopy/laparoscopy as indicated.

Management

Non-surgical options

- ▶ Vaginal micronized progesterone (from diagnosis of a short cervix until ~36 weeks) — reduces preterm birth in singleton pregnancies with a short cervix.
- ▶ Cervical (Arabin) silicone pessary — a non-surgical alternative when the cervix is short on ultrasound; trial evidence is conflicting (see Recent advances).
- ▶ Bed rest, pelvic rest and avoidance of intercourse — adjunctive; unproven as sole therapy.

Cervical cerclage — reinforces the weak cervix with a non-absorbable tape encircling the internal os.

Type	Technique	Success rate	Notes
McDonald (1963)	Vaginal purse-string suture of Mersilene tape at the cervicovaginal junction; no incision	~80–90%	Simpler, less blood loss, less cervical scarring; most commonly used
Shirodkar (1955)	Vaginal; anterior transverse + posterior vertical incision, tape passed submucosally at the level of the internal os, buried under mucosa	~80–90%	More technically demanding; a retained tape can be used in a future pregnancy
Transabdominal	Mersilene tape at the uterine isthmus via laparotomy/laparoscopy/robotic surgery, ideally 11–13 weeks or pre-pregnancy	Superior to repeat vaginal cerclage	Reserved for failed vaginal cerclage or a hypoplastic/scarred cervix; mandates caesarean delivery

Steps of McDonald's cerclage

- ▶ Regional anaesthesia; lithotomy position; bladder emptied; cervix exposed with a posterior speculum.
- ▶ Non-absorbable Mersilene tape placed as a purse-string suture at the cervicovaginal junction, at the level of the internal os, starting anteriorly.
- ▶ Successive deep bites (4–5) taken circumferentially around the cervix, encircling the canal.
- ▶ Tape tied anteriorly, narrowing the canal to 5–10 mm; any bulging membranes are gently reduced into the uterus beforehand.
- ▶ *Shirodkar* variant: anterior transverse and posterior vertical vaginal incisions are made first so the tape can be placed higher and submucosally at the internal os, then the mucosa is closed over the buried knot.

Contraindications: (1) intrauterine infection/chorioamnionitis; (2) ruptured membranes; (3) active vaginal bleeding; (4) severe uterine irritability/contractions; (5) cervical dilatation >4 cm; (6) fetal death or lethal anomaly.

Postoperative care: bed rest 2–3 days; periodic ultrasound surveillance of cervix and fetus; avoid intercourse; the stitch is electively removed at 36–37 weeks, or immediately if labour, rupture of membranes, or chorioamnionitis supervenes.

Complications: (1) suture slippage/cutting through the cervix; (2) chorioamnionitis; (3) iatrogenic preterm rupture of membranes; (4) preterm labour/abortion; (5) cervical laceration at delivery if the stitch is not removed in time; (6) cervical stenosis or scarring causing dystocia requiring caesarean delivery.

Recent advances [RA]

- ▶ ACOG (2021) recommends that cerclage be considered — as an alternative to vaginal progesterone — in a singleton pregnancy with prior spontaneous preterm birth, TVS cervical length <25 mm, and gestational age <24 weeks; universal transvaginal cervical-length surveillance is advised in women with a prior spontaneous preterm birth.
- ▶ RCOG Green-top Guideline No. 75 (*Cervical Cerclage*, 2022) similarly favours history-, ultrasound-, or examination-indicated cerclage over screening-based cerclage in low-risk women, and endorses elective removal of a transvaginal cerclage at 36–37 weeks.
- ▶ Weekly intramuscular 17 α -hydroxyprogesterone caproate (17-OHPC, brand Makena), long used as a postoperative/preventive adjunct, lost its US approval after the confirmatory PROLONG trial (2020) failed to reproduce the original benefit reported by Meis (2003); the FDA subsequently withdrew Makena from the US market. Vaginal micronized progesterone, not IM 17-OHPC, is now the evidence-supported progestogen for a short cervix.
- ▶ Cervical (Arabin) pessary evidence remains conflicting — a Spanish trial (Goya et al, 2012) showed benefit in asymptomatic short-cervix singletons, but a larger multicentre trial (Nicolaidis et al, 2016) found no benefit; the Society for Maternal-Fetal Medicine currently limits routine pessary use outside a confirmed short cervix plus prior preterm birth indication.
- ▶ Transabdominal cerclage, now increasingly placed laparoscopically or robotically before or in the first trimester of pregnancy, is confirmed superior to repeat vaginal cerclage after a failed transvaginal cerclage (Shennan et al, 2020).
- ▶ Combined ("multiple") therapy — cerclage plus vaginal progesterone plus pessary — is being explored for an extremely short cervix, though robust randomised evidence for combination therapy is still awaited.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 16.7A,B — Cerclage operation: A. McDonald's technique; B. Shirodkar's technique (DC Dutta's Obstetrics 9e, p.190)

High-yield exam pointers

- ▶ Cervical insufficiency = **painless** mid-trimester cervical dilatation; a **diagnosis of exclusion**.
- ▶ TVS criteria: cervical length <25 mm + funnelling >1 cm, both **before 24 weeks**.
- ▶ Three bases for cerclage: **history-indicated** / **ultrasound-indicated** / **examination-indicated (rescue)**.
- ▶ *McDonald* (purse-string, no incision) vs *Shirodkar* (buried tape via incisions) — both ~80–90% success.
- ▶ Cerclage timing: place **12–14 weeks**, remove **36–37 weeks**.
- ▶ Contraindications to remember: infection, ruptured membranes, bleeding, dilatation >4 cm.

- ▶ 17-OHPC (Makena) **withdrawn by the FDA** after the PROLONG trial — vaginal progesterone is now preferred.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Classical (Dutta-style) teaching emphasises only the history-indicated "diagnosis of exclusion" and routine postoperative weekly 17-OHPC. Current ACOG/RCOG practice additionally recognises ultrasound- and examination-indicated cerclage, prefers vaginal micronized progesterone over 17-OHPC (now withdrawn from the US market), and restricts cervical pessary largely to research settings given conflicting trial evidence.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; ACOG (2021); RCOG Green-top Guideline No. 75 (2022).



Chronic pelvic pain

Asked in: Paper III 15-Apr-2026 · Paper III May 2010 · Paper III Apr 2008 (4×) — RGUHS MS Obstetrics & Gynaecology

Definition — Chronic pelvic pain (CPP) is non-cyclic pain localized to the pelvis, anterior abdominal wall at or below the umbilicus, or lower back, present for **6 months or longer**, severe enough to cause functional disability or to require medical or surgical treatment. It is distinct from acute pain (sudden onset, short course, often with autonomic/inflammatory signs) and from purely cyclic pain such as dysmenorrhoea; CPP affects roughly 10–20% of women and accounts for 20–30% of laparoscopies and up to 12–19% of hysterectomies.

Aetiology / classification

Category	Causes
Gynaecological — cyclic	Primary/secondary dysmenorrhoea, mittelschmerz (intermenstrual pain), premenstrual syndrome, endometriosis/adenomyosis , pelvic congestion syndrome
Gynaecological — acyclic	Chronic pelvic inflammatory disease (PID), pelvic adhesions (post-PID/endometriosis/surgery), uterine retroversion/prolapse, fibroid, ovarian cyst (functional/neoplastic), ovarian remnant/residual (trapped) ovarian syndrome , non-hormonal IUD, idiopathic

Category	Causes
Gastrointestinal	Irritable bowel syndrome, constipation, diverticulitis, inflammatory bowel disease, appendicitis, hernia
Urological	Interstitial cystitis/bladder pain syndrome, urethral syndrome, recurrent UTI/calculi, ureteric obstruction
Musculoskeletal/neurological	Nerve entrapment (ilioinguinal, iliohypogastric, genitofemoral, pudendal), myofascial trigger points, lumbosacral disc/spondylolisthesis disease
Systemic/psychosomatic	Fibromyalgia, abdominal migraine, porphyria, depression/anxiety, past physical/sexual trauma

CPP is now understood as a disorder of visceral **central sensitization** rather than of a single anatomical lesion — silent nociceptive afferents are activated by tissue injury (e.g. endometriosis), producing upregulated dorsal-horn and cortical pain processing so that pain persists and may amplify even after the peripheral pathology resolves; this explains why 60–80% of women undergoing laparoscopy for CPP have no visible intraperitoneal pathology, and why relief after removing an apparent lesion is inconsistent.

Clinical evaluation

- ▶ **Structured pain history** (mnemonic **OLD CAARTS**) — Onset, Location, Duration, Characteristic, Alleviating/Aggravating factors, Associated symptoms, Radiation, Temporal pattern, Severity (0–10 visual analogue scale); relationship to menses, intercourse, micturition and bowel habit; psychosexual and trauma history.
- ▶ **General/abdominal examination** — look for a surgical scar, hernia (standing), abdominal-wall trigger point.
- ▶ **Carnett's sign (test)** — palpate the tender point, then repeat with the abdominal muscles tensed (head/shoulders raised off the table); pain that persists or worsens indicates an **abdominal-wall** source (myofascial/nerve entrapment); pain that lessens indicates a **visceral** source.
- ▶ **Bimanual and rectovaginal examination** — uterine size/mobility/tenderness, adnexal mass/tenderness, nodularity of the uterosacral ligaments (endometriosis), pelvic-floor muscle tenderness.
- ▶ **Pessary test** — in a mobile retroverted uterus, a ring pessary retained 3 months; symptom relief confirms retroversion as the cause and supports surgical correction (ventrosuspension).
- ▶ **Diagnostic hormonal/therapeutic trial** — cyclic combined oral contraceptive pills for 3 months relieves pain of a functional ovarian cyst or primary dysmenorrhoea by inducing anovulation.
- ▶ Screen for **non-gynaecological** contributors (irritable bowel syndrome, interstitial cystitis) and for depression/anxiety, since these commonly coexist with and perpetuate CPP.

Investigations

Test	Purpose/finding
Complete blood count, ESR	Screens for infection/PID
Cervical/vaginal swab (Gram stain, culture)	Diagnoses PID
Endometrial biopsy	Suspected genital tuberculosis
Urine microscopy/culture	Excludes UTI/interstitial cystitis
Transvaginal ultrasound (TVS)	Fibroid, ovarian cyst, adenomyosis; colour Doppler for torsion or pelvic venous congestion
MRI pelvis	Adenomyosis, deep endometriosis, ovarian remnant tissue (when TVS inconclusive)
Transuterine venography / colour Doppler	Confirms pelvic congestion syndrome (Taylor syndrome)
X-ray lumbosacral spine/hip	Orthopaedic causes
Cystoscopy/sigmoidoscopy/colonoscopy	Selected urological/gastrointestinal causes
Diagnostic laparoscopy	Gold standard when pain persists despite negative work-up — detects minimal endometriosis and adhesions; a negative finding is also of value, reassuring the patient

Management

- ▶ **General principles** — establish a definite diagnosis where possible; assess whether the identified pathology actually explains the pain; evaluate psychosocial contributors early; adopt a **multidisciplinary approach** (gynaecologist, psychologist, physiotherapist, pain specialist) especially when no pathology is found, when pathology and pain correlate poorly, or when prior medical/surgical treatment has failed.
- ▶ **Assurance and counselling** — sympathetic explanation of the pain mechanism, a daily pain-diary, and regular scheduled follow-up (not "return only if pain persists") reduce pain behaviour and improve coping.
- ▶ **Medical analgesia:**

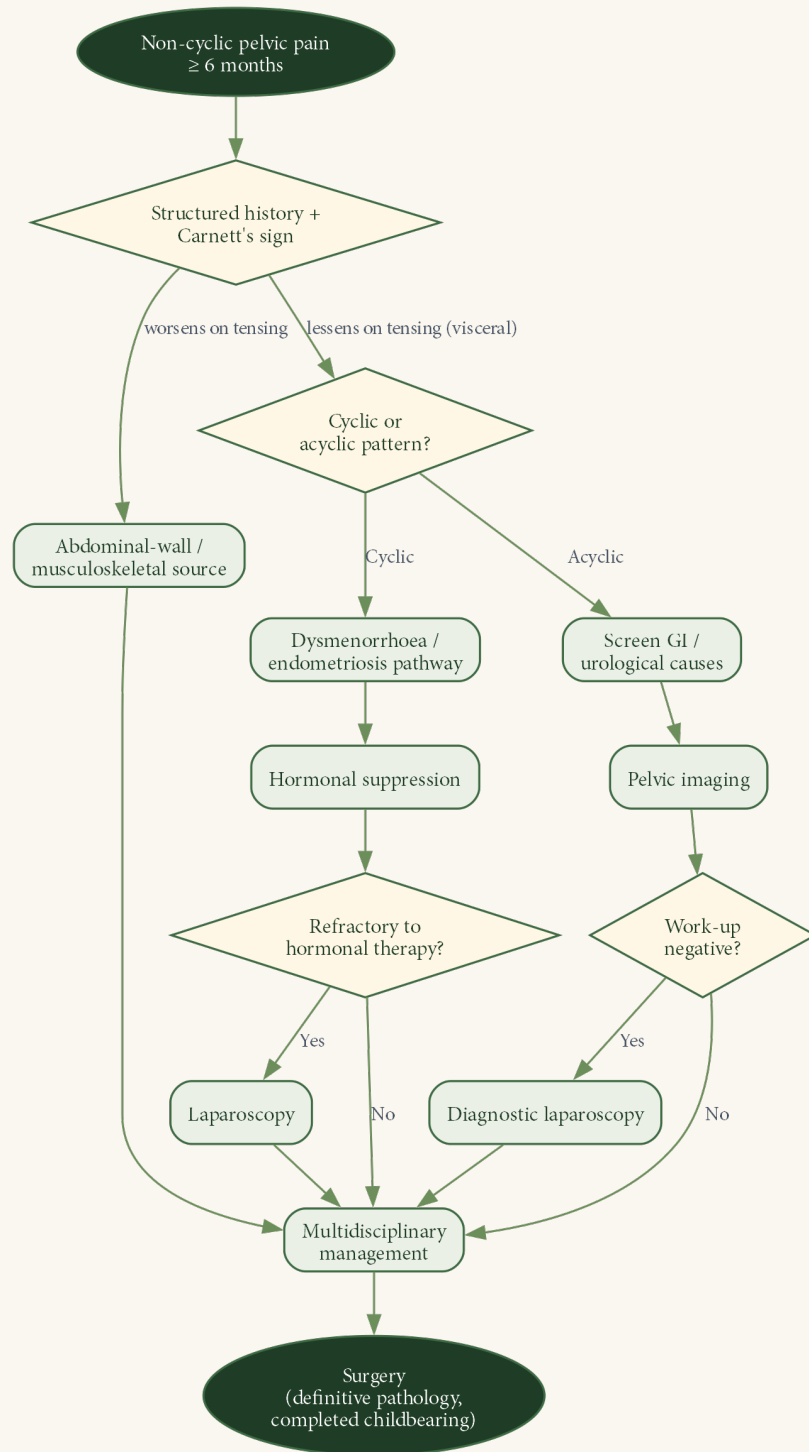
Drug class	Agents
NSAIDs	Ibuprofen, naproxen; COX-2 selective — celecoxib, ketorolac

Drug class	Agents
Neuromodulators	Tricyclic antidepressants (amitriptyline, imipramine); SSRIs (sertraline, fluoxetine, paroxetine); anticonvulsants — gabapentin , pregabalin , carbamazepine (block neuronal calcium channels; useful for neuropathic/central-sensitization pain, especially combined with cognitive-behavioural therapy)
Hormonal suppression	Combined oral contraceptive pills, cyclic/continuous progestogens, danazol, GnRH agonists (with add-back oestrogen) — for cyclic pain, endometriosis, pelvic congestion
Pelvic congestion syndrome	Medroxyprogesterone acetate 50 mg daily , or GnRH agonist with oestrogen add-back
Narcotics	Codeine, tramadol, methadone — last resort, under a written narcotic contract with scheduled dosing and follow-up

- **Non-pharmacological** — physical therapy for myofascial/pelvic-floor pain; transcutaneous electrical nerve stimulation (TENS); cognitive-behavioural therapy, mindfulness, hypnosis; acupuncture; local nerve blocks (ilioinguinal, iliohypogastric, pudendal) and trigger-point injections.
- **Minimally invasive surgery** — laparoscopic excision/ablation of endometriotic implants, adhesiolysis (efficacy for pain relief is inconsistent and adhesions may reform); **presacral neurectomy (PSN)** and **laparoscopic uterosacral nerve ablation (LUNA)** for midline dysmenorrhoea unresponsive to conservative therapy — a randomised trial found LUNA no better than laparoscopy alone.
- **Definitive surgery** — ventrosuspension/round-ligament plication for pain from uterine retroversion confirmed by a positive pessary test; **hysterectomy** (with or without bilateral salpingo-oophorectomy) for women who have completed childbearing with pain clearly attributable to adenomyosis, fibroid or refractory endometriosis. The American College of Obstetricians and Gynecologists (ACOG) requires at least 6 months of pelvic pain with no otherwise correctable pathology before hysterectomy is offered for pain alone, and recommends the vaginal or laparoscopic route over the abdominal route where feasible; roughly a quarter of women still have persistent or worsened pain at 1 year, so hysterectomy must be offered judiciously and only after multidisciplinary evaluation.
- **Special syndromes** — trapped/residual ovarian syndrome and ovarian remnant syndrome (retained/regrown ovarian tissue after hysterectomy or "complete" oophorectomy) are managed by ovarian suppression (progestins, combined pills, danazol, GnRH agonists) for symptom

control, with surgical removal of the remnant/retained ovary for cure (careful ureteric dissection, as the tissue lies retroperitoneally).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

CPP evaluation algorithm: history/Carnett sign triage to abdominal-wall vs visceral source, visceral split into cyclic/acyclic work-up, converging on multidisciplinary management with surgery reserved for confirmed pathology after childbearing is complete.

High-yield exam pointers

- ▶ Definition: non-cyclic pain, **≥6 months**, localized to pelvis/lower abdominal wall/back, causing functional disability (ACOG/Berek & Novak criterion; matches Dutta).
- ▶ History mnemonic: **OLD CAARTS**.
- ▶ **Carnett's sign**: pain worse on tensing abdominal muscles = abdominal-wall source; pain better = visceral source.
- ▶ 60–80% of laparoscopies for CPP show no pathology — reflects central sensitization, not a diagnostic failure.
- ▶ Pelvic congestion (Taylor) syndrome dose to remember: **medroxyprogesterone acetate 50 mg daily**.
- ▶ LUNA/presacral neurectomy: no proven benefit over laparoscopy alone for CPP — do not overstate surgical nerve ablation.
- ▶ ACOG hysterectomy criterion: **≥6 months pain**, no correctable pathology found, vaginal/laparoscopic route preferred.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older editions of DC Dutta's Gynaecology retain the same 6-month definition of chronic pelvic pain as current sources; the answer above follows the current ACOG/Berek & Novak account, which the two texts otherwise agree on.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; American College of Obstetricians and Gynecologists (ACOG) criteria for hysterectomy in pelvic pain (as cited in Berek & Novak 16e).



Classify Progestogens. Discuss its uses in Gynaecology

Asked in: Paper III 30-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Progestogens are natural or synthetic steroids that act on the progesterone receptor to reproduce the effects of endogenous progesterone: secretory transformation of an oestrogen-primed endometrium, suppression of the mid-cycle luteinising hormone (LH) surge and ovulation, and thickening of cervical mucus. The term covers natural progesterone and a chemically diverse family of synthetic progestins that differ in potency, androgenicity and route of delivery.

Classification of Progestogens

A. By source and chemical structure

Class	Sub-type	Examples
Natural	Progesterone	Micronized progesterone (oral/vaginal)
Synthetic — Pregnanes (C21, progesterone derivatives)	Acetylated (17 α -hydroxyprogesterone derivatives)	Medroxyprogesterone acetate (MPA), megestrol acetate, chlormadinone acetate, cyproterone acetate (antiandrogenic)
	Non-acetylated ("retro-progesterone")	Dydrogesterone
Synthetic — Estranes (C19, 19-nortestosterone derivatives, 1st generation)		Norethisterone (norethindrone), norethisterone acetate, norethynodrel, lynestrenol, etynodiol diacetate
Synthetic — Gonanes (C18, further-modified 19-nortestosterone)	2nd generation	Levonorgestrel, norgestrel
	3rd generation ("lipid-friendly", less androgenic)	Desogestrel, gestodene, norgestimate
	4th generation	Drospirenone (spironolactone analogue — antimineralocorticoid + antiandrogenic), dienogest, nomegestrol acetate
Others	19-nortestosterone derivative, antagonodotropic	Gestrinone

B. By route/formulation

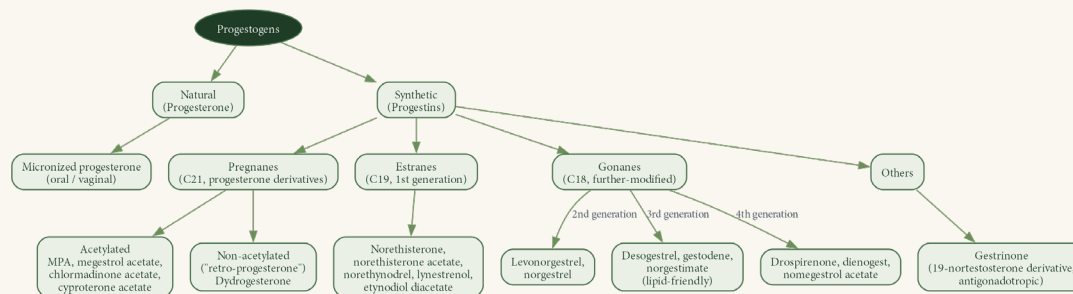
Route	Preparations
Oral	Combined pill (progestin component), progestin-only pill (POP), cyclical/continuous tablets
Parenteral depot (IM/SC)	Depot medroxyprogesterone acetate (DMPA), norethisterone enanthate (NET-EN), Depo-subQ Provera 104
Subdermal implant	Implanon/Nexplanon (etonogestrel), Norplant-II/Jadelle (levonorgestrel)
Intrauterine	Levonorgestrel intrauterine system (LNG-IUS)
Vaginal	Micronized progesterone gel/pessary

Uses of Progestogens in Gynaecology

Indication	Progestogen & regimen	Key point
Contraception	POP: levonorgestrel 75 µg / norethisterone 350 µg / desogestrel 75 µg / lynestrenol 500 µg / norgestrel 30 µg daily. DMPA 150 mg IM 3-monthly (WHO 4-monthly) or 300 mg 6-monthly; NET-EN 200 mg IM 2-monthly. Implanon 68 mg etonogestrel (3 yr); Jadelle/Norplant-II (5 yr). LNG-IUS 52 mg reservoir, releases 20 µg/day (licensed 5 yr)	Combined pill: progestin suppresses LH/ovulation, oestrogen suppresses FSH
Emergency contraception	Levonorgestrel 0.75 mg stat + 0.75 mg after 12 h (older 2-dose protocol)	Started within 72 h of unprotected coitus
Abnormal uterine bleeding (AUB)/DUB	Acute ovulatory bleeding: MPA or norethisterone 10 mg/5 mg thrice daily till bleeding stops (3–7 days), tapered over 21 days. Anovulatory/cyclical control: MPA 10 mg or norethisterone 5 mg, day 5–25 × 3 cycles. Continuous: MPA 10 mg thrice daily × 90 days	LNG-IUS is first-line for heavy menstrual bleeding with no structural/histological abnormality — reduces loss up to 97% ("medical hysterectomy")
Endometriosis/adenomyosis	MPA 10 mg thrice daily, dydrogesterone 10–20 mg/day, or norethisterone 10–30 mg/day, each × 6–9 months; gestrinone 2.5 mg twice weekly	Causes endometrial decidualisation and atrophy (pseudopregnancy); LNG-IUS reduces dysmenorrhoea/menorrhagia of adenomyosis
Dysmenorrhoea & premenstrual syndrome (PMS)	Cyclical/continuous COC (drospirenone-containing pill preferred in PMS); LNG-IUS to suppress the ovarian cycle	Drospirenone's antimineralocorticoid action gives better PMS symptom control
Hormone therapy (menopause, intact uterus)	MPA 2.5–5 mg/day, micronized progesterone 100–300 mg/day, or dydrogesterone 5–10 mg/day, added for the last 12–14 days of the cycle (or continuous-combined); LNG-IUS as the progestin arm	Prevents oestrogen-driven endometrial hyperplasia/carcinoma

Indication	Progestogen & regimen	Key point
Endometrial hyperplasia / fertility-sparing endometrial cancer	Hyperplasia without atypia: cyclical/continuous oral progestin or LNG-IUS. Atypical hyperplasia/well-differentiated Stage IA cancer wanting fertility: 17-hydroxyprogesterone caproate 1 g IM weekly, or MPA 1 g IM weekly/150 mg/day oral, or megestrol acetate 160 mg/day, for ≥ 3 months	LNG-IUS is an alternative in poor surgical candidates
Delay of menstruation (medico-social)	Norethisterone 5 mg twice daily, started 3–6 days before the expected date, continued till the event is over	Menses resume 2–3 days after stopping the drug
Diagnostic — progestin challenge test	MPA 10 mg/day for 5–10 days in secondary amenorrhoea (or an oestrogen–progestin challenge: ethinyl estradiol/conjugated oestrogen daily $\times$ 25 days with MPA 10 mg added on days 15–25)	Withdrawal bleeding confirms adequate endogenous oestrogen (>40 pg/mL), a patent outflow tract, and a responsive endometrium

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Classification tree of progestogens by source, chemical structure and generation.

High-yield exam pointers

- ▶ Structural triad: **Pregnanes** (C21) vs **Estranes** (C19, 1st generation) vs **Gonanes** (C18, 2nd–4th generation) — write this as the classification spine.
- ▶ Generation ladder: 1st = norethisterone; 2nd = levonorgestrel; 3rd = desogestrel/gestodene/norgestimate (lipid-friendly); 4th = drospirenone (antimineralocorticoid + antiandrogenic).

- ▶ LNG-IUS = single highest-yield "use" line — first-line for heavy menstrual bleeding, contraception, HRT progestin arm, adenomyosis, and fertility-sparing endometrial hyperplasia.
- ▶ DUB acute control dose to memorise: MPA/norethisterone 10 mg/5 mg **thrice daily till bleeding stops**, then taper over 21 days.
- ▶ Fertility-sparing endometrial cancer doses: 17-OHP caproate 1 g/week IM or MPA 1 g/week IM (or 150 mg/day oral) or megestrol 160 mg/day.
- ▶ Progestin challenge test = bedside test for endogenous oestrogen + outflow-tract patency in amenorrhoea work-up.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The levonorgestrel emergency-contraception regimen above is DC Dutta's older two-dose (0.75 mg + 0.75 mg 12-hourly) protocol; current WHO/FOGSI practice uses a single 1.5 mg dose of equal efficacy with better compliance.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Clinical features, investigations and management of Bacterial vaginosis

Asked in: Paper III 18-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Bacterial vaginosis (BV) is a polymicrobial clinical syndrome in which the normal hydrogen-peroxide-producing *Lactobacillus*-dominant vaginal flora is replaced by an overgrowth of anaerobic and facultative organisms — chiefly *Gardnerella vaginalis*, *Mycoplasma hominis*, *Prevotella*, *Bacteroides* and *Mobiluncus* species. It is termed "vaginosis," not vaginitis, because there is little or no accompanying vaginal inflammation, and it is the most common cause of abnormal vaginal discharge in reproductive-age women.

Clinical features

- ▶ Asymptomatic in up to half of affected women; detected only on speculum examination or screening.
- ▶ Increased, thin, homogeneous, greyish-white discharge that coats the vaginal walls uniformly — non-viscous, non-curdy, non-frothy.
- ▶ Characteristic **fishy/musty odour**, classically more noticeable after coitus (alkaline semen) and around menstruation (alkaline blood raises vaginal pH and releases volatile amines).

- ▶ No significant vulval or vaginal inflammation — erythema, oedema, dyspareunia and dysuria are typically absent; mild vulval irritation occurs in only about 25% of cases. This absence of inflammatory signs/symptoms is the key clinical clue distinguishing BV from candidiasis or trichomoniasis.
- ▶ No systemic features (fever, lower abdominal pain).
- ▶ On speculum examination: discharge may pool visibly at the introitus/labia in copious cases; the cervix and vaginal epithelium otherwise look normal (unlike the strawberry cervix of trichomoniasis).

Investigations

BV is diagnosed by bedside/office tests, confirmed by microscopy; culture has no diagnostic role.

Investigation	Finding / purpose
Vaginal pH (pH paper/litmus applied to lateral vaginal wall)	Raised, > 4.5 (usually 4.7–5.7); normal vagina is < 4.5 due to lactobacillary lactic acid — lost in BV
Whiff (amine) test	A drop of 10% potassium hydroxide (KOH) added to the discharge releases a fishy amine odour — positive in BV
Saline wet-mount microscopy	Clue cells — vaginal epithelial cells so heavily studded with coccobacilli that the cell border is blurred/stippled ("ground-glass" cytoplasm) — present on > 20% of epithelial cells; leucocytes are conspicuously absent (unlike trichomoniasis)
Gram stain — Nugent score (laboratory/research gold standard)	Semiquantitative scoring (0–10) of lactobacillus vs <i>Gardnerella/Bacteroides</i> vs curved-rod (<i>Mobiluncus</i>) morphotypes: 0–3 normal , 4–6 intermediate , ≥ 7 = BV
Gram stain — Hay-Ison criteria (alternative grading)	Grade 1 = lactobacilli predominant (normal); Grade 2 = mixed flora (intermediate); Grade 3 = <i>Gardnerella/Mobiluncus</i> predominant with clue cells (BV); Grades 0 and 4 are unrelated patterns
Culture of <i>G. vaginalis</i>	Not recommended — poor specificity, as the organism is also isolated from many normal, asymptomatic women
Nucleic acid amplification test (NAAT)/point-of-care assay	Available for symptomatic women where microscopy is unavailable; not needed routinely

Diagnosis is made clinically by **Amsel's criteria** — presence of **3 of the following 4**:

- ▶ Homogeneous, thin, grey-white discharge coating the vaginal walls.
- ▶ Vaginal fluid pH > 4.5.
- ▶ Positive whiff/amine test on adding 10% KOH.

- ▶ Clue cells on saline wet mount (> 20% of epithelial cells) — the single most important criterion.

A Nugent score ≥ 7 on Gram stain is the reference-standard laboratory diagnosis where Amsel's criteria are equivocal.

Management

- ▶ **Whom to treat:** all symptomatic women; women undergoing surgical abortion, hysterectomy, endometrial biopsy, or intrauterine device insertion (perioperative treatment of BV-positive women reduces post-procedure pelvic infection); symptomatic pregnant women, at any gestation.
- ▶ **Screening in pregnancy:** routine screening of asymptomatic, low-risk pregnant women is **not recommended** (ACOG 2021; USPSTF 2020) — treating asymptomatic BV in this group does not reduce preterm birth. Evidence for benefit of screening/treating asymptomatic BV in women with a prior preterm birth is conflicting, and many units do not routinely screen this group either.
- ▶ **Partner treatment is not recommended** — BV is not conventionally classified as a sexually transmitted infection, and treating the male partner does not improve cure rates or lower recurrence.
- ▶ **Drug regimens:**

Setting	Regimen	Dose	Duration
Non-pregnant — first-line	Metronidazole, oral	500 mg twice daily	7 days
Non-pregnant — first-line	Metronidazole vaginal gel 0.75%	One applicator (5 g) intravaginally once daily	5 days
Non-pregnant — first-line	Clindamycin vaginal cream 2%	One applicator (5 g) intravaginally at bedtime	7 days
Non-pregnant — alternative	Clindamycin ovules	100 mg intravaginally at bedtime	3 days
Non-pregnant — alternative	Clindamycin, oral	300 mg twice daily	7 days
Pregnancy — preferred	Metronidazole, oral	500 mg twice daily	7 days
Pregnancy — preferred	Metronidazole vaginal gel 0.75%	One applicator (5 g) intravaginally once daily	5 days
Pregnancy — alternative	Clindamycin, oral	300 mg twice daily	7 days
Pregnancy — alternative	Clindamycin ovules	100 mg intravaginally at bedtime	3 days

- ▶ Metronidazole is not teratogenic and is considered safe throughout pregnancy and during breastfeeding (avoid alcohol during treatment and for 24 hours after, to prevent a disulfiram-like reaction).
- ▶ **Recurrence** is common — roughly half of women relapse within 12 months, because lactobacilli are difficult to re-establish once lost; a recurrence is managed with a repeat course of the same or an alternative first-line regimen.
- ▶ **Follow-up:** test-of-cure is not routinely required in women who become asymptomatic; re-evaluate only if symptoms persist or recur.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 12.1 — Clue cells (DC Dutta's Gynaecology 7e, p.145)

High-yield exam pointers

- ▶ BV = **vaginosis**, not vaginitis — no significant pruritus, erythema or dyspareunia; this is the clinical hallmark to write first.
- ▶ **Amsel's criteria** — 3 of 4: thin grey-white discharge, pH > 4.5, positive whiff test, clue cells > 20% of epithelial cells.
- ▶ **Nugent score** (Gram stain, gold standard): 0–3 normal, 4–6 intermediate, ≥ 7 = BV.
- ▶ Clue cells are the single most specific and important diagnostic sign.
- ▶ First-line drug: **metronidazole 500 mg orally twice daily $\times$ 7 days** — identical regimen used in pregnancy.
- ▶ **Partner treatment is NOT indicated.**
- ▶ ACOG/USPSTF: **no routine screening** of asymptomatic low-risk pregnant women for BV.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e and Jeffcoate's Principles of Gynaecology 9e additionally cite an older/alternative oral course of metronidazole 400 mg three times daily for 5–7 days (~80% cure); the 500 mg twice-daily $\times$ 7-day regimen given above is the current CDC/ACOG-endorsed standard reproduced in Williams Obstetrics 26e and Berek & Novak 16e.

SOURCE & COVERAGE

Williams Obstetrics 26e (Ch. 68 — Sexually Transmitted Infections, Bacterial Vaginosis); Berek & Novak's Gynecology 16e (Vaginal Infections — Bacterial Vaginosis); DC Dutta's Textbook of Gynaecology 7e (Ch. 12); Jeffcoate's Principles of Gynaecology 9e (Vaginal Discharge chapter); current guideline: CDC Sexually Transmitted Infections Treatment Guidelines (Workowski, 2021) and ACOG (2021)/USPSTF (2020) guidance on BV screening in pregnancy, as reproduced in Williams Obstetrics 26e.

**Complete Perineal Tear**

Asked in: Paper III 19-Nov-2022 · Paper I May 2007 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Complete perineal tear (CPT) is a tear of the perineal body that involves the **external anal sphincter (EAS)**, with or without involvement of the anorectal mucosa (**internal anal sphincter, IAS, and anal epithelium**). It corresponds to a third-degree (grade 3c) or fourth-degree obstetric anal sphincter injury. It is termed "old" CPT once the injury has been present for more than an arbitrary 3 months.

Classification — RCOG classification of obstetric anal sphincter injury

Degree	Extent of injury
First degree	Perineal skin only
Second degree	Perineal muscles involved; anal sphincter intact
Third degree	Anal sphincter complex torn — 3a: <50% of EAS thickness; 3b: >50% of EAS thickness; 3c: both EAS and IAS torn
Fourth degree	EAS + IAS torn and anal epithelium (anorectal mucosa) breached

Complete perineal tear = grade 3c or 4th degree.

Etiology / risk factors

Category	Risk factors
Obstetrical (over-stretching/sudden stretching of an inelastic perineum)	Primigravida; big baby (>3 kg); face-to-pubis delivery; midline episiotomy; forceps delivery; outlet contraction with narrow pubic arch; shoulder dystocia; precipitate labour; scarred perineum; prolonged second stage

Category	Risk factors
Gynaecological	Direct perineal trauma — fall, coital injury

Clinical features

- ▶ **Incontinence of flatus** — invariable; incontinence of feces depends on the extent of EAS damage — loose stool only if damage is slight, hard stool as well if severe.
- ▶ **Perianal soreness** from constant fecal irritation; the condition may remain asymptomatic for years (compensatory over-activity of levator ani) and be picked up incidentally on pelvic exam.
- ▶ **Inspection** — absence of perineum; vaginal (pinkish) and rectal (reddish) mucosa are continuous, separated only by a fibrous septum; visible skin dimples on either side of the fused mucosa (retracted, subcutaneously fixed ends of the torn EAS); radial skin wrinkling only on the posterior aspect of the anal opening.
- ▶ **Palpation (per-rectal exam)** — absent sphincteric grip on a finger in the rectum; anal canal separated from the vagina by only a thin septum.
- ▶ **No associated prolapse** despite the perineal deficit — explained by compensatory levator ani over-activity; if prolapse coexists, it is usually pre-existing.

Investigations / diagnosis

Test	Purpose / finding
Clinical bidigital vaginal + rectal exam	Confirms continuity of vaginal/rectal mucosa and sphincter defect — usually sufficient for diagnosis
Endoanal or transvaginal ultrasound (EAUS/TVS)	Localises the defect in both EAS and IAS; also images puborectalis and perineal body; perineal body thickness >12 mm is considered sufficient to maintain continence
MRI	Best delineates EAS morphology; not routinely used
Anorectal manometry	IAS resting pressure, EAS squeeze pressure — low values suggest sphincter dysfunction/neuropathy
Electromyography	Detects denervation of the sphincter muscles

Differential diagnosis

A low rectovaginal fistula with intact overlying perineal skin can mimic CPT; a rectovaginal fistula causes greater patient distress (continuous soiling irrespective of stool consistency) than CPT.

Management

A. Preventive (intrapartum)

- ▶ Controlled delivery of the flexed head between contractions — avoid early extension so the smaller suboccipitofrontal (10 cm) diameter, not a larger one, distends the introitus.
- ▶ Slow, controlled delivery of the head during forceps extraction, maintaining correct line of pull.
- ▶ Timely, judicious **mediolateral** (not midline) episiotomy, especially in primigravidae and in occipito-posterior, face, breech or forceps deliveries.
- ▶ Careful, slow delivery of the shoulders (bisacromial diameter, 12 cm).

B. Timing of repair

- ▶ **Fresh tear**, recognised immediately after delivery — repair within **24 hours**.
- ▶ **Old/missed CPT** — repair deferred **2–3 months** after injury, to let local infection settle and the patient's general condition improve; undue further delay only adds fibrosis and prolongs disability.

C. Preoperative workup (old CPT)

- ▶ Stool examination for hookworm, *Ascaris*, *Entamoeba histolytica* — treat if positive.
- ▶ Admit at least 3 days pre-op; **low-residue diet** (milk, bread, lime-whey) for 2 days.
- ▶ Intestinal antiseptics from 2 days before surgery — **neomycin 250 mg TDS**, or **erythromycin 500 mg TDS**, or **metronidazole 400 mg TDS**.
- ▶ Daily enema/bowel wash for 2 days pre-op (not on the morning of surgery).

D. Operative repair — sphincteroplasty + perineorrhaphy (Warren flap method)

- ▶ Inverted-V incision over the fused rectovaginal mucosa, extended on each side up to the labium minus, then downward over each skin dimple — giving an "H"-shaped incision.
- ▶ Mobilise the rectal wall off the vaginal wall; mobilise the retracted, torn EAS ends (held on Allis forceps).
- ▶ Excise scar tissue from the rectal margins.
- ▶ Repair the rectal wall in **two layers** with interrupted **PDS 3-0** sutures (knots tied inside the lumen), then approximate the pararectal fascia over it.
- ▶ **Anal sphincteroplasty** — approximate the torn EAS ends anterior to the repaired rectum using **PDS 2-0**, by either the **end-to-end technique** (commonly used) or the **overlapping technique** (favoured for an old, retracted tear); outcomes of the two methods are comparable.
- ▶ Excise redundant vaginal mucosa.
- ▶ Reconstruct the **perineal body** with 2–3 interrupted **Vicryl '0'** sutures (perineorrhaphy).
- ▶ Close the vaginal mucosa and perineal skin with interrupted sutures.

E. Postoperative care

- ▶ Non-residue diet until day 3, full diet from day 6; **no bowel motion for 4–5 days**.
- ▶ Stool softener — **lactulose 10 mL BD** from day 2, increased up to **30 mL** by day 3.

- ▶ Compound (oil-glycerine-saline) enema if the patient is uncomfortable and unable to pass stool.
- ▶ Perioperative IV antibiotics — **cefuroxime 1.5 g + metronidazole 500 mg**; continue oral intestinal antiseptics for 5 days.

F. Discharge advice / follow-up

- ▶ Keep stool soft with a bedtime laxative; contraception to postpone the next pregnancy; review at 6 weeks.
- ▶ Next pregnancy — regular antenatal care, mandatory institutional delivery, and a **liberal mediolateral episiotomy**.
- ▶ If symptomatic, or endoanal ultrasound/manometry is abnormal after repair — deliver the next pregnancy by **elective caesarean section**.

Complications of repair

- ▶ Complete dehiscence of the repair.
- ▶ Incomplete dehiscence → **rectovaginal fistula**.
- ▶ Over-tightened sphincter → difficulty with defecation.
- ▶ Dyspareunia.
- ▶ Persistent flatal or fecal incontinence — residual sphincter defect on endoanal ultrasound/manometry in **20–30%**.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 27.1 — Diagrammatic representation showing different degrees of perineal tear (DC Dutta's Gynaecology 7e, p.373)

High-yield exam pointers

- ▶ CPT = **grade 3c or 4th-degree** obstetric anal sphincter injury (RCOG classification); "old" if >3 months since injury.
- ▶ Remember the grading ladder: 1st = skin; 2nd = muscle, sphincter spared; 3a/3b/3c = EAS <50%/>50%/EAS+IAS; 4th = + anal epithelium.
- ▶ Key sign: continuous pink (vaginal) — red (rectal) mucosa with absent sphincteric grip on PR exam, yet **no prolapse** (levator ani over-activity compensates).
- ▶ Repair timing rule: **<24 hours** if fresh, else **2–3 months** later if old/missed.
- ▶ Suture cheat-sheet: rectal wall — PDS 3-0; EAS approximation (end-to-end or overlap) — PDS 2-0; perineal body — Vicryl '0'.
- ▶ Postoperative bowel regimen: no motion for 4–5 days, lactulose 10→30 mL, non-residue diet.
- ▶ Future delivery: liberal mediolateral episiotomy; elective caesarean section if symptomatic/abnormal endoanal imaging post-repair.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

For reference — not written in the exam: end-to-end and overlap sphincteroplasty give comparable continence outcomes on follow-up; the choice is largely operator preference, with overlap often favoured for an old, retracted EAS.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Chapter 27 — Genital Tract Injuries and Anorectal Dysfunctions); RCOG classification of obstetric anal sphincter injury.



Complications of tuboplasty

Asked in: Paper III 16-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Tuboplasty is reconstructive microsurgery on the fallopian tube performed to restore tubal anatomy and physiology in tubal-factor infertility. It includes salpingo-ovariolysis (adhesiolysis), fimbrioplasty, salpingostomy (neosalpingostomy), tubotubal anastomosis (reversal of sterilisation), and tubocornual anastomosis, done by laparotomy/microsurgery or, preferably, laparoscopically.

Complications classified by timing

Timing	Complications
Intraoperative	Haemorrhage from the mesosalpinx or tubo-ovarian vessels; injury to bladder, bowel, or ureter (more likely with dense adhesions from prior pelvic inflammatory disease or surgery); injury to major pelvic vessels; extraperitoneal insufflation/gas embolism (laparoscopic route); uterine or cornual perforation during chromopertubation
Early postoperative	Pelvic infection/cellulitis, wound infection or haematoma, secondary haemorrhage/haemoperitoneum, paralytic ileus, pyrexia, urinary retention, anaesthetic complications
Late / specific reproductive	Ectopic pregnancy (the single most important complication), recurrent tubal obstruction from adhesion reformation, persistent or recurrent hydrosalpinx, failure of the procedure (continued infertility), tubal rupture at the anastomosis site in a subsequent pregnancy, cornual/interstitial pregnancy after tubocornual anastomosis

Key complications — detail

- ▶ **Ectopic pregnancy** — the most important and specific complication of tubal reconstructive surgery. The risk of ectopic pregnancy following **tubal reanastomosis** is 3–7%. Risk is further governed by the method and site of the original sterilisation, the length of residual/reconstructed tube, presence of adhesions, and is higher after **cauterisation-based** sterilisation compared with clip/ring methods; risk is also elevated after **salpingostomy** for distal tubal block because the endosalpingeal damage that caused the occlusion persists after the tube is re-opened. Every subsequent pregnancy after tuboplasty must be localised early by transvaginal ultrasound and serum β -hCG to exclude an ectopic gestation.
- ▶ **Adhesion reformation** — the commonest cause of surgical failure; peri-tubal and peri-ovarian adhesions re-form despite meticulous technique and are minimised by microsurgical/laparoscopic handling and adhesion-barrier use.
- ▶ **Recurrent tubal obstruction/failure of patency** — related to poor case selection; outcome is worse with dense pelvic adhesions, loss of fimbriae, bilateral hydrosalpinx > 3 cm, a reconstructed tube < 4 cm in length, reversal attempted more than 5 years after the sterilisation procedure, and coexisting infertility factors in the couple.
- ▶ **Pelvic infection** — can precipitate re-obstruction of the reconstructed segment or tubo-ovarian abscess formation; minimised by prophylactic antibiotics and aseptic technique.
- ▶ **Haemorrhage** — from the mesosalpinx or ovarian vessels during adhesiolysis or anastomosis; occasionally requires transfusion or conversion from laparoscopy to laparotomy.
- ▶ **Visceral injury** — bladder, bowel, or ureteric injury, as with any pelvic dissection, with higher risk when dense adhesions from prior surgery or tuberculosis/PID are present.
- ▶ **Persistent infertility despite a patent tube** — coexisting peritoneal, ovarian, or male-factor infertility may mean pregnancy still does not occur even after anatomically successful tuboplasty.

Factors predisposing to poor outcome/complications

Factor	Effect on outcome
Dense pelvic adhesions	Higher failure/re-obstruction rate
Loss of fimbriae	Poorer prognosis for salpingostomy
Bilateral hydrosalpinx > 3 cm	Poor prognosis; salpingectomy before IVF is preferred
Length of reconstructed tube < 4 cm	Reduced pregnancy rate, higher ectopic risk
Reversal done > 5 years after sterilisation	Lower success, more complications
Other coexisting infertility factors	Reduces overall success despite tubal patency

Prevention / minimisation of complications

- ▶ Careful patient selection with preoperative assessment by hysterosalpingography and/or laparoscopy (falloscopy where available) to assess tubal mucosa.
- ▶ Preoperative counselling of the couple about the risk of ectopic pregnancy and the possibility of failure.
- ▶ **Microsurgical technique** with magnification, fine sutures, and minimal tissue handling to reduce adhesion formation and preserve vascularity.
- ▶ **Laparoscopic approach preferred over laparotomy** — gives the best results with least tissue trauma and fewest adhesions.
- ▶ Meticulous haemostasis during adhesiolysis/anastomosis.
- ▶ Use of adhesion-prevention barriers (e.g., Interceed, Seprafilm).
- ▶ Prophylactic antibiotics perioperatively.
- ▶ Postoperative **hydrotubation** — Gentamicin 80 mg with Dexamethasone 4 mg in 10 mL normal saline, instilled transcervically in the post-menstrual/proliferative phase for at least 3 cycles.
- ▶ Withholding surgery in tubercular salpingitis; offering in-vitro fertilisation (IVF) instead once the endometrium is free of disease.
- ▶ Early first-trimester ultrasound in every post-tuboplasty pregnancy to localise the gestational sac and exclude ectopic pregnancy.
- ▶ Choosing IVF over redo-tuboplasty for complicated tubal occlusive disease or bilateral large hydrosalpinges, avoiding repeated surgical morbidity.

Recognition and management of major complications

- ▶ **Intraoperative haemorrhage** — controlled by bipolar coagulation or fine 8-0/6-0 vicryl sutures to the mesosalpinx; uncontrolled bleeding warrants conversion from laparoscopy to laparotomy.
- ▶ **Ectopic pregnancy after tuboplasty** — suspected in any post-tuboplasty patient with amenorrhoea, pain, or bleeding; confirmed by transvaginal ultrasound plus serial serum β -hCG, and managed as any tubal ectopic (methotrexate if unruptured and haemodynamically stable, laparoscopic salpingostomy/salpingectomy if larger or ruptured).
- ▶ **Recurrent tubal obstruction/adhesion reformation** — suspected when pregnancy does not occur within 12 months; confirmed by repeat hysterosalpingography or second-look laparoscopy; managed by adhesiolysis/redo-tuboplasty in favourable cases or by proceeding directly to IVF when repeat surgery is unlikely to succeed.
- ▶ **Pelvic infection/abscess** — treated with broad-spectrum antibiotics; drainage (laparoscopic or image-guided) if a tubo-ovarian abscess forms.
- ▶ **Visceral (bladder/bowel/ureteric) injury** — recognised intraoperatively where possible and repaired primarily, with the relevant surgical specialty involved for bowel or ureteric injury.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 17.6 — Tubotubal anastomosis. Placement of four to five interrupted sutures using 8-0 polyglactin (DC Dutta's Gynaecology 7e, p.222)

High-yield exam pointers

- ▶ Ectopic pregnancy after tubal reanastomosis: 3–7% — the single most tested number.
- ▶ Adhesion reformation = commonest cause of failure of tuboplasty.
- ▶ Poor-outcome factors: dense adhesions, lost fimbriae, hydrosalpinx > 3 cm, reconstructed tube < 4 cm, reversal > 5 years post-sterilisation, coexisting infertility factors.
- ▶ Laparoscopic microsurgery gives the best results and fewest complications; nylon splints, if used, must be removed within 48 hours to limit mucosal damage.
- ▶ Hydrotubation regimen: Gentamicin 80 mg + Dexamethasone 4 mg in 10 mL saline, post-menstrual phase, ≥3 cycles.
- ▶ Salpingectomy is done before IVF when hydrosalpinges are present, to prevent hydrosalpingeal fluid from reducing implantation rates.
- ▶ Tuberculous salpingitis — surgery contraindicated; treat medically first, then consider IVF.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e.

♦ ♦ ♦

Condyloma acuminata

Asked in: Paper III 23-Nov-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Condyloma acuminata (genital warts) are soft, papillary, cauliflower-like excrescences of the anogenital skin and mucosa caused by the **human papillomavirus (HPV)**, most often the non-oncogenic (low-risk) types **6 and 11**. They are sexually transmitted, commonly multiple, and their growth is favoured by pregnancy, immunosuppression, diabetes mellitus, and local trauma.

Aetiology & Pathogenesis

- ▶ **Causative organism** — human papillomavirus (HPV); low-risk types **6 and 11** account for the great majority of visible genital warts; types **16, 18, 31, 33, 35** are occasionally co-detected and carry oncogenic potential for cervical/vulval/vaginal intraepithelial neoplasia.
- ▶ **Transmission** — predominantly sexual contact; more than 75% of exposed sexual partners develop warts. Autoinoculation to other skin sites also occurs. Vertical transmission during vaginal delivery is rare but can cause neonatal/juvenile recurrent respiratory papillomatosis.

- ▶ **Mechanism** — coital microtrauma allows the virus to reach the basal epidermal layer, where it replicates and drives papillomatous, acanthotic proliferation of squamous epithelium with koilocytosis.
- ▶ **Predisposing factors** — immunosuppression (HIV, transplant, corticosteroids), diabetes mellitus, pregnancy (increased vascularity, relative immune tolerance, associated vaginal discharge), and local trauma/maceration.
- ▶ **Anatomic distribution** of anogenital HPV infection — cervix 70%, vulva 25%, anus 20%, vagina 10% (lesions frequently multicentric).

Clinical Features

- ▶ Multiple soft, papillary, exophytic warts growing in clusters along a narrow stalk giving a **cauliflower appearance**; occasionally the stalk is broad and sessile.
- ▶ Commonest sites — posterior fourchette, labia majora/minora, perineum, and perianal skin; may extend to the vagina, cervix, and urethral meatus.
- ▶ Often asymptomatic and noticed incidentally; when symptomatic — pruritus, local irritation, malodorous vaginal discharge, dyspareunia, and bleeding on minor trauma.
- ▶ Growth is markedly accelerated by pregnancy, diabetes, and immunosuppression; large confluent masses can occasionally obstruct the vaginal introitus.
- ▶ Rarely, unchecked proliferation produces a **giant condyloma acuminatum (Buschke–Löwenstein tumour)** — a locally invasive, non-metastasising verrucous mass that mimics verrucous carcinoma; adequate base biopsy is needed to exclude malignant transformation.

Differential Diagnosis

Condition	Distinguishing feature
Condyloma lata (2° syphilis)	Flat-topped, broad-based, moist, coarse, teeming with treponemes; VDRL/TPHA/FTA-abs positive; systemic rash, lymphadenopathy
Verrucous carcinoma / giant condyloma (Buschke–Löwenstein)	Larger, indurated, locally invasive on base biopsy; lacks a central fibrovascular core on histology
Vulvar intraepithelial neoplasia (VIN)	Pigmented, thickened, hyperkeratotic; biopsy shows dysplasia, not benign koilocytosis
Molluscum contagiosum	Dome-shaped, pearly-white, umbilicated papules; pox virus; Giemsa stain shows molluscum bodies
Vestibular papillomatosis	Symmetric, uniform, finger-like papillae on erythematous vestibule; normal variant, not HPV-related
Skin tags (acrochordon)	Single, soft, pedunculated; non-papillomatous surface

Investigations & Diagnosis

- ▶ **Clinical diagnosis** on inspection is usually sufficient — most cases do not need confirmatory testing.
- ▶ **Acetic acid application** — lesions turn acetowhite (a nonspecific sign shared with other epithelial changes; used mainly to map extent before treatment/colposcopy).
- ▶ **Colposcopy/vulvoscopy** if cervical or vaginal extension is suspected, or to define margins before ablative therapy.
- ▶ **Biopsy** — indicated when the lesion is atypical, pigmented, indurated/fixed, ulcerated, bleeding spontaneously, unresponsive to standard therapy, or in an immunocompromised patient — to exclude VIN, verrucous carcinoma, or invasive squamous cell carcinoma.
- ▶ **Screen for coexisting sexually transmitted infections** (VDRL/TPHA, HIV, Chlamydia trachomatis, Neisseria gonorrhoeae) given the shared risk-behaviour profile.
- ▶ HPV DNA typing is **not** required for the routine diagnosis or management of visible genital warts.

Management

The goal is **removal of visible warts**, not eradication of the virus — no single therapy is superior; choice depends on wart number, size, and anatomic site, patient preference, cost, convenience, pregnancy status, and provider experience.

Modality	Efficacy	Recurrence risk
Cryotherapy (liquid nitrogen)	63–88%	21–39%
Imiquimod 5% cream (patient-applied)	33–72%	13–19%
Podophyllin resin 10–25%	32–79%	27–65%
Podofilox 0.5% (patient-applied)	45–88%	33–60%
Trichloroacetic/bichloroacetic acid 80–90%	81%	36%
Electrodesiccation/cautery	94%	22%
Laser vaporisation	43–93%	29–95%
Intralesional interferon	44–61%	0–67%
Sinecatechins 15% ointment	not established	60%

- ▶ **Patient-applied topical agents** — imiquimod 5% cream, podofilox 0.5% solution/gel, or sinecatechins 15% ointment, for small-volume external warts.

- ▶ **Provider-administered options** — cryotherapy, 80–90% trichloroacetic/bichloroacetic acid, podophyllin resin 10–25%, electrocautery, surgical excision, laser vaporisation, or intralesional interferon for larger/refractory/pregnancy-related lesions.
- ▶ **In pregnancy** — podophyllin, podofilox, and sinecatechins are **contraindicated** (teratogenic/insufficiently studied); imiquimod is likewise not routinely recommended given limited safety data. Cryotherapy, trichloroacetic acid, surgical excision, or laser are the preferred options in pregnancy (CDC Sexually Transmitted Infections Treatment Guidelines, 2021).
- ▶ **Mode of delivery** — vaginal delivery is not contraindicated by genital warts; caesarean section is reserved for warts large enough to obstruct the birth canal or that risk severe haemorrhage on vaginal trauma. Vertical transmission to the neonate is uncommon but may (rarely) cause juvenile recurrent respiratory papillomatosis.
- ▶ **Prevention** — quadrivalent/9-valent HPV vaccination (covering types 6 and 11) prevents about 90% of condyloma when given before exposure; it has no therapeutic effect on established warts.
- ▶ **Counselling and follow-up** — sex partners may benefit from examination and counselling, though this is not mandatory since recurrence chiefly reflects reactivation of latent infection rather than reinfection. Roughly two-thirds of high-risk and most low-risk HPV infections clear spontaneously within 24 months; regular follow-up is advised to detect recurrence or malignant change.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 12.2 — Giant condyloma acuminata of vulva (DC Dutta's Gynaecology 7e, p.148)

High-yield exam pointers

- ▶ HPV types **6 and 11** cause >90% of condyloma acuminata; cauliflower-like papillary morphology.
- ▶ Anatomic distribution to recall: **cervix 70% > vulva 25% > anus 20% > vagina 10%**.
- ▶ Giant condyloma = **Buschke–Löwenstein tumour** — locally invasive, biopsy the base to exclude verrucous carcinoma.
- ▶ Key DDx: **condyloma lata** of secondary syphilis (flat, broad-based, VDRL/TPHA positive).
- ▶ Treatment table numbers to write: cryotherapy 63–88%, imiquimod 5% (33–72%), podophyllin 10–25% (32–79%), TCA 80–90% (81% efficacy, 36% recurrence).
- ▶ **Pregnancy rule:** podophyllin, podofilox, sinecatechins contraindicated; cryotherapy/TCA/excision/laser are safe; vaginal delivery permitted unless the warts obstruct the birth canal.
- ▶ HPV vaccine (types 6, 11) prevents ~90% of condyloma but does not treat existing lesions.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The pregnancy-specific drug contraindications and the CDC 2021 attribution are standard current STI-management teaching cross-checked against, but not verbatim from, the OBG textbook corpus used for this answer.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; CDC Sexually Transmitted Infections Treatment Guidelines, 2021.



Conservative management of fibroid uterus

Asked in: Paper III Nov 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — A fibroid (*leiomyoma*) is a benign, oestrogen/progesterone-responsive smooth-muscle tumour of the myometrium. "Conservative management" means treating the fibroid while preserving the uterus (and, where desired, fertility) — expectant observation, medical therapy, or a fertility-sparing/minimally invasive procedure — as opposed to hysterectomy, which remains definitive treatment.

Indications for a conservative approach

- ▶ Young woman desiring fertility, or infertility work-up where a fibroid must be shrunk before assisted reproduction.
- ▶ Asymptomatic fibroid found incidentally, size <12 weeks' gestation-equivalent.
- ▶ Perimenopausal woman with mild symptoms, awaiting natural atrophy after menopause.
- ▶ High surgical/anaesthetic risk (severe anaemia, cardiac/renal disease) needing temporary palliation.
- ▶ Preoperative shrinkage planned before myomectomy or vaginal hysterectomy.

Expectant (watchful) management

- ▶ Reserved for **asymptomatic** fibroids only, once the diagnosis is certain (transvaginal ultrasound ± saline-infusion sonography) — malignant (sarcomatous) change is rare (~0.1%), so prophylactic removal is not justified.
- ▶ Criteria: size <12 **weeks**, diagnosis certain, follow-up assured.
- ▶ Clinical review every **6 months** with **annual ultrasound**; escalate to treatment if the fibroid grows, becomes symptomatic, or distorts the cavity.

Medical management

Used as temporary palliation (to control bleeding/pain, correct anaemia, or shrink the fibroid before surgery) or, in selected perimenopausal/high-risk women, as an alternative to surgery. Diagnosis must first be certain.

Class	Agent & dose	Effect
Antifibrinolytic	Tranexamic acid 3–6 g/day in divided doses during bleeding	Inhibits plasminogen activation; cuts menstrual loss by ~30–55%; avoid if past thromboembolism
Prostaglandin synthetase inhibitor (NSAID)	Mefenamic acid 250–500 mg 8-hourly	Relieves pain from associated dysmenorrhoea/degeneration; does not reliably reduce fibroid-related menorrhagia
Antiprogestosterone	Mifepristone 25–30 mg daily for 3 months (5 mg also effective)	Shrinks fibroid, may cause amenorrhoea; long-term use avoided — risk of endometrial hyperplasia
Selective progesterone-receptor modulator (SPRM)	Ulipristal acetate 5–10 mg orally daily, given in 12-week courses (repeated up to 4 courses in trials)	Amenorrhoea in >70% within days; controls bleeding in >73%; reduces fibroid volume in the majority by the 4th course (PEARL trial data)
Antigonadotropin	Danazol 200–400 mg/day in divided doses for 3–6 months	Modest shrinkage via antigonadotropic/androgenic action; limited by androgenic side effects
GnRH agonist	Leuprolide 3.75 mg IM monthly; Goserelin 3.6 mg SC monthly; Buserelin 300–400 µg intranasal tds; Nafarelin 200 µg intranasal bd — optimum duration 3 months	Pituitary down-regulation → hypo-oestrogenism; shrinks uterine/fibroid volume by 30–64%, corrects anaemia and eases myomectomy/vaginal hysterectomy; add-back therapy needed beyond 6 months; fibroid regrows within 3–4 months of stopping
GnRH antagonist	Cetrorelix, Ganirelix	Immediate pituitary/ovarian suppression without an initial flare; benefits comparable to agonists, faster onset
LNG-IUS	Levonorgestrel-releasing intrauterine system	Local endometrial atrophy reduces blood loss and improves haemoglobin; not advised if uterine size >12 weeks or the cavity is distorted

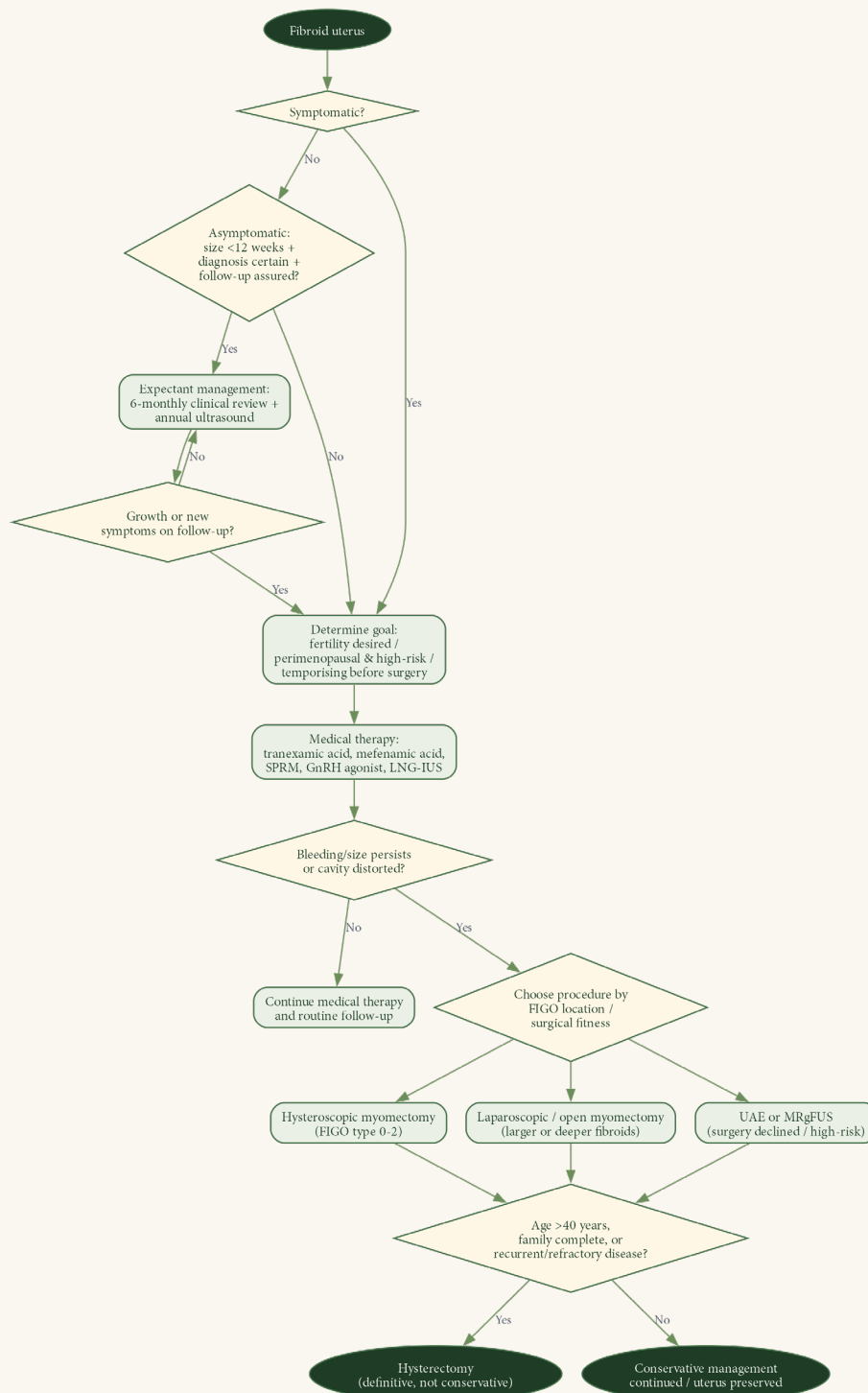
Class	Agent & dose	Effect
Hormonal	Combined oral contraceptive pill / progestogen-only pill	Second-line symptomatic control of bleeding

Fertility-sparing & minimally invasive procedures

Offered when medical therapy fails, or first-line in a woman wanting definitive shrinkage while retaining the uterus. Preoperative GnRH-agonist therapy (3 months) reduces size, vascularity and intraoperative blood loss before any of these.

Procedure	Technique	Suitable for	Outcome / caution
Hysteroscopic myomectomy	Resection with monopolar/bipolar loop or Nd:YAG laser	Submucous fibroid, FIGO type 0–2 (intracavitary to <50% intramural), generally ≤5 cm	Best conservation option for heavy menstrual bleeding/infertility; risk of uterine perforation, fluid overload
Laparoscopic myomectomy	Enucleation with laser/bipolar diathermy and extracorporeal suturing	Subserous and intramural fibroids of manageable number/size	Avoided if large, deep-intramural, multiple, or technically inaccessible
Abdominal (open) myomectomy	Single anterior incision; tourniquet/vasopressin around uterine isthmus to limit bleeding	Large, multiple, or deep fibroids unsuited to endoscopy	Recurrence 30–50%, relaparotomy 20–25%, pregnancy rate 40–60% after surgery
Laparoscopic myolysis	Laser/bipolar diathermy desiccation of the fibroid	Subserous/intramural fibroid where enucleation is not intended	Uterus retained but fibroid not removed; scarring may limit future pregnancy
Uterine artery embolization (UAE)	Polyvinyl-alcohol microspheres injected via femoral-artery catheter to occlude both uterine arteries	Symptomatic fibroid where surgery is declined/high-risk	Menorrhagia improves in 80–90%, ~60% volume reduction; post-embolization syndrome (pain, fever); contraindicated if future pregnancy desired, active infection, or genital malignancy
MR-guided focused ultrasound (MRgFUS)	Focused high-energy ultrasound causes coagulative thermal necrosis; outpatient, no anaesthesia	Small-to-moderate fibroid	Symptomatic improvement in 70–80%; contraindicated with uterine size >24 weeks, abdominal-wall scars, or desired fertility

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision pathway from expectant/medical management through fertility-sparing procedures to hysterectomy.

High-yield exam pointers

- ▶ Expectant management only if size <12 weeks, diagnosis certain, follow-up assured — review 6-monthly, ultrasound annually.
- ▶ Tranexamic acid 3–6 g/day; Mefenamic acid 250–500 mg tds (pain only, not menorrhagia).
- ▶ Mifepristone 25–30 mg OD × 3 months; Ulipristal acetate 5–10 mg OD, 12-week courses.
- ▶ GnRH agonist — leuprolide 3.75 mg IM monthly, optimum 3 months; shrinks uterus 30–64%; add-back beyond 6 months.
- ▶ FIGO leiomyoma type 0–2 = hysteroscopically resectable; deeper/hybrid types need laparotomy/laparoscopy.
- ▶ UAE: 80–90% symptom relief, 60% volume reduction — avoid if fertility desired.
- ▶ MRgFUS: outpatient, no anaesthesia; contraindicated if uterine size >24 weeks.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Coverage note: exact regulatory restrictions on long-term ulipristal acetate use (periodic liver-function monitoring) are current pharmacovigilance guidance and were not separately verified against the corpus texts used here; the dosing and efficacy figures above are textbook-verified.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e (FIGO leiomyoma classification, ulipristal acetate PEARL-trial data).



Critically analyse role of vaginal pessary in gynaecology

Asked in: Paper III 15-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — A vaginal pessary is a mechanical device inserted into the vagina to support or reposition the pelvic organs without surgery. It acts by occupying the vagina/stretching the genital hiatus, thereby preventing descent of the uterus and vaginal walls; it is a **conservative, reversible** measure — it relieves symptoms but does not cure the underlying defect.

Types and their place in current practice

Category	Examples	Mechanism	Best suited for
Support pessary	Ring (± support/knob), Hodge-Smith, Gehrung	Rests on pelvic floor, stretches uterosacral/levator support	POP-Q stage I–II; retroverted uterus

Category	Examples	Mechanism	Best suited for
Space-filling pessary	Gellhorn, cube, donut, inflatable	Fills vault, held by suction/space occupation	POP-Q stage III–IV, wide introitus, poor perineal body
Continence pessary	Ring with knob, Suarez ring, incontinence dish	Elevates/kinks bladder neck	Stress urinary incontinence in women declining surgery

Ring pessaries are the most used — easiest to fold, insert and remove; Gellhorn/cube give stronger support but are harder to self-manage (Berek & Novak 16e).

Indications in gynaecology

- ▶ **Pelvic organ prolapse (POP)** — patient unfit for anaesthesia/surgery, unwilling for surgery, awaiting surgery, or wishing to preserve fertility.
- ▶ **Mobile retroverted uterus** — *Hodge-Smith pessary* used both therapeutically and as the **pessary test**: inserted and retained for 3 months; relief of symptoms confirms retroversion as the cause and favours surgical correction (ventrosuspension) (DC Dutta's Gynaecology 7e).
- ▶ **Prolapse in early pregnancy** — placed until ~18 weeks, when the enlarging uterus rises above the pelvic brim and becomes self-supporting; also used in **puerperium** to aid involution.
- ▶ **Stress urinary incontinence** — continence/ring-with-knob pessary elevates the bladder neck in women who decline surgery.
- ▶ **Diagnostic aid** — distinguishes symptoms genuinely due to displacement from coincidental pathology before committing to surgery.

Patient selection

Favours pessary	Relative/absolute contraindication
Motivated, able to attend follow-up	Active vaginitis, erosion or ulceration
Adequate vaginal length, narrow introitus, good perineal body	Wide introitus/short vagina (<6 cm) — poor retention
Medically unfit for surgery, elderly, pregnant	Undiagnosed vaginal bleeding, active pelvic sepsis
Awaiting or refusing operation	Latex allergy (for latex/rubber devices); cognitive/motor impairment precluding self-care

Fitting and follow-up

- ▶ Empty bladder, lithotomy position; digital and ring-forceps examination to reduce the prolapse and estimate size.
- ▶ Select type/size by prolapse stage, vaginal length and introital width (trial-and-error is usual — size/type is often changed after the first fitting).

- ▶ Insert with water-soluble lubricant: broad end into the posterior fornix, narrow end behind the symphysis pubis.
- ▶ Confirm retention and comfort — ask the patient to stand, cough and perform Valsalva; a fingertip should sweep freely between pessary and vaginal wall.
- ▶ Ensure she can void before leaving the clinic.
- ▶ Review at 1–2 weeks, then 4–6 weeks; thereafter every 3 months if self-managed, or 4–12-weekly if removed/cleaned by the provider. Cube pessaries need daily removal; Gellhorn can stay 6–8 weeks; ring/donut are changed 2–3-monthly.
- ▶ At every visit check for discharge, erosion or ulceration; supplement with local vaginal oestrogen in atrophic/postmenopausal mucosa to reduce erosion and improve retention.

Complications

Frequency	Complications
Common	Vaginal discharge, odour, contact bleeding
Occasional	Erosion/ulceration, expulsion or an ill-fitting device causing excoriation, de-novo/unmasked stress incontinence after reduction of prolapse
Rare (neglected pessary)	Incarceration/forgotten pessary, vesicovaginal or rectovaginal fistula, hydronephrosis, urosepsis, and — very rarely — vaginal malignant change from chronic irritation

Critical appraisal

Strengths	Limitations
Non-surgical, immediately reversible; safe in the medically unfit, elderly, or pregnant patient	Does not cure prolapse — only mechanically supports it (Dutta)
High short-term satisfaction — 77–92% of successful fittings satisfied at 2–6 months (Berek & Novak 16e)	Continuation falls sharply with time — only ~45% at 3 months in an RCT, and ~14% at 14 years on long-term follow-up
Randomised data show ring and Gellhorn pessaries are equally effective for prolapse symptoms and voiding dysfunction	Fitting is trial-and-error; no consensus guideline yet on ideal device, change interval, or role of local oestrogen
Useful bridge to surgery, or definitive option when surgery is declined/contraindicated	Requires sustained patient motivation and follow-up; may mask rather than treat coexisting stress incontinence
A prospective cohort found no case worsened with pessary use over a year, and 21% actually improved	Evidence base is largely cohort-level with few randomised trials

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 38.48 — Ring pessary (DC Dutta's Gynaecology 7e, p.556)

Also sketch, alongside the ring: a *Hodge-Smith* pessary (curved, broad posterior/narrow anterior end) and a *Gellhorn* pessary (disc with a stem, for higher-grade prolapse), labelling how each seats in the vaginal vault.

High-yield exam pointers

- ▶ One-liner to always write: pessary "**relieves symptoms but does not cure prolapse.**"
- ▶ Rule of thumb: **support pessary (ring/Hodge)** → stage I–II; **space-filling (Gellhorn/cube/donut)** → stage III–IV.
- ▶ **Pessary test** = Hodge-Smith pessary retained **3 months**; relief of symptoms confirms retroversion as the cause.
- ▶ Prolapse in pregnancy: pessary until **18 weeks**.
- ▶ Follow-up ladder: **1–2 wk** → **4–6 wk** → **3-monthly**; cube = daily removal, Gellhorn up to 6–8 weeks.
- ▶ Complication mnemonic: discharge – erosion – incarceration – fistula (rare, from neglect).
- ▶ Co-prescribe **vaginal oestrogen** in atrophic mucosa to reduce erosion.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Evidence on pessary care (device choice, change interval, oestrogen use) remains sparse and mostly observational; current practice is guided by expert consensus rather than a single named society guideline.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.

♦ ♦ ♦

Current CDC regimes for treatment of acute PID

Asked in: Paper III 02-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Acute pelvic inflammatory disease (PID) is infection/inflammation of the upper female genital tract — endometrium, fallopian tubes, ovaries and pelvic peritoneum — from ascending spread of cervicovaginal organisms (*Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Mycoplasma genitalium*, and endogenous aerobic/anaerobic vaginal flora). Because delayed therapy raises the risk of tubal infertility, ectopic pregnancy and chronic pelvic pain, empirical broad-spectrum antibiotics are started

as soon as the clinical (minimum-criteria) diagnosis is made, without awaiting microbiological confirmation. The regimens below are those of the **Centers for Disease Control and Prevention (CDC) Sexually Transmitted Infections Treatment Guidelines, 2021** (Workowski KA, Bachmann LH, Chan PA, et al. *MMWR Recomm Rep* 2021;70(RR-4):1–187) — the current edition, which added **metronidazole to every regimen** (outpatient and inpatient) to strengthen anaerobic cover.

Principles of therapy

- ▶ Treat empirically as soon as PID is clinically suspected — do not wait for nucleic acid amplification test (NAAT) results.
- ▶ Cover all likely pathogens: *N. gonorrhoeae*, *C. trachomatis*, *M. genitalium*, gram-negative facultative bacteria, anaerobes and streptococci.
- ▶ Choose outpatient (oral/IM) or inpatient (parenteral) therapy on defined criteria (below) — both routes give equivalent long-term outcomes when correctly selected.
- ▶ Treat all recent sexual partners; ensure compliance and follow-up.

Criteria for hospitalisation

- ▶ A surgical emergency (e.g., appendicitis) cannot be excluded.
- ▶ Tubo-ovarian abscess (TOA) is suspected or confirmed.
- ▶ Pregnancy.
- ▶ Severe clinical illness — nausea/vomiting, high fever ($>38.3^{\circ}\text{C}/101^{\circ}\text{F}$), or peritonism precluding outpatient management.
- ▶ No clinical response to oral antimicrobial therapy within 48–72 hours.
- ▶ Inability to tolerate or follow an outpatient oral regimen.

If none of the above are present, outpatient (oral/IM) therapy is appropriate; otherwise, admit for parenteral therapy.

Outpatient (oral/IM) regimens — CDC 2021

Regimen	Drugs and doses
A	Ceftriaxone 500 mg IM single dose (1 g if body weight ≥ 150 kg) + doxycycline 100 mg orally twice daily $\times 14$ days + metronidazole 500 mg orally twice daily $\times 14$ days
B	Cefoxitin 2 g IM single dose with probenecid 1 g orally, given concurrently, + doxycycline 100 mg orally twice daily $\times 14$ days + metronidazole 500 mg orally twice daily $\times 14$ days

Regimen	Drugs and doses
C	Another parenteral third-generation cephalosporin (e.g., ceftizoxime or cefotaxime) + doxycycline 100 mg orally twice daily × 14 days + metronidazole 500 mg orally twice daily × 14 days

Re-examine the patient at 48–72 hours; hospitalise for parenteral therapy if there is no clinical improvement.

Inpatient (parenteral) regimens — CDC 2021

Regimen	Drugs and doses
A (preferred)	Ceftriaxone 1 g IV every 24 hours + doxycycline 100 mg orally or IV every 12 hours + metronidazole 500 mg orally or IV every 12 hours
B	Cefotetan 2 g IV every 12 hours or cefoxitin 2 g IV every 6 hours + doxycycline 100 mg orally or IV every 12 hours
Alternative	Ampicillin–sulbactam 3 g IV every 6 hours + doxycycline 100 mg orally or IV every 12 hours (preferred when a tubo-ovarian abscess is present), or clindamycin 900 mg IV every 8 hours + gentamicin 2 mg/kg IV/IM loading dose, then 1.5 mg/kg every 8 hours (a once-daily dose of 3–5 mg/kg may be substituted)

- ▶ Oral doxycycline is preferred over the intravenous form even in hospitalised patients — bioavailability is equivalent and oral dosing avoids infusion-site pain — unless ileus precludes oral intake.
- ▶ Continue parenteral therapy for at least 24–48 hours after clinical improvement (defervescence, reduced abdominal/pelvic tenderness), then switch to oral therapy to complete a **total 14-day course**: doxycycline 100 mg twice daily plus metronidazole 500 mg twice daily (Regimen A/B), or, after the clindamycin–gentamicin alternative, clindamycin 450 mg orally four times daily or doxycycline 100 mg twice daily.
- ▶ Metronidazole is added throughout (not only when bacterial vaginosis coexists) because anaerobes are increasingly implicated in tubal damage and long-term reproductive sequelae — the key change from the 2015 guidance.

Management in special situations

Situation	Modification
Tubo-ovarian abscess	Ampicillin–sulbactam + doxycycline, or clindamycin + gentamicin, are preferred (better anaerobic and abscess penetration); if no response by 72 hours, proceed to image-guided (ultrasound/CT) percutaneous drainage, or laparoscopic/laparotomy drainage if percutaneous access fails
Pregnancy	Hospitalise for parenteral therapy; avoid doxycycline (tetracycline class) — substitute per specialist consultation (e.g., azithromycin-based regimen); increased risk of maternal morbidity and preterm delivery
Intrauterine device (IUD) in situ	No routine removal is required; treat and reassess closely — remove the IUD only if there is no clinical improvement within 48–72 hours
HIV infection	Treat with the same regimens as HIV-negative women; monitor closely as clinical response may be slower

Partner treatment and follow-up

- ▶ Evaluate and empirically treat all sexual partners from the preceding 60 days for gonorrhoea and chlamydia, regardless of symptoms.
- ▶ Advise abstinence from intercourse until therapy is completed in the patient and her partner(s).
- ▶ Retest (rescreen) for gonorrhoea and chlamydia 3 months after treatment, irrespective of whether partners were treated.
- ▶ Indications for surgical drainage: generalised peritonitis, ruptured tubo-ovarian abscess, or a pelvic/tubo-ovarian abscess not responding to 48–72 hours of appropriate antibiotics.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 41.1 — Algorithm for management of pelvic inflammatory disease. (Te Linde 13e, p.2175)

High-yield exam pointers

- ▶ **2021 change:** metronidazole added to every regimen (outpatient and inpatient) — write this first.
- ▶ All regimens run for a **total of 14 days**, whatever the starting route.
- ▶ Outpatient Regimen A doses to reproduce verbatim: **ceftriaxone 500 mg IM (1 g if ≥ 150 kg) + doxycycline 100 mg BID + metronidazole 500 mg BID, all $\times 14$ days.**

- ▶ Inpatient Regimen A: ceftriaxone 1 g IV q24h + doxycycline + metronidazole; Regimen B: cefotetan/cefoxitin + doxycycline; Alternative: ampicillin–sulbactam + doxycycline (TOA) or clindamycin + gentamicin.
- ▶ Oral doxycycline = IV doxycycline in bioavailability — prefer oral even when hospitalised.
- ▶ Switch parenteral → oral 24–48 h after improvement; IUD does **not** need routine removal.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e and Berek & Novak's Gynecology 16e reproduce the older CDC 2006/2010/2015 tables (ceftriaxone 250 mg IM, metronidazole listed only as an optional addition for concurrent bacterial vaginosis); the regimens above reflect the current CDC Sexually Transmitted Infections Treatment Guidelines, 2021, which raised the ceftriaxone dose and added metronidazole routinely to every regimen.

SOURCE & COVERAGE

CDC Sexually Transmitted Infections Treatment Guidelines, 2021 (Workowski KA, Bachmann LH, Chan PA, et al., *MMWR Recomm Rep* 2021;70(RR-4):1–187); cross-checked against Berek & Novak's Gynecology 16e (Ch. 15) and DC Dutta's Textbook of Gynaecology 7e (Ch. 11), both of which print the earlier CDC 2006/2010 tables.



Dermoid cyst of ovary

Asked in: Paper III 20-Dec-2023 · Paper III Apr 2008 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — A dermoid cyst (mature cystic teratoma) is the most common benign germ-cell tumour of the ovary. It arises from a totipotent germ cell arrested after the first meiotic division and contains well-differentiated tissue derived predominantly from **ectoderm**, with variable mesodermal and endodermal elements, enclosed in a cystic capsule.

Pathology

Feature	Detail
Origin	Germ cell arrested after the first meiotic division (parthenogenetic)
Incidence	20–40% of all ovarian tumours; ~97% of ovarian teratomas
Laterality	Bilateral in 10–20%

Feature	Detail
Malignant transformation	1–2% — usually squamous cell carcinoma; typically women >40 years
Most common complication	Torsion (15–20%) ; rupture is uncommon (~1%)
<i>Rokitansky's protuberance</i>	Solid nodule covered by skin with sweat/sebaceous glands, projecting into the lumen; teeth and bone are found here — histology section must be taken from this area
Rare monodermal variants	Struma ovarii (thyroid tissue — may cause hyperthyroidism); strumal carcinoid (secretes serotonin/peptide hormones → carcinoid syndrome)

Tissue components:

Germ layer	Derivatives
Ectoderm (predominant)	Skin, hair, teeth, sebaceous material, neural tissue
Mesoderm	Bone, cartilage, muscle
Endoderm	Thyroid, salivary gland, bronchus, gut

Clinical features

- ▶ **Age** — reproductive years (most common ovarian germ-cell tumour of adolescence/young adulthood); reported in up to a quarter of cases in postmenopausal women.
- ▶ **Symptoms** — most tumours are asymptomatic, detected incidentally on abdominal/pelvic examination or imaging. When symptomatic: heaviness in the lower abdomen; a slowly and painlessly enlarging mass (grows over months); dull aching pain; rarely cardiorespiratory or gastrointestinal pressure symptoms if huge.
- ▶ **Signs** — general condition unaffected. Abdominally, a cystic, freely mobile mass with well-defined upper/lateral borders. On pelvic examination the mass is separate from the uterus and the cervix does not move with it. A mass felt **anterior to the uterus is classically dermoid**, because its high fat content lets it float.
- ▶ **Acute presentation** — torsion causes sudden severe hypogastric pain with a tender, tense, restricted mass; rupture causes peritonism from chemical/granulomatous peritonitis (sebum spill).

Differential diagnosis

Condition	Distinguishing feature
Full bladder	Disappears after catheterisation
Pregnancy	Re-examine after 4 weeks / confirm with ultrasound

Condition	Distinguishing feature
Pedunculated subserous fibroid	Slow growth over years, continuity with the uterus, firm/solid feel
Chocolate cyst (endometrioma)	Dysmenorrhoea, fixity and tenderness, "ground-glass" echoes on ultrasound
Encysted (tubercular) peritonitis	Doughy feel, associated ascites/tuberculosis history
Ascites	Flanks full and dull, umbilicus everted, fluid thrill, shifting dullness (absent with an ovarian cyst)

Investigations

Investigation	Finding
Plain X-ray abdomen/pelvis	Shadow of a tooth or bone — direct radiological evidence
Transvaginal ultrasound + colour Doppler	Echogenic "dermoid plug"/Rokitansky nodule with posterior acoustic shadowing ("tip-of-the-iceberg" sign), fat-fluid level, low vascularity
CT	Mixed-attenuation adnexal mass — fat + calcification/dental elements + fat-fluid level
MRI	Confirms fat-suppression pattern; used when ultrasound is equivocal
Serum CA-125, AFP, β -hCG	Usually normal; done to exclude malignant germ-cell elements/malignancy
Risk of Malignancy Index (RMI = ultrasound score $\times$ menopausal status $\times$ CA-125)	<25 = low risk; >250 = ~75% risk of malignancy — used to triage referral to a gynaecological-oncology centre

Complications

- ▶ **Torsion (15–20%)** — the most common complication; favoured by moderate size, a long pedicle, and the high fat content that lets the cyst float. Mechanism is haemodynamic — partial venous occlusion $\rightarrow$ congestion $\rightarrow$ progressive arterial compromise $\rightarrow$ complete torsion. Treatment: emergency laparoscopy/laparotomy with detorsion and cystectomy, conserving viable ovarian tissue, $\pm$ oophoropexy to prevent recurrence; ovariectomy (salpingo-oophorectomy) only if the adnexa is frankly gangrenous.
- ▶ **Rupture (~1%)** — spontaneous, or following trauma/torsion; sebum spill causes chemical/granulomatous peritonitis.
- ▶ **Infection** — usually secondary to torsion with adherent bowel.
- ▶ **Malignant transformation (1–2%)** — squamous cell carcinoma is the most common type; occurs mainly in women over 40 years.

Management

- ▶ Once diagnosed, admit for elective surgery — the nature and malignant potential cannot be reliably predicted on clinical grounds alone, and complications can occur at any time.
- ▶ **Preoperative triage** — a mass >8 cm at the extremes of age (postmenopausal or prepubertal), a solid component on imaging, or a high Risk of Malignancy Index warrants referral to a gynaecological-oncology centre before surgery.
- ▶ **Operative principles** — vertical (paramedian) incision adequate to deliver the cyst intact (preliminary aspiration is avoided — risk of spill and peritoneal contamination); inspect the peritoneal fluid and send washings for cytology; deliver the tumour intact and inspect the contralateral ovary, omentum, liver, undersurface of the diaphragm, and para-aortic nodes; frozen section if the cyst looks suspicious.
- ▶ **Definitive surgery**, individualised by age and fertility wish:
 - Young, fertility desired: **laparoscopic ovarian cystectomy**, preserving as much healthy ovarian cortex as possible (operation of choice); a retrieval endobag is used to prevent intraperitoneal spill.
 - Bilateral disease: cystectomy performed in at least one ovary; the uterus may be preserved for future assisted reproduction if bilateral ovariectomy is unavoidable.
 - Parous, age ≥40 years: **total abdominal hysterectomy with bilateral salpingo-oophorectomy**.
 - Torsion with a gangrenous adnexa: salpingo-oophorectomy (ovariectomy).
- ▶ The entire specimen — or, if only a piece is sent, a sample from the solid Rokitansky's protuberance — is sent for histopathological confirmation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 38.60A — Gross appearance of a dermoid cyst of the ovary showing hair, teeth (arrow) and butter balls (sebum aggregated to form spherules) (DC Dutta's Gynaecology 7e, p.563)

High-yield exam pointers

- ▶ Most common ovarian germ-cell tumour; **20–40%** of all ovarian tumours; bilateral in **10–20%**.
- ▶ **Torsion is the most common complication (15–20%)**; rupture is rare (~1%); malignant transformation is **1–2%** (squamous cell carcinoma).
- ▶ ***Rokitansky's protuberance*** — solid nodule bearing teeth/hair/bone; always sample histology from here.
- ▶ A mass felt **anterior to the uterus** = think dermoid (high fat content → floats).
- ▶ Plain X-ray showing a tooth/bone shadow = direct diagnostic evidence.
- ▶ ***Struma ovarii*** = monodermal teratoma composed of thyroid tissue (may cause hyperthyroidism); strumal carcinoid can cause carcinoid syndrome.

- Treatment: laparoscopic ovarian cystectomy (young, fertility desired) vs total abdominal hysterectomy with bilateral salpingo-oophorectomy (parous, ≥ 40 years); Risk of Malignancy Index stratifies oncology referral.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology quotes bilaterality as 15–20%, while Berek & Novak quotes approximately 10%; both agree malignant transformation is under 2%. Either figure (or the range 10–20%) is acceptable in the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Describe histogenesis of fibroid and secondary changes occurring in fibroid

Asked in: Paper I 16-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — A **fibroid (leiomyoma, fibromyoma)** is a benign, monoclonal tumour arising from a single transformed smooth-muscle cell of the myometrium, composed of interlacing smooth-muscle bundles and a variable amount of fibrous connective tissue. It is the commonest solid pelvic tumour in women, and being oestrogen- and progesterone-dependent, it grows through reproductive life and regresses after menopause.

Histogenesis

Factor	Mechanism / evidence
Cell of origin	Neoplastic transformation of a single myometrial smooth-muscle stem cell (monoclonal tumour); hypoxia during menstruation is postulated as the trigger for the initiating mutation
Chromosomal/genetic change	40–50% of fibroids show non-random, tumour-specific rearrangements — deletions, duplications, translocations of chromosomes 6, 7, 12 and 14 ; these alter energy metabolism, extracellular-matrix remodelling, and oestrogen/progesterone receptor expression

Factor	Mechanism / evidence
Growth factors	TGF- β and basic FGF drive smooth-muscle proliferation; EGF, PDGF increase DNA synthesis; TGF- β , EGF, IGF-1, prolactin promote mitogenesis; bFGF, VEGF drive angiogenesis; TGF- β also upregulates collagen/extracellular-matrix synthesis, explaining the fibrous component
Oestrogen dependence	Fibroids are rare before menarche, grow through reproductive years (fastest in pregnancy), regress after menopause, and contain more oestrogen receptors and more local aromatase (higher intratumoral oestradiol) than adjacent myometrium
Progesterone dependence	Fibroids have increased progesterone receptors (A and B) ; mitotic activity peaks with progesterone, not oestrogen, production; GnRH agonists shrink fibroids, but concurrent progestin blocks the shrinkage — progesterone is now recognised as the principal growth-driving hormone, not oestrogen alone
Family history	Positive family history common; risk raised by nulliparity, obesity/high body-mass index, polycystic ovary syndrome, and black race; reduced by multiparity, smoking, and combined oral contraceptive use
Growth pattern	Growth is asymmetric among multiple fibroids in the same uterus; overall growth is slow (3–5 years to become clinically palpable), but accelerates in pregnancy
Structural correlate	The tumour develops a false capsule from compressed adjacent myometrium; the periphery is the most vascular zone (site of continued growth) and the centre is the least vascular zone — this vascular gradient is the anatomical basis for the secondary changes below

Secondary changes in fibroid

Fibroids commonly undergo secondary change because the centre of the tumour repeatedly outgrows its blood supply. **Hyaline degeneration is the single most common secondary change (about 65% of fibroids); malignant (sarcomatous) change is rare (<0.1%).**

Category	Change	Key features
Degenerations	Hyaline (commonest, ~65%)	Central, least-vascular part; tumour becomes soft/elastic instead of firm; cut surface shows homogeneous loss of the whorled pattern; microscopically both muscle and fibrous elements show hyaline change
	Cystic	Follows liquefaction of hyalinised areas, typically post-menopause, in interstitial fibroids; irregular ragged-walled cystic spaces; a large cystic fibroid may mimic an ovarian cyst or pregnancy
	Fatty	Usually at/after menopause; fat globules deposited in muscle cells
	Calcific (~10%)	Subserous fibroids with a small pedicle or myomas in postmenopausal women; usually follows fatty change; precipitation of calcium carbonate/phosphate; complete calcification produces a "womb stone"
	Red (carneous) degeneration	Occurs in a large fibroid, characteristically in the second half of pregnancy and puerperium ; probably vascular (venous thrombosis with infarction) rather than infective; raw-beef cut surface with a fishy odour (fatty acids), colour from haemolysed red cells; partial recovery possible — called necrobiosis
	Atrophy	Post-menopausal loss of oestrogen support, or regression after a pregnancy-related enlargement — reduction in tumour size
	Necrosis	Circulatory inadequacy causing central necrosis, typically in a submucous polyp or pedunculated subserous fibroid

Category	Change	Key features
Infection	—	Organisms reach the tumour core through the sloughed/ulcerated surface of a submucous fibroid, usually following delivery or abortion; an intramural fibroid may also be infected post-delivery
Vascular change	Telangiectasis / lymphangiectasis	Dilatation of blood vessels or lymphatics within the myoma; cause unknown
Sarcomatous change	Leiomyosarcoma (<0.1%)	Suspected with sudden/rapid enlargement, recurrence of a fibroid polyp, or fibroid with post-menopausal bleeding

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 20.3 — Cut section of a uterus showing a submucous fibroid (DC Dutta's Gynaecology 7e, p.243)

Label on the cut section: the whorled/trabeculated fibromuscular pattern, the false capsule (compressed myometrium) with its plane of cleavage used at myomectomy, the more vascular periphery versus the avascular centre, and an area of hyaline change appearing as a homogeneous grey zone with loss of the whorled pattern.

High-yield exam pointers

- ▶ **Monoclonal origin from one myometrial smooth-muscle stem cell**; chromosomal rearrangements (6, 7, 12, 14) in 40–50%.
- ▶ Both **oestrogen and progesterone** drive growth — mitotic peak coincides with progesterone, not oestrogen, production (a shift from the "oestrogen-only" teaching).
- ▶ **Hyaline degeneration = commonest secondary change (~65%)**; sarcomatous change is rarest (<0.1%).
- ▶ **Red/carneous degeneration** — classic in **pregnancy and puerperium**; vascular in origin, called necrobiosis.
- ▶ **Calcific degeneration** — postmenopausal subserous fibroid → "**womb stone**."
- ▶ Vascular gradient: **periphery vascular (grows) vs centre avascular (degenerates)** — same logic explains the false capsule and the myomectomy cleavage plane.
- ▶ Red flag for malignancy: **sudden/rapid growth, recurrent fibroid polyp, or postmenopausal bleeding** — think leiomyosarcoma.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older texts (including DC Dutta's Gynaecology 7e) list sarcomatous change simply as a "secondary change" of an existing fibroid and describe only chromosome 6/7 abnormalities; current molecular evidence (Berek & Novak 16e) additionally implicates chromosomes 12 and 14, shows progesterone is at least as important as oestrogen in driving growth, and shows leiomyosarcoma is genetically distinct from fibroids — i.e., it arises *de novo* rather than by malignant transformation of a pre-existing fibroid.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Describe the development of Vagina and the management of Vaginal Agenesis

Asked in: Paper I 12-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — The vagina is a fibromuscular canal with a **dual embryological origin**: its upper four-fifths (mucosa) forms from the fused caudal ends of the **paramesonephric (Müllerian) ducts** (the uterovaginal canal), while its lower one-fifth forms from the **urogenital sinus** via the **sinovaginal bulbs**; the fibromuscular wall throughout is derived from Müllerian mesenchyme. **Vaginal agenesis** is congenital absence or hypoplasia of the vagina from failure of this sequence, most often as part of *Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome*.

Development of the Vagina

Gestational age	Event
5th–6th week	Paired paramesonephric (Müllerian) ducts arise as invaginations of coelomic epithelium lateral to the mesonephric (Wolffian) ducts
6th–9th week	Ducts grow caudally, then medially, and fuse in the midline ; unfused cranial parts remain as the fallopian tubes
9th week	The solid, fused caudal tip of the Müllerian ducts contacts the posterior wall of the urogenital sinus, forming the Müllerian (sinus) tubercle
~9th–10th week	Endoderm of the sinus tubercle proliferates to form paired sinovaginal bulbs , which become the inferior 20% (lower one-fifth) of the vagina

Gestational age	Event
—	The lowest part of the fused Müllerian ducts (uterovaginal canal) is occluded by a solid cord of tissue, the vaginal plate , continuous with the sinovaginal bulbs
3rd–5th month	The vaginal plate elongates cranially (carrying the developing cervix further from the introitus) and then canalises by central desquamation
~20th week	Canalisation is complete; the upper end of the new canal opens around the cervix to form the vaginal fornices
5th month	A thin rim of tissue at the junction of the sinovaginal bulbs and urogenital sinus persists as the hymen

Vaginal component	Embryological origin
Upper 4/5 (mucosa of vault, fornices, upper canal)	Müllerian (paramesonephric) duct — uterovaginal canal
Lower 1/5 (mucosa)	Urogenital sinus endoderm — sinovaginal bulbs → vaginal plate
Fibromuscular wall (entire length)	Mesoderm surrounding the Müllerian ducts
Hymen	Junction of fused sinovaginal bulbs with the urogenital sinus

Vaginal Agenesis — Classification and Associated Anomalies

- ▶ **Partial (segmental) agenesis of the upper vagina** — atresia of the upper third, often with cervical hypoplasia; the uterus may be present and functioning, so obstruction causes cryptomenorrhoea, haematometra and haematocolpos.
- ▶ ***Complete agenesis (Mayer-Rokitansky-Küster-Hauser, MRKH, syndrome)*** — the vagina and, almost always, the uterus are absent or rudimentary, while the ovaries and fallopian tubes are normal; karyotype is 46,XX with normal secondary sexual characteristics (normal ovarian/endocrine function). It accounts for roughly 10–15% of primary amenorrhoea and is the second commonest cause of primary amenorrhoea after gonadal dysgenesis (Turner syndrome).
- ▶ Two recognised subtypes: (1) **isolated Müllerian aplasia**; (2) Müllerian aplasia with **associated anomalies** — renal (absent, pelvic, or horseshoe kidney, duplicated collecting system — about 40%), skeletal (vertebral anomalies — about 12%), and occasionally cardiac or auditory defects.

- ▶ Must be distinguished from **complete androgen insensitivity syndrome** (46,XY, testes present, absent/scanty pubic-axillary hair, male-range testosterone) — both present as a blind vaginal pouch with normal breast development.

Clinical Features

- ▶ Primary amenorrhoea with otherwise normal pubertal (breast, pubic/axillary hair) development.
- ▶ Normal external genitalia with a shallow **blind vaginal dimple** on inspection.
- ▶ Cyclical lower abdominal pain, a pelvic/abdominal mass, or urinary symptoms if a functioning uterus is obstructed above a partial atresia (haematometra/haematocolpos).
- ▶ Inability to have vaginal intercourse (dyspareunia/apareunia) — often the presenting complaint around the time of marriage.
- ▶ Normal breast development and axillary/pubescent hair (distinguishes from androgen insensitivity, where hair is scanty).

Investigations

Investigation	Purpose / finding
Per-abdominal/per-rectal & genital examination	Blind, short vaginal pouch or dimple; absent cervix
Karyotype	46,XX (differentiates MRKH from 46,XY androgen insensitivity syndrome)
Serum testosterone	Normal female range (male range in androgen insensitivity)
Ultrasonography (pelvic ± transabdominal)	Confirms absent/rudimentary uterus, assesses ovaries and any obstructed haematometra
MRI pelvis	Best delineates Müllerian remnants and rudimentary uterine horns before surgery
Renal ultrasound / intravenous pyelography	Detects associated urinary tract anomalies (~40%)
Spine radiograph	Detects associated vertebral/skeletal anomalies (~12%)
Diagnostic laparoscopy	Confirms Müllerian anatomy, assesses functioning endometrium in rudimentary horns before definitive surgery

Management of Vaginal Agenesis

Management begins with **repeated psychological counselling** — patients are frequently distressed about sexual function, fertility and body image — before treatment is chosen. Options are **non-surgical** (first-line) and **surgical** (for dilation failure or patient preference).

- ▶ **Non-surgical — progressive dilation (Frank method, 1938): graduated vaginal dilators (starting ~1.5 cm diameter, 2–3 cm length) are pressed against the vaginal dimple for 20–30 minutes, 3–4 times daily, over 6–12 months; a functional vagina is usually achieved. The Ingram "bicycle-seat" stool* modification allows hands-free, sustained perineal pressure and improves compliance. This is the recommended first-line approach as it avoids surgery and graft-related scarring.*
- ▶ **Surgical vaginoplasty** (when dilation fails or is unacceptable):
 - ***McIndoe-Reed procedure (1938):*** a neovaginal space is created bluntly between bladder and rectum; a split-thickness skin graft is placed over a mould and kept in the space until epithelialisation occurs; post-operative dilator use is essential to prevent contracture.
 - ***Vecchiotti procedure:*** a laparoscopically-guided traction device ("olive") applies continuous inward traction on an acrylic bead placed at the vaginal dimple via threads brought out through the abdominal wall, progressively invaginating the perineum to create a neovagina over about 7–10 days.
 - **Vaginoplasty with amnion graft** (Chakraborty & Konar) — amniotic membrane is used over the mould instead of a skin graft.
 - ***Williams vulvovaginoplasty (1976):*** a vaginal pouch is fashioned from labia majora skin flaps; largely of historical interest now.
 - **Bowel (sigmoid) vaginoplasty:** a segment of sigmoid colon is interposed to create a self-lubricating neovagina; reserved for failed grafts or when extra length is needed.
- ▶ **Complications of vaginoplasty:** intra-operative — vesicovaginal fistula, rectovaginal fistula, infection, haemorrhage; late — dyspareunia and re-stenosis/contracture, which is why long-term dilator use or regular intercourse is required post-operatively to maintain patency.
- ▶ **Fertility:** the uterus is absent in complete MRKH syndrome, so pregnancy is not possible through the neovagina; genetic parenthood is achieved by oocyte retrieval, in-vitro fertilisation and embryo transfer to a **gestational surrogate**. When a functioning uterus exists above a corrected partial atresia, spontaneous conception and live birth are possible.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 5.2 — Embryonic development of the female genital tract: fusion of the paramesonephric ducts, sinovaginal bulb, genital canal and hymen (Berek & Novak's Gynecology 16e, p.151)

High-yield exam pointers

- ▶ Vagina = **dual origin**: upper 4/5 Müllerian (uterovaginal canal), lower 1/5 urogenital sinus (sinovaginal bulbs → vaginal plate); muscularis is Müllerian mesenchyme throughout.
- ▶ Canalisation of the vaginal plate completes by **~20 weeks**; failure → agenesis/atresia.
- ▶ **MRKH = 46,XX, normal ovaries/secondary sexual characters, vagina ± uterus absent** — write this line to separate it instantly from androgen insensitivity (46,XY).

- ▶ Associated anomalies to quote: renal ~40%, skeletal ~12%.
- ▶ Management ladder: Frank/Ingram dilators (first-line) → McIndoe-Reed graft / Vecchiotti traction / amnion graft / bowel vaginoplasty if dilation fails.
- ▶ Fertility in complete MRKH needs oocyte retrieval + IVF + gestational surrogacy (uterus absent).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Some texts describe the entire vaginal epithelium as sinus-derived with only the muscularis being Müllerian (an alternative embryological model); the "upper 4/5 Müllerian, lower 1/5 sinus" description above is the version most widely reproduced in current gynaecology texts and is adequate for exam purposes.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e.



Describe the methods, general principles of safe minimal access surgery and its advantages and disadvantages

Asked in: Paper III 17-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Minimal access surgery (MAS), synonymous with minimally invasive surgery (MIS), is the range of gynaecological operative procedures performed through a laparoscope or hysteroscope instead of a laparotomy incision. Access is gained via small port incisions after creating a working space (pneumoperitoneum for laparoscopy, distension medium for hysteroscopy), and the operation is carried out under video-magnified vision.

Methods (routes of access)

Method	Access route	Typical use
Laparoscopy	Transabdominal, via umbilical/accessory ports, CO ₂ pneumoperitoneum	Diagnostic evaluation; adnexal, tubal, endometriosis, myomectomy, hysterectomy (TLH/LAVH) surgery
Hysteroscopy	Transcervical, uterine cavity distended with CO ₂ /fluid medium	Abnormal uterine bleeding, submucous fibroid/polyp, septum, Asherman's, IUD retrieval

Method	Access route	Typical use
Robot-assisted laparoscopy	Same ports as laparoscopy, instruments driven by a surgeon-console robotic interface	Complex reconstructive work — sacrocolpopexy, radical procedures, fistula/ureteric repair
Culdoscopy/NOTES (historical/limited)	Trans-vaginal (pouch of Douglas)	Largely superseded by laparoscopy

General principles of a SAFE procedure

- ▶ **Patient selection** — screen out contraindications (Table): severe cardiopulmonary disease, haemodynamic instability, generalized peritonitis/significant haemoperitoneum, intestinal obstruction, extensive peritoneal adhesions, very large pelvic mass, pregnancy beyond mid-trimester (>16 weeks), advanced malignancy, uncorrected anticoagulation.
- ▶ **Informed consent** must include the possibility of conversion to laparotomy.
- ▶ **Positioning** — low lithotomy with buttocks at the table edge, well-padded stirrups, empty bladder (Foley catheter), Trendelenburg tilt (15–30°) after primary entry to displace bowel from the pelvis.
- ▶ **Safe peritoneal entry** — the single step responsible for most laparoscopy-specific complications:
 - **Closed (Veress needle) technique:** 1–1.5 cm sub-umbilical incision; needle held in the midline sagittal plane, directed at 45° to the sacral hollow in average-weight women (up to ~90° in obese patients, since the umbilicus migrates caudally with weight).
 - **Open (Hasson) technique** (Harrith Hasson, 1971): mini-laparotomy under direct vision down to the fascia, which is opened sharply and the peritoneum entered under vision — avoids the blind needle/trocar pass.
 - **Direct trocar entry:** primary cannula–trocar placed without pre-insufflation, acceptable when there is no prior abdominal surgery.
 - **Alternate entry sites** when sub-umbilical adhesions are suspected: **Palmer's point** (left mid-clavicular line, 3 cm below the costal margin, after gastric decompression) or trans-vaginal (pouch of Douglas).
- ▶ **Confirm correct Veress needle placement before insufflating:**
 - Initial intraperitoneal pressure <10 mmHg on the insufflator (most reliable sign).
 - Syringe (saline aspiration) test — no blood/bowel content aspirated, and instilled saline cannot be withdrawn back.
 - Hanging-drop sign, loss of liver dullness, symmetrical abdominal distension.
- ▶ **Controlled pneumoperitoneum** — CO₂ insufflation at a flow rate of about 1 L/min; many surgeons briefly raise pressure to 20–25 mmHg to tense the abdominal wall for safer cannula insertion, then drop to a **steady working pressure of 12–15 mmHg (ceiling 20 mmHg)** — exceeding this impairs diaphragmatic excursion and venous return.

- ▶ **Secondary ports** are always placed **under direct vision**, lateral to the inferior epigastric vessels, to avoid vascular and visceral injury.
- ▶ **Meticulous haemostasis** with bipolar diathermy/vessel-sealing devices (LigaSure, harmonic scalpel) before deflation; **complete gas evacuation** and layered port closure (≥ 10 mm fascial defects) to prevent port-site hernia.
- ▶ **General anaesthesia with muscle relaxation** is standard (minor procedures such as sterilization may use local/regional); anaesthetist must anticipate the haemodynamic effects of pneumoperitoneum and head-down tilt.
- ▶ **Low threshold for conversion to laparotomy** if anatomy is unclear, bleeding is uncontrolled, or a suspected bowel/ureteric/bladder injury needs formal repair.

Advantages

- ▶ Rapid postoperative recovery and quicker resumption of day-to-day activity
- ▶ Less postoperative pain and reduced analgesic requirement
- ▶ Shorter hospital stay, lower overall cost
- ▶ Minimal abdominal scarring (cosmetic benefit)
- ▶ Reduced blood loss and less adhesion formation
- ▶ Lower risk of incisional hernia
- ▶ Higher patient satisfaction

Disadvantages / difficulties

- ▶ Longer operating time, especially early in the learning curve
- ▶ High initial equipment expenditure; sophisticated instruments needed
- ▶ Requires specialized surgeon training and a long learning curve
- ▶ Counter-intuitive instrument motion; loss of tactile (haptic) feedback/palpation
- ▶ Two-dimensional video image (loss of natural 3-D depth) — improved with robotic 3-D optics
- ▶ Limited number of ports restricts instrument movement and access
- ▶ Complications specific to MAS may occur and can rarely be fatal (see below)

Complications specific to minimal access surgery

Category	Examples
Entry-related	Vascular injury (great vessels, inferior epigastrics, mesenteric vessels), bowel perforation by Veress needle/trocar, extraperitoneal (surgical/omental) emphysema
Visceral/thermal	Bowel, bladder or ureteric injury — mechanical (dissection) or thermal (electrosurgical/laser)

Category	Examples
Gas-related	CO ₂ gas embolism (hypotension, arrhythmia); hypercarbia and metabolic acidosis
Anaesthesia-related	Basal atelectasis, hypoventilation from pneumoperitoneum + Trendelenburg, aspiration
General surgical	Haemorrhage, infection, port-site hernia, wound dehiscence

Reported mortality for diagnostic laparoscopy is about **5 per 100,000 procedures**, falling towards zero with surgeon experience; fatal causes are cardiac arrest, gas embolism, and unrecognised bowel injury.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 36.2A–E — Laparoscopic instruments: A. Telescope; B. Telescope 0-degree viewing angle; C. Telescope 30-degree viewing angle; D. Veress needle; E. Trocar and cannula with multifunctional valve (DC Dutta's Gynaecology 7e, p.524)

Also sketch the **port entry map**: primary umbilical port, two lateral accessory ports (3–4 cm medial to each anterior superior iliac spine, lateral to the inferior epigastric vessels), a suprapubic port, and Palmer's point in the left mid-clavicular line.

High-yield exam pointers

- ▶ MAS = MIS — umbrella term for laparoscopy + hysteroscopy ± robotic surgery.
- ▶ Entry: **Veress (closed) vs Hasson (open) vs direct trocar** — know all three and when each is preferred (adhesions → open or Palmer's point).
- ▶ Confirm needle placement: **intraoperative pressure <10 mmHg** is the most reliable sign.
- ▶ Numbers to reproduce: **45° needle angle** (up to 90° if obese); insufflation flow ~1 L/min; entry pressure **20–25 mmHg**, working pressure **12–15 mmHg**, **never >20 mmHg**.
- ▶ Contraindications mnemonic — cardio-pulmonary instability, peritonitis/haemoperitoneum, obstruction, dense adhesions, large mass, advanced pregnancy/malignancy, anticoagulation.
- ▶ Mortality figure: ~5/100,000 diagnostic laparoscopies.
- ▶ Advantages/disadvantages are commonly asked as a table — pair "less pain/shorter stay" against "long learning curve/high cost/loss of haptic feedback."

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Working pressures quoted above follow current practice as described in Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e states a simpler ceiling of 20 mmHg throughout without distinguishing an entry versus maintenance phase — both are acceptable in an RGUHS answer, but the entry/working split reflects current standard practice.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Chapter 36, Endoscopic Surgery in Gynecology); Berek & Novak's Gynecology 16e (Chapter 26, laparoscopic peritoneal access).

**Describe the steps of Fothergill's operation**

Asked in: Paper III 29-Sep-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — *Fothergill's operation* (also called the **Manchester operation**) is a uterus-conserving surgery for uterovaginal prolapse associated with **supravaginal elongation of the cervix, cystocele and rectocele**. It combines amputation of the elongated cervix, shortening/plication of the **Mackenrodt's (cardinal) ligaments** in front of the cervix to restore uterine support and anteversion, with anterior colporrhaphy and colpoperineorrhaphy to repair the associated vaginal wall prolapse.

Indications

Indication
Uterovaginal prolapse where preservation of reproductive/uterine function is desired (young or middle-aged woman not wishing hysterectomy)
Prolapse due to supravaginal elongation of the cervix with cystocele/rectocele
Alternative to vaginal hysterectomy with pelvic floor repair (PFR) when the family is not completed

Principal steps (composite outline)

- ▶ Preliminary dilatation and curettage (D&C).
- ▶ Amputation of the (elongated) cervix.
- ▶ Plication of the Mackenrodt's ligaments in front of the cervix.
- ▶ Anterior colporrhaphy.
- ▶ Colpoperineorrhaphy ($\pm$ vaginal sterilisation if the family is completed).

Detailed steps of the operation

Preliminaries (as for anterior colporrhaphy)

- ▶ General or epidural anaesthesia; patient in lithotomy position; vulva/vagina swabbed with antiseptic and sterile draping.
- ▶ Bladder emptied by metal catheter; vaginal/bimanual examination to assess type and degree of prolapse.

- ▶ **Preliminary D&C** — uterine sound assesses the degree of cervical elongation; dilatation facilitates later passage of sutures through the cervical canal, ensures uterine drainage and prevents stenosis of the external os; curettage removes unhealthy endometrium.

Actual operative steps

- ▶ Sims' speculum introduced; anterior lip of cervix held with vulsellum and drawn down; inverted "T" incision made on the anterior vaginal wall as in anterior colporrhaphy, and the bladder dissected and pushed up to expose the uterovesical peritoneal fold.
- ▶ Posterior lip of the cervix held with a vulsellum and drawn upward; Allis forceps placed at the midpoint of the posterior cervicovaginal junction.
- ▶ The anterior transverse incision is extended posteriorly across the posterior cervicovaginal junction; the lateral and posterior vaginal wall is dissected off the cervix by scissors and finger dissection.
- ▶ The **Mackenrodt's ligament with the descending cervical artery** on each side is clamped at a level above the planned cervical amputation, cut, and the pedicle ligated with chromic catgut No. 1 — this preserves a long stump of ligament for later plication.
- ▶ Any coexisting enterocele is sought for and repaired if present.
- ▶ The cervix is **amputated** at the calculated level (kept low if future childbearing is desired).
- ▶ The anterior lip of the amputated cervix is held with a single-toothed vulsellum.
- ▶ The **posterior lip** of the amputated cervix is re-covered by the posterior vaginal flap using a **Sturmdorf suture**, or alternatively by **Bonney's method** (a catgut stitch fixed at the apex of the posterior flap, its ends passed through the cervical canal and brought out laterally on either side of the new posterior fornix, then tied in the midline).
- ▶ The cut ends of the Mackenrodt's ligaments of each side are sutured to the **anterior surface of the cervix**, shortening and re-suspending the ligaments so the cervix (and uterus) is drawn up and anteverted. Alternatively the ligaments are fixed with the **Fothergill's stitch**, which passes in sequence: vaginal skin at the Fothergill's lateral point → Mackenrodt's ligament → cervical tissue (outside-in) → cervical tissue (inside-out) → Mackenrodt's ligament of the opposite side → vaginal skin (Fothergill's lateral point) of the opposite side.
- ▶ **Pubocervical fascia** is approximated as in anterior colporrhaphy, closing the cystocele.
- ▶ Redundant vaginal mucosa is excised and the cut margins of the anterior vaginal wall are opposed with interrupted sutures.
- ▶ **Posterior colpoperineorrhaphy** is carried out to correct the rectocele and repair the perineal body.
- ▶ Toileting of the vagina; a vaginal pack is inserted and a self-retaining (Foley) catheter is placed.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.18A–D — Principal steps of Fothergill's (Manchester) operation: A. Sturmdorf suture covering the raw posterior cervical lip; B. Knot tied in the new posterior fornix; C. Mackenrodt's ligament ends approximated in front of the cervix; D. Ligament ends fixed using the Fothergill's stitch (DC Dutta's Gynaecology 7e, p.199)

Complications

Timing	Complications
During operation	Haemorrhage; injury to bladder or rectum
Postoperative	Retention of urine/cystitis; haemorrhage (primary or secondary); infection
Late	Dyspareunia; cervical stenosis → haematometra; infertility; cervical incompetence; cervical dystocia in a subsequent labour; recurrence of prolapse

High-yield exam pointers

- ▶ Fothergill's = Manchester operation — uterus-conserving prolapse surgery (unlike Ward–Mayo vaginal hysterectomy with PFR, used when family is completed).
- ▶ Five-step composite mnemonic: D&C → cervical amputation → Mackenrodt's plication in front of cervix → anterior colporrhaphy → colpoperineorrhaphy.
- ▶ Name the two ways to cover the amputated posterior cervical lip: Sturmdorf suture (routine) vs Bonney's method.
- ▶ Know the Fothergill's stitch path: lateral vaginal skin point → Mackenrodt's → across cervix → Mackenrodt's (opposite side) → opposite lateral vaginal skin point — it re-approximates and anteverts the cervix.
- ▶ Late-complication triad worth writing: cervical stenosis/haematometra, infertility, cervical incompetence/dystocia in future labour.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e is the source of this classical description; the operation is now performed less often than in the past because vaginal hysterectomy with pelvic floor repair or, in younger nulliparous women, a sling/cervicopexy procedure (e.g., Purandare's operation) is increasingly preferred, but Fothergill's operation remains the standard answer where uterine preservation with cervical elongation is the specific indication.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 16 — Displacement of the Uterus, pp.174–180, Figs 16.18A–D, Tables 16.4–16.6).



Diagnosis of cervical incompetence. Role of encerclage in Modern obstetrics

Asked in: Paper II 14-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Cervical incompetence (now termed *cervical insufficiency*) is the inability of the uterine cervix to retain a pregnancy to term in the absence of perceived uterine contractions. It presents classically as recurrent, painless, progressive second-trimester cervical dilatation and effacement, with prolapse and ballooning of the membranes into the vagina, followed by rupture of membranes and expulsion of an immature fetus — a sequence that, untreated, tends to recur at a progressively earlier gestational age in each subsequent pregnancy. It remains a clinical diagnosis of exclusion.

Diagnosis of cervical incompetence

Basis of diagnosis	Findings	Comment
Obstetric history (before/between pregnancies)	Classic history of ≥ 1 (typically ≥ 2) painless second-trimester loss(es) or extreme preterm birth (< 28 weeks) with no or minimal contractions, bleeding, or other symptoms; risk factors on history — cervical trauma (dilatation & curettage, dilatation & evacuation, forceful mechanical dilatation, cone biopsy/LEEP, trachelectomy, cervical amputation) or a congenital cause (Müllerian anomaly, in-utero diethylstilbestrol exposure, connective-tissue disorder e.g. <i>Ehlers-Danlos</i> , <i>Marfan</i>)	Supports the diagnosis; presence of risk factors for structural cervical weakness strengthens it
Interconceptional (non-pregnant) examination	A no. 6–8 Hegar dilator passes beyond the internal os without resistance or pain, and without the normal "snap" on withdrawal; premenstrual hystero-cervicography shows a funnel-shaped internal os; pull-through test with an inflated Foley balloon	Largely of historical value, rarely used now

Basis of diagnosis	Findings	Comment
Transvaginal sonography (TVS) — current gold standard	Cervical length ≤ 25 mm before 24 weeks (mean length is 35–40 mm from 14–22 weeks, falling to ~ 35 mm at 24–28 weeks and ~ 30 mm after 32 weeks; the 10th centile at mid-pregnancy is ~ 25 mm); funnelling of the internal os > 1 cm, progressing through the T $\rightarrow$ Y $\rightarrow$ V $\rightarrow$ U shapes described by <i>Ziliani</i> as effacement advances from the internal os outward	Used serially in women with one prior second-trimester loss/extreme preterm birth, or when a history-based diagnosis is uncertain
Physical examination in pregnancy (14–27 weeks)	Painless cervical dilatation/effacement on speculum or digital examination, with no or inadequate contractions to explain it, $\pm$ prolapsed or ruptured membranes; a cervix < 15 mm carries a very high risk of preterm labour	The "rescue"/physical-examination-based category

Associated work-up: pelvic (3D) ultrasonography and hysterosalpingography in the secretory phase to detect a Müllerian anomaly, and hysteroscopy/laparoscopy where a uterine malformation is suspected, since a congenital anomaly is a treatable/identifiable co-factor.

These three time-points of diagnosis — obstetric history, TVS-detected short cervix, and physical-examination-detected dilatation — map directly onto the three evidence-based indications for cerclage described below.

Role of cerclage in modern obstetrics

Cerclage reinforces the weak cervix with a non-absorbable tape encircling the internal os. Older practice offered cerclage empirically to almost every woman with a "classic history"; modern obstetrics restricts it to women most likely to benefit, because cerclage itself carries surgical risk and can stimulate uterine contractions.

Indication category	Criteria	Current recommendation
History-indicated (elective/prophylactic)	Classic history of painless second-trimester loss(es), no other identifiable cause	Placed electively at 12–14 weeks
Ultrasound-indicated (therapeutic)	Singleton pregnancy + prior spontaneous preterm birth/second-trimester loss + TVS cervical length ≤ 25 mm before 24 weeks	Strongest trial evidence; ACOG (2021) and RCOG Green-top Guideline No. 75 (<i>Cervical Cerclage</i> , 2022) both recommend offering cerclage on this basis

Indication category	Criteria	Current recommendation
Physical examination-indicated (rescue/emergency)	Painless cervical dilatation $\pm$ bulging membranes on examination, 14–23 ⁺ ₆ weeks	Emergency cerclage; reduces preterm birth versus expectant management but has a higher complication rate
Twin (multiple) gestation with an incidental short cervix	No prior cervical-factor loss	Routine cerclage is not recommended — evidence shows no benefit and a possible increase in preterm birth

Types and technique

Type	Technique	Notes
McDonald (1963)	Vaginal purse-string suture of Mersilene tape at the cervicovaginal junction, level of the internal os; no incision	~80–90% success; simplest, least blood loss; most widely used
Shirodkar (1955)	Vaginal; anterior transverse + posterior vertical incision, tape passed submucosally at the internal os and buried under mucosa	More technically demanding; a retained tape can be reused in a future pregnancy
Transabdominal (isthmic)	Mersilene tape placed at the uterine isthmus via laparotomy/laparoscopy/robotic surgery, ideally pre-pregnancy or at 11–13 weeks	Reserved for failed vaginal cerclage or a hypoplastic/scarred cervix; mandates caesarean delivery

Steps of McDonald's cerclage

- ▶ Regional anaesthesia, lithotomy position, bladder emptied; cervix exposed with a posterior speculum; any bulging membranes gently reduced.
- ▶ Non-absorbable Mersilene tape placed as a purse-string suture at the cervicovaginal junction, at the level of the internal os, starting anteriorly.
- ▶ Four to five deep bites taken circumferentially around the cervical stroma, avoiding the bladder and vessels laterally.
- ▶ Tape tied anteriorly, narrowing the canal to 5–10 mm (admitting a fingertip).
- ▶ In the *Shirodkar* variant, anterior transverse and posterior vertical vaginal incisions are made first so the tape can be placed higher, submucosally at the internal os, and the mucosa is then closed over the buried knot.

Contraindications: intrauterine infection/chorioamnionitis; ruptured membranes; active vaginal bleeding; uterine irritability/regular contractions; cervical dilatation >4 cm; fetal death or lethal anomaly.

Timing and follow-up: elective cerclage at 12–14 weeks; rescue cerclage up to 23–24 weeks; bed rest 2–3 days postoperatively; serial cervical/fetal surveillance; stitch electively removed at 36–37 weeks, or immediately on onset of labour, membrane rupture, or chorioamnionitis.

Complications: suture slippage/cutting through the cervix; chorioamnionitis; iatrogenic preterm rupture of membranes; preterm labour; cervical laceration at delivery if the stitch is not removed in time; cervical stenosis/scarring causing dystocia.

Current place among alternatives: vaginal micronized progesterone is now the preferred first-line option for an incidentally short cervix without a prior spontaneous preterm birth; a cervical (Arabin) pessary is an alternative non-surgical option but trial evidence is conflicting. Cerclage is favoured specifically when a prior spontaneous preterm birth/second-trimester loss coexists with a short cervix, or when the classic history itself is diagnostic — reflecting modern obstetrics' shift from blanket empirical cerclage to an individualised, evidence-based choice between cerclage, progesterone, and pessary.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 11.3 — McDonald cerclage procedure for incompetent cervix (Williams Obstetrics 26e, p.221)
- Fig 11.4 — Modified Shirodkar cerclage for incompetent cervix (Williams Obstetrics 26e, p.222)

High-yield exam pointers

- ▶ Diagnosis rests on three pillars: **classic history**, **TVS cervical length ≤ 25 mm before 24 weeks** ($\pm$ funnelling >1 cm, T $\rightarrow$ Y $\rightarrow$ V $\rightarrow$ U progression), and **physical-examination dilatation** (14–27 weeks).
- ▶ These three pillars = the three **indications for cerclage**: history-indicated, ultrasound-indicated, physical examination-indicated (rescue).
- ▶ *McDonald* (purse-string, no incision) vs *Shirodkar* (buried tape via incisions) — both ~80–90% success; transabdominal reserved for failed vaginal cerclage.
- ▶ Cerclage timing: **12–14 weeks** placement (elective), up to **23–24 weeks** (rescue); remove at **36–37 weeks**.
- ▶ Contraindications to write: infection, ruptured membranes, bleeding, dilatation >4 cm.
- ▶ Routine cerclage is **not** recommended for twins with an incidental short cervix.
- ▶ Vaginal micronized progesterone, not cerclage, is first-line for an isolated short cervix without prior preterm birth.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Classical teaching offered cerclage empirically to any woman with a "classic history" of cervical incompetence, whereas current ACOG (2021)/RCOG Green-top Guideline No. 75 (2022) practice selects cerclage using the three evidence-based indications above, prefers vaginal progesterone over cerclage for an isolated short cervix, and specifically advises against routine cerclage in twin pregnancies.

SOURCE & COVERAGE

Williams Obstetrics 26e; Jeffcoate's Principles of Gynaecology 9e; DC Dutta's Textbook of Gynaecology 7e; ACOG (2021); RCOG Green-top Guideline No. 75 (2022).



Discuss clinical evaluation of woman with postmenopausal bleeding

Asked in: Paper III 15-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Postmenopausal bleeding (PMB) is any vaginal bleeding, however slight, occurring after established menopause (12 months of amenorrhea); the same concern applies to menstruation persisting beyond age 55 years. As many as **one-third of cases are due to genital malignancy**, so every case of PMB must be regarded as **carcinoma until proved otherwise** — evaluation is therefore aimed at excluding malignancy first, then treating the benign cause found.

Causes (guides the differential to be excluded)

Cause	Approx. frequency	Comment
Atrophic endometritis/vaginitis	~30%	Commonest benign cause; thin, friable atrophic mucosa
Exogenous estrogen (HRT, unopposed or missed-dose)	~30%	Any unexpected/breakthrough bleeding on HRT needs endometrial sampling
Endometrial carcinoma	~15%	Single most important diagnosis to exclude
Endometrial or cervical polyp	~10%	May coexist with malignancy — a benign finding does not stop the work-up
Endometrial hyperplasia	~5%	~30% of atypical hyperplasia/EIN has concurrent carcinoma

Cause	Approx. frequency	Comment
Miscellaneous	~10%	Cervical/vaginal/vulval/tubal carcinoma, uterine sarcoma, granulosa cell tumour of ovary, urethral caruncle/polyp, senile vaginitis, decubitus ulcer (with procidentia), retained pessary/IUCD, tubercular endometritis, trauma

Cause remains unidentified in up to 25% (falling with wider hysteroscopy use).

History

- ▶ Age at menopause and years since; whether menstruation truly ceased.
- ▶ Menstrual pattern before menopause (any perimenopausal irregular bleeding).
- ▶ Use of **hormone therapy (HT)/tamoxifen** — even if present, full evaluation is still mandatory to exclude malignancy.
- ▶ Amount, number of episodes, duration, and any postcoital bleeding.
- ▶ Sensation of "something coming down" (procidentia predisposes to decubitus ulcer bleeding).
- ▶ Urinary symptoms — dysuria/frequency (urethral caruncle, polyp or carcinoma).
- ▶ Comorbidities that raise endometrial-cancer risk — **obesity, diabetes, hypertension**.
- ▶ Family history of endometrial/ovarian/colorectal cancer (Lynch syndrome).

Examination

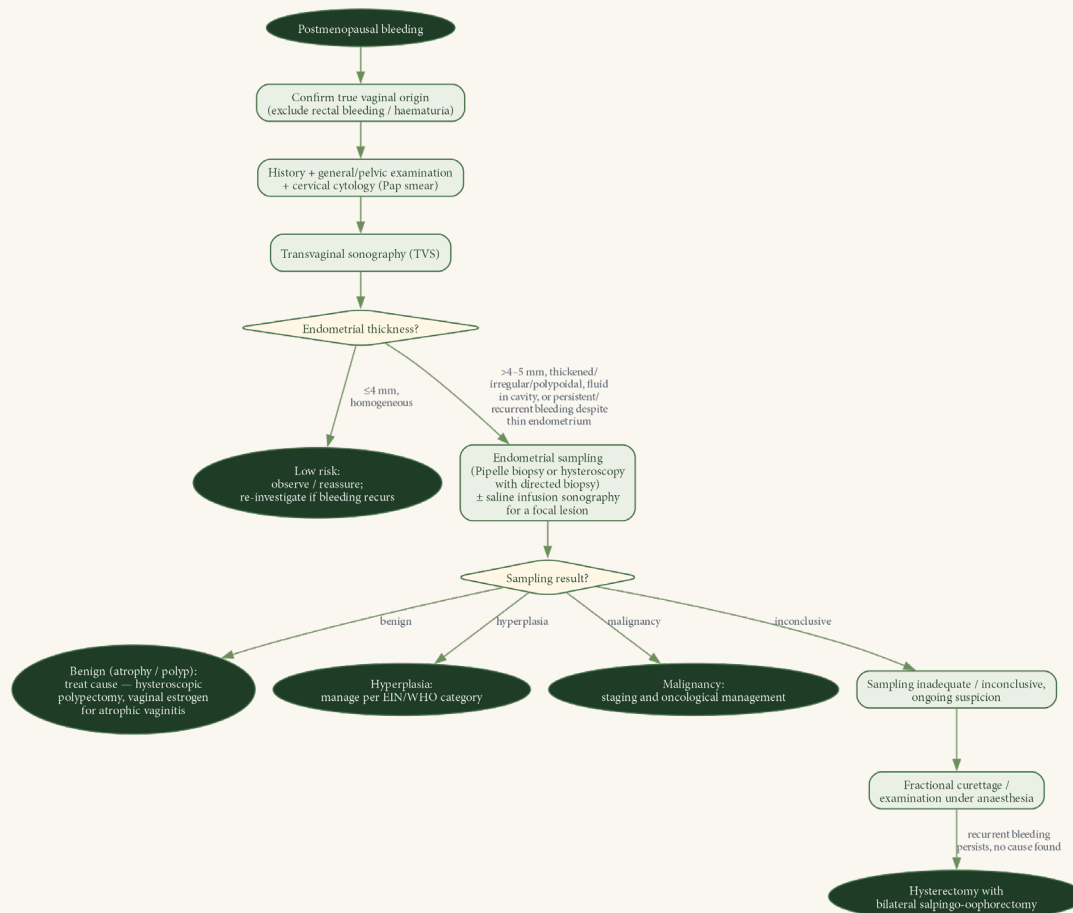
- ▶ **General:** obesity, diabetes, hypertension screen (endometrial-cancer risk factors); palpate groin/supraclavicular nodes; breast examination.
- ▶ **Per abdomen:** a lower-abdominal lump may indicate pyometra, uterine sarcoma, or an adnexal mass.
- ▶ **Inspection of perineum:** look for a **decubitus ulcer** if the uterus prolapses outside the introitus; inspect vulva for a growth — biopsy any suspicious lesion.
- ▶ **Palpation of urethral meatus:** separate labia to look for a **caruncle, polyp, or mucosal prolapse**.
- ▶ **Speculum examination:** inspect cervix and vaginal vault —
 - visible cervical growth → **biopsy for histology**;
 - grossly normal cervix → **cervical/endocervical cytology (Pap smear)** to exclude CIN;
 - atrophic vaginal mucosa is confirmatory of senile vaginitis as a bleeding source.
- ▶ **Bimanual examination:** uterine size (normal, atrophic, or enlarged from pyometra/sarcoma); palpate for an **adnexal mass**.

Investigations

Investigation	Purpose / finding
Transvaginal sonography (TVS) — first-line	Endometrial thickness ≤ 4 mm is a widely used low-risk cut-off (endometrium unlikely to harbour cancer, sampling may be deferred); a thick (9–10 mm), polypoidal, irregular endometrium or fluid within the cavity mandates tissue sampling. Add colour Doppler/3D-TVS for extra information.
Saline infusion sonography (SIS)/sonohysterography	More accurate than TVS alone at distinguishing a focal lesion (polyp, submucous fibroid) from diffuse thickening; guides directed biopsy.
Endometrial (Pipelle) biopsy	Outpatient sampling with a narrow plastic cannula; diagnostic accuracy for endometrial cancer is comparable to sonohysterography/hysteroscopy-guided biopsy.
Hysteroscopy with directed biopsy	Direct visualisation localises focal lesions (polyp, submucous myoma) precisely; superior to blind sampling; treats (polypectomy) at the same sitting.
Fractional curettage	Reserved for when cervical cytology is negative but suspicion persists, or hysteroscopy is unavailable; separately samples endocervix and endometrium under anaesthesia.
Cervical cytology $\pm$ colposcopy	Essential in every case; cytology is insensitive for endometrial cancer but detects coexisting cervical pathology.
Laparoscopy	For a suspected adnexal/ovarian mass or when uterine causes are excluded and bleeding persists.
CT/MRI	Selected cases with suspected malignancy, for local extent/staging.

A benign finding never negates the need for a thorough work-up — benign and malignant lesions may coexist.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for postmenopausal bleeding: history/exam/Pap → TVS → endometrial-thickness branch → sampling → benign/hyperplasia/malignancy outcomes, with a side path to fractional curettage/EUA and hysterectomy with BSO for unexplained recurrent bleeding.

High-yield exam pointers

- ▶ One-line rule to write first: "A case of PMB is carcinoma of the endometrium until proved otherwise."
- ▶ Overall, ~1/3 of PMB is **malignant** (Dutta); by cause-specific frequency (Hacker/Berek): atrophy 30% : exogenous estrogen 30% : endometrial cancer 15% : polyp 10% : hyperplasia 5% : miscellaneous 10%.
- ▶ TVS endometrial thickness cut-off: ≤4 mm → **low risk**, sampling may be deferred; thick/irregular/polypoidal endometrium or fluid in cavity → biopsy.
- ▶ First-line OPD sampling = **Pipelle endometrial biopsy**; hysteroscopy + directed biopsy is the definitive/gold-standard method, especially for a focal lesion.
- ▶ A benign finding (e.g., polyp) does **not** stop the search for malignancy — both may coexist.

- ▶ Recurrent/unexplained bleeding with no cause found on repeated evaluation → **laparotomy, total abdominal hysterectomy with bilateral salpingo-oophorectomy.**
- ▶ Obesity, diabetes, and hypertension in the history point toward endometrial carcinoma as the underlying cause.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The ≤ 4 mm transvaginal-sonography cut-off reflects current practice; Dutta's textbook still prints a slightly wider <5 mm threshold for the atrophic endometrium — both point to the same next step (sample if thicker or if bleeding persists), so the management pathway is unaffected.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Postmenopausal Bleeding, Ch. 34); Berek & Novak's Gynecology 16e (Postmenopausal Age Group — Abnormal Bleeding, Ch. 10, Table 10-13 etiology, Table 10-14 EIN nomenclature per ACOG/Society of Gynecologic Oncology 2015).



Discuss the management of an adnexal mass in a 20 year old unmarried woman

Asked in: Paper III May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — An adnexal mass is any swelling arising in the region of the uterine appendages — ovary, fallopian tube, or the adjacent broad ligament/parametrium — and must be distinguished from a uterine, bowel, or urinary-tract lump. In a woman of this age, malignancy is uncommon, but the differential is dominated by germ-cell tumours; management is therefore aimed at an accurate diagnosis using the least invasive tests, followed by fertility-sparing (and, where feasible, hymen-preserving) treatment.

Causes of an adnexal mass at this age

Site	Causes
Ovarian	Functional cyst (follicular, corpus luteal); dermoid cyst (mature cystic teratoma); endometrioma; germ-cell tumour (benign/malignant); epithelial tumour (uncommon before 30 years)
Tubal	Hydrosalpinx/tubo-ovarian mass (pelvic inflammatory disease); ectopic pregnancy if sexually active
Uterine	Pedunculated subserous fibroid

Site	Causes
Gastrointestinal	Appendicular mass/abscess, diverticular abscess
Genitourinary	Pelvic kidney

Clinical evaluation — points specific to the unmarried patient

- ▶ **Autonomy and confidentiality** — at 20 years she is a competent adult; history (menstrual, sexual, pain pattern) is taken directly from her in confidence, and consent for examination/surgery is hers alone, not a parent's or guardian's.
- ▶ **Pregnancy is always excluded** with a urine or serum beta human chorionic gonadotropin (β -hCG), irrespective of stated sexual activity or marital status.
- ▶ **Examination** — per-abdominal palpation, supplemented by a per-rectal examination, is preferred to preserve the hymen; a per-vaginal/speculum examination is deferred unless she is sexually active and consents. Examination under anaesthesia is used if abdominal/rectal findings are inconclusive.
- ▶ **Acuity** — sudden severe pain with peritonism suggests torsion, rupture, or haemorrhage into a cyst and needs urgent evaluation; painless, slowly enlarging swelling over months suggests a neoplasm.

Investigations

Investigation	Purpose / finding
Urine/serum β -hCG	Excludes pregnancy/ectopic pregnancy in every reproductive-age woman
Complete blood count, C-reactive protein	Supports an inflammatory mass (tubo-ovarian abscess, appendicitis)
Transabdominal ultrasound (first-line)	Preserves the hymen; documents size, laterality, and echotexture
Transvaginal or transrectal ultrasound (only with consent)	Better internal architecture; reserved for an equivocal transabdominal scan
Ultrasound morphology	Multilocularity, solid areas/papillary excrescences, wall thickness, ascites, bilaterality, and colour Doppler flow raise suspicion of malignancy; the International Ovarian Tumour Analysis (IOTA) Simple Rules (benign vs malignant ultrasound features) refine this assessment
Serum CA-125	Poor specificity below 45 years — also raised by fibroids, endometriosis, pelvic inflammatory disease, and pregnancy; a level >200 U/mL in a premenopausal woman warrants gynaecologic-oncology referral

Investigation	Purpose / finding
Serum alpha-fetoprotein (AFP), β -hCG, lactate dehydrogenase (LDH)	Screen for a malignant germ-cell tumour — the dominant ovarian malignancy of this age group (yolk sac tumour secretes AFP; choriocarcinoma/embryonal carcinoma secrete β -hCG; LDH is raised in ~95% of dysgerminomas)
Contrast CT chest	If germ-cell malignancy is suspected — these tumours metastasise early to lung/mediastinum
Karyotype	Obtained pre-operatively in premenarchal patients, especially with suspected dysgerminoma, which can arise in a dysgenetic gonad

Risk stratification and choice of approach

The **Risk of Malignancy Index (RMI)** = ultrasound score $\times$ menopausal status score $\times$ serum CA-125 (U/mL) triages women into **Low risk** (RMI <25), **Moderate risk** (RMI 25–250), and **High risk** (RMI >250).

Risk category / presentation	Management
Simple, unilateral, unilocular cyst <8 cm, low RMI (<25), normal CA-125	Expectant — repeat transvaginal ultrasound at 6–8 weeks (functional cysts usually resolve) or at the 4-month interval used in RMI-based protocols; ~50% resolve spontaneously. Oral contraceptive pills do not hasten resolution of an existing cyst but reduce the risk of new functional cysts
Persistent, enlarging, or symptomatic mass; moderate RMI (25–250)	Laparoscopic management — ovary/fertility-preserving operation of choice at this age; frozen section of any suspicious tissue
High RMI (>250), predominantly solid/complex mass, ascites, or an acute abdomen (torsion, rupture, haemorrhage)	Laparotomy with immediate frozen section; proceed to staging only if malignant is confirmed

Management — stepwise plan

- Confirm the diagnosis, exclude pregnancy, and counsel the patient herself on the differential (including the small but real possibility of a germ-cell malignancy at this age) and on the intent to preserve the uterus, the contralateral ovary, and the hymen wherever oncologically safe.
- **Acute torsion/rupture/haemorrhage** — emergency laparoscopy: detorsion and cystectomy preserving viable ovarian tissue is preferred even if the ovary looks congested/blue; salpingo-oophorectomy is reserved for a frankly gangrenous adnexa.
- **Elective surgery for a persistent/symptomatic/suspicious mass** — laparoscopic ovarian cystectomy using a retrieval endobag to avoid intraperitoneal spill, conserving as much healthy

ovarian cortex as possible; bivalving a normal-looking contralateral ovary is avoided (risk of adhesions and infertility).

- ▶ **Intraoperative suspicion of malignancy** — peritoneal washings for cytology before further handling, inspection/palpation of the contralateral ovary, omentum, and peritoneal surfaces, and frozen section before deciding the extent of surgery.
- ▶ **Confirmed malignant germ-cell tumour** — fertility-sparing surgical staging: **unilateral salpingo-oophorectomy** + peritoneal washings + omental biopsy + pelvic/para-aortic lymph node sampling, preserving the uterus and a normal contralateral ovary. Stage IA dysgerminoma needs no further therapy beyond staging; higher stage or an unfavourable histology (yolk sac tumour, embryonal carcinoma, choriocarcinoma, grade 2/3 immature teratoma) needs adjuvant chemotherapy.
- ▶ **Adjuvant chemotherapy** — **BEP regimen** (3–4 cycles, repeated every 3 weeks): Bleomycin 30,000 IU IV on days 1, 8, and 15; Etoposide 100 mg/m²/day IV for 5 days; Cisplatin 20 mg/m²/day IV for 5 days (or 100 mg/m² as a single dose). Tumour markers (LDH, AFP, β -hCG) are followed to monitor response.
- ▶ **Incidental epithelial or borderline tumour** — same fertility-sparing principle applies (unilateral salpingo-oophorectomy with comprehensive staging); radical surgery (total abdominal hysterectomy with bilateral salpingo-oophorectomy and omentectomy $\pm$ lymphadenectomy) is reserved for bilateral disease, frankly invasive cancer where fertility preservation is not oncologically safe, or once childbearing is complete.
- ▶ Long-term follow-up with clinical examination, tumour markers, and pelvic imaging at scheduled intervals.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 10.2 — Preoperative evaluation of the patient with an adnexal mass. (Berek & Novak 16e, p.486)

High-yield exam pointers

- ▶ Malignancy risk at laparotomy for a pelvic mass under 30 years is only about **10%** (Berek & Novak); the two commonest tumours in this age group are the **dermoid cyst** and the **endometrioma**.
- ▶ In the first two decades of life, **~70% of ovarian tumours are germ-cell in origin, and one-third of these are malignant**; **dysgerminoma** is the commonest malignant germ-cell tumour.
- ▶ Markers to write: **AFP** (yolk sac tumour), **β -hCG** (choriocarcinoma/embryonal carcinoma), **LDH** (raised in ~95% of dysgerminomas), **CA-125** (poor specificity <45 years).
- ▶ **RMI = U $\times$ M $\times$ CA-125**; Low <25, Moderate 25–250, High >250 — laparoscopy for moderate risk, laparotomy for high risk.

- ▶ **BEP** (Bleomycin + Etoposide + Cisplatin), 3–4 cycles every 3 weeks, is the standard chemotherapy for malignant germ-cell tumours.
- ▶ Golden rule in the unmarried/young patient: **fertility-sparing surgery** (unilateral salpingo-oophorectomy + staging, preserving the uterus and the healthy contralateral ovary) — **not** a routine total abdominal hysterectomy with bilateral salpingo-oophorectomy.
- ▶ Preserve the hymen: per-abdominal/per-rectal examination and transabdominal ultrasound are first-line before any transvaginal test in a virgin patient.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The Risk of Malignancy Index cut-offs above were validated mainly for peri-/postmenopausal triage; current guidance for premenopausal women (American College of Obstetricians and Gynecologists Practice Bulletin No. 174, 2016 — Evaluation and Management of Adnexal Masses) instead emphasises ultrasound morphology, supplemented selectively rather than routinely by CA-125.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; American College of Obstetricians and Gynecologists Practice Bulletin No. 174 (2016).



Discuss the prevention and management of postmenopausal osteoporosis

Asked in: Paper III Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Postmenopausal osteoporosis is a metabolic bone disease characterised by low bone mass and micro-architectural deterioration of bone tissue, causing increased bone fragility and fracture risk, driven by accelerated osteoclastic bone resorption once the protective effect of oestrogen is lost. The World Health Organization (WHO) defines it densitometrically using the bone mineral density (BMD) T-score on dual-energy X-ray absorptiometry (DEXA) of hip and spine: **normal** T-score ≥ -1.0 , **osteopenia** (low bone mass) T-score -1.0 to -2.5 , and **osteoporosis** T-score ≤ -2.5 ; a T-score ≤ -2.5

with a fragility fracture is "established" osteoporosis. Bone loss is fastest in the first 5 years after menopause (about 3%/year), then continues at 1–2%/year.

Risk factors

Category	Risk factors
Non-modifiable	Advancing age (>65 yr); Asian/Caucasian race; small body frame; early menopause (natural, or surgical/radiation-induced); family history of osteoporosis; prior fragility fracture; height loss >1.5 inches
Modifiable	Low dietary calcium (<300 mg/day) and vitamin D deficiency; smoking; alcohol >7 oz/week; low body weight/low body mass index (BMI); sedentary lifestyle; high caffeine intake
Associated diseases/drugs	Hyperthyroidism, hyperparathyroidism, chronic renal disease, rheumatoid arthritis, malabsorption, multiple myeloma; anovulation from excess exercise or an eating disorder; corticosteroids, heparin, gonadotropin-releasing hormone (GnRH) analogues, anticonvulsants

Prevention

- ▶ **Risk-based screening:** DEXA of hip and spine (gold-standard BMD test) in all women aged ≥ 65 years regardless of risk factors, and in younger postmenopausal women with ≥ 1 risk factor above. The Fracture Risk Assessment Tool (FRAX, WHO 2004) combines femoral-neck BMD with 11 clinical risk factors to give a 10-year probability of major osteoporotic/hip fracture, and helps decide who in the osteopenic range (T-score -1.0 to -2.5) benefits from drug therapy.
- ▶ **Calcium:** dietary intake preferred; supplement to a total of **1200–1500 mg/day** if diet is insufficient.
- ▶ **Vitamin D:** **800–1000 IU/day** (higher replacement doses, 1500–2000 IU/day, are often needed in India where deficiency is common); sunlight exposure enhances cutaneous cholecalciferol synthesis.
- ▶ **Exercise:** regular weight-bearing and muscle/resistance-strengthening exercise — back-extensor strengthening reduces the kyphosis of oestrogen deficiency, wrist and quadriceps strengthening reduce wrist and hip fracture risk; benefit occurs at any age, even in the 80s–90s.
- ▶ **Lifestyle:** stop smoking; limit alcohol; limit central nervous system depressants that increase fall risk.
- ▶ **Fall prevention:** home safety assessment (grab bars, carpeted stairs, night lights), vision correction.

- **Hormone therapy (HT):** effective for osteoporosis prevention when started soon after menopause and continued long term; specifically indicated in **premature/early menopause** — continue until the average age of natural menopause, then reassess and consider substituting other bone-specific agents.

Management of established osteoporosis

Indications for pharmacological treatment: T-score ≤ -2.5 at hip or spine; T-score -2.0 to -2.5 with at least one additional fracture risk factor; or any osteoporotic (fragility) vertebral or hip fracture, irrespective of BMD. Before starting therapy, exclude secondary causes (thyroid-stimulating hormone, parathyroid hormone, serum calcium, 25-OH vitamin D, renal function, 24-hour urinary calcium).

Drug class/agent	Dose & route	Mechanism/key notes
Calcium + vitamin D	Continue as above alongside all drug therapy	Substrate for mineralisation; does not by itself reduce fracture risk but is mandatory background therapy
Bisphosphonates — Alendronate	10 mg/day orally, or 70 mg once weekly	Inhibit osteoclastic resorption; take fasting, ½ hour before food, with a full glass (~240 mL) of water, remain upright 30 min (reduces oesophageal irritation)
Risedronate	5 mg/day, or 35 mg once weekly, or 150 mg once monthly	Similar profile; fewer gastrointestinal side effects
Ibandronate	150 mg orally once monthly, or 3 mg intravenously every 3 months	Oral or parenteral option
Zoledronic acid	5 mg intravenous infusion over 15 minutes, once every 1–2 years	Once-yearly dosing improves adherence; risks — hypocalcaemia, atrial fibrillation, renal impairment; class-wide rare risks — osteonecrosis of the jaw, atypical femoral fracture
Selective oestrogen receptor modulator (SERM) — Raloxifene	60 mg/day orally	Oestrogen-agonist on bone and lipids, antagonist on breast/endometrium; reduces vertebral (not clearly non-vertebral) fractures; also reduces invasive breast cancer risk; contraindicated in current/past venous thromboembolism
Tissue-selective oestrogen complex — Bazedoxifene + conjugated equine oestrogen	20 mg/0.45 mg once daily orally	Combines SERM + oestrogen; treats vasomotor symptoms and prevents osteoporosis while protecting endometrium/breast

Drug class/agent	Dose & route	Mechanism/key notes
Calcitonin	Nasal spray 200 IU/day, or subcutaneous 100 IU/day	Inhibits osteoclastic resorption; weakest anti-fracture effect; used when oestrogen/bisphosphonates contraindicated
Parathyroid hormone analogue (anabolic) — Teriparatide	20 µg/day subcutaneously	Recombinant PTH (1-34); stimulates osteoblast number/activity (net bone formation); duration capped at 18–24 months; black-box warning for osteosarcoma (rodent studies)
Abaloparatide	80 µg/day subcutaneously	PTH-related-protein analogue; anabolic, similar duration cap
Denosumab	60 mg subcutaneously every 6 months	Monoclonal antibody to RANKL; reduces osteoclast formation; reduces vertebral and hip fractures; rebound bone loss on stopping — must bridge to another agent
Tibolone	2.5 mg/day orally (1.25 mg also effective)	Selective tissue oestrogenic activity regulator (STEAR); prevents osteoporosis and vasomotor/vaginal atrophy symptoms; avoid in women >60 years or with stroke risk factors

Principles of drug selection and monitoring

- ▶ Bisphosphonates are first-line for most postmenopausal women; combine with oestrogen only in severe cases (added benefit over either alone).
- ▶ Anabolic agents (teriparatide, abaloparatide) are preferred in severe/established osteoporosis with fracture, given before an antiresorptive, since starting an antiresorptive first blunts the anabolic response.
- ▶ Denosumab, teriparatide and abaloparatide all require a follow-on antiresorptive agent when stopped, as bone loss resumes rapidly.
- ▶ Repeat DEXA every 1–2 years to monitor response; a bisphosphonate "drug holiday" (3–5 years) may be considered once fracture risk is reduced, as antifracture benefit persists after stopping.
- ▶ Treat the underlying secondary cause if identified, and correct fall-risk factors in parallel with drug therapy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 59.3 — T-score normal, osteopaenia, and osteoporosis. (Jeffcoate's Principles of Gynaecology 9e, p.1074)

High-yield exam pointers

- ▶ WHO T-score cut-offs: normal ≥ -1.0 ; osteopenia -1.0 to -2.5 ; osteoporosis ≤ -2.5 (write this line verbatim).
- ▶ DEXA of hip/spine = gold-standard test; FRAX = 10-year fracture-probability tool used at T-score -1 to -2.5 .
- ▶ Calcium 1200–1500 mg/day + vitamin D 800–1000 IU/day is the universal background of both prevention and treatment.
- ▶ Bisphosphonate dosing rule: empty stomach, full glass of water, remain upright 30 minutes (alendronate 10 mg/day or 70 mg/week).
- ▶ Anabolic agents (teriparatide 20 µg/day, abaloparatide 80 µg/day SC) build bone; antiresorptives (bisphosphonates, denosumab 60 mg SC 6-monthly, raloxifene 60 mg/day, calcitonin) prevent further loss.
- ▶ Denosumab/teriparatide/abaloparatide: never stop without bridging to another agent — rebound bone loss.
- ▶ HT prevents osteoporosis best if started early after menopause; premature menopause is a specific indication to continue HT till the natural age of menopause.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Osteoporosis drug doses above are cross-checked against Berek & Novak's Gynecology 16e (current, denosumab/FRAX-era) and are consistent with Jeffcoate's Principles of Gynaecology 9e and DC Dutta's Textbook of Gynaecology 7e; where DC Dutta's older figures (e.g., calcium 1–1.5 g/day, vitamin D 1500–2000 IU/day) differ slightly from the current National Osteoporosis Foundation/American College of Obstetricians and Gynecologists (ACOG) figures (calcium 1200 mg/day, vitamin D 800–1000 IU/day), both ranges are given as they overlap and are both in clinical use.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; ACOG Practice Bulletin No. 129, Osteoporosis (2012).

♦ ♦ ♦

Discuss the role of leptin in reproduction

Asked in: Paper III Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Leptin is a 167-amino acid peptide hormone encoded by the *LEP* gene (chromosome 7q31.3), secreted mainly by white adipocytes in direct proportion to fat mass. Acting through its long-form receptor (Ob-Rb) on hypothalamic arcuate-nucleus neurons, it functions as the principal metabolic signal that informs the hypothalamic–pituitary–gonadal (HPG) axis of adequate energy reserves, and it has additional direct actions on the ovary, endometrium, and placenta — making it a key link between nutritional status and reproductive competence.

Synthesis, receptor and mechanism of action

Feature	Detail
Gene/structure	Human <i>LEP</i> gene, chromosome 7q31.3 (murine homolog: <i>Ob</i> gene); leptin is a 167-amino acid peptide of the cytokine superfamily
Main source	White adipose tissue, in proportion to fat mass; also secreted by placental cyto-/syncytiotrophoblast, gastric mucosa, and the ovarian follicle
Receptor	Ob-R/ <i>LEPR</i> — class I cytokine receptor family; long signalling isoform (Ob-Rb) predominates in the arcuate, ventromedial, paraventricular and dorsomedial hypothalamic nuclei; short isoforms mediate blood–CSF transport via the choroid plexus
Signal transduction	Receptor dimerisation → JAK2 activation → STAT3 phosphorylation → nuclear gene transcription
Central hypothalamic action	Inhibits orexigenic NPY/AgRP neurons and stimulates anorexigenic POMC neurons in the arcuate nucleus; both neuronal populations modulate kisspeptin (KNDy) neurons , which are the final relay driving the pulsatile GnRH generator
Circulating pattern	Levels correlate directly with body fat/BMI; rise progressively through puberty in girls (in boys, levels rise then fall back to prepubertal values)

Leptin and the hypothalamic–pituitary–gonadal axis

- **Onset of puberty** — Leptin is a *permissive*, not primary, trigger. Leptin-deficient rodents fail to enter puberty, and leptin replacement induces its onset. In girls, a rise in mean serum leptin to about 12.2 ng/mL (corresponding to ~29.7% body fat and a body mass index of 22.3) is associated with earlier menarche; each 1 ng/mL rise in serum leptin advances menarche by about one month (Speroff 9e).

- ▶ **Congenital leptin/leptin-receptor deficiency** — Causes failure of pubertal onset and severe hypogonadotropic hypogonadism in affected adults. Recombinant leptin restores pubertal endocrine changes in leptin-deficient children of pubertal age but does **not** induce premature puberty in younger children — confirming leptin's role is permissive rather than the primary pulse-generator signal.
- ▶ **Critical fat mass hypothesis** — Regular menstrual cyclicity requires body fat to remain above a threshold, classically estimated at **17% of body weight for menarche and 22% for regular menstruation**; the discovery of leptin and hypothalamic leptin receptors provided the physiological basis for this long-observed clinical correlation.
- ▶ **Hypothalamic amenorrhea** — Low leptin (out of proportion to fat mass) is characteristic of exercise-associated, eating-disorder-associated, and idiopathic hypothalamic amenorrhea; the normal diurnal leptin rhythm is lost. In a landmark trial (Welt et al., *N Engl J Med* 2004;351:987), recombinant human leptin therapy in women with hypothalamic amenorrhea restored LH pulsatility, oestradiol, insulin-like growth factor-1, thyroid hormone, ovulation, and bone mass.
- ▶ **Reciprocal ghrelin–leptin signalling** — Ghrelin (gastric, orexigenic, appetite-stimulating) and leptin (adipose-derived, anorexigenic) act as reciprocal regulators on the same arcuate NPY/AgRP–POMC network; ghrelin also suppresses kisspeptin secretion, reinforcing GnRH suppression when energy stores are low.

Peripheral reproductive actions of leptin

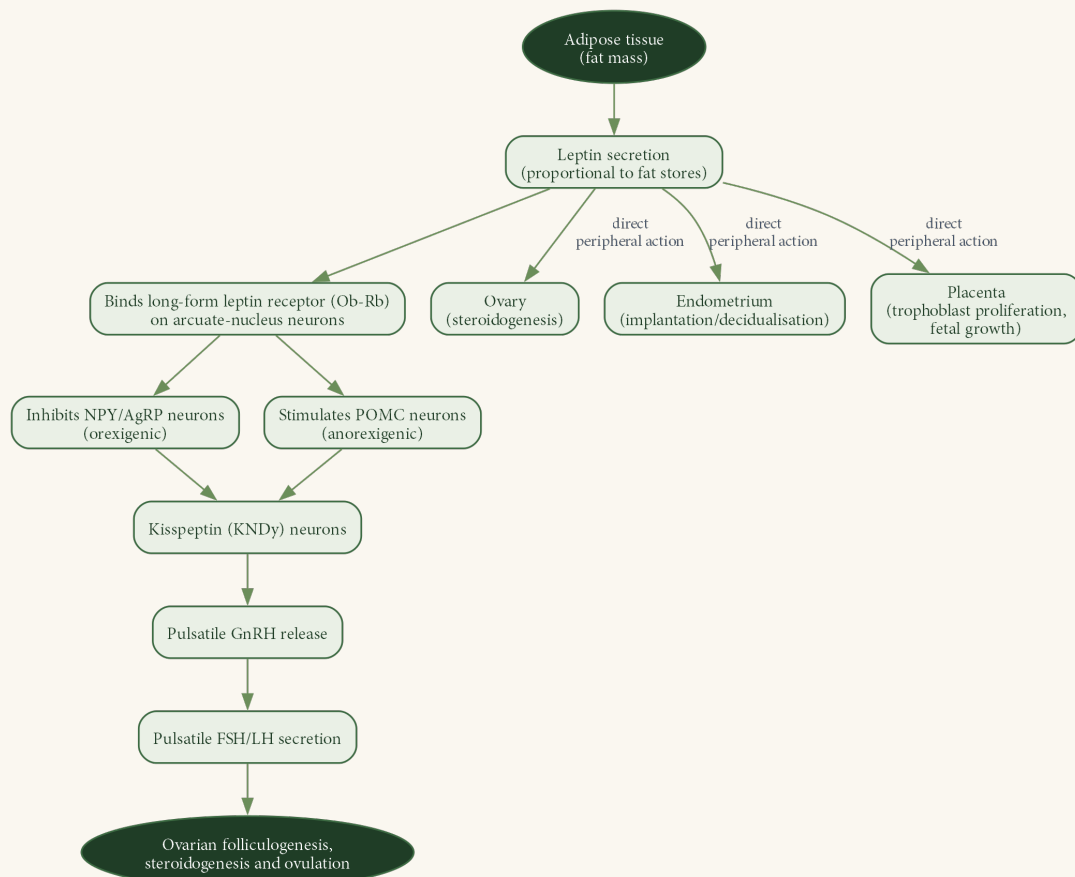
Site	Action of leptin
Ovary	Leptin (from fat and from the ovarian follicle itself) modulates granulosa-cell steroidogenesis and follicular development; contributes, together with insulin resistance and hyperandrogenaemia, to the increased GnRH/LH pulse frequency seen in polycystic ovary syndrome (PCOS)
Endometrium/implantation	Leptin has a recognised role in implantation , decidualisation, and blastocyst–endometrial cross-talk; it promotes trophoblast proliferation, invasion and angiogenesis
Placenta	Cytotrophoblast and syncytiotrophoblast synthesise leptin in addition to maternal adipose tissue; maternal serum leptin rises through pregnancy, peaking and plateauing from the second trimester in normal-weight women. Placental leptin promotes placental cell proliferation, protein synthesis, immune tolerance, and anti-apoptotic signalling

Site	Action of leptin
Fetus	Leptin is detectable in amniotic fluid (peaking mid-pregnancy) and fetal serum (rising from ~34 weeks); fetal leptin correlates positively with birthweight and contributes to development of the fetal heart, brain, kidney and pancreas. Levels are reduced in fetal growth restriction

Clinical correlations — leptin disorders and reproductive consequence

Condition	Leptin status	Reproductive consequence
Congenital leptin/ <i>LEPR</i> deficiency	Absent/non-functional leptin signalling	Failure of puberty, severe hypogonadotropic hypogonadism, infertility, morbid obesity
Hypothalamic amenorrhea (exercise, eating disorder, idiopathic)	Low leptin, disproportionate to fat mass; loss of diurnal rhythm	Reduced GnRH/LH pulsatility → anovulation, amenorrhea
Obesity / PCOS	Hyperleptinaemia with central leptin resistance	Increased GnRH/LH pulse frequency, hyperandrogenaemia, anovulatory infertility
Fetal growth restriction	Low placental/fetal leptin	Impaired fetal growth and metabolic programming

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Leptin signalling: central HPG-axis relay (adipose tissue → Ob-Rb → NPY/AgRP–POMC → kisspeptin → GnRH → FSH/LH → ovulation) with parallel direct peripheral actions on ovary, endometrium and placenta.

High-yield exam pointers

- ▶ *LEP* gene, chromosome 7q31.3; 167-amino acid adipokine; receptor **Ob-Rb**, JAK2–STAT3 signalling, arcuate nucleus.
- ▶ Leptin **inhibits NPY/AgRP**, **stimulates POMC**, and modulates **kisspeptin** neurons — the relay to the GnRH pulse generator.
- ▶ Critical body fat: **17% for menarche**, **22% for regular menstruation** (leptin = the physiological basis of the old "critical weight hypothesis").
- ▶ Leptin is **permissive, not primary** — congenital leptin deficiency blocks puberty and causes hypogonadotropic hypogonadism; recombinant leptin restores puberty only in already pubertal-age children.
- ▶ **Low leptin = hypothalamic amenorrhea** signature; Welt et al. (*NEJM* 2004) — recombinant leptin restored LH, oestradiol, ovulation and bone mass.

- **High leptin + leptin resistance = obesity/PCOS axis** — raised LH pulse frequency, hyperandrogenaemia, anovulation.
- Leptin is essential for **implantation**; the placenta itself is a leptin source, and fetal leptin tracks **birthweight** (low in fetal growth restriction).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The mechanistic detail on the arcuate NPY/AgRP–POMC–kisspeptin relay and the Welt et al. recombinant-leptin trial come from Speroff 9e and Berek & Novak 16e; DC Dutta's Gynaecology 7e states the same core facts (GnRH release, PCOS, implantation) more briefly and the two are concordant.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; Williams Obstetrics 26e; DC Dutta's Textbook of Gynaecology 7e.



Discuss various modalities of management of tubal ectopic pregnancy

Asked in: Paper III 15-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — A **tubal ectopic pregnancy** is implantation and development of the blastocyst within the fallopian tube instead of the endometrial cavity; it accounts for the great majority (95–98%) of all ectopic gestations, most often in the **ampulla** (~70%), followed by the isthmus, fimbria and interstitial (cornual) segment. Management is individualised on haemodynamic status, the serum **β-human chorionic gonadotropin** (**β-hCG**) trend, transvaginal sonographic (TVS) findings and the woman's fertility wishes, and falls into three broad modalities — **expectant, medical and surgical**.

Principles: triage and choosing the modality

- **First step** — **assess haemodynamic status**. A haemodynamically unstable patient or one with sonographic/clinical evidence of tubal rupture and haemoperitoneum goes **directly to resuscitation-with-laparotomy**, irrespective of β-hCG value, sac size or fertility wish — there is no role for expectant or medical therapy here.
- In a **stable, unruptured** ectopic, the choice among expectant/medical/conservative-surgical/radical-surgical is guided by the criteria below.

Criterion	Expectant	Medical (methotrexate, MTX)	Conservative surgery
Haemodynamic status	Stable	Stable	Stable or unstable
Serum β -hCG	Low and falling on serial estimation (initial <1,500 IU/L)	Stable/plateauing, ideally <3,000 IU/L	Not fulfilling medical-therapy criteria, or hCG not declining despite MTX
Sac/tubal size on TVS	<4 cm	<4 cm	Any size once surgery is chosen
Fetal cardiac activity	Absent	Absent (relative contraindication if present)	Persistent cardiac activity is an indication for surgery
Rupture/haemoperitoneum	Absent	Absent	Present $\rightarrow$ emergency surgery

- **Anti-D immunoglobulin** is given to every **Rh-negative, non-sensitised** woman regardless of the modality chosen — **50 μ g IM** if gestation is <12 weeks, **300 μ g IM** if >12 weeks.

Medical management — methotrexate (MTX)

MTX, a folate antagonist that arrests trophoblastic DNA synthesis, is first-line medical therapy. Other agents (potassium chloride, hyperosmolar glucose, prostaglandin F₂ α , actinomycin) have been used as direct intratubal injections but are not preferred because of less-robust safety/efficacy data.

Absolute contraindications to MTX: intrauterine pregnancy; haemodynamic instability/ruptured ectopic; breastfeeding; immunodeficiency; moderate-to-severe anaemia, leukopenia or thrombocytopenia; known hepatic/renal dysfunction; known MTX sensitivity; active pulmonary disease. Baseline work-up: complete blood count, liver function tests, renal function, blood group and antibody screen.

Regimen	Dose	Monitoring	Next step
Single-dose	MTX 50 mg/m ² IM, day 0	β -hCG on days 4 and 7	Fall $\geq 15\%$ between D4–D7 $\rightarrow$ weekly β -hCG till non-pregnant level. Fall <15% $\rightarrow$ repeat MTX 50 mg/m ² (needed in ~15–25% of patients)
Multi-dose (variable-dose)	MTX 1 mg/kg IM/IV on days 1, 3, 5, 7, alternating with folinic acid (leucovorin) 0.1 mg/kg IM on days 2, 4, 6, 8	β -hCG on days 1, 3, 5, 7	Stop once β -hCG falls $\geq 15\%$ between two levels; continue weekly β -hCG till non-pregnant

Side effects: gastrointestinal upset (nausea, vomiting, stomatitis, abdominal pain — 30–40%), bone-marrow suppression, hepatotoxicity, pneumonitis; alcohol, NSAIDs and folate-containing multivitamins are avoided during treatment.

Persistent ectopic pregnancy (incomplete trophoblastic removal after conservative surgery or medical therapy, reported in roughly 4–20% after laparoscopic salpingostomy, higher after fimbrial expression and when initial β -hCG >3,000 IU/L) is managed with continued weekly β -hCG follow-up and a **single prophylactic/therapeutic dose of MTX 1 mg/kg IM**.

Surgical management

A. Ruptured/haemodynamically unstable ectopic (emergency laparotomy). Principle: *resuscitation and laparotomy simultaneously — not resuscitation followed by laparotomy*.

- ▶ Start IV crystalloid (Ringer's lactate), by venesection if required; draw blood for group and cross-match.
- ▶ Arrange blood transfusion; if blood is unavailable laparotomy must proceed regardless — transfusion is most useful once bleeding vessels are clamped.
- ▶ Laparotomy through an infraumbilical vertical incision; principle is "**quick in, quick out**."
- ▶ Inspect both tubes and ovaries to confirm the side and extent of rupture.
- ▶ **Salpingectomy** is the definitive procedure; send the excised tube for histopathology.
- ▶ Preserve the ipsilateral ovary and its blood supply — oophorectomy only if the ovary itself is irreparably damaged.
- ▶ In **interstitial (cornual) pregnancy** with a large rent and poor general condition, a **subtotal hysterectomy** may be required.
- ▶ Autotransfusion of blood collected from the peritoneal cavity (strained through 4–5 layers of gauze into citrate 3.8% solution, 5 parts blood : 1 part citrate) is reserved for situations where donor blood is unavailable.

B. Unruptured ectopic — conservative surgery. Indicated when the patient does not fulfil medical-therapy criteria, β -hCG fails to fall on MTX, or fetal cardiac activity persists. **Laparoscopy is preferred over laparotomy** (shorter hospital stay, less blood loss, faster convalescence, lower cost, comparable subsequent tubal patency and fertility outcome); mini-laparotomy is an option where laparoscopic expertise/equipment is unavailable. Laparotomy is reserved for haemodynamic instability, extensive adhesions, or when laparoscopy is technically unsafe.

Procedure	Technique	Indication
Linear salpingostomy (salpingotomy)	Longitudinal incision on the antimesenteric border over the ectopic; products removed by suction/forceps; incision left open to heal by secondary intention ; haemostasis by cautery or laser	Unruptured ampullary pregnancy, tube otherwise healthy, fertility desired (especially if the contralateral tube is damaged/absent)
Segmental resection	Excise the affected tubal segment; tubal end-to-end anastomosis immediately or later	Isthmic pregnancy
Fimbrial expression	Digital expression of the products	Distal ampullary/fimbrial pregnancy
Salpingectomy	Excision of the whole tube	Tube irreparably damaged; recurrent ectopic in the same tube; contralateral tube normal and future fertility not desired

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 36.8A–C — Laparoscopic linear salpingostomy for unruptured tubal ectopic pregnancy: A. Linear incision on the antimesenteric border; B. Gestation sac removed; C. Incision margins left unsutured (DC Dutta's Gynaecology 7e, p.527)

Follow-up and counselling

- ▶ After any conservative treatment (medical or salpingostomy), follow weekly β -hCG until it reaches the non-pregnant level to exclude persistent trophoblast.
- ▶ Contraception should be started at discharge; ovulation may resume within 3–4 weeks post-treatment.
- ▶ Recurrence risk after one tubal ectopic is roughly **1 in 10**; advise the patient to report as soon as the next period is missed for an early pregnancy test and, if positive, a high-resolution TVS to localise the pregnancy.
- ▶ Subsequent intrauterine pregnancy rate after conservative management of an unruptured ectopic is comparable to or better than after salpingectomy, provided the contralateral tube is healthy.

High-yield exam pointers

- ▶ Ruptured/unstable ectopic → **straight to laparotomy**; "resuscitation *and* laparotomy together," never sequential.
- ▶ MTX candidacy triad to write: **haemodynamically stable + no rupture + β -hCG <3,000 IU/L + sac <4 cm + no cardiac activity**.

- ▶ Single-dose MTX = 50 mg/m² IM, check β -hCG D4 & D7, repeat if fall <15%; multi-dose = 1 mg/kg MTX D1,3,5,7 with leucovorin 0.1 mg/kg D2,4,6,8.
- ▶ Anti-D dose: 50 μ g (<12 weeks) or 300 μ g (>12 weeks) IM in every Rh-negative woman.
- ▶ Salpingostomy (fertility-sparing, ampullary) vs salpingectomy (damaged tube/fertility not desired) — know the indications, not just the names.
- ▶ Persistent ectopic after salpingostomy (4–20%): weekly β -hCG + single-dose MTX 1 mg/kg.
- ▶ Recurrence risk after one ectopic $\approx$ 1 in 10.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Success/failure with single-dose methotrexate correlates with the pre-treatment β -hCG level (higher failure rates above roughly 5,000 mIU/mL per the American Society for Reproductive Medicine data); DC Dutta's more conservative Indian-teaching cut-off of <3,000 IU/L for offering medical therapy is the one to reproduce in an RGUHS answer.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Practice Committee of the American Society for Reproductive Medicine, "Medical Treatment of Ectopic Pregnancy," 2013.



Endometrial ablation

Asked in: Paper III 29-Sep-2025 · Paper IV Apr 2008 (2 $\times$) — RGUHS MS Obstetrics & Gynaecology

Definition — Endometrial ablation (EA) is a minimally invasive hysteroscopic/transcervical technique that destroys the endometrium, including its basal layer and the superficial myometrium (to a depth of about 3–5 mm), so that regeneration cannot occur. It is used to reduce or abolish heavy menstrual bleeding (HMB) due to primary endometrial dysfunction (AUB-E) or ovulatory dysfunction (AUB-O) that has failed medical therapy, in women who have completed childbearing and wish to retain the uterus.

Indications & patient selection

Criterion	Detail
Failed/declined medical therapy	HMB not controlled by antifibrinolytics, hormonal therapy, or LNG-IUS
Fertility	Family completed; future pregnancy not desired

Criterion	Detail
Uterine cavity	Normal or near-normal contour; not bigger than a 10-week pregnant size (DC Dutta); resectoscopic ablation remains an option up to a sounded length of ~12 cm
Fibroids	Absent, or small submucous myoma < 3 cm (FIGO type 0/1)
Endometrium	Benign on biopsy/hysteroscopy — no hyperplasia with atypia or malignancy
Patient preference	Wants to avoid, or is medically unfit for, a longer hysterectomy operation

Contraindications

Absolute	Relative
Desire for future fertility	Uterine cavity > 10–12 cm sounded length
Pregnancy	Submucous fibroid > 3 cm or large cavity distortion
Endometrial hyperplasia with atypia / endometrial or cervical malignancy	Previous classical caesarean section or myomectomy (thin myometrium — perforation risk)
Active pelvic infection	Cervical stenosis; undiagnosed postmenopausal bleeding
—	Chronic pelvic pain (a recognised contraindication to TCRE/laser ablation)
—	IUD in situ (must be removed first); uterine cavity < 4 cm (contraindicated for NovaSure)

Preoperative work-up & pretreatment

- ▶ Exclude pregnancy.
- ▶ Endometrial sampling/biopsy to rule out hyperplasia or malignancy before destroying the tissue.
- ▶ Diagnostic hysteroscopy with transvaginal sonography/saline-infusion sonography to map the cavity and exclude polyp or submucous fibroid.
- ▶ Best timed in the **postmenstrual (early proliferative) phase**.
- ▶ **Pretreatment with a GnRH agonist, danazol, or a progestogen for 3–6 weeks** thins the endometrium, shortens operating time, and reduces bleeding and fluid absorption.
- ▶ Counsel that ablation is **not a sterilization procedure** — effective contraception must continue — and that amenorrhea is not guaranteed.

Techniques — classification

Generation	Principle	Examples	Depth/notes
First-generation (resectoscopic / "under direct vision")	Continuous-flow resectoscope under hysteroscopic vision; needs distension media + general/regional anaesthesia	Transcervical resection of the endometrium (TCRE) — cutting-loop electrode shaves endometrium + superficial myometrium; Rollerball/roller-barrel ablation — coagulates surface; Vaporizing electrode; Nd:YAG laser ablation	Destroys endometrium to 3–5 mm, producing a "therapeutic Asherman's syndrome"; TCRE/REA also used when concurrent hysteroscopic myomectomy is planned
Second-generation (non-resectoscopic / "global")	Blind or semi-blind device inserted into the cavity; quicker, office-based, local/paracervical block	Thermal balloon — heated saline (~87 °C) for 8–10 min, no cervical dilatation, day-care; NovaSure — bipolar radiofrequency on an expandable mesh, ~90 seconds; contraindicated if cavity < 4 cm, active pelvic infection, or recent caesarean scar; Microwave endometrial ablation (MEA) — 75–80 °C, ablates to 6 mm depth, 2–3 minutes; Hydrothermal ablation — circulated heated free fluid; Cryoablation	Comparable success to resectoscopic methods in a normal-sized cavity; limited by cavity size/configuration

Procedure — key steps

- ▶ Confirm a negative pregnancy test and obtain informed consent (irreversible endometrial destruction; contraception still required; not curative for fibroids or pelvic pain).
- ▶ Anaesthesia — paracervical block for office/second-generation devices; general or regional for resectoscopic ablation.
- ▶ Cervical dilatation (resectoscopic route); prostaglandin E2 gel priming if the cervix is stenosed.
- ▶ Diagnostic hysteroscopy first, to reconfirm a normal cavity and exclude missed pathology.
- ▶ Resectoscopic technique: the loop/roller electrode is passed systematically from **cornu to cornu and over the fundus**; ablation is **not extended below the level of the internal os** to avoid later hematometra.

- ▶ Non-resectoscopic technique: the device is deployed per protocol (balloon inflation and heating / NovaSure mesh deployment with impedance-controlled radiofrequency cycle / microwave probe sweep).
- ▶ Continuously monitor the fluid deficit of the distension medium to detect early fluid overload.
- ▶ Day-care discharge with analgesia; most procedures are completed in under 30 minutes.

Results

- ▶ Overall success/satisfaction: **75–95% at 1 year**.
- ▶ Amenorrhoea rates range **30–90%** (a practical figure to quote patients is **40–50%**); most of the remainder have a significant reduction in blood loss.
- ▶ About **10%** eventually need a repeat ablation or hysterectomy, with the proportion rising with longer follow-up.
- ▶ Resectoscopic and non-resectoscopic techniques give comparable clinical outcomes; non-resectoscopic devices are preferred for a normal-sized cavity, while resectoscopic ablation is retained for larger uteri or when concurrent submucous myomectomy is required.
- ▶ Long-term efficacy in women with adenomyosis is uncertain, since ectopic endometrium within the myometrium cannot be ablated.

Complications

Timing	Complications
Perioperative	Fluid overload, hyponatraemia, cerebral/pulmonary oedema (with hypotonic glycine media); uterine perforation (< 1%); haemorrhage; thermal/electrosurgical injury to bowel or urinary tract; gas (CO ₂) embolism; infection; anaesthetic complications
Late	Recurrent/persistent abnormal bleeding (treatment failure, especially in younger women); haematometra or pyometra (from cervical stenosis or ablation carried below the internal os); post-ablation tubal sterilization syndrome — cyclic pain from bleeding trapped behind a previously occluded tube; rare pregnancy (contraception must continue); delayed detection of endometrial malignancy due to post-ablation synechiae

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 26-41 — Resectoscopic endometrial ablation (REA) techniques: roller barrel, vaporizing electrode, and cutting loop, each destroying the endometrium to about 4 mm depth (Berek & Novak's Gynecology 16e, p.1500)

High-yield exam pointers

- ▶ EA destroys endometrium + **basal layer** to a 3–5 mm depth — that is why it is not simply curettage.
- ▶ **First-generation (resectoscopic)**: TCRE, rollerball, laser — need hysteroscope + distension medium + GA/regional anaesthesia.
- ▶ **Second-generation (non-resectoscopic/global)**: thermal balloon, NovaSure (bipolar RF, ~90 sec), MEA (75–80 °C, 6 mm depth), hydrothermal ablation.
- ▶ Pretreat with **GnRH agonist or danazol for 3–6 weeks** to thin the endometrium.
- ▶ **LNG-IUS** is the medical alternative when fertility is wanted — up to 97% reduction in blood loss ("medical hysterectomy").
- ▶ Outcomes: amenorrhoea **30–90% (avg. 40–50%)**; satisfaction **75–95%**; ~10% need repeat ablation/hysterectomy.
- ▶ Absolute no-go: desire for fertility, malignancy/atypical hyperplasia, active pelvic infection, pregnancy.
- ▶ Ablation must **stop at the internal os** — prevents haematometra and post-ablation tubal sterilization syndrome.
- ▶ It is **not a sterilization method** — contraception is still mandatory afterwards.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's figures (uterine size ≤ 10 weeks, 4–6 week pretreatment) reflect the traditional Indian teaching criteria; Berek & Novak's refinement (sound cavity length up to ~12 cm for resectoscopic ablation) is the current operative-gynaecology standard used to select between resectoscopic and non-resectoscopic devices.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.

♦ ♦ ♦

Endometrial atypia

Asked in: Paper I 06-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Endometrial atypia is cytologic atypia arising within hyperplastic endometrial glands — the premalignant end of the endometrial hyperplasia spectrum, occurring almost always against a background of prolonged, unopposed estrogen stimulation of the endometrium. It corresponds to "atypical hyperplasia" of the older four-tier WHO (1994) classification and is now termed **endometrial intraepithelial neoplasia (EIN)** in the simplified two-tier scheme endorsed by the American College of Obstetricians and Gynecologists (ACOG) and the Society of Gynecologic Oncology (SGO) in 2015, reflecting its role as the true morphologic precursor of type I (endometrioid) endometrial carcinoma.

Classification and natural history

WHO (1994) type	Architecture	Cytologic atypia	Progression to carcinoma*
Simple hyperplasia	Dilated/cystic glands, increased gland:stroma ratio	Absent	~1%
Complex hyperplasia	Crowded, budding/infolding glands	Absent	~3%
Simple atypical hyperplasia	Cystic glands	Present	~8%
Complex atypical hyperplasia	Crowded, adenomatous glands	Present	~29%

*Kurman et al., 170 untreated patients followed a mean 13.4 years (cited in Berek & Novak 16e).

Current (ACOG–SGO 2015) class	Nomenclature	Management
Benign	Benign endometrial hyperplasia (no atypia)	Medical (progestin)
Premalignant	Endometrial intraepithelial neoplasia (EIN) — replaces "atypical hyperplasia"	Surgical (preferred) vs medical if fertility desired/poor surgical candidate
Malignant	Endometrial adenocarcinoma, endometrioid, well differentiated	Surgical ± staging

25–43% of women with a biopsy/curettage diagnosis of atypical hyperplasia/EIN already harbour a concurrent, usually well-differentiated, endometrial carcinoma at hysterectomy (Berek & Novak 16e).

Etiology / risk factors

All operate through prolonged unopposed estrogen exposure.

Risk factor	Relative risk
Nulliparity	2–3
Late menopause (>52 yr)	2.4
Overweight (21–50 lb excess)	3
Obese (>50 lb excess)	10
Diabetes mellitus	2.8
Unopposed estrogen therapy	4–8
Tamoxifen therapy	2–3
Lynch syndrome (HNPCC)	~20

Other recognised factors: polycystic ovary syndrome and chronic anovulation, estrogen-secreting ovarian tumours (granulosa cell tumour), family history of endometrial/breast/ovarian/colon cancer, and prior pelvic radiotherapy (DC Dutta's Gynaecology 7e; Berek & Novak 16e).

Histology, clinical features and diagnosis

- ▶ **Cytologic atypia** on histology: enlarged nuclei of variable size/shape with loss of polarity, increased nuclear:cytoplasmic ratio, prominent nucleoli, and irregularly clumped chromatin with parachromatin clearing (Berek & Novak 16e).
- ▶ **EIN morphometric criteria** (Dutta's Gynaecology 7e): (i) increased glandular volume relative to stroma, (ii) architectural complexity (crowding, budding), (iii) cytologic atypia distinct from the background endometrium.
- ▶ **Clinical presentation:** abnormal uterine bleeding is the constant feature — most often perimenopausal irregular bleeding or postmenopausal bleeding; a minority are asymptomatic, discovered incidentally during work-up for infertility/PCOS/dysfunctional uterine bleeding or in a hysterectomy specimen removed for another indication.

Investigation	Purpose / finding
Transvaginal sonography (TVS)	Endometrial thickness ≤ 4 mm suggests atrophy (low risk); a thickened, hyperechoic, irregular endometrium raises suspicion of hyperplasia/EIN
Endometrial (Pipelle) biopsy or fractional curettage	Confirms the histologic diagnosis — mandatory in all suspected cases
Hysteroscopy with directed biopsy	Preferred method — localises focal lesions and improves sampling accuracy over blind curettage
MRI	Used before fertility-sparing therapy to exclude myometrial invasion/occult carcinoma (low sensitivity, so not definitive)

Management

Young patient desiring fertility, no atypia (benign hyperplasia)

- ▶ Cyclic oral progestin (e.g., medroxyprogesterone acetate) for 6–9 months.
- ▶ Repeat endometrial sampling at 6-month intervals to confirm regression.
- ▶ Correct anovulation — induce ovulation if PCOS-related.

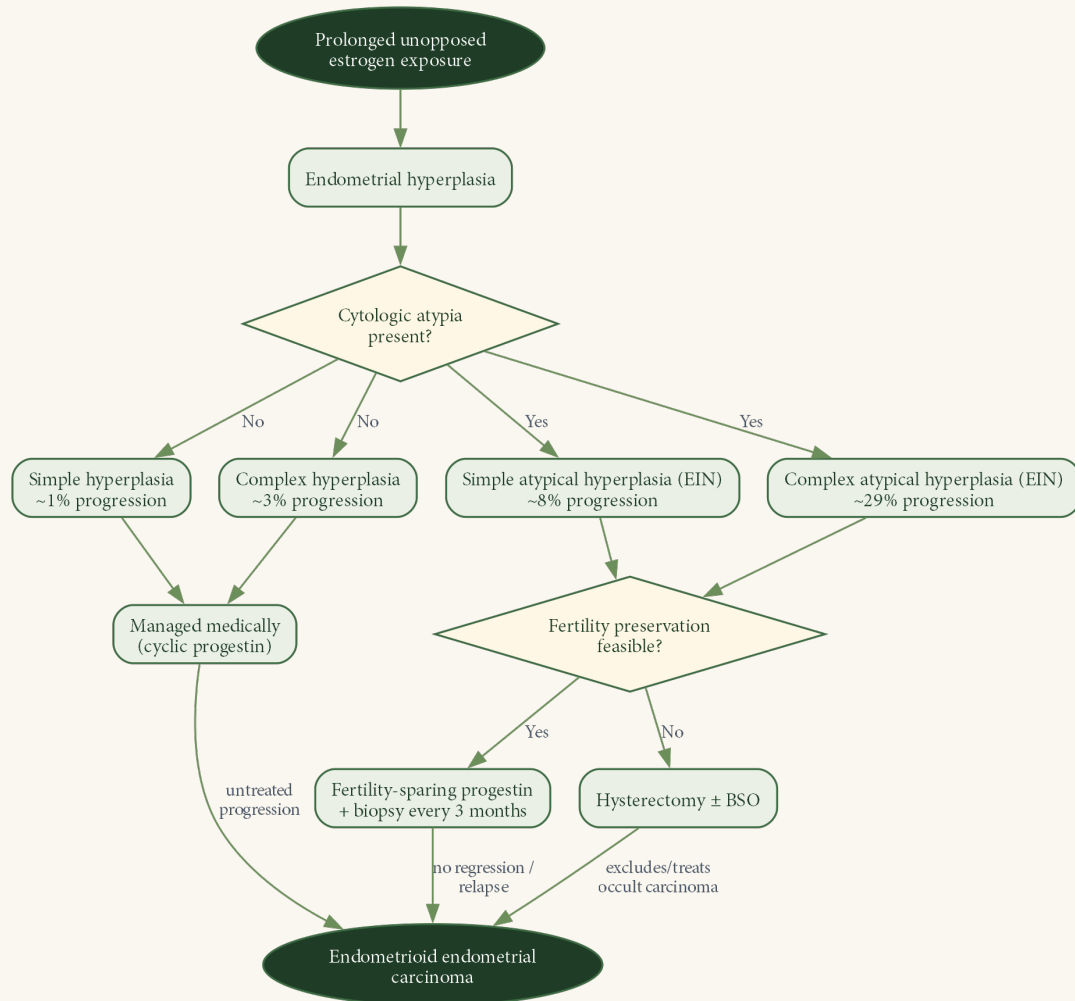
EIN/atypical hyperplasia — fertility desired or poor surgical candidate

- ▶ Continuous progestin therapy: oral medroxyprogesterone acetate (Provera) 10 mg twice daily, or megestrol acetate 40–160 mg/day, or a levonorgestrel-releasing intrauterine system for local delivery (Berek & Novak 16e; DC Dutta's Gynaecology 7e).
- ▶ Endometrial biopsy every 3 months to document regression — recurrence risk on progestin surveillance approaches 50% (Berek & Novak 16e).
- ▶ MRI beforehand to reasonably exclude an occult invasive carcinoma.
- ▶ Proceed to hysterectomy if no regression, relapse on stopping progestin, or fertility no longer desired.

EIN/atypical hyperplasia — fertility not desired / peri- or postmenopausal

- ▶ Total hysterectomy (with bilateral salpingo-oophorectomy in most cases) is the definitive treatment of choice (ACOG) — it also excludes the substantial rate of concurrent occult carcinoma.
- ▶ At surgery: send peritoneal washings for cytology; the uterus is opened and inspected in the operating theatre, with frozen section if invasive carcinoma is suspected, and full surgical staging performed if confirmed.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Classification/pathogenesis tree from unopposed estrogen through the WHO hyperplasia subtypes to definitive management and progression risk.

High-yield exam pointers

- ▶ WHO (1994) four-tier scheme (simple/complex ± atypia) → replaced by the two-tier EIN system (ACOG–SGO, 2015); remember "EIN = atypical hyperplasia".
- ▶ Kurman progression figures: 1% – 3% – 8% – 29% (simple / complex / atypical simple / atypical complex).
- ▶ 25–43% of atypical hyperplasia/EIN biopsies harbour a concurrent occult carcinoma at hysterectomy.
- ▶ Fertility-sparing regimen: Provera 10 mg BID or megestrol acetate 40–160 mg/day or LNG-IUS, with endometrial biopsy every 3 months.
- ▶ Hysterectomy ± BSO = definitive treatment when fertility is not a concern.

- ▶ Lynch syndrome carries ~**20-fold** relative risk of endometrial cancer — screen young patients with atypical hyperplasia/endometrial cancer.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e still teaches the older WHO (1994) four-tier hyperplasia classification, while current ACOG/SGO practice (2015) uses the two-tier EIN scheme; the underlying management principles (progestin for fertility preservation, hysterectomy as definitive cure) are unchanged across both systems.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; ACOG/Society of Gynecologic Oncology (2015) EIN nomenclature.



Evaluate the causes of vaginal discharge and how will you diagnose and manage Bacterial vaginosis?

Asked in: Paper I 26-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Vaginal discharge is any per-vaginal secretion whose amount, colour, consistency, or odour is noticed by the woman; it may be **physiological** (oestrogen-driven, cyclical) or **pathological** (infective or non-infective). Bacterial vaginosis (BV) — a polymicrobial dysbiosis with loss of lactobacilli and overgrowth of *Gardnerella vaginalis* and anaerobes — is the single most common cause of pathological discharge in women of reproductive age.

Causes of vaginal discharge

Category	Causes	Key point
Physiological	Mid-cycle oestrogen surge, premenstrual congestion, pregnancy, combined oral contraceptive/hormonal use, sexual arousal, neonatal (maternal oestrogen withdrawal)	Clear/white, mucoid, non-offensive, no pruritus, self-limiting

Category	Causes	Key point
Vaginal — infective	Bacterial vaginosis (<i>Gardnerella vaginalis</i> + anaerobes), vulvovaginal candidiasis (<i>Candida albicans</i>), trichomoniasis (<i>Trichomonas vaginalis</i>), nonspecific/vulvovaginitis of childhood (foreign body, threadworm), atrophic vaginitis with secondary infection	See differentiating table below
Cervical	Mucopurulent cervicitis (<i>Chlamydia trachomatis</i> , <i>Neisseria gonorrhoeae</i>), cervical ectopy/erosion, cervical polyp, cervical carcinoma	Mucopurulent discharge, contact bleeding on speculum
Uterine/upper tract	Endometritis (post-partum, post-abortion, senile), pyometra (obstructing endocervical/endometrial carcinoma), retained products of conception, endometrial carcinoma	Blood-stained, offensive; suspect malignancy if postmenopausal
Non-infective/iatrogenic	Retained tampon/pessary/vaginal foreign body, toxic shock syndrome (<i>Staphylococcus aureus</i>), copper IUCD-associated discharge	Offensive; history of foreign body/tampon use
Fistulous	Vesicovaginal or rectovaginal fistula (obstetric trauma, radiation, malignancy)	Continuous watery (urine) or faeculent leak
Allergic/chemical	Contact reaction to soaps, douches, spermicides, latex condoms	Pruritus/burning, no organism isolated

Differentiating the common infective causes

Feature	Trichomoniasis	Candidiasis	Bacterial vaginosis	Chlamydial cervicitis	Normal discharge
Colour/consistency	Greenish-yellow, frothy	Curdy white, thick	Grey-white, thin, homogeneous	Mucopurulent	White, clear, thin

Feature	Trichomoniasis	Candidiasis	Bacterial vaginosis	Chlamydial cervicitis	Normal discharge
pH	≥ 4.5	< 4.5	> 4.5 (usually 4.7–5.7)	< 4.5	< 4.5
Whiff test (KOH)	Negative	Negative	Positive (fishy amine odour)	Negative	Negative
Microscopy	Motile trichomonads	Budding yeast/pseudohyphae	Clue cells (> 20% of cells)	Chlamydia NAAT positive	—
Pruritus	+++	++	Absent/minimal	Absent	Absent

Diagnosis of bacterial vaginosis

- ▶ **History and speculum examination** — thin, homogeneous, grey-white discharge adherent to the vaginal walls with a fishy odour, most noticeable after coitus; there is **no** significant vulvovaginal erythema, pruritus, burning, or dyspareunia — the absence of inflammation is why the condition is called "vaginosis," not "vaginitis." A large proportion of women are asymptomatic.
- ▶ **Amsel's clinical criteria** — diagnosis requires 3 of the following 4:
 - Homogeneous, thin, grey-white discharge coating the vaginal walls.
 - Vaginal pH > 4.5.
 - Positive **whiff test** — fishy amine odour on adding 10% potassium hydroxide (KOH) to the discharge.
 - **Clue cells** on saline wet-mount microscopy — vaginal epithelial cells so heavily studded with coccobacilli that the cell border is stippled/obscured (> 20% of epithelial cells), with leucocytes conspicuously absent.
- ▶ **Gram-stained vaginal smear (Nugent score, 0–10)** — the laboratory gold standard, based on relative morphotypes of lactobacilli, *Gardnerella/Bacteroides*, and *Mobiluncus*: 0–3 normal, 4–6 intermediate, ≥ 7 diagnostic of BV.
- ▶ Culture of *G. vaginalis* is **not** used diagnostically — it lacks specificity, being isolated in many normal women.

Management of bacterial vaginosis

Regimen	Dose
Metronidazole (oral) — first-line	500 mg orally twice daily × 7 days
Metronidazole vaginal gel 0.75%	One applicator (5 g) intravaginally once daily × 5 days

Regimen	Dose
Clindamycin vaginal cream 2%	One applicator (5 g) intravaginally at bedtime × 7 days
Clindamycin ovules 100 mg	Intravaginally once at bedtime × 3 days
Clindamycin (oral) — alternative	300 mg orally twice daily × 7 days

- ▶ Cure rates with the standard regimens are 75–85%; recurrence within 3–12 months is common.
- ▶ **Recurrent BV** (≥ 3 episodes/year): repeat an approved regimen, then suppressive metronidazole gel twice weekly for 4–6 months.
- ▶ **Partner treatment is not recommended** — it does not improve cure rates or reduce recurrence.
- ▶ **In pregnancy**: routine screening of asymptomatic, low-risk women is not recommended; symptomatic BV, or BV in a woman at high risk of preterm birth, is treated with the same oral metronidazole regimen, which is considered safe in pregnancy. Perioperative metronidazole in BV-positive women before hysterectomy or surgical abortion reduces post-operative pelvic infection.
- ▶ Avoid alcohol during and for 24 hours after oral metronidazole, to prevent a disulfiram-like reaction.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 12.1 — Clue cells (DC Dutta's Gynaecology 7e, p.145)

High-yield exam pointers

- ▶ Discharge work-up triad at the bedside: **pH paper** → **whiff (KOH) test** → **saline/KOH wet mount microscopy**.
- ▶ **Amsel's criteria** — 3 of 4: thin grey-white discharge, pH > 4.5, positive whiff test, clue cells > 20%.
- ▶ **Nugent score**: 0–3 normal, 4–6 intermediate, ≥ 7 = BV (Gram-stain gold standard).
- ▶ First-line drug: **metronidazole 500 mg PO BID × 7 days** (or intravaginal gel 0.75% OD × 5 days).
- ▶ BV = **vaginosis, not vaginitis; partner treatment not indicated**.
- ▶ Obstetric triad to recall: **preterm labour, PROM, chorioamnionitis**.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e prints an older oral regimen (metronidazole 200 mg three times daily, citing CDC 2010); the current standard reproduced above — metronidazole 500 mg twice daily for 7 days — matches Berek & Novak 16e and current CDC guidance.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 12 — Sexually Transmitted Infections; Ch. 13 — Infections of the Individual Pelvic Organ); Berek & Novak's Gynecology 16e (Vaginal Infections — Bacterial Vaginosis); CDC Sexually Transmitted Infections Treatment Guidelines (current edition).



Evaluation of chronic pelvic pain

Asked in: Paper III May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Chronic pelvic pain (CPP) is non-cyclic pain localised to the pelvis, the anterior abdominal wall at or below the umbilicus, or the lower back, present for **6 months or longer**, severe enough to cause functional disability or to require medical or surgical treatment (American College of Obstetricians and Gynecologists, ACOG). Because pain severity is often disproportionate to any demonstrable tissue damage (central sensitisation), evaluation must be systematic, multisystem, and multidisciplinary rather than aimed only at finding a single pelvic lesion.

Differential framework that guides the evaluation

Category	Examples
Gynaecological — cyclic	Primary/secondary dysmenorrhoea, mittelschmerz, endometriosis/adenomyosis, pelvic congestion syndrome, non-hormonal intrauterine device
Gynaecological — noncyclic	Pelvic adhesions, chronic pelvic inflammatory disease (PID), ovarian remnant/residual (trapped) ovarian syndrome, pelvic organ prolapse, benign/malignant adnexal mass
Gastrointestinal	Irritable bowel syndrome, inflammatory bowel disease, diverticulitis, hernia, recurrent partial bowel obstruction
Urological	Interstitial cystitis/bladder pain syndrome, recurrent urinary tract infection, urethral syndrome, calculus
Musculoskeletal/neurological	Nerve entrapment (ilioinguinal, iliohypogastric, genitofemoral), myofascial trigger points, low-back/spinal disease
Systemic/psychological	Fibromyalgia, abdominal migraine, depression/anxiety, past physical/sexual trauma

Pain history

- ▶ **Structured history** using the mnemonic **OLD CAARTS** — Onset (and change over time), Location (can the patient point to it?), Duration, Characteristic (cramping/aching/stabbing/burning), Alleviating/Aggravating factors, Associated symptoms, Radiation, Temporal pattern (relation to menstrual cycle/day), Severity (0–10 visual analogue scale).
- ▶ **System-specific review** — genital (abnormal bleeding, discharge, dyspareunia, subfertility), enterocoelic (constipation, diarrhoea, bloating, relief with defaecation), urological (frequency, urgency, dysuria, incontinence), musculoskeletal/neuropathic (worse with exercise/posture, numbness, lancinating pain), psychological (depression, anxiety, physical/sexual trauma, suicidal ideation).
- ▶ Relationship of pain to intercourse, micturition and bowel habit; the context in which pain arose; occupational and social impact; and review of any prior evaluations, operative notes and pathology reports.
- ▶ Screen for depression, anxiety and past trauma **at the first visit** — persistent pain is commonly sustained by these factors regardless of the original trigger, and referral for parallel psychological evaluation should be framed as a routine part of assessment, not as dismissing the pain as unreal.

Physical examination

- ▶ General/vital signs and abdominal palpation for tenderness; standing examination for abdominal (inguinal/femoral) and pelvic (cystocele/enterocele) hernias.
- ▶ **Carnett's sign (test)** — palpate the tender point, then repeat with the abdominal wall muscles tensed (head/shoulders raised off the table, or bilateral straight-leg raise). Pain that **worsens or persists** localises to the **abdominal wall** (myofascial/nerve entrapment); pain that **lessens** indicates a **visceral** source.
- ▶ Localise sharp/lancinating/burning/tingling pain to a specific peripheral nerve distribution.
- ▶ **Speculum, bimanual and rectovaginal examination** — uterine size, mobility and tenderness (retroversion); adnexal mass or tenderness; nodularity/thickening of the uterosacral ligaments or rectovaginal septum (suggests endometriosis); cervical motion tenderness (suggests PID). In advanced endometriosis the uterus may be fixed in retroversion with reduced tubo-ovarian mobility ("frozen pelvis").
- ▶ Pelvic-floor palpation for myofascial trigger points.

Confirmatory bedside/diagnostic tests

Suspected cause	Test	Interpretation
Abdominal-wall nerve entrapment	Local infiltration of bupivacaine 0.25% at the trigger point	Pain relief confirms the diagnosis and is simultaneously therapeutic

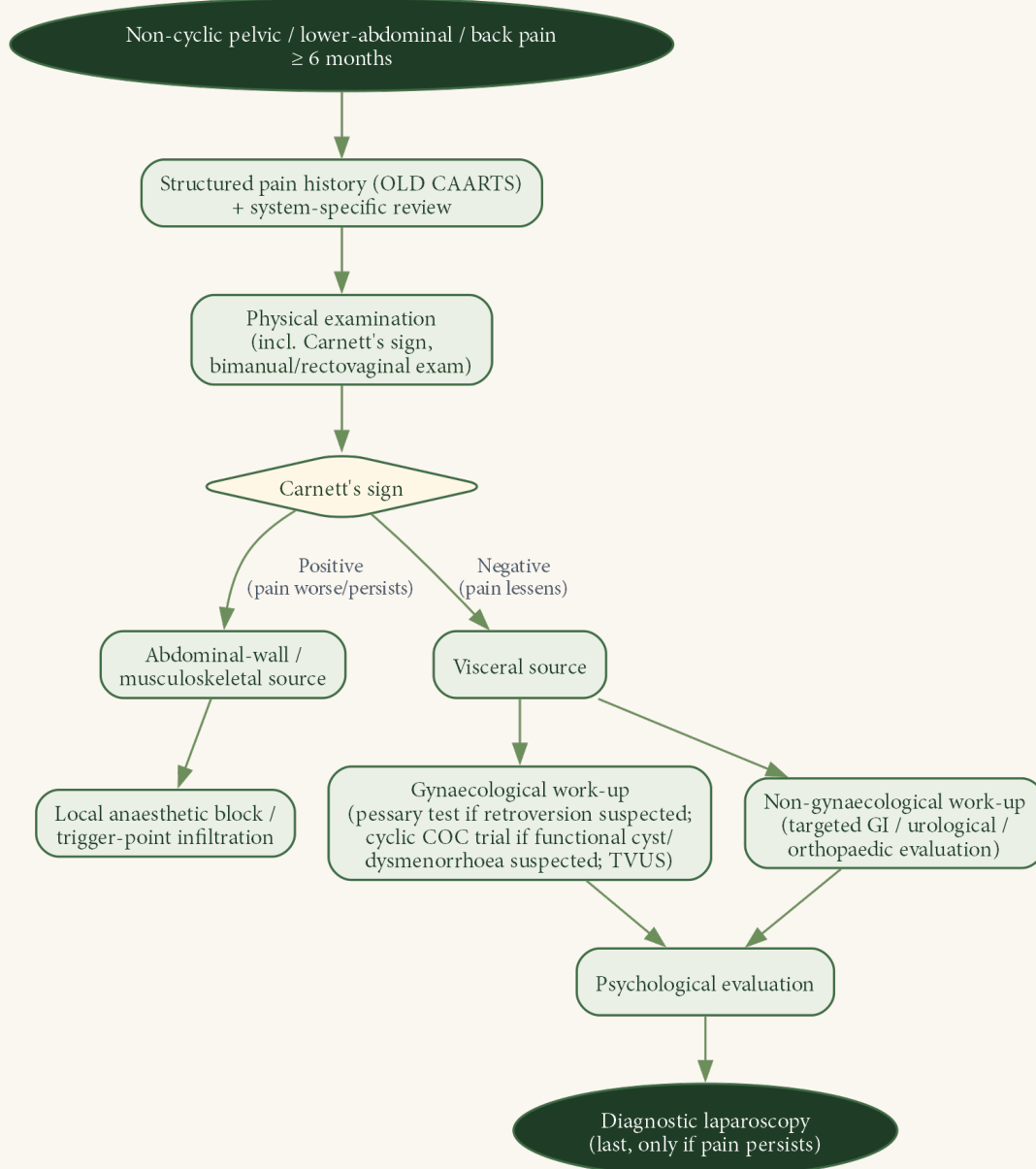
Suspected cause	Test	Interpretation
Retroverted/mobile uterus	Pessary test — ring pessary retained for 3 months	Symptom relief confirms uterine displacement as the cause and supports surgical correction
Functional ovarian cyst / midcycle or primary dysmenorrhoea	Cyclic combined oral contraceptive pill for 3 months	Regression of the cyst with symptom relief, or abolition of midcycle/menstrual pain by inducing anovulation, is diagnostic

Investigations

Investigation	Purpose/finding
Complete blood count, ESR	Screens for infection/chronic PID
Cervical/vaginal swab (Gram stain, culture); NAAT for gonorrhoea/chlamydia	Diagnoses PID/cervicitis
Endometrial biopsy	Suspected genital tuberculosis
Urine microscopy/culture	Excludes urinary tract infection/interstitial cystitis
Transvaginal ultrasound (TVUS)	First-line imaging step (ESHRE/ACOG guidance); detects fibroid, adenomyosis, ovarian cyst; reliably detects an endometrioma (sensitivity ~93%, specificity ~96%) but is poor for peritoneal endometriosis (sensitivity ~65%); colour Doppler adds torsion/pelvic congestion assessment
MRI pelvis	Deep infiltrating endometriosis (rectovaginal/bladder nodules), ovarian remnant tissue, when TVUS is inconclusive
Transuterine venography / colour Doppler	Confirms pelvic congestion (Taylor) syndrome
X-ray lumbosacral spine/hip	Orthopaedic causes
Cystoscopy/sigmoidoscopy/colonoscopy	Selected urological/gastrointestinal causes

Investigation	Purpose/finding
Diagnostic laparoscopy	Performed last — only after gastrointestinal, urological and musculoskeletal/neuropathic causes are excluded or treated and psychological evaluation is negative. It remains the gold standard for endometriosis (found in 15–40% of laparoscopies done for CPP) and adhesions, yet 60–80% of laparoscopies for CPP show no intraperitoneal pathology — a negative finding still reassures the patient. Clinical–laparoscopic discordance is well documented: about 50% of women with a clinically normal pelvis have a detectable laparoscopic abnormality, while roughly a third of women with detectable clinical pathology prove normal at laparoscopy

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision-algorithm flowchart for evaluating chronic pelvic pain, from initial history/examination through Carnett's-sign triage to reserved-for-last diagnostic laparoscopy.

High-yield exam pointers

- ▶ CPP definition: non-cyclic pain ≥ 6 months, pelvis/anterior abdominal wall/lower back, causing functional disability (ACOG; matches DC Dutta).
- ▶ History mnemonic: OLD CAARTS.
- ▶ **Carnett's sign:** pain worse on tensing abdominal muscles = abdominal-wall source; pain better = visceral source.

- ▶ Three bedside confirmatory tests to name: bupivacaine 0.25% infiltration (nerve entrapment), 3-month pessary test (retroversion), 3-month cyclic oral contraceptive pill trial (functional cyst/dysmenorrhoea).
- ▶ **TVUS is first-line imaging** (ESHRE/ACOG); detects an endometrioma with ~93% sensitivity but misses peritoneal endometriosis.
- ▶ Diagnostic laparoscopy is the **last** step, not the first — **60–80%** show no pathology.
- ▶ Discordance figures worth quoting: ~50% of clinically normal pelves show an abnormality at laparoscopy; ~33% of clinically abnormal pelves are normal at laparoscopy.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Evaluation proceeds stepwise — history and examination first, then targeted investigations, with diagnostic laparoscopy reserved for last; jumping straight to laparoscopy is a common error, since 60–80% of such laparoscopies for chronic pelvic pain show no pathology.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; American College of Obstetricians and Gynecologists (ACOG)/European Society of Human Reproduction and Embryology (ESHRE) guidance on transvaginal ultrasound, as cited in Berek & Novak 16e.



Gynaecological problems associated with obesity

Asked in: Paper III Nov 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — Obesity is a chronic disease of excess adiposity, defined by the World Health Organization (WHO) as body mass index (BMI, weight in kg / height in m²) ≥30 kg/m² — overweight 25–29.9, Class I obesity 30–34.9, Class II 35–39.9, Class III (morbid) ≥40 kg/m². Central ("android") fat distribution, more than the gynoid pattern, drives gynaecological morbidity through increased peripheral aromatization of androgens to oestrogen, hyperinsulinaemia and reduced sex-hormone-binding globulin (SHBG).

Mechanism linking obesity to gynaecological disease

Mechanism	Downstream effect
Aromatase in adipose tissue converts androstenedione/androgens to oestrone	Chronic unopposed hyperoestrogenism , unbalanced by cyclical progesterone
Hyperinsulinaemia/insulin resistance (central obesity)	Increased ovarian and adrenal androgen production

Mechanism	Downstream effect
Insulin excess and hyperandrogenism suppress hepatic synthesis of SHBG	Raised free testosterone and free oestradiol (obesity → ↑insulin → impaired glucose tolerance → ↑androgen production → ↓SHBG → ↑free testosterone/oestradiol)
Elevated leptin from excess adipocytes	Altered gonadotropin-releasing hormone (GnRH) pulsatility → anovulation

Menstrual, ovulatory and reproductive problems

Problem	Feature/mechanism in obesity
Polycystic ovary syndrome (PCOS)	Over half of women with PCOS are obese (android pattern); obesity worsens hyperandrogenism, insulin resistance and anovulation; a 5–7% weight loss (target BMI <25) restores spontaneous ovulation in many
Oligomenorrhoea, secondary amenorrhoea, abnormal/dysfunctional uterine bleeding	Chronic anovulation with unopposed oestrogen causes irregular, unpredictable endometrial shedding
Anovulatory infertility	Obese women need higher gonadotropin doses for ovulation induction/assisted reproduction, with poorer response; BMI >35 kg/m ² is an indication to consider bariatric surgery before fertility treatment
Early pregnancy loss	Increased risk of both sporadic and recurrent miscarriage
Hirsutism and acne	Peripheral and ovarian/adrenal androgen excess

Gynaecological malignancy and premalignant risk

Lesion	Obesity-related risk
Endometrial hyperplasia (including endometrial intraepithelial neoplasia) and endometrial carcinoma	Unopposed oestrogen from peripheral aromatization is the principal driver; obesity + hypertension + diabetes mellitus constitutes the classic " corpus cancer syndrome "; risk is 3-fold in women 10–20 kg overweight and 10-fold if more than 25 kg overweight, from increased peripheral conversion of androstenedione to oestrone
Endometrial polyps	Obesity is a recognised risk factor, alongside unopposed oestrogen, tamoxifen, diabetes and hypertension
Uterine leiomyoma (fibroids)	Oestrogen-dependent growth; obesity increases prevalence and is a comorbidity that influences choice of hysterectomy route

Lesion	Obesity-related risk
Epithelial ovarian cancer	Obesity carries a modest increase in risk (particularly endometrioid/mucinous subtypes); adnexal masses are also harder to palpate and to image transabdominally
Postmenopausal breast cancer	Peripheral aromatization raises endogenous oestrogen, increasing postmenopausal breast cancer risk (while paradoxically protecting against osteoporosis)

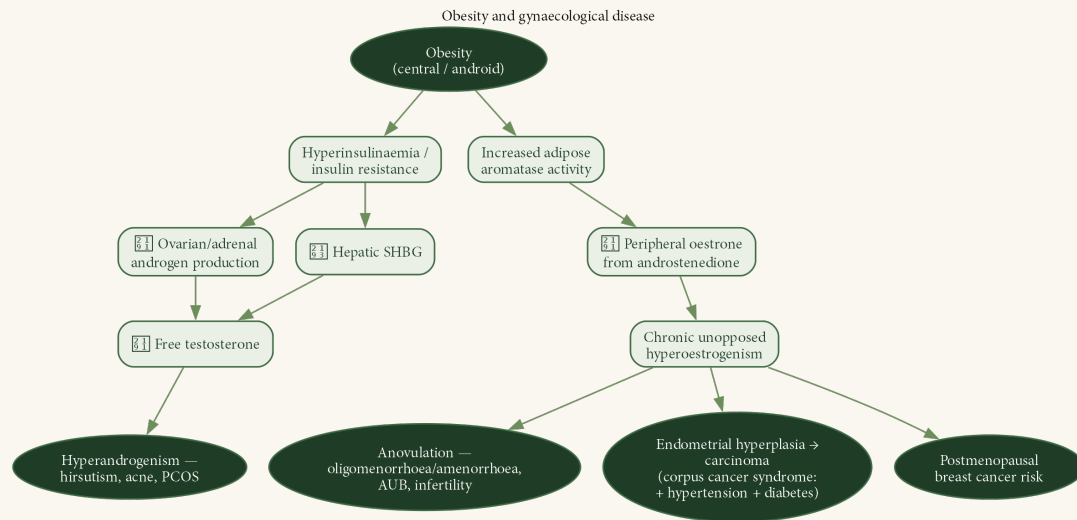
Pelvic floor dysfunction

- ▶ Chronically raised intra-abdominal pressure is a recognised non-obstetric risk factor for **pelvic organ prolapse**, alongside age, chronic constipation and chronic cough.
- ▶ Obesity is an **independent risk factor for both stress and urgency urinary incontinence**, additive to but independent of coexisting diabetes.
- ▶ Weight reduction is first-line conservative management for stress incontinence and for mild prolapse, before pessary or surgery is offered.

Difficulties in gynaecological assessment, surgery and anaesthesia

Difficulty	Practical implication
Bimanual/abdominal palpation limited by the abdominal panniculus	Adnexal or uterine masses may be missed; examination under anaesthesia may be needed
Transabdominal sonography degraded by obesity	Transvaginal sonography (no full bladder needed, 5–8 MHz probe) is the preferred pelvic imaging modality
Laparoscopic entry technically harder (thick abdominal wall, Veress needle/port placement)	Not an absolute contraindication to laparoscopy; open (Hasson) or higher umbilical entry may be chosen
Longer operating time; higher wound/surgical-site infection rate at hysterectomy	Meticulous hemostasis and antibiotic prophylaxis; vaginal hysterectomy preferred where feasible to reduce wound morbidity
Increased perioperative venous thromboembolism (VTE) risk — BMI ≥ 30 kg/m ² is an independent risk factor	Mechanical prophylaxis (compression stockings/intermittent pneumatic compression) plus pharmacological thromboprophylaxis, and early mobilisation
Anaesthetic risk — reduced pulmonary reserve, difficult intubation	Preoperative chest physiotherapy; regional anaesthesia preferred where feasible

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart: obesity's two parallel pathways — hyperinsulinaemia (→ hyperandrogenism) and adipose aromatase (→ unopposed hyperoestrogenism) — converging on the three major clinical endpoints.

High-yield exam pointers

- ▶ WHO BMI cut-offs: overweight 25–29.9; obese ≥ 30 (Class I 30–34.9, Class II 35–39.9, Class III/morbid ≥ 40 kg/m²).
- ▶ One-line mechanism to write first: $\uparrow$ aromatization + $\downarrow$ SHBG $\rightarrow$ unopposed oestrogen + free-androgen excess.
- ▶ "Corpus cancer syndrome" = obesity + hypertension + diabetes mellitus, with endometrial carcinoma.
- ▶ Numbers to quote: 10–20 kg overweight $\rightarrow$ 3-fold endometrial cancer risk; >25 kg overweight $\rightarrow$ 10-fold risk.
- ▶ BMI >35 kg/m² before ovulation induction/assisted reproduction $\rightarrow$ consider bariatric surgery first.
- ▶ BMI ≥ 30 kg/m² is an independent VTE risk factor at gynaecological surgery $\rightarrow$ thromboprophylaxis mandatory.
- ▶ Transvaginal sonography, not transabdominal, is the imaging of choice for the obese pelvis.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The obesity–ovarian-cancer and obesity–breast-cancer associations above reflect current oncology literature (e.g., American College of Obstetricians and Gynecologists (ACOG)/Society of Gynecologic Oncology (SGO) guidance); they are not elaborated in DC Dutta's Textbook of Gynaecology 7e or Jeffcoate's Principles of Gynaecology 9e, both of which predate these data.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e; WHO body mass index classification.



How will you evaluate and manage a sixty-year-old woman who reports with vaginal bleeding?

Asked in: Paper III 26-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Bleeding per vaginam occurring 12 months or more after the last menstrual period (established menopause) is called **postmenopausal bleeding (PMB)**, and includes frank bleeding, spotting, or blood-stained discharge. A 60-year-old woman is well past the median menopausal age (~51 years); by convention, **PMB is regarded as due to genital malignancy until proved otherwise**, and even a single minimal episode must be fully investigated.

Causes of postmenopausal bleeding

Cause	Approximate frequency
Atrophic endometrium / atrophic vaginitis	60–80% (most common)
Exogenous estrogen / hormone therapy (HT)-related	15–25%
Endometrial or cervical polyp	2–12%
Endometrial hyperplasia	5–10%
Endometrial carcinoma	~10%
Other: cervical/vaginal/vulval carcinoma, uterine sarcoma, granulosa-cell tumour of ovary, urethral caruncle/polyp, senile vaginitis, decubitus ulcer, retained pessary/IUCD, tubercular endometritis, trauma	remainder

Evaluation

History

- ▶ Age at menopause; menstrual pattern before menopause; amount and number of bleeding episodes.
- ▶ History of any estrogen intake (HT, phytoestrogens) — does **not** exclude the need for full work-up.
- ▶ Associated symptoms — feeling of "something coming down" (prolapse/decubitus ulcer), urinary symptoms (dysuria, frequency — urethral caruncle or bladder cause), bowel symptoms (exclude PR bleeding/haematuria masquerading as PV bleeding).
- ▶ Risk factors for endometrial carcinoma — obesity, diabetes, hypertension, nulliparity, tamoxifen use, family history of endometrial/ovarian/colon cancer.

General & local examination

- ▶ General survey for obesity, pallor; palpate breast and supraclavicular/groin nodes (metastasis).
- ▶ Per abdomen — mass suggesting pyometra, sarcoma, or adnexal tumour.
- ▶ Inspect perineum/vulva for growth, decubitus ulcer, urethral caruncle.
- ▶ Speculum — inspect cervix and vaginal vault; biopsy any visible growth; if cervix looks normal, take cervical/endocervical cytology.
- ▶ Bimanual/rectovaginal examination — uterine size, mobility; adnexal mass; parametrial induration; cul-de-sac nodularity.

Investigations

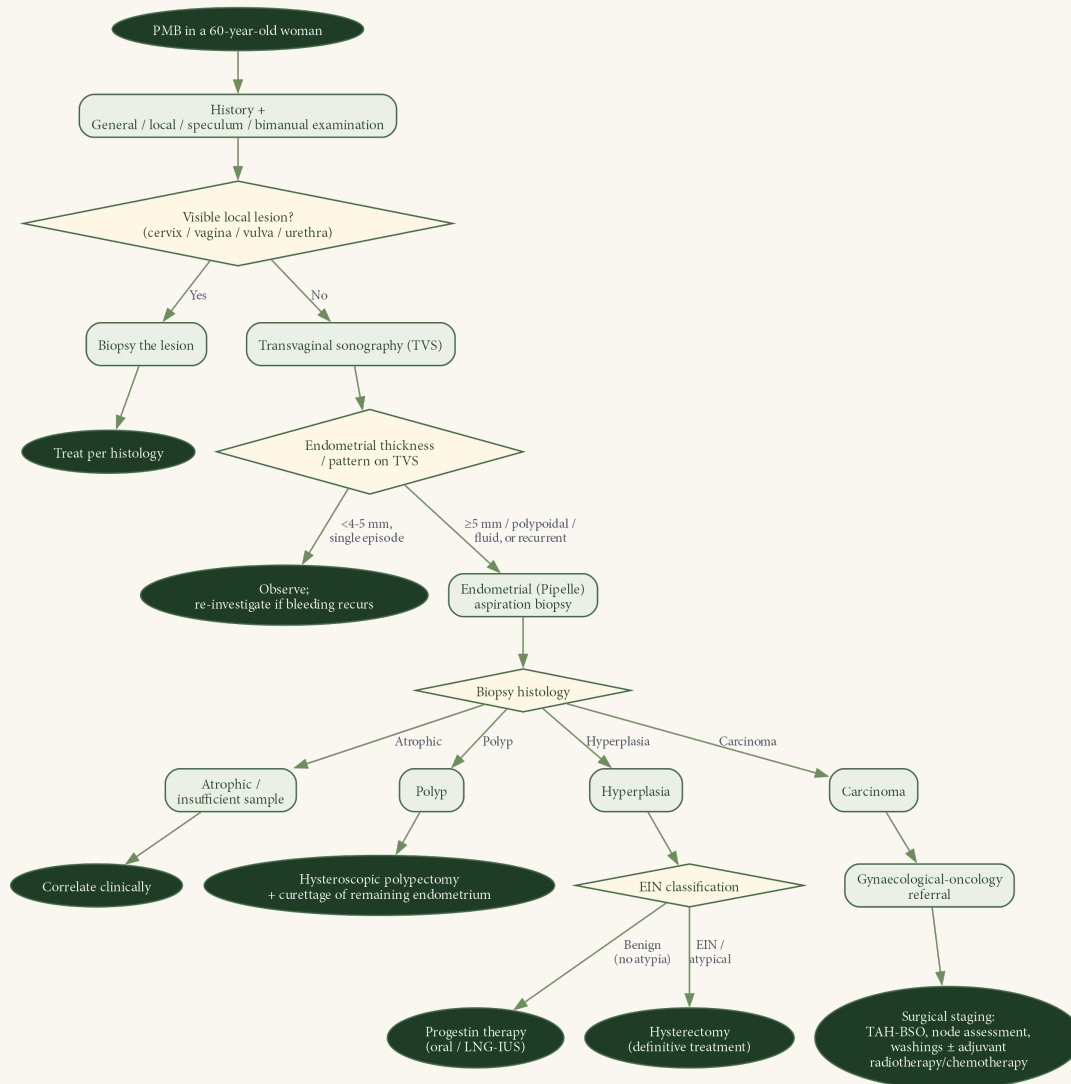
Investigation	Purpose / interpretation
Cervical cytology (Pap smear)	Screens cervical dysplasia/malignancy; insensitive for endometrial cancer (positive in only 30–50%)
Transvaginal sonography (TVS)	First-line; endometrial thickness <4–5 mm is reassuring (atrophic pattern, low malignancy risk) ; thickened (≥5 mm), polypoidal, irregular endometrium or intrauterine fluid needs tissue sampling
Saline-infusion sonohysterography (SIS)	More accurate than TVS alone; delineates focal lesions (polyp, submucous myoma) from diffuse thickening
Endometrial (Pipelle) aspiration biopsy	Office-based first step for tissue diagnosis; 90–98% diagnostic accuracy versus subsequent D&C/hysterectomy; uterine perforation rare (1–2/1000)

Investigation	Purpose / interpretation
Hysteroscopy + directed/fractional curettage	Reserved for cervical stenosis, inadequate/negative biopsy with continuing bleeding, or to localise a polyp/submucous myoma before removal
CA-125, chest X-ray, CT/MRI pelvis-abdomen	If carcinoma confirmed or strongly suspected — pre-treatment staging work-up

Management

- ▶ **Local benign lesion found** — treat directly: atrophic vaginitis → topical (or low-dose systemic) estrogen once malignancy is excluded; cervical/endometrial polyp → hysteroscopic polypectomy with curettage of remaining endometrium; retained pessary/IUCD → remove; urethral caruncle → excision if symptomatic.
- ▶ **Endometrium thin (<4–5 mm on TVS) with a single/minimal episode** — reassurance and clinical observation is acceptable; any recurrence, however slight, mandates endometrial sampling regardless of the earlier thin-endometrium report.
- ▶ **Endometrial hyperplasia on biopsy** — classify by the WHO system or the 2015 ACOG/Society of Gynecologic Oncology endometrial intraepithelial neoplasia (EIN) schema: benign hyperplasia (without atypia) is managed medically with progestins (oral, or levonorgestrel intrauterine system); EIN/atypical hyperplasia carries a ~40–50% risk of coexisting carcinoma, so **hysterectomy is the recommended definitive treatment in a postmenopausal woman**; progestin therapy with 3-monthly endometrial biopsy is reserved for those unfit for surgery, accepting a recurrence risk approaching 50%.
- ▶ **Endometrial (or other genital-tract) carcinoma confirmed** — refer to gynaecological oncology for surgical staging: total abdominal hysterectomy with bilateral salpingo-oophorectomy, pelvic ± para-aortic lymph node assessment, peritoneal washings/omental sampling as indicated, followed by adjuvant radiotherapy/chemotherapy guided by stage and risk factors.
- ▶ **No cause found on full evaluation** — if bleeding was minimal and occurred only once or twice, careful follow-up observation is reasonable; with recurrent or continued bleeding despite a negative work-up, proceed to laparoscopy (if adnexal mass suspected) or laparotomy with hysterectomy and bilateral salpingo-oophorectomy, since an occult ovarian, tubal, or endometrial pathology may still be found on the removed specimen.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart of the evaluation and management pathway for postmenopausal bleeding in a 60-year-old woman.

High-yield exam pointers

- ▶ Definition: bleeding ≥ 12 months after last menses = PMB; treat as malignancy until proved otherwise.
- ▶ TVS endometrial thickness cut-off: $<4-5$ mm $\rightarrow$ low risk, biopsy usually deferred; ≥ 5 mm or recurrent bleeding $\rightarrow$ biopsy mandatory.
- ▶ Office **Pipelle biopsy** = first-line tissue test (90–98% accuracy vs D&C); hysteroscopy + curettage when biopsy fails, is inadequate, or bleeding recurs.
- ▶ Commonest cause overall = **atrophic endometrium/vaginitis (60–80%)**; endometrial carcinoma accounts for $\sim 10\%$ of PMB.

- ▶ 2015 ACOG/SGO EIN **schema**: benign hyperplasia (medical/progestin) vs EIN (surgical — hysterectomy preferred postmenopausally, ~40–50% coexisting cancer).
- ▶ Never dismiss PMB as "just fibroids" — leiomyoma should never be accepted as the cause of PMB without excluding endometrial pathology.
- ▶ Persistent/recurrent bleeding with a negative work-up → laparotomy with hysterectomy + bilateral salpingo-oophorectomy.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older texts (e.g., DC Dutta) state that "as many as one-third" of PMB is malignant, largely reflecting pre-hysteroscopy era data; contemporary series (Berek & Novak) show endometrial carcinoma in roughly 10% of PMB, with atrophic endometrium being by far the commonest cause — this answer follows the current figures.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; 2015 ACOG/Society of Gynecologic Oncology endometrial intraepithelial neoplasia (EIN) nomenclature (as cited in Berek & Novak 16e).



HPV vaccine

Asked in: Paper IV 19-Nov-2021 · Paper III Nov 2018 · Paper III May 2011 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — Human papillomavirus (HPV) vaccines are prophylactic, non-infectious, recombinant subunit vaccines built from the HPV **L1 major capsid protein**, which self-assembles into virus-like particles (VLPs) that carry no viral DNA and cannot cause HPV infection or cancer. They induce high-titre, type-specific neutralising antibody that prevents *persistent* infection with oncogenic (high-risk) HPV types — the necessary cause of cervical cancer and a major cause of vulval, vaginal, anal and oropharyngeal cancers and genital warts.

Types and composition

Vaccine	HPV types covered	Adjuvant	Manufacturer
Bivalent (Cervarix)	16, 18	AS04	GlaxoSmithKline
Quadrivalent (Gardasil-4)	6, 11, 16, 18	Amorphous aluminium hydroxyphosphate sulfate	Merck

Vaccine	HPV types covered	Adjuvant	Manufacturer
Nonavalent (Gardasil-9)	6, 11, 16, 18, 31, 33, 45, 52, 58	Amorphous aluminium hydroxyphosphate sulfate	Merck
Indigenous quadrivalent (Cervavac)	6, 11, 16, 18	Aluminium phosphate	Serum Institute of India

Bivalent and quadrivalent vaccines also show partial **cross-protection** against related high-risk types 31, 33 and 45. Types 16 and 18 together account for ~70% of cervical cancers; adding types 6 and 11 additionally prevents ~90% of genital warts; the nonavalent formulation extends protection to types responsible for a further ~15–20% of cervical cancers.

Mechanism of action

- ▶ Recombinant L1 protein is expressed in yeast (Gardasil) or insect cells (Cervarix) and self-assembles into an empty, non-infectious VLP that is structurally identical to the native virion capsid.
- ▶ Intramuscular injection generates a robust, type-specific humoral response with antibody titres far exceeding those of natural infection, mediated largely by neutralising IgG that transudates to the genital mucosa.
- ▶ Protection is **prophylactic only** — the vaccine prevents new/persistent infection and its downstream neoplastic sequence (cervical intraepithelial neoplasia (CIN), vulval/vaginal intraepithelial neoplasia) but has no therapeutic effect on established HPV infection, existing CIN, or genital warts. Maximum benefit therefore requires vaccination **before first sexual exposure**.

Indications and vaccination schedule

Age at first dose	Number of doses	Schedule
9–14 years (primary target group)	2 doses	0, 6–12 months
≥15 years, or any age if immunocompromised/HIV-positive	3 doses	0, 1–2, 6 months

- ▶ **Primary target:** girls aged 9–14 years, ideally before coitarche.
- ▶ **Catch-up vaccination:** recommended up to age 26 years (FOGSI/ACOG); the US FDA has extended the approved age indication for the nonavalent vaccine to **9–45 years**, and to **males as well as females** (gender-neutral vaccination, reducing transmission and preventing HPV-related anal/oropharyngeal/penile disease).
- ▶ **Route:** intramuscular, deltoid region.

- ▶ Vaccination does **not** replace cervical cancer screening, since no licensed vaccine covers every oncogenic HPV type — vaccinated women must continue Pap smear/HPV-DNA screening per age-appropriate protocol.

Efficacy and safety

- ▶ Nonavalent vaccine: ~97% efficacy against CIN 2/3, vulval intraepithelial neoplasia (VIN) 2/3 and vaginal intraepithelial neoplasia (VaIN) 2/3 related to its covered types in HPV-naïve women; efficacy falls to well below this in women already infected with a covered type before vaccination — hence the emphasis on early, pre-exposure administration.
- ▶ **Adverse effects:** mostly mild and self-limiting — injection-site pain, erythema, swelling; occasional low-grade fever; vasovagal syncope is reported disproportionately in adolescents, so a **15-minute post-injection observation** period is advised. Anaphylaxis is rare.
- ▶ **Contraindications:** known severe hypersensitivity to any vaccine component (including yeast, for Gardasil); moderate-to-severe acute illness (defer until recovery); pregnancy — the series should be completed after delivery, though inadvertent administration in pregnancy has not shown teratogenicity and is not an indication for termination. The vaccine is safe in breastfeeding and in immunocompromised individuals (who need the 3-dose schedule at any age).
- ▶ Both bivalent and quadrivalent vaccines are "type-specific" and safe/well-tolerated, per long-term post-marketing surveillance.

Recent advances [RA]

- ▶ **WHO single-dose recommendation (2022)** — following SAGE's April 2022 review of trial and real-world data showing comparable protection with fewer doses, WHO's updated position paper (Weekly Epidemiological Record, Dec 2022) now endorses a **1- or 2-dose schedule** for the primary target group (girls 9–20 years) and a **2-dose schedule** for those older or immunocompromised, a major shift from the earlier mandatory 2/3-dose schedules aimed at improving global coverage and cost.
- ▶ **Population-level cervical cancer reduction** — a register-based observational study of England's national HPV vaccination programme (Falcato M et al., *Lancet* 2021;398:2084–2092, PMID 34741816) showed an ~87% reduction in cervical cancer incidence in women vaccinated at ages 12–13, providing the first direct real-world evidence that vaccination prevents invasive cervical cancer, not just precancer.
- ▶ **WHO Global Strategy to Accelerate the Elimination of Cervical Cancer (2020)** sets the **90-70-90 targets by 2030**: 90% of girls fully vaccinated by age 15, 70% of women screened with a high-performance test by ages 35 and 45, and 90% of women with cervical disease receiving treatment.
- ▶ **Indigenous vaccine (India)** — Cervavac, India's first indigenously developed quadrivalent HPV vaccine (Serum Institute of India), received regulatory approval and was commercially launched

in 2023/2024, aimed at making vaccination affordable for national-scale rollout; FOGSI has endorsed HPV vaccination in girls 9–14 years as a priority public-health measure, with catch-up to 26 years.

- ▶ **Gender-neutral vaccination** is increasingly adopted internationally to reduce HPV transmission and to prevent HPV-related anal, penile and oropharyngeal cancers in men, supported by the FDA's extension of the nonavalent vaccine's age/sex indication to 9–45 years in both sexes.

High-yield exam pointers

- ▶ Vaccine is made of the **L1 capsid VLP** — non-infectious, prophylactic only, no effect on established infection/lesions.
- ▶ Types covered: bivalent 16,18; quadrivalent 6,11,16,18; nonavalent adds 31,33,45,52,58.
- ▶ Schedule to write verbatim: **9–14 years → 2 doses (0, 6–12 mo); ≥15 years or immunocompromised → 3 doses (0, 1–2, 6 mo).**
- ▶ Primary target = girls 9–14 years, before coitarche; catch-up to 26 years; nonavalent now FDA-approved 9–45 years, both sexes.
- ▶ Vaccination **never replaces** cytological/HPV-DNA screening.
- ▶ WHO 90-70-90 elimination targets by 2030; WHO 2022 single-dose option.
- ▶ Nonavalent efficacy ~97% for CIN2+/VIN2+/VaIN2+ in HPV-naïve recipients.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older textbook editions describe fixed brand-specific 3-dose schedules (e.g., bivalent/quadrivalent given as three doses over 6 months); the age-based 2-dose-versus-3-dose schedule above is the current WHO/ACIP/FOGSI standard and should be quoted in the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 23 — Premalignant Lesions of Cervix; Ch. 33 — Adolescent Gynaecology); Berek & Novak's Gynecology 16e (Ch. 16 — Preinvasive Disease of the Cervix, Vagina and Vulva); WHO position paper on HPV vaccines (Weekly Epidemiological Record, Dec 2022); WHO Global Strategy to Accelerate the Elimination of Cervical Cancer (2020); FOGSI recommendations on HPV vaccination; Falcão et al., *Lancet* 2021 (PMID 34741816).



Hysteroscopy

Asked in: Paper III 16-Nov-2019 · Paper III Jul 2016 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Hysteroscopy is an endoscopic procedure in which a rigid or flexible telescope is passed transcervically to directly visualize the endocervical canal and uterine cavity under distension, for **diagnostic** evaluation of intrauterine pathology or **operative** correction of it. It may be done as an outpatient diagnostic procedure under paracervical block or extended to an operative procedure under general/regional anaesthesia using instruments passed through a separate operating sheath.

Instruments and distension media

A telescope (0°, or fore-oblique 30°/70°) is passed through a diagnostic sheath (5 mm) or an operative sheath (7–10 mm) with separate inflow/outflow channels for the distending medium; accessory instruments (scissors, grasping forceps, monopolar/bipolar electrodes, resectoscope loop) are introduced through the operative sheath. Intrauterine pressure of **70–80 mmHg** — kept below the mean arterial pressure — is enough for adequate distension and to limit intravasation.

Distension medium	Type	Use	Current safety limit (AAGL)
Carbon dioxide (CO ₂)	Gas	Diagnostic only, via a dedicated hysteroflator (not a laparoscopic insufflator)	Pressure <100 mmHg, flow rate <100 mL/min — risk of gas embolism if exceeded
Normal saline	Isotonic, electrolyte-containing	Operative — bipolar electrosurgery or mechanical (scissors/morcellator) instruments only; not with monopolar	Maximum tolerated fluid deficit ~2.5 L
1.5% Glycine	Hypo-osmolar, electrolyte-free	Operative with monopolar electrosurgery (non-conducting)	Fluid deficit >1 L → recheck serum electrolytes and consider IV furosemide, finish expeditiously; deficit reaching 1.5 L → mandatory termination
5% Mannitol / 3% Sorbitol	Near-isosmolar/hypo-osmolar, electrolyte-free	Operative with monopolar; mannitol has an added diuretic effect	Same 1 L / 1.5 L deficit thresholds as glycine
Dextran 70	Hyperosmolar, hydrophilic	Rarely used now	Limit <300 mL — draws fluid into circulation, risk of anaphylaxis/coagulopathy

Indications

Diagnostic hysteroscopy	Operative hysteroscopy
Abnormal uterine bleeding (menorrhagia, postmenopausal bleeding) — endometrial evaluation ± directed biopsy	Polypectomy and submucous myomectomy (European Society of Hysteroscopy grade G0–G2 by endocavitary extent)
Infertility with an abnormal hysterosalpingogram (filling defect, synechiae)	Synechiolysis for <i>Asherman's syndrome</i>
Recurrent pregnancy loss — submucous fibroid, polyp, <i>Asherman's syndrome</i> , septum	Metroplasty — resection of a uterine septum
Müllerian anomaly delineation (arcuate/septate/bicornuate/didelphys), combined with laparoscopy	Endometrial ablation/resection (TCRE) for dysfunctional uterine bleeding unresponsive to medical therapy
Localizing a misplaced IUCD with missing threads	Removal of a retained foreign body/IUCD
Chronic pelvic pain from obstructive anomaly or submucous fibroid	Selective proximal tubal cannulation for cornual block
Evaluation of the transformation zone (microcolposcopy) when colposcopy is unsatisfactory	Laser coagulation of endometrial haemangioma/AV malformation

Contraindications

- ▶ **Active pelvic infection** — the flowing medium can disseminate infection into the peritoneal cavity via the tubes.
- ▶ **Pregnancy** — except to retrieve an IUCD with missing threads.
- ▶ **Known cervical cancer** — the friable cervix bleeds excessively on instrumentation.
- ▶ **Profuse active uterine bleeding** obscuring the view.
- ▶ **Cervical stenosis** — relative; prime with intracervical prostaglandin E2 gel or misoprostol 2 hours before to soften the cervix.
- ▶ **Severe cardiopulmonary disease** — higher anaesthesia risk plus the added hazard of gas embolism, fluid overload and pulmonary oedema from the distending medium.

Procedure

- ▶ **Diagnostic hysteroscopy** — outpatient, under paracervical block (1% lidocaine, 10–15 mL); cervix prepared as for dilatation and curettage; telescope introduced through the diagnostic sheath under vision while flushing the distension medium; fundus, all four walls and both tubal ostia are inspected, and the endocervical canal is examined on withdrawal.
- ▶ **Operative hysteroscopy** — under general or regional (spinal/epidural) anaesthesia; cervix dilated (with prior PGE2 priming if stenosed); operative sheath with continuous inflow/outflow of medium is introduced; the working instrument or resectoscope loop is used under direct vision.

- ▶ **Endometrial resection/ablation (TCRE/LAE)** — endometrium suppressed for 4–6 weeks pre-operatively with danazol/GnRH agonist/progestogen; resection or ablation is carried out from cornu to cornu to a depth of 3–5 mm (destroying the basal layer and spiral arterioles) but not below the internal os, to avoid haematometra; completed in ~30 minutes with same-day discharge.
- ▶ **Complexity grading (RCOG)** — Level 1: diagnostic hysteroscopy with target biopsy, simple polyp/IUCD removal; Level 2: proximal tubal cannulation, minor synechiolysis, pedunculated fibroid/large polyp removal; Level 3: septal resection, major synechiolysis, TCRE, submucous myomectomy — used to match case complexity to operator experience.

Complications

Timing	Complication
Perioperative — distension medium	Fluid overload, pulmonary/cerebral oedema, hyponatraemia, ammonia toxicity (excess glycine metabolism), CO ₂ gas embolism
Perioperative — mechanical/energy	Uterine perforation; intraoperative/postoperative haemorrhage; thermal injury to bowel/bladder from laser or electrosurgery if perforation occurs
Perioperative — general	Anaesthetic complications, pelvic infection, cervical trauma, failure to complete the procedure
Late	Recurrent abnormal uterine bleeding after failed TCRE (especially in younger women); haematometra/pyometra from cervical stenosis — avoided by not ablating below the internal os

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 35.10 — Panoramic view of the uterine cavity with a hysteroscope; tubal ostium seen on either side (DC Dutta's Gynaecology 6e, p.635)

High-yield exam pointers

- ▶ Intrauterine distension pressure: **70–80 mmHg**, always kept **below mean arterial pressure**.
- ▶ CO₂ limits (diagnostic only): pressure **<100 mmHg**, flow **<100 mL/min**, via a hysteroflator — never a laparoscopic insufflator.
- ▶ Electrolyte-free medium (glycine/sorbitol/mannitol) fluid-deficit rule: **>1 L → check electrolytes ± furosemide; 1.5 L → stop**. Normal saline tolerated to **~2.5 L**.
- ▶ Monopolar energy needs an electrolyte-free, non-conducting medium (glycine); saline is used only with bipolar/mechanical instruments.

- ▶ TCRE/ablation destroys endometrium to **3–5 mm depth**; never ablate below the **internal os** (risk of haematometra).
- ▶ RCOG **Level 1/2/3** grades hysteroscopic procedure complexity.
- ▶ Absolute no-go list: active pelvic infection, pregnancy (except missing-thread IUCD retrieval), cervical malignancy.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Hysteroscopic tubal sterilization (Essure micro-insert) is described in older textbooks as an operative indication, but the device was withdrawn from the market by its manufacturer in 2018 after safety concerns — do not offer it as a current sterilization option. DC Dutta's Gynaecology prints older, more conservative fluid-deficit cut-offs (glycine deficit >500 mL as the alarm threshold, ≥1 L as mandatory action); the current AAGL practice guideline (>1 L caution, 1.5 L mandatory stop for electrolyte-free media) is the one followed above.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 36 — Endoscopic Surgery in Gynecology); Berek & Novak's Gynecology 16e (Endoscopy/Hysteroscopy chapters); AAGL practice guidelines for the management of hysteroscopic distending media (as cited in Berek & Novak 16e); RCOG classification of hysteroscopic procedure levels (1994).



ICSI

Asked in: Paper III 23-Nov-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Intracytoplasmic sperm injection (ICSI) is a micromanipulation technique of assisted reproduction in which a single spermatozoon is injected directly into the cytoplasm (ooplasm) of a mature, metaphase-II oocyte under a high-power inverted microscope, bypassing the natural barriers to fertilization (zona pellucida binding, acrosome reaction, sperm-oolemma fusion). It was first described by *Van Steirteghem* and colleagues in Belgium (1992) and is now the standard treatment for severe male-factor infertility, used in the great majority of assisted reproductive technology (ART) cycles worldwide. ICSI has proved far more effective than older micromanipulation methods such as

subzonal insemination (SUZI) and has markedly reduced the need for artificial insemination by donor (AID) in couples with severe male-factor infertility.

Indications

Category	Indications
Severe male factor	Severe oligozoospermia (sperm count <5 million/mL); asthenozoospermia; severe teratozoospermia (<4% normal forms by strict criteria)
Azoospermia	Obstructive azoospermia — bilateral congenital absence of vas deferens (CBAVD), post-vasectomy, ejaculatory duct obstruction; non-obstructive azoospermia — sperm retrieved surgically
Immunological	Presence of antisperm antibodies
Prior ART failure	Failed or very low fertilization with conventional in-vitro fertilization (IVF)
Gamete/embryo factors	Fertilization of cryopreserved oocytes with a hardened zona pellucida; fertilization before preimplantation genetic testing (to avoid extraneous sperm-DNA/cumulus-cell contamination)
Non-male-factor (contentious)	Unexplained infertility, diminished ovarian reserve, fertility preservation — used increasingly worldwide though benefit over conventional IVF is unproven (ASRM/SART Committee Opinion, 2012)

Contemporary semen-analysis thresholds for offering ICSI: <2 million total motile sperm or <5% progressive motility, or whenever surgically retrieved sperm is used.

Prerequisites and work-up

- ▶ Controlled ovarian hyperstimulation and transvaginal oocyte retrieval, exactly as for conventional IVF.
- ▶ Semen analysis of the partner; if azoospermic or severely oligospermic — **karyotype and Y-chromosome microdeletion testing (AZFa/AZFb/AZFc regions)** before proceeding, because an AZFc deletion is transmitted to all sons conceived by ICSI.
- ▶ **Cystic fibrosis transmembrane conductance regulator (CFTR) gene mutation screening** in couples with congenital bilateral absence of the vas deferens.
- ▶ Genetic counselling of the couple when a heritable cause of male infertility is found.
- ▶ Sperm source: ejaculated sperm (processed by swim-up/density-gradient) or surgically retrieved sperm — **percutaneous epididymal sperm aspiration (PESA), microsurgical epididymal sperm aspiration (MESA), testicular sperm aspiration (TESA), or testicular sperm extraction (TESE).**

- ▶ Oocyte denudation — removal of the surrounding cumulus-corona cells (hyaluronidase plus mechanical pipetting) to confirm maturity; only a **metaphase-II oocyte with an extruded first polar body** is injected (immature oocytes may occasionally still be used).

Technique (stepwise)

- ▶ Denude the retrieved oocyte of cumulus-corona cells and select mature metaphase-II oocytes.
- ▶ Immobilize a single motile spermatozoon by crushing its tail against the base of the microinjection needle (disrupts the sperm membrane and aids release of the oocyte-activating sperm factor).
- ▶ Hold the oocyte steady on a holding pipette by gentle suction, with the first polar body stabilized at the **6 or 12 o'clock position**.
- ▶ Introduce the injection (micropipette) needle at the **3 o'clock position**, piercing the zona pellucida and then the oolemma.
- ▶ Inject the single spermatozoon (or, rarely, a spermatid if no mature sperm is available) directly into the ooplasm; withdraw the needle.
- ▶ Culture the injected oocytes; assess fertilization at **16–20 hours** — two pronuclei with extrusion of the second polar body confirms normal fertilization.
- ▶ Continue embryo culture with grading, and transfer on day 3 (cleavage stage) or day 5 (blastocyst), exactly as in conventional IVF; excess embryos may be cryopreserved.

Results and complications

Parameter	Figure
Fertilization rate	~60–70%
Clinical pregnancy rate	20–40% per embryo transfer
Oocyte degeneration after injection	5–19%
Overall congenital-malformation risk vs conventional IVF	Not increased — ART overall carries a modestly higher baseline risk than spontaneous conception, but ICSI is not higher than IVF
Sex-chromosome abnormalities/de-novo structural rearrangements	Slightly higher with ICSI than IVF — likely reflects the underlying sperm/gamete defect rather than the injection procedure itself
Imprinting disorders	Small increased risk reported
Failed fertilization (failed oocyte activation)	Can occasionally be rescued by assisted oocyte activation with a calcium ionophore
Transmissible male infertility	Y-chromosome microdeletions and CFTR mutations are passed to male offspring

Fertilization outcomes with ICSI are comparable to conventional IVF performed for non-male-factor infertility, which is why it is now the default fertilization method whenever a male factor is present.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 17.9 — Technique of intracytoplasmic sperm injection (ICSI) (DC Dutta's Gynaecology 7e, p.227)

High-yield exam pointers

- ▶ First described by Van Steirteghem, Belgium, 1992.
- ▶ Oocyte held at 6/12 o'clock, needle enters at 3 o'clock; only a metaphase-II oocyte is injected.
- ▶ Fertilization rate 60–70%; pregnancy rate 20–40% per embryo transfer.
- ▶ Offer when <2 million total motile sperm or <5% motility, or with surgically retrieved sperm.
- ▶ Mandatory work-up before ICSI in azoospermia/severe oligospermia: karyotype + Y-microdeletion (AZFa/b/c) testing; CFTR screening in CBAVD.
- ▶ Sperm-retrieval alphabet: PESA, MESA, TESA, TESE.
- ▶ ICSI does not raise overall malformation risk above conventional IVF, but slightly raises sex-chromosome anomaly risk.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Non-male-factor use of ICSI (unexplained infertility, diminished ovarian reserve) is widespread in practice but is not evidence-supported over conventional IVF — the American Society for Reproductive Medicine/Society for Assisted Reproductive Technology (ASRM/SART) Committee Opinion (2012) flags this as an area of overuse.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (citing the ASRM/SART Committee Opinion, 2012, on ICSI for non-male-factor infertility).

♦ ♦ ♦

Justify your management of a new born who on examination is found to have ambiguous external genitalia

Asked in: Paper III 16-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Ambiguous genitalia are external genitalia that cannot be classified as typically male or female (a clitoris/phallus of intermediate size, incomplete labioscrotal fusion, or a non-palpable gonad in an apparently male infant). They are the commonest neonatal presentation of a **disorder of sex**

development (DSD) — a congenital condition in which chromosomal, gonadal, or anatomical sex is atypical.

Immediate management — exclude a life-threatening cause first

Justification: **congenital adrenal hyperplasia (CAH) from 21-hydroxylase deficiency is the single commonest cause of ambiguous genitalia at birth**, and roughly three-quarters of classic 21-hydroxylase deficiency is the **salt-wasting** form — a hyperkalaemic, hyponatraemic, hypoglycaemic crisis that can present within the first 1–2 weeks and is fatal if missed. The degree of virilisation does **not** predict which infants will salt-waste, so every ambiguous newborn is screened regardless of how mild the ambiguity looks.

Step	Action	Why
1	Do not register or announce a sex; tell parents the genitals are incompletely formed and tests are needed	Avoids a wrong assignment that later needs painful reversal
2	Admit, monitor for vomiting, dehydration, shock	Signs of an evolving adrenal/salt-wasting crisis
3	Check serum electrolytes, glucose serially for 1–2 weeks	Hyperkalaemia, hyponatraemia, hypoglycaemia may only manifest by day 3–14
4	Start emergency IV normal saline + dextrose + stress-dose hydrocortisone if crisis is evident	Correct the life-threatening biochemical derangement before any diagnostic delay

Diagnostic work-up (and its justification)

A **multidisciplinary team** — neonatologist, paediatric endocrinologist, geneticist, paediatric urologist/surgeon, and psychiatrist/counsellor — is required because sex assignment has lifelong medical, surgical, and psychological consequences that no single specialty can decide alone.

Test/step	What it shows	Why it is done
History	Consanguinity, drug/hormone intake in pregnancy, prior neonatal deaths	Suggests autosomal-recessive CAH or maternal androgen/progestogen exposure
Examination	Phallus length (clitoris normally < 1 cm, penis normally < 2.5 cm), site of urethral meatus, degree of labioscrotal fusion, palpability of gonads	An inguinal/labial palpable gonad is a testis (an ovary never descends) — this alone points strongly to a Y-bearing line

Test/step	What it shows	Why it is done
Rectal exam / pelvic USG	Cervix, uterus, Müllerian structures; adrenal size/echotexture	Confirms whether Müllerian derivatives are present; CAH adrenals may show a cribriform pattern
Karyotype (rapid FISH for X/Y + formal karyotype)	Chromosomal sex	Defines the genetic sex line (46,XX vs 46,XY vs mosaic) that anchors the rest of the work-up
Serum 17-hydroxyprogesterone (17-OHP)	Markedly raised in 21-hydroxylase deficiency	Confirms/excludes CAH, the default diagnosis in ambiguity at birth "unless proved otherwise"
Serum electrolytes, glucose	Hyperkalaemia, hyponatraemia, hypoglycaemia	Detects an evolving salt-wasting crisis
Gonadal biopsy/diagnostic laparoscopy (selected cases)	Ovotestis, streak gonad, dysgenetic testis	Confirms true hermaphroditism or gonadal dysgenesis when biochemistry/imaging is inconclusive

Gender assignment — the justified basis

Gender assignment is deliberately **not** based on karyotype alone; it rests on:

- ▶ Projected appearance of the genitalia after puberty (adequacy for the assigned sex).
- ▶ Phallus length and its capacity for satisfactory sexual function.
- ▶ Prospect of future fertility — CAH is the only DSD in which normal pregnancy is possible, which favours female rearing when the diagnosis is CAH.

If the diagnosis remains uncertain or corrective surgery must be deferred, **the infant is reared as female**, because feminising reconstruction is technically easier and more successful than masculinising reconstruction.

Definitive management by cause

Diagnosis	Karyotype	Management	Justification
CAH (21-hydroxylase deficiency), virilised female	46,XX	Hydrocortisone 10–20 mg/m ² body-surface-area/day in divided doses; fludrocortisone (mineralocorticoid) with salt supplementation if salt-wasting; reared as female	Suppresses excess ACTH-driven androgen; corrects mineralocorticoid deficiency; fertility potential is preserved, favouring female rearing

Diagnosis	Karyotype	Management	Justification
Complete androgen insensitivity syndrome	46,XY	Reared as female; gonadectomy deferred until after puberty , then oestrogen replacement	Testes provide spontaneous feminising puberty via peripheral aromatisation; malignancy risk in the undescended testis rises mainly after puberty
Gonadal dysgenesis with a Y chromosome (mixed gonadal dysgenesis, Swyer syndrome)	45,XO/46,XY or 46,XY	Early gonadectomy once diagnosed; oestrogen–progestin replacement at puberty	Dysgenetic gonads carrying Y material have a high (20–30%) risk of gonadoblastoma/dysgerminoma
True hermaphroditism (ovotestis)	46,XX (usual), or mosaic	Gonadal biopsy; remove/modify genitalia and gonadal tissue inconsistent with the assigned sex	Sex of rearing must match retained anatomy and function

Surgical management and its timing — the crux of the "justify"

- ▶ **No emergency genital surgery is needed** — the only neonatal emergency is correcting a salt-wasting crisis medically; genital surgery is always elective and follows hormonal stabilisation and full work-up.
- ▶ **Feminising genitoplasty (reduction clitoroplasty ± vaginoplasty)** in CAH: clitoroplasty may be done once the infant is medically stable, but **vaginoplasty is preferably deferred to puberty/adolescence**, because early vaginoplasty carries a high rate of introital stenosis, loss of length, and need for repeat surgery, whereas adolescent/adult vaginal self-dilatation achieves comparable results with fewer surgical complications and can proceed with the patient's own informed consent.
- ▶ **Gonadectomy timing is diagnosis-specific**: immediate/early once diagnosed if the gonad carries Y material and is dysgenetic (malignancy risk is now, not decades later); deferred to after puberty in complete androgen insensitivity (malignancy risk rises later, and the testis first provides useful pubertal oestrogen).
- ▶ **Counsel and re-counsel the parents** at every stage — psychological support and full transparency about the evolving diagnosis reduce long-term psychosexual morbidity, which several outcome studies show is otherwise significant regardless of surgical technique.

Long-term follow-up

- ▶ Lifelong endocrine follow-up: growth, bone age, and hormone titration in CAH (over- and under-replacement both risk premature epiphyseal closure and short stature); long-term oestrogen replacement after any gonadectomy for bone and cardiovascular protection.

- ▶ Genetic counselling for future pregnancies: **prenatal diagnosis of CAH is possible by chorionic villus sampling (9–12 weeks) or amniocentesis** using DNA probes, with elevated amniotic-fluid 17-OHP; maternal dexamethasone can reduce fetal virilisation but its risk–benefit balance is still debated.
- ▶ Continued psychological support into adolescence and adulthood, including disclosure of the diagnosis to the growing child at an appropriate age.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 14.11 — *The virilised external genitalia of a newborn female suffering from congenital adrenal hyperplasia* (Jeffcoate's Principles of Gynaecology 9e, p.263)

For the algorithmic side of the answer, sketch a decision flowchart: **Newborn with ambiguous genitalia** → **do NOT assign sex** → **resuscitate/treat if salt-wasting crisis** → **history + examination (palpable gonad?)** → **karyotype + serum 17-OHP + electrolytes + pelvic USG** → **branch by diagnosis (CAH / androgen insensitivity / gonadal dysgenesis / true hermaphrodite)** → **multidisciplinary gender assignment** → **cause-specific hormonal and surgical management.**

High-yield exam pointers

- ▶ CAH (21-hydroxylase deficiency) is the default diagnosis for ambiguity at birth "unless proved otherwise" — confirm with serum 17-OHP + karyotype 46,XX.
- ▶ A **palpable gonad** = **testis**; ovaries never descend.
- ▶ **Salt-wasting crisis** = hyperkalaemia + hyponatraemia + hypoglycaemia → emergency IV saline + dextrose + stress-dose hydrocortisone.
- ▶ CAH maintenance: **hydrocortisone 10–20 mg/m²/day** + **fludrocortisone** (+ salt supplements if salt-losing).
- ▶ Never assign sex before the work-up is complete; if uncertain, **rear as female**.
- ▶ Y chromosome in a dysgenetic gonad → **early gonadectomy** (gonadoblastoma/dysgerminoma risk); complete androgen insensitivity → gonadectomy **deferred to after puberty**.
- ▶ Vaginoplasty is preferably deferred to adolescence/adulthood; self-dilatation is the first-line, lower-morbidity option.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Optimal timing of feminising genital surgery in DSD is an evolving area — this answer reflects the currently favoured practice of deferring non-urgent reconstruction (especially vaginoplasty) to adolescence with the patient's own consent; older texts and some centres still describe earlier infancy surgery.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e.

**LLETZ**

Asked in: Paper III 23-Nov-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — LLETZ (large loop excision of the transformation zone), synonymous with LEEP (loop electrosurgical excision procedure), is an outpatient technique for cervical intraepithelial neoplasia (CIN) in which a thin wire loop carrying blended electrosurgical current excises the entire transformation zone and squamocolumnar junction (SCJ) as one intact specimen. It is simultaneously **diagnostic** (histopathology, margin status) and **therapeutic**, and is the preferred excisional method for CIN 2–3.

Indications and prerequisites

Category	Criteria
Definitive treatment	Biopsy-confirmed CIN 2 and CIN 3/carcinoma-in-situ — destruction or excision of the transformation zone is required once histology is confirmed
	Persistent (≥24 months) or recurrent CIN 1 preceded by ASC-H/HSIL cytology
"See-and-treat"	HSIL cytology in populations where reliable colposcopic follow-up cannot be assured
Prerequisites (must all be met)	Entire lesion and the SCJ fully visualised on colposcopy
	No cytology–colposcopy–biopsy discordance
	No colposcopic/cytological suspicion of microinvasive or invasive disease
	No endocervical glandular abnormality (atypical glandular cells/adenocarcinoma-in-situ)

Contraindications — go to cold-knife/laser conization instead

- ▶ Suspected microinvasive or invasive carcinoma on cytology, colposcopy, endocervical curettage (ECC) or biopsy.
- ▶ SCJ/upper lesion margin not visualised (unsatisfactory colposcopy).
- ▶ Suspected glandular lesion (AGC/adenocarcinoma-in-situ).

- ▶ Active cervicitis or pelvic inflammatory disease; uncorrected bleeding disorder; pregnancy (relative — defer to postpartum unless invasion must be excluded).

Procedure

- ▶ Schedule mid-cycle (day 6–10), confirm the patient is not pregnant; written informed consent.
- ▶ Lithotomy position; apply acetic acid and/or Lugol's iodine under colposcopy to delineate the acetowhite lesion and the full transformation zone.
- ▶ Paracervical **local anaesthesia** (1–2% lignocaine with adrenaline) infiltrated at the 3, 6, 9 and 12 o'clock positions of the cervix.
- ▶ Select a thin (≈ 0.2 mm) stainless-steel/tungsten wire **loop**, 2–3 cm wide, matched to lesion size, on an electrosurgical generator.
- ▶ Set **blended (cut + coagulation) current at low voltage**, ~35–55 W — a small-diameter loop at high power gives an electrosurgical (steam-envelope) cutting effect with minimal thermal spread; low power or a large wire instead gives an electrocautery effect with excessive thermal damage.
- ▶ Pass the loop once through the transformation zone, removing the SCJ and lesion to a depth of ~8–10 mm (deeper if there is endocervical extension), producing a single oriented cone-shaped specimen.
- ▶ Achieve haemostasis with a **5-mm ball electrode at ~50 W** (electrofulguration) $\pm$ Monsel's paste/silver nitrate; avoid over-fulguration, which causes an eschar with more discharge and a higher infection/late-bleeding risk.
- ▶ Send the intact, oriented specimen for histopathology to confirm the lesion grade and assess margin status.
- ▶ Advise pelvic rest — no intercourse, tampons or douching for **4 weeks** — and review with the histology report.

Advantages and disadvantages (versus ablation/cold-knife conization)

LLETZ/LEEP	
Advantages	Outpatient, quick, under local anaesthesia, low cost; one visit is both diagnostic and therapeutic (unlike ablation, which gives no tissue); less blood loss and less patient discomfort than laser conization; SCJ remains visible in >90% of women afterward, so future colposcopic follow-up stays feasible; short-term efficacy comparable to cold-knife or laser conization
Disadvantages	Thermal artefact at the cut edge can compromise histological assessment of the margin; excision of transformation zone/endocervical canal can affect subsequent obstetric outcome

Complications

Timing	Complication
Intraoperative	Haemorrhage (uncommon, low rate)
Early (days)	Secondary/postoperative haemorrhage, infection/cervicitis
Late	Cervical stenosis; cervical incompetence in a future pregnancy
Recurrence	CIN recurrence ~3–5%; invasive carcinoma after treatment 0.1–0.4%
Obstetric	Increased risk of preterm delivery , preterm delivery after PPROM , and low-birth-weight infants in pregnancies beyond 20 weeks — risk rises with excision depth/volume and is greatest in young women with large, immature transformation zones

Follow-up after LLETZ

- ▶ **Cytology at 6 months**, repeated at **12 months**; HPV-DNA co-testing may be performed between 6 and 12 months.
- ▶ If both tests are negative, revert to routine cytology at **3-yearly intervals**, continued for a prolonged period (textbook teaching cites up to **20 years**, per ACOG).
- ▶ Any abnormal surveillance result is referred back to colposcopy for re-evaluation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig — Loop Electrosurgical Excision (Berek & Novak 16e, p.943)

High-yield exam pointers

- ▶ LLETZ = LEEP (UK vs US term) — thin wire loop, blended cut + coagulation current, ~35–55 W.
- ▶ Preferred excisional treatment for CIN 2 and CIN 3/CIS; loop depth ~8–10 mm; haemostasis with 5-mm ball electrode at ~50 W.
- ▶ Prerequisites mnemonic: whole lesion + SCJ seen, no discordance, no suspected invasion/glandular disease — if any fails, do a cold-knife/laser cone instead.
- ▶ SCJ visible in **>90%** post-procedure — key advantage over deep cone biopsy.
- ▶ Recurrence **3–5%**; post-treatment invasive cancer **0.1–0.4%**.
- ▶ Follow-up: cytology **6 and 12 months** + HPV-DNA, then **3-yearly** long-term surveillance.
- ▶ Obstetric caution: deeper/repeat excisions → higher risk of **preterm birth/PPROM**.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e frames post-treatment surveillance on the older ACOG schedule (cytology at 6 and 12 months, then 3-yearly to 20 years); current ASCCP risk-based consensus guidance instead uses HPV-inclusive co-testing at 6 and 12 months and, if negative, continued 3-yearly co-testing for a longer duration — the principle (early co-testing, then extended interval screening) is unchanged and is what should be written in the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 23 — Premalignant Lesions); Berek & Novak's Gynecology 16e (Ch. 16 — Preinvasive Disease of the Cervix); ACOG cervical cancer screening/management guidance; ASCCP consensus guidelines for management of abnormal cervical cytology/histology.



Lymphatic drainage of the vulva

Asked in: Paper I 24-Sep-2025 · Paper III May 2007 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — The vulva (mons pubis, labia majora, labia minora, clitoris, vestibule, Bartholin's glands and perineum) drains predominantly into the **superficial inguinal lymph nodes**, which are the **sentinel nodes** of the vulva. Drainage then proceeds in a stepwise fashion to the **deep inguinal (femoral) nodes** and thence to the **external iliac/pelvic nodes**, with free crossover to the opposite groin because midline structures anastomose across the mons pubis and vestibule.

Groups of lymph nodes concerned

Node group	Location	Afferents received	Efferents drain to
Superficial inguinal nodes (horizontal + vertical chains)	Below the inguinal ligament; horizontal chain parallel to the ligament, vertical chain along the long saphenous vein	Vulva, perineum, gluteal region, anterior abdominal wall below the umbilicus, lower vagina (below the hymen), anal canal below Hilton's line, uterine cornu (via round ligament)	Deep inguinal nodes and external iliac nodes, through the inguinal canal

Node group	Location	Afferents received	Efferents drain to
Deep inguinal (femoral) nodes	Medial to the femoral vein, within the femoral canal; 3–6 in number	Glans clitoris directly, efferents from superficial inguinal nodes, deep femoral vessels	External iliac nodes, through the femoral canal
Node of Cloquet (Rosenmüller)	Uppermost deep inguinal node, beneath the inguinal ligament in the femoral canal	Once regarded as the obligatory relay node between superficial and deep groups; absent in up to 50% of individuals	External iliac nodes
External iliac and pelvic nodes (obturator, hypogastric/internal iliac, common iliac)	Along the external iliac vessels and pelvic side wall	Deep inguinal nodes (main route); direct afferents from clitoris/Bartholin gland are described but are clinically insignificant	Common iliac → para-aortic nodes
Internal iliac (hypogastric) nodes	Along internal iliac vessels	Deep tissues of the vulva, via the internal pudendal vessels	Common iliac nodes

Region-wise drainage of the vulva

Vulval region	Primary node reached	Route / special point
Labia majora — anterior half, mons pubis	Superficial inguinal nodes, both sides	Lymphatics cross the midline over the mons veneris → bilateral and contralateral spread
Labia majora — posterior half	Superficial inguinal → deep inguinal → external iliac	Sequential, stepwise
Labia minora and prepuce of clitoris	Superficial inguinal nodes, both sides	Intercommunicate with the opposite side in the vestibule
Glans of clitoris	Deep inguinal and external iliac nodes directly	Important exception — bypasses the superficial inguinal group
Bartholin's gland	Superficial inguinal + anorectal nodes	—
Perineum / posterior fourchette	Superficial inguinal nodes, often bilateral	Midline structure — high contralateral risk
Deep vulval tissues (clitoral body, vestibular bulbs)	Internal iliac (hypogastric) nodes	Along the internal pudendal vessels
Lower half of urethra	Superficial inguinal nodes	Same as vulval skin
Anal canal below Hilton's line	Superficial inguinal nodes	Shares drainage with the vulva

Pattern of spread and clinical significance

- ▶ **Sequential, stepwise spread:** vulva → superficial inguinal nodes → deep inguinal (femoral) nodes → pelvic nodes (external iliac, obturator, hypogastric, common iliac). Involvement of pelvic nodes without prior groin metastasis is rare.
- ▶ Because the **superficial inguinal nodes are the sentinel nodes** of the vulva, they are the basis for **sentinel lymph-node biopsy** in early vulvar cancer (clinically node-negative, unifocal lesion, usually <4 cm) — mapped with blue dye and/or **technetium-99m radiocolloid**, with or without lymphoscintigraphy; validated by the **GROningen International Study on Sentinel nodes in Vulvar cancer (GROINSS-V)**.
- ▶ **Bilateral/contralateral spread** occurs from midline structures (mons pubis, clitoris, anterior labia minora, posterior fourchette) — a lesion **on or within 2 cm of the midline** therefore requires **bilateral** groin (inguinofemoral) lymphadenectomy or bilateral sentinel-node assessment.
- ▶ A **strictly lateral lesion (>2 cm from the midline)** with a **negative ipsilateral groin** carries a very low risk of contralateral node metastasis, so a **unilateral** groin dissection suffices.
- ▶ The **node of Cloquet/Rosenmüller**, once taught as an obligatory relay node, is **absent in up to 50%** of individuals, and current series show efferents from the superficial inguinal nodes can bypass it to reach the external iliac group directly — its presence/absence does not change management.
- ▶ **Pelvic node involvement is secondary** (roughly 20% of cases with positive groin nodes) and essentially never occurs with negative inguinofemoral nodes — so **primary pelvic lymphadenectomy is not performed**; a positive groin instead triggers adjuvant treatment/pelvic imaging rather than routine pelvic dissection.
- ▶ This drainage pattern is the anatomical basis for **radical vulvectomy with (uni- or bilateral) inguinofemoral lymphadenectomy** in invasive vulvar carcinoma, and underlies the **nodal (N) component of FIGO staging** of vulvar cancer.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 1.17 — Lymphatic drainage of the vulva and femoral triangle. Superficial inguinal nodes (Te Linde 13e, p.81)

Label: horizontal and vertical chains of superficial inguinal nodes below the inguinal ligament; deep inguinal (femoral) nodes medial to the femoral vein; the node of Cloquet at the upper end of the femoral canal; efferents passing to the external iliac nodes.

High-yield exam pointers

- ▶ **Sentinel nodes of the vulva = superficial inguinal nodes.** Sequence to write: superficial inguinal → deep inguinal → external iliac → pelvic.

- ▶ **Exception to remember:** glans clitoris drains **directly** to deep inguinal/external iliac nodes, bypassing the superficial inguinal group.
- ▶ **Node of Cloquet = Rosenmüller node** — uppermost deep inguinal node in the femoral canal; **absent in ~50%**; no longer regarded as an obligatory relay.
- ▶ **"2 cm from midline" rule:** midline/near-midline lesions (clitoris, anterior labia minora, posterior fourchette) or those within 2 cm of midline → **bilateral** groin dissection; strictly lateral lesion + negative ipsilateral nodes → unilateral dissection suffices.
- ▶ **GROINSS-V** validated sentinel-node biopsy (blue dye ± Tc-99m) for early vulvar cancer, sparing full inguinofemoral lymphadenectomy morbidity (lymphoedema, wound breakdown).
- ▶ Pelvic nodes involved secondarily in about **20%**, virtually never without positive groin nodes first.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older texts describe the node of Cloquet/Rosenmüller as the obligatory relay node between the superficial and deep inguinal groups; Berek & Novak 16e and Te Linde 13e note it is absent in up to half of individuals and that efferents may bypass it, so current teaching no longer relies on it to define the nodal basins of the vulva.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e.



Management of menopausal symptoms

Asked in: Paper III Nov 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — Menopause is the permanent cessation of menstruation following loss of ovarian follicular activity, confirmed retrospectively after 12 consecutive months of amenorrhoea (average age 45–52 years). The *climacteric* is the surrounding transition (4–7 years either side) during which oestrogen withdrawal produces vasomotor, genitourinary, psychological and long-term metabolic symptoms that require individualised management.

Symptom groups that guide management

Group	Typical features
Vasomotor	Hot flushes, night sweats, palpitations (affect up to 75% of perimenopausal women)

Group	Typical features
Psychological	Irritability, anxiety, low mood, insomnia, poor concentration
Genitourinary syndrome of menopause (GSM)	Vaginal dryness, dyspareunia, urgency, recurrent urinary tract infection (at least 50% of menopausal women)
Sexual	Reduced desire/arousal, dyspareunia
Long-term	Osteoporosis, cardiovascular risk change

General and non-hormonal measures (first-line/adjunct for all women)

- ▶ **Counselling and reassurance** — explain menopause as a physiological transition, not disease.
- ▶ **Lifestyle** — weight-bearing exercise, weight control, smoking and alcohol cessation, cool environment, layered clothing, paced respiration/relaxation techniques.
- ▶ **Diet** — calcium 1000–1200 mg/day and vitamin D 800–1000 IU/day (dietary preferred, supplement if intake inadequate).
- ▶ **Complementary therapies** (limited, largely placebo-level evidence) — phytoestrogens/soy isoflavones, black cohosh, acupuncture.
- ▶ **Vaginal lubricants/moisturisers** — first-line for mild dryness/dyspareunia before hormonal therapy.

Menopausal hormone therapy (MHT) — the most effective treatment for vasomotor symptoms

Indications: bothersome vasomotor symptoms, GSM, premature/surgical/radiation menopause, and prevention of bone loss when other agents are unsuitable. **Principle:** lowest effective dose, for the shortest duration needed, individualised and reviewed at least annually (NAMS 2017 Hormone Therapy Position Statement).

Component	Route/preparation	Dose
Estrogen	Oral conjugated equine estrogen (CEE)	0.3–0.625 mg/day
	Oral micronised estradiol	1–2 mg/day
	Transdermal patch (17 β -estradiol)	~50 μ g/24 h, changed twice weekly
	Percutaneous gel	1 g applicator = 1 mg estradiol/day
	Subdermal implant	25–100 mg 17 β -estradiol every 6 months

Component	Route/preparation	Dose
Progestin (mandatory if uterus intact)	Medroxyprogesterone acetate (MPA), cyclic	5–10 mg/day for last 12–14 days/cycle
	MPA, continuous-combined	2.5 mg/day continuously
	Micronised progesterone	100–300 mg/day (cyclic 200 mg × 12–14 days, or continuous 100 mg/day)
	Dydrogesterone	10 mg/day cyclic
	Levonorgestrel intrauterine system	10–20 µg LNG/day, endometrial protection without systemic progestogen effect
Tibolone (estrogen alone not needed)	Oral	2.5 mg/day

- ▶ **Regimen choice:** cyclic estrogen–progestin (withdrawal bleed) for women within ~1 year of menopause; continuous-combined for women further into menopause (amenorrhoea after initial irregular spotting).
- ▶ **Hysterectomised women** need estrogen alone (no progestin required).
- ▶ Transdermal/percutaneous routes avoid first-pass hepatic metabolism and do not raise venous thromboembolism (VTE)/gallbladder-disease risk to the same degree as oral estrogen.
- ▶ **Evidence base:** the Women's Health Initiative (WHI) randomised trial (combined estrogen-progestin, CEE 0.625 mg/MPA 2.5 mg vs placebo) showed increased hazard ratios for coronary heart disease (1.3), breast cancer (1.3), stroke (1.4) and pulmonary embolism (2.1), with reduced hip fracture (0.7) and colorectal cancer (0.6); risk was concentrated in women >60 years or >10 years past menopause — supporting the "**window of opportunity**": initiate MHT within 10 years of menopause or before age 60 (Indian Menopause Society 2013/International Menopause Society 2016/NAMS 2012 consensus).

Contraindications to systemic MHT

Absolute	Relative (caution)
Known/suspected breast cancer or other estrogen-dependent neoplasm	Prior cholestatic jaundice
Undiagnosed genital tract bleeding	Gallbladder disease
Active/past venous thromboembolism (DVT/PE)	Endometriosis
Active liver disease	Uncontrolled hypertension, migraine with aura
Active/recent coronary or cerebrovascular event	Strong family history of breast cancer

Management of genitourinary syndrome of menopause (GSM)

- ▶ Non-hormonal lubricants/moisturisers as first step.
- ▶ **Low-dose vaginal estrogen** (preferred over systemic therapy for isolated GSM — minimal systemic absorption): cream 0.5 g twice–thrice weekly; estradiol tablet 10 µg twice weekly; estradiol vaginal ring 7.5 µg/day, replaced 3-monthly. Progestin not required with low-dose vaginal preparations.
- ▶ **Vaginal dehydroepiandrosterone (DHEA/prasterone)** 0.5% daily — treats moderate–severe dyspareunia.
- ▶ **Ospemifene** (oral estrogen agonist/antagonist) 60 mg/day for moderate–severe dyspareunia when local therapy is declined.
- ▶ Pelvic floor physiotherapy and vaginal dilators for associated dyspareunia.

Non-hormonal options when MHT is contraindicated/declined

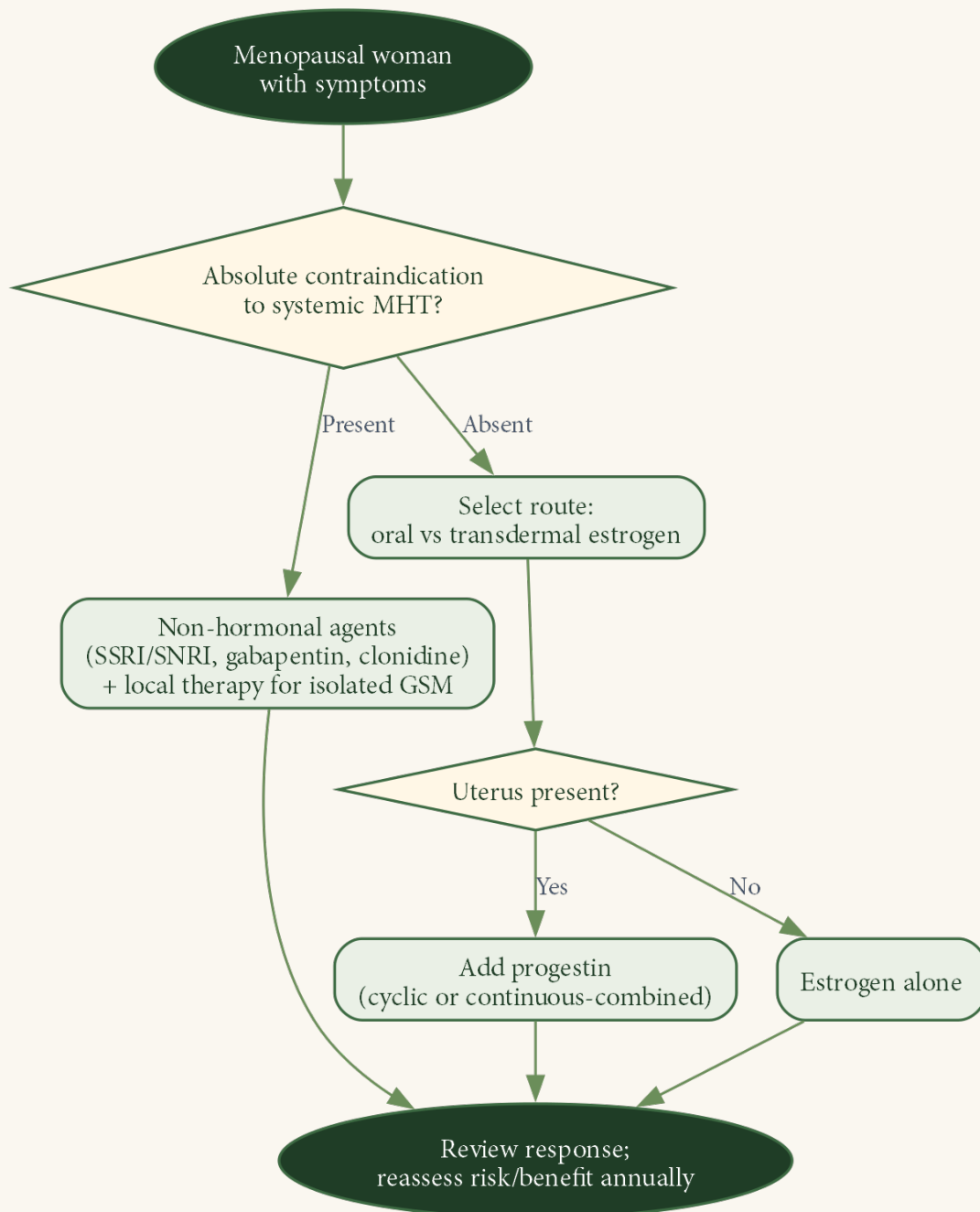
Symptom target	Agent	Notes
Vasomotor	Paroxetine (SSRI)	7.5 mg/day — the only FDA-approved non-hormonal drug for hot flushes
	Venlafaxine/escitalopram (SNRI/SSRI)	Off-label, reduce frequency/severity
	Gabapentin	Off-label, best for night sweats/sleep disruption
	Clonidine (α2-agonist)	Useful when estrogen contraindicated, e.g. hypertension
Bone protection	Bisphosphonates (alendronate 70 mg weekly, risedronate 35 mg weekly)	First-line non-hormonal osteoporosis prevention/treatment
	Raloxifene (SERM)	60 mg/day — reduces vertebral fracture and breast cancer risk, does not relieve vasomotor symptoms
	Calcitonin	200 IU intranasal daily — used when estrogen contraindicated

Monitoring before and during MHT

- ▶ Baseline and annual/semi-annual physical, breast and pelvic examination; blood pressure.
- ▶ Mammography per screening schedule; cervical cytology.
- ▶ Transvaginal sonography for endometrial thickness (normal <5 mm); any irregular/breakthrough bleeding warrants endometrial sampling.

- ▶ Reassess benefit-versus-risk and the need for continued therapy at least yearly; taper (dose/interval reduction) rather than abrupt cessation to avoid symptom rebound.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Approach to menopausal symptom management — contraindication screen, route/progestin selection, and annual review.

High-yield exam pointers

- Menopause = amenorrhoea for 12 months; window of opportunity for MHT = within 10 years of menopause or age <60.

- ▶ Estrogen alone only if hysterectomised; intact uterus always needs a progestin (12–14 days cyclic, or continuous-combined) to prevent endometrial hyperplasia/cancer.
- ▶ Low-dose vaginal estrogen is first-line for isolated GSM — does not need progestin cover.
- ▶ Only FDA-approved non-hormonal drug for hot flushes: paroxetine 7.5 mg/day.
- ▶ WHI numbers to reproduce: CHD HR 1.3, breast cancer 1.3, stroke 1.4, PE 2.1, hip fracture 0.7 (combined EPT arm).
- ▶ Absolute contraindications: breast/endometrial cancer, undiagnosed bleeding, active VTE, active liver disease, active CHD/stroke.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The doses above (NAMS 2017 Hormone Therapy Position Statement) reflect current international practice; older textbook editions (including some Dutta printings) still show higher legacy oral estrogen doses (e.g. CEE 0.625–1.25 mg/day) — the lowest effective dose principle should be followed in the exam answer.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; NAMS 2017 Hormone Therapy Position Statement; Indian Menopause Society (2013)/International Menopause Society (2016)/NAMS (2012) consensus; Women's Health Initiative trial data.



Management of misplaced CuT

Asked in: Paper III 20-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — A misplaced (translocated/displaced) Copper-T (CuT) intrauterine contraceptive device (IUCD) is one that has moved from its normal fundal position — lying low or malrotated within the endometrial cavity, partially expelled through the cervix, or having perforated the myometrium to lie within the broad ligament, omentum, peritoneal cavity, or an adjacent viscus (bowel/bladder). It

classically presents as "missing threads" — the marker string is no longer visible at the external os on routine follow-up.

Causes of malposition / missing threads

Category	Mechanism
Insertion-related	Fundal placement not confirmed; excessive force; inexperienced inserter; acutely flexed/retroverted uterus
Uterine factors	Submucous fibroid distorting cavity, congenital uterine anomaly, adenomyosis
Perforation	Primary — unrecognised perforation at insertion; secondary — partial perforation followed by progressive myometrial migration with uterine contractions
Expulsion	Strong uterine (menstrual) contractions pushing device down and out, unnoticed by the patient
Pregnancy	Growing gravid uterus draws the device (and thread) upward, out of reach
Thread-specific	Thread coiled inside the canal; thread torn off at removal attempt

Reasons the thread specifically is not seen through the os (Dutta): (a) coiled inside, (b) torn through, (c) device expelled unnoticed, (d) device perforated the uterine wall and lies in the peritoneal cavity, (e) device pulled up by the growing uterus in pregnancy.

Clinical features

- ▶ Most are **asymptomatic** — detected only when the thread is not felt/seen at a routine check.
- ▶ **Contraceptive failure** — intrauterine or, less commonly, ectopic pregnancy.
- ▶ **Abnormal uterine bleeding** — menorrhagia or irregular spotting.
- ▶ **Pelvic pain / dyspareunia.**
- ▶ If the device has perforated into bowel or bladder (rare): tenesmus, dyschezia, haematuria, recurrent urinary tract infection.
- ▶ Occasionally presents with **pelvic inflammatory disease** flare-up.

Diagnosis — stepwise

- ▶ **Exclude pregnancy first** (urine/serum β -hCG) before any instrumentation.
- ▶ **Gentle exploration** of the endocervical canal with sponge/artery forceps or a cytobrush — the coiled thread may simply be retrieved.

- ▶ **Transvaginal ultrasonography (USG)** — first-line investigation; detects the device within the cavity or, if it has perforated, within the peritoneal cavity. Preferred over radiography as the initial test.
- ▶ **Uterine sounding** with a probe — if the sound passes the expected depth without resistance and the device is not encountered, perforation is suspected.
- ▶ **Straight X-ray, antero-posterior and lateral views**, taken *after* introducing a radiopaque uterine sound into the cavity — confirmatory for perforation: the device is seen away from the shadow of the sound.
- ▶ **Hysteroscopy** — direct visualisation of an intracavitary device, with simultaneous retrieval.
- ▶ **CT/laparoscopy** if bowel or bladder involvement is suspected on the above.

Management by location

Location of device	Management
Within the uterine cavity, thread coiled/retracted	Hysteroscopic removal under direct vision (preferred), or blind removal with a specially designed IUCD hook, artery forceps, or uterine curette, ideally USG-guided
Partially expelled, visible in cervix/vagina	Grasp and remove per vaginum with sponge/ring forceps
Perforated — Lippes loop (inert, no copper)	May be left in the peritoneal cavity if asymptomatic, as adhesions/visceral injury are unlikely; still generally removed by laparoscopy (or laparotomy) for documentation and patient reassurance
Perforated — copper-bearing device (CuT/Multiload)	Remove as soon as diagnosed , by laparoscopy (laparotomy if adhesions are dense or organ injury present) — copper provokes an intense local inflammatory reaction with adhesions to bowel/omentum
Device embedded in bowel or bladder wall	Laparotomy with organ repair; involve general surgery/urology as needed
Pregnancy with device in situ, thread visible	Remove promptly by gentle, steady traction — reduces miscarriage, sepsis, preterm labour, and abruption risk
Pregnancy with device in situ, thread not visible	Confirm device and viability on USG; do not attempt blind removal. Counsel on risks of continuing pregnancy (chorioamnionitis, septic abortion, preterm birth) versus ultrasound-guided removal versus elective termination — decision is individualised; if left, the device is usually expelled with the placenta at delivery

Laparoscopic removal of a perforated copper device — steps

- ▶ Pre-operative counselling and consent; cross-check imaging (USG ± CT) for bowel/bladder involvement.
- ▶ General anaesthesia; standard pneumoperitoneum and port placement.
- ▶ Systematic survey of the peritoneal cavity — the device is often embedded in omentum, the broad ligament leaf, or adherent to bowel serosa.
- ▶ Adhesiolysis where the device is adherent to bowel/omentum.
- ▶ Grasp and extract the device through a port (endobag/enlarged port if the copper sleeve has fragmented).
- ▶ Inspect the uterine perforation site and adjacent bowel/bladder for injury; repair if present.
- ▶ Haemostasis and port-site closure; the uterine perforation itself rarely needs suturing if small.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 30.6 — Straight X-ray of the pelvis with a uterine sound placed inside the cavity: the displaced intrauterine contraceptive device (IUCD) is seen away from the sound, confirming perforation (DC Dutta's Gynaecology 7e, p.416)

High-yield exam pointers

- ▶ **5 reasons for a missing thread:** coiled inside, torn off, expelled unnoticed, perforated into peritoneum, pulled up by a growing pregnant uterus.
- ▶ **USG is first-line;** X-ray (AP + lateral) *with a radiopaque sound in situ* is confirmatory for perforation.
- ▶ **Copper device perforated** → **always remove** (adhesions, possible bowel injury); an inert Lippes loop may be left if asymptomatic.
- ▶ **Perforation incidence** ≈ 1 per 1,000 insertions in experienced hands.
- ▶ **Pregnancy + missing thread** → **never blind-remove**; localise on USG first.
- ▶ Risk of ectopic pregnancy with a device in situ is low (~0.02–0.1%) but must be excluded whenever pain/bleeding occurs with a device in place.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Both Dutta's Gynaecology and Berek & Novak's Gynecology concur on ultrasound as the first diagnostic step and on individualising management when a pregnancy coexists with a non-retrievable device; no guideline-year conflict arises on this topic.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Management of overactive bladder

Asked in: Paper III 17-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Overactive bladder (OAB) is defined by the *International Continence Society* as a syndrome of urinary **urgency**, with or without urgency incontinence, usually accompanied by **frequency** and **nocturia**, in the absence of urinary tract infection or other obvious pathology. It results from involuntary detrusor contractions during the bladder-filling phase despite the woman's conscious effort to inhibit micturition, and is labelled **OAB-wet** (with incontinence) or **OAB-dry** (without incontinence). Overall prevalence is 12–15% in women over 40 years, rising further in the elderly.

Confirm the diagnosis before starting treatment

- ▶ **3-day frequency–volume (bladder) chart** — voids >8/day, nocturia, urgency episodes.
- ▶ **Urine dipstick + midstream culture** to exclude urinary tract infection; **post-void residual (PVR)** by catheter or ultrasound — normal <50 mL.
- ▶ **Pelvic examination** to exclude urogenital atrophy, prolapse, or a pelvic mass mimicking OAB symptoms.
- ▶ **Urodynamics/cystometry** — reserved for mixed incontinence, failed empirical treatment, suspected neurological disease, or before continence surgery. Confirms **detrusor overactivity**: urge to void provoked at a low filling volume of 100–175 mL, and detrusor pressure rise >15 cm H₂O during filling with 200 mL — with an involuntary detrusor contraction the woman cannot suppress despite trying.
- ▶ If OAB coexists with genuine stress incontinence (mixed incontinence), **treat the OAB component first** before any continence surgery.

First-line: lifestyle and behavioural therapy

- ▶ **Fluid advice** — moderate intake to about 1–1.5 L/day; reduce caffeine, alcohol and carbonated ("bladder-irritant") drinks.
- ▶ **Weight reduction** in obese women; treat constipation.
- ▶ **Bladder training/bladder drill** — voiding by the clock at progressively increasing intervals over a **6-week** programme, with urge-suppression techniques (distraction, pelvic-floor squeeze) when urgency strikes between scheduled voids. Response is better when combined with an antimuscarinic drug.

- ▶ **Pelvic floor muscle training** (Kegel exercises), with biofeedback or electrical stimulation as an adjunct if the squeeze is weak.
- ▶ **Prompted/timed voiding and double-voiding**, particularly useful in elderly or cognitively-impaired women.

Behavioural therapy is recommended as **first-line treatment** ahead of drugs (AUGS 2017 consensus statement; AUA/SUFU guideline).

Second-line: pharmacotherapy

Started when behavioural measures fail or alongside them; start at the lowest dose and increase after 4–6 weeks if response is inadequate. If one antimuscarinic causes side effects, switching to another agent is reasonable before abandoning drug therapy.

Drug class	Drug & dose	Chief side effects / cautions
Antimuscarinic (non-selective)	Oxybutynin 5 mg PO thrice daily, or transdermal patch 3.9 mg twice weekly	Dry mouth, dry skin, constipation, blurred vision; avoid in glaucoma, myasthenia gravis, intestinal obstruction
Antimuscarinic (detrusor-selective)	Tolterodine 1–2 mg PO twice daily (4 mg once daily extended-release)	As above; avoid in urinary retention, ulcerative colitis
Antimuscarinic (M3-selective)	Solifenacin 5–10 mg PO once daily	As above, plus flatulence, chest pain
Antimuscarinic (M3-selective)	Darifenacin 7.5–15 mg PO once daily	As above
Quaternary-amine antimuscarinic (low CNS penetration)	Trospium chloride 20 mg PO twice daily	As above; preferred in the elderly/cognitively impaired
β ₃ -adrenergic agonist	Mirabegron — relaxes detrusor via β ₃ -receptor stimulation	No dry mouth/constipation/blurred vision; avoid/caution in uncontrolled hypertension, renal/hepatic impairment; safe in cognitive impairment
Tricyclic antidepressant	Imipramine 50 mg at night — for the nocturia component	Sedation, blurred vision, constipation; avoid in coronary artery disease, hypertension
Vasopressin analogue	Desmopressin (DDAVP) intranasal 20–40 µg at night — for nocturia/enuresis	Fluid retention, hyponatraemia; avoid in cardiac insufficiency

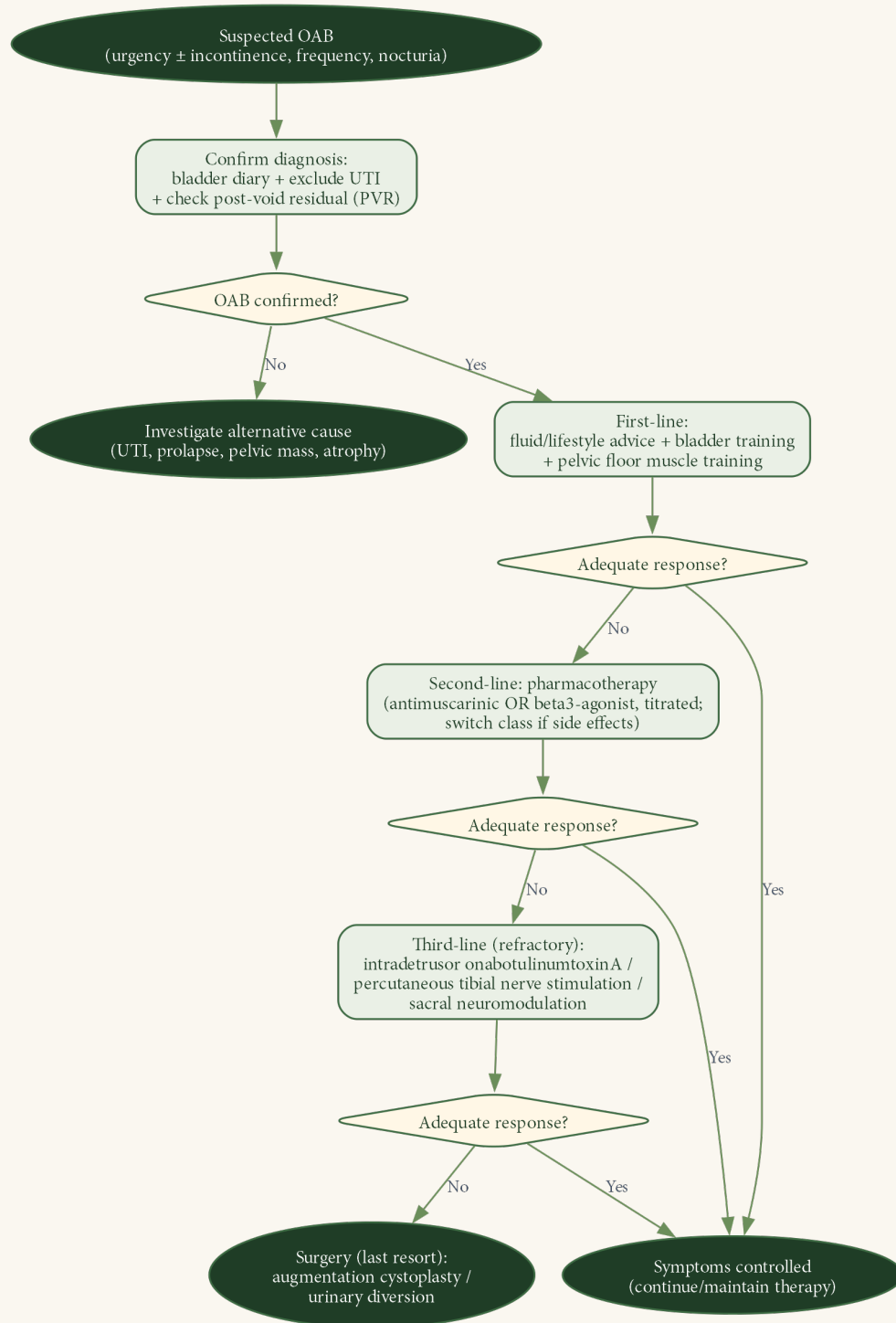
Drug class	Drug & dose	Chief side effects / cautions
Adjunct in peri/postmenopausal women	Low-dose local (vaginal) estrogen	Raises the sensory threshold; systemic estrogen is <i>not</i> used (worsens incontinence)

The 2017 AUGS consensus flags a cumulative dementia/Alzheimer's-disease signal with long-term anticholinergic use, and advises caution in frail or cognitively impaired women — mirabegron or trospium (minimal CNS penetration) are preferred in this group.

Third-line: refractory OAB (failed behavioural + an adequate pharmacological trial)

- ▶ **Intradetrusor onabotulinumtoxinA (Botox)** — cystoscopic injection into the detrusor at about 20 sites, mostly supratrigonal, sparing the trigone. Dose: **100 U for idiopathic (non-neurogenic) OAB; 200 U for neurogenic detrusor overactivity**. Effect lasts roughly 6–9 months and can be repeated. The woman must be counselled and willing to self-catheterise if retention occurs; other effects include urinary tract infection, gross haematuria, dry mouth, and (rarely) generalised muscle weakness.
- ▶ **Percutaneous tibial nerve stimulation (PTNS)** — a 34-gauge needle electrode is placed about three fingerbreadths above the medial malleolus and connected to a low-voltage stimulator; **30-minute weekly sessions for 12 weeks**, then monthly maintenance if successful.
- ▶ **Sacral neuromodulation (sacral nerve stimulation)** — two-stage procedure: a percutaneous test lead is placed at the **third sacral nerve root (S3)** for a 1–2 week trial; if symptoms improve by $\geq 50\%$, a permanent electrode and implantable pulse generator are placed.
- ▶ **Intravesical instillation** — capsaicin (a chilli-derived neurotoxin, 30% alcohol) or the more potent, less irritant resiniferatoxin; used mainly for neurogenic detrusor overactivity (e.g., multiple sclerosis).
- ▶ **Surgery (last resort)**, for intractable neurogenic detrusor overactivity unresponsive to the above: bladder **denervation**, **augmentation (clam) cystoplasty** to enlarge bladder capacity, or **urinary diversion** (ileal conduit).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Stepwise OAB management algorithm: confirm the diagnosis, then escalate behavioural → pharmacological → third-line/refractory → surgical options based on response at each stage.

High-yield exam pointers

- ▶ ICS definition: urgency ± incontinence + frequency + nocturia, no urinary tract infection/other pathology; OAB-wet vs OAB-dry.
- ▶ Ladder to write in every answer: **Behavioural (1st) → Drugs (2nd) → Botox/PTNS/sacral neuromodulation (3rd) → Surgery (last)** — AUA/SUFU three-tier framework.
- ▶ Cystometry clincher: urge provoked at 100–175 mL filling; detrusor pressure rise >15 cm H₂O with 200 mL filling.
- ▶ Botox dose split: **100 U non-neurogenic OAB** vs **200 U neurogenic detrusor overactivity**, cystoscopic, ~20 injection sites, supratrigonal.
- ▶ Bladder drill = voiding by the clock, escalating intervals, over **6 weeks**.
- ▶ OAB + stress incontinence (mixed) → treat OAB first, before continence surgery.
- ▶ Trosipium/mirabegron preferred over classic antimuscarinics in frail/elderly (dementia-risk caution, AUGS 2017).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Mirabegron's standard once-daily dosing (25 mg, titratable to 50 mg) is well-established FDA/product-label dosing but was not tabulated in the two specialty texts searched (Berek & Novak 16e; DC Dutta's Gynaecology 7e), which name the drug without printing its dose — flagged here rather than left unstated.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Gormley EA, Lightner DJ, Faraday M, et al. Diagnosis and treatment of overactive bladder (non-neurogenic) in adults: AUA/SUFU guideline amendment, *J Urol* 2015;193:1572–1580; International Continence Society (ICS) definition.



Oocyte Aspiration for ICSI

Asked in: Paper III 29-Sep-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Oocyte aspiration (ovum pick-up, OPU) is transvaginal ultrasound-guided needle retrieval of mature oocytes from stimulated ovarian follicles, timed 34–37 hours after the ovulation-triggering human chorionic gonadotropin (hCG) injection, as part of an assisted reproductive technology (ART) cycle. Intracytoplasmic sperm injection (ICSI) is the micromanipulation technique

in which a single spermatozoon is injected directly into the cytoplasm of a retrieved metaphase-II (mature) oocyte to achieve fertilization, bypassing the natural barriers to sperm entry.

Indications for ICSI

Category	Indications
Male factor	Severe oligospermia (<5 million sperm/mL); asthenozoospermia, teratozoospermia; antisperm antibodies; obstructive azoospermia/congenital bilateral absence of vas deferens (sperm by PESA/MESA); non-obstructive azoospermia (sperm by TESE)
Other	Failure of fertilization in a prior conventional in vitro fertilisation (IVF) cycle; unexplained infertility; fertilisation of cryopreserved oocytes with a hardened zona pellucida; fertilisation before preimplantation genetic diagnosis (PGD)

Pre-requisites before oocyte retrieval

- ▶ **Pituitary down-regulation** — long luteal gonadotropin-releasing hormone (GnRH) agonist protocol (started day 21 of the preceding cycle) or a GnRH antagonist added once the lead follicle reaches 12–14 mm, to prevent a premature luteinising hormone (LH) surge.
- ▶ **Controlled ovarian stimulation** — exogenous gonadotropins (urinary/recombinant follicle-stimulating hormone [FSH], human menopausal gonadotropin) started once down-regulation is confirmed (serum estradiol [E2] <40 pg/mL, no follicle >10 mm on transvaginal sonography [TVS]).
- ▶ **Monitoring** — serial TVS for follicle number/size and serum E2 from around day 8 of stimulation; endometrial thickness ≥8–9 mm with a trilaminar pattern is the target.
- ▶ **Ovulation trigger** — given once ≥2 follicles reach 17–18 mm (E2 ~250 pg/mL per mature follicle): hCG 5,000–10,000 IU intramuscularly (urinary) or recombinant hCG 250 µg subcutaneously (≈5,000–6,000 IU equivalent). A GnRH agonist trigger is substituted in antagonist protocols when ovarian hyperstimulation syndrome (OHSS) risk is high.
- ▶ **Timing of retrieval** — 34–37 hours after the trigger; spontaneous follicular rupture occurs at a mean of ~38 hours, so retrieval before this window maximises oocyte yield.
- ▶ **Peri-procedure preparation** — informed consent, fasting, prophylactic antibiotic (e.g., ceftriaxone), emptied bladder, vaginal cleansing with saline with or without povidone-iodine.

Technique of transvaginal oocyte aspiration

- ▶ Patient positioned in lithotomy; intravenous conscious sedation/analgesia or short general anaesthesia is given.

- ▶ A transvaginal ultrasound probe fitted with a needle-guide is passed per vaginum and each ovary visualised.
- ▶ A single-lumen aspiration needle is passed through the guide and the vaginal fornix into each follicle under continuous sonographic vision, avoiding the bladder, bowel and pelvic vessels.
- ▶ Follicular fluid is aspirated under continuous controlled vacuum suction into pre-warmed collection tubes; if no oocyte is seen, the follicle is flushed with heparinised culture medium and re-aspirated.
- ▶ All accessible follicles in both ovaries are aspirated systematically in turn.
- ▶ The aspirate is handed immediately to the embryologist, who identifies the oocyte–cumulus complex under a stereomicroscope — the oocyte is recognisable as a single cell surrounded by a mass of cumulus cells.
- ▶ Retrieved oocytes are held in culture medium in vitro for a few hours to allow completion of cytoplasmic maturation before insemination/ICSI.
- ▶ Post-procedure: transvaginal check for haemostasis, observation for 1–2 hours, and analgesia.

ICSI procedure (after retrieval)

- ▶ **Denudation** — cumulus and corona cells are stripped from the oocyte–cumulus complex (hyaluronidase plus gentle mechanical pipetting) to assess nuclear maturity.
- ▶ Only **metaphase-II oocytes** (first polar body visible) are injected; immature oocytes may be cultured further.
- ▶ **Sperm preparation** — by density-gradient centrifugation or the swim-up technique (from ejaculate, or from surgically retrieved sperm — PESA/MESA/TESE).
- ▶ Under an inverted microscope with micromanipulators, the oocyte is stabilised on a holding pipette at the 9 o'clock position (polar body oriented at 6 or 12 o'clock to avoid the meiotic spindle); a single immobilised spermatozoon is aspirated into the injection pipette.
- ▶ The injection pipette pierces the zona pellucida and oolemma at the 3 o'clock position and the sperm is deposited directly into the ooplasm.
- ▶ **Fertilisation check** at 16–18 hours — presence of two pronuclei and a second polar body confirms normal fertilisation.
- ▶ Fertilised embryos are cultured to the cleavage/blastocyst stage and transferred transcervically 2–5 days later, with not more than 2–3 embryos transferred to limit multiple pregnancy.

Luteal phase support (after retrieval)

- ▶ **Progesterone**, started the day after retrieval: micronized progesterone 200 mg orally or as a vaginal suppository (vaginal route preferred) thrice daily, or progesterone in oil 50 mg intramuscularly daily — continued for about 14 days, by when pregnancy can be confirmed by quantitative beta-hCG.

- ▶ Supplemental hCG (1,500–2,500 IU) may add luteal support but increases OHSS risk in high responders and is avoided in that group.

Complications

Complication	Note
Bleeding	Vaginal or intraperitoneal haemorrhage; occasionally requires transfusion
Injury to adjacent structures	Bladder, bowel, ureter, iliac vessels — may need laparotomy
Pelvic infection/abscess	Reduced by prophylactic antibiotics; risk higher when an endometrioma is traversed
Ovarian hyperstimulation syndrome	Consequence of the preceding stimulation/hCG trigger, may worsen after retrieval
Anaesthesia-related risks	Related to sedation/general anaesthesia used for the procedure
Oocyte degeneration (ICSI-specific)	Occurs in 5–19% of injected oocytes

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 17.9 — Technique of intracytoplasmic sperm injection (ICSI) (DC Dutta's Gynaecology 7e, p.227)

Also sketch: transvaginal ultrasound probe with attached needle-guide, needle passed through the vaginal fornix directly into a visualised ovarian follicle, follicular fluid flowing into a collection tube via suction tubing.

High-yield exam pointers

- ▶ Trigger doses: hCG 5,000–10,000 IU IM (urinary) or 250 µg SC (recombinant).
- ▶ Trigger criterion: ≥2 follicles 17–18 mm, E2 ~250 pg/mL/follicle, endometrium ≥8 mm trilaminar.
- ▶ Retrieval timing: 34–37 hours after hCG (before spontaneous rupture at ~38 h).
- ▶ Only **metaphase-II** oocytes (first polar body seen) are injected in ICSI.
- ▶ Fertilisation confirmed at 16–18 hours — two pronuclei + second polar body.
- ▶ Luteal support: micronized progesterone for ~14 days post-retrieval.
- ▶ Not more than 2–3 **embryos** transferred per cycle to limit multiple pregnancy.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Threshold semen parameters quoted for offering ICSI vary between textbooks (e.g. sperm count <5 million/mL in DC Dutta vs <2 million motile sperm or <5% motility cited in Berek & Novak) because ICSI has been progressively extended to non-male-factor indications; either cut-off is acceptable if the underlying rationale — bypassing sperm-related fertilisation failure — is stated.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Ovarian conservation

Asked in: Paper III 17-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Ovarian conservation is the deliberate retention of one or both macroscopically normal ovaries at the time of hysterectomy done for benign uterine or adnexal disease in a woman who has not yet reached menopause, as an alternative to prophylactic (elective) bilateral salpingo-oophorectomy (BSO) at the same sitting. The American College of Obstetricians and Gynecologists (ACOG) and the Society of Gynecologic Oncologists (SGO) state that the decision to remove or conserve the ovaries should be individualised on **ovarian cancer risk assessment, not on the route of hysterectomy**.

Benefits and risks of ovarian conservation

Benefits of conserving healthy ovaries	Risks of conserving healthy ovaries
Ovarian (endocrine + residual fertility) function continues until the natural age of menopause	Retained risk of a subsequent ovarian neoplasm, benign or malignant, in the conserved ovary
Menopausal symptoms appear later and are milder	Residual (trapped) ovarian syndrome in 1–3% of cases, from multiple cystic follicles and/or periovarian adhesions
Decreased incidence of vasomotor symptoms, osteoporosis and atherosclerotic/cardiovascular changes; avoids need for early hormone replacement therapy (HRT)	Chronic pelvic pain and dyspareunia; 3–5% risk of relaparotomy for later ovarian pathology

- ▶ Even after hysterectomy with ovarian conservation, the ovaries are not risk-free: the relative risk (RR) of ovarian cancer is quoted as 0.6 even 10 years after the hysterectomy, i.e., a background risk persists though somewhat reduced compared with an intact uterus.
- ▶ Conversely, elective BSO before natural menopause has its own costs: in average-risk premenopausal women under 50 years, BSO is associated with a significant increase in cardiovascular mortality compared with ovarian preservation, and a Markov decision-analysis

model estimated an 8.58% excess all-cause mortality by age 80 when BSO is performed before age 55 years in average-risk women.

Factors deciding conservation versus removal

Clinical situation	Ovaries
Premenopausal, average risk (lifetime ovarian cancer risk $\approx$ 1.4%), ovaries grossly healthy	Conserve (ACOG/SGO)
Postmenopausal woman, any age	Remove as routine
Ovaries diseased — inflammatory (tubo-ovarian mass/pelvic inflammatory disease), endometriotic, or neoplastic	Remove, irrespective of age
Age $\geq$ 45 years, even if grossly healthy (traditional teaching)	Individualise; many operators remove, balanced against the mortality data above
Strong family history of ovarian or breast cancer in a first-degree relative	Remove
Confirmed <i>BRCA1/BRCA2</i> mutation or other hereditary breast-ovarian/Lynch syndrome (lifetime ovarian cancer risk 10–50%)	Risk-reducing bilateral salpingo-oophorectomy, after genetic counselling, once childbearing is complete
HRT	To be planned whenever both ovaries are removed

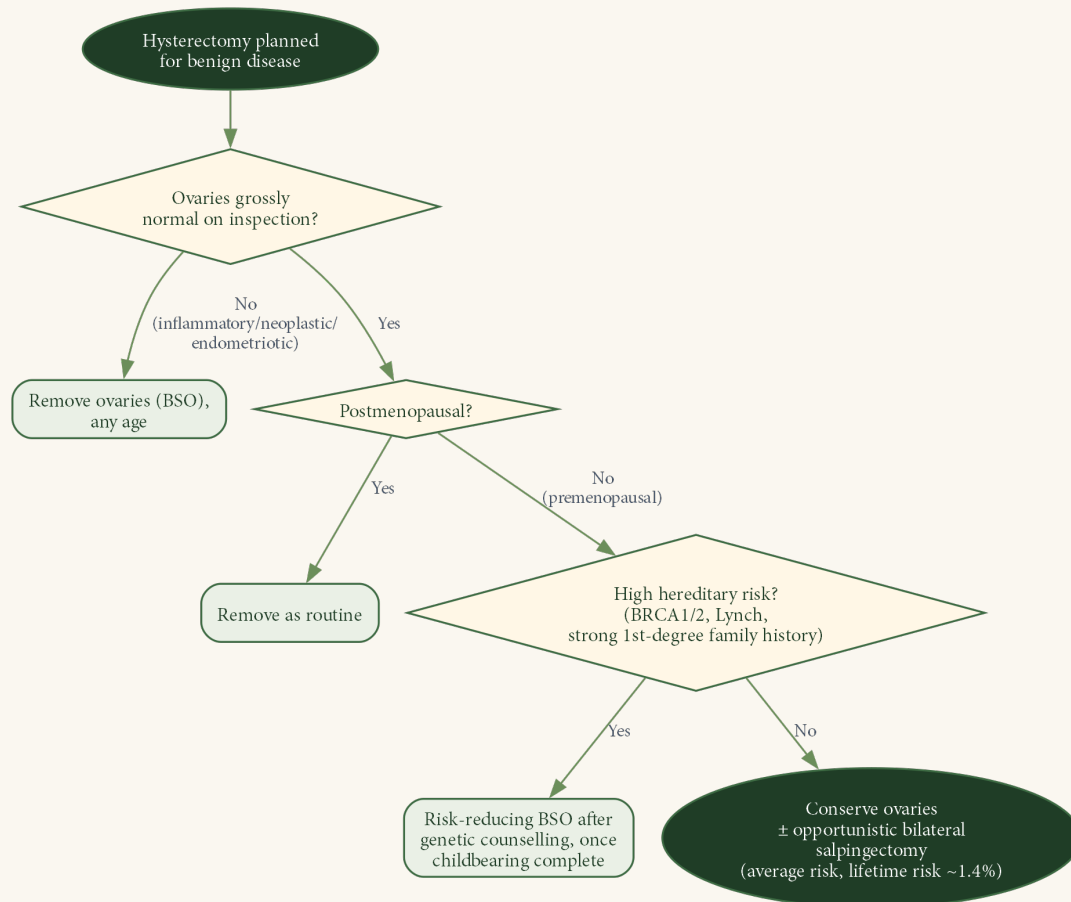
- ▶ Fallopian tubes: removed together with the ovaries whenever oophorectomy is done (salpingo-oophorectomy). If tubes are diseased but ovaries are conserved (young patient, or fertility/IVF considerations), salpingectomy alone is performed.
- ▶ **Opportunistic bilateral salpingectomy with ovarian conservation:** because many high-grade serous "ovarian" cancers actually arise from the fimbrial end of the fallopian tube, removing both tubes while conserving the ovaries at hysterectomy for benign disease is now discussed with and offered to patients — it lowers subsequent ovarian cancer risk in population-based cohorts without inducing surgical menopause. In known high-penetrance mutation carriers awaiting definitive risk-reducing surgery, interval bilateral salpingectomy with ovarian conservation has also been proposed as a bridging option.

Residual (trapped) ovary syndrome and ovarian remnant syndrome

- ▶ **Residual/trapped ovarian syndrome:** chronic pelvic pain from an ovary that was deliberately conserved at hysterectomy, caused by tension within the growing follicle or by peri-ovarian adhesions encasing the ovary.
- ▶ **Ovarian remnant syndrome:** chronic pelvic pain from ovarian cortical tissue unintentionally left behind after a technically difficult oophorectomy; a strong association exists with laparoscopic oophorectomy combined with dense adhesions/prior multiple pelvic surgeries.

- ▶ Clinical features: cyclical, lateralising pelvic pain (often with ovulation or the luteal phase), a tender palpable adnexal mass typically appearing 2–5 years after the original surgery, deep dyspareunia, and occasional bowel/bladder symptoms.
- ▶ Diagnosis: transvaginal sonography (accuracy improved by a 5–10-day course of clomiphene citrate 100 mg daily to stimulate follicular development before the scan); serum estradiol/FSH if the patient has had a prior BSO and is not on hormone therapy.
- ▶ Management: surgical (usually laparoscopic) excision of the retained ovarian tissue/remnant.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for ovaries at hysterectomy done for benign disease.

High-yield exam pointers

- ▶ One-line rule: "decide on risk, not on route" (ACOG/SGO) — average-risk premenopausal woman, lifetime ovarian cancer risk $\approx 1.4\%$ $\rightarrow$ conserve.
- ▶ Benefits vs risks table of conservation — reproduce verbatim: continued ovarian function/delayed menopause/less vasomotor-osteoporosis-atherosclerosis risk vs residual ovarian syndrome (1–3%), chronic pelvic pain, relaparotomy (3–5%), RR ovarian cancer 0.6 even at 10 years.

- ▶ BRCA1/2 lifetime ovarian cancer risk 10–50% → risk-reducing BSO.
- ▶ BSO before age 55 in average-risk women → ~8.58% excess all-cause mortality by age 80 (Markov model); BSO <50 years → increased cardiovascular mortality.
- ▶ Opportunistic bilateral salpingectomy with ovarian conservation = current practice trend to cut ovarian cancer risk without surgical menopause.
- ▶ Distinguish residual/trapped ovary syndrome (intentionally conserved ovary + adhesions) from ovarian remnant syndrome (unintentional tissue left after difficult oophorectomy).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older Indian teaching of routinely removing ovaries beyond 45 years at hysterectomy predates the current mortality/cardiovascular data; ACOG and SGO now recommend individualised risk-based counselling favouring conservation in average-risk premenopausal women rather than an age cut-off alone.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (benefits/risks table of ovarian conservation at hysterectomy, indications for oophorectomy, residual ovarian syndrome); Berek & Novak's Gynecology 16e (ACOG/SGO risk-based guidance on prophylactic salpingo-oophorectomy, average and BRCA-associated ovarian cancer risk, opportunistic salpingectomy, ovarian remnant/residual ovary syndrome).



Ovarian Hyperstimulation Syndrome

Asked in: Paper III 19-Nov-2022 · Paper III 02-Aug-2021 · Paper I May 2011 · Paper I Apr 2008 (4×) — RGUHS MS Obstetrics & Gynaecology

Definition — Ovarian hyperstimulation syndrome (OHSS) is an iatrogenic, potentially life-threatening complication of ovulation induction/controlled ovarian hyperstimulation, characterised by cystic ovarian enlargement with multiple follicles and a systemic increase in capillary permeability causing fluid shift into a "third space" (ascites, hydrothorax) with intravascular volume depletion. **Early OHSS** appears 3–7 days after the human chorionic gonadotropin (hCG) trigger (exogenous hCG-driven); **late OHSS** appears 12–17 days after trigger, is driven by endogenous hCG from an early pregnancy, and tends to be more severe, especially with multiple gestation.

Risk factors

Category	Factors
Patient-related	Young age (<30 years), low body weight, polycystic ovary syndrome (PCOS)/polycystic ovarian morphology, high ovarian reserve (anti-Müllerian hormone (AMH) >3.3–3.4 ng/mL, high antral follicle count), previous episode of OHSS
Cycle-related	Higher gonadotropin starting/total dose, gonadotropin-releasing hormone (GnRH) agonist protocol (more than antagonist), multiple small follicles — "necklace sign" on ultrasound
Hormonal	Rapidly rising serum estradiol (>75% rise/day), peak estradiol >2,500–3,500 pg/mL (severe risk rises steeply above 6,000 pg/mL), >20 preovulatory follicles, ≥20–24 oocytes retrieved
Trigger/luteal support	Use of hCG (rather than GnRH agonist) for trigger, supplemental hCG for luteal support
Pregnancy	Conception cycle, multiple pregnancy (raises endogenous hCG → late/severe OHSS)

Pathophysiology

- ▶ Ovarian vascular endothelial growth factor (VEGF) expression in granulosa cells is up-regulated by hCG → is the principal mediator of increased capillary permeability.
- ▶ Additional mediators: ovarian **renin–angiotensin system** (prorenin/renin), pro-inflammatory **cytokines** (interleukin-1 β , interleukin-6), and the **nitric oxide (NO)** system.
- ▶ Net effect: protein-rich fluid leaks from the peritoneal and ovarian surfaces into the peritoneal cavity (ascites), pleural space (hydrothorax) and subcutaneous tissue (anasarca).
- ▶ Consequent **intravascular volume depletion** → hemoconcentration, hyponatremia (non-osmotic antidiuretic hormone release), hyperkalemia, oliguria, reduced renal perfusion, and a hypercoagulable state → **thromboembolism** risk.

Classification (severity grading)

Severity	Incidence	Clinical/laboratory features
Mild	10–20%	Abdominal bloating, mild pain; ovarian size <8 cm
Moderate	5–10%	Nausea, vomiting, diarrhoea; ultrasound evidence of ascites; ovarian size 8–12 cm

Severity	Incidence	Clinical/laboratory features
Severe	1–2%	Clinical ascites ± hydrothorax; acute respiratory distress; haematocrit >45%, WBC >15,000/mL; oliguria with normal creatinine; liver dysfunction; anasarca; ovarian size >12 cm
Critical	Rare	Tense ascites; haematocrit >55%; WBC >25,000/mL; oliguria with raised creatinine/renal failure; thromboembolism; ovarian size >12 cm

(Criteria adapted from Golan/Navot and used in the RCOG Green-top Guideline No. 5 and the ASRM practice guideline on OHSS.)

Investigations

Test	Purpose/finding
Haematocrit, complete blood count	Haemoconcentration (>45% moderate–severe, >55% critical), leucocytosis
Serum electrolytes	Hyponatraemia, hyperkalaemia
Renal function (creatinine, creatinine clearance)	Detect renal compromise (creatinine >1.2 mg/dL, clearance <50 mL/min = hospitalisation criterion)
Liver function tests	Transaminase elevation in severe/critical disease
Transvaginal/transabdominal ultrasound	Ovarian size, number of follicles ("necklace sign"), free fluid/ascites
Chest X-ray, echocardiography	If pleural or pericardial effusion suspected
Pulse oximetry	If pulmonary symptoms
Coagulation profile	Before anticoagulation, if thromboembolism suspected

Prevention

- ▶ Identify high-risk women before stimulation (PCOS, high AMH/antral count, young/lean patients).
- ▶ **GnRH-antagonist protocol** preferred over long agonist protocol — lowers incidence.
- ▶ Low starting/step-up gonadotropin dose in high-risk women; adjunctive **metformin** in PCOS patients.

- ▶ Close cycle monitoring by serial transvaginal ultrasound + serum estradiol.
- ▶ **GnRH-agonist trigger** (e.g., leuprolide) instead of hCG in antagonist cycles, or a lower hCG trigger dose (5,000 IU); dual/low-dose hCG trigger if a fresh transfer is planned.
- ▶ **Coasting** — withhold further gonadotropins and delay hCG 1–3 days until estradiol plateaus/declines (consider when estradiol >4,500 pg/mL or 15–30 mature follicles); cancel the cycle if coasting >4 days or estradiol continues to rise (>6,000–6,500 pg/mL) or >30 mature follicles.
- ▶ **Cabergoline** 0.5 mg daily for 8 days from the day of hCG (dopamine agonist, reduces VEGF-mediated permeability) in high-risk women.
- ▶ **Elective cryopreservation of all embryos** ("freeze-all"/segmentation) with deferred frozen embryo transfer — abolishes late (pregnancy-driven) OHSS.
- ▶ In-vitro maturation (IVM) of oocytes — avoids gonadotropin hyperstimulation altogether (experimental, specialised centres).

Management

- ▶ **Outpatient (mild–moderate)**: oral analgesics; oral fluid ≥ 1 L/day (electrolyte-balanced drinks); daily weight and abdominal girth; light activity (avoid strenuous exercise/intercourse — risk of torsion/rupture); avoid NSAIDs; telephone/clinic follow-up.
- ▶ **Indications for admission**: intractable nausea/vomiting or pain, tense ascites, dyspnoea/tachypnoea, dizziness/syncope, weight gain >2 lb/day, haematocrit >45–55%, hyponatraemia (Na <135 mEq/L)/hyperkalaemia (K >5 mEq/L), deranged renal or liver function, suspected thromboembolism.
- ▶ **IV fluids** to restore effective plasma volume — **normal saline preferred over Ringer lactate** (lower hyponatraemia risk); given judiciously to avoid worsening ascites.
- ▶ If hypovolaemia persists after saline: **IV human albumin 25%, 50–100 g infused over 4 hours, every 4–12 hours.**
- ▶ Avoid premature diuretics (worsen intravascular depletion); use only after rehydration if oliguria/weight gain persists.
- ▶ Correct hyperkalaemia (insulin–glucose, sodium bicarbonate) and arrhythmia risk (calcium gluconate) if needed.
- ▶ **Ultrasound-guided paracentesis** (transabdominal or transvaginal) for tense/painful ascites, oliguria unresponsive to fluids, or respiratory compromise; thoracentesis if symptomatic pleural effusion.
- ▶ **Thromboprophylaxis**: graduated compression stockings + prophylactic low-molecular-weight heparin in severe OHSS, continued at least to the end of the first trimester if pregnant; therapeutic anticoagulation if thromboembolism confirmed/strongly suspected.
- ▶ **Progesterone** (not hCG) for luteal support to avoid perpetuating OHSS.

- ▶ Intensive care for critical disease (renal failure, respiratory failure, thromboembolism).
- ▶ **Surgery** reserved for ovarian torsion or ruptured cyst with haemorrhage — laparoscopy preferred, conservative (detorsion/cystectomy), avoiding oophorectomy where possible.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 32.1 — Ultrasonographic view of ovarian hyperstimulation syndrome (OHSS). Enlargement of the ovary with multiple follicles (DC Dutta's Gynaecology 7e, p.457)

High-yield exam pointers

- ▶ Onset timing: **early OHSS 3–7 days** (exogenous hCG) vs **late OHSS 12–17 days** (endogenous/pregnancy hCG, more severe).
- ▶ Key mediator to name: **VEGF** (hCG-driven, granulosa-cell derived) → capillary permeability.
- ▶ Severity table numbers: mild <8 cm ovary, moderate 8–12 cm + ascites, severe >12 cm + Hct >45%/WBC >15,000, critical Hct >55%/WBC >25,000 + renal failure.
- ▶ Prevention triad to write first: GnRH-antagonist protocol + GnRH-agonist trigger + freeze-all embryos.
- ▶ Cabergoline dose: **0.5 mg/day × 8 days** from day of hCG.
- ▶ Albumin dose: **25%, 50–100 g IV over 4 h, q4–12h**.
- ▶ Fluid of choice: **normal saline** (not Ringer lactate) — avoids worsening hyponatraemia; diuretics only after correcting hypovolaemia.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The Golan/Navot severity grades and thresholds above track the RCOG Green-top Guideline No. 5 and ASRM 2016 practice-committee guideline on OHSS; DC Dutta's table gives the same cut-offs in simplified mild/moderate/severe/critical form and is safe to reproduce verbatim in the exam.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; RCOG Green-top Guideline No. 5 and ASRM Practice Committee guideline on ovarian hyperstimulation syndrome (as referenced within the above texts).

♦ ♦ ♦

PCOD- diagnostic criteria & management

Asked in: Paper III May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Polycystic ovarian disease/syndrome (PCOD/PCOS) is a heterogeneous endocrine-metabolic disorder of reproductive-age women, first described by *Stein and Leventhal* (1935), characterised by chronic anovulation, clinical and/or biochemical hyperandrogenism, and polycystic ovarian morphology on ultrasound. It is the commonest endocrine disorder in women of reproductive age (prevalence 5–10%) and the leading cause of anovulatory infertility.

Diagnostic criteria

Diagnosis requires **any 2 of the following 3 criteria** (Rotterdam, ESHRE/ASRM 2003, revised from the 1990 NIH criteria), after exclusion of other aetiologies.

Criterion	Details
1. Oligo- or anovulation	Cycles >35 days apart, or <8 cycles/year; presents as oligomenorrhoea, amenorrhoea or abnormal uterine bleeding
2. Clinical and/or biochemical hyperandrogenism	Hirsutism (Ferriman-Gallwey), acne, androgenic alopecia; raised free/total testosterone
3. Polycystic ovarian morphology (PCOM) on transvaginal ultrasound	≥20 follicles (2–9 mm) in either ovary and/or ovarian volume >10 mL (updated threshold with high-resolution transducers; older texts use ≥12 follicles)
Mandatory exclusion	Congenital adrenal hyperplasia (17-OHP), androgen-secreting tumour, Cushing syndrome, thyroid dysfunction, hyperprolactinaemia

- ▶ **1990 NIH criteria** (older, stricter): both hyperandrogenism AND chronic anovulation required.
- ▶ The 2 of 3 Rotterdam scheme generates **4 phenotypes**: (A) hyperandrogenism + anovulation + PCOM, (B) hyperandrogenism + anovulation, (C) hyperandrogenism + PCOM (ovulatory), (D) anovulation + PCOM (non-hyperandrogenic).
- ▶ In **adolescents**, diagnosis needs both persistent anovulation AND hyperandrogenism — PCOM alone is not diagnostic (normal pubertal ovaries are often multifollicular).

Clinical features

- ▶ Menstrual irregularity — oligomenorrhoea, amenorrhoea, or abnormal uterine bleeding (70%).
- ▶ Obesity, usually central/android pattern (>50%).
- ▶ Hirsutism and acne (70%) — from hyperandrogenism.
- ▶ Infertility due to chronic anovulation.
- ▶ Acanthosis nigricans — velvety, grey-brown thickened skin at nape of neck, axilla, groin, inner thighs (marker of insulin resistance).

- ▶ HAIR-AN syndrome (hyperandrogenism, insulin resistance, acanthosis nigricans) in severe cases.
- ▶ Bilateral enlarged ovaries on pelvic examination (may be masked by obesity).

Investigations

Test	Purpose/finding
Transvaginal ultrasound	PCOM — ≥ 20 follicles (2–9 mm)/ovary and/or volume > 10 mL
LH, FSH	Raised LH, low-normal FSH; LH:FSH ratio $> 2:1$ (supportive, not diagnostic)
Total/free testosterone	Raised (usually $< 2 \times$ upper normal; > 200 ng/dL suggests hyperthecosis/tumour)
DHEAS	Mildly raised in $\sim 50\%$ (adrenal component)
17-hydroxyprogesterone (morning, follicular phase)	Excludes non-classic congenital adrenal hyperplasia
Prolactin, TSH	Excludes hyperprolactinaemia, thyroid disease
Fasting glucose/insulin, 2-hour 75 g OGTT	Screens for insulin resistance and impaired glucose tolerance/type 2 diabetes
Fasting lipid profile	Dyslipidaemia (raised LDL/triglycerides, low HDL)
BMI, waist circumference, blood pressure	Metabolic syndrome screening
Metabolic syndrome (NCEP-ATP III-based; any 3 of 5)	Triglycerides ≥ 150 mg/dL; HDL < 50 mg/dL; BP $\geq 130/80$ mmHg; fasting glucose ≥ 100 mg/dL; waist circumference > 88 cm

Management

Individualised to the woman's presenting problem — menstrual irregularity/endometrial protection (fertility not desired), infertility (fertility desired), hyperandrogenism, or metabolic risk — after weight optimisation as the universal first step.

- ▶ **Lifestyle modification** — diet and exercise to achieve weight loss; even a 5–10% reduction in body weight restores ovulatory cycles in many women, improves the metabolic profile, and is first-line before drug therapy in all overweight/obese women (body mass index [BMI] > 25 kg/m²).
- ▶ **Fertility not desired — menstrual regulation, endometrial protection, hyperandrogenism**
 - Combined oral contraceptive pills (COCs) — progestin suppresses luteinising hormone (LH); ethinyl estradiol raises sex hormone-binding globulin (SHBG), lowering free testosterone; also protects the endometrium from unopposed-oestrogen-driven hyperplasia. A pill combining ethinyl estradiol 35 μ g with cyproterone acetate 2 mg is a preferred option when hirsutism/acne coexist.

- Antiandrogens (added to a COC, with contraception mandatory as they are teratogenic — risk of feminisation of a male fetus): cyproterone acetate 10–100 mg on days 1–10 of the cycle, spironolactone, or flutamide; finasteride 1–5 mg/day (5 α -reductase inhibitor) for hirsutism/alopecia. Clinical response takes 3–6 months.
- Cosmetic measures for hirsutism: bleaching, shaving, depilatories, electrolysis, laser.
- Insulin sensitisers for the metabolic component (below).
- **Fertility desired — ovulation induction** (stepwise escalation)
 - **First line:** Letrozole (aromatase inhibitor) 2.5–5 mg/day for 5 days from cycle day 3–5 — current first-line agent, giving higher ovulation, pregnancy and live-birth rates than clomiphene with a lower multiple-pregnancy rate (used off-label; approved indication is breast cancer).
 - **Alternative:** Clomiphene citrate 50 mg/day for 5 days from day 2–5 of a spontaneous or progestin-induced bleed; increase to 100 mg (maximum ~150 mg/day) if anovulatory. About 80% ovulate on letrozole or clomiphene. Adjunctive dexamethasone 0.5 mg/day for the first 10 days may help clomiphene-resistant hyperandrogenic women.
 - **Metformin** 500 mg 8-hourly (up to 500 mg thrice daily) as an insulin sensitiser — improves ovulation rates when combined with clomiphene in women with hyperinsulinaemia/BMI >25, though clomiphene alone is superior to metformin alone for live birth.
 - **Laparoscopic ovarian drilling (LOD)** — for clomiphene-resistant PCOS: 4–8 diathermy punctures per ovary (monopolar current, 2–4 mm depth, 20–40 W) or laser vaporisation; has replaced ovarian wedge resection; risk of periovarian adhesions and, rarely, ovarian failure.
 - **Gonadotropin therapy** — recombinant/urinary FSH $\pm$ LH by a low-dose step-up (or step-down) protocol, with human chorionic gonadotropin (hCG) 10,000 IU trigger when the lead follicle reaches 17–18 mm; requires ultrasound/estradiol monitoring for ovarian hyperstimulation syndrome and multiple pregnancy risk.
 - **In vitro fertilisation (IVF)/intracytoplasmic sperm injection (ICSI)** — for gonadotropin failure or coexisting tubal/male factor; long agonist down-regulation protocol is preferred in PCOS to blunt the high LH milieu.
 - **Bariatric surgery** may be considered in morbidly obese women unresponsive to other measures.
- **Long-term surveillance** — periodic screening for impaired glucose tolerance/type 2 diabetes (fasting + 2-hour 75 g oral glucose tolerance test), lipid profile, blood pressure, and cardiovascular risk factors; endometrial surveillance/biopsy in women with prolonged unopposed oestrogen exposure given the raised endometrial hyperplasia and carcinoma risk; cyclic progestin or COCs if the woman is not planning ovulation induction, to ensure regular endometrial shedding.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 29.4 — Laparoscopic view of polycystic changes (PCOS) of the ovary. Multiple small peripheral cysts on the ovarian surface (DC Dutta's Gynaecology 7e, p.398)

High-yield exam pointers

- ▶ **Rotterdam criteria = 2 of 3:** oligo/anovulation + hyperandrogenism + polycystic ovaries (after excluding congenital adrenal hyperplasia, androgen tumour, Cushing, thyroid, hyperprolactinaemia).
- ▶ **Ultrasound threshold:** ≥ 20 follicles (2–9 mm)/ovary or volume > 10 mL (updated from the older ≥ 12 -follicle cut-off).
- ▶ LH:FSH ratio $> 2:1$ is supportive but not a diagnostic criterion.
- ▶ **Ovulation induction ladder:** **letrozole (first line)** → **clomiphene $\pm$ metformin** → **laparoscopic ovarian drilling/gonadotropins** → **IVF**.
- ▶ Clomiphene dose: 50 mg $\times$ 5 days (day 2–5); letrozole: 2.5–5 mg $\times$ 5 days.
- ▶ Metformin dose: **500 mg three times daily**.
- ▶ **Metabolic syndrome (3 of 5):** triglycerides ≥ 150 , HDL < 50 , BP $\geq 130/80$, fasting glucose ≥ 100 , waist > 88 cm.
- ▶ **Long-term risk mnemonic:** Diabetes, Dyslipidaemia, hypertension, Endometrial carcinoma, cardiovascular disease, obstructive sleep apnoea.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Letrozole (not clomiphene) is now the current evidence-based first-line ovulation-induction agent for PCOS-related anovulatory infertility; older textbook editions still list clomiphene citrate as first line.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Jeffcoate's Principles of Gynaecology 9e. Diagnostic criteria per the Rotterdam ESHRE/ASRM Consensus (2003, updated ultrasound threshold).

♦ ♦ ♦

Postmenopausal osteoporosis

Asked in: Paper III 29-Sep-2025 · Paper III Oct 2008 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — **Osteoporosis** is a systemic skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue, with a normal bone mineral-to-matrix ratio, leading to

increased bone fragility and fracture risk. The WHO defines it operationally on dual-energy X-ray absorptiometry (DEXA) as a **T-score** ≤ -2.5 SD below the young adult mean. **Postmenopausal (Type I)** osteoporosis is estrogen-deficiency-driven trabecular bone loss beginning within 5-10 years of menopause, distinct from age-related **Type II (senile)** osteoporosis of cortical bone.

Aetiopathogenesis

- ▶ Normal bone remodelling is a balance of **osteoblastic formation** and **osteoclastic resorption**.
- ▶ **Estrogen withdrawal** removes its inhibitory effect on osteoclastogenesis — it raises **RANKL** (receptor activator of nuclear factor- κ B ligand) and monocyte interleukin-1/6 activity while lowering **osteoprotegerin (OPG)**, so resorption outpaces formation. Estrogen also reduces intestinal calcium absorption, calcitonin secretion, and 1,25-dihydroxyvitamin D — compounding negative calcium balance.
- ▶ Trabecular bone loss reaches **3-5%/year** in the first 5-10 postmenopausal years (vertebrae, distal radius most affected), then slows.

Feature	Type I — postmenopausal	Type II — senile
Onset	51-65 years	>70 years
Bone affected	Trabecular (vertebra, distal radius)	Cortical + trabecular (hip, pelvis)
Principal driver	Estrogen deficiency	Age-related osteoblast decline, secondary hyperparathyroidism
Typical fracture	Vertebral crush, Colles' fracture	Femoral neck / hip fracture

Risk factors

Non-modifiable	Modifiable	Secondary/medical
Age >65 years	Low dietary calcium & vitamin D	Hyperthyroidism, hyperparathyroidism
Race — White, Asian	Smoking, excess alcohol, high caffeine	Chronic renal disease
Small body frame, low BMI	Sedentary lifestyle	Rheumatoid arthritis
Early menopause (surgical/radiation)	Fall-risk factors (visual/cognitive impairment)	Malabsorption, multiple myeloma
Family history of osteoporosis/fracture	Medications — corticosteroids, heparin, GnRH analogues, anticonvulsants	Prolonged anovulation (excess exercise/eating disorder)
Prior fragility fracture, osteopenia	—	—

Clinical features

- ▶ Often **asymptomatic** ("silent disease") until a fracture occurs.
- ▶ **Back pain** — acute (after a vertebral compression fracture) or chronic dull ache.
- ▶ **Loss of height and kyphosis** ("dowager's hump") from multiple vertebral compressions.
- ▶ **Fragility fractures** with minimal trauma — vertebral crush fracture, distal radius (*Colles' fracture*), femoral neck/hip.
- ▶ Hip fracture carries the highest morbidity/mortality of postmenopausal fractures.

Diagnosis / Investigations

Test	Finding / purpose
DEXA (hip + lumbar spine)	Gold-standard BMD measurement; reported as T-score (vs young adult mean) and Z-score (vs age-matched mean)
WHO T-score criteria	Normal ≥ -1.0 ; osteopenia -1.0 to -2.5 ; osteoporosis ≤ -2.5 ; severe/established osteoporosis = $T \leq -2.5$ + a fragility fracture
FRAX (WHO fracture risk assessment tool)	Gives 10-year probability of major osteoporotic/hip fracture; used to decide pharmacotherapy in the osteopenic range
Serum calcium, phosphate, alkaline phosphatase	Usually normal — helps exclude osteomalacia/Paget disease/bone metastasis
Urinary calcium/creatinine, hydroxyproline/creatinine ratio	Biochemical markers of bone turnover
TSH, PTH, 25-OH vitamin D, renal panel, complete blood count	To exclude secondary causes before starting treatment
Plain X-ray	Insensitive — needs ~25-30% bone loss before osteoporosis is visible; may show vertebral wedge/crush deformity

Management

Non-pharmacological (all women)

- ▶ Weight-bearing exercise (walking, resistance training) and muscle-strengthening to improve balance and reduce falls.
- ▶ **Calcium 1,200 mg/day** (diet-first, supplement only if intake insufficient) + **vitamin D3 800-1,000 IU/day**.
- ▶ Smoking cessation, limit alcohol and caffeine.
- ▶ Fall-prevention: home safety assessment (grab bars, night lights, carpeted stairs), vision correction, avoid CNS-depressant drugs.

Pharmacological — indicated for T-score ≤ -2.5 , a prior hip/vertebral fragility fracture, or osteopenia (T -1 to -2.5) with a high FRAX score.

Class	Agent & dose	Notes
Bisphosphonates (first-line antiresorptive)	Alendronate 70 mg oral once weekly; Risedronate 35 mg weekly; Ibandronate 150 mg oral monthly or 3 mg IV 3-monthly; Zoledronic acid 5 mg IV once yearly	Empty stomach, large glass of water, remain upright 30 min; SE — GI/oesophageal irritation, rare osteonecrosis of jaw, atypical femoral fracture; "drug holiday" after 3-5 years
Denosumab	60 mg subcutaneous every 6 months	Anti-RANKL monoclonal antibody; for bisphosphonate intolerance/renal impairment; rapid rebound bone loss on stopping — needs follow-on therapy
SERM	Raloxifene 60 mg/day oral	Reduces vertebral fracture and breast cancer risk; does not relieve hot flushes; increases venous thromboembolism/stroke risk
Anabolic (PTH analogues)	Teriparatide 20 µg/day SC (max 2 years); Abaloparatide 80 µg/day SC	Stimulate new bone formation; reserved for severe/high-risk osteoporosis
Hormone therapy	Estrogen ± progestin	FDA-approved for prevention; WHI trial — ~34% reduction in hip fracture; best when started within 10 years of menopause, especially with concurrent vasomotor symptoms
Calcitonin	200 IU intranasal daily (or 50-100 IU SC daily)	Weak, second-line; useful when estrogen is contraindicated

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 17.18 — Normal (A) versus osteoporotic (B) trabecular bone architecture: thinned, perforated, poorly connected trabeculae in osteoporosis (Speroff 9e, p.1701)

High-yield exam pointers

- ▶ WHO T-score cut-offs: Normal ≥ -1.0 → Osteopenia -1.0 to -2.5 → Osteoporosis ≤ -2.5 .
- ▶ DEXA = gold standard; FRAX = 10-year fracture-probability tool used in the osteopenic zone.
- ▶ First-line drug: **bisphosphonate** (alendronate 70 mg weekly); zoledronic acid 5 mg IV yearly for the non-compliant.

- ▶ **Denosumab** 60 mg SC 6-monthly = anti-RANKL antibody; stopping needs a follow-on drug.
- ▶ **Teriparatide** 20 µg/day SC = anabolic PTH analogue, capped at 2 years.
- ▶ Baseline for everyone: calcium 1,200 mg/day + vitamin D 800-1,000 IU/day.
- ▶ WHI trial: hormone therapy cut hip fracture risk by ~34%.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e recommends higher supplemental doses (calcium 1-1.5 g/day, vitamin D3 1,500-2,000 IU/day) than the current National Osteoporosis Foundation/ACOG-endorsed calcium 1,200 mg/day and vitamin D 800-1,000 IU/day used above; the lower, more recent figures are followed here.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (figure). Guideline basis: National Osteoporosis Foundation Clinician's Guide (2014), as cited in Berek & Novak 16e; WHO fracture-risk (FRAX) criteria.



Premenstrual syndrome

Asked in: Paper III 20-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — Premenstrual syndrome (PMS) is a psychoneuroendocrine disorder of unknown aetiology characterised by the cyclic recurrence of somatic, affective and behavioural symptoms during the last 7–10 days of the luteal (secretory) phase of each ovulatory cycle, with a symptom-free interval in the follicular phase and no demonstrable organic pelvic lesion. When the psychiatric symptoms dominate and cause marked functional impairment, the disorder is termed premenstrual dysphoric disorder (PMDD) — DSM-5 code F32.81 — which affects an estimated 3–5% of ovulating women.

Aetiopathogenesis

Theory	Proposed mechanism
Ovarian steroid imbalance	Altered oestrogen : progesterone ratio / relative luteal-phase progesterone deficiency acting on a hormonally sensitive brain
Serotonin dysfunction	Decreased CNS serotonin synthesis/turnover in the luteal phase

Theory	Proposed mechanism
Endorphin withdrawal	Withdrawal of endogenous endorphins from the CNS in the luteal phase
GABA–allopregnanolone axis	Reduced gamma-aminobutyric acid (GABA)-ergic tone; GABA-agonist drugs relieve anxiety symptoms
Other biochemical mediators	Thyrotrophin-releasing hormone (TRH), prolactin, renin–aldosterone, prostaglandins — implicated but unproven
Psychosocial factors	Prior mood disorder, stress and psychosocial predisposition amplify symptom perception

Clinical features

- ▶ Age 30–45 years; onset or worsening often follows childbirth or a stressful life event.
- ▶ Symptoms recur regularly in the luteal phase of every ovulatory cycle and resolve within days of onset of menses.
- ▶ No abnormal pelvic finding on examination.

Symptom group	Symptoms
Related to water retention	Abdominal bloating, breast tenderness/mastalgia, swelling of extremities, weight gain
Neuropsychiatric	Irritability, tearfulness, depression, anxiety, mood swings, tension, forgetfulness, confusion, restlessness, headache, increased appetite, anger
Behavioural	Fatigue, tiredness, dyspareunia, insomnia

Diagnosis

Criteria set	Key requirements
ACOG criteria for PMS	Not related to any organic lesion; regularly occurs in the luteal phase of every ovulatory cycle; symptoms severe enough to disturb lifestyle or need medical help; symptom-free period during the rest of the cycle

Criteria set	Key requirements
DSM-5 criteria for PMDD (F32.81)	≥5 symptoms present in most cycles during the premenstrual week, improving within days of onset of menses and minimal/absent postmenstrually; at least 1 core symptom (marked affective lability, irritability/anger, depressed mood/hopelessness, or anxiety/tension) plus additional symptoms (poor concentration, lethargy, appetite change, hypersomnia/insomnia, feeling overwhelmed, bloating/breast tenderness); must markedly impair work/family/academic function and be confirmed on ≥2 months of prospective daily charting

- ▶ **Most useful diagnostic tool:** a prospective symptom diary kept for at least 2 menstrual cycles — mood/behaviour ratings are recorded separately from menstrual dates to avoid recall bias.
- ▶ The patient must be screened for domestic abuse and other psychosocial contributors before labelling symptoms as PMS/PMDD.

Differential diagnosis

Condition	Distinguishing feature
Major depressive disorder / dysthymia	Symptoms present throughout the cycle, not confined to the luteal phase
Perimenopausal mood disturbance	Irregular cycles, vasomotor symptoms, raised FSH
Hypothyroidism	Persistent (non-cyclical) symptoms; abnormal TSH
Anaemia / chronic fatigue	Fatigue independent of cycle day; low haemoglobin
Pelvic pathology (endometriosis, adenomyosis, pelvic congestion)	Organic findings on examination/imaging; pain not restricted to the luteal window

Management

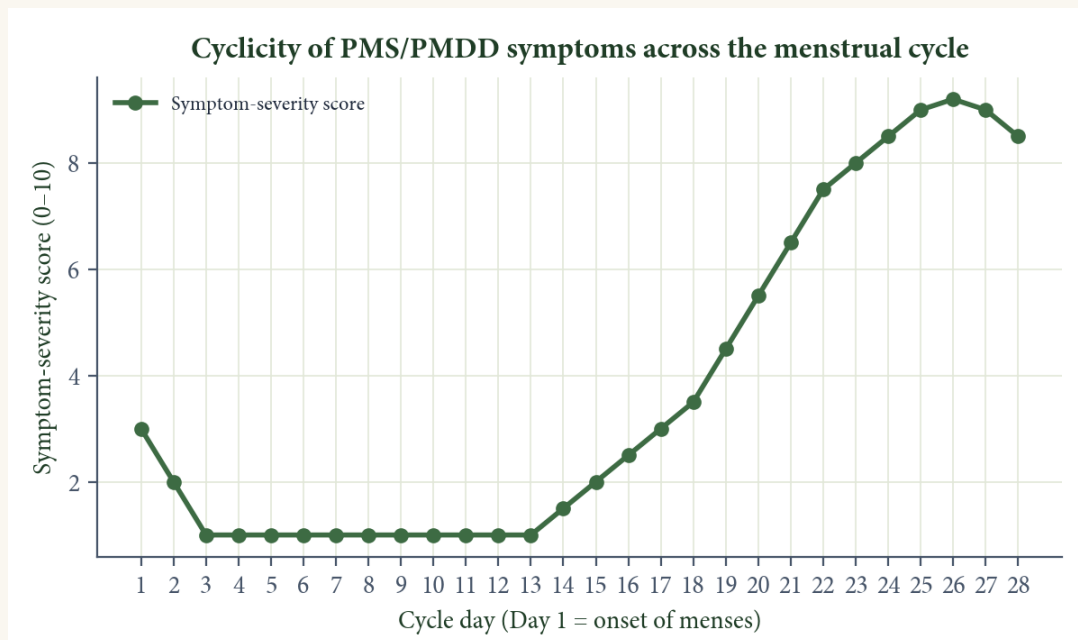
Non-pharmacological (first step in every patient):

- ▶ Reassurance, lifestyle modification and cognitive behavioural therapy.
- ▶ Regular exercise, adequate sleep and stress reduction (yoga, relaxation techniques).
- ▶ Diet: avoid excess salt, caffeine and alcohol, especially in the luteal phase; regular meals with complex carbohydrates.

Pharmacological:

Category	Drug and dose
SSRI/SNRI (first-line for PMDD)	Fluoxetine 20 mg/day; Sertraline 50–150 mg/day; Paroxetine CR 12.5–25 mg/day; Citalopram 5–20 mg/day; Venlafaxine 75 mg/day — may be given continuously or luteal-phase-only (started ~2 days before expected symptoms, continued till menses)
Anxiolytic	Alprazolam 0.25 mg BID, luteal phase only
Diuretic	Furosemide 20 mg/day for 5 days/week in the luteal phase for fluid retention; Spironolactone 25–200 mg/day (luteal phase) — anti-mineralocorticoid/anti-androgenic, helps PMDD
Hormonal — ovulation suppression	Drospirenone-containing combined oral contraceptive (e.g., ethinyl estradiol 20 µg/drospirenone 3 mg) for 3–6 cycles — FDA-approved for PMDD; Danazol 200–400 mg/day titrated to produce amenorrhoea (advise barrier contraception)
GnRH agonist ("medical oophorectomy")	Goserelin 3.6 mg SC every 4 weeks; Leuporelin acetate 3.75–7.5 mg SC/IM every 4 weeks; Triptorelin 3 mg IM every 4 weeks — for 6 months, with oestrogen–progestin "add-back" to offset hypo-oestrogenic effects; also used as a therapeutic trial to predict response to oophorectomy
Other	Bromocriptine 2.5 mg once or twice daily for mastalgia; Pyridoxine (vitamin B6) 100 mg BID; Calcium 600 mg BID; chasteberry (limited evidence)
Surgical (last resort)	Total abdominal hysterectomy with bilateral salpingo-oophorectomy in established primary PMS with recurrent, refractory symptoms in a woman approaching menopause

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Symptoms are flat/low through the follicular phase (Days ~5–13), rise through the luteal phase from around Day 14 (ovulation), peak in the last 7–10 premenstrual days (Days ~21–28), and fall sharply back to baseline within days of the next menstrual onset — the cyclicity that is diagnostic of PMS/PMDD.

High-yield exam pointers

- ▶ ACOG criteria for PMS = organic lesion excluded + strictly luteal-phase + disruptive severity + symptom-free interval.
- ▶ PMDD = DSM-5 F32.81; ≥5 symptoms with ≥1 core affective symptom, confirmed on ≥2 prospective cycles of charting.
- ▶ Diagnostic tool of choice = prospective symptom diary (never retrospective recall).
- ▶ First-line PMDD drug = SSRI (Fluoxetine 20 mg/day or Sertraline 50–150 mg/day); can be luteal-phase-only dosing.
- ▶ Drospirenone-containing COC is FDA-approved specifically for PMDD.
- ▶ GnRH agonist trial ("medical oophorectomy") predicts response before offering bilateral oophorectomy.
- ▶ Last resort = hysterectomy with bilateral salpingo-oophorectomy in refractory primary PMS near menopause.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's ACOG-style clinical criteria for PMS and Berek & Novak's DSM-5 criteria for PMDD are complementary rather than conflicting — PMS is the broader clinical diagnosis and PMDD is its severe, psychiatrically defined subtype; both current standards (ACOG, DSM-5) require prospective symptom charting over at least two cycles before a diagnosis is made or treatment escalated.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e. Guidelines: American College of Obstetricians and Gynecologists (ACOG) diagnostic criteria for PMS; DSM-5 (American Psychiatric Association) diagnostic criteria for PMDD.



Preterm birth and the role of vaginal microbiomes

Asked in: Paper IV 03-Oct-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Preterm birth (PTB) is delivery before **37 completed weeks** of gestation (WHO). About 70% is **spontaneous** (spontaneous preterm labour or preterm prelabour rupture of membranes, *PPROM*), the remainder **medically indicated**. Ascending genital-tract infection, seeded by a **dysbiotic vaginal microbiome** with loss of protective *Lactobacillus*, is now recognised as a major and mechanistically well-defined pathway to spontaneous PTB.

Classification & risk factors

Basis	Categories
Gestational age (WHO)	Extremely preterm <28 wk; very preterm 28–<32 wk; moderate-to-late preterm 32–<37 wk (late preterm subset 34–36 ⁺ 6 wk)
Mechanism	Spontaneous labour (~45%); PPROM (~25–30%); indicated/iatrogenic (~30%, e.g., pre-eclampsia, fetal growth restriction)
Risk factors	Prior spontaneous PTB (strongest predictor); short cervix on TVS; uterine anomaly/fibroid/cervical surgery; bacterial vaginosis (BV)/vaginal dysbiosis , UTI, periodontal disease; multifetal gestation, polyhydramnios; low BMI, short interpregnancy interval, smoking, psychosocial stress

Vaginal microbiome and pathogenesis of spontaneous preterm birth

- ▶ The vagina normally hosts a **low-diversity, Lactobacillus-dominated community**; diversity falls further and the community stabilises further in normal pregnancy (Stout et al., 2017).
- ▶ **Community state types (CSTs)**, defined by 16S rRNA sequencing (Ravel et al., 2011): CST I (**Lactobacillus crispatus-dominant*) shows the lowest PTB risk* — the most reproducible microbiome finding in PTB research (Bayar et al., 2020).
- ▶ **Dysbiosis** — depleted *Lactobacillus*, higher diversity, overgrowth of **Gardnerella vaginalis, Ureaplasma urealyticum, Mycoplasma** species — is variably associated with increased PTB risk (Donders et al., 2009; Nelson et al., 2014).
- ▶ **Mechanism (ascending-infection cascade)**: dysbiotic organisms ascend the cervical canal (contiguous with the lower fetal membrane–decidual junction) → colonise cervix/decidua/membranes → activate **Toll-like receptors (TLRs)** → release IL-1 β , IL-6, IL-8, TNF- α → cytokines drive **prostaglandin E2 (PGE2)** synthesis (cervical ripening + myometrial contractions) and **matrix metalloproteinase (MMP)** activation (membrane collagen breakdown) → **spontaneous preterm labour and/or PPROM**.
- ▶ Amniotic fluid cultures are positive in $\sim\frac{1}{3}$ of PPROM cases (Goncalves, 2002); "sterile intra-amniotic inflammation" (no recoverable organism) also causes PTB, so dysbiosis is one of several converging triggers, not the sole cause. The **placenta itself has no clinically relevant resident microbiome** (de Goffau et al., 2019, refuting Aagaard, 2014).

Diagnosis and screening

Test	Purpose/finding
Transvaginal cervical length (universal screen 18–24 wk, or after 16 wk if high-risk)	Short cervix <25 mm predicts spontaneous PTB
Fetal fibronectin (fFN)	Marker of choriodecidual disruption; valued for high negative predictive value , symptomatic women 24–34 wk
Vaginal pH/wet mount, Amsel/Nugent criteria	Diagnoses bacterial vaginosis/dysbiosis
Tocodynamometry + digital cervical exam	Contraction frequency + cervical dilatation/effacement
Amniocentesis (selected cases)	Subclinical intra-amniotic infection (Gram stain, glucose, IL-6)

Clinical features of preterm labour

- ▶ Regular contractions ($\geq 4/20$ min or $\geq 8/60$ min) with progressive cervical dilatation/effacement.
- ▶ Pelvic pressure, low backache, menstrual-like cramps.
- ▶ Increased/altered (watery/blood-tinged) vaginal discharge.

- ▶ With PPROM — sudden gush or continuous leak of fluid per vaginum.

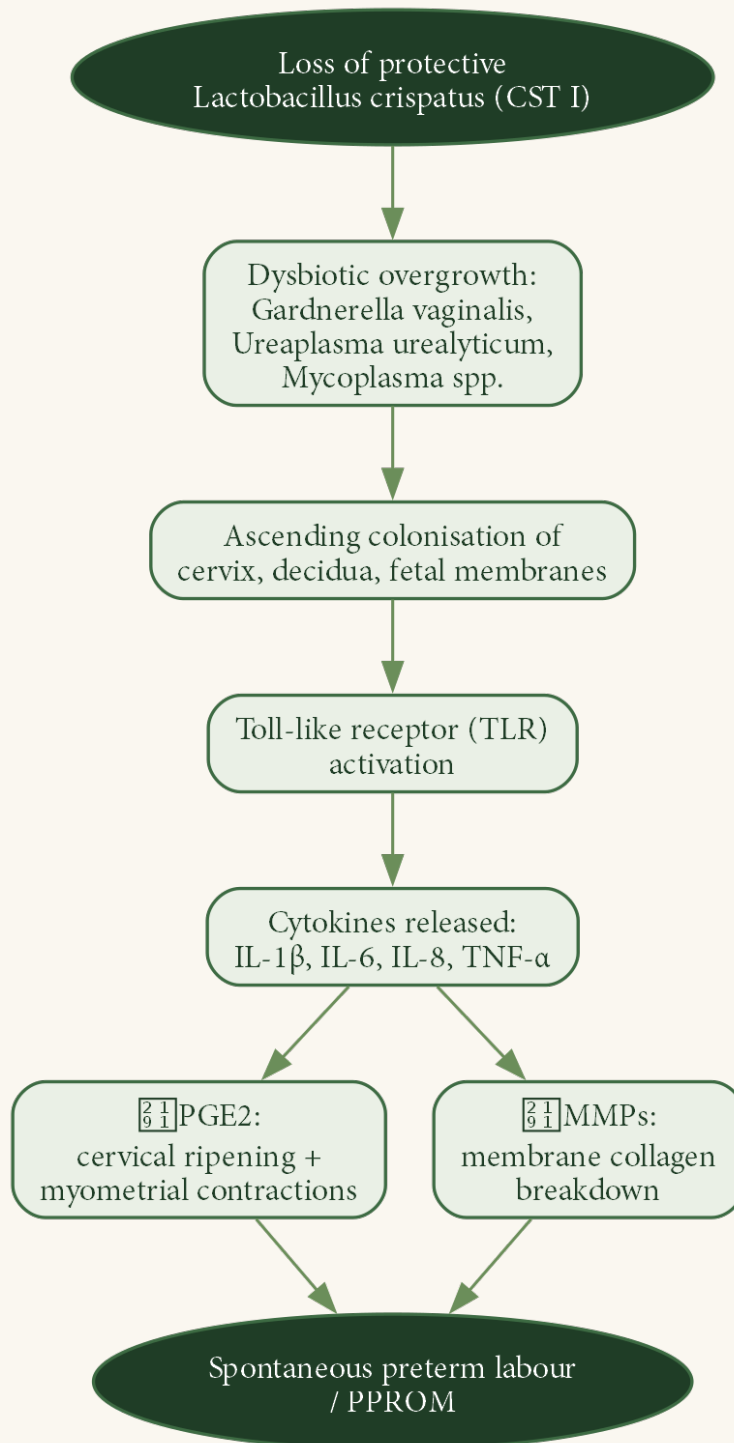
Management — prevention in the at-risk woman

Intervention	Regimen/indication
Vaginal progesterone	90 mg gel (or 200 mg micronised suppository) daily, 16–36 wk; singleton with short cervix ≤ 25 mm ($\pm$ prior PTB)
17 α -hydroxyprogesterone caproate (17-OHPC)	250 mg IM weekly, 16–36 wk; singleton with prior spontaneous PTB — efficacy not confirmed on the confirmatory PROLONG trial; US FDA required market withdrawal (2023)
Cervical cerclage (McDonald)	Prior spontaneous PTB plus cervical length < 25 mm before 24 wk; also for classic painless cervical insufficiency and emergency "rescue" cerclage
Cervical pessary	Adjunct/alternative in short cervix; trial evidence inconsistent
Treat asymptomatic bacteriuria; targeted (not universal) BV screening/treatment in high-risk women	Reduces ascending-infection risk in selected populations

Management — acute preterm labour / PPROM

- ▶ Confirm diagnosis: contractions + cervical change on TVS/exam $\pm$ fFN.
- ▶ **Antenatal corticosteroids** — single course 24–34 wk (consider at 23 wk with parental counselling; consider repeating single course 34–36⁺⁶ wk): **betamethasone 12 mg IM $\times$ 2 doses, 24 h apart**, OR **dexamethasone 6 mg IM q12h $\times$ 4 doses**.
- ▶ **Short-term tocolysis** (< 48 h, up to ~ 33 –34 wk): **nifedipine** (preferred — safer/more effective than β -agonists) or **indomethacin** (only < 32 wk, ≤ 48 h — oligohydramnios/ductal-constriction risk). **Atosiban** not FDA-approved in the US. **MgSO₄ is not an effective tocolytic** and must not combine with nifedipine (neuromuscular blockade).
- ▶ **MgSO₄ for fetal neuroprotection**, < 32 wk with imminent delivery: **6 g IV bolus/20–30 min, then 2 g/hr** (BEAM protocol) — distinct from the eclampsia-prophylaxis regimen.
- ▶ **Intrapartum GBS prophylaxis** if status unknown/positive.
- ▶ **PPROM latency antibiotics**: IV **ampicillin + erythromycin q6h $\times$ 48 h**, then oral **amoxicillin + erythromycin q8h $\times$ 5 days** (azithromycin may replace erythromycin). Not given for preterm labour with intact membranes.
- ▶ Deliver for chorioamnionitis, non-reassuring fetal status, or ≥ 34 wk; no routine episiotomy/forceps.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Ascending-infection cascade from vaginal dysbiosis (loss of *Lactobacillus crispatus*) through TLR-mediated cytokine release to the convergent PGE2/MMP pathways driving spontaneous preterm labour or PPROM.

Recent advances [RA]

- ▶ **Metagenomic CST profiling** (Fettweis et al., 2019, *Nat Med* 25:1012; building on Ravel et al., 2011): confirms CST I (*L. crispatus*-dominant) as lowest-risk and CST IV (diverse, low-*Lactobacillus*) as highest-risk for spontaneous PTB.
- ▶ Multi-omic work shows the **host immune/inflammatory response**, not microbiome composition alone, may be the stronger PTB determinant in some cohorts (Elovitz et al., 2019) — reframing dysbiosis as one contributor within a host–microbe interaction model.
- ▶ **Live-biotherapeutic/probiotic Lactobacillus supplementation** to restore a protective CST is being trialled; no study has yet proven a reduction in PTB rates.
- ▶ **WHO ACTION-I trial** (Oladapo et al., *NEJM* 2020): antenatal dexamethasone in low-resource settings, 24–33⁺⁶ wk, cut neonatal mortality without raising maternal infection — basis for expanded WHO low-resource corticosteroid guidance.
- ▶ **17-OHPC (Makena) withdrawn from the US market (2023)** after the confirmatory PROLONG trial failed to replicate benefit, shifting practice toward **vaginal progesterone** in short-cervix cohorts.
- ▶ Cervicovaginal biomarker panels (fFN, IL-6, PAMG-1) combined with **machine-learning risk models** are being studied to individualise PTB risk stratification.

High-yield exam pointers

- ▶ WHO definition: birth <37 **completed weeks**; ~70% spontaneous, ~30% indicated.
- ▶ Short-cervix cut-off: <25 **mm** on TVS at/after 16 weeks.
- ▶ Protective: **Lactobacillus crispatus (CST I). Dysbiotic: Gardnerella vaginalis, Ureaplasma urealyticum, Mycoplasma hominis**.
- ▶ Cascade: dysbiosis → ascending infection → TLR activation → IL-1 β /6/8, TNF- α → PGE2 + MMPs → cervical ripening/membrane rupture.
- ▶ Doses: vaginal progesterone **90 mg gel daily**; 17-OHPC **250 mg IM weekly** (withdrawn, FDA 2023); betamethasone **12 mg IM $\times$ 2 @24 h** or dexamethasone **6 mg IM $\times$ 4 @12 h**; MgSO₄ neuroprotection **6 g bolus + 2 g/hr** (<32 wk, distinct from eclampsia dosing).
- ▶ PPRM antibiotics: IV **ampicillin + erythromycin $\times$ 48 h** → oral **amoxicillin + erythromycin $\times$ 5 days**.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Obstetrics states *routine* tocolytic/progesterone/cerclage use has no proven benefit; this does not conflict with current ACOG/Williams guidance, which also rejects *universal* use but recommends these interventions in the specific high-risk subgroups above (short cervix, prior spontaneous PTB).

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; American College of Obstetricians and Gynecologists (2020 guidance on corticosteroids/tocolysis/PPROM, as cited in Williams 26e); WHO ACTION-I trial (Oladapo et al., *NEJM* 2020); Ravel et al. (2011, *PNAS*) and Fettweis et al. (2019, *Nat Med*) on the vaginal microbiome. Coverage note: this topic's assigned specialty books (Berek & Novak 16e, DC Dutta's Gynaecology 7e) carry minimal direct microbiome/PTB content; grounding drawn primarily from Williams Obstetrics 26e.



Prophylactic oophorectomy

Asked in: Paper III 02-Aug-2021 · Paper III Nov 2018 · Paper IV May 2015 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — Prophylactic (risk-reducing) oophorectomy is the elective bilateral removal of grossly normal ovaries — usually together with the fallopian tubes as **risk-reducing salpingo-oophorectomy (RRSO)** — in a woman who has no ovarian disease, performed either incidentally at hysterectomy for benign disease or specifically to reduce a hereditary risk of ovarian and breast cancer (**BRCA1/BRCA2, Lynch syndrome**).

Indications and risk stratification

Risk group	Lifetime ovarian cancer risk	Recommendation
Average-risk premenopausal woman at hysterectomy for benign disease, ovaries healthy	~1.4%	Ovarian conservation preferred; oophorectomy decided on risk, not route of hysterectomy (ACOG/SGO)
BRCA1 mutation carrier	44% cumulative risk by age 80	RRSO recommended
BRCA2 mutation carrier	17% cumulative risk by age 80	RRSO recommended (later onset)
Lynch syndrome (HNPCC)	Ovarian cancer 10–12%; endometrial cancer risk reduced from ~60% to nil with hysterectomy	Risk-reducing hysterectomy + bilateral salpingo-oophorectomy (BSO) after childbearing
Strong family history, no documented mutation	Individualised	Manage on family history; genetic counselling

Timing of surgery

Group	Recommended age
BRCA1 carrier	35–40 years (highest, earlier-onset risk)
BRCA2 carrier	40–45 years (later-onset cancers, may delay)
Lynch syndrome	After completion of childbearing; discuss by early-to-mid 40s
Fertility not yet completed	Interim transvaginal sonography every 6 months or CA-125 from age 30–35 until RRSO; combined oral contraceptives reduce risk and are recommended before childbearing is attempted

Pre-operative work-up

- ▶ Genetic counselling and confirmatory **BRCA1/BRCA2** or mismatch-repair gene testing before proceeding.
- ▶ Full pedigree analysis (both maternal and paternal lines) — autosomal dominant inheritance.
- ▶ Counsel on the alternative of **bilateral salpingectomy with delayed oophorectomy** — removes the fallopian tube (site of origin of most "ovarian" high-grade serous cancers) while deferring surgical menopause in a premenopausal woman awaiting definitive RRSO.
- ▶ Discuss concurrent **risk-reducing mastectomy** counselling for BRCA carriers (breast cancer risk is also lowered by RRSO).
- ▶ Baseline mammography/breast MRI surveillance status reviewed.

Surgical technique (RRSO)

- ▶ Laparoscopic approach is preferred (near 100% feasibility by laparoscopy/laparotomy; vaginal route less reliable for adnexa).
- ▶ Thorough visual inspection of the entire peritoneal cavity; **peritoneal washings** taken for cytology before any dissection.
- ▶ The **entire fallopian tube**, including the fimbrial end, is removed with the ovary — no tubal or ovarian tissue left behind.
- ▶ The **infundibulopelvic (suspensory) ligament** is identified, the ureter traced and separated from it, then the ligament is coagulated and transected (see figure) — division close to the pelvic sidewall ensures complete ovarian vessel removal.
- ▶ The utero-ovarian ligament and mesovarium are similarly divided if the uterus is retained.
- ▶ Specimen sent for **complete serial sectioning** of both ovary and tube with careful microscopic examination to detect an occult (already-invasive) malignancy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 24.5 — Salpingo-oophorectomy. After removal of the uterine corpus, there is unobstructed access to the adnexal structures; the infundibulopelvic ligament is identified and separated from the ureter before coagulation and transection (Te Linde's Operative Gynecology 13e, p.1302)

Effects, limitations and hormone replacement

Issue	Detail
Residual cancer risk	Peritoneal (primary peritoneal) carcinoma can still occur in 2–3% even after complete BSO, as the whole peritoneum shares the same coelomic origin — RRSO reduces but never eliminates risk
Surgical menopause	Abrupt hypo-estrogenism — vasomotor symptoms, accelerated bone loss, and (if performed before ~50–55 years without hormone replacement) increased cardiovascular mortality; a Markov model showed ~8.6% excess mortality by age 80 when BSO is done before 55 in average-risk women
Survival benefit	No overall survival benefit from prophylactic BSO in average-risk premenopausal women — hence the emphasis on ovarian conservation at benign hysterectomy in this group
Breast cancer risk	RRSO also lowers breast cancer risk in BRCA carriers, in addition to its ovarian-cancer risk reduction
Hormone replacement therapy (HRT)	Recommended until the natural age of menopause in women without a personal history of breast cancer, to offset vasomotor and bone/cardiovascular effects; a standard regimen is intramuscular estradiol valerate (Progynon Depot) 10 mg every 4 weeks as prophylaxis against post-oophorectomy menopausal symptoms in a premenopausal woman after hysterectomy with BSO

High-yield exam pointers

- ▶ BRCA1 → RRSO at 35–40 years; BRCA2 → 40–45 years (BRCA2 cancers occur later).
- ▶ Lifetime ovarian cancer risk: population 1.4%; BRCA1 44%; BRCA2 17%; Lynch syndrome 10–12%.
- ▶ Even after complete RRSO, 2–3% **residual peritoneal carcinoma risk** — counsel patients this is risk-reduction, not elimination.
- ▶ Screening (transvaginal ultrasound 6-monthly + CA-125) from age 30–35 is only a bridging strategy until definitive RRSO — it does NOT reduce mortality.

- ▶ Alternative for the premenopausal high-risk woman not ready for oophorectomy: **bilateral salpingectomy with delayed oophorectomy**.
- ▶ Complete peritoneal washings + serial sectioning of the entire ovary and fallopian tube is mandatory at RRSO to detect occult malignancy.
- ▶ HRT is advised until the natural age of menopause in non-breast-cancer patients undergoing surgical menopause.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Dutta's Gynaecology text abbreviates the sponsoring bodies as "RANCOG, SOG"; the substantive recommendations (BSO after completed childbearing in BRCA carriers, salpingectomy-with-delayed-oophorectomy as an alternative) match the current ACOG Practice Bulletin No. 182 used above, so both sources are cited together.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Te Linde's Operative Gynecology 13e (Fig 24.5); American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin No. 182.



Pruritus vulvae

Asked in: Paper III May 2019 · Paper III May 2010 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Pruritus is the sensation of itching; when confined to the vulva it is called **pruritus vulvae**. It must not be confused with pain, and about 10% of women attending a gynaecology clinic present with this complaint. Pruritus vulvae is not a disease in itself but a symptom of an underlying local or systemic pathology, and the underlying cause must always be sought.

Mechanism of the itch-scratch cycle

- ▶ Special sensory nerve endings in the vulvar skin transmit the itch stimulus.
- ▶ Underlying vascular instability (strongly influenced by emotional state) releases histamine-like mediators that induce itching.
- ▶ Scratching damages the epithelium, which perpetuates further itching — the **itch-scratch cycle**.
- ▶ Symptoms characteristically worsen at night because of: absence of daytime distraction, a tired central nervous system, and local warmth with poor aeration under bedclothes.

Etiology (causes)

Category	Causes
Vaginal discharge (commonest cause)	<i>Trichomonas vaginalis</i> , <i>Candida albicans</i> , or mixed infection
Vulvar infections	Fungal — <i>Candida</i> ; Viral — herpes genitalis, genital warts (HPV); Parasitic — threadworm (esp. in children), scabies, pediculosis pubis; STIs — gonorrhoea, trichomoniasis
Allergy / contact dermatitis	Nylon undergarments, certain soaps/detergents, bubble bath, shampoos, chemical contraceptives, condoms
Non-neoplastic epithelial disorders	Squamous cell hyperplasia (lichen simplex chronicus), lichen sclerosus
Neoplastic epithelial disorders	Vulvar intraepithelial neoplasia (VIN), Paget's disease of the vulva, invasive carcinoma of the vulva
Local skin disease (generalized dermatoses involving vulva)	Psoriasis, seborrheic dermatitis, intertrigo
Systemic — medical disorders	Diabetes mellitus (glycosuria causes a "raw-beef" skin change and favours <i>Candida</i> growth), thyroid disorders, chronic liver disease
Deficiency states	Iron, folic acid, vitamin B12, vitamin A deficiency
Psychosomatic	Mental anxiety or sexual frustration — diagnosis of exclusion once organic causes are ruled out
Postmenopausal atrophic changes	Oestrogen-deficient atrophic vulvovaginitis

Clinical evaluation and investigations

Step	Detail
History	Age of onset, intensity and duration of itching, associated vaginal discharge, contraceptive practice, relation to psychological upset, allergy to nylon/soap/detergent
General/systemic examination	Screen for diabetes mellitus, thyroid disease, liver disease, haematological disease
Local examination	Extent and morphology of the vulvar lesion; look for excoriation, pigmentation, ulceration, or a discrete plaque
Wet mount / KOH mount of discharge or vulvar scraping	Detects <i>Candida</i> (pseudohyphae) or <i>T. vaginalis</i> (motile flagellates)

Step	Detail
Urine analysis	Sugar, protein, pus cells
Blood investigations	Complete blood count, post-prandial blood glucose, thyroid profile, liver and renal function tests; further haematological work-up if polycythaemia/leukaemia suspected
Stool examination	Ova, parasites, cysts (threadworm)
Vulvar biopsy (random or colposcopy-directed)	Mandatory in long-standing disease (>1 year), especially with a vulvar epithelial lesion, to characterise the skin change and exclude malignancy

Management

► General measures

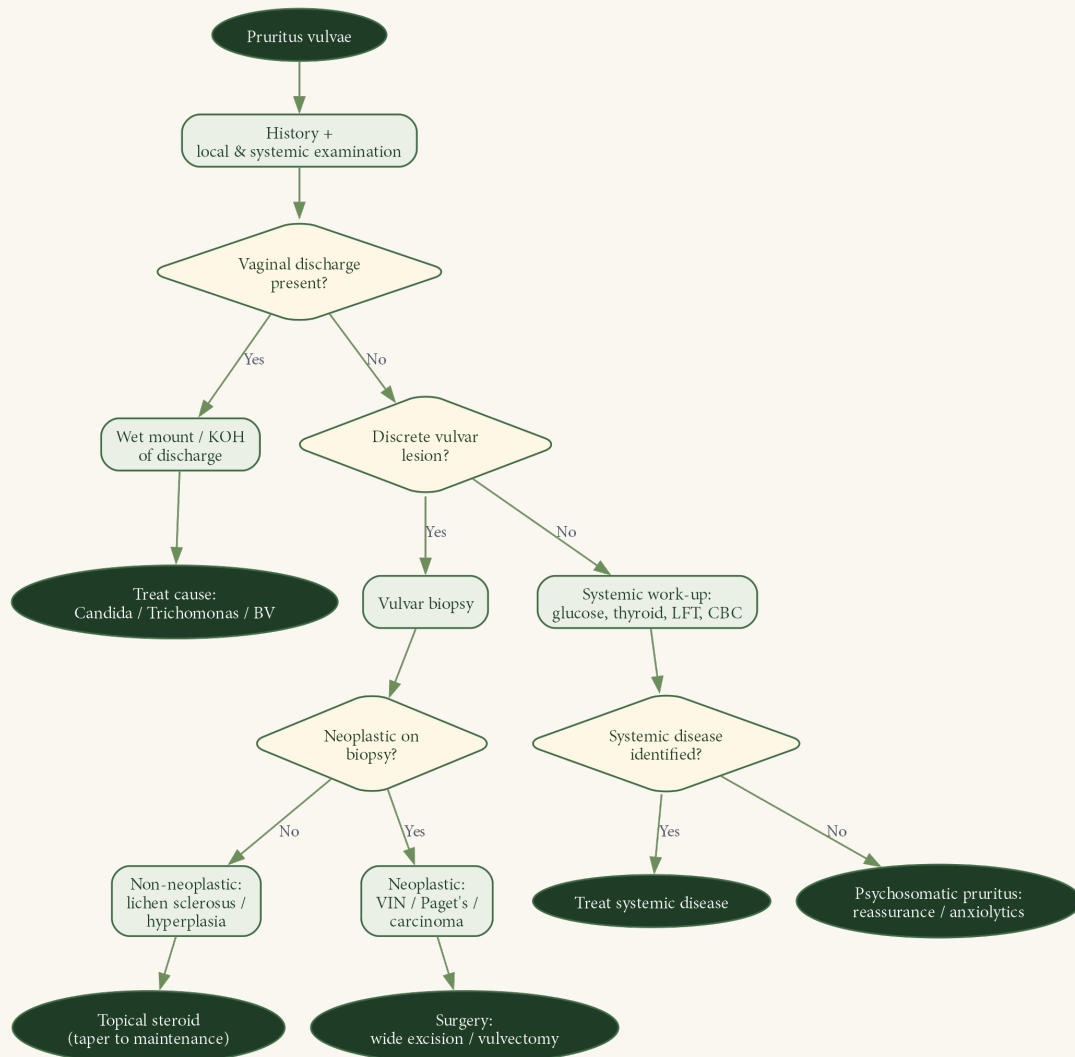
- Meticulous local hygiene; loose-fitting cotton undergarments to keep the area aerated.
- Avoid irritants — nylon clothing, scented soaps/detergents, bubble baths, spermicides.
- Break the itch-scratch cycle: night-time sedative antihistamines, and short-term local application of a topical antibiotic or **clobetasol propionate 0.05% ointment**; if the skin is atrophic, an oestrogen or testosterone cream helps.

► Treat the specific cause

- *Candida*: topical clotrimazole or a single oral dose of fluconazole 150 mg.
- *Trichomonas vaginalis* / bacterial vaginosis: metronidazole 400–500 mg twice daily for 7 days (treat the partner for trichomoniasis).
- Threadworm: single-dose albendazole 400 mg, with treatment of household contacts.
- Scabies/pediculosis: topical permethrin 5%.
- **Lichen sclerosus**: an ultrapotent topical steroid, **clobetasol propionate 0.05%** applied once daily, is the current standard — about 96% of patients respond; therapy is then graduated down from ultrapotent to medium- and low-potency steroids for maintenance. Topical calcineurin inhibitors (tacrolimus/pimecrolimus) are second-line if steroids fail.
- Squamous cell hyperplasia/lichen simplex chronicus: medium-potency topical corticosteroid.
- Atrophic (postmenopausal) vulvovaginitis: local oestrogen cream.
- Systemic disease: optimise glycaemic control in diabetes, correct thyroid dysfunction, manage liver disease; replace iron/folate/B12/vitamin A if deficient.
- Psychosomatic pruritus: reassurance, anxiolytics, and counselling once organic causes are excluded.

- **Surgery** — reserved for cases where biopsy confirms VIN or invasive carcinoma, managed by wide local excision/vulvectomy as per the histological stage.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision flowchart for evaluating pruritus vulvae: history/examination branches into vaginal discharge workup, vulvar lesion biopsy, systemic disease workup, and psychosomatic diagnosis of exclusion.

High-yield exam pointers

- Pruritus vulvae ≈ 10% of gynaecology OPD attendees; it is a **symptom**, not a diagnosis — always seek the underlying cause.
- Commonest single cause: vaginal discharge due to *Candida albicans* or *Trichomonas vaginalis*.
- Itch-scratch cycle worse at night — no distraction, tired CNS, local warmth/poor aeration.

- ▶ Diabetes mellitus classically gives a "raw-beef" vulvar skin change and predisposes to candidal overgrowth.
- ▶ Biopsy is mandatory if the lesion has persisted >1 year — to exclude VIN, lichen sclerosus-associated change, or invasive carcinoma.
- ▶ Lichen sclerosus treatment = **clobetasol propionate 0.05%** (ultrapotent topical steroid), ~96% response, then taper to maintenance.
- ▶ Deficiency states to remember: iron, folic acid, vitamin B12, vitamin A.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's text names only "clobetasol propionate 0.05% ointment" for symptomatic relief without detailing the regimen; the once-daily-then-taper schedule and the ~96% response figure above are drawn from Berek & Novak's Gynecology 16e, which reflects current dermatological practice for lichen sclerosus.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Recent trends in management of Fibroid uterus

Asked in: Paper III Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Uterine fibroids (leiomyomas) are benign, monoclonal smooth-muscle tumours of the myometrium and the commonest pelvic tumour in reproductive-age women. Management has shifted away from hysterectomy as the default toward individualised, fertility-preserving, minimally invasive care, guided by the FIGO leiomyoma sub-classification (submucous types 0/1/2, intramural, subserous,

transmural), symptom type, and fertility wish, per the American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin No. 228 (2021).

Recent trends in medical management

Drug class	Agent & regimen	Mechanism / effect	Recent evidence & limitation
Oral gonadotropin-releasing hormone (GnRH) antagonist + "add-back" combination	Relugolix 40 mg + estradiol 1 mg + norethindrone acetate 0.5 mg, once daily, orally, up to 24 months (elagolix-based regimens similar)	Immediate competitive blockade of the pituitary GnRH receptor — no initial flare; built-in low-dose estrogen/progestin add-back limits hypoestrogenic bone loss	LIBERTY trials (Al-Hendy et al., <i>N Engl J Med</i> 2021) showed significant reduction in menstrual blood loss, outcomes comparable to monthly depot leuprolide; approved for heavy menstrual bleeding due to fibroids
Selective progesterone receptor modulator (SPRM)	Ulipristal acetate 5–10 mg PO once daily, given as repeated 12-week courses (up to 4 courses)	Antagonises progesterone signalling, reduces extracellular-matrix turnover in the myoma	Amenorrhea in ≥70%, ~80% women had >25% volume reduction by the 4th course; restricted by the European Medicines Agency (2020) after reports of rare serious liver injury — now second-line only, with mandatory liver-function monitoring
Progestin-releasing intrauterine device	Levonorgestrel-releasing intrauterine system (LNG-IUS)	Endometrial suppression	Reduces menstrual blood loss, raises haemoglobin/ferritin, but does not shrink fibroid volume; avoid if cavity length >12 weeks or cavity-distorting fibroid; higher expulsion (15.4%) with fibroids >3 cm
Antifibrinolytic	Tranexamic acid, oral, during menses	Reduces fibrinolysis at the endometrial surface	Variable response in fibroid-related bleeding; avoid with prior thromboembolism

Drug class	Agent & regimen	Mechanism / effect	Recent evidence & limitation
GnRH agonist	Leuprolide/goserelin depot, 3–4 months pre-operatively, with add-back	Pituitary down-regulation → hypo-oestrogenic amenorrhoea, shrinks fibroid and corrects anaemia	Used chiefly as a short pre-operative bridge (facilitates a transverse rather than vertical incision, corrects anaemia) — rapid symptom/size rebound on stopping, so not for long-term primary therapy

Medical therapy is now positioned as either a **bridge to surgery/menopause** or **definitive long-term treatment** in women unfit for or declining surgery, replacing the older "GnRH agonist-only" pre-operative model.

Recent trends in minimally invasive, non-surgical management

Procedure	Technique	Outcomes	Key limitation
Uterine artery embolization (UAE)	Polyvinyl alcohol/gelatin microsphere occlusion of both uterine arteries via percutaneous femoral catheterization → coagulative necrosis	Symptom relief 75–80%, uterine volume reduction 30–45%, low transfusion need; quality-of-life outcomes at long-term follow-up comparable to hysterectomy in good responders	Reintervention rate 17–31% (higher than myomectomy); post-embolization syndrome (pain, fever, myometrial infarction); not recommended if future fertility is desired
Magnetic resonance-guided focused ultrasound (MRgFUS/HIFU)	Thermal coagulative ablation of myoma under real-time MR guidance, non-invasive	Volume reduction ~37–40% (similar to UAE); approved for women desiring future fertility	Not suitable if fibroid >10 cm, >4 myomas, poor vascularity, abdominal-wall scarring, or bowel/bladder interposed; reintervention as high as 54% by 5 years
Radiofrequency ablation (laparoscopic ultrasound-guided or transcervical)	Heat delivered directly into the myoma via a radiofrequency handpiece → coagulative necrosis	Sustained improvement in quality-of-life scores to 36 months; ~11% needed re-treatment over 3 years	Limited fertility/pregnancy outcome data; larger trials still awaited

Recent trends in surgical management

- ▶ **Laparoscopic/robot-assisted myomectomy** — now the preferred route for accessible intramural/subserous myomas; robotic assistance broadens the range of myomas amenable to a minimally invasive approach (larger, deeper, or multiple fibroids) with the same operative principles as conventional laparoscopy, and gives faster recovery, less analgesic need, and quicker return to function than laparotomy.
- ▶ **Hysteroscopic myomectomy for submucous fibroids**, graded by the FIGO/PALM-COEIN **submucous sub-classification** — type 0 (entirely intracavitary), type 1 ($\geq 50\%$ intracavitary), type 2 ($< 50\%$ intracavitary, predominantly intramural) — which predicts single-stage resectability; types 0/1 up to 5 cm are readily resected, type 2 needs pre-operative sonohysterography/MRI to gauge residual myometrium and perforation risk.
- ▶ **Hysteroscopic Tissue Removal (HTR) systems** — newer mechanical intrauterine morcellators used under continuous saline irrigation, an alternative to the resectoscopic cutting loop, with comparable complete-resection rates and no added fluid-overload risk within a 2500 mL deficit limit.
- ▶ **Contained ("in-bag") morcellation** — after the **US FDA safety communications of 2014 and 2017** discouraging uncontained power morcellation because of the risk of disseminating an occult leiomyosarcoma (found in roughly 1 in 495–1100 women operated for presumed fibroids), specimens are now morcellated inside a tear-resistant bag within the abdomen before extraction; open myomectomy/laparotomy is preferred whenever pre-operative imaging (irregular vascular mass with necrotic areas, arterial-phase gadolinium enhancement) raises suspicion of sarcoma.
- ▶ **Peri-operative blood-loss reduction bundle** — intravenous tranexamic acid, dilute intramyometrial vasopressin, a pericervical tourniquet, and cell-saver use are now combined (Delphi consensus) rather than relying on a single measure; a single 400 microgram dose of misoprostol given within 60 minutes before incision (any route) also reduces blood loss and transfusion need.
- ▶ **Pre-operative anaemia correction** — intravenous iron (effective within days) or, for refractory cases, erythropoietin, is now favoured over prolonged oral iron, which needs months and has poor compliance.
- ▶ **Route selection for hysterectomy** remains individualised — vaginal/laparoscopic routes are preferred where uterine size permits; hysterectomy is reserved for women who have completed childbearing, as it gives definitive symptom control with no recurrence, unlike myomectomy (reintervention $\geq 15\%$, subsequent hysterectomy $\sim 11\%$).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 11.2 — FIGO leiomyoma classification system. (Berek & Novak 16e, p.547)

High-yield exam pointers

- ▶ Relugolix 40 mg + estradiol 1 mg + norethindrone acetate 0.5 mg OD, up to 24 months — LIBERTY trial, *NEJM* 2021.
- ▶ Ulipristal acetate 5–10 mg OD, 12-week courses (max 4) — EMA-restricted (2020) for hepatotoxicity.
- ▶ FDA 2014 & 2017: contained/in-bag morcellation mandatory; uncontained power morcellation risks disseminating occult leiomyosarcoma.
- ▶ FIGO submucous classes 0/1/2 — decides single-stage hysteroscopic resectability.
- ▶ UAE reintervention 17–31%; MRgFUS reintervention up to 54% by 5 years — both non-fertility-sparing-preferred, UAE contraindicated if fertility desired.
- ▶ Misoprostol 400 µg, any route, within 60 minutes pre-incision — reduces myomectomy blood loss.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e predates the 2021 US Food and Drug Administration approval of the relugolix combination regimen and the 2020 European Medicines Agency restriction on long-term ulipristal acetate; the current standard follows ACOG Practice Bulletin No. 228 (2021) and the trial evidence cited above.

SOURCE & COVERAGE

Te Linde's Operative Gynecology 13e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; ACOG Practice Bulletin No. 228 (2021) "Management of Symptomatic Uterine Leiomyomas"; US FDA safety communications on power morcellation (2014, 2017); LIBERTY trial (Al-Hendy et al., *N Engl J Med* 2021;384:630–642).

♦ ♦ ♦

Role of gynecologists in prevention of osteoporosis

Asked in: Paper III 18-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Osteoporosis is a skeletal disorder characterised by low bone mass and microarchitectural deterioration of bone tissue, leading to increased bone fragility and fracture risk, with a normal bone mineral-to-matrix ratio (unlike osteomalacia). It follows accelerated bone loss (3–5%/year) after the postmenopausal fall in oestrogen, which normally inhibits osteoclastic resorption. The gynecologist, as

the primary physician for most peri- and postmenopausal women, is uniquely placed to identify risk, screen, counsel, and initiate preventive therapy before the first fragility fracture occurs.

1. Identifying women at risk

Bone mineral density (BMD) is measured by **dual-energy X-ray absorptiometry (DEXA)** of hip and spine and reported as a **T-score** (SD from young-adult peak bone mass):

T-score	Category
≥ -1.0	Normal
-1.0 to -2.5	Osteopenia
≤ -2.5	Osteoporosis

Risk category	Factors
Non-modifiable	Age, race (White/Asian), small body frame, early menopause (natural or surgical/radiation-induced), prior adult fracture, family history of osteoporosis
Modifiable	Inadequate calcium/vitamin D intake, smoking, low body weight, excess alcohol, sedentary lifestyle
Associated medical conditions/drugs	Anovulation (excess exercise, eating disorder), hyperthyroidism, hyperparathyroidism, chronic renal disease, rheumatoid arthritis, long-term corticosteroid/heparin/GnRH-analogue/anticonvulsant use

Indications for BMD (DEXA) screening: all women aged ≥ 65 years regardless of risk factors, and younger postmenopausal women with ≥ 1 risk factor other than being White and menopausal. The **fracture risk assessment tool (FRAX)**, a WHO online tool, estimates the 10-year probability of a major osteoporotic fracture and helps decide on treatment in women with osteopenia (T-score -1 to -2.5) — drug therapy is cost-effective when FRAX predicts a $\geq 3\%$ 10-year hip fracture risk or $\geq 20\%$ risk of any major osteoporotic fracture. Before starting treatment, secondary causes should be excluded (complete blood count, comprehensive metabolic panel, thyroid-stimulating hormone, parathyroid hormone, 25-OH vitamin D, 24-hour urinary calcium).

2. Counselling and lifestyle measures (primary prevention — every woman)

- **Counselling** every woman at the perimenopause about bone loss, so lifestyle change starts before fractures occur.
- **Dietary calcium** 1,200–1,500 mg/day (diet preferred over supplements).

- ▶ **Vitamin D** 800–1,000 IU/day (up to 1,500–2,000 IU/day when replacing deficiency) with sunlight exposure.
- ▶ **Regular weight-bearing and muscle-strengthening exercise** — improves balance and strength and reduces fall/fracture risk.
- ▶ **Smoking cessation and limiting alcohol intake.**
- ▶ **Avoid/limit drugs** that cause bone loss (systemic corticosteroids) and CNS depressants.
- ▶ **Fall-prevention/home safety measures** — grab bars in bathrooms, carpeted stairs, night lights, vision correction.

3. Pharmacological prevention

Indicated for osteoporosis (T-score ≤ -2.5), prior hip/vertebral fragility fracture, or osteopenia with high FRAX-predicted fracture risk.

Drug class	Agent and dose	Notes
Hormone therapy (HT)	Estrogen or estrogen–progestin therapy	FDA-approved for osteoporosis prevention; the WHI trial showed a 34% reduction in hip fractures with conjugated estrogen (CE) 0.625 mg/day; even low-dose CE 0.3 mg/day or transdermal estradiol 0.014 mg/day increases BMD with calcium/vitamin D. Best suited when vasomotor symptoms also need treatment; add progestogen if uterus intact
Tissue-selective estrogen complex	Bazedoxifene 20 mg + conjugated estrogen 0.45 mg, once daily	Approved for prevention in women with a uterus and vasomotor symptoms
Selective estrogen-receptor modulator (SERM)	Raloxifene 60 mg/day oral	Prevents vertebral fractures, does not reduce non-vertebral fracture risk; also reduces invasive breast cancer risk; avoid if high venous thromboembolism/stroke risk
Bisphosphonates	Alendronate 35 mg (prevention)/70 mg (treatment) weekly; Risedronate 35 mg/week or 150 mg/month; Ibandronate 150 mg/month oral or 3 mg IV every 3 months; Zoledronic acid 5 mg IV once yearly	First-line antiresorptive; take on an empty stomach with a full glass of water, remain upright ≥ 30 min, nothing orally for 30 min; normal creatinine clearance required; side effects — GI irritation, rare osteonecrosis of jaw/atypical femoral fracture; "drug holiday" after 3–5 years is reasonable

Drug class	Agent and dose	Notes
RANK-ligand inhibitor	Denosumab 60 mg subcutaneous every 6 months	Monoclonal antibody; rapid bone loss on stopping — must transition to an alternative agent
Anabolic (PTH analogues)	Teriparatide 20 µg/day SC; Abaloparatide 80 µg/day SC	Stimulate new bone formation; used 18–24 months; must follow with an antiresorptive agent to maintain gains
Calcitonin	Nasal spray 200 IU/day (or SC ~100 IU/day)	Weak antiresorptive, reserved for women who cannot tolerate other agents

4. Monitoring and follow-up

- ▶ Repeat DEXA every 1–2 years to assess response and guide continuation/switch of therapy.
- ▶ Reinforce calcium, vitamin D, exercise, and fall-prevention counselling at every visit.
- ▶ Watch for treatment-specific adverse effects (jaw pain/dental issues on bisphosphonates, breakthrough bleeding on HT).
- ▶ Refer to endocrinology/orthopaedics for secondary osteoporosis, treatment failure (continued fracture/bone loss on therapy), or need for anabolic agents.
- ▶ In **premature/early menopause** (natural or after bilateral oophorectomy, radiation, or chemotherapy), the gynecologist should offer HT for bone protection at least until the average age of natural menopause, unless contraindicated.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 17.18 — Normal (A) and osteoporotic (B) bone architecture (Speroff 9e, p.1701)

High-yield exam pointers

- ▶ T-score cut-offs: Normal ≥ -1.0 ; Osteopenia -1.0 to -2.5 ; Osteoporosis ≤ -2.5 (WHO/DEXA criteria).
- ▶ DEXA screening: all women ≥ 65 years, or younger postmenopausal women with ≥ 1 risk factor.
- ▶ FRAX treatment threshold: $\geq 3\%$ 10-year hip fracture risk or $\geq 20\%$ risk of any major osteoporotic fracture.
- ▶ Calcium 1,200 mg/day + vitamin D 800–1,000 IU/day + weight-bearing exercise = the non-negotiable baseline for every woman.
- ▶ First-line drug doses to write verbatim: Alendronate 70 mg weekly, Raloxifene 60 mg/day, Denosumab 60 mg SC 6-monthly, Teriparatide 20 µg/day SC.
- ▶ WHI: CE 0.625 mg/day HT $\rightarrow$ 34% reduction in hip fractures.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Some older texts describe the WHO T-score cut-off for normal bone mass as "-1.0 or above" rather than a separate upper range up to +2.5 — both conventions are used interchangeably in the literature and do not change clinical practice.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (FRAX).



Role of intraoperative ultrasonography

Asked in: Paper III Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Intraoperative ultrasonography (IOUS) is the real-time use of an ultrasound transducer — transabdominal, transvaginal, or a sterile-sheathed laparoscopic probe — during a surgical procedure to give the operating surgeon dynamic anatomical information not available from preoperative imaging or from vision/palpation alone. It supplements the surgeon's eyes and hands, particularly where the operative field is a closed cavity (endometrium, myometrium) or where minimal-access surgery limits tactile feedback.

Modalities used in the operating room

Modality	How it is used
Transabdominal (synchronous) ultrasound	Assistant scans the anterior abdominal wall while the primary surgeon operates hysteroscopically or performs uterine evacuation; distension fluid/blood in the endometrial cavity acts as an acoustic window
Transvaginal ultrasound (TVS)	Used to guide oocyte retrieval and embryo transfer, and for early real-time confirmation of intrauterine instrument position
Laparoscopic ultrasound probe (sterile, passed through a port)	Placed directly on the uterine or ovarian serosa, or on the liver surface, to image structures not visible or palpable through the laparoscope
Intraoperative sonography at open laparotomy	Used in open fetal surgery/EXIT (ex utero intrapartum treatment) procedures before the hysterotomy is made

Role in gynaecological surgery

Procedure	Role of intraoperative ultrasonography	Benefit
Operative hysteroscopy — resection of a uterine septum, synechiolysis (Asherman's syndrome), submucous myomectomy, deep endometrial dissection	Simultaneous transabdominal ultrasound outlines the endometrial cavity, myometrium and serosa together, and localises the resecting instrument tip in real time	Prevents uterine perforation in the procedures known to carry the highest perforation risk (Berek & Novak 16e)
"Lost"/embedded intrauterine contraceptive device (IUCD)	Real-time sonography localises the IUCD within the cavity, embedded in the myometrium, or perforated into the peritoneal cavity	If within the cavity, the IUCD is retrieved with forceps under direct abdominal ultrasound guidance (safer and cheaper than radiography); if perforated, ultrasound directs laparoscopic retrieval (Jeffcoate 9e)
Laparoscopic myomectomy / laparoscopic radiofrequency ablation of fibroids	A sterile laparoscopic ultrasound probe is placed on the uterine serosa to map intramural and subserous myomas that are not visible or palpable laparoscopically	Guides the myometrial incision or the ablation electrode/needle placement and confirms complete treatment of all myomas (Berek & Novak 16e; Williams Obstetrics 26e)
Second-/mid-trimester surgical abortion (dilatation and evacuation)	Ultrasound guidance is used throughout the evacuation	Reduces the incidence of uterine perforation — the practice that established this is Darney & Sweet's landmark study of <i>routine</i> intraoperative ultrasonography for second-trimester abortion (cited in Berek & Novak 16e)
Caesarean scar (ectopic) pregnancy	Dilatation and curettage is performed under continuous ultrasound guidance	Confirms complete removal of trophoblastic tissue from the scar niche; reported success $\approx$ 76%, but haemorrhage risk remains $\approx$ 30% and hysterectomy risk $\approx$ 3% even with ultrasound guidance (Berek & Novak 16e)
Laparoscopy for adnexal mass / oncological staging	Laparoscopic ultrasound of the liver surface and retroperitoneum	Detects occult hepatic or nodal deposits not evident on visual laparoscopic inspection, aiding staging decisions

Role in obstetric surgery

Procedure	Role of intraoperative ultrasonography
Open fetal surgery (e.g., myelomeningocele repair)	Intraoperative ultrasound is used at hysterotomy to avoid the placental edge and to verify fetal position before the stapling device is applied
Ex utero intrapartum treatment (EXIT) procedure	Intraoperative sonography confirms the placental margin and fetal position and visualises the vessels at the planned hysterotomy site before incision, preventing placental transection and catastrophic haemorrhage (Williams Obstetrics 26e)
Caesarean section in placenta praevia/suspected morbidly adherent placenta	Real-time scanning helps the surgeon plan the uterine incision away from the placental edge

Advantages

- Provides **real-time, dynamic imaging** that complements static preoperative scans and the limited tactile/visual feedback of minimal-access surgery.
- Directly **reduces major intraoperative complications** — uterine perforation, incomplete resection/evacuation, missed residual myoma or trophoblastic tissue.
- Involves **no ionising radiation**, unlike fluoroscopic alternatives.
- Can be repeated freely through the procedure without additional risk to patient or operator.
- Allows accurate localisation of intramural/embedded pathology (myoma, IUCD) that cannot be seen or felt.

Limitations

- **Operator-dependent** — requires an assistant/radiologist skilled at simultaneous scanning and coordination with the primary surgeon.
- Needs additional equipment (dedicated ultrasound machine, sterile laparoscopic probe) not universally available.
- **Prolongs operating time.**
- Acoustic window may be degraded by bowel gas, obesity, or absent distension fluid in the cavity.
- Even with guidance, complications are reduced but not eliminated (e.g., caesarean scar pregnancy evacuation still carries a substantial haemorrhage rate).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

No dedicated intraoperative-ultrasound theatre figure matched the indexed figure set closely enough to embed. Draw a labelled schematic instead: a supine patient on the operating table with (i) a hysteroscope/resectoscope inserted transcervically into the uterine cavity, (ii) an assistant holding a transabdominal probe over the lower abdomen with the resulting split image showing the endometrial cavity, myometrium and serosa on one side and the intrauterine instrument tip on the other (after Berek & Novak 16e, Fig. 26-51 concept — "simultaneous hysteroscopic and transabdominal ultrasound imaging").

High-yield exam pointers

- ▶ **Berek & Novak Fig. 26-51** — "simultaneous hysteroscopic and transabdominal ultrasound imaging" for high-perforation-risk hysteroscopic procedures (adhesiolysis, deep myoma dissection, septal resection).
- ▶ **Darney & Sweet (1989)** — routine intraoperative ultrasonography during second-trimester dilatation and evacuation reduces uterine perforation.
- ▶ **Caesarean scar pregnancy** numbers to write: ultrasound-guided D&C success $\approx$ 76%, haemorrhage risk $\approx$ 30%, hysterectomy risk $\approx$ 3%.
- ▶ **IUCD**: sonography > plain radiography for a "lost" IUCD; retrieve under abdominal ultrasound guidance with forceps if intracavitary, laparoscopy if perforated.
- ▶ **EXIT procedure** mnemonic: ultrasound maps "placenta + position + vessels" before the hysterotomy is made.
- ▶ Laparoscopic ultrasound probe = the tool that lets the surgeon "feel" with sound what cannot be seen or palpated laparoscopically (intramural myoma, liver surface).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

This topic is not treated as a single named chapter in the standard textbooks; the answer above compiles the scattered intraoperative-ultrasonography applications documented across the gynaecology and obstetrics spines (hysteroscopic surgery, IUCD retrieval, fibroid ablation, second-trimester evacuation, caesarean scar pregnancy, open fetal surgery/EXIT).

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Jeffcoate's Principles of Gynaecology 9e; Williams Obstetrics 26e. Coverage note: DC Dutta's Textbook of Gynaecology 7e supports the IUCD-localisation content but does not otherwise address intraoperative ultrasonography as a discrete topic.



Role of laparoscopy in gynaecology

Asked in: Paper III 30-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Laparoscopy is a minimally invasive endoscopic technique that allows direct visualisation of the peritoneal cavity and pelvic organs through a fiberoptic telescope introduced via a small abdominal-wall incision, after a pneumoperitoneum is created with carbon dioxide. From a purely diagnostic tool it has expanded, with advances in optics, energy sources and instrumentation, into an operative modality covering almost the entire range of gynaecological surgery — minor, moderate and extensive.

Diagnostic role

Category	Uses of laparoscopy
Infertility work-up	Assessment of peritubal adhesions; chromopertubation (tubal patency with dye); detection of minimal/mild endometriosis; confirming the ovulation stigma; pre-reversal-of-sterilisation assessment
Chronic pelvic pain	Identifies endometriosis, pelvic adhesions and other occult pathology when examination/imaging is inconclusive
Pelvic mass	Characterises a mass as fibroid, ovarian cyst or tubo-ovarian in origin; assessment in suspected ovarian malignancy
Acute pelvic conditions	Diagnosis of unruptured/ruptured ectopic pregnancy , acute appendicitis, and acute salpingitis (pelvic inflammatory disease) with collection of pus for culture — diagnostic laparoscopy is regarded as the gold standard for confirming pelvic inflammatory disease (CDC-2006 clinical criteria)
Endometriosis	Gold-standard diagnostic test; permits biopsy, staging of the disease, and recording the extent of adhesions
Müllerian anomalies / amenorrhoea work-up	Combined with hysteroscopy to confirm arcuate, septate, bicornuate uterus or uterus didelphys; evaluation of primary amenorrhoea; in a streak gonad with a Y chromosome, laparoscopy is followed by prophylactic gonadectomy
Follow-up	"Second-look" laparoscopy after pelvic surgery or after medical/surgical treatment of endometriosis, to assess response and adhesion reformation

Timing is tailored to the indication — the **periovulatory period** is preferred for infertility work-up (chromopertubation, confirming ovulation), while the **premenstrual period** is preferred for suspected endometriosis, when ectopic implants are largest and most visible.

Therapeutic (operative) role

Operative laparoscopic procedures are graded by extent of surgery and the operator's competence:

Grade	Procedures
Minor	Tubal sterilisation; adhesiolysis (no bowel involvement); aspiration of a simple ovarian cyst; ovarian biopsy
Moderate	Ectopic pregnancy surgery — salpingostomy, segmental resection, salpingectomy, salpingo-oophorectomy; ablation of endometriosis (diathermy/laser); ovarian drilling for polycystic ovary syndrome; drainage of an endometrioma; ovarian cystectomy; salpingo-ovariolysis
Extensive	Myomectomy; laparoscopic-assisted vaginal hysterectomy (LAVH) and total laparoscopic hysterectomy (TLH); adhesiolysis with bowel involvement; surgery for major/deep endometriosis; retroperitoneal lymphadenectomy; surgery for urinary incontinence; sacrocolpopexy

Laparoscopy prior to vaginal hysterectomy adds value by: (i) diagnosing coexisting pelvic pathology, (ii) adhesiolysis/excision of endometriosis, (iii) freeing the adnexa, (iv) dissecting the bladder off the uterus, and (v) desicating/transecting the uterine artery, converting a difficult vaginal case into a completable one.

Advantages over laparotomy

- ▶ Smaller incisions with magnified visualisation and comparable surgical precision.
- ▶ Reduced intraoperative blood loss and postoperative pain.
- ▶ Shorter hospital stay (typically discharge by 48–72 hours) and faster return to daily activity (by 10–12 days).
- ▶ Reduced wound-related morbidity and better cosmesis; lower rates of de novo adhesion formation.

Contraindications

Contraindications to laparoscopy
Severe cardiopulmonary disease
Haemodynamically unstable patient

Contraindications to laparoscopy

Generalised peritonitis
Significant haemoperitoneum
Intestinal obstruction
Extensive peritoneal adhesions
Large pelvic tumour
Pregnancy beyond 16 weeks
Advanced malignancy
Ongoing anticoagulant therapy

Complications

- ▶ **Specific to laparoscopy** — extraperitoneal insufflation (surgical emphysema, omental emphysema, cardiac arrhythmia); injury to major vessels (mesenteric, omental, epigastric) during Veress-needle/trocar or port insertion; bowel injury, especially where adhesions are present; injury to bladder or ureter (mechanical or thermal); electrosurgical burns from insulation defects; carbon dioxide gas embolism causing hypotension and arrhythmia.
- ▶ **Anaesthesia-related** — hypoventilation and basal lung atelectasis from pneumoperitoneum plus Trendelenburg positioning; hypercarbia and metabolic acidosis from CO₂ absorption; oesophageal intubation, aspiration, cardiac arrest.
- ▶ **Common to any surgery** — haemorrhage, infection, wound dehiscence, port-site hernia.

The mortality of diagnostic laparoscopy is quoted at about **5 per 100,000 procedures**, falling markedly with operator experience; fatal causes are cardiac arrest, gas embolism and unrecognised bowel injury.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 36.10 — Port entry: (A) Primary port—umbilical port; (B1, B2) Accessory lateral ports; (C) Palmer's point; (D) Suprapubic port (DC Dutta's Gynaecology 7e, p.528)

High-yield exam pointers

- ▶ Grade the answer by **diagnostic vs therapeutic**, and within therapeutic by **minor / moderate / extensive**.
- ▶ Laparoscopy = **gold standard** for diagnosing **endometriosis** (with staging) and, per CDC-2006 criteria, for confirming **pelvic inflammatory disease**.
- ▶ **Timing**: periovulatory for infertility work-up; premenstrual for endometriosis.

- ▶ Correct **Veress-needle placement** is confirmed by the hanging-drop test, syringe-barrel test, low intra-abdominal pressure (<10 mmHg), and loss of liver dullness; intra-abdominal pressure must not exceed **20 mmHg** during insufflation.
- ▶ **Palmer's point** — left subcostal margin, midclavicular line, 3 cm below the costal margin — alternative entry site when umbilical entry is risky.
- ▶ Diagnostic laparoscopy mortality $\approx 5/100,000$ procedures.
- ▶ List all ten contraindications if the stem asks for them explicitly — do not omit pregnancy beyond 16 weeks or anticoagulant therapy.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Robot-assisted laparoscopic surgery is now used as an adjunct in gynaecological endoscopy for complex procedures (e.g., myomectomy, sacrocolpopexy, lymphadenectomy) offering three-dimensional vision and articulated instruments, but this is a supplementary technology rather than a distinct "role of laparoscopy" and was not separately elaborated here (DC Dutta's Gynaecology 7e).

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Role of micro endoscopy in gynecology

Asked in: Paper III Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Micro-endoscopy is the use of narrow-gauge (needlescopic, 1.2–3.5 mm) rigid or flexible fibre-optic telescopes to directly visualise sites of the female genital tract that are inaccessible, or accessible only at low resolution, to conventional-calibre (5–10 mm) laparoscopes and hysteroscopes. It extends gynaecological endoscopy from panoramic inspection to office-based, minimally invasive,

and near-histological (contact) assessment of the peritoneal cavity, endometrial surface and fallopian tube lumen.

Types of micro-endoscopy in gynaecology

Technique	Instrument & route	What is visualised	Magnification / medium
Microlaparoscopy (needlescopic laparoscopy)	1.2–3.5 mm telescope through a Veress-type needle/needlescopic port, transabdominal, under local anaesthesia ± conscious sedation	Peritoneal cavity, tubo-ovarian adnexa, adhesions	CO ₂ pneumoperitoneum; standard low-power panoramic view
Microhysteroscopy / contact hysteroscopy — <i>Hamou's microcolpohysteroscope</i>	Dual-optic hysteroscope passed transcervically, usually without cervical dilatation, held in light contact with the mucosa	Endocervical/endometrial surface — colour, contour, vascular pattern (interpreted like colposcopy); the transformation zone	Panoramic (macro) mode plus a contact "micro" mode with the lens switched to magnify up to 150×; contact mode needs no distension medium
Salpingoscopy	Rigid telescope introduced through the operating channel of a laparoscope , entering via the fimbrial (abdominal) ostium	Tubal mucosal folds, adhesions, epithelial pattern of the ampulla	Saline infusion distends the tubal lumen
Fallopscopy	Fine, flexible fibre-optic microendoscope passed transcervically through a hysteroscope , threaded coaxially along a guidewire/catheter the entire length of the tube	Tubal ostia, mucosal folds, intraluminal polyps, debris, or agglutination along the full tubal length	Coaxial catheter–guidewire delivery system

Role / clinical applications

- ▶ **Tubal-factor infertility work-up** — salpingoscopy and fallopscopy directly grade tubal mucosal integrity, allowing more accurate selection of patients for **in-vitro fertilisation (IVF)** rather than **reconstructive tubal surgery** than hysterosalpingography (HSG) alone can offer.
- ▶ **Chronic pelvic pain** — microlaparoscopy under local anaesthesia with conscious sedation permits "**conscious pain mapping**": adhesions and suspected lesions are palpated while the awake patient localises and confirms her pain, improving diagnostic correlation before deciding on adhesiolysis.

- ▶ **Office/day-care diagnostic laparoscopy** — second-look evaluation after adhesiolysis, myomectomy, or tubal reconstructive surgery; assessment of unexplained infertility or chronic pelvic pain without a general-anaesthesia admission.
- ▶ **Cervical and endometrial pathology** — microcolpohysteroscopy visualises the transformation zone when colposcopy is unsatisfactory, and assesses endometrial vascular pattern in unresponsive abnormal uterine bleeding.
- ▶ **Planning before tubal surgery or sterilisation reversal** — falloposcopic/salpingoscopic mucosal grading before tuboplasty helps predict surgical success and avoid futile reconstructive surgery.
- ▶ **Adjunct in assisted reproduction** — the transcervical catheter–guidewire system developed for falloposcopy has also been adapted for selective proximal tubal cannulation/catheterisation of tubal spasm or debris, and historically for transcervical gamete/embryo transfer.

Advantages of micro-endoscopy

- ▶ Narrower instruments cause less abdominal-wall or cervical trauma, minimal scarring, and faster recovery than standard-calibre endoscopy.
- ▶ Feasible under local anaesthesia, conscious sedation, or **no anaesthesia at all** (contact hysteroscopy needs no cervical dilatation or distension medium) — suitable for the office/outpatient setting, avoiding general-anaesthesia risk.
- ▶ Awake-patient participation (conscious pain mapping) improves localisation and diagnostic yield in chronic pelvic pain.
- ▶ Near-histological, real-time mucosal assessment (contact hysteroscopy, salpingoscopy, falloposcopy) gives a more physiological picture of tubal and endometrial epithelium than static imaging (HSG, ultrasound).
- ▶ Shorter procedure time and lower cost than formal laparoscopy or laparotomy for purely diagnostic indications.
- ▶ Adds physiological/functional information — tubal mucosal folds, agglutination, fimbrial architecture — that complements the purely anatomical picture given by static contrast studies such as hysterosalpingography (HSG).

Limitations

- ▶ Micro-telescopes are fragile and expensive; salpingoscopy and falloposcopy are not widely available as a routine clinical service and remain largely confined to tertiary/research centres.
- ▶ Narrower field of view and lower light transmission than standard-calibre scopes; a steep learning curve is required for interpretation, particularly of contact hysteroscopic vascular patterns.
- ▶ Falloposcopy carries a risk of tubal perforation, and instrumentation/technical complications limit its routine use.

- ▶ Salpingoscopy and fallopscopy are **diagnostic only** — the tubal pathology visualised cannot be treated in the same sitting; a decision for surgery or IVF must follow as a separate step.
- ▶ Microlaparoscopy's narrow ports limit working space and instrumentation, restricting it mainly to diagnostic and pain-mapping use rather than major therapeutic procedures — a standard-calibre port must still be added if operative treatment (adhesiolysis, cystectomy) is needed at the same sitting.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 54.29A — Diagrammatic view of a hysteroscope inside the uterine cavity (Jeffcoate's Principles of Gynaecology 9e, p.927)

Label alongside it: the dual optical pathway of Hamou's microcolpohysteroscope — panoramic low-power objective versus the contact "micro" objective in mucosal contact, magnifying up to 150×

High-yield exam pointers

- ▶ Micro-endoscopy = needlescopic (≤ 3.5 mm) telescopes: **microlaparoscopy, microhysteroscopy/contact hysteroscopy, salpingoscopy, fallopscopy**.
- ▶ *Hamou's microcolpohysteroscope*: panoramic + contact mode, magnification up to 150×, contact mode needs **no distension medium**.
- ▶ **Fallopscopy** = transcervical, via a hysteroscope, whole tubal length. **Salpingoscopy** = transabdominal, via a laparoscope, through the fimbrial ostium only.
- ▶ Both salpingoscopy and fallopscopy: select IVF **versus tuboplasty** by directly grading tubal mucosa.
- ▶ Microlaparoscopy under local anaesthesia enables "**conscious pain mapping**" for chronic pelvic pain.
- ▶ Contact hysteroscopy is used when **colposcopy is unsatisfactory** to visualise the transformation zone.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Salpingoscopy and fallopscopy remain tertiary-centre/research tools rather than routine clinical services; with rising IVF success rates, assisted reproduction has largely superseded tubal reconstructive microsurgery guided by them, so their present-day role is chiefly in selecting IVF versus surgery rather than driving surgical planning as originally described.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Jeffcoate's Principles of Gynaecology 9e.



Role of Uterine Artery Embolisation in Fibroid Uterus

Asked in: Paper III 18-Jul-2020 · Paper III Oct 2008 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Uterine artery embolisation (UAE) is a minimally invasive, non-surgical, uterus-conserving interventional-radiology procedure in which both uterine arteries are selectively catheterised (via a percutaneous femoral artery approach) and occluded with an embolic agent, causing ischaemic infarction and subsequent shrinkage of the fibroid while the uterus is retained.

Technique

- ▶ **Access:** Percutaneous cannulation of the femoral artery under local anaesthesia and conscious sedation, by a trained interventional radiologist.
- ▶ **Angiography:** A catheter is threaded to each internal iliac/uterine artery in turn; pelvic angiography confirms the vascular supply to the fibroid.
- ▶ **Embolisation:** Polyvinyl alcohol (PVA) particles/microspheres (or trisacryl gelatin microspheres) are injected through the catheter to occlude both uterine arteries selectively, until stasis of flow is seen on fluoroscopy.
- ▶ **Mechanism:** Occlusion of the uterine arteries causes **avascular (ischaemic) necrosis** of the fibroid, sparing the normal myometrium (which recruits collateral supply from ovarian/vaginal vessels), leading to fibroid shrinkage.
- ▶ **Bilateral uterine artery ligation** (surgical) produces a comparable result to UAE and is an alternative where interventional radiology is unavailable.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 10.3A and B — Uterine artery embolization: A. Pelvic angiography through femoral artery catheterization; B. Embolization through the catheter (DC Dutta's Gynaecology 7e, p.119)

Patient selection and pre-procedure work-up

- ▶ **Confirm the diagnosis and map the fibroid(s)** — pelvic ultrasound/Doppler or MRI to define number, size, and location (submucous, intramural, subserous) and exclude adenomyosis or adnexal mass mimicking a fibroid.
- ▶ **Exclude malignancy** — endometrial sampling if abnormal bleeding pattern, to rule out endometrial carcinoma/sarcoma before committing to a conservative procedure.

- **Counsel on alternatives and risk** — the woman must be one who would otherwise be a candidate for hysterectomy or myomectomy for her degree of symptoms, and must accept that rare complications of embolisation can necessitate an emergency hysterectomy; a woman who would not accept hysterectomy under any circumstance should not undergo UAE.
- **Multidisciplinary care** — joint evaluation by the gynaecologist and interventional radiologist, with clearly defined responsibility for follow-up care.

Indications

Indication	Detail
Symptomatic fibroid failing medical therapy	Persistent heavy menstrual bleeding despite medical management
Bulk/pressure symptoms	Pelvic pressure, urinary frequency/urgency from fibroid mass effect
Patient wants uterine conservation	Woman not desirous of hysterectomy/myomectomy, or unfit for major surgery
Multiple/large fibroids	Where myomectomy is technically difficult

Contraindications

Absolute/relative	Contraindication
Absolute	Active pelvic/genital infection
Absolute	Genital tract malignancy
Absolute	Pregnancy
Absolute	Contrast allergy; impaired renal function
Relative	Desire for future fertility/pregnancy (uncertain fertility outcomes — see below)
Relative	Severe vascular disease limiting arterial access; diminished immune status
Relative	Pedunculated subserous fibroid (risk of detachment/peritonitis)

Outcomes / results

Parameter	Result
Improvement in menorrhagia	80–90%
Fibroid/uterine volume reduction	~60% (persists up to 5 years per EMMY trial follow-up)

Parameter	Result
Relief of pressure/urinary symptoms	Frequency/urgency improved in the majority of women
Subsequent hysterectomy needed	Up to ~28% by 5 years
Repeat procedure/further treatment needed	10% (higher than after hysterectomy/myomectomy on Cochrane comparison)

Complications

- ▶ **Post-embolisation syndrome** — pain, low-grade fever, malaise, nausea (self-limiting, managed with analgesia/NSAIDs for 1–2 weeks; usually needs 1 day of inpatient pain control).
- ▶ **Infection/sepsis** — myometrial infarction and necrosis; may progress to sepsis needing emergency hysterectomy.
- ▶ **Amenorrhoea and premature ovarian failure** — from non-target embolisation of ovarian arterial collaterals; transient amenorrhoea in up to 15%, more frequent and often permanent in women over 45 years.
- ▶ **Procedure-related** — femoral artery puncture-site injury/haematoma, non-target embolisation, contrast reaction.
- ▶ **Fertility/pregnancy effects** — higher miscarriage and postpartum haemorrhage rates than untreated controls; therefore not recommended as first-line in women desiring future pregnancy — myomectomy is preferred if fertility is the goal.

Fertility and pregnancy after UAE

Comparison	Finding
UAE pregnancies vs untreated fibroid-matched controls	Miscarriage 35% vs 17%; postpartum haemorrhage 14% vs 3%; preterm delivery, growth restriction and malpresentation rates similar
Randomised trial: UAE vs laparoscopic myomectomy (women trying to conceive)	Pregnancy rate 50% (UAE) vs 78% (myomectomy); miscarriage rate 53% (UAE) vs 19% (myomectomy)
Randomised trial: UAE vs hysterectomy	Hospital stay shorter with UAE (2 vs 5 days), but more 6-week readmissions for pain/fever after UAE (9 vs 0)
Cochrane review	No difference in major-complication risk between UAE and myomectomy/hysterectomy; UAE has a higher minor-complication rate and higher likelihood of needing further intervention within 2–5 years

Because of the possibility of decreased ovarian reserve and the higher miscarriage/postpartum haemorrhage rates above, **UAE is not recommended for women who wish to conceive** — myomectomy

remains the fertility-sparing procedure of choice; UAE is reserved for women who have completed childbearing or do not desire future pregnancy but still wish to avoid hysterectomy.

Comparison with other fibroid treatment options

Modality	Uterus conserved	Fertility-preserving	Key point
UAE	Yes	Uncertain/discouraged	Non-surgical; effective for bleeding and bulk symptoms; higher re-intervention rate
Myomectomy	Yes	Yes (preferred)	Better fertility/pregnancy outcomes than UAE; risk of recurrence 30–50%
Hysterectomy	No	No	Definitive cure; no recurrence; preferred over 40 years/family complete
MR-guided focused ultrasound (MRgFUS)	Yes	Uncertain	Non-invasive thermal ablation; less pain than UAE; limited by uterine size >24 weeks

High-yield exam pointers

- ▶ Embolic agent: **polyvinyl alcohol (PVA) particles** via **femoral artery catheterisation**.
- ▶ Mechanism: **avascular necrosis** of fibroid.
- ▶ Result figures to write: **80–90% improvement in menorrhagia**, **~60% volume reduction**.
- ▶ Key complication triad: **post-embolisation syndrome**, **sepsis/necrosis**, **premature ovarian failure/amenorrhoea**.
- ▶ Contraindication to remember: **future fertility desire** (uncertain/adverse pregnancy outcomes) and **active infection/malignancy**.
- ▶ Alternative to UAE with same principle: **bilateral uterine artery ligation**.
- ▶ Compare in one line: myomectomy preserves fertility better than UAE; hysterectomy is definitive but non-conservative.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

American College of Obstetricians and Gynecologists guidance recommends that women considering uterine artery embolisation undergo a thorough evaluation by a gynaecologist working collaboratively with the interventional radiologist, with clarity on who is responsible for ongoing care.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e (including ACOG-referenced practice point and EMMY-trial/Cochrane-review data cited therein).

♦ ♦ ♦

Supports of uterus and vagina

Asked in: Paper I May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — The uterus normally lies **anteverted** (uterine axis at ~90° to the vaginal axis) and **anteflexed** (body flexed forward on the cervix), with the **external os at the level of the ischial spines**. This position and level are held by a **three-tier system** of ligamentous, fascial and muscular supports. The same structures, viewed from the vagina's standpoint, are described as **DeLancey's three levels of vaginal support**, which explain the site-specific pattern seen when support fails (pelvic organ prolapse).

Supports of the uterus — three-tier system

Tier	Structures	Function
Upper tier (positional support)	Endopelvic fascia over the uterus; round ligaments ; broad ligaments with intervening pelvic cellular tissue	Act as a "guy-rope," maintaining anteversion ; they have no role in preventing descent of the uterus
Middle tier (mechanical/main support — the strongest)	Pericervical ring — a fibroelastic collar around the supravaginal cervix, continuous with the pubocervical ligament anteriorly, the cardinal (Mackenrodt's/transverse cervical) ligament laterally, and the uterosacral ligament posteriorly; plus the surrounding condensed endopelvic fascia (pelvic cellular tissue) carrying the uterine vessels and nerves	Stabilises the cervix at the interspinous (ischial spine) level ; this hammock-like condensation is the principal support preventing uterine descent

Tier	Structures	Function
Lower tier (indirect support)	Levator ani (pubovisceral fibres of pubococcygeus, puborectalis, iliococcygeus), the levator plate, perineal body, and urogenital diaphragm/perineal membrane	Closes the urogenital hiatus; forms a horizontal shelf on which the rectum, upper vagina and cervix rest, and counteracts the downward thrust of raised intra-abdominal pressure

- ▶ The upper and middle tiers are **passive** (ligamentous/fascial); the lower tier is **active** (striated muscle) — loss of the active lower-tier support throws extra load onto the passive ligaments, which then stretch and fail, producing prolapse.
- ▶ The **round and broad ligaments** are frequently over-credited by students: they steady the fundus but do **not** resist descent — this is the single most commonly tested distinction in this topic.

Supports of the vagina

Segment	Structures	Note
Upper third / vault	Cardinal–uterosacral ligament complex (paracolpium), suspending the vault to the pelvic side wall and sacrum	Same tissue as the uterine "pericervical ring"; loss here causes vault/uterine prolapse
Middle third	Paracolpium fused laterally to the arcus tendineus fasciae pelvis and the superior fascia of levator ani; pubocervical fascia anteriorly, rectovaginal (Denonvilliers') fascia posteriorly	A break here is a "paravaginal defect"
Lower third	Fusion of the vagina anteriorly to the urethra, laterally to the levator ani, and posteriorly to the perineal body	Perineal body damage during childbirth alters the normal vaginal axis

DeLancey's three levels of vaginal support

Level	Structures (paracolpium)	Consequence of loss
Level I — Suspension	Cardinal–uterosacral ligament complex suspending the vaginal apex/cervix from the pelvic side wall and sacrum	Uterine procidentia or vaginal vault prolapse (often with enterocele)

Level	Structures (paracolpium)	Consequence of loss
Level II — Attachment	Paracolpium attached along the length of the lateral vagina via the arcus tendineus fasciae pelvis and the superior fascia of levator ani	Cystocele (anterior defect) or rectocele (posterior defect)
Level III — Fusion	Distal vagina fused directly — anteriorly to the urethra , laterally to the levator ani , posteriorly to the perineal body	Urethral hypermobility/distal rectocele, perineal body deficiency

- ▶ Disruption of **Level I** predisposes to apical prolapse; damage to **Level II and III** predisposes to **anterior and posterior wall prolapse** respectively — all three levels must be assessed and, where deficient, repaired at reconstructive pelvic surgery.
- ▶ The **levator ani** (with its intact hiatus) is common to, and reinforces, all three levels: when the levator plate sags (denervation/overstretch of childbirth, menopausal atrophy), the urogenital hiatus widens and every level of ligamentous support becomes overloaded.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.6 — *Ligamentous supports of uterus* (DC Dutta's Textbook of Gynaecology 7e, p.187)

Label on the sketch: pericervical ring at the cervicovaginal junction, pubocervical ligament (anterior), cardinal/Mackenrodt's ligament (lateral), uterosacral ligament (posterior), round and broad ligaments (upper tier), and the levator ani/perineal body forming the lower-tier shelf — this single figure covers both the "three-tier" and "DeLancey level" descriptions asked above.

High-yield exam pointers

- ▶ **Three tiers, one line each:** Upper = round + broad ligament (position only); Middle = pericervical ring (cardinal + uterosacral + pubocervical) = strongest, prevents descent; Lower = levator ani + perineal body (indirect, active).
- ▶ **External os lies at the level of the ischial spines** — the reference plane the middle tier stabilises to.
- ▶ **DeLancey I/II/III → apex/anterior/posterior** — Level I loss = vault/uterine prolapse; Level II loss = cystocele; Level III loss = urethral hypermobility/perineal deficiency.
- ▶ Round and broad ligaments are a **guy-rope**, not a descent-preventing support — a favourite distractor.
- ▶ Cardinal (Mackenrodt's) and uterosacral ligaments are anatomically and functionally the **same condensed endopelvic fascial unit** as the "paracolpium" of DeLancey's Level I.
- ▶ **Levator plate** = medial fibres of both levator ani muscles forming a horizontal shelf; its sag (from levator injury/denervation) widens the urogenital hiatus and precipitates prolapse.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's classical "three-tier" description and DeLancey's "three levels" describe the **same anatomical structures** from two teaching traditions (Indian textbook vs. Western urogynaecological) — both are acceptable in the exam and are best presented together, as above.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e (DeLancey levels of vaginal support); Jeffcoate's Principles of Gynaecology 9e.



Theca Lutein cysts

Asked in: Paper III 26-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Theca lutein cysts (clinically also called **hyperreactio luteinalis**) are benign, functional, non-neoplastic ovarian cysts that result from an exaggerated luteinization response of the theca interna cells to markedly elevated serum human chorionic gonadotropin (hCG) or other gonadotropin stimulation. They are typically **bilateral, multicystic, and regress spontaneously** once the gonadotropin drive falls, and are most classically associated with hydatidiform mole.

Aetiology / conditions associated

Category	Conditions
Very high endogenous hCG	Complete hydatidiform mole (commonest cause), invasive mole/choriocarcinoma (gestational trophoblastic neoplasia, GTN)
Physiologically raised hCG	Multiple gestation, Rh (D) isoimmunization with hydropic placenta, diabetes mellitus
Iatrogenic gonadotropin stimulation	Human menopausal gonadotropin–hCG ovulation induction, clomiphene citrate, GnRH-analogue cycles (basis of iatrogenic ovarian hyperstimulation syndrome, OHSS)
Pre-existing ovarian hyperandrogenism (rare)	Polycystic ovary syndrome, ovarian stromal hyperthecosis with gestational hyperandrogenism

Pathogenesis

- ▶ Markedly elevated hCG (or LH-receptor cross-stimulation) drives an exaggerated, diffuse luteinization of the **theca interna** of multiple follicles.

- ▶ Follicular fluid accumulates within the luteinized theca layer, producing numerous thin-walled cystic spaces rather than one dominant cyst.
- ▶ The intervening ovarian cortex shows **focal hyalinization**; ovaries can enlarge markedly, reaching **10–15 cm** in diameter.
- ▶ Because the process is a diffuse hormonal response and not a neoplasm, it resolves once the gonadotropin stimulus is withdrawn.

Clinical features

- ▶ **Bilateral** in the great majority of cases; multicystic, thin-walled, can become very large (up to 10–15 cm).
- ▶ Often **asymptomatic** — an incidental ultrasound finding during antenatal scanning or work-up of a molar pregnancy.
- ▶ May be **difficult to palpate per abdomen** because of a coexisting excessively enlarged (molar) uterus.
- ▶ Pelvic heaviness/pressure when large.
- ▶ **Acute pelvic pain** if complicated by torsion or cyst rupture with haemoperitoneum.
- ▶ **Hirsutism/virilization** in roughly one-third of clinically apparent cases (raised serum testosterone and androstenedione); fetal (female infant) virilization has not been reported, attributed to the pregnancy-related rise in sex-hormone-binding globulin buffering free androgen.
- ▶ When of iatrogenic (ovulation-induction) origin, may coexist with the ascites, hemoconcentration and oliguria of severe OHSS.

Differential diagnosis

Feature	Theca lutein cyst (hyperreactio luteinalis)	Pregnancy luteoma	Granulosa cell tumour / other ovarian neoplasm
Laterality	Bilateral (usually >90%)	Unilateral in about half	Usually unilateral
Nature on ultrasound	Cystic, multiloculated, thin septae ("spoke-wheel"/"soap-bubble")	Solid mass, 6–10 cm	Solid or complex solid-cystic
Serum hCG	Markedly elevated	Not characteristically elevated	Normal
Androgenic effect	Virilization in ~30%	Virilization in ~1/3, occasionally marked	Variable; granulosa cell tumour is oestrogenic
Course	Regresses spontaneously with falling hCG / after delivery	Regresses spontaneously after delivery	Does not regress; needs surgical excision

Investigations / diagnosis

Test	Finding / purpose
Serum β -hCG	Markedly elevated (often >100,000 mIU/mL in complete mole); trended serially
Transvaginal/transabdominal ultrasound	Bilateral, multiloculated cystic ovarian masses with thin septae, preserved intervening stroma — classic "spoke-wheel"/soap-bubble pattern
Colour Doppler	Low-resistance flow, no solid vascularised nodularity — helps exclude a neoplasm
Serum testosterone/androstenedione	Sent only if hirsutism or virilization present
CA-125	May be mildly and non-specifically raised; not used alone to suspect malignancy
Serial follow-up	Repeat ultrasound + hCG until cysts regress, run alongside molar/GTN hCG surveillance

Management

- ▶ **Treat the underlying cause first** — suction evacuation of the hydatidiform mole, chemotherapy for GTN, or reduction/discontinuation of the ovulation-induction gonadotropin/clomiphene regimen.
- ▶ **Expectant management is the rule for the cyst itself** — no cystectomy is required; the cysts regress spontaneously as serum hCG falls after evacuation or delivery.
- ▶ **Serial clinical and ultrasound follow-up** (alongside the hCG regression curve) until the cysts resolve.
- ▶ **Percutaneous decompression** (ultrasound- or laparoscopically-guided aspiration) for markedly symptomatic large cysts causing pelvic pressure, without removing the ovary.
- ▶ **Surgery is reserved for acute complications only:**
 - Laparoscopy for suspected torsion — detorsion with ovary-conserving cystectomy if the ovary is viable; oophorectomy only if the ovary is frankly necrotic/gangrenous.
 - Laparotomy if there is cyst rupture with haemoperitoneum or haemodynamic instability.
- ▶ If hysterectomy is performed for the mole (e.g., family completed), the ovaries — even with prominent theca lutein cysts — may be **conserved**; large cysts can simply be aspirated at the same sitting.
- ▶ Avoid over-aggressive surgery — correlating imaging with the hCG trend prevents unnecessary oophorectomy from a mistaken diagnosis of malignancy.

Complications / clinical significance

- ▶ Adnexal **torsion** with ovarian infarction.

- ▶ **Cyst rupture** causing haemoperitoneum.
- ▶ Maternal **hirsutism/virilization** (~30% of clinically apparent cases).
- ▶ Forms one of the **three classic Berkowitz–Goldstein high-risk clinical markers for postmolar gestational trophoblastic neoplasia** — pre-evacuation serum hCG >100,000 mIU/mL, excessive uterine enlargement, and theca lutein cysts ≥6 cm in diameter — presence of any one mandates closer post-evacuation hCG surveillance.
- ▶ When iatrogenic, may present as part of severe OHSS (ascites, haemoconcentration, oliguria).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 38.55 — Hydatidiform mole with bilateral large theca lutein cysts (*DC Dutta's Gynaecology 7e, p.561*)
- Fig 13.3 — Sonogram of an ovary with multiple theca-lutein cysts in a woman with a complete hydatidiform mole (*Williams Obstetrics 26e, p.253*)

High-yield exam pointers

- ▶ **Hyperreactio luteinalis** = the clinical term for clinically apparent theca lutein cysts.
- ▶ Classic trigger = **hydatidiform mole** (prominent 6 cm+ cysts seen in ~half of complete moles); also multiple pregnancy, Rh isoimmunization, diabetes, ovulation induction (hMG-hCG/clomiphene/GnRH analogues).
- ▶ **Berkowitz–Goldstein high-risk triad for post-molar GTN**: hCG >100,000 mIU/mL + excessive uterine size + theca lutein cysts ≥6 cm.
- ▶ USG hallmark: bilateral, multiloculated, thin-septae "spoke-wheel"/soap-bubble ovaries with low-resistance Doppler flow.
- ▶ Management mnemonic: **treat the cause and WAIT** — surgery only for torsion/rupture/haemorrhage.
- ▶ ~30% show hirsutism/virilization, but no reported case of a virilized female infant.
- ▶ Differentiate from pregnancy luteoma (solid, unilateral in ~50%) and granulosa cell tumour (solid, does not regress).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e states regression occurs "within a few weeks" of effective mole/GTN therapy, while Berek & Novak's Gynecology 16e (citing US series) gives 2–4 months after molar evacuation; both agree resolution tracks the fall in serum hCG, so either time-frame is acceptable if the source is named.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Williams Obstetrics 26e.

**Turner's syndrome**

Asked in: Paper III 26-Jun-2024 · Paper I May 2018 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Turner's syndrome (*Henry Turner, 1938*) is the commonest form of gonadal dysgenesis in phenotypic females, caused by complete or partial absence of the second sex chromosome (classic karyotype 45,X), with or without mosaicism. It presents with short stature, sexual infantilism, streak gonads, and characteristic somatic stigmata, and is the single most frequent chromosomal disorder in humans (about 1 in 2,500 live-born phenotypic females), although 99% of 45,X conceptuses abort spontaneously.

Aetiology / karyotype variants

Karyotype	Features
45,X (classic, ~50%)	Full somatic stigmata; most severe phenotype
Mosaic 45,X/46,XX	Classic stigmata are usually absent, normal-to-near-normal height; occasional spontaneous menstruation and rare pregnancy
Structural X abnormality — Xp deletion, isochromosome Xq, ring X	Xp (short-arm) deletion → somatic Turner stigmata (loss of the SHOX gene at Xp22.33, the short stature homeobox-containing gene); isolated Xq (long-arm) deletion → streak gonads/amenorrhea but no somatic stigmata
Mosaic 45,X/46,XY (mixed gonadal dysgenesis)	Unilateral streak gonad + contralateral testis; Y-chromosome material present — gonadectomy mandatory (dysgerminoma/gonadoblastoma risk)

Clinical features

- ▶ **Short stature** (height usually <150 cm) — the *sine qua non*, present in virtually all patients; due to SHOX haploinsufficiency.
- ▶ **Sexual infantilism** — primary amenorrhea with poorly developed secondary sexual characters; gonads are bilateral fibrous "**streaks**" with no follicles (hypergonadotrophic hypogonadism).
- ▶ **Somatic stigmata** — webbed neck with low posterior hairline, broad **shield chest** with widely spaced nipples, **cubitus valgus** (increased carrying angle), short 4th metacarpal/metatarsal,

micrognathia, high-arched palate, multiple pigmented nevi, and lymphoedema of the hands/feet at birth.

- ▶ **Cardiac anomalies** — bicuspid aortic valve/aortic root dilation (~20–30%) and coarctation of the aorta (classically ~30%); risk of aortic dissection/rupture.
- ▶ **Renal anomalies** (~30–50%) — horseshoe kidney is the commonest, predisposing to hydronephrosis.
- ▶ **Autoimmune disease** — Hashimoto thyroiditis, coeliac disease.
- ▶ **Other** — sensorineural hearing loss, ocular defects (strabismus, ptosis), osteoporosis (oestrogen deficiency), hypertension, glucose intolerance/diabetes. Intelligence is typically **normal**, though attention-deficit/hyperactivity disorder and visuospatial learning difficulty are more common (see Note).

Investigations / diagnosis

Test	Finding / purpose
Karyotype (peripheral lymphocytes)	Confirmatory — 45,X or a mosaic pattern; indicated in any short, sexually infantile girl
Serum FSH and LH	Elevated — confirms hypergonadotrophic hypogonadism
Serum estradiol (E2)	Low
Pelvic ultrasound ± laparoscopy	Bilateral streak gonads; small uterus that remains oestrogen-responsive
FISH/PCR for Y-chromosome material	Mandatory if a marker chromosome or any virilisation is present — positive result mandates gonadectomy
Echocardiography ± cardiac MRI	Baseline at diagnosis, then every 3–5 years — screens for coarctation, bicuspid valve, aortic root dilation
Renal ultrasonography / intravenous pyelography	Screens for horseshoe kidney and other structural anomalies
Thyroid function tests + anti-thyroid antibodies (yearly), fasting glucose, lipid profile, anti-endomysial antibodies, audiometry	Screen for the associated autoimmune/metabolic/hearing abnormalities

Management

- ▶ **Multidisciplinary care** — paediatric endocrinologist, cardiologist, gynaecologist, and geneticist.
- ▶ **Growth hormone (GH)** — start as soon as height falls below the 5th percentile (usually 2–5 years of age); improves growth velocity and final adult height. In girls diagnosed late (initiation after

8–9 years) or with extreme short stature, add low-dose **oxandrolone** (anabolic steroid) to maximise growth. Watch for scoliosis and benign intracranial hypertension on therapy.

- ▶ **Oestrogen replacement** for pubertal induction — begin **low-dose, gradually escalating** oestrogen at 11–14 years (once growth-promoting effect of GH is optimised, since oestrogen accelerates epiphyseal closure): micronised estradiol 0.25–0.5 mg/day (or an equivalent transdermal patch cut to deliver 3–7 µg/day), increased every 3–6 months up to a full replacement dose (micronised estradiol 2 mg/day, or transdermal patch up to 100 µg/day) over 2–3 years to complete breast/uterine development. Add a **cyclic progestogen** (e.g., medroxyprogesterone acetate 5–10 mg/day for 12–14 days/month) after the first withdrawal bleed or after 12–24 months of oestrogen-only therapy, to protect the endometrium; combined oral contraceptives are a convenient longer-term option.
- ▶ **Gonadectomy** if Y-chromosome material is detected (risk of gonadoblastoma/dysgerminoma).
- ▶ **Coarctation of the aorta** is corrected surgically; hypertension, hypothyroidism, and hearing/visual problems are treated on detection.
- ▶ **Fertility** — spontaneous conception is rare (mosaics only); **donor-oocyte IVF-embryo transfer** is the option for most patients. Turner's syndrome is considered a **relative contraindication to pregnancy** (ASRM Practice Committee, 2012) because of a markedly increased risk of aortic dissection/rupture (mortality risk up to ~2%) — a full cardiology evaluation, including cardiac MRI, is mandatory before any fertility treatment or pregnancy is undertaken.
- ▶ **Long-term surveillance** for osteoporosis (bone mineral density), venous thromboembolism risk on hormone therapy, autoimmune disease, and metabolic syndrome, plus psychological support/counselling regarding the diagnosis and infertility.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 27.2A — 17-year-old girl with Turner's syndrome (45, X). Characteristic somatic abnormalities: short stature, shield chest, widely-spaced nipples, cubitus valgus, short neck, absent secondary sex characters (DC Dutta's Gynaecology 6e, p.457)

High-yield exam pointers

- ▶ Karyotype **45,X** (classic) — commonest human chromosomal disorder; SHOX gene loss (Xp22.33) → short stature.
- ▶ Stigmata mnemonic: **webbed neck, shield chest, cubitus valgus, short 4th metacarpal, streak gonads**.
- ▶ Cardiac (coarctation/bicuspid aortic valve) + renal (horseshoe kidney) screening is compulsory at diagnosis.
- ▶ GH started early (2–5 yrs); oestrogen deliberately delayed to 11–14 yrs and started low-dose to protect final height.
- ▶ Y-chromosome material on FISH → **gonadectomy** (gonadoblastoma risk).

- Pregnancy = **relative contraindication** (ASRM 2012) — aortic dissection risk; donor-oocyte IVF is the fertility route.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology (7e) still lists "mental retardation" as a feature of Turner's syndrome; current teaching (Speroff 9e; Berek & Novak 16e) is that intelligence is typically normal, with only a higher rate of specific visuospatial/learning difficulty and attention-deficit/hyperactivity disorder — follow the current texts on this point.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; ASRM Practice Committee guideline (2012).



Update on recurrent miscarriage

Asked in: Paper IV 03-Oct-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — **Recurrent pregnancy loss (RPL)**, classically termed *recurrent (habitual) miscarriage*, was traditionally defined as **three or more consecutive clinically recognised pregnancy losses before 20 weeks of gestation** (RCOG Green-top Guideline No. 17). Current bodies (ASRM 2020; ESHRE 2022) have revised this to **two or more pregnancy losses**, not necessarily consecutive or with the same partner, since the diagnostic-abnormality yield is similar after two versus three losses. It affects under 1% of women; nearly 50% remain unexplained after full evaluation.

Aetiology

Category	Approx. share	Examples
Genetic (parental)	2–5%	Balanced reciprocal or Robertsonian translocation, chromosomal inversion/mosaicism (both partners karyotyped)
Fetal aneuploidy (sporadic)	50–60% of individual losses (>80% if maternal age ≥35 years)	De novo trisomy, monosomy X — the single commonest cause of any one miscarriage

Category	Approx. share	Examples
Anatomic	10–12%	Septate uterus (commonest congenital anomaly in RPL), bicornuate/unicornuate uterus, submucous fibroid, intrauterine adhesions (<i>Asherman's syndrome</i>), cervical insufficiency
Antiphospholipid syndrome (APS)	~15%	Lupus anticoagulant, anticardiolipin, anti- β 2-glycoprotein-1 antibodies
Endocrine	~10%	Poorly controlled diabetes/overt thyroid disease, polycystic ovary syndrome (PCOS) with hyperandrogenism, hyperprolactinaemia
Infective	Uncommon, unproven causality	Chronic plasma-cell endometritis, bacterial vaginosis (linked to second-trimester loss)
Unexplained	~50% of couples	No abnormality found after complete evaluation

Evaluation

Test	Purpose / positive finding
Detailed history (both partners)	Pattern, trimester and number of losses; consanguinity; family history; subfertility; drug/environmental exposure
General and pelvic examination	Obesity, hirsutism, thyroid/breast findings; uterine and cervical anatomy
Parental peripheral blood karyotype (G-banding, both partners)	Balanced translocation/inversion (2–5%)
Karyotype of products of conception (most recent loss)	Documents fetal aneuploidy (~50–60%) — favourable prognostic sign, guides counselling
3D-transvaginal ultrasonography / sonohysterography / hysterosalpingography $\pm$ office hysteroscopy	Septum, bicornuate/unicornuate uterus, submucous fibroid, synechiae
Lupus anticoagulant, anticardiolipin IgG/IgM, anti- β 2-glycoprotein-1 IgG/IgM — positive on 2 occasions $\geq$ 12 weeks apart	Antiphospholipid syndrome (revised Sapporo/Miyakis criteria — 1 clinical + 1 laboratory criterion)
Serum TSH, prolactin, HbA1c	Thyroid dysfunction, hyperprolactinaemia, glycaemic control

Test	Purpose / positive finding
Not recommended (ASRM/ESHRE): inherited thrombophilia panel (factor V Leiden, prothrombin gene, protein C/S, antithrombin III, homocysteine, MTHFR), natural-killer-cell assays, HLA typing, endometrial biopsy for luteal-phase defect	Poor evidence base unless personal/family history of thrombosis

Management

Cause identified	Treatment
Parental balanced translocation	Genetic counselling; spontaneous conception still carries a good live-birth chance; donor gametes if a Robertsonian translocation between homologous chromosomes (always unbalanced gametes)
Uterine septum / submucous fibroid / adhesions	Hysteroscopic metroplasty / myomectomy / adhesiolysis
Cervical insufficiency	History-indicated cervical cerclage (McDonald/Shirodkar), placed early in the second trimester after confirming viability
Antiphospholipid syndrome	Low-dose aspirin 75–81 mg orally once daily , started with attempts to conceive, plus unfractionated heparin 5,000 IU subcutaneously twice daily (or an equivalent low-molecular-weight heparin dose) once pregnancy is confirmed, continued throughout gestation under joint perinatology care; combination therapy improves live-birth rate over aspirin alone
Endocrine cause	Levothyroxine to normalise TSH; optimise glycaemic control before conception; metformin/lifestyle measures for PCOS; cabergoline/bromocriptine only if hyperprolactinaemia is confirmed
Chronic endometritis (if biopsy-proven)	Course of antibiotics — improves subsequent live-birth in observational series, though not yet an endorsed routine test
Unexplained (~50%)	Supportive "tender loving care" with early reassurance ultrasonography; no empirical aspirin/heparin or IVIG — unproven benefit; selective vaginal progesterone in a defined subgroup (see Recent advances)

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

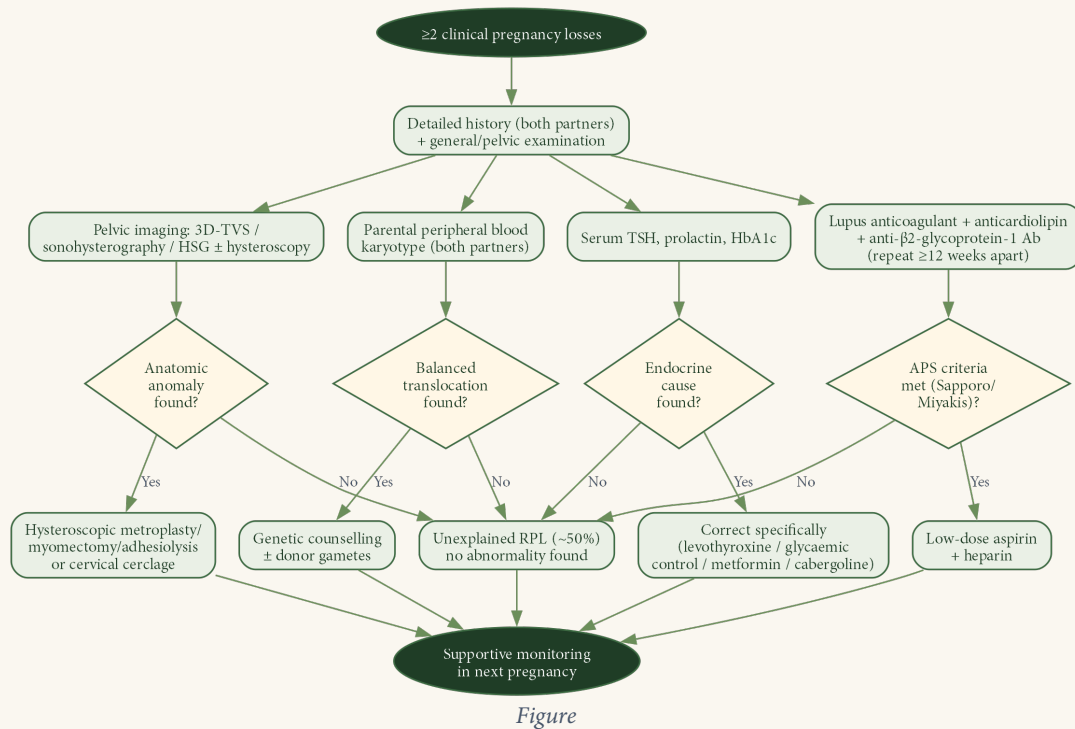


Fig: Evaluation and management algorithm for recurrent pregnancy loss — parallel work-up across genetic, anatomic, antiphospholipid, and endocrine causes, converging on unexplained RPL (~50%) if all negative.

Recent advances [RA]

- ▶ **Definition lowered:** ASRM (2020 Practice Committee) and ESHRE (2022 Guideline on Recurrent Pregnancy Loss) now diagnose RPL after **two or more** losses (not necessarily consecutive), superseding the older RCOG Green-top No. 17 "three consecutive" threshold — workup can start earlier.
- ▶ **ESHRE 2022** explicitly recommends **against** routine inherited-thrombophilia screening, natural-killer-cell testing, HLA typing and TH1/TH2 cytokine ratios for unexplained RPL, correcting a generation of over-testing.
- ▶ **Empirical anticoagulation:** the international **ALIFE2 randomised trial** (Lancet, 2023) found low-molecular-weight heparin gave **no improvement in live-birth rate** over standard care in unexplained RPL — confirming anticoagulation should be reserved for confirmed antiphospholipid syndrome only.
- ▶ **Progesterone:** the **PROMISE trial** (NEJM, 2015) showed **no overall benefit** of vaginal micronized progesterone in unexplained RPL; the subsequent **PRISM trial** (NEJM, 2019) found a live-birth benefit confined to women with **three or more prior miscarriages presenting with**

first-trimester bleeding — current practice offers vaginal progesterone selectively to this subgroup only, not universally.

- ▶ **Preimplantation genetic testing for aneuploidy (PGT-A):** despite biological rationale, cumulative live-birth rate per started in-vitro fertilisation cycle has **not** been shown superior to expectant natural conception in RPL couples without a parental translocation; ASRM does not strongly recommend it.
- ▶ **Chronic endometritis:** hysteroscopy/biopsy-diagnosed plasma-cell endometritis treated with antibiotics shows higher subsequent live-birth rates in observational cohorts, but routine biopsy remains unendorsed by ASRM/ESHRE pending randomised evidence.
- ▶ **Emerging/investigational:** endometrial receptivity assays, uterine natural-killer-cell profiling and sperm DNA fragmentation testing are under study but lack sufficient evidence for routine clinical use (ESHRE 2022).

High-yield exam pointers

- ▶ Write the number first: **2 or more** losses = current (ASRM/ESHRE) definition; **3 or more consecutive** = older RCOG/textbook definition — state both and say which is current.
- ▶ Etiology bucket sizes to reproduce: genetic 2–5%, anatomic 10–12%, APS ~15%, endocrine ~10%, unexplained ~50%.
- ▶ APS regimen is the single most testable line: **aspirin 75–81 mg/day + unfractionated heparin 5,000 IU SC BD** (or LMWH equivalent), aspirin from conception attempt, heparin once pregnancy confirmed.
- ▶ Revised Sapporo (Miyakis) criteria for APS: 1 clinical + 1 laboratory criterion, laboratory tests positive **twice, 12 weeks apart**.
- ▶ Landmark trial pairing to quote: **PROMISE (2015)** = no benefit overall; **PRISM (2019)** = benefit only in ≥3 losses + bleeding; **ALIFE2 (2023)** = LMWH no benefit in unexplained RPL.
- ▶ Tests **NOT** recommended anymore: thrombophilia panel, NK-cell assay, HLA typing, endometrial luteal-phase biopsy — name these as "outdated" tests examiners like to trap on.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older Indian texts (DC Dutta) still describe the classic "three consecutive losses" definition and broader thrombophilia/immune work-up; current international guidance (ASRM 2020, ESHRE 2022) lowers the threshold to two losses and drops most of that extended panel, so answer from the current-guideline position and mention the older definition only as historical context.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; current guideline knowledge — ASRM Practice Committee (2020), ESHRE Guideline on Recurrent Pregnancy Loss (2022), RCOG Green-top Guideline No. 17.

**Uterine artery embolisation**

Asked in: Paper III 19-Nov-2022 · Paper IV May 2019 · Paper III May 2011 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — **Uterine artery embolisation (UAE)**, also called uterine fibroid embolisation (UFE), is a minimally invasive interventional-radiology procedure in which both uterine arteries are selectively catheterised via the femoral artery and an embolic agent is injected to occlude their flow. This produces ischaemic infarction and shrinkage of uterine leiomyomas (and controls bleeding from adenomyosis or obstetric haemorrhage) while conserving the uterus.

Indications & patient selection

Indication	Remarks
Symptomatic uterine fibroid(s) — menorrhagia/heavy menstrual bleeding	Commonest indication; done in fibroids > 3 cm with heavy bleeding after failed/declined medical therapy
Bulk/pressure symptoms	Pelvic heaviness, urinary frequency/urgency
Adenomyosis with heavy bleeding	Effective alternative to hysterectomy
Intractable primary/secondary postpartum haemorrhage or other obstetric bleeding	When conservative measures fail and uterus conservation is desired; alternative to internal iliac ligation/hysterectomy
Patient desires uterine conservation / poor surgical candidate	Appropriate only if the patient has symptoms that would otherwise warrant hysterectomy or myomectomy and would accept a rare life-saving hysterectomy if a complication occurs

Contraindications

Absolute	Relative
Pregnancy	Desire for future fertility — effect of UAE on ovarian reserve, fertility and pregnancy is uncertain; many interventional radiologists advise against UAE if future fertility is wanted
Active pelvic/genital infection	Severe contrast allergy

Absolute	Relative
Suspected or confirmed genital tract malignancy	Impaired renal function
—	Severe vascular disease limiting arterial access, or immunocompromise

Procedure (technique)

- ▶ **Pre-procedure work-up** — pelvic ultrasound/MRI to size, number and locate fibroids, and to exclude pregnancy and malignancy.
- ▶ **Femoral artery catheterisation** (Seldinger technique) by a trained, experienced interventional radiologist, under local anaesthesia and conscious sedation.
- ▶ Catheter advanced under **fluoroscopic guidance** into the anterior division of the internal iliac artery and then selectively into each **uterine artery**, one side at a time.
- ▶ **Angiography** to delineate the uterine and fibroid vasculature.
- ▶ **Embolic material** injected through the catheter — **polyvinyl alcohol (PVA) particles**, gelatin sponge pledgets, or tris-acryl gelatin microspheres — until occlusion or slow flow is confirmed on angiography.
- ▶ Procedure **repeated on the contralateral uterine artery** — bilateral embolisation is standard.
- ▶ Total radiation exposure is ~15 cGy, comparable to one to two CT scans or barium enemas.
- ▶ **Post-procedure**: inpatient analgesia (NSAIDs ± opioids) for ischaemic pain, usually for 1 day; most women resume normal activity within 1–3 weeks.

Outcomes

Parameter	Result
Improvement in heavy menstrual bleeding	80–90% (Dutta); 83% at 3 months in the largest prospective series (n = 555, Berek)
Reduction in fibroid/uterine volume	~60% size reduction (Dutta); mean dominant-fibroid volume reduction 33% at 3 months, persisting to 5 years (EMMY trial)
Dysmenorrhoea / urinary frequency relief	Improved in 77% and 86% respectively at 3 months
Need for further treatment (6–60 months follow-up)	Hysterectomy 17.5%; myomectomy 8.8%; repeat embolisation 6.3%; medical therapy 6.7%; endometrial ablation 1.2%
Major procedure-related complication rate	1.2–6.9% (Cochrane review, 2014) — no different from myomectomy/hysterectomy, but UAE has more minor complications and a higher chance of needing re-intervention by 2–5 years

Complications

Complication	Notes
Postembolisation syndrome (commonest)	Diffuse abdominal pain, nausea, vomiting, low-grade fever, malaise, anorexia, leukocytosis; ~10% need hospital readmission; managed with IV fluids/NSAIDs, resolving in 2–3 days. Persistent fever → antibiotics; failure to respond suggests sepsis, needing urgent hysterectomy
Femoral artery access-site injury	Haematoma, pseudo-aneurysm
Non-target embolisation	Ovarian or vaginal artery territory
Diminished ovarian reserve / premature ovarian failure	Transient amenorrhoea in up to 15%; permanent amenorrhoea in 3% of women < 40 years vs 41% of women > 50 years; fall in AMH and antral follicle count
Fibroid expulsion (submucous fibroids)	Vaginal discharge, cramping, expulsion per vaginam
Uterine/myometrial infarction and necrosis	Rare; may need hysterectomy
Missed leiomyosarcoma	Continued growth/pain post-UAE should prompt re-evaluation (sarcoma found in 0.4% of one large series)
Effect on fertility/pregnancy	Uncertain; possible increase in miscarriage risk — not recommended if future fertility is desired (ACOG)

UAE vs surgical alternatives

Feature	UAE	Myomectomy	Hysterectomy
Uterus conserved	Yes	Yes	No
Fertility preserved	Uncertain — avoid if fertility desired	Best option for fertility-sparing removal	None
Hospital stay	Shortest (~2 days)	Longer	Longest (~5 days)
Need for further treatment	Higher (up to 17.5% hysterectomy by 5 yr)	Recurrence 30–50% (Dutta)	Definitive — none
Major complication rate	Comparable to surgery (Cochrane 2014)	Standard surgical risk	Standard surgical risk

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 10.3A and B — Uterine artery embolisation: A. pelvic angiography through femoral artery catheterisation; B. embolisation performed through the catheter (DC Dutta's Gynaecology 7e, p.119)

High-yield exam pointers

- ▶ Embolic agent to name first: **PVA particles** (also gelatin sponge, tris-acryl gelatin microspheres) via **femoral artery catheter** into **both uterine arteries**.
- ▶ Definition line for the classic complication: **postembolisation syndrome** — pain, fever, nausea, malaise, leukocytosis, resolving in 2–3 days with IV fluids/NSAIDs.
- ▶ Success numbers to write: **80–90% improvement in menorrhagia, ~60% reduction in fibroid size**.
- ▶ Contraindication triad: **pregnancy, active pelvic infection, genital tract malignancy** — plus relative contraindication of **desire for future fertility**.
- ▶ ACOG position: recommends thorough gynaecological evaluation before UAE and against UAE if future fertility is a priority.
- ▶ Cochrane (2014): major complication rates **similar** to surgery, but **more minor complications and re-intervention** with UAE.
- ▶ Radiation dose to quote: **~15 cGy** ($\approx$ 1–2 CT scans).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Berek & Novak 16e reports slightly more conservative 3-month figures (33% fibroid-volume reduction, 83% bleeding improvement) than DC Dutta's headline "80–90% improvement, 60% size reduction" figures; both are consistent with the Cochrane 2014 review and current ACOG guidance, so either figure set is acceptable in the exam if attributed correctly.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (Chapter 11, Uterine Artery Embolization — technique, outcomes, complications); DC Dutta's Textbook of Gynaecology 7e (Uterine Artery Embolization, pp.99–100, 119, 230); American College of Obstetricians and Gynecologists (ACOG) Committee Opinion on Uterine Artery Embolization (2004); Society of Obstetricians and Gynaecologists of Canada (SOGC) Clinical Practice Guideline No. 150, Uterine Fibroid Embolization (2004); Cochrane Database of Systematic Reviews 2014 (Gupta et al., Uterine artery embolization for symptomatic uterine fibroids).

♦ ♦ ♦

Vulval Itching

Asked in: Paper III 26-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — **Pruritus vulvae** is the sensation of itching confined to the vulva; it must not be confused with vulval pain or burning. About 10% of patients attending a gynaecology clinic complain of vulval itching, and it is always a symptom/sign of an underlying local or systemic disorder rather than a disease in itself.

Mechanism ("itch-scratch" cycle)

- ▶ Rich special sensory (C-fibre) innervation of the vulval skin transmits the itch sensation.
- ▶ Underlying vascular instability — strongly influenced by emotion — releases a histamine-like mediator that induces itching.
- ▶ Itching is characteristically **worse at night** because of absence of mental distraction, a "tired" central nervous system, and local warmth with poor aeration under bedclothes.
- ▶ Scratching causes excoriation → further irritation → more scratching, perpetuating the **itch-scratch cycle**, which itself can produce secondary lichenification/lichen simplex chronicus.

Etiology

Category	Causes
Vaginal discharge (commonest cause)	<i>Trichomonas vaginalis</i> vaginitis; monilial (<i>Candida albicans</i>) vaginitis; often mixed
Infections of the vulva	Fungal — <i>Candida</i> ; Viral — herpes genitalis, genital warts (condyloma); Parasitic — threadworm (esp. children), scabies, pediculosis pubis; STIs — gonorrhoea, trichomoniasis
Local skin disorders	Contact/allergic dermatitis (nylon undergarments, soaps, detergents, bubble bath, shampoo, chemical contraceptives, condom), psoriasis, seborrheic dermatitis, intertrigo
Non-neoplastic epithelial disorders (vulvar dermatoses)	Squamous cell hyperplasia; lichen sclerosis; lichen simplex chronicus; lichen planus
Neoplastic epithelial disorders	Vulvar intraepithelial neoplasia (VIN); Paget's disease of the vulva; invasive vulval carcinoma
Systemic/medical disorders	Diabetes mellitus (glycosuria produces a "raw-beef" skin change and favours <i>Candida</i> overgrowth); thyroid disorders; chronic liver disease; chronic renal disease
Deficiency states	Iron, folic acid, vitamin B12, vitamin A deficiency; haematological disease (polycythaemia, leukaemia)

Category	Causes
Physiological/atrophic	Postmenopausal oestrogen-deficiency atrophic vulvovaginitis
Psychosomatic	Diagnosis of exclusion — mental anxiety or sexual frustration driving habitual scratching

Clinical evaluation and investigations

Step	Details
History	Age of onset, intensity and duration of itching, associated vaginal discharge, contraceptive practice, relation to psychological upset, allergy to nylon/soap/detergent
General examination	Full systemic check — signs of diabetes, thyroid disease, liver/renal disease, anaemia
Local examination	Extent and morphology of the lesion; look for discharge, ulcers, white lesions, excoriation, lichenification
Microscopy	Wet-mount/vulvar scraping and vaginal discharge for <i>Candida</i> or <i>T. vaginalis</i> ; KOH test; whiff test
Urine	Sugar, protein, pus cells
Blood	Complete blood count, post-prandial blood glucose, thyroid profile, liver and renal function tests
Stool	Ova, cysts and parasites (children — threadworm)
Biopsy	Mandatory for any lesion persisting > 1 year, or any suspicious/pigmented/thickened lesion — random or colposcopy-directed — to define the skin change and exclude VIN/malignancy

Management

► General measures (for every patient)

- Local hygiene; loose-fitting, cotton (non-synthetic) undergarments to keep the area aerated.
- Stop the offending irritant/allergen (soap, detergent, nylon, chemical spermicide/condom).
- Break the **itch-scratch cycle** — counsel against scratching; nocturnal sedative antihistamine helps sleep and reduces night-time scratching.

► Symptomatic topical therapy

- **Clobetasol propionate 0.05% ointment** applied to the vulva is the mainstay for inflammatory/lichenified pruritus and is the **ultrapotent topical steroid of choice for lichen sclerosus** — apply nightly, then taper frequency once symptoms settle; roughly **96% of**

lichen sclerosis patients respond satisfactorily. Long-term disease needs **maintenance therapy**, graduating down from ultrapotent to medium- and then low-potency steroids to sustain remission.

- Second-line for steroid-refractory lichen sclerosis: topical **calcineurin inhibitors** (**tacrolimus, pimecrolimus**) — effective, but carry an FDA caution regarding a possible long-term malignancy risk, so use judiciously.
- **Atrophic (postmenopausal) vulva** — local oestrogen cream (or testosterone cream) restores trophism and relieves itching.
- ▶ **Treat the specific etiological factor**
 - Vaginal discharge: antifungal (e.g., topical/oral azole) for candidiasis, oral metronidazole/tinidazole for *T. vaginalis* (and partner treatment).
 - Parasites: anti-helminthic for threadworm, scabicide/permethrin for scabies, pediculocide for pediculosis.
 - Systemic disease: optimise glycaemic control in diabetes, correct iron/B12/folate deficiency, treat thyroid or hepatic/renal disease.
 - Psychosomatic pruritus: reassurance and counselling once organic causes are excluded.
- ▶ **Surgery**
 - Reserved for cases where biopsy confirms **VIN or invasive carcinoma** — managed by the appropriate excisional/ablative or oncological surgical protocol for that lesion; simple pruritus vulvae without neoplasia is **not** an indication for surgery.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 10.19 — Lichen sclerosis of the vulva, a common cause of persistent pruritus vulvae — pale, atrophic, "cigarette-paper" skin with fissuring (Berek & Novak's Gynecology 16e, p.523)

High-yield exam pointers

- ▶ Pruritus vulvae is a **symptom, not a diagnosis** — always search for the underlying cause; commonest cause overall is **vaginal discharge* (Trichomonas/Candida)*.
- ▶ Biopsy any lesion persisting **beyond 1 year** or any suspicious lesion to exclude VIN/carcinoma.
- ▶ Lichen sclerosis → **clobetasol propionate 0.05% ointment**, ~96% response; taper to maintenance; calcineurin inhibitors as steroid-sparing second line (FDA malignancy caution).
- ▶ Remember the systemic triad: **diabetes (glycosuria), thyroid disease, chronic liver/renal disease** — always screen blood/urine.
- ▶ Deficiency causes to recall: **iron, folate, B12, vitamin A**.
- ▶ Break the "itch-scratch" cycle — worse at night (no distraction, warmth, poor aeration) — general hygiene measures are first-line for every patient regardless of cause.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The ultrapotent-steroid regimen for lichen sclerosus (clobetasol propionate 0.05%) described above is consistent across DC Dutta's Gynaecology and Berek & Novak's Gynecology and matches the ACOG Practice Bulletin No. 93 (2008) on diagnosis and management of vulvar skin disorders — there is no material dose discrepancy to reconcile between the textbook and current guideline.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; ACOG Practice Bulletin No. 93 (2008).



Vulvodynia

Asked in: Paper III 19-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Vulvodynia is vulvar pain of at least 3 months' duration, of unknown cause, occurring in the absence of any identifiable specific disorder (infective, inflammatory, neoplastic, neurological, or traumatic) that would otherwise explain the pain. It has a prevalence of about 15% among women and is a diagnosis of exclusion. It is classified per the current 2015 International Society for the Study of Vulvovaginal Disease (ISSVD) / International Society for the Study of Women's Sexual Health (ISSWSH) / International Pelvic Pain Society (IPPS) consensus terminology.

Classification (2015 ISSVD/ISSWSH/IPPS consensus terminology)

Axis	Subtypes
Site	Localized — vestibulodynia (pain confined to the vulvar vestibule) or clitorodynia (pain confined to the clitoris); Generalized — pain over the entire vulva; Mixed — localized and generalized pain coexist
Provocation	Provoked — pain with genital contact (intercourse, tampon insertion, cotton-swab touch); Spontaneous (unprovoked) — pain occurs without contact; Mixed — both provoked and spontaneous pain
Onset	Primary — pain present from the very first attempt at genital contact/penetration; Secondary — pain begins after a period of pain-free contact

Provoked localized vulvodynia (vestibulodynia) is the commonest presentation and was formerly termed vulvar vestibulitis syndrome, a term now discouraged because inflammation is not consistently demonstrable.

Aetiology and factors to exclude/implicate

Category	Details
Specific disorders that must be excluded before labelling vulvodynia	Vulvar dermatoses (lichen sclerosus, lichen planus), inflammatory conditions (dermatitis), infection (candida, herpes genitalis), neoplasia, neuralgia (pudendal/genitofemoral nerve), trauma, iatrogenic causes (chemotherapy, radiotherapy, surgery), hormonal (oestrogen) deficiency
Factors that initiate/maintain vulvodynia once exclusions are made	Genetic predisposition to pain or inflammation; comorbid chronic pain disorders (irritable bowel syndrome, interstitial cystitis) or psychiatric disorders; sex-steroid hormone deficiency (including from long-term hormonal contraceptives, which can cause vestibular thinning); pelvic floor musculoskeletal abnormality/hypertonicity; neurologic changes in the pudendal or sacral 2–4 nerve roots; psychosocial factors

Pathophysiology (brief)

- ▶ Provoked vestibular pain (the commonest type) is hypothesised to begin with a **chronic inflammatory or immunologic trigger** — e.g., recurrent candidal infection or minor injury to the vestibule.
- ▶ This leads to **proliferation of nociceptive nerve fibres** in the vestibular mucosa.
- ▶ An **increased inflammatory infiltrate dominated by mast cells**, with elevated neuroinflammatory cytokines, chemokines, and prostanoids, develops in predisposed women.
- ▶ **Altered/hypertonic pelvic floor musculature** is commonly associated and may itself be aetiologic.
- ▶ **Central and peripheral sensitisation** develops, producing hypersensitivity to tactile, thermal, and chemical stimuli — explaining why pain outlasts any inciting trigger.

Clinical features and diagnosis

- ▶ **Symptoms:** burning, stinging, rawness or irritation over the vulva (hence the older name "burning vulva syndrome"); superficial dyspareunia; pain on tampon insertion, cycling, or prolonged sitting in provoked disease.
- ▶ **History:** detailed medical, psychological, sexual, and pain history is essential; ask about comorbid chronic pain disorders and psychosocial stressors.

- ▶ **Vulvo-vaginal examination:** inspect for any lesion, dermatosis, or infection to exclude a specific cause; the vulva typically looks entirely normal in true vulvodynia.
- ▶ **Cotton-swab (Q-tip) test:** the vestibule is touched sequentially at the 12, 2, 5, 6, 7, and 10 o'clock positions with a cotton swab pressed to about one-third of the cotton-tip depth for 1 second; pain scored $\geq 4/10$ on a numeric rating scale is consistent with **provoked vestibulodynia**.
- ▶ **Pelvic floor assessment:** a single lubricated finger in the vagina assesses pelvic floor muscle tone and tenderness, which is frequently increased.
- ▶ **Wet mount** of vaginal discharge to exclude candida/bacterial vaginosis and to look for inflammatory (excess white cells) or oestrogen-deficiency (parabasal/intermediate cells) changes.
- ▶ Imaging is considered only if pain is not confined to the vestibule (to exclude a pelvic source).

Management

- ▶ **General/first-line measures** — treat any underlying disorder found (infection, dermatosis, hormonal deficiency); vulvar hygiene counselling — stop pads, soaps, fabric softeners, and other irritants/allergens; review and, if implicated, stop long-term hormonal contraceptives.
- ▶ **Topical therapy** — topical lidocaine 5% applied to the vestibule (including before intercourse); topical anticonvulsant — gabapentin 6% compounded cream; topical tricyclic antidepressant (TCA) formulations.
- ▶ **Systemic pharmacotherapy** (table below).
- ▶ **Injections** — local anaesthetic with or without corticosteroid injected into tender vestibular sites; botulinum toxin injection for refractory pelvic floor hypertonicity.
- ▶ **Pelvic floor physical therapy** — usually recommended for most patients, especially where hypertonic pelvic floor musculature is demonstrated; adjunct EMG biofeedback.
- ▶ **Psychological therapy** — cognitive-behavioural therapy, psychosexual counselling, supportive psychotherapy, and mindfulness-based relaxation.
- ▶ **Surgery** — **vestibulectomy** (with perineoplasty/laser vaporisation as alternatives) is reserved for **provoked vestibulodynia refractory to conservative treatment**; surgery is **not** used for generalized/unprovoked vulvodynia, where results are otherwise unsatisfactory.

Drug	Regimen
Lidocaine	5% topical ointment/gel to vestibule
Gabapentin	Topical 6% compounded cream to affected area; oral gabapentin also used, titrated from a low starting dose
Amitriptyline (TCA)	Oral, titrated up to 60 mg/day, continued for 3–6 months

Drug	Regimen
Carbamazepine	Oral anticonvulsant alternative, also reported beneficial

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 2.3 — Vulvar structures and subcutaneous layer of urogenital triangle. Inset: vestibule boundaries (Williams Obstetrics 26e, p.30)

Label the vestibule (bounded by the hymenal ring medially and Hart's line laterally), the openings of Bartholin's and Skene's ducts within it, the clitoris, and labia — this is the territory tested by the cotton-swab test and excised in vestibulectomy.

High-yield exam pointers

- ▶ Vulvodynia = vulvar pain ≥ 3 months, no identifiable cause, **diagnosis of exclusion**; prevalence ~15%.
- ▶ 2015 ISSVD/ISSWSH/IPPS terminology: site (localized/vestibulodynia, clitorodynia/generalized/mixed) $\times$ provocation (provoked/spontaneous/mixed) $\times$ onset (primary/secondary).
- ▶ **Cotton-swab test**: 12, 2, 5, 6, 7, 10 o'clock; pain $\geq 4/10$ = provoked vestibulodynia.
- ▶ Old term "vulvar vestibulitis syndrome" = provoked (localized) vestibulodynia.
- ▶ First-line: vulvar hygiene + topical lidocaine 5%/gabapentin; TCA (amitriptyline up to 60 mg/day $\times$ 3–6 months) is the systemic mainstay.
- ▶ **Vestibulectomy** only for refractory *provoked vestibulodynia*; surgery is not used for generalized vulvodynia.
- ▶ Multidisciplinary care: pelvic floor physiotherapy + psychosexual counselling/CBT alongside pharmacotherapy.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Gynaecology 7e still prints the older 2006 ISSVD classification table and the synonym "vulvar vestibulitis syndrome"; the 2015 ISSVD/ISSWSH/IPPS consensus terminology used above (localized/generalized/mixed $\times$ provoked/spontaneous $\times$ primary/secondary) is the current standard and is the version to reproduce in the exam.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; 2015 ISSVD/ISSWSH/IPPS consensus terminology and classification of persistent vulvar pain and vulvodynia (Bornstein et al., Obstet Gynecol 2016).



Vulvovaginitis

Asked in: Paper III May 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Vulvovaginitis is combined inflammation of the vulva and vagina; in gynaecological practice the term is used principally for the **childhood (premenarchal) entity**, seen typically between 2 and 10 years of age, and is the **commonest gynaecological complaint of childhood**. It occurs because the unestrogenised vulva and vagina of this age group lack the normal adult defence mechanisms, so that organisms of perineal or environmental origin readily produce infection. The usual presentation is vaginal discharge, pruritus, soreness, or dysuria; most cases are due to non-specific, polymicrobial infection rather than a single pathogen.

Predisposing factors and aetiology

Predisposing factor (why the child is vulnerable)	Mechanism
Lack of circulating oestrogen	No stratification of vaginal epithelium → no glycogen → absent <i>Doderlein's</i> bacilli → no lactic acid → vaginal pH stays alkaline (≈ 7) instead of the protective adult acid pH
Poor perineal hygiene, wiping back-to-front	Faecal flora contaminates the vestibule (vulva and vagina lie close to the anus)
Absent labial fat pad and pubic hair	Loss of the mechanical/anatomical barrier that develops at puberty
Thin, unkeratinised vulval skin	Easily traumatised and irritated by chemicals, tight clothing

Cause	Examples
Non-specific (commonest, polymicrobial)	Mixed perineal/faecal flora — no single organism isolated in most cases

Cause	Examples
Specific — non-gonococcal	<i>Streptococcus</i> (esp. group A), <i>Escherichia coli</i> , <i>Gardnerella vaginalis</i> , <i>Chlamydia trachomatis</i> , <i>Candida albicans</i> (rare once toilet-trained, seen in glycosuria/juvenile diabetes or recent antibiotic use), <i>Trichomonas vaginalis</i>
Specific — gonococcal	<i>Neisseria gonorrhoeae</i> — the most serious but now uncommon; always raises suspicion of sexual abuse
Foreign body	Toilet paper (commonest), small toys, beads — presents with foul-smelling or blood-stained discharge
Infestation	Threadworm (<i>Enterobius vermicularis</i>) migrating from the perianal region
Systemic/other	Following measles, chickenpox, or antibiotic therapy; juvenile diabetes mellitus; skin disease (lichen sclerosus, psoriasis, eczema, allergic/contact dermatitis to soaps or bubble bath)

Clinical features

► Symptoms

- Vaginal discharge — purulent, or blood-stained when a foreign body/neoplasm is present.
- Pruritus or soreness of the external genitalia, worse on walking.
- Dysuria and, occasionally, urinary retention from vulval soreness.
- Parents often notice the child crying during micturition or scratching herself.

► Signs

- Vulva reddened, oedematous, sometimes excoriated and bathed in discharge.
- Vaginal inspection (aural/nasal speculum, never a digital examination) shows congested epithelium with pooled discharge; the unestrogenised epithelium normally looks redder than in an adult, so mild erythema alone is not diagnostic.
- Labial agglutination (adhesions) may follow chronic inflammation.

Investigations

Investigation	Purpose / finding
Discharge collected on a platinum loop or fine pipette through the hymenal opening	Direct smear + Gram stain; identifies gonococci (intracellular Gram-negative diplococci)
Culture (Stuart's/Thayer-Martin media for gonococcus; Diamond's/Feinberg-Whittington for <i>Trichomonas</i>)	Confirms the causative organism and guides specific therapy

Investigation	Purpose / finding
Vaginoscopy (Huffman-Graves speculum, paediatric cystoscope, or hysteroscope)	Excludes a retained foreign body, cervical polyp, or sarcoma botryoides when discharge is recurrent or blood-stained
Perianal cellophane-tape smear + stool examination	Detects <i>Enterobius vermicularis</i> ova
Blood sugar	Excludes juvenile diabetes mellitus predisposing to candidal infection
Urine microscopy/culture	Excludes a concurrent urinary tract infection, a common confounder
Examination under anaesthesia	Reserved for suspected foreign body/tumour not settled by the above, or when sexual abuse is suspected

A persistent, recurrent, or blood-stained discharge that does not settle with treatment should always trigger a search for a foreign body, sexual abuse, or (rarely) sarcoma botryoides/an oestrogen-producing ovarian tumour — this exclusion is an integral part of managing childhood vulvovaginitis, not an afterthought.

Management

- ▶ **General/hygiene measures (first line in the large majority, where no organism is isolated)**
 - Perineal hygiene taught to child and parent — wiping front to back.
 - Warm sitz baths (plain water or baking soda) to relieve soreness.
 - Avoid chemical irritants — bubble bath, scented soaps, tight synthetic underwear; use loose cotton undergarments and keep the area dry.
- ▶ **Empirical/non-specific antibiotic therapy** (for persistent symptomatic discharge with mixed/no organism)
 - **Amoxicillin 20–40 mg/kg/day in 3 divided doses**, oral, for a short course.
 - **Local oestrogen cream** applied nightly for 2–3 weeks (Berek & Novak: a brief 2–6 week course) — restores vaginal epithelial defence and hastens healing; also used after removal of a foreign body or for labial adhesions/soreness.
- ▶ **Foreign body** — removal (aural forceps, vaginal irrigation, or vaginoscopy-guided retrieval), followed by local oestrogen cream to aid healing.
- ▶ **Specific therapy once an organism is identified**

Organism	Regimen
<i>Trichomonas vaginalis</i>	Metronidazole 100 mg orally thrice daily for 10 days (child dose)
<i>Candida albicans</i>	Topical clotrimazole 1% cream

Organism	Regimen
<i>Enterobius vermicularis</i> (threadworm)	Oral albendazole, single dose, repeated after 2 weeks
Gonococcal vulvovaginitis	Weight-adjusted ceftriaxone (as for adult gonorrhoea — ceftriaxone 250 mg IM plus azithromycin 1 g orally, dose-adjusted to body weight) — refer for evaluation and reporting of possible sexual abuse
Systemic illness-associated infection	Intramuscular antibiotic therapy for the underlying illness
Allergic/contact dermatitis	Remove the irritant; topical hydrocortisone 2% ointment twice daily
Labial adhesions	Usually resolve with oestrogen cream; manual/surgical separation (introitoplasty) rarely needed

- ▶ **Recurrent disease** — re-evaluate for an overlooked foreign body, threadworm, diabetes, or sexual abuse; most non-specific cases resolve spontaneously at puberty once endogenous oestrogen restores the normal acidic vaginal environment.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 9.9 — A: Labial adhesions. B: Cotton-tipped applicator placed inside the labial adhesions shown in A (Berek & Novak 16e, p.426)

High-yield exam pointers

- ▶ **Key mechanism to write:** low oestrogen → no glycogen → no *Doderlein's* bacilli → no lactic acid → vaginal pH ≈ 7 (alkaline) instead of adult acid pH.
- ▶ Commonest cause overall = **non-specific, polymicrobial** perineal-flora infection, not a named pathogen.
- ▶ **Blood-stained discharge in a child = foreign body until proven otherwise** (also exclude sarcoma botryoides, sexual abuse).
- ▶ Never do a digital vaginal examination in a child — use an aural/nasal speculum or vaginoscope.
- ▶ Doses to remember: Amoxicillin 20–40 mg/kg/day (3 divided doses); metronidazole 100 mg TDS × 10 days for trichomoniasis; local oestrogen cream nightly × 2–3 weeks.
- ▶ Threadworm is a common and easily missed cause — always ask about perianal itching and examine a perianal tape smear.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Yeast (candidal) vulvovaginitis is uncommon in prepubertal, toilet-trained girls and should prompt a search for an underlying cause such as juvenile diabetes mellitus or recent antibiotic use.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e.



Write briefly on bone health in menopausal women

Asked in: Paper III Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Estrogen deficiency after menopause uncouples bone remodelling, so osteoclastic resorption outpaces osteoblastic formation, producing a 3–5%/year loss of bone mass in the early postmenopausal years. This reduces bone mineral density (BMD) with normal mineral-to-matrix ratio — **osteoporosis** — and raises the lifetime risk of fragility fracture of the vertebra, femoral neck and distal radius (Colles').

Mechanism of postmenopausal bone loss

Estrogen action lost at menopause	Consequence
Inhibition of osteoclast activity and IL-1 release from monocytes	Unchecked osteoclastic resorption
Stimulation of intestinal calcium absorption	Negative calcium balance
Stimulation of calcitonin secretion (thyroid C cells)	Loss of resorption brake
Increase in 1,25-dihydroxyvitamin D	Reduced bone mineralisation
Maintenance of trabecular micro-architecture	Trabecular bone (vertebra, distal radius) lost preferentially — vertebral/wrist fractures occur early; cortical (hip) loss is slower but causes the most morbid fracture

Risk factors for osteoporosis

Non-modifiable	Modifiable	Associated conditions
Age, White/Asian race, small body frame	Low dietary calcium/vitamin D, smoking, excess alcohol, sedentary lifestyle	Anovulation/eating disorders, hyperthyroidism, hyperparathyroidism, chronic renal disease, rheumatoid arthritis
Early menopause (surgical/radiation), prior fragility fracture, family history	Low body weight (low body mass index, BMI), high caffeine intake	Long-term corticosteroid, heparin, GnRH-analogue or anticonvulsant use

Screening and diagnosis

Test	Purpose/finding
Dual-energy X-ray absorptiometry (DXA/DEXA) of hip and spine	Gold-standard bone mineral density (BMD) measurement; reported as T-score (SD from young-adult mean) and Z-score (SD from age-matched mean)
WHO T-score criteria	Normal: T $\geq$ -1.0. Osteopenia: T-score -1.0 to -2.5. Osteoporosis: T-score $\leq$ -2.5
FRAX (WHO Fracture Risk Assessment Tool)	Online tool combining 11 risk factors + femoral-neck BMD to give 10-year probability of major osteoporotic/hip fracture; used to decide on pharmacotherapy in the osteopenic range
Screening indication	DXA recommended in all women $\geq$65 years regardless of risk factors, and in younger postmenopausal women with $\geq$ 1 risk factor besides being White and menopausal
Secondary-cause work-up before treatment	Complete blood count, renal/liver panel, thyroid-stimulating hormone, parathyroid hormone, 25-OH vitamin D, 24-hour urinary calcium

Management — prevention and treatment

1. Lifestyle measures (all women):

- ▶ Weight-bearing and muscle-strengthening exercise (walking, jogging) — improves balance, strength and reduces falls.
- ▶ Smoking cessation; limit alcohol and caffeine.
- ▶ Fall-prevention: home safety assessment, grab bars, night lights, vision correction, avoid CNS-depressant drugs.
- ▶ **Calcium** 1,200 mg/day (diet preferred; supplement only if dietary intake is inadequate).

- **Vitamin D3 (cholecalciferol)** 800–1,000 IU/day (up to 2,000 IU/day per Indian texts) — calcium and vitamin D alone do not directly reduce fracture risk but are foundational to all regimens.

2. Pharmacologic therapy — indicated for osteoporosis (T-score ≤ -2.5), prior hip/vertebral fragility fracture, or osteopenia with a high FRAX-predicted fracture risk:

Class	Drug and dose	Notes
Bisphosphonates (antiresorptive, first line)	Alendronate 35 mg (prevention) or 70 mg (treatment) orally once weekly; Risedronate 35 mg weekly or 150 mg monthly orally; Ibandronate 150 mg orally monthly or 3 mg intravenously (IV) every 3 months; Zoledronic acid 5 mg IV once yearly	Take on empty stomach with a full glass of water, remain upright and fast 30 minutes; rare risks — osteonecrosis of jaw, atypical femoral fracture, (IV) atrial fibrillation/renal impairment; "drug holiday" after 3–5 years as antifracture effect persists
Hormone therapy (HT)	Estrogen or estrogen-progestin combination (e.g., conjugated equine estrogen 0.625 mg/day)	Women's Health Initiative (WHI) trial: 34% reduction in hip fracture with HT; Food and Drug Administration (FDA)-approved for osteoporosis prevention; also relieves vasomotor and urogenital symptoms — best used when HT is already indicated for symptom control, not as a bone-only agent given breast cancer/venous thromboembolism/cardiovascular risk
Selective estrogen receptor modulator (SERM)	Raloxifene 60 mg orally once daily	Increases spine BMD, reduces vertebral (not non-vertebral) fractures, lowers low-density lipoprotein (LDL); also reduces invasive breast cancer risk; increases venous thromboembolism and stroke risk; does not relieve hot flashes
Tissue-selective estrogen complex	Bazedoxifene 20 mg/conjugated estrogen 0.45 mg, once daily	Approved for osteoporosis prevention in women with a uterus
RANK-ligand inhibitor	Denosumab 60 mg subcutaneously every 6 months	Monoclonal antibody; reduces vertebral and hip fracture; rapid bone loss on stopping — must transition to another agent

Class	Drug and dose	Notes
Anabolic (bone-forming) agents	Teriparatide (recombinant parathyroid hormone 1-34) 20 µg/day subcutaneously; abaloparatide 80 µg/day subcutaneously	Reserved for severe osteoporosis/high fracture risk; increases osteoblast number/activity; limit use to 18–24 months (lifetime cap 2 years); side effects — leg cramps, nausea, headache
Calcitonin	200 IU intranasal daily, or 50–100 IU subcutaneously daily	Inhibits osteoclastic resorption; weakest antifracture evidence — used when estrogen/bisphosphonates contraindicated

3. **Adjuncts:** phytoestrogens/soy isoflavones and tibolone (2.5 mg/day) have mild bone-protective, estrogen-agonist activity and may help women who cannot take standard HT or bisphosphonates.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 17.18 — Normal (A) and osteoporotic (B) bone architecture. (Speroff 9e, p.1701)

High-yield exam pointers

- ▶ **T-score cut-offs (write verbatim):** Normal ≥ -1.0 ; Osteopenia -1.0 to -2.5 ; Osteoporosis ≤ -2.5 (dual-energy X-ray absorptiometry, DXA/DEXA).
- ▶ **DXA screening:** all women ≥ 65 years, or earlier if ≥ 1 risk factor.
- ▶ **FRAX** = 10-year fracture-risk probability tool; guides therapy in the osteopenic zone.
- ▶ **First-line drug + dose:** alendronate 70 mg orally once weekly (treatment) — empty stomach, upright 30 minutes.
- ▶ **WHI:** HT reduced hip fracture by 34%.
- ▶ Anabolic agent (teriparatide 20 µg/day subcutaneously) capped at 2 years; denosumab/teriparatide need a follow-on agent on stopping.
- ▶ Calcium 1,200 mg/day + vitamin D 800–1,000 IU/day is the universal baseline — never omit even when a drug is started.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e records vitamin D3 dosing up to 1,500–2,000 IU/day and zoledronic acid as 4 mg IV; the figures above follow the more recent Berek & Novak 16e/current guideline dosing (vitamin D 800–1,000 IU/day; zoledronic acid 5 mg IV yearly for osteoporosis treatment), which should be used in the exam.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; ACOG Practice Bulletin No. 129 (Osteoporosis).

**Gynaecological oncology****"Fetus as a Patient" — Describe Methods of Screening Mothers at Risk for Fetal Disease**

Asked in: Paper II Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — The "fetus as a patient" concept recognises the fetus as an individual with its own diagnosable disease, prognosis, and treatment options, not merely a passenger within the mother. **Prenatal diagnosis** is the discipline of identifying congenital structural, chromosomal, and single-gene disease in the fetus. It begins with **screening** — non-invasive tests that estimate the risk that a given pregnancy is affected — reserving invasive diagnostic testing (chorionic villus sampling (CVS)/amniocentesis) for those who screen positive.

Identifying the Mother "At Risk" — Indications for Targeted Counselling

Maternal / historical risk factors	Pregnancy / ultrasound risk factors
Age ≥35 years at delivery (advanced maternal age)	Abnormal first- or second-trimester serum screen
Previous child/fetus with chromosomal abnormality or neural-tube defect (NTD)	Structural anomaly or "soft marker" on ultrasound
Parent with balanced translocation/structural chromosomal rearrangement	Oligohydramnios or polyhydramnios
Family history of a heritable single-gene disorder; consanguinity	Severe symmetric fetal-growth restriction
Ethnic predisposition (Ashkenazi Jewish, Mediterranean/African/Asian) to a specific recessive disorder	Uncontrolled pregestational diabetes in the periconceptional period
Recurrent pregnancy loss	Periconceptional teratogen exposure or infection (e.g., rubella, cytomegalovirus)
Higher-order multifetal gestation	Multifetal gestation (reduces screening accuracy)

All pregnant women — irrespective of the above — should be **offered** aneuploidy and NTD screening (American College of Obstetricians and Gynecologists, ACOG 2020); the table identifies those needing individualised counselling and, often, direct diagnostic testing rather than screening.

Methods of Screening

- 1. First-trimester combined screening (11–14 weeks).** Nuchal translucency (NT) by ultrasound + serum free β -human chorionic gonadotropin (β -hCG) + pregnancy-associated plasma protein-A (PAPP-A). Trisomy 21 pregnancies show $\uparrow$ hCG and $\downarrow$ PAPP-A; trisomy 18/13 show both $\downarrow$. NT ≥ 3 mm or ≥ 99 th percentile prompts detailed ultrasound $\pm$ fetal echocardiography.
- 2. Second-trimester analyte ("quadruple") screening (15–20/21 weeks).** Maternal serum alpha-fetoprotein (MSAFP), hCG, unconjugated estriol (uE3), dimeric inhibin-A. Trisomy 21: $\downarrow$ MSAFP, $\uparrow$ hCG, $\downarrow$ uE3, $\uparrow$ inhibin-A.
- 3. Combined first- + second-trimester screening.** Integrated (NT + PAPP-A at 11–14 weeks, quad markers at 15–21 weeks) or sequential (stepwise/contingent) strategies raise detection above either component alone.
- 4. Cell-free DNA (cfDNA) screening / "NIPT".** Analyzes placental-derived cfDNA in maternal blood from 9–10 weeks onward; may be used in any pregnancy. Highest sensitivity/specificity of all screening modalities but not diagnostic.

Screening test	Detection rate (trisomy 21)	False-positive rate	Positive predictive value
Quadruple screen	80–82%	5%	~3%
First-trimester combined (NT+hCG+PAPP-A)	80–84%	5%	3–4%
Integrated screening	94–96%	5%	~5%
Sequential (stepwise/contingent)	91–97%	4.5–5.1%	~5%
Cell-free DNA (positive result)	~99%	0.1%	age-dependent (Table below)

cfDNA pooled sensitivity: trisomy 21 = 99.7%, trisomy 18 = 98%, trisomy 13 = 99%; specificity 99.9% for each (Gil, 2017). Positive predictive value rises steeply with maternal age — e.g., trisomy 21 PPV is ~48% at age 20 but ~93% at age 40 — because PPV depends on baseline disease prevalence. No-call/indeterminate results occur in 2–4% (low fetal fraction, e.g., maternal obesity), carrying a residual aneuploidy risk of up to 4%; amniocentesis should then be offered.

5. Ultrasound screening.

- *First-trimester:* NT (with nasal bone, ductus venosus flow, tricuspid regurgitation at specialised centres).
- *Detailed (second-trimester) anomaly scan, 18–20/22 weeks:* systematic fetal anatomical survey for major structural anomalies (which alone carry a high enough aneuploidy risk to warrant direct

diagnostic testing with chromosomal microarray) and minor "soft markers" — nuchal fold ≥ 6 mm, echogenic intracardiac focus, echogenic bowel, renal pelvis dilatation ≥ 4 mm, short femur/humerus, absent/hypoplastic nasal bone, single umbilical artery. Each marker carries its own likelihood ratio and modifies aneuploidy risk when analyte screening has already been performed.

6. Maternal serum AFP for neural-tube defects. Threshold 2.5 multiples of the median (MoM); detects ~90–95% of anencephaly and ~80% of open spina bifida (screen-positive rate 1–3%). MSAFP elevation is non-specific — also seen with wrong dates, multifetal gestation, ventral-wall defects, fetal death, and Rh isoimmunisation — and elevated levels should prompt a detailed ultrasound examination, now the preferred diagnostic step, before amniocentesis.

7. Carrier screening for single-gene/recessive disorders — ideally preconceptional; strategies are ethnicity-based, panethnic, or expanded-panel screening (ACOG 2020).

Disorder	Gene/locus	Approximate carrier frequency	Confirmatory test
Cystic fibrosis	<i>CFTR</i> , chromosome 7	~1:25 (Ashkenazi Jewish/non-Hispanic white)	23-mutation panethnic panel; expanded sequencing panel
Spinal muscular atrophy	<i>SMN1</i> , chromosome 5q13.2	~1:35–1:117 (ethnicity-dependent)	SMN1 copy-number analysis
Sickle-cell disease/trait	β -globin	~1:12 African Americans	Hemoglobin electrophoresis
Thalassemia (α/β)	α/β -globin	Mediterranean, Southeast Asian, African	Electrophoresis $\pm$ molecular testing
Tay-Sachs, Canavan, familial dysautonomia	Various	1:30, 1:40, 1:32 (Ashkenazi Jewish)	Targeted mutation panel

If a woman's screen is positive, her partner is offered screening; if both are carriers, genetic counselling and prenatal diagnostic testing (CVS/amniocentesis) are offered.

Pretest Counselling — Essential Elements

- ▶ Every pregnant woman has three options: screening, diagnostic testing, or neither.
- ▶ Screening estimates risk; it does not diagnose — a positive result requires diagnostic confirmation, a negative result lowers but does not eliminate risk.
- ▶ No single screening test is superior in all circumstances (ACOG); choice depends on gestational age at presentation, singleton versus multifetal gestation, and patient preference.
- ▶ Screening tests are less accurate in multifetal gestation and are not recommended once a major structural anomaly is already identified — direct diagnostic testing is preferred instead.

- ▶ Irreversible decisions should never be based on a screening result alone.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 17.2 — Sagittal image of a normal, 12-week fetus showing correct caliper placement for nuchal translucency measurement, with the nasal bone and skin labelled (Williams Obstetrics 26e, p.352)

Also sketch as a flowchart: **All pregnant women** → offered choice of (a) no screening, (b) screening [first-trimester combined / quad / integrated-sequential / cfDNA], (c) direct diagnostic testing (if major anomaly or very high a priori risk) → **screen-positive** → genetic counselling → diagnostic testing (CVS 10–13 weeks or amniocentesis ≥15 weeks) → karyotype/microarray result → informed decision on pregnancy management.

High-yield exam pointers

- ▶ NT window: **11–14 weeks**; abnormal if ≥3 mm or ≥99th percentile for crown-rump length.
- ▶ MSAFP cut-off for NTD screening: **2.5 MoM**; detects ~90% anencephaly, ~80% spina bifida.
- ▶ cfDNA: usable **after 9–10 weeks**; highest PPV of any screening test but still **not diagnostic** — confirm with CVS/amniocentesis.
- ▶ Quad screen analytes mnemonic — "**AFP, hCG, Estriol, Inhibin-A**"; combined first-trimester = "**PAPP-A + free β-hCG + NT**."
- ▶ Carrier screening triad in Ashkenazi Jewish couples: **Tay-Sachs, Canavan, familial dysautonomia**.
- ▶ CVS timing 10–13 weeks (transcervical/transabdominal); amniocentesis from ~15 weeks.
- ▶ Every screen-positive result → offer diagnostic test; never terminate a pregnancy on a screening result alone.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older textbook editions (e.g., DC Dutta's Obstetrics) cite somewhat higher detection rates for combined first-trimester (~92%) and quadruple (~85%) screening than the pooled contemporary figures above (80–84% and 80–82%, both at a 5% false-positive rate); the figures used in this answer follow current Williams Obstetrics 26e/ACOG-referenced data.

SOURCE & COVERAGE

Williams Obstetrics 26e (Chapter 17, "Prenatal Diagnosis"; Chapter 10, "Genetic Screening"); DC Dutta's Textbook of Obstetrics 9e (Chapter 12, "Prenatal Genetic Counseling, Screening and Diagnosis"); ACOG Practice Bulletins/Committee Opinions on aneuploidy screening, carrier screening, and cell-free DNA screening (2020).



60 years old post menopausal woman presents with two episodes of bleeding. Discuss the management if diagnosed with endometrial carcinoma

Asked in: Paper III Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Endometrial carcinoma is a malignant tumour arising from the glandular epithelium of the endometrium; it is the commonest genital malignancy in the West and the third commonest in India after cancer cervix and ovary. Any postmenopausal bleeding is considered due to endometrial carcinoma until proved otherwise, and once histology (endometrial biopsy or fractional curettage) confirms the diagnosis, treatment is planned on the basis of surgico-pathological staging.

Pretreatment work-up before definitive treatment

Investigation	Purpose
Complete haemogram, blood sugar, renal and liver function tests	Fitness for major surgery/anaesthesia (patient usually elderly, obese, with comorbidities)
Transvaginal sonography with colour Doppler	Endometrial thickness, myometrial invasion (screening)
MRI pelvis (best modality)	Depth of myometrial invasion, cervical stromal extension
CT abdomen-pelvis / chest X-ray	Nodal and distant metastasis
Serum CA-125	Baseline in serous histology; monitors treatment response
Histological grade & type (already obtained)	Endometrioid (Type I) vs serous/clear-cell (Type II) — drives extent of surgery
ECG, chest X-ray, anaesthetic fitness	Elderly, obese patients with frequent hypertension/diabetes

FIGO staging (endometrial carcinoma)

Stage	Description
I	Confined to corpus uteri (± ovary if low-grade endometrioid, synchronous primary)
IA	Non-aggressive histology, endometrium only or <50% myometrial invasion, no/focal lymphovascular space invasion (LVSI)
IB	Non-aggressive histology, ≥50% myometrial invasion, no/focal LVSI
IC	Aggressive histology (serous, clear-cell, carcinosarcoma), confined to endometrium/polyp

Stage	Description
II	No extrauterine spread
IIA	Cervical stromal invasion, non-aggressive histology
IIB	Substantial LVSI, non-aggressive histology
IIC	Aggressive histology with any myometrial invasion
III	Local/regional spread
IIIA	Serosa/adnexal involvement
IIIB	Vagina/parametrium (B1) or pelvic peritoneum (B2)
IIIC	Pelvic (C1) or para-aortic (C2) nodal metastasis
IV	Distant spread
IVA	Bladder/bowel mucosa invasion
IVB	Abdominal peritoneal spread beyond pelvis
IVC	Distant metastasis (lung, liver, bone, inguinal/other extra-abdominal nodes)

Surgical management — mainstay in all operable stages

- ▶ **Route:** midline/paramedian laparotomy traditionally; laparoscopic or robot-assisted surgery is now the preferred minimally invasive route, with equivalent oncological outcome and lower morbidity.
- ▶ **Peritoneal washings** for cytology — collected and reported separately (does not change stage).
- ▶ **Thorough exploration** of liver, diaphragm, omentum, pelvis and para-aortic nodes; uterus is NOT held with a vulsellum (risk of tumour spill) — traction is taken on the cornua with straight artery forceps.
- ▶ **Total (extrafascial) hysterectomy with bilateral salpingo-oophorectomy** — the core operation for Stage I disease.
- ▶ **Uterus opened on the table:** gross (or frozen-section) assessment of tumour size, myometrial invasion depth and cervical extension.
- ▶ **Sentinel lymph node mapping** (cervical injection of indocyanine green with fluorescence imaging) is now preferred over routine complete lymphadenectomy for staging low-to-intermediate-risk disease; nodes positive on ultrastaging are managed as node-positive disease.
- ▶ **Comprehensive pelvic + para-aortic lymphadenectomy** — reserved for high-risk features: tumour >2 cm, deep (>50%) myometrial invasion, cervical extension, grade 3, or non-endometrioid histology.

- ▶ **Omentectomy** for serous/clear-cell histology.
- ▶ **Stage II:** modified radical hysterectomy with bilateral salpingo-oophorectomy and pelvic/para-aortic lymphadenectomy; alternatively, extrafascial hysterectomy followed by adjuvant radiation, or radiation followed by hysterectomy in 6 weeks.
- ▶ **Stage III/IV (operable):** maximal cytoreductive surgery aiming for no gross residual disease, followed by chemoradiation.
- ▶ **Vaginal hysterectomy:** selectively for Stage I, well-differentiated tumour, in women with prolapse or extreme obesity/poor surgical risk.

Risk-adapted adjuvant therapy (after surgical staging)

Risk group	Features	Adjuvant treatment
Low risk	Stage IA, Grade 1–2, no LVSI	Observation only
Intermediate risk	Stage IB Grade 1–2, or IA Grade 3, no substantial LVSI	Vaginal vault brachytherapy (reduces vaginal recurrence — PORTEC-2)
High-intermediate risk	Substantial LVSI, or Stage II	Vaginal brachytherapy ± whole-pelvis external beam radiotherapy (EBRT)
High risk	Stage III, Grade 3 with deep invasion, serous/clear-cell histology	Whole-pelvis EBRT (45–50 Gy/25–28 fractions over 5 weeks) + vaginal vault boost, combined with adjuvant chemotherapy (PORTEC-3/GOG-258)
Advanced (III with gross residual/IV)	Any residual disease	Combination chemotherapy ± sequential/concurrent pelvic radiation

Chemotherapy and hormonal therapy

Modality	Regimen
Standard combination chemotherapy	Carboplatin (AUC 5–6) + Paclitaxel 175 mg/m ² , IV, every 3 weeks × 6 cycles — current standard for advanced/recurrent disease
Older regimen (still described in some texts)	TAP — Paclitaxel + Doxorubicin (Adriamycin) + Cisplatin
Progestogens (well-differentiated, ER/PR-positive, medically inoperable, or fertility issues not relevant here but useful in frail elderly unfit for surgery)	Medroxyprogesterone acetate 1 g/week IM or 150 mg/day oral; or 17-hydroxyprogesterone caproate 1 g/week IM; or Megestrol acetate 160 mg/day oral — continued ≥3 months
Tamoxifen (added to progestogen for synergy)	10 mg twice daily

Modality	Regimen
Immune checkpoint inhibition (advanced/recurrent, especially mismatch-repair-deficient tumours)	Considered in select advanced/recurrent disease per current oncology practice, added to chemotherapy or as maintenance

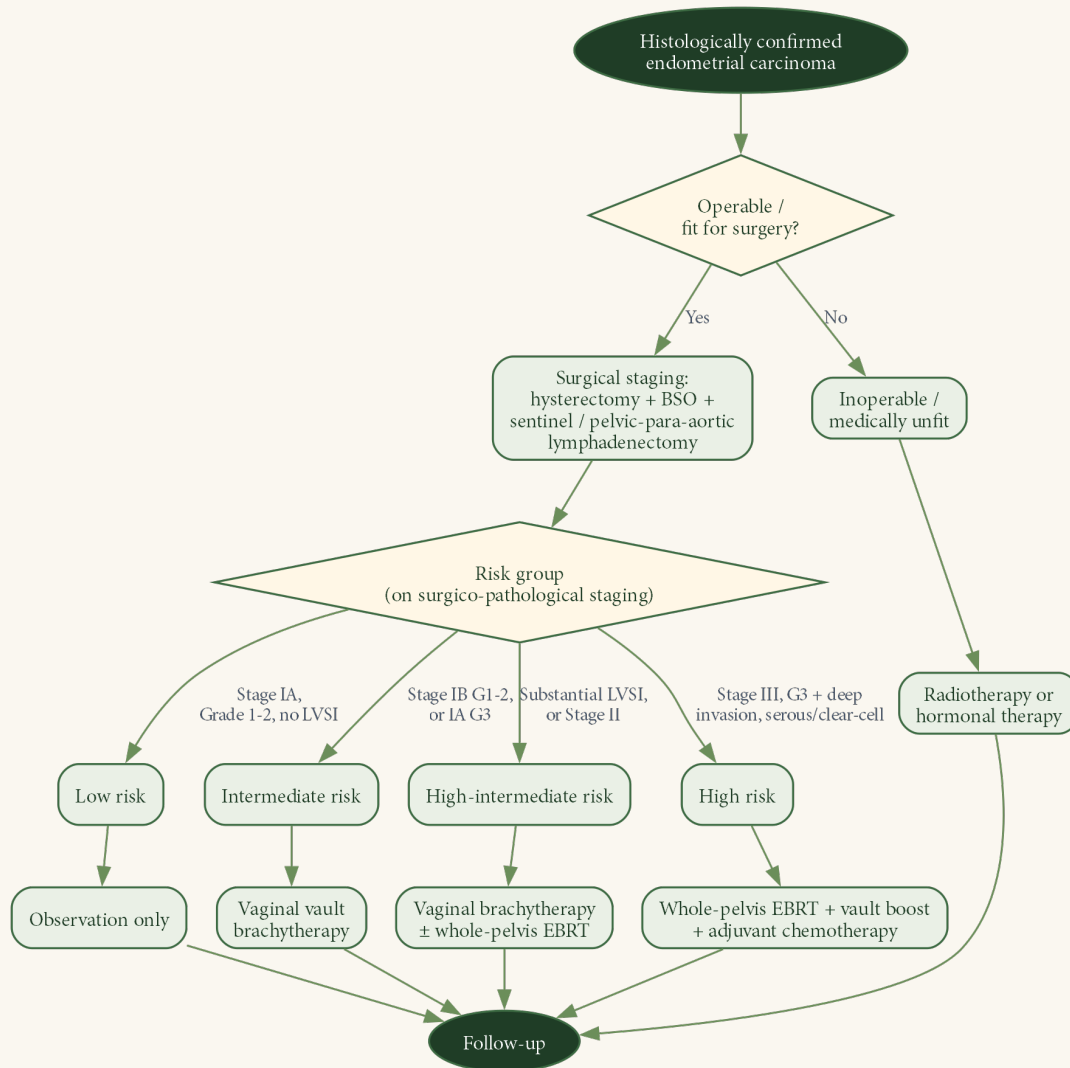
Recurrent disease

- ▶ **Isolated vaginal/pelvic recurrence** (no prior radiation): radiotherapy (EBRT + vaginal brachytherapy) gives the best salvage rates.
- ▶ **Prior radiation field recurrence** or **distant recurrence**: surgical resection where feasible (better-differentiated tumour, long disease-free interval, resectable margins), otherwise chemotherapy ± hormonal therapy.
- ▶ **Estrogen replacement** for severe postmenopausal symptoms after treatment is individualised; non-hormonal agents (e.g., clonidine) or topical vaginal estrogen for urogenital symptoms are alternatives.

Follow-up

Clinical examination every 4 months for 2 years, 6-monthly for the next 3 years, then annually; annual chest X-ray and mammography; CA-125 monitoring if serous histology; MRI/CT only if clinically indicated.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Risk-adapted management pathway from confirmed diagnosis through surgical staging to adjuvant therapy and follow-up.

High-yield exam pointers

- ▶ "Postmenopausal bleeding = endometrial carcinoma until proved otherwise" — always open with this.
- ▶ FIGO staging is **surgico-pathological**, not clinical — hysterectomy specimen dictates the final stage.
- ▶ Extrafascial TAH-BSO is the operation of choice for Stage I; sentinel lymph node mapping (indocyanine green) is replacing routine full lymphadenectomy in low/intermediate-risk disease.
- ▶ Remember the adjuvant ladder: Observation (low risk) → vaginal brachytherapy (intermediate) → brachytherapy ± EBRT (high-intermediate) → EBRT + chemotherapy (high risk).

- ▶ Current standard chemotherapy doublet: **carboplatin + paclitaxel**, not the older TAP regimen.
- ▶ Progestogen doses to write verbatim: MPA 1 g/week IM or 150 mg/day oral; 17-OHPC 1 g/week IM; megestrol acetate 160 mg/day.
- ▶ Lynch syndrome carriers: prophylactic hysterectomy + bilateral salpingo-oophorectomy reduces endometrial cancer risk from 40–60% lifetime risk to nil, and also reduces ovarian cancer risk.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

FIGO revised the endometrial cancer staging in 2023 to incorporate histological subtype and lymphovascular space invasion into Stage I/II sub-stages (as reflected above); DC Dutta's Gynaecology 7e and Berek & Novak's Gynecology 16e in this library still print the preceding FIGO 2009 staging (Stage IA/IB split purely by 50% myometrial invasion, without histology-based sub-stages) — the 2023 staging is followed here as the current standard.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e (including PORTEC-1/2/3 trial data and ESMO-ESGO-ESTRO consensus risk-group framework cited therein); FIGO Committee on Gynecologic Oncology staging (2009 corpus reference, updated to FIGO 2023 endometrial staging per current practice).



A 30-year-old patient has High grade squamous intraepithelial lesion (HSIL) cytology on her routine pap smear. How will you manage?

Asked in: Paper III 18-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — High-grade squamous intraepithelial lesion (HSIL) is a **Bethesda System** cytologic category combining moderate dysplasia, severe dysplasia and carcinoma-in-situ (histologically CIN 2, CIN 3 and CIS). It carries a high risk of underlying CIN 2/3 on colposcopic biopsy (~70%) and a small but real risk of invasive cancer (~1–2%), so it mandates prompt colposcopic evaluation.

Step 1 — Initial evaluation

- ▶ History: age, parity, fertility wish, smoking, HIV/immunosuppression, prior smear/colposcopy/treatment, contraception.
- ▶ Confirm pregnancy status (urine β -hCG) — management pathway differs if pregnant.
- ▶ Per-speculum examination of the cervix — look for a grossly visible growth; a visible lesion suspicious for invasion is biopsied directly and staged clinically, **not** managed by routine colposcopy-directed biopsy.

Step 2 — Colposcopy-directed diagnosis

- ▶ Colposcopy with directed biopsy is mandatory for any woman with HSIL cytology — at least 2, and up to 4, biopsies of all acetowhite/abnormal areas.
- ▶ Endocervical curettage (ECC) if the squamocolumnar junction (SCJ) is not fully seen (unsatisfactory colposcopy/Type 2–3 transformation zone) — excludes endocervical and glandular disease.
- ▶ "See-and-treat" exception: in a woman who has completed childbearing and is unlikely to return for follow-up, an outpatient excisional procedure (loop electrosurgical excision procedure, LEEP) may be performed directly after HSIL cytology, without prior biopsy, since roughly two-thirds will have CIN 2/3 on histology.
- ▶ Colposcopic impression is graded normal/benign, low-grade or high-grade, and correlated with the cytology and biopsy (triple assessment) before deciding treatment.

Step 3 — Definitive treatment once CIN 2/3 (or CIS) is confirmed

Modality	Technique	When used
LEEP/LLETZ (loop excision) — preferred	Wire loop, 35–55 W, 0.5 mm loop; excises the transformation zone; gives a tissue specimen for margin assessment	First-line for CIN 2–3; simultaneously diagnostic (rules out occult microinvasion) and therapeutic; recurrence 4–10%
Cold-knife/laser conization	Scalpel/electrode/laser cone of cervix and canal	Unsatisfactory colposcopy (SCJ not seen), suspected microinvasion or glandular disease (AIS), cytology–colposcopy–histology discordance
Ablative therapy (cryotherapy, laser ablation)	Destroys epithelium without tissue for histology	Only if: SCJ fully visualised (satisfactory colposcopy), small ectocervical lesion, negative ECC, no gland involvement, no discordance, no suspicion of invasion
Hysterectomy	Simple hysterectomy	Adenocarcinoma-in-situ (AIS) on a diagnostic excisional specimen with childbearing complete; recurrent/persistent CIN 2–3 after re-excision when conservative options are exhausted

- ▶ Ablative therapy is **not** appropriate if there is CIN 2–3 in the endocervix (positive ECC), or any evidence of microinvasive/invasive cancer on cytology, colposcopy, ECC or biopsy.

- ▶ Positive excision margins → higher recurrence risk (endocervical gland involvement raises residual/recurrence rate); re-excision or close co-testing surveillance is recommended.

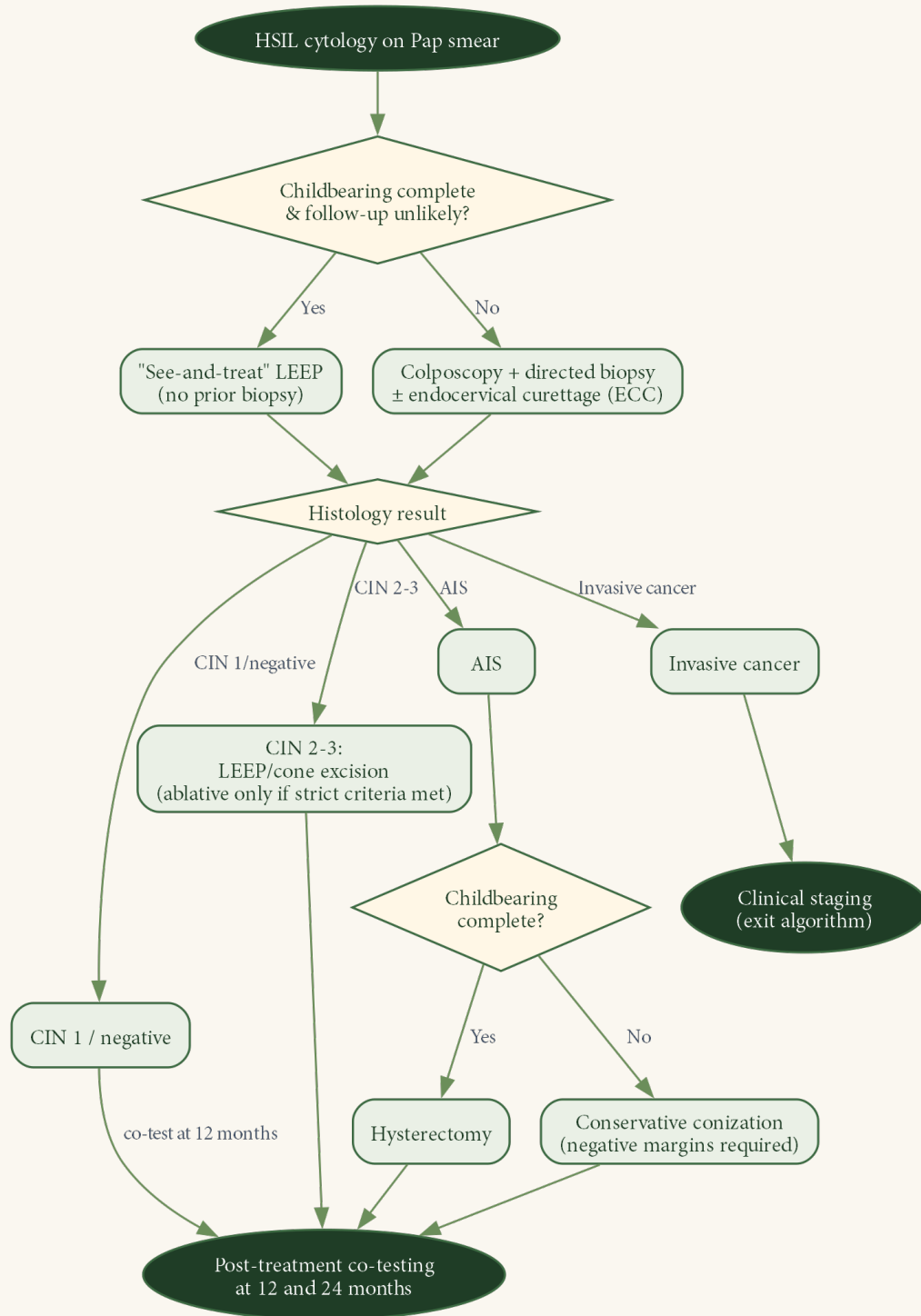
Step 4 — Special clinical situations

Situation	Management
Pregnancy	Colposcopy + biopsy only if invasion is suspected; otherwise follow with cytology/colposcopy through pregnancy; re-evaluate at 6 weeks postpartum ; no excisional/ablative treatment antenatally unless invasive cancer is diagnosed
Age <25 years with CIN 2 (not CIN 3)	Intensive observation — colposcopy + cytology at 6 and 12 months, then co-testing a year later if normal — rather than immediate treatment, to avoid preterm-birth risk from excision and because regression is common
Fertility desired, AIS	Conservative conization acceptable if margins and endocervical sampling are negative; positive margins mandate re-excision because of cancer risk
Childbearing complete, AIS	Hysterectomy is the preferred definitive treatment after diagnostic excision confirms AIS

Step 5 — Post-treatment follow-up

- ▶ Co-testing (cytology + high-risk HPV) at **12 and 24 months** after treatment for CIN 2/3 — if both are negative, return to age-appropriate routine screening.
- ▶ For AIS treated conservatively, reassessment at **6 months** with cytology, colposcopy, high-risk HPV testing and endocervical sampling.
- ▶ Any abnormal result on surveillance → repeat colposcopy and biopsy; positive margins with abnormal follow-up → re-excision.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Algorithm for triage and treatment of HSIL cytology, from colposcopy/see-and-treat through histology-directed management to post-treatment surveillance.

High-yield exam pointers

- ▶ HSIL (Bethesda) = CIN 2 + CIN 3 + CIS; ~70% have CIN 2/3, ~1–2% invasive cancer on colposcopic biopsy.
- ▶ "See-and-treat" LEEP is acceptable only when childbearing is complete and follow-up is unreliable.
- ▶ LEEP is preferred over ablative methods for CIN 2–3 because it yields tissue to exclude occult invasion.
- ▶ Ablative therapy is contraindicated if ECC is positive, gland involvement, unsatisfactory colposcopy, or suspected invasion.
- ▶ Pregnancy: observe with cytology/colposcopy; treat only if invasion suspected; reassess 6 weeks postpartum.
- ▶ Age <25 with CIN 2: observe (colposcopy + cytology at 6 and 12 months) — do not treat immediately.
- ▶ Post-treatment surveillance = co-testing at 12 and 24 months before return to routine screening.
- ▶ AIS: hysterectomy if fertility complete; conservative conization with negative margins if fertility desired.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The excisional/ablative criteria and co-testing follow-up schedule above follow the current ASCCP (American Society for Colposcopy and Cervical Pathology) risk-based management consensus; older editions of Indian textbooks still describe the earlier 2006 ASCCP terminology, but the underlying triage principle — colposcopy-directed biopsy before treatment, with "see-and-treat" reserved for select patients — is unchanged.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; ASCCP risk-based management consensus guidelines.



Anatomy of Cervix and pathology of Cervical intraepithelial neoplasia

Asked in: Paper I 12-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — The cervix is the lowermost fibromuscular part of the uterus, extending from the histological internal os to the external os, which is the principal site of **cervical intraepithelial neoplasia** (CIN) — a premalignant lesion in which the normal squamous epithelium of the transformation zone is replaced, to a variable thickness, by cells showing disordered maturation and nuclear atypia without

breach of the basement membrane, driven by persistent high-risk human papillomavirus (hrHPV) infection.

Gross anatomy of the cervix

Feature	Description
Position	Lowermost part of the uterus; extends from histological internal os to external os
Shape/size	Almost cylindrical; ~2.5 cm in length and diameter
Parts	Supravaginal part (1.25 cm, above the vaginal vault) and vaginal part/portio vaginalis (1.25 cm, projecting into the vaginal fornix)
External os	Nulliparous — small, circular; Parous — transverse slit-like with anterior and posterior lips (from tear of circular fibres at delivery)
Composition	Mainly fibrous connective tissue; smooth muscle only 10–15% (unlike the corpus, which is chiefly muscular)
Peritoneal coat	Only the posterior surface is covered by peritoneum
Relations	Anterior — separated from bladder base by loose areolar tissue below the internal os; Posterior — related to pouch of Douglas; Lateral — base of broad ligament/parametrium, with the ureter passing ~1.5 cm lateral to the supravaginal cervix, crossed above and in front by the uterine artery
Supports	Transverse cervical (Mackenrodt's/cardinal) ligament, uterosacral ligament, and pubocervical fascia condense around the cervix at the level of the internal os

Histology and the transformation zone

- ▶ **Endocervix** — endocervical canal lined by a single layer of tall mucus-secreting columnar epithelium (ciliated over the folds); mucosal folds form the **arbor vitae uteri**; complex racemose glands dip into the stroma, and subcolumnar reserve cells lie beneath the columnar layer.
- ▶ **Ectocervix (portio vaginalis)** — covered by non-keratinised stratified squamous epithelium continuous with the vagina.
- ▶ **Original squamocolumnar junction (SCJ)** — the abrupt meeting point of columnar and squamous epithelium; a dynamic point that shifts with hormonal state (moves outward onto the ectocervix at puberty, in pregnancy, and on the pill under high oestrogen; retreats up the canal after menopause).

- **Transformation zone (TZ)** — the 1–10 mm zone between the original SCJ and the new, physiologically active SCJ, in which columnar epithelium is progressively replaced by metaplastic squamous epithelium (subcolumnar reserve-cell metaplasia, and squamous epidermidisation from the ectocervical margin). This zone is constantly exposed to hormonal, infective and traumatic stimuli and is therefore the site where **dysplasia, carcinoma in situ, and invasive carcinoma most often arise**.
- **Cervical secretion** — alkaline mucus (pH 7.8), rich in fructose, glycoprotein and mucopolysaccharide; oestrogen aligns the glycoprotein network to favour sperm ascent, progesterone forms interlacing bridges that block it.

Blood, lymphatic and nerve supply

System	Detail
Arterial	Chiefly the uterine artery (from the anterior division of the internal iliac artery, or in common trunk with the superior vesical artery), which crosses above and in front of the ureter about 1.5 cm lateral to the internal os; anastomoses with the vaginal and ovarian arteries; azygos arteries (anterior and posterior) formed by cervicovaginal, vaginal, middle rectal and internal pudendal branches supply the vaginal part
Venous	Corresponds to the arterial pattern; drains into the internal iliac veins
Lymphatic (primary groups)	Parametrial (inconsistent) → internal iliac, obturator, external iliac (anterior/medial group), and sacral nodes; all primary groups drain secondarily to the common iliac and superior lumbar (para-aortic) nodes
Nerve supply	Predominantly autonomic — sympathetic fibres (T10–L1) and parasympathetic fibres via S2–S4 through the pelvic splanchnic nerves, converging as the paracervical plexus in Frankenhäuser's ganglion lateral to the cervix; the cervix itself is relatively insensitive to touch/cautery but sensitive to stretch/dilatation

Etiology and pathogenesis of CIN

Category	Factors
Infective	Persistent high-risk HPV (types 16, 18, 31, 33 most consistently implicated); co-infection with herpes simplex virus-2, HIV, chlamydia

Category	Factors
Sexual/reproductive	Early coitus (≤ 16 years), multiple sexual partners (HPV-DNA positivity ~60% with multiple partners vs ~21% with a single partner), early first pregnancy, high parity
Host	Age >30 years, smoking, immunosuppression, compromised host immune defence

- ▶ Carcinogenesis begins in the **transformation zone**, where immature metaplastic (subcolumnar reserve) cells are most vulnerable.
- ▶ Microtrauma during intercourse allows HPV entry into the basal/parabasal cells adjacent to the squamocolumnar junction.
- ▶ Persistent infection with **high-risk HPV subtypes**, presence of **multiple HPV types**, and a **compromised host immune response** favour viral DNA integration into the host genome.
- ▶ Viral oncoproteins **E6 and E7** are over-expressed — E6 degrades the tumour-suppressor **p53**, E7 inactivates the retinoblastoma protein (**Rb**) — abolishing normal cell-cycle checkpoints and driving immortalisation of the metaplastic cell, i.e. neoplastic transformation.
- ▶ The abnormal epithelium then behaves as an unstable, continuously changing tissue that may regress, persist, or progress with time.

Histopathological grading of CIN

Nomenclature evolved from *Rubin's* carcinoma-in-situ (1910) → *Walters & Regan's* dysplasia (1956) → *Richart's* single continuum "CIN" (1967) → the World Health Organization's three-tier grading (1975) → the cytological **Bethesda system** (1988).

Dysplasia	CIN (WHO, 1975)	Extent of epithelial replacement	Bethesda (cytology)
Mild	CIN I	Basal one-third	LSIL
Moderate	CIN II	Basal half to two-thirds	HSIL
Severe	CIN III	Whole thickness except one or two surface layers	HSIL
—	CIS (carcinoma in situ)	Whole thickness	HSIL

- ▶ Microscopically, CIN shows loss of normal stratification and polarity, nuclear enlargement/hyperchromasia, pleomorphism, increased and abnormal mitoses, and koilocytosis (perinuclear halo with peripheral condensed cytoplasm — a cytopathic marker of productive HPV infection, characteristic of CIN I).

- ▶ The **basement membrane remains intact** in all grades of CIN; its breach defines microinvasion/invasion.
- ▶ There is no sharp morphological boundary between grades, and considerable inter-observer overlap exists — hence CIN is best regarded as a continuum rather than discrete steps.

Natural history of CIN

Outcome (%)	CIN I	CIN II	CIN III/CIS
Regression to normal	60	40	30
Persistence	30	35	50
Progression to CIN III/CIS	10	20	—
Progression to invasion	<1	5	20

The overall duration from normal epithelium through CIN to frank invasion is typically **10–15 years**, with CIN most often diagnosed at 25–35 years of age and invasive carcinoma a decade or more later — the biological basis for cytological screening at intervals that can intercept the lesion before invasion.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.2 — The cervix and the transformation zone. (Berek & Novak 16e, p.916)

High-yield exam pointers

- ▶ Cervix = 2.5 cm long/wide; supravaginal + vaginal parts, each 1.25 cm; uterine artery crosses **above and in front of** the ureter ~1.5 cm lateral to the internal os ("water under the bridge").
- ▶ Ectocervix = stratified squamous; endocervix = tall columnar (arbor vitae folds); **transformation zone** = site of metaplasia and neoplasia.
- ▶ Nomenclature ladder: Rubin (CIS, 1910) → Walters & Regan (dysplasia, 1956) → Richart (CIN, 1967) → WHO (1975) → Bethesda (1988).
- ▶ CIN grading by basal-thickness involvement: CIN I = basal 1/3; CIN II = basal 1/2–2/3; CIN III/CIS = **full thickness**; basement membrane always intact.
- ▶ Pathogenesis mnemonic: HPV E6 → **degrades p53**; E7 → **inactivates Rb**.
- ▶ Natural history numbers: CIN I regresses **60%**, CIN III/CIS progresses to invasion in **20%**; total time to invasion **10–15 years**.
- ▶ Nerve supply of cervix converges at **Frankenhäuser's ganglion**; lymphatic drainage — parametrial, internal iliac, obturator, external iliac, sacral nodes.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Many textbook editions still use only the three-tier CIN I/II/III nomenclature; contemporary practice additionally applies the two-tier LSIL/HSIL (Bethesda/CAP–ASCCP LAST) system with p16 immunostaining to adjudicate equivocal biopsies — know both, as either may be asked.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 1 — Anatomy of the Female Pelvic Organs; Ch. 2 — Applied Anatomy; Ch. 23 — Premalignant Lesions); Berek & Novak's Gynecology 16e (Ch. 16 — Preinvasive Disease of the Cervix).



Angiogenesis inhibitors in the management of Ovarian cancer

Asked in: Paper III 18-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Angiogenesis inhibitors are targeted anti-cancer agents that block formation of new tumour blood vessels, chiefly by neutralising vascular endothelial growth factor (VEGF-A) or its receptors. Epithelial ovarian cancer is a highly angiogenesis-dependent tumour with raised tumour-tissue and malignant-ascites VEGF-A levels, which makes anti-angiogenic therapy an established adjunct to platinum-taxane chemotherapy in both primary and recurrent disease.

Rationale — why anti-angiogenic therapy works in ovarian cancer

- ▶ Ovarian cancer cells and tumour stroma over-express VEGF-A, which binds endothelial VEGF receptor-2 (VEGFR-2) and drives endothelial proliferation, formation of leaky, tortuous new vessels, and increased vascular permeability.
- ▶ This same VEGF-driven capillary leak is the principal mechanism generating **malignant ascites**.
- ▶ Blocking VEGF starves the tumour of its blood supply, "normalises" residual vessels (improving delivery of concurrent chemotherapy), and reduces re-accumulation of ascites.

Classes of anti-angiogenic agents studied in ovarian cancer

Class	Drug	Molecular target	Status in ovarian cancer
Humanised anti-VEGF monoclonal antibody (MonAb)	Bevacizumab	Circulating VEGF-A ligand	Only agent with a proven, guideline-endorsed clinical role

Class	Drug	Molecular target	Status in ovarian cancer
Oral multi-target tyrosine kinase inhibitor (TKI)	Pazopanib	VEGFR-1/2/3, PDGFR, c-KIT	Improved progression-free survival (PFS) as maintenance (AGO-OVAR16 trial) but not licensed — high grade 3/4 toxicity led the sponsor to withhold regulatory submission
Oral triple angiokinase inhibitor	Nintedanib	VEGFR, fibroblast growth factor receptor, PDGFR	No clinically meaningful PFS benefit (AGO-OVAR12 trial) — not used
VEGF-trap fusion protein	Aflibercept	VEGF-A, VEGF-B, placental growth factor	Investigational only
Peptibody	Trebananib	Angiopoietin-1/2–Tie2 axis	Investigational only

Bevacizumab is therefore the only agent used in routine practice and is the focus of dosing, evidence and toxicity below.

Bevacizumab — mechanism and trial-based use by clinical setting

Bevacizumab is a humanised monoclonal antibody that binds circulating VEGF-A, preventing it from engaging VEGFR, and was the first targeted drug to show significant single-agent activity in ovarian cancer.

Clinical setting	Key trial(s)	Regimen	Result
First-line, after primary surgery (stage III–IV)	GOG-218; ICON7	Carboplatin-paclitaxel + bevacizumab 15 mg/kg (GOG-218) or 7.5 mg/kg (ICON7) IV 3-weekly, added from cycle 2 and continued as single-agent maintenance for 16 (GOG-218) or 12 (ICON7) further cycles	GOG-218: PFS gain of 3.8 months, no overall survival (OS) benefit overall but OS benefit in the high-risk/ascites subgroup; ICON7: PFS and OS benefit concentrated in the poor-prognosis subgroup (restricted mean OS 39.3 vs 34.5 months)

Clinical setting	Key trial(s)	Regimen	Result
Platinum-sensitive relapse	OCEANS; GOG-213	Carboplatin-gemcitabine + bevacizumab 15 mg/kg 3-weekly (OCEANS), or carboplatin-paclitaxel + bevacizumab (GOG-213), continued to progression	OCEANS: PFS 12 vs 8 months; GOG-213: PFS 13.8 vs 10.4 months and OS gain of ~5 months (42.6 vs 37.3 months)
Platinum-resistant relapse	AURELIA	Investigator-choice chemotherapy (weekly paclitaxel, topotecan, or pegylated liposomal doxorubicin) + bevacizumab 15 mg/kg 3-weekly, until progression	Median PFS 6.7 vs 3.4 months; no OS benefit; best response with weekly paclitaxel combination
Maintenance with PARP inhibitor in homologous-recombination-deficient (HRD)-positive tumours	PAOLA-1	Bevacizumab maintenance + olaparib (a poly-ADP-ribose polymerase, PARP, inhibitor)	Substantial PFS benefit concentrated in <i>BRCA</i> -mutated/HRD-positive tumours

Dosing and administration principles

- ▶ Standard dose **15 mg/kg IV every 3 weeks** (used in GOG-218, AURELIA, GOG-213, PAOLA-1); **7.5 mg/kg every 3 weeks** is the validated alternative (ICON7).
- ▶ Low-dose metronomic option for heavily pre-treated recurrent disease: **bevacizumab 10 mg/kg IV every 2 weeks with oral cyclophosphamide 50 mg daily**.
- ▶ Bevacizumab is started only **from cycle 2** of chemotherapy, never cycle 1, and is then continued as single-agent maintenance until disease progression or unacceptable toxicity.
- ▶ Held for at least **4–6 weeks before and after any major surgery** because of impaired wound healing and bowel perforation risk.

Patient selection

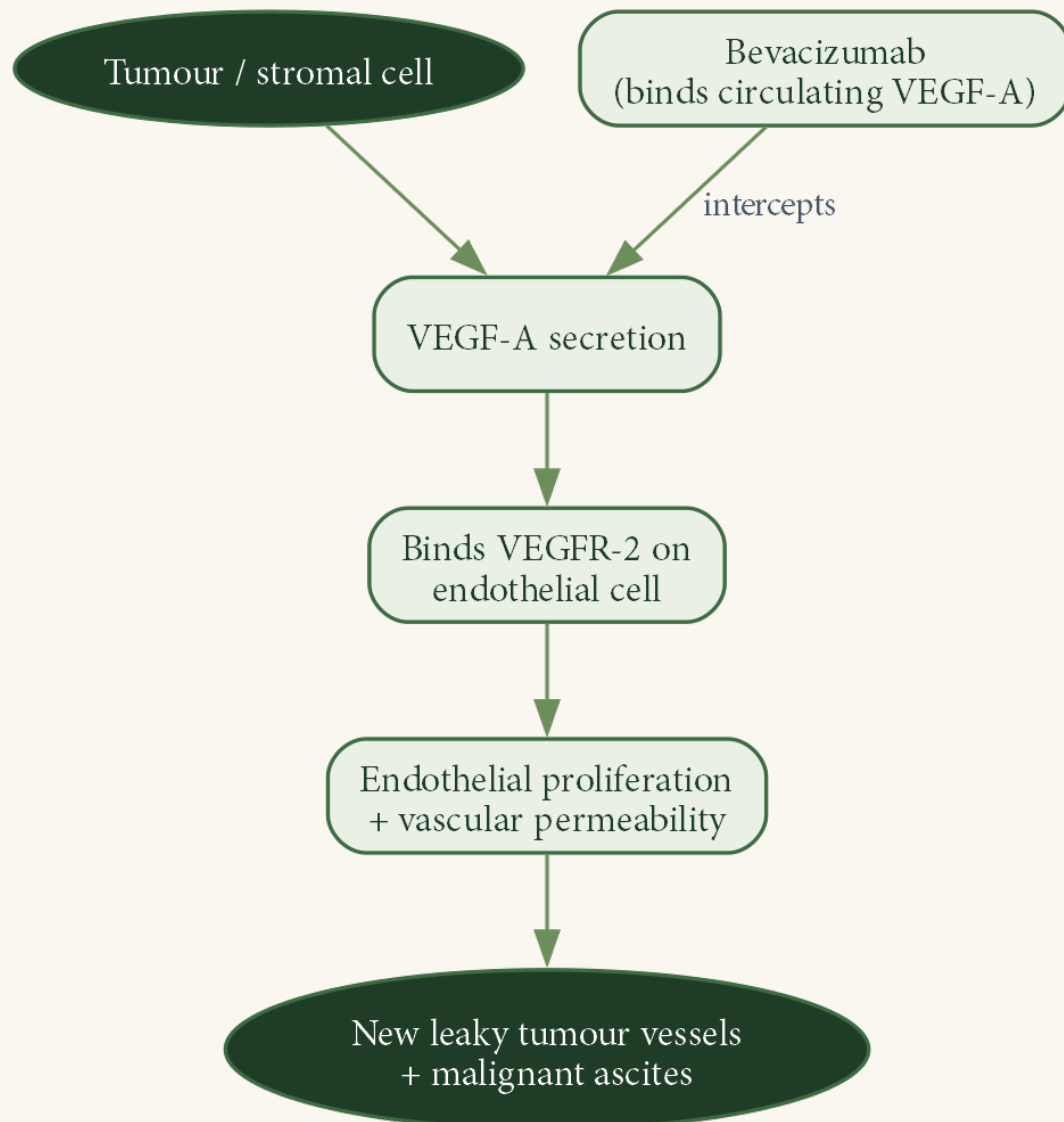
- ▶ Suboptimally debulked or stage IV disease with residual tumour or ascites — the greatest first-line benefit.
- ▶ Platinum-sensitive first relapse, particularly with bulky/inoperable disease or symptomatic ascites.
- ▶ Platinum-resistant relapse — improves response rate and PFS and controls ascites, though without a survival gain.

- ▶ Combined with olaparib maintenance in *BRCA*-mutated/HRD-positive tumours (PAOLA-1 population).
- ▶ Avoided with bowel-wall tumour involvement, recent bowel surgery, uncontrolled hypertension, or active bleeding.

Adverse effects

System	Adverse effect
Cardiovascular	Hypertension (most common toxicity); arterial thromboembolism
Renal	Proteinuria, occasionally progressing to nephrotic-range
Gastrointestinal	Bowel perforation and fistula formation — the most feared complication, risk higher with bowel-wall disease
Surgical/wound	Impaired wound healing, wound dehiscence
Vascular	Venous thromboembolism, haemorrhage
Neurological	Reversible posterior leukoencephalopathy syndrome (rare)

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

VEGF-A-driven angiogenesis in ovarian cancer, with bevacizumab intercepting the ligand before it engages VEGFR-2.

High-yield exam pointers

- ▶ Bevacizumab = humanised anti-VEGF-A monoclonal antibody; first targeted drug proven active in ovarian cancer.
- ▶ Trial-to-setting recall: GOG-218/ICON7 = first-line; OCEANS/GOG-213 = platinum-sensitive relapse; AURELIA = platinum-resistant relapse; PAOLA-1 = maintenance with olaparib in HRD-positive disease.
- ▶ Standard dose: 15 mg/kg IV 3-weekly (7.5 mg/kg alternative); always started from cycle 2, never cycle 1.

- ▶ Toxicity recall: Hypertension–Proteinuria–Perforation–Poor wound healing–Thromboembolism.
- ▶ No consistent overall survival benefit except in high-risk/ascites subgroups and platinum-sensitive relapse (GOG-213).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Gynaecology describes bevacizumab briefly as an anti-angiogenic maintenance option; current international practice (as reflected in Berek & Novak 16e) individualises its use by disease risk, platinum sensitivity, and *BRCA*/HRD biomarker status, which is more granular than the older textbook description.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (GOG-218, ICON7, OCEANS, GOG-213, AURELIA, AGO-OVAR16/pazopanib, AGO-OVAR12/nintedanib trial data and bevacizumab dosing); DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e. PAOLA-1 (bevacizumab-olaparib maintenance) cited as a landmark trial per standard oncology literature.



Borderline tumours of the ovary

Asked in: Paper III 30-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Borderline ovarian tumours (BOTs) — also called tumours of low malignant potential (LMP) or atypical proliferative tumours — are epithelial ovarian neoplasms showing epithelial proliferation, stratification, cellular pleomorphism, detached cell clusters and increased mitotic activity, but **without destructive stromal invasion**, placing them histologically and prognostically between benign cystadenomas and frank carcinoma. They form 10–20% of all epithelial ovarian tumours, present about a decade earlier than invasive cancer (mean age ~46 years vs 50–70 years for invasive disease), and carry an excellent overall prognosis.

Pathological classification

Histological type	Key features
Serous borderline tumour (commonest)	~10% of all serous ovarian tumours; 50% occur before age 40; up to 40% show extraovarian (peritoneal) implants at diagnosis
— micropapillary variant	Exuberant non-hierarchical micropapillary architecture; more often bilateral , exophytic and higher stage than the usual serous BOT

Histological type	Key features
Mucinous borderline tumour	Marked morphological heterogeneity within the same tumour — well-differentiated epithelium may lie next to a poorly-differentiated focus, so multiple sections from many areas are mandatory to exclude a focus of carcinoma
Endometrioid borderline tumour	Resembles an endometrial polyp/complex hyperplasia; a prominent fibromatous component is termed adenofibroma
Borderline Brenner tumour	Resembles high-grade papillary urothelial (transitional-cell) carcinoma of the bladder; cured by complete surgical excision
Peritoneal serous borderline tumour	Ovaries normal or minimally involved; disease predominantly on uterosacral ligaments/pelvic peritoneum/omentum; prognosis excellent and comparable to ovarian serous BOT

Diagnostic histological criteria for serous BOT (all four required):

- ▶ Epithelial hyperplasia — pseudostratification, tufting, cribriform and micropapillary architecture.
- ▶ Mild nuclear atypia with mildly increased mitotic activity.
- ▶ Detached cell clusters.
- ▶ Absence of destructive stromal invasion.

Foci of **stromal microinvasion** may occasionally be seen (increased ~9-fold in pregnant women with serous BOT) but do **not** worsen prognosis and are managed identically to BOT without microinvasion.

Clinical features

- ▶ Frequently **asymptomatic**, discovered incidentally on pelvic examination, ultrasound, or during infertility work-up.
- ▶ Chronic lower abdominal/pelvic pain or a palpable adnexal mass.
- ▶ Acute pain from **torsion** or rupture of the cystic mass.
- ▶ Abdominal distension (rarely with ascites) if extraovarian peritoneal implants are extensive.
- ▶ Bimanual examination: unilateral (occasionally bilateral) cystic-to-complex adnexal swelling, mobile, usually not fixed.

Diagnosis

Investigation	Purpose / finding
Transvaginal ultrasound ± colour Doppler	Complex cystic adnexal mass with septations and papillary excrescences projecting into the lumen; low-resistance flow in solid/papillary areas raises suspicion
Serum CA-125	May be mildly raised, especially with peritoneal spread, but is non-specific and not reliable for distinguishing BOT from benign or frank malignant disease
CT/MRI abdomen-pelvis	Delineates extent of disease, peritoneal implants, omental involvement when advanced-stage disease is suspected
Intraoperative frozen section	Essential step — gross appearance alone cannot reliably distinguish benign, borderline and malignant serous/mucinous tumours; guides the extent of surgery at the same sitting
Final paraffin histopathology	Confirms the diagnosis; multiple blocks mandatory, especially for mucinous tumours, to exclude an invasive focus

Staging: BOTs are surgically staged using the same **FIGO (2014) staging system** as invasive epithelial ovarian cancer, assigned after a comprehensive staging laparotomy/laparoscopy; most are FIGO stage I at diagnosis.

Management

- **Comprehensive surgical staging** (laparotomy or laparoscopy) — peritoneal fluid/washings for cytology, systematic inspection and biopsy of all peritoneal surfaces, infracolic **omentectomy**, and **appendectomy** for a mucinous-type tumour (to exclude an appendiceal primary/pseudomyxoma peritonei); routine pelvic/para-aortic lymphadenectomy is not mandated as nodal status does not alter prognosis in BOT.
- **Fertility-sparing conservative surgery** — ovarian **cystectomy** or **unilateral salpingo-oophorectomy**, preserving the uterus and contralateral ovary, for young women desiring fertility with apparent stage I disease; cystectomy carries a higher recurrence rate (~8%, associated with positive cyst margins) than oophorectomy, but recurrences remain confined to the ovary and are curable.
- **Definitive surgery** — total hysterectomy with bilateral salpingo-oophorectomy (± omentectomy/peritoneal biopsies) for women who have completed childbearing, are peri-/postmenopausal, or have bilateral ovarian involvement or peritoneal spread.

- ▶ **No role for adjuvant chemotherapy or radiotherapy** after complete surgical resection — even in advanced-stage BOT, neither improves survival.
- ▶ If a **simple oophorectomy or cystectomy** performed for an apparently benign cyst is later reported as borderline on permanent histopathology, **no immediate further surgery is required** — long-term surveillance suffices.
- ▶ **Long-term follow-up** with clinical examination, transvaginal ultrasound $\pm$ CA-125, since recurrence — though uncommon — can occur many years later, particularly after fertility-sparing surgery.

Prognosis

Parameter	Outcome
Stage I disease	~98% 15-year survival
All stages combined	86–90% 5-year survival
Non-invasive peritoneal implants	Excellent outcome
Invasive implants (behave as low-grade serous carcinoma, seen in $\leq 10\%$ with extraovarian spread)	More aggressive course; ~50% 5-year survival
Recurrence risk (fertility-sparing cystectomy)	~8%; usually curable, confined to ovary

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 39.1 — Serous borderline tumor of the ovary. Complex papillary fronds with hierarchical branching lined by pseudostratified columnar cells; epithelium and stroma clearly separated by a basement membrane, indicating no stromal invasion (Berek & Novak 16e, p.2549)

High-yield exam pointers

- ▶ Core definition line: proliferation + atypia + mitoses **but no destructive stromal invasion** — that single phrase is the examiner's key discriminator from carcinoma.
- ▶ Numbers to write: **10–20%** of epithelial ovarian tumours; mean age **~46 years**; Stage I **98%** 15-year survival; all-stage 5-year survival **86–90%**.
- ▶ Serous BOT diagnostic tetrad: hyperplasia (tufting/cribriform/micropapillary) + mild atypia/mitoses + detached clusters + **no stromal invasion**.
- ▶ Micropapillary variant = more bilateral, exophytic, higher stage — write this if asked to differentiate.
- ▶ Management one-liner: **fertility-sparing conservative surgery in the young**; TAH+BSO $\pm$ omentectomy in the rest; **no adjuvant chemo/radiotherapy ever**.
- ▶ Frozen section is the intraoperative decision point — gross appearance cannot separate benign/borderline/malignant.

- Staged surgically using FIGO 2014 ovarian cancer staging (same system as invasive disease).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older textbook editions describe borderline tumours mainly under "benign ovarian lesions" with less emphasis on the micropapillary variant, invasive-implant subgroup and fertility-sparing surgical evidence detailed in current gynaecologic-oncology texts (Berek & Novak 16e) — the management principles above follow the current standard.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (Ch. 39 — Epithelial Ovarian, Fallopian Tube, and Peritoneal Cancer); DC Dutta's Textbook of Gynaecology 7e (Ch. 21 — Benign Lesions of the Ovary, Borderline Epithelial Tumors; Ch. 24 — FIGO 2014 staging of ovarian carcinoma).



Cervical intraepithelial neoplasia

Asked in: Paper III 30-May-2025 · Paper III Nov 2016 · Paper III May 2011 · Paper III Oct 2008 (4×) — RGUHS MS Obstetrics & Gynaecology

Definition — Cervical intraepithelial neoplasia (CIN) is a premalignant lesion of the cervical **transformation zone** (TZ) in which the normal squamous epithelium is replaced, in varying thickness, by cells showing disordered maturation, nuclear atypia and abnormal mitoses, without breach of the basement membrane. It results from persistent infection with high-risk human papillomavirus (hrHPV) and represents a continuum — regressing, persisting, or progressing over 10–15 years to invasive squamous cell carcinoma if untreated.

Classification and nomenclature

Nomenclature evolved: CIS (*Rubin*, 1910) → dysplasia (*Walters & Regan*, 1956) → single-continuum CIN (*Richart*, 1967) → WHO (1975) → Bethesda cytology system (1988, revised 2001/2014) → CAP–ASCCP LAST two-tier histology (2012).

Dysplasia	CIN (WHO)	Extent of epithelium replaced	Bethesda/LAST
Mild	CIN I	Basal one-third	LSIL
Moderate	CIN II	Basal half to two-thirds	HSIL
Severe	CIN III	Whole thickness except 1–2 surface layers	HSIL

Dysplasia	CIN (WHO)	Extent of epithelium replaced	Bethesda/LAST
—	CIS	Whole thickness	HSIL

LSIL (CIN I) reflects productive HPV infection with high spontaneous regression; HSIL (CIN II/III) is the true precancer, biologically and clinically managed together — p16 immunostaining adjudicates equivocal CIN 2 as LSIL or HSIL.

Etiology and risk factors

Category	Factors
Infective	Persistent high-risk HPV (16, 18, 31, 33, 35, 45, 56 — high oncogenic risk); HSV-2, HIV, chlamydia co-infection
Sexual/reproductive	Early coitus (≤ 16 years), multiple partners, husband with multiple partners, early first pregnancy, high parity
Host	Immunosuppression (HIV-positive), smoking, dietary deficiency (vitamins A, C, E, folate), low socioeconomic status, oral contraceptive use, inadequate screening

Pathogenesis and natural history

- ▶ Carcinogenesis begins at the **transformation zone**, the dynamic area between the original and the physiologically active squamocolumnar junction, where subcolumnar reserve cells undergo squamous metaplasia.
- ▶ Immature metaplastic cells are vulnerable to hrHPV entry (via microtrauma) into basal/parabasal cells.
- ▶ Oncogenic HPV-DNA integrates into the host genome → over-expression of viral oncoproteins **E6 and E7** → E6 degrades **p53**, E7 inactivates **Rb** → loss of cell-cycle control → host-cell immortalisation and neoplastic transformation.
- ▶ **p16** (a CDK4/6 inhibitor) is over-expressed as a surrogate marker of transforming HPV infection and is used to adjudicate equivocal CIN 2 as HSIL or LSIL (LAST project).

Outcome (%)	CIN I	CIN II	CIN III/CIS
Regression to normal	60	40	30
Persistence	30	35	50
Progression to CIN III/CIS	10	20	—

Outcome (%)	CIN I	CIN II	CIN III/CIS
Progression to invasion	<1	5	20

Clinical features

- Usually **asymptomatic** — detected on cytological screening.
- May present with post-coital bleeding, intermenstrual bleeding, or persistent blood-stained/mucoid discharge if the lesion is extensive.
- Cervix may look grossly normal, or show erosion/ectopy, leukoplakia (white patch), or an acetowhite area only on colposcopy — no visible growth or ulceration (which would suggest invasion).

Diagnosis

Modality	Purpose/finding
Cervical cytology (Pap smear) — Ayre's spatula + endocervical brush, conventional or liquid-based	Screening test; reported by the Bethesda system (ASC-US/ASC-H, LSIL, HSIL, AGC)
High-risk HPV-DNA testing (hybrid capture-2/PCR)	Co-testing or primary screening ≥30 years; triage of ASC-US; ~95–96% sensitive for CIN 2/3
Visual inspection with acetic acid (VIA)/Lugol's iodine (VILI)	Low-resource "screen-and-treat" alternative; acetowhite/iodine-negative areas biopsied
Colposcopy	Low-power (6–16×) magnified examination after 3–5% acetic acid; identifies acetowhite epithelium, punctation, mosaicism, atypical vessels (suggest invasion); localises site for directed biopsy
Schiller's test (when colposcopy unavailable)	0.3% Lugol's/Schiller's iodine — unstained (iodine-negative) areas biopsied; glycogenated normal epithelium stains brown
Endocervical curettage (ECC)	Unsatisfactory colposcopy, glandular abnormality, before ablative treatment, or surveillance after cone excision for adenocarcinoma-in-situ
Diagnostic conization	When the lesion's limits or the TZ are not fully seen, microinvasion is suspected, ECC shows CIN, or cytology–colposcopy–biopsy are discordant

Management

Choice depends on grade, patient's age, fertility desire, risk factors and colposcopy/follow-up facilities available.

CIN grade	Standard management
CIN I (LSIL)	Observe — repeat cytology at 6 months and/or HPV-DNA test at 12 months; routine recall if both negative (most regress spontaneously)
CIN II (HSIL)	Excision (LLETZ/LEEP) is standard; ablation acceptable if colposcopy is satisfactory and p16-negative CIN 2 in a woman desiring fertility (low progression risk)
CIN III/CIS (HSIL)	Excisional treatment — LLETZ/LEEP or cone biopsy; hysterectomy reserved for selected cases

Criteria for **local ablation**: entire lesion visualised within the TZ, no microinvasion/invasion, no endocervical glandular involvement, no cytology–colposcopy–biopsy discrepancy.

- ▶ **Cryotherapy** — freezes tissue to -90°C (N_2O or CO_2), destruction depth ~ 5 mm; double freeze–thaw–freeze technique improves efficacy; best for small, localised lesions.
- ▶ **Cold coagulation** — $100\text{--}120^{\circ}\text{C}$, depth ~ 4 mm; no anaesthesia needed.
- ▶ **Electrodiathermy** — unipolar needle, depth 8–10 mm; needs general anaesthesia.
- ▶ **CO_2 laser vaporisation** — colposcopy-guided, depth ~ 7 mm; preferred when CIN extends onto the vaginal fornices.
- ▶ **LLETZ/LEEP** (large loop excision of the transformation zone) — 2–3 cm thin wire loop, blended cutting/coagulation current, local anaesthesia, excises ≥ 10 mm depth with a histology specimen; fewer complications than cone excision.
- ▶ **Cold-knife or laser cone biopsy** — as effective as hysterectomy if margins are clear; complications include haemorrhage, infection, cervical stenosis/incompetence.
- ▶ **Hysterectomy** — recurrent high-grade CIN, CIN extending into the vagina, persistent abnormal cytology despite treatment, associated gynaecological pathology (prolapse/fibroid/PID), family completed, or poor follow-up compliance.

Follow-up: cytology at 6 and 12 months post-treatment ($\pm$ HPV-DNA testing), then 3-yearly for 20 years (per ACOG); recurrence rate 3–5%, invasive progression 0.1–0.4%.

Prevention: prophylactic **HPV vaccination** — bivalent (types 16, 18), quadrivalent (16, 18, 6, 11), and nonavalent vaccines, ideally given at age 9–13 years before HPV exposure. Current WHO schedule: <15 years — 2 doses (0, 6 months); ≥ 15 years or immunocompromised — 3 doses (0, 1–2, 6 months), intramuscular over the deltoid. Vaccination does not replace continued cytological screening as protection is HPV-type-specific.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 16.4 — Different locations of the transformation zone and the squamocolumnar junction during a woman's reproductive life (Berek & Novak 16e, p.918)

High-yield exam pointers

- ▶ Nomenclature ladder: Rubin (CIS, 1910) → Richart (CIN, 1967) → WHO (1975) → Bethesda (1988) → LAST two-tier LSIL/HSIL (2012).
- ▶ CIN grading by basal-thickness involvement: CIN I = basal 1/3; CIN II = basal 1/2–2/3; CIN III/CIS = full thickness.
- ▶ Natural history numbers: CIN I regresses 60%, CIN III/CIS progresses to invasion in 20%.
- ▶ Colposcopic red flags for invasion: **atypical vessels**, irregular surface, friability.
- ▶ Rule of treatment: CIN I → **observe**; CIN II/III → **excise (LLETZ/cone)**; hysterectomy only for selected indications.
- ▶ HPV vaccine schedule: <15 yr → **2 doses (0, 6 mo)**; ≥15 yr → **3 doses (0, 1–2, 6 mo)**.
- ▶ p16 immunostaining resolves equivocal "CIN 2" into true HSIL vs LSIL.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Many textbook editions still use the three-tier CIN I/II/III nomenclature; the current CAP–ASCCP LAST project (2012) and ASCCP risk-based management guidance use the two-tier LSIL/HSIL system with p16 adjudication for equivocal biopsies — cite whichever the question specifies, but know both map onto each other.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 23 — Premalignant Lesions); Berek & Novak's Gynecology 16e (Ch. 16 — Preinvasive Disease of the Cervix); CAP–ASCCP Lower Anogenital Squamous Terminology (LAST) project 2012; ASCCP risk-based management consensus guidance; WHO HPV vaccination schedule.

♦ ♦ ♦

Chemotherapy in epithelial ovarian cancer

Asked in: Paper III Jul 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — Epithelial ovarian cancer (EOC, arising from the coelomic/tubal epithelium) is chemosensitive, and systemic chemotherapy is central to management at every stage — as adjuvant therapy after primary cytoreductive surgery, as neoadjuvant therapy before interval debulking, as

maintenance after response, and for recurrent disease. **Platinum + taxane combination chemotherapy** is the standard of care.

Indications by stage

Stage	Chemotherapy
IA/IB, Grade 1	No adjuvant chemotherapy — surgery alone (staging laparotomy + total abdominal hysterectomy with bilateral salpingo-oophorectomy, or fertility-sparing unilateral salpingo-oophorectomy in a young woman)
IA/IB Grade 2–3, IC, all clear-cell and high-grade serous stage I, carcinosarcoma	Adjuvant chemotherapy — carboplatin-paclitaxel (CP) , 3–6 cycles
II–IV (advanced disease)	Chemotherapy is mandatory after (or, with neoadjuvant intent, before) cytoreductive surgery

First-line combination chemotherapy — drugs, dose, schedule

Regimen	Dose	Route	Cycles/interval
Carboplatin (C)	AUC 5–6 (Calvert formula, using GFR)	IV	6 cycles, every 3 weeks
Paclitaxel (T)	175 mg/m ² over 3 hours	IV	Day 1, every 3 weeks
Dose-dense alternative	Carboplatin AUC 6 (3-weekly) + paclitaxel 80 mg/m² weekly	IV	6 cycles
Docetaxel substitute (paclitaxel hypersensitivity/neuropathy)	Docetaxel 75 mg/m ² with carboplatin AUC 5–6	IV	6 cycles
Frail/comorbid/elderly	Single-agent carboplatin AUC 5–6	IV	6 cycles

- ▶ Carboplatin (second-generation platinum analogue) is preferred over cisplatin for its lower nephro-/neuro-/ototoxicity, at the cost of more myelosuppression; the target AUC of 5–6 is calculated from GFR by the **Calvert formula**.
- ▶ Paclitaxel is included in essentially all advanced-stage regimens unless contra-indicated (pre-existing peripheral neuropathy); it acts by stabilising microtubule polymerisation.
- ▶ Adding gemcitabine, topotecan or liposomal doxorubicin to CP (GOG-182/ICON5, five-arm trial) did **not** improve progression-free or overall survival — CP remains standard.

Route and delivery strategies

- ▶ **Standard IV chemotherapy** — CP as above, the default for most patients.
- ▶ **Intraperitoneal (IP) chemotherapy** (GOG-172 protocol) — paclitaxel 135 mg/m² IV day 1 → cisplatin 75–100 mg/m² IP day 2 → paclitaxel 60 mg/m² IP day 8, every 3 weeks × 6 cycles. IP therapy improved median overall survival (65.6 vs 49.7 months) but at higher toxicity and catheter-related morbidity; it is reserved for **optimally debulked (<1 cm residual)**, **good performance-status** patients after informed discussion.
- ▶ **Neoadjuvant chemotherapy (NACT) + interval debulking surgery (IDS)** — 3 (occasionally up to 4) cycles of CP followed by IDS and further adjuvant cycles. Indicated for a low likelihood of primary optimal cytoreduction, poor performance status, or heavy tumour/ascites/pleural burden. EORTC-55971 and CHORUS trials showed progression-free and overall survival with NACT-IDS non-inferior to primary surgery, with lower surgical morbidity.
- ▶ **Dose-dense weekly paclitaxel** — the Japanese GOG (JGOG-3016) trial showed a marked progression-free and overall survival benefit for weekly paclitaxel over 3-weekly dosing; this was **not confirmed** in largely non-Japanese populations (GOG-262, ICON8, MITO-7), so dose-dense scheduling is not superior to 3-weekly CP outside that population.

Targeted maintenance therapy after response

Agent	Key trial	Regimen	Benefit
Bevacizumab (anti-VEGF-A monoclonal antibody)	GOG-218	15 mg/kg IV with cycles 2–6 of CP, then 16 further cycles alone	Modest PFS gain (~3.8 months); no overall survival benefit overall (benefit seen in high-risk/ascites subgroup)
Bevacizumab	ICON7	7.5 mg/kg IV with CP for 6 cycles, then 12 further cycles alone	Longer PFS (24 vs 22 months); survival benefit only in the high-risk subgroup
Olaparib (PARP inhibitor)	SOLO1	Maintenance after response to first-line platinum chemotherapy, in germline/somatic BRCA1/2-mutated advanced disease	70% reduction in risk of progression or death vs placebo

Agent	Key trial	Regimen	Benefit
Niraparib (PARP inhibitor)	PRIMA/NOVA	Maintenance after platinum response, regardless of BRCA/homologous-recombination-deficiency (HRD) status (greatest benefit if BRCA-mutated or HRD-positive)	Significant PFS prolongation in all biomarker subgroups

- ▶ Bevacizumab is typically started with the second chemotherapy cycle (to reduce the risk of gastrointestinal perforation) and continued as single-agent maintenance.
- ▶ PARP inhibitors exploit **synthetic lethality** — tumour cells with homologous-recombination deficiency (BRCA1/2 mutation or HRD) cannot repair the single-strand DNA breaks that accumulate when PARP is inhibited, causing selective tumour-cell death; germline/somatic BRCA testing (and HRD testing where available) should therefore precede maintenance-therapy selection.
- ▶ Common toxicities: bevacizumab — hypertension, proteinuria, delayed wound healing, gastrointestinal perforation (<2%), thromboembolism; PARP inhibitors — myelosuppression (anaemia, thrombocytopenia), fatigue, nausea, rare myelodysplasia/leukaemia.

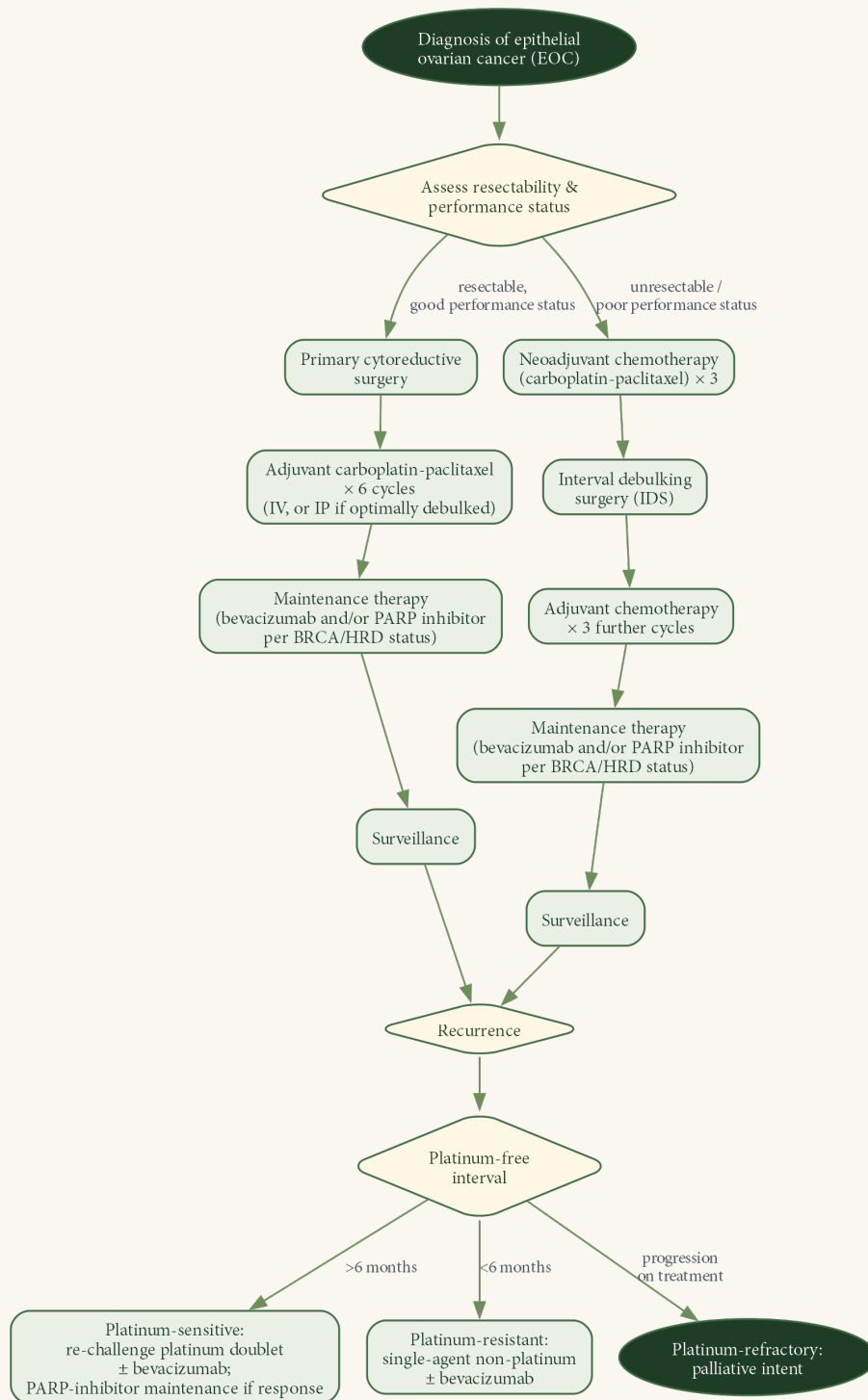
Chemotherapy for recurrent disease

Category	Platinum-free interval	Approach
Platinum-sensitive	>6 months since last platinum	Re-challenge with a platinum doublet (carboplatin-paclitaxel, carboplatin-gemcitabine, or carboplatin-liposomal doxorubicin) ± bevacizumab; PARP-inhibitor maintenance if response achieved
Platinum-resistant	<6 months	Single-agent, non-platinum cytotoxic (weekly paclitaxel, liposomal doxorubicin, topotecan, or gemcitabine) ± bevacizumab; response rates only 10–30%
Platinum-refractory	Progression during platinum treatment	Poor response (<20%) to any agent; palliative intent

- ▶ Secondary cytoreductive surgery may precede chemotherapy in selected platinum-sensitive recurrences with a long disease-free interval and a favourable AGO score (DESKTOP III).

- ▶ Serum **CA-125** is the standard biochemical response marker — a rise to $\geq 2\times$ the upper limit of normal on two occasions a week apart defines biochemical (GCIG-criteria) progression.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Chemotherapy pathway in epithelial ovarian cancer, from diagnosis through primary/neoadjuvant treatment, maintenance, and recurrence management by platinum-free interval.

High-yield exam pointers

- ▶ CP regimen = Carboplatin AUC 5–6 (Calvert formula) + Paclitaxel 175 mg/m² IV, every 3 weeks × 6 cycles — write this verbatim.
- ▶ GOG-172 IP protocol: paclitaxel 135 IV D1 → cisplatin 75–100 IP D2 → paclitaxel 60 IP D8, q3w × 6.
- ▶ 6-month platinum-free interval is the key cut-off: >6 months = platinum-sensitive; <6 months = platinum-resistant; progression on treatment = platinum-refractory.
- ▶ GOG-218 (bevacizumab 15 mg/kg) and ICON7 (bevacizumab 7.5 mg/kg) — modest PFS benefit, no overall OS benefit except high-risk subgroup.
- ▶ SOLO1 (olaparib, BRCA-mutated) and PRIMA/NOVA (niraparib, all-comers) — first landmark PARP-inhibitor maintenance trials; mechanism = synthetic lethality via homologous-recombination deficiency.
- ▶ Stage IA/IB Grade 1 = surgery alone, no chemotherapy; every other stage I and all advanced disease gets adjuvant CP.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Current PARP-inhibitor dosing (olaparib 300 mg tablets twice daily; niraparib 200–300 mg once daily, individualised to baseline body weight/platelet count) reflects the reformulated regulatory labels; the original trials (Study 19, NOVA) used earlier capsule/flat-dose formulations — cite the mechanism and trial names in the exam rather than a specific milligram dose unless asked.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e.



Chemotherapy of chorio carcinoma

Asked in: Paper I 06-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Choriocarcinoma is the most malignant form of gestational trophoblastic neoplasia (GTN), composed of anaplastic cyto- and syncytiotrophoblast invading the myometrium with no villous pattern; about 50% follow a hydatidiform mole, 30% a miscarriage/ectopic pregnancy, and 20% a normal/term pregnancy. Chemotherapy has revolutionised outcome and is now the mainstay of treatment, chosen according to the anatomic FIGO stage and the WHO prognostic score.

Selecting the regimen — staging and prognostic scoring

FIGO anatomic stage	Extent
I	Disease confined to the uterus

FIGO anatomic stage	Extent
II	Extends outside the uterus but limited to genital structures (adnexa, vagina, broad ligament)
III	Metastasis to the lungs, with or without genital tract involvement
IV	Metastasis to brain, liver, kidney or gastrointestinal tract (worst prognosis)

WHO prognostic scoring system (as modified by FIGO, 2000) — the score is added to the stage (e.g. Stage III:6) to guide chemotherapy:

Parameter	0	1	2	4
Age (years)	<40	>40	—	—
Antecedent pregnancy	Mole	Abortion	Term	—
Interval* (months)	<4	4–6	7–12	≥13
Pretreatment hCG (IU/L)	<10 ³	10 ³ –<10 ⁴	10 ⁴ –<10 ⁵	≥10 ⁵
Largest tumour (cm)	<3	3–4	>5	—
Site of metastases	Lung, pelvis	Spleen, kidney	GI tract, liver	Brain
No. of metastases	—	1–4	5–8	>8
Prior chemotherapy	—	—	Single drug	Multiple drugs

Interval = time from antecedent pregnancy to start of chemotherapy. Total score ≤6 = low risk; ≥7 = high risk.* Stage I is almost always low risk and stage IV almost always high risk; the low-vs-high distinction chiefly matters for stage II/III disease.

Low-risk disease — single-agent chemotherapy

Indications: Stage I disease, and Stage II/III with score ≤6.

Regimen	Drug(s) and dose	Schedule
8-day methotrexate-folinic acid (MTX-FA)	Methotrexate 1–1.5 mg/kg IM/IV	Days 1, 3, 5, 7
	Folinic acid 0.1–0.15 mg/kg IM	Days 2, 4, 6, 8 (rescue)
Pulsed actinomycin-D (alternative)	Actinomycin-D 1.25 mg/m ² IV bolus	Biweekly

Regimen	Drug(s) and dose	Schedule
Weekly methotrexate (alternative)	Methotrexate 30–50 mg/m ² IM	Weekly

- ▶ Courses repeat every 1–2 weeks until hCG is undetectable, followed by **2–3 consolidation courses** to reduce relapse.
- ▶ If resistant to one single agent (hCG plateau $\pm 10\%$ over 2 cycles, or rise), switch to the **alternative single agent** (MTX $\leftrightarrow$ Actinomycin-D) before escalating to combination therapy.
- ▶ **MAC triple therapy** (methotrexate + folinic acid as above, plus actinomycin-D 12 micrograms/kg IV days 1–5 and cyclophosphamide 3 mg/kg IV days 1–5, repeated 2-weekly) is reserved for low-risk disease resistant to sequential single agents — it is no longer used as primary therapy for high-risk disease.
- ▶ Single-agent therapy achieves remission in roughly 80% of low-risk cases; the remainder are salvaged by combination chemotherapy or surgery.

High-risk disease — combination chemotherapy (EMA-CO)

Indication: score ≥ 7 (any stage), and all Stage IV disease. EMA-CO is the regimen of choice.

Day	Drug	Dose
Day 1	Etoposide	100 mg/m ² in 200 mL saline, infused over 30 min
	Actinomycin-D	0.5 mg IV bolus
	Methotrexate	100 mg/m ² IV bolus, then 200 mg/m ² IV infusion over 12 h
Day 2	Etoposide	100 mg/m ² infused over 30 min
	Actinomycin-D	0.5 mg IV bolus
	Folinic acid	15 mg IM every 12 h $\times$ 4 doses, starting 24 h after methotrexate
Day 8	Cyclophosphamide	600 mg/m ² IV in saline over 30 min
	Vincristine (Oncovin)	1 mg/m ² IV bolus

- ▶ Cycle repeats every 2 weeks (course restarts on day 15); **2 further consolidation courses** are given after hCG normalises.
- ▶ Remission rates of 80–90% are reported even in high-risk and brain-metastatic disease; the regimen is well tolerated.

- ▶ **Salvage for EMA-CO failure** — EMA-EP: substitute etoposide + cisplatin for the day-8 cyclophosphamide/vincristine, achieving remission in most EMA-CO-resistant patients ($\pm$ adjunct surgery).

Monitoring during chemotherapy and response criteria

Parameter	Frequency	Hold chemotherapy if
Complete blood count	Daily during a cycle	WBC $<3000/\text{mm}^3$; neutrophils $<1500/\text{mm}^3$; platelets $<100,000/\text{mm}^3$
Liver & renal function	Daily during a cycle	Significant rise in transaminases/BUN
Serum/urine hCG	Weekly	— (repeat chest X-ray only if hCG plateaus or rises)

- ▶ **Remission** — 3 consecutive normal weekly hCG values.
- ▶ **Response** — $>10\%$ fall in hCG over one cycle.
- ▶ **Plateau** — hCG change within $\pm 10\%$ over one cycle.
- ▶ **Resistance** — hCG rise $>10\%$ in one cycle, or plateau over 2 consecutive cycles $\rightarrow$ escalate therapy.

Adjuncts to chemotherapy

- ▶ **Hysterectomy** — indicated for: disease confined to the uterus in women >35 years not desiring fertility; placental site/epithelioid trophoblastic tumour (relatively chemo-resistant); intractable uterine bleeding; a localised uterine lesion resistant to chemotherapy; accidental uterine perforation on curettage. Chemotherapy is continued peri-operatively (started around day 3 of the surgical admission) to prevent tumour cell dissemination.
- ▶ **Brain metastases** — whole-brain radiotherapy 3000 cGy over 10 fractions given concurrently with combination chemotherapy (haemostatic + tumoricidal, reducing spontaneous bleed risk); craniotomy reserved for acute decompression/bleeding control.
- ▶ **Liver metastases** — hepatic arterial infusion/embolisation or whole-liver radiotherapy (2000 cGy/10 fractions) alongside systemic chemotherapy; prognosis remains poor.
- ▶ **Lung metastases** — thoracotomy only for a persistent, chemo-resistant, viable pulmonary nodule after a full metastatic work-up excludes disease elsewhere.

Post-treatment surveillance

- ▶ Serum hCG weekly until 3 consecutive normal values $\rightarrow$ then monthly (current practice: 12 consecutive months for low-risk disease; older texts recommend extending 6-monthly surveillance up to 3–5 years, especially for high-risk disease).

- ▶ Effective contraception is mandatory throughout the hCG follow-up period so that a new pregnancy does not confound hCG trend monitoring; combined oral contraceptives are preferred and an intrauterine device is avoided until hCG has normalised.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 38.56 — Choriocarcinoma resistant to chemotherapy. Lesion is seen to invade the myometrium (DC Dutta's Gynaecology 7e, p.562)

High-yield exam pointers

- ▶ Score ≤ 6 = low risk → single agent (methotrexate-folinic acid or pulsed actinomycin-D); ≥ 7 = high risk → EMA-CO.
- ▶ EMA-CO mnemonic: Etoposide + Methotrexate + Actinomycin-D (days 1–2) → Cyclophosphamide + Oncovin/vincristine (day 8); repeat 2-weekly.
- ▶ EMA-CO-resistant disease → EMA-EP (etoposide + cisplatin replace day-8 drugs).
- ▶ Resistance = hCG rise $>10\%$ /cycle, or plateau over 2 cycles; remission = 3 consecutive negative weekly hCG.
- ▶ Brain metastasis: whole-brain RT 3000 cGy/10# concurrent with chemotherapy.
- ▶ Contraception is mandatory during and after chemotherapy follow-up.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The anatomic FIGO stage alone correlates poorly with prognosis (site of lesion, treatment implication) — it is always combined with the WHO prognostic score (FIGO 2000) to select therapy; a stage reported without the score is incomplete for treatment planning.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.

♦ ♦ ♦

Define and classify preconception genetic screening. Discuss the indications and management

Asked in: Paper IV 22-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — Preconception genetic screening is testing offered to a couple before conception to identify carrier status for heritable chromosomal or single-gene disorders, so that at-risk couples can make an informed reproductive decision (ACOG Committee Opinion No. 691, 2017, reaffirmed 2020). It differs from prenatal (post-conception) screening — such as aneuploidy screening for Down's

syndrome — in that its goal is primary prevention rather than detection in an already-established pregnancy.

Classification of preconception genetic screening

A. By screening strategy (American College of Obstetricians and Gynecologists, Committee Opinion No. 690, 2017/2020):

Strategy	Basis	Example
Ethnicity-based (targeted)	Autosomal recessive conditions with a founder effect in a specific racial/ethnic group	Tay-Sachs disease, Canavan disease, familial dysautonomia (Ashkenazi Jewish); haemoglobinopathies (African, Mediterranean, Southeast Asian, Indian)
Panethnic	Same panel offered to everyone irrespective of ethnicity	Cystic fibrosis (23-mutation panel), spinal muscular atrophy (SMA)
Expanded carrier screening (ECS)	Panethnic screening for a large number (tens to >1000) of conditions simultaneously by next-generation sequencing	Multi-gene NGS panels

B. By modality:

- ▶ Family history and three-generation **pedigree analysis**.
- ▶ **Carrier screening** for single-gene disorders — molecular/DNA-based (e.g., cystic fibrosis transmembrane conductance regulator gene mutations) or biochemical (e.g., haemoglobin electrophoresis, hexosaminidase-A assay for Tay-Sachs).
- ▶ **Parental cytogenetic analysis (karyotype)** — for couples with recurrent pregnancy loss, to detect a balanced translocation.
- ▶ **Preconception biochemical screening of the mother** for a maternal metabolic disorder (e.g., phenylalanine level in maternal phenylketonuria) that can damage the fetus even when the fetus itself does not inherit the disease.

Indications

- ▶ **Universal offer** — cystic fibrosis and SMA carrier screening should be offered to *all* women/couples considering or already pregnant, regardless of risk (ACOG Committee Opinion No. 691).
- ▶ Family history of a genetic or chromosomal disorder, intellectual disability, or autism.
- ▶ Previous child/pregnancy affected by a genetic disorder, structural birth defect, or a stillbirth with an abnormal karyotype.
- ▶ Consanguineous marriage.

- ▶ High-risk ethnicity — Ashkenazi Jewish descent (Tay-Sachs, Canavan, familial dysautonomia); African/African-American descent (sickle cell disease); Mediterranean, Middle Eastern, Southeast Asian, and Indian-subcontinent descent (thalassaemia).
- ▶ **Recurrent pregnancy loss** (two or more miscarriages) — indication for parental karyotyping.
- ▶ One partner already a known carrier (from a prior test or newborn screening) — the partner should then be offered screening.
- ▶ Advanced parental age — maternal age >35 years (aneuploidy risk); advanced paternal age (new autosomal-dominant mutations).
- ▶ Known parental single-gene disorder with a Mendelian inheritance pattern (autosomal recessive/dominant or X-linked).

Management

- ▶ **Preconception counselling visit** — detailed medical, obstetric, family, and reproductive history; construct a pedigree.
- ▶ **Offer carrier screening** as an informed, optional choice; discuss the three strategies above and the residual risk that remains after a negative test.
 - *Cystic fibrosis*: minimum 23-mutation panethnic panel; carrier frequency $\approx 1:25$ (Ashkenazi Jewish/non-Hispanic white), $1:60$ (African American/Hispanic), $1:95$ (Asian American); residual risk after a negative test $\approx 1:380$ (Ashkenazi) to $1:200$ (other ethnicities).
 - *SMA*: carrier frequency $1:35$ (white) to $1:117$ (Hispanic white); detection rate 90–95% ($\approx 70\%$ in African Americans).
 - *Haemoglobinopathies*: haemoglobin electrophoresis in at-risk ethnicities.
 - *Ashkenazi Jewish panel*: Tay-Sachs (carrier rate $1:30$), Canavan disease ($1:40$), familial dysautonomia ($1:32$) — detection rate $\geq 98\%$ for each.
- ▶ If one partner screens positive, **offer screening to the partner.**
- ▶ If **both partners are carriers** of the same autosomal recessive condition (25% recurrence risk per pregnancy) → genetic counselling and reproductive options:
 - Conceive naturally and pursue **prenatal diagnosis** — chorionic villus sampling (10–13 weeks) or amniocentesis (15–20 weeks), with the option of pregnancy termination if the fetus is affected.
 - **In vitro fertilisation with preimplantation genetic testing** to select and transfer an unaffected embryo.
 - Use of donor gametes.
 - Adoption, or remaining childless.
- ▶ **Recurrent pregnancy loss (≥ 2 losses)** — karyotype both partners; if a balanced translocation is found, offer genetic counselling. Natural conception still carries a high chance of an eventual live

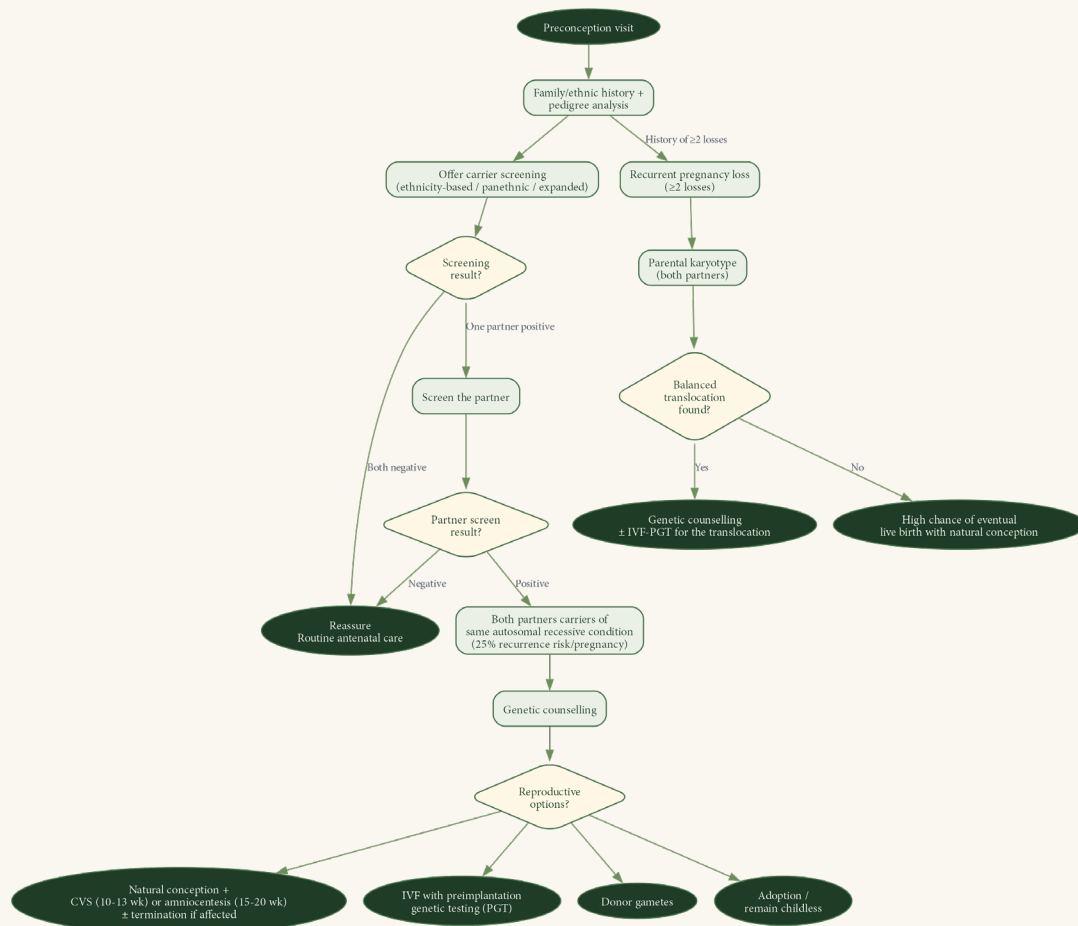
birth; IVF with preimplantation testing for the translocation is an option, but current evidence does not show it to be superior to natural conception.

- ▶ **General preconception optimisation** (all couples, regardless of screening result): folic acid 400 µg (0.4 mg) daily from at least 1 month before conception through the first trimester for all women, increased to **4 mg daily** if a previous pregnancy was affected by a neural-tube defect; optimise glycaemic control in diabetics (target HbA1c <7%); treat thyroid dysfunction; update immunisations; stop teratogenic drugs (ACE inhibitors/ARBs, valproate, warfarin, methotrexate) and switch to safer agents; screen for and address substance use.
- ▶ A negative carrier screen is generally **not repeated** in a subsequent pregnancy, as the additional yield is low.

Recent advances [RA]

- ▶ Practice has shifted from ethnicity-limited testing toward **panethnic and expanded carrier screening (ECS)** using next-generation sequencing panels covering tens to over 1000 conditions simultaneously (ACOG Committee Opinion No. 690, "Carrier Screening in the Age of Genomic Medicine," 2017, reaffirmed 2020).
- ▶ ACOG now accepts **all three strategies** (ethnicity-based, panethnic, expanded) as equally valid choices, and sets minimum criteria for a condition to be included on an expanded panel — carrier frequency ≥1:100, a well-defined phenotype affecting quality of life or requiring intervention, and exclusion of purely adult-onset conditions.
- ▶ Expanded NGS-based cystic fibrosis panels improve at-risk-couple detection by roughly **30%** compared with the standard 23-mutation panel.
- ▶ **Preimplantation genetic testing** with IVF is now formally addressed by ACOG Committee Opinion No. 799 (February 2020) as an accepted option for couples identified as carriers, alongside donor gametes and prenatal diagnosis.
- ▶ **Chromosomal microarray analysis (CMA)** is now preferred over conventional karyotyping in evaluating a structural fetal anomaly or an unexplained stillbirth — it detects clinically significant abnormalities in an additional ~6.5% of cases with a normal karyotype.
- ▶ Widespread uptake of **cell-free DNA (cfDNA)/noninvasive prenatal screening** has led to a marked fall (up to ~70%) in invasive diagnostic procedures (CVS/amniocentesis) since its introduction, though fewer than 40% of women with a positive screen currently proceed to diagnostic testing.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Preconception genetic screening and management algorithm, with a parallel recurrent-pregnancy-loss pathway.

High-yield exam pointers

- ▶ Three ACOG-endorsed strategies: **ethnicity-based, panethnic, expanded** carrier screening.
- ▶ ACOG: offer **CF + SMA carrier screening** to all women/couples planning or in pregnancy, regardless of risk.
- ▶ CF carrier frequency **1:25** (Ashkenazi/white); 23-mutation panethnic panel; residual risk after negative test $\approx 1:380$ (Ashkenazi).
- ▶ Ashkenazi Jewish triad: **Tay-Sachs (1:30), Canavan (1:40), familial dysautonomia (1:32)**.
- ▶ Both partners carriers of the same autosomal recessive gene $\rightarrow$ **25% risk** of an affected child each pregnancy.
- ▶ Folic acid: **0.4 mg/day** universal preconception dose; **4 mg/day** if a prior pregnancy had a neural-tube defect, from 1 month before conception to 12 weeks.
- ▶ Recurrent pregnancy loss $\rightarrow$ karyotype **both** partners for a balanced translocation.

- ▶ Reproductive options once both partners are carriers: prenatal diagnosis (CVS/amniocentesis) with option of termination, IVF + preimplantation genetic testing, donor gametes, adoption.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Obstetrics (9e) covers this subject mainly under "Prenatal Genetic Counseling, Screening and Diagnosis," weighted toward post-conception aneuploidy screening (triple/quad test, nuchal translucency, cell-free DNA); the preconception carrier-screening classification and ACOG data above are drawn from Williams Obstetrics.

SOURCE & COVERAGE

Williams Obstetrics 26e (Chapter 9 "Preconceptional Counseling"; Chapter 17 "Carrier Screening for Genetic Disorders"); DC Dutta's Textbook of Obstetrics 9e (Chapter 12 "Prenatal Genetic Counseling, Screening and Diagnosis"); Berek & Novak's Gynecology 16e (Chapter 33 "Recurrent Pregnancy Loss"); American College of Obstetricians and Gynecologists Committee Opinions No. 690, 691, and 799.



Screening for cervical cancer

Asked in: Paper III 26-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Cervical cancer screening is the systematic testing of asymptomatic women to detect cervical intraepithelial neoplasia (CIN) or early invasive disease before symptoms appear, exploiting the long, slowly progressive premalignant phase driven by persistent high-risk human papillomavirus (hrHPV) infection. Regular cytology-based screening has cut the incidence of invasive cervical cancer by about 80% and mortality by about 70%.

Whom to screen, and at what interval

Age / group	Recommended test	Interval	Guideline
< 21 years	No screening, regardless of age at first intercourse	—	ACOG/ASCCP
21–29 years	Cytology (conventional Pap or liquid-based cytology, LBC) alone	Every 3 years	ACOG/USPSTF (hrHPV testing not used at this age — transient positivity is common)

Age / group	Recommended test	Interval	Guideline
30–65 years	Primary hrHPV testing alone (preferred) or co-testing (cytology + hrHPV) or cytology alone	Every 5 years (primary HPV/co-test) or every 3 years (cytology alone)	ACOG/ASCCP/ACS
High-risk (HIV-positive, immunosuppressed, DES exposure, treated CIN 2/3)	Cytology ± hrHPV	Annual; continued for at least 20 years after treatment of CIN 2/3	ACOG
65–70 years	Discontinue screening	If 3 consecutive negative cytology results, or 2 consecutive negative co-tests, in the preceding 10 years (latest within 5 years), and no CIN 2+ in the past 25 years	ACOG/USPSTF
Post-hysterectomy for benign disease, cervix removed, no history of CIN 2+	Nil	—	ACOG
Low-resource / national programme setting (India)	Visual inspection with acetic acid (VIA), or hrHPV DNA testing where feasible	Once every 5 years, women 30–65 years	WHO / Government of India national programme

Screening tests

Test	Technique	Key point
Conventional Pap smear (cytology)	Ayre's spatula scrape of the squamocolumnar junction/transformation zone + endocervical brush sample; smear fixed immediately in 95% ethyl alcohol; Papanicolaou stain	Single-smear sensitivity for CIN 2/3 only ~50–60%; false-negative rate up to 25–49%, but falls below 1% after 3 consecutive negative smears
Liquid-based cytology (LBC)	Sample rinsed into a liquid medium; a uniform thin layer is prepared by filtration	Reduces unsatisfactory smears by 70–90% versus conventional smear; allows reflex hrHPV testing on the same sample

Test	Technique	Key point
High-risk HPV DNA testing	Hybrid capture-2 or PCR-based assay	Used for ASC-US triage, as part of co-testing, or as a stand-alone primary screening test from age 30; very high negative predictive value when combined with cytology
Visual inspection with acetic acid (VIA)	5% acetic acid applied to the cervix; acetowhite change = positive	Low-cost, needs no laboratory; basis of "screen-and-treat" programmes in India and other resource-limited settings
Visual inspection with Lugol's iodine (VILI)/Schiller's test	Iodine-unstained (mustard-yellow) area = abnormal	Used to direct punch biopsy when colposcopy is unavailable
Colposcopy	Examination of the cervix under 6–16× magnification after acetic acid/iodine application	Not a primary screening test — a triage/diagnostic step for women with an abnormal screening result, used to direct biopsy

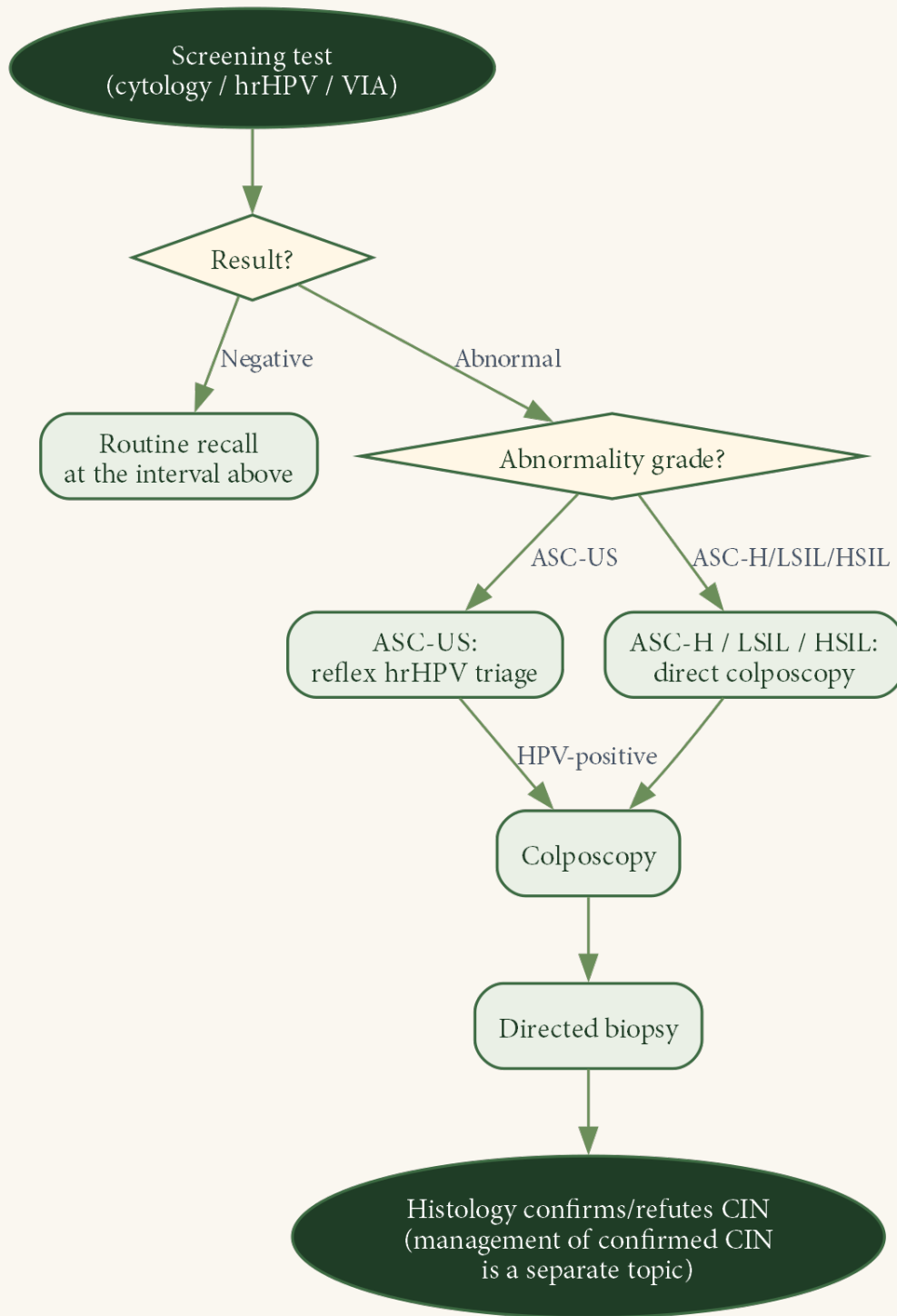
Reporting cytology — the Bethesda System (2001)

Category	Includes
Specimen adequacy	Satisfactory / Unsatisfactory
Squamous cell abnormalities	Atypical squamous cells (ASC-US, ASC-H); low-grade squamous intraepithelial lesion (LSIL — CIN 1/HPV change); high-grade squamous intraepithelial lesion (HSIL — CIN 2/CIN 3/carcinoma-in-situ); squamous cell carcinoma
Glandular cell abnormalities	Atypical glandular cells (AGC); adenocarcinoma-in-situ (AIS); adenocarcinoma

Triage of an abnormal screening result

- ▶ ASC-US → reflex hrHPV testing → HPV-positive: refer to colposcopy; HPV-negative: repeat co-testing in 3 years.
- ▶ ASC-H, LSIL, or worse (HSIL/SCC) → direct colposcopy; hrHPV triage is not used for these grades.
- ▶ **Primary hrHPV-positive, cytology negative** → genotype for HPV 16/18: positive → colposcopy; negative but another hrHPV type → repeat co-testing in 1 year.
- ▶ **Colposcopy** → satisfactory examination with an abnormal (acetowhite/punctuation/mosaic) area → directed punch biopsy ± endocervical curettage to confirm histology before any treatment decision.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart of the cervical cancer screening pathway.

High-yield exam pointers

- ▶ "80/70 rule": regular Pap screening cuts cervical cancer incidence by ~80% and mortality by ~70%.

- ▶ Start screening at 21 regardless of coitarche; stop at 65–70 only with an adequately documented negative screening history.
- ▶ Current intervals: 21–29 years — cytology alone every 3 years; 30–65 years — primary hrHPV or co-testing every 5 years, or cytology alone every 3 years.
- ▶ Bethesda 2001 grades: know which need direct colposcopy (ASC-H, LSIL, HSIL) versus hrHPV triage first (ASC-US only).
- ▶ VIA is the test of choice in India's national screening programme — low-cost, same-visit "screen-and-treat."
- ▶ Single Pap smear false-negative rate ~25–49%; falls below 1% after 3 consecutive negative smears.
- ▶ Colposcopy is a triage/diagnostic tool, not a primary screening test.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older textbook schedules (e.g., the ACOG-2009 table reproduced in some editions — 2-yearly cytology from 21–29 years, annual high-risk-group screening) have been superseded; the intervals in the table above reflect current ACOG/ASCCP/ACS practice, and the exam answer should follow these.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; current ACOG/ASCCP/ACS guidance; WHO cervical cancer screening recommendations and the Government of India national cancer screening programme.



Describe latest FIGO staging of carcinoma endometrium. Discuss various treatment options for Stage I carcinoma endometrium

Asked in: Paper III 02-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Carcinoma of the endometrium is staged surgico-pathologically (not clinically), based on findings at hysterectomy, lymph node assessment, and histopathology. The *International Federation of Gynecology and Obstetrics* (FIGO) revised its 2009 staging in 2023 to incorporate histological subtype

("aggressive" vs "non-aggressive"), lymphovascular space invasion (LVSI), and an optional molecular-classification modifier, since these independently affect prognosis and adjuvant treatment.

FIGO staging of carcinoma endometrium (2023, latest)

Stage	Extent of disease
I	Tumour confined to the corpus uteri, non-aggressive histology (or aggressive histology with no invasion)
IA	Non-aggressive histology limited to a polyp/endometrium (IA1), or <50% myometrial invasion with no/focal LVSI (IA2), or low-grade endometrioid confined to uterus with synchronous low-grade ovarian involvement (IA3)
IB	Non-aggressive histology, ≥50% myometrial invasion , no/focal LVSI
IC	Aggressive histology (serous, clear cell, undifferentiated carcinoma, carcinosarcoma, or mixed carcinoma with any of these) confined to endometrium/polyp, no myometrial invasion
II	Cervical stromal invasion, or substantial LVSI, or aggressive histology with any invasion — still confined to the uterus
IIA	Non-aggressive histology invading the cervical stroma
IIB	Non-aggressive histology with substantial LVSI
IIC	Aggressive histology with any myometrial invasion
III	Local and/or regional spread
IIIA	Serosa/adnexal invasion — IIIA1 (ovary/tube), IIIA2 (uterine subserosa)
IIIB	IIIB1 (vagina/parametrium), IIIB2 (pelvic peritoneum)
IIIC	IIIC1 (pelvic nodes), IIIC2 (para-aortic nodes); each subdivided i = micrometastasis, ii = macrometastasis
IV	Spread beyond the pelvis
IVA	Bladder and/or bowel mucosa invasion
IVB	Abdominal peritoneal metastasis beyond the pelvis

Stage	Extent of disease
IVC	Distant metastasis — extra-abdominal lymph nodes (above renal vessels), lung, liver, bone, brain

- ▶ Every stage/substage may carry an optional molecular modifier — **mPOLEmut**, **mMMRd**, **mp53abn**, or **mNSMP** (no specific molecular profile) — determined by immunohistochemistry/sequencing; a *POLE*-mutant tumour is generally downstaged in prognosis, a *p53*-abnormal tumour upstaged, regardless of the anatomical FIGO stage.
- ▶ Peritoneal cytology is reported separately and no longer changes the stage.

Treatment options for Stage I carcinoma endometrium

1. Primary surgical treatment (mainstay for all operable Stage I disease)

- ▶ Midline/paramedian laparotomy, or a laparoscopic/robotic approach (preferred where expertise exists — equivalent oncological outcome, less morbidity).
- ▶ **Peritoneal washings** taken for cytology before manipulating the uterus.
- ▶ Uterus is **not held with a vulsellum**; traction is applied via artery forceps on the cornua to avoid tumour spillage.
- ▶ **Total (extrafascial) hysterectomy with bilateral salpingo-oophorectomy** — the standard operation; vaginal cuff excision is not required.
- ▶ Uterus opened in the operating room (or frozen section sent) to confirm histological grade, depth of myometrial invasion, and cervical extension.
- ▶ **Sentinel lymph node (SLN) mapping** (cervical injection of indocyanine green with fluorescence imaging) is now the preferred method of nodal assessment for clinical Stage I disease of all grades/histologies; comprehensive pelvic ± para-aortic lymphadenectomy is reserved for tumours with grade 3 histology, deep (≥50%) myometrial invasion, LVSI, tumour diameter >2 cm, or aggressive (non-endometrioid) histology, and for SLN mapping failure.

2. Adjuvant treatment — risk-adapted (after surgical staging)

Risk group (within Stage I)	Criteria	Adjuvant treatment
Low risk	Grade 1–2 endometrioid, IA, no LVSI	Observation only — surgery alone gives >95% disease-free survival
Intermediate risk	IA grade 3, or IB grade 1–2, no LVSI	Vaginal vault brachytherapy (or observation if age <60 years) — reduces vaginal recurrence, no survival benefit shown

Risk group (within Stage I)	Criteria	Adjuvant treatment
High-intermediate risk	IB with grade 3 histology, or substantial LVSI present, or age >60 with additional risk factor	Vaginal brachytherapy ± external pelvic radiotherapy (PORTEC-2 shows equivalent vault control with brachytherapy alone and fewer toxicities)
High risk (aggressive histology)	Stage IC (serous/clear cell/undifferentiated/carcinosarcoma)	Adjuvant chemotherapy (carboplatin–paclitaxel) with or without vaginal brachytherapy, as these behave aggressively even without myometrial invasion

3. Fertility-sparing (non-surgical) option — for a young woman with grade 1 endometrioid Stage IA disease (no invasion on MRI) who desires future childbearing:

- ▶ Continuous **progestin therapy** — megestrol acetate 40–160 mg/day (or levonorgestrel intrauterine system) for a minimum of 3–6 months.
- ▶ Repeat **endometrial biopsy** every 3 months to confirm regression; roughly three-quarters of appropriately selected patients respond.
- ▶ On completion of childbearing, or on failure/progression of disease, proceed to definitive **hysterectomy with bilateral salpingo-oophorectomy**.
- ▶ Counsel that this remains non-standard care with a real (~24%) relapse rate and needs close, informed surveillance.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 27.2 — Surgical stages of endometrial cancer (Te Linde 13e, p.1424)

High-yield exam pointers

- ▶ FIGO endometrial staging is **surgico-pathological**, not clinical — unlike cervical cancer (2018 FIGO added imaging/pathology to a clinical framework).
- ▶ **2023 revision** (write this, not the 2009 version): introduces "aggressive" vs "non-aggressive" histology and LVSI as stage-determining in Stage I/II, and a new **Stage IC / IIC** for aggressive histology.
- ▶ Molecular classification (**POLEmut / MMRd / p53abn / NSMP**) can be appended as an "m" modifier alongside the anatomical stage.
- ▶ Stage I surgery = **total hysterectomy + bilateral salpingo-oophorectomy ± SLN mapping**; no vulsellum on the uterus, cuff excision not needed.

- ▶ Low-risk Stage I → **observation**; intermediate/high-intermediate → **vaginal vault brachytherapy** (PORTEC-2); aggressive histology → **chemotherapy**.
- ▶ Fertility-sparing dose to remember: **megestrol acetate 40–160 mg/day**, for grade 1 IA endometrioid only.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Gynaecology 7e and Berek & Novak's Gynecology 16e both print the 2009 FIGO staging table; the staging above is the FIGO 2023 revision, which is now the current standard and should be used in the exam answer.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Te Linde's Operative Gynecology 13e (figure); FIGO Committee on Gynecologic Oncology — FIGO staging of endometrial cancer: 2023; PORTEC-1/PORTEC-2 trial data as cited in Berek & Novak 16e.

♦ ♦ ♦

Describe management of patient with positive HPV DNA test on cervical cancer screening

Asked in: Paper III 15-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — High-risk human papillomavirus (hrHPV) DNA testing detects oncogenic HPV genotypes (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68) in cervical cells and is used either as a stand-alone primary screening test or in co-testing with cytology. Because only 2–5% of hrHPV-positive women will ever develop cervical intraepithelial neoplasia (CIN) — most infections clear spontaneously within 9–15 months — a positive test is not treated itself; it triggers a risk-stratified triage algorithm (genotyping → reflex cytology → colposcopy) to identify the minority with a true precursor lesion.

Step 1 — Triage of the positive HPV DNA result

HPV DNA result	Next step
HPV 16 or 18 positive (any of the two most oncogenic genotypes)	Refer directly to colposcopy , regardless of cytology result
Other high-risk genotype positive (non-16/18 of the 12 pooled hrHPV types)	Perform reflex liquid-based cytology on the same sample
→ reflex cytology ASC-US or worse	Colposcopy
→ reflex cytology negative (NILM)	Repeat co-test (cytology + hrHPV) at 12 months

HPV DNA result	Next step
→ repeat co-test still HPV-positive or cytology abnormal	Colposcopy
→ repeat co-test negative on both	Return to routine age-appropriate screening interval
Persistently positive HR-HPV-DNA on two occasions, irrespective of genotype	Colposcopy (an accepted stand-alone indication)

- ▶ Genotyping for HPV 16/18 as an adjunct to high-risk HPV-DNA testing is validated for use as a primary screening/triage method — HPV 16 carries the highest risk of underlying CIN 2/3 among all genotypes.
- ▶ In low-resource settings (as endorsed by WHO 2021 guidance and India's National Programme), a "screen-and-treat" **single-visit approach** is acceptable: an HPV-positive woman with a fully visible, small acetowhite lesion on visual inspection with acetic acid (VIA)/colposcopy and no suspicion of invasion may proceed directly to ablative treatment (cryotherapy or thermal ablation) without waiting for histologic confirmation, reducing loss to follow-up.

Step 2 — Colposcopy-directed evaluation

- ▶ **Position and visualize** — lithotomy position, Cusco's speculum; treat any active cervical infection before the procedure.
- ▶ **Apply 3–5% acetic acid** — identify acetowhite areas, abnormal vascular patterns (punctuation, mosaicism, atypical vessels), and leukoplakia.
- ▶ **Confirm a satisfactory examination** — entire squamocolumnar junction (SCJ) and transformation zone visualized (use an endocervical speculum if the SCJ is canalicular).
- ▶ **Schiller's/Lugol's iodine** may supplement acetic acid — non-glycogenated (iodine-negative) areas correspond to abnormal epithelium.
- ▶ **Directed punch biopsy** of the most abnormal-appearing area(s); **endocervical curettage (ECC)** if the SCJ is not fully visualized, colposcopy is unsatisfactory, or the patient is being evaluated for a glandular (AGC) abnormality.
- ▶ **Correlate** cytology, colposcopic impression, and histology jointly before deciding treatment — discordance (cytology worse than histology) mandates re-evaluation with repeat colposcopy/biopsy or an excisional diagnostic procedure.

Step 3 — Management by histologic result

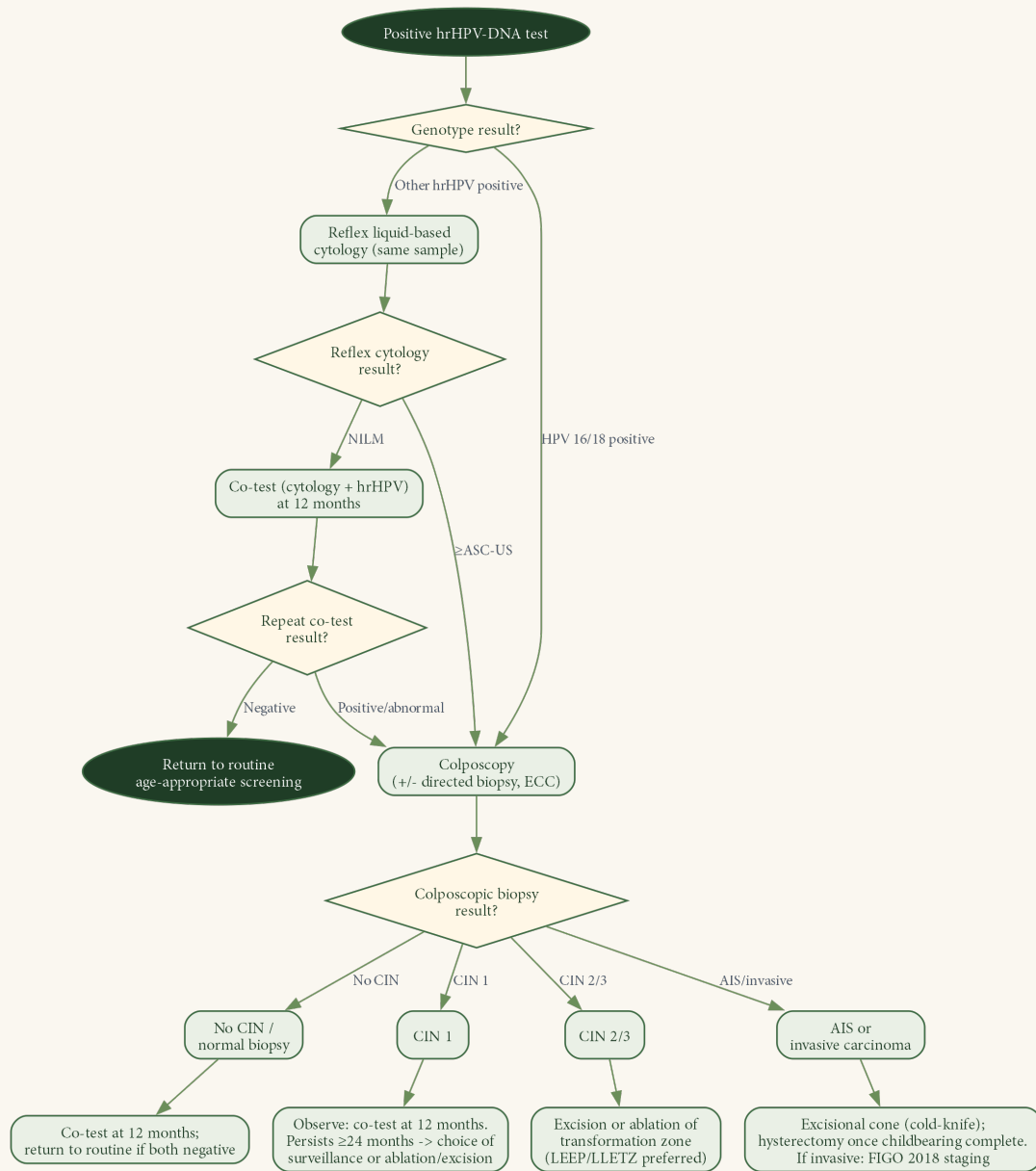
Colposcopic biopsy result	Management
No CIN / normal biopsy, satisfactory colposcopy	Co-testing (cytology + hrHPV) at 12 months; return to routine screening if both negative

Colposcopic biopsy result	Management
CIN 1	Not a cancer precursor (60–85% regress spontaneously in 2 years) — observe with co-testing at 12 months; if it persists ≥24 months , offer the patient a choice of continued surveillance or ablation/excision of the transformation zone. CIN 1 preceded by ASC-H/HSIL cytology is higher-risk — co-test at 12 and 24 months, or proceed to loop excision
CIN 2/CIN 3 (age ≥25 years, adequate colposcopy)	Excision or ablation of the transformation zone required. Loop electrosurgical excision procedure (LEEP/LLETZ) is preferred over ablation, as it yields a specimen for margin/occult-invasion assessment. Ablation (cryotherapy/laser) is contraindicated if colposcopy is unsatisfactory, disease is recurrent, or ECC is positive
CIN 2/3 in women <25 years or in pregnancy	Conservative — cytology + colposcopy surveillance at 6 and 12 months (postpartum at 6 weeks if pregnant); treat only if progression or invasion is suspected
Adenocarcinoma in situ (AIS)	Excisional diagnostic procedure (cold-knife cone preferred over LEEP for clear margins); hysterectomy is definitive treatment once childbearing is completed
Biopsy/colposcopy suspicious of microinvasive or invasive carcinoma	Diagnostic conization for serial sections; if invasion confirmed, stage clinically per FIGO 2018 staging and refer for appropriate surgical/oncologic management

Post-treatment and special-situation surveillance

- ▶ After treatment for CIN 2/3: **co-testing at 12 and 24 months** before returning to age-appropriate routine screening; a positive test at either visit mandates repeat colposcopy.
- ▶ **HIV-positive / immunosuppressed women:** more frequent surveillance; expectant management of CIN 1 is not appropriate.
- ▶ **Recurrent high-grade CIN:** hysterectomy is the treatment of last resort.
- ▶ **VAIN** noted on follow-up after treatment: VAIN 1/2 — surveillance; VAIN 3 — excision or laser ablation after ruling out invasion.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision-algorithm flowchart for management of a positive hrHPV-DNA test, from genotype triage through colposcopy to histology-based management.

High-yield exam pointers

- ▶ HPV 16 or 18 positive → **colposcopy directly**, no reflex cytology needed — the single most-tested step.
- ▶ Other hrHPV positive + reflex cytology **negative** → **repeat co-test at 12 months**, not immediate colposcopy.
- ▶ Only 2–5% of HPV-DNA-positive women ever develop CIN; ~80% clear the infection spontaneously.

- ▶ CIN 1 = observe (persistent HPV infection, not a precursor); CIN 2/3 = excise/ablate (LEEP preferred).
- ▶ AIS → excisional cone (not LEEP) → hysterectomy once family complete.
- ▶ WHO 2021 low-resource algorithm: HPV-DNA positive + small, fully visible lesion → "screen-and-treat" ablation in a single visit.
- ▶ ECC indicated when colposcopy is unsatisfactory, SCJ not seen, or AGC cytology.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older textbook editions still print the 2001/2012 ASCCP-era triage tables reproduced above; the current (ASCCP 2019 risk-based) guidelines assign management by calculated CIN 3+ risk rather than by test result alone, but the genotyping-and-reflex-cytology logic shown here remains the backbone of both frameworks and is what is examinable at this level.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (HPV screening, ASC-US/LSIL/HSIL triage, CIN 1/2-3 management, colposcopy standards); DC Dutta's Textbook of Gynaecology 7e (HPV-DNA/genotyping as primary screening adjunct, colposcopy indications, VIA, Bethesda cytology-management table). Guideline context: WHO (2021) cervical cancer screening and treatment guidance for secondary prevention.



Describe the Bethesda system of pap smear classification

Asked in: Paper I 12-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — The Bethesda System is a standardized, uniform terminology for reporting cervical/vaginal cytology (Pap smear) results, introduced at a 1988 National Cancer Institute (NCI) workshop in Bethesda, Maryland, and revised in 1991, 2001, and 2014 (current version). It replaced the older numerical Papanicolaou grading (Groups I–V) with a structured, descriptive report — specimen adequacy, an optional general categorization, and a detailed interpretation of any epithelial cell abnormality — so that the cytology report correlates directly with clinical management.

Structure of a Bethesda report

Component	Content
Specimen type	Conventional Pap smear or liquid-based cytology (LBC)

Component	Content
Specimen adequacy	Satisfactory for evaluation, or unsatisfactory for evaluation (reason stated — obscuring blood/inflammation, scant squamous cellularity, poor fixation)
General categorization (optional)	Negative for intraepithelial lesion or malignancy (NILM) / epithelial cell abnormality / other
Interpretation/result	Non-neoplastic findings (organisms, reactive changes) and/or epithelial cell abnormality, stated explicitly by category (below)
Ancillary testing	High-risk human papillomavirus (hrHPV) DNA/reflex test result, if performed
Educational notes/suggestions	Optional comment correlating the cytologic finding with recommended management (added in the 2014 revision)

Squamous cell abnormalities

Category	Abbreviation	Description	Approx. risk of underlying CIN2+
Atypical squamous cells of undetermined significance	ASC-US	Changes suggestive of but not definitive for a squamous intraepithelial lesion (SIL); the most common abnormal category (3–5% of smears)	~5–10% CIN2/3; invasive cancer rare (~0.1–0.2%)
Atypical squamous cells, cannot exclude HSIL	ASC-H	Higher-risk atypia in which a high-grade lesion cannot be excluded (~10% of atypical results)	Substantially higher than ASC-US; managed like HSIL — direct colposcopy, not hrHPV triage
Low-grade squamous intraepithelial lesion	LSIL	Cytopathic effect of human papillomavirus (HPV) infection (koilocytosis) and CIN 1 (mild dysplasia)	Up to ~15–20% CIN2/3
High-grade squamous intraepithelial lesion	HSIL	Correlates with CIN 2, CIN 3, and carcinoma in situ (CIS)	~70% CIN2/3; ~1–2% invasive cancer
Squamous cell carcinoma	SCC	Frank invasive squamous malignancy on cytology	Diagnostic of malignancy

Glandular cell abnormalities

Category	Description
Atypical glandular cells (AGC)	Endocervical, endometrial, or not otherwise specified (NOS) — mild atypia exceeding reactive change
AGC, favour neoplastic	Endocervical or NOS; higher suspicion for CIN/adenocarcinoma in situ (AIS) or invasive disease
Endocervical adenocarcinoma in situ (AIS)	Pre-invasive glandular lesion of the endocervix
Adenocarcinoma	Endocervical, endometrial, extra-uterine, or NOS

AGC carries the highest neoplasia risk among the "atypical" categories — up to ~9% harbour AIS/adenocarcinoma, and endometrial pathology must specifically be excluded in women over 35 years or with abnormal uterine bleeding.

Non-neoplastic findings reported under NILM

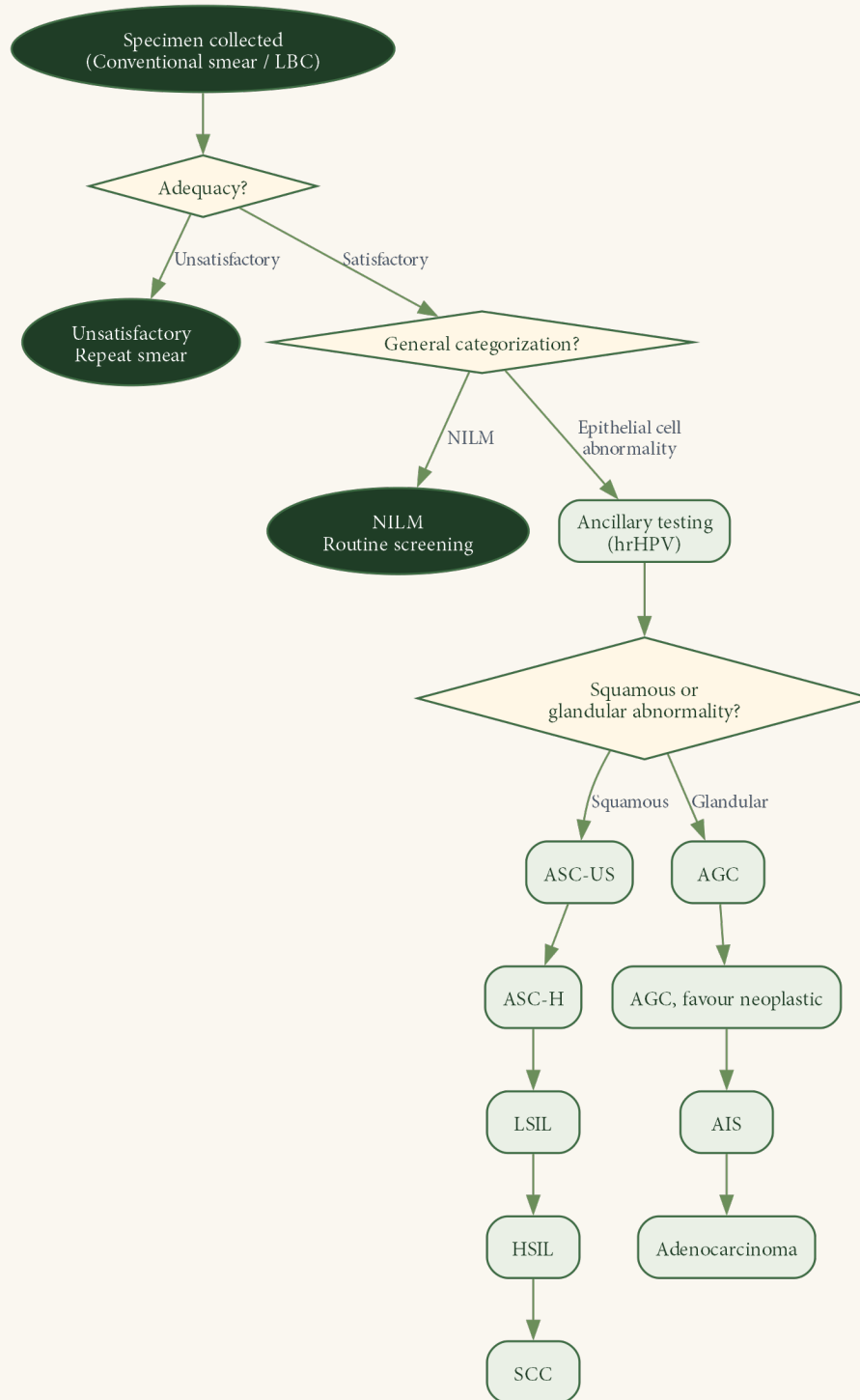
- **Organisms:** *Trichomonas vaginalis*; fungal organisms morphologically consistent with *Candida* species; shift in flora suggestive of bacterial vaginosis; bacteria morphologically consistent with *Actinomyces* species; cellular changes consistent with herpes simplex virus or cytomegalovirus.
- **Reactive cellular changes:** associated with inflammation, radiation, or an intrauterine contraceptive device (IUCD).
- **Glandular cells:** status post-hysterectomy.
- **Atrophy.**

Clinical correlation and management pathway

Cytology result	Recommended pathway
ASC-US	Reflex hrHPV testing (preferred) → hrHPV-positive → colposcopy; hrHPV-negative → routine screening interval
LSIL	Colposcopy (± endocervical curettage, ECC)
ASC-H / HSIL	Direct colposcopy ± loop electrosurgical excision procedure (LEEP); not triaged with hrHPV testing alone
AGC	Colposcopy + ECC + hrHPV testing; endometrial sampling if age >35 years or abnormal bleeding
AIS/adenocarcinoma	Diagnostic excisional conization (cold-knife or LEEP) to assess margins and exclude invasion

This risk-stratified pathway follows the current American Society for Colposcopy and Cervical Pathology (ASCCP) 2019 Risk-Based Management Consensus Guidelines, which base the next step on the estimated risk of CIN3+ rather than the cytology result alone.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Bethesda System reporting algorithm — specimen adequacy through squamous and glandular abnormality categories.

High-yield exam pointers

- Origin: 1988 NCI workshop, Bethesda, Maryland; revised 1991, 2001, current 2014 version.

- ▶ Three components of every report: **specimen adequacy** → **general categorization** → **interpretation/result**.
- ▶ **ASC-US** = commonest abnormal smear; triage with reflex hrHPV testing.
- ▶ **ASC-H and HSIL go straight to colposcopy** — hrHPV triage is not used for these.
- ▶ **LSIL** ≈ HPV/CIN 1; **HSIL** ≈ CIN 2/CIN 3/CIS.
- ▶ **AGC carries the highest malignancy risk** of the atypical categories — mandates ECC ± endometrial sampling.
- ▶ Current risk-based management framework: **ASCCP 2019 consensus guidelines**.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta and Berek & Novak print the categories as codified in the **2001** Bethesda revision (Table 9.3/16-1); the **2014** update kept the same squamous and glandular categories and mainly refined specimen-adequacy wording, added human papillomavirus/ancillary-testing notation, and introduced optional educational comments — so the classification content above remains current.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Table 9.3, p.91); Berek & Novak's Gynecology 16e (Table 16-1); Jeffcoate's Principles of Gynaecology 9e; The Bethesda System for Reporting Cervical Cytology, 2014 edition; ASCCP 2019 Risk-Based Management Consensus Guidelines.



Describe the methods of cervical cancer screening and management of a case of carcinoma cervix in a 43-year-old woman?

Asked in: Paper III 17-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Carcinoma cervix is a malignancy arising from the squamous or glandular epithelium of the uterine cervix, driven in >99% of cases by persistent infection with high-risk human papillomavirus (hrHPV, chiefly types 16 and 18). Screening detects the pre-invasive stage (cervical intraepithelial

neoplasia, CIN) or early invasive disease before symptoms develop, since the natural history allows a long, treatable pre-cancer window.

Methods of screening

Method	Technique	Interpretation / action
Cervical cytology (Pap smear)	Conventional (Ayre's spatula + endocervical brush) or liquid-based cytology (LBC); smear from squamocolumnar junction, transformation zone, endocervix	Reported by the Bethesda system — ASC-US, LSIL, HSIL, ASC-H, AGC; abnormal result → colposcopy ± HPV triage
High-risk HPV DNA testing	Hybrid capture-2 or PCR-based detection of HR-HPV (types 16, 18, 31, 33, 35, 45, 56 etc.)	Used alone as primary screening, or with cytology as co-testing ; genotyping for 16/18 refines risk
Visual inspection with acetic acid (VIA)	3–5% acetic acid applied to cervix; acetowhite areas are abnormal	Low-cost, immediate "see-and-treat" option — used in low-resource settings (national programme in India)
Visual inspection with Lugol's iodine (VILI)	Iodine-unstained (mustard-yellow) areas are abnormal (Schiller's test)	Alternative/adjunct to VIA where colposcopy unavailable
Colposcopy	Low-power (6–16×) magnified examination after acetic acid; assesses acetowhite change, punctation, mosaicism, atypical vessels	Clinical method — not a substitute for cytology; guides targeted biopsy
Cervicography	Photograph of acetic-acid-treated cervix reviewed by expert	Adjunct to cytology/colposcopy
Directed/punch biopsy ± endocervical curettage (ECC)	Biopsy from colposcopically abnormal area, or from Schiller-negative (unstained) areas if colposcopy unavailable	Confirms histological diagnosis of CIN/invasion
Diagnostic conization	Cold-knife cone or LEEP	When colposcopy unsatisfactory, lesion extends into canal, or microinvasion/glandular abnormality suspected

Screening schedule (age-based): screening starts at 21 years regardless of sexual history. Age 21–29 years — cytology alone every 3 years. Age 30–65 years — co-testing (cytology + HR-HPV) every 5 years, or cytology alone every 3 years, or primary HR-HPV testing every 5 years, are acceptable alternatives. Screening may be **stopped after 65 years** if there is an adequate negative screening history (3 consecutive negative cytology or 2 negative co-tests in the preceding 10 years) (ACOG/ASCCP-endorsed intervals).

Primary prevention complements screening: prophylactic HPV vaccination

(bivalent/quadrivalent/nonavalent, given to girls 9–14 years ideally before sexual debut, and catch-up to 26 years), and treatment of premalignant CIN detected on screening.

A 43-year-old woman falls in the 30–65-year co-testing band; any abnormal cytology/HR-HPV result triggers colposcopy and biopsy, and if biopsy confirms invasive carcinoma, staging and treatment planning follow as below.

FIGO staging (2018) — carcinoma cervix

Stage	Description
I	Carcinoma strictly confined to the cervix
IA	Invasive carcinoma diagnosed only microscopically, depth of invasion <5 mm — IA1 (<3 mm), IA2 (≥3 to <5 mm)
IB	Invasion ≥5 mm, still confined to cervix — IB1 (<2 cm), IB2 (≥2 to <4 cm), IB3 (≥4 cm)
II	Invades beyond uterus, not to lower third of vagina or pelvic wall
IIA	Upper two-thirds vagina, no parametrial invasion — IIA1 (<4 cm), IIA2 (≥4 cm)
IIB	Parametrial invasion, not up to pelvic wall
III	Lower third vagina and/or pelvic wall and/or hydronephrosis/non-functioning kidney and/or pelvic/para-aortic node involvement
IIIA	Lower third of vagina, no extension to pelvic wall
IIIB	Pelvic wall extension and/or hydronephrosis/non-functioning kidney
IIIC	Pelvic (IIIC1) and/or para-aortic (IIIC2) lymph node metastasis, any tumour size (r = imaging, p = pathology confirmed)
IV	Extends beyond true pelvis, or biopsy-proven bladder/rectal mucosa involvement
IVA	Spread to adjacent pelvic organs
IVB	Spread to distant organs

Pre-treatment work-up

- ▶ General/gynaecological + per-rectal examination to assess parametrial/pelvic-wall spread; examination under anaesthesia with biopsy/conization confirms histology and clinical stage.
- ▶ Chest X-ray, cystoscopy/proctoscopy if bladder/rectal involvement suspected.

- ▶ Contrast-enhanced **MRI pelvis** (parametrial/local extent) and CT/PET-CT (nodal/distant staging) where available.
- ▶ Baseline haemogram and renal function (cisplatin fitness), HIV status.

Management of carcinoma cervix (stage-wise)

Stage	Depth of invasion / extent	Treatment
IA1, no lymphovascular space invasion (LVSI)	≤3 mm	Therapeutic conization (fertility desired) or simple trachelectomy/simple hysterectomy (childbearing complete); margins must be free
IA1/IA2 with LVSI, or IA2	3–5 mm	Radical trachelectomy or modified radical (type II) hysterectomy + pelvic lymphadenectomy
IB, IIA (early invasive)	>5 mm invasion, confined to cervix ± upper vagina	Radical hysterectomy (type III, Wertheim's) + bilateral pelvic lymphadenectomy with para-aortic node evaluation; nerve-sparing/laparoscopic-robotic approach where available. If nodes positive → adjuvant external-beam radiotherapy. Equally acceptable: primary chemoradiation (survival equivalent to surgery in early stage)
Bulky IB2/IB3, IIA (≥4 cm)	Bulky early disease	Concurrent chemoradiation (external-beam radiotherapy + weekly cisplatin , platinum-based radiosensitiser) followed by intracavitary brachytherapy ; or neoadjuvant platinum-based chemotherapy (cisplatin + paclitaxel/ifosfamide) for 3 cycles followed by radical hysterectomy
IIB–IVA (locally advanced)	Parametrial/pelvic-wall/vaginal extension	Concurrent chemoradiation as primary treatment: external-beam pelvic radiotherapy + weekly cisplatin, followed by intracavitary brachytherapy to boost central dose

Stage	Depth of invasion / extent	Treatment
IVB (distant metastasis)	Distant spread	Palliative: systemic combination chemotherapy (cisplatin/carboplatin + paclitaxel ± bevacizumab) and palliative radiotherapy for symptom control
Young woman wanting fertility	IA2/small IB1 (<2 cm), node-negative	Radical trachelectomy with pelvic ± aortic lymphadenectomy and permanent cervical cerclage

Key surgical points — radical (Wertheim's) hysterectomy:

- ▶ En-bloc removal of uterus, cervix, parametrium, upper one-third to three-fourths of vagina, and bilateral pelvic lymph nodes.
- ▶ Ureters dissected free from the parametrium ("tunnel of Wertheim") and preserved; uterine artery ligated at its origin from the internal iliac artery; cardinal/uterosacral ligaments divided at the pelvic side wall.
- ▶ Ovaries may be conserved (and transposed out of the radiation field) in a young woman with squamous histology.
- ▶ Complications: bladder atony/denervation, ureteric fistula, lymphocyst, lymphoedema.

Palliative care (advanced/recurrent disease): Monsel's-solution vaginal packing or palliative radiotherapy for bleeding; NSAIDs/opioids ± palliative radiotherapy for bone pain; nephrostomy/urinary diversion for ureteric obstruction; cisplatin/paclitaxel/ifosfamide for recurrence.

Follow-up: 3–4-monthly for 2 years, 6-monthly for the next 2 years, then annually, with examination and cervico-vaginal cytology.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 24.7 — Diagrammatic representation of staging of carcinoma cervix according to FIGO (DC Dutta's Gynaecology 7e, p.303)

High-yield exam pointers

- ▶ Screening start **21 years**; 21–29y → cytology q3y; 30–65y → co-test q5y OR cytology q3y OR primary HR-HPV q5y; stop at 65y if adequate negative history.
- ▶ **FIGO 2018** cervical staging: IA (≤5 mm depth), IB1/IB2/IB3 cut-offs at 2 cm and 4 cm, IIIC = node-positive (any size) — the single biggest change from 2009.
- ▶ Early stage (IA2–IIA): **radical hysterectomy + pelvic lymphadenectomy = primary chemoradiation** in survival.

- ▶ Bulky/locally advanced (≥ 4 cm, IIB–IVA): **concurrent chemoradiation** = external radiotherapy + **weekly cisplatin** + brachytherapy boost.
- ▶ Fertility-sparing option: radical trachelectomy — only for IA2/small IB1 (< 2 cm), node-negative.
- ▶ Wertheim's operation = uterus + parametrium + upper vagina + pelvic nodes; ureters dissected free, uterine artery ligated at origin.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The screening intervals above follow current ACOG/ASCCP consensus guidance; older textbook editions may still print the earlier 2009 FIGO staging (undivided IB, no IIIC category) rather than the 2018 revision used here.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; FIGO Committee on Gynecologic Oncology (2018 cervical cancer staging revision); ACOG/ASCCP cervical cancer screening guidance.



Discuss predisposing factors, types of endometrial hyperplasia. Describe the management of 35 yrs old nullipara with endometrial hyperplasia with atypia willing for conception

Asked in: Paper III 20-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — Endometrial hyperplasia is a spectrum of architectural and cytological alteration of the endometrial glands and stroma, with an increased gland-to-stroma ratio, resulting from prolonged estrogenic stimulation of the endometrium unopposed by progesterone. It ranges from a reversible benign proliferative state to endometrial intraepithelial neoplasia (EIN), a direct, non-invasive precursor of endometrioid endometrial carcinoma.

Predisposing factors

Mechanism	Predisposing factor	Note / relative risk
Endogenous unopposed estrogen	Chronic anovulation, polycystic ovary syndrome (PCOS)	Persistent follicular estrogen without a secretory phase

Mechanism	Predisposing factor	Note / relative risk
	Obesity	Peripheral aromatization of androstenedione to estrone in adipose tissue; RR 3 (21–50 lb overweight) to 10 (>50 lb overweight)
	Estrogen-secreting ovarian tumour	Granulosa cell tumour, thecoma
Exogenous estrogen	Unopposed estrogen therapy (no progestin)	RR 4–8
	Tamoxifen therapy	RR 2–3 (weak endometrial estrogen agonist effect)
Reproductive factors	Nulliparity	RR 2–3
	Early menarche / late menopause (>52 yr)	RR 2.4
	Infertility, irregular anovulatory cycles	Prolonged unopposed estrogen exposure
Metabolic ("corpus cancer syndrome" triad)	Obesity, hypertension, diabetes mellitus	Diabetes RR 2.8
Genetic	Lynch (HNPCC) syndrome — germline <i>MLH1/MSH2/MSH6</i> mutation	RR ~20; 40–60% lifetime risk of endometrial/colon cancer
Age	Perimenopausal age group (40–50 years)	Most cases arise around the menopausal transition

Types / classification of endometrial hyperplasia

The traditional WHO (1994)/International Society of Gynecological Pathologists (ISGP) scheme grades hyperplasia by architecture and cytologic atypia, with progression risk validated by *Kurman et al.*'s long-term follow-up study:

Type	Architecture	Cytologic atypia	Progression to carcinoma
Simple hyperplasia (cystic)	Dilated/cystic glands, mild crowding	Absent	1%
Complex hyperplasia (adenomatous)	Crowded, budding/infolding glands, reduced stroma	Absent	3%
Simple atypical hyperplasia	Cystic gland pattern	Present	8%

Type	Architecture	Cytologic atypia	Progression to carcinoma
Complex atypical hyperplasia	Crowded, complex gland pattern	Present	29%

In 2015 the American College of Obstetricians and Gynecologists (ACOG) and the Society of Gynecologic Oncology endorsed replacing this four-tier system with the WHO (2014) two-tier EIN nomenclature:

- ▶ **Benign endometrial hyperplasia (hyperplasia without atypia)** — managed medically; low progression risk.
- ▶ **Endometrial intraepithelial neoplasia (EIN)**, replacing "atypical hyperplasia" — premalignant; 40–50% harbour a concurrent, usually well-differentiated, carcinoma; managed surgically, or medically if fertility is desired or the patient is a poor surgical candidate.

Management of this 35-year-old nullipara with atypical hyperplasia (EIN) desiring conception

- ▶ **Confirm the diagnosis and exclude concurrent carcinoma** — hysteroscopy with directed endometrial biopsy (preferred over blind curettage), histopathology reviewed by a gynaecologic pathologist; counsel that 40–50% of atypical hyperplasia/EIN specimens harbour an occult, usually well-differentiated, carcinoma.
- ▶ **Surrogate staging work-up** — transvaginal sonography ± pelvic MRI to assess myometrial invasion and exclude extrauterine spread; also excludes a synchronous estrogen-secreting ovarian tumour as the driving cause.
- ▶ **Counsel the patient** — hysterectomy with bilateral salpingo-oophorectomy remains the definitive, gold-standard treatment (ACOG); fertility-sparing hormonal therapy is offered only to a motivated, compliant woman who understands the risk of an undiagnosed occult carcinoma, the recurrence risk after stopping progestins, and the plan for definitive hysterectomy once childbearing is complete.
- ▶ **Fertility-sparing progestin therapy** — continuous oral progestin, either **megestrol acetate 40–160 mg/day** or **medroxyprogesterone acetate (Provera) 10 mg twice daily**, given continuously or cyclically for **6–9 months** (minimum 3–6 months before assessing response); the **levonorgestrel-releasing intrauterine system** is an alternative delivery route with fewer systemic progestin side effects.
- ▶ **Surveillance** — repeat hysteroscopy-guided endometrial biopsy every **3 months**; continue progestin until two consecutive biopsies confirm regression to normal/inactive endometrium.
- ▶ **On confirmed regression** — proceed promptly to fertility treatment, correcting the underlying anovulation (ovulation induction with letrozole/clomiphene, or assisted reproduction if indicated, since most such patients have PCOS-related anovulatory infertility); the endometrium

can relapse, so conception should not be delayed and a maintenance cyclic progestin may bridge treatment cycles.

- ▶ **If no regression by 6 months, progression to carcinoma, or poor compliance** — abandon the conservative approach and proceed to hysterectomy with bilateral salpingo-oophorectomy, with peritoneal cytology and gross intraoperative examination of the uterus for surgical staging.
- ▶ **After childbearing is complete** — definitive hysterectomy with bilateral salpingo-oophorectomy is advised even after apparent regression, because of the high long-term recurrence risk once progestin therapy is withdrawn.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 23.10 — Complex endometrial hyperplasia with nuclear stratification and cytological atypia (DC Dutta's Gynaecology 7e, p.291)

High-yield exam pointers

- ▶ Kurman progression figures — Simple 1% / Complex 3% / Atypical simple 8% / Atypical complex 29% — write these numbers verbatim.
- ▶ "Corpus cancer syndrome" triad — obesity + hypertension + diabetes mellitus.
- ▶ 2015 ACOG/SGO nomenclature — two-tier EIN schema (hyperplasia without atypia vs EIN) replaces the four-tier WHO(1994) system; "atypical hyperplasia" = EIN.
- ▶ 40–50% of atypical hyperplasia/EIN specimens harbour a concurrent carcinoma — mention this when counselling for conservative therapy.
- ▶ Progestin doses: megestrol acetate 40–160 mg/day OR medroxyprogesterone acetate 10 mg BID, for 6–9 months; endometrial sampling every 3 months.
- ▶ Hysterectomy + bilateral salpingo-oophorectomy = definitive treatment once fertility is no longer desired (ACOG).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older textbook editions still teach the four-tier WHO(1994)/ISGP classification (simple/complex, with/without atypia); the current standard, endorsed by ACOG and the Society of Gynecologic Oncology since 2015, is the two-tier WHO(2014) EIN nomenclature — either answer is acceptable if the progression-risk data and management are stated correctly.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; ACOG/Society of Gynecologic Oncology (2015) endometrial hyperplasia nomenclature statement.

♦ ♦ ♦

Discuss the changing trends in management of vulval cancer

Asked in: Paper III Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Vulval (vulvar) cancer is an uncommon malignancy, over 90% squamous cell carcinoma, occurring predominantly in postmenopausal women. For decades every operable case was treated with a single radical procedure — en-bloc radical vulvectomy with bilateral inguino-femoral (groin) lymphadenectomy, often with pelvic lymphadenectomy — regardless of tumour size or laterality. Over the past four decades this has given way to a paradigm shift toward **individualised, conservative, multidisciplinary management** that preserves survival while markedly reducing physical and psychosexual morbidity.

The paradigm shift — historical versus current approach

Parameter	Traditional (Taussig/Way era)	Current individualised approach
Primary lesion	Radical vulvectomy (entire vulva removed) for all operable disease	Radical local excision with an adequate margin, vulva/clitoris conserved where feasible
Groin nodes	Bilateral inguino-femoral lymphadenectomy in every patient, even unilateral T1 lesions	Omitted for T1a; ipsilateral-only for lateral lesions with negative ipsilateral nodes; sentinel lymph node (SLN) biopsy replaces full dissection in selected cases
Incision	Single en-bloc ("butterfly") incision joining vulva and both groins	Triple-incision technique — separate vulvar and groin incisions
Pelvic nodes	Routine pelvic lymphadenectomy	Omitted; reserved patients receive radiotherapy instead of surgery
Locally advanced disease	Primary pelvic exenteration	Neoadjuvant chemoradiation followed by limited resection
Radiotherapy technique	Orthovoltage — poor tissue tolerance, frequent vulvar necrosis; groin radiotherapy alone used instead of surgery	Megavoltage with concurrent chemosensitisation; surgery remains the standard for the groin, radiotherapy used adjuvantly/neoadjuvantly

Changing trends in managing the primary lesion

- ▶ **Microinvasive disease (FIGO T1a — ≤2 cm, ≤1 mm stromal invasion):** wide local excision alone is curative; groin dissection is omitted as nodal metastasis risk is negligible.
- ▶ **T1b/early T2 with an otherwise normal vulva:** radical local excision, not radical vulvectomy, is now standard. Pooled data show local recurrence of only 2.4% with a histological margin ≥8 mm

versus 30.3% with <8 mm — margin adequacy, not radicality of the operation, controls recurrence. A grossly clear margin of 1 cm (uninvolved by tension) extended to the inferior fascia of the urogenital diaphragm is the surgical target.

- ▶ **Anterior/periclitoral lesions:** clitoris-sparing excision is favoured; in young patients unwilling to accept surgical disfigurement, a small field of external radiotherapy (about 5,000 cGy) with chemosensitisation can control the primary lesion.
- ▶ **Early T2 tumours:** vulva-conserving resection is now extended to selected early T2 disease when the anus, clitoris and urethra can be preserved.
- ▶ **Reconstruction:** large defects, once left to granulate over weeks, are increasingly closed with fasciocutaneous (rhomboid, V-Y gluteal) or myocutaneous (gracilis, rectus abdominis) flaps, or managed with negative-pressure wound therapy.

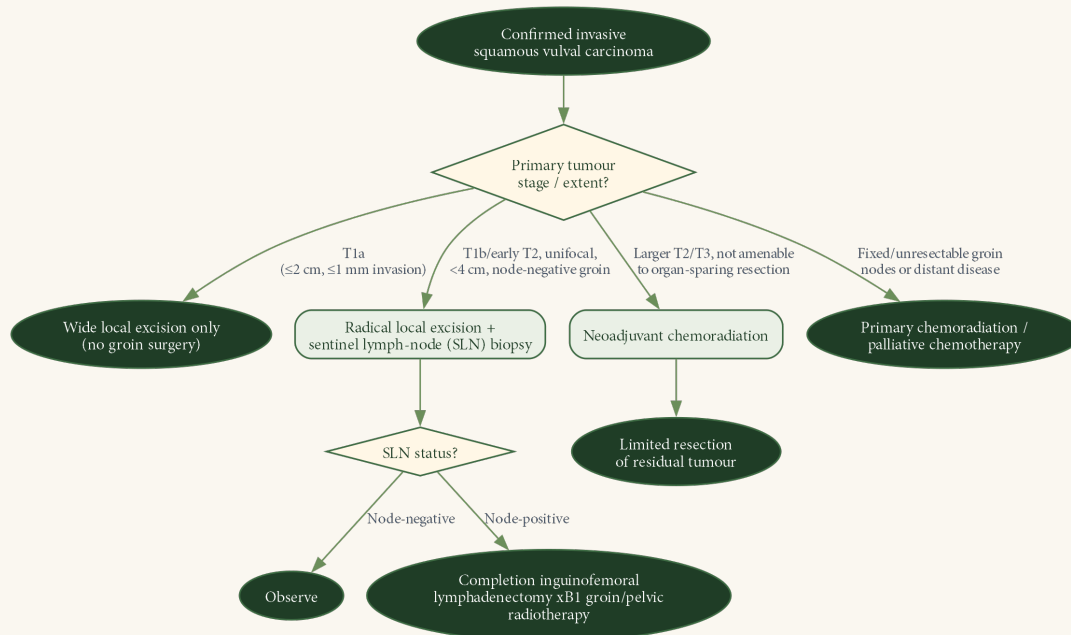
Changing trends in groin lymph-node management

- ▶ Bilateral en-bloc dissection for every patient has been replaced by **selective, laterality-based** dissection: unilateral groin dissection suffices for a lateral T1 lesion with negative ipsilateral nodes (contralateral metastasis risk $<2\%$); bilateral dissection is reserved for midline lesions (clitoris, anterior labia minora, posterior fourchette) or lesions within 2 cm of the midline.
- ▶ The **triple-incision technique** (vulvectomy incision plus two separate groin incisions) has halved groin wound breakdown compared with the historical en-bloc "butterfly" incision.
- ▶ **Routine pelvic lymphadenectomy** has been abandoned; it is now reserved for patients with three or more positive groin nodes, in whom pelvic and groin **radiotherapy** is preferred. A landmark GOG trial randomising node-positive patients to pelvic lymphadenectomy versus pelvic-plus-groin irradiation showed a 2-year survival of 68% with radiotherapy versus 54% with lymphadenectomy ($p = 0.03$), establishing radiotherapy as superior for this group.
- ▶ **Sentinel lymph-node (SLN) biopsy** using technetium-99m nanocolloid plus isosulfan blue dye is the single biggest change of the last two decades. In unifocal tumours <4 cm with clinically/radiologically negative groins, SLN biopsy reliably predicts nodal status (detection rate 98%, pooled sensitivity 0.95, negative predictive value $>95\%$ on Cochrane review of 34 studies/1,614 women; validated by the long-term GROINSS-V study). It has cut chronic lymphoedema from about 25% (complete lymphadenectomy) to 2%, and groin recurrence rates are comparable (3.4% after SLN biopsy versus 1.4% after complete, and 6.6% after inadequate superficial-only dissection).
- ▶ Radiotherapy alone can **never substitute** for groin dissection in a clinically node-negative groin — a GOG trial was stopped early because groin-radiotherapy-only patients had a 19% recurrence rate versus 0% with surgery.

Multimodality treatment of locally advanced disease

Tumours needing pelvic exenteration for cure (upper urethra, anus, rectum or rectovaginal septum involvement) were once managed by primary exenterative surgery with high morbidity and roughly 50% 5-year survival. The current trend is **preoperative (neoadjuvant) chemoradiation** — external-beam radiotherapy with concurrent weekly cisplatin chemosensitisation — followed by limited resection of the residual tumour bed; this produces an 80–90% initial response, operability in 63–92%, and a complete clinical response in about 64% of patients (pathological complete response ~50%), often obviating exenteration and stoma formation. For bulky (N2/N3) groin nodes, resection of the involved nodes alone (without full lymphadenectomy) combined with radiotherapy is preferred to reduce leg oedema. For recurrent/metastatic disease, platinum-taxane chemotherapy (extrapolated from cervical cancer regimens) with or without bevacizumab is increasingly used, alongside earlier integration of palliative care.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Risk-stratified current management algorithm for vulval cancer, branching by primary-tumour stage from wide local excision through sentinel-node-guided groin management to neoadjuvant chemoradiation for advanced disease.

High-yield exam pointers

- ▶ Four-decade **paradigm shift**: radical vulvectomy + bilateral groin dissection (every patient) → individualised, vulva- and node-conserving therapy.
- ▶ T1a (≤2 cm, ≤1 mm invasion) = wide local excision, **no** groin dissection.

- ▶ **Margin ≥ 8 mm** histological (≈ 1 cm gross) is the key determinant of local control, not the extent of the operation.
- ▶ **Triple-incision technique** halves groin wound breakdown versus en-bloc dissection.
- ▶ **GROINSS-V**: SLN biopsy in unifocal < 4 cm, node-negative-groin tumours — lymphoedema 2% vs 25% with full lymphadenectomy.
- ▶ GOG trial: groin/pelvic **radiotherapy beats pelvic lymphadenectomy** in node-positive disease (68% vs 54% 2-year survival).
- ▶ Locally advanced disease: **neoadjuvant chemoradiation** (cisplatin-based) now preferred over primary exenteration.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The FIGO surgico-pathological staging cited in current standard texts is the 2009 revision (stages IA–IVB, incorporating number/size of positive nodes and extracapsular spread); readers should confirm against the latest FIGO cancer report for any subsequent revision before an exam sitting.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (vulvar cancer chapter — key points, staging, GOG/GROINSS-V/AGO-CaRE-1 data); DC Dutta's Textbook of Gynaecology 7e (traditional Indian-standard management, radiotherapy dosing); Jeffcoate's Principles of Gynaecology 9e (surgical evolution — three-incision technique, FIGO staging history).



Discuss the diagnosis and management of carcinoma endometrium

Asked in: Paper III Nov 2016 · Paper III May 2009 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Carcinoma of the endometrium is a malignant epithelial neoplasm arising from the glandular lining of the uterine corpus and is the commonest gynaecological malignancy in developed countries, typically presenting as abnormal (chiefly postmenopausal) uterine bleeding in the sixth–seventh decade. It is broadly divided into oestrogen-driven **Type I** (endometrioid, low-grade, favourable) and oestrogen-independent **Type II** (serous/clear-cell, high-grade, aggressive) disease, now further refined by TCGA molecular subtyping — POLE-mutated (POLEmut), mismatch-repair-

deficient (MMRd), no specific molecular profile (NSMP), and p53-abnormal (p53abn) — which underpins the current FIGO staging.

Diagnosis

Postmenopausal bleeding (PMB) is presumed to be due to endometrial carcinoma until proved otherwise, even though fewer than 10% of PMB cases are ultimately malignant.

Investigation	Finding / purpose
Transvaginal ultrasonography (TVS)	Endometrial thickness >4 mm, an irregular hyperechoic endometrium, or intracavitary fluid mandates tissue sampling; a thin (≤4 mm) endometrium has a high negative predictive value but cannot replace biopsy in a symptomatic woman
Office endometrial aspiration biopsy (Pipelle/Sharman curette)	First-line test; 90–98% diagnostic accuracy against subsequent curettage/hysterectomy specimen; done without anaesthesia
Papanicolaou (Pap) smear	Unreliable — abnormal in only 30–50% of cases; not a screening test for endometrial cancer
Hysteroscopy with directed biopsy	Superior to blind biopsy/curettage for detecting polyps and focal lesions
Fractional curettage (endocervical curettage, then endometrial curettage under anaesthesia)	Definitive method when office biopsy is non-diagnostic, cervical stenosis prevents sampling, or bleeding recurs after a negative biopsy; also assesses cervical extension
Serum CA-125	Raised in advanced-stage or serous-type disease; used to monitor response/recurrence
MRI pelvis	Best modality for depth of myometrial invasion and cervical stromal extension
CT chest/abdomen/pelvis, chest X-ray	Distant metastasis and lymph-node assessment for staging
Histopathology of biopsy/curettings	Confirms diagnosis; assigns histologic type (endometrioid 80%, mucinous, serous, clear-cell, carcinosarcoma, undifferentiated) and FIGO grade — G1 <5%, G2 6–50%, G3 >50% solid non-squamous/non-morular growth

FIGO Staging of Carcinoma of the Endometrium (2023)

Stage	Definition
I	Confined to the corpus $\pm$ ovary. IA1 : non-aggressive histology limited to a polyp/confined to endometrium. IA2 : non-aggressive histology, <50% myometrial invasion, no/focal lymphovascular space invasion (LVSI). IA3 : low-grade endometrioid with simultaneous low-grade endometrioid ovarian involvement. IB : non-aggressive histology, $\geq$ 50% myometrial invasion, no/focal LVSI. IC : aggressive histology (serous, clear-cell, high-grade endometrioid, carcinosarcoma, undifferentiated) confined to endometrium/polyp, no invasion
II	IIA : non-aggressive histology invading cervical stroma. IIB : non-aggressive histology with substantial LVSI. IIC : aggressive histology with any myometrial invasion
III	IIIA1 : spread to ovary/tube. IIIA2 : uterine subserosal invasion/through serosa. IIIB1 : vagina/parametria. IIIB2 : pelvic peritoneum. IIIC1 : pelvic node metastasis (i micro-, ii macro-). IIIC2 : para-aortic node metastasis ($\pm$ pelvic), up to the renal vessels
IV	IVA : bladder and/or bowel mucosal invasion. IVB : abdominal peritoneal metastasis beyond the pelvis. IVC : distant metastasis — extra-abdominal nodes above the renal vessels, lung, liver, brain, bone

Molecular class modifies stage: a **POLEmut** tumour otherwise confined to the uterus is *downstaged* (e.g. Stage IAmpOLEmut, excellent prognosis), whereas a **p53abn** tumour is *upstaged* (e.g. Stage IICmp53abn, poor prognosis) regardless of conventional histologic features.

Management

Pretreatment work-up: complete haemogram, renal/liver function, ECG, chest X-ray, pelvic/abdominal ultrasonography, MRI/CT as indicated (most patients are elderly, obese, with comorbidity — physician co-management is routine); universal mismatch-repair (Lynch syndrome) screening of the tumour by immunohistochemistry (MLH1/MSH2/MSH6/PMS2) is now recommended for every new case.

Primary surgical staging (numbered):

- Midline/paramedian laparotomy, or a laparoscopic/robotic approach — equivalent oncological outcome with less morbidity and shorter stay.
- Peritoneal washings taken for cytology (reported separately; no longer changes the stage).

- ▶ Thorough exploration of liver, diaphragm, omentum, pelvis and para-aortic nodes.
- ▶ Extrafascial total hysterectomy with bilateral salpingo-oophorectomy.
- ▶ Sentinel lymph-node mapping (cervical indocyanine-green injection, standard for all histologies/grades) or selective pelvic $\pm$ para-aortic lymphadenectomy when adverse features are present (tumour >2 cm, grade 3, deep myometrial invasion, non-endometrioid histology).
- ▶ Omentectomy, appendicectomy and peritoneal biopsies added for serous/clear-cell/carcinosarcoma histology.
- ▶ Uterus opened on the table for gross/frozen-section assessment of invasion depth, guiding the extent of lymph-node dissection.

Fertility-sparing treatment: in a young woman with grade-1 endometrioid carcinoma confined to the endometrium (Stage IA, no myometrial invasion) who desires fertility, continuous progestin — megestrol acetate 40–160 mg/day (or a levonorgestrel intrauterine system) — is given with endometrial biopsy every 3–6 months to confirm regression; hysterectomy follows once childbearing is complete, or on failure to respond or on progression.

Risk-adapted adjuvant therapy:

Risk group	Adjuvant treatment
Low risk (Stage IA, grade 1–2, no/minimal invasion)	Observation only
Intermediate risk (Stage IB, or IA with grade 3/LVSI)	Vaginal-vault brachytherapy (high-dose-rate, 21 Gy in 3 fractions to 0.5 cm depth) — controls vaginal recurrence as well as pelvic radiotherapy, with less toxicity
High(-intermediate) risk (grade 3, deep invasion, cervical/serosal/adnexal involvement, nodal disease)	Pelvic external-beam radiotherapy (45–50.4 Gy in 1.8 Gy fractions over 5–6 weeks) $\pm$ vaginal brachytherapy boost
Serous/clear-cell/carcinosarcoma, Stage III–IVA	Adjuvant chemotherapy (carboplatin–paclitaxel) combined with pelvic radiotherapy
Stage IVB / recurrent or metastatic disease	Systemic chemotherapy $\pm$ hormonal therapy (below)

Advanced, recurrent or metastatic disease:

- ▶ Isolated vaginal or pelvic recurrence in a previously non-irradiated patient — salvage radiotherapy (external beam followed by brachytherapy) achieves remission in up to 70–80%.
- ▶ Standard chemotherapy is **carboplatin–paclitaxel**; the GOG-209 trial showed it non-inferior to the older three-drug regimen paclitaxel–doxorubicin–cisplatin (TAP), with substantially less toxicity.
- ▶ Hormonal therapy suits low-grade, hormone-receptor-positive, asymptomatic recurrence: **megestrol acetate 80 mg twice daily or medroxyprogesterone acetate 50–100 mg three times**

daily; tamoxifen 20 mg twice daily if progestins are contraindicated (e.g. prior thromboembolism).

- ▶ **Pembrolizumab** (anti-PD-1) is used for mismatch-repair-deficient/microsatellite-instability-high recurrent disease that has failed chemotherapy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 24.10 — Diffuse type of endometrial carcinoma (DC Dutta's Gynaecology 7e, p.313)

High-yield exam pointers

- ▶ PMB = endometrial carcinoma until proved otherwise; office Pipelle biopsy is first-line (90–98% accurate); Pap smear is **not** a screening tool (positive in only 30–50%).
- ▶ TVS: endometrial thickness **>4 mm** in a postmenopausal woman needs biopsy.
- ▶ FIGO grade: G1 <5%, G2 6–50%, G3 >50% solid growth.
- ▶ FIGO 2023 staging now folds in molecular class — POLEmut downstages (best prognosis), p53abn upstages (worst prognosis).
- ▶ Surgical staging = extrafascial TAH-BSO + peritoneal cytology + sentinel/selective node assessment ± omentectomy (for serous/clear-cell).
- ▶ Standard first-line/recurrent chemotherapy = carboplatin + paclitaxel (GOG-209), replacing the older TAP triplet.
- ▶ Fertility preservation (megestrol acetate) is offered **only** for Stage IA, grade-1 endometrioid disease.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e still reproduces the 2009 FIGO staging (simple Stage IA/IB, IIIC1/IIIC2, without molecular modifiers); the 2023 FIGO revision given above, which adds histologic-aggressiveness and TCGA molecular sub-staging, is the current standard and is what is used in this answer.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; FIGO Committee on Gynecologic Oncology — revised staging for carcinoma of the endometrium, 2023 (Berek et al., Int J Gynecol Obstet 2023;162:383–394).

♦ ♦ ♦

Dysgerminoma

Asked in: Paper III 26-Jun-2024 · Paper III May 2018 · Paper III May 2010 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — Dysgerminoma is the most common malignant germ cell tumour of the ovary, arising from undifferentiated primordial germ cells; it is the ovarian counterpart of the testicular seminoma. It accounts for 30–40% of malignant germ cell tumours but only 1–3% of all ovarian cancers, and typically affects young women (75% between 10–30 years).

Pathology

Feature	Detail
Origin	Undifferentiated primordial germ cell
Age	75% between 10–30 years; 5% before 10 years; rare after 50 years
Association with gonadal dysgenesis	~5% arise in dysgenetic gonads — pure gonadal dysgenesis (46,XY streak gonads), mixed gonadal dysgenesis (45,X/46,XY), androgen insensitivity syndrome (46,XY); often arises within a pre-existing gonadoblastoma
Laterality	Bilateral in 10–15% — the only germ cell tumour with significant bilaterality
Gross	5–15 cm, round/bosellated, solid; cut surface fleshy, pale tan to grey-brown, with necrosis
Microscopy	Large round/polygonal cells, clear cytoplasm, large irregular nuclei with prominent nucleoli, arranged in lobules/nests separated by fibrous septa densely infiltrated by lymphocytes, plasma cells and epithelioid granulomas (may mimic tuberculosis when necrotic)
Special cells	May contain syncytiotrophoblastic giant cells (source of β -hCG) — associated with precocious puberty/virilisation but does not alter prognosis
Stage at diagnosis	~65% Stage I (confined to ovary/ovaries); of these, 85–90% unilateral

Clinical features

- ▶ Rapidly growing abdomino-pelvic mass with dull abdominal pain (most common presentation).
- ▶ May coexist with pregnancy in 20–30% of cases — hCG positivity can be mistaken for pregnancy.
- ▶ Precocious puberty or virilisation if syncytiotrophoblastic giant cells are present.

- ▶ Primary amenorrhoea, virilism, or genital ambiguity in patients with an underlying dysgenetic gonad.
- ▶ Ascites and distant spread are uncommon at presentation (most present early, Stage I).
- ▶ Spread is chiefly lymphatic (pelvic/para-aortic nodes around the renal vessels); haematogenous spread to lung, liver, bone (lower vertebrae) or brain occurs mainly with recurrent/longstanding disease.

Investigations and diagnosis

Investigation	Purpose/finding
Serum LDH	Elevated in up to 95% of dysgerminomas — most sensitive marker, also used for monitoring
Placental alkaline phosphatase (PLAP)	Elevated in up to 95% — supportive marker
Serum β -hCG	Elevated only if syncytiotrophoblastic giant cells are present; normal in pure dysgerminoma
Serum AFP	Normal in pure dysgerminoma; elevation indicates a mixed germ cell tumour (e.g., yolk sac element)
Karyotype	Mandatory in every premenarcheal girl or phenotypic female presenting with a pelvic mass — a Y chromosome mandates removal of both gonads because of high (>50%) malignant transformation risk in a retained dysgenetic gonad
Pelvic ultrasound/CT/MRI	Solid adnexal mass; assesses the contralateral ovary and peritoneal/omental spread
CT chest	Germ cell tumours can metastasise to lung/mediastinum — important staging step
Surgical staging	Peritoneal washings, careful inspection/palpation of all peritoneal surfaces, omental biopsy, pelvic and para-aortic lymphadenectomy — dysgerminoma is staged using the FIGO ovarian cancer staging system

Management

- ▶ **Surgery is the cornerstone**, and fertility preservation is the guiding principle because the disease affects young women and the tumour is highly chemosensitive.
 - Minimum operation: **unilateral salpingo-oophorectomy (USO)** with complete surgical staging (peritoneal washings, omental biopsy, pelvic + para-aortic lymphadenectomy). The uterus, contralateral tube and ovary are conserved **even in the presence of metastatic disease**, since the tumour responds well to chemotherapy.

- Because dysgerminoma is the only germ cell tumour with a significant bilaterality rate, the contralateral ovary is inspected and any suspicious area is excised and biopsied (routine bisection/wedge biopsy of a grossly normal ovary is not required).
 - If karyotype shows a **Y chromosome**, both gonads are removed (uterus may be retained for future embryo transfer/surrogacy).
 - If fertility preservation is not desired or disease is bulky/advanced, total abdominal hysterectomy with bilateral salpingo-oophorectomy and resection of readily removable bulky disease (e.g., omental cake) is performed.
- **Adjuvant treatment by stage**
- Fully staged **Stage IA** (confined to one ovary, capsule intact): surgery alone, followed by close surveillance with serum markers (LDH, AFP, β -hCG) and imaging — adjuvant chemotherapy is **not** required.
 - **Stage IB/IC or higher, capsular rupture, or metastatic disease:** adjuvant platinum-based combination chemotherapy.
- **Chemotherapy** — platinum-based combination chemotherapy is the treatment of choice as it preserves fertility even in advanced disease.

Regimen	Drugs and dose/schedule
BEP (regimen of choice, 3–4 cycles)	Bleomycin 30,000 IU IV on days 1, 8, 15 every 3 weeks + Etoposide 100 mg/m ² /day IV $\times$ 5 days every 3 weeks + Cisplatin 20 mg/m ² /day IV $\times$ 5 days (or 100 mg/m ² as a single day) every 3 weeks
VBP	Vinblastine 0.15 mg/kg days 1–2 + Bleomycin 15 units/m ² /week $\times$ 5 + Cisplatin 100 mg/m ² day 1, every 3 weeks
EC (completely resected disease)	Etoposide 120 mg/m ² IV days 1–3 + Carboplatin (AUC-dosed) every 4 weeks
VAC (historical/second-line)	Vincristine 1–1.5 mg/m ² + Actinomycin D 0.5 mg/day $\times$ 5 days + Cyclophosphamide 150 mg/m ² /day $\times$ 5 days, every 4 weeks

Second-line/recurrent disease after BEP: **TIP** (paclitaxel, ifosfamide, cisplatin) or **VIP** (vinblastine, ifosfamide, cisplatin).

- **Radiotherapy** — dysgerminoma is exquisitely radiosensitive; 2,500–3,500 cGy can be curative even for gross metastatic disease. However, radiotherapy is rarely used as first-line treatment today because of loss of ovarian/fertility function; it is reserved for recurrence in women who do not desire fertility or after chemotherapy failure.

- ▶ **Follow-up** — serial tumour markers (LDH, AFP, β -hCG) and imaging for early detection of relapse (~75% of recurrences occur within the first year, mainly in the peritoneal cavity and retroperitoneal nodes).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 39.18 — Dysgerminoma of the ovary. Note that the lesion is principally solid with some cystic areas and necrosis (Berek & Novak 16e, p.2625)

High-yield exam pointers

- ▶ Commonest malignant germ cell tumour of the ovary; ovarian counterpart of testicular seminoma.
- ▶ **Only** germ cell tumour with significant bilaterality (10–15%).
- ▶ Marker triad: **LDH raised** (~95%), AFP normal (raised only if mixed germ cell element), β -hCG raised only if syncytiotrophoblastic giant cells present.
- ▶ **Karyotype mandatory** in every premenarcheal girl with a pelvic mass — Y chromosome → bilateral gonadectomy (arises from gonadoblastoma in dysgenetic gonads).
- ▶ Fertility-sparing **unilateral salpingo-oophorectomy + surgical staging** is standard even in advanced disease, because the tumour is highly chemosensitive.
- ▶ Chemotherapy of choice: **BEP × 3–4 cycles**; radiosensitive (2,500–3,500 cGy) but radiotherapy is rarely first-line now (loss of fertility).
- ▶ Stage IA alone after complete staging → surveillance only, no adjuvant chemotherapy.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e.



Dysgerminoma of the ovary

Asked in: Paper I 26-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Dysgerminoma is the most common malignant germ cell tumour of the ovary, arising from undifferentiated primordial germ cells; it is the exact ovarian counterpart of the testicular seminoma. It makes up 30–40% of malignant ovarian germ cell tumours but only 1–3% of all ovarian cancers, and characteristically affects children and young women (75% between 10 and 30 years).

Pathology

Feature	Detail
Origin	Undifferentiated primordial germ cell

Feature	Detail
Age	75% between 10–30 years; 5% before age 10; rare after 50 years
Association with dysgenetic gonads	~5% arise in a dysgenetic gonad — pure gonadal dysgenesis (46,XY streak gonads), mixed gonadal dysgenesis (45,X/46,XY), or androgen insensitivity syndrome (46,XY) — typically developing within a pre-existing gonadoblastoma ; if left in situ, over half of gonadoblastomas undergo malignant transformation
Laterality	Bilateral in 10–15% — the only ovarian germ cell tumour with significant bilaterality
Gross	5–15 cm, round or bosselated, solid; cut surface fleshy, pale tan to grey-brown, with areas of necrosis
Microscopy	Large round/polygonal cells with abundant clear cytoplasm, large irregular nuclei and prominent nucleoli, arranged in lobules/nests separated by fibrous septa densely infiltrated with lymphocytes, plasma cells and epithelioid granulomas (extensive necrosis may mimic tuberculosis)
Special cells	May contain syncytiotrophoblastic giant cells (secrete β -hCG) — linked to precocious puberty/virilisation but does not worsen prognosis
Stage at diagnosis	~65% Stage I; of these, 85–90% are unilateral

Clinical features

- ▶ Rapidly enlarging abdomino-pelvic mass with dull lower abdominal pain — the commonest presentation.
- ▶ May coexist with pregnancy (20–30% of ovarian malignancies diagnosed in pregnancy are dysgerminomas); β -hCG positivity can be mistaken for pregnancy.
- ▶ Precocious puberty or virilisation when syncytiotrophoblastic giant cells are present.
- ▶ Primary amenorrhoea, virilism or ambiguous genitalia in patients with an underlying dysgenetic gonad.
- ▶ Ascites and distant spread are uncommon at presentation since most tumours are Stage I.
- ▶ Spread is chiefly lymphatic (pelvic and para-aortic nodes around the renal vessels); haematogenous spread to lung, liver, bone (lower vertebrae) or brain is a feature of longstanding/recurrent disease.

Investigations and diagnosis

Investigation	Purpose/finding
Serum lactate dehydrogenase (LDH)	Elevated in up to 95% of dysgerminomas — the most sensitive marker, also used to monitor treatment response and relapse
Placental alkaline phosphatase (PLAP)	Elevated in up to 95% — a supportive marker
Serum β -human chorionic gonadotropin (β -hCG)	Elevated only if syncytiotrophoblastic giant cells are present; normal in a pure dysgerminoma
Serum alpha-fetoprotein (AFP)	Normal in a pure dysgerminoma; elevation indicates a mixed germ cell tumour with a yolk sac (endodermal sinus) element
Karyotype	Mandatory in every premenarcheal girl/phenotypic female with a pelvic mass — a Y chromosome mandates removal of both gonads because of the high risk of malignant transformation of a retained dysgenetic gonad
Pelvic ultrasound/CT/MRI	Solid adnexal mass; assesses the contralateral ovary and peritoneal/omental spread
Contrast CT chest	Germ cell tumours can metastasise to lung/mediastinum — an essential staging step
Surgical staging	Peritoneal washings for cytology, careful inspection/palpation of all peritoneal surfaces, omental biopsy, unilateral pelvic and para-aortic lymphadenectomy — dysgerminoma is staged using the same FIGO staging system used for epithelial ovarian carcinoma

FIGO staging (surgical) — applied to dysgerminoma

Stage	Extent
I	Growth limited to one (IA) or both (IB) ovaries, capsule intact, no malignant ascites; IC — surgical spill, capsule rupture, or malignant cells in ascites/washings
II	Extension to uterus/tubes (IIA) or other pelvic tissues (IIB), below the pelvic brim
III	Peritoneal spread outside the pelvis and/or retroperitoneal (pelvic/para-aortic) lymph node metastasis

Stage	Extent
IV	Distant metastasis (IVA — malignant pleural effusion; IVB — parenchymal or extra-abdominal nodal metastasis)

Management

- ▶ **Surgery is the cornerstone**, and fertility preservation is the guiding principle because the disease affects young women and the tumour is highly chemosensitive.
 - Minimum operation: **unilateral salpingo-oophorectomy (USO)** with complete surgical staging (peritoneal washings, careful inspection of all surfaces, omental biopsy, pelvic and para-aortic lymphadenectomy). The uterus, contralateral tube and ovary are conserved **even with metastatic disease**, since the tumour responds well to chemotherapy.
 - Because dysgerminoma is the only germ cell tumour with significant bilaterality, the contralateral ovary is carefully inspected and any suspicious area excised and biopsied (routine wedge biopsy of a grossly normal ovary is not required).
 - If the karyotype shows a **Y chromosome**, both gonads are removed (the uterus may be retained for future embryo transfer/surrogacy).
 - If fertility preservation is not desired, or disease is bulky/advanced, total abdominal hysterectomy with bilateral salpingo-oophorectomy, plus resection of readily removable bulky disease (e.g., omental cake), is performed.
- ▶ **Adjuvant treatment by stage**
 - Fully staged **Stage IA** (confined to one ovary, capsule intact): surgery alone followed by close surveillance with serum markers (LDH, AFP, β -hCG) and imaging — adjuvant chemotherapy is **not** required.
 - **Stage IB/IC or higher, capsular rupture, or metastatic/incompletely resected disease:** adjuvant platinum-based combination chemotherapy.
- ▶ **Chemotherapy** — platinum-based combination chemotherapy is the treatment of choice, preserving fertility even in advanced disease.

Regimen	Drugs and dose/schedule
BEP (regimen of choice, 3–4 cycles)	Bleomycin 30,000 IU IV on days 1, 8, 15 every 3 weeks + Etoposide 100 mg/m ² /day IV x 5 days every 3 weeks + Cisplatin 20 mg/m ² /day IV x 5 days (or 100 mg/m ² as a single day) every 3 weeks
VBP	Vinblastine 0.15 mg/kg days 1–2 + Bleomycin 15 units/m ² /week x 5 + Cisplatin 100 mg/m ² day 1, every 3 weeks

Regimen	Drugs and dose/schedule
EC (completely resected disease)	Etoposide 120 mg/m ² IV days 1–3 + Carboplatin (AUC-dosed) every 4 weeks

Second-line/recurrent disease after BEP: **TIP** (paclitaxel, ifosfamide, cisplatin) or **VIP** (vinblastine, ifosfamide, cisplatin).

- ▶ **Radiotherapy** — dysgerminoma is exquisitely radiosensitive; 2,500–3,500 cGy can be curative even for gross metastatic disease. It is rarely used as first-line treatment today because of loss of ovarian/fertility function; it is reserved for recurrence in women who do not desire fertility, or after chemotherapy failure.
- ▶ **Pregnancy** — an intact Stage IA tumour can be excised and the pregnancy continued; chemotherapy can be given safely in the second and third trimesters at standard doses.
- ▶ **Follow-up** — serial tumour markers (LDH, AFP, β -hCG) and imaging for early detection of relapse (~75% of recurrences occur within the first year, chiefly in the peritoneal cavity and retroperitoneal nodes).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 39.19 — Dysgerminoma of the ovary. Primitive germ cells are divided into clusters and lobules by fibrous septa rich in lymphocytes (Berek & Novak 16e, p.2626)

High-yield exam pointers

- ▶ Commonest malignant germ cell tumour of the ovary; ovarian counterpart of testicular seminoma.
- ▶ **Only** ovarian germ cell tumour with significant bilaterality (10–15%).
- ▶ Marker pattern: **LDH raised (~95%)**, AFP normal (raised only if a mixed germ cell element is present), β -hCG raised only if syncytiotrophoblastic giant cells are present.
- ▶ **Karyotype mandatory** in every premenarcheal girl with a pelvic mass — a Y chromosome means bilateral gonadectomy (tumour arises from a gonadoblastoma in the dysgenetic gonad).
- ▶ Staged with the same **FIGO ovarian cancer staging system**; ~65% present as Stage I.
- ▶ Fertility-sparing **unilateral salpingo-oophorectomy + surgical staging** is standard even in advanced disease, because the tumour is highly chemosensitive.
- ▶ Chemotherapy of choice: **BEP x 3–4 cycles**; radiosensitive (2,500–3,500 cGy) but radiotherapy is rarely first-line now (loss of fertility).
- ▶ Stage IA after complete staging → surveillance only, no adjuvant chemotherapy; 5-year disease-free survival >95%.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e.



Endometrial hyperplasia

Asked in: Paper III Jul 2016 · Paper III Oct 2008 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Endometrial hyperplasia is a proliferation of endometrial glands of irregular size and shape with an increased gland-to-stroma ratio compared with normal proliferative endometrium. It results from prolonged, unopposed oestrogen stimulation unbalanced by progesterone, and represents a histological spectrum extending from a benign, reversible lesion to endometrial intraepithelial neoplasia (EIN), the direct precursor of endometrioid endometrial carcinoma.

Aetiology (sources of unopposed oestrogen)

Risk factor	Mechanism / example
Chronic anovulation	PCOS, perimenarche, perimenopause — no luteal progesterone to oppose oestrogen
Obesity	Peripheral aromatisation of androgens to oestrone in adipose tissue
Oestrogen-secreting tumour	Granulosa cell tumour, thecoma
Unopposed exogenous oestrogen	Oestrogen-only therapy in a woman with an intact uterus
Tamoxifen	Oestrogen-agonist effect on the endometrium
Nulliparity, early menarche, late menopause	Increased lifetime oestrogen exposure
Diabetes mellitus, hypertension	Corpus-cancer syndrome triad, with obesity
Lynch syndrome (HNPCC)	Germline mismatch-repair gene mutation (<i>MLH1/MSH2/MSH6</i>) — 40–60% lifetime endometrial cancer risk

Protective factors: multiparity, normal body weight, combined oral contraceptive use, progestogen therapy/levonorgestrel intrauterine system (LNG-IUS), early menopause.

Classification

Current nomenclature (WHO 2014 / EIN schema, endorsed by ACOG & Society of Gynecologic Oncology, 2015)	Older WHO/ISGP (1994) equivalent	Progression to carcinoma
Hyperplasia without atypia (benign)	Simple hyperplasia without atypia	1%
	Complex hyperplasia without atypia	3%
Atypical hyperplasia / endometrial intraepithelial neoplasia (EIN) (pre-malignant)	Simple atypical hyperplasia	8%
	Complex atypical hyperplasia	29%
Endometrioid adenocarcinoma, well differentiated (malignant)	Carcinoma-in-situ	—

The 2015 ACOG/Society of Gynecologic Oncology statement recommended abandoning the four-tier WHO/ISGP scheme for this simplified three-tier EIN nomenclature, because 40–50% of women with a biopsy diagnosis of atypical hyperplasia/EIN are found to have a concurrent, usually well-differentiated, endometrioid carcinoma at hysterectomy — so **cytological atypia, not architectural complexity, is the key determinant of management**.

Clinical features

- ▶ **Abnormal uterine bleeding** is the presenting complaint in almost all symptomatic women:
 - Perimenopausal — irregular, prolonged or heavy intermenstrual bleeding.
 - Postmenopausal bleeding — always mandates exclusion of hyperplasia/carcinoma.
- ▶ Often **asymptomatic** — found incidentally during work-up for infertility, PCOS, or an abnormal scan.
- ▶ History usually reveals a source of unopposed oestrogen (anovulatory cycles, obesity, PCOS, tamoxifen, unopposed hormone therapy).
- ▶ Pelvic examination is usually normal; look for stigmata of the underlying cause — obesity, hirsutism/acne of PCOS, or an adnexal mass of an oestrogen-secreting tumour.

Diagnosis / investigations

Investigation	Purpose / finding
Transvaginal sonography (TVS) with colour Doppler	Endometrial thickness >4 mm in postmenopausal bleeding warrants sampling; thickened (>12 mm), hyperechoic, irregular endometrium with increased vascularity suggests hyperplasia
Office endometrial biopsy (Pipelle aspiration)	First-line, outpatient sampling; gives histological type and atypia status
Hysteroscopy with directed biopsy	Gold standard — visualises focal lesions/polyps missed on blind sampling, higher diagnostic yield
Fractional curettage	When hysteroscopy is unavailable or the cervix is stenosed
Histopathology	Confirms architecture (simple/complex) and presence of cytological atypia — decides management
MRI pelvis	If atypical hyperplasia/EIN is being managed conservatively — assesses myometrial invasion/occult carcinoma, though sensitivity is limited

Management

A. Hyperplasia without atypia

- ▶ Correct reversible risk factors — weight reduction, stop unopposed oestrogen, induce ovulation in PCOS.
- ▶ Medical therapy is first-line: **levonorgestrel intrauterine system (LNG-IUS, 52 mg device)** gives the highest regression rates and is preferred where fertility is not immediately desired.
- ▶ If LNG-IUS is declined/unsuitable — continuous oral progestogen: **medroxyprogesterone acetate (MPA) 10 mg twice daily** or cyclical progestogen for **6–9 months** in a young woman.
- ▶ Follow-up endometrial biopsy at **6-monthly intervals**; continue until two consecutive negative biopsies, then observe.
- ▶ Persistent or progressive disease, recurrence after stopping treatment, or patient preference → **hysterectomy**.

B. Atypical hyperplasia / EIN

- ▶ **Total hysterectomy (± bilateral salpingo-oophorectomy)**, preferably by the laparoscopic/vaginal route, is the definitive treatment of choice at any age once childbearing is complete — because of the 40–50% risk of a concurrent invasive carcinoma. The uterus is opened and examined in the operating theatre; peritoneal washings are taken for cytology.

- ▶ Fertility-sparing therapy (young woman desiring pregnancy, or a poor surgical candidate): continuous progestogen — LNG-IUS or oral megestrol acetate 40–160 mg/day, or MPA — with endometrial biopsy every 3 months.
- ▶ If regression is achieved, encourage early conception (assisted reproduction if needed); proceed to hysterectomy once the family is complete, given the high (~50%) relapse rate.
- ▶ No regression by 6–12 months of progestogen therapy → proceed to hysterectomy.
- ▶ Counsel every woman about the concurrent-carcinoma risk before choosing conservative management.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

A real histology figure best illustrates the key diagnostic feature (glandular crowding with cytological atypia):

□ Fig 23.10 — Complex endometrial hyperplasia with nuclear stratification and cytological atypia; glands are dilated and crowded, mitoses also seen in the stroma (DC Dutta's Gynaecology 7e, p.291)

Alternatively, sketch the management algorithm as a flowchart: endometrial biopsy → branch on **atypia present/absent** → medical therapy (LNG-IUS/progestogen) vs hysterectomy → periodic follow-up biopsy loop.

High-yield exam pointers

- ▶ Mechanism in one line: **unopposed, unbalanced oestrogen** → **glandular proliferation without secretory transformation**.
- ▶ "Corpus-cancer" triad: **obesity + hypertension + diabetes mellitus**.
- ▶ Kurman progression-to-cancer figures to reproduce verbatim: simple 1% → complex 3% → atypical simple 8% → atypical complex 29%.
- ▶ Current nomenclature (ACOG/Society of Gynecologic Oncology, 2015): **benign hyperplasia** → EIN (replaces "atypical hyperplasia") → **endometrioid adenocarcinoma**.
- ▶ **Atypia, not complexity, drives management** — 40–50% concurrent carcinoma risk when EIN/atypical hyperplasia is found on biopsy.
- ▶ LNG-IUS = first-line medical therapy (hyperplasia without atypia); **hysterectomy = definitive treatment for atypical hyperplasia/EIN** once fertility is no longer desired.
- ▶ Postmenopausal bleeding → endometrial biopsy is mandatory to exclude hyperplasia/carcinoma.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology still teaches the older four-tier WHO/International Society of Gynecological Pathologists (ISGP) classification (simple/complex, with/without atypia); current practice (ACOG and the Society of Gynecologic Oncology, 2015) has replaced this with the simpler three-tier endometrial intraepithelial neoplasia (EIN) nomenclature described above, which is what should be used to communicate management to the patient.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; guideline: ACOG/Society of Gynecologic Oncology (2015) endometrial hyperplasia nomenclature statement (as cited in Berek & Novak 16e).



Enumerate the risk factors. Discuss the down staging and the magnitude of cervical cancer in India

Asked in: Paper IV May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Carcinoma cervix is a malignant neoplasm arising from the squamous or columnar epithelium of the uterine cervix, causally linked to persistent infection with high-risk human papillomavirus (HPV). It is regarded as an **entirely preventable disease** because it passes through a long, detectable premalignant phase (cervical intraepithelial neoplasia, CIN) before becoming invasive, and effective screening/treatment of this phase interrupts progression.

Risk factors

Category	Risk factors
Viral/infective	Persistent infection with high-risk HPV (types 16, 18 most oncogenic; found in up to 70% of cervical cancers); infection with multiple HPV types; age >30 years at time of persistent infection; co-infection with herpes simplex virus and <i>Chlamydia trachomatis</i> (cofactors)
Sexual behaviour	Early age at first coitus (<16–18 years); multiple sexual partners (own or partner's); early age at first pregnancy
Reproductive	High parity; too many/too frequently spaced births

Category	Risk factors
Immune status	Human immunodeficiency virus (HIV) infection/AIDS (a designated AIDS-defining illness); other chronic immunosuppression (transplant, long-term steroids)
Lifestyle	Cigarette smoking (direct oncogenic co-factor, also increases risk of vulvar cancer)
Socioeconomic	Low socioeconomic status; poor genital hygiene; lack of access to screening
Contraceptive	Long-term combined oral contraceptive (COC) use (a debated, weaker association with glandular abnormalities)
Protective factors	Barrier contraception (condom); male circumcision (partially protective only); HPV vaccination

Magnitude of the problem in India

- ▶ Cervical cancer is the **second most common cancer in Indian women** after breast cancer on population-based cancer registries (Indian Council of Medical Research, ICMR 2004); the relative proportion of cervical cancer among female cancers ranged 14–24% versus 21–24% for breast cancer.
- ▶ India's overall age-adjusted incidence was **23.5 per 100,000 women** (World Health Organization, WHO 2008); globally about 1 million women are affected by cervical cancer each year, and it remains the **leading female cancer in resource-poor countries** where organised screening is inadequate.
- ▶ **Late presentation is the core Indian problem:** about **80% of cervical carcinoma patients attending Indian hospitals present in advanced stage (FIGO Stage II or beyond)**, chiefly because most women are asymptomatic in the curable pre-invasive/microinvasive phase and organised cytology screening has not reached the majority of the population.
- ▶ Major determinants of the high Indian burden are the **economic factor, sexual behaviour, and inadequacy of mass screening coverage** — the same triad that "down-staging" was designed to address.
- ▶ Where Papanicolaou (Pap) smear screening has been effectively implemented (developed countries), incidence has fallen by nearly 80% and mortality by 70%, illustrating what organised early detection can achieve — the yardstick against which India's coverage gap is measured.

Down-staging screening (WHO, 1986)

Concept. Because organised cytology-based mass screening could not be extended to the entire at-risk population in low-resource settings, the World Health Organization (WHO) in 1986 proposed "down-staging" as a pragmatic alternative strategy.

- ▶ **Definition** — Down-staging is defined as the detection of cervical cancer at an earlier, still-curable stage (rather than prevention of the cancer itself), performed by nurses and other trained paramedical/primary health workers using a simple speculum examination of the cervix — without cytology, colposcopy, or laboratory back-up.
- ▶ **Training** — A female primary health worker is given a short 2–3 week structured training to perform a per-speculum examination and to visually distinguish a normal from an abnormal cervix.
- ▶ **Normal cervix** — Pink in colour, round in shape, smooth surface, does not bleed on touch.
- ▶ **Abnormal cervix (referral criteria)** — Reddish appearance, a red or white patch, a visible growth or ulcer on the surface, or bleeding on touch.
- ▶ **Referral pathway** — Any woman with an abnormal-looking cervix is referred to a centre equipped for colposcopy, biopsy, and definitive treatment of premalignant/malignant disease; the health worker herself makes no diagnosis or treatment decision.
- ▶ **Rationale and place in low-resource practice** — Down-staging does not require cytology laboratories, trained cytopathologists, or repeated visits, making it deployable at the primary/community level in areas where regular Pap-smear-based screening cannot be sustained.
- ▶ **Limitations** — Compared with cytological screening it is **suboptimal in sensitivity and specificity** (a normal-looking cervix can still harbour early neoplasia, and the strategy misses cervical intraepithelial neoplasia and microinvasive disease that is not yet visibly abnormal). It is **not expected to lower the incidence** of cervical cancer (it does not prevent disease), but it can **substantially reduce cervical-cancer mortality** by shifting the stage distribution at diagnosis toward earlier, more treatable stages — hence the term "down-staging."
- ▶ **Modern equivalent/successor** — The visual methods now preferred over unaided speculum inspection in low-resource national programmes are **visual inspection with acetic acid (VIA)** and visual inspection with Lugol's iodine (VILI): 3–5% acetic acid or iodine is applied to the cervix and acetowhite/mustard-yellow areas are directly triaged to colposcopy/biopsy or "see-and-treat" ablation, giving better performance than plain speculum-based down-staging while remaining low-cost and single-visit.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ▶ **Type:** decision-algorithm flowchart (auto-rendered).
- ▶ **Content:** Community/primary health worker performs per-speculum examination of cervix → "Normal cervix" (pink, round, smooth, non-bleeding) → routine follow-up/re-screen interval vs. "Abnormal cervix" (red/white patch, growth, ulcer, bleeds on touch) → refer to secondary/tertiary centre → colposcopy + biopsy → confirmed CIN/early invasive disease → treat (ablation/LEEP/cone for CIN; surgery/radiotherapy per FIGO stage for invasive disease). Label the two exit branches "down-staged detection (curable)" versus "missed on visual inspection."
- ▶ ![Fig 38.1 — Gross appearance of cervical cancer on examination. (Berek & Novak 16e, p.2451)](C:/Users/Harshad/Documents/obg-notes/answer-bank/references/figures/BerekNovak16e/figp24510.png) — shows the visibly abnormal, friable, ulcero-proliferative cervix that a down-staging health worker is trained to recognise and refer.

Recent advances [RA]

- ▶ **WHO global elimination strategy (2020) — the "90-70-90" targets by 2030:** 90% of girls fully vaccinated against HPV by age 15; 70% of women screened with a high-performance test (HPV DNA testing preferred) by age 35 and again by 45; 90% of women with cervical disease receiving treatment — the organised-programme response that has effectively superseded ad hoc down-staging as the policy goal.
- ▶ **HPV DNA testing as primary screening** is now WHO's preferred modality over cytology or visual inspection alone because of superior sensitivity, including **self-collected vaginal sample HPV testing**, which extends reach into exactly the under-screened populations down-staging was designed for.
- ▶ **Single-dose HPV vaccine schedule** — WHO's 2022 position paper endorsed a single-dose regimen (in addition to the established two-dose schedule under age 15) for girls aged 9–20 years, substantially easing programmatic delivery.
- ▶ **Indigenous HPV vaccine in India** — the Drugs Controller General of India approved a quadrivalent HPV vaccine (Serum Institute of India, "Cervavac") in 2022, with phased introduction into the Universal Immunization Programme from 2023–24, aimed at closing India's vaccination-coverage gap.
- ▶ **Nonavalent HPV vaccine** (covering HPV 6, 11, 16, 18, 31, 33, 45, 52, 58) now extends protection against roughly 90% of cervical cancers, with United States Food and Drug Administration (FDA)-approved age indication extended to 9–45 years.

High-yield exam pointers

- Down-staging = WHO 1986 concept; goal is **early detection**, NOT reduction of incidence.
- Key line to write verbatim: *"detection of the disease at an earlier stage when it is still curable"* — done by trained nurses/paramedics using plain speculum, no cytology.
- Normal cervix mnemonic: P-R-S-N (Pink, Round, Smooth, does Not bleed); abnormal = red/white patch, growth/ulcer, bleeds on touch.
- India magnitude numbers to quote: **2nd commonest** female cancer (ICMR 2004); incidence **23.5/100,000** (WHO 2008); **~80%** present in advanced (Stage II+) disease.
- Risk factor one-liner for the exam: HPV 16/18 + early coitus/multiparity + smoking + immunosuppression + low socioeconomic status.
- WHO elimination target to quote: **90-70-90 by 2030**.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Down-staging is a historically important WHO strategy still asked in Indian postgraduate exams as the forerunner of organised screening; contemporary national and WHO guidance has largely superseded it with visual inspection with acetic acid/Lugol's iodine, HPV DNA testing, and vaccination-linked elimination programmes, though the underlying rationale (shift stage-at-diagnosis earlier when cytology cannot be scaled) remains the same.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Magnitude of the problem, Downstaging Screening WHO 1986, risk factors/primary prevention, Advanced/Late Carcinoma India statistic); Berek & Novak's Gynecology 16e (epidemiology and risk factors, FIGO 2018 staging context, HPV vaccine data); Jeffcoate's Principles of Gynaecology 9e (cervical cancer figures). Guidelines: World Health Organization (WHO) 1986 down-staging concept; WHO Global Strategy to Accelerate the Elimination of Cervical Cancer (2020, "90-70-90" targets); WHO HPV vaccine position paper (2022, single-dose schedule).



Enumerate the tumor markers and various screening methods used for epithelial ovarian cancer

Asked in: Paper I 06-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Epithelial ovarian cancer (EOC), arising from the coelomic-derived surface epithelium, accounts for ~90% of ovarian malignancies. Since there is no recognised pre-invasive lesion (unlike cervical intraepithelial neoplasia), "screening" for EOC means applying tumour markers, imaging and

composite risk indices to symptomatic women or those at high genetic/familial risk, rather than a validated population-based programme.

Tumour markers used in epithelial ovarian cancer

Marker	Significance in epithelial ovarian cancer
CA-125	The principal marker. Level >35 U/mL is suggestive; elevated in only ~50% of stage I but 80–90% of advanced serous cancers. Not tumour-specific — also raised in endometriosis, leiomyoma, pelvic inflammatory disease, peritonitis, pregnancy, menstruation, and cancers of breast/lung/colon/endometrium. Serum half-life ≈20 days; used chiefly to monitor response to chemotherapy and detect recurrence, more than for primary screening
HE4 (human epididymis protein 4)	Raised in nonmucinous epithelial ovarian carcinoma; less often elevated by benign conditions than CA-125, so it complements CA-125 (combined index below)
CEA	Serous and endometrioid ovarian carcinoma
CA 19-9	Mucinous epithelial ovarian carcinoma
CA 15-3	Epithelial ovarian carcinoma
TAG-72 (tumour-associated glycoprotein)	Epithelial ovarian carcinoma
M-CSF (macrophage colony-stimulating factor)	Epithelial ovarian carcinoma
OVX1, OVX2	Epithelial ovarian carcinoma — used with CA-125 in multivariate marker panels
HER-2/neu (oncogene product)	Epithelial ovarian carcinoma; associated with poorer prognosis
Galactosyltransferase (GAT)	Distinguishes ovarian cancer from endometriosis
CYFRA 21-1	Epithelial ovarian and endometrial carcinoma
Cell-free DNA	Emerging marker in ovarian carcinoma

AFP, β -hCG, LDH and inhibin/anti-Müllerian hormone are markers of germ-cell and sex-cord-stromal tumours, not of epithelial ovarian cancer, and are checked mainly to exclude a non-epithelial component in a mixed histology.

Screening methods

- **Clinical examination** — periodic bimanual pelvic examination in the "high-risk" group (strong family history of ovarian/breast/endometrial cancer, known *BRCA1/BRCA2* mutation, Lynch

syndrome, prior breast/ovarian neoplasm surgery, nulliparity, postmenopausal palpable ovary >8 cm³). Detects an adnexal mass but has poor sensitivity/specificity for early malignancy.

- ▶ **Serum CA-125** — single-threshold testing (>35 U/mL) or serial trend; a rising trend is more informative than one value because of the marker's poor specificity (see table above).
- ▶ **Transvaginal ultrasonography (TVS) ± colour Doppler** — assesses morphology (multilocularity, solid areas, papillary projections, ascites, bilaterality) and vascularity; central neovascularity with **pulsatility index (PI) <1.0** or **resistive index (RI) <0.4** raises suspicion of malignancy. Three-dimensional, contrast-enhanced power Doppler improves diagnostic yield further.
- ▶ **Risk of Malignancy Index (RMI)** — composite index combining ultrasound morphology, menopausal status and CA-125:

$$\text{RMI} = \text{U} \times \text{M} \times \text{CA-125}$$

- U (ultrasound score) = 1 point each for multilocular cyst, solid areas, metastases, ascites, bilateral lesions.
- M (menopausal score) = 3 if postmenopausal, 1 if premenopausal.
- CA-125 = serum level in U/mL.

Risk stratification: **Low risk <25, Moderate risk 25–250, High risk >250** (≈75% risk of malignancy) — used to triage referral to a gynaecological-oncology centre before surgery.

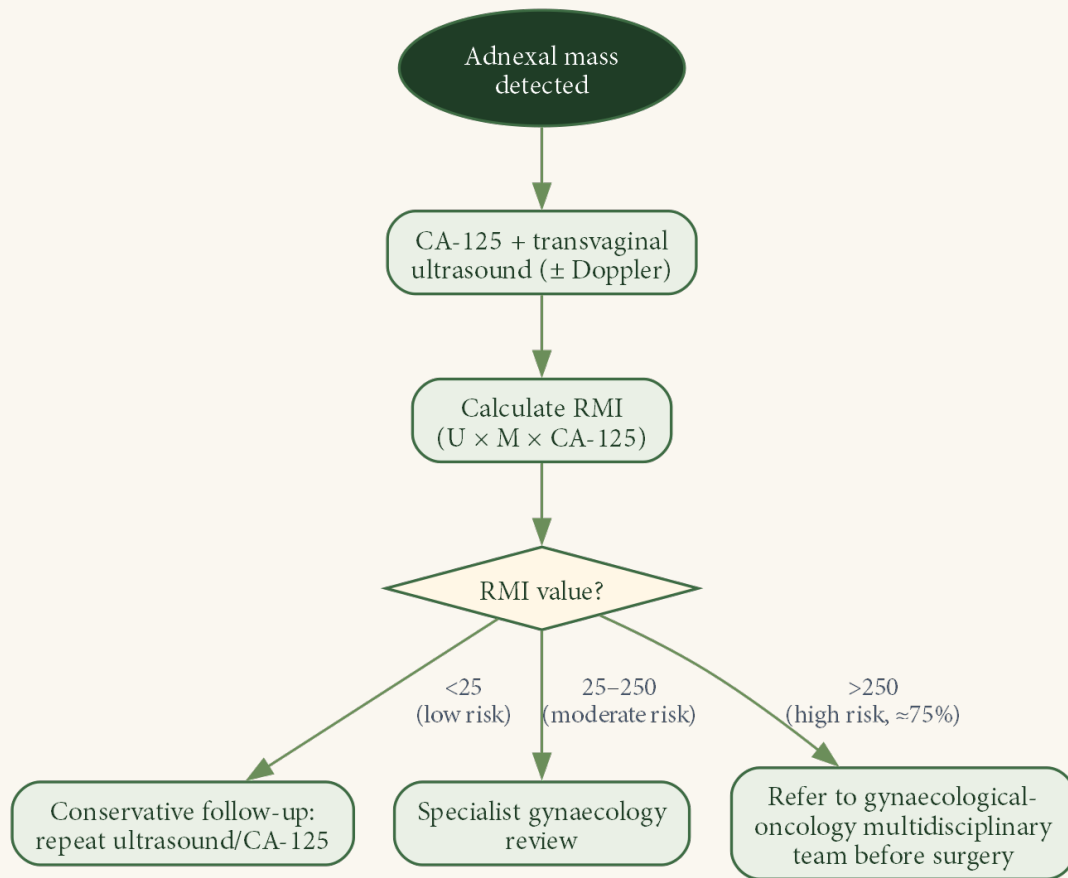
- ▶ **HE4–CA-125 composite index (ROMA)** — combines CA-125, HE4 and menopausal status into a predictive index that classifies women with an adnexal mass as low- or high-risk for epithelial malignancy; used alongside RMI for pre-surgical triage, particularly when CA-125 alone is borderline.
- ▶ **Risk of Ovarian Cancer Algorithm (ROCA) / multimodal screening** — serially measured CA-125 interpreted by a longitudinal mathematical model; a rising trend triggers TVS. This was the screening strategy tested in the **UK Collaborative Trial of Ovarian Cancer Screening (UKCTOCS)**.
- ▶ **Genetic risk assessment** — *BRCA1/BRCA2* and Lynch-syndrome (HNPCC) testing/counselling in women with a strong family history, to identify candidates for intensive surveillance or risk-reducing bilateral salpingo-oophorectomy after childbearing.

Evidence on screening effectiveness

Trial	Design	Key finding
UKCTOCS	202,638 average-risk postmenopausal women (50–74 y) randomised to no screening / annual TVS / multimodal (ROCA + TVS) screening	Multimodal screening had a better positive predictive value (35.1%) than USG alone, but follow-up showed no significant reduction in ovarian cancer mortality versus no screening
PLCO (Prostate, Lung, Colorectal, Ovarian trial)	78,216 average-risk women (55–74 y) randomised to annual CA-125 (6 y) + TVS (4 y) vs usual care	Mortality 3.1 vs 2.6 deaths/10,000 person-years (screened vs usual care) at 12.4-year median follow-up — no mortality benefit , with harm from false-positive-driven surgery
BRCA1/2 carrier cohorts (Netherlands, UK)	Annual TVS + CA-125 in mutation carriers	High proportion of interval cancers detected at advanced stage despite screening — limited benefit even in high-risk women

Current position: the USPSTF recommends **against** screening asymptomatic average-risk women with pelvic examination, TVS, or serum tumour-marker testing, concluding there is no mortality benefit and at least moderate harm (false positives, unnecessary surgery); this is echoed in the ACOG committee opinion on the role of the generalist obstetrician–gynaecologist in early detection. No tumour marker or imaging modality — alone or combined — has been validated as an effective population screening test for epithelial ovarian cancer; risk-reducing bilateral salpingo-oophorectomy remains the only evidence-based strategy in confirmed high-risk (*BRCA*/Lynch) women who have completed childbearing.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Risk-triage pathway for a suspicious adnexal mass using the Risk of Malignancy Index (RMI).

High-yield exam pointers

- ▶ CA-125 cut-off >35 U/mL; sensitivity only ~50% in stage I — not useful alone for early detection.
- ▶ $RMI = U \times M \times CA-125$; $M = 3$ postmenopausal/1 premenopausal; **Low** <25, **Moderate** 25–250, **High** >250.
- ▶ UKCTOCS and PLCO trials — both showed **no mortality benefit** from CA-125/TVS-based screening in average-risk women.
- ▶ USPSTF recommends **against** population screening for ovarian cancer (grade D).
- ▶ HE4 complements CA-125 in the ROMA composite index, especially when CA-125 is borderline.
- ▶ Tumour markers are used more for **monitoring response/recurrence** than for primary screening — CA-125 half-life ≈20 days.
- ▶ High-risk (*BRCA1/2*, Lynch) women: annual TVS + CA-125 has limited proven benefit; **risk-reducing bilateral salpingo-oophorectomy** after childbearing is the definitive evidence-based measure.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The HE4-CA-125 composite index (ROMA) is widely used internationally alongside the Risk of Malignancy Index but is not detailed with a formula in the Indian standard texts searched for this answer; it is presented here as an accepted adjunct, not a substitute for RMI-based triage or histopathological diagnosis.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e.



First trimester biochemical screening

Asked in: Paper IV 17-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — First-trimester biochemical screening is a maternal serum test performed between **11 weeks 0 days and 13 weeks 6 days** of gestation that measures two placental analytes — **pregnancy-associated plasma protein-A (PAPP-A)** and **free beta subunit of human chorionic gonadotropin (free β -hCG)** — and combines them with the ultrasound-measured **fetal nuchal translucency (NT)** and maternal age to calculate an individualised numeric risk for **trisomy 21, 18 and 13** (the "combined test"). It is a **screening**, not a diagnostic, test: a screen-positive result must be confirmed by an invasive procedure (chorionic villus sampling or amniocentesis) before any clinical decision is based on it.

Screening parameters

Parameter	Nature / source	Level in trisomy 21	Level in trisomy 18/13
PAPP-A	Glycoprotein secreted by the syncytiotrophoblast	Reduced	Reduced (more markedly)
Free β -hCG	Free beta subunit of placental hCG	Increased	Reduced
Nuchal translucency (NT)	Ultrasound measurement of the subcutaneous fluid-filled space between fetal skin and soft tissue overlying the cervical spine	Increased (≥ 3 mm, or ≥ 99 th percentile for crown-rump length)	Increased

Parameter	Nature / source	Level in trisomy 21	Level in trisomy 18/13
Nasal bone / ductus venosus a-wave / tricuspid flow	Adjunct biophysical soft markers assessed at FMF-certified centres	Absent nasal bone, reversed a-wave, tricuspid regurgitation raise risk	Same direction

Timing, technique and risk calculation

- ▶ **Window:** 11–14 weeks' gestation; NT is valid only when the crown-rump length (CRL) is between **38–45 mm and 84 mm** (lower limit varies by laboratory).
- ▶ NT is imaged in the mid-sagittal plane with the fetus in neutral position, magnified so the head and upper thorax fill the screen, calipers placed on the **inner borders** of the nuchal fluid — accuracy requires standardised, certified training (Fetal Medicine Foundation / Nuchal Translucency Quality Review programmes).
- ▶ Each serum analyte is expressed as a **multiple of the median (MoM)**, adjusted for maternal weight, race/ethnicity, gestational age and smoking; this MoM is combined with the maternal age-related a priori risk and the NT measurement in a validated software algorithm to generate a specific numerical risk (e.g., "1 in X").
- ▶ **Screen-positive cut-off:** a calculated risk of **1 in 300 or greater**.
- ▶ In **twin pregnancies**, serum free β -hCG and PAPP-A levels run approximately double the singleton values; a normal co-twin tends to normalise the biochemical result, and overall trisomy-21 detection is roughly 15% lower than in singletons.

Test performance compared with other strategies

Screening test	Timing	Trisomy 21 detection rate	False-positive rate
NT alone	11–14 wk	64–70%	5%
Combined test (NT + free β -hCG + PAPP-A)	11–14 wk	80–84%, up to 92% with nasal bone added	5%
Quadruple test (MSAFP, hCG, uE3, inhibin A)	15–20 wk	80–85%	0.9–5%
Integrated (1st- + 2nd-trimester combined)	11–20 wk	94–96%	5%
Sequential — stepwise / contingent	11–20 wk	92–97% / 91–95%	5.1% / 4.5%
Cell-free DNA (NIPT)	>10 wk	~99%	0.1%

- ▶ Maternal age modifies performance: in women <35 years, combined-test detection is 67–75%; in women ≥35 years, detection reaches 90–95% but at a higher false-positive rate of 15–22%.
- ▶ ACOG regards **combined first- and second-trimester (integrated/sequential) screening** as giving the best overall detection among serum-based strategies.

Advantages of first-trimester timing

- ▶ Earlier, individualised risk assessment permits **first-trimester diagnostic testing** (CVS at 10–13 weeks, karyotype in 24–48 hours) and, if the couple opts for it, an earlier and safer termination.
- ▶ The same scan assesses **accurate dating** and detects early major structural anomalies (e.g., cystic hygroma, acrania) independent of the biochemical result.
- ▶ Detection is equal to, or better than, second-trimester biochemical screening alone.
- ▶ Forms the platform for **integrated/sequential/contingent** protocols, which give the highest serum-based detection rates (94–97%).

Management of a screen-positive result

- ▶ Genetic counselling — explain that a screen-positive result is a **risk estimate**, not a diagnosis.
- ▶ Offer **diagnostic testing**: chorionic villus sampling (if still first trimester) or amniocentesis (after 15 weeks) for definitive karyotype/chromosomal microarray.
- ▶ If NT ≥3.5 mm (or ≥99th percentile for CRL), arrange a detailed second-trimester anomaly scan and **fetal echocardiography**, since an enlarged NT independently predicts major cardiac and other structural defects regardless of karyotype.
- ▶ If the couple declines invasive testing, offer **cell-free DNA (NIPT)** as an additional, more sensitive screen — but it remains non-diagnostic.
- ▶ If karyotype is normal despite a markedly increased NT/cystic hygroma, continue targeted anomaly surveillance, as the residual risk of a structural or genetic syndrome persists.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 17.2 — Sagittal image of a normal, 12-week fetus shows correct caliper placement (+) for nuchal translucency measurement (*Williams Obstetrics* 26e, p.352)

Label: mid-sagittal section of a 12-week fetus in neutral position; calipers placed on the inner echogenic borders of the nuchal fluid space (NT) behind the cervical spine; nasal bone and profile also labelled as an adjunct marker.

Recent advances [RA]

Advance	Key point
Universal cfDNA (NIPT) offering	ACOG Practice Bulletin No. 226 (2020) now recommends cell-free DNA screening be discussed with and offered to all pregnant women regardless of age or a priori risk, performable from ~10 weeks, with ~99% trisomy-21 sensitivity and 0.1% false-positive rate
Contingent/reflex screening models	Many centres use the combined test as first-tier and reserve cfDNA for intermediate-risk results only, balancing cost against detection
Expanded microdeletion cfDNA panels	Not recommended by ACOG (2020e) for general screening — low prevalence of these conditions gives an unacceptably low positive predictive value
Extension to pre-eclampsia risk stratification	The same first-trimester visit increasingly also screens for preterm pre-eclampsia using maternal risk factors + mean arterial pressure + uterine artery pulsatility index + serum placental growth factor (PIGF)/PAPP-A (Fetal Medicine Foundation combined algorithm); women flagged high-risk are started on aspirin 150 mg nightly from 11–14 weeks to 36 weeks — the ASPRE trial (Rolnik et al., <i>N Engl J Med</i> 2017; PMID 28657417) showed this cut preterm pre-eclampsia by approximately 62%, and ACOG (2018, reaffirmed 2020) now endorses this practice
Genome-wide/SNP-based cfDNA	Newer platforms can additionally flag triploidy, a vanishing co-twin, or rarely occult maternal mosaicism/malignancy as explanations for an abnormal "no-call" result
AI-assisted risk algorithms	Software (e.g., FMF Astraia algorithm) integrates maternal characteristics, biochemical, and biophysical markers to generate the individualised risk report in real time at the point of care

Advance	Key point
Indian practice position	FOGSI good clinical practice recommendations note cost/access limitations of cfDNA in India and continue to endorse the combined test as the primary first-trimester aneuploidy-screening strategy in routine public-sector care

High-yield exam pointers

- ▶ Window: 11 weeks 0 days–13 weeks 6 days; NT valid for CRL 38–45 mm to 84 mm.
- ▶ Combined test pattern in trisomy 21: ↑ free β-hCG, ↓ PAPP-A, ↑ NT; in trisomy 18/13, both hCG and PAPP-A are reduced.
- ▶ NT ≥3 mm (or ≥99th centile) is abnormal; ≥3.5 mm triggers fetal echocardiography.
- ▶ Detection 80–92%, false-positive rate 5%; screen-positive cut-off 1 in 300.
- ▶ cfDNA (NIPT): 99% detection, 0.1% false-positive — a screening, not diagnostic, test; now offered universally per ACOG Practice Bulletin No. 226 (2020).
- ▶ Integrated/sequential first- + second-trimester screening gives the **highest serum-based detection (94–97%)**.
- ▶ ASPRE trial: aspirin 150 mg from 11–14 to 36 weeks cuts preterm pre-eclampsia by ~62% in women flagged high-risk at this same first-trimester visit.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Detection-rate figures vary slightly by source — Williams Obstetrics 26e quotes 80–84% for the combined test, while DC Dutta's Obstetrics 9e quotes 85–92% when nasal bone assessment is added; both are quoted at a 5% false-positive/screen-positive rate and either figure is acceptable in the exam.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; ACOG Practice Bulletin No. 226 — Screening for Fetal Chromosomal Abnormalities (2020); ASPRE trial (Rolnik et al., *N Engl J Med* 2017; PMID 28657417).



First trimester screening

Asked in: Paper II 31-Jul-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — First trimester screening (the **combined test**) is a non-invasive, risk-assessment method performed between **11 and 14 weeks** gestation that combines maternal age, ultrasound measurement of

fetal nuchal translucency (NT), and maternal serum free β -hCG and PAPP-A (pregnancy-associated plasma protein-A) to calculate an individualised risk for trisomy 21, 18 and 13. It should be offered to every pregnant woman irrespective of age, and a screen-positive result is followed by diagnostic testing (CVS/amniocentesis) or cell-free DNA (cfDNA) screening.

Components and timing

Parameter	Type	Timing	Change in trisomy 21
Crown-rump length (CRL)	Ultrasound	11–14 wk (CRL 45–84 mm)	Used to date pregnancy & calculate risk
Nuchal translucency (NT)	Ultrasound (biophysical)	11–14 wk	Increased (≥ 3 mm or ≥ 99 th percentile for CRL)
Nasal bone	Ultrasound (biophysical)	11–14 wk	Often absent/hypoplastic
Free β -hCG	Serum (biochemical)	11–14 wk	Increased
PAPP-A	Serum (biochemical)	11–14 wk	Reduced

- ▶ In trisomy 18/13, both free β -hCG and PAPP-A are **reduced**, unlike trisomy 21.
- ▶ A low PAPP-A (below the 5th percentile) independent of aneuploidy is also linked to **pre-eclampsia, fetal growth restriction and preterm birth**.

Technique of NT measurement (must-know criteria)

- ▶ Crown-rump length between 45 mm and 84 mm (11–14 weeks).
- ▶ Mid-sagittal section of the fetus with nasal tip, palate, and diencephalon visible.
- ▶ Fetal neck in a **neutral position** (not flexed, not hyperextended).
- ▶ Image magnified so head, neck and upper thorax fill most of the screen.
- ▶ Calipers placed perpendicular to the long axis, on the **inner borders** of the nuchal membrane (crossbar not protruding into the fluid space).
- ▶ Amnion line clearly distinguished from the NT line.
- ▶ Largest of **three** measurements at the widest point is recorded.
- ▶ NT ≥ 3 mm (or ≥ 99 th percentile for CRL) $\rightarrow$ offer detailed anomaly scan $\pm$ fetal echocardiography (recommended if NT ≥ 3.5 mm); differentiate from a **cystic hygroma** (septated, extends down the back), which carries a higher aneuploidy risk than simple NT enlargement.

Detection performance and comparison of screening tests

Test	Analytes	Timing	Detection rate (T21)	False-positive rate
First-trimester combined test	NT + free β -hCG + PAPP-A	11–14 wk	85–92%	5%
NT alone	NT only	11–14 wk	64–70%	5%
Quadruple test	MSAFP, uE3, hCG, inhibin-A	15–20 wk	80–85%	0.9–5%
Triple test	MSAFP, hCG, uE3	15–20 wk	69–73%	5%
Integrated/sequential screening	1st + 2nd trimester combined	11–20 wk	92–96%	5%
Cell-free DNA (cfDNA/NIPT)	Placental cfDNA in maternal blood	>10 wk	~99%	0.1%

- ▶ Cut-off for "screen positive": a risk ≥ 1 in 250–300 for the combined test.
- ▶ **cfDNA** has the highest sensitivity/specificity but is a **screening**, not diagnostic, test; a "no-call"/indeterminate result (low fetal fraction, 2–4% of samples) itself carries an increased aneuploidy risk and needs repeat testing or diagnostic confirmation.
- ▶ Maternal age affects performance: detection is only 67–75% in women <35 years but 90–95% (with a higher false-positive rate of 15–22%) in women ≥ 35 years.

Interpretation and further management

- ▶ **Screen negative** → routine antenatal care; continue with the anomaly scan at 18–22 weeks.
- ▶ **Screen positive (high risk)** → counsel and offer:
 - **Diagnostic test:** chorionic villus sampling (CVS, transabdominal from 10 weeks or transcervical 10–13 weeks) for karyotype, **or**
 - **cfDNA screening** as an intermediate step if the patient wants to avoid an invasive procedure (still requires diagnostic confirmation if positive).
- ▶ **NT ≥ 3 mm** on its own (even with normal biochemistry) → detailed second-trimester anomaly scan and fetal echocardiography, because it also flags cardiac defects and other genetic syndromes, not only aneuploidy.
- ▶ Any abnormal result → genetic counselling before and after testing.

Advantages over second-trimester screening

- ▶ **Earlier reassurance or earlier diagnosis** — a screen-positive result allows first-trimester CVS, so if the pregnancy is affected, termination (when opted for) can be performed in the safer, less traumatic first trimester rather than the second.
- ▶ Detection rate is **equal to or better than** the second-trimester quadruple test at a comparable 5% false-positive rate.
- ▶ NT and nasal-bone assessment also flag structural anomalies (especially **cardiac defects**) independent of karyotype, prompting an early detailed anomaly scan and fetal echocardiography.
- ▶ Allows a **combined/integrated or sequential protocol** (first-trimester NT/biochemistry followed by second-trimester quad test) to push detection up to 92–96%, useful when a woman books late for the first-trimester window alone.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 1.1 — (A) Midsagittal view of the face; (B) normal nuchal translucency; (C) increased nuchal translucency (Arias *High-Risk Pregnancy* 5e, p.41)

High-yield exam pointers

- ▶ **Window: 11–14 weeks**; CRL must be 45–84 mm for a valid NT.
- ▶ **Combined test** = NT + free β -hCG ($\uparrow$) + PAPP-A ($\downarrow$) — remember trisomy 21 raises hCG but lowers PAPP-A; trisomy 18/13 lowers both.
- ▶ **NT cut-off ≥ 3 mm** (or ≥ 99 th percentile for CRL) is abnormal; distinguish from cystic hygroma.
- ▶ Detection rate of the combined test: **85–92% at a 5% false-positive rate**.
- ▶ **cfDNA: ~99% detection, 0.1% false-positive** — best performing screening test, but still not diagnostic.
- ▶ Screen positive $\rightarrow$ **CVS/amniocentesis** for karyotype confirmation.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Detection-rate figures vary slightly across sources (DC Dutta cites 92% for the combined test; recent Williams/ACOG meta-analyses cite 85–87%) — both ranges are acceptable in the exam, but the ACOG Practice Bulletin No. 226 (2020) figures were used as the current reference where the two disagreed.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; Arias' High-Risk Pregnancy & Delivery 5e (figure); ACOG Practice Bulletin No. 226 (2020) — Screening for Fetal Chromosomal Abnormalities.



Genetic predisposition to Gynaecological malignancies

Asked in: Paper I 26-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Genetic (hereditary) predisposition to gynaecological malignancy refers to germline mutations in tumour-suppressor genes or DNA mismatch-repair (MMR) genes, transmitted in an **autosomal dominant** pattern, that confer a markedly increased lifetime risk of ovarian, endometrial and related cancers. Hereditary causes account for about 10–15% of epithelial ovarian cancers and 3–5% of endometrial cancers; the two clinically dominant syndromes are **Hereditary Breast and Ovarian Cancer (HBOC) syndrome** (*BRCA1/BRCA2*) and **Lynch syndrome** (hereditary nonpolyposis colorectal cancer, HNPCC).

Classification of hereditary cancer syndromes with gynaecological tumours

Syndrome	Gene(s)	Gynaecological tumour(s)	Other associated cancers
Hereditary breast and ovarian cancer (HBOC)	<i>BRCA1, BRCA2</i>	Ovary, fallopian tube, peritoneum	Breast
Lynch syndrome (HNPCC)	<i>MLH1, MSH2, MSH6, PMS2</i> (± <i>EPCAM</i>)	Endometrium, ovary	Colorectal, stomach, small bowel, urinary tract
Cowden / Bannayan–Zonana syndrome	<i>PTEN</i>	Endometrium	Breast, hamartoma, glioma
Li–Fraumeni syndrome	<i>TP53, CHEK2</i>	(rarely gynaecological)	Breast, sarcoma, adrenocortical, brain
Multiple endocrine neoplasia I	Menin	Ovarian carcinoid	Thyroid, pancreas, pituitary
Multiple endocrine neoplasia II	<i>RET</i>	Ovarian carcinoid	Medullary thyroid, pheochromocytoma
Peutz–Jeghers syndrome	<i>STK11</i>	Ovarian sex cord tumour with annular tubules (SCTAT), mucinous tumours	GI hamartomatous polyps, GI cancers

Hereditary breast and ovarian cancer (HBOC) syndrome

- **Genes:** *BRCA1* (chromosome 17q21) and *BRCA2* (chromosome 13q12) — tumour-suppressor genes that mediate DNA double-strand-break repair by homologous recombination; loss of the wild-type allele (loss of heterozygosity) drives carcinogenesis.
- Accounts for **80–95%** of all familial ovarian cancers; tumours are typically **high-grade serous** (not mucinous), now believed to arise from serous tubal intraepithelial carcinoma (STIC) in the distal fallopian tube, and present at an earlier age than sporadic cancers.
- **Founder mutations** (Ashkenazi Jewish population): *185delAG* and *5382insC* (*BRCA1*), *6174delT* (*BRCA2*) — carrier rate **1 in 40 (2.5%)** versus **1 in 500** in the general population.
- **Lifetime risk (by age 70):**

Cancer	BRCA1	BRCA2
Ovarian cancer	~40%	~18%
Breast cancer	~57%	~49%

- Clinical relevance: BRCA-deficient tumours have defective homologous recombination repair, giving increased sensitivity to platinum chemotherapy and to **PARP inhibitors** (olaparib, niraparib, rucaparib) through the principle of **synthetic lethality**.

Lynch syndrome (HNPCC)

- Autosomal dominant; caused by germline mutation in a DNA **mismatch-repair (MMR)** gene — *MLH1*, *MSH2*, *MSH6*, *PMS2* — or epigenetic silencing of *MSH2* via an *EPCAM* deletion; *MLH1/MSH2* mutations account for ~90% of cases.
- Endometrial cancer is often the **sentinel malignancy**, preceding colorectal cancer.
- **Lifetime risk:** endometrial cancer **40–60%**; ovarian cancer **10–12%**; colorectal cancer up to ~54–70% by age 70.
- **Universal tumour screening:** every newly diagnosed endometrial (and colorectal) cancer is tested by **immunohistochemistry** for loss of *MLH1/MSH2/MSH6/PMS2* expression, ± microsatellite instability (MSI) testing. If *MLH1* expression is lost, *MLH1* promoter-methylation testing distinguishes a sporadic (methylated) from a Lynch-associated (unmethylated) tumour before proceeding to germline testing. Older family-history-based tools (Amsterdam/revised Bethesda criteria) have poor sensitivity and are now superseded by universal molecular screening.

Genetic counselling and criteria for germline testing

- All women with epithelial ovarian, fallopian tube, or peritoneal cancer (excluding pure mucinous histology), irrespective of family history.
- Endometrial cancer with abnormal MMR immunohistochemistry, or diagnosed at a young age.

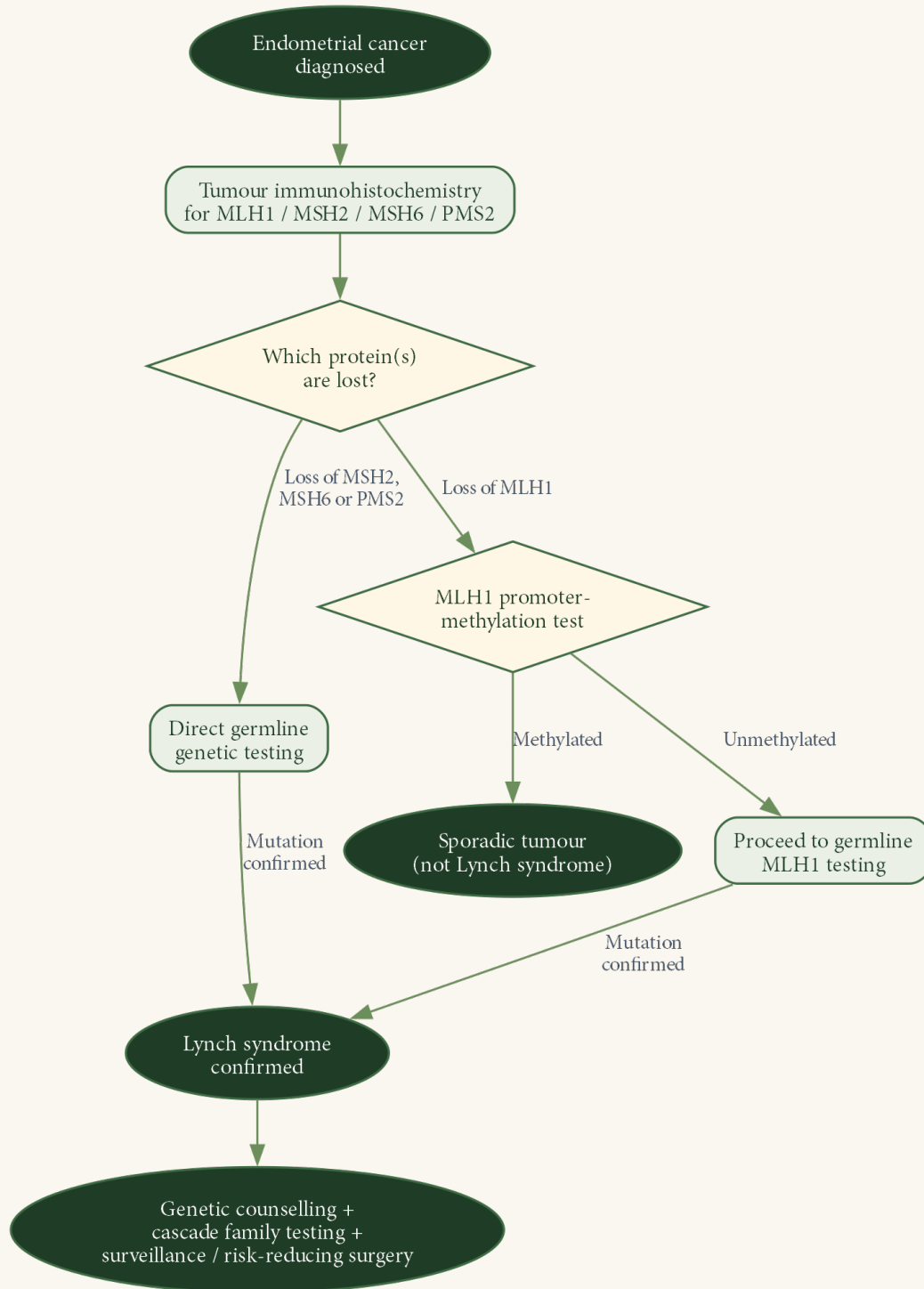
- ▶ Personal or family history of breast cancer at a young age, triple-negative breast cancer, male breast cancer, or multiple relatives with breast/ovarian cancer.
- ▶ Multiple relatives across generations with Lynch-spectrum cancers (colorectal, endometrial, ovarian, urinary tract).
- ▶ Ashkenazi Jewish ancestry with any personal/family history of breast or ovarian cancer.
- ▶ All carriers require formal genetic counselling before and after testing (implications for insurability, psychological impact, and cascade testing of relatives).

Surveillance and risk-reduction in confirmed carriers

Syndrome	Surveillance	Risk-reducing surgery	Chemoprevention
<i>BRCA1</i>	Transvaginal ultrasound + serum CA-125 6-monthly from age 30–35y (unproven mortality benefit)	Risk-reducing salpingo-oophorectomy (RRSO) at 35–40 years	Combined oral contraceptives ≥5 years → ~60% reduction in ovarian cancer risk (RR 0.4)
<i>BRCA2</i>	Same	RRSO at 40–45 years (later-onset tumours)	Same
Lynch syndrome	Annual pelvic examination + transvaginal ultrasound + endometrial biopsy from 35–40 years	Prophylactic total hysterectomy + bilateral salpingo-oophorectomy once childbearing is complete	—

- ▶ RRSO reduces BRCA-related gynaecological cancer risk by ~96%; occult (often microscopic, tubal) cancer is found in a small proportion of prophylactic specimens, so **complete serial sectioning of the ovaries and fallopian tubes with microscopic examination** is mandatory. Residual peritoneal carcinoma risk after RRSO is low (~1%).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Universal molecular screening algorithm for Lynch syndrome in newly diagnosed endometrial cancer.

High-yield exam pointers

- ▶ *BRCA1* = chromosome 17q21; *BRCA2* = chromosome 13q12 — both tumour-suppressor, DNA-repair genes, autosomal dominant.
- ▶ HBOC → high-grade serous ovarian/tubal/peritoneal cancer + breast cancer; Lynch syndrome → endometrial + ovarian + colorectal cancer (MMR genes MLH1/MSH2/MSH6/PMS2 ± EPCAM).
- ▶ Ashkenazi Jewish founder mutations: 185delAG & 5382insC (*BRCA1*), 6174delT (*BRCA2*).
- ▶ RRSO timing to remember: *BRCA1* at 35–40y, *BRCA2* at 40–45y (later onset).
- ▶ PARP inhibitors (olaparib/niraparib/rucaparib) exploit **synthetic lethality** in BRCA-deficient tumours.
- ▶ Peutz–Jeghers syndrome (*STK11*) → ovarian **sex-cord tumour with annular tubules** (SCTAT).
- ▶ Universal IHC/MSI screening of all new endometrial cancers is now standard practice for Lynch syndrome detection.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Reported lifetime-risk ranges for BRCA- and Lynch-associated cancers vary modestly between sources; the figures above reflect the consistent teaching in DC Dutta's Textbook of Gynaecology 7e and Berek & Novak's Gynecology 16e, cross-checked against ACOG Practice Bulletin No. 182.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; ACOG Practice Bulletin No. 182 (Hereditary Cancer Syndromes and Risk Assessment).



Germ cell tumors

Asked in: Paper III May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Ovarian germ cell tumors (GCTs) arise from the primordial germ cells of the ovary; they make up 20-25% of ovarian neoplasms but only ~3% are malignant (<5% of all ovarian cancers). They occur mainly in children and young women (~70% of ovarian tumors in the first two decades are germ

cell in origin, one-third malignant), grow rapidly, and are highly chemosensitive, so fertility-sparing management is central to treatment.

Classification (WHO 2014, histologic)

Group	Tumor types
1. Primitive germ cell tumors	Dysgerminoma · Yolk sac tumor (endodermal sinus tumor) · Embryonal carcinoma · Polyembryoma · Nongestational choriocarcinoma · Mixed germ cell tumor
2. Biphasic/triphasic teratoma	Immature teratoma · Mature teratoma (solid/cystic — dermoid cyst, fetiform teratoma)
3. Monodermal teratoma & somatic-type tumors	Struma ovarii · Carcinoid · Neuroectodermal tumor · Sebaceous/pituitary-type tumors, etc.

- ▶ **Dysgerminoma** — commonest malignant GCT (30-40%); testicular counterpart is seminoma; bilateral in 10-20% (the only GCT with significant bilaterality).
- ▶ **Yolk sac tumor** — second commonest (~20%); **Schiller-Duval bodies** (perivascular cystic spaces, flattened epithelium) on histology; secretes AFP.
- ▶ **Immature teratoma** — third commonest (<1% of ovarian cancers, 10-20% of malignancies in women <20 years); graded low/high-grade (or 1-3) by amount of immature neuroepithelium.
- ▶ **Embryonal carcinoma** — secretes both AFP and hCG; the undifferentiated progenitor lesion.
- ▶ **Nongestational choriocarcinoma** — secretes hCG; precocious pseudopuberty; poor prognosis, relatively methotrexate-resistant unlike gestational choriocarcinoma.
- ▶ **Mixed GCT** — ≥2 elements, dysgerminoma the commonest component (70-80%).

Clinical features

- ▶ Rapidly growing pelvic/abdominal mass with acute or subacute pain (capsular distension, torsion, haemorrhage, or necrosis) — unlike slow-growing epithelial tumors.
- ▶ Pressure symptoms on bladder/rectum; menstrual irregularity in menarcheal girls; acute presentation can mimic torsion, rupture or appendicitis.
- ▶ Advanced disease: ascites, abdominal distension.
- ▶ Precocious pseudopuberty/virilisation with hCG- or steroid-secreting tumors (choriocarcinoma, some teratomas).
- ▶ May coexist with pregnancy (20-30% of ovarian malignancies in pregnancy are dysgerminomas).

Tumor markers and their significance

Marker	Tumor secreting it
Alpha-fetoprotein (AFP)	Yolk sac tumor, embryonal carcinoma, some immature teratomas
Human chorionic gonadotropin (hCG)	Choriocarcinoma, embryonal carcinoma, syncytiotrophoblastic cells in dysgerminoma
Lactate dehydrogenase (LDH)	Dysgerminoma (elevated in ~95%)
Placental alkaline phosphatase (PLAP)	Dysgerminoma
CA-125, CA 19-9, CEA	Non-specific, sometimes raised in teratoma
—	Pure dysgerminoma and pure (mature/low-grade immature) teratoma do not secrete AFP/hCG

Investigations and diagnosis

- ▶ Serum AFP, hCG and LDH in every young patient with an adnexal mass.
- ▶ Pelvic ultrasound — solid or mixed solid-cystic mass suggests malignancy; adnexal mass ≥ 2 cm in premenarcheal girls or ≥ 8 cm in other premenopausal women usually warrants surgical exploration.
- ▶ Contrast-enhanced CT abdomen and chest (germ cell tumors metastasise to lungs/mediastinum) to assess retroperitoneal nodes and distant spread.
- ▶ Karyotype in every premenarcheal girl with a pelvic mass (particularly dysgerminoma) to exclude a dysgenetic gonad/Y-chromosome-bearing streak gonad (gonadoblastoma risk).
- ▶ Frozen-section histology at laparotomy to guide extent of surgery.

FIGO staging (used for ovarian, fallopian tube and primary peritoneal cancer, including germ cell tumors)

Stage	Extent
I	Growth limited to the ovaries/fallopian tubes (IA one ovary; IB both ovaries, capsule intact; IC surgical spill/capsule rupture/positive cytology)
II	Pelvic extension below the pelvic brim (IIA uterus/tubes/ovaries; IIB other pelvic tissues)
III	Peritoneal spread outside the pelvis and/or retroperitoneal nodal metastasis (IIIA microscopic/nodal only; IIIB macroscopic peritoneal disease ≤ 2 cm; IIIC > 2 cm)
IV	Distant metastasis (IVA malignant pleural effusion; IVB parenchymal/extra-abdominal metastasis)

Management

- ▶ **Surgical staging** at laparotomy/laparoscopy: peritoneal fluid/washings for cytology, inspection/palpation of all peritoneal surfaces, unilateral pelvic lymphadenectomy with palpation/biopsy of para-aortic nodes (preferential spread route, around the renal vessels), omental biopsy, biopsy of any suspicious lesion.
- ▶ **Fertility-sparing surgery is the standard** in young patients: unilateral salpingo-oophorectomy, uterus and contralateral ovary/tube preserved in situ even with metastatic disease (highly chemosensitive tumors). Routine wedge biopsy of a normal contralateral ovary is unnecessary, except in dysgerminoma (bilateral in 10-20%), where a suspicious contralateral ovary should be inspected/biopsied.
- ▶ **Y chromosome** on karyotype → remove both gonads (dysgenetic/streak gonads have malignant potential — gonadoblastoma), though the uterus may be preserved for future embryo transfer.
- ▶ Total abdominal hysterectomy with bilateral salpingo-oophorectomy is reserved for women not desiring fertility preservation or with disease not amenable to conservative surgery.
- ▶ Cytoreduction of easily resectable bulky disease (e.g., omental cake) is reasonable, but aggressive debulking is unproven and must never delay chemotherapy.

Adjuvant/first-line chemotherapy

Regimen	Drug	Dose and schedule
BEP (regimen of choice)	Bleomycin	30,000 IU (30 units) IV on days 1, 8, 15, every 3 weeks
	Etoposide	100 mg/m ² IV daily × 5 days, every 3 weeks
	Cisplatin	20 mg/m ² IV daily × 5 days (or 100 mg/m ² as a single dose), every 3 weeks
EP	Etoposide + Cisplatin (as above, bleomycin omitted)	used when bleomycin pulmonary toxicity is a concern
EC	Etoposide 120 mg/m ² days 1-3 + Carboplatin (AUC-based)	every 4 weeks
VAC (second line/older)	Vincristine 1-1.5 mg/m ² + Actinomycin D 0.5 mg/day × 5 days + Cyclophosphamide 150 mg/m ² /day × 5 days	every 4 weeks

- ▶ BEP is given for **3 cycles** in completely resected (surgical stage I) disease and **3-4 cycles** in incompletely resected/advanced disease; chemotherapy should start within 7-10 days of surgery as these tumors progress rapidly.

- ▶ **Stage IA, grade 1 immature teratoma and stage IA dysgerminoma** with complete staging may be observed with serial tumor markers and imaging without adjuvant chemotherapy; all other stages/grades receive BEP.
- ▶ **Radiotherapy** (2500-3500 cGy) is highly effective for dysgerminoma (very radiosensitive) but is rarely first-line because of loss of fertility and ovarian function; reserved for relapse after chemotherapy in specialised centres.
- ▶ **Recurrent disease** — treated with platinum-based combination chemotherapy if chemo-naive; if relapse occurs after BEP, second-line regimens include TIP (paclitaxel, ifosfamide, cisplatin) or VIP (vinblastine/etoposide, ifosfamide, cisplatin), with high-dose chemotherapy considered in selected cases.
- ▶ **Follow-up** — serial tumor markers (AFP, hCG, LDH) and imaging; menstrual, fertility and endocrine function are preserved in the great majority after fertility-sparing surgery plus chemotherapy.

Prognosis

- ▶ Stage IA dysgerminoma, unilateral oophorectomy alone: >95% 5-year disease-free survival.
- ▶ Advanced/incompletely resected disease with platinum-based chemotherapy: durable remission in the great majority (~75-95% disease-free in reported series).
- ▶ Immature teratoma: prognosis tracks stage and grade (higher immature neuroepithelium content = lower survival, though children do well with surgery alone regardless of grade).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 39.17 — Relationship between types of pure malignant germ cell tumors and their secreted markers (Berek & Novak 16e, p.2622)

High-yield exam pointers

- ▶ Classification: dysgerminoma > yolk sac tumor > immature teratoma > embryonal carcinoma > choriocarcinoma > mixed GCT (decreasing frequency).
- ▶ Markers: AFP = yolk sac tumor; hCG = choriocarcinoma/embryonal carcinoma; LDH + PLAP = dysgerminoma; pure dysgerminoma/pure teratoma = marker-negative.
- ▶ Schiller-Duval bodies = yolk sac tumor pathognomonic histology.
- ▶ Y chromosome on karyotype in a premenarcheal girl with a pelvic mass → remove both gonads (gonadoblastoma risk).
- ▶ BEP = Bleomycin 30 units IV days 1,8,15 + Etoposide 100 mg/m²/day ×5 days + Cisplatin 20 mg/m²/day ×5 days, every 3 weeks × 3-4 cycles — the single most important dose table to reproduce.
- ▶ Fertility-sparing unilateral salpingo-oophorectomy + surgical staging is standard even with metastatic disease, because these tumors are exquisitely chemosensitive.

- Dysgerminoma is very radiosensitive (2500-3500 cGy) but radiotherapy is avoided first-line to preserve fertility.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e prints a slightly older BEP schedule (bleomycin weekly continuous, etoposide days 1-3 every 4 weeks, cisplatin as a single 100 mg/m² dose every 3 weeks); the 5-day etoposide/cisplatin, 3-weekly BEP schedule in the dose table above is the current international standard (as in Berek & Novak 16e, derived from testicular germ cell tumor trials) and should be used for the exam.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e.



Management of endometrial carcinoma in a 60-year-old postmenopausal woman

Asked in: Paper III 23-Nov-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Endometrial carcinoma is a malignant epithelial neoplasm of the glandular lining of the uterine corpus, and is the classic tumour of the postmenopausal woman — the median age at diagnosis is 60, and 75% of patients are postmenopausal at presentation, typically with the "corpus cancer syndrome" of obesity, hypertension, and diabetes. In this age group the disease is confirmed by endometrial sampling and staged surgically, and treatment is planned around surgical stage, histologic grade/type, and the patient's fitness for surgery.

Confirming diagnosis and staging before treatment

Step	Purpose
Endometrial (Pipelle) biopsy or fractional curettage	Confirms histology and grade before definitive treatment; fractional curettage is done if office biopsy is non-diagnostic or cervical stenosis prevents sampling
Transvaginal ultrasonography	Endometrial thickness >4 mm, irregular hyperechoic endometrium, or intracavitary fluid supports the diagnosis and estimates myometrial invasion
Serum CA-125	Raised in advanced-stage or serous-type disease; useful for monitoring

Step	Purpose
MRI pelvis	Best modality to assess depth of myometrial invasion and cervical stromal extension, guiding the extent of lymph-node surgery
Chest X-ray / CT chest–abdomen–pelvis	Screens for distant metastasis before major surgery
Preoperative fitness work-up	Complete haemogram, renal/liver function, blood sugar, ECG; anaesthetic and physician clearance, given the frequent comorbid obesity, hypertension and diabetes in this age group

Primary surgical management

- ▶ Midline/paramedian laparotomy, or a laparoscopic/robotic approach with equivalent oncological outcome and less morbidity.
- ▶ Peritoneal washings taken for cytology (reported separately; no longer changes the FIGO stage).
- ▶ Thorough exploration of liver, diaphragm, omentum, pelvis, and pelvic/para-aortic nodes.
- ▶ **Extrafascial total hysterectomy with bilateral salpingo-oophorectomy** — the mainstay of treatment for disease confined to the corpus, which accounts for most patients at this age.
- ▶ **Sentinel lymph-node mapping** by standardised cervical injection of indocyanine green with fluorescence imaging (clinical stage I, any histology/grade), or selective pelvic ± para-aortic lymphadenectomy where nodal risk factors are present (tumour >2 cm, grade 3, deep myometrial invasion, non-endometrioid histology); lymphadenectomy may be omitted in low-risk small endometrioid tumours with <50% invasion.
- ▶ Omentectomy, appendicectomy, and peritoneal biopsies are added for serous, clear-cell, or carcinosarcoma histology.
- ▶ The uterus is opened on the table for gross/frozen-section assessment of invasion depth and cervical extension, which guides the extent of nodal surgery.
- ▶ **Vaginal hysterectomy** may be selected for a stage I, well-differentiated tumour in an obese or medically unfit patient. Fertility-sparing progestin therapy has no role in this age group — it is reserved for young women who still desire childbearing.

Risk-adapted adjuvant therapy

Risk group (surgical stage/grade)	Adjuvant treatment
Low risk — Stage IA, grade 1–2, no/minimal invasion	Observation only
Intermediate risk — Stage IB, or Stage IA with grade 3 or lymphovascular invasion	Vaginal-vault brachytherapy — controls vaginal recurrence with less toxicity than pelvic radiotherapy

Risk group (surgical stage/grade)	Adjuvant treatment
High(-intermediate) risk — Stage II, grade 3 with deep invasion, cervical/serosal/adnexal involvement, or nodal disease	Whole-pelvis external-beam radiotherapy ± vaginal-cuff brachytherapy boost
Serous/clear-cell/carcinosarcoma, Stage III–IVA	Adjuvant chemotherapy combined with pelvic radiotherapy
Stage IVB, or recurrent/metastatic disease	Systemic chemotherapy ± hormonal therapy (below)

A **POLE-mutated** tumour otherwise confined to the uterus is now managed less aggressively (excellent prognosis), whereas a **p53-abnormal** tumour is treated more aggressively regardless of conventional grade — molecular class increasingly modifies the risk group above.

Management of advanced, recurrent, or metastatic disease

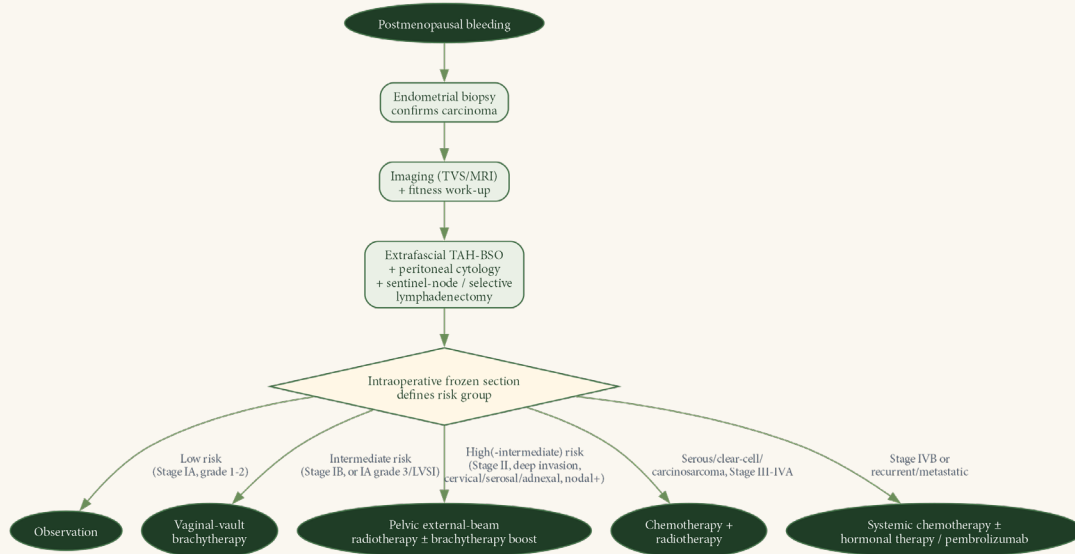
- ▶ Isolated vaginal or pelvic recurrence in a previously unirradiated patient — salvage radiotherapy (external beam followed by brachytherapy) achieves durable remission in a majority of cases.
- ▶ Combination chemotherapy — classically **paclitaxel–doxorubicin–cisplatin** (TAP), shown effective in advanced/recurrent disease in the GOG-177 trial; the doublet **carboplatin–paclitaxel** is now the standard regimen, non-inferior to TAP with substantially less toxicity, and is preferred first-line and at recurrence.
- ▶ Hormonal therapy suits low-grade, hormone-receptor-positive, indolent recurrence: **medroxyprogesterone acetate** 1 g/week intramuscularly or 150 mg/day orally, 17-**hydroxyprogesterone caproate** 1 g/week intramuscularly, or **megestrol acetate** 160 mg/day orally, continued for at least 3 months and tapered if responsive; **tamoxifen** 10 mg twice daily is added, or substituted if progestins fail or are contraindicated.
- ▶ **Pembrolizumab** (anti-PD-1) is an option for mismatch-repair-deficient/microsatellite-instability-high recurrent disease that has progressed on chemotherapy.
- ▶ Exenterative surgery has only a limited role, reserved for selected isolated central recurrence.

Special considerations and follow-up in this patient

- ▶ Actively screen and optimise the **corpus cancer syndrome** triad (obesity, hypertension, diabetes) before anaesthesia; involve a physician for perioperative co-management.
- ▶ Universal **mismatch-repair (Lynch syndrome) testing** of the tumour by immunohistochemistry is now recommended regardless of family history, as it affects surveillance for synovial and colonic cancers in the patient and her relatives.
- ▶ Unopposed systemic oestrogen is avoided for postmenopausal symptoms after treatment; severe vasomotor symptoms are managed with a low-dose progestin or a non-hormonal agent (e.g. clonidine), while topical vaginal oestrogen is acceptable for urogenital atrophy.

- **Follow-up:** clinical review every 4 months for 2 years, 6-monthly for the next 3 years, then annually; annual chest X-ray, and CA-125 monitoring where the histology is serous.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Stage-based management algorithm for endometrial carcinoma, from presentation through surgical staging to risk-adapted adjuvant therapy.

High-yield exam pointers

- At 60 years, presume any postmenopausal bleeding is due to endometrial carcinoma until biopsy proves otherwise.
- Surgery = extrafascial TAH-BSO + peritoneal cytology + sentinel-node mapping (indocyanine green, cervical injection) ± selective lymphadenectomy — the backbone of management for Stage I disease, which most 60-year-olds will have.
- Adjuvant therapy is risk-adapted: observation (low risk) → vaginal-vault brachytherapy (intermediate) → pelvic EBRT (high) → chemotherapy + radiotherapy (serous/advanced).
- Current standard chemotherapy is **carboplatin–paclitaxel**, replacing the older TAP triplet (paclitaxel–doxorubicin–cisplatin, GOG-177).
- Hormonal therapy doses to remember: MPA 1 g/week IM or 150 mg/day oral; megestrol acetate 160 mg/day oral; tamoxifen 10 mg twice daily.
- Corpus cancer syndrome (obesity + hypertension + diabetes) drives perioperative risk in exactly this patient profile.
- Follow-up: 4-monthly (years 1–2) → 6-monthly (years 3–5) → annual thereafter.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e still frames staging and radiotherapy doses using the 2009 FIGO system (in cGy, delivered by colpostat afterloading); the modern equivalent — high-dose-rate vaginal brachytherapy (commonly 21 Gy in 3 fractions) under the current 2023 FIGO staging with molecular-class modifiers — is the current standard used above.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e (surgical staging, sentinel lymph-node protocol, GOG-177 trial data); FIGO Committee on Gynecologic Oncology — revised staging for carcinoma of the endometrium, 2023.



Management of ovarian tumours complications in pregnancy

Asked in: Paper II 28-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — An ovarian tumour complicates about **1 in 2,000 pregnancies**; the germ-cell (dermoid) tumour is about **two-fold more common** in pregnancy than in the non-pregnant state, while true **ovarian malignancy is rare** (overall incidence of ovarian cancer in pregnancy $\approx$ **1 in 30,000**). Superimposed on the tumour's usual complications (torsion, haemorrhage, rupture, infection, malignant change), pregnancy adds its own mechanical effects, so management must be individualised by the timing of diagnosis — antenatal (uncomplicated/complicated), intrapartum, or puerperal.

Complications & how they present

Complication	Timing / mechanism in pregnancy	Clinical clue
Torsion of the pedicle	Classic timing: 8-10 weeks (tumour rises out of the pelvis into the abdomen) or early puerperium (sudden laxity of the abdominal wall); favoured by a moderate-sized, mobile, long-pediced tumour (dermoid/serous cystadenoma)	Sudden severe hypogastric pain with a tender, tense, restricted-mobility cystic mass felt separate from the gravid uterus ; general condition initially unaffected
Intracystic haemorrhage	Increased pelvic vascularity of pregnancy; also follows partial torsion	Rapidly enlarging, increasingly tender lump

Complication	Timing / mechanism in pregnancy	Clinical clue
Rupture	Follows intracystic haemorrhage, direct impaction/trauma in labour, or degeneration of a tense cyst	Acute abdomen, peritonism — mimics a disturbed ectopic pregnancy
Infection	Common after abortion or delivery (puerperal sepsis seeding an adherent/devitalised cyst)	Fever, localised tenderness, leucocytosis
Malignant change	Rare; most tumours found malignant are germ-cell or early-stage, low-grade epithelial cancers	Solid/irregular component; CA-125, β -hCG, AFP are all physiologically raised in pregnancy — useful prognostically but not reliably diagnostic
Mechanical/obstetric effects	Tumour impacted in the pelvis	Retention of urine, malpresentation, non-engagement of the head at term, obstructed labour if impacted

Diagnosis (guides the management decision)

- ▶ **Abdominal examination** — a cystic swelling palpable separate from the gravid uterus.
- ▶ **Vaginal examination in the head-down (Trendelenburg) position** elicits a groove between the two masses — the **Hingorani sign**.
- ▶ **Ultrasonography** — first-line; MRI is safe in pregnancy and gives the most accurate detail of tumour nature and of the pregnancy.
- ▶ Differential diagnosis: pelvic kidney, uterine fibroid, colorectal or bladder tumour.

Management

A. Antenatal — uncomplicated tumour

- ▶ Principle: remove the tumour as soon as the diagnosis is confirmed.
- ▶ **Elective surgery at 14-18 weeks** — the corpus luteum of pregnancy has handed over progesterone support to the placenta, miscarriage risk is lowest, and the pedicle is still easily accessible.
- ▶ If diagnosed **beyond 36 weeks**, surgery is withheld and the tumour removed as early as possible in the puerperium.
- ▶ **Ovarian cystectomy**, preserving healthy ovarian tissue, is the operation of choice in a young woman wanting to preserve fertility; **ovariotomy (oophorectomy/salpingo-oophorectomy)** is reserved for a tumour that has destroyed the ovary or is gangrenous.

B. Antenatal — complicated tumour (torsion / rupture / haemorrhage / infection)

- ▶ The tumour is removed **irrespective of the period of gestation** — this is an emergency laparotomy (or laparoscopy if the uterine size and stability permit).
- ▶ Analgesia: **morphine 15 mg IM** for pain control while arranging surgery.
- ▶ **Detorsion + cystectomy** is attempted first to try to salvage the ovary (risk of embolism after detorsion is low, $\approx 0.2\%$); **ovariotomy** is done only if the adnexa is frankly gangrenous.
- ▶ Resuscitate shock/haemorrhage before surgery; adequate post-operative analgesia is maintained for **48 hours**.

C. Intrapartum

- ▶ **Tumour well above the presenting part** — watchful expectancy; allow vaginal delivery and remove the tumour electively in the puerperium.
- ▶ **Tumour impacted in the pelvis causing obstruction** — caesarean section followed by tumour removal in the same sitting.

D. Puerperium

- ▶ If the tumour is first recognised after delivery, it is removed **as early as possible** in the puerperium.
- ▶ The specimen is **always sent for histopathological examination**, whatever its intra-operative appearance.

E. Tumour found malignant at laparotomy

- ▶ Surgical staging is carried out **as it would be in a non-pregnant woman** — peritoneal cytology/washings, inspection and biopsy of the contralateral ovary, omentum, and para-aortic nodes.
- ▶ Most malignancies detected in pregnancy are germ-cell or early low-grade epithelial tumours, so **fertility-sparing unilateral salpingo-oophorectomy with staging**, continuing the pregnancy, is favoured wherever the disease permits.
- ▶ Adjuvant cytotoxic chemotherapy, when needed, follows standard gynaecologic-oncology timing principles — avoided in the first trimester.
- ▶ Counsel that **pregnancy itself does not usually alter the prognosis** of most ovarian cancers.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 21.15 — *Torsion of the pedicle of an ovarian tumor. Note the turns in the pedicle (arrow) and the stretched fallopian tube (DC Dutta's Gynaecology 7e, p.263)*

High-yield exam pointers

- ▶ Best elective window for removing an uncomplicated tumour: **14-18 weeks**; beyond **36 weeks**, wait and remove in the puerperium.

- ▶ **Complicated tumour** = remove at ANY gestation — this overrides the timing rule above.
- ▶ Torsion clusters at **8-10 weeks** or **early puerperium**; dermoid is the commonest ovarian tumour of pregnancy (2-fold increase).
- ▶ Remember the **Hingorani sign** (groove on bimanual exam, Trendelenburg position) for clinically separating tumour from gravid uterus.
- ▶ Labour rule: tumour clear of the pelvis → vaginal delivery, remove later; tumour impacted/obstructing → **LSCS + tumour removal, same sitting**.
- ▶ Tumour markers (CA-125/ β -hCG/AFP) are physiologically elevated in pregnancy — prognostic, not diagnostic, value.
- ▶ Ovarian cancer in pregnancy is rare ($\approx 1:30,000$) and pregnancy does not worsen its prognosis.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

First-trimester avoidance of cytotoxic chemotherapy is standard gynaecologic-oncology practice; the corpus texts describe staging-surgery principles for a malignant tumour found in pregnancy but do not specify a chemotherapy regimen for this scenario.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e.



Molar pregnancy

Asked in: Paper II 18-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — Molar pregnancy (hydatidiform mole, syn. vesicular mole) is the benign form of **gestational trophoblastic disease (GTD)** in which the chorionic villi undergo partly degenerative and partly proliferative change, forming grape-like clusters of hydropic vesicles with no viable embryo (complete mole) or a focally affected placenta with a fetus/amniotic sac (partial mole). It is best regarded as a benign neoplasia of the chorion with malignant potential, since it is the commonest antecedent of **gestational trophoblastic neoplasia (GTN)**.

Classification and aetiology

Feature	Complete mole	Partial mole
Karyotype	46,XX (85%) or 46,XY — entirely paternal (androgenesis)	Triploid — 69,XXX/69,XXY/69,XXY (90%)

Feature	Complete mole	Partial mole
Mechanism	Empty (anucleate) ovum fertilised by a haploid sperm that duplicates its own chromosomes	Normal ovum fertilised by two sperm (dispermy)
Embryo/fetus	Absent	Present (usually dies in the first trimester; rarely liveborn but growth-restricted)
Villous hydrops / trophoblast hyperplasia	Diffuse and marked	Focal and variable
Uterine size	Large-for-dates (30–60%)	Usually not large-for-dates
Theca lutein cysts	Common (25–50%)	Uncommon
Serum β -hCG	High, often >50,000–100,000 mIU/mL	Only mildly raised (<50,000)
p57^KIP2 immunostaining	Negative (no maternal genome expressed)	Positive
Risk of persistent GTN	~15–20%	<5%

Risk factors/aetiology: maternal age extremes (teenage and >35–40 years); prior molar pregnancy (recurrence 1–4%); Asian/oriental ethnicity (highest incidence Philippines ~1:80; India ~1:400 pregnancies); low dietary carotene/animal-fat intake; disturbed maternal immune mechanisms (raised gammaglobulin, blood group A). Cause is otherwise unknown; the fundamental defect is an abnormal paternal:maternal chromosome ratio (2:0 in complete, 2:1 in partial mole).

Clinical features

- ▶ **Amenorrhoea** of 8–12 weeks with exaggerated early-pregnancy symptoms.
- ▶ **Vaginal bleeding** (~90%) — dark, may contain grape-like vesicles ("white currant in red currant juice"); **passage of vesicles per vaginum is pathognomonic**.
- ▶ **Uterus large-for-dates**, soft/doughy on palpation; **no fetal parts, fetal heart sounds, or ballottement** felt (complete mole).
- ▶ **Hyperemesis gravidarum** (~15%) from markedly elevated hCG.
- ▶ **Early-onset pre-eclampsia** (before 20 weeks, in up to 50%) — pre-eclampsia this early is otherwise virtually never seen and strongly suggests a mole; rarely eclamptic convulsion.
- ▶ **Bilateral theca lutein cysts** (25–50%), from ovarian hyperstimulation by hCG; usually regress within 2 months of evacuation.
- ▶ **Thyrototoxic features** (tremor, tachycardia) in ~2%, from hCG cross-reactivity at the TSH receptor.

- ▶ **Acute breathlessness** (~2%) from early trophoblastic pulmonary embolisation, even before evacuation.
- ▶ Absent quickening.

Diagnosis / investigations

Test	Finding
Serum β -hCG	Markedly elevated, often >100,000 mIU/mL (>2 MoM for gestation) in complete mole; only mild rise in partial mole
Transvaginal ultrasound	" Snowstorm "/ honeycomb pattern — diffuse vesicular echoes with no fetal pole or sac (complete mole); focal cystic placental change with a fetus/gestational sac (partial mole)
Chest X-ray	Baseline film — excludes early pulmonary trophoblastic embolisation even in a benign mole
Blood work-up	Full blood count, ABO/Rh grouping, renal/hepatic/thyroid function
Histopathology of evacuated tissue	Confirms diagnosis — hydropic avascular villi with trophoblastic hyperplasia (diffuse in complete, focal with fetal vessels/RBCs in partial mole)
p57 ^{KIP2} immunostaining / karyotype	Distinguishes complete mole (p57-negative, paternal-only) from partial mole or a hydropic abortus (p57-positive), and from a coexistent mole with a normal twin

Differential diagnosis

Condition	Distinguishing point
Threatened/missed/incomplete abortion	Uterus not disproportionately enlarged; hCG normal for dates; no snowstorm pattern
Multiple pregnancy	Pre-eclampsia and high hCG can mimic mole, but USG shows two normal fetal poles
Fibroid or ovarian tumour with pregnancy	Disproportionate uterine enlargement, but a normal intrauterine gestation is seen on USG
Twin pregnancy with coexistent mole + normal fetus	Rare (1 in 22,000–100,000); differentiated from a partial mole by high-resolution USG and karyotype/p57 study

Complications

- ▶ **Immediate:** haemorrhage and shock (from vesicle separation, concealed bleeding, or a spontaneously perforating mole); sepsis (no protective membranes); uterine perforation

(spontaneous or during evacuation); pre-eclampsia/eclampsia; acute pulmonary insufficiency from trophoblastic embolisation (onset 4–6 hours after evacuation); coagulation failure/DIC; thyroid storm if evacuation is done under anaesthesia in an unrecognised hyperthyroid state.

- ▶ **Late:** persistent GTN (15–20% after complete mole, <5% after partial mole); choriocarcinoma (2–10% following a complete mole); recurrence in a future pregnancy (1–4%).

Management

- ▶ **Stabilise:** correct anaemia/infection, set up IV access, cross-match and keep blood reserved, treat pre-eclampsia/hyperthyroidism if present; baseline investigations as above.
- ▶ **Suction evacuation (SE)** is the treatment of choice regardless of uterine size (safe even up to 28 weeks' size):
 - If the cervix is unfavourable (long, firm, closed), prime with a laminaria tent, or **vaginal misoprostol 400 µg 3 hours pre-operatively**.
 - IV oxytocin infusion is run alongside the procedure to improve uterine tone and limit blood loss; a **medical (oxytocin/prostaglandin) pre-induction to ripen the cervix before formal evacuation is avoided**, as it raises the risk of trophoblastic pulmonary embolisation.
 - Progressively dilate the cervix (bleeding may transiently increase — do not stop); evacuate with a wide-bore (~12 mm) suction cannula; if the uterus is >14 weeks' size, support the fundus and massage to aid contraction and reduce perforation risk.
 - Follow with **gentle sharp curettage** to remove residual tissue; give **methylergometrine 0.2 mg IM** after evacuation.
- ▶ Give **anti-D immunoglobulin** to Rh-negative, non-sensitised women (trophoblast expresses the RhD antigen).
- ▶ Send evacuated tissue for **histopathology** (± p57 immunostaining) to confirm complete/partial mole and exclude choriocarcinoma.
- ▶ **Hysterectomy** is an option for women who have completed their family or are aged >35–40 years, or for uncontrolled haemorrhage/perforation; ovaries (even with theca lutein cysts) are conserved; it reduces but does not abolish the risk of GTN, and does **not** remove the need for hCG follow-up.
- ▶ Routine post-evacuation re-curettage is **not** recommended; reserved for persistent bleeding, performed at 5–7 days.
- ▶ **Prophylactic chemotherapy** is not routine — used selectively for high-risk features (hCG plateau/rise, post-evacuation haemorrhage, unreliable follow-up access, evident metastasis): **methotrexate 1 mg/kg IV/IM on days 1, 3, 5, 7 with folinic acid rescue 0.1 mg/kg IM on days 2, 4, 6, 8, repeated weekly for 3 courses; or IV actinomycin D 12 µg/kg/day for 5 days** as a less toxic alternative.

- ▶ Mandatory **hCG surveillance** follows every evacuation (weekly until normal for 3 weeks, then monthly for 6 months) with effective contraception throughout (barrier/combined pills; IUD deferred until hCG is normal) — the full protocol and criteria for postmolar GTN are detailed under "Follow up of hydatiform mole" / "Persistent trophoblastic disease."

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 13.1 — Complete hydatidiform mole. Gross specimen with characteristic vesicles of variable size (Williams Obstetrics 26e, p.251)

High-yield exam pointers

- ▶ Complete mole = **46XX (85%), all-paternal (androgenesis)**; no fetal parts; **p57-negative**; ~15–20% risk of persistent GTN.
- ▶ Partial mole = **triploid (69XXX/69XXY)**, **dispermy** of a normal ovum; fetus/sac present; **p57-positive**; <5% risk of persistent GTN.
- ▶ Triad pointing to a mole: **pre-eclampsia before 20 weeks + uterus large-for-dates + absent fetal heart sounds**; passage of vesicles is pathognomonic.
- ▶ **Suction evacuation** is the treatment of choice at any uterine size; avoid medical pre-induction (embolisation risk).
- ▶ Prophylactic MTX-FA regimen (high-risk cases only): **MTX 1 mg/kg days 1,3,5,7 + folinic acid 0.1 mg/kg days 2,4,6,8**.
- ▶ Never conceive during hCG surveillance; theca lutein cysts regress spontaneously within ~2 months.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

RCOG Green-top Guideline No. 38 additionally requires every confirmed molar pregnancy in the UK to be registered with a designated GTD surveillance centre; DC Dutta's Obstetrics 9e (the Indian-exam source used here) does not carry this registration requirement, but the underlying hCG-surveillance principle is identical.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; Berek & Novak's Gynecology 16e; Williams Obstetrics 26e.

♦ ♦ ♦

Pap smear

Asked in: Paper IV 13-May-2022 · Paper III Oct 2010 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — The Papanicolaou (Pap) smear is an **exfoliative cytology** technique that samples cells shed from the cervical squamocolumnar junction (SCJ) and transformation zone, stained and examined microscopically to detect **cervical intraepithelial neoplasia (CIN)** and malignancy before symptoms appear. It remains the original and most widely used cervical cancer screening test worldwide, reducing the incidence of invasive cervical cancer by about **80%** and mortality by about **70%** (DC Dutta).

Indications

- ▶ **Screening** (primary indication) — detection of preinvasive CIN/HPV-related change in asymptomatic sexually exposed women.
- ▶ **Diagnostic work-up** of an abnormal-looking cervix, postmenopausal bleeding, or chronic cervicitis.
- ▶ **Cytohormonal assessment** — a lateral upper-vaginal-wall smear graded for estrogenic/progestational effect (used in threatened abortion, amenorrhoea work-up).
- ▶ **Follow-up after treatment** of CIN or invasive cervical cancer (post-surgery or post-radiotherapy).
- ▶ **Pre-operative clearance** — must be normal before conservative uterine-conserving surgery (Fothergill/Manchester repair, cervical amputation, subtotal hysterectomy).
- ▶ **Sex-chromatin (Barr body) study** — buccal smear, Papanicolaou-stained (not a cervical sample, but uses the same stain).

Technique

- ▶ **Timing:** avoid menstruation; patient advised no douching, vaginal medication, or intercourse for 24–48 hours beforehand.
- ▶ **Cusco's bivalve speculum inserted without lubricant**, before bimanual examination — lubricant distorts cell morphology.
- ▶ **Ectocervical sample:** Ayre's spatula (wood or plastic) rotated through 360° over the entire SCJ/transformation zone.
- ▶ **Endocervical sample:** cytobrush (rocket endocervical brush) rotated within the canal — mandatory, since the SCJ recedes upward after menopause and many lesions arise here.
- ▶ **Vaginal-pool aspiration** (posterior fornix, glass pipette or swab) is an alternative but less reliable method.
- ▶ Material is spread **thinly on a slide and fixed immediately** in 95% ethyl alcohol for ~30 minutes before it dries — delay causes drying artefact and misinterpretation.
- ▶ Slide stained by **Papanicolaou's or Short's method** and read by a trained cytotechnologist/cytopathologist.

- **Liquid-based cytology (LBC)** is now preferred where available: the spatula/brush head is rinsed into a liquid medium, cells are separated by centrifugation and a thin-layer slide is made — this reduces obscuring by blood/mucus and unsatisfactory smears, and permits **reflex HPV testing** on the residual sample.

Screening interval

Age group	Recommended test/interval
< 21 years	No screening
21–29 years	Cytology (Pap/LBC) alone every 3 years
30–65 years	Cytology alone every 3 years, or primary hrHPV/co-testing every 5 years
> 65 years	Discontinue if 3 consecutive negative cytology (or 2 negative co-tests) in the last 10 years, none in last 5 years, and no CIN2+ in the last 25 years
Post-hysterectomy (benign indication, no CIN2+ history)	Discontinue
High-risk — HIV-positive/immunosuppressed, prior CIN2+, DES-exposed	Continue/intensify — annual, indefinitely

Reporting systems

System	Categories
Papanicolaou's grading (older, five groups)	I – Normal; II – Borderline atypia, probably infective; III – Suspicious of malignancy; IV – Few malignant cells; V – Plenty of malignant cells
The Bethesda System (1988, revised 2001, updated 2014)	Specimen adequacy (satisfactory/unsatisfactory) → Squamous cell abnormalities: ASC-US, ASC-H, LSIL, HSIL, squamous cell carcinoma (SCC) → Glandular abnormalities: atypical glandular cells (AGC), adenocarcinoma in situ (AIS), adenocarcinoma

The two-tier "normal/abnormal" report and the Bethesda categories have largely superseded the Papanicolaou grading in current practice, though DC Dutta still cross-tabulates both.

Interpretation and further management

Result	Risk of CIN2/3	Next step
ASC-US	~5–10%	Reflex hrHPV testing (preferred) or repeat cytology at 6–12 months; positive → colposcopy

Result	Risk of CIN2/3	Next step
LSIL (HPV effect/CIN 1)	up to 20%	Colposcopy ± endocervical curettage
ASC-H / HSIL	~70% (HSIL)	Direct colposcopy (± immediate LEEP as "see-and-treat"); HPV triage is not used
AGC/AIS	high risk of glandular neoplasia	Colposcopy + endocervical curettage + hrHPV testing; endometrial sampling if age > 35 or risk factors

Diagnostic accuracy: a single smear has ~60% sensitivity; false-negative rate up to 25% (technical error — too scanty, thick, bloody, or poorly stained smear, or misinterpretation), but falls to < 1% **after three consecutive negative smears**. Abnormal cytology mandates colposcopy and directed biopsy (or Schiller's/Lugol's iodine-guided biopsy where colposcopy is unavailable); biopsy, not cytology, is confirmatory.

Advantages and limitations

- **Advantages:** simple, inexpensive, outpatient, repeatable; proven mortality reduction; also detects infective/hormonal changes.
- **Limitations:** operator- and reader-dependent; sampling and screening error; single-test sensitivity only ~60%; unreliable for endometrial carcinoma (positive in only ~30% of cases); cannot substitute for histological confirmation of an abnormal result.

Recent advances [RA]

- **Primary hrHPV testing** (stand-alone, without cytology) is now an ACOG/ASCCP-preferred option from age 30, since a negative hrHPV test has higher negative predictive value for CIN2+ than cytology alone.
- **HPV self-sampling** (vaginal self-swab for hrHPV DNA/mRNA) is endorsed by the WHO (2021) global cervical cancer elimination strategy to widen access, and the US FDA approved self-collection for HPV testing in a clinical setting in 2024.
- **Dual-stain cytology** (p16/Ki-67, e.g. CINtec PLUS) improves specificity for triage of hrHPV-positive women, reducing unnecessary colposcopy referrals compared with reflex cytology alone.
- **ASCCP 2019 risk-based management consensus guidelines** replaced the earlier result-specific algorithms — management is now based on a patient's estimated immediate and 5-year CIN3+ risk (combining current result with screening history).
- **Automated/AI-assisted cytology screening** (imaging systems that pre-select fields of abnormal cells) improves reader sensitivity and throughput for high-volume laboratories.

- ▶ **WHO's 90-70-90 global strategy (2020)** targets 90% HPV vaccination, 70% of women screened with a high-performance test (HPV-based) by ages 35 and 45, and 90% of screen-positive women treated, aiming to eliminate cervical cancer as a public health problem this century.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 9.14A–C — Collection of smear: A. Using Ayre's spatula from the squamocolumnar junction for screening; B. By cytobrush taking endocervical sampling for screening; C. By wooden spatula from the lateral vaginal fornix for cytohistological study (DC Dutta's Gynaecology 7e, p.109)

High-yield exam pointers

- ▶ Reduces incidence by **80%**, mortality by **70%** — quote this figure.
- ▶ Speculum **without lubricant**; sample fixed **immediately** in 95% ethyl alcohol.
- ▶ Single-smear sensitivity **~60%**; false-negative rate **< 1%** after three consecutive negative smears.
- ▶ Bethesda ladder: **ASC-US/ASC-H → LSIL → HSIL → AGC/AIS/SCC**; ASC-H and HSIL bypass HPV triage.
- ▶ Schedule mnemonic — "**3-3-5**": cytology every 3 years from 21–29, then every 3 (cytology) or 5 (HPV/co-test) years from 30–65; stop at 65 if adequately screened.
- ▶ Pap smear is **not** a reliable test for endometrial carcinoma (positive in only ~30%).
- ▶ **WHO 90-70-90** elimination strategy — a favourite recent-advances one-liner.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta and Berek & Novak (current editions in this corpus) reproduce the Bethesda 2001 system and the ACOG-2009 interval schedule; the screening intervals and risk-based triage above reflect the current ACOG/ASCCP/WHO consensus and should be quoted in the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 9 — Examination of a Gynecological Patient and Diagnostic Procedures; Ch. 23 — CIN); Berek & Novak's Gynecology 16e (Ch. 16); ACOG Practice Bulletin on Cervical Cancer Screening and Prevention; ASCCP 2019 Risk-Based Management Consensus Guidelines; WHO Global Strategy to Accelerate the Elimination of Cervical Cancer (2020) and Guideline for Screening and Treatment of Cervical Pre-Cancer Lesions (2021).

♦ ♦ ♦

Precancerous lesions of cervix

Asked in: Paper III 19-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Precancerous (pre-malignant) lesions of the cervix, collectively termed **cervical intraepithelial neoplasia (CIN)**, are a spectrum of dysplastic squamous-cell changes confined to the cervical epithelium, without breach of the basement membrane. They arise in the **transformation zone (TZ)** — the dynamic area between the original and the new squamocolumnar junction (SCJ) — through persistent infection with high-risk human papillomavirus (hrHPV), and if untreated may progress through increasing grades to invasive carcinoma over 10–20 years.

Classification and natural history

Dysplasia	CIN (WHO)	Depth of epithelial involvement	Bethesda category
Mild	CIN 1	Basal one-third	LSIL
Moderate	CIN 2	Basal half to two-thirds	HSIL
Severe	CIN 3	Full thickness except 1–2 surface layers	HSIL
Carcinoma-in-situ (CIS)	CIN 3/CIS	Full thickness	HSIL

The 2001 Bethesda system also separates equivocal cytology as atypical squamous cells (ASC-US/ASC-H) and atypical glandular cells (AGC); current histopathology reporting (CAP–ASCCP consensus) groups CIN 2 and CIN 3 together as **high-grade squamous intraepithelial lesion (HSIL)**, since a subset of CIN 2 in young women can be safely observed rather than treated. A glandular counterpart, **cervical glandular intraepithelial neoplasia (CGIN)/adenocarcinoma-in-situ (AIS)**, is less reliably picked up by cytology or colposcopy and is best diagnosed by cone biopsy.

Outcome over follow-up	CIN 1	CIN 2	CIN 3/CIS
Regression to normal	~60%	~40%	~30%
Persistence	~30%	~35%	~50%
Progression to CIN 3/CIS	~10%	~20%	—
Progression to invasion	<1%	~5%	~20%

Mean age at CIN diagnosis is ~30 years, roughly 15 years before the peak age of invasive cancer — the long preinvasive window that makes screening effective.

Etiology and risk factors

Category	Risk factors
Infective	Persistent high-risk HPV (types 16, 18, 31, 33, 45 most implicated — 16/18 account for most high-grade CIN and cancer); HIV; HSV-2; Chlamydia
Sexual/reproductive	Early coitarche (≤ 16 years), multiple sexual partners, partner with multiple partners, early first pregnancy, high parity
Host/behavioural	Smoking, immunosuppression, long-term combined oral contraceptive use, dietary deficiency (folate, vitamins A/C/E)
Socio-demographic	Low socioeconomic status, inadequate or absent cervical screening

Pathogenesis (one line): HPV infects immature metaplastic cells at the TZ; viral oncoproteins E6 and E7 degrade the tumour-suppressor proteins p53 and pRb respectively, causing host-cell immortalization, koilocytic change, and progressive dysplasia.

Screening and diagnosis

Test	Method / interval	Purpose
Cervical cytology (Pap smear/liquid-based cytology)	Ayre's spatula + endocervical brush from SCJ/TZ; alone every 3 years (age 21–29)	Primary screening; gold standard
High-risk HPV DNA co-testing	Cytology + hrHPV every 5 years, or cytology alone every 3 years (age 30–65, ACOG/ASCCP)	Increases sensitivity for CIN 2+
Visual inspection with acetic acid (VIA)	5% acetic acid; acetowhite change	Low-resource-setting screening
Colposcopy	Magnification 6–16 $\times$ after acetic acid; identifies acetowhite epithelium, punctation, mosaicism, atypical vessels	Localizes site for biopsy after abnormal cytology/hrHPV
Directed punch biopsy $\pm$ endocervical curettage (ECC)	Under colposcopic guidance	Histological confirmation
Diagnostic conization	Cold-knife or laser cone	When colposcopy is unsatisfactory, SCJ not seen, or cytology–colposcopy–biopsy findings are discordant, or high-grade CGIN suspected

Indications for colposcopy: (1) repeated abnormal cytology; (2) clinically abnormal-looking cervix despite normal cytology; (3) unexplained postcoital bleeding; (4) persistently positive hrHPV test.

Management

CIN grade	Preferred management
CIN 1	Observation — repeat cytology at 6 months and/or hrHPV test at 12 months; most regress spontaneously
CIN 2	Excision (LLETZ/LEEP) is standard; selected low-risk CIN 2 in young women desiring fertility may be observed with close colposcopic/cytological follow-up
CIN 3/CIS	Excision — LLETZ/LEEP or cold-knife/laser conization; hysterectomy if family is complete

Ablation is used only if the entire lesion and TZ are visualized, there is no microinvasion, no endocervical glandular involvement, and no cytology–colposcopy–biopsy discrepancy:

- ▶ **Cryotherapy** — freezes tissue to about -90°C (nitrous oxide/carbon dioxide probe), double freeze–thaw–freeze technique; destroys tissue to 5 mm depth; no anaesthesia; no specimen for histology.
- ▶ **Cold coagulation** — $100\text{--}120^{\circ}\text{C}$, depth ~4 mm, no anaesthesia required.
- ▶ **Electrodiathermy** — depth 8–10 mm; requires general anaesthesia.
- ▶ **CO₂ laser vaporization** — depth up to 7 mm under colposcopic guidance; preferred when CIN extends onto the vaginal fornices.

Excisional methods:

- ▶ **LLETZ/LEEP** (large loop excision of the transformation zone/loop electrosurgical excision procedure) — thin stainless-steel wire loop (2–3 cm), blended cutting-coagulation current, local anaesthesia, removes tissue to ≥ 10 mm depth, yields a specimen for histology, minimal complications.
- ▶ **Cold-knife or laser cone biopsy** — as effective as hysterectomy provided margins are clear; complications include haemorrhage, infection, cervical stenosis, and cervical incompetence.

Hysterectomy is preferred for: recurrent high-grade CIN in perimenopausal/elderly women; CIN extending into the vagina; persistent abnormal cytology despite conservative treatment; CIN coexisting with prolapse/fibroid/pelvic inflammatory disease; CIN 3 with family completed; poor compliance with follow-up; and cancer phobia.

Follow-up after treatment: cytology at 6 and 12 months ($\pm$ hrHPV testing between 6 and 12 months), reverting to routine screening once tests are negative. Recurrence rate is 3–5%; progression to invasive cancer after treatment is 0.1–0.4%.

Prevention

Vaccine	HPV types covered
Bivalent (Cervarix)	16, 18
Quadrivalent (Gardasil)	6, 11, 16, 18
Nonavalent (Gardasil-9)	6, 11, 16, 18, 31, 33, 45, 52, 58

WHO schedule: girls aged <15 years — 2 doses (0, 6 months); age ≥15 years or immunocompromised — 3 doses (0, 1–2, 6 months); given intramuscularly over the deltoid. Vaccines are prophylactic and type-specific only — they do not treat established infection or protect against all oncogenic types, so cytology/hrHPV screening must continue after vaccination.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.2 — The cervix and the transformation zone. (Berek & Novak 16e, p.916)

Label the original squamocolumnar junction, the new (physiologically active) squamocolumnar junction, and the transformation zone between them where CIN arises; add a small inset colposcopic view marking acetowhite epithelium, punctation, and mosaic pattern.

High-yield exam pointers

- ▶ CIN 1/2/3 = LSIL/HSIL/HSIL on Bethesda, corresponding to basal one-third / half-to-two-thirds / full-thickness dysplasia.
- ▶ Regression : persistence : progression-to-invasion ≈ 60:30:<1 (CIN1), 40:35:5 (CIN2), 30:50:20 (CIN3) — quote these approximate figures.
- ▶ HPV oncoproteins: **E6 degrades p53, E7 degrades pRb** — the pair to name for pathogenesis marks.
- ▶ ACOG/ASCCP screening: cytology alone every 3 years (age 21–29); co-testing (cytology + hrHPV) every 5 years (age 30–65).
- ▶ Ablative depths to quote for comparison: cryotherapy 5 mm, cold coagulation 4 mm, electrodiathermy 8–10 mm, CO₂ laser 7 mm; LEEP removes ≥10 mm with histology.
- ▶ Nonavalent vaccine covers 9 HPV types; WHO schedule is 2 doses if <15 years, 3 doses if ≥15 years or immunocompromised.
- ▶ Cone biopsy is indicated when colposcopy is unsatisfactory, SCJ is not seen, or cytology–colposcopy–biopsy findings disagree.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Current ACOG/ASCCP guidance also allows primary hrHPV testing alone every 5 years as an option from age 25–30 onward; the cytology-every-3-years/co-testing-every-5-years schedule above is the version most textbooks, including DC Dutta's Gynaecology, still print and is the safest to reproduce in the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Chapter 23, Premalignant Lesions); Berek & Novak's Gynecology 16e (Chapter 16, Intraepithelial Neoplasia of the Lower Genital Tract); current ACOG/ASCCP cervical cancer screening guidance; WHO HPV vaccination schedule.



Quadruple marker screening

Asked in: Paper II 18-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — The quadruple marker test ("quad screen") is a second-trimester maternal serum biochemical screening test that combines four analytes — alpha-fetoprotein (AFP), human chorionic gonadotropin (hCG), unconjugated estriol (uE3), and dimeric inhibin A — to generate a pregnancy-specific risk for fetal trisomy 21 (Down syndrome), trisomy 18 (Edwards syndrome), and open neural-tube defects (NTDs). It is a screening test only: an abnormal result gives an adjusted risk, not a diagnosis, and must be followed by counselling and, if the patient wishes, definitive diagnostic testing.

Analytes, biological source & timing

Analyte	Biological source
Alpha-fetoprotein (AFP)	Fetal yolk sac and liver — a fetal serum protein analogous to albumin
Human chorionic gonadotropin (hCG)	Syncytiotrophoblast
Unconjugated estriol (uE3)	Feto-placental unit (fetal adrenal/liver precursor aromatised by the placenta)
Dimeric inhibin A	Corpus luteum and placenta

- **Timing:** performed from 15 through 20–22 weeks' gestation depending on the laboratory (optimal window 16–18 weeks). Accurate gestational-age dating (last menstrual period confirmed by first-trimester ultrasound) is essential — MSAFP rises by roughly 15% per week through this window, so an under- or over-estimated gestational age is a major cause of a false result.

- ▶ Each analyte is measured and converted to a **multiple of the median (MoM)** for the gestational week, then corrected for maternal weight, age, race/ethnicity, diabetic status, and number of fetuses (twin values are roughly double singleton values) before the composite likelihood ratio and patient-specific risk are calculated.
- ▶ Advantage over first-trimester (nuchal translucency, NT) screening: only a single maternal venous blood sample is needed — no certified sonographer or dedicated NT training is required.

Interpretation pattern

Condition	AFP	hCG	uE3	Inhibin A
Trisomy 21 (Down syndrome)	Low	High	Low	High
Trisomy 18 (Edwards syndrome)	Low	Low	Low	Not used in the trisomy-18 calculation
Open neural-tube defect / ventral-wall defect (spina bifida, anencephaly, gastroschisis, omphalocele)	High (cut-off ≥ 2.5 MoM)	—	—	—

- ▶ **Screen-positive cut-off** for trisomy 21 is conventionally set at the second-trimester risk equivalent to that of a 35-year-old woman (approximately 1 in 270); some laboratories use 1 in 200 as the threshold.
- ▶ The **2.5 MoM AFP cut-off** is used for open NTD screening and detects roughly 95% of anencephaly and 80% of open spina bifida, at a 1–3% screen-positive rate; the overall positive predictive value is low (about 2%), so a raised AFP prompts a targeted anomaly scan rather than an automatic invasive test.

Screening performance & comparison with other strategies

Screening strategy	Trisomy 21 detection	False-positive rate	Positive predictive value
Quadruple screen (AFP + hCG + uE3 + inhibin A)	80–82% (up to 85% by some series)	5% (as low as 0.9% in some series)	~3%
Triple test (AFP + hCG + uE3)	~70–73%	5%	Lower than quad screen
First-trimester combined (NT + hCG + PAPP-A)	80–84%	5%	3–4%

Screening strategy	Trisomy 21 detection	False-positive rate	Positive predictive value
Integrated screening (1st + 2nd trimester combined)	94–96%	5%	~5%
Cell-free DNA (non-invasive prenatal testing)	>99%	<0.1–0.5%	Highest of all listed strategies

- ▶ Trisomy-18 detection with the quad screen is similar to trisomy 21, but at a much lower false-positive rate (about 0.5%), because inhibin A does not enter the trisomy-18 calculation.
- ▶ Quadruple screening adds **no additional benefit over first-trimester combined screening** for trisomy 21/18 detection; its main current role is for women who begin antenatal care only in the second trimester, or in settings where first-trimester screening or cell-free DNA testing is unavailable.

Advantages & limitations

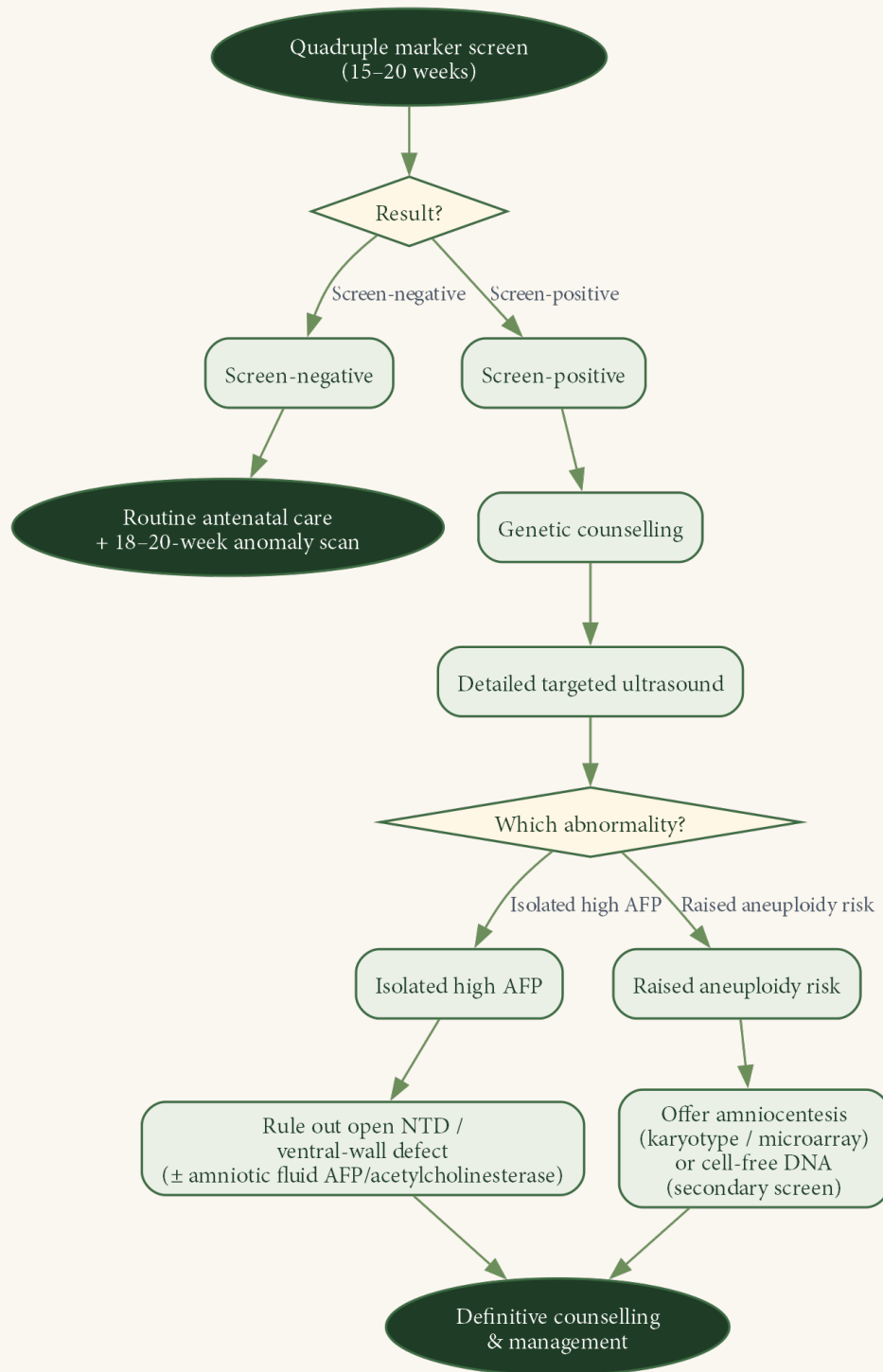
Advantages	Limitations
Simple venous blood sample; no ultrasound expertise required	Lower trisomy 21 detection than integrated screening or cell-free DNA
Only serum test that simultaneously screens for open NTD	Does not screen for trisomy 13
Useful for women booking late (after 14 weeks)	A positive result is never diagnostic — carries a high false-positive burden and causes patient anxiety
Inexpensive, widely available, single sample	Accuracy depends on correct dating; distorted by multifetal gestation, maternal weight, diabetes, or ethnicity if not corrected

Management of a screen-positive result

- ▶ **Genetic counselling** before and after testing — explain that a "positive" screen is a raised statistical risk, not a diagnosis.
- ▶ **Confirm gestational age and perform a detailed (targeted) ultrasound** — recheck dating, exclude multifetal gestation, and look for structural anomalies or soft markers of aneuploidy.
- ▶ If **AFP alone is elevated**, target the scan for an open neural-tube defect, ventral-wall defect (gastroschisis/omphalocele), or other causes of raised AFP (wrong dates, multiple gestation, fetal death, renal anomalies, oligohydramnios); amniotic fluid AFP and acetylcholinesterase can confirm whether a defect is open.

- ▶ Offer **definitive diagnostic testing** — amniocentesis (from 15 weeks) for fetal karyotype/chromosomal microarray, with counselling on the procedure-related pregnancy loss rate (about 0.5%).
- ▶ **Cell-free DNA** may be offered as a secondary screen if the patient wishes to defer invasive testing, with counselling that a negative cell-free DNA result still carries a residual aneuploidy risk of up to about 2%, and that a positive or "no-call" result should still be followed by amniocentesis.
- ▶ If AFP is isolated and elevated with an otherwise normal anatomy scan, counsel on the associated risk of adverse pregnancy outcome (fetal growth restriction, pre-eclampsia, stillbirth) and plan surveillance accordingly.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Second-trimester quad-screen algorithm: screen-negative → routine care; screen-positive → counselling + targeted ultrasound, branching into isolated-AFP (NTD work-up) and raised-aneuploidy-risk (invasive/cfDNA) pathways.

High-yield exam pointers

- ▶ Four analytes = AFP + hCG + uE3 + Inhibin A ("triple test + inhibin A").
- ▶ Down syndrome pattern — "2 down, 2 up": AFP↓, uE3↓, hCG↑, inhibin A↑.
- ▶ Trisomy 18 — all three of AFP, hCG, and uE3 are low; inhibin A is not part of the trisomy-18 calculation.
- ▶ Window: 15–20 (up to 22) weeks; AFP cut-off for NTD screening = 2.5 MoM.
- ▶ Detection ~80–85% for trisomy 21 at ~5% false-positive rate; screen-positive cut-off ≈ 1 in 270 (age-35-equivalent risk).
- ▶ A positive quad screen is NEVER diagnostic — always followed by counselling + detailed ultrasound + a diagnostic test (amniocentesis or, secondarily, cell-free DNA).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Detection-rate and false-positive figures differ slightly between sources (Williams Obstetrics 26e reports 80–82% trisomy 21 detection at a 5% false-positive rate; DC Dutta's Obstetrics 9e reports up to 85% detection at a 0.9% false-positive rate), and the screen-positive risk cut-off is quoted as either 1 in 270 or 1 in 200 depending on the laboratory or textbook — either figure is acceptable in the exam if used consistently.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e.



Radiotherapy in gynaecology

Asked in: Paper III May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Radiotherapy (RT) is the use of ionizing radiation (photons, electrons, or particulate radiation) to kill dividing malignant cells by damaging their DNA, either directly or via free radicals generated from water (indirect action). In gynaecology it is a curative primary modality (carcinoma cervix), an adjuvant after surgery (high-risk endometrial and vulvar cancer), and a palliative tool for bleeding and pain in advanced disease.

Types and sources of radiotherapy

Type	Description	Common sources/isotopes
Teletherapy (external beam radiotherapy, EBRT)	Radiation from a source outside the body directed at the tumour, nodes and parametrium; treats large volumes uniformly	Cobalt-60, linear accelerator (megavoltage photons)

Type	Description	Common sources/isotopes
Brachytherapy	High-dose radiation from a sealed source placed within or close to the tumour; rapid dose fall-off (inverse square law) spares surrounding normal tissue	Caesium-137, Cobalt-60, Iridium-192 (temporary interstitial/intracavitary), Iodine-125 (permanent interstitial), Phosphorus-32 (intracavitary/intraperitoneal instillation)
Intraperitoneal instillation	Radiocolloid instilled into peritoneal/pleural cavity; penetration only 4–8 mm	Radioactive gold-198, chromic phosphate-32
Intraoperative radiotherapy	Single large fraction (1500–2500 cGy) delivered directly to a selected field (e.g., biopsy-proven para-aortic nodes) at laparotomy	Electron beam

Brachytherapy sub-types: (i) *Intracavitary* — hollow intrauterine tandem plus vaginal ovoids/colpostats (Manchester, Paris, Stockholm techniques); (ii) *Interstitial* — needles/wires/seeds placed directly into tissue (small-volume vaginal/vulvar tumours); (iii) *Surface* application. **After-loading technique** — applicators are positioned and checked on imaging before the radioactive source is loaded (manually or by remote-control afterloader, e.g., Fletcher-Suit system), protecting staff from radiation exposure. Brachytherapy is delivered as **low-dose-rate (LDR)**, about 50–100 cGy/hour (needs inpatient admission), or **high-dose-rate (HDR)**, about 100 cGy/minute (outpatient).

Dose, units and technique

Concept	Detail
Unit of absorbed dose	1 gray (Gy) = 1 Joule/kg = 100 rad; 1 centigray (cGy) = 1 rad (current usage)
Fractionation	Total EBRT dose split into daily fractions (5 days/week) of 180–220 cGy, allowing normal tissue to repair sublethal injury while tumour cells accumulate lethal damage
Point A / Point B (Manchester system)	Point A = 2 cm superior to the external cervical os and 2 cm lateral to the uterine canal (represents the paracervical tissue/ureter crossing); Point B = 3 cm lateral to Point A (represents the pelvic side-wall/obturator nodes)

Concept	Detail
Typical cervical cancer dose	Combined EBRT + brachytherapy delivers approximately 7000–8000 cGy to Point A and approximately 6000 cGy to Point B; bladder/rectal dose is limited to under 7000–7500 cGy, small bowel tolerance is only about 4500 cGy
Radiosensitivity	Higher in well-oxygenated, actively mitotic (M/G2-phase) cells; hypoxic tumour cells need about 2–3 times the dose (oxygen enhancement ratio) — radiopotentiators (cisplatin, paclitaxel, misonidazole) improve response
Newer techniques	3D-conformal RT, intensity-modulated RT (IMRT), image-guided adaptive brachytherapy (IGABT), stereotactic RT/gamma knife — all use CT/MRI/PET-based planning to concentrate dose on tumour and spare bladder/rectum/bowel

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 24.9 A–C — *Different methods of brachytherapy: A. Stockholm technique; B. Paris technique; C. Manchester technique (DC Dutta's Gynaecology 7e, p.308)*

Label the intrauterine tandem, the paired vaginal ovoids/colpostats, and mark Point A and Point B relative to the external cervical os and uterine canal.

Indications in gynaecological malignancy

Malignancy	Role of radiotherapy
Carcinoma cervix	Primary curative modality for locally advanced disease (FIGO 2018 stage IIB–IVA): concurrent chemoradiation (CCRT) — pelvic EBRT with weekly radiosensitising cisplatin, followed by intracavitary brachytherapy boost. Early stage (IA2–IIA, bulky IB3/IIA2) — either radical hysterectomy or primary CCRT give comparable survival; adjuvant CCRT is added after surgery for positive nodes, parametrium, or margins (Sedlis/Peters criteria)
Endometrial carcinoma	Adjuvant after hysterectomy in high-risk disease: vaginal vault brachytherapy alone for stage IA grade 2 (superficial myoinvasion); whole-pelvis EBRT plus vaginal cuff boost for deep myoinvasion (stage IB) or high-grade/high-risk histology

Malignancy	Role of radiotherapy
Carcinoma vulva	Adjuvant EBRT to groin and pelvis (4500–5000 cGy) for positive/multiple inguinofemoral nodes, in place of pelvic lymphadenectomy; primary chemoradiation in locally advanced/unresectable disease
Carcinoma vagina	Primary treatment for most stages — combined EBRT (whole pelvis) plus intracavitary/interstitial brachytherapy boost
Epithelial ovarian cancer	Very limited current role (superseded by platinum-based chemotherapy); occasional use for painful pelvic/bone recurrence or nodal disease not responding to chemotherapy
Gestational trophoblastic neoplasia	Whole-brain RT (3000 cGy) for brain metastases, whole-liver RT (2000 cGy) for liver metastases, as an adjunct to chemotherapy
Palliation	Low-dose short-course RT (about 2000 cGy over 5 fractions) for bone pain; palliative pelvic RT for bleeding/discharge in advanced or recurrent disease

Contraindications to radiotherapy: pelvic mass, pelvic kidney, pyometra, pelvic abscess, prior laparotomy with dense adhesions to bowel, and previous pelvic irradiation.

Complications (radiation reactions) and their management

Timing	Reaction	Management
Early (acute)	Anorexia, nausea, vomiting, lassitude, fever	Antiemetics, antihistamines
	Radiation enteritis (diarrhoea)	Intravenous fluids to correct electrolyte imbalance
	Leukopenia, thrombocytopenia, anaemia	Haematinics, blood transfusion, granulocyte colony-stimulating factor (G-CSF)
	Colitis, proctitis	Antispasmodics, analgesics, antidiarrhoeals
	Cystitis, pyelitis, haematuria	Urinary antiseptics, analgesics
	Vulval skin peeling (moist desquamation)	Keep area dry; 1% aqueous gentian violet
Late (radiation vasculitis/fibrosis)	Vaginal stenosis, vulval atrophy	Minimised by megavoltage therapy; vaginal dilators
	Radiation fibrosis	May mimic recurrent tumour

Timing	Reaction	Management
	Pathological fracture (osteoporosis)	Standard fracture care — union is not impaired
	Bowel stricture, bleeding, perforation, obstruction	Surgical correction as indicated
	Malabsorption with megaloblastic anaemia	Folic acid
	Proctosigmoiditis	Steroid enemas, antidiarrhoeals
	Vesicovaginal/rectovaginal fistula (1–2 years later)	Difficult to repair locally; colpocleisis may be an alternative
	Ovarian failure	Premature menopause — hormone replacement

Uterine perforation may occur during introduction of the intrauterine tandem — a recognised procedural complication of brachytherapy.

High-yield exam pointers

- ▶ Two techniques: **teletherapy** (EBRT, Cobalt-60/linear accelerator, treats large volumes) and **brachytherapy** (sealed source in/near tumour, inverse square law, LDR ~50–100 cGy/hour vs HDR ~100 cGy/minute).
- ▶ **Point A** (2 cm above external os, 2 cm lateral to canal) and **Point B** (3 cm lateral to Point A) — the Manchester dosimetry landmarks; write these definitions verbatim.
- ▶ **1 Gy = 100 rad = 100 cGy**; EBRT fractionation is 180–220 cGy/day, 5 days/week.
- ▶ Cervical cancer CCRT = pelvic EBRT + weekly radiosensitising **cisplatin** + intracavitary brachytherapy boost — the standard of care for FIGO stage IIB–IVA and an option for early bulky disease.
- ▶ Remember the fistula rule: vesicovaginal/rectovaginal fistula typically appears **1–2 years after** radiotherapy, not immediately.
- ▶ Radiotherapy contraindications: pelvic mass, pyometra, pelvic abscess, dense bowel adhesions, prior pelvic irradiation.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Modern practice (image-guided adaptive brachytherapy, IMRT) uses CT/MRI-based volumetric dose reporting rather than the classical 2-D Point A/B system, but Point A/B remain the exam-standard reference points taught in Indian textbooks.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Chapter 31 — Basic Principles of Radiotherapy; Chapter 24 — Carcinoma Cervix); Berek & Novak's Gynecology 16e (cervical and endometrial cancer radiotherapy chapters).



Role of photodynamic therapy in gynaecology and mechanism of action of photosensitiser and its implication in malignancy

Asked in: Paper III Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Photodynamic therapy (PDT) is a non-surgical, tissue-conserving treatment in which a light-sensitive drug (photosensitiser) is selectively taken up by dysplastic/malignant tissue and then activated by light of a specific wavelength in the presence of molecular oxygen, generating cytotoxic reactive oxygen species that destroy the target cells while sparing surrounding normal tissue. It requires three simultaneous components — photosensitiser, light of matching wavelength, and tissue oxygen — and is used mainly for premalignant and superficial gynaecological lesions.

Mechanism of action of the photosensitiser

- ▶ **Uptake and localisation** — the photosensitiser (or its prodrug) is applied topically or given systemically; it accumulates preferentially in rapidly dividing/dysplastic cells because of leaky tumour neovasculature (enhanced permeability), low interstitial pH, poor lymphatic drainage, and increased low-density lipoprotein (LDL)-receptor-mediated uptake by proliferating cells.
- ▶ **Photoactivation** — light of the photosensitiser's absorption wavelength (usually 630–652 nm, red light, chosen for deeper tissue penetration) excites the drug from its ground state to an excited singlet state, which converts by intersystem crossing to a longer-lived excited triplet state.
- ▶ **Photochemical reaction (in the presence of oxygen):**
 - **Type I reaction** — the triplet photosensitiser transfers an electron/hydrogen directly to a substrate, generating free radicals and reactive oxygen species (superoxide, hydroxyl radical).
 - **Type II reaction** (dominant mechanism) — the triplet photosensitiser transfers energy directly to ground-state molecular oxygen, producing **singlet oxygen** ($^1\text{O}_2$), the principal cytotoxic species.
- ▶ **Cellular damage** — singlet oxygen and free radicals oxidise lipids, proteins and nucleic acids of cell membranes, mitochondria and the endoplasmic reticulum, triggering **apoptosis** (low-dose PDT) or **necrosis** (high-dose PDT).

- **Vascular effect** — endothelial injury in the tumour microvasculature causes vessel constriction, platelet aggregation and thrombosis, producing secondary tumour hypoxia and infarction-type cell death.
- **Immune-mediated effect** — acute local inflammation with release of damage-associated molecular patterns and heat-shock proteins recruits neutrophils, macrophages and dendritic cells, generating a secondary anti-tumour immune response ("PDT vaccination effect").

Photosensitising agents

Agent	Generation	Route	Activation wavelength	Remarks
Porfimer sodium (Photofrin)	First-generation hematoporphyrin derivative	Intravenous	~630 nm	Prolonged cutaneous photosensitivity (4–6 weeks)
5-Aminolevulinic acid (5-ALA) / methyl aminolevulinate	Second-generation (endogenous prodrug)	Topical	~635 nm	Converted intracellularly via the heme-synthesis pathway to photoactive protoporphyrin IX ; short photosensitivity (24–48 h)
Verteporfin, Temoporfin (m-THPC)	Third-generation	Topical/IV	652–690 nm	Improved tumour selectivity, deeper penetration

Role of PDT in gynaecology

Site / condition	Use of PDT
Vulva	Vulvar intraepithelial neoplasia (VIN, usual and differentiated type) — organ-conserving alternative to wide local excision, especially for multifocal disease
Vulva	Extramammary Paget's disease — after invasive adenocarcinoma is excluded
Vulva	Refractory condyloma acuminata (HPV wart) not responding to cryotherapy/imiquimod
Cervix	Cervical intraepithelial neoplasia (CIN) — 5-ALA PDT as a fertility-preserving option, mainly for low-to-moderate grade/recurrent disease

Site / condition	Use of PDT
Vagina	Vaginal intraepithelial neoplasia (VAIN) — especially post-hysterectomy multifocal disease difficult to excise
Selected early/superficial malignancy	Adjunct in patients unfit for surgery, or for palliation of superficial recurrent tumour nodules

Advantages that make PDT attractive in gynaecology: preserves anatomy and fertility, treats multifocal/field disease in one sitting, day-care/outpatient procedure, repeatable without cumulative toxicity, minimal scarring (important for vulva/vagina/cervix), and can be combined with other topical or surgical modalities.

Procedure

- ▶ Confirm diagnosis and exclude invasive malignancy by biopsy before treatment.
- ▶ Apply photosensitiser — topical 5-ALA cream under occlusive dressing for 3–6 hours (drug–light interval) allowing selective conversion to protoporphyrin IX in dysplastic cells, or intravenous porfimer sodium 24–72 hours beforehand for systemic protocols.
- ▶ Illuminate the lesion with a laser/LED light source of the matching wavelength at a calculated light dose (fluence, J/cm²).
- ▶ Local tissue response over the next few days — erythema, oedema, superficial necrosis of treated epithelium.
- ▶ Re-epithelialisation over 4–6 weeks with minimal scarring.
- ▶ Follow-up colposcopy/vulvoscopy with biopsy at 3–6 months to confirm histological clearance; repeat treatment if residual/recurrent disease.

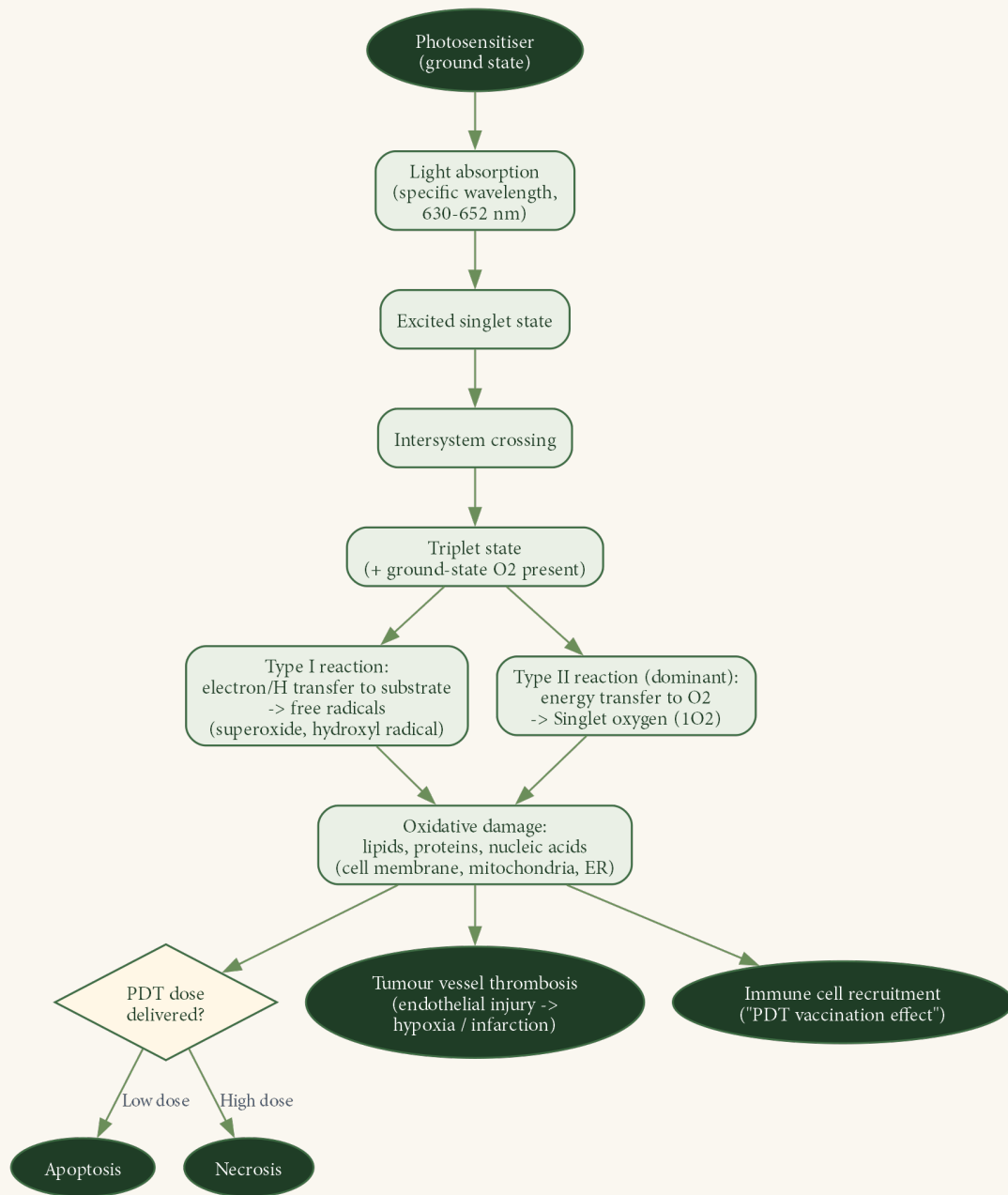
Implication in malignancy

- ▶ **Selective tumour kill** — the same triad (photosensitiser accumulation + local light + oxygen) that underlies the mechanism above is exploited to destroy dysplastic/malignant cells directly (apoptosis/necrosis), via tumour vasculature damage, and via a secondary anti-tumour immune response — giving PDT a three-pronged (direct cytotoxic, vascular, immunological) anti-cancer action.
- ▶ **Selectivity** exploited clinically — because photosensitisers concentrate preferentially in neoplastic tissue and cytotoxicity occurs only where light is delivered, PDT can spare adjacent normal epithelium — valuable for field-treating multifocal intraepithelial neoplasia without sacrificing normal vulva/vagina/cervix.
- ▶ **Limitation — depth of effect** — red light penetrates only a few millimetres, so PDT reliably treats only superficial/premalignant disease (VIN, VAIN, CIN, early superficial cancer); it is **not**

a substitute for surgery, radiotherapy or chemotherapy in bulky, deeply invasive or metastatic gynaecological malignancy.

- ▶ **Toxicity implication** — systemic hematoporphyrin-derivative photosensitisers cause generalised cutaneous photosensitivity for several weeks, mandating strict sunlight avoidance to prevent severe skin burns; topical 5-ALA carries a much shorter photosensitivity window.
- ▶ **Response is variable and recurrence can occur**, so long-term colposcopic/vulvosopic surveillance after PDT is mandatory, similar to surveillance after excisional treatment of intraepithelial neoplasia.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Schematic of photosensitiser photochemistry (Type I vs Type II reactions) converging on cellular, vascular and immune-mediated anti-tumour effects.

High-yield exam pointers

- ▶ PDT triad to write first: **photosensitiser + light (specific wavelength) + oxygen**.
- ▶ Type I → free radicals; Type II → **singlet oxygen ($^1O_2$)**, the main cytotoxic species — this line is commonly asked.

- ▶ **5-ALA** is a prodrug converted intracellularly (heme pathway) to **protoporphyrin IX**, the actual photosensitiser — topical, used for VIN/CIN/VAIN.
- ▶ **Porfimer sodium (Photofrin)** = first-generation hematoporphyrin derivative, IV, ~630 nm, causes prolonged skin photosensitivity.
- ▶ Three anti-tumour mechanisms: direct cytotoxic, vascular (thrombosis), immune-mediated.
- ▶ Key gynaecological uses: VIN, VAIN, CIN, **vulvar Paget's disease, refractory condyloma**.
- ▶ Key limitation: shallow (few mm) tissue penetration — superficial/premalignant disease only, not invasive cancer.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Standard gynaecology texts describe photodynamic therapy briefly as one treatment option for vulvar intraepithelial neoplasia, vulvar Paget's disease and refractory condyloma (with 5-aminolevulinic acid as the photosensitiser); the fuller mechanistic detail on photosensitiser photochemistry, agent generations and cervical/vaginal applications given above is drawn from established photodynamic-therapy oncology literature since textbook coverage of this niche topic is limited.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (photodynamic therapy for vulvar intraepithelial neoplasia, extramammary Paget's disease and condyloma acuminata, 5-aminolevulinic acid as photosensitiser). Coverage note: Berek & Novak 16e and Jeffcoate's Principles of Gynaecology 9e do not carry a dedicated photodynamic-therapy section; mechanism-of-photosensitiser and broader gynaecological-application detail supplements the corpus from standard photodynamic-therapy oncology knowledge, as flagged above.



Role of tumour markers in gynecological cancers

Asked in: Paper I 16-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — A **tumour marker** is a biochemical substance — a protein, hormone, enzyme, or oncofetal antigen — produced by tumour cells themselves or by the host in response to the tumour, which can be measured in serum (or other body fluid) to reflect the presence, behaviour, or treatment response of a cancer. In gynaecological oncology, tumour markers are used chiefly for diagnostic support, monitoring

therapy, and detecting recurrence — not as stand-alone screening tools, as none fulfils all criteria of an ideal marker (DC Dutta's Gynaecology 7e; Berek & Novak 16e).

Ideal properties of a tumour marker

- ▶ Produced only by tumour cells — **specific** for the tissue of origin.
- ▶ **Sensitive** enough to detect microscopic/subclinical disease.
- ▶ Serum/urine level correlates accurately with tumour volume, so it can track response to treatment.
- ▶ Assay is **inexpensive, reproducible, and widely available**.
- ▶ Ideally indicates not only the presence but also the **site of tumour origin**.

(No marker in current use satisfies all five — detectable levels usually require a tumour burden of $\geq 10^{10}$ cells.)

Major tumour markers in gynaecological cancers

Marker	Tumour type / tissue of origin	Key clinical point
CA-125	Epithelial ovarian cancer (non-mucinous, especially serous); also endometrial adenocarcinoma	> 35 U/mL suggestive; elevated in ~50% of stage I but 80–90% of advanced serous cancers; half-life $\approx$ 20 days; falls after surgery/chemotherapy
HE4 (human epididymis protein 4)	Ovarian epithelial cancer (especially serous); also raised in endometrial cancer	Less often raised by benign conditions (e.g., endometriosis) than CA-125; combined with CA-125 in the Risk of Ovarian Malignancy Algorithm (ROMA)
CEA and CA 19-9	Mucinous ovarian tumours; CEA also in cervical adenocarcinoma	Useful when CA-125 is normal (mucinous histology is often CA-125-negative)
AFP (alpha-fetoprotein)	Germ cell tumours — yolk sac (endodermal sinus) tumour, immature teratoma, embryonal carcinoma	Diagnostic and follow-up marker, especially in children/young women with an adnexal mass
β -hCG	Gestational trophoblastic neoplasia (mole, choriocarcinoma, PSTT); germ cell tumours — choriocarcinoma, embryonal carcinoma, occasionally dysgerminoma	Diagnoses and defines postmolar GTN; feeds into the FIGO/WHO prognostic scoring system; drives follow-up schedule

Marker	Tumour type / tissue of origin	Key clinical point
LDH (lactate dehydrogenase)	Dysgerminoma	Elevated in ~95% of dysgerminomas; serial levels used for monitoring
Inhibin (A/B) and anti-Müllerian hormone (AMH)	Granulosa cell tumour (sex cord-stromal tumour)	Secreted by ~70% of adult granulosa cell tumours; recurrence on inhibin may precede imaging findings by ~12 months
SCC antigen (squamous cell carcinoma antigen)	Squamous cell carcinoma of cervix, vulva, vagina	Correlates with tumour size, stromal invasion, and nodal status; used to monitor response and detect recurrence, not for diagnosis
HER-2/neu, CA 15-3, OVX1, galactosyltransferase (GAT), CYFRA 21-1, cell-free DNA	Ovarian epithelial carcinoma (adjunct/investigational)	Supplementary; not used alone in routine practice

Roles of tumour markers in management

- ▶ **Diagnostic adjunct for a pelvic/adnexal mass** — combined with age, menopausal status, and ultrasound findings; never diagnostic in isolation.
- ▶ **Composite risk-stratification algorithms:**
 - **Risk of Malignancy Index (RMI)** = $U \times M \times CA-125$, where U = ultrasound score (0 = no features, 1 = one feature, 3 = ≥ 2 features, from multilocular cyst/solid areas/bilaterality/ascites/metastases), M = 3 (postmenopausal) or 1 (premenopausal), and CA-125 in U/mL. RMI < 25 = **low risk**, 25–250 = **moderate**, > 250 = **high risk** ($\approx 75\%$ risk of malignancy) — a high RMI mandates referral to a gynaecological-oncology centre (DC Dutta's Gynaecology 7e; RCOG guidance).
 - **ROMA** combines CA-125, HE4, and menopausal status for similar triage, with better performance for early-stage and non-serous tumours.
- ▶ **Monitoring response to chemotherapy** — a falling CA-125/hCG indicates good response; a level that stays elevated after 3 cycles almost always signifies persistent/resistant disease.
- ▶ **Detecting recurrence on follow-up** — the accepted GCIG (Gynecologic Oncology Intergroup) criterion for CA-125 progression is a rise to $\geq 2 \times$ the upper limit of normal on two occasions at least 1 week apart; a rising marker frequently precedes clinical/radiological recurrence.
- ▶ **Guiding GTN management** — postmolar GTN is diagnosed when β -hCG plateaus over ≥ 4 values across 3 weeks, rises > 10% over 2 weeks, or persists beyond 6 months; pretreatment hCG value is one criterion in the FIGO/WHO prognostic scoring system; remission requires 3

consecutive normal weekly values, after which follow-up continues (fortnightly, then monthly, then 6-monthly) for at least a year.

- ▶ **Prognostic indicator** — baseline level and rate of fall broadly correlate with tumour burden and treatment response.
- ▶ **Population screening** — **NOT recommended**. Large trials (UKCTOCS, PLCO) using CA-125 ± transvaginal ultrasonography in average-risk women showed no reduction in ovarian-cancer mortality and increased harm from false positives and unnecessary surgery; ACOG and USPSTF advise **against** screening asymptomatic average-risk women with CA-125/ultrasound. Annual CA-125 and ultrasound surveillance is still offered to genetically high-risk women (BRCA1/2, Lynch syndrome) pending better tools, though evidence of mortality benefit even here is limited.

Limitations of tumour markers

- ▶ **Not tumour-specific** — CA-125 is also raised in endometriosis, leiomyoma, pelvic inflammatory disease, peritonitis, and other cancers (breast, lung, colon, endometrium), and even in ~1% of healthy women.
- ▶ **Poor sensitivity in early-stage disease** — CA-125 is elevated in only about half of stage I ovarian cancers, limiting its use for early detection.
- ▶ **Threshold-dependent** — cut-offs (e.g., 35 U/mL) trade sensitivity against specificity and vary with menopausal status.
- ▶ No single ideal marker exists for gynaecological cancers, which is why composite indices (RMI, ROMA) are preferred over any one marker alone.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 39-17 — Relationship between types of pure malignant germ cell tumours and their secreted marker substances (Berek & Novak 16e, p.2622)

High-yield exam pointers

- ▶ CA-125 > 35 U/mL suggestive threshold; half-life ≈ 20 days; falls after resection/chemotherapy.
- ▶ RMI = U × M × CA-125; > 250 → ~75% malignancy risk → refer to oncology centre.
- ▶ ROMA = CA-125 + HE4 + menopausal status (better for non-serous/early-stage tumours).
- ▶ GCIG CA-125 progression = $\geq 2 \times \text{ULN}$ on two occasions ≥ 1 week apart.
- ▶ Germ cell markers: AFP → yolk sac tumour; β -hCG → choriocarcinoma/embryonal carcinoma; LDH → dysgerminoma (~95%).
- ▶ Inhibin/AMH → granulosa cell tumour; SCC antigen → squamous carcinoma cervix/vulva/vagina.
- ▶ GTN remission = **3 consecutive normal weekly hCG values**; USPSTF/ACOG advise against CA-125-based population screening.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e lists HE4 in more than one table (once grouped with ovarian epithelial markers, once separately against endometrial cancer); this answer follows the current literature (Berek & Novak 16e), where HE4 is primarily an ovarian-epithelial-cancer marker used with CA-125 in ROMA, with secondary elevation described in endometrial cancer.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e.



Screening endometrial carcinoma

Asked in: Paper IV 20-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Screening means testing asymptomatic women to detect endometrial carcinoma or its precursor lesion (endometrial hyperplasia) before symptoms develop. Unlike cervical cancer, no validated, cost-effective test has been shown to reduce mortality in the general population, so endometrial cancer screening is risk-based — offered only to defined high-risk groups — while early detection in the general population instead relies on prompt investigation of any abnormal bleeding.

Why population-based screening is not recommended

Reason	Explanation
Low prevalence in the general population	Poor positive predictive value; any test applied to all women would generate excess unnecessary invasive procedures
Most patients self-present early	About 90% have abnormal (peri/postmenopausal) bleeding as the presenting symptom, and most seek care within 3 months, giving early-stage disease and a high cure rate on prompt work-up
Cervical cytology (Pap smear) is inadequate	Too insensitive and nonspecific for endometrial pathology, even in high-risk women
Transvaginal sonography (TVS)/endometrial biopsy applied to everyone	Too expensive and invasive to justify as a universal screening tool; no mortality-reduction evidence

Accordingly, both the American College of Obstetricians and Gynecologists (ACOG) and the Society of Gynecologic Oncology (SGO) hold that there is insufficient evidence to recommend endometrial cancer screening in the general population, or even in women whose only risk factor is unopposed-

estrogen exposure, late menopause, nulliparity, anovulation/infertility, obesity, diabetes, or hypertension.

Risk factors that define the 'high-risk' population

Risk factor	Relative risk
Nulliparity	2–3
Late menopause (after 52 years)	2.4
Obesity — 21–50 lb overweight / >50 lb overweight	3 / 10
Diabetes mellitus	2.8
Unopposed estrogen therapy	4–8
Tamoxifen therapy	2–3
Atypical endometrial hyperplasia	8–29
Lynch syndrome (Lynch II/HNPCC)	~20 (lifetime risk of endometrial cancer 40–60%)

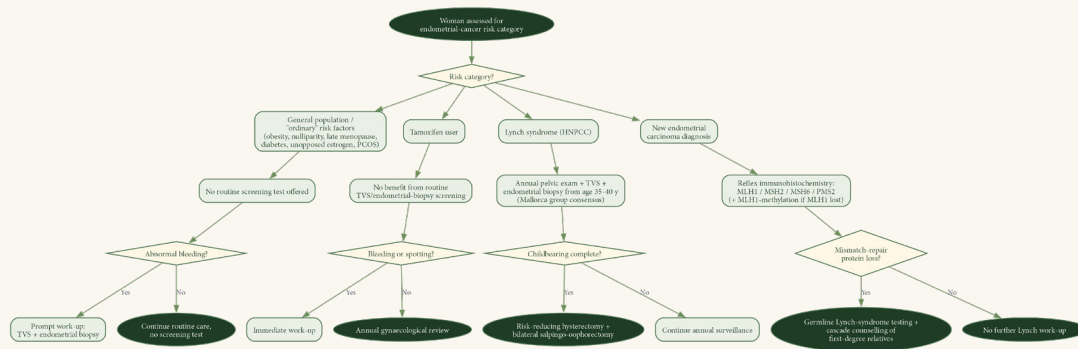
Risk-based screening/surveillance strategy

- **General population and women with the "ordinary" risk factors above** (obesity, nulliparity, late menopause, diabetes, unopposed estrogen, anovulation/PCOS) — no routine screening test is offered; management is prompt evaluation of any abnormal bleeding. "A case of postmenopausal bleeding is considered to be due to endometrial carcinoma unless proved otherwise."
- **Tamoxifen users** — receive no benefit from routine screening with TVS or endometrial biopsy; instead, an annual gynaecological review plus immediate work-up of any bleeding or spotting is advised.
- **Lynch syndrome (hereditary nonpolyposis colorectal cancer)** — the only group with an active surveillance protocol: annual pelvic examination, transvaginal ultrasonography, and endometrial biopsy, beginning at 35–40 years of age (Mallorca group consensus). Risk-reducing (prophylactic) total hysterectomy with bilateral salpingo-oophorectomy after completion of childbearing is the most effective preventive strategy — no woman who underwent this surgery later developed endometrial, ovarian, or peritoneal cancer, versus 33% endometrial and 5% ovarian cancer in unoperated Lynch-syndrome women on follow-up.
- **Every newly diagnosed endometrial carcinoma** — universal ("reflex") tumour testing by immunohistochemistry for the mismatch-repair proteins MLH1, MSH2, MSH6, and PMS2 (with MLH1-promoter methylation analysis if MLH1 staining is lost) is performed to unmask previously unsuspected Lynch syndrome, so that the patient's relatives can be offered genetic counselling and their own surveillance.

Tests used for case-finding in at-risk or symptomatic women

Test	Technique/cut-off	Role and limitation
Cervical cytology (Pap smear)	Standard smear	Insensitive and nonspecific for endometrial disease — not used to screen for endometrial cancer even in high-risk women
Transvaginal sonography (TVS) — endometrial thickness	Thickness $\leq 4\text{--}5$ mm correlates with a low risk of malignancy/atrophic endometrium; thicker ($\geq 9\text{--}10$ mm), irregular, or fluid-containing endometrium needs further evaluation	First-line triage test; some authors argue diagnostic accuracy is over-estimated at 5 mm and prefer a stricter 3 mm cut-off
Endometrial aspiration/Pipelle biopsy	Office-based suction sampling, no anaesthesia	Accepted first-step diagnostic/case-finding test in a symptomatic or high-risk woman
Hysteroscopy with directed/fractional curettage	Direct visualisation + biopsy	Reserved for an inadequate/inconclusive aspiration biopsy, or symptoms persisting despite a negative biopsy; also localises polyps
Saline-infusion sonohysterography	Saline instilled during TVS	Distinguishes a focal lesion (polyp/submucous fibroid) from diffuse endometrial thickening when TVS is equivocal

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Risk-stratified endometrial-cancer screening/surveillance pathway: general population, tamoxifen users, Lynch syndrome, and newly diagnosed endometrial carcinoma each follow a distinct branch.

Recent advances [RA]

- ▶ **Universal reflex tumour testing for Lynch syndrome** on every new endometrial cancer (immunohistochemistry for MLH1/MSH2/MSH6/PMS2, with MLH1-methylation analysis when MLH1 expression is lost) has replaced clinical-criteria-based screening as the recommended model: Bruegl et al. (Cancer Prev Res, 2014) showed the SGO clinical-criteria approach missed most Lynch-syndrome cases (sensitivity only 32.6%), and Goverde et al. (Gynecol Oncol, 2016) confirmed universal testing in patients under 70 years is cost-effective through prevention of colorectal cancer in the index patient and relatives.
- ▶ **The Cancer Genome Atlas (TCGA) integrated genomic classification of endometrial carcinoma** (Nature, 2013) defined four molecular subgroups (POLE-ultramutated, microsatellite-instability-hypermutated, copy-number-low/endometrioid, copy-number-high/serous-like); this now underlies molecular risk-stratification models increasingly used alongside histology to individualise adjuvant treatment and the intensity of surveillance in survivors.
- ▶ **Prophylactic risk-reducing surgery** (hysterectomy with bilateral salpingo-oophorectomy after childbearing) remains the only intervention proven to prevent Lynch-syndrome-associated endometrial and ovarian cancer (Schmeler et al., N Engl J Med 2006).
- ▶ **Non-invasive detection platforms** — cervicovaginal self-sampling analysed for tumour-derived DNA mutations or methylation signatures — are under active research evaluation as possible future population screening tools, but are investigational only; ACOG/SGO positions still hold that no validated general-population endometrial cancer screening test exists.

High-yield exam pointers

- ▶ One-liner definition to open with: "no validated general-population screening test for endometrial cancer exists — screening is risk-based, not universal."
- ▶ Mnemonic: postmenopausal bleeding (PMB) = carcinoma endometrium until proved otherwise.
- ▶ Only group with an active surveillance protocol: **Lynch syndrome** — annual pelvic exam + TVS + endometrial biopsy from **35–40 years** (Mallorca group).
- ▶ TVS endometrial-thickness cut-off to quote: **≤4–5 mm** = low risk/atrophic in a postmenopausal woman.
- ▶ **Tamoxifen users get no benefit from routine screening** — only prompt evaluation of any bleeding.
- ▶ Universal immunohistochemistry for **MLH1/MSH2/MSH6/PMS2** on every new endometrial cancer = current reflex-Lynch-screening standard.
- ▶ Risk-reducing **hysterectomy + bilateral salpingo-oophorectomy** after childbearing = most effective Lynch-syndrome prevention strategy.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Reported endometrial-thickness cut-offs vary slightly by source (4 mm, 5 mm, or a stricter 3 mm proposed by some authors for higher diagnostic accuracy); quote the commonly cited ≤4–5 mm figure for a postmenopausal-bleeding work-up unless the question specifically asks about the cut-off controversy.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Society of Gynecologic Oncology (SGO) clinical practice statement on Lynch-syndrome tumour testing; Mallorca group consensus on Lynch-syndrome surveillance; The Cancer Genome Atlas (TCGA) Research Network, Nature 2013; current ACOG position on endometrial cancer screening.



Screening for carcinoma cervix

Asked in: Paper IV 20-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Screening for carcinoma cervix is the systematic testing of asymptomatic women to detect cervical intraepithelial neoplasia (CIN) or early invasive disease before symptoms appear, exploiting the long (10–15 year) preinvasive phase driven by persistent high-risk human papillomavirus (hrHPV)

infection. Organised cytology-based screening programmes have reduced cervical cancer incidence and mortality by 70–80% in populations with good coverage.

Screening methods

Method	Technique	Principle / use
Conventional Pap smear (cervical cytology)	<i>Ayre's spatula</i> scrape from the squamocolumnar junction (ectocervix) + cytobrush sample from the endocervical canal; smeared on a slide, fixed in 95% ethyl alcohol, Papanicolaou-stained	Detects exfoliated dyskaryotic cells; reported by the Bethesda System
Liquid-based cytology (LBC)	Sample rinsed into a liquid medium, centrifuged, thin-layer slide prepared	Reduces obscuring blood/mucus and unsatisfactory smears; allows reflex hrHPV testing on the same sample
High-risk HPV (hrHPV) DNA testing	Hybrid capture-2 (HC-2) or PCR on a cervical sample; detects oncogenic types (16, 18, 31, 33, 35, 45, 52, 58, etc.)	Used as co-testing with cytology, as a stand-alone primary screen (age ≥ 30), or to triage ASC-US cytology
Visual inspection with acetic acid (VIA)	Naked-eye inspection of the cervix after applying 3–5% acetic acid; acetowhite areas are positive	Low-cost, immediate-result test suited to low-resource settings; allows same-visit "screen-and-treat"
Visual inspection with Lugol's iodine (VILI) / Schiller's test	Cervix painted with Lugol's 5% (or Schiller's 0.3%) iodine; normal glycogen-rich epithelium stains brown, abnormal areas remain unstained (mustard-yellow)	Alternative/adjunct to VIA, guides punch biopsy when colposcopy is unavailable
Colposcopy ± cervicography	Low-power (6–16×) magnified examination after saline, then 3–5% acetic acid and Lugol's iodine	Not a primary screening test — used to triage/localise the biopsy site after a positive screen

Bethesda System — cytology reporting

Category	Sub-types
Specimen adequacy	Satisfactory / unsatisfactory

Category	Sub-types
Squamous cell abnormalities	Atypical squamous cells (ASC) → ASC-US (undetermined significance) or ASC-H (cannot exclude high grade); Low-grade squamous intraepithelial lesion (LSIL, = HPV change/CIN 1); High-grade squamous intraepithelial lesion (HSIL, = CIN 2/3); Squamous cell carcinoma
Glandular cell abnormalities	Atypical glandular cells (AGC); Adenocarcinoma-in-situ (AIS); Adenocarcinoma

Screening schedule

Age group	Recommended screening (current ACOG/ASCCP-endorsed)
< 21 years	No screening, regardless of age at first intercourse
21–29 years	Cytology (Pap/LBC) alone every 3 years
30–65 years	Co-testing (cytology + hrHPV) every 5 years, OR cytology alone every 3 years, OR primary hrHPV testing alone every 5 years
> 65 years	Stop screening if adequate prior negative screening — 3 consecutive negative cytology results, or 2 consecutive negative co-tests, in the preceding 10 years (most recent within 5 years)
Post-hysterectomy for benign disease (no cervix)	No screening needed
High-risk (HIV-positive/immunosuppressed, prior CIN 2/3, multiple partners, DES exposure)	Continue annual screening; do not exit the programme at 65

- **India (population-based, low-resource programme):** the national cervical-cancer-screening framework under Ayushman Bharat Health & Wellness Centres recommends **VIA-based screening once every 5 years for women 30–65 years**, with a single-visit "screen-and-treat" approach (cryotherapy for eligible VIA-positive lesions) where trained providers and colposcopy referral are limited.

Management of an abnormal screening test

- ASC-US → reflex hrHPV DNA test → positive → colposcopy (± endocervical curettage, ECC); negative → repeat cytology at 12 months.
- LSIL → colposcopy ± ECC → manage per CIN grade on biopsy.
- ASC-H / HSIL → colposcopy, or in populations with poor follow-up, "see-and-treat" loop electrosurgical excision procedure (LEEP).

- ▶ **AGC** → colposcopy + ECC + hrHPV testing; endometrial sampling if age > 35 years or with risk factors for endometrial neoplasia.
- ▶ **hrHPV-positive, cytology-negative co-test** → extended genotyping for HPV 16/18 → positive → colposcopy; negative → repeat co-test in 1 year.
- ▶ **VIA/VILI-positive** → colposcopy and directed biopsy, or immediate cryotherapy in the single-visit approach if the lesion is small, fully visible, and cryotherapy-eligible.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 23.8A — Colposcopic view of acetowhite epithelium after acetic acid application (Schiller's negative area) (DC Dutta's Gynaecology 7e, p.288)

Recent advances [RA]

- ▶ **WHO Global Strategy to Eliminate Cervical Cancer as a Public Health Problem (2020)** sets the **90-70-90 targets for 2030**: 90% of girls fully HPV-vaccinated by age 15; 70% of women screened with a high-performance test by age 35 and again by 45; 90% of women with cervical disease (pre-cancer or invasive) receiving treatment.
- ▶ **WHO Guideline for Screening and Treatment of Cervical Pre-cancer Lesions, 2nd edition (2021)** recommends **primary hrHPV DNA testing** over cytology or VIA wherever feasible: general population screened from age 30, repeated every 5–10 years; women living with HIV screened from age 25, repeated every 3–5 years given their higher CIN/cancer risk.
- ▶ **HPV self-sampling** (self-collected vaginal swab tested for hrHPV DNA) is validated as non-inferior to clinician-collected sampling for detecting CIN 2+ and is endorsed by WHO (2021) as an additional strategy to reach under-screened women.
- ▶ **ASCCP 2019 Risk-Based Management Consensus Guidelines** replaced the older result-specific algorithms with individualised estimation of a woman's **immediate and 5-year CIN 3+ risk** (combining the current test result with screening/treatment history) to decide between colposcopy, treatment, or 1/3/5-yearly surveillance; extended HPV genotyping for types 16/18 is used to risk-stratify hrHPV-positive, cytology-negative women.
- ▶ Dual biomarker (**p16/Ki-67**) cytology triage reduces unnecessary colposcopy referral in hrHPV-positive women.
- ▶ India introduced its indigenous quadrivalent HPV vaccine (**CERVAVAC**) into select immunisation programmes to complement screening, and AI-assisted automated reading of cytology/VIA images is being piloted to extend screening reach in low-resource settings.

High-yield exam pointers

- ▶ Remember the **90-70-90** by 2030 WHO elimination targets.

- ▶ Screening interval numbers: 21–29 years — cytology every 3 years; 30–65 years — co-test every 5 years (or cytology alone every 3 years); stop at 65 only with adequate prior negative screening (3 negative cytology or 2 negative co-tests in 10 years).
- ▶ VIA = 3–5% acetic acid (acetowhite = positive); VILI/Schiller's = Lugol's/Schiller's iodine (unstained = positive); India's single-visit "screen-and-treat" pairs VIA with same-visit cryotherapy.
- ▶ Bethesda squamous ladder: ASC-US/ASC-H → LSIL → HSIL; glandular: AGC → AIS → adenocarcinoma.
- ▶ hrHPV detection: hybrid capture-2 or PCR; types **16 and 18** carry the highest risk and mandate colposcopy even with negative cytology.
- ▶ A single Pap smear has ~60% sensitivity; false-negative rate falls to < 1% after 3 consecutive negative smears — hence the repeat-interval logic.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Gynaecology 7e still prints the older ACOG-2009 age-based schedule (cytology every 2 years for 21–29 years, every 3 years thereafter); the schedule given above is the current ASCCP/ACOG co-testing/primary-HPV-testing standard and should be used in the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e. Guidelines: ACOG/ASCCP cervical cancer screening and risk-based management guidance; WHO Guideline for Screening and Treatment of Cervical Pre-cancer Lesions, 2nd edition (2021); WHO Global Strategy to Eliminate Cervical Cancer as a Public Health Problem (2020).



Screening for congenital malformation

Asked in: Paper I 15-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Screening for congenital malformation is the systematic antenatal assessment — by history, biochemical analytes and ultrasound, alone or combined — of **every** pregnant woman to identify the subgroup at increased risk of a fetal chromosomal, structural or neural-tube defect, so that this "screen-positive" group can be offered a definitive diagnostic test. About 3% of live-born infants

have a major birth defect, and congenital malformation/chromosomal abnormality accounts for roughly 15% of antepartum stillbirths.

Who is screened — risk factors (indications)

Maternal risk factors	Pregnancy/prenatal risk factors
Age >35 years at delivery	Oligohydramnios or polyhydramnios
Family history or previous baby with a neural tube defect	Severe symmetrical fetal growth restriction
Previous child with a chromosomal anomaly	Abnormal ultrasound finding (structural anomaly)
Parent a carrier of a sex-linked/autosomal trait, or of a balanced translocation	Uncontrolled diabetes mellitus in the periconceptional period
History of recurrent miscarriage	Teratogen exposure — rubella, cytomegalovirus, teratogenic drugs
—	Soft-tissue marker of aneuploidy on ultrasound, or an abnormal maternal serum screen

**Noninvasive screening for aneuploidy (trisomy 21, 18, 13) and for open neural tube defects (NTDs) is now offered as a routine to all pregnant women, irrespective of age* (DC Dutta; American College of Obstetricians and Gynecologists, ACOG). Screen-positive women are then offered fetal karyotyping/diagnostic testing for confirmation.*

First-trimester combined screening (11–14 weeks)

Component	Change in trisomy 21
Nuchal translucency (NT) — ultrasound-measured fluid space at the fetal nape	Increased (abnormal if ≥ 3 mm)
Nasal bone on ultrasound	Absent
Free β -hCG	Increased
PAPP-A (pregnancy-associated plasma protein-A)	Decreased
Crown–rump length smaller than gestational age	Marker of aneuploidy/triploidy

The **combined test** (NT + free β -hCG + PAPP-A) gives a calculated risk ratio; a value at or below the laboratory cut-off (commonly **1 in 300**) is screen-positive. It detects trisomy 21 in **85–92%** of cases with a 5% false-positive rate, and NT + nasal bone together raise detection to **92%**. First-trimester screening is at least as good as, and arguably superior to, second-trimester screening because a screen-positive woman can proceed to early diagnostic testing (chorionic villus sampling) and, if needed, a safer first-trimester termination.

Second-trimester biochemical screening (15–20 weeks)

Test	Analytes measured	Screen-positive cut-off	Detection rate	False-positive rate	Detects
Maternal serum AFP (MSAFP) alone	AFP raised	2.5 multiples of the median (MoM), adjusted for maternal weight/ethnicity	85% of open NTDs (90% anencephaly, 80% open spina bifida)	3–5%	Open neural tube defects
Triple test	MSAFP ↓, unconjugated estriol (uE3) ↓, hCG ↑	1 in 200	73%	5%	Down syndrome
Quadruple ("quad") test	MSAFP ↓, uE3 ↓, hCG ↑, inhibin A ↑	risk-ratio based	85–92%	0.9%	Down syndrome

Very low MSAFP is itself a marker of adverse outcome (miscarriage, stillbirth, neonatal death), not just of trisomy. The best-performing strategy is a combined first- plus second-trimester protocol (ACOG), which raises Down-syndrome detection to about 95%.

Ultrasound screening for structural anomalies

- ▶ A dedicated **anomaly (level II/targeted) scan at 18–20 weeks** systematically surveys the fetal central nervous, cardiovascular, gastrointestinal, renal and skeletal systems for structural defects (e.g., neural tube defects, cardiac anomalies, exomphalos/gastroschisis, renal agenesis, limb-reduction defects).
- ▶ **Fetal echocardiography** and a repeat targeted scan are added when the first-trimester NT is ≥ 3 mm, given the strong association with structural (especially cardiac) anomalies as well as aneuploidy.
- ▶ 3-D/4-D ultrasound and, where available, fetal **magnetic resonance imaging (MRI)**, add resolution for equivocal structural findings.
- ▶ **Single gene/inherited disorders** in a couple with a known carrier status (e.g., thalassaemia, cystic fibrosis) are screened for by carrier testing $\pm$ preimplantation genetic diagnosis before conception where assisted reproduction is used.

Cell-free fetal DNA screening and the screen-positive pathway

Parameter	Cell-free (fetal) DNA / NIPT
Source	Fragments from apoptotic placental trophoblast in maternal plasma ("fetal fraction")

Parameter	Cell-free (fetal) DNA / NIPT
Earliest reliable timing	≥10 weeks gestation
Method	Massively parallel (whole-genome) sequencing, chromosome-selective sequencing, or SNP analysis
Detects	Trisomy 21 (sensitivity ≈99.7%), 18 and 13 (≈98–99%); fetal sex; fetal RhD status
Detection/false-positive rate	Overall detection >98%, false-positive rate <0.5%
Key limitation	A screening , not a diagnostic, test — false positives from confined placental mosaicism, vanishing twin, maternal mosaicism or occult maternal malignancy; no result in 2–4% (low fetal fraction, e.g., maternal obesity)

Screen-positive pathway:

- ▶ Refer for genetic counselling — explain the calculated risk, its meaning, and the options.
- ▶ Offer a **diagnostic (invasive) test** for karyotype/chromosomal microarray confirmation — chorionic villus sampling, amniocentesis, or cordocentesis (technique detailed under those topics) — because no screening test, including cell-free DNA, is itself diagnostic.
- ▶ If a structural anomaly or confirmed aneuploidy is present, refer to a **fetal medicine unit**; options are continued pregnancy with planned delivery at a tertiary centre, selected in-utero fetal therapy, or termination of pregnancy within the gestational limits permitted by law, after informed counselling.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 17.2 — Sagittal image of a normal, 12-week fetus shows correct caliper placement (+) for nuchal translucency measurement (Williams Obstetrics 26e, p.352)

High-yield exam pointers

- ▶ Write the four screening tiers in order: **first-trimester combined (11–14 wk) → second-trimester biochemical (15–20 wk) → anomaly scan (18–20 wk) → cell-free DNA (≥10 wk, any trimester)**.
- ▶ Numbers to quote: **NT ≥3 mm abnormal; combined test detects 85–92% (FPR 5%); MSAFP cut-off 2.5 MoM detects 85% of open NTDs; quad test detects 85–92% (FPR 0.9%); cell-free DNA detects >98% (FPR <0.5%)**.
- ▶ Best strategy = **combined first + second trimester screening (ACOG)**.
- ▶ Screening ≠ diagnosis: a screen-positive result is always confirmed by an **invasive diagnostic test** (CVS/amniocentesis/cordocentesis) for karyotype/chromosomal microarray.
- ▶ Universal offer: screening for aneuploidy and NTDs is now offered to **all** pregnant women, not just those ≥35 years.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older texts still frame maternal age ≥ 35 years as the main trigger for offering prenatal screening; current ACOG guidance is that aneuploidy and neural-tube-defect screening should be offered to every pregnant woman as an informed choice, regardless of age.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; American College of Obstetricians and Gynecologists (ACOG) statements on aneuploidy screening and cell-free DNA as cited in Williams Obstetrics 26e.



Screening for Down's syndrome

Asked in: Paper I 12-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Down syndrome (trisomy 21) is the commonest autosomal chromosomal disorder, due to an extra chromosome 21 (47 chromosomes) in about 95% of cases, with the remainder from a Robertsonian translocation or mosaicism. Overall birth incidence is about 1 in 600–700, rising steeply with maternal age. Screening is the use of non-invasive maternal serum analytes and/or ultrasound markers to identify pregnancies at increased risk of fetal trisomy 21, so that only screen-positive women are offered a definitive invasive diagnostic test; a screening test is never itself diagnostic.

Principles of screening

- ▶ Aneuploidy screening should be offered to **all pregnant women irrespective of age** (current ACOG standard) — not restricted to those ≥ 35 years as in older practice.
- ▶ Every woman has **three options**: screening, direct diagnostic testing, or no testing — the choice is informed and voluntary.
- ▶ Each screening test converts the maternal age-related background risk into an **individualised risk ratio** using the measured analyte/ultrasound values (expressed as multiples of the median, MoM).
- ▶ A **screen-positive** result (conventional cut-off in the range 1:200–1:300, laboratory-dependent) mandates a diagnostic test (karyotype), never termination on screening alone.
- ▶ Performance is described by **detection (sensitivity) rate**, **false-positive rate**, and **positive predictive value (PPV)** — PPV rises sharply with maternal age (e.g., cell-free DNA PPV for trisomy 21 is ~48% at age 20 but ~93% at age 40).
- ▶ All screening tests are **less accurate in twins** and invalid in higher-order multiples.

Screening tests

Test	Components & timing	Change in trisomy 21	Detection rate	False-positive rate
First-trimester ("dual/double marker") combined test	Free β -hCG + PAPP-A + ultrasound nuchal translucency (NT), 11–14 weeks (CRL 45–84 mm)	β -hCG $\uparrow$, PAPP-A $\downarrow$, NT $\uparrow$	80–84%	5%
NT alone	Ultrasound only, 11–14 weeks	NT $\uparrow$ (≥ 3 mm or ≥ 99 th centile abnormal)	64–70%	5% (not used alone in singletons)
Second-trimester triple test	MSAFP + hCG + unconjugated estriol (uE3), 15–20 weeks	MSAFP $\downarrow$, hCG $\uparrow$, uE3 $\downarrow$	~73%	5%
Second-trimester quadruple ("quad") test	Triple test + inhibin A, 15–20/21 weeks	MSAFP $\downarrow$, hCG $\uparrow$, uE3 $\downarrow$, inhibin A $\uparrow$	80–82%	5%
Integrated screening	NT + PAPP-A (11–14 wk) combined with quad markers (15–21 wk); single result released	—	94–96%	5%
Sequential screening (stepwise/contingent)	First-trimester result triages to early diagnostic testing (high risk) or second-trimester screening (intermediate risk)	—	91–97%	4.5–5.1%
Cell-free DNA (cfDNA/NIPT)	Placental cfDNA in maternal plasma, any time after 9–10 weeks	—	~99% (pooled sensitivity 99.7%)	<0.2%

Cross-check note: Indian texts (DC Dutta) quote a slightly higher combined-test detection of ~92% and the same quad-test false-positive rate of 0.9%; the figures above follow the current ACOG-referenced data (Williams Obstetrics 26e) and should be used as the primary answer.

Ultrasound soft markers of trisomy 21

Trimester	Markers
First (11–14 wk)	Enlarged NT; absent/hypoplastic nasal bone; reversed/absent ductus venosus a-wave; tricuspid regurgitation
Second (15–20 wk)	Nuchal fold ≥ 6 mm; echogenic intracardiac focus; echogenic bowel; shortened humerus/femur; mild pyelectasis; clinodactyly (hypoplastic 5th middle phalanx); sandal-gap toe

An NT ≥ 3.5 mm (or ≥ 99 th centile for crown–rump length) should prompt a detailed anomaly scan and fetal echocardiography. Only about one-third of trisomy 21 fetuses show a major structural anomaly; adding minor soft markers raises detection of a sonographic abnormality to 50–75%.

Diagnostic confirmation of a screen-positive result

Procedure	Timing	Tissue	Result turnaround	Procedure-related fetal loss
Chorionic villus sampling (CVS)	Transcervical 10–13 wk; transabdominal 10 wk–term	Chorionic villi	FISH/direct 24–48 h; culture 10–14 d	0.1–0.3%
Amniocentesis	15–20 weeks	Amniocytes	FISH/CMA 24–48 h; karyotype culture 10–14 d	0.1–0.3%
Cordocentesis (rarely used now)	18–20 weeks	Fetal blood	48–72 h	1–2%

Karyotype (or chromosomal microarray, offered alongside) remains the reference diagnostic standard; a positive cfDNA or analyte screen is never acted upon (e.g., pregnancy termination) without this confirmation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 1.1C — Ultrasound image showing increased nuchal translucency at the 11–14 week scan (Arias' High-Risk Pregnancy 5e, p.41)

- ▶ Flowchart: **Pretest counselling** → patient chooses **screening** / **diagnostic test** / **no test** → if screening chosen, perform **first-trimester combined test** or **cfDNA** or **quad/integrated/sequential test** → **screen-negative** → routine care (residual risk, not zero) OR **screen-positive** → **genetic counselling** → offer **CVS (first trimester)** or **amniocentesis (second trimester)** → **karyotype/CMA** → confirmed affected → management options discussed.

High-yield exam pointers

- ▶ "Double marker" (11–14 wk) = free β -hCG + PAPP-A + NT; "quadruple marker" (15–20 wk) = MSAFP + hCG + uE3 + inhibin A — write the four analytes and their direction of change.
- ▶ Trisomy 21 serum pattern mnemonic: hCG **up**, PAPP-A/MSAFP/uE3 **down**, inhibin A **up**.
- ▶ cfDNA has the highest sensitivity (~99%) and lowest false-positive rate but is a **screening**, not diagnostic, test — a positive result still needs CVS/amniocentesis and karyotype.
- ▶ Integrated screening gives the best single-strategy detection (94–96%) at a 5% false-positive rate.
- ▶ NT cut-off ≥ 3.5 mm (or 99th centile) → detailed scan + fetal echocardiography.
- ▶ Maternal age risk: overall birth incidence ~1:600–700, rising to ~1:356 at age 35, ~1:97 at age 40, and ~1:23 by age 45 (delivery risk).
- ▶ CVS and amniocentesis now carry comparable procedure-related loss (~0.1–0.3%) with modern ultrasound guidance — older teaching of 0.5–1% is outdated.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older/Indian textbook editions (DC Dutta) report combined-test detection up to 92% and older CVS/amniocentesis loss rates of 0.5–1%; the figures used above follow current American College of Obstetricians and Gynecologists (ACOG)-referenced data, which is the standard to quote in exams.

SOURCE & COVERAGE

Williams Obstetrics 26e (Chapter 17 — Prenatal Diagnosis, Tables 17-1 to 17-4, 17-9); DC Dutta's Textbook of Obstetrics 9e (Chapter 12 — Prenatal Genetic Counseling, Screening and Diagnosis, Tables 12.1–12.3); American College of Obstetricians and Gynecologists (ACOG) guidance on prenatal aneuploidy screening (2020).

♦ ♦ ♦

Screening for ovarian malignancy

Asked in: Paper I 12-Nov-2021 · Paper IV Nov 2017 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Screening for ovarian malignancy means testing asymptomatic women to detect epithelial ovarian cancer before symptoms appear, when cure is more likely. Unlike cervical cancer, ovarian cancer has no recognised pre-invasive stage, a low population prevalence, and often-silent early disease, so no test has yet reduced mortality in average-risk women; screening is therefore risk-stratified rather than universal.

Why population screening has failed

- ▶ **Low prevalence** (lifetime risk ~1.3%) means even a fairly specific test yields many false positives and a poor positive predictive value.
- ▶ **No precursor lesion** analogous to cervical intraepithelial neoplasia exists for early detection to target.
- ▶ Many high-grade serous "ovarian" cancers actually originate in the **fimbrial end of the fallopian tube** (serous tubal intraepithelial carcinoma), evading ovary-directed tests.
- ▶ Early-stage disease is largely **asymptomatic**; by diagnosis ~70% already have extra-pelvic spread.

Target population — risk stratification

Group	Criteria
Average risk	General population, no significant personal/family history
High risk	<i>BRCA1/BRCA2</i> mutation carriers; Lynch syndrome (hereditary non-polyposis colorectal cancer, HNPCC); personal history of breast cancer or prior removal of a benign ovarian tumour; ≥2 first-degree relatives with breast/ovarian/endometrial/colorectal cancer; age 40–60 years; nulliparity or infertility; early menarche/late menopause; prolonged fertility-drug use (incessant ovulation); body mass index >30; dysgenetic gonad

Screening modalities

Modality	Test / threshold	Value and limitation
Clinical	Bimanual pelvic examination	Simple, but low sensitivity — detects only a sizeable adnexal mass

Modality	Test / threshold	Value and limitation
Primary tumour marker	Serum CA-125 (cut-off >35 U/mL)	Raised in ~50% of stage I and 80–90% of advanced serous cancers; NOT tumour-specific — also raised in endometriosis, leiomyoma, pelvic inflammatory disease, peritonitis, pregnancy, and cancers of breast/lung/colon/endometrium; serum half-life ~20 days, useful for monitoring, not validated as a standalone screening test
Newer marker	Human epididymis protein 4 (HE4)	More specific than CA-125 (less often raised in benign disease); combined with CA-125 and menopausal status in the Risk of Ovarian Malignancy Algorithm (ROMA) for triage of an adnexal mass, not for population screening
Imaging	Transvaginal sonography (TVS) ± colour Doppler	Assesses morphology — multilocularity, solid areas, papillary projections, ascites, bilaterality; neoangiogenesis lowers pulsatility index (PI) <1.0 and resistive index (RI) <0.4; not sensitive/specific enough as a stand-alone screening test
Combined algorithms	Risk of Malignancy Index (RMI); Risk of Ovarian Cancer Algorithm (ROCA)	Used to triage a detected mass into a management pathway (below), not as a population-screening test

Risk-scoring tools

- ▶ Risk of Malignancy Index (RMI) = $U \times M \times CA-125$
 - U (ultrasound score) = 0 if none, 1 if one, 3 if two or more of: multilocular cyst, solid areas, bilateral lesions, ascites, intra-abdominal metastases.
 - M (menopausal score) = 1 (premenopausal), 3 (postmenopausal).
 - CA-125 = absolute serum value in U/mL.
 - Interpretation: Low risk RMI <25; Moderate risk 25–250; High risk >250 (~75% probability of malignancy) — guides referral (see flowchart).
- ▶ Risk of Ovarian Cancer Algorithm (ROCA) — models the *trend* of serially measured CA-125 (rather than one fixed cut-off) to trigger reflex TVS; used in the UKCTOCS multimodal arm and

shown to out-perform a fixed CA-125 threshold, though it has not translated into a proven mortality benefit.

Evidence from major screening trials

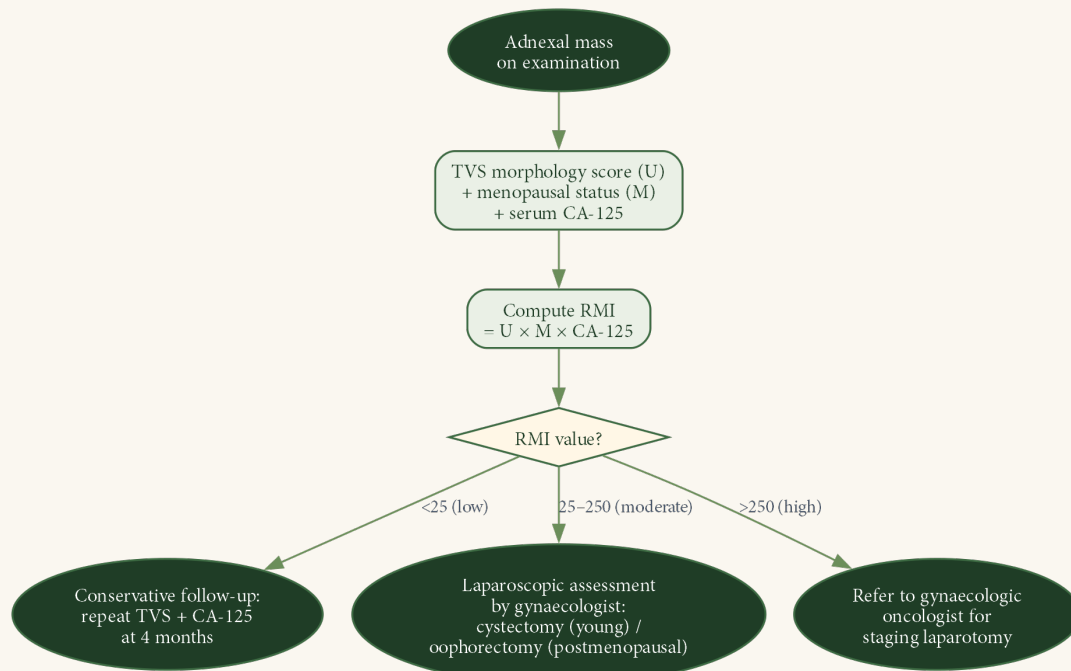
Trial	Design	Key result
PLCO (Buys et al., <i>JAMA</i> 2011)	78,216 average-risk women aged 55–74 y; annual CA-125 (35 U/mL cut-off) + TVS for 4–6 years vs usual care	No reduction in ovarian cancer mortality (3.1 vs 2.6 deaths/10,000 person-years); more false positives leading to unnecessary surgery
UKCTOCS (Jacobs et al., <i>Lancet</i> 2016)	202,638 postmenopausal women aged 50–74 y; no screening vs annual TVS vs multimodal (ROCA-triggered TVS)	Multimodal arm had the best positive predictive value (35.1%) but long-term follow-up showed no statistically significant reduction in ovarian cancer mortality

Current recommendations

- ▶ **Average-risk women:** the US Preventive Services Task Force (USPSTF, 2018, Grade D) recommends **against** screening asymptomatic average-risk women with pelvic examination, TVS, or serum CA-125 — no mortality benefit is demonstrated and harms (false positives, unnecessary invasive surgery) are at least moderate. The American College of Obstetricians and Gynecologists (ACOG) and the US Food and Drug Administration concur; the FDA has separately warned that no marketed "early-detection" test, including ROCA-based assays, is reliable for screening.
- ▶ **High-risk women** — per ACOG Practice Bulletin No. 182 (Hereditary Breast and Ovarian Cancer Syndrome):
 - **Genetic counselling ± testing** for *BRCA1/BRCA2* or Lynch-associated mismatch-repair genes in all women with epithelial ovarian/tubal/peritoneal cancer, or a personal/family history of breast or ovarian cancer.
 - **Interim surveillance** while fertility is desired: TVS every 6 months ± serum CA-125, starting at age 30–35 years, until risk-reducing surgery — a reasonable short-term strategy, though it has not been proven to reduce mortality.
 - **Chemoprevention:** combined oral contraceptive pills before childbearing is undertaken.
 - **Risk-reducing bilateral salpingo-oophorectomy (RRSO)** after childbearing is complete: *BRCA1* carriers at age 35–40 years (earlier-onset cancers); *BRCA2* carriers may delay to 40–45 years (later-onset cancers); does not give absolute protection since peritoneal carcinoma can still occur.

- **Opportunistic bilateral salpingectomy** at the time of unrelated pelvic surgery (hysterectomy, sterilisation) — reduces risk since many high-grade serous "ovarian" cancers arise in the fimbrial tube.
- **Lynch syndrome:** colonoscopy every 1–2 years from age 20–25 years; endometrial biopsy every 1–2 years from age 30–35 years; hysterectomy with bilateral salpingo-oophorectomy after childbearing.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

RMI-based triage of a detected adnexal mass, from initial assessment through risk stratification to management pathway.

High-yield exam pointers

- ▶ **RMI** = $U \times M \times \text{CA-125}$; $U = 0/1/3$ by ultrasound features, $M = 1$ (pre-) / 3 (postmenopausal); Low <25 , Moderate $25-250$, High >250 (~75% malignant).
- ▶ CA-125 cut-off **35 U/mL**; remember it is raised in endometriosis, fibroid, PID, pregnancy, and non-ovarian cancers too — not tumour-specific.
- ▶ **USPSTF 2018, Grade D** — no screening for average-risk asymptomatic women.
- ▶ **PLCO and UKCTOCS** — both large RCTs, both showed **no mortality benefit** from CA-125 + TVS (fixed cut-off) or multimodal (ROCA) screening.
- ▶ **ACOG Practice Bulletin No. 182** — RRSO at 35–40 y (*BRCA1*) vs 40–45 y (*BRCA2*); interim TVS/CA-125 6-monthly from age 30–35 y till surgery.

- ▶ **Opportunistic salpingectomy** — cheap, low-risk prevention exploiting the tubal origin of high-grade serous cancer.
- ▶ High-risk group mnemonic: age 40–60, family history, prior benign ovarian tumour/breast cancer, *BRCA*, nulliparity/infertility, early menarche–late menopause, BMI >30.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The RMI's "one point per feature" wording in some Indian textbook editions is a simplification of the original 0/1/3 ultrasound scoring; the age-cut-off recommendations for risk-reducing surgery reflect the current ACOG Practice Bulletin No. 182 standard rather than older textbook phrasing.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (ACOG Practice Bulletin No. 182 recommendations; PLCO and UKCTOCS trial data; USPSTF 2018 statement); DC Dutta's Textbook of Gynaecology 7e (RMI formula, CA-125 characteristics, high-risk group criteria). Guidelines: ACOG; USPSTF.



Tumour markers

Asked in: Paper III 23-Nov-2020 · Paper I Sep 2007 · Paper III Oct 2006 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — A tumour marker is a substance — protein, hormone, enzyme, oncofetal antigen, or tumour-associated gene product — that is produced by, or released in response to, neoplastic tissue and is detectable in blood, urine, or tissue at levels that broadly reflect tumour presence and burden. In gynaecological oncology, markers assist screening of high-risk women, triage of a pelvic/adnexal mass, monitoring of treatment response, and detection of recurrence, but very few are specific or sensitive enough to diagnose cancer on their own.

Ideal criteria of a tumour marker

- ▶ Produced selectively by tumour cells — organ- and tumour-specific.
- ▶ Sensitive enough to detect subclinical or microscopic disease.
- ▶ Level correlates accurately with tumour volume — falls with effective therapy, rises with progression or recurrence.
- ▶ Indicates not only presence but also the site of tumour origin.
- ▶ Assay simple, inexpensive, reproducible, and widely available.

Classification — major gynaecological tumour markers

Tumour marker	Principal tumour association
Human chorionic gonadotropin (hCG)	Gestational trophoblastic neoplasia (GTN); germ cell tumours — dysgerminoma, embryonal carcinoma, nongestational choriocarcinoma
Alpha-fetoprotein (AFP)	Germ cell tumours — yolk sac (endodermal sinus) tumour, immature teratoma
Lactate dehydrogenase (LDH)	Dysgerminoma
Cancer antigen 125 (CA-125)	Epithelial (nonmucinous) ovarian carcinoma; endometrial adenocarcinoma
Carcinoembryonic antigen (CEA)	Mucinous ovarian tumours; squamous carcinoma cervix
CA 19-9	Mucinous ovarian tumours; mature/immature teratoma
Squamous cell carcinoma antigen (SCC-Ag)	Carcinoma cervix, vulva, vagina (squamous histology)
Human epididymis protein 4 (HE4)	Epithelial ovarian carcinoma (combined with CA-125 in the ROMA algorithm); endometrial carcinoma
Inhibin, anti-Müllerian hormone (AMH)	Granulosa cell tumour
Oestrogen / testosterone	Sex cord–stromal (gonadal stromal) tumours
HER-2/neu (oncogene product)	Epithelial ovarian carcinoma
CA 15-3, TAG-72, macrophage colony-stimulating factor (M-CSF), OVX1	Adjunct markers for epithelial ovarian carcinoma

Clinical uses of tumour markers

- ▶ **Screening** — restricted to high-risk women (strong family history, *BRCA1/2* carriers): periodic serum CA-125 plus transvaginal sonography. NOT recommended for population-wide screening of average-risk women (see Note).
- ▶ **Triage of an adnexal mass** — combined with ultrasound morphology and menopausal status in the **Risk of Malignancy Index (RMI)**: $RMI = U \times M \times CA-125$, where U = ultrasound score (one point each for multilocular cyst, solid areas, ascites, bilateral lesions, and metastases) and $M = 3$ for postmenopausal women (1 if premenopausal). An $RMI > 250$ carries about a 75% risk of malignancy and mandates referral to a gynaecological oncology centre (per RCOG guidance).
- ▶ **Monitoring response to therapy** — serial CA-125 during chemotherapy for epithelial ovarian cancer, and serial β -hCG in GTN; a plateau or rise indicates chemo-resistant disease requiring a change of regimen.

- ▶ **Follow-up and recurrence detection** — a rising marker often precedes clinical or radiological recurrence; CA-125 has a serum half-life of about 20 days and is used to judge completeness of response after surgery or chemotherapy.
- ▶ **Prognostication** — marker level reflects tumour burden and adequacy of cytoreduction (persistently elevated CA-125 after surgery suggests bulky residual disease).
- ▶ **Combined panels raise sensitivity** — AFP + hCG + LDH together for germ cell tumours; CA-125 + HE4 (ROMA algorithm) for pre-operative triage of an adnexal mass.

Limitations of tumour markers

- ▶ **Not tumour-specific** — CA-125 is raised in ~1% of normal women and also in endometriosis, leiomyoma, pelvic inflammatory disease, peritonitis, pregnancy, and carcinomas of the breast, lung, colon, and endometrium (false positives).
- ▶ **Insensitive in early disease** — CA-125 is elevated in only about 50% of stage I but 80–90% of advanced serous ovarian cancers; most markers rise late, once tumour burden is already large.
- ▶ **No proven mortality benefit as a population screen** — transvaginal ultrasound and/or CA-125 have not been shown to reduce ovarian cancer mortality in average-risk women, while causing false-positive harm (unnecessary surgery).
- ▶ **Never diagnostic in isolation** — a marker must always be interpreted alongside clinical examination and imaging, never used alone to label a mass as malignant.
- ▶ **Cannot reliably exclude subclinical residual disease** — tumour markers and radiological assessment are both too insensitive after treatment; this insensitivity historically led to routine second-look laparotomy in epithelial ovarian cancer, a practice now abandoned as it showed no survival benefit.

High-yield exam pointers

- ▶ Germ cell tumour panel: **AFP** (yolk sac tumour, immature teratoma) + **hCG** (dysgerminoma, embryonal, choriocarcinoma) + **LDH** (dysgerminoma) — remember together.
- ▶ **CA-125 > 35 U/mL** → epithelial (nonmucinous) ovarian carcinoma, but the same cut-off is also raised in endometriosis/PID/pregnancy.
- ▶ **RMI = U × M × CA-125**; RMI > 250 ≈ 75% risk of malignancy → refer to gynaecological oncology.
- ▶ **SCC-Ag** → squamous carcinoma of cervix/vulva/vagina.
- ▶ **Inhibin/AMH** → granulosa cell tumour.
- ▶ CA-125 serum half-life ≈ **20 days** — used to time post-operative/post-chemotherapy reassessment.
- ▶ **HE4 + CA-125 = ROMA** algorithm for adnexal-mass triage.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Population-wide ovarian cancer screening with CA-125 and/or transvaginal ultrasound is not recommended in average-risk asymptomatic women — the American College of Obstetricians and Gynecologists (ACOG) and the US Preventive Services Task Force (USPSTF) both advise against it, since large trials showed no mortality benefit and a real risk of false-positive-driven surgery.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Table 31.9, tumour marker definitions and criteria, RMI formula, CA-125 causes of false elevation); Berek & Novak's Gynecology 16e (CA-125 sensitivity by stage, ACOG committee opinion and USPSTF screening recommendation).



Universal versus Selective Screening for HIV in Pregnancy

Asked in: Paper IV 02-Jun-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Universal (routine, "opt-out") screening for human immunodeficiency virus (HIV) means every pregnant woman is offered an HIV test as a standard part of the antenatal blood panel, irrespective of her risk profile; the test is performed unless she specifically declines, without requiring a separate written consent. Selective (targeted, risk-based) screening instead confines testing to women who disclose recognised risk factors — injecting drug use, commercial sex work, multiple or new sexual partners, a known HIV-positive partner, or another sexually transmitted infection (STI). The Centers for Disease Control and Prevention (CDC, 2006) and the American College of Obstetricians and Gynecologists (ACOG, 2020) recommend universal opt-out prenatal HIV screening for all pregnant women; DC Dutta's Textbook of Obstetrics likewise describes a voluntary counselling and testing centre (VCTC) offered at the antenatal clinic to all pregnant women on an opt-out basis, the model followed in Indian antenatal care.

Universal vs selective screening — key differences

Feature	Universal (opt-out) screening	Selective (risk-based) screening
Population tested	All pregnant women at booking	Only women who disclose/are identified with risk factors
Basis for testing	Routine antenatal blood panel	Self-reported or clinician-identified risk

Feature	Universal (opt-out) screening	Selective (risk-based) screening
Consent model	Opt-out — tested unless declined	Opt-in — tested only if risk identified and accepted
Cases missed	Very few	Many — most HIV-positive pregnant women report no recognised risk factor
Stigma	Low — testing is routine and non-selective	Higher — singles out women labelled "high-risk"
Current guideline status	ACOG (2020), CDC (2006), and the Indian VCTC opt-out model at antenatal clinics	Largely superseded as the primary strategy; retained only as an add-on for repeat/third-trimester testing in risk groups

Advantages of universal screening

- ▶ **Maximum case detection** — most HIV-infected pregnant women do not report a recognised risk factor, so a risk-based strategy alone under-diagnoses; testing every woman removes reliance on disclosure or clinician suspicion.
- ▶ **Enables timely prevention of mother-to-child transmission (MTCT)** — early diagnosis allows combination antiretroviral therapy (ART), an appropriately planned mode of delivery, and infant-feeding counselling; with ART plus appropriate delivery/feeding measures, vertical transmission falls from an untreated rate of 25–30% to under 1%.
- ▶ **De-stigmatising and normalising** — because every woman is tested as routine care, no individual is singled out as "at risk," which improves acceptance; the opt-out approach has been shown to raise testing uptake compared with risk-based, consent-heavy models.
- ▶ **Simplicity of protocol** — one uniform policy applied to every booking is easier for antenatal staff to implement reliably than individualised risk assessment and counselling for each woman.
- ▶ **Benefits maternal health directly** — early diagnosis permits staging (CD4 count, viral load), screening for co-infections (tuberculosis, other STIs, hepatitis B and C), and timely initiation of therapy for the woman's own health, independent of the pregnancy.
- ▶ **Facilitates partner testing** — a positive antenatal result triggers partner counselling and testing, reducing both horizontal spread and future vertical transmission in subsequent pregnancies.
- ▶ **Favourable public-health economics** — population-level analyses show universal testing remains cost-effective even in comparatively low-prevalence settings once the lifelong cost of paediatric HIV infection is factored in, and it supports national and global goals for elimination of mother-to-child transmission.
- ▶ **Equity** — removes the discriminatory element of deciding, on the basis of appearance or history, who "looks" high-risk enough to test.

Disadvantages of universal screening

- ▶ **Higher aggregate cost** — testing every pregnant woman, the great majority of whom will be negative, consumes more test kits, counsellor time, and laboratory capacity than testing a smaller, risk-selected group.
- ▶ **Lower positive predictive value in low-prevalence populations** — where background prevalence is low, even a highly specific assay yields more false positives in absolute numbers, generating unnecessary anxiety and the need for confirmatory testing (Western blot/HIV-1,2 antibody-differentiation assay or nucleic acid testing).
- ▶ **Logistic burden** — requires uninterrupted availability of combination antigen/antibody immunoassay kits, trained pre- and post-test counsellors, and an assured referral pathway into ART services; this can strain resource-limited antenatal clinics.
- ▶ **Consent and autonomy concerns** — folding HIV testing into the routine panel under an opt-out default can feel coercive if adequate pre-test information is not genuinely conveyed to every woman.
- ▶ **Psychosocial impact of a positive result** — anxiety while awaiting confirmation, and risk of partner conflict, intimate-partner violence, or social stigma on disclosure, particularly where community awareness is low — making robust post-test counselling essential.
- ▶ **Does not by itself capture late seroconversion** — a single test at booking can still miss infection acquired later in pregnancy; repeat testing in the third trimester, preferably before 36 weeks, is still required, particularly where community HIV prevalence exceeds 1 per 1000 women screened or risk factors persist — so universal screening at booking does not eliminate the need for continued risk-based repeat testing.

High-yield exam pointers

- ▶ Opt-out (tested unless declined), not opt-in, is the defining feature of universal screening — state this explicitly.
- ▶ Guidelines to quote: CDC (2006) and ACOG (2020) recommend universal opt-out prenatal HIV screening; DC Dutta's Obstetrics describes the Indian VCTC opt-out model at the antenatal clinic.
- ▶ Transmission numbers to quote: untreated mother-to-child transmission 25–30%, reduced to **under 1%** with combination ART plus appropriate delivery/feeding measures.
- ▶ Repeat/third-trimester testing (before 36 weeks) is retained even with universal screening, for areas with prevalence >1/1000 pregnant women screened or ongoing risk factors.
- ▶ Core "universal is better" argument: most HIV-positive pregnant women have no identifiable risk factor, so selective screening misses them.
- ▶ Core trade-off for disadvantages: higher cost + lower positive predictive value in low-prevalence settings + counselling/referral infrastructure burden.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Coverage note: the exact operational statistics of India's national programme for prevention of parent-to-child transmission of HIV are not detailed in the corpus texts consulted; the answer above rests on the internationally grounded ACOG/CDC opt-out recommendation and DC Dutta's description of the Indian VCTC opt-out model, both of which embody the same universal-screening principle.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; Berek & Novak's Gynecology 16e (routine versus targeted screening by age/risk); guidelines: American College of Obstetricians and Gynecologists (ACOG, 2020); Centers for Disease Control and Prevention (CDC, 2006).

♦ ♦ ♦

What are the methods of screening for cancer cervix? and the management of a patient whose Pap smear is suggestive of High-grade Intraepithelial lesion

Asked in: Paper III 16-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Cervical cancer screening detects precancerous cervical intraepithelial neoplasia (CIN) caused by persistent high-risk human papillomavirus (hrHPV) infection before it progresses to invasive cancer, using cytology, hrHPV testing, or visual methods depending on the resource setting. A Pap smear reported as high-grade squamous intraepithelial lesion (HSIL) on the Bethesda System correlates with CIN 2 or CIN 3 in about 70% of cases and mandates colposcopy-directed biopsy followed by destruction or excision of the entire transformation zone (TZ).

Methods of screening for carcinoma cervix

Method	Technique	Role / use
Cervical cytology (Pap smear)	Cells sampled from the squamocolumnar junction (SCJ) and TZ with an Ayre's spatula plus endocervical brush/cytobrush, smeared on a slide, fixed at once in 95% ethyl alcohol, and stained by the Papanicolaou method; conventional smear or liquid-based cytology (LBC)	Gold-standard primary screening test; has reduced the incidence of invasive cervical cancer by about 80% and mortality by about 70%

Method	Technique	Role / use
High-risk HPV DNA testing	Hybrid capture-2, PCR, or HPV-16/18 genotyping on a cervical sample	Co-testing with cytology in women over 30 years; the World Health Organization (WHO, 2021) now recommends hrHPV testing as the preferred primary screening test, repeated at a 5-year interval (3-yearly if immunocompromised)
Visual inspection with acetic acid (VIA) / with Lugol's iodine (VILI)	Naked-eye inspection of the cervix after applying 3–5% acetic acid (or Lugol's iodine); acetowhite (or mustard-yellow, iodine-negative) areas are scored positive	Low-cost, single-visit "screen-and-treat" strategy suited to low-resource settings; an Indian trial showed a single round of VIA reduced cervical cancer incidence by ~25% and mortality by ~35% over 7 years
Colposcopy	In-situ examination of the cervix under 6–16× magnification after acetic acid	Not a primary screening test — used to localise the biopsy site after an abnormal cytology/HPV/VIA result
Cervicography	Photograph of the acetowhitened cervix taken by a special camera and reported by a remote specialist	Alternative to colposcopy for women in remote areas
Co-testing	Cytology + hrHPV testing performed together	Standard for ages 30–65 in resource-rich settings (American College of Obstetricians and Gynecologists (ACOG)/American Society for Colposcopy and Cervical Pathology (ASCCP) guidance)

Screening age and interval (ACOG/ASCCP/USPSTF, concordant): start at 21 years regardless of sexual history → cytology alone every 3 years (21–29 years) → co-testing every 5 years or cytology alone every 3 years (30–65 years) → discontinue after 65–70 years if 3 consecutive negative cytology or 2 negative co-tests in the preceding 10 years. Screen annually in HIV-positive, immunosuppressed, or DES-exposed women, and for 20 years after treated CIN 2 or worse.

Bethesda System — what "HSIL" means

Cytology category	CIN correlate	Risk of underlying CIN 2/3
Atypical squamous cells of undetermined significance (ASC-US)	Often none, or CIN 1	5–10%

Cytology category	CIN correlate	Risk of underlying CIN 2/3
Low-grade squamous intraepithelial lesion (LSIL)	CIN 1 (HPV cytopathic effect)	Up to 20%
Atypical squamous cells, cannot exclude HSIL (ASC-H)	Variable	Higher than ASC-US; refer directly to colposcopy, do not triage with hrHPV testing
High-grade squamous intraepithelial lesion (HSIL)	CIN 2 / CIN 3 (moderate–severe dysplasia, carcinoma-in-situ)	~70%; risk of invasive cancer ~1%
Atypical glandular cells (AGC)	Endocervical/endometrial glandular atypia, adenocarcinoma-in-situ (AIS)	High risk of neoplasia — needs endocervical curettage (ECC) ± endometrial sampling

Management of a Pap smear suggestive of HSIL

- ▶ **Colposcopy with directed biopsy is mandatory** — any woman with HSIL cytology must undergo colposcopy; treatment should not be based on cytology alone (except the "screen-and-treat" pathway below). Assess whether the examination is adequate (entire SCJ and TZ visualised); perform ECC if the SCJ is not seen, the lesion extends into the canal, or colposcopy is inadequate.
- ▶ **Biopsy confirms CIN 2 or CIN 3** → treat by destroying or excising the whole transformation zone; women 25 years and older with adequate colposcopy and histologically confirmed CIN 2/3 require definitive treatment.
- ▶ **Choose ablation only if all of the following criteria are met:** the entire lesion is visualised within the TZ; no microinvasion or invasion; no endocervical glandular involvement; and no discrepancy between cytology, colposcopy, and biopsy.
 - *Cryotherapy*: crystallises intracellular water at about -90°C ; tissue destruction depth 5 mm; freeze–thaw–freeze (double-freeze) technique improves efficacy.
 - *Cold coagulation*: destroys tissue at $100\text{--}120^{\circ}\text{C}$; depth 4 mm; needs no anaesthesia.
 - *Electrodiathermy*: unipolar needle electrode; depth 8–10 mm; done under general anaesthesia.
 - *Carbon dioxide (CO_2) laser vaporisation*: colposcopically guided; depth 7 mm; preferred when CIN extends onto the vaginal fornices.
- ▶ **Excision is preferred whenever ablation criteria are not met**, or when histologic confirmation of clear margins is needed (occult microinvasion, adenocarcinoma, endocervical extension, cytology–colposcopy–histology discrepancy, recurrent disease, or suspected glandular lesion).
 - *Loop electrosurgical excision procedure (LEEP)/large loop excision of the transformation zone (LLETZ)*: a thin stainless-steel wire loop (2–3 cm) with blended cutting/coagulation current under local anaesthesia; removes tissue to a depth of ≥ 10 mm for histopathology; this is the

preferred technique for CIN 2–3 because it simultaneously treats and excludes occult invasion; persistent/recurrent disease rate 4–10%.

- *Cold-knife or laser cone biopsy*: reserved for the situations listed above where LEEP margins would be unreliable (e.g., suspected microinvasion or AIS); complications (haemorrhage, infection, cervical stenosis/incompetence) relate to the length of cone excised.
- ▶ **"See-and-treat"**: immediate excisional treatment (LEEP) at the same visit as colposcopy, without waiting for a confirmatory biopsy, is reasonable when the colposcopic impression is high-grade and concordant with HSIL cytology — particularly for women likely to be lost to follow-up. This underlies the WHO screen-and-treat strategies (HPV test or VIA positive → treat with cryotherapy, or LEEP if not eligible for cryotherapy) used in low-resource, high-burden settings including India.
- ▶ **Special situations**:
 - *Pregnancy*: colposcopy only; biopsy only if invasion is suspected; defer definitive treatment to 6 weeks postpartum.
 - *Young women (<25 years)*: given the small but real risk of preterm birth after excision, conservative surveillance with colposcopy and cytology at 6 and 12 months is an acceptable alternative to immediate treatment.
 - *Glandular abnormality (AGC/AIS)*: add ECC; endometrial sampling if age ≥35 years or abnormal bleeding.
 - *Recurrent/persistent CIN 2–3, positive endocervical margin, or fertility not desired*: hysterectomy is an option but never first-line treatment.
- ▶ **Post-treatment follow-up**: cytology ± hrHPV co-testing at 6 and 12 months; if negative, continue annual cytology for up to 20 years (ACOG) before returning to routine age-based screening.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.2 — The cervix and the transformation zone. (Berek & Novak 16e, p.916)

High-yield exam pointers

- ▶ HSIL on Bethesda = CIN 2/3; ~70% risk of underlying CIN 2/3, ~1% risk of invasive cancer — colposcopy + biopsy always, never triage HSIL cytology with hrHPV testing alone.
- ▶ ASC-H → straight to colposcopy (do not use hrHPV triage); ASC-US/LSIL → hrHPV triage or repeat cytology is acceptable.
- ▶ 4 criteria that must ALL be met before ablation: whole lesion seen, no invasion, no endocervical extension, no cytology–colposcopy–histology discrepancy.
- ▶ Destruction depths to memorise: cryotherapy 5 mm, cold coagulation 4 mm, electrodiathermy 8–10 mm, CO₂ laser 7 mm, LEEP ≥10 mm.

- ▶ LEEP/LLETZ is the preferred treatment for CIN 2–3 (treats + gives margin histology).
- ▶ Follow-up after treatment: co-testing at 6 and 12 months, then annual cytology to 20 years (ACOG).
- ▶ WHO 2021: hrHPV testing as the preferred primary screening test (5-yearly); VIA-based screen-and-treat for low-resource settings.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Berek & Novak 16e presents the 2012 ASCCP/American Cancer Society (ACS)/American Society for Clinical Pathology (ASCP) consensus algorithm for triage of abnormal cytology; the subsequent 2019 ASCCP risk-based management guidelines refine the thresholds using HPV genotype and prior screening history, but the underlying CIN 2/3 → excision-or-ablation pathway described above is unchanged — this corpus does not carry the 2019 risk-table update in full detail.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e. Guidelines: American College of Obstetricians and Gynecologists (ACOG); American Society for Colposcopy and Cervical Pathology (ASCCP); World Health Organization (WHO) 2021 guideline for screening and treatment of cervical pre-cancer lesions.



What are the types of Endometrium? Discuss the management of endometrial hyperplasia

Asked in: Paper I Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — The endometrium is the hormone-responsive mucosal lining of the uterine cavity that undergoes cyclical proliferation, secretory transformation, and shedding under ovarian steroid control. Endometrial hyperplasia is a spectrum of excessive proliferation of endometrial glands relative to stroma, resulting from prolonged, unopposed oestrogen stimulation, that ranges from a reversible physiological exaggeration to a direct precursor of endometrioid endometrial carcinoma.

Types of endometrium

Type	Timing / hormonal driver	Key histological features
Menstrual endometrium	Days 1–4; oestrogen/progesterone withdrawal as the corpus luteum regresses	Thin, necrotic functionalis with disintegrating glands; only the inactive basalis remains

Type	Timing / hormonal driver	Key histological features
Proliferative endometrium	Days 5–14 (follicular phase); rising oestradiol	Thickens 1–2 mm → 2–3 mm; narrow, mitotically active glands, pseudostratified before ovulation; compact stroma
Secretory endometrium	Days 15–28 (luteal phase); progesterone on a primed endometrium	Thickens to 5–7 mm; subnuclear vacuoles (early) → coiled glycogen-secreting glands (mid) → predecidual stroma around spiral arterioles (late)
Gestational (decidualised) endometrium	Post-implantation; progesterone sustained by human chorionic gonadotropin (hCG)	Stroma transforms into decidua of polyhedral cells; glands become hypersecretory
Atrophic endometrium	Hypo-oestrogenic states — postmenopause, lactation, prolonged progestin/GnRH agonist use	Thin (≤ 4 mm on transvaginal sonography), few inactive glands, dense fibrous stroma
Hyperplastic endometrium	Sustained unopposed oestrogen (anovulation, unopposed oestrogen therapy, oestrogen-secreting tumour)	Increased gland:stroma ratio, glandular crowding, $\pm$ cytological atypia (detailed below)

Classification of endometrial hyperplasia

System	Categories	Approximate risk of progression to carcinoma
WHO 1994 (four-tier) — still widely used by pathologists	Simple hyperplasia (without atypia)	~1%
	Complex hyperplasia (without atypia)	~3%
	Simple atypical hyperplasia	~8%
	Complex atypical hyperplasia	~29%
EIN schema — endorsed 2015 by ACOG and the Society of Gynecologic Oncology, replacing WHO terms	Benign endometrial hyperplasia	Low; treated medically
	Endometrial intraepithelial neoplasia (EIN) — replaces "atypical hyperplasia"	Premalignant; ~40–50% harbour a concurrent, usually well-differentiated, endometrioid adenocarcinoma

System	Categories	Approximate risk of progression to carcinoma
	Endometrioid adenocarcinoma, well differentiated	Malignant

Aetiology / risk factors (both systems)

Category	Risk factors
Endogenous unopposed oestrogen	Chronic anovulation (polycystic ovary syndrome), obesity (peripheral aromatisation of androgens to oestrone), oestrogen-secreting ovarian tumours, nulliparity, early menarche/late menopause
Exogenous unopposed oestrogen	Oestrogen-only hormone therapy in a woman with a uterus, tamoxifen
Metabolic/genetic	Diabetes mellitus, hypertension, Lynch syndrome (hereditary non-polyposis colorectal cancer)

Clinical features and diagnosis

- ▶ **Abnormal uterine bleeding** — intermenstrual or heavy bleeding in the perimenopausal woman, or postmenopausal bleeding; occasionally an incidental finding during work-up for infertility or polycystic ovary syndrome.
- ▶ **Transvaginal sonography**: endometrial thickness > 12 mm with an irregular, hyperechoic outline and increased colour Doppler vascularity suggests hyperplasia; thickness ≤ 4 mm suggests atrophy and makes hyperplasia unlikely.
- ▶ **Endometrial sampling is mandatory for histological diagnosis** — office biopsy (Pipelle cannula) first-line; if non-diagnostic, cervical stenosis prevents sampling, or a focal lesion is suspected, proceed to hysteroscopy with directed biopsy or fractional curettage.
- ▶ The report must specify presence or absence of cytological atypia — this single distinction drives all subsequent management.

Management of endometrial hyperplasia

Preventive measures

- ▶ Maintain ideal body weight; treat insulin resistance.
- ▶ Restrict unopposed oestrogen use — any woman with an intact uterus on oestrogen therapy must receive a concurrent progestin.
- ▶ Periodic endometrial surveillance in "at-risk" women (chronic anovulation, tamoxifen use, Lynch syndrome).

Definitive treatment depends on three factors: (i) presence or absence of cytological atypia, (ii) age/menopausal status and fertility wish, (iii) fitness for surgery.

A. Hyperplasia without atypia (benign endometrial hyperplasia)

Step	Regimen
First-line	Cyclic oral progestin — medroxyprogesterone acetate 10 mg/day for 12–14 days per cycle, OR continuous oral progestin, for 3–6 months
Alternative	Levonorgestrel-releasing intrauterine system (LNG-IUS) — the most effective medical option, with the highest regression rates
In a woman desiring fertility with polycystic ovary syndrome	Ovulation induction (e.g., clomiphene citrate/letrozole) in addition to endometrial protection
Follow-up	Repeat endometrial sampling at 6 months to confirm regression; if hyperplasia persists or bleeding continues despite therapy, escalate to hysterectomy
Perimenopausal/postmenopausal women who complete childbearing	Continuous progestin therapy is acceptable, but hysterectomy with bilateral salpingo-oophorectomy is a reasonable alternative because the risk of carcinoma rises with age

B. Atypical hyperplasia / endometrial intraepithelial neoplasia (EIN)

- ▶ **Hysterectomy is the recommended definitive treatment at any age** because of the substantial (~25–50%) risk of a concurrent, undiagnosed endometrioid carcinoma — the standard ACOG position.
- ▶ Total hysterectomy (with bilateral salpingo-oophorectomy in peri-/postmenopausal women); the specimen is opened and examined immediately in theatre, and peritoneal washings taken for cytology in case occult carcinoma is found.
- ▶ **Fertility-sparing progestin therapy** is reserved for young women who strongly desire fertility, or poor surgical candidates, after reasonably excluding myoinvasive disease:
 - Continuous **megestrol acetate 40–160 mg/day** orally — the most reliable regimen (higher doses trade efficacy against tolerability), OR
 - Continuous oral **medroxyprogesterone acetate 10 mg twice daily**, OR
 - **Levonorgestrel-releasing intrauterine system**, alone or combined with a GnRH agonist.
 - Continue for at least 3–6 months; repeat **endometrial biopsy every 3 months** — recurrence occurs in up to 50%, so this is temporary, fertility-bridging therapy, not definitive management.
 - On failure to regress, or on completing childbearing, proceed to hysterectomy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 23.10 — Complex endometrial hyperplasia with nuclear stratification and cytological atypia. The glands are dilated, mitosis is present in stroma also. (DC Dutta's Textbook of Gynaecology 7e, p.291)

Alongside this histology figure, sketch a management flowchart: **Endometrial biopsy → atypia present?** → NO: progestin (cyclic MPA/LNG-IUS) 3–6 months → repeat biopsy → regressed / persistent (hysterectomy); → YES (EIN): fertility desired & operable? → NO: hysterectomy ± BSO; → YES: high-dose progestin + 3-monthly biopsy → respond (conceive, then hysterectomy) / fail (hysterectomy).

High-yield exam pointers

- ▶ Five phases of the normal endometrial cycle: menstrual → proliferative → secretory → implantation → breakdown.
- ▶ WHO four-tier system (simple/complex ± atypia) is being replaced by the two-tier EIN schema (benign hyperplasia vs EIN) per ACOG/Society of Gynecologic Oncology, 2015.
- ▶ Progression-to-carcinoma percentages: simple 1%, complex 3%, atypical simple 8%, atypical complex 29% (Kurman).
- ▶ ~40–50% of women with EIN/atypical hyperplasia have a concurrent endometrial carcinoma — this single fact justifies hysterectomy as the default treatment.
- ▶ Fertility-sparing dose to write in the exam: megestrol acetate 40–160 mg/day OR medroxyprogesterone acetate 10 mg BID, for 3–6 months, with endometrial biopsy every 3 months.
- ▶ Endometrial thickness cut-offs on transvaginal sonography: ≤ 4 mm suggests atrophy; > 12 mm raises suspicion of hyperplasia.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Many pathology reports and older textbooks (including Indian standard texts) still use the older four-tier WHO nomenclature (simple/complex hyperplasia with or without atypia); the current ACOG/Society of Gynecologic Oncology-endorsed terminology simplifies this to benign hyperplasia versus endometrial intraepithelial neoplasia (EIN), which more directly predicts management.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; ACOG/Society of Gynecologic Oncology endometrial intraepithelial neoplasia terminology (2015).



Reproductive endocrinology & infertility



17-year-old girl presents with primary amenorrhea. Diagnosis and management

Asked in: Paper III 30-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Primary amenorrhoea is absence of menarche by 16 years of age regardless of normal growth and secondary sexual character development, or by 14 years if growth and secondary sexual characters (breast, pubic/axillary hair) have not appeared. Normal menstruation needs an intact hypothalamo-pituitary-ovarian (HPO) axis, functioning ovaries, and a patent genital outflow tract (uterus, cervix, vagina); primary amenorrhoea results from a defect at any one of these levels, so causes are best organised by the level (compartment) of the defect.

Causes/classification

Compartment	Level of defect	Common causes
I — Genital outflow tract/uterus	Anatomical	Imperforate hymen, transverse vaginal septum, cervical/vaginal atresia, complete vaginal agenesis, Müllerian agenesis (Mayer-Rokitansky-Küster-Hauser, MRKH, syndrome), androgen insensitivity syndrome (AIS), congenital unresponsive endometrium/Asherman syndrome (rare)
II — Ovary	Hypergonadotropic hypogonadism	Turner syndrome (45,X and mosaics), pure gonadal dysgenesis (46,XX or 46,XY — Swyer), premature ovarian insufficiency, resistant ovary syndrome, galactosemia, 17 α -hydroxylase deficiency

Compartment	Level of defect	Common causes
III — Anterior pituitary	Hypogonadotropic hypogonadism	Hyperprolactinemia (prolactinoma), isolated gonadotropin deficiency, panhypopituitarism
IV — Hypothalamus/CNS	Hypogonadotropic hypogonadism	Constitutional delay of puberty, Kallmann syndrome (anosmia/hyposmia + isolated GnRH deficiency), functional hypothalamic amenorrhoea (stress, weight loss, excessive exercise, anorexia nervosa), craniopharyngioma and other CNS tumours
Other	Adrenal/thyroid/systemic	Late-onset (non-classic) congenital adrenal hyperplasia, hypothyroidism (cretinism), juvenile diabetes, malnutrition/anaemia, genital tuberculosis

Clinical approach to diagnosis

A focused history (anosmia, galactorrhoea, cyclic pain, weight change, virilisation, family history) and examination of stature, secondary sexual characters and external genitalia narrow the diagnosis before any test is ordered. The two key discriminators are **breast development** (a marker of oestrogen exposure) and **presence of the uterus** (on ultrasound/examination):

Breast development	Uterus	Probable diagnosis	Key distinguishing point
Present	Present, but cyclic pain/mass	Outflow tract obstruction — imperforate hymen, transverse vaginal septum, cervical agenesis	Bulging bluish membrane at introitus (hymen) vs high obstruction with palpable hematocolpos/hematometra
Present	Absent	MRKH syndrome vs androgen insensitivity syndrome (AIS)	MRKH: 46,XX, normal pubic/axillary hair, normal female testosterone, normal ovaries. AIS: 46,XY, absent/scanty pubic-axillary hair, testosterone in male range, testes present (labial/inguinal/abdominal)

Breast development	Uterus	Probable diagnosis	Key distinguishing point
Absent	Present	Hypergonadotropic vs hypogonadotropic hypogonadism	High FSH/LH → gonadal dysgenesis (Turner, pure gonadal dysgenesis). Low/normal FSH/LH → hypothalamic-pituitary cause (constitutional delay, Kallmann, CNS lesion, hyperprolactinemia)
Absent	Absent	Rare combined defect	e.g. 17 α -hydroxylase deficiency (46,XY) — no uterus (antimüllerian hormone from testes) and no breast development (no oestrogen)

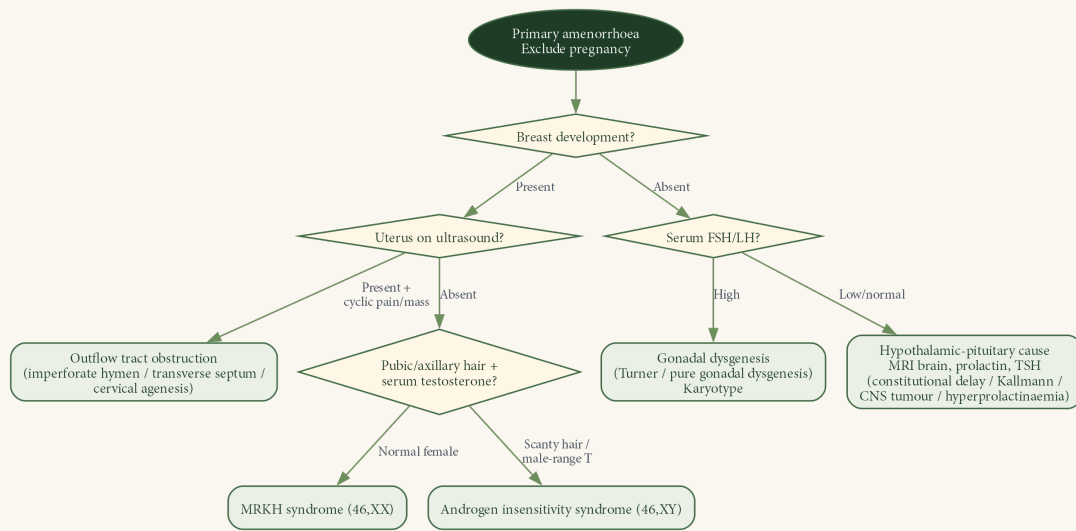
Investigations

Investigation	Purpose/finding
Urine/serum β -hCG	Exclude pregnancy — always first, even in a girl who has never menstruated
Pelvic ultrasound (transabdominal $\pm$ transperineal)	Presence/absence of uterus and ovaries; hematocolpos/hematometra in outflow obstruction
Serum FSH, LH	Elevated (hypergonadotropic) → gonadal cause; low/normal (hypogonadotropic) → hypothalamic-pituitary cause
Karyotype	Mandatory in all hypergonadotropic hypogonadism and in any girl with absent uterus (differentiates MRKH 46,XX from AIS 46,XY); not routinely needed in isolated hypogonadotropic hypogonadism
Serum testosterone	Male range in AIS; normal female range in MRKH
Serum prolactin, TSH	Hyperprolactinaemia; hypothyroidism
MRI brain/CT sella	Hypogonadotropic hypogonadism, to exclude a CNS/pituitary tumour (craniopharyngioma)
Serum 17-hydroxyprogesterone	Elevated in congenital adrenal hyperplasia
Renal ultrasound/IVP	Associated renal anomalies in ~30–40% of Müllerian agenesis; skeletal anomalies in ~10–12%
Progesterone challenge test	Withdrawal bleed confirms oestrogenised endometrium and a patent outflow tract; of limited value in primary amenorrhoea and reserved for equivocal cases

Management

- ▶ **Outflow tract obstruction** — imperforate hymen: cruciate incision and drainage of hematocolpos (never needle aspiration — risk of pyocolpos); transverse vaginal septum: surgical excision with post-operative vaginal dilators to prevent re-stenosis; cervical agenesis with a functioning uterus: laparoscopic uterovaginal anastomosis is first-line, hysterectomy reserved for failure.
- ▶ **MRKH syndrome (vaginal agenesis, absent uterus, normal 46,XX ovaries)** — first-line is progressive vaginal dilation (Frank/Ingram technique); if unsuccessful, surgical vaginoplasty (McIndoe split-skin graft, Vecchietti traction procedure, or Davydov peritoneal vaginoplasty). Ovaries are retained; fertility is achieved only through assisted reproduction using the patient's oocytes with a gestational carrier (or emerging uterine transplantation).
- ▶ **Androgen insensitivity syndrome** — raise/continue as female; vaginal dilation for coital function; the intra-abdominal/inguinal testes are **left in place until after pubertal feminisation is complete** (malignancy risk is low, ~2%, before puberty and rises thereafter), then removed by bilateral laparoscopic gonadectomy, followed by oestrogen replacement.
- ▶ **Gonadal dysgenesis (Turner syndrome, pure gonadal dysgenesis)** — if a Y-chromosome cell line is detected on karyotype, **laparoscopic prophylactic gonadectomy is done at the time of diagnosis** (gonadoblastoma risk, unlike AIS where it is deferred). Supportive care: growth hormone from early childhood for short stature; pubertal induction with low-dose (transdermal or oral) oestrogen from 12–14 years, with cyclic progestogen added after several months once withdrawal bleeding begins; screen for and manage associated cardiac (coarctation of aorta) and renal anomalies.
- ▶ **Hypogonadotropic hypogonadism (hypothalamic/pituitary)** — treat the underlying cause (weight restoration, reduce excessive exercise, treat systemic illness); pulsatile GnRH or exogenous gonadotropins for ovulation/fertility induction (including in Kallmann syndrome); cyclic oestrogen-progestin for secondary sexual character development and bone protection if fertility is not the immediate goal; craniopharyngioma/CNS tumour needs neurosurgical/oncology referral.
- ▶ **Hyperprolactinaemia** — dopamine agonist (cabergoline/bromocriptine); pituitary imaging if a macroadenoma is suspected.
- ▶ **Congenital adrenal hyperplasia/adrenal cause** — glucocorticoid replacement; clitoroplasty if clitoromegaly present.
- ▶ **Thyroid dysfunction** — levothyroxine replacement.
- ▶ **Asherman syndrome/unresponsive endometrium** — hysteroscopic adhesiolysis, followed by an intrauterine device or paediatric Foley catheter for 7–10 days with antibiotic cover, then high-dose cyclic oestrogen-progestin to prevent re-adhesion.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Diagnostic algorithm for primary amenorrhoea.

High-yield exam pointers

- ▶ Cut-offs: **no periods by 16y** (with normal secondary sexual characters) or **by 14y** (without them) = primary amenorrhoea.
- ▶ Two-axis clinical sieve to memorise: **breast present/absent** (oestrogen status) × **uterus present/absent** (Müllerian status).
- ▶ MRKH vs AIS in a "normal-breast, absent-uterus" girl: pubic/axillary hair and karyotype (46,XX vs 46,XY) clinch it.
- ▶ Y-chromosome material on karyotype → gonadectomy **at diagnosis**; complete AIS → gonadectomy **deferred to after puberty**.
- ▶ Turner stigmata: short stature, webbed neck, cubitus valgus, coarctation of aorta, streak gonads, 45,X.
- ▶ Hypergonadotropic hypogonadism → karyotype mandatory; isolated hypogonadotropic hypogonadism → MRI brain to rule out a CNS lesion, karyotype not routinely needed.
- ▶ Never aspirate a hematocolpos with a needle — cruciate incision only.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older texts still quote 40%/12% for renal/skeletal anomaly rates in Müllerian agenesis and describe immediate gonadectomy across the board; current teaching (Berek & Novak's Gynecology 16e) reserves immediate gonadectomy for a Y-bearing gonadal-dysgenesis karyotype and defers it in complete androgen insensitivity syndrome until after puberty.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e;
DC Dutta's Textbook of Gynaecology 7e.



A 18 year old college student with history of irregular cycles since menarche presents with amenorrhoea of 8 months duration. Her height is 162cm and weight is 75kg. what will you look for in clinical examination? Discuss the investigations and treatment

Asked in: Paper III 29-Sep-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Oligomenorrhea since menarche progressing to 8 months of secondary amenorrhea, in a girl with a body mass index (BMI) of 28.6 kg/m^2 ($75 \text{ kg}/1.62 \text{ m}^2$; overweight, bordering obese), is the classic presentation of **polycystic ovary syndrome (PCOS)** — the commonest cause of chronic anovulation in adolescents. Diagnosis rests on the *Rotterdam* 2003 criteria (2 of 3: oligo/anovulation, clinical/biochemical hyperandrogenism, polycystic ovarian morphology on ultrasonography), after excluding other endocrinopathies that mimic it.

Clinical examination

Component	What to look for
General/anthropometric	Height, weight, BMI (calculate — here 28.6 kg/m^2 , overweight); waist circumference/waist-hip ratio (central obesity, ratio >0.85); blood pressure (metabolic syndrome)
Secondary sexual characters	Tanner staging of breast and pubic hair (assess whether puberty completed); look for underdevelopment suggesting a non-PCOS cause
Hyperandrogenism	Hirsutism — score with modified <i>Ferriman-Gallwey</i> scale (upper lip, chin, chest, back, abdomen, arms, thighs; score ≥ 8 = hirsutism); acne (face, chest, back); androgenic (frontotemporal) alopecia; clitoromegaly/deepened voice/frank virilization (rare in PCOS — if present, suspect an androgen-secreting tumour)
Insulin resistance	Acanthosis nigricans — thickened, grey-brown, velvety skin at nape of neck, axillae, groin, inner thighs

Component	What to look for
Other endocrinopathy stigmata	Thyroid — enlargement/nodularity (hypothyroidism); galactorrhoea on breast expression (hyperprolactinoma); Cushingoid features — moon facies, buffalo hump, purple striae, proximal myopathy (Cushing syndrome); skin hyperpigmentation/hypotension (adrenal)
Abdominal examination	Any palpable pelvic mass; striae; hepatomegaly (metabolic-associated fatty liver)
Pelvic (per speculum + bimanual, or per rectal if virgo intacta)	Uterus size/position; bilaterally enlarged, mildly tender ovaries (may be missed on bimanual if obese — hence transvaginal/transabdominal ultrasound is needed); adnexal masses to exclude androgen-producing ovarian/adrenal tumour

Investigations

1. First, rule out pregnancy — urine/serum β -hCG (mandatory first test in any reproductive-age secondary amenorrhoea).

2. Confirm PCOS — Rotterdam 2003 criteria (2 of 3 needed)

Criterion	Defining finding
Oligo/anovulation	History of irregular cycles/amenorrhoea (present in this case)
Clinical/biochemical hyperandrogenism	Ferriman–Gallwey ≥ 8 , or raised total/free testosterone
Polycystic ovarian morphology	Transvaginal ultrasound: ovarian volume $>10 \text{ cm}^3$ and/or ≥ 12 follicles of 2–9 mm arranged peripherally ("string of pearls")

3. Hormonal panel (also serves to exclude mimics)

Test	Purpose/expected finding
LH, FSH	LH raised, LH:FSH ratio $>2:1$ (supportive, not diagnostic)
Total/free testosterone, DHEAS	Mild elevation in PCOS (testosterone $>150 \text{ ng/dL}$ suggests need to exclude tumour)
17-hydroxyprogesterone	Excludes late-onset (non-classic) congenital adrenal hyperplasia
TSH	Excludes hypo-/hyperthyroidism
Prolactin	Excludes hyperprolactinaemia

Test	Purpose/expected finding
SHBG	Typically low (raises free androgen)

4. **Metabolic screen** (given BMI 28.6 kg/m²) — 75 g **oral glucose tolerance test** (fasting and 2-hour glucose; fasting insulin/glucose ratio <4.5 suggests insulin resistance), fasting **lipid profile**, and reassessment of BP/waist circumference for metabolic syndrome.

5. **Imaging/other** — **Transvaginal ultrasonography** is the investigation of choice for ovarian morphology (transabdominal if virgo intacta, though less sensitive in obesity); endometrial thickness should be noted (chronic anovulation → unopposed oestrogen → endometrial hyperplasia risk); **endometrial biopsy** if endometrial thickness is markedly increased or bleeding is abnormal. Diagnostic laparoscopy is not required for diagnosis but may incidentally show typical enlarged, pearly-white, polycystic ovaries.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 35.4 — Diagnostic algorithm for polycystic ovary syndrome (Berek & Novak 16e, p.2108)

Treatment

General measure (first-line for all, regardless of fertility desire): **Weight reduction** — even a 5–10% weight loss through diet and exercise restores ovulatory cycles, improves insulin resistance, hyperandrogenism, and fertility; target BMI <25 kg/m².

A. Fertility not desired (menstrual regulation and endometrial protection)

Problem	Treatment
Irregular cycles / endometrial protection	Combined oral contraceptive pills (drug of choice) — regularize cycles, protect against endometrial hyperplasia; newer progestins (e.g., desogestrel) preferred for lower androgenicity
Metabolic syndrome/insulin resistance	Metformin 500 mg starting dose, increased gradually (over 4–6 weeks) to 500 mg three times daily — improves insulin sensitivity, weight, LDL, and blood pressure
Hirsutism/acne	Antiandrogens — cyproterone acetate, spironolactone, or flutamide (used with contraception, as these are teratogenic)
Endometrial hyperplasia	Cyclic progestins or COCs; endometrial biopsy if bleeding is abnormal or endometrium is thickened

B. Fertility desired (ovulation induction) — correct BMI and metabolic abnormalities first, then:

- **Letrozole** (aromatase inhibitor) 2.5 mg/day for 5 days from cycle day 3–5, increased in 2.5 mg increments to a maximum of 7.5 mg/day if no ovulation — current evidence (including the

PPCOS II trial) shows letrozole gives higher ovulation and live-birth rates than clomiphene and is now favoured as the first-line agent.

- ▶ **Clomiphene citrate** 50 mg/day for 5 days (cycle days 5–9), increased by 50 mg increments each cycle up to 150 mg/day if anovulatory — the classical first-line agent, still widely used; combining with **metformin** improves ovulation rates in obese, insulin-resistant women.
- ▶ If clomiphene/letrozole-resistant — **gonadotropins** (purified/recombinant FSH or human menopausal gonadotropin) with hCG trigger, under ultrasound monitoring for multifollicular development/ovarian hyperstimulation risk.
- ▶ **Laparoscopic ovarian drilling (LOD)** — for clomiphene-resistant PCOS; monopolar diathermy punctures (4–8 punctures, 2–4 mm depth, 20–30 W) per ovary; has replaced wedge resection; avoids multiple pregnancy risk of gonadotropins.
- ▶ **In vitro fertilization** — reserved for those who fail the above or have coexisting infertility factors.
- ▶ **Bariatric surgery** may be considered in morbidly obese women with PCOS unresponsive to lifestyle measures.

High-yield exam pointers

- ▶ BMI = weight(kg)/height(m)²; here $75/1.62^2 = 28.6 \text{ kg/m}^2$ — state it explicitly, examiners look for the calculation.
- ▶ **Rotterdam 2003 criteria** — 2 of 3: oligo/anovulation + hyperandrogenism (clinical/biochemical) + polycystic ovaries on ultrasound (>10 cm³ or ≥12 follicles 2–9 mm), after excluding mimics.
- ▶ Mimics to exclude by name: hypothyroidism (TSH), hyperprolactinaemia (prolactin), late-onset CAH (17-OHP), Cushing syndrome, androgen-secreting tumour.
- ▶ Acanthosis nigricans = insulin resistance marker; Ferriman–Gallwey ≥8 = hirsutism.
- ▶ Drug doses to write exactly: clomiphene 50 mg (days 5–9, max 150 mg); letrozole 2.5 mg (days 3–5, max 7.5 mg); metformin 500 mg start, up to 500 mg tds.
- ▶ First-line if fertility not desired = COCs; first-line ovulation induction (current evidence) = letrozole; classical agent = clomiphene ± metformin.
- ▶ Always do β-hCG first in any reproductive-age woman with amenorrhoea.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Gynaecology (Indian exam standard) still presents clomiphene citrate as the default ovulation-induction agent; current international evidence (Legro et al., PPCOS II trial) and recent guidance favour letrozole as first-line for anovulatory PCOS given higher live-birth rates — both are acceptable exam answers, but letrozole should be named as the current preferred agent.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group (2003) diagnostic criteria.



A 30-year-old patient presents with Infertility, Galactorrhea and Amenorrhea. Briefly describe the diagnosis and management

Asked in: Paper III 18-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — This triad points to **hyperprolactinemia**, the most common endocrine cause of infertility and secondary amenorrhea in reproductive-age women. Excess prolactin disrupts hypothalamic gonadotropin-releasing hormone (GnRH) pulsatility, causing hypogonadotropic hypogonadism, anovulation and, when estrogen is adequate, inappropriate lactation (galactorrhea) unrelated to childbirth.

Approach to diagnosis

- ▶ **History** — menstrual pattern (oligo-/amenorrhea), drug intake (antipsychotics, metoclopramide, antihypertensives, opioids, cimetidine, hormonal contraceptives), visual symptoms/headache (mass effect), symptoms of hypothyroidism, breast/chest wall surgery or herpes zoster, renal disease, infertility duration and partner's semen analysis.
- ▶ **General & breast examination** — expressible or spontaneous milky discharge (confirm fat globules on microscopy), visual field testing for bitemporal hemianopia, signs of hypothyroidism.
- ▶ **Baseline investigations** (mandatory in every case of amenorrhea/galactorrhea):

Test	Purpose/finding
Serum prolactin (fasting, non-stressed sample)	Random level <15–20 ng/mL excludes hyperprolactinemia; 20–40 ng/mL is repeated to confirm before labelling hyperprolactinemia; >100 ng/mL strongly suggests a macroprolactinoma
Serum TSH ± free T4	Excludes primary hypothyroidism, a treatable cause of secondary hyperprolactinemia (raised hypothalamic TRH drive)
Serum FSH, LH, estradiol	Confirms hypogonadotropic state; excludes premature ovarian failure (FSH >40 mIU/mL)
Urine/serum β-hCG	Excludes pregnancy before any further work-up

Test	Purpose/finding
PEG precipitation of serum	Confirms macroprolactinemia (biologically inert "big prolactin") if prolactin is mildly raised with normal cycles
MRI sella with gadolinium contrast	Investigation of choice once a non-physiological, non-drug cause of hyperprolactinemia is confirmed — localises and sizes a pituitary adenoma

- **Classify the adenoma on MRI:** tumours <10 mm = **microadenoma**; ≥10 mm = **macroadenoma** (Speroff 9e). Macroadenomas are more likely to cause mass effect (headache, bitemporal hemianopia from optic chiasm compression, cranial nerve palsy, hypopituitarism).

Causes of hyperprolactinemia

Category	Examples
Physiological	Pregnancy, lactation, sleep, stress, exercise, nipple stimulation, coitus
Pharmacological	Phenothiazines, metoclopramide, antipsychotics, tricyclic antidepressants, methyl dopa, verapamil, cimetidine, opiates, high-dose combined oral contraceptives
Pathological — pituitary	Prolactinoma (micro/macroadenoma) — commonest pathological cause; other functioning/non-functioning adenomas compressing the stalk
Pathological — hypothalamic/stalk	Craniopharyngioma, meningioma, stalk section, empty sella
Pathological — systemic	Primary hypothyroidism (raised TRH), chronic renal failure (reduced clearance), cirrhosis
Pathological — chest wall	Herpes zoster, thoracotomy scar, chronic nipple stimulation/ill-fitting brassiere
Ectopic	Bronchogenic carcinoma, renal cell carcinoma, ovarian teratoma/gonadoblastoma
Idiopathic	No demonstrable cause found on MRI

Management

Principle: treat the underlying cause; a dopamine agonist is first-line for functional/idiopathic hyperprolactinemia and for prolactinomas of any size when fertility, troublesome galactorrhea, or a large macroadenoma is the concern.

- **Correct a reversible cause first** — stop/replace the offending drug (in consultation with the prescriber); treat hypothyroidism with levothyroxine, which usually normalises prolactin.

- **Medical therapy — dopamine agonists** (drug of choice for prolactinoma and idiopathic hyperprolactinemia):

Drug	Starting dose	Titration/maintenance	Notes
Bromocriptine (non-selective D1/D2 agonist)	1.25–2.5 mg at bedtime with food	Increase gradually; usual effective dose 2.5–5 mg twice daily (up to 10 mg/day in resistant cases)	Shorter acting; more gastrointestinal/orthostatic side effects (nausea, dizziness, postural hypotension); long safety record in pregnancy
Cabergoline (selective D2 agonist)	0.25 mg twice weekly	Increase every ~4 weeks; most respond to 0.5–1.0 mg/week (rarely >2 mg/week)	More effective, better tolerated, twice-weekly dosing improves compliance; preferred first choice in most women (Speroff 9e)

- Serum prolactin is checked at monthly intervals until normalised; menses/ovulation typically return within 6–8 weeks.
 - Vaginal administration of either drug is an option if oral intolerance occurs.
 - Cabergoline and bromocriptine are both considered safe if conception occurs on treatment; cabergoline is usually stopped once pregnancy is confirmed (bromocriptine has the longer track record and is preferred by some if a macroadenoma needs continued control in pregnancy).
 - A trial of drug discontinuation may be attempted once prolactin has been normal for **2 years or more** with no residual tumour on repeat MRI (recurrence of hyperprolactinemia is common, more so with macroadenomas).
- **Fertility desired:** dopamine agonist therapy alone restores ovulation in the majority; if anovulation persists despite normoprolactinemia, add clomiphene citrate or exogenous gonadotropins for ovulation induction.
- **Fertility not desired, microadenoma, normal estrogen:** can be followed without treatment (annual prolactin ± MRI); combined oral contraceptives may be used as they do not stimulate microadenoma growth.
- **Surgery** (transnasal–transsphenoidal adenomectomy) — indicated for:
- Failure of, intolerance to, or resistance to dopamine agonists.
 - Large macroadenoma (e.g., >3 cm) with persistent visual field defect despite medical therapy, or a patient wanting rapid tumour reduction before planned pregnancy.
 - Pituitary apoplexy.

- Complications: cerebrospinal fluid (CSF) rhinorrhoea, meningitis, transient/permanent diabetes insipidus, hypopituitarism, and tumour recurrence (up to about 20–25% long-term).
- ▶ **Radiotherapy** — reserved for large macroadenomas with significant residual tumour after failed surgery/medical therapy; response is slow (months to years); risk of delayed panhypopituitarism.
- ▶ **Follow-up:** serum prolactin and clinical review at regular intervals; MRI repeated at 6–12 months (macroadenoma) to document shrinkage; monitor visual fields serially in macroadenoma.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 61.6 — Magnetic resonance imaging of a pituitary adenoma (sagittal T1-weighted image) (Williams Obstetrics 26e, p.1118)

Alternatively, sketch a simple diagnostic flowchart: Infertility + galactorrhea + amenorrhea → serum prolactin/TSH/β-hCG → prolactin raised & confirmed → exclude drug/hypothyroid cause → MRI sella → microadenoma (<10 mm) vs macroadenoma (≥10 mm) → dopamine agonist first-line → surgery/radiotherapy if resistant or complicated.

High-yield exam pointers

- ▶ Triad = **hyperprolactinemia** until proven otherwise; only about one-third of hyperprolactinemic women actually have galactorrhea (needs adequate estrogen).
- ▶ Microadenoma <10 mm; macroadenoma ≥10 mm — write this cut-off explicitly.
- ▶ Random prolactin <15–20 ng/mL normal; >100 ng/mL suggests prolactinoma; always repeat a mildly raised level before labelling disease.
- ▶ Always rule out **pregnancy, drugs, and hypothyroidism (TSH)** before imaging.
- ▶ Cabergoline 0.25 mg twice weekly vs bromocriptine 1.25–2.5 mg at bedtime, up-titrated — write both starting doses.
- ▶ MRI with gadolinium = imaging of choice for the sella.
- ▶ Surgery = **transsphenoidal adenomectomy**, reserved for medical failure/resistance or complicated macroadenoma.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Williams Obstetrics 26e (figure).

♦ ♦ ♦

A 35 years old multiparous woman presents with amenorrhoea of one-year duration. Discuss causes, evaluation and management of the same

Asked in: Paper III 02-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Secondary amenorrhoea is the absence of menstruation for six months or more (or three previous cycle-lengths) in a woman who has previously menstruated normally. In any multiparous woman of reproductive age presenting this way, pregnancy must be excluded before any pathological work-up is pursued; her obstetric history (mode of delivery, postpartum haemorrhage, curettage, breastfeeding) is directly relevant to several of the causes below.

Causes

Level	Cause	Mechanism / note
Physiological	Pregnancy, lactational amenorrhoea	Commonest cause at this age — always excluded first
Uterine/outflow tract	Asherman syndrome (intrauterine synechiae)	Follows postpartum or post-abortion curettage (rarely tubercular endometritis); progesterone challenge test negative
Ovarian	Polycystic ovary syndrome (PCOS)	Tonic luteinising hormone (LH)/androgen excess causes chronic anovulation — commonest endocrine cause of secondary amenorrhoea overall
	Premature ovarian insufficiency (POI), before age 40	Accelerated follicular depletion → hypergonadotropic hypogonadism; genetic, autoimmune, iatrogenic (chemotherapy/radiotherapy) or idiopathic
	Resistant ovary (Savage) syndrome	Follicles present but unresponsive — defective follicle-stimulating hormone (FSH) receptor
Pituitary	Hyperprolactinaemia/prolactinoma	Raised prolactin suppresses gonadotropin-releasing hormone (GnRH) pulsatility
	Sheehan syndrome	Ischaemic pituitary necrosis after severe postpartum haemorrhage/shock — relevant in a multiparous woman

Level	Cause	Mechanism / note
	Cushing disease	Adrenocorticotrophic hormone (ACTH)-driven cortisol/androgen excess opposes oestrogen action
Hypothalamic	Stress, rapid weight loss/gain, excessive exercise, anorexia nervosa	Reduced GnRH pulse frequency (opioid/leptin-mediated)
Thyroid/adrenal/systemic	Hypothyroidism, late-onset congenital adrenal hyperplasia, adrenal tumour, malnutrition, tuberculosis, chronic nephritis	Hypothyroid state raises thyrotropin-releasing hormone (TRH) → secondary hyperprolactinaemia; androgen excess opposes oestrogen
Iatrogenic	Post-pill amenorrhoea, dopamine-antagonist/antihypertensive drugs, prior pelvic radiotherapy	Usually self-limited once the drug is stopped

Evaluation

- ▶ **History** — mode of onset (abrupt or preceded by oligomenorrhoea), obstetric history (last delivery, postpartum haemorrhage/shock, postpartum or post-abortion curettage, current breastfeeding), galactorrhoea, hirsutism/acne/virilisation, hot flushes/vaginal dryness, headache/visual disturbance, weight change, stress/strenuous exercise, drug history, family history of premature menopause.
- ▶ **General and pelvic examination** — body mass index (BMI), thyroid, breast discharge, acne/hirsutism/acanthosis nigricans, abdominal striae, clitoromegaly, adnexal mass.
- ▶ **First-line laboratory tests (mandatory in every case)** — serum or urine beta human chorionic gonadotropin (β -hCG), serum prolactin, thyroid-stimulating hormone (TSH) — done even without galactorrhoea or clinical thyroid signs.
- ▶ If these are normal, proceed through the dynamic hormonal work-up in Table below.
- ▶ **Imaging/karyotype as indicated** — transvaginal ultrasonography (polycystic ovaries, endometrial thickness), magnetic resonance imaging (MRI) sella if prolactin is raised or a pituitary/hypothalamic tumour is suspected, karyotype if age under 30 years with confirmed POI, hysteroscopy for definitive diagnosis (and treatment) of synechiae.

Test	Interpretation
Progesterone challenge test — medroxyprogesterone acetate 10 mg/day orally for 5–10 days	Withdrawal bleed → intact hypothalamic–pituitary–ovarian (HPO) axis, endogenous oestradiol >40 pg/mL, patent outflow tract, responsive endometrium. No bleed → proceed to next test

Test	Interpretation
Oestrogen–progesterone challenge test — ethinyl oestradiol 0.02 mg (or conjugated equine oestrogen 1.25 mg) daily for 25 days, with medroxyprogesterone acetate 10 mg added on days 15–25	Bleed → oestrogen-deficient state (ovarian/pituitary/hypothalamic cause) — proceed to gonadotropin estimation. No bleed → uterine/outflow-tract lesion (Asherman syndrome) — confirm by hysterosalpingography (honeycomb appearance) or hysteroscopy
Serum FSH, LH	FSH >40 mIU/mL on two samples 4 weeks apart → premature ovarian insufficiency (hypergonadotropic hypogonadism). Normal or low FSH → hypothalamic–pituitary cause; a GnRH stimulation test (rise in gonadotropins) then distinguishes hypothalamic from primary pituitary disease
Pelvic ultrasonography	Polycystic ovaries — ≥12 follicles of 2–9 mm and ovarian volume ≥10 cm ³ (with oligo/anovulation and/or clinical or biochemical hyperandrogenism, two of three Rotterdam criteria confirm PCOS)

Management

Cause confirmed	Management
Pregnancy	Routine antenatal booking and care
No abnormality detected, patient not anxious	Reassurance only — spontaneous resumption occurs in up to 60% of women with amenorrhoea of over a year's duration
No abnormality, fertility not desired	Normal oestrogen: cyclic combined oral contraceptive pills for at least 3 cycles. Low oestrogen: sequential ethinyl oestradiol 0.02 mg (or conjugated equine oestrogen 1.25 mg) daily for 25 days with medroxyprogesterone acetate 10 mg on days 16–25
Hyperprolactinaemia/prolactinoma	Dopamine agonist — cabergoline 0.25 mg or 0.5 mg once or twice weekly (preferred: fewer side effects, better tolerated) or bromocriptine as alternative; trans-sphenoidal adenectomy reserved for medical failure or a macroadenoma with mass effect
PCOS	Weight reduction and lifestyle change first; combined oral contraceptives to regulate cycles and prevent endometrial hyperplasia; metformin for insulin resistance; clomiphene citrate ± metformin, or laparoscopic ovarian drilling for resistant cases, if fertility is desired

Cause confirmed	Management
Premature ovarian insufficiency	Hormone replacement therapy to prevent osteoporosis and cardiovascular risk; corticosteroids if an autoimmune cause is confirmed; ovulation-induction drugs are largely futile — donor-oocyte in-vitro fertilisation (IVF) is the definitive fertility option
Asherman syndrome	Hysteroscopic adhesiolysis followed by intrauterine device insertion, with a combined oral contraceptive course for about 3 months to aid endometrial regeneration; live-birth rate 70–80% after treatment, recurrence in about 30%
Sheehan syndrome	Lifelong replacement of corticosteroid, thyroid hormone, and oestrogen-progestin; fertility is achieved with human menopausal gonadotropin (hMG) plus human chorionic gonadotropin (hCG) — clomiphene is ineffective as pituitary gonadotropin reserve is destroyed
Hypothyroidism	Levothyroxine 1.6 microgram/kg body weight per day
Hypothalamic (stress/weight/exercise)	Correct the precipitant — nutritional rehabilitation, reduced exercise load, psychotherapy/assurance; pulsatile GnRH or gonadotropins if fertility is desired and the precipitant cannot be fully reversed

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 29.1 — Schematic representation of the coordinated function of the hypothalamic–pituitary–ovarian axis (DC Dutta's Gynaecology 7e, p.390)

High-yield exam pointers

- ▶ First test in every reproductive-age woman with amenorrhoea: β -hCG — pregnancy is the commonest cause.
- ▶ Progesterone challenge test bleed = intact HPO axis + endogenous oestradiol >40 pg/mL + patent outflow tract + responsive endometrium.
- ▶ Rotterdam criteria for PCOS: 2 of 3 — oligo/anovulation, clinical/biochemical hyperandrogenism, polycystic ovaries.
- ▶ POI diagnosis: FSH >40 mIU/mL on two samples 4 weeks apart, age <40 years; karyotype if <30 years.
- ▶ Asherman syndrome: honeycomb pattern on hysterosalpingography; hysteroscopy is both diagnostic and therapeutic.

- ▶ Cabergoline (0.25–0.5 mg once/twice weekly) is first-choice dopamine agonist for hyperprolactinaemia — better tolerated than bromocriptine.
- ▶ Sheehan syndrome — think of it specifically when the amenorrhoea follows a delivery complicated by severe postpartum haemorrhage/shock.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Some current sources accept 3 cycles/3 months of amenorrhoea (in a woman with previously regular cycles) as sufficient to start evaluation, rather than waiting the traditional 6 months quoted in older texts; the underlying causes and evaluation pathway are unchanged.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Rotterdam ESHRE/ASRM 2003 consensus (as cited in Berek & Novak's Gynecology 16e).



Anti sperm antibodies

Asked in: Paper IV May 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Anti-sperm antibodies (ASA) are immunoglobulins (chiefly **IgG** and **IgA**, occasionally **IgM**) directed against sperm-surface antigens, which develop when the normally sequestering blood–testis barrier is breached and sperm antigens are exposed to the immune system. They interfere with fertility by causing sperm **agglutination**, **immobilisation**, or impaired penetration of cervical mucus and the zona pellucida, and are recognised as one of the immunological causes of otherwise-unexplained infertility.

Aetiology / risk factors

Category	Risk factors
Male	Vasectomy or vasectomy reversal (vasovasostomy/vasoepididymostomy) — commonest and most important cause; genital tract infection (orchitis, epididymitis); testicular torsion or trauma; ductal obstruction/obstructive azoospermia; testicular surgery or biopsy
Female	Antibodies detected in cervical mucus or serum after repeated exposure to partner's sperm antigens; mechanism and clinical significance less well defined than in the male

Category	Risk factors
Both	Any process that breaches the blood–testis (blood–sperm) barrier , which normally isolates sperm antigens — these appear only after puberty, once systemic immune tolerance has already been established, so sperm are intrinsically "foreign" to the immune system

Immunology and mechanism of action

Isotype	Site found	Feature
IgG	Cervical mucus, serum, semen	Commonest isotype; can coat head, midpiece, or tail
IgA	Cervical mucus, seminal plasma	Agglutinating antibody
IgM	Serum only	Molecule too large to cross into cervical mucus or semen

- ▶ The **blood–testis barrier** (Sertoli-cell tight junctions) normally prevents sperm autoantigens from reaching the systemic circulation.
- ▶ Trauma, infection, torsion, surgery, or vasectomy breaches this barrier, exposing antigenic sperm to blood/lymphatics and triggering antibody formation (locally in the genital tract and/or systemically).
- ▶ The **site of antibody binding on the sperm** determines the functional effect:
 - **Tail/tail-tip binding** → tail-to-tail agglutination and impaired motility.
 - **Head binding** → head-to-head or mixed agglutination, blocked cervical mucus penetration, and interference with zona pellucida binding/acrosome reaction.
- ▶ Net effects: sperm **agglutination** (head–head, tail–tail, or mixed patterns), **immobilisation**, impaired mucus penetration, and impaired fertilising capacity at the zona pellucida.

When to suspect antisperm antibodies

- ▶ Marked **spontaneous sperm agglutination** or isolated **asthenozoospermia** on an otherwise normal semen analysis.
- ▶ Poor or "shaking" pattern on the **postcoital (Sims–Huhner) test** despite adequate semen parameters and mid-cycle mucus.
- ▶ History of **vasectomy reversal**, genital tract infection, or testicular trauma.
- ▶ **Unexplained infertility** after a complete standard work-up (accounts for 10–20% of infertile couples overall).
- ▶ Failure of conception even after successful surgical reversal of vasectomy.

Investigations

Test	Specimen	Principle / interpretation
Postcoital test (Sims–Huhner test)	Cervical mucus, examined a few hours after coitus at ovulation (day 12–14)	Presence of ≥ 10 progressively motile sperm/high-power field is normal; shaking/immobile sperm suggest an antibody effect — now largely abandoned for cervical-factor diagnosis owing to poor reproducibility and no proven impact on management
Sperm–cervical mucus contact test (SCMCT / Kremer test)	Wife's mid-cycle mucus + husband's semen, cross-checked against donor mucus/sperm	In-vitro cross-over test that localises the antibody defect to the male or the female partner
Sperm agglutination test	Semen	Direct microscopic agglutination pattern (head–head, tail–tail, mixed)
Immunobead test (direct/indirect)	Direct: washed motile sperm; indirect: serum or cervical mucus	Latex beads coated with anti-human-immunoglobulin bind antibody-coated sperm; >50% of motile sperm coated is considered clinically significant; also localises the isotype and the site of binding
Mixed antiglobulin reaction (MAR) test	Fresh semen + IgG/IgA-sensitised red cells or latex particles	Mixed agglutinates of motile sperm with sensitised particles = positive; simpler screening alternative to the immunobead test
Sperm immobilisation test (Isojima test)	Serum + donor sperm + complement	Complement-dependent immobilisation of sperm; of historical interest, rarely performed now

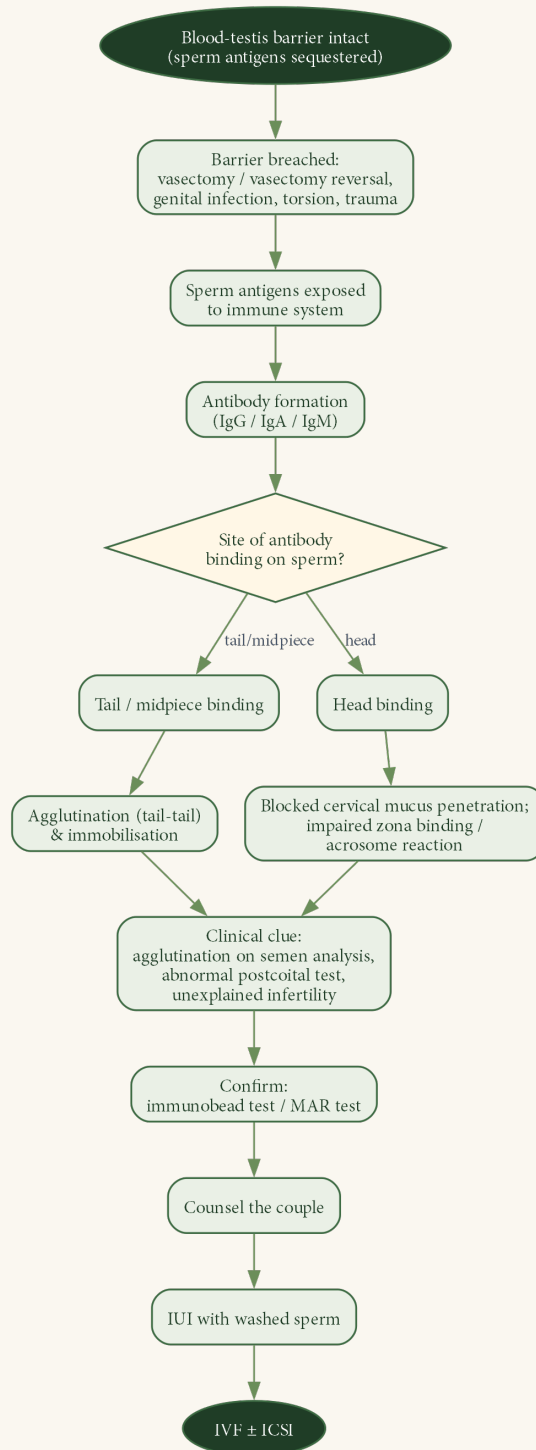
Management

- ▶ **Counsel the couple honestly** — the presence of ASA does not reliably predict infertility, and directed treatment of ASA has not been consistently shown to improve pregnancy rates; for this reason ASA testing itself is now infrequently performed, particularly once assisted reproduction is available.
- ▶ **Condom therapy** for several months to reduce antigenic re-exposure before attempting conception — of doubtful benefit and rarely used today.
- ▶ **Corticosteroid/immunosuppressive therapy** — e.g., **dexamethasone 0.5 mg at bedtime through the follicular phase** for antibodies confined to cervical mucus; no consistent benefit over no

treatment has been demonstrated, and higher-dose systemic steroid regimens carry real risk (including avascular necrosis of bone), so this approach is not favoured.

- ▶ **Intrauterine insemination (IUI) with washed/prepared sperm** — bypasses the antibody-laden cervical mucus and is the treatment of choice when antibody is largely confined to mucus/seminal plasma and semen parameters otherwise permit.
- ▶ **Controlled ovarian hyperstimulation (COH) combined with IUI** if simple IUI cycles fail to achieve pregnancy.
- ▶ **In vitro fertilisation (IVF), with intracytoplasmic sperm injection (ICSI) if needed** — the definitive option, especially when more than half the sperm are antibody-coated or IUI fails; ICSI bypasses antibody-mediated blocks to cervical penetration, zona binding, and the acrosome reaction, though clear proof of its incremental benefit specifically for ASA remains limited.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Algorithm: barrier breach → antibody formation → site-dependent sperm dysfunction → clinical suspicion → immunobead/MAR confirmation → counsel → IUI → IVF/ICSI.

High-yield exam pointers

- ▶ Isotypes and location: **IgG** — mucus/serum/semen; **IgA** — mucus and seminal plasma (agglutinating); **IgM** — serum only (too large for secretions).
- ▶ Immunobead test positive/clinically significant when **>50% of motile sperm are antibody-coated**.
- ▶ Cervical-factor ASA treatment dose: **dexamethasone 0.5 mg at bedtime, follicular phase** — but of no proven benefit.
- ▶ Postcoital test = **Sims-Huhner test**; now largely abandoned for cervical/antibody-factor infertility.
- ▶ Site of binding determines effect — **tail binding** → agglutination/immotility; **head binding** → blocked mucus penetration and zona binding.
- ▶ Treatment ladder to remember: counsel → (condoms/steroids — doubtful value) → **IUI** → **IVF/ICSI** (definitive).
- ▶ Commonest single risk factor: **vasectomy or its surgical reversal**.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

ASA testing is performed far less often in current practice because treatment directed at the antibody has not reliably improved pregnancy outcomes, and intrauterine insemination, in vitro fertilisation, and intracytoplasmic sperm injection bypass the antibody effect regardless of the test result.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; Jeffcoate's Principles of Gynaecology 9e.



ART in pregnancy HIV infected women

Asked in: Paper II 26-Sep-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Antiretroviral therapy (ART) is combination drug treatment against the human immunodeficiency virus (HIV) given to every HIV-infected pregnant woman, started as early as possible and continued through labour and lifelong postpartum. In pregnancy its dual purpose is to

treat the mother's infection and to suppress her plasma viral load so as to prevent mother-to-child transmission (MTCT) of HIV.

Goals and principles of ART in pregnancy

- ▶ **Universal treatment** — ART is offered to *all* pregnant women with HIV regardless of CD4+ count or viral load ("test and treat"); it is never withheld to "wait and watch."
- ▶ **Never monotherapy** — at least **three antiretroviral agents** are used together to maximally suppress viral replication and prevent resistance.
- ▶ **Start early** — initiated as soon as HIV is diagnosed in pregnancy (ideally pre-conceptionally if already known positive) to achieve an undetectable viral load well before delivery.
- ▶ **Continue lifelong** — the regimen is not stopped after delivery; postpartum continuation preserves maternal health and lowers vertical transmission risk in a future pregnancy.
- ▶ **Adherence is emphasised** — poor compliance is the chief driver of resistance and treatment failure.

Antenatal ART — initiation by clinical scenario

Clinical scenario	Action
Already on ART, becomes pregnant	Continue the same regimen if viral suppression is adequate and the drugs are tolerated/safe in pregnancy
ART-naïve	Start ART regardless of trimester, CD4 count or viral load
Prior ART use, not currently on treatment	Send HIV drug-resistance testing, but do not delay starting ART while awaiting the result; choose regimen based on prior drug history
Presents in labour, no antenatal ART	Start intravenous zidovudine (ZDV) intrapartum (below) and begin oral ART postpartum

First-line drug regimen and monitoring

Anti-HIV drugs used in pregnancy are grouped as: **NRTIs** (zidovudine, lamivudine, abacavir, tenofovir), **NNRTIs** (nevirapine, efavirenz), **protease inhibitors/PI** (atazanavir, darunavir, ritonavir, indinavir, saquinavir), and **integrase inhibitors** (dolutegravir, raltegravir).

Component	Preferred agents (current)	Notes
NRTI backbone (2 drugs)	Tenofovir disoproxil fumarate (TDF) 300 mg + lamivudine (3TC) 300 mg once daily, or TDF + emtricitabine (FTC); alternative abacavir/lamivudine	Test *HLA-B*5701** before abacavir to avoid hypersensitivity

Component	Preferred agents (current)	Notes
Third agent	Dolutegravir (DTG) 50 mg once daily — current WHO/NACO/DHHS preferred first-line third agent	Do not give within 2 hours of prenatal vitamins/iron/calcium (chelation reduces absorption); ritonavir-boosted atazanavir or darunavir is the alternative third agent
Older/alternative regimen	TDF 300 mg + 3TC 300 mg + efavirenz (EFV) 600 mg once daily	Widely quoted first-line regimen in older texts/NACO 2013; still used where dolutegravir is unavailable

Monitoring: CD4+ count at baseline and every 3–6 months; HIV RNA viral load at baseline, 2–4 weeks after starting/changing ART, monthly until undetectable, then every 3 months, and again at 34–36 weeks to plan mode of delivery. If viral load is ≥ 500 –1000 copies/mL, send resistance testing but start ART without delay. Women on ART are additionally screened for gestational diabetes.

Intrapartum ART and delivery planning

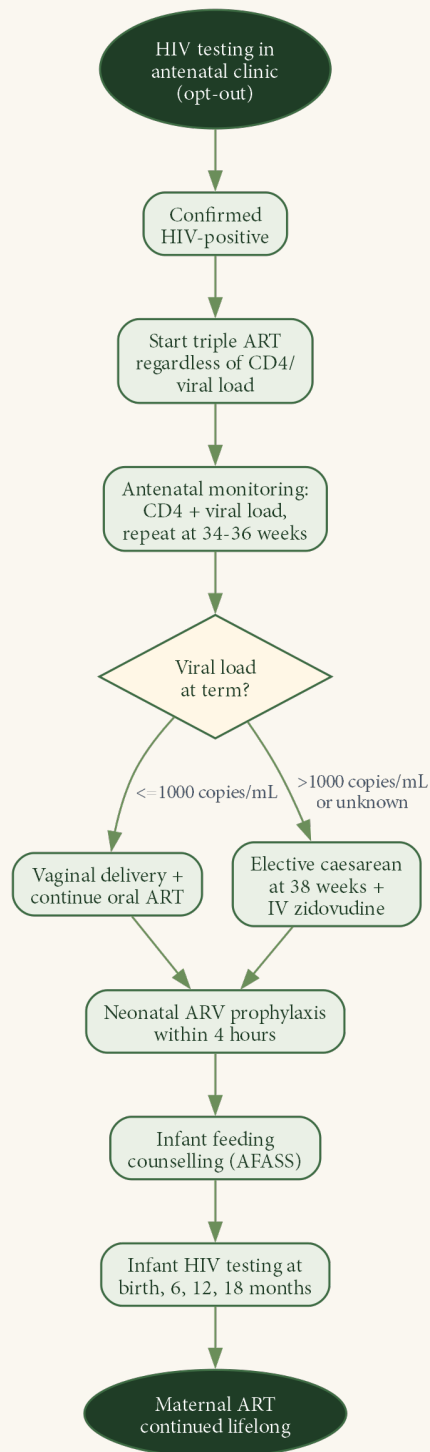
Viral load near delivery	Delivery plan	Intravenous zidovudine
>1000 copies/mL or unknown	Plan elective caesarean at 38 weeks, before labour/rupture of membranes	Start IV ZDV 4 hours before the scheduled caesarean
≤ 1000 copies/mL, adherent to oral ART	Vaginal delivery is permitted; caesarean not routinely needed	IV ZDV may be omitted if oral ART regimen is confirmed and viral load <50 copies/mL at 34–36 weeks
Any woman in labour, unknown/untreated	Vaginal or caesarean per obstetric indication	Start IV ZDV intrapartum regardless

- ▶ **IV zidovudine dosing:** loading dose 2 mg/kg over 1 hour, then continuous infusion 1 mg/kg/hour until cord clamping.
- ▶ Continue the woman's oral ART regimen through labour (sips of water permitted).
- ▶ **Avoid** wherever possible: artificial rupture of membranes, fetal scalp electrode, fetal scalp pH sampling, episiotomy and instrumental (ventouse/forceps) delivery unless obstetrically essential; avoid prolonged labour and prolonged rupture of membranes.
- ▶ Universal precautions in theatre/labour room: double gloves, gown, mask, protective eyewear, blunt-tipped needles.
- ▶ **Postpartum haemorrhage** is managed with oxytocin and prostaglandin analogues; **ergot alkaloids (methylergometrine) are avoided** — they interact with protease inhibitors/NNRTIs to cause severe vasoconstriction.

Neonatal ART prophylaxis and infant feeding

- ▶ Every neonate receives ARV prophylaxis within **4 hours of birth**, irrespective of the feeding choice.
- ▶ **Zidovudine syrup**: 15 mg/dose twice daily if birth weight >2.5 kg; 10 mg/dose twice daily if ≤2.5 kg, continued for 4–6 weeks. **Nevirapine** (15 mg once daily if >2.5 kg, or 10 mg once daily if ≤2.5 kg, for 4–6 weeks) is an accepted alternative.
- ▶ High-risk neonates (mother untreated or poorly suppressed) receive intensified dual/triple ARV prophylaxis.
- ▶ Infant HIV testing at birth and at 6, 12 and 18 months; a negative confirmatory antibody test at 18 months declares the child HIV-free.
- ▶ **Feeding**: replacement (formula) feeding is preferred where it is Affordable, Feasible, Acceptable, Sustainable and Safe (AFASS); where it is not, WHO recommends **exclusive breastfeeding for the first 6 months** with maternal/infant ARV cover, since mixed feeding carries the highest transmission risk.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

PMTCT (prevention of mother-to-child transmission) cascade from antenatal HIV testing through delivery-mode decision to infant follow-up.

High-yield exam pointers

- ▶ Triple-drug ART for **all** HIV-positive pregnant women, regardless of CD4/viral load — never monotherapy.
- ▶ Preferred current backbone: 2 NRTIs (TDF + 3TC/FTC) + **dolutegravir 50 mg OD**; efavirenz-based regimen is the older/alternative first-line.
- ▶ IV zidovudine intrapartum: **2 mg/kg loading over 1 hr, then 1 mg/kg/hr** till cord clamping.
- ▶ Delivery mode cut-off: viral load >1000 copies/mL or unknown → **elective LSCS at 38 weeks**.
- ▶ Infant prophylaxis: **zidovudine 15 mg (or 10 mg if <2.5 kg) BD** or **nevirapine OD** for 4–6 weeks, started within 4 hours of birth.
- ▶ Avoid **ergometrine/methylergonovine** in a woman on protease inhibitors/NNRTIs — severe vasoconstriction interaction.
- ▶ Avoid instrumentation, ARM, scalp electrode/pH sampling, and prolonged ROM to cut intrapartum transmission risk.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Guideline thresholds vary and are updated frequently — DC Dutta's Obstetrics still quotes the RCOG-2010 cut-off (viral load 50 copies/mL) and an efavirenz-based first-line regimen, whereas current DHHS/ACOG (as in Williams Obstetrics 26e) and WHO/NACO practice prefer a dolutegravir-based regimen and a 1000 copies/mL threshold for planning caesarean delivery; follow current national ART guidelines in practice.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e. Current guideline context: DHHS/ACOG Panel on Treatment of Pregnant Women with HIV Infection and Prevention of Perinatal Transmission (2021, as cited in Williams 26e); WHO/NACO perinatal ART programme guidance.



Critically evaluate ovulation induction drugs

Asked in: Paper I 16-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — Ovulation induction (OI) is the pharmacological stimulation of mono- or oligo-follicular development and ovulation in an anovulatory or oligo-ovulatory woman to restore fertility. Drug choice is dictated by the **WHO classification of anovulation**: Group I (hypogonadotropic hypogonadism — hypothalamic amenorrhoea), Group II (normogonadotropic normo-oestrogenic — polycystic ovary

syndrome (PCOS), the commonest cause), and Group III (hypergonadotropic hypogonadism — ovarian failure, in whom OI drugs do not work).

Classification of ovulation induction drugs

Category	Agent(s)	Best-suited WHO group
Selective oestrogen-receptor modulator (SERM)	Clomiphene citrate (CC)	Group II (PCOS) — traditional first-line
Aromatase inhibitor	Letrozole (anastrozole less used)	Group II — now the preferred first-line agent
Gonadotropins	Urinary/recombinant FSH, human menopausal gonadotropin (hMG), hCG (trigger)	Group I (obligatory) and CC/letrozole-resistant Group II
Pulsatile gonadotropin-releasing hormone (GnRH)	GnRH via portable infusion pump	Group I — most physiological
Insulin sensitiser	Metformin	Adjunct in PCOS with insulin resistance
Dopamine agonist	Bromocriptine, cabergoline	Hyperprolactinaemic anovulation (any group)

Individual drugs — mechanism, regimen and efficacy

Drug	Mechanism	Regimen	Reported outcome
Clomiphene citrate	Competitive oestrogen-receptor antagonist at the hypothalamus → blocks negative feedback → increases GnRH pulsatility → raises FSH/LH	50 mg/day orally for 5 days, started cycle day 2–5; increase by 50 mg increments each subsequent anovulatory cycle to a maximum of 150 mg/day	Ovulation in 70–80% of properly selected women; cumulative pregnancy 70–75% over 6–9 cycles; beyond 6 ovulatory cycles, benefit falls sharply
Letrozole	Aromatase inhibitor → transient fall in oestrogen releases the hypothalamic–pituitary axis from feedback + intra-ovarian androgen accumulation sensitises the follicle to FSH	2.5 mg/day orally for 5 days, started cycle day 3–5; if anovulatory, increase by 2.5 mg increments to a maximum of 7.5 mg/day	Randomised data: ovulation 88.5% vs 76.6% with CC; live birth 27.5% vs 19.1%; a 2018 systematic review confirms higher live-birth odds than CC (OR 1.79)

Drug	Mechanism	Regimen	Reported outcome
Gonadotropins (FSH/hMG)	Direct ovarian follicular recruitment, bypassing the hypothalamic-pituitary axis	Low-dose step-up: starting dose 37.5–75 IU/day (unexplained infertility/intrauterine insemination (IUI) protocols) up to 150–300 IU/day (in-vitro fertilisation (IVF) protocols); titrated by serial transvaginal scan (TVS) and serum oestradiol	Higher per-cycle pregnancy rate than CC/letrozole, but at a significantly higher multiple-pregnancy rate
hCG (ovulation trigger)	Acts as an LH surrogate to complete final oocyte maturation	5,000–10,000 IU intramuscularly (or 250 µg recombinant hCG) once the leading follicle reaches maturity, then intercourse/IUI/oocyte retrieval timed 24–40 hours later	Used with any of the above once the follicular cohort is mature
Pulsatile GnRH	Restores a physiological pulsatile signal to the pituitary gonadotrophs	Intravenous pump, 2.5–5 µg/pulse every 60–90 minutes (increase to 10–20 µg/pulse if resistant); subcutaneous route needs a higher dose (15–20 µg/pulse)	Near-normal monofollicular cycles; the most physiological method, with the lowest ovarian hyperstimulation syndrome (OHSS)/multiple-pregnancy risk, but effective mainly in Group I and requires an indwelling IV line for weeks
Metformin	Insulin sensitiser → lowers hyperinsulinaemia-driven ovarian androgen excess	250–500 mg/day, increased gradually over 4–6 weeks to 500 mg three times daily	Restores ovulation in roughly half of PCOS women with insulin resistance; best used as an adjunct to CC/letrozole, not as monotherapy

Drug	Mechanism	Regimen	Reported outcome
Bromocriptine / Cabergoline	Dopamine D2-receptor agonist → suppresses prolactin → restores pulsatile GnRH	Bromocriptine 1.25 mg at bedtime , increased up to 5 mg twice daily; cabergoline 0.25 mg twice weekly , increased up to 1.5 mg twice weekly	Restores ovulation in over 80% of hyperprolactinaemic anovulation; cabergoline better tolerated

Critical evaluation — comparative appraisal

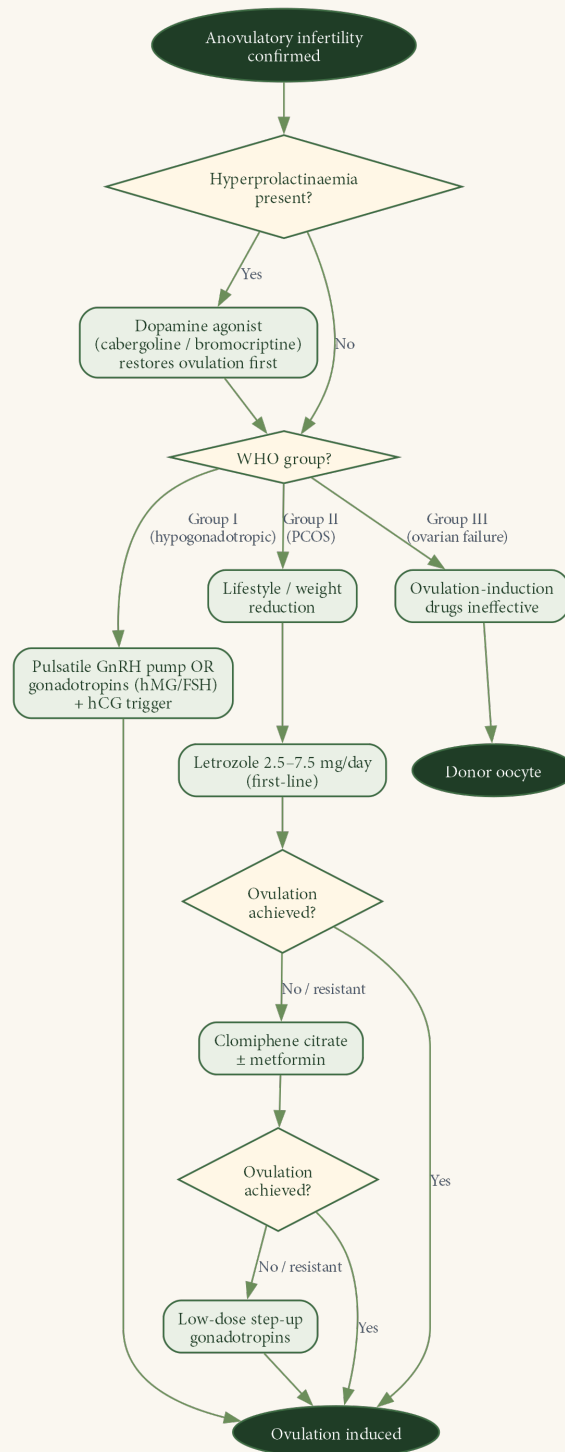
Parameter	Clomiphene citrate	Letrozole	Gonadotropins
Current place in therapy	Traditional first-line; now second-line in PCOS	First-line for anovulatory PCOS (international evidence-based PCOS guideline)	Second/third-line — CC/letrozole-resistant PCOS, or first-line in WHO Group I
Ovulation rate	70–80%	Higher than CC (~88%)	Highest of all, but least selective for a single follicle
Multiple pregnancy risk	7–9% (mostly twins)	3–7% (mostly twins)	Highest — up to 20–30%, includes triplets
OHSS risk	Rare	Rare	Significant — needs monitoring, coasting, or cycle cancellation
Endometrial effect	Anti-oestrogenic — thins the endometrium/cervical mucus	No anti-oestrogenic effect — thicker, more receptive endometrium	Not applicable
Monitoring/cost	Minimal; low cost	Minimal; low cost	Mandatory serial TVS + oestradiol; expensive
Regulatory status	Approved for ovulation induction	Off-label for OI (approved as a breast-cancer drug) despite strong trial evidence	Approved
Teratogenicity concern	None demonstrated	Initial concern refuted — congenital anomaly rate comparable to CC	None demonstrated

Complications of ovulation induction and their grading

Severity of OHSS (occurs 3–6 days after the ovulatory hCG dose)	Features
Mild (10–20%)	Abdominal bloating, mild pain; ovarian size <8 cm
Moderate (5–10%)	Nausea, vomiting, diarrhoea; ultrasound ascites; ovarian size 8–12 cm
Severe (1–2%)	Clinical ascites $\pm$ hydrothorax, respiratory distress, haematocrit >45%, oliguria, liver dysfunction, anasarca; ovarian size >12 cm
Critical (rare)	Tense ascites, haematocrit >55%, renal failure, thromboembolism

- Prevention of OHSS: low starting gonadotropin dose in high-risk women, GnRH antagonist protocols, metformin co-treatment in PCOS, coasting (delaying/withholding hCG), freeze-all strategy in high responders.
- Multiple pregnancy is the commonest complication overall — highest with gonadotropins, lowest with pulsatile GnRH.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

WHO-group-based decision tree for ovulation induction, with the hyperprolactinaemia check and PCOS step-up ladder (letrozole → clomiphene ± metformin → gonadotropins).

High-yield exam pointers

- ▶ CC 50 mg × 5 days (day 2–5), step up by 50 mg to a max of 150 mg/day — write this dose exactly.
- ▶ Letrozole 2.5 mg × 5 days (day 3–5), step up by 2.5 mg to a max of 7.5 mg/day — now first-line in PCOS, but off-label.
- ▶ hCG trigger 5,000–10,000 IU (or 250 µg recombinant) once the lead follicle is mature.
- ▶ Metformin start low (250–500 mg/day) and titrate to 500 mg TDS; adjunct only, not monotherapy.
- ▶ Cabergoline 0.25 mg twice weekly vs bromocriptine 1.25 mg nocte — remember hyperprolactinaemia is treated first before other OI drugs.
- ▶ OHSS severity grades: mild <8 cm, moderate 8–12 cm, severe/critical >12 cm ovary — remember the percentages (mild 10–20%, moderate 5–10%, severe 1–2%).
- ▶ WHO Group mnemonic: I = low gonadotropins (hypothalamic), II = normal (PCOS), III = high (ovarian failure — drugs won't help).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The current international evidence-based PCOS guideline and large randomised trials now favour letrozole over clomiphene citrate as first-line ovulation induction in PCOS; DC Dutta's Gynaecology 7e still lists clomiphene citrate doses up to 250 mg/day, but current sources (Speroff 9e) recommend capping at 150 mg/day and avoiding higher, unapproved doses.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; International evidence-based guideline for the assessment and management of PCOS.



Define Azoospermia. Discuss its cause and management

Asked in: Paper III 16-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Azoospermia is the **complete absence of spermatozoa in the ejaculate**, confirmed on microscopic examination (400×) of the pellet of a semen sample centrifuged at high speed (3,000 g for 15 minutes), the finding being documented on **at least two separate occasions** 2–4 weeks apart. It affects about **1% of all men** and **10–15% of infertile men**; it is broadly split into **obstructive** (normal

spermatogenesis, blocked outflow — ~40% of cases) and **non-obstructive** (impaired sperm production) azoospermia.

Classification and causes

Category	Mechanism	Causes
Pretesticular (hypogonadotropic hypogonadism)	Hypothalamic–pituitary failure → inadequate gonadotropin drive to an otherwise normal testis	<i>Kallmann syndrome</i> (GnRH deficiency + anosmia), isolated GnRH/gonadotropin deficiency, pituitary tumour/panhypopituitarism, hyperprolactinaemia, exogenous androgen/anabolic-steroid use, severe systemic illness
Testicular (non-obstructive; primary gonadal failure/hypergonadotropic hypogonadism)	Intrinsic testicular damage — spermatogenesis fails despite adequate/raised gonadotropins	<i>Klinefelter syndrome</i> (47,XXY — commonest chromosomal cause); Y-chromosome microdeletions (AZFa, AZFb, AZFc regions of Yq11); Sertoli-cell-only syndrome; cryptorchidism/testicular maldescent; varicocele; mumps orchitis; testicular torsion; chemotherapy/radiotherapy (>6 Gy → permanent azoospermia); gonadotoxins (heat, smoking, chronic alcohol); anorchia
Post-testicular (obstructive)	Ductal blockage anywhere from the efferent ductules to the ejaculatory ducts; spermatogenesis is normal	Congenital bilateral absence of the vas deferens (CBAVD) — usually a <i>CFTR</i> gene mutation; previous vasectomy; iatrogenic vas injury (inguinal/hernia surgery); infective epididymo-vasal obstruction (gonococcal/chlamydial epididymitis, genital tuberculosis); ejaculatory duct obstruction/cyst; <i>Young syndrome</i> ; functional (retrograde ejaculation — no true azoospermia, but no antegrade sperm)

Diagnostic pointers guiding classification

Test	Key finding
Testicular volume + serum FSH, LH, testosterone, prolactin	Low FSH/LH + low testosterone → pretesticular; raised FSH/LH + small testes + low testosterone → testicular failure; normal FSH with normal-sized testes → obstruction
Karyotype	47,XXY (Klinefelter) in hypergonadotropic azoospermia
Y-chromosome microdeletion analysis (AZFa/b/c)	Mandatory before ICSI in non-obstructive azoospermia; complete AZFa/AZFb deletion predicts a failed testicular sperm extraction (TESE), while AZFc deletion still often yields retrievable sperm
CFTR mutation screening	Positive in most men with CBAVD; screen the female partner too before assisted reproduction
Testicular biopsy (fixed in Bouin's solution, not formol saline)	Differentiates primary testicular failure from obstruction; tissue may be cryopreserved for IVF/ICSI
Scrotal Doppler ultrasound / transrectal ultrasound (TRUS)	Detects varicocele; ejaculatory duct cyst/obstruction, absent seminal vesicles

Management

General measures (all categories): stop gonadotoxic drugs/anabolic steroids, treat obesity, avoid heat and smoking, treat genital tract infection, and give genetic counselling before any sperm are used for assisted reproduction.

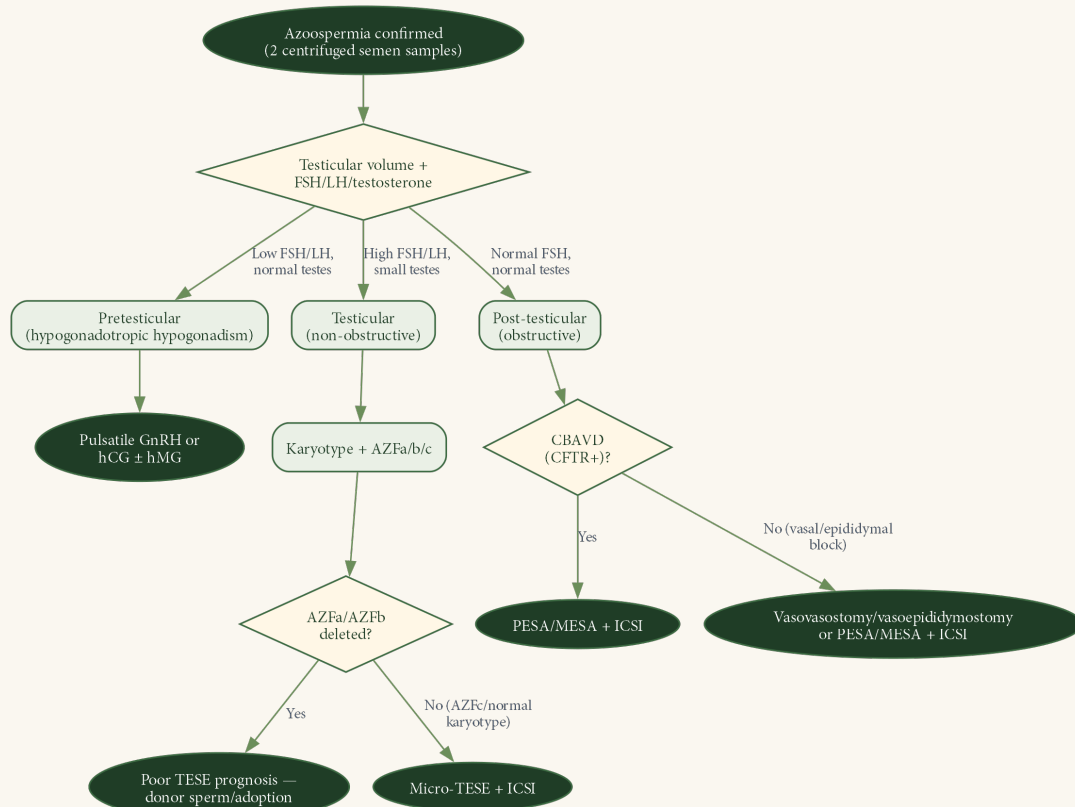
► Pretesticular (hypogonadotropic hypogonadism)

- **Pulsatile GnRH** by subcutaneous minipump — treatment of choice for hypothalamic causes (e.g., Kallmann syndrome); target is a normal adult male LH pulse pattern.
- **Gonadotropin replacement:** human chorionic gonadotropin (**hCG**), commonly **1,000–2,500 IU intramuscularly (IM) twice weekly** (some regimens use up to 5,000 IU once–twice weekly), titrated to keep serum testosterone in the normal range; if no sperm appear in the ejaculate after **6–12 months**, add **human menopausal gonadotropin (hMG)/pure FSH, 75–150 IU IM thrice weekly**. Combined hCG + hMG therapy achieves spermatogenesis and pregnancy in up to **80–88% of patients after 1 year**.
- **Cabergoline** (dopamine agonist) for hyperprolactinaemia to restore gonadotropin pulsatility, libido and fertility.

► Testicular (non-obstructive)

- No medical therapy restores fertility once **primary gonadal failure is confirmed on biopsy** — endocrine treatment is then contraindicated.
- **Surgical sperm retrieval:** microdissection testicular sperm extraction (**micro-TESE**) gives the highest yield (especially in Klinefelter syndrome/Sertoli-cell-only pattern); conventional TESE/testicular sperm aspiration (TESA) is an alternative — sperm obtained are used for **intracytoplasmic sperm injection (ICSI)**.
- **Karyotype + AZFa/b/c + genetic counselling mandatory before ICSI** — an AZFa/AZFb deletion carries a very poor retrieval prognosis.
- **Varicocele** may occasionally bring a few sperm into the ejaculate even in non-obstructive azoospermia, converting a surgical-retrieval case to a natural/IUI candidate (results variable).
- **Orchidopexy** for cryptorchidism, ideally by **1–2 years of age**, is preventive rather than curative once azoospermia is established.
- If no sperm are retrievable: **donor insemination** or adoption.
- ▶ **Post-testicular (obstructive)**
 - **Microsurgical reconstruction** — vasovasostomy (post-vasectomy) or vasoepididymostomy (epididymal-level block); patency is restored in ~80% and pregnancy achieved in ~50% of cases.
 - **Transurethral resection of the ejaculatory ducts (TURED)** for ejaculatory duct obstruction — an outpatient microsurgical procedure.
 - **CBAVD** — reconstruction is not possible; proceed to **percutaneous/microsurgical epididymal sperm aspiration (PESA/MESA)** or TESE with ICSI, after screening both partners for *CFTR* mutations.
 - **Retrograde ejaculation** — alkalinise urine and harvest sperm from post-ejaculatory urine for intrauterine insemination (IUI)/ICSI; an α -adrenergic agonist may improve bladder-neck closure in partial cases.
- ▶ **Assisted reproduction (common final pathway):** once sperm are retrieved by any route — ejaculate, epididymis (PESA/MESA), or testis (TESA/TESE) — **ICSI** is the definitive treatment for both obstructive and most non-obstructive azoospermia.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Diagnostic and management algorithm for azoospermia — branches on testicular volume/hormone profile into pretesticular, testicular, and post-testicular pathways.

High-yield exam pointers

- ▶ Confirmatory protocol: centrifuge 3,000 g × 15 min, examine pellet at 400×, positive on 2 occasions.
- ▶ Prevalence: ~1% of all men, 10–15% of infertile men; ~40% of azoospermia is obstructive.
- ▶ Three-tier classification (Sharif): **pretesticular / testicular / post-testicular** — maps directly to hormone profile and testicular size.
- ▶ Klinefelter = 47,XXY, commonest chromosomal cause of non-obstructive azoospermia; small firm testes + gynaecomastia.
- ▶ Y-microdeletion regions: AZFa, AZFb, AZFc on Yq11 — AZFa/b deletion = poor TESE yield.
- ▶ CBAVD → screen *CFTR* in both partners before ICSI.
- ▶ Testicular biopsy fixative: **Bouin's solution**, never formol saline (distorts histology).
- ▶ Sperm-retrieval alphabet: PESA, MESA, TESA, TESE (micro-TESE) → all feed into ICSI.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Doses for hCG/hMG gonadotropin therapy in hypogonadotropic hypogonadism vary slightly across standard texts (Jeffcoate 9e: hCG 1,000–2,500 IU IM twice weekly + hMG 150 IU thrice weekly; DC Dutta 7e: hCG up to 5,000 IU IM once–twice weekly + hMG/FSH 75–150 IU) — both are accepted regimens; the dose is titrated to serum testosterone and sperm response rather than fixed.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Jeffcoate's Principles of Gynaecology 9e; DC Dutta's Textbook of Gynaecology 7e.



Describe PALM-COEIN classification. Evaluate the endometrial pattern in AUB & define the types of abnormal uterine bleeding

Asked in: Paper III Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Abnormal uterine bleeding (AUB) is any deviation from the normal menstrual pattern (frequency, regularity, duration or volume) in a non-gravid woman of reproductive age. The International Federation of Gynecology and Obstetrics (FIGO), endorsed by the American College of Obstetricians and Gynecologists (ACOG), replaced the older imprecise terms (menorrhagia, metrorrhagia, dysfunctional uterine bleeding) with a standardised, aetiology-based classification — PALM-COEIN (FIGO 2011).

PALM-COEIN classification (FIGO 2011)

Category	Code	Cause	Key point
Structural (PALM) — visible/measurable on imaging or histology			
Polyp	AUB-P	Endometrial/endocervical polyp	Cause of intermenstrual and heavy bleeding; diagnosed on transvaginal sonography (TVS)/hysteroscopy

Category	Code	Cause	Key point
Adenomyosis	AUB-A	Ectopic endometrial glands/stroma in myometrium	MRI superior to TVS (myometrial cysts, asymmetric thickening, subendometrial striations)
Leiomyoma	AUB-L	Uterine fibroid	Sub-classified AUB-L SM (submucosal, distorts cavity) vs AUB-L O (other — intramural/subserosal)
Malignancy & hyperplasia	AUB-M	Endometrial hyperplasia/carcinoma, cervical cancer	Mandatory to exclude in age ≥ 45 years or risk factors
Non-structural (COEIN) — systemic/functional			
Coagulopathy	AUB-C	Von Willebrand disease, platelet disorders	Screen adolescents with heavy bleeding from menarche
Ovulatory dysfunction	AUB-O	Anovulation/oligo-ovulation — PCOS, hypothyroidism, hyperprolactinaemia, hypothalamic dysfunction	Commonest cause overall; unopposed oestrogen effect
Endometrial	AUB-E	Primary haemostatic/local endometrial disorder (chronic endometritis, altered PGF2 α /PGE2 or plasminogen activator levels)	Diagnosis of exclusion with regular cycles
Iatrogenic	AUB-I	Breakthrough bleeding on combined oral contraceptives, erratic pill use, IUCD/LNG-IUS, anticoagulants	
Not yet classified	AUB-N	Rare/unidentified causes (e.g., arteriovenous malformation, myometrial hypertrophy)	

The term **dysfunctional uterine bleeding (DUB)** — AUB with no identifiable structural or systemic cause, historically ovulatory or anovulatory — falls largely under AUB-O/AUB-E and is now discouraged in favour of PALM-COEIN, though it remains in common Indian clinical use.

Types of abnormal uterine bleeding

Traditional term	Definition	Current FIGO/descriptive term
Menorrhagia	Regular cyclic bleeding, excessive in amount and/or duration	Heavy menstrual bleeding (HMB) — objectively >80 mL blood loss/cycle (Hallberg criterion), or subjectively bleeding that impairs quality of life
Metrorrhagia	Irregular, acyclic (intermenstrual) bleeding	Intermenstrual bleeding (IMB)
Menometrorrhagia	Irregular, excessive and prolonged bleeding	Combined heavy + irregular bleeding
Polymenorrhea	Cyclic bleeding with cycle length <21 days	Frequent menstrual bleeding
Oligomenorrhea	Cyclic bleeding with cycle length >35 days	Infrequent menstrual bleeding
Hypomenorrhea	Scanty bleeding of short duration (<2 days)	Light/shortened menstrual bleeding
Amenorrhoea	Absence of menstruation ≥6 months (secondary)	Absent bleeding

A normal cycle: 21–35 days interval, flow duration <7 days. Any bleeding pattern outside these limits, or postmenopausal/postcoital bleeding, qualifies as AUB and warrants evaluation.

Evaluation of the endometrial pattern in AUB

1. Clinical work-up (numbered):

- ▶ History — age, cycle pattern (cyclic/acyclic), duration, pad count/clots, associated pain, drug/IUCD use, bleeding tendency (epistaxis, gum bleeding), family history.
- ▶ General/systemic examination — pallor, thyroid, bleeding signs; pelvic examination (speculum, Pap smear, bimanual).
- ▶ Laboratory — complete haemogram, serum ferritin (selected), thyroid-stimulating hormone (TSH), coagulation profile (platelet count, prothrombin time, activated partial thromboplastin time) especially in adolescents, urine/serum β -hCG to exclude pregnancy.

2. Imaging & tissue evaluation of the endometrium (table):

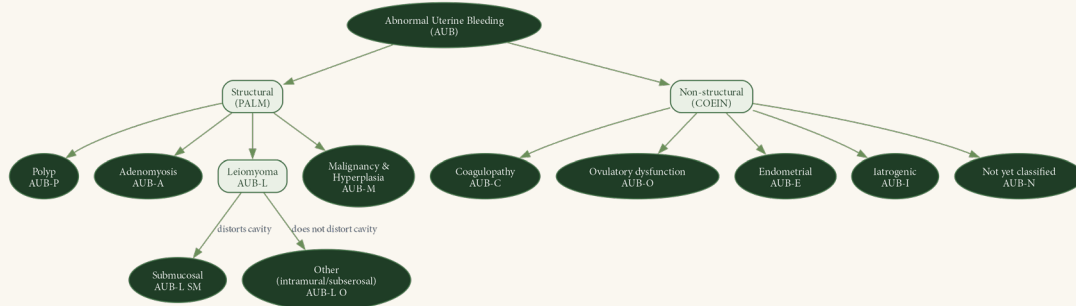
Modality	Endometrial finding/role
Transvaginal sonography (TVS)	Endometrial thickness >12 mm with hyperechoic, irregular outline and neovascularity suggests hyperplasia; ≤4 mm suggests atrophic endometrium; first-line screen
Saline infusion sonography (SIS)/sonohysterography	Superior to TVS for intracavitary lesions — polyps, submucous fibroids, septate uterus
Magnetic resonance imaging (MRI)	Second-line; best for adenomyosis (myometrial cysts, asymmetric thickening, subendometrial striations)
Hysteroscopy + directed biopsy	Gold standard — direct visualisation, has replaced blind dilatation and curettage (D&C); therapeutic (polypectomy)
Endometrial sampling (Pipelle)	Simple outpatient blind sampler; misses focal intracavitary pathology
Diagnostic D&C	Reserved for acute uncontrolled bleeding unresponsive to medical therapy; blind, misses lesions in 10–20%

3. Histological patterns seen on endometrial biopsy in AUB (table):

Pattern	Approximate frequency/significance
Normal secretory endometrium	~60% of biopsies in ovulatory AUB — confirms ovulation, no organic pathology
Proliferative/disordered proliferative endometrium	Anovulatory unopposed-oestrogen effect; glands vary in size without cytological atypia
Hyperplastic endometrium	~30% — ranges from simple/cystic ("Swiss-cheese" pattern) to complex hyperplasia; current nomenclature (WHO 2014/ACOG-SGO 2015) is two-tier: benign endometrial hyperplasia (no atypia, managed medically) vs endometrial intraepithelial neoplasia (EIN) , which replaces "atypical hyperplasia" and is premalignant, managed surgically or with high-dose progestin if fertility is desired
Irregular shedding/irregular ripening	Delayed or patchy sloughing of secretory endometrium (classic "Halban's disease" pattern)
Atrophic endometrium	Thin, inactive glands — seen in postmenopausal AUB or after prolonged unopposed progestin/oestrogen deficiency

4. Indications for mandatory endometrial biopsy: age ≥ 45 years; younger women with risk factors (obesity, PCOS, chronic anovulation, tamoxifen use, unopposed oestrogen); persistent AUB despite medical therapy; and **all postmenopausal bleeding** (mandatory, to exclude AUB-M).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

PALM-COEIN classification tree: AUB branches into structural (PALM) and non-structural (COEIN) categories, each terminal node labelled with its AUB-code.

High-yield exam pointers

- ▶ PALM-COEIN = FIGO 2011 (endorsed ACOG); **PALM** = structural (Polyp, Adenomyosis, Leiomyoma [SM/O], Malignancy-hyperplasia); **COEIN** = non-structural (Coagulopathy, Ovulatory dysfunction, Endometrial, Iatrogenic, Not-yet-classified).
- ▶ **HMB** = objective >80 mL/cycle blood loss (Hallberg); DUB terminology now discouraged.
- ▶ Endometrial biopsy pattern in DUB: **secretory 60% : hyperplastic 30% : irregular shedding/ripening/atrophic (remainder)**.
- ▶ TVS cut-offs to remember: endometrium >12 mm $\rightarrow$ suspect hyperplasia; ≤ 4 mm $\rightarrow$ atrophic.
- ▶ Age ≥ 45 years or postmenopausal bleeding $\rightarrow$ endometrial biopsy is mandatory before hormonal therapy.
- ▶ EIN (endometrial intraepithelial neoplasia) replaces "atypical hyperplasia" — premalignant, ACOG/SGO 2015 nomenclature.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology (7th edition, Indian standard text) still uses "DUB" alongside PALM-COEIN and reports the classic WHO four-tier hyperplasia grading; the current international standard (ACOG/Society of Gynecologic Oncology, 2015) has moved to the simpler benign-hyperplasia-versus-EIN nomenclature described above, and FIGO/ACOG discourage the term DUB in favour of the aetiology-based AUB-O/AUB-E labels.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; FIGO Classification System (PALM-COEIN) for Causes of Abnormal Uterine Bleeding in Non-gravid Women of Reproductive Age (Munro MG et al., Int J Gynaecol Obstet 2011;113:3–13), endorsed by ACOG; ACOG/Society of Gynecologic Oncology 2015 endometrial intraepithelial neoplasia nomenclature.



Describe spermatogenesis and discuss aetiopathogenesis of male infertility

Asked in: Paper III Jul 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — Spermatogenesis is the process by which diploid spermatogonial stem cells in the seminiferous tubules undergo mitotic proliferation, meiotic division, and morphological transformation (spermiogenesis) to produce haploid, motile spermatozoa. Male infertility is failure of the male partner to contribute functionally to conception after 12 months of regular unprotected intercourse, and it is the sole or contributory factor in roughly 30–40% of infertile couples (DC Dutta's Gynaecology 7e).

Spermatogenesis

Hormonal control (hypothalamic-pituitary-testicular axis)

Level	Hormone/cell	Action
Hypothalamus	Gonadotropin-releasing hormone (GnRH), pulsatile, non-cyclical in the male	Drives pituitary gonadotropin release
Anterior pituitary	Luteinising hormone (LH)	Stimulates Leydig cells to synthesise testosterone
Anterior pituitary	Follicle-stimulating hormone (FSH)	Acts with testosterone on Sertoli cells to initiate and sustain spermatogenesis
Sertoli cell	Androgen-binding protein (ABP)	Binds testosterone/dihydrotestosterone, maintaining the high intratubular androgen concentration spermatogenesis needs
Sertoli cell	Inhibin B	Negative feedback selectively suppressing FSH

Level	Hormone/cell	Action
Testis (local)	Scrotal temperature	Maintained 1–2°F (about 2°C) below core body temperature — essential for normal spermatogenesis

Cellular stages (within the seminiferous tubule, base to lumen)

- ▶ **Spermatogonia** (diploid, 46XY) — type A (stem cell reserve) and type B — undergo repeated mitotic division.
- ▶ **Primary spermatocytes** — enter meiosis I.
- ▶ **Secondary spermatocytes** — complete meiosis I (transient, rapidly enter meiosis II) to give haploid cells.
- ▶ **Spermatids** — haploid (23 chromosomes), products of meiosis II.
- ▶ **Spermiogenesis** — spermatid remodelling into the mature spermatozoon: nuclear condensation, acrosome formation from the Golgi complex, flagellum formation, and shedding of residual cytoplasm.
- ▶ **Spermiation** — release of the mature spermatozoon into the tubular lumen.

Duration: the full cycle of spermatogenesis takes approximately **74 days**, with a fresh cohort of spermatogonia entering maturation roughly every 16 days; the released spermatozoa then require a further **12–20 days** transiting the epididymis (caput to cauda) to gain progressive motility and fertilising capacity, giving a total of about 3 months from stem cell to a mature, ejaculate-ready sperm (DC Dutta's Gynaecology 7e; corroborated by Berek & Novak's Gynecology 16e).

Classification of causes of male infertility

Level	Category	Representative causes
Pretesticular (endocrine/hypothalamic-pituitary, ~1–2%)	Gonadotropin deficiency	Kallmann's syndrome, hypogonadotropic hypogonadism, hyperprolactinaemia, obesity, thyroid dysfunction, drugs (antihypertensives, antipsychotics)
Testicular (primary gonadal, ~30–40%)	Genetic	Klinefelter's syndrome (47,XXY), Y-chromosome (Yq11, AZF) microdeletions, single-gene mutations
	Congenital/developmental	Cryptorchidism (undescended testis), Sertoli-cell-only syndrome

Level	Category	Representative causes
	Acquired	Mumps orchitis, other infections, varicocele, testicular torsion, toxins (radiation, chemotherapy, smoking, alcohol), immunological (antisperm antibodies)
Post-testicular (sperm transport, ~10–20%)	Obstructive	Congenital bilateral absence of vas deferens (cystic fibrosis/CFTR mutation), Young's syndrome, tuberculous or gonococcal epididymitis, post-vasectomy or post-herniorrhaphy obstruction
	Ejaculatory/coital	Retrograde ejaculation, premature ejaculation, erectile dysfunction, hypospadias
—	Idiopathic	No identifiable cause on full work-up, ~40–50% — the single largest category

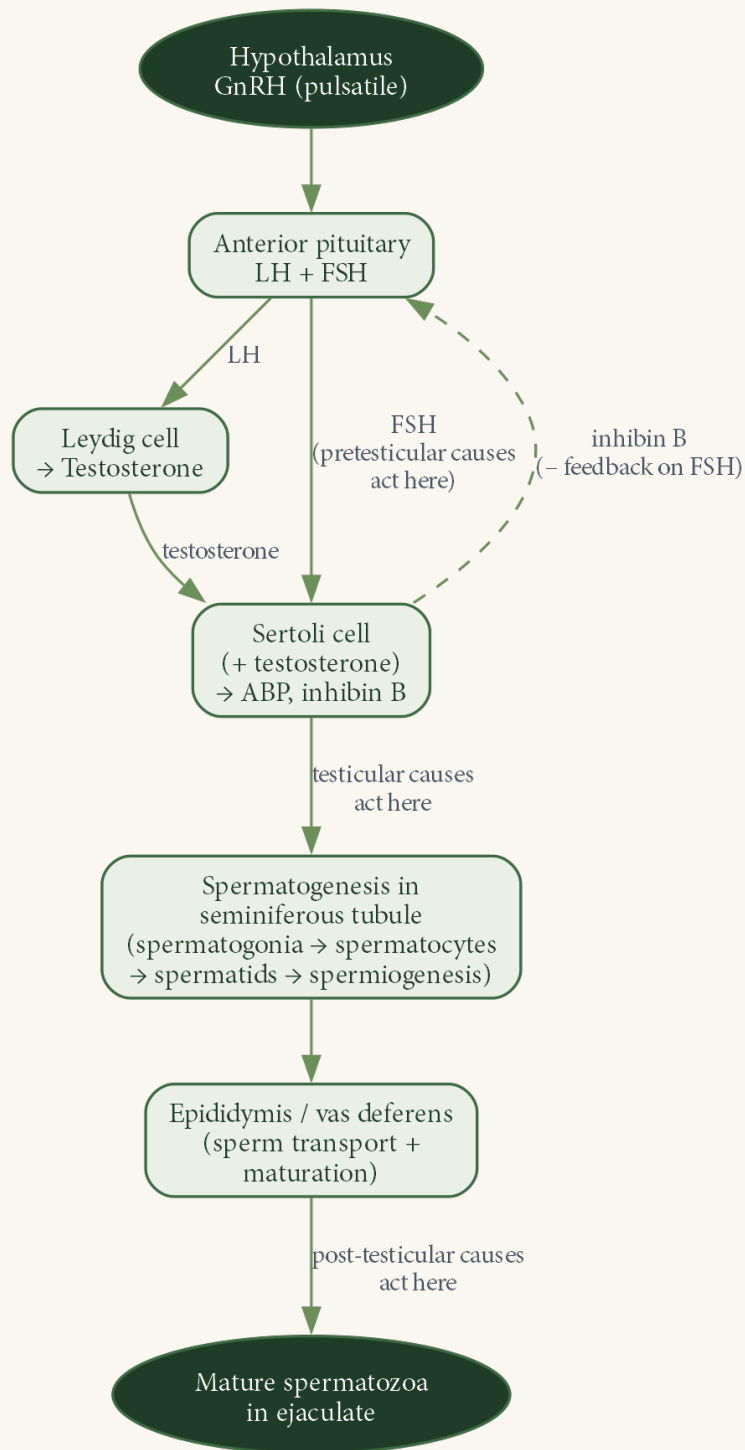
(Classification and figures per DC Dutta's Gynaecology 7e; concordant three-tier pretesticular/testicular/post-testicular framework in Berek & Novak's Gynecology 16e and Jeffcoate's Principles of Gynaecology 9e.)

Aetiopathogenesis — mechanisms

- ▶ **Pretesticular (endocrine) failure** — Reduced hypothalamic GnRH pulsatility or pituitary gonadotropin secretion lowers LH and FSH drive to the testis; Leydig cell testosterone synthesis and Sertoli cell support of spermatogenesis both fall, producing oligo- or azoospermia with low-normal testicular volume. Hyperprolactinaemia suppresses GnRH pulsatility directly and additionally impairs libido/erectile function.
- ▶ **Testicular (primary gonadal) failure**
 - *Genetic*: Klinefelter's syndrome (47,XXY) is the commonest chromosomal cause of azoospermia — seminiferous tubule hyalinisation and Sertoli-cell-only histology with elevated gonadotropins; Yq11 (AZFa/b/c) microdeletions selectively impair the spermatogenic gene programme, producing severe oligospermia to azoospermia proportional to the region deleted.
 - *Thermal*: Cryptorchidism and varicocele raise intratesticular/scrotal temperature above the critical 1–2°F margin below core, and varicocele additionally causes venous stasis, reflux of adrenal/renal metabolites, and oxidative stress — all impairing the temperature-sensitive meiotic stages of spermatogenesis.

- *Infective/inflammatory*: Post-pubertal mumps orchitis directly destroys germinal epithelium (Sertoli and germ cells), often irreversibly; chronic epididymo-orchitis (tuberculous, gonococcal, chlamydial) produces fibrosis of the germinal epithelium and later duct obstruction.
 - *Toxic/iatrogenic*: Radiation, cytotoxic chemotherapy, alcohol (via Leydig cell suppression and reduced gonadotropin), smoking, and drugs (nitrofurantoin, cimetidine, sulfasalazine, antihypertensives) act directly on the germinal epithelium or Leydig cell steroidogenesis.
 - *Immunological*: Breach of the blood–testis barrier (trauma, infection, vasectomy) exposes sequestered sperm antigens, generating antisperm antibodies that cause sperm agglutination and impaired motility.
- ▶ **Post-testicular (transport) failure** — Spermatogenesis is intact, but congenital (CFTR-related absence of vas, Young's syndrome) or acquired (infective, surgical) obstruction of the epididymis, vas deferens, or ejaculatory duct prevents sperm reaching the ejaculate; coital/ejaculatory disorders (erectile dysfunction, retrograde ejaculation, hypospadias) prevent deposition of an otherwise normal ejaculate high in the vagina.
 - ▶ **Idiopathic** — The largest single group (40–50%): semen parameters are subnormal without a demonstrable endocrine, genetic, structural, or infective cause on standard evaluation; subtle sperm DNA fragmentation and oxidative stress are postulated contributors.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Hypothalamic-pituitary-testicular axis driving spermatogenesis, annotated with the three aetiological tiers (pretesticular, testicular, post-testicular) at their point of action.

High-yield exam pointers

- ▶ Spermatogenesis cycle $\approx$ 74 days + 12–20 days epididymal transit $\approx$ 3 months stem cell to fertile sperm; new cohort enters every 16 days.
- ▶ FSH + testosterone $\rightarrow$ **Sertoli cell** (supports spermatogenesis, makes ABP + inhibin B); LH $\rightarrow$ **Leydig cell** (makes testosterone).
- ▶ Three-tier classification: **pretesticular** – **testicular** – **post-testicular**, plus idiopathic (largest, 40–50%).
- ▶ **Klinefelter's** (47,XXY) = commonest chromosomal cause of azoospermia; **Yq11 (AZF) microdeletion** = commonest genetic cause of severe oligo/azoospermia.
- ▶ **CBAVD** $\rightarrow$ think CFTR/cystic fibrosis.
- ▶ Scrotal temperature must stay 1–2°F ($\approx$ 2°C) below core — basis of cryptorchidism/varicocele damage.
- ▶ Male factor contributes to about 30–40% of couple infertility; the female contributes 40–55%; both partners in about 10%.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's category-wise percentage breakdown (hypothalamic-pituitary 1–2%, primary gonadal 30–40%, transport 10–20%, idiopathic 40–50%) is the Indian exam-standard figure; Western series in Berek & Novak's Gynecology 16e report idiopathic factor and varicocele as the two leading individual diagnoses on case-series analysis — the two are complementary (category-wise versus single-diagnosis framing), not contradictory.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Jeffcoate's Principles of Gynaecology 9e.



Describe the anatomy of normal sperm and semen analysis normal parameters (WHO)

Asked in: Paper I Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — A spermatozoon is the mature, motile male gamete produced by spermatogenesis in the seminiferous tubules and matured in the epididymis, structurally adapted to carry the paternal haploid genome and penetrate the oocyte. Semen is the ejaculate consisting of spermatozoa suspended in secretions of the seminal vesicles (~60%), prostate (~30%) and bulbourethral (Cowper's) glands, together with a small testicular/epididymal contribution. Semen analysis is the first-line, essential investigation of the male partner in an infertile couple, and its normal values are the lower reference

limits published by the World Health Organization (WHO), derived from the 5th centile of fertile men whose partners conceived within 12 months.

Anatomy of the normal spermatozoon

A mature spermatozoon is about 60 micrometres (μm) long and has two principal parts — a **head** and a **tail**; the tail is further divided into the neck, middle piece, principal piece and end piece. A plasma membrane envelops the entire cell.

Part	Approx. length	Components	Function
Head	4–5 μm long, 2–3 μm wide (flattened, oval)	Condensed haploid nucleus capped anteriorly by the acrosome (acrosomal cap)	Carries paternal DNA; acrosome is a lysosome-like vesicle rich in proteolytic enzymes (hyaluronidase, acrosin) released in the acrosome reaction to digest the zona pellucida
Neck	Short	Proximal and distal centrioles ; connecting piece	Anchors tail to head; distal centriole organises the axoneme
Middle piece	5–7 μm	Mitochondrial sheath spiralled around the axoneme (9+2 microtubule arrangement)	Generates ATP by oxidative phosphorylation to power flagellar motility
Principal piece	~40–45 μm (longest segment)	Axoneme surrounded by a fibrous sheath	Propulsive whip-like flagellar movement
End piece	Terminal, tapering	Axoneme only (fibrous sheath absent)	Tail tip

Post-testicular maturation (functional continuation of sperm anatomy):

- ▶ Sperm produced in the seminiferous tubules pass through the **epididymis** (caput → corpus → cauda) and reach the caudal epididymis (the storage site) approximately **72 days** after spermatogenesis begins; motility and fertilising capacity mature progressively during this transit.
- ▶ **Capacitation** occurs in the female genital tract — removal of surface glycoproteins and cholesterol from the sperm plasma membrane renders the sperm hypermotile ("hyperactivated") and capable of undergoing the acrosome reaction.
- ▶ The **acrosome reaction** — fusion of the outer acrosomal membrane with the overlying plasma membrane, releasing acrosomal enzymes — is triggered on contact with the zona pellucida and is essential for zona penetration and fertilisation.

- ▶ Sperm with a structurally abnormal flagellum (absent dynein arms — primary ciliary dyskinesia/Kartagener syndrome) are viable but non-motile, illustrating the tail's dedicated motility function.

Semen analysis — collection and WHO normal reference values

The specimen is collected by masturbation after 2–3 days of sexual abstinence, delivered to the laboratory promptly so examination is completed within about 2 hours of collection. If a single report is abnormal, the test must be repeated after a minimum of 4 weeks, since semen parameters vary widely between samples in the same man; a diagnosis of an abnormal semen parameter should never rest on one report.

Parameter	Normal reference value	Lower reference limit (5th centile)
Volume	2.0 mL or more	1.5 mL
pH	7.2–7.8	—
Viscosity	Liquefies fully; graded < 3 on a 0–4 scale	—
Sperm concentration	20 million/mL or more	15 million/mL
Total sperm count	> 40 million/ejaculate	39 million/ejaculate
Motility	> 50% progressive forward motility	Progressive motility 32%
Morphology (strict/Kruger criteria)	> 14% normal forms	4% normal forms
Viability	75% or more live	58%
Leukocytes	< 1 million/mL	—
Round cells	< 5 million/mL	—
Sperm agglutination	< 10% spermatozoa with adherent particles	—

(WHO 2010 semen analysis manual, 5th edition — reference values above are cross-checked between DC Dutta's Textbook of Gynaecology 7e, Table 17.3, and Speroff's Clinical Gynecologic Endocrinology & Infertility 9e, Table 26.2/26.3.)

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 2.2A and B — Structure of a mature spermatozoon (DC Dutta's Obstetrics 9e, p.44)

High-yield exam pointers

- ▶ Two parts, four tail zones: **head** — **neck** — **middle piece** — **principal piece** — **end piece**; total length $\approx 60 \mu\text{m}$.
- ▶ **Acrosome** = **enzymes** (hyaluronidase, acrosin) for zona penetration; **middle piece** = **mitochondria** (ATP for motility) — a favourite "match the part to the function" question.
- ▶ WHO lower reference limits to reproduce verbatim: **volume 1.5 mL**, **concentration 15 million/mL**, **total count 39 million**, **progressive motility 32%**, **morphology 4% (strict criteria)**, **vitality 58%**, **pH ≥ 7.2** , **leukocytes < 1 million/mL**.
- ▶ Strict (Kruger/Tygerberg) morphology criteria: fertilisation is good when $\geq 14\%$ forms are normal, poor when $< 4\%$.
- ▶ Repeat an abnormal semen analysis **after at least 4 weeks** before labelling a true abnormality — never diagnose on one sample.
- ▶ 72-day epididymal transit; capacitation happens in the female tract, not the male — acrosome reaction only occurs after capacitation.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Some current andrology references now cite the WHO 6th edition (2021) semen analysis manual, whose lower reference limits are only marginally different from the 2010 (5th edition) values reproduced above; this corpus (Speroff 9e, DC Dutta's Gynaecology 7e) is grounded to the 2010 figures, which remain the values printed in current Indian OBG textbooks and are acceptable for RGUHS exam reproduction.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Table 17.3, semen analysis WHO 2010; sperm structure/collection); DC Dutta's Textbook of Obstetrics 9e (Fig. 2.2, structure of a mature spermatozoon, capacitation/acrosome reaction); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (sperm transport, epididymal maturation, WHO Table 26.2/26.3, strict/Kruger morphology criteria).

♦ ♦ ♦

Describe the endocrinological and physiological changes during menarche and menopause

Asked in: Paper I 15-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Menarche is the onset of the first spontaneous menstrual bleed, occurring at a mean age of 13 years (range 10–16 years), and marks activation of a previously quiescent hypothalamic–pituitary–ovarian (HPO) axis. Menopause is the permanent cessation of menstruation following loss of ovarian follicular activity, confirmed retrospectively after twelve consecutive months of amenorrhoea, at a mean age of about 50–51 years (range 45–55 years); it reflects exhaustion of the ovarian follicular pool and consequent failure of the same axis.

Endocrinology of menarche — activation of the HPO axis

Stage/mechanism	Endocrine event
"Gonadostat" (age < 8 years)	Hypothalamus is 6–15× more sensitive to oestrogen's negative feedback; GnRH stays suppressed despite very low estradiol (~10 pg/mL)
Adrenarche (~7–8 years)	Adrenal zona reticularis secretes DHEA, DHEA-sulfate, androstenedione → pubic/axillary hair, sebum, adult body odour
Kisspeptin–GPR54 activation	<i>KISS1</i> neurons of the arcuate/anteroventral periventricular nuclei disinhibit the hypothalamic GnRH pulse generator; the childhood gonadostat sensitivity is progressively lost
Gonadarche	↑ GnRH pulse amplitude and frequency (nocturnal first, then diurnal) → ↑ FSH and LH → ovarian follicular recruitment → ↑ estradiol
Permissive signal	Leptin from adipose tissue signals adequate energy stores, permissive for GnRH pulsatility; growth hormone + insulin-like growth factor-1 + oestrogen drive the growth spurt
Menarche	Cyclic oestrogen → endometrial proliferation → transient oestrogen withdrawal → first bleed. The positive-feedback (mid-cycle LH surge) pathway matures only ~2 years later, so the first cycles are anovulatory

Physiological (somatic) changes of puberty leading to menarche

- Sequence of pubertal events (Marshall & Tanner): growth spurt → breast budding (**thelarche**) → pubic/axillary hair (**pubarche/adrenarche**) → peak height velocity → **menarche**.
- **Tanner staging** (breast and pubic hair, five stages each):

Stage	Breast	Pubic hair (median age)
I	Prepubertal, elevation of papilla only	None
II	Breast bud, areola enlarges (~9.8 y)	Sparse hair on labia majora (~10.5 y)
III	Further enlargement of breast tissue	Darker, coarser, curly hair over mons (~11–12 y)
IV	Secondary mound of areola/papilla above breast contour (~12.1 y)	Adult-type hair, mons only (~12 y)
V	Areola recessed to breast contour (~14.6 y)	Adult escutcheon extending to medial thighs (~13.7 y)

- **Genital organ changes:** uterine body : cervix ratio shifts from 1:2 at birth to 1:1 at menarche (2:1 in the adult); vaginal epithelium thickens and accumulates glycogen, Doderlein's bacilli appear and vaginal pH falls to 4–5; vulva, mons pubis and labia minora enlarge; breast ducts proliferate and fat is deposited under oestrogen.

Endocrinology of the menopausal transition and menopause

Hormone/axis	Change
Ovarian follicles	Progressive depletion + acquired resistance to gonadotropins → impaired folliculogenesis
Inhibin (granulosa cell)	Falls first, removing its selective FSH-suppressing action
FSH	Rises 10–20-fold — the earliest and most sensitive marker of the transition
LH	Rises later, about 3-fold
Estradiol	Falls from 50–300 pg/mL (reproductive years) to < 20 pg/mL after menopause
Predominant post-menopausal oestrogen	Oestrone (30–70 pg/mL, exceeds estradiol 10–20 pg/mL) — from peripheral aromatisation of adrenal/ovarian androgens in fat and muscle; about one-tenth as potent as estradiol
Androgens	Ovarian stromal androstenedione/testosterone secretion increases (LH-driven), but peripheral levels fall as they are aromatised to oestrone; the falling oestrogen : androgen ratio causes facial hair growth and voice change
Progesterone	Only trace amounts, of adrenal origin

Hormone/axis	Change
Anti-Müllerian hormone (AMH)	Markedly reduced, reflecting depleted ovarian reserve
GnRH pulsatility	Frequency largely unchanged, amplitude markedly increased initially; with true senescence GnRH, gonadotropins and oestrogens all decline together

Diagnostic confirmation of menopause: amenorrhoea for 12 consecutive months; vaginal maturation index $\geq 10/85/5$ (low-oestrogen pattern); serum estradiol < 20 pg/mL; serum FSH and LH > 40 mIU/mL on two to three samples taken weeks apart.

Physiological (organ-system) changes of menopause

- ▶ **Ovary** — shrinks, becomes wrinkled and white; cortical thinning with relative increase in medullary/stromal tissue.
- ▶ **Fallopian tube** — atrophy of muscle coat; cilia disappear, plicae flatten.
- ▶ **Uterus** — atrophies; body : cervix ratio reverts to 1:1; endometrium thin and inactive (unless peripheral aromatisation keeps it proliferative/hyperplastic in obese women).
- ▶ **Vagina** — narrows, loses rugae and elasticity; glycogen and Doderlein's bacilli disappear; pH becomes alkaline; maturation index shifts to 10/85/5.
- ▶ **Vulva/pelvic floor** — labial flattening, sparse pubic hair, narrow introitus; loss of ligamentous/muscular tone aggravates pre-existing pelvic-floor weakness (prolapse, stress incontinence).
- ▶ **Bladder/urethra** — epithelial thinning $\rightarrow$ dysuria, frequency, urgency, recurrent infection.
- ▶ **Breast** — fat reabsorbed, glandular atrophy, nipple shrinkage, ptosis.
- ▶ **Bone** — oestrogen deficiency uncouples remodeling (osteoclastic $>$ osteoblastic activity); bone mass falls 3–5%/year, producing osteopenia (T-score -1.0 to -2.5) and osteoporosis (T-score < -2.5), with increased fracture risk (vertebra, distal radius, femoral neck).
- ▶ **Cardiovascular system** — loss of oestrogen's favourable effect on HDL/LDL, its antioxidant, anti-platelet, and nitric-oxide/prostacyclin-mediated vasodilator actions increases atherogenic risk.
- ▶ **Vasomotor** — the **hot flush** (sudden heat sensation with sweating and cutaneous vasodilation) is driven by hypothalamic thermoregulatory-centre resetting linked to GnRH pulses and altered noradrenaline/serotonin tone; it coincides with LH pulses and requires a low-oestrogen state.
- ▶ **Skin, psyche, sexual function** — collagen loss (1–2%/year) with wrinkling; mood change, poor memory, insomnia; vaginal dryness and dyspareunia from urogenital atrophy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 7.8 — Interplay of hormones along the hypothalamo-pituitary-ovarian axis through feedback mechanism (DC Dutta's Gynaecology 7e, p.83)

- ▶ Use this HPO-axis feedback diagram to show both ends of reproductive life: at menarche, loss of the sensitive childhood negative-feedback ("gonadostat") releases GnRH pulsatility; at menopause, loss of follicular oestrogen and inhibin removes negative feedback, driving FSH/LH up.

High-yield exam pointers

- ▶ Menarche: mean age **13 years** (range 10–16); menopause: mean age **50–51 years** (range 45–55).
- ▶ **Gonadostat theory** — prepubertal hypothalamus is 6–15× more sensitive to oestrogen negative feedback.
- ▶ **Kisspeptin–GPR54** (*KISS1* gene) is the trigger that switches on the GnRH pulse generator at puberty.
- ▶ First menstrual cycles after menarche are **anovulatory** (positive-feedback/LH-surge mechanism matures ~2 years later).
- ▶ Menopause hormone order: **inhibin falls first** → FSH rises 10–20-fold (**earliest marker**) → LH rises ~3-fold → estradiol falls < 20 pg/mL.
- ▶ Post-menopausal dominant oestrogen is **oestrone**, from peripheral fat/muscle aromatisation, not estradiol.
- ▶ Diagnostic triad for menopause: 12 months' amenorrhoea + FSH/LH > 40 mIU/mL (repeat samples) + estradiol < 20 pg/mL.
- ▶ Vaginal maturation index is low-oestrogen (parabasal-predominant) at **both** extremes of reproductive life — childhood and post-menopause — but through opposite mechanisms (axis not yet activated vs axis exhausted).

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (puberty endocrinology, Tanner staging, menopausal transition endocrinology, organ changes, bone/cardiovascular physiology); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (kisspeptin–GPR54 mechanism, cross-checked mean age of menopause ~50–51 years); Berek & Novak's Gynecology 16e (Tanner-stage figure reference).

♦ ♦ ♦

Describe the female factors causing infertility. Write about the tubal factors and their management

Asked in: Paper IV 17-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Infertility is failure to conceive after **12 months** of regular unprotected intercourse (shortened to 6 months if the woman is >35 years or the man >40 years). Successful conception needs a patent, motile fallopian tube to pick up the ovum, transport sperm, and permit fertilisation — hence tubal and peritoneal disease is the single commonest identifiable female cause of infertility.

Female factors causing infertility

Factor	Approx. share of female infertility	Principal causes
Ovulatory (dysovulatory)	20–40%	Anovulation/oligo-ovulation (PCOS commonest), decreased ovarian reserve, luteal phase defect, luteinised unruptured follicle syndrome, hyperprolactinaemia, thyroid dysfunction
Tubal & peritoneal	25–40%	PID (chlamydia, gonococcus), genital tuberculosis, previous tubal surgery/sterilisation, endometriosis, salpingitis isthmica nodosa
Uterine	up to 15%	Submucous fibroid, intrauterine adhesions (Asherman's), congenital Müllerian anomaly, endometritis (especially tubercular)
Cervical	<5%	Hostile/scanty mucus (post-conisation, chronic cervicitis), anatomical elongation, antisperm antibodies
Vaginal	rare	Vaginal atresia/septum, dyspareunia
Unexplained	10–20%	No abnormality on standard work-up (semen analysis, ovulation, tubal patency)

Tubal (and peritoneal) factor — causes

Category	Cause
Infective (commonest)	<i>Chlamydia trachomatis</i> and <i>Neisseria gonorrhoeae</i> — the major cause of tubal infertility and ectopic pregnancy; risk of tubal damage rises with repeat pelvic inflammatory disease (PID) episodes (~10–12% after 1, 23–35% after 2, 54–75% after 3 episodes)
Genital tuberculosis	Fallopian tube is the primary site in ~100% of pelvic TB; found in ~10% of Indian infertile women; causes tubal blockage, endometrial synechiae, ovulatory dysfunction
Post-surgical	Previous tubal sterilisation, tubectomy, adhesiolysis, ectopic surgery, ruptured appendix
Endometriosis	Peritubal adhesions, distorted tubo-ovarian relationship, impaired fimbrial ovum pick-up
Structural	Salpingitis isthmica nodosa, tubal polyps/mucous debris, tubal spasm (functional, cornual)
Mechanism	Proximal block prevents sperm reaching the ampulla (fertilisation site); distal block (fimbrial agglutination → phimosis → complete hydrosalpinx) prevents ovum capture — a graded spectrum of severity

Diagnosis of tubal factor

Test	Timing	Yield
Hysterosalpingography (HSG)	Proliferative phase, day 6–11	Site/side of block, uterine cavity; complementary to, not a substitute for, laparoscopy
Sonosalpingography / hysterosalpingo-contrast sonography (HyCoSy)	Proliferative phase	No radiation; comparable yield to HSG
Laparoscopy with chromopertubation (methylene blue dye test)	Proliferative phase	Gold standard — direct visualisation of adhesions, endometriosis, fimbrial state; therapy possible in the same sitting
Fallopscopy / salpingoscopy	—	Assesses tubal mucosal architecture — prognostic before tuboplasty

Test	Timing	Yield
Chlamydia antibody testing	—	Indirect, inexpensive screen for silent past infection

Management of tubal factors

Choice between reconstructive surgery and IVF depends on: age of the woman, ovarian reserve, prior fertility, number of children desired, **site and severity of tubal damage**, presence of other infertility factors, surgeon's expertise, and cost/access to an IVF programme. Younger women with proven fertility and mild, localised disease are the best surgical candidates; **IVF is now the first-line treatment for most tubal factor infertility**, especially bilateral or severe disease, added male/other factors, and older women.

- ▶ **Proximal tubal block** — hysteroscopic-guided tubal cannulation/balloon tuboplasty (fluoroscopic salpingography to clear mucus plugs); restores patency in ~85%, pregnancy rate ~45–60%; avoids costlier assisted reproductive technology (ART) if successful.
- ▶ **Mid-tubal block (post-sterilisation)** — microsurgical **tubotubal anastomosis** (reversal of sterilisation); pregnancy rate 50–82%, best of all tubal surgeries; outcome depends on age, method of sterilisation (rings/clips > cautery), site (isthmic–isthmic best) and final tube length ≥ 4 cm; ectopic risk 3–10%.
- ▶ **Distal tubal block** (graded mild → severe):
 - *Fimbriolysis* — separation of agglutinated fimbriae.
 - *Fimbrioplasty* — release of fimbrial phimosis, opens the abdominal ostium.
 - *Neosalpingostomy* — fashions a new ostium ("cuff") in a completely occluded tube, everted with fine (6-0 to 8-0) Vicryl sutures.
 - Outcome inversely related to severity: mild disease — postoperative live-birth >50%; severe disease/bilateral hydrosalpinx >3 cm — success only 10–35% with ectopic risk 5–20%; here IVF is the logical first choice.
- ▶ **Peritubal/peri-adnexal adhesions** — **salpingo-ovariolysis** (adhesiolysis), laparoscopic route preferred; microsurgical technique (minimal handling, meticulous haemostasis, anti-adhesion barriers such as Interceed/Seprafilm, and postoperative hydrotubation) minimises re-adhesion.
- ▶ **Hydrosalpinx before IVF** — a hydrosalpinx halves IVF implantation, pregnancy and live-birth rates through toxic/mechanical effect on the embryo and endometrium. Current evidence (systematic review of randomised trials) shows **laparoscopic salpingectomy or proximal tubal occlusion before IVF nearly doubles the odds of an ongoing pregnancy**; salpingectomy does not reduce ovarian reserve (AMH/response to stimulation unaffected) — this holds even for a unilateral hydrosalpinx.

- ▶ **Genital tuberculosis** — surgery is **withheld**; give a full course of anti-tubercular therapy (ATT) first — IVF-embryo transfer is the only realistic route to pregnancy once the endometrium is disease-free, because the tubal/endometrial tissue is too fibrotic for reconstructive surgery to succeed.

Factors predicting a poor surgical outcome: dense pelvic adhesions, loss of fimbriae, bilateral hydrosalpinx >3 cm, reconstructed tube length <4 cm, reversal attempted >5 years after sterilisation, and coexisting infertility factors.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 13.7 — Hydrosalpinx. Note the retort shape of the tube. Depending on tubal diameter, hydrosalpinx is graded mild (<15 mm), moderate (15–30 mm) or severe (>30 mm) (DC Dutta's Gynaecology 7e, p.160)

High-yield exam pointers

- ▶ Tubal/peritoneal factor = commonest identifiable female cause (~25–40%); *Chlamydia trachomatis* is the leading organism.
- ▶ PID recurrence risk rule: tubal infertility risk 10–12% (1 episode) → 23–35% (2) → 54–75% (3 episodes).
- ▶ HSG + laparoscopy are **complementary**, never a substitute for each other; laparoscopy + chromopertubation is the gold standard.
- ▶ Table nomenclature to reproduce exactly: fimbriolysis / fimbrioplasty / neosalpingostomy / tubotubal anastomosis / tubocornual anastomosis.
- ▶ Hydrosalpinx before IVF → salpingectomy/proximal occlusion first (near-doubles ongoing pregnancy odds); never leave it untreated.
- ▶ Genital tuberculosis → ATT first, surgery contraindicated, IVF-ET is the definitive treatment.
- ▶ Best surgical prognosis: sterilisation reversal in a young woman, ring/clip method, isthmic–isthmic anastomosis.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Contribution percentages for each female factor vary slightly across textbooks (e.g., tubal factor quoted as 25–35% in Speroff and 30–40% in Berek & Novak) — the ranges above are reconciled across sources and are exam-safe.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e.



Describe the physiology of menstruation and the causes of primary amenorrhoea

Asked in: Paper I 26-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Menstruation is the cyclical shedding of the endometrium with bleeding that occurs at regular intervals in the absence of pregnancy, driven by rhythmic hypothalamic-pituitary-ovarian (HPO) hormonal changes. Primary amenorrhoea is the absence of menarche by 15 years of age in a girl with normal secondary sexual characteristics, or by 13 years in their absence — reflecting failure anywhere along the HPO axis or an obstructed/absent genital outflow tract.

Hypothalamic-Pituitary-Ovarian Axis

Level	Hormone	Physiological role
Hypothalamus	Gonadotropin-releasing hormone (GnRH), pulsatile (~every 60–90 min)	Drives pituitary gonadotroph secretion; pulse frequency/amplitude sets the FSH:LH ratio
Anterior pituitary	Follicle-stimulating hormone (FSH)	Recruits and matures the follicular cohort; induces aromatase and LH receptors on granulosa cells
Anterior pituitary	Luteinizing hormone (LH)	Mid-cycle surge triggers final oocyte maturation, ovulation and luteinisation; sustains the corpus luteum
Ovary — follicular phase	Oestradiol	Rising levels give negative feedback early, then positive feedback → LH surge; drives endometrial proliferation
Ovary — luteal phase	Progesterone + oestradiol (corpus luteum)	Negative feedback on GnRH/FSH/LH; converts endometrium to the secretory type

Ovarian and Endometrial Cycle (idealised 28-day cycle)

Phase	Days	Ovarian events	Endometrial phase
Proliferative (follicular)	Day 1–13 (variable length — sets cycle-to-cycle variability)	Recruitment → dominant follicle selection → rising oestradiol	Glandular and stromal mitosis; spiral arteries elongate

Phase	Days	Ovarian events	Endometrial phase
Ovulation	~Day 14	LH surge → oocyte release 34–36 h after surge onset (10–12 h after the LH peak)	Transition
Secretory (luteal)	Day 15–28 (fixed at ~14 days)	Corpus luteum secretes progesterone + oestradiol; undergoes luteolysis around day 24–26 if no implantation	Glandular coiling and subnuclear vacuoles (from day 17), stromal decidualisation, spiral-artery coiling
Menstrual	Day 1–4 of the next cycle	Corpus luteum exhausted → oestrogen/progesterone withdrawal	Functional layer sheds; basalis layer preserved

Mechanism of Menstrual Shedding

- ▶ No implantation → no rescuing human chorionic gonadotropin → the fixed-lifespan corpus luteum undergoes luteolysis (~day 24–26) → progesterone and oestradiol fall.
- ▶ Loss of progesterone destabilises lysosomal membranes → release of proteolytic enzymes and matrix metalloproteinases that digest the stromal extracellular matrix of the functionalis layer.
- ▶ Hormone withdrawal triggers rhythmic spiral-arteriole vasoconstriction (mediated by prostaglandin F_{2α} and endothelin-1) → ischaemia, stasis and progressive endometrial blanching.
- ▶ Prostaglandin F_{2α} also produces myometrial contractions that help expel the shed tissue.
- ▶ The functionalis layer sloughs off as menstrual flow (blood + endometrial debris + prostaglandins); the basalis layer, with its own basal arterial supply and residual stem cells, is preserved.
- ▶ Re-epithelialisation of the cavity begins by day 4–6 under rising oestradiol from the next follicular cohort, completing repair before the next ovulation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 7.9 — The menstrual cycle: cyclic changes in FSH, LH, oestradiol and progesterone across the follicular, ovulatory and luteal phases, correlated with the endometrial cycle (Berek & Novak 16e, p.301)

Causes of Primary Amenorrhoea

Category (gonadotropin / anatomic status)	Causes
Hypogonadotropic hypogonadism (low/normal FSH-LH; absent or delayed secondary sexual characters)	Constitutional delay of puberty (delayed GnRH pulse reactivation) · Functional — stress, excessive exercise, weight loss/anorexia nervosa, chronic illness (e.g. tuberculosis) · <i>Kallmann syndrome</i> (GnRH deficiency ± anosmia) · CNS tumours (craniopharyngioma) and other hypothalamic-pituitary lesions · Hyperprolactinaemia
Hypergonadotropic hypogonadism (high FSH-LH; gonadal failure)	Turner syndrome (45,X and mosaics) — commonest overall cause · Pure gonadal dysgenesis (46,XX or 46,XY — <i>Swyer syndrome</i>) · Premature ovarian insufficiency · Galactosaemia · 17 α -hydroxylase deficiency · Resistant-ovary syndrome · Gonadotropin-receptor mutations
Eugonadotropic / anatomic (normal FSH-LH and oestrogen, normal secondary sexual characters)	Müllerian agenesis (<i>Mayer-Rokitansky-Küster-Hauser syndrome</i>) — 2nd commonest cause; absent uterus/upper vagina with normal ovaries · Imperforate hymen, transverse vaginal septum, cervical/vaginal atresia (cryptomenorrhoea — normal axis, obstructed outflow) · Unresponsive endometrium — endometrial tuberculosis, congenital synechiae
Disorder of androgen action	Androgen insensitivity syndrome (46,XY; testicular feminisation) — female phenotype, good breast development, scant axillary/pubes hair, absent uterus, short blind vaginal pouch
Endocrine / systemic	Hypothyroidism/cretinism · Congenital adrenal hyperplasia · Juvenile (type 1) diabetes mellitus · Malnutrition and chronic systemic illness

High-yield exam pointers

- ▶ Definition cut-offs: no menarche by 15 y with normal secondary sexual characters, or by 13 y without them (current criteria); older texts print 16/14 y — same logic, one year later.
- ▶ Commonest cause overall: **Turner syndrome (45,X)**; 2nd commonest: **MRKH syndrome**.
- ▶ Work-up order: pregnancy test → examine for secondary sexual characters and uterus → serum FSH + oestradiol (separates hyper- vs hypogonadotropic) → TSH, prolactin.

- ▶ **Karyotype is mandatory** in hypergonadotropic hypogonadism, short stature, or virilisation — exclude a Y-bearing dysgenetic gonad (gonadoblastoma risk → prophylactic gonadectomy).
- ▶ Luteal phase is **fixed at ~14 days**; cycle-length variability comes entirely from the follicular phase.
- ▶ Ovulation occurs **34–36 h after the onset of the LH surge** (10–12 h after the LH peak).
- ▶ Menstruation = a hormone-withdrawal event: prostaglandin F_{2α}-driven spiral-arteriole vasoconstriction plus matrix-metalloproteinase digestion of the functionalis; the basalis is preserved for repair.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Current teaching (Berek & Novak 16e, aligned with ACOG) sets the age cut-offs at 13 years (no secondary sexual characteristics) and 15 years (normal secondary sexual characteristics) to reflect the falling mean age of menarche; Speroff's own summary criteria and DC Dutta's text still print the traditional 14/16-year cut-offs — both are accepted clinically, and neither changes the causes or work-up.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e.



Discuss clinical evaluation of patient with Turner's syndrome presenting as primary amenorrhea. Discuss various fertility options in these patients

Asked in: Paper III 15-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — *Turner's syndrome* is the most common form of gonadal dysgenesis and the single commonest cause of primary amenorrhoea, resulting from complete or partial loss of one X chromosome (classic karyotype 45,X, though more than half of patients are mosaics, e.g., 45,X/46,XX). It produces streak gonads with hypergonadotropic hypogonadism, short stature, and a characteristic somatic phenotype, and carries important cardiovascular, renal and autoimmune comorbidity that must be actively screened for.

Clinical evaluation

History

- ▶ Age at presentation — no menarche by **16 years with normal secondary sexual characters**, or by **14 years with absent growth/development** (revised threshold to start work-up).

- ▶ Birth history — intrauterine growth restriction, neonatal lymphoedema of hands/feet, cystic hygroma.
- ▶ Growth pattern — poor growth velocity from early childhood plotted on a growth chart; family height.
- ▶ Associated illness — recurrent otitis media/hearing loss, hypothyroid symptoms, diabetes, coeliac symptoms, hypertension.
- ▶ Family history of delayed puberty/androgen insensitivity (differentiates familial delay from Turner).

General and phenotypic examination

System	Finding on examination
Stature	Short stature (< 150 cm final height untreated) — the <i>sine qua non</i>
Neck	Webbed neck, low posterior hairline
Chest	Widely spaced nipples (“shield chest”)
Limbs	Cubitus valgus, short 4th metacarpal, lymphoedema of hands/feet
Skin	Multiple pigmented naevi
Face	Micrognathia, high-arched palate, low-set ears
Secondary sexual characters	Absent/poor breast development; scanty axillary/pubertic hair may still appear (adrenarche intact, thelarche fails)
Genitalia	External genitalia normal female; vagina and uterus present but hypoplastic
Cardiovascular	Murmur of bicuspid aortic valve, radiofemoral delay/weak femoral pulses (coarctation), hypertension
Abdomen/pelvis	Laparoscopy (if performed) shows bilateral “streak” gonads

Investigations to confirm diagnosis and screen for comorbidity

Investigation	Purpose / expected finding
Karyotype (≥ 30 cells counted)	Confirms 45,X or mosaic (45,X/46,XX, 45,X/46,XY); mandatory to exclude any Y-chromosome material
Serum FSH/LH	Elevated (hypergonadotropic), FSH often > 40 mIU/mL
Serum estradiol	Low, < 20 pg/mL

Investigation	Purpose / expected finding
Pelvic ultrasound	Streak gonads, small/absent-appearing uterus (about one-third have imageable ovaries)
FISH with Y-probes	If karyotype ambiguous/virilisation present — occult Y-material in up to 5–10% raises gonadoblastoma risk (20–30% if Y confirmed), warranting prophylactic laparoscopic gonadectomy
Echocardiography ± cardiac MRI	Bicuspid aortic valve, coarctation, aortic root dilatation — baseline and periodic (every 5 years if normal)
Renal ultrasound/IVP	Horseshoe kidney (most common), unilateral agenesis, pelvic kidney
TSH, free T4, anti-TPO	Autoimmune hypothyroidism
Fasting glucose, lipid profile, LFT	Increased diabetes/metabolic risk
Anti-endomysial antibody	Coeliac disease screen
Audiometry	Sensorineural hearing loss
Bone age (wrist X-ray)	Assesses growth potential

Table 29.1 of DC Dutta correlates the phenotype above (poor secondary sexual characters, short stature, webbed neck, cubitus valgus, cardiac/renal anomaly, phenotypically female with normal external genitalia but streak gonads) directly with the diagnosis of Turner's syndrome, distinguishing it from other causes of primary amenorrhoea such as Müllerian agenesis (normal breasts, absent uterus) and androgen insensitivity syndrome (46,XY, absent uterus, scanty pubic/axillary hair).

Fertility options in Turner's syndrome

- ▶ **Spontaneous conception** — occurs only in a minority of mosaics with residual functioning ovarian tissue (about 5% menstruate spontaneously); pregnancies are rare and carry a high risk of sex-chromosome aneuploidy and spontaneous miscarriage.
- ▶ **Fertility preservation** (for girls/young women with demonstrable residual ovarian function before ovarian failure) — oocyte or ovarian tissue cryopreservation; retrieved oocytes/embryos are at higher risk of aneuploidy, so **preimplantation genetic testing for aneuploidy (PGT-A)** is used before transfer. This benefits only a fraction of patients, as most progress to pre- or peri-pubertal ovarian failure.
- ▶ **Donor oocyte IVF** — the realistic option for the **majority** of women with Turner's syndrome, since their own gonads are non-functional streaks. Steps:
 - Hormonal priming of the (usually hypoplastic but functional) uterus with sequential oestrogen–progestogen to develop a receptive endometrium synchronised with the donor cycle.

- **Mandatory pre-pregnancy cardiovascular evaluation** — echocardiography or cardiac MRI to look specifically at aortic root diameter and valve morphology.
- Counselling that pregnancy in Turner's syndrome carries a markedly increased risk of **aortic dissection/rupture**, with mortality reported as high as ~2% or more, and an overall risk of pregnancy-related death increased up to 100-fold over background — the risk is greatest with a pre-existing bicuspid aortic valve or dilated aortic root, but persists even with a normal evaluation.
- Per the **ASRM Practice Committee (2012)**, Turner's syndrome should be regarded as a **relative contraindication to pregnancy**; any significant cardiac abnormality is a strong indication to discourage oocyte donation altogether, and those who proceed need close cardiology–obstetric surveillance throughout pregnancy.
- ▶ **Gestational surrogacy** — recommended in preference to the patient carrying the pregnancy herself when significant cardiac risk factors are present, using either donor oocytes or the patient's own cryopreserved oocytes/embryos.
- ▶ **Adoption** — an option to be discussed for family building without the maternal cardiovascular risk of pregnancy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 27.2A — 17-year-old girl with Turner's syndrome (45, X): short stature, shield chest, widely spaced nipples, cubitus valgus, short neck, absent secondary sex characters (DC Dutta's Gynaecology 6e, p.457)

High-yield exam pointers

- ▶ Karyotype **45,X** (classic) or mosaic **45,X/46,XX**; more than half of patients are mosaics.
- ▶ Diagnostic threshold: no menarche by 16 years (normal secondary characters) or by 14 years (no development).
- ▶ Investigation of choice: karyotype (≥ 30 cells) — confirms diagnosis and excludes occult Y material.
- ▶ Y-chromosome material in 5–10% → gonadoblastoma risk 20–30% → prophylactic gonadectomy.
- ▶ FSH > 40 mIU/mL, estradiol < 20 pg/mL — hypergonadotropic hypogonadism.
- ▶ Baseline work-up mnemonic: **Cardiac (echo/MRI) – Renal (USG) – Thyroid (TSH) – Glucose/lipids – Coeliac Ab – Audiometry.**
- ▶ Fertility: own gametes almost never usable → **donor oocyte IVF** is the mainstay; ASRM 2012 — pregnancy is a *relative contraindication* because of up to 100-fold increased risk of fatal aortic dissection.
- ▶ Gestational surrogacy preferred over the patient carrying pregnancy when cardiac risk factors are present.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Fertility-preservation technology (oocyte/ovarian tissue cryopreservation) benefits only a small subset of Turner patients with residual ovarian function — most present after ovarian failure has already occurred, by which time donor-oocyte IVF or surrogacy remain the only biological-parenting routes.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; ASRM Practice Committee (2012) guideline on Turner syndrome and pregnancy risk.



Discuss indications, benefits and adverse effects of hormone replacement therapy

Asked in: Paper III 15-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Hormone replacement therapy (HRT), now more precisely termed **menopausal hormone therapy (HT)**, is the administration of **estrogen alone** (in a hysterectomised woman) or **estrogen combined with a progestogen** (in a woman with an intact uterus) to relieve the symptoms of estrogen deficiency and to reduce the long-term consequences of hypoestrogenism. The progestogen component is mandatory whenever the uterus is present, as it opposes estrogen-driven endometrial proliferation.

Indications for hormone therapy

Indication	Detail
Vasomotor symptoms	Hot flushes and night sweats — the commonest and most reliable indication
Urogenital atrophy	Vaginal dryness, dyspareunia, urinary frequency/urgency and recurrent urinary tract infection; when systemic symptoms are absent, low-dose vaginal estrogen cream (e.g., conjugated equine estrogen 1.25 mg locally) suffices and avoids most systemic risk
Prevention of osteoporosis	In postmenopausal women at high fracture risk
Maintenance of quality of life	Sleep disturbance, irritability and mood change in the menopausal transition

Indication	Detail
Premature ovarian insufficiency / premature menopause (age <40)	HT continued at least until the average natural age of menopause (~50 years)
Gonadal dysgenesis (e.g., Turner syndrome, androgen insensitivity syndrome)	To initiate/maintain secondary sexual characters after gonadectomy
Surgical or radiation-induced menopause	Especially in younger women rendered abruptly hypoestrogenic

Benefits of hormone therapy

- ▶ **Vasomotor symptom relief** in 70–80% of women — the most rapid and consistent benefit.
- ▶ **Reversal of urogenital atrophy** — improves vaginal dryness, dyspareunia and urinary symptoms.
- ▶ **Skeletal protection** — increases bone mineral density by 2–5% and reduces vertebral and hip fracture risk by 25–50%.
- ▶ **Colorectal cancer** — incidence reduced by about 20% with combined HT.
- ▶ **Possible cardioprotection** — the "**timing hypothesis**": estrogen has antioxidant action on LDL (limiting oxidised-LDL-driven endothelial injury and foam-cell formation), improves endothelial function and reduces postmenopausal insulin resistance; clinical/WHI subgroup data show benefit (or at least no harm) when HT is started within 10 years of menopause or before age 60, whereas the same therapy started in older women (>10 years postmenopause) does not protect and may harm.
- ▶ **Improved overall quality of life** — better sleep, mood and sexual function in symptomatic women.

Adverse effects, risks and contraindications

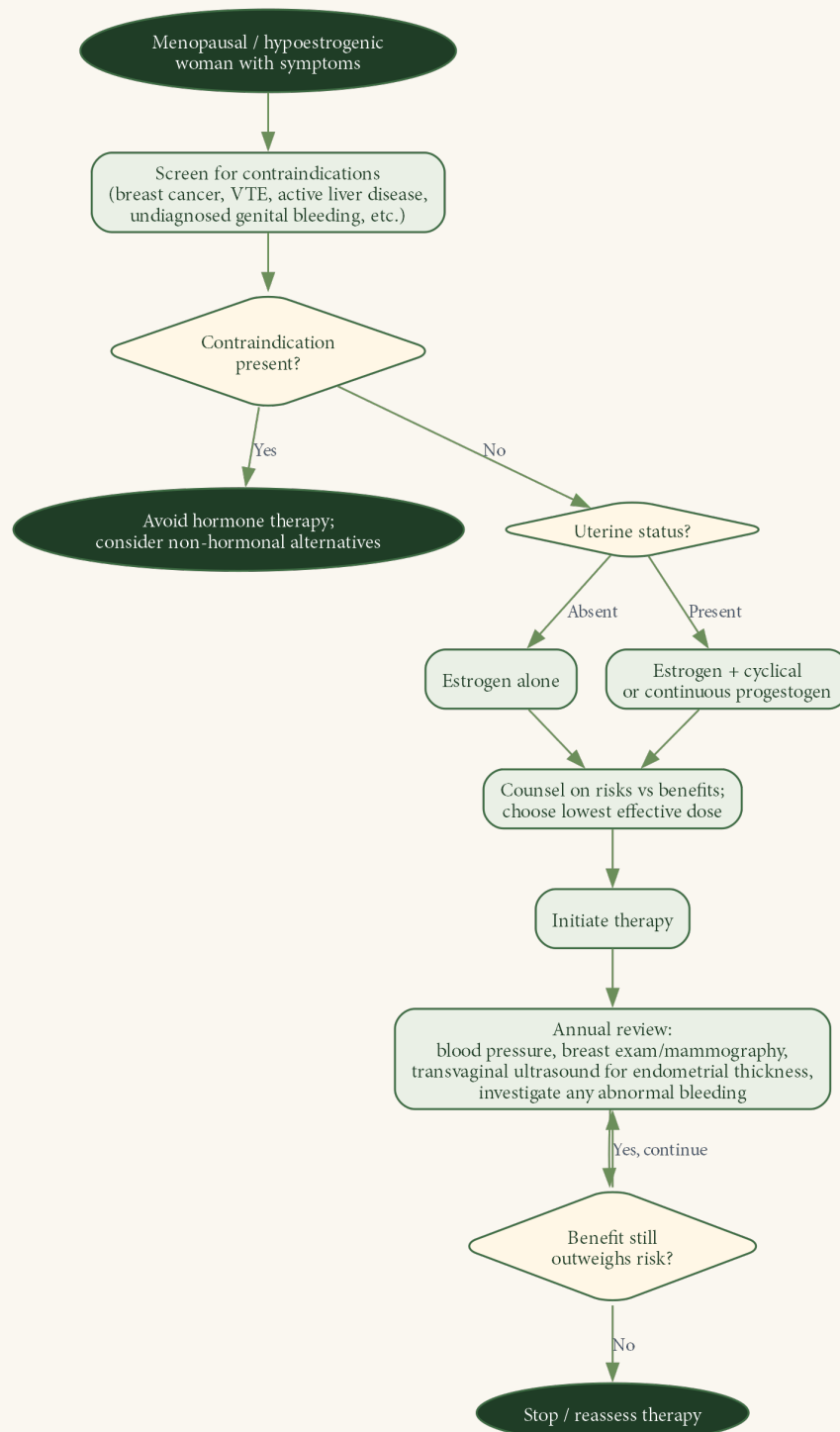
Risk	Key evidence
Endometrial hyperplasia/carcinoma	Occurs with unopposed estrogen in a woman with an intact uterus; prevented by adding a progestogen for 12–14 days/month (or continuously)
Breast cancer	Long-term combined estrogen–progestin therapy increases risk slightly (relative risk $\approx$ 1.26 in the WHI trial, consistent with the pooled worldwide reanalysis showing RR 1.14 in ever-users, rising to RR 1.35 with $\geq$ 5 years' continuous use); risk rises with duration of use and falls again after stopping. The WHI estrogen-only arm (hysterectomised women) showed no increase in breast cancer

Risk	Key evidence
Venous thromboembolism (VTE)	Roughly doubled, concentrated in the first 1–2 years of use; the WHI combined estrogen–progestin arm showed about 18 extra VTE cases per 10,000 women per year with oral therapy — the transdermal route avoids first-pass hepatic metabolism and does not carry the same excess risk
Coronary heart disease and stroke	Increased in older women (>10 years since menopause or age >60) in the WHI combined arm; not increased — and possibly reduced — when started close to menopause (timing hypothesis). The estrogen-only arm showed no change in coronary heart disease risk but a similar increase in stroke
Gallbladder disease	Increased incidence from a rise in biliary cholesterol with oral estrogen
Cognition/dementia	No protective benefit; a trend toward increased risk of dementia/cognitive impairment was seen in women started after age 65 (WHI Memory Study)

Contraindications to hormone therapy

Absolute/major	
Known, suspected or past breast cancer	Undiagnosed genital tract bleeding
Estrogen-dependent neoplasm	History of VTE or active deep vein thrombosis
Active liver disease	Prior cholestatic jaundice of pregnancy (caution)
Gallbladder disease	Prior endometriosis (caution)

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision-algorithm flowchart for initiating and monitoring menopausal hormone therapy.

High-yield exam pointers

- HT = estrogen $\pm$ progestogen; progestogen is **compulsory** with an intact uterus to prevent endometrial hyperplasia/cancer.

- ▶ **WHI trial (2002)** — combined estrogen–progestin arm stopped early for excess breast cancer and cardiovascular events; the estrogen-only arm (hysterectomised women) showed no increase in breast cancer.
- ▶ **Timing hypothesis:** HT started <10 years from menopause/<60 years age is cardio-neutral-to-protective; started later, it raises CHD/stroke risk.
- ▶ VTE risk ~2×, mainly in year 1–2 of use; **transdermal route** does not carry the same VTE/gallbladder risk as oral.
- ▶ Skeletal benefit: BMD ↑ 2–5%, hip/vertebral fracture risk ↓ 25–50%.
- ▶ Absolute contraindications to remember: breast cancer, undiagnosed genital bleeding, active VTE, active liver disease.
- ▶ Golden rule: **lowest effective dose**, individualised duration, with structured annual review.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older texts (quoting ACOG 2008) advise "lowest dose, shortest duration"; current practice instead favours **individualising the duration of use** through periodic risk–benefit reassessment rather than an arbitrary stop date, provided indications persist and no contraindication develops.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Chapter 6, Menopause); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Women's Health Initiative and postmenopausal hormone therapy chapters).



Discuss on pathophysiology of PCOS and how to prevent long term sequelae

Asked in: Paper III 16-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Polycystic ovary syndrome (PCOS) is the commonest endocrine disorder of reproductive-age women, characterised by chronic anovulation, hyperandrogenism, and polycystic ovarian morphology. Diagnosis rests on the **Rotterdam criteria** (ESHRE/ASRM consensus, 2003) — at least **2 of 3**: (1) oligo-/anovulation, (2) clinical (hirsutism, acne) or biochemical hyperandrogenism, (3) polycystic ovaries on ultrasound (ovarian volume >10 mL and/or ≥12 follicles measuring 2–9 mm in

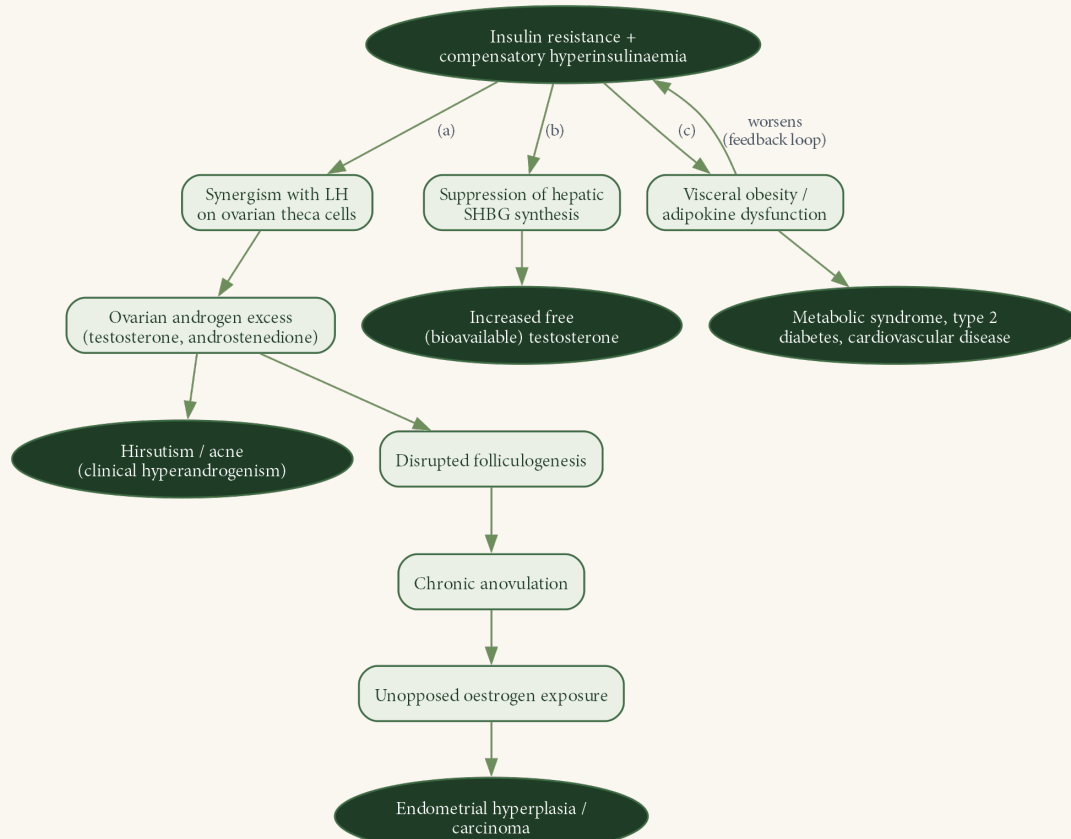
either ovary) — after excluding mimicking endocrinopathies (thyroid dysfunction, hyperprolactinaemia, non-classic congenital adrenal hyperplasia, androgen-secreting tumour).

Pathophysiology

Mechanism	Key events	Net effect
Neuroendocrine (hypothalamic-pituitary) dysregulation	Increased gonadotropin-releasing hormone (GnRH) pulse frequency, with reduced hypothalamic sensitivity to progesterone-mediated negative feedback	Preferential luteinising hormone (LH) synthesis over follicle-stimulating hormone (FSH); elevated LH:FSH ratio (roughly 2–3:1)
Ovarian theca-cell hyperfunction	LH excess drives theca-cell hyperplasia and upregulates the P450c17 enzyme (17 α -hydroxylase/17,20-lyase activity)	Excess ovarian androgen synthesis (testosterone, androstenedione)
Insulin resistance with compensatory hyperinsulinaemia	Intrinsic post-receptor insulin-signalling defect in muscle/fat, worsened by obesity and visceral adiposity	Insulin acts as a co-gonadotropin, synergising with LH on theca cells, and suppresses hepatic sex hormone-binding globulin (SHBG) synthesis
Reduced SHBG	Hyperinsulinaemia downregulates hepatic SHBG output	Increased free (bioavailable) testosterone $\rightarrow$ clinical hyperandrogenism
Disordered folliculogenesis	The excess cohort of small antral follicles secretes high anti-Müllerian hormone (AMH), which blunts FSH-dependent dominant-follicle selection and granulosa aromatase activity	Follicular arrest at the 2–9 mm stage $\rightarrow$ chronic anovulation and the polycystic ovarian morphology itself
Adipose tissue dysfunction	Visceral obesity alters adipokine secretion (low adiponectin, leptin resistance) and produces chronic low-grade inflammation (raised C-reactive protein)	Further worsens insulin resistance, closing a self-perpetuating cycle
Genetic predisposition	Polygenic trait; higher concordance in monozygotic twins and first-degree relatives	Familial clustering of the PCOS phenotype and its metabolic risk
Chronic anovulation	Persistent follicular-phase oestrogen production without cyclical progesterone opposition	Unopposed oestrogen drives endometrial proliferation — the pathophysiological bridge to the long-term sequelae below

Insulin resistance/hyperinsulinaemia is the pathophysiological hub linking the reproductive (hyperandrogenism, anovulation) and metabolic (dysglycaemia, dyslipidaemia) faces of PCOS — this is why lifestyle and insulin-sensitising measures address both arms simultaneously.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Insulin resistance/hyperinsulinaemia as the central hub, with its three downstream arms to hyperandrogenism (a), reduced SHBG/free testosterone (b), and the obesity-driven metabolic-syndrome feedback loop (c).

Long-term sequelae and their prevention

System	Long-term sequela	Prevention / surveillance
Metabolic	Impaired glucose tolerance / type 2 diabetes mellitus	Baseline and periodic 75 g oral glucose tolerance test (OGTT), especially if obese or with family history of diabetes; lifestyle modification is first-line

System	Long-term sequela	Prevention / surveillance
Metabolic	Metabolic syndrome — met by roughly one-third to one-half of women with PCOS	Regular monitoring of weight, waist circumference, blood pressure, fasting lipids and glucose; even a 5–10% loss of body weight substantially improves insulin sensitivity and lowers cardiometabolic risk
Cardiovascular	Dyslipidaemia, hypertension, accelerated atherosclerosis	Lipid profile and blood pressure screening, statins where indicated, structured exercise, smoking cessation
Gynaecological/oncological	Endometrial hyperplasia and endometrial carcinoma from chronic unopposed oestrogen	Ensure a withdrawal bleed at least every 3 months with cyclical progestin or combined oral contraceptive pills (COCs); endometrial thickness surveillance/biopsy if amenorrhoea is prolonged
Reproductive	Anovulatory infertility	Weight reduction first; letrozole is now the first-line ovulation-inducing agent — the Pregnancy in Polycystic Ovary Syndrome II (PPCOS II) randomised trial showed significantly higher live-birth and ovulation rates with letrozole (start 2.5 mg, max 7.5 mg/day) than with clomiphene citrate (start 50 mg, max 150 mg/day); metformin is used as an adjunct in insulin-resistant women
Hepatic/metabolic	Non-alcoholic fatty liver disease	Weight management, periodic metabolic screening
Respiratory	Obstructive sleep apnoea (compounded by obesity)	Screen with sleep history/symptoms in obese women with PCOS; weight loss, continuous positive airway pressure (CPAP) if confirmed
Psychological	Anxiety, depression, body-image disturbance, disordered eating	Routine psychological screening and counselling at diagnosis and follow-up
Obstetric (if she conceives)	Gestational diabetes mellitus, pre-eclampsia, preterm birth	Preconception weight optimisation; early screening for gestational diabetes in pregnancy

General preventive strategy

- ▶ **Lifestyle modification** (calorie-appropriate diet plus regular exercise) is first-line for every woman with PCOS regardless of baseline weight — a loss of only 5–10% of body weight can restore ovulation, lower circulating androgens and improve insulin sensitivity.
- ▶ **Insulin sensitisation** — metformin is started at a low dose (250–500 mg/day) and titrated upward over 4–6 weeks to an effective maintenance dose; it improves insulin resistance, may restore ovulatory cycles, and helps limit progression to diabetes.
- ▶ **Endometrial protection/menstrual regulation** — combined oral contraceptive pills (low-dose ethinyl estradiol with an antiandrogenic or neutral progestin) for women not seeking pregnancy, or cyclical progestins where oestrogen is contraindicated, to prevent unopposed-oestrogen-driven endometrial hyperplasia.
- ▶ **Ovulation induction** when fertility is desired — letrozole first-line (PPCOS II), clomiphene citrate second-line, with metformin as an adjunct.
- ▶ **Periodic metabolic screening** — OGTT, fasting lipid profile and blood pressure at diagnosis and at regular intervals thereafter, more so in obese women.
- ▶ **Symptomatic control of hyperandrogenism** (e.g., spironolactone, cosmetic therapy for hirsutism) once contraception/pregnancy status is secured.
- ▶ **Multidisciplinary long-term follow-up** — gynaecologist, endocrinologist/physician, dietician and mental-health screening, since PCOS is a lifelong metabolic condition and not merely a menstrual disorder.

High-yield exam pointers

- ▶ **Rotterdam criteria (2003):** 2 of 3 — oligo/anovulation, hyperandrogenism (clinical/biochemical), polycystic ovary on ultrasound (volume >10 mL or ≥12 follicles of 2–9 mm).
- ▶ **Raised LH:FSH ratio** (~2–3:1) reflects increased GnRH pulse frequency — classic exam point.
- ▶ **Insulin resistance/hyperinsulinaemia** is the pathophysiologic hub: synergises with LH on theca cells + suppresses hepatic SHBG → free androgen excess.
- ▶ Metformin: start **250–500 mg/day**, titrate over 4–6 weeks.
- ▶ **Letrozole (2.5–7.5 mg)** beat **clomiphene (50–150 mg)** for live birth/ovulation in the PPCOS II trial — write this comparison verbatim.
- ▶ One-third to one-half of women with PCOS meet criteria for the **metabolic syndrome**.
- ▶ Chronic anovulation → unopposed oestrogen → **endometrial hyperplasia/carcinoma** risk — the key long-term gynaecological sequela to prevent with cyclical withdrawal bleeds.
- ▶ A **5–10% weight loss** is enough to restore ovulation and cut metabolic risk — cheap, high-yield preventive fact.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The Rotterdam (2003) criteria remain the exam-standard diagnostic definition used above; the Androgen Excess-PCOS Society has since proposed raising the ultrasound antral-follicle-count threshold (to 25 or more per ovary) to match modern high-resolution transducers, but this refinement has not replaced Rotterdam as the standard teaching criterion.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Rotterdam criteria, insulin-resistance/theca-cell pathophysiology, metformin dosing, PPCOS II trial, weight-loss data, endometrial cancer risk from chronic anovulation); Berek & Novak's Gynecology 16e (metabolic syndrome prevalence in PCOS); DC Dutta's Textbook of Gynaecology 7e (clinical correlation).

♦ ♦ ♦

Discuss the diagnosis and management of 38 year old multiparous lady presented with abnormal uterine bleeding

Asked in: Paper III May 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Abnormal uterine bleeding (AUB) is menstrual bleeding of abnormal quantity, duration, or frequency occurring in the absence of pregnancy, from the body of the uterus. The FIGO/ACOG PALM-COEIN system (FIGO, 2011) has replaced the older term "dysfunctional uterine bleeding" (DUB) with a structured, biopsy-oriented classification. In a 38-year-old multipara, the late-reproductive/perimenopausal transition makes structural causes (fibroid, adenomyosis, polyp) and anovulatory dysfunction both common, and mandates exclusion of endometrial hyperplasia/malignancy before labelling the bleeding "functional."

Causes — FIGO PALM-COEIN classification (FIGO/ACOG, 2011)

Structural (PALM)	Nonstructural (COEIN)
P — Polyp (endometrial/endocervical)	C — Coagulopathy (von Willebrand disease, ITP, leukaemia)
A — Adenomyosis	O — Ovulatory dysfunction (PCOS, hypothyroidism, hyperprolactinaemia, obesity, stress)
L — Leiomyoma (submucous L-SM vs other L-O)	E — Endometrial (primary haemostatic defect — excess plasminogen activator/PGE2, chronic endometritis)

Structural (PALM)	Nonstructural (COEIN)
M — Malignancy and hyperplasia	I — Iatrogenic (COC/IUCD breakthrough bleeding, anticoagulants, tamoxifen)
	N — Not yet classified

In this age group the commonest structural causes are **leiomyoma** and **adenomyosis** (multiparity is a recognised risk factor for adenomyosis); ovulatory dysfunction and early endometrial hyperplasia become increasingly likely as she enters the perimenopausal transition, so malignancy must always be actively excluded.

Clinical evaluation

- **History** — pattern of bleeding (cyclic/acyclic), number of pads/clots, duration, intermenstrual or postcoital bleeding, dyspareunia/pelvic pain, contraceptive/IUCD use, bleeding from other sites (epistaxis, gum bleeding — suggests coagulopathy), thyroid symptoms, drug history (anticoagulants, tamoxifen).
- **General examination** — pallor, thyroid enlargement, signs of PCOS (hirsutism, acanthosis), bruising.
- **Pelvic examination** — speculum (to exclude cervical polyp/growth, take a Pap smear) and bimanual examination (uterine size, mobility, adnexal mass).

Investigation	Purpose / finding
Complete haemogram, peripheral smear	Confirm/quantify anaemia
Coagulation profile (platelet count, PT, aPTT)	Exclude coagulopathy if history suggestive
Thyroid profile (TSH)	Exclude thyroid dysfunction (AUB-O)
Urine/serum β -hCG	Exclude pregnancy-related bleeding
Transvaginal sonography (TVS)	First-line imaging; endometrial thickness >12 mm suggests hyperplasia, $\leq$ 4 mm suggests atrophy; detects fibroid/adenomyosis
Saline infusion sonography (SIS)	Superior to TVS for polyp/submucous fibroid/septate uterus
Hysteroscopy with directed biopsy	Gold standard — direct visualisation + targeted biopsy; has replaced blind dilatation and curettage (D&C), which misses 10–20% of intracavitary lesions
Endometrial biopsy (Pipelle/D&C)	Mandatory in all women $\geq$ 45 years with AUB, and in this reproductive-age patient if bleeding is acyclic/persistent or she has risk factors for hyperplasia (obesity, PCOS, chronic anovulation) — to exclude AUB-M

Investigation	Purpose / finding
MRI	Second-line; superior to TVS for adenomyosis (myometrial cysts, asymmetric thickening, subendometrial striations)

Management

General measures

- ▶ Correct anaemia — haematinics, or blood transfusion if the patient is symptomatic/severely anaemic.
- ▶ Treat any identified systemic cause (thyroid dysfunction, coagulopathy).
- ▶ Counsel on the diagnosis, and confirm fertility wishes — she is multiparous, so a fertility-sparing but organ-conserving approach (medical therapy, then ablation) is usually preferred over hysterectomy as first line.

Medical management (used once malignancy is excluded)

Drug class	Agent & dose	Notes
Antifibrinolytic	Tranexamic acid 1000–1500 mg orally 3–4 times daily for 4–7 days during menses (FDA-approved regimen: 1300 mg three times daily for 5 days)	Reduces menstrual blood loss by 35–60%; avoid if past thromboembolism
Prostaglandin synthetase inhibitor (NSAID)	Mefenamic acid 150–600 mg/day in divided doses during the bleeding phase	Especially effective in ovulatory AUB in women >35 years; reduces loss by 25–40%
Progestin (anovulatory AUB)	Norethisterone 5 mg thrice daily to arrest acute bleeding, then cyclic norethisterone 5 mg or medroxyprogesterone acetate (MPA) 10 mg from day 5–25 for 3 cycles	Cyclic therapy regulates cycles once bleeding is controlled
Continuous progestin	MPA 10 mg thrice daily for ≥90 days	Suppresses gonadotropins/ovarian hormone production
Combined oral contraceptive	Low-dose COC, day 5–25 × 3 cycles	Effective in ovulatory bleeding; also contraceptive
Levonorgestrel intrauterine system (LNG-IUS)	52 mg device, effective 5 years	Reduces blood loss by up to 97% — recommended as first-line therapy for heavy menstrual bleeding without significant structural/histological abnormality

Drug class	Agent & dose	Notes
Acute severe bleeding	Conjugated (equine) estrogen 25 mg IV , repeated every 4 hours until bleeding controlled, then oral progestin (MPA 10 mg/day) added; COC for maintenance	If bleeding continues despite this, proceed to D&C
Danazol	200–400 mg/day in 4 divided doses × 3 months	Reserved for recurrent symptoms or as a bridge to surgery; reduces loss by ~60%
GnRH agonist	Subcutaneous/intranasal, short-term	Produces amenorrhoea; useful pre-ablation or if infertile and wants pregnancy later
Desmopressin	0.3 µg/kg IV or intranasal	Specifically for von Willebrand disease/factor VIII deficiency

Surgical management (failed/contraindicated medical therapy, or structural pathology)

- ▶ **Uterine curettage (D&C)** — now used mainly to arrest an acute bleed when medical treatment fails, not as a diagnostic tool (superseded by hysteroscopy and biopsy).
- ▶ **Hysteroscopic polypectomy / myomectomy** — for AUB-P and submucous (type 0/1/2) leiomyoma.
- ▶ **Endometrial ablation/resection** (thermal balloon, microwave, Novasure, transcervical resection of the endometrium (TCRE), roller-ball, laser) — indicated when family is completed, uterus ≤10-week size, no significant endometrial pathology, fibroid <3 cm; achieves amenorrhoea in 30–40% and reduced flow in a further 50%.
- ▶ **Uterine artery embolisation** — for symptomatic fibroids >3 cm with heavy bleeding, wanting uterine conservation.
- ▶ **Hysterectomy** (vaginal/abdominal/laparoscopic) — definitive treatment when conservative measures fail, when there is significant structural pathology (large/multiple fibroids, adenomyosis) or endometrial hyperplasia with atypia; a reasonable option in a multiparous woman who has completed childbearing and failed medical/ablative therapy. Healthy ovaries can be conserved, particularly if she is under 45 years.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 11.6 — Fibroid classification. (From Munro MG, Critchley HO, Broder MS, et al; FIGO Working Group on Menstrual Disorders) (Berek & Novak 16e, p.572)

Also sketch the PALM-COEIN classification as a two-branch flowchart: AUB → Structural (Polyp / Adenomyosis / Leiomyoma / Malignancy-hyperplasia) vs Nonstructural (Coagulopathy / Ovulatory dysfunction / Endometrial / Iatrogenic / Not-yet-classified), each leaf box naming its first-line investigation (TVS/SIS/hysteroscopy for PALM; coagulation profile/TSH for COEIN).

High-yield exam pointers

- ▶ PALM-COEIN = FIGO/ACOG 2011 classification; "DUB" is an obsolete term.
- ▶ Endometrial biopsy is **mandatory** ≥45 years, and in reproductive age if bleeding is **acyclic** or risk factors for hyperplasia exist.
- ▶ **Tranexamic acid** 1300 mg TDS × 5 days (FDA regimen) or 1 g TDS–QDS during menses; avoid with past thromboembolism.
- ▶ **LNG-IUS** = first-line therapy for heavy menstrual bleeding without structural/histological cause — "medical hysterectomy," up to 97% reduction in blood loss.
- ▶ Acute severe bleeding: **conjugated estrogen 25 mg IV q4h** until controlled, then progestin cover.
- ▶ Hysteroscopy + directed biopsy has replaced blind D&C for both diagnosis and therapy (D&C misses 10–20% of intracavitary lesions).
- ▶ Endometrial ablation criteria: family completed, uterus ≤10 weeks size, fibroid <3 cm, no cancer/atypia.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Dilatation and curettage is retained in current teaching only as an emergency haemostatic measure for acute bleeding refractory to medical therapy — it should not be used as a first-line diagnostic or therapeutic tool, since transvaginal sonography plus hysteroscopy-directed biopsy are more accurate.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; FIGO/ACOG PALM-COEIN classification (Munro MG et al., FIGO Working Group on Menstrual Disorders, 2011).

♦ ♦ ♦

Discuss the management of infertility due to ovulatory dysfunction

Asked in: Paper III 17-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Ovulatory dysfunction (anovulation or oligo-ovulation) is failure of regular, cyclical release of a mature oocyte due to disordered hypothalamic-pituitary-ovarian function, and accounts for a large share of female infertility. The World Health Organization (WHO) classifies it into three groups by gonadotropin/oestrogen status, plus hyperprolactinaemic anovulation as a fourth category; management is tailored to the group.

Principles of management

- ▶ Confirm anovulation — menstrual history, mid-luteal (day 21–25) serum progesterone <3 ng/mL, basal body temperature charts, or urinary luteinising hormone (LH) kits.
- ▶ Classify by WHO group with serum follicle-stimulating hormone (FSH), LH, oestradiol, prolactin, thyroid-stimulating hormone (TSH), and anti-Müllerian hormone (AMH)/ultrasonography.
- ▶ Correct reversible causes first: hypothyroidism (levothyroxine), hyperprolactinaemia, drug-induced anovulation (stop offending drug), and weight extremes — 5–10% weight loss restores ovulation in many obese women with polycystic ovary syndrome (PCOS); nutritional rehabilitation and reduced exercise stress for hypothalamic amenorrhoea.
- ▶ Complete the baseline infertility work-up in parallel (semen analysis, tubal patency) before committing to ovulation induction, since a coexisting factor changes the plan.
- ▶ Counsel on multiple-pregnancy and ovarian hyperstimulation syndrome (OHSS) risk before starting gonadotropins; step-wise escalation from the least to the most invasive option.

Group-wise management

WHO group	Endocrine profile	Example	Management
I — Hypogonadotropic hypogonadal (5–10%)	Low/low-normal FSH, low oestradiol	Hypothalamic amenorrhoea, Kallmann syndrome	Correct the precipitant (weight, stress, exercise) first; pulsatile gonadotropin-releasing hormone (GnRH) or exogenous gonadotropins containing LH activity (human menopausal gonadotropin, hMG) — clomiphene/letrozole are ineffective here as there is no endogenous oestrogen for them to block
II — Normogonadotropic normo-oestrogenic (75–85%, largest group)	Normal FSH/oestradiol, normal-to-high LH	PCOS is the commonest cause	Weight loss/lifestyle → letrozole or clomiphene citrate (± metformin) → gonadotropins or laparoscopic ovarian drilling (LOD) for resistant cases → in-vitro fertilisation (IVF)
III — Hypergonadotropic (10–20%)	High FSH, low AMH	Premature ovarian insufficiency	Ovulation-induction drugs are largely ineffective; oocyte-donation IVF is the definitive fertility option; hormone replacement for symptom control
Hyperprolactinaemic (5–10%, separate category)	Low/low-normal FSH and oestradiol, raised prolactin	Prolactinoma, hypothyroidism, dopamine-blocking drugs	Treat the cause; a dopamine agonist restores ovulation in most women

Drug doses and regimens

Drug	Regimen
Clomiphene citrate (first-line anti-oestrogen)	50 mg/day for 5 days, started on cycle day 2–5; if anovulatory, increase by 50 mg increments each subsequent cycle up to a maximum of 150 mg/day (current practice — higher doses do not improve success and only add cost/anti-oestrogenic endometrial effect); a course of up to 6 ovulatory cycles is usual
Letrozole (aromatase inhibitor)	2.5 mg/day for 5 days from cycle day 3–7; increase to a maximum of 7.5 mg/day if anovulatory — more effective than clomiphene for ovulation and live birth in PCOS, with a lower multiple-pregnancy rate, and is now preferred first-line
Metformin (insulin sensitiser, adjunct)	Start 250–500 mg/day and up-titrate gradually over 4–6 weeks to 500 mg three times daily; combined with clomiphene/letrozole in insulin-resistant or obese PCOS, and used before gonadotropins to reduce cycle cancellation
Gonadotropins (FSH ± LH/hMG) — "low-dose step-up"	Start 75 IU/day (37.5–75 IU, "low-and-slow", in PCOS); hold the dose 7–14 days, monitor serum oestradiol and transvaginal ultrasonography, and increase only in small increments if no response; trigger ovulation with human chorionic gonadotropin (hCG) 5,000–10,000 IU once the lead follicle reaches 16–18 mm
Cabergoline (dopamine agonist, preferred)	0.25 mg twice weekly, increased gradually to 0.5–1 mg twice weekly (maximum 1.5 mg twice weekly)
Bromocriptine	1.25 mg at bedtime, increased gradually to 2.5 mg twice daily (maximum 5 mg twice daily)

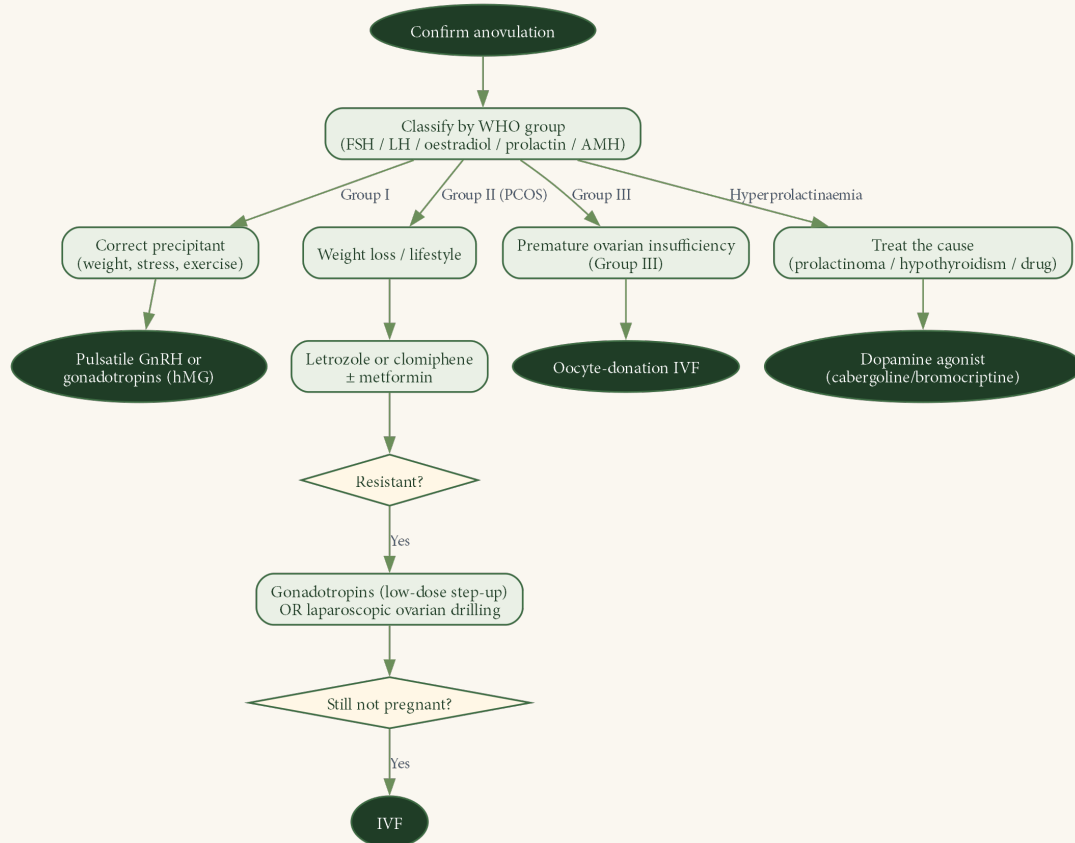
Surgical option — laparoscopic ovarian drilling

- ▶ **Indication** — clomiphene/letrozole-resistant PCOS (WHO Group II), particularly non-obese women with no other infertility factor, or when diagnostic laparoscopy is already planned.
- ▶ **Technique** — unipolar diathermy or laser puncture, 3–6 sites per ovary; unilateral drilling is comparable to bilateral; the tubo-ovarian surface is avoided to limit adhesion formation.
- ▶ **Outcome** — ovulation in 40–90% and pregnancy in roughly half of treated women; live-birth and pregnancy rates are comparable to gonadotropin therapy, but the multiple-pregnancy rate is far lower (about 1% vs. 16%) with no risk of OHSS.
- ▶ **Risk** — postoperative adnexal adhesions; a theoretical risk to ovarian reserve with excessive energy application; poor response if body mass index (BMI) >30 kg/m².

Assisted reproduction

- **In-vitro fertilisation (IVF)** is indicated when ovulation induction fails after an adequate trial, when WHO Group III disease (premature ovarian insufficiency) needs oocyte donation, or when a coexisting tubal or male factor requires IVF regardless of ovulatory status.
- **Intrauterine insemination (IUI)** may be combined with letrozole, clomiphene, or low-dose gonadotropin stimulation as an intermediate step before proceeding to IVF.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Management algorithm for ovulatory-dysfunction infertility by WHO group.

High-yield exam pointers

- WHO classification: Group I hypogonadotropic (5–10%), Group II normogonadotropic/PCOS (75–85%, commonest), Group III hypergonadotropic/premature ovarian insufficiency (10–20%), plus hyperprolactinaemic (4th category).
- Clomiphene 50 mg/day × 5 days from cycle day 2–5, step up by 50 mg to a maximum of 150 mg/day.
- Letrozole 2.5 mg/day × 5 days (max 7.5 mg/day) — now preferred first-line in PCOS over clomiphene.

- ▶ Gonadotropin trigger: hCG 5,000–10,000 IU when the lead follicle is 16–18 mm; "low-dose step-up"/"low-and-slow" protocol minimises OHSS and multiples in PCOS.
- ▶ Laparoscopic ovarian drilling: equivalent pregnancy/live-birth rate to gonadotropins in clomiphene-resistant PCOS, but ~1% vs. 16% multiple-pregnancy rate.
- ▶ Cabergoline (0.25 mg twice weekly) preferred over bromocriptine (1.25 mg at bedtime) for better tolerability/compliance.
- ▶ Group III (premature ovarian insufficiency): ovulation induction is futile — oocyte-donation IVF is the definitive option.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older texts (for example, DC Dutta) describe clomiphene escalation up to 250 mg/day; current practice caps escalation at 150 mg/day, since higher doses do not improve pregnancy rates and only add cost and anti-oestrogenic endometrial thinning.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Discuss the management of primary amenorrhoea in a 18 years old girl

Asked in: Paper III 19-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Primary amenorrhoea is absence of menarche by **16 years** of age regardless of normal growth and secondary sexual characters, or by **14 years** if growth and secondary sexual characters (breast, pubic/axillary hair) have not appeared; at 18 years, evaluation must never be deferred further. Management is entirely cause-specific — it presupposes that the standard work-up (exclude pregnancy, pelvic ultrasound for uterus/ovaries, serum FSH/LH/prolactin/TSH, karyotype where indicated) has already localised the defect to one of the four functional compartments — genital outflow tract, ovary, pituitary, or hypothalamus — so treatment is organised below by the cause identified.

Management by cause

- ▶ **Outflow tract obstruction** — imperforate hymen: cruciate incision of the hymen and drainage of the hematocolpos (never needle aspiration — risk of pyocolpos); transverse vaginal septum: surgical excision with post-operative vaginal moulds/dilators to prevent re-stenosis; cervical/upper-vaginal atresia with a functioning uterus: canalisation/uterovaginal anastomosis

attempted first, hysterectomy (with ovarian conservation, to preserve endogenous oestrogen) reserved for failed reconstruction or recurrent hematometra.

- ▶ **Müllerian agenesis** (*Mayer-Rokitansky-Küster-Hauser, MRKH, syndrome*) — normal ovaries, 46,XY excluded by karyotype. Surgery is not indicated for the amenorrhoea itself; it is done only to create a functional vagina, and only "when the time is appropriate" (i.e., when the patient is ready for coitus). First-line is **non-surgical progressive vaginal dilation** (*Frank* technique, or the *Ingram* modification using a bicycle-seat stool); if this fails or is unacceptable, surgical vaginoplasty — the modified laparoscopic *Vecchiotti* traction procedure or traditional *McIndoe* split-skin-graft vaginoplasty. Ovaries are always retained. Fertility is achieved by in-vitro fertilisation (IVF) using the patient's own oocytes and partner's sperm with embryo transfer to a **gestational surrogate**; uterine transplantation (first live birth reported 2015) is an emerging, still largely experimental, option for the patient to carry her own pregnancy. Screen for and manage the commonly associated renal (~40%) and skeletal (~12%) anomalies.
- ▶ **Androgen insensitivity syndrome (AIS), 46,XY** — raise/continue rearing as female with full psychological support; create a functional vagina (dilation, or vaginoplasty if needed) for coital function. The intra-abdominal/inguinal **testes are deliberately left in place until pubertal feminisation is complete** (~16–18 years) — tumour risk is low (5–10%) before this and rises thereafter — then removed by bilateral laparoscopic **gonadectomy**, followed by lifelong oestrogen replacement.
- ▶ **Gonadal dysgenesis** (*Turner syndrome 45,X and mosaics; pure gonadal dysgenesis 46,XX/46,XY*) — if karyotype shows a **Y-chromosome cell line, prophylactic laparoscopic gonadectomy is done at the time of diagnosis** (gonadoblastoma risk, unlike AIS where it is deferred). Because this girl is already 18 (linear growth complete), the cautious low-dose paediatric induction schedule used in early adolescence is not required; a standard adult hormone-replacement regimen can be started directly — oral micronized estradiol (building to ~2 mg/day) or transdermal estradiol (building to ~100 µg/day), with a cyclic progestin (e.g., medroxyprogesterone acetate 5 mg daily for 12–14 days each month) added once withdrawal bleeding is established, or a combined oral contraceptive as a convenient long-term alternative. Growth hormone therapy (if not already given in childhood) no longer has a role at this age. Screen and manage associated cardiac (coarctation of aorta, bicuspid valve), renal, thyroid, and hearing anomalies; oocyte donation with IVF is the fertility option, with pre-pregnancy cardiac risk assessment given the high (up to 100-fold) risk of aortic dissection in pregnancy.
- ▶ **Hypogonadotropic hypogonadism (hypothalamic/pituitary cause)** — treat the reversible trigger first: weight restoration in anorexia/malnutrition, reduction of excessive exercise, treatment of chronic systemic illness. Once treated (or in isolated gonadotropin deficiency/*Kallmann* syndrome), a combined oestrogen-progestin (cyclic hormone therapy or a combined oral contraceptive) is given for development/maintenance of secondary sexual characters and bone protection when fertility is not the immediate goal; **pulsatile GnRH** (via a portable subcutaneous

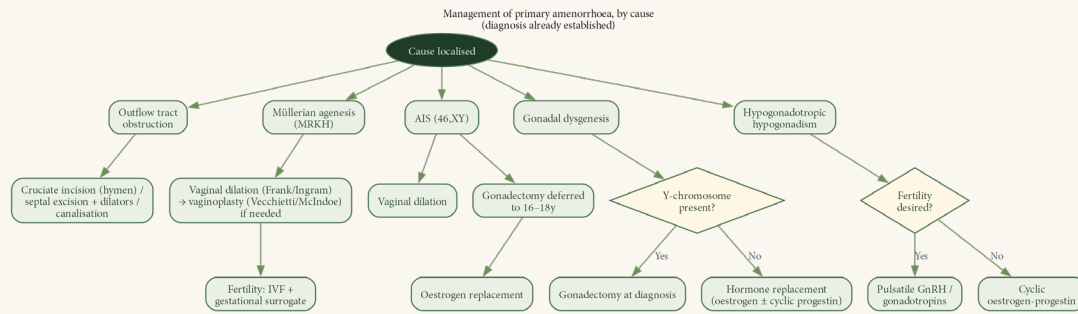
pump) or exogenous **gonadotropins (hMG/FSH)** are used for ovulation induction when fertility is desired. A hypothalamic-pituitary tumour (e.g., craniopharyngioma) needs neurosurgical/oncology referral for excision or radiotherapy.

- ▶ **Hyperprolactinaemia** — dopamine agonist: **cabergoline 0.25 mg twice weekly** (increased gradually, up to 1.5 mg twice weekly) or **bromocriptine 1.25 mg at bedtime** (up to 5 mg twice daily), guided by serial prolactin levels; pituitary MRI to size the adenoma; trans-sphenoidal surgery reserved for medically resistant or large tumours with visual-field compromise.
- ▶ **Adrenal/thyroid causes** — late-onset (non-classic) congenital adrenal hyperplasia: glucocorticoid replacement, with clitoroplasty if clitoromegaly is present; 17 α -hydroxylase deficiency: corticosteroid replacement (to suppress excess mineralocorticoid precursor and correct the associated hypertension/hypokalaemia) plus oestrogen for feminisation; hypothyroidism: levothyroxine replacement (may itself restore menstruation).
- ▶ ***Unresponsive endometrium (tubercular synechiae/Asherman syndrome)*** — antitubercular therapy where indicated, hysteroscopic adhesiolysis, followed by an intrauterine device or paediatric Foley catheter for 7–10 days (with antibiotic cover) to keep the cavity separated, then high-dose cyclic oestrogen-progestin to encourage re-epithelialisation and prevent recurrent adhesions.
- ▶ **Metabolic/systemic causes** — correction of anaemia and malnutrition, glycaemic control in juvenile diabetes, and antitubercular therapy for genital tuberculosis; menstruation may resume once the systemic illness is controlled.

Supportive and long-term management

- ▶ **Psychological counselling** for the patient and family — essential in MRKH, AIS, and gonadal dysgenesis, given the implications for gender identity, body image, and fertility; disclosure of the diagnosis (especially the XY karyotype in AIS) should be truthful and staged.
- ▶ **Bone health** — baseline bone mineral density and adequate oestrogen replacement (plus calcium/vitamin D) in every hypo-oestrogenic state (*Turner syndrome*, premature ovarian insufficiency, hypothalamic amenorrhoea, post-gonadectomy AIS) to protect peak bone mass.
- ▶ **Fertility counselling**, tailored to cause: gestational surrogacy with the patient's own oocytes (MRKH, complete AIS); donor-oocyte IVF (gonadal dysgenesis, premature ovarian insufficiency); pulsatile GnRH or gonadotropin-induced ovulation (hypothalamic-pituitary causes).
- ▶ **Genetic counselling** where relevant (*Turner syndrome*, *Kallmann syndrome*, congenital adrenal hyperplasia, AIS).
- ▶ Multidisciplinary, long-term follow-up involving the gynaecologist, endocrinologist, and, where indicated, geneticist and psychologist.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Five parallel management pathways branching from the localised cause, with decision points for Y-chromosome status and fertility intent.

High-yield exam pointers

- ▶ Cruciate incision only for hematocolpos — never needle aspiration.
- ▶ Y-chromosome material on karyotype → gonadectomy **at diagnosis**; complete AIS → gonadectomy **deferred to after puberty (16–18 years)**, tumour risk 5–10%.
- ▶ MRKH: first-line is **non-surgical dilation** (Frank/Ingram), not primary surgery; ovaries always retained; fertility only via IVF + surrogate (or emerging uterine transplant).
- ▶ Dopamine agonist first-line doses: cabergoline **0.25 mg twice weekly**; bromocriptine **1.25 mg at bedtime**.
- ▶ Turner/gonadal dysgenesis HRT: growth-complete adolescents can start standard adult-dose oestrogen (≈ 2 mg oral estradiol or ≈ 100 μ g transdermal patch) directly with cyclic progestin — unlike the slow paediatric titration used before growth is complete.
- ▶ Kallmann/hypothalamic amenorrhoea: pulsatile GnRH or gonadotropins for fertility; cyclic OCP if fertility not immediately desired.
- ▶ MRKH associated anomalies to screen: renal ($\sim 40\%$), skeletal ($\sim 12\%$).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Gynaecology states only that "XY gonads should be removed" without specifying timing; current teaching (Speroff 9e) is more precise — gonadectomy is deferred to after puberty (16–18 years) in complete androgen insensitivity syndrome because tumour risk is low before then, whereas a Y-bearing dysgenetic gonad (e.g., mixed gonadal dysgenesis) is removed at the time of diagnosis because of its higher gonadoblastoma risk.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Elaborate the essential components in infertility history and what are the specific important investigation in relation to infertility management

Asked in: Paper III 02-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Infertility is failure to conceive after **one or more years of regular unprotected coitus**. **Primary infertility** denotes a couple that has never conceived; **secondary infertility** denotes a couple with a prior conception (livebirth, abortion or ectopic) now failing to conceive again. Evaluation is begun at 1 year but is **advanced to 6 months once the woman is over 35 years or the man over 40 years**, and a couple with an obvious major defect (e.g., azoospermia, müllerian agenesis) should be investigated without waiting out the full duration.

Essential components of the infertility history

Component	Details to elicit	Clinical relevance
Duration & type	Length of cohabitation/exposure; primary vs secondary; outcome and interval of any previous pregnancy	Duration itself is prognostic; secondary infertility raises suspicion of post-abortal/puerperal sepsis causing tubal damage
Age of both partners	Wife's and husband's age	Female fecundity declines sharply beyond 35 years; shortens the "when to investigate" threshold to 6 months
Menstrual history	Menarche, cycle length/regularity, flow, mid-cycle spotting or pain (mittelschmerz), dysmenorrhoea/premenstrual symptoms	Regular cycles with mid-cycle symptoms are presumptive evidence of ovulation; oligomenorrhoea/amenorrhoea points to a disturbed hypothalamo-pituitary-ovarian axis
Previous obstetric history	Number of pregnancies, inter-pregnancy interval, mode of termination, history of post-abortal or puerperal sepsis, vigorous curettage	Sepsis or curettage → ascending infection/tubal damage or intrauterine synechiae (Asherman's syndrome)

Component	Details to elicit	Clinical relevance
Coital history	Frequency and timing of intercourse relative to the fertile window, technique, use of spermicidal lubricants, dyspareunia, erectile/ejaculatory dysfunction	Infrequent or mistimed intercourse is a common, easily correctable cause
Contraceptive history	Type and duration of prior contraception, particularly an intrauterine device	IUCD use is a recognised risk factor for pelvic inflammatory disease and tubal damage
General medical/surgical history	Tuberculosis, sexually transmitted infection, diabetes mellitus, thyroid dysfunction; previous abdominal or pelvic surgery	TB/STI/pelvic inflammatory disease → tubal-peritoneal factor; pelvic surgery → peritubal adhesions
Male-specific history	Mumps orchitis after puberty, undescended testis, hernia repair/herniorrhaphy, varicocele, chemotherapy/radiotherapy, occupational heat or toxin exposure, smoking/alcohol, drugs (antihypertensives, antipsychotics, cimetidine, nitrofurantoin)	Point toward primary testicular failure, ductal obstruction, or a reversible toxic cause of oligospermia
Family history	Consanguinity, genetic disease, early menopause in mother/sister	Screens for a chromosomal/genetic cause or premature ovarian insufficiency risk
Psychosexual/lifestyle history	Anxiety, marital/sexual discord, knowledge of the fertile period, body mass index, occupational stress	Loss of libido and coital-technique errors are common combined factors; female orgasm is not essential for conception

Couple counselling — explaining the need to evaluate both partners together, the sequence and cost of tests, and the probable outcome — should precede any investigation.

Specific investigations in infertility management

A. Male partner

Investigation	Timing/technique	Purpose / finding
Semen analysis (mandatory first-line, both partners)	After 2–7 days of abstinence; repeat after ≥ 4 weeks if abnormal	Oligospermia = sperm concentration < 20 million/mL (traditional cut-off); WHO lower reference limit is 15 million/mL ; progressive motility below the WHO lower limit of 32% is abnormal; azospermia = no sperm on high-speed centrifuged pellet
Serum FSH, LH, testosterone, prolactin, TSH	When semen analysis is abnormal	Raised FSH/LH $\rightarrow$ testicular failure; low FSH/LH $\rightarrow$ hypogonadotropic hypogonadism; raised prolactin $\rightarrow$ pituitary adenoma with impotence
Post-ejaculatory urinalysis	Low/absent ejaculate volume	Detects retrograde ejaculation
Transrectal ultrasound (TRUS)	Azoospermia/severe oligospermia with normal testicular volume, abnormal digital rectal exam	Seminal vesicle, prostate, ejaculatory-duct obstruction
Karyotyping	Azoospermia or severe oligospermia with raised FSH	Klinefelter syndrome (47,XXY) commonest; Y-chromosome microdeletions
Testicular biopsy	Azoospermia, to distinguish obstructive from non-obstructive cause	Sample sent in Bouin's solution , not formol-saline

B. Female partner — ovulation and ovarian reserve

Investigation	Timing	Finding confirming ovulation/reserve
Basal body temperature (BBT)	Throughout the cycle	Biphasic pattern (indirect, retrospective)
Serum progesterone	Day 8 and day 21 of a 28-day cycle	Rise from < 1 ng/mL to > 6 ng/mL confirms ovulation
Serum/urinary LH	Mid-cycle, daily	Ovulation ~ 10 – 12 hours after the LH peak; urinary surge detected 14–26 (up to 48) hours before ovulation
Transvaginal sonography (TVS), serial	Day 12–14	Peri-ovulatory follicle 18–20 mm; collapsed follicle with fluid in the pouch of Douglas confirms recent ovulation

Investigation	Timing	Finding confirming ovulation/reserve
Endometrial biopsy	Day 21–23	Secretory endometrium (largely replaced by hormonal/sonographic methods)
Laparoscopy	Secretory phase	Direct evidence — recent corpus luteum/stigma (used mainly when done for another indication)
Cycle day 3 serum FSH + estradiol	Early follicular phase	FSH 10–15 IU/L (with normal estradiol) is concerning for diminished ovarian reserve
Serum anti-Müllerian hormone (AMH)	Any day of the cycle (cycle-independent)	Low/undetectable AMH → diminished reserve; AMH >5 ng/mL with amenorrhoea suggests PCOS
Antral follicle count	TVS, early follicular phase	Low count corroborates diminished ovarian reserve

C. Female partner — tubal, uterine and cervical factors

Investigation	Timing/notes	Finding
Hysterosalpingography (HSG)	Post-menstrual/proliferative phase, after bleeding stops; contraindicated in active pelvic infection	Site and side of tubal block; uterine cavity contour (synechiae, submucous fibroid, septum)
Laparoscopy + chromopertubation	Gold-standard, definitive test for tubal factor; done in proliferative phase (RCOG) after male and ovulatory factors are normal; indicated for age >35, abnormal HSG, unexplained infertility, or suspected endometriosis/pelvic inflammatory disease	Tubal patency by dye spillage, peritubal adhesions, endometriosis; complementary to HSG, not a substitute for it
Sonohysterosalpingography / hysterosalpingo-contrast sonography (HyCoSy)	Proliferative phase	Comparable to HSG for tubal patency, superior for intrauterine pathology, no radiation exposure
Hysteroscopy	—	Gold standard for the uterine cavity and tubal ostia; also therapeutic (polypectomy, septal resection, adhesiolysis)

Investigation	Timing/notes	Finding
Postcoital test (Sims–Huhner)	Around ovulation, examined 8–12 hours after coitus	≥10 progressively motile sperm per high-power field is "normal"; poor predictive value — routine postcoital testing is no longer recommended

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 37.69 — Hysterosalpingogram showing bilateral peritoneal spillage confirming tubal patency (DC Dutta's Gynaecology 6e, p.673)

High-yield exam pointers

- ▶ Definition cut-offs: **1 year** regular unprotected coitus; shortened to **6 months** if wife >35 or husband >40 years.
- ▶ Basic infertility work-up triad (must-write): **semen analysis + confirmation of ovulation + confirmation of tubal patency**.
- ▶ Semen numbers to write: oligospermia <20 million/mL (traditional)/WHO lower limit **15 million/mL**; WHO progressive motility lower limit **32%**.
- ▶ Ovulation number to write: serum progesterone day 8 <1 ng/mL → day 21 >**6 ng/mL** = ovulation confirmed.
- ▶ Ovarian reserve: **cycle day 3 FSH 10–15 IU/L** = diminished reserve; **AMH** is cycle-day independent, low = diminished reserve, high (>5 ng/mL) with amenorrhoea suggests PCOS.
- ▶ Tubal factor gold standard = **laparoscopy + chromopertubation**; HSG and laparoscopy are complementary, not substitutes.
- ▶ Male-factor: azoospermia biopsy goes in **Bouin's solution** (not formol-saline); karyotype for Klinefelter (47,XXY).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Postcoital (Sims–Huhner) testing is retained in older textbook chapters as a cervical-factor test, but current practice — reflected across recent editions — has dropped it from routine use because of its poor predictive value.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Evaluate a 46-year-old menopausal women attending well women clinic asking for advice on HRT

Asked in: Paper IV 17-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Menopause is the permanent cessation of menstruation for 12 consecutive months due to loss of ovarian follicular activity, occurring at an average age of 50 years. This patient is menopausal at 46 years — somewhat before the population average — and is requesting advice on hormone replacement therapy (HRT), i.e., oestrogen alone or combined with a progestin, to relieve oestrogen-deficiency symptoms and gain long-term skeletal and possibly cardiovascular benefit. Evaluation must confirm the diagnosis, screen for contraindications, and individualise the risk–benefit decision before prescribing.

History-taking at the well-woman visit

Domain	Key points to elicit
Confirm menopause & symptom burden	Last menstrual period >12 months ago; hot flushes/night sweats and their severity/impact on sleep and work; mood/cognitive complaints; genitourinary syndrome of menopause (GSM) — vaginal dryness, dyspareunia, urinary urgency/frequency
Gynaecological/reproductive history	Parity; uterus intact or hysterectomised (decides whether a progestin is needed); any abnormal or postmenopausal bleeding (must be worked up before HRT)
Contraindication screen	Personal history of breast or endometrial cancer, venous thromboembolism (VTE)/DVT/PE, stroke/myocardial infarction, migraine with aura, active liver or gallbladder disease
Cardiometabolic & bone risk	Smoking, hypertension, diabetes, dyslipidaemia, obesity/metabolic syndrome, fracture history
Family history	Breast/ovarian cancer, premature coronary disease, VTE, osteoporosis
Preferences	Patient's goals and fears (e.g., of cancer); willingness for shared decision-making

Examination & baseline investigations

Test/exam	Purpose
BP, weight/BMI, waist circumference	Cardiometabolic risk stratification
Breast examination + mammography	Baseline screening before oestrogen exposure

Test/exam	Purpose
Pelvic/speculum exam + cervical cytology	Exclude local pathology; due cancer screening
Transvaginal sonography	Endometrial thickness — should be <5 mm; any bleeding needs endometrial biopsy/hysteroscopy before HRT
Fasting lipid profile & glucose	Baseline, as oestrogen affects triglycerides
TSH	If vasomotor symptoms are atypical or resistant to therapy
DEXA bone density	If additional osteoporosis risk factors present
Liver function tests	If liver disease suspected

Benefit–risk assessment (individualised)

Benefit (evidence)	Risk — WHI randomised data, combined oestrogen–progestin (EPT) arm, ~5 years
Vasomotor symptom relief in 70–80%	Coronary heart disease, hazard ratio (HR) 1.3
Improves GSM/urogenital atrophy	Breast cancer, HR 1.3
Bone mineral density up 2–5%; vertebral/hip fracture risk down 25–50% (WHI hip-fracture HR 0.7)	Stroke, HR 1.4
Reduced colorectal cancer risk (WHI HR 0.6)	Pulmonary embolism, HR 2.1
Possible cardioprotection if started early — the "timing hypothesis," supported by the ELITE trial	Absolute excess risk ≈7–8 extra events per 10,000 woman-years — small

Being **46 years old and within 10 years of menopause**, she falls within the favourable "window of opportunity," where benefit is highly likely to outweigh risk. The oestrogen-only WHI arm (hysterectomised women) showed no increase in coronary heart disease or breast cancer.

Contraindications to HRT

Absolute	Relative (individualise)
Known/suspected breast or oestrogen-dependent cancer	Migraine with aura
Undiagnosed genital tract bleeding	Uncontrolled hypertension
History of or active VTE, stroke, or coronary disease	High VTE-risk states (obesity, thrombophilia, immobility)
Active liver disease	Gallbladder disease; prior cholestatic jaundice

Absolute	Relative (individualise)
Pregnancy	Endometriosis/fibroids (caution)

HRT regimen and counselling for this patient

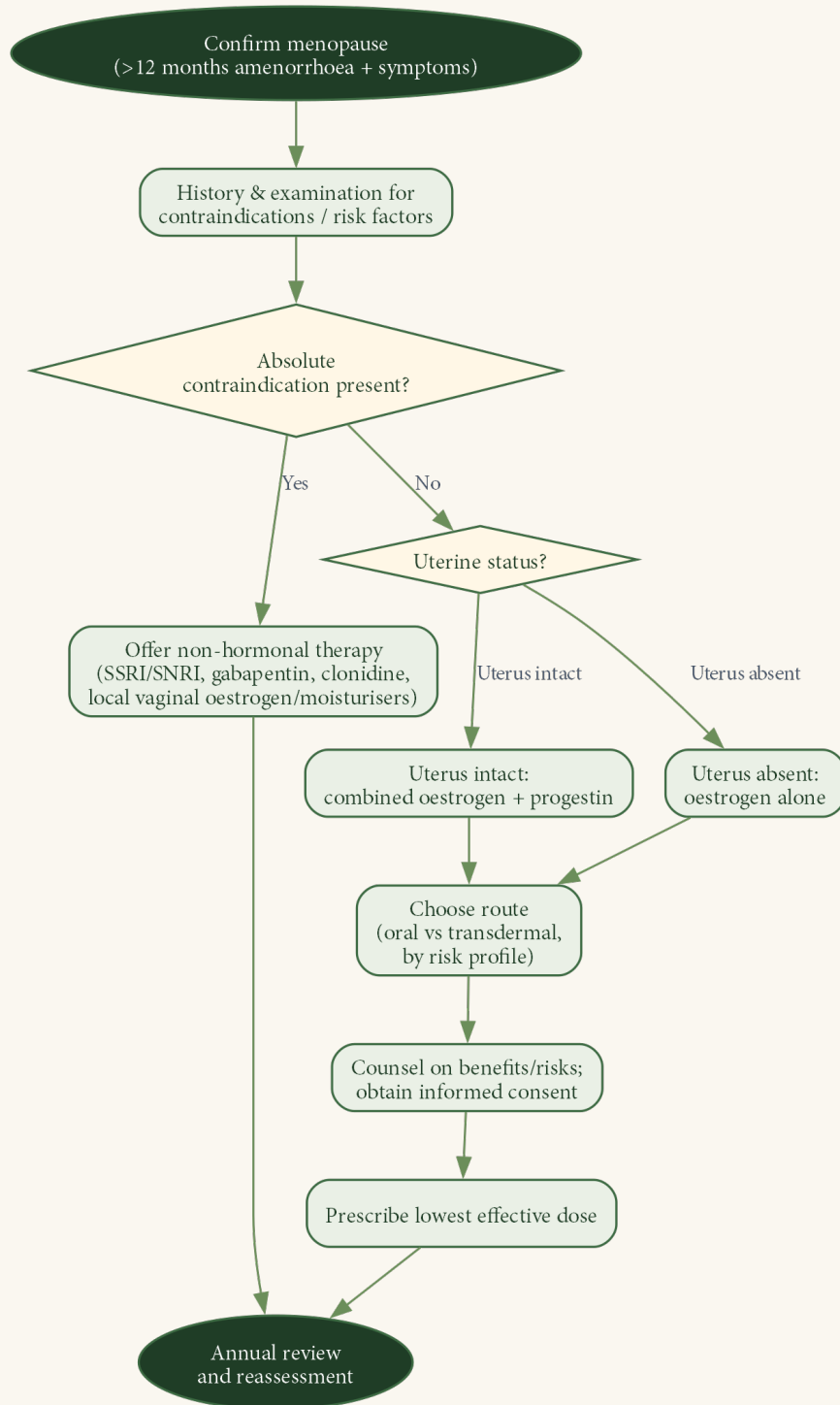
- ▶ If the **uterus is intact**, combined oestrogen–progestin is mandatory — unopposed oestrogen risks endometrial hyperplasia/carcinoma; choose a **sequential** regimen (progestin for the last 12–14 days each month, giving predictable withdrawal bleeding) or a **continuous-combined** regimen (daily, usually amenorrhoeic by one year).
- ▶ **Oestrogen**: conjugated equine oestrogen (CEE) 0.625 mg/day or micronised estradiol 1–2 mg/day orally; or transdermal patch (~50 µg/day) or gel (1 mg/day). Start at the **lowest effective dose** (e.g., CEE 0.3 mg/day, or low-dose CE/MPA 0.3–0.45/1.5 mg combinations).
- ▶ **Progestin**: medroxyprogesterone acetate (MPA) 2.5–5 mg/day, micronised progesterone 100–300 mg/day (200 mg cyclic for 12–14 days, or 100 mg continuous, taken at night), dydrogesterone 5–10 mg/day, or a levonorgestrel intrauterine system for endometrial protection.
- ▶ **Route selection**: prefer **transdermal** oestrogen if she smokes, is obese, hypertensive, diabetic, has hypertriglyceridaemia, or reports low libido — it avoids first-pass hepatic effects and does not raise VTE or gallbladder risk.
- ▶ Use the **lowest effective dose for the shortest duration needed**; reassess annually; taper slowly rather than stopping abruptly — abrupt cessation causes symptom rebound in about 50%.
- ▶ If HRT is declined or contraindicated: SSRIs/SNRIs (low-dose paroxetine 7.5 mg, venlafaxine), gabapentin, or clonidine for vasomotor symptoms; local low-dose vaginal oestrogen or moisturisers for isolated GSM.
- ▶ Lifestyle advice: calcium 1–1.5 g/day plus vitamin D3 800–2000 IU/day, weight-bearing exercise, smoking and alcohol cessation.
- ▶ Annual monitoring: blood pressure, breast examination/mammography, cervical cytology, and prompt evaluation (transvaginal scan/endometrial biopsy) of any irregular bleeding.

Recent advances [RA]

- ▶ **The Menopause Society (formerly NAMS) 2022 Position Statement** reaffirms no fixed stopping age; continuation is individualised through annual shared decision-making, not an arbitrary duration limit.
- ▶ **2016 Global Consensus Statement on Menopausal Hormone Therapy** (IMS/NAMS and allied bodies) confirms HRT as the most effective treatment for vasomotor symptoms and bone-loss prevention when started before age 60 or within 10 years of menopause.
- ▶ **NICE guideline NG23** (updated 2024) favours absolute (not relative) risk framing, prefers transdermal oestrogen and micronised progesterone in women with cardiovascular/thrombotic risk, and notes the added breast cancer risk is small and falls after stopping.

- ▶ **Fezolinetant**, a neurokinin-3 receptor antagonist blocking hypothalamic KNDy-neuron signalling, was approved (2023, SKYLIGHT trials) as the first non-hormonal drug targeting the mechanism of hot flushes, for women unable/unwilling to use HRT.
- ▶ **Tissue-selective oestrogen complex** (conjugated oestrogen 0.45 mg + bazedoxifene 20 mg) gives endometrial protection without a progestin, avoiding the progestin-related risk signal.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for evaluating and counselling a menopausal woman requesting HRT at the well-woman clinic.

High-yield exam pointers

- ▶ Menopause = 12 months' amenorrhoea; average age 50 years — 46 years is before this average, favouring HRT within the "window of opportunity."
- ▶ WHI combined (EPT) arm: CHD HR 1.3, breast cancer HR 1.3, stroke HR 1.4, PE HR 2.1 — but absolute excess only 7–8 events/10,000 woman-years.
- ▶ Unopposed oestrogen with an intact uterus risks endometrial cancer — always add a progestin.
- ▶ "Lowest effective dose, shortest necessary duration, reassessed annually" — the rule to quote.
- ▶ Transdermal oestrogen preferred in smokers, obese, diabetic, hypertensive, or VTE-risk women.
- ▶ Absolute contraindications: breast/oestrogen-dependent cancer, undiagnosed bleeding, VTE/stroke/CHD, active liver disease.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The corpus editions used (DC Dutta's Gynaecology 7e; Berek & Novak 16e, citing the 2017 NAMS statement) predate the 2022/2024 updates quoted under Recent Advances; the doses and WHI data above are unchanged and remain current.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 6 — Menopause); Berek & Novak's Gynecology 16e (Ch. 18 — Menopause); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (hormone therapy and route-of-administration chapter); Women's Health Initiative trial data as reported in Berek & Novak; The Menopause Society 2022 Hormone Therapy Position Statement; 2016 Global Consensus Statement on Menopausal Hormone Therapy; NICE guideline NG23 (updated 2024).



Evaluation of male in an infertile couple

Asked in: Paper III May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — The male partner is solely or partly responsible in about 30–40% of infertile couples (faults in the male alone in 20–30%, combined male-and-female factors in about 10%). Because semen analysis is inexpensive, non-invasive, and highly informative, evaluation of the male should begin at the very first visit, in parallel with — not after — evaluation of the female partner.

History

- ▶ **Duration of infertility**, coital frequency and timing, any previous fertility (children from present or earlier partner).
- ▶ **Sexual function** — erectile dysfunction, ejaculatory failure, retrograde ejaculation, libido.

- ▶ **Developmental** — undescended testis (cryptorchidism), delayed puberty, anosmia (suggests *Kallmann syndrome*).
- ▶ **Infections** — mumps orchitis after puberty, sexually transmitted infection, epididymitis, genitourinary tuberculosis, recurrent chest infection/bronchiectasis (*Kartagener syndrome*).
- ▶ **Past surgery** — herniorrhaphy, orchidopexy, hydrocele/varicocele repair, vasectomy, bladder-neck surgery.
- ▶ **Systemic illness** — diabetes mellitus, chronic renal or hepatic disease, malnutrition.
- ▶ **Drugs/toxins** — chemotherapy, pelvic/testicular radiation, antihypertensives, antipsychotics, cimetidine, nitrofurantoin, anticonvulsants, anabolic steroids, heavy smoking, alcohol; occupational heat exposure.
- ▶ **Family history** — infertility, cystic fibrosis (relevant to congenital absence of the vas).

Examination

Component	What to look for
General	Body mass index, body hair distribution, gynaecomastia, eunuchoid proportions, anosmia
Genitalia — inspection	Penile abnormality (hypospadias — prevents deposition of sperm high in the vagina)
Testes	Size and consistency; testicular volume by orchidometer should be ≥ 20 mL
Epididymis/vas deferens	Palpate bilaterally for thickening or absence (congenital bilateral absence of the vas deferens, CBAVD)
Varicocele	Elicited with the patient standing, with and without Valsalva
Digital rectal examination	Prostate and seminal vesicles, when ejaculatory duct pathology is suspected

Semen analysis — the pivotal first investigation

- ▶ **Collection:** by masturbation (coitus interruptus if masturbation unacceptable) into a clean, dry, wide-mouthed glass jar after **2–3 days of abstinence**; examined within **2 hours** of collection.
- ▶ If the first analysis is abnormal, a **second sample is repeated after at least 4 weeks** before any abnormality is labelled significant, because values fluctuate.

Semen analysis — WHO (2010) normal reference value and lower reference limit

Parameter	Normal value (lower reference limit)
Volume	2.0 mL or more (1.5 mL)

Parameter	Normal value (lower reference limit)
pH	7.2–7.8
Viscosity	< 3 (scale 0–4)
Sperm concentration	20 million/mL (15 million/mL)
Total sperm count	> 40 million/ejaculate (39 million/ejaculate)
Motility	> 50% progressive forward motility (32%)
Morphology (normal forms)	> 14% (4%)
Viability	75% or more living (58%)
Leukocytes	< 1 million/mL
Sperm agglutination	< 10% spermatozoa with adherent particles

Nomenclature of abnormal semen parameters

Term	Meaning
Aspermia	No ejaculate (failure of emission)
Hypospermia	Semen volume < 2 mL
Oligozoospermia	Sperm concentration < 20 million/mL
Polyzoospermia	Sperm concentration > 350 million/mL
Azoospermia	No spermatozoa in the semen
Asthenozoospermia	Reduced sperm motility
Necrozoospermia	Spermatozoa dead/non-motile
Teratozoospermia	> 70% spermatozoa with abnormal morphology
Oligoasthenoteratozoospermia (OAT)	Combined defect of concentration, motility and morphology

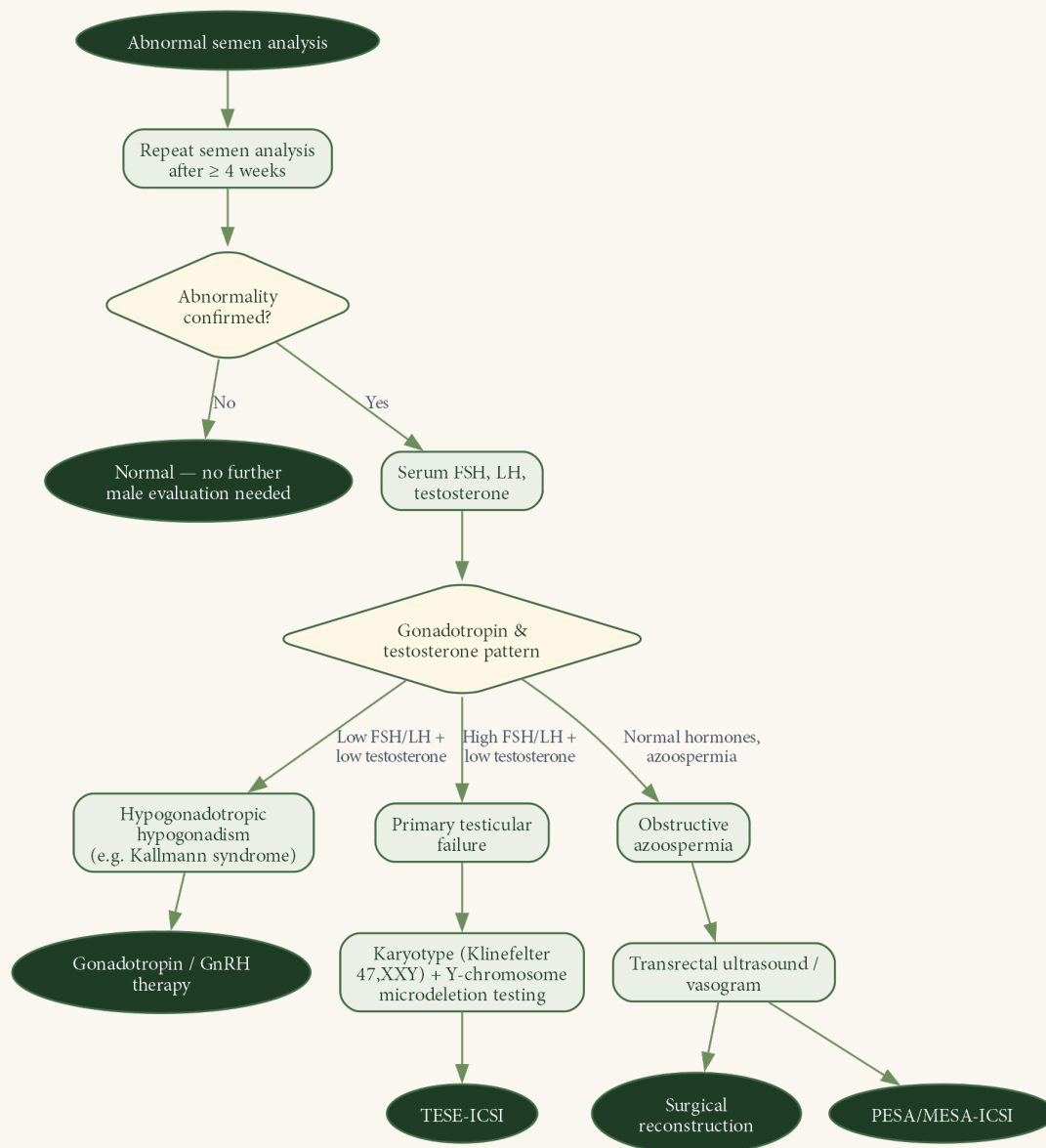
Further evaluation when semen analysis is abnormal

Indicated in azoospermia, oligozoospermia, low-volume ejaculate, or sexual dysfunction.

- ▶ **Hormonal profile** — serum FSH, LH, testosterone, prolactin, TSH.
 - High FSH/LH with low testosterone → primary testicular failure.
 - Low FSH/LH with low testosterone → hypogonadotropic hypogonadism (e.g., *Kallmann syndrome*).
 - Raised prolactin → pituitary adenoma, may cause impotence.
- ▶ **Karyotype analysis** — for azoospermia or severe oligozoospermia with raised FSH; *Klinefelter syndrome* (47,XXY) is the commonest chromosomal cause.

- ▶ **Y-chromosome microdeletion testing (AZFa/b/c regions of Yq11)** — before use of sperm for intracytoplasmic sperm injection (ICSI), since AZFc deletions are transmissible to male offspring.
- ▶ **Seminal fructose** — its absence indicates congenital absence of the seminal vesicle/vas or ejaculatory duct obstruction.
- ▶ **CFTR gene mutation testing** — in CBAVD, given its strong association with the cystic fibrosis gene.
- ▶ **Scrotal/transrectal ultrasound (TRUS)** — indicated for azoospermia with normal testicular volume, abnormal digital rectal examination, or suspected ejaculatory duct pathology (cysts, dilatation, calcification); vasogram is now largely superseded by TRUS.
- ▶ **Post-ejaculatory urinalysis** — when ejaculate volume is low/absent, to detect retrograde ejaculation.
- ▶ **Testicular biopsy** — to differentiate primary testicular failure from ductal obstruction as the cause of azoospermia; **specimen is sent in Bouin's solution, never in formol saline**; tissue may be cryopreserved for later in-vitro fertilisation/ICSI.
- ▶ **Antisperm antibody testing** — sperm-agglutinating and sperm-immobilising antibodies (history of orchitis, trauma, vasectomy); their presence in cervical mucus is shown by the post-coital test.
- ▶ **Sperm function tests** (selected cases) — creatine phosphokinase, reactive oxygen species/sperm DNA fragmentation.
- ▶ **Semen culture/prostatic massage** — when plentiful pus cells are seen, to identify infection needing antibiotic therapy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Diagnostic algorithm for an abnormal semen analysis, branching on the hormonal profile to hypogonadotropic hypogonadism, primary testicular failure, or obstructive azoospermia.

High-yield exam pointers

- ▶ WHO (2010) lower reference limits to write verbatim: volume 1.5 mL, concentration 15 million/mL, total count 39 million/ejaculate, progressive motility 32%, normal morphology 4%, vitality 58%.
- ▶ Repeat an abnormal semen analysis only after **≥ 4 weeks**.
- ▶ Normal testicular volume by orchidometer = **≥ 20 mL**.

- ▶ **Klinefelter syndrome (47,XXY)** — commonest genetic cause of azoospermia; diagnosed by karyotype.
- ▶ Testicular biopsy specimen goes in **Bouin's solution**, not formol saline (a classic "don't-miss" line).
- ▶ CBAVD triad: absent vas on palpation, **low-volume acidic, fructose-negative** ejaculate, **CFTR gene** mutation.
- ▶ Y-chromosome microdeletion (AZFc) testing is mandatory counselling before ICSI in severe oligozoospermia/azoospermia.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The lower reference limits above follow the WHO 2010 (5th edition) manual, which is what both DC Dutta's Gynaecology 7e and Speroff 9e print and remains the Indian exam standard; the WHO 6th edition (2021) laboratory manual has since revised several of these lower limits modestly (e.g., progressive motility 30%, total motility 42%), and examiners accepting either value should be told so if directly asked about the manual edition.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e.



Hirsutism

Asked in: Paper III 20-Dec-2023 · Paper I Apr 2008 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Hirsutism is excessive growth of terminal (coarse, pigmented, androgen-dependent) hair in a male-pattern distribution — upper lip, chin, chest, inter-mammary area, linea alba, and inner thighs — in a woman, resulting from increased androgen production, increased peripheral conversion of testosterone to dihydrotestosterone (DHT) by 5 α -reductase, or increased sensitivity of the pilosebaceous unit to androgens. It must be distinguished from **hypertrichosis** (generalised, androgen-independent excess of vellus/lanugo-type hair in normal, non-sexual sites) and from **virilism** (hirsutism

plus clitoromegaly, temporal balding, voice change, and breast atrophy — a marked degree of androgen excess that is usually tumour-related).

Causes (Classification)

Category	Causes
Ovarian	Polycystic ovary syndrome (PCOS) — commonest cause; Sertoli–Leydig cell tumour; hilus cell tumour; lipoid cell tumour; stromal hyperthecosis; luteoma of pregnancy
Adrenal	Late-onset (non-classic) congenital adrenal hyperplasia — 21-hydroxylase deficiency; Cushing syndrome ; adrenal adenoma/carcinoma
Obesity / insulin resistance	Android obesity with hyperinsulinaemia → ↓sex hormone-binding globulin (SHBG) → ↑free testosterone; HAIR-AN syndrome (hyperandrogenism, insulin resistance, acanthosis nigricans)
Other endocrine	Hyperprolactinaemia; acromegaly (excess growth hormone); pituitary Cushing disease (excess adrenocorticotrophic hormone, ACTH)
Exogenous (iatrogenic)	Androgens, anabolic steroids, danazol, androgenic progestogens, phenytoin, diazoxide, ciclosporin
Idiopathic	Increased 5 α -reductase activity/androgen-receptor sensitivity at the pilosebaceous unit with normal circulating androgens and regular ovulatory cycles — roughly half of hirsute women
Physiological	Puberty, pregnancy, post-menopause (mild, transient hirsutism from relatively unopposed androgen as oestrogen and SHBG fall)

Clinical Evaluation and Grading

- **History** — age of onset and rate of progression (rapid onset/progression suggests a neoplasm); menstrual history (oligomenorrhoea/amenorrhoea raises the probability of true hyperandrogenism); drug history; family history of hirsutism, PCOS, or adrenal hyperplasia.
- **Examination** — body mass index; site and degree of hair growth; signs of virilisation (clitoromegaly, temporal balding, deepened voice); acne, acanthosis nigricans, galactorrhoea; moon facies, central obesity, and abdominal striae suggesting Cushing syndrome.
- **Grading** — the modified ***Ferriman–Gallwey score grades terminal hair growth from 0 to 4 in nine androgen-sensitive sites (upper lip, chin, chest, upper and lower back, upper and lower abdomen, arms, thighs); a total score of 8 or more*** defines hirsutism.

- **Red flags mandating tumour work-up** — sudden onset, rapid progression, frank virilisation, or onset after the menopause.

Investigations and Differentiating the Cause

Feature	Late-onset adrenal hyperplasia	Adrenal tumour	Ovarian tumour	PCOS
Onset	Peri-menarcheal, insidious	Any age, rapid	Any age, rapid	Early reproductive age, insidious
Hirsutism / virilism	Hirsutism +, virilism ±	Hirsutism ++, virilism +	Hirsutism ++, virilism +	Hirsutism ±, virilism nil
Key hormone	17-hydroxyprogesterone (17-OHP) raised, basal and after ACTH stimulation	Dehydroepiandrosterone-sulphate (DHEA-S) >700 µg/dL	Total testosterone >200 ng/dL	Luteinising hormone : follicle-stimulating hormone (LH:FSH) ≈ 3:1; testosterone only mildly raised
Confirmatory test	ACTH stimulation test	Adrenal computed tomography (CT)/magnetic resonance imaging (MRI)	Transvaginal sonography, laparoscopy	Transvaginal sonography (polycystic ovarian morphology)

The Endocrine Society (2018) recommends androgen testing only for **moderate–severe hirsutism** (Ferriman–Gallwey score ≥ 9), or hirsutism of any severity with sudden onset, rapid progression, virilisation, or onset outside adolescence; mild hirsutism with regular cycles needs no biochemical work-up. Baseline tests are total/free testosterone, DHEA-S, and a follicular-phase morning 17-OHP; prolactin and thyroid-stimulating hormone are added when periods are irregular. Total testosterone >200 ng/dL should prompt imaging to exclude an androgen-secreting tumour; a basal 17-OHP >10,000 ng/dL (300 nmol/L) is diagnostic of congenital adrenal hyperplasia, while levels between 300 and 10,000 ng/dL require an ACTH-stimulation test to distinguish PCOS from late-onset adrenal hyperplasia. An overnight 1 mg dexamethasone-suppression test (morning cortisol below approximately 2 µg/dL makes Cushing syndrome unlikely) is added when Cushing syndrome is suspected clinically.

Management

- **General measure** — weight reduction to body mass index <25 in obese women; lowers hyperinsulinaemia, raises SHBG, and improves both menstrual function and hirsutism.

- ▶ **Remove the source** — surgical excision of an androgen-secreting ovarian or adrenal tumour; adrenalectomy, pituitary radiotherapy, or trans-sphenoidal surgery for Cushing disease; stop the offending drug in iatrogenic hirsutism.
- ▶ **Hormonal suppression of androgen production** — a combined oestrogen–progestin contraceptive pill (preferring a low-androgenic or antiandrogenic progestin such as drospirenone, desogestrel, or cyproterone acetate) is first-line for PCOS-related and idiopathic hirsutism: the progestin suppresses LH-driven ovarian androgen output, and the oestrogen raises SHBG and inhibits cutaneous 5 α -reductase. An antiandrogen (table below) is added if hirsutism is moderate–severe, or if the response to the pill alone is inadequate after **6 months**.
- ▶ **Hair removal** — mechanical/cosmetic methods (shaving, waxing, bleaching, plucking, electrolysis, laser) give immediate cosmetic benefit; topical **eflornithine hydrochloride 13.9% cream** (an ornithine-decarboxylase inhibitor) applied twice daily slows facial hair growth but is not a depilatory, and hair growth reverts within about 8 weeks of stopping.
- ▶ **Counselling** — antiandrogens are potentially teratogenic (can feminise a male fetus) and must always be prescribed with effective contraception; a minimum of 6 months of therapy is needed before judging response, since the hair-follicle growth cycle is about 6 months, and medical therapy prevents new terminal hair but does not remove hair already present.

Drug	Dose	Notes
Spirolactone	50–100 mg twice daily (100–200 mg/day)	First-choice antiandrogen; competes with DHT for the androgen receptor and inhibits 5 α -reductase; monitor serum potassium
Cyproterone acetate	2 mg with ethinyl estradiol 35 μ g as a combined pill, or 100 mg on days 5–15 with ethinyl estradiol 30–50 μ g on days 5–26 (reverse-sequential regimen)	Competitive androgen-receptor antagonist
Flutamide	100–200 mg daily	Not first-line, owing to hepatotoxicity; monitor liver function
Finasteride	5 mg daily	5 α -reductase inhibitor; does not affect ovulation or menstrual regularity
Dexamethasone	0.25–0.75 mg at bedtime	For adrenal-source hyperandrogenism; monitor morning cortisol to avoid over-suppression

Drug	Dose	Notes
Gonadotropin-releasing hormone (GnRH) agonist + add-back oestrogen	Monthly depot injection	Reserved for hirsutism refractory to the above

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 35.1 — Ferriman–Gallwey hirsutism scoring system. Each of the nine body areas (Berek & Novak 16e, p.2094)

High-yield exam pointers

- ▶ Modified Ferriman–Gallwey score ≥ 8 (nine body areas, each scored 0–4) defines hirsutism.
- ▶ Total testosterone >200 ng/dL $\rightarrow$ exclude an ovarian/adrenal tumour; DHEA-S >700 μ g/dL $\rightarrow$ adrenal source; LH:FSH $\approx 3:1 \rightarrow$ PCOS.
- ▶ Basal 17-OHP $>10,000$ ng/dL (300 nmol/L) is diagnostic of congenital adrenal hyperplasia; 300–10,000 ng/dL needs an ACTH-stimulation test.
- ▶ Combined oral contraceptive pill first, add an antiandrogen after 6 months of inadequate response — the Endocrine Society (2018) pharmacologic sequence.
- ▶ Spironolactone 100–200 mg/day is the most commonly used antiandrogen; finasteride 5 mg/day inhibits 5 α -reductase — both need effective contraception.
- ▶ Minimum 6 months of therapy before assessing response, reflecting the hair-follicle growth cycle.
- ▶ Hirsutism with rapid onset or virilisation = androgen-secreting tumour until proven otherwise.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology quotes an older, single basal 17-hydroxyprogesterone cut-off (around 800 ng/dL) for late-onset adrenal hyperplasia, whereas the tiered 300/10,000 ng/dL figures used above (and the advice against insulin sensitisers for hirsutism itself) follow the current Endocrine Society-anchored practice in Berek & Novak and Speroff.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Endocrine Society Clinical Practice Guideline — Evaluation and Treatment of Hirsutism in Premenopausal Women (Martin et al., J Clin Endocrinol Metab 2018;103:1233).

♦ ♦ ♦

Hormone replacement therapy in menopause

Asked in: Paper III 23-Nov-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Hormone replacement therapy (HRT), now more precisely termed menopausal hormone therapy (MHT), is the administration of exogenous **estrogen** — combined with a **progestogen** in every woman with an intact uterus — to relieve symptoms of estrogen deficiency after natural or surgical menopause. It is prescribed at the **lowest effective dose, for the shortest duration needed** to meet treatment goals, after an individualised risk–benefit assessment.

Indications

Indication	Comment
Vasomotor symptoms (hot flushes, night sweats)	Systemic estrogen is the single most effective treatment (ACOG/NAMS)
Genitourinary syndrome of menopause (GSM)	Vaginal dryness, dyspareunia, recurrent urinary tract infection — low-dose vaginal estrogen is first line
Premature/early menopause or premature ovarian insufficiency	HRT continued at least until the average age of natural menopause (~51 years) to limit early bone loss and cardiovascular risk
Surgical menopause (bilateral oophorectomy before natural menopause)	Especially if performed at a young age
Prevention of osteoporosis	Reasonable in women <60 years/within 10 years of menopause who also have vasomotor symptoms and cannot use other bone-protective agents

Contraindications

Absolute	Relative
Known/suspected breast cancer or estrogen-dependent malignancy (e.g., endometrial cancer)	Known thrombophilia
Undiagnosed abnormal genital bleeding	Migraine with aura
Active or past venous thromboembolism (DVT/PE)	Active gallbladder disease
Active arterial thromboembolic disease (recent stroke/myocardial infarction) or established coronary/cerebrovascular disease	Uncontrolled hypertension, hypertriglyceridemia
Active liver disease	High-risk states for the above absolute conditions
Pregnancy	—

(Berek & Novak 16e.)

Types of regimen and doses

- ▶ **Estrogen-only therapy (ET)** — used **only after hysterectomy**; unopposed estrogen in a woman with a uterus causes endometrial hyperplasia/carcinoma.
- ▶ **Combined estrogen–progestogen therapy (EPT)** — mandatory whenever the uterus is intact:
 - **Sequential/cyclical regimen** — estrogen daily + progestogen for 12–14 days every month → predictable withdrawal bleeding in 80–90% of women.
 - **Continuous-combined regimen** — estrogen + a lower daily dose of progestogen every day → amenorrhoea within 1 year in 80–90% of women; better long-term compliance.

Comparable estrogen doses (Speroff 9e): conjugated equine estrogen (CEE) 0.625 mg/day (lower-dose options 0.3–0.45 mg/day), micronized estradiol 1–2 mg/day, estradiol valerate 1–2 mg/day, transdermal estradiol patch ~0.025–0.1 mg/day (commonly 50 µg/day), ethinyl estradiol 5 µg/day.

Comparable progestogen doses (sequential, 12–14 days/month): medroxyprogesterone acetate (MPA) 5 mg; norethindrone acetate 1.0 mg; micronized progesterone 200 mg (taken at bedtime — sedative effect).

Comparable progestogen doses (continuous-combined, daily): MPA 1.5–2.5 mg; norethindrone 0.35 mg or norethindrone acetate 0.5–1.0 mg; micronized progesterone 100 mg; drospirenone 2 mg; dienogest 2 mg.

Route options:

Route	Use	Notes
Oral	Systemic vasomotor/bone indication	Subject to first-pass hepatic metabolism (↑ triglycerides, clotting factors, SHBG)
Transdermal (patch/gel/spray)	Preferred if VTE risk factors, hypertriglyceridemia, migraine, or hepatic disease	Avoids first-pass effect; observational data show no increased VTE risk
Low-dose vaginal (tablet 10 µg twice weekly, ring 7.5 µg/day for 3 months, cream)	GSM only	Minimal systemic absorption — progestogen add-back not required even with a uterus
Tissue-selective estrogen complex	CEE 0.45 mg + bazedoxifene 20 mg once daily	Bazedoxifene protects the endometrium — no separate progestogen needed

Benefits vs risks — Women's Health Initiative (WHI) evidence

The WHI randomised ~27,000 women 50–79 years to combined estrogen-progestin therapy (EPT: CEE 0.625 mg + MPA 2.5 mg) or estrogen-only therapy (ET: CEE 0.625 mg, hysterectomised women) versus placebo.

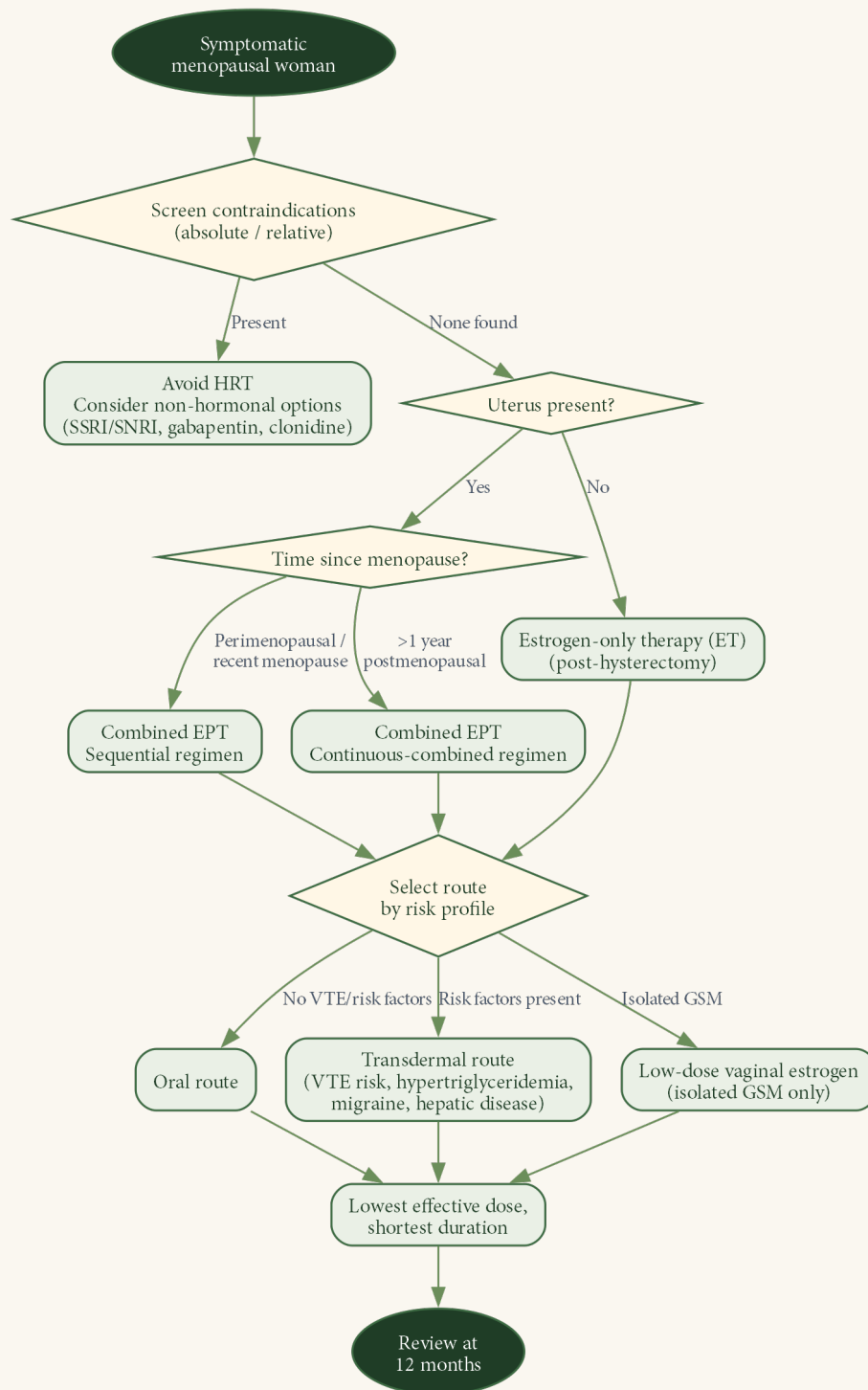
Outcome	Hazard ratio, EPT	Absolute excess/reduction, EPT (per 10,000 woman-years)	ET (hysterectomised women)
Coronary heart disease	1.3	~6 additional cases	No increase
Breast cancer (invasive)	1.24–1.3	4–6 additional cases	No increase (possible reduction)
Ischaemic stroke	1.4	~7–8 additional cases	Similar increase
Venous thromboembolism/pulmonary embolism	~2.1 (twofold)	18 additional cases (mostly in the first 1–2 years)	Smaller increase; PE not significant
Hip fracture	0.7	Reduced	Reduced
Colorectal cancer	0.6	Reduced	No effect

The "**timing/window-of-opportunity**" hypothesis (supported by the ELITE trial) holds that starting HRT in women **under 60 years or within 10 years of menopause onset** gives the most favourable risk–benefit balance; no excess coronary risk was seen in this group, and benefits (vasomotor relief, fracture prevention) generally outweigh the small absolute risks.

Prescribing principles

- ▶ **Individualise** — weigh personal/family history of breast cancer, VTE, cardiovascular disease against symptom severity before starting.
- ▶ Baseline evaluation: history, blood pressure, body mass index, breast examination/mammogram, pelvic examination; exclude contraindications.
- ▶ Use the **lowest effective dose for the shortest duration** needed; reassess the need for continued therapy at least annually.
- ▶ Prescribe **combined EPT in every woman with a uterus**; ET only after hysterectomy.
- ▶ Favour the **transdermal route** in women with risk factors for VTE, hypertriglyceridemia, migraine, or hepatic disease.
- ▶ On stopping, **taper the dose gradually** over months rather than abruptly, since sudden withdrawal returns vasomotor symptoms in about half of users.
- ▶ Avoid unregulated **custom-compounded "bioidentical" hormones**; prescribe FDA/standard-approved estradiol and micronized progesterone formulations.
- ▶ When estrogen is contraindicated or declined, non-hormonal options for vasomotor symptoms include low-dose paroxetine (7.5 mg — the only agent specifically approved for this), other SSRIs/SNRIs, gabapentin/pregabalin, and clonidine.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for initiating HRT — from symptom screening and contraindication check through EPT/ET selection, route choice, and 12-month review.

High-yield exam pointers

- ▶ Golden rule: estrogen alone only after hysterectomy; add a progestogen whenever the uterus is present.
- ▶ WHI headline hazard ratios to write verbatim: CHD 1.3, breast cancer 1.3, stroke 1.4, VTE/PE 2.1 (all ↑ with EPT); hip fracture 0.7, colorectal cancer 0.6 (both ↓).
- ▶ VTE absolute risk = 18 extra cases/10,000 woman-years, concentrated in the first 1–2 years of use.
- ▶ "Window of opportunity" = age <60 years or <10 years since menopause — best risk–benefit ratio.
- ▶ Standard estrogen dose to quote: CEE 0.625 mg/day (or micronized estradiol 1–2 mg/day); standard sequential progestogen: MPA 5 mg or micronized progesterone 200 mg for 12–14 days/month.
- ▶ Low-dose vaginal estrogen for GSM does not need progestogen cover — minimal systemic absorption.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The WHI absolute-risk figures above come from the original CEE + MPA arm; risks differ somewhat with other estrogens, progestogens, and non-oral routes, and current guidance (ACOG/NAMS) emphasises individualised, age/time-since-menopause-stratified counselling rather than these numbers being applied uniformly to every formulation.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e (Women's Health Initiative trial data and dose tables verified against Speroff 9e and Berek & Novak 16e).



How will you investigate a case of primary amenorrhea who lacks a normal vagina but has well developed breast?

Asked in: Paper III 18-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Well-developed breasts indicate that oestrogen action has occurred, so the hypothalamo-pituitary-ovarian (or testicular) axis is functioning; an absent/abnormal vagina localises the defect to the **genital outflow tract**. This combination narrows the differential to two entities — **Müllerian agenesis** (Mayer-Rokitansky-Küster-Hauser, MRKH, syndrome) and **complete androgen**

insensitivity syndrome (AIS, testicular feminisation) — with rare mimics (isolated vaginal agenesis, incomplete AIS).

Clinical approach — history and examination

- **History:** age at presentation (both conditions present in late adolescence with primary amenorrhea as the sole complaint), cyclical lower abdominal pain (suggests a functioning endometrial remnant in MRKH, seen in ~10%), family history (AIS is X-linked recessive — affected sisters/maternal aunts; MRKH is usually sporadic), inguinal swelling/hernia in childhood (AIS).
- **General examination:** height and body habitus — MRKH patients have average stature; AIS patients tend to be tall with a mildly eunuchoid habitus (long limbs, large hands/feet).
- **Secondary sexual characters:** breast development is **normal and symmetrical in both**. The key discriminator is **sexual (pubic/axillary) hair** — present and normal in MRKH, **scanty or absent in AIS** (because hair growth is androgen-dependent and AIS is end-organ androgen resistance).
- **Local/genital examination:** a short blind vaginal pouch or dimple in both; **inguinal or labial swellings** (cryptorchid testes) suggest AIS; per-rectal or examination under anaesthesia to assess for a uterus/cervix.

Investigations — confirming and differentiating the diagnosis

Investigation	Müllerian agenesis (MRKH)	Androgen insensitivity syndrome (AIS)
Karyotype (buccal smear/chromatin, then confirmatory blood karyotype)	46,XX	46,XY
Serum testosterone	Normal female range	Normal-to-elevated male range (often above normal male values)
Serum LH/FSH	Normal for age	LH modestly raised (androgen resistance at the hypothalamo-pituitary level); FSH normal
Pelvic ultrasonography	Uterus absent or rudimentary (bicornuate rudimentary horns); ovaries normal, may lie high near the pelvic brim; fallopian tubes usually present	Uterus and tubes absent (normal Müllerian regression by anti-Müllerian hormone from functioning testes); gonads (testes) may be seen in the inguinal canal/labia, rarely intra-abdominal
Pelvic MRI (when ultrasound is equivocal)	Defines Müllerian remnants precisely; gold standard before planned surgery	Confirms absent uterus/cervix and localises testes

Investigation	Müllerian agenesis (MRKH)	Androgen insensitivity syndrome (AIS)
Renal ultrasonography/IVP	Associated urinary tract anomalies in ~15–40% (unilateral renal agenesis, ectopic/horseshoe kidney, duplex collecting system) — routinely done	Not a feature
Spinal X-ray	Skeletal anomalies in ~10–15% (hemivertebrae, scoliosis, Klippel-Feil syndrome) — routinely done	Not a feature
Diagnostic laparoscopy (if imaging inconclusive)	Confirms rudimentary Müllerian remnants, normal ovaries and tubes	Confirms absent Müllerian structures and intra-abdominal/inguinal testes; gonadal biopsy shows testicular architecture
Gonadal/testicular biopsy	Not indicated	Confirms testicular histology (immature seminiferous tubules, no spermatogenesis) when gonadal identity is in doubt

Interpreting the results

- ▶ A 46,XX karyotype with a **female-range testosterone**, normal pubic/axillary hair, and ultrasound/MRI showing an absent or rudimentary uterus with normal ovaries and tubes confirms **Müllerian agenesis (MRKH)** — go on to screen the renal tract and spine for associated anomalies.
- ▶ A 46,XY karyotype with **normal-to-elevated (male-range) testosterone**, scanty/absent sexual hair, and absent uterus **and tubes** with palpable inguinal/labial gonads confirms **complete AIS**.
- ▶ If the karyotype is unavailable, a **normal female serum testosterone effectively excludes AIS**, and vice versa a male-range testosterone with elevated LH is diagnostic of AIS even before karyotyping.
- ▶ Rare mimics to keep in mind if the above pattern is atypical: **incomplete (partial) AIS** — some pubic hair with ambiguous genitalia due to residual androgen action; and **17 β -hydroxysteroid dehydrogenase type 3 deficiency** — a 46,XY enzyme defect that mimics AIS but is due to impaired testosterone synthesis rather than receptor resistance; both are distinguished by molecular analysis of the androgen receptor (AR) and 17HSD3 genes.

Diagnosis to management — the key point examiners test

- ▶ **Both** conditions ultimately need creation of a functional vagina — first-line is **progressive vaginal dilation** (Frank's method: daily pressure with graduated dilators for 20–30 minutes over 3–6 months); surgical options if dilation fails or is declined — **McIndoe vaginoplasty** (skin graft

over a mould) or the laparoscopic **modified Vecchietti operation** (traction device draws a dilator inward to create ~7–8 cm depth over 7–10 days, followed by maintenance dilation).

- ▶ **The critical management difference is gonadal fate:** in AIS the gonads are **cryptorchid testes with malignant potential** (gonadal tumour risk ~5–10%, historically quoted up to 22%). Unlike XY gonadal dysgenesis (Swyer syndrome), where gonadectomy is done **immediately at diagnosis**, in **complete AIS gonadectomy is deliberately deferred until after puberty is complete (around age 16–18)** — endogenous testicular oestrogen drives a smoother spontaneous puberty than exogenous hormone replacement, and tumours are rare before this age. **Incomplete AIS is the exception — gonadectomy should not be delayed**, as residual androgen action can cause unwanted virilisation at puberty.
- ▶ After gonadectomy, **life-long oestrogen replacement** (e.g., conjugated equine oestrogen ~0.625 mg/day or equivalent) is mandatory to maintain secondary sexual characters and prevent osteoporosis and cardiovascular complications; progestogen is not required as there is no uterus.
- ▶ In MRKH the ovaries are normal and are **not** removed; fertility can be achieved via IVF using the patient's own oocytes with embryo transfer to a gestational surrogate, and uterine transplantation is now an emerging option.
- ▶ Psychological counselling and sensitive, honest disclosure of karyotype/gonadal status are essential in both conditions, particularly in AIS where gender identity is female despite a 46,XY karyotype.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 28.3 — A case of androgen insensitivity syndrome. Breasts are well-developed, pubic hair absent (DC Dutta's Gynaecology 7e, p.384)

- ▶ Also sketch a side-by-side comparison diagram: MRKH (46,XX — uterus/tubes rudimentary, ovaries normal, normal pubic hair) versus AIS (46,XY — uterus/tubes absent, testes in labia/inguinal canal, absent pubic hair) to visually anchor the differentiating table above.

High-yield exam pointers

- ▶ Mnemonic for the discriminator: **"hair tells the difference"** — normal pubic/axillary hair = MRKH; scanty/absent hair = AIS.
- ▶ MRKH = **46,XX**, normal female testosterone, uterus absent/rudimentary, tubes present, ovaries normal; associated renal (15–40%) and skeletal (10–15%) anomalies.
- ▶ AIS = **46,XY**, male-range testosterone + raised LH, uterus AND tubes absent, testes in labia/inguinal canal.
- ▶ **Gonadectomy timing is the favourite viva trap:** AIS gonads are removed only **AFTER** puberty (age 16–18), not at diagnosis — the sole exception among Y-chromosome-bearing gonads, which are otherwise removed as soon as diagnosed (e.g., Swyer syndrome).

- ▶ First-line vaginal reconstruction in both = **Frank's progressive dilation**; surgical options = **McIndoe** (skin graft) or **laparoscopic modified Vecchietti**.
- ▶ Post-gonadectomy in AIS: oestrogen-only HRT (no progestogen — no uterus).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Renal/skeletal association figures are quoted with some variation across sources (Speroff: renal 15–40%, skeletal 10–15%; DC Dutta: renal ~30–40%, skeletal ~12%) — either figure is acceptable in the exam; the pattern (both are increased) is the testable point.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



How will you investigate a case of primary amenorrhea with normal reproductive tract

Asked in: Paper III Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Primary amenorrhea is failure of menarche by **16 years** in the presence of normal growth and secondary sexual characteristics, or by **14 years** if secondary sexual characteristics are absent. A "normal reproductive tract" means a patent vagina, a visible cervix, and a uterus confirmed present on pelvic examination and ultrasonography — this single finding excludes müllerian agenesis (Mayer-Rokitansky-Küster-Hauser, MRKH syndrome), transverse vaginal septum, imperforate hymen, cervical agenesis, and androgen insensitivity syndrome (uterus absent in all of these), so the entire work-up shifts to the hypothalamic-pituitary-ovarian (HPO) axis and other endocrine causes of anovulation.

History and examination

- ▶ **Pubertal timeline** — age at thelarche/pubarche/growth spurt; menarche normally follows thelarche within 2–3 years, so its absence with normal breast development points to the outflow tract (already excluded here) or unresponsive endometrium.
- ▶ **Nutrition and stress** — weight loss, eating disorder, excessive exercise, chronic illness (diabetes, tuberculosis, renal disease) — clues to functional hypothalamic amenorrhea.
- ▶ **Galactorrhea** — suggests hyperprolactinemia.
- ▶ **Hyperandrogenism** — acne, hirsutism, or virilization (clitoromegaly, voice change) — suggests polycystic ovary syndrome (PCOS), non-classic congenital adrenal hyperplasia (CAH), or an androgen-secreting tumour.

- ▶ **Neurological symptoms** — anosmia, headache, visual field defect, seizures — suggests Kallmann syndrome or a central nervous system (CNS)/pituitary mass.
- ▶ **Drug history** — antipsychotics, gonadotropin-releasing hormone (GnRH) agonists, chronic opioids.
- ▶ **Family history** — delayed menarche, premature ovarian insufficiency (POI), consanguinity.
- ▶ **Examination** — height, weight, body mass index (BMI), arm span (short stature <150 cm raises gonadal dysgenesis); Tanner staging of breast and pubic hair; stigmata of Turner syndrome (webbed neck, cubitus valgus, shield chest); thyroid palpation; visual field testing and fundoscopy for papilledema (pituitary/CNS mass).

Baseline (first-line) investigations

Test	Purpose / expected finding
Urine/serum β -human chorionic gonadotropin (β -hCG)	Excludes pregnancy in every case
Serum follicle-stimulating hormone (FSH), luteinizing hormone (LH), estradiol	Localises the level of HPO axis defect (see classification below)
Serum prolactin	Screens for hyperprolactinemia — a common cause of anovulation
Serum thyroid-stimulating hormone (TSH), free T4	Screens for hypo- or hyperthyroidism, both of which cause anovulation
Transvaginal/transabdominal pelvic ultrasonography	Re-confirms uterine size, assesses ovarian volume, antral follicle count, streak gonads, or polycystic morphology
Serum anti-Müllerian hormone (AMH) (adjunct)	Undetectable suggests ovarian failure; >5 ng/mL supports PCOS

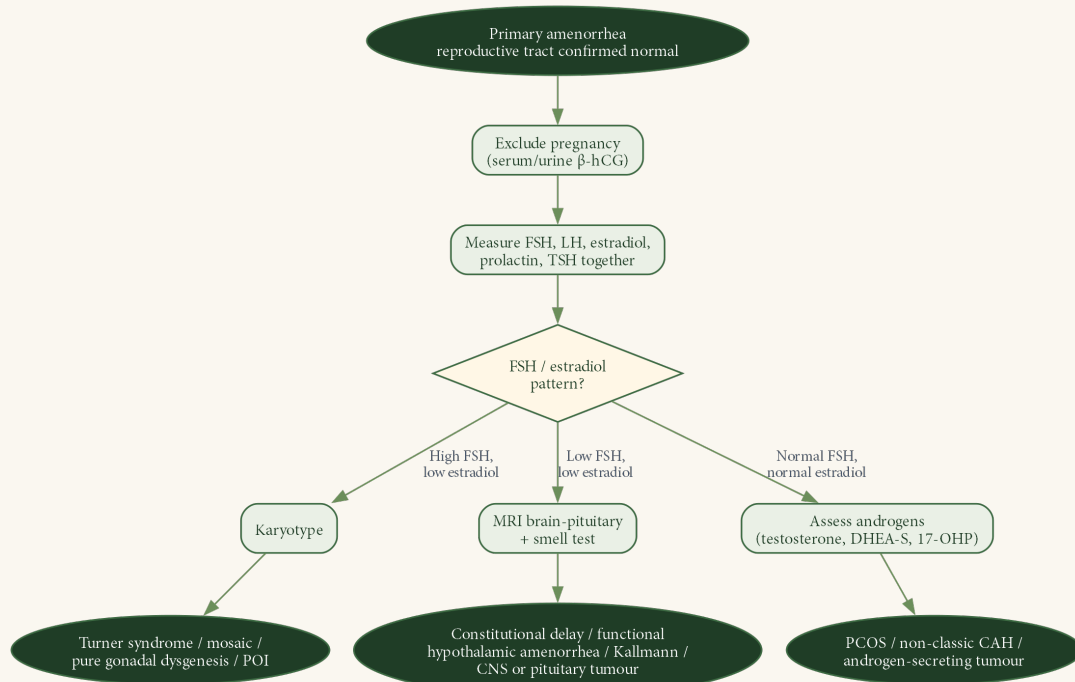
Classification by gonadotropin–estradiol pattern and confirmatory tests

Category	FSH / estradiol	Likely causes	Confirmatory investigation
Hypergonadotropic hypogonadism	FSH high (repeat to confirm), estradiol low (<20 pg/mL)	Gonadal dysgenesis — Turner syndrome (45,X), mosaics, pure gonadal dysgenesis (46,XX/46,XY); premature ovarian insufficiency (autoimmune, galactosemia, <i>FMRI</i> premutation, prior chemo/radiation); 17 α -hydroxylase deficiency; resistant ovary syndrome	Karyotype in every case (mandatory) — a Y chromosome (e.g., Swyer syndrome) mandates gonadectomy for a 20–30% risk of gonadal malignancy
Hypogonadotropic hypogonadism	FSH low or inappropriately normal despite low estradiol (<5 IU/L)	Constitutional delay of puberty; functional hypothalamic amenorrhea (stress, weight loss, excessive exercise); Kallmann syndrome (isolated GnRH deficiency with anosmia); CNS tumour (craniopharyngioma); pituitary tumour/hypopituitarism	Magnetic resonance imaging (MRI) of the brain and pituitary (mandatory); smell testing for anosmia (Kallmann); wrist X-ray for bone age (delayed in constitutional delay)

Category	FSH / estradiol	Likely causes	Confirmatory investigation
Eugonadotropic/normogonadotropic (chronic anovulation)	FSH and estradiol normal	PCOS (Rotterdam 2003 criteria — 2 of 3: oligo/anovulation, clinical/biochemical hyperandrogenism, polycystic ovarian morphology); non-classic CAH; androgen-secreting ovarian/adrenal tumour; obesity-related anovulation	Serum total testosterone, dehydroepiandrosterone sulfate (DHEA-S); morning serum 17-hydroxyprogesterone (17-OHP) in the early follicular phase — <200 ng/dL excludes and >800 ng/dL is virtually diagnostic of non-classic 21-hydroxylase-deficiency CAH, with intermediate values needing an adrenocorticotrophic hormone (ACTH) stimulation test

Progesterone/progestin challenge test (adjunct when estrogen status is equivocal): medroxyprogesterone acetate (MPA) 10 mg orally daily for 5–7 days (or micronized progesterone 200–300 mg daily). Withdrawal bleeding within 2–7 days of completion implies adequate endogenous estrogen and a responsive, patent tract; absence of bleeding suggests a hypoestrogenic state (hypogonadism) or an unresponsive endometrium.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for primary amenorrhea with a confirmed-normal reproductive tract, branching by the FSH/estradiol pattern.

High-yield exam pointers

- ▶ Cut-offs to write: no menses by **16 years** (with normal secondary sexual characters) or **14 years** (without) — Speroff/current American College of Obstetricians and Gynecologists (ACOG) criteria, matching DC Dutta.
- ▶ "Normal reproductive tract" (patent vagina + visible cervix + uterus on ultrasonography) excludes MRKH, transverse vaginal septum, imperforate hymen, and androgen insensitivity syndrome in one step.
- ▶ First-line panel done together: β -hCG, FSH, LH, estradiol, prolactin, TSH ($\pm$ AMH).
- ▶ High FSH $\rightarrow$ karyotype is **mandatory**; a Y chromosome mandates gonadectomy (20–30% malignancy risk).
- ▶ Low FSH $\rightarrow$ MRI brain/pituitary + smell test (anosmia = Kallmann syndrome).
- ▶ Normal FSH/estradiol + hyperandrogenism $\rightarrow$ Rotterdam criteria for PCOS vs 17-OHP for non-classic CAH.
- ▶ Progestin challenge (MPA 10 mg/day $\times$ 5–7 days): withdrawal bleed = estrogenised, patent tract.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's older progesterone-challenge dosing (progesterone in oil or higher-dose oral progestin) is superseded by the now-standard MPA 10 mg daily for 5–7 days used in current practice.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; current ACOG-aligned amenorrhea criteria (2003 Rotterdam ESHRE/ASRM PCOS consensus).

**HRT — Current concepts**

Asked in: Paper III 19-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Hormone replacement therapy (HRT), now more precisely called **menopausal hormone therapy (MHT)**, is administration of estrogen — alone or combined with a progestogen — to a woman after natural or surgical menopause to relieve estrogen-deficiency symptoms and to prevent selected long-term sequelae (osteoporosis). Estrogen given alone is **estrogen therapy (ET)** — used only in a hysterectomised woman; estrogen plus a progestogen is **estrogen-progestogen therapy (EPT)** — mandatory whenever the uterus is intact, to prevent unopposed-estrogen-driven endometrial hyperplasia and carcinoma.

Indications

- ▶ Moderate-to-severe **vasomotor symptoms** (hot flushes, night sweats) — HT is the single most effective treatment.
- ▶ **Genitourinary syndrome of menopause (GSM)** — vaginal dryness, dyspareunia, recurrent urinary tract infection — treated with low-dose local vaginal estrogen.
- ▶ **Prevention of osteoporosis/fracture** in a symptomatic woman aged <60 years or within 10 years of menopause, when other bone agents are unsuitable.
- ▶ **Premature ovarian insufficiency, premature or surgical menopause** — HT continued at least until the average natural age of menopause (~50–51 years).
- ▶ **Hypoactive sexual desire disorder** — short-term androgen (testosterone) add-back, off-label.

Contraindications

Absolute	Relative (caution)
Known/suspected breast cancer	Migraine with aura
Estrogen-dependent neoplasm (e.g., endometrial cancer)	Controlled hypertension
Undiagnosed abnormal genital bleeding	Gallbladder disease
Active or past venous thromboembolism (DVT/PE)	Prior cholestatic jaundice
Active liver disease	Endometriosis
Active coronary heart disease or cerebrovascular disease	High-risk states for the above

Regimens, doses & routes

Component	Preparation	Dose
Oral estrogen	Conjugated equine estrogen (CEE)	0.3–0.625 mg/day
	Micronized estradiol	1–2 mg/day
Cyclic progestogen (12–14 days/month)	Medroxyprogesterone acetate (MPA)	5–10 mg/day
	Micronized progesterone	200 mg/day (cyclic)
Continuous progestogen	MPA	2.5–5 mg/day
	Micronized progesterone	100 mg/day
	Dydrogesterone	5–10 mg/day
Low-dose combined oral	CEE/MPA	0.3/1.5 or 0.45/1.5 mg/day
Transdermal patch	17 β -estradiol	3.2 mg patch, releasing ~50 μ g/24 h; changed twice weekly
Percutaneous gel	Estradiol gel	1 g applicator = 1 mg estradiol/day
Subdermal implant	17 β -estradiol	25/50/100 mg, lasts ~6 months
Vaginal (GSM only, no progestogen needed)	CEE cream	0.5 g, 2–3 $\times$ /week
	Estradiol tablet	10 μ g or 4 μ g, twice weekly
	Estradiol vaginal ring	7.5 μ g/day, changed 3-monthly
	Vaginal DHEA (prasterone)	0.5% nightly

Component	Preparation	Dose
Non-hormonal for GSM	Ospemifene (oral SERM)	60 mg/day
Tissue-selective complex	Conjugated estrogen + bazedoxifene	0.45 mg + 20 mg, one tablet daily (no progestogen needed)
Tibolone	Steroid with estrogenic/progestogenic/androgenic action	2.5 mg/day (endometrium stays atrophic, no added progestogen)

Choosing the regimen

- ▶ **Uterus present** → EPT; either **sequential** (estrogen daily + progestogen for the last 12–14 days → predictable withdrawal bleed) or **continuous-combined** (both daily → most women amenorrhoeic by 1 year, but unpredictable spotting early on).
- ▶ **Post-hysterectomy** → ET alone (no progestogen required).
- ▶ **Isolated GSM, no vasomotor symptoms** → low-dose local vaginal ET is preferred over systemic therapy; endometrial surveillance/added progestogen is not needed at these doses.
- ▶ **Progestogen-sparing option** → off-label levonorgestrel intrauterine system provides endometrial protection while estrogen is given by any systemic route.
- ▶ Prefer the **transdermal/percutaneous route** in women with risk factors for venous thromboembolism or gallbladder disease — it bypasses first-pass hepatic metabolism.

Benefits and risks — the WHI evidence

The Women's Health Initiative (WHI) randomised trial (CEE 0.625 mg ± MPA 2.5 mg vs placebo, mean age 63 years) remains the pivotal evidence base.

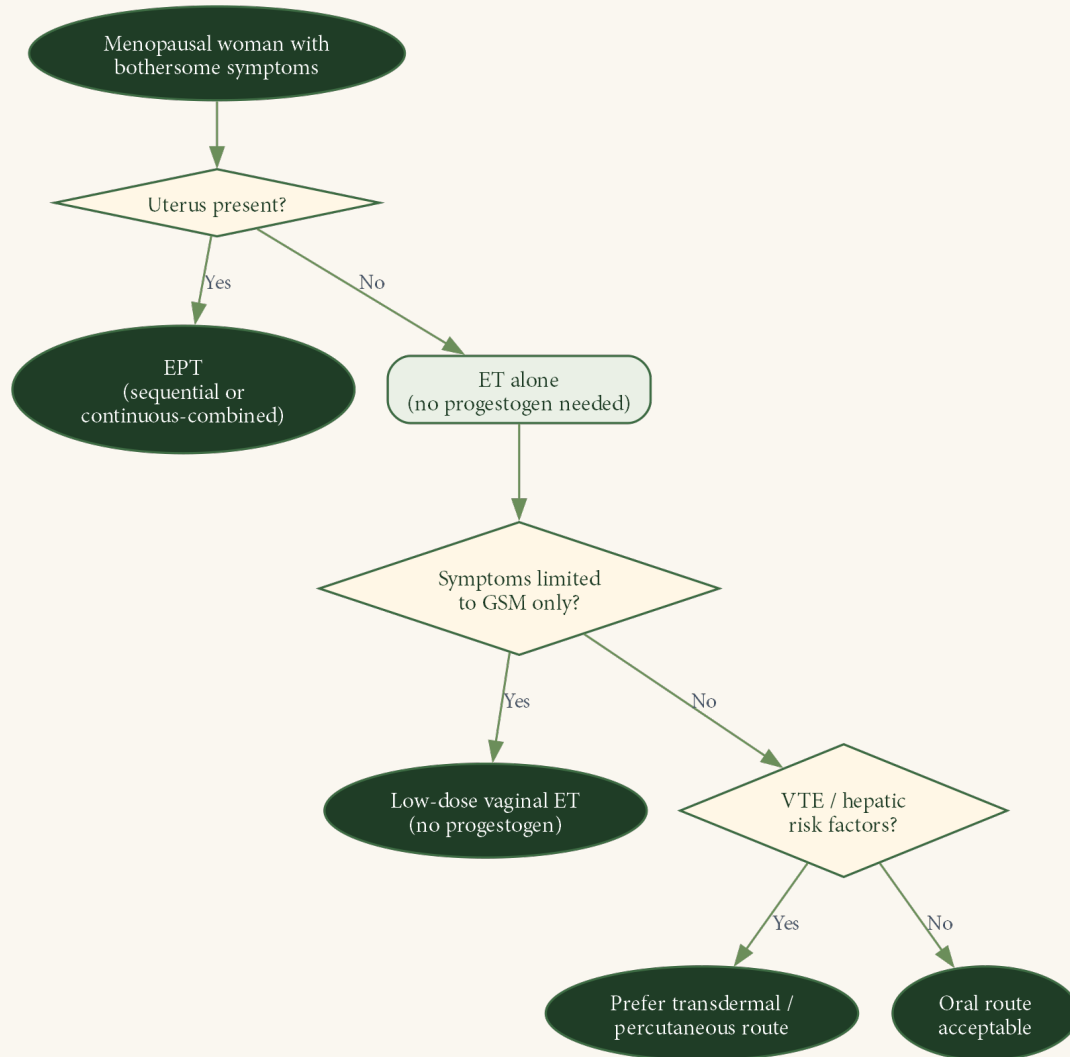
Outcome	Combined EPT (5-yr follow-up)	Estrogen-alone ET (7-yr follow-up, post-hysterectomy)
Coronary heart disease	HR 1.3 (increased; risk confined to older women/>10 yr postmenopause)	No increase
Stroke	HR 1.4 (increased)	Increased, similar magnitude
Pulmonary embolism/VTE	HR 2.1 (increased, ~2-fold)	Increased, similar magnitude
Breast cancer	HR 1.3 (increased)	RR 0.8 (not increased/reduced)
Hip fracture	HR 0.7 (reduced)	Reduced
Colorectal cancer	HR 0.6 (reduced)	No effect
Probable dementia (age ≥65, WHIMS substudy)	~2-fold increase	Not significant

The absolute excess risk attributable to EPT was small — about 7–8 additional cases each of coronary events, breast cancer, stroke, and pulmonary embolism per 10,000 woman-years. Transdermal estradiol has **not** shown the same increase in VTE risk in observational data.

Current concepts

- ▶ **Lowest effective dose, shortest necessary duration, individualised:** reassess the need for HT at least annually; there is no arbitrary stop age if benefits continue to outweigh risks after shared decision-making.
- ▶ **"Timing hypothesis"/window of opportunity:** starting HT before age 60 years or within 10 years of menopause gives the most favourable benefit–risk ratio for cardiovascular outcomes — supported by the ELITE trial (slower progression of carotid intima–media thickness when HT was started <6 years since menopause; no benefit if started >10 years since menopause), though the KEEPS trial did not confirm a carotid benefit — evidence is still evolving.
- ▶ **Route matters:** non-oral (transdermal/percutaneous/vaginal) estrogen avoids first-pass hepatic effects on clotting factors and lipids, and does not raise VTE or gallbladder-disease risk the way oral therapy does.
- ▶ **Prefer FDA-approved "bioidentical" preparations** (estradiol, micronized progesterone) over unregulated custom-compounded "bioidentical HT" — no proven added benefit and quality is not standardised.
- ▶ **Non-hormonal alternatives** when HT is contraindicated/declined: low-dose paroxetine 7.5 mg/day (the only agent specifically FDA-approved for vasomotor symptoms), gabapentin, clonidine, SSRIs/SNRIs.
- ▶ **Baseline and annual monitoring:** pelvic and breast examination, mammography, blood pressure, transvaginal ultrasound (endometrial thickness <5 mm reassuring), prompt evaluation of any irregular bleeding.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision flow for choosing the HRT/MHT regimen and route.

High-yield exam pointers

- ▶ WHI EPT arm (CEE 0.625 mg + MPA 2.5 mg): ↑ CHD (HR 1.3), ↑ stroke (HR 1.4), ↑ VTE/PE (HR 2.1), ↑ breast cancer (HR 1.3); ↓ hip fracture (HR 0.7), ↓ colorectal cancer (HR 0.6).
- ▶ ET-alone arm (post-hysterectomy): breast cancer risk **not** increased (RR 0.8); no CHD increase; stroke/VTE still increased.
- ▶ Progestogen is mandatory whenever the uterus is present, whatever the estrogen route.
- ▶ Tibolone 2.5 mg/day needs no added progestogen — endometrium remains atrophic.
- ▶ Low-dose vaginal estrogen for isolated GSM needs no progestogen and carries minimal systemic risk.

- ▶ "Timing hypothesis": age <60 years or <10 years since menopause = best cardiovascular risk-benefit window.
- ▶ Absolute contraindications: breast/endometrial cancer, undiagnosed genital bleeding, active VTE, active liver disease, active CHD/stroke.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology (7e) figures for benefits (BMD rise 2–5%, fracture reduction 25–50%) match the WHI-derived figures in Berek & Novak (16e) and are retained; the WHI hazard-ratio table above is the current evidence standard and should be quoted over older textbook prose where the two differ.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (WHI trial data, contraindications, current dosing/route tables); DC Dutta's Textbook of Gynaecology 7e (regimen doses, tibolone, subdermal/transdermal/percutaneous preparations); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (timing hypothesis, ELITE/KEEPS trials).



Hypergonadotrophic primary amenorrhoea

Asked in: Paper III 17-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Primary amenorrhoea is absence of menarche by 15 years with normal secondary sexual characters, or by 13 years if they are absent. It is termed **hypergonadotrophic** when serum FSH and LH are markedly elevated (FSH typically >30–40 mIU/mL) with low serum oestradiol — the biochemical signature of **primary gonadal (ovarian) failure**, in which an intact hypothalamic-pituitary axis loses negative feedback because the gonad neither produces steroid nor inhibin. It is the second commonest category of primary amenorrhoea after Müllerian/genital-tract anomalies, and **gonadal dysgenesis** is by far its largest subgroup.

Causes / classification

Category	Karyotype	Key mechanism / distinguishing feature
Turner syndrome (classic)	45,X (± Xp/Xq structural defect)	Bilateral streak gonads; short stature, webbed neck, shield chest, <i>cubitus valgus</i>

Category	Karyotype	Key mechanism / distinguishing feature
Mosaic Turner syndrome	45,X/46,XX	Milder or absent stigmata; occasional spontaneous menses, rare pregnancy
Pure gonadal dysgenesis, 46,XX	46,XX	Streak gonads, average height, no somatic stigmata; may coexist with sensorineural deafness (Perrault syndrome)
Pure gonadal dysgenesis, 46,XY (<i>Swyer syndrome</i>)	46,XY (SRY mutation in 10–15%)	Streak gonads make neither anti-Müllerian hormone nor androgen → normal uterus/vagina, normal pubic hair, female phenotype
Mixed gonadal dysgenesis	45,X/46,XY mosaic	Testis one side, streak the other; ambiguous genitalia at birth ± virilisation at puberty
17 α -hydroxylase deficiency (CYP17A1, a form of congenital adrenal hyperplasia)	46,XX or 46,XY	↓cortisol, androgen and oestrogen synthesis with shunting into mineralocorticoid precursors → sexual infantilism plus hypertension and hypokalaemia
Resistant ovary (Savage) syndrome	46,XX	Ovaries contain follicles but fail to respond to endogenous/exogenous gonadotropin (receptor/post-receptor defect)
Autoimmune oophoritis	46,XX	Part of autoimmune polyglandular syndrome — associated Addison disease, thyroiditis
Galactosaemia	46,XX	Galactose metabolites are directly gonadotoxic → accelerated follicular depletion
Iatrogenic	46,XX	Pre-pubertal chemotherapy, pelvic radiation, or bilateral oophorectomy

Clinical evaluation

- **History** — growth pattern and age of any breast budding; family history of delayed puberty/infertility; hypertension or virilisation (points to 17 α -hydroxylase deficiency or mixed gonadal dysgenesis); prior chemotherapy/radiation.

- **Examination** — height and arm span (short stature/somatic stigmata → Turner); Tanner staging of breast and pubic hair (normal pubic hair with absent breasts and a blind vagina suggests androgen insensitivity, not this group); clitoromegaly/labial fusion (mixed gonadal dysgenesis, 17 α -hydroxylase deficiency); blood pressure.

Investigations

Test	Finding / purpose
Serum FSH and LH	Markedly raised — confirms hypergonadotrophic hypogonadism
Serum oestradiol	Low
Karyotype (peripheral lymphocytes)	Mandatory in every case — defines the subtype
FISH/PCR for Y-chromosome material	Detects occult Y-derived material; a positive result mandates gonadectomy
Pelvic ultrasound $\pm$ laparoscopy	Confirms uterus present (Turner, mosaic, 46,XX and Swyer forms) and streak/dysgenetic gonads
Serum 17-hydroxyprogesterone, cortisol, electrolytes	Diagnoses 17 α -hydroxylase deficiency (low cortisol/17-OHP, hypokalaemia, hypertension)
TSH, anti-TPO/anti-adrenal antibodies, fasting glucose	Screens for associated autoimmune endocrinopathy
Echocardiography and renal ultrasonography	Turner-specific — coarctation/bicuspid valve, horseshoe kidney
Bone age X-ray, DEXA	Skeletal maturation and bone mineral density

Management

- **Karyotype plus Y-chromosome screen in every patient** — presence of Y-material mandates **prophylactic laparoscopic gonadectomy** (20–30% risk of gonadoblastoma/dysgerminoma in the dysgenetic gonad); done soon after diagnosis in Swyer syndrome and mixed gonadal dysgenesis, and after FISH confirmation in Turner mosaics.
- **Growth hormone** for short stature in Turner and mosaic forms — start as early as 4–5 years, before oestrogen is introduced, to maximise final height; oxandrolone may be added in girls diagnosed late or with marked short stature.
- **Induction of puberty** — low-dose oestrogen (e.g., micronised estradiol 0.25–0.5 mg/day, or an equivalent transdermal patch) started around 12–14 years, increased gradually over 2–3 years to a full adult replacement dose; add a **cyclic progestin** (e.g., medroxyprogesterone acetate) once withdrawal bleeding occurs or after 12–24 months of oestrogen alone, to protect the endometrium.

- ▶ **Long-term cyclic hormone replacement** until the average age of natural menopause, for bone, cardiovascular and vaginal health, with awareness of an increased venous thromboembolism risk.
- ▶ **Disease-specific treatment** — 17 α -hydroxylase deficiency needs physiological glucocorticoid replacement (suppresses the ACTH drive behind the mineralocorticoid excess) in addition to oestrogen/progestin; autoimmune oophoritis needs screening and treatment of associated Addison disease/thyroiditis; galactosaemia needs lifelong galactose restriction (does not reverse existing gonadal damage).
- ▶ **Fertility** — donor-oocyte in vitro fertilisation with embryo transfer is the realistic option wherever a uterus is present (Turner, Swyer, pure gonadal dysgenesis, resistant ovary syndrome). In Turner syndrome, pregnancy is a **relative contraindication** (American Society for Reproductive Medicine, 2012) because of a markedly increased risk of aortic dissection, so cardiac evaluation is mandatory beforehand.
- ▶ **Multidisciplinary surveillance and counselling** — gynaecologist, endocrinologist, cardiologist and geneticist; psychological support at diagnosis and, particularly, at disclosure of a 46,XY karyotype.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 27.2A — 17-year-old girl with Turner's syndrome (45,X); characteristic somatic abnormalities: short stature, shield chest, widely-spaced nipples, cubitus valgus, short neck, absent secondary sex characters (DC Dutta's Gynaecology 6e, p.457)

High-yield exam pointers

- ▶ FSH >30–40 mIU/mL + low oestradiol + primary amenorrhoea = hypergonadotrophic hypogonadism = primary gonadal failure.
- ▶ Karyotype in every case; **any Y-chromosome material** → **gonadectomy** (20–30% gonadoblastoma/dysgerminoma risk).
- ▶ Turner syndrome (45,X) = commonest cause; Swyer syndrome (46,XY) = uterus present + normal pubic hair (distinguishes it from androgen insensitivity).
- ▶ 17 α -hydroxylase deficiency is the CAH variant that causes sexual infantilism **with hypertension and hypokalaemia**.
- ▶ Hormone sequence to write: growth hormone before oestrogen (protect final height) → low-dose oestrogen alone → add progestin after withdrawal bleed/12–24 months → continue cyclic HRT till menopausal age.
- ▶ Donor-oocyte IVF is the fertility route across nearly all subtypes; Turner syndrome + pregnancy = relative contraindication (ASRM 2012).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology uses a serum FSH threshold of >40 mIU/mL for ovarian failure; Speroff and Berek & Novak use the lower cut-off of >30 mIU/mL for hypergonadotrophic hypogonadism in adolescents — either figure is acceptable in the exam, but state the source you follow.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; American Society for Reproductive Medicine Practice Committee guidance (2012), as cited in Berek & Novak 16e.



Hyperprolactinemia

Asked in: Paper III May 2018 · Paper III May 2011 · Paper I Oct 2008 · Paper III Sep 2007 · Paper III May 2007 (6×) — RGUHS MS Obstetrics & Gynaecology

Definition — Hyperprolactinemia is a serum prolactin level above the normal reference range for a non-pregnant, non-lactating woman (most laboratories: less than about 20–25 ng/mL; a random value of 20–40 ng/mL should be repeated before the diagnosis is accepted). It is one of the commonest endocrine causes of secondary amenorrhoea and infertility, arising from excess pituitary lactotroph secretion — most often a prolactin-secreting pituitary adenoma (**prolactinoma**) — or from any condition that removes the tonic hypothalamic dopaminergic inhibition of prolactin release.

Causes of hyperprolactinemia

Category	Causes
Physiological	Pregnancy, lactation/nipple stimulation, sleep, stress, exercise, coitus, a protein-rich meal
Pituitary/hypothalamic	Prolactinoma — microadenoma (<10 mm, commonest) or macroadenoma (≥10 mm); non-functioning adenoma or craniopharyngioma compressing the pituitary stalk (disrupts dopamine delivery — "stalk effect"); empty sella syndrome; pituitary surgery/trauma
Systemic/endocrine	Primary hypothyroidism (raised hypothalamic TRH is a potent prolactin-releasing factor); polycystic ovary syndrome; chronic renal failure (reduced clearance); cirrhosis of liver; chest-wall/breast surgery or herpes zoster (afferent neural stimulus mimicking suckling); MEN-1 syndrome

Category	Causes
Pharmacological	Antipsychotics/phenothiazines, risperidone; metoclopramide, domperidone; methyl dopa, verapamil; opiates; tricyclic antidepressants, SSRIs; H2-blockers (cimetidine, ranitidine); oestrogens/combined oral contraceptives
Ectopic/rare	Bronchogenic or renal-cell carcinoma; prolactin-secreting ovarian teratoma/gonadoblastoma
Idiopathic	No demonstrable cause found after full work-up

Clinical features

- ▶ **Menstrual/reproductive** — inhibition of hypothalamic GnRH pulsatility suppresses gonadotropins; severity correlates roughly with the prolactin level: mild elevation (20–50 ng/mL) → short luteal phase; moderate (50–100 ng/mL) → oligomenorrhoea/amenorrhoea; markedly high (>100 ng/mL) → frank hypogonadotropic hypogonadism with anovulatory infertility.
- ▶ **Galactorrhoea** — in only about one-third of hyperprolactinaemic women (milk let-down needs background oestrogen, which is often low from the associated hypogonadism).
- ▶ **Hypo-oestrogenic features** — dyspareunia, genital atrophy, loss of libido, accelerated bone loss/osteopenia.
- ▶ **Mass-effect symptoms** (macroadenoma) — headache; **bitemporal hemianopia** from optic chiasm compression; cranial nerve palsy; hypopituitarism (secondary hypothyroidism, adrenal insufficiency).
- ▶ **In men** — decreased libido, erectile dysfunction, infertility; gynaecomastia/galactorrhoea are rare.
- ▶ **Pre-menarchal onset** — may present as delayed puberty or primary amenorrhoea.

Investigations

Test	Purpose/finding
Serum prolactin (fasting, no prior breast exam/stress)	Confirms and grades hyperprolactinaemia; repeat if borderline (20–40 ng/mL)
Urine/serum β -hCG	Excludes pregnancy, the commonest physiological cause
TSH, free T4	Excludes primary hypothyroidism (a fully reversible cause)
Renal function tests, liver function tests	Screens for renal failure/cirrhosis as the cause
Serum FSH, LH, oestradiol	Confirms hypogonadotropic hypogonadism pattern

Test	Purpose/finding
Macroprolactin screen (polyethylene-glycol precipitation)	If prolactin only mildly raised and asymptomatic — excludes biologically inactive "big-big" prolactin, avoiding unnecessary imaging
Serum calcium, IGF-1	Screens for MEN-1 and for GH co-secretion (found in ~10% of prolactinomas)
MRI pituitary with contrast	Investigation of choice once physiological/drug/systemic causes are excluded, or if prolactin persistently >100 ng/mL — detects and sizes microadenoma/macroadenoma; no radiation risk (superior to CT)
Visual field (perimetry)	Mandatory when a macroadenoma is found, to detect chiasmal compression

Management

Principle: treat the patient, not the number — an asymptomatic microadenoma in a woman not desiring pregnancy may simply be observed with yearly prolactin and imaging ($\pm$ physiological oestrogen replacement if hypo-oestrogenic). Drug-induced cases are managed by stopping/substituting the offending drug in consultation with the prescriber; hypothyroidism is corrected with thyroxine.

- **Medical therapy — dopamine agonists (first line for all sizes of prolactinoma):**

Drug	Starting dose	Dose escalation	Maximum (large macroadenoma)
Bromocriptine	1.25 mg at bedtime	Increase gradually, guided by monthly prolactin	Up to 5 mg twice daily
Cabergoline	0.25 mg twice weekly	Increase gradually, guided by monthly prolactin	Up to 1.5 mg twice weekly

- **Cabergoline** (selective D2 agonist) is more potent, better tolerated and needs less frequent dosing than **bromocriptine**, so is now preferred first-line; bromocriptine avoids the small long-term risk of cabergoline-associated valvular heart disease seen with high cumulative doses, and has the longer pregnancy-safety record.
- Prolactin falls within 2–3 weeks; tumour shrinkage is assessable on repeat MRI at 3–6 months; vaginal administration is an option for those with GI intolerance.
- A trial of drug withdrawal may be attempted once prolactin has been normal for **2 years or more** with no residual tumour on MRI (recurrence still occurs in roughly a third).
- **Surgical treatment — transsphenoidal adenomectomy**, indicated for dopamine-agonist resistance/intolerance, pituitary apoplexy, CSF leak on medical therapy, or a very large

macroadenoma (>3 cm) in a woman wanting pregnancy. Cure is more likely with microadenomas; persistent hyperprolactinaemia is common after macroadenoma surgery. Complications: CSF leak, diabetes insipidus, meningitis, hypopituitarism, recurrence.

- ▶ **Radiotherapy** — reserved for significant residual/recurrent tumour after surgery unresponsive to drugs; shrinks the tumour slowly over years; roughly half of patients develop panhypopituitarism by 10 years, so long-term endocrine follow-up is essential.
- ▶ **Fertility/pregnancy:**
 - Dopamine agonists restore ovulation in ~80% of women; both drugs are considered safe in early pregnancy and are stopped once pregnancy is confirmed in microadenoma (drug continued if a large macroadenoma poses a growth risk).
 - Serial prolactin measurement is unnecessary in pregnancy (placental oestrogen raises it physiologically); symptomatic tumour growth occurs in only 1–2% with microadenoma versus 15–20% with macroadenoma.
 - New headache/visual field defect in pregnancy → restart the dopamine agonist and obtain non-contrast MRI; surgery is reserved for drug failure.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 61.6 — Magnetic resonance imaging of a pituitary adenoma; sagittal T1-weighted image (Williams Obstetrics 26e, p.1118)

High-yield exam pointers

- ▶ Normal prolactin roughly <20–25 ng/mL; repeat a 20–40 ng/mL value before labelling hyperprolactinaemia.
- ▶ Prolactin level roughly predicts severity: 20–50 → luteal defect; 50–100 → oligo/amenorrhoea; >100 → hypogonadotropic hypogonadism, usually prolactinoma.
- ▶ Only ~1/3 of hyperprolactinaemic women have galactorrhoea.
- ▶ First-line drug doses to write exactly: **bromocriptine 1.25 mg nocte** (up to 5 mg BD); **cabergoline 0.25 mg twice weekly** (up to 1.5 mg twice weekly).
- ▶ Microadenoma <10 mm, macroadenoma ≥10 mm; MRI with contrast is the imaging of choice.
- ▶ Macroadenoma mass effect mnemonic: headache + **bitemporal hemianopia**.
- ▶ Trial off dopamine agonist only after 2 years of normal prolactin with no tumour on MRI.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e quotes a slightly wider normal prolactin range (1–20 ng/mL) and an older drug list; the causes, dosing and pregnancy guidance above follow the more current Speroff 9e account, which the two texts otherwise agree on.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Williams Obstetrics 26e (figure).



Indications and different regimens of hormone replacement therapy

Asked in: Paper III 16-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Hormone replacement therapy (HRT), now termed menopausal hormone therapy (MHT), is administration of estrogen — alone or combined with a progestogen — to a menopausal or otherwise hypoestrogenic woman to relieve estrogen-deficiency symptoms and their long-term sequelae. A progestogen must always be added when the uterus is in situ, to prevent unopposed-estrogen-driven endometrial hyperplasia and carcinoma.

Indications for hormone replacement therapy

Category	Indication
Vasomotor symptoms	Hot flushes and night sweats — systemic estrogen therapy (ET)/estrogen-progestin therapy (EPT) is the single most effective treatment available
Genitourinary syndrome of menopause (GSM)	Vaginal dryness, dyspareunia, urgency, dysuria, recurrent urinary tract infection — low-dose vaginal estrogen is preferred over systemic therapy if this is the only complaint
Osteoporosis prevention	Approved for prevention (not first-line sole treatment) of postmenopausal bone loss and vertebral/hip fracture in symptomatic women who are under 60 years or within 10 years of menopause
Premature ovarian insufficiency (POI) / gonadal dysgenesis	e.g., Turner syndrome — HT is continued at least until the average age of natural menopause (~51 years) to prevent premature cardiovascular disease and osteoporosis
Surgical or radiation-induced menopause	Bilateral oophorectomy, pelvic radiotherapy, gonadotoxic chemotherapy — symptoms are often more abrupt and severe than natural menopause
Quality of life	Improvement of mood, sleep and sexual function in symptomatic women
Hypoactive sexual desire disorder (HSDD)	Short-term testosterone add-back, in carefully selected women, once estrogen is optimised

HT is **not recommended** as the sole therapy for primary or secondary prevention of coronary heart disease, or as a first-line agent for osteoporosis in an otherwise asymptomatic woman — alternative agents (bisphosphonates, raloxifene, denosumab) are preferred there.

Contraindications to hormone replacement therapy

Absolute	Relative (caution)
Known, suspected, or past estrogen-dependent breast/endometrial cancer	Migraine with aura
Undiagnosed abnormal genital tract bleeding	Well-controlled hypertension
Active or past venous thromboembolism (deep vein thrombosis/pulmonary embolism)	Gallbladder disease
Active or recent (within 1 year) myocardial infarction, stroke or coronary artery disease	Strong family history of breast cancer
Active liver disease	Prior cholestatic jaundice of pregnancy, endometriosis, large fibroids
Pregnancy	—

Regimens and preparations of hormone replacement therapy

- ▶ **Estrogen therapy (ET) alone** — for women who have had a hysterectomy (no progestin required).
 - Oral: conjugated equine estrogen (CEE) 0.3–0.625 mg/day; micronized estradiol 1–2 mg/day; estradiol valerate 1–2 mg/day.
 - Transdermal patch: releases 14–100 µg estradiol/24 h (commonly ~50 µg), applied below the waistline and changed twice weekly.
 - Percutaneous gel: 1 g applicator delivers ~1 mg estradiol/day, applied to abdomen or thigh.
 - Subdermal implant: 17β-estradiol pellets of 25/50/100 mg, inserted subcutaneously, effective for ~6 months.
- ▶ **Combined estrogen-progestin therapy (EPT)** — mandatory whenever the uterus is intact.
 - **Sequential (cyclic) regimen:** estrogen given daily (continuously or for 25 days/month) with a progestin added for the last 12–14 days of each cycle. Produces a predictable withdrawal bleed in 80–90% of women; best suited to the early menopausal transition/perimenopause.
 - **Continuous-combined regimen:** both estrogen and progestin given daily without a break. Aims for amenorrhoea within 1 year in 80–90% of users; best started ≥1 year after the last menstrual period, as starting earlier causes more breakthrough bleeding.
- ▶ **Local/vaginal estrogen-only regimen** — for isolated GSM: conjugated equine estrogen (CEE) vaginal cream, low dose applied 2–3 times weekly (older texts describe a 1.25 mg daily dose; current practice favours less-frequent, lower-dose application), estradiol vaginal tablet 10 µg (or

ultra-low 4 µg) twice weekly, or an estradiol vaginal ring (7.5 µg/day) changed 3-monthly. Systemic absorption is minimal, so a progestin is not required even with an intact uterus.

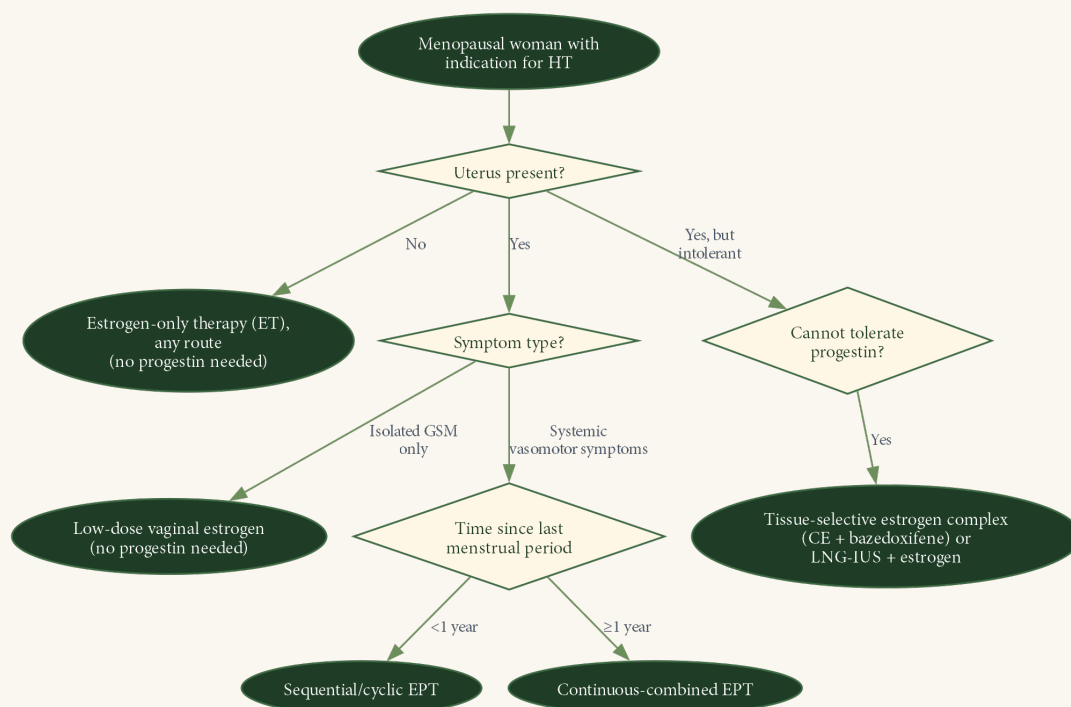
- ▶ **Progestin delivered by the levonorgestrel intrauterine system (LNG-IUS)** — a low-release device (~10 µg/day, versus the standard ~20 µg/day contraceptive device) combined with estrogen given by any route; provides endometrial protection with minimal systemic progestin effect and doubles as contraception in the perimenopause.
- ▶ **Tibolone** — a synthetic steroid with combined weak estrogenic, progestogenic and androgenic activity; 2.5 mg/day orally. Produces endometrial atrophy, so no added progestin is needed; also improves libido.
- ▶ **Tissue-selective estrogen complex** — conjugated estrogen 0.45 mg + bazedoxifene 20 mg (1 tablet/day); an alternative to a progestin in women with a uterus who cannot tolerate progestogens.

Progestin doses (sequential/continuous, respectively): medroxyprogesterone acetate (MPA) 5 mg vs 2.5 mg/day; norethindrone acetate 1.0 mg vs 0.35–1.0 mg/day; micronized progesterone 200 mg vs 100 mg/day; dydrogesterone 5–10 mg/day; drospirenone 2 mg/day or dienogest 2 mg/day (continuous regimens only).

Duration, choice of route and monitoring

- ▶ Use the **lowest effective dose, for the shortest duration** needed to control symptoms; reassess annually.
- ▶ Prefer the **transdermal route** in women at higher baseline risk of venous thromboembolism or gallbladder disease, since it avoids first-pass hepatic metabolism.
- ▶ Baseline and annual monitoring: blood pressure, breast examination and mammography, cervical cytology, transvaginal ultrasound (endometrial thickness <5 mm is reassuring), and prompt evaluation of any irregular bleeding (endometrial biopsy/hysteroscopy).
- ▶ Dose can be tapered gradually (e.g., daily → alternate-day → every third day over several months) rather than stopped abruptly, to reduce rebound vasomotor symptoms.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

(No usable anatomical photograph applies to this pharmacological topic — the closest indexed figure, DC Dutta's Gynaecology 6e p.78 "Available preparations for hormone replacement therapy," rendered blank on extraction, so the flowchart above and the tables serve as the exam diagram.)

High-yield exam pointers

- ▶ Golden rule: **uterus present** → **always add a progestin** (12–14 days/month if sequential, daily if continuous) to prevent endometrial hyperplasia/carcinoma.
- ▶ Sequential regimen → predictable withdrawal bleed (80–90%); continuous-combined regimen → amenorrhoea by 1 year (80–90%).
- ▶ Standard oral doses to write verbatim: CEE 0.625 mg/day, micronized estradiol 1–2 mg/day, MPA 2.5–5 mg/day, micronized progesterone 100–300 mg/day, dydrogesterone 5–10 mg/day, tibolone 2.5 mg/day.
- ▶ Transdermal patch changed **twice weekly**; releases ~50 µg estradiol/24 h; subdermal implant lasts **6 months**.
- ▶ Vaginal (local) estrogen for isolated GSM does **not** need concurrent progestin.
- ▶ Absolute contraindications mnemonic: breast/endometrial cancer, undiagnosed bleeding, VTE, active liver disease, recent MI/stroke.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology and older sources still quote the ACOG 2008 dictum of "lowest effective dose, shortest duration"; current North American Menopause Society and ACOG guidance keeps this principle but removes any arbitrary duration cap, individualising continuation on a risk-benefit basis, especially for persistent vasomotor symptoms or premature ovarian insufficiency.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Chapter 6, Menopause); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Chapter 17, Menopausal Hormone Therapy); Berek & Novak's Gynecology 16e (Chapter 18, Menopause — NAMS 2017 Hormone Therapy Position Statement, Women's Health Initiative trial data).



Infertility causes in female

Asked in: Paper IV 21-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Infertility is failure to conceive after **12 months** of regular unprotected intercourse (shortened to **6 months** if the woman is >35 years or the man >40 years); it affects 10–15% of couples. Female factors are identifiable in ~40–55% of infertile couples, and causes are conventionally grouped by the anatomical/functional level at which conception can fail — **ovarian, tubo-peritoneal, uterine, cervical, vaginal, and unexplained**.

Classification and relative contribution

Level	Approx. share of female infertility	Principal causes
Ovarian (ovulatory)	30–40%	Anovulation/oligo-ovulation (PCOS commonest), diminished ovarian reserve/POI, luteal phase defect, luteinised unruptured follicle syndrome, hyperprolactinaemia, thyroid dysfunction
Tubal & peritoneal	25–40%	PID (<i>Chlamydia</i> , gonococcus), genital tuberculosis, prior tubal surgery/sterilisation, endometriosis, salpingitis isthmica nodosa

Level	Approx. share of female infertility	Principal causes
Uterine	~10%	Submucous fibroid, intrauterine adhesions (<i>Asherman's syndrome</i>), congenital Müllerian anomaly, endometritis (especially tubercular), inadequate secretory endometrium
Cervical	~5%	Hostile/scanty mucus (post-conisation, chronic cervicitis), anatomical elongation/prolapse, antisperm antibodies
Peritoneal (endometriosis)	1–10% (overlaps ovarian/tubal)	Peritubal adhesions, distorted tubo-ovarian relationship, altered peritoneal fluid, impaired ovum pick-up
Vaginal	rare	Vaginal atresia/septum, dyspareunia
Unexplained/combined	10–20%	Normal standard work-up in both partners; ~10% have factors in both partners

(Source: FIGO-based classification, DC Dutta's Gynaecology 7e; contribution ranges reconciled against Speroff 9e, which quotes ovulatory 20–40%, tubal/peritoneal 30–40% at the couple level.)

Ovarian (ovulatory) causes

- Anovulation/oligo-ovulation — classified by the WHO system:

WHO group	Profile	Approx. share of anovulatory women	Examples
Group I — hypogonadotropic hypogonadal	Low/low-normal FSH, low oestradiol	5–10%	Hypothalamic amenorrhoea (stress, weight loss, excess exercise, anorexia), <i>Kallmann syndrome</i> , isolated gonadotropin deficiency
Group II — normogonadotropic normoestrogenic	Normal FSH/oestradiol, normal or raised LH	75–85% (largest group)	Polycystic ovary syndrome (PCOS) — commonest cause overall

WHO group	Profile	Approx. share of anovulatory women	Examples
Group III — hypergonadotropic	Elevated FSH, low AMH	10–20%	Premature ovarian insufficiency (POI) — follicular depletion
Hyperprolactinaemic	Low/low-normal FSH, raised prolactin	5–10%	Prolactinoma, hypothyroidism, drugs

- ▶ **PCOS** — diagnosed by the *Rotterdam* (ESHRE/ASRM 2003) criteria, **2 of 3**: (i) oligo/anovulation, (ii) clinical or biochemical hyperandrogenism, (iii) polycystic ovarian morphology on ultrasound — after excluding congenital adrenal hyperplasia, Cushing syndrome, androgen-secreting tumours, thyroid disease and hyperprolactinaemia.
- ▶ **Diminished ovarian reserve / POI** — POI = amenorrhoea with hypergonadotropic hypogonadism before age 40 (prevalence ~1%); causes include Turner syndrome and other chromosomal defects, ****fragile X (FMR1) premutation****, autoimmune oophoritis, iatrogenic (chemotherapy/radiation), and idiopathic.
- ▶ **Luteal phase defect** — inadequate corpus luteum function/progesterone secretion, corpus luteum lifespan <10 days, defective folliculogenesis (associated with hyperprolactinaemia, subclinical hypothyroidism, endometriosis, older age).
- ▶ **Luteinised unruptured follicle (LUF) syndrome** — the oocyte is trapped in a luteinised, unruptured follicle; associated with endometriosis and hyperprolactinaemia.
- ▶ **Endocrinopathies** — thyroid dysfunction and hyperprolactinaemia both disturb the hypothalamic-pituitary-ovarian axis and are routinely screened (TSH, prolactin) in every anovulatory woman.

Tubal and peritoneal causes

Category	Cause	Mechanism
Infective (commonest)	<i>Chlamydia trachomatis</i> , <i>Neisseria gonorrhoeae</i>	Peritubal adhesions, endosalpingeal damage; risk rises with repeat PID
Genital tuberculosis	Haematogenous spread to the tube (near-universal site of pelvic TB)	Tubal blockage, endometrial synechiae, ovulatory dysfunction; found in ~10–15% of Indian infertile women
Post-surgical	Prior tubal sterilisation, tubectomy, adhesiolysis, ectopic surgery, ruptured appendix	Structural obstruction/adhesions

Category	Cause	Mechanism
Endometriosis	Ectopic endometrial tissue in tube/peritoneum	Peritubal adhesions, altered tubal motility, distorted fimbria-ovary relationship, abnormal peritoneal fluid
Structural	Salpingitis isthmica nodosa, tubal polyps/mucous debris, functional tubal spasm	Luminal narrowing/blockage

Block is described as **proximal** (prevents sperm reaching the ampulla, the site of fertilisation) or **distal** (fimbrial agglutination → phimosis → hydrosalpinx, preventing ovum pick-up) — a graded spectrum of severity.

Uterine causes

- **Submucous fibroid** — distorts/occupies the cavity, impedes implantation.
- ****Asherman's syndrome**** (intrauterine adhesions/synechiae) — usually post-curettage or post-partum, obliterates the endometrial cavity.
- **Congenital Müllerian anomalies** — septate, bicornuate, unicornuate uterus, uterus didelphys.
- **Endometritis**, especially **tubercular** — destroys endometrial receptivity.
- **Uterine hypoplasia / inadequate secretory endometrium** — poor nidation environment.

Cervical and vaginal causes

Type	Cause
Cervical — anatomic	Congenital elongation of cervix, second-degree uterine prolapse (external os fails to bathe in the seminal pool)
Cervical — physiologic	Hostile/scanty mucus after conisation, amputation or deep cauterisation; chronic cervicitis with purulent discharge; antisperm/sperm-immobilising antibodies
Vaginal	Vaginal atresia (partial/complete), transverse vaginal septum, septate vagina, narrow introitus, vaginitis with dyspareunia

Unexplained and combined factors

- **Unexplained infertility** — no abnormality found despite complete standard evaluation (semen analysis, confirmation of ovulation, tubal patency); ~10–20% of couples; roughly 4 in 10 conceive spontaneously within 3 years without treatment.
- **Combined factors** — both partners contribute in ~10% of couples.

- ▶ **General/contributory factors** — maternal age >35 years (declining oocyte quality/number), infrequent intercourse or poor timing/technique, coital dysfunction (apareunia/dyspareunia), anxiety, spermicidal lubricant use.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 17.1 — Showing common causes of female infertility (DC Dutta's Gynaecology 7e, p.208)

Recent advances [RA]

- ▶ **2023 International evidence-based PCOS guideline** (update of the 2018 Teede et al. guideline, *Fertil Steril* 110:364, 2018) refines the *Rotterdam* criteria for adolescents and reinforces anti-Müllerian hormone (AMH) as an optional substitute for antral follicle count on ultrasound when assessing polycystic ovarian morphology.
- ▶ **AMH** has become the preferred first-line marker of ovarian reserve over day-3 FSH because it is stable across the cycle, though low-AMH thresholds (0.2–0.7 ng/mL) predict poor stimulation response better than they predict pregnancy chances — it should not by itself be used to deny a couple treatment.
- ▶ **Genetic testing in POI** — karyotype and ****FMR1** premutation** testing are now recommended in every woman with unexplained POI, since fragile-X premutation carriers are at increased risk of POI and of transmitting fragile X syndrome; whole-exome sequencing is increasingly identifying additional monogenic causes.
- ▶ **Endometrial receptivity array (ERA)** — a molecular test of the endometrial "window of implantation" (Vilella, Pellicer, Simón et al.) is used to individualise embryo-transfer timing in women with suspected uterine-factor/unexplained infertility and recurrent implantation failure.
- ▶ **Non-invasive tubal screening** (hysterosalpingo-contrast sonography/HyCoSy, saline-infusion sonography) is increasingly used as a first-line, radiation-free alternative to hysterosalpingography before proceeding to diagnostic laparoscopy.

High-yield exam pointers

- ▶ Female factor alone ~40–55%; male alone ~30–40%; both ~10%; unexplained ~10%.
- ▶ WHO ovulatory groups: I hypogonadotropic (low FSH), II normogonadotropic (PCOS, 75–85% of anovulatory women), III hypergonadotropic (POI); + **hyperprolactinaemic** as a fourth category.
- ▶ PCOS = *Rotterdam* criteria, **2 of 3**: oligo/anovulation + hyperandrogenism (clinical/biochemical) + polycystic ovaries on ultrasound.
- ▶ POI = amenorrhoea + hypergonadotropic hypogonadism **before age 40**; check karyotype + *FMR1* premutation.
- ▶ Tubal/peritoneal is the commonest identifiable organic cause; *Chlamydia trachomatis* is the leading organism; genital TB is an important Indian-specific cause.

- ▶ Remember the level-wise mnemonic: Ovarian → Tubal/peritoneal → Uterine → Cervical → Vaginal → Unexplained.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Contribution percentages for each category vary modestly across textbooks (e.g., tubal factor is quoted as 25–35% in Speroff and up to 40% in Berek & Novak); the ranges given above are reconciled across sources and are exam-safe.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; International evidence-based guideline for the assessment and management of PCOS (Teede et al., 2018, updated 2023).



Lactational amenorrhoea method

Asked in: Paper IV 21-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — The lactational amenorrhoea method (LAM) is a temporary, natural, hormone-free contraceptive method that uses the physiological infertility of intense breastfeeding to prevent pregnancy in the first 6 months postpartum. It is effective only when three conditions are simultaneously met — amenorrhoea, full/near-full breastfeeding, and an infant age under 6 months — and must be replaced by another method as soon as any one of these fails.

Mechanism of action

- ▶ Frequent infant suckling raises prolactin and, through hypothalamic afferents, **reduces pulsatile gonadotropin-releasing hormone (GnRH) release**.
- ▶ This blunts pituitary **luteinizing hormone (LH)** pulsatility, so the mid-cycle LH surge is suppressed.
- ▶ **Follicular maturation and ovulation are inhibited**; without ovulation there is no corpus luteum, no progesterone withdrawal, and hence amenorrhoea.
- ▶ Protection is dose-dependent on suckling intensity — reliability requires feeding gaps **not exceeding 4 hours by day and 6 hours at night**, with supplemental feeds kept to **under 5–10% of total feeds**. Reduced frequency/intensity (day–night gaps, supplementation, pacifier use) lets GnRH pulsatility recover and ovulation can resume before the first bleed.

The three criteria (Bellagio Consensus/WHO)

Criterion	Requirement
Amenorrhoea	No vaginal bleeding after postpartum day 56 (lochia in the first 8 weeks is excluded)
Breastfeeding pattern	Fully or nearly fully breastfeeding , day and night, at short intervals, with minimal/no supplementary feeds
Infant age	Less than 6 months postpartum

All three must hold together; if any one criterion is not met, LAM protection is lost and a backup method must be started immediately.

Effectiveness

Source	Reported pregnancy rate	Condition
Bellagio Consensus (1988, international lactational-infertility working group)	<2% (i.e., >98% protection)	First 6 months, full/nearly-full breastfeeding and amenorrhoeic
WHO multinational prospective study	0.8% at 6 months; 4.4% at 12 months	Still breastfeeding and amenorrhoeic
DC Dutta's Gynaecology 7e	<2% at 6 months; 1–10% otherwise	Fully breastfeeding + amenorrhoeic vs partial/menstruating
Berek & Novak's Gynecology 16e (field cohorts)	0.45–2.45% at 6 months	Couples relying solely on LAM

Once any criterion breaks — supplementation increases, feeding gaps lengthen, menstruation returns, or the infant turns 6 months — the failure rate rises sharply toward that of unprotected intercourse, so continued reliance on LAM alone is not advised beyond this point.

Counselling and transition to backup contraception

- ▶ Begin counselling at **birth**, ideally reinforced at an **early postpartum visit in the 3rd week** (not the traditional 6-week visit) — the first ovulation can precede the first bleed, especially with partial breastfeeding.
- ▶ Instruct **on-demand feeding, day and night**, avoiding long gaps and unnecessary formula/pacifier use.
- ▶ Teach the woman to **watch for any bleeding after day 56** and to report it — this signals loss of protection even before a "true" period is confirmed.

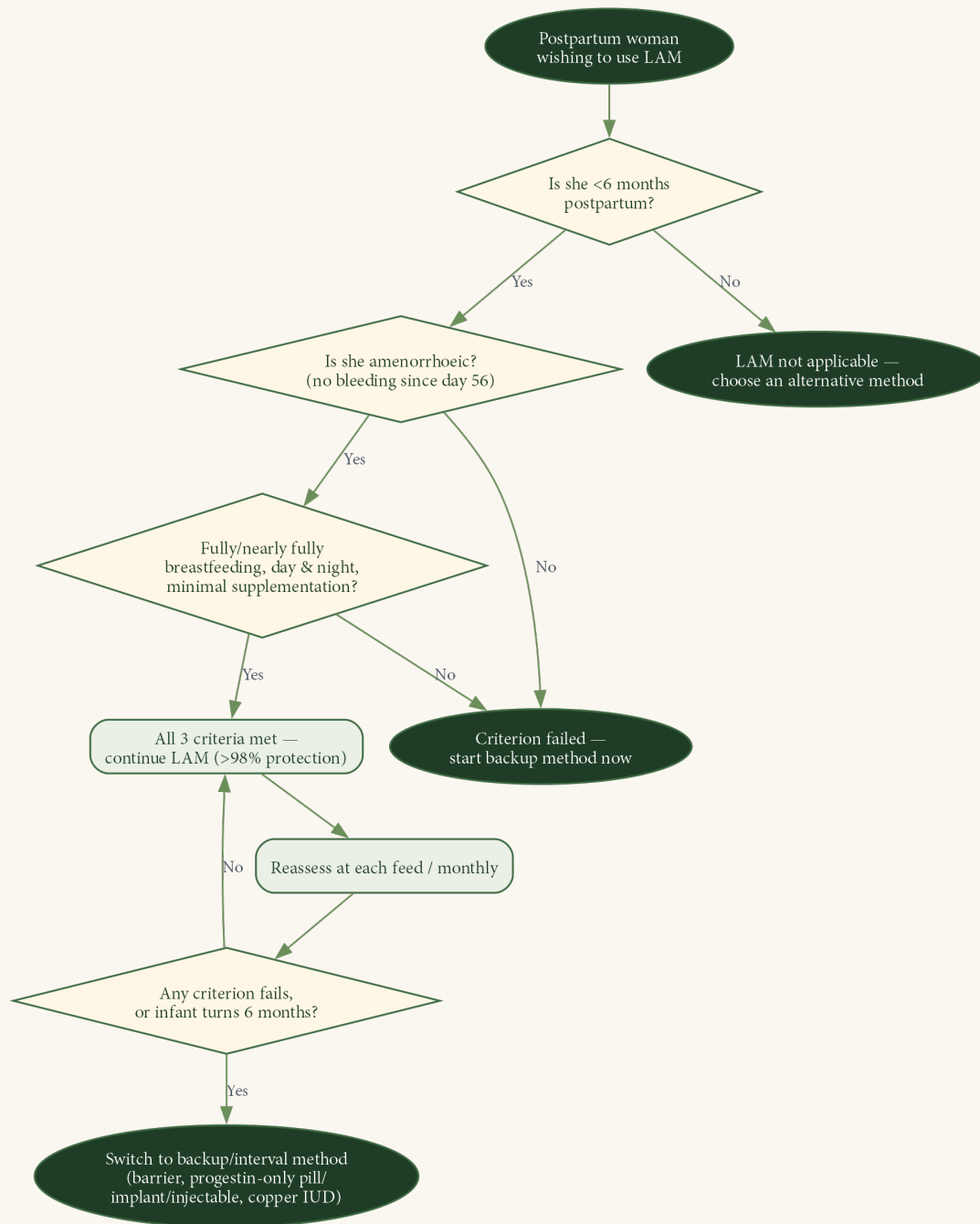
- ▶ As soon as **any one criterion fails**, or the infant reaches **6 months**, add a **backup method**: barrier methods, progestin-only pills, implants, injectables (DMPA/NET-EN), or a copper intrauterine device (IUD) — none impair milk quantity/quality.
- ▶ **Combined estrogen–progestin methods** (combined oral contraceptives, patch, ring) are best avoided in the early puerperium; per Berek & Novak's Gynecology 16e they are WHO Medical Eligibility Criteria (MEC) **Category 2** in breastfeeding women beyond 30 days postpartum, reflecting concern (though evidence is mixed) about milk volume/quality plus the added postpartum thrombosis risk.
- ▶ LAM is best used as a **bridge** to a definitive interval method — postpartum IUD or implant insertion — rather than a stand-alone long-term method.

Advantages and limitations

Advantages: no cost, no device, no hormones or systemic side effects; immediately available from delivery; promotes exclusive breastfeeding, with its established maternal (delayed return of fertility, lower postpartum blood loss/anaemia, reduced lifetime breast cancer risk) and infant (nutrition, immunity, bonding) benefits; requires no supplies or clinic visit; reversible instantly on stopping.

Limitations: effective for a maximum of only 6 months and only while strict criteria are met; demands disciplined, frequent day-and-night feeding that working or unwell mothers may find hard to sustain; gives **no protection against sexually transmitted infections**; unreliable once any supplementation or feeding gap creeps in; requires the couple's understanding and cooperation, and careful counselling to recognise the moment protection is lost.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision-algorithm flowchart for applying and monitoring the three Bellagio/WHO LAM criteria, with the reassessment loop back to continued LAM use and the exit to a backup/interval method.

High-yield exam pointers

- **3 Bellagio criteria:** amenorrhoea + full/near-full breastfeeding + infant <6 months — ALL three required.

- ▶ Mechanism one-liner: suckling → ↑prolactin → ↓pulsatile GnRH → ↓LH surge → anovulation.
- ▶ Feeding-gap thresholds: <4 h day, <6 h night; supplements <5–10% of total feeds.
- ▶ Amenorrhoea defined as **no bleeding after day 56** postpartum (lochia excluded).
- ▶ Effectiveness: >98% **protection** (Bellagio Consensus) — quoted failure rate <2% at 6 months.
- ▶ Progestin-only methods/implants/injectables/copper IUD/barrier — safe in lactation; **combined estrogen–progestin methods are WHO MEC Category 2** beyond 30 days postpartum in Berek & Novak's Gynecology 16e.
- ▶ LAM = a **bridge method** to an interval/LARC method, not a stand-alone method beyond 6 months.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The Cochrane systematic review (Van der Wijden C, Kleijnen J, Van den Berk T. "Lactational amenorrhea for family planning." Cochrane Database Syst Rev 2003;(4):CD001329) found the evidence base for LAM effectiveness derived largely from observational cohorts rather than randomised trials, but its findings were consistent with the Bellagio Consensus figures reproduced above; current practice still counsels LAM as an early bridge method with prompt transition to a backup or long-acting method once any criterion is lost.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Bellagio Consensus (1988/1989); World Health Organization (WHO) multinational study of breastfeeding and lactational amenorrhoea; Cochrane Database of Systematic Reviews (Van der Wijden et al., 2003).



Management of adolescent endometriosis

Asked in: Paper III May 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Endometriosis is the presence of endometrial-like glands and stroma outside the uterine cavity provoking a chronic inflammatory reaction; it is less common in adolescence than adulthood, but up to 70% of adolescents who undergo laparoscopy for chronic pelvic pain or dysmenorrhoea unresponsive to first-line therapy are found to have it. Minimal-to-mild disease (revised American Society for Reproductive Medicine, rASRM — formerly American Fertility Society, AFS — stage I–II)

predominates, and lesions in teenagers typically show an atypical clear, red-pink, or white/vesicular morphology with peritoneal "windows" rather than the classic powder-burn spots of adult disease.

Step-wise management algorithm

- ▶ **First-line empirical medical therapy** — started on clinical suspicion of cyclic pelvic pain/dysmenorrhoea, without waiting for laparoscopic confirmation: a nonsteroidal anti-inflammatory drug (NSAID) plus a combined hormonal contraceptive, trialled for at least 3 months (doses in table below).
- ▶ **Diagnostic laparoscopy** — indicated when pain persists or recurs despite Step 1; visualised implants are excised or ablated in the same sitting and the disease is assigned an rASRM stage.
- ▶ **Post-operative suppression of mild disease** — continuous combined oral contraceptives (COCs) after laparoscopic excision of minimal/mild (rASRM I–II) implants, to prevent recurrence.
- ▶ **Extended medical therapy for more advanced or persistent disease** — a 6-month course of hormonal therapy (progestin or continuous COC), followed by continuous COC maintenance; repeat surgery is reserved for hormonal-therapy failure.
- ▶ **Gonadotropin-releasing hormone (GnRH) agonist with add-back therapy** — considered only in adolescents who have completed pubertal and skeletal (bone) maturation, once other hormonal suppression has failed to control symptoms; add-back is mandatory and use beyond 6 months needs bone-density monitoring.
- ▶ **Definitive/radical surgery** (hysterectomy ± bilateral salpingo-oophorectomy) has **no place** in adolescents — all surgery is fertility-conserving.
- ▶ **Multidimensional supportive care** runs alongside every step above — pain-team input, mental-health support, pelvic physiotherapy, and education in self-management strategies.

Medical therapy — drugs, doses & duration

Drug class	Agent(s) and dose	Duration	Mechanism / note
NSAID	Ibuprofen 800–1200 mg/day, or mefenamic acid 150–600 mg/day	Symptomatic, ongoing	First-line, safe in adolescents
Combined oral contraceptive (COC)	1–2 tablets/day, cyclic or continuous	6–9 months	"Pseudopregnancy" (decidualisation/atrophy); preferred first hormonal choice in teenagers
Oral progestin	Medroxyprogesterone acetate 10 mg thrice daily, or norethisterone 10–30 mg/day, or dydrogesterone 10–20 mg/day	6–9 months	Decidualisation and atrophy; cheaper than danazol

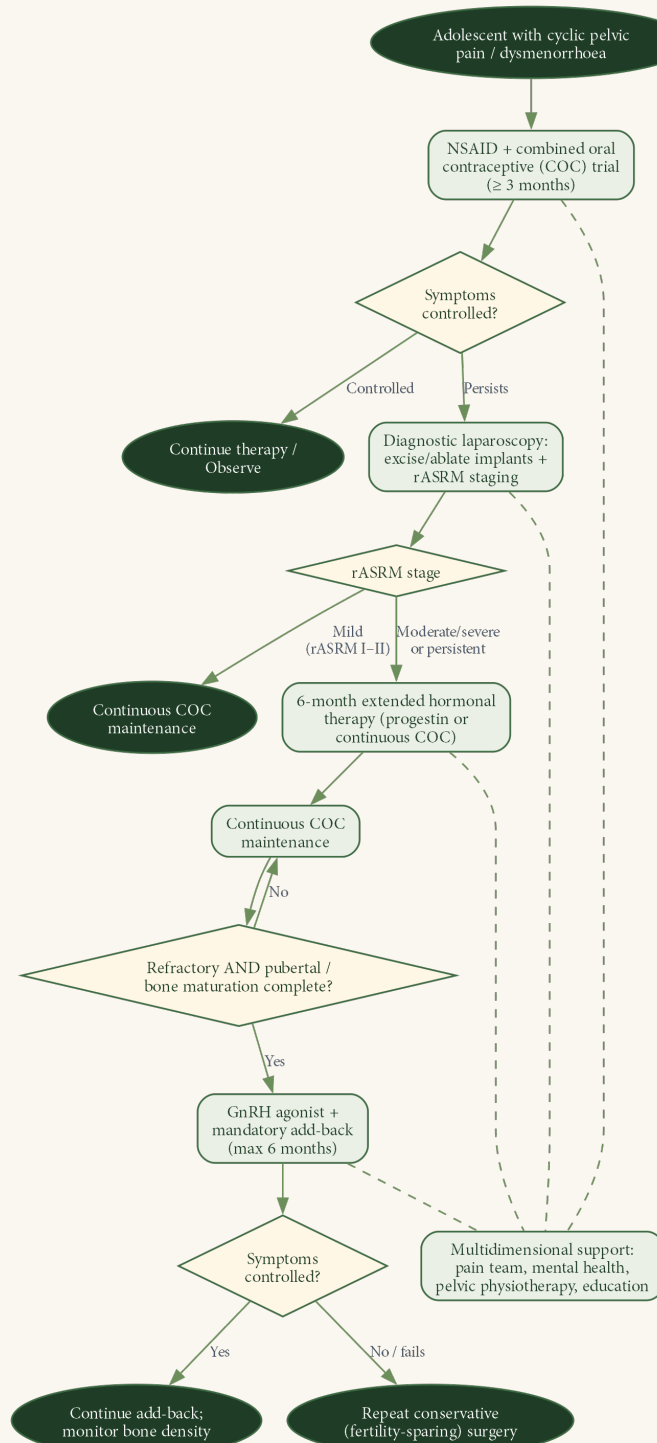
Drug class	Agent(s) and dose	Duration	Mechanism / note
Depot progestin	Depot medroxyprogesterone acetate 150 mg IM every 3 months × 2 doses	6 months	Avoid if early return of fertility desired
Levonorgestrel-releasing intrauterine system (LNG-IUS)	Continuous in situ	Long-term	Reduces dysmenorrhoea/dyspareunia; useful for rectovaginal disease
Danazol	200–400 mg/day (up to 800 mg in 4 divided doses) from cycle day 5	6–9 months	"Pseudomenopause"; androgenic side effects (acne, weight gain, voice change) limit use in teenagers — second-line
GnRH agonist	Leuprolide 3.75 mg IM monthly, or nafarelin 200 µg intranasally daily, or goserelin 3.6 mg depot IM monthly	6 months, always with add-back	"Medical oophorectomy"; only after pubertal/bone maturation
Add-back therapy (with GnRH agonist)	Norethisterone acetate 5 mg/day, or conjugated oestrogen 0.625 mg + medroxyprogesterone acetate 2.5 mg/day, or tibolone 2.5 mg/day	Co-administered throughout GnRH-agonist course	Prevents vasomotor symptoms and bone loss; target serum estradiol 30–45 pg/mL

Surgical management

- ▶ **Operative laparoscopy** is simultaneously diagnostic and therapeutic and remains the gold standard.
- ▶ Recognise the **atypical adolescent lesion morphology** — clear, red-pink, or white/vesicular lesions and subtle peritoneal puckering/windows — rather than the classic black powder-burn spots.
- ▶ **Excise or ablate** (laser, electrocautery) all visualised implants; perform adhesiolysis where present.
- ▶ **Endometrioma** is uncommon in teenagers; if found, perform ovarian cystectomy with careful preservation of normal ovarian cortex.
- ▶ **Correct any obstructive müllerian anomaly** identified at the same sitting (e.g., imperforate hymen, obstructed uterine horn) — surgical correction of outflow obstruction is followed by regression of the endometriosis it caused.

- ▶ Stage the disease intra-operatively using the **rASRM score** (based on size/depth of peritoneal and ovarian implants, and degree of adhesions/cul-de-sac obliteration) to guide subsequent hormonal therapy.
- ▶ All surgery must be **fertility-sparing** — hysterectomy and bilateral salpingo-oophorectomy have no role at this age.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart of the step-wise adolescent endometriosis management algorithm, with multidimensional supportive care running alongside every step (dashed side branches).

High-yield exam pointers

- ▶ Up to **70%** of adolescents with pelvic pain refractory to NSAIDs/COCs have endometriosis at laparoscopy.
- ▶ Commonest stage in teenagers: **rASRM (revised ASRM/AFS) stage I–II** (minimal–mild).
- ▶ Adolescent lesions look **atypical**: clear/red-pink/white vesicular, peritoneal windows — not powder-burn spots.
- ▶ **NSAID + COC is always first line**, medical or surgical escalation only if this fails.
- ▶ **GnRH agonist + add-back only after pubertal/bone maturation** (mid-to-late teens) and only as a later-line option — never first-line, never without add-back.
- ▶ Add-back target: serum estradiol **30–45 pg/mL**; agents — norethisterone acetate 5 mg, or conjugated oestrogen 0.625 mg + medroxyprogesterone acetate 2.5 mg, or tibolone 2.5 mg.
- ▶ **No definitive surgery** (hysterectomy/bilateral salpingo-oophorectomy) at this age — always fertility-conserving.
- ▶ Look for and correct an **obstructive müllerian anomaly** — treating it can regress the endometriosis.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Textbook sources differ slightly on the minimum age for empirical GnRH-agonist use (Berek & Novak 16e: completed pubertal/bone maturation, generally over 17 years; DC Dutta's Gynaecology 7e, citing the American College of Obstetricians and Gynecologists, ACOG: over 18 years if pain persists after NSAIDs and combined oral contraceptives) — in practice the deciding factor is completed bone-mass accrual and documented failure of first-line hormonal therapy, not age alone.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Jeffcoate's Principles of Gynaecology 9e; American College of Obstetricians and Gynecologists (ACOG) guidance on endometriosis in adolescents (as cited in the above texts).



Management of adolescent PCOS

Asked in: Paper III Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Polycystic ovary syndrome (PCOS) is a heterogeneous endocrine-metabolic disorder defined by the Rotterdam criteria (2 of 3: oligo/anovulation, clinical/biochemical hyperandrogenism, polycystic ovarian morphology on ultrasound), after excluding mimicking disorders. In adolescents the

diagnosis needs caution because irregular cycles, mild acne, and multifollicular ovaries are normal features of the first 1–3 postmenarcheal years; a consensus recommendation is to observe for 2 years postmenarche and require **both** hyperandrogenism **and** persistent oligomenorrhea (or primary amenorrhea at/beyond 16 years) before labelling PCOS — ovarian morphology on ultrasound is **not** used as a diagnostic criterion in this age group (Speroff 9e; International Evidence-Based Guideline for PCOS, 2018).

General principles of management

- ▶ **Confirm the diagnosis cautiously** as above and exclude mimics — non-classic congenital adrenal hyperplasia (17-OH progesterone), hyperprolactinemia, thyroid dysfunction, androgen-secreting tumour, Cushing syndrome.
- ▶ **Individualise treatment to the presenting complaint** — menstrual irregularity, hirsutism/acne, obesity/metabolic risk, or (rarely at this age) fertility concerns.
- ▶ **Counsel** the adolescent and family on the chronic, lifelong nature of PCOS and the rationale for long-term follow-up.
- ▶ **Lifestyle modification is first-line** for every overweight/obese adolescent, regardless of the presenting symptom.
- ▶ **Screen for metabolic and endometrial sequelae** at diagnosis and periodically thereafter.
- ▶ Fertility preservation counselling is **not** routinely required in adolescence; ovulation induction is deferred until pregnancy is desired.

Lifestyle modification (first-line, all patients)

- ▶ **Diet** — caloric restriction with a balanced macronutrient composition; dietician input.
- ▶ **Exercise** — regular aerobic activity, ≥ 150 minutes/week.
- ▶ **Target weight loss of 5–10%** of body weight — this alone reduces visceral fat by roughly a third and is often sufficient to restore ovulatory menses and improve the metabolic profile.
- ▶ **Behavioural support** — sleep hygiene, psychological support for body-image concerns (acne, hirsutism, obesity carry a significant psychosocial burden in teenagers).

Menstrual irregularity & endometrial protection

Option	Regimen	Rationale/benefit
Combined oral contraceptive pill (COC)	Low-dose ethinylestradiol (20–35 mcg) with an anti-androgenic progestin — e.g., ethinylestradiol 35 mcg + cyproterone acetate 2 mg, or drospirenone-containing COC	First-line if cycle regulation <i>and</i> contraception/anti-androgen benefit both wanted; progestin suppresses LH, estrogen raises sex hormone-binding globulin (SHBG) lowering free testosterone; protects endometrium from unopposed estrogen
Cyclic progestin	Medroxyprogesterone acetate or dydrogesterone for 10–12 days every 1–2 months	Where COC is declined/contraindicated; induces withdrawal bleed and protects endometrium but gives no anti-androgen benefit and is not contraceptive
Metformin	See metabolic section below	Improves insulin sensitivity and may itself restore spontaneous ovulatory cycles in insulin-resistant adolescents

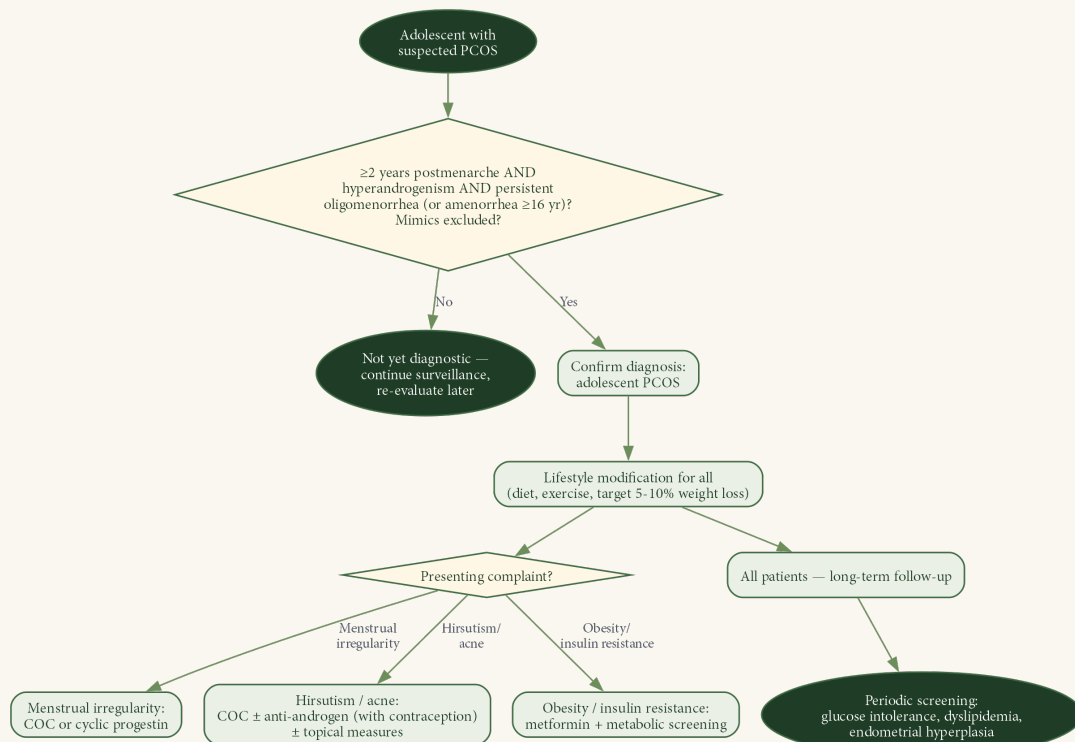
Hyperandrogenism — hirsutism, acne, alopecia

- ▶ **COC is first-line** for mild-moderate hirsutism/acne (as above); assess response after ~6 months (hair growth cycle is slow).
- ▶ **Add an anti-androgen** if hirsutism/acne is moderate-severe or persists on COC alone — **must always be combined with a reliable contraceptive**, given the feminising risk to a male fetus:
 - **Cyproterone acetate** 10–100 mg/day on days 1–10 of the COC cycle (reverse-sequential regimen); low-dose EE/CPA pill alone is effective in many.
 - **Spironolactone** 50–100 mg twice daily (aldosterone antagonist with anti-androgen activity).
 - **Finasteride** 1–5 mg/day (5 α -reductase inhibitor).
 - **Flutamide** 62.5 mg/day — rarely used now because of hepatotoxicity risk.
- ▶ **Topical/physical measures for hirsutism** — bleaching, shaving, plucking, depilatory creams, electrolysis, laser — adjunct to hormonal therapy, not a substitute.
- ▶ **Acne** — topical benzoyl peroxide/retinoids/azelaic acid for mild disease; oral antibiotics (tetracyclines, erythromycin) for moderate disease; oral isotretinoin for severe/resistant acne.
- ▶ Set expectations: visible improvement in hirsutism takes 4–6 months; maintenance therapy for 1–2 years is usually required.

Insulin resistance & metabolic risk

- ▶ **Metformin** is indicated in adolescents with demonstrable insulin resistance, obesity, oligomenorrhea not responding to lifestyle change alone, or in those who decline hormonal therapy.
- ▶ **Dosing** — start low (250–500 mg/day) and increase gradually over 4–6 weeks to reduce gastrointestinal side effects, up to a maintenance dose in the range of 500 mg three times daily; sustained-release preparations are better tolerated.
- ▶ **Effect** — decreases hyperinsulinemia and hyperandrogenism, aids weight loss, improves the lipid profile, and can restore ovulatory cycles.
- ▶ **Precautions** — avoid in renal impairment, hepatic disease, or alcohol abuse (lactic acidosis risk); monitor for vitamin B12 deficiency with long-term use.
- ▶ **Metabolic screening** — 2-hour 75 g oral glucose tolerance test, fasting lipid profile, blood pressure, and waist circumference at diagnosis and periodically, especially in obese adolescents or those with a low-birth-weight history (both linked to premature adrenarche and PCOS).
- ▶ **Bariatric surgery** may be considered in the rare morbidly obese adolescent unresponsive to medical therapy, on a case-by-case multidisciplinary basis.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Algorithm for management of adolescent PCOS, branched by presenting complaint.

High-yield exam pointers

- ▶ Adolescent PCOS diagnosis needs **both** hyperandrogenism **and** persistent oligomenorrhea (or amenorrhea ≥ 16 years) after ≥ 2 years postmenarche; ovarian ultrasound morphology is **NOT** a diagnostic criterion in teenagers.
- ▶ First-line for everyone: **lifestyle modification**, target **5–10% weight loss**.
- ▶ First-line drug for cycle control/hyperandrogenism: **low-dose COC** (ethinylestradiol + cyproterone acetate or drospirenone).
- ▶ Anti-androgen doses: cyproterone acetate 10–100 mg/day (days 1–10 with COC); spironolactone 50–100 mg BD; finasteride 1–5 mg/day — always with contraception.
- ▶ Metformin: start 250–500 mg/day, titrate to ~ 500 mg TDS.
- ▶ Fertility management is deferred in adolescence — not part of routine management at this age.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Coverage note — the modified Ferriman-Gallwey score used to grade hirsutism in adults is not formally validated in adolescents, so greater weight is placed on biochemical hyperandrogenism in this age group; the diagnostic-criteria detail above follows the 2018 International Evidence-Based Guideline for PCOS (Teede et al., Fertil Steril 2018) as cross-checked against Speroff 9e.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e; International Evidence-Based Guideline for the Assessment and Management of Polycystic Ovary Syndrome, 2018 (Teede et al.).



Management of deep infiltrating endometriosis

Asked in: Paper III Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Deep infiltrating endometriosis (DIE) is endometriotic tissue that penetrates more than 5 mm beneath the peritoneal surface. It typically involves the uterosacral ligaments (60–90%), the rectovaginal septum and posterior vaginal fornix, the urinary tract (up to 52%, mostly bladder), and the bowel, chiefly the rectosigmoid (3–37%). Because these lesions are richly innervated, they cause disproportionately severe dysmenorrhoea, deep dyspareunia, dyschezia, and non-menstrual pelvic pain, and management needs an individualised combination of medical suppression and, where indicated, complex multidisciplinary surgery.

Principles of management

- ▶ Individualise treatment by symptom severity, extent of disease, desire for fertility, age, side-effect profile, and cost.
- ▶ Refer to a tertiary centre with a multidisciplinary team (gynaecologist, colorectal surgeon, urologist) — DIE surgery has high complication rates and a high risk of incomplete excision if performed outside expert hands.
- ▶ Obtain preoperative transvaginal ultrasound and/or pelvic MRI ($\pm$ rectal endoscopic ultrasound, intravenous urography if ureteric involvement is suspected) to map the extent of disease and plan the surgical team required.
- ▶ Surgery is offered only for symptomatic disease — the exception is silent ureteric obstruction threatening renal function, which is an indication for surgery even when asymptomatic.

- Preoperative hormonal therapy has **not** been shown to improve the outcome of surgery, despite being common clinical practice.

Medical (hormonal) management

Aims to induce a hypo-oestrogenic, decidualised, amenorrhoeic state that causes atrophy of the ectopic endometrium; it is suppressive, not curative — symptoms recur once treatment is stopped.

Drug / class	Dose & regimen	Key point
NSAIDs	e.g., mefenamic acid, as needed	First-line adjunct analgesia; combine with hormonal therapy
Combined oral contraceptive (COC)	Monophasic pill, continuous/extended-cycle (no pill-free interval) for 6–9 months or longer	First-line; also provides contraception; "pseudopregnancy" effect
Dienogest	2 mg once daily orally	Fourth-generation progestin; effective for rectovaginal/DIE pain, as effective as GnRH agonists
Norethisterone acetate	5–15 mg/day orally	Alternative oral progestin
Medroxyprogesterone acetate (MPA)	30–100 mg/day orally, or 150 mg IM every 3 months (depot)	Depot form avoided if fertility is desired (delayed return of ovulation)
Levonorgestrel intrauterine system (LNG-IUS)	52 mg device, releasing 20 µg/day	Particularly useful for rectovaginal DIE nodules; reduces nodule volume and post-surgical recurrence
GnRH agonists	Leuprolide 3.75 mg IM monthly / goserelin 3.6 mg SC monthly / nafarelin 200 µg intranasally twice daily	"Medical oophorectomy"; start add-back (norethindrone acetate 5 mg/day, or conjugated oestrogen 0.625 mg + MPA 2.5 mg/day) from the outset , not delayed, to limit bone loss
GnRH antagonist (elagolix)	150 mg once daily (low dose) or 200 mg twice daily (high dose), oral	No flare effect, rapid onset; ovulation not fully suppressed — needs concomitant contraception
Danazol	400–800 mg/day in divided oral doses	"Pseudomenopause"; effective but significant androgenic/hypo-oestrogenic side effects — second-line; barrier contraception mandatory (teratogenic/virilising)

Drug / class	Dose & regimen	Key point
Aromatase inhibitors (letrozole 2.5 mg/day or anastrozole 1 mg/day)	Add-on only, combined with a COC, progestin, or GnRH agonist	Never used as monotherapy — unopposed use stimulates follicular activity via FSH rise; reserved for refractory DIE, especially rectovaginal nodules

Surgical management

The goal is complete excision of all visible disease in a single procedure, restoring normal anatomy while preserving organ function.

Site of deep infiltrating disease	Surgical option
Uterosacral ligament / posterior compartment nodule	Laparoscopic excision of the nodule
Rectovaginal septum / posterior vaginal fornix	Laparoscopically-assisted vaginal resection of the nodule; posterior vaginal wall excision if vagina is infiltrated
Bladder (detrusor)	Partial cystectomy — excision of the bladder dome/posterior wall with two-layer closure; transurethral resection is contraindicated
Ureter	Ureterolysis for extrinsic compression; segmental ureteric resection with end-to-end anastomosis or ureteroneocystostomy (reimplantation) for intrinsic/obstructive disease; pre-operative ureteric stenting facilitates dissection
Bowel (rectosigmoid)	Shaving (superficial disease), disc/discoid excision, or segmental resection with anastomosis, graded to nodule depth and circumferential extent; a covering stoma may be needed for a very low anastomosis
Coexisting ovarian endometrioma	Cystectomy (excision of the cyst wall) preferred over drainage/ablation — lower recurrence of the cyst and of pain, higher subsequent pregnancy rate

- ▶ Laparoscopy is the preferred route over laparotomy: equal or better efficacy, less blood loss, fewer complications, quicker recovery; laparotomy is reserved for advanced disease where laparoscopy is not feasible.
- ▶ Complete, one-stage excision is preferred wherever possible, to avoid repeat surgery.
- ▶ Adjunct nerve-ablative procedures: laparoscopic uterosacral nerve ablation (LUNA) is **not recommended** — no added pain benefit over excision alone; presacral neurectomy (PSN) may help central pelvic pain but requires high surgical skill and carries risk of bowel/bladder dysfunction — reserve for carefully selected, well-counselled patients.

- ▶ Postoperative complications specific to DIE surgery include bowel/anastomotic leak, ureteric injury or stricture, and bladder dysfunction — hence the emphasis on expert, multidisciplinary centres.

Combined therapy, recurrence prevention & definitive surgery

- ▶ **Postoperative hormonal suppression** (continuous COC, LNG-IUS, or dienogest) lowers recurrence of dysmenorrhoea and pelvic pain in women not seeking immediate pregnancy, but does **not** improve subsequent pregnancy rates.
- ▶ The **highest chance of pregnancy is in the first 6–12 months after surgery** — postoperative medical therapy should be deferred if conception is desired soon.
- ▶ Recurrence of dysmenorrhoea, deep dyspareunia, and pelvic pain over 3 years ranges 15–30%, and is lowest when any vaginal or rectal component is also completely excised.
- ▶ **Definitive surgery** (total hysterectomy with bilateral salpingo-oophorectomy, together with excision of all DIE lesions) is reserved for women with a completed family, in whom conservative treatment has failed or fertility is no longer desired; leaving ovarian tissue or incompletely excising DIE risks persistent or recurrent symptoms.

Management of endometriosis-associated infertility

- ▶ Individualise by age, ovarian reserve, duration of infertility, tubal status, and whether an endometrioma coexists.
- ▶ Surgical excision of DIE can improve spontaneous conception, but excision (especially of endometriomas) may lower ovarian reserve (post-cystectomy AMH decline) — weigh this against proceeding directly to in vitro fertilisation (IVF)/intracytoplasmic sperm injection (ICSI).
- ▶ IVF/ICSI is preferred over repeat surgery in older women, those with diminished ovarian reserve, or after prior surgical failure/recurrence.
- ▶ Do not delay assisted reproduction for repeated conservative surgery — surgery does not reliably improve IVF outcomes in this group.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 10.13 — Resection of deeply infiltrating endometriosis (DIE) involving right uterosacral ligament (*Te Linde's Operative Gynecology 13e, p.582*)

High-yield exam pointers

- ▶ DIE = penetration >5 mm below the peritoneum; sites — uterosacral ligaments (60–90%), urinary tract (up to 52%), bowel (3–37%).
- ▶ First-line hormonal options are equally effective: continuous COC / dienogest 2 mg OD / LNG-IUS 52 mg — individualise.
- ▶ GnRH agonist **add-back from day 1** (norethindrone acetate 5 mg/day) — never delay add-back.

- ▶ Elagolix = oral GnRH antagonist; 150 mg OD (low) or 200 mg BD (high dose); no flare.
- ▶ **Transurethral resection is contraindicated** for bladder DIE — needs partial cystectomy.
- ▶ LUNA = no benefit (abandoned); PSN = selective use, expert hands only.
- ▶ Best pregnancy window after surgery = **first 6–12 months** post-op.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The management principles above follow the current ESHRE endometriosis guideline; the corpus textbook (Berek & Novak 16e) cites its earlier 2014 edition, but the core medical and surgical recommendations (cystectomy over ablation, no benefit from preoperative hormones, LUNA not recommended) are unchanged in the updated guideline.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Te Linde's Operative Gynecology 13e (figure); European Society of Human Reproduction and Embryology (ESHRE) guideline for the management of women with endometriosis.



Management of endometriosis in a 26-year-old woman with infertility

Asked in: Paper III 26-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Endometriosis is the presence of functioning endometrial glands and stroma outside the uterine cavity — most often on the ovaries, uterosacral ligaments and pouch of Douglas — producing chronic pelvic inflammation, adhesions, dysmenorrhoea, dyspareunia and infertility (found in 20–40% of infertile women). In a 26-year-old woman who wants to conceive, every treatment decision must weigh symptom and disease control against preservation of ovarian reserve and the time available for fertility.

Confirming diagnosis and staging (before choosing treatment)

Step	Finding/tool
History	Progressive secondary dysmenorrhoea, deep dyspareunia, infertility ± dyschezia
Examination	Fixed retroverted uterus, nodular uterosacral ligaments, tender fixed adnexal mass

Step	Finding/tool
Transvaginal ultrasound (TVS)	Detects ovarian endometrioma (homogeneous "ground-glass" echoes); poor for peritoneal disease
MRI	Best for deep infiltrating endometriosis (DIE) — T1 hyperintense/T2 hypointense
Serum CA-125	Non-diagnostic; used to monitor treatment response/recurrence
Diagnostic laparoscopy	Gold standard — visualises "powder-burn"/red-flame implants, allows biopsy, staging and simultaneous operative treatment

Staging — the revised American Society for Reproductive Medicine (rASRM/AFS, 1996) score grades size, depth and site of implants plus extent of adhesions and cul-de-sac obliteration: **Stage I minimal (1–5 points)**, **Stage II mild (6–15)**, **Stage III moderate (16–40)**, **Stage IV severe (>40)**. It correlates poorly with pain and fertility outcome, so the **endometriosis fertility index (EFI, 0–10)** — combining age, duration of infertility, prior pregnancy and post-surgical tubal/ovarian function with the rASRM score — is used to predict non-IVF conception (3-year pregnancy rate 10% at EFI 0–3 vs 75% at EFI 9–10).

Factors deciding the treatment plan in this patient

- ▶ Age (26 years — reasonable ovarian reserve, some time for a staged approach) and duration of infertility.
- ▶ Stage/site of disease (peritoneal vs endometrioma vs deep infiltrating) and whether tubes/ovaries are distorted.
- ▶ Coexisting infertility factors — semen analysis, tubal patency, ovulatory status.
- ▶ Severity of pain, prior treatment received, and the couple's urgency and cost constraints.

Medical (hormonal) therapy — for pain, NOT for the infertility itself

A Cochrane review of ovulation-suppressive agents (combined oral contraceptives, progestins, danazol, GnRH agonists) found **no benefit in fertility and an increased time-to-conception**; hormonal suppression is therefore not used as primary treatment of endometriosis-associated infertility. Its roles here are pain control while awaiting surgery/ART, and short pretreatment before IVF.

Drug	Dose/regimen	Notes
Combined OC (monophasic)	Continuous, 6–9 months	First-line for pain; not fertility treatment
Medroxyprogesterone acetate	10 mg orally thrice daily, or 150 mg IM every 3 months	Withhold depot form if conception planned soon

Drug	Dose/regimen	Notes
Danazol	400–800 mg/day in 2–4 divided doses × 6 months	Barrier contraception mandatory — teratogenic (virilises female fetus)
GnRH agonist (leuprolide/goserelin/nafarelin)	Leuprolide 3.75 mg IM monthly; goserelin 3.6 mg depot monthly; nafarelin 200 µg intranasally daily — × 6 months	Add-back norethindrone acetate 5 mg/day from the start if therapy >6 months (prevents bone loss without losing pain control)
Aromatase inhibitor (letrozole 2.5 mg/day or anastrozole 1 mg/day)	Adjunct only	Must be combined with an ovarian-suppressive agent (OC/GnRH agonist) — never first-line alone, as unopposed use stimulates follicular growth
GnRH agonist pretreatment before IVF	3–6 months pre-IVF	The <i>one</i> evidence-based fertility indication — significantly raises clinical pregnancy and live-birth rates

Surgical management — fertility-sparing, staged by severity

- ▶ Diagnostic laparoscopy is combined with therapeutic surgery at the same sitting whenever feasible.
- ▶ **Minimal–mild disease (Stage I–II):** laparoscopic excision or ablation of implants plus adhesiolysis gives a modest fertility benefit (meta-analysis of two RCTs); roughly 9–12 women need surgery for one extra pregnancy.
- ▶ **Endometrioma (>3–4 cm):** laparoscopic cystectomy (excision) is preferred over drainage/ablation — lower recurrence and a higher post-operative pregnancy rate than ablation. Bilateral excision carries a small (~2.5%) risk of ovarian failure, so counsel on ovarian reserve (antral follicle count/AMH) and consider oocyte or embryo cryopreservation first if reserve is already reduced.
- ▶ **Moderate–severe disease/DIE (Stage III–IV):** complete excision of deep lesions and adhesiolysis by an experienced (tertiary) surgical team to restore normal anatomy; cumulative pregnancy rates approach 50% over 1–3 years for endometrioma and about 30% with complete cul-de-sac obliteration.
- ▶ Avoid routine post-operative hormonal suppression if the couple is actively trying to conceive — it only delays the fertile window; reserve it for those deferring pregnancy.
- ▶ Definitive surgery (hysterectomy with bilateral salpingo-oophorectomy) has **no place here** — it is reserved for a completed family or failure of all fertility-sparing options.

Stepwise route to conception

- ▶ **Minimal–mild disease, patent tubes, normal semen, age <35:** expectant management for up to 6 months post-surgery, or ovulation induction (clomiphene citrate/letrozole/gonadotropins) with intrauterine insemination (IUI) — capped at 3–4 cycles, as further cycles add little benefit and can re-stimulate disease.
- ▶ **Failure of IUI, tubal disease, moderate–severe disease/DIE, coexisting male factor, or advancing age:** proceed to in-vitro fertilisation (IVF)/ICSI — overall the most effective treatment for endometriosis-associated infertility.
- ▶ Pretreat with a GnRH agonist (or, as an alternative, an OC) for 3–6 months before starting the IVF cycle to improve outcome.
- ▶ Small endometriomas (<4 cm) may safely be left untreated before IVF — no proven adverse effect on stimulation/oocyte yield; aspiration alone is avoided (risk of ovarian abscess).
- ▶ Discuss fertility preservation (oocyte/embryo cryopreservation) before any repeat or bilateral ovarian surgery in a woman with borderline ovarian reserve.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 22.3 — Laparoscopic view of pelvic endometriosis: left ovary-endometriotic implants, right ovary-chocolate cyst (DC Dutta's Gynaecology 7e, p.271)

High-yield exam pointers

- ▶ rASRM (1996) staging cut-offs: I = 1–5, II = 6–15, III = 16–40, IV = >40; EFI score range 0–10.
- ▶ Hormonal suppression treats **pain, not infertility** — Cochrane evidence shows no fertility benefit and delayed conception.
- ▶ Endometrioma: **cystectomy > drainage/ablation** for both recurrence and post-op pregnancy.
- ▶ GnRH agonist for 3–6 months **before IVF** is the one proven fertility indication for hormonal therapy.
- ▶ Danazol 400–800 mg/day — mandatory contraception (teratogenic, virilising).
- ▶ IUI capped at 3–4 cycles; beyond that, move to IVF.
- ▶ Definitive surgery (hysterectomy + BSO) is never the answer in a fertility-desiring patient.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

For reference only: current international practice (ESHRE 2022 guideline, broadly mirrored by NICE NG73) supplements rASRM staging with the Enzian system for deep infiltrating disease and the EFI for fertility prognosis — worth mentioning if the examiner probes "recent advances," but not required for the core answer.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e;
DC Dutta's Textbook of Gynaecology 7e.



Management of intramural myomas and infertility

Asked in: Paper IV 02-Jun-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Intramural myomas are leiomyomas confined mainly to the myometrium: FIGO PALM-COEIN type 3 (100% intramural but contacting/distorting the endometrium) or type 4 (entirely intramural, touching neither endometrium nor serosa). Unlike submucosal myomas, which uniformly impair fertility, an intramural myoma's effect depends chiefly on whether it distorts the endometrial cavity, and on its size.

Mechanisms and evidence linking myoma location to fertility outcome

Myoma location/feature	Mechanism	Effect on fertility/ART outcome
Submucosal (cavity contact)	Endometrial ulceration, chronic inflammation, defective nidation	IVF success reduced by ~70%; miscarriage risk increased >3-fold
Intramural, cavity-distorting (type 3)	Distorted cavity contour impairs sperm ascent and embryo transport	Lower implantation and live-birth rates
Intramural, non-cavity-distorting (type 4)	Reduced HOXA10 gene expression, altered junctional-zone peristalsis, focal endometrial dysfunction even at a distance from the tumour	IVF live-birth rate reduced ~20–40%; pooled relative risk 0.79 (95% CI 0.70–0.88) on a 2010 meta-analysis of 19 studies/6,087 IVF cycles; miscarriage risk increased by more than half
Intramural >5 cm, any cavity status	Mass effect, local vascular steal reducing endometrial perfusion	Lower implantation/live-birth rates
Subserosal	No endometrial or cavity contact	No adverse effect on fertility or IVF outcome
Myoma near the cornu	Cornual compression, tubal elongation/kinking	Added tubal-factor infertility

Evaluation before deciding management

Investigation	Purpose
Transvaginal ultrasound	First-line; documents number, size, and location
Saline infusion sonography or hysterosalpingography	Assesses cavity outline and distortion; HSG also checks tubal patency
Hysteroscopy	Gold-standard confirmation that no submucosal (intracavitary) component coexists before a myoma is labelled "purely intramural"
Magnetic resonance imaging	Best sensitivity/specificity for mapping intramural extent and distance from cavity/serosa; differentiates adenomyosis; guides surgical planning for large or multiple myomas
Semen analysis of husband	Excludes a coexisting male factor before committing the couple to myomectomy
Ovarian reserve (AMH, antral follicle count)	Guides the surgery-first-versus-ART-first decision, particularly in older women or long-standing infertility

Indications for myomectomy in intramural myomas

- ▶ **Cavity-distorting intramural myoma** (type 3, or any myoma abutting/deforming the endometrium) — myomectomy is recommended before proceeding with infertility treatment.
- ▶ **Non-cavity-distorting intramural myoma >5 cm** — associated with lower implantation/live-birth rates; myomectomy is individualised, weighing benefit against surgical morbidity, especially before IVF.
- ▶ **Non-cavity-distorting intramural myoma <4–5 cm** — the benefit of removal is not established; reasonable to proceed with expectant management or ART without surgery, particularly with a short infertility duration, other correctable factors, or reduced ovarian reserve where surgical delay is costly.
- ▶ **Recurrent pregnancy loss with no other identifiable cause** and a myoma present, especially ≥5 cm — removal improves outcome.
- ▶ **Symptomatic myoma** — persistent abnormal uterine bleeding unresponsive to medical therapy, pain/pressure symptoms, or rapid growth on follow-up — operate regardless of cavity status.
- ▶ Uterine artery embolisation is **relatively contraindicated** in women desiring fertility; myomectomy remains the preferred fertility-sparing treatment.

Management

Medical (adjunct only, not curative of the infertility): GnRH agonist (e.g., depot leuprolide) for 3–4 months before myomectomy shrinks the myoma and its vascularity, improving pre-operative

haemoglobin and reducing operative blood loss; it may shrink a large (5–6 cm) myoma enough to allow hysteroscopic resection. It does not itself restore fertility and delays the conception attempt, so hormonal therapy is never used as a stand-alone treatment for myoma-related infertility.

Route of myomectomy:

Route	When used
Hysteroscopic	Only if a submucosal component coexists (type 0–2); not applicable to a myoma with no cavity contact
Laparoscopic/robot-assisted	Accessible intramural myomas; reproductive outcomes comparable to open surgery, with less blood loss and faster recovery; low, posterior myomas are less amenable
Open (laparotomy/mini-laparotomy)	Large (>8–10 cm), multiple, deep, or posterior myomas requiring layered uterine reconstruction

Steps of abdominal myomectomy:

- ▶ Pre-operative work-up — correct anaemia, cross-match blood, hysteroscopy/HSG to exclude a submucous component, semen analysis of the husband; consider GnRH agonist pretreatment for large, vascular myomas.
- ▶ Reduce blood loss — dilute vasopressin (20 units in 20 mL normal saline) injected into the myometrium overlying the myoma; a Bonney's clamp or tourniquet around the uterine and ovarian vessels; controlled hypotensive anaesthesia; moderate Trendelenburg position.
- ▶ A single linear or elliptical incision in the midline on the anterior uterine wall — avoids tubo-ovarian injury; lateral myomas are removed by tunnelling, and posterior or cavity-abutting myomas are approached transcavity to avoid an additional posterior scar.
- ▶ Deepen the incision through myometrium and pseudocapsule to the myoma; enucleate with traction–countertraction, preserving the pseudocapsule's vascular supply.
- ▶ Obliterate the dead space with tiered figure-of-eight sutures over the myoma bed to prevent haematoma.
- ▶ Close the myometrium in layers with minimal exposed, reactive suture.
- ▶ Avoid uncontained power morcellation (risk of disseminating an occult leiomyosarcoma); use in-bag morcellation or mini-laparotomy extraction for large specimens.

Post-myomectomy reproductive counselling

- ▶ Allow adequate myometrial healing before the couple attempts conception.
- ▶ Subsequent pregnancy needs mandatory hospital delivery; caesarean delivery is generally recommended after a myomectomy that enters or closely approaches the cavity, or removes a deep intramural myoma, to avoid the (rare) risk of scar rupture in labour.

- ▶ Pregnancy rate after myomectomy is about 40–60%; fibroid recurrence risk is 30–50% and re-laparotomy risk is 20–25%.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 10.10 — Enucleation of intramural myoma. (Te Linde 13e, p.578)

High-yield exam pointers

- ▶ FIGO type 3 = intramural touching endometrium (cavity-distorting); type 4 = purely intramural, no cavity/serosal contact.
- ▶ Submucosal myoma: IVF success ↓~70%; non-cavity-distorting intramural: IVF success ↓20–40%, live-birth RR 0.79 (95% CI 0.70–0.88); subserosal: no effect.
- ▶ Hysteroscopic myomectomy is impossible for a truly intramural myoma with no cavity contact — route selection hinges on cavity status.
- ▶ Vasopressin dose for blood-loss control: 20 units in 20 mL normal saline, injected into the myometrium overlying the myoma.
- ▶ GnRH agonist pretreatment: 3–4 months, shrinks myoma/vascularity, improves preoperative haemoglobin.
- ▶ Uterine artery embolisation is relatively contraindicated when future fertility is desired — myomectomy is preferred.
- ▶ Myomectomy → mandatory hospital delivery in a subsequent pregnancy; caesarean generally advised if the cavity was entered.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

For a non-cavity-distorting intramural myoma under about 5 cm, published evidence on whether myomectomy actually improves live-birth rate is inconsistent between studies, so management is individualised rather than protocol-driven.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Te Linde's Operative Gynecology 13e. FIGO PALM-COEIN leiomyoma classification (as reproduced in Berek & Novak 16e).

♦ ♦ ♦

Management of poor responders in ovulation induction

Asked in: Paper III 02-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — A **poor ovarian responder (POR)** is a woman who yields too few oocytes/follicles despite an optimal or high-dose gonadotropin stimulus in an assisted reproduction cycle. The *Bologna criteria* (European Society of Human Reproduction and Embryology, 2011) operationalise this; a simpler bedside definition (DC Dutta 7e) is fewer than 3 growing follicles with peak serum estradiol <500 pg/mL despite high-dose gonadotropins. Because the underlying problem is usually a genuinely diminished ovarian reserve, management is aimed at individualising the stimulation protocol, adding adjuvants of limited but real evidence, and offering salvage/alternative strategies rather than expecting any single regimen to "cure" the poor response.

Bologna criteria (ESHRE 2011) — at least 2 of 3 required

#	Criterion
1	Advanced maternal age (≥ 40 years) or any other risk factor for POR
2	A previous POR — ≤ 3 oocytes retrieved with a conventional stimulation protocol
3	An abnormal ovarian reserve test — antral follicle count <5–7, or anti-Müllerian hormone (AMH) <0.5–1.1 ng/mL

Two episodes of POR after maximal stimulation are, by themselves, sufficient to satisfy the definition even in a woman <40 years with normal ovarian reserve tests.

General principles of management

- ▶ **Counsel realistically** — explain the guarded prognosis (lower oocyte yield, higher cancellation rate) before starting; discuss donor oocytes early as a fallback, not only after repeated failures.
- ▶ **Correct modifiable factors first** — optimise body-mass index, treat thyroid/prolactin abnormality, stop smoking, correct vitamin D deficiency.
- ▶ **Start at a high, individualised gonadotropin dose from day 2–3** — doses beyond 300 IU/day rarely improve oocyte yield further in poor responders, and no regimen benefits from exceeding 450 IU/day in any patient (Speroff 9e; Berek & Novak 16e).
- ▶ **Choose a stimulation protocol tailored to the prior cycle** (table below) — avoid the standard long agonist protocol as first choice.
- ▶ **Add adjuvant therapy** if a repeat POR is anticipated (table below); counsel that the evidence for each is limited.
- ▶ **Escalate to salvage strategies** (oocyte accumulation, dual/double stimulation, donor oocyte) if conventional stimulation fails on ≥ 2 occasions.

Stimulation protocols

Protocol	Regimen	Rationale / evidence
GnRH antagonist protocol	Ganirelix or cetrorelix 0.25 mg/day subcutaneously from stimulation day 5–6 (or when lead follicle reaches 13–14 mm) + high-dose gonadotropins from day 2–3	First-line choice — shorter, avoids agonist-induced suppression of follicular response and the flare-cyst risk; comparable oocyte yield to agonist protocols with lower gonadotropin consumption
Microdose flare (agonist)	14–21 days of combined oral-contraceptive (OC) pretreatment → microdose leuprolide (Speroff 9e: 40 mcg twice daily; Berek & Novak 16e: 25 mcg) begun 3–4 days after stopping the OC → high-dose gonadotropins from day 3 of leuprolide	Alternative first-line — exploits the agonist's initial "flare" to boost endogenous follicle-stimulating hormone (FSH)/luteinising hormone (LH); yields similar oocyte numbers to the antagonist protocol
Standard short/flare protocol	Leuprolide 1.0 mg daily on cycle days 2–4, then 0.5 mg daily, gonadotropins from day 3	Older short protocol; largely superseded by the microdose flare/antagonist protocols because it raises progesterone/androgen levels, which may harm oocyte quality
Long agonist protocol, higher dose	Standard long protocol repeated with an increased gonadotropin dose	Reserved for a woman who was under-dosed in her index cycle; not first choice for a genuinely diminished ovarian reserve — longer, uses more gonadotropin, with no proven benefit over antagonist/flare protocols
Mild/minimal stimulation or natural-cycle in-vitro fertilisation (IVF)	Clomiphene citrate or letrozole with low-dose gonadotropins, or no stimulation at all	Lower cost and burden; fewer oocytes per cycle, but can give a comparable cumulative live-birth rate over repeated cycles in a very poor prognosis woman who declines aggressive stimulation

Adjuvant therapies (limited/inconclusive evidence)

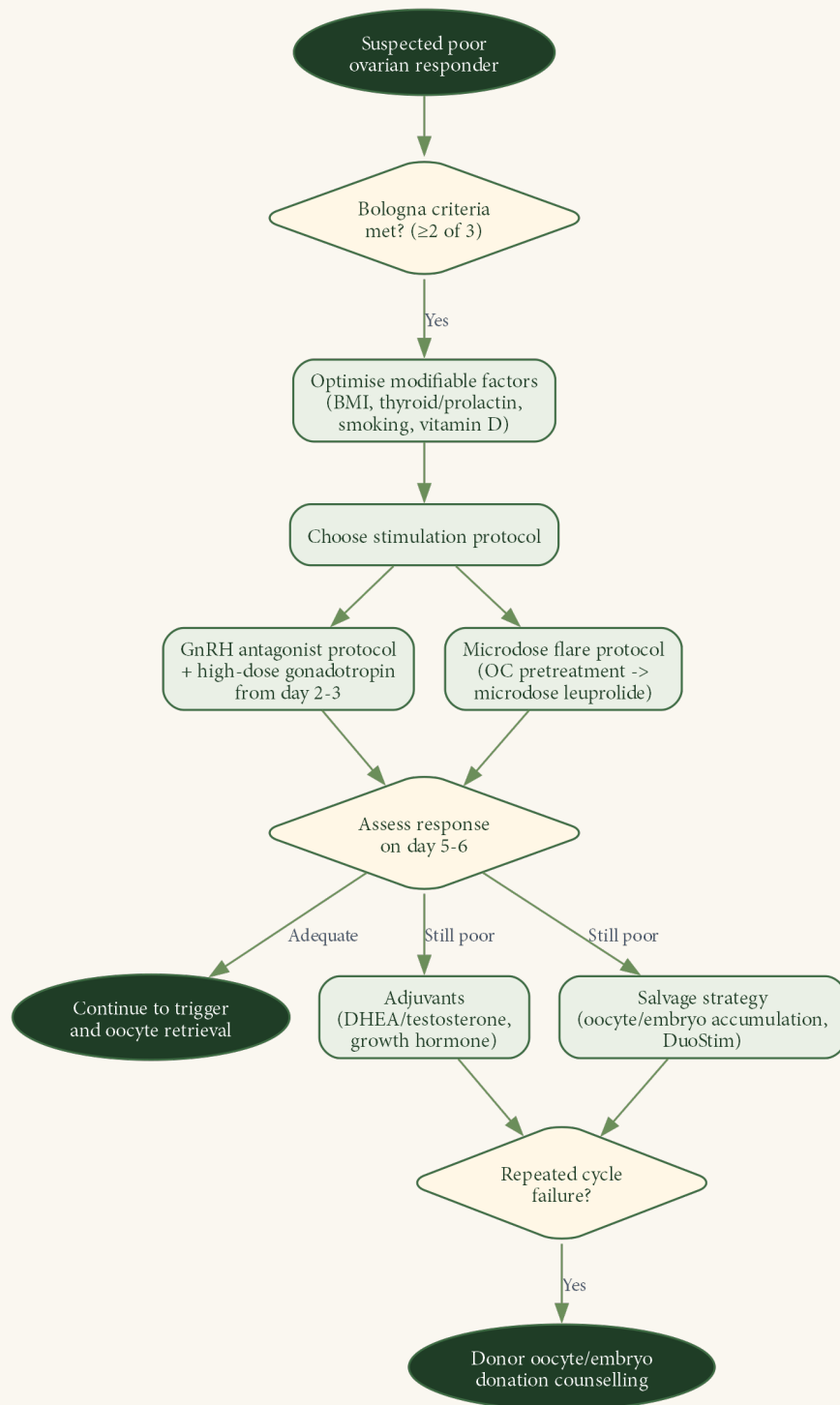
Adjuvant	Rationale in poor responders
Oral contraceptive priming	Schedules the cycle and synchronises the follicular cohort
Oestrogen priming (late luteal or early follicular)	Micronized estradiol suppresses endogenous FSH to synchronise the follicular cohort before stimulation begins

Adjuvant	Rationale in poor responders
Dehydroepiandrosterone (DHEA) / transdermal testosterone	Proposed to improve granulosa-cell sensitivity to FSH; no well-designed randomised controlled trial has proven benefit
Growth hormone	Used as an adjuvant especially in the elderly poor responder; may modestly improve oocyte yield, but evidence remains limited
Low-dose aspirin/vasodilators	Proposed to improve ovarian blood flow; evidence weak

Salvage / unconventional strategies

- ▶ **Oocyte or embryo accumulation** — vitrify oocytes/embryos across two or more consecutive stimulation cycles, then transfer once a usable cohort has accumulated; raises the cumulative pregnancy rate for an individually poor yield.
- ▶ **Dual/double stimulation in one cycle ("DuoStim")** — a follicular-phase antagonist stimulation with a GnRH-agonist trigger, followed by a second, luteal-phase stimulation in the same cycle; shortens time to an adequate oocyte/embryo number, though it uses more gonadotropin and takes slightly longer overall.
- ▶ **Repeat cycle with a different protocol** if the first attempt used a submaximal dose or an unfavourable (long agonist) protocol.
- ▶ **Donor oocytes/embryo donation** — the most effective option once ovarian reserve is genuinely exhausted or repeated cycles have failed; must be discussed early and non-judgementally.
- ▶ **Gestational surrogacy or adoption** — considered when donor oocytes are declined or a co-existing uterine factor precludes carrying a pregnancy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Management algorithm for the poor ovarian responder, from Bologna-criteria confirmation through protocol choice, day 5–6 response assessment, adjuvant/salvage escalation, to donor-oocyte counselling on repeated failure.

High-yield exam pointers

- ▶ Bologna criteria (ESHRE 2011) — need 2 of 3: age ≥ 40 or risk factor / prior POR ≤ 3 oocytes / abnormal ovarian reserve test (antral follicle count $< 5-7$, AMH $< 0.5-1.1$ ng/mL).
- ▶ First-line protocols = GnRH antagonist or microdose flare — NOT the standard long agonist protocol.
- ▶ Antagonist dose to memorise: ganirelix/cetrorelix 0.25 mg/day subcutaneously.
- ▶ Microdose flare = OC pretreatment $\rightarrow$ leuprolide 25–40 mcg twice daily.
- ▶ Gonadotropin dose > 300 IU/day gives no added benefit in poor responders; > 450 IU/day benefits no one.
- ▶ Adjuvants to name if asked "recent advances": DHEA, transdermal testosterone, growth hormone — evidence inconclusive.
- ▶ Salvage options: oocyte/embryo accumulation, DuoStim (double stimulation), donor oocyte.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The POSEIDON (2016) stratification is a newer, complementary system that classifies low-prognosis patients by age, ovarian reserve and prior response to individualise the target oocyte number; it is referenced in the current literature but not required for this answer.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e.



Management of unexplained infertility

Asked in: Paper III Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Unexplained (idiopathic) infertility is diagnosed when a couple fails to conceive after ≥ 1 year of regular unprotected intercourse (6 months if female age ≥ 35 years) despite a completely normal standard infertility work-up — normal semen analysis, confirmed ovulation, at least one patent fallopian tube, and a normal uterine cavity. It is a diagnosis of exclusion, accounting for 10-30% of

infertile couples, and since no defined defect exists to correct, all treatment is empirical — aimed at increasing monthly fecundability rather than curing a disease.

Pre-treatment assessment and prognostic counselling

Factor	Effect on prognosis / management
Female age	<35 years: better spontaneous and treatment-related prognosis. ≥35 years: falling fecundability — favours earlier escalation to gonadotropin/IUI (intrauterine insemination) or straight to IVF (in vitro fertilisation)
Duration of infertility	<3 years: better chance of spontaneous conception (up to 60-70% conceive within 3 years untreated). >3 years: poor spontaneous prognosis — justifies active treatment
Previous pregnancy	Secondary unexplained infertility carries a better prognosis than primary
Ovarian reserve	Anti-Müllerian hormone (AMH), antral follicle count, or day-3 follicle-stimulating hormone (FSH) — assessed before treatment is planned, as reduced reserve favours IVF over prolonged ovulation-induction cycles

Couples must be counselled on the relative cost, invasiveness, and multiple-pregnancy risk of each option before a shared decision is made.

Stepwise management

- ▶ **Expectant management (timed intercourse)** — reasonable first step for women <35 years with short duration of infertility; untreated cycle fecundability is only 2-4%/cycle (versus 20-25% in normally fertile couples), but roughly 60-70% conceive within 3 years without treatment.
- ▶ **Ovulation induction/superoovulation with IUI** — clomiphene citrate or letrozole, or low-dose gonadotropins, combined with IUI for 3-4 cycles; the rationale is to bring more oocytes and motile sperm together at the right time.
- ▶ **Assisted reproductive technology** — IVF ± intracytoplasmic sperm injection (ICSI) — the single most effective treatment (per-cycle live-birth rate ~29-32%); recommended after failed ovulation-induction/IUI cycles, or as first-line therapy in women >35-38 years or with long-standing (>3 year) infertility ("fast-track" approach).
- ▶ **Selected adjunct/surgical measures** — diagnostic laparoscopy in young women (to detect and treat occult minimal/mild endometriosis) and hysteroscopic correction of an incidentally found submucous fibroid, endometrial polyp, or septum.

Drugs and regimens used in ovulation induction/superovulation

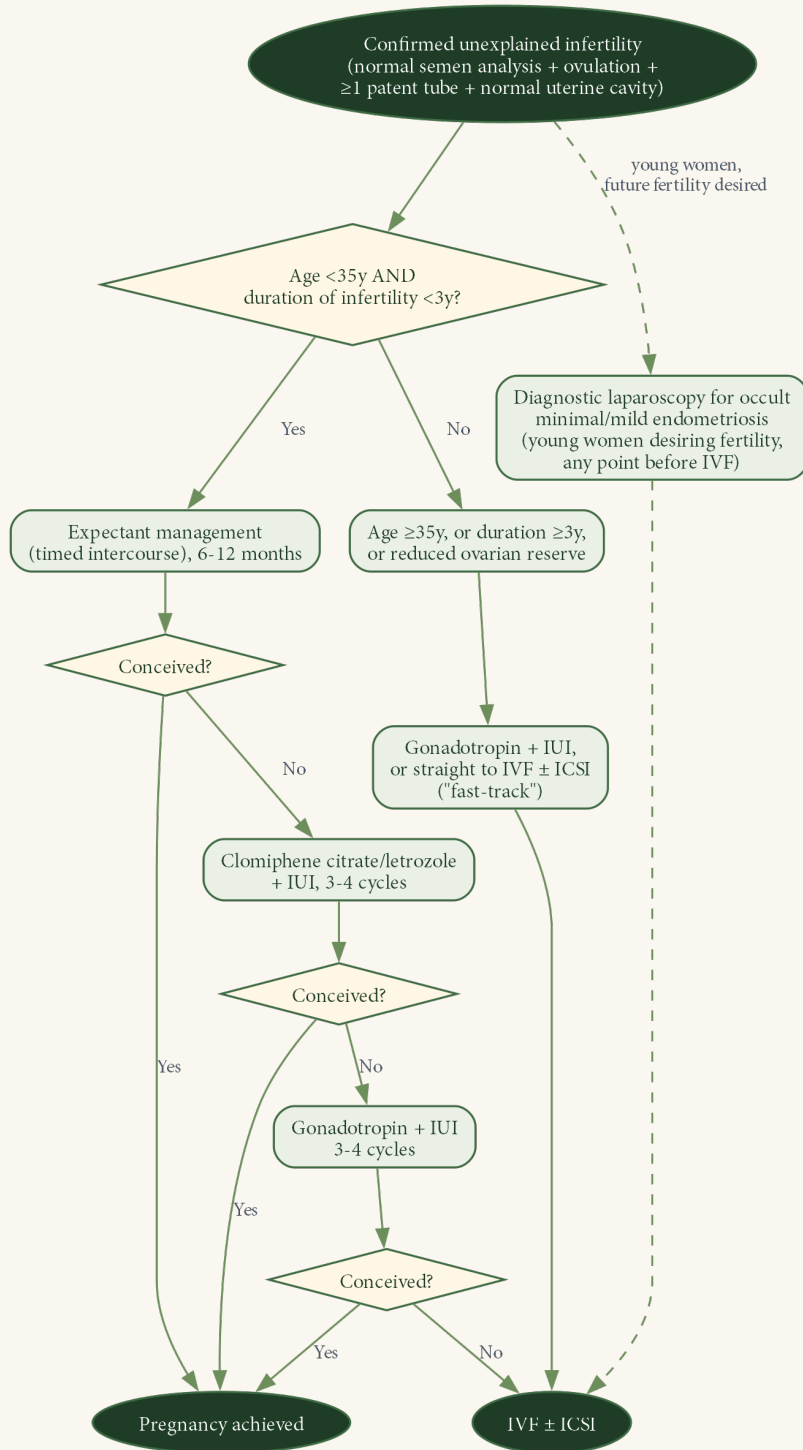
Drug	Dose/regimen	Key point
Clomiphene citrate	50 mg/day orally, cycle days 3-7 (or 5-9) for 5 days; increase by 50 mg increments each failed cycle to a maximum of 150 mg/day	First-line oral agent; monitor follicular response by transvaginal ultrasound
Letrozole (aromatase inhibitor)	2.5 mg/day, cycle days 3-7; increase to a maximum of 7.5 mg/day if ovulation fails	Off-label use; in a large multicentre trial, letrozole gave significantly lower pregnancy/live-birth rates than gonadotropin for unexplained infertility-IUI and is not the preferred agent for this indication
Gonadotropins (recombinant FSH/human menopausal gonadotropin), low-dose step-up	Starting dose 37.5-75 IU/day subcutaneously, increased in small increments if response is inadequate, with serial ultrasound + oestradiol monitoring	Higher pregnancy/live-birth rate than clomiphene-IUI, but markedly higher multiple-pregnancy risk (31.8% versus 9.4% with clomiphene in one large trial, with triplets occurring only in the gonadotropin arm)
Human chorionic gonadotropin (hCG) trigger	5,000-10,000 IU intramuscularly (or recombinant hCG) once the lead follicle reaches ≥ 18 mm	IUI timed 24-36 hours after the trigger

Evidence for choice of treatment

Approach	Per-cycle pregnancy rate	Comment
Expectant management	2-4%	Baseline for comparison
IUI alone, natural cycle	~4-5%	No clinically important benefit over expectant management
Clomiphene $\pm$ IUI	5-10%	Clomiphene alone is no better than placebo; adding IUI gives a modest benefit
Gonadotropin + IUI	8-12%	Best non-ART option, particularly when infertility exceeds 3 years; limited by cost and multiple-pregnancy risk

Approach	Per-cycle pregnancy rate	Comment
IVF ($\pm$ ICSI)	~30%	Most effective option regardless of whether used first-line or after failed IUI cycles; superior in older women and longer-duration infertility (Forty and Over Treatment Trial, fast-track/FASTT trial)

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Stepwise management of unexplained infertility, from expectant management through ovulation induction/IUI to IVF ± ICSI, with the age/duration-based fast-track and laparoscopy side branch.

High-yield exam pointers

- ▶ Diagnostic criteria: **normal semen analysis + confirmed ovulation + ≥ 1 patent tube + normal uterine cavity**, after ≥ 1 year (6 months if ≥ 35 years) trying.
- ▶ Postcoital test, endometrial biopsy for luteal phase defect, and routine diagnostic laparoscopy are **no longer required** to label infertility "unexplained."
- ▶ Clomiphene citrate 50 mg (max 150 mg) days 3-7 or 5-9; letrozole 2.5 mg (max 7.5 mg) days 3-7; gonadotropin low-dose step-up 37.5-75 IU/day.
- ▶ Untreated fecundability 2-4%/cycle versus IVF $\sim 30\%$ per cycle — IVF is the single most effective treatment.
- ▶ Gonadotropin/IUI beats clomiphene/IUI on pregnancy rate but at the cost of a much higher multiple-pregnancy rate — remember this trade-off.
- ▶ "Fast-track" concept (FASTT trial): skip straight to IVF in older women or long-duration infertility rather than cycling through every step.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Coverage note: older Indian texts (DC Dutta's Gynaecology, Jeffcoate's Principles of Gynaecology) still teach the classical stepwise ladder — ovulation induction/IUI, then superovulation/IUI, then assisted reproductive technology — whereas current randomised trial evidence (as reflected in Speroff 9e) increasingly favours earlier recourse to IVF, especially in women over 35 years or with infertility beyond 3 years; the answer above follows the current evidence and flags this evolution.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e.



Medical management of endometriosis

Asked in: Paper III 19-Nov-2022 · Paper III 18-Jul-2020 · Paper III 16-Nov-2019 · Paper III Jul 2016 (4x) — RGUHS MS Obstetrics & Gynaecology

Definition — **Endometriosis** is the presence of endometrial-like glands and stroma outside the uterine cavity, most often on the ovaries and pelvic peritoneum, causing dysmenorrhoea, dyspareunia, chronic pelvic pain and infertility. **Medical management** is hormonal/non-hormonal drug therapy that

suppresses ovarian oestrogen production and induces atrophy of ectopic implants; it is **suppressive, not curative**, and does not improve fertility.

Principles of medical therapy

- ▶ All hormonal regimens act by inducing **pseudopregnancy** (combined pills, progestins), **pseudomenopause** (danazol, gestrinone) or **medical oophorectomy** (GnRH agonists/antagonists) — i.e., they create a low-oestrogen, anovulatory, amenorrhoeic state in which implants become atrophic.
- ▶ Empirical therapy (an **NSAID plus a combined pill or progestin**) may be started for typical symptoms without laparoscopic confirmation, once other causes of pelvic pain are excluded.
- ▶ Combined pills, progestins, danazol, gestrinone and GnRH agonists are **equally effective** for pain relief — choice depends on side-effect profile, cost, and whether the patient desires future fertility.
- ▶ Usual treatment duration is **6 months** (up to 2 years with add-back therapy); pain and disease commonly recur once treatment stops.
- ▶ Medical treatment does **not** enhance fertility and is never used to treat endometriosis-associated infertility — it is reserved for pain-predominant disease in women not immediately seeking conception.

Drugs, doses and mechanism

Drug/class	Dose & regimen	Mechanism	Key side effects
NSAIDs	Mefenamic acid 250–500 mg 8-hourly, or ibuprofen 800–1200 mg/day	Inhibit prostaglandin synthesis (COX inhibition)	Gastric ulceration; may inhibit ovulation
Combined oestrogen–progestin pill (OCP)	1 tablet/day, cyclic or continuous, × 6–9 months	Pseudopregnancy → decidualisation → atrophy	Breakthrough bleeding, VTE risk

Drug/class	Dose & regimen	Mechanism	Key side effects
Oral progestins	Medroxyprogesterone acetate (MPA) 10 mg thrice daily; norethisterone 10–30 mg/day; dydrogesterone 10–20 mg/day; dienogest 2 mg/day — all × 6–9 months	Decidualisation and atrophy of implants	Weight gain, bloating, breakthrough bleeding, mood change
Depot MPA	150 mg IM every 3 months	Amenorrhoea/anovulation	Delayed return of ovulation (avoid if fertility desired); bone loss with prolonged use
Levonorgestrel-releasing IUS (LNG-IUS)	20 µg/day released locally	Local endometrial/implant atrophy — useful in rectovaginal disease	Irregular spotting, especially in first months
Danazol	400–800 mg/day PO in divided doses (start 200 mg twice daily, titrate to amenorrhoea) × 6–9 months	Antigonadotropic + androgen-agonist "pseudomenopause"	Weight gain, acne, hirsutism, irreversible voice change, dyslipidaemia; avoid in liver disease/pregnancy
Gestrinone	2.5 mg twice weekly PO (1.25 mg twice weekly less effective) × 6–9 months	Antiprogestogenic/antioestrogenic/antigonadotropic, same family as danazol	Similar to danazol but milder; better bone-mass profile

Drug/class	Dose & regimen	Mechanism	Key side effects
GnRH agonists	Leuprolide 3.75 mg depot IM monthly; goserelin 3.6 mg depot SC monthly; nafarelin 200 µg intranasally twice daily; triptorelin 3.75 mg IM monthly — × 6 months	Initial flare, then pituitary downregulation → medical oophorectomy	Hot flushes, vaginal dryness, trabecular bone loss (6–8% at 6 months)
Add-back therapy (with GnRH agonist)	Norethisterone acetate 5 mg/day, or tibolone 2.5 mg/day, or conjugated equine oestrogen 0.625 mg + MPA 2.5 mg/day	Prevents hypo-oestrogenic bone loss/vasomotor symptoms without reducing pain relief	Allows safe extension of therapy to 12–24 months
GnRH antagonist	Elagolix 150 mg once daily (low dose) or 200 mg twice daily (high dose) orally; cetrorelix 3 mg SC weekly	Immediate competitive pituitary blockade — no initial flare, dose-dependent oestrogen suppression	Hot flushes, dose-dependent bone density loss; concomitant contraception still needed
Aromatase inhibitors	Anastrozole 1 mg/day (combined with an OCP or progestin to prevent functional ovarian cysts)	Blocks local and peripheral oestrogen synthesis	Used mainly in resistant/rectovaginal disease; monotherapy in premenopausal women risks ovarian cyst formation
Progesterone antagonists/SP RMs	Mifepristone 50–100 mg/day PO; ulipristal acetate; asoprisnil	Antiproliferative on endometrium, induces amenorrhoea	Mifepristone can cause endometrial hyperplasia on prolonged use

Choice and sequencing of therapy

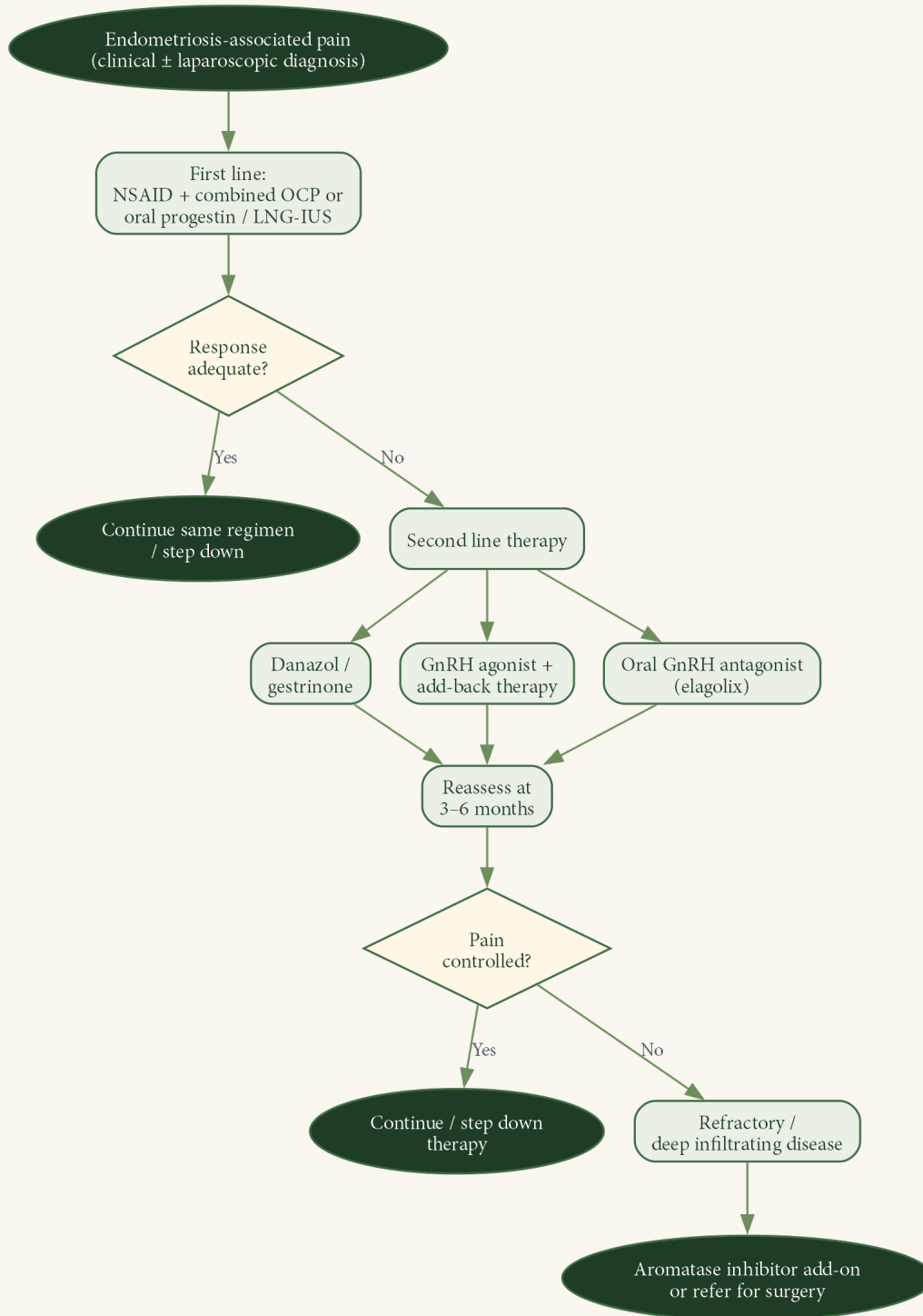
- **First line:** an NSAID combined with a low-dose combined OCP (cyclic or continuous) or an oral progestin/LNG-IUS — cheapest, best tolerated, and can be continued long-term.

- ▶ **Second line** (first line failed, contraindicated, or more severe pain): danazol, gestrinone, or a **GnRH agonist with add-back therapy started at initiation** — GnRH agonists are kept second-line for cost and bone-density concerns, and are avoided in adolescents who have not reached peak bone mass.
- ▶ **Oral GnRH antagonist (elagolix)** is an alternative for moderate-to-severe pain — faster onset, no flare, tailorable dose.
- ▶ **Deep infiltrating/rectovaginal endometriosis:** vaginal danazol, or an aromatase inhibitor combined with an OCP/progestin, gives 60–90% pain relief.
- ▶ If the patient wishes to conceive, hormonal suppression is stopped — medical therapy is never a fertility treatment; surgery or assisted reproduction is planned instead.

Limitations of medical management

- ▶ **Suppressive, not curative** — implants survive treatment-induced atrophy and commonly reactivate once therapy stops; recurrence rates are high (up to 40% with danazol).
- ▶ **No agent improves fertility;** androgenic drugs (danazol, gestrinone) mandate barrier contraception because of the risk of fetal virilisation if pregnancy occurs.
- ▶ **No single medical therapy is superior** to another for pain relief, recurrence, or side-effect burden — selection is individualised.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

No dedicated textbook figure for this drug-therapy algorithm was found in the indexed figure library; this labelled flowchart substitutes for the two infertility-specific management-pathway figures the index otherwise returns for this topic.

High-yield exam pointers

- ▶ Mechanism triad to write first: **pseudopregnancy (OCP/progestins) — pseudomenopause (danazol/gestrinone) — medical oophorectomy (GnRH agonists/antagonists).**
- ▶ Danazol dose to memorise: **400–800 mg/day PO, titrate to amenorrhoea**; irreversible voice change is the classic non-negotiable side effect.
- ▶ GnRH agonist doses: **leuprolide 3.75 mg IM monthly, goserelin 3.6 mg SC monthly, nafarelin 200 µg intranasal BD** — always pair with add-back if >6 months.
- ▶ Add-back regimen: **norethisterone acetate 5 mg/day** (or CEE 0.625 mg + MPA 2.5 mg) — prevents bone loss without losing efficacy.
- ▶ Dienogest **2 mg/day** and elagolix **150 mg OD/200 mg BD** are the two newer oral agents to name for a "recent advances in medical therapy" sub-line.
- ▶ Gestrinone **2.5 mg twice weekly** — cite it as "danazol-like but better tolerated."
- ▶ Golden rule to state explicitly: **medical treatment does not improve endometriosis-associated infertility.**

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Textbook of Gynaecology 7e prints the same drug list and near-identical doses as Berek & Novak 16e (whose figures track the ESHRE guideline for endometriosis referenced within it); ACOG likewise favours NSAID/combined-pill first-line before escalating to a GnRH agonist, so the sequencing above is safe to reproduce as the current standard.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (Chapter 13, Medical Treatment of Endometriosis-Associated Pain); DC Dutta's Textbook of Gynaecology 7e (Chapter 22, Tables 22.6–22.7); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (GnRH antagonists/elagolix); European Society of Human Reproduction and Embryology (ESHRE) guideline and American College of Obstetricians and Gynecologists (ACOG) practice guidance on endometriosis, as referenced within the above texts.



Mention the drugs used for ovulation induction and different methods of ovulation induction

Asked in: Paper I 26-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Ovulation induction (OI) is the pharmacological or surgical stimulation of follicular development and ovulation in an anovulatory or oligo-ovulatory woman who desires pregnancy.

Anovulation is classified by the **World Health Organization (WHO)** into three groups based on the hypothalamic-pituitary-ovarian axis status, which determines drug choice.

Drugs used for ovulation induction

Class	Drug(s)	Dose / regimen	Mechanism
Selective estrogen receptor modulator (SERM)	Clomiphene citrate (CC)	50 mg/day orally for 5 days, started cycle day 2–5; increase by 50 mg/cycle to a maximum of 100–150 mg/day if anovulatory	Blocks hypothalamic estrogen receptors → loss of negative feedback → increased GnRH pulse amplitude → increased FSH/LH
Aromatase inhibitor	Letrozole	2.5 mg/day for 5 days from cycle day 3–7; increase to a maximum of 7.5 mg/day	Blocks peripheral androgen-to-estrogen conversion → reduced central estrogen feedback → increased endogenous FSH; short half-life (~48 h), no antiestrogenic effect on endometrium/mucus
Insulin sensitiser	Metformin	250–500 mg/day, increased gradually to 1500–2550 mg/day (adjunct in PCOS with insulin resistance, or combined with CC/letrozole)	Reduces hyperinsulinaemia → lowers ovarian/adrenal androgen production, improves clomiphene responsiveness
Gonadotropins (parenteral)	Human menopausal gonadotropin (hMG) (FSH 75 IU + LH 75 IU/ampule); purified/recombinant FSH (75 IU); recombinant LH	Low-dose "step-up" start: 75 IU/day; step up by 37.5 IU after 7–14 days if no response; average requirement 75–450 IU/day	Direct stimulation of ovarian follicular growth, bypassing hypothalamic-pituitary axis
GnRH analogue	Pulsatile GnRH	Delivered by portable pump, subcutaneous or intravenous, mimicking physiological pulsatility	Restores physiological pulsatile gonadotropin secretion in hypothalamic causes
Ovulation trigger	Human chorionic gonadotropin (hCG)	5,000–10,000 IU IM once lead follicle reaches 18–20 mm, with adequate serum estradiol	Mimics the LH surge to complete oocyte maturation and trigger ovulation ~36–40 h later

Class	Drug(s)	Dose / regimen	Mechanism
Dopamine agonist	Bromocriptine (1.25–2.5 mg/day, up to 5–10 mg/day) or Cabergoline (0.25 mg twice weekly, up to 1.5 mg twice weekly)	For hyperprolactinaemia-induced anovulation	Suppresses pituitary prolactin secretion, restoring pulsatile GnRH/gonadotropin release

Methods of ovulation induction — by WHO group

WHO group	Underlying defect	Method of choice
Group I — hypogonadotropic hypogonadal anovulation (5–10%)	Low FSH/LH, low estradiol; hypothalamic amenorrhoea, Kallmann syndrome, isolated gonadotropin deficiency	Pulsatile GnRH (physiological, low OHSS/multiple-pregnancy risk) or gonadotropin therapy (hMG, since endogenous LH is absent); CC ineffective (no endogenous estrogen to block)
Group II — normogonadotropic, normoestrogenic anovulation (75–85%)	Normal/high LH, normal estradiol; mainly PCOS	Weight reduction first if obese → oral agents (letrozole first-line , or clomiphene citrate) ± metformin → gonadotropins (step-up/step-down protocol) if resistant → laparoscopic ovarian drilling (LOD) as surgical alternative
Group III — hypergonadotropic ovarian failure	Elevated FSH, low estradiol; premature/primary ovarian insufficiency	OI with own oocytes largely unsuccessful; oocyte donation is the definitive option
Hyperprolactinaemic anovulation (separate category)	Raised prolactin suppressing GnRH pulsatility	Dopamine agonist (bromocriptine/cabergoline) restores ovulation once prolactin normalises

Stepwise protocols and modalities

- ▶ **Lifestyle modification** — 5–10% weight loss in obese PCOS women can restore spontaneous ovulation before drug therapy.
- ▶ **Oral first-line agents** — letrozole (2.5 mg, days 3–7) preferred over clomiphene per the *Pregnancy in Polycystic Ovary Syndrome II (PPCOS II)* trial, which showed significantly higher live-birth and ovulation rates with letrozole; clomiphene (50 mg, days 2–5) remains a standard alternative. Metformin may be added in insulin-resistant PCOS.
- ▶ **Sequential clomiphene-gonadotropin therapy** — a standard course of clomiphene (50–100 mg) followed by low-dose FSH/hMG (75 IU/day) from the last clomiphene day, for CC partial responders.

- ▶ **Low-dose "step-up" gonadotropin protocol** — start hMG/FSH 75 IU/day; if no response after 7–14 days, increase by 37.5 IU increments; monitor by transvaginal ultrasound follicle tracking ± serum estradiol to titrate dose, minimise ovarian hyperstimulation syndrome (OHSS) and multiple pregnancy. A "step-down" protocol (higher starting dose, tapered down) is an alternative used in some centres.
- ▶ **Pulsatile GnRH therapy** — reserved for WHO Group I hypothalamic anovulation; delivered via a programmable pump.
- ▶ **Ovulation trigger** — hCG 5,000–10,000 IU once the dominant follicle is 18–20 mm, timed with intercourse or intrauterine insemination (IUI) 34–40 hours later.
- ▶ **Laparoscopic ovarian drilling (LOD)** — surgical option for clomiphene-resistant PCOS; electrocautery or laser, 3–6 punctures per ovary, unilateral or bilateral; lowers intraovarian androgens and inhibin, raising FSH; avoids OHSS/multiple pregnancy but carries a small risk of adhesions and diminished ovarian reserve.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 36.9 — Surgical treatment of PCOS by drilling (DC Dutta's Gynaecology 7e, p.527)

High-yield exam pointers

- ▶ WHO Group I (hypogonadotropic), II (normogonadotropic — PCOS, commonest), III (hypergonadotropic — ovarian failure) — write this table first.
- ▶ Clomiphene: 50 mg → max 100–150 mg/day, days 2–5, for 5 days; letrozole 2.5 mg → max 7.5 mg, days 3–7.
- ▶ PPCOS II trial: letrozole superior to clomiphene for live birth in PCOS.
- ▶ Gonadotropin "step-up": start 75 IU/day, up-titrate by 37.5 IU.
- ▶ hCG trigger: 5,000–10,000 IU once follicle 18–20 mm.
- ▶ LOD: 3–6 punctures/ovary, electrocautery or laser — the surgical alternative for CC-resistant PCOS.
- ▶ Bromocriptine/cabergoline only for hyperprolactinaemia-driven anovulation.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older Indian textbook figures for clomiphene (up to 250 mg/day) predate current practice; Speroff 9e and the PPCOS II data support a practical ceiling of 150 mg/day and first-line preference for letrozole in PCOS.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; PPCOS II trial (cited in Speroff 9e).



Outcome of ART techniques

Asked in: Paper III Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Assisted reproductive technology (ART) covers procedures in which oocytes and/or sperm are handled outside the body to achieve pregnancy — in vitro fertilisation and embryo transfer (IVF-ET), intracytoplasmic sperm injection (ICSI), gamete/zygote intrafallopian transfer (GIFT/ZIFT), donor oocyte/embryo IVF, frozen embryo transfer (FET), and gestational surrogacy. "Outcome" of ART is judged by cycle-based success (live birth) rates and by maternal, obstetric, and perinatal complication rates.

Success (live birth) rates by technique

Technique	Reported outcome
IVF-ET	Live birth rate 32.7% per oocyte retrieval (fresh, own oocytes)
ICSI	Fertilisation rate 60–70%; pregnancy rate 20–40% per embryo transfer
GIFT	Delivered pregnancy rate 27–30% (best in unexplained infertility; requires patent tubes)
ZIFT	29–30%, comparable to IVF; higher ectopic risk than IVF
Donor oocyte/embryo IVF	Live birth rate ≈55%, largely independent of the recipient's own age
Frozen embryo transfer (FET)	Live birth rate 44.3% per transfer (US national ART registry, 2015)

Age-related decline (US national ART summary, 2015; fresh, nondonor cycles), **live birth rate per embryo transfer**: <35y — 46.5%; 35–37y — 38.4%; 38–40y — 27.4%; 41–42y — 15.5%; 43–44y — 6.6%. Miscarriage rate rises in parallel — below 15% under age 35, ~29% at 40, and up to 65% at ≥44 years. Age is the single most important determinant of ART success; live birth per transfer in donor-oocyte cycles remains >50% across recipient ages because it tracks the donor's (not the recipient's) age.

Factors influencing outcome

Factor	Effect on outcome
Maternal age / ovarian reserve (day-3 FSH, AMH, antral follicle count)	Most important predictor; ↓ oocyte number and quality, ↓ implantation with age
Cause of infertility	Tubal, ovulatory, unexplained factors → better prognosis than diminished ovarian reserve or severe male factor
Embryo stage transferred	Blastocyst (day 5/6) transfer gives a higher live-birth rate per transfer than cleavage-stage (day 3), difference greatest under age 35
Number of embryos transferred	SART/ASRM (2017) age- and prognosis-based limits (1 embryo if <35y and favourable; up to 3–4 with advancing age) balance success against multiple-pregnancy risk
Hydrosalpinx	Adversely affects implantation and pregnancy rate — salpingectomy/tubal occlusion before ART recommended
Submucous/cavity-distorting fibroids	Adverse effect on implantation; polyps/fibroids not distorting the cavity have little effect
Fresh vs frozen embryo transfer	FET singleton preterm-birth risk is lower than fresh-transfer singletons, but risk of macrosomia/large-for-gestational-age is higher
Smoking	Poorer ovarian response and lower success rate
Previous live birth / first ART attempt	Favourable prognostic sign

Maternal & procedure-related complications

Complication	Key data
Ovarian hyperstimulation syndrome (OHSS)	Iatrogenic, gonadotropin-related; capillary-permeability syndrome (vascular endothelial growth factor-mediated). Graded mild 10–20%, moderate 5–10%, severe 1–2% of stimulated cycles. Risk factors: young age, low body weight, PCOS/high ovarian reserve, high gonadotropin dose, conception cycle
Oocyte-retrieval complications	Limited vaginal puncture-site bleeding ~8% (usually self-limiting); major haemorrhage from vessel injury 0.04–0.07%; pelvic infection/tubo-ovarian abscess 0.3–0.6% (higher with endometrioma or past salpingitis); empty follicle syndrome 0.5–1%

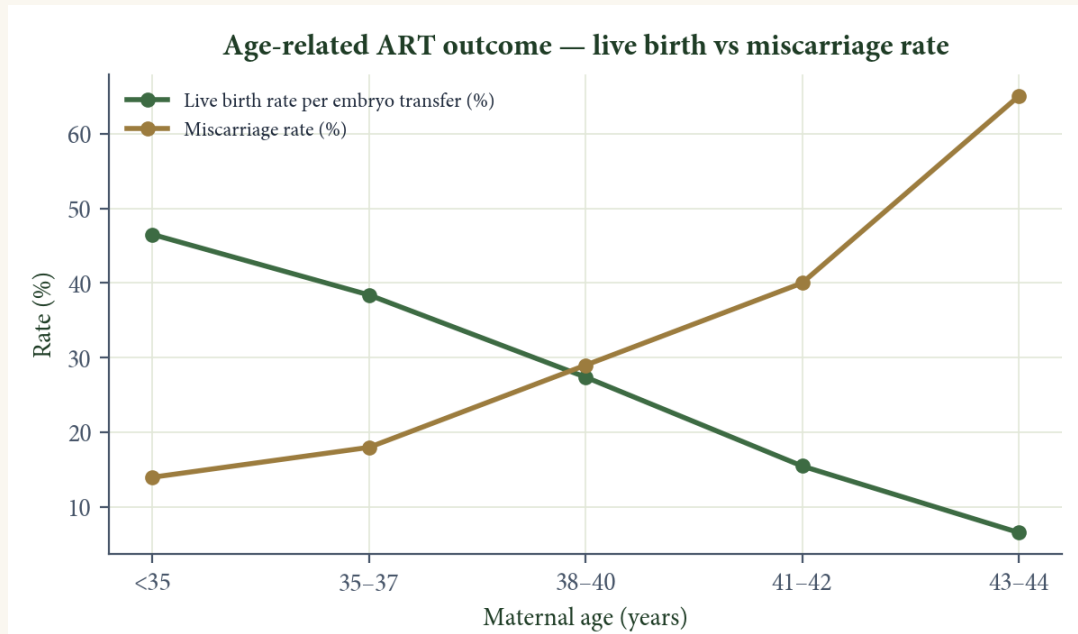
Complication	Key data
Multiple pregnancy	Twin rate after fresh nondonor ET $\approx 22\%$, 5–7 $\times$ the $\sim 3\%$ background population rate; risk rises with number of embryos transferred
Ectopic/heterotopic pregnancy	ART roughly doubles ectopic risk (registry data now $\approx 0.7\text{--}0.9\%$ of ART pregnancies, having fallen from earlier highs); heterotopic pregnancy far commoner after ART (≈ 1 in 100) than spontaneously (1 in 4,000–10,000); risk highest with GIFT/ZIFT and with tubal-factor infertility
Fertility drugs and cancer	No consistent association demonstrated between ovulation-induction drugs and ovarian cancer
Psychological morbidity	Significant stress/anxiety, worsened by treatment failure or pregnancy loss

Obstetric & perinatal (offspring) outcomes

Outcome	ART vs spontaneous conception
Miscarriage	$\sim 16\text{--}18\%$ of ART pregnancies (vs background 10–15% in young women)
Preterm birth (singletons)	<37 weeks: relative risk (RR) 1.54; <32 weeks: RR 1.68
Low birth weight / very low birth weight	LBW <2,500 g: odds ratio (OR) 1.65; VLBW <1,500 g: OR 1.93; small-for-gestational-age: OR 1.39
Obstetric complications (singletons)	Antepartum haemorrhage OR 2.49; hypertensive disorders OR 1.49; gestational diabetes OR 1.48; caesarean delivery OR 1.56
Congenital malformations	Overall relative risk $\approx 1.3\text{--}1.4$ (baseline 2–3% $\rightarrow$ 2.7–4%); no significant difference between IVF and ICSI (RR 1.05) once maternal/paternal infertility itself is accounted for
Imprinting disorders	Rare (background ≈ 1 in 12,000 births); Beckwith–Wiedemann and Angelman syndromes reported in early cohorts after ART, but larger later cohorts did not confirm an excess risk attributable to ART itself rather than underlying subfertility
Large-for-gestational-age/macrosomia	Increased after frozen (vs fresh) embryo transfer and vs natural conception
Long-term child health	Some cohorts show mildly higher adiposity and blood-pressure/metabolic markers in ART-conceived children; no consistent increase in childhood cancer

Take-home: overall ART success is driven chiefly by maternal age and embryo quality; the excess perinatal risk is attributable partly to multiple pregnancy, partly to the ART procedure itself (endometrial/embryo-culture effects), and partly to the underlying subfertility of the parents — a distinction increasingly borne out by sibling and subfertility-matched cohort studies.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



US national ART summary, 2015 (fresh, nondonor cycles), as cited in Speroff 9e — live birth rate per transfer falls while miscarriage rate rises with advancing maternal age.

High-yield exam pointers

- ▶ IVF live birth rate 32.7%/retrieval; age <35 → 46.5%/transfer; age ≥43 → 6.6%/transfer (write the age table).
- ▶ OHSS grading: mild 10–20%, moderate 5–10%, severe 1–2%.
- ▶ Twin rate after ART ≈22% — 5–7× background (~3%).
- ▶ Congenital anomaly RR ≈1.3–1.4; IVF vs ICSI RR 1.05 (no difference).
- ▶ Preterm birth RR 1.54 (<37 wk) / 1.68 (<32 wk); LBW OR 1.65.
- ▶ Imprinting disorders (Beckwith–Wiedemann, Angelman) — reported early, **not confirmed** on larger follow-up; attributed more to subfertility than ART per se.
- ▶ SART/ASRM (2017) embryo-number limits are age- and prognosis-based, aimed at cutting multiple pregnancy without sacrificing live birth rate.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Percentages vary by registry/year and by whether "success" is expressed per cycle start, per retrieval, or per transfer; the figures above are the commonly quoted US national ART summary (2015) and DC Dutta reference values used for Indian postgraduate exams.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (ART outcomes, OHSS grading); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (age-stratified US national ART summary 2015; perinatal outcome meta-analyses; SART/ASRM 2017 embryo-transfer guidelines; imprinting-disorder data).



Ovarian reserve

Asked in: Paper I 15-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Ovarian reserve is the size and functional quality of the remaining pool of non-growing (primordial) follicles in the ovary, which determines a woman's remaining reproductive potential and her ovarian response to exogenous gonadotropin stimulation. It declines physiologically with advancing age, from a peak in intrauterine life to a negligible level at menopause, and the rate of decline varies between individual women independent of chronological age.

Biological basis of declining ovarian reserve

- ▶ Oocyte number peaks at about **6-7 million by 20 weeks of intrauterine life**, then undergoes irreversible **apoptosis/atresia** (not replenished by new oogenesis): it falls to **1-2 million at birth** and **300,000-400,000 by puberty**.
- ▶ Over the next 35-40 reproductive years only about **400 oocytes ovulate**; the rest are lost to atresia. By **age 40 roughly 25,000 follicles remain**, and at **menopause fewer than 1,000** remain.
- ▶ The pace of depletion is not linear — current models describe a gradually **accelerating (exponential) decline** rather than the older "biphasic" model, with the fall becoming clinically evident from the mid-to-late 30s.
- ▶ Endocrine correlate: fewer growing follicles means less granulosa-cell **inhibin B** and **anti-Müllerian hormone (AMH)** secretion, which reduces negative feedback on the pituitary, producing an early-follicular-phase (monotropic) **rise in serum FSH** — the earliest detectable biochemical sign of reproductive ageing, occurring before any change in cycle length.

Tests used to assess ovarian reserve

Test	Timing / protocol	Value suggestive of diminished reserve	Key point
Day-3 serum FSH	Early follicular phase (cycle day 2-4)	>10-15 IU/L	Oldest, cheapest test; wide inter- and intra-cycle variability, low sensitivity
Day-3 serum estradiol	With FSH, cycle day 2-4	>60-80 pg/mL despite a normal FSH	Early dominant-follicle recruitment can suppress and mask an otherwise high FSH
Clomiphene citrate challenge test (CCCT)	Baseline D3 FSH + estradiol; clomiphene citrate 100 mg/day D5-D9; repeat FSH on D10	Exaggerated rise in D10 FSH	More sensitive than basal FSH alone but adds cost for little extra benefit; used less now
Anti-Müllerian hormone (AMH)	Any day of cycle (gonadotropin-independent, low intercycle variation)	<0.7-1.1 ng/mL (poor IVF response if <1 ng/mL)	Current best single marker; correlates well with antral follicle count
Antral follicle count (AFC) on transvaginal sonography	Early follicular phase; follicles 2-10 mm, both ovaries counted	<5-7 (older criteria used <10)	Best used combined with AMH; high specificity but low sensitivity for poor response
Serum inhibin B	Early follicular phase	<40-45 pg/mL	Wide variability; not a reliable stand-alone measure
Ovarian volume (TVS)	Any day	<3 mL	High inter-observer variability; limited clinical utility

AMH and AFC have now largely replaced basal FSH/estradiol as the first-line tests of ovarian reserve in clinical practice.

Diminished ovarian reserve (DOR) — definition and criteria

- ▶ DOR denotes an abnormal ovarian-reserve test result that predicts a likely **poor response to gonadotropin stimulation**. It is a screening category, not a diagnosis of infertility, and does not reliably predict failure of spontaneous conception.
- ▶ ESHRE "Bologna criteria" (2011) define poor ovarian response — **at least 2 of the following 3 features**:
- ▶ Advanced maternal age (≥ 40 years) or another risk factor for poor response.

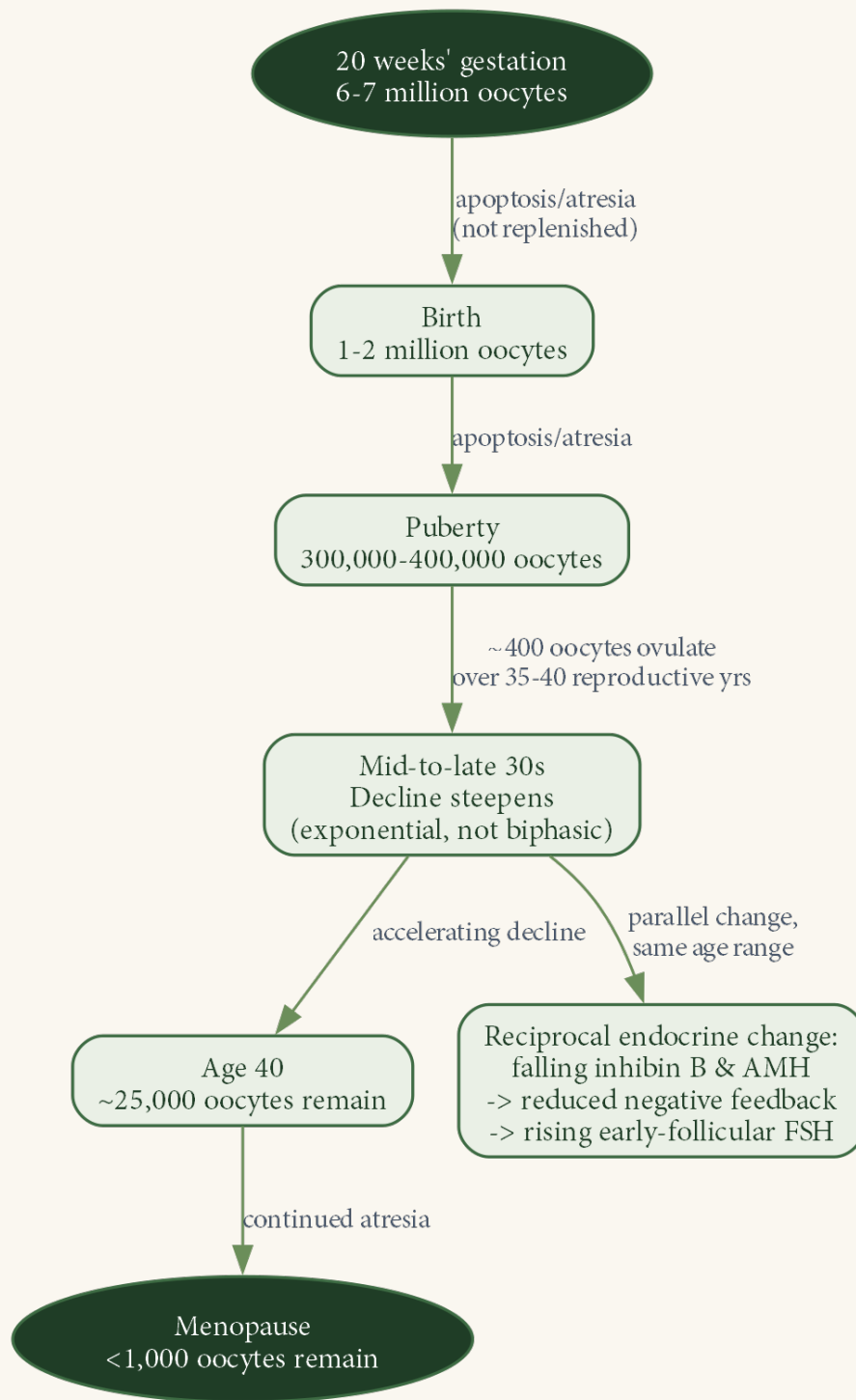
- ▶ A previous poor response (≤ 3 oocytes with a conventional stimulation protocol).
- ▶ An abnormal ovarian reserve test (AFC $< 5-7$, or AMH $< 0.5-1.1$ ng/mL).
 - Two episodes of poor response after maximal stimulation are sufficient to label a woman a poor responder even without advanced age or an abnormal reserve test.

Cause category	Examples
Physiological	Advancing reproductive age (the dominant cause)
Iatrogenic	Ovarian surgery (cystectomy for endometrioma, oophorectomy), chemotherapy (alkylating agents), pelvic radiotherapy
Pathological	Endometrioma/endometriosis, tubo-ovarian adhesions from pelvic infection
Genetic	<i>FMRI</i> premutation, mosaic Turner syndrome, other causes of primary ovarian insufficiency
Autoimmune	Autoimmune oophoritis
Idiopathic	No identifiable cause in a proportion of women

Clinical significance and uses

- ▶ **Predicting ovarian response** to controlled ovarian stimulation in assisted reproductive technology (ART) — number of oocytes likely to be retrieved and risk of cycle cancellation — to individualise the gonadotropin starting dose.
- ▶ **Counselling** women, especially before fertility-sparing gynaecological surgery, chemotherapy, or when childbearing is being deliberately delayed, on the realistic reproductive time window.
- ▶ Identifying likely **poor responders/DOR** early so alternatives (donor oocyte IVF, fertility preservation, adoption) can be discussed in good time.
- ▶ Ovarian reserve tests are **screening, not diagnostic**: a normal result does not guarantee fertility, and an abnormal result alone should not be used to deny a woman fertility-promoting treatment, including ART.
- ▶ None of the current tests reliably predicts the chance of **spontaneous conception** in a regularly cycling woman.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Fig: Oocyte pool depletion across the reproductive lifespan, with the reciprocal early-follicular FSH rise as a parallel endocrine correlate.

High-yield exam pointers

- ▶ Numbers to write verbatim: 6-7 million (20-week fetus) → 1-2 million (birth) → 300,000-400,000 (puberty) → ~25,000 (age 40) → <1,000 (menopause); only ~400 oocytes ovulate in a lifetime.
- ▶ AMH + AFC = current first-line combination (both gonadotropin-/cycle-independent); D3 FSH/estradiol and inhibin B are older, less reliable tests.
- ▶ Cut-offs to quote: D3 FSH >10-15 IU/L; D3 estradiol >60-80 pg/mL; AMH <0.7-1.1 ng/mL; AFC <5-7.
- ▶ CCCT protocol: clomiphene citrate 100 mg/day on cycle days 5-9, with FSH checked on day 3 and day 10.
- ▶ **Bologna criteria (ESHRE 2011):** ≥2 of — age ≥40 / prior poor response (≤3 oocytes) / abnormal reserve test (AFC or AMH).
- ▶ Ovarian reserve tests predict IVF stimulation response, NOT spontaneous fecundity — a frequently tested distinction.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's older antral-follicle-count threshold of <10 for poor reserve is a looser cut-off from an earlier edition; current ART practice under the ESHRE Bologna criteria uses the tighter value of AFC <5-7, and this stricter figure is preferred in a current answer.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; ESHRE Bologna criteria (2011) for poor ovarian response.



Physiology of ovulation

Asked in: Paper I Jun 2016 · Paper I May 2009 · Paper I Oct 2006 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — Ovulation is the mid-cycle rupture of the mature (Graafian) follicle with extrusion of a secondary oocyte — arrested in metaphase II of meiosis, with its first polar body already expelled — into the peritoneal cavity for pick-up by the fallopian tube. It is the culmination of folliculogenesis under

follicle-stimulating hormone (FSH)/luteinising hormone (LH) drive, triggered by the midcycle LH surge, and occurs about 14 days before the onset of the next menstruation.

Hormonal control of the ovulatory follicle

Hormone	Source / mechanism	Role in triggering ovulation
FSH	Anterior pituitary	Recruits and matures the antral cohort; morphogenic action on granulosa cells; induces LH receptors on granulosa cells of the dominant follicle
LH	Anterior pituitary	Steroidogenic on theca cells (androgen precursor supply); at the midcycle surge , triggers resumption of oocyte meiosis, luteinisation of granulosa cells, and follicular rupture
Estradiol	Dominant follicle, via the two-cell, two-gonadotropin mechanism — theca cells (LH-driven) make androgens, which granulosa cells (FSH-driven aromatase) convert to estradiol	A sustained rise (>200 pg/mL for ~50 hours, reached once the dominant follicle is ~15 mm) switches hypothalamic-pituitary feedback from negative to positive , precipitating the LH surge
Progesterone (preovulatory rise)	Luteinising granulosa cells, under early LH action	Facilitates estrogen's positive-feedback action on LH release; the preovulatory rise also helps trigger the smaller midcycle FSH co-surge

The onset of the LH surge is the most reliable clinical marker of impending ovulation: rupture follows **34–36 hours** after surge onset, **10–12 hours** after the LH peak, and **24–36 hours** after the estradiol peak; the surge itself lasts **48–50 hours**.

Mechanism of follicular rupture — sequence of events

- ▶ LH acts on newly-induced LH receptors on granulosa cells of the dominant follicle → luteinisation begins; progesterone and prostaglandin synthesis rise.
- ▶ **Meiosis resumes** in the oocyte (previously held in prophase I by an oocyte-maturation-inhibitor in follicular fluid): the germinal vesicle breaks down, the first meiotic division completes with extrusion of the **first polar body**, and the oocyte re-arrests at **metaphase II** until fertilisation.
- ▶ The cumulus-oocyte complex detaches from the follicle wall and floats free in the antral fluid.

- ▶ Theca and granulosa cells secrete **plasminogen activator** → converts plasminogen to **plasmin** → plasmin activates **collagenase**, which digests the collagen of the follicular and ovarian surface wall.
- ▶ Locally raised **prostaglandins** (cyclooxygenase-2 induction by the LH surge) cause contraction of theca-externa/ovarian-stroma smooth-muscle-like cells and drive an inflammatory-like breakdown of the wall.
- ▶ A conical, avascular **stigma** forms at the point of maximal thinning on the ovarian surface; rupture is a **passive stretching/necrobiosis** process, not an explosive one — intrafollicular pressure stays low throughout (**10–15 mmHg**).
- ▶ The stigma opens; the oocyte–cumulus mass oozes out slowly, over about **1–2 minutes**, with some follicular fluid, and the stigma reseals with a plasma/fibrin plug.
- ▶ The collapsed follicle luteinises fully into the **corpus luteum**, which secretes progesterone (and some estradiol) through the luteal phase.

Time of ovulation and oocyte status

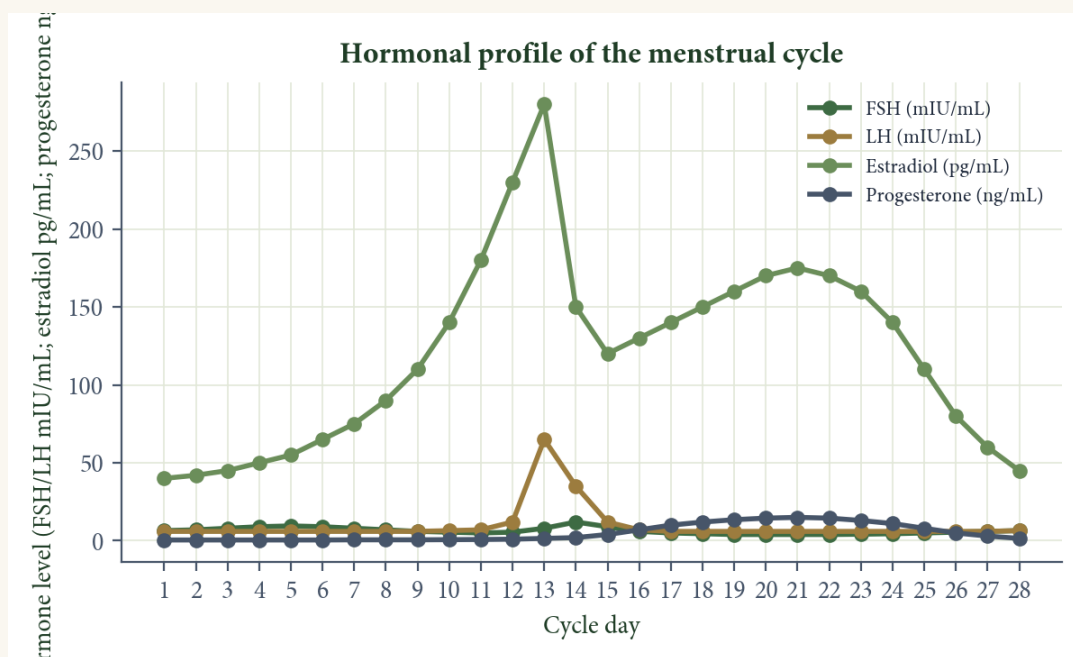
Event	Timing
LH surge onset → follicle rupture	34–36 hours
LH peak → ovulation	10–12 hours
Estradiol peak → ovulation	24–36 hours
Total duration of the LH surge	48–50 hours
Oocyte status at ovulation	Secondary oocyte, arrested at metaphase II, first polar body already extruded

Clinical evidence of ovulation

Method	Finding
Menstrual history	Regular cycles; mid-cycle spotting/pain (Mittelschmerz)
Basal body temperature (BBT)	Biphasic chart — rise of 0.2–0.5°C , thermogenic effect of progesterone, beginning ~2 days after the LH peak, sustained till 2 days before the next period
Cervical mucus	Estrogenic (preovulatory): clear, abundant, elastic (spinnbarkeit), ferns on drying; becomes thick, scanty and non-ferning after ovulation under progesterone (Insler score 10–12 = mature preovulatory follicle)

Method	Finding
Endometrial biopsy (day 21–23)	Subnuclear vacuolation — the earliest evidence, seen 36–48 hours after ovulation; secretory transformation confirms an intact corpus luteum
Hormone assays	Mid-luteal serum progesterone >5 ng/mL (presumptive); urinary/serum LH-surge kits (predictive)
Transvaginal sonography	Serial folliculometry — dominant follicle 18–20 mm preovulation; after ovulation, a collapsed follicle with free fluid in the pouch of Douglas
Laparoscopy	Direct visualisation of a fresh corpus luteum/stigma, or recovery of the oocyte from Douglas-pouch fluid — the only direct evidence
Pregnancy	The conclusive evidence

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



LH surge peaks ~day 13 (onset day 12); estradiol peaks just before the surge then dips at ovulation (day 14, 10–12 h after the LH peak); progesterone rises steeply post-ovulation to a mid-luteal peak (~day 21).

Reference lines to mark: LH-surge onset (day 12), estradiol peak (day 13), and ovulation (day 14, 10–12 hours after the LH peak).

High-yield exam pointers

- ▶ **Two-cell, two-gonadotropin theory:** theca (LH → androgens) + granulosa (FSH → aromatase → estradiol).

- ▶ Estradiol threshold for the LH surge: **>200 pg/mL sustained ~50 hours**, reached at a follicle diameter of **~15 mm**.
- ▶ LH-surge triad to write verbatim: onset **34–36 h** before rupture; peak **10–12 h** before rupture; surge lasts **48–50 h**.
- ▶ Ovulation is **not explosive** — plasmin/collagenase digestion + prostaglandin-mediated contraction + passive stigma necrobiosis; intrafollicular pressure stays low (10–15 mmHg).
- ▶ Oocyte at ovulation = secondary oocyte, **metaphase II**, first polar body already extruded (not a "mature ovum").
- ▶ Earliest histological proof = **subnuclear vacuolation** on day-21 endometrial biopsy (36–48 h post-ovulation).
- ▶ Only **direct** evidence = laparoscopic corpus luteum/stigma or oocyte recovery from Douglas-pouch fluid; pregnancy is **conclusive**.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Textbook figures for LH-surge duration vary slightly in granularity — Speroff describes a surge lasting ~48–50 hours (rupture 34–36 hours after onset), while some Indian texts quote a shorter "effective" surge of ~24 hours; both describe the same event, and the Speroff figures above are the ones to reproduce as the more precise timeline.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e.



Precocious puberty

Asked in: Paper III 23-Nov-2020 · Paper I Nov 2017 · Paper III May 2010 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — Precocious puberty is the appearance of any secondary sexual characteristic before the age of 8 years, or menarche before the age of 10 years, in a girl (in a boy: before age 9, with testicular enlargement >4 mL in volume or >2.5 cm in diameter). It is **isosexual** when development matches the child's phenotypic sex and **heterosexual** when features of the opposite sex appear (virilisation in a girl).

Central (true, GnRH-dependent) puberty reproduces the normal orderly pubertal sequence early;

peripheral (pseudo, GnRH-independent) puberty is driven by an autonomous sex-steroid source and the sequence is often disordered.

Classification and causes

Category	Causes
GnRH-dependent (central/true) — ~80%	Constitutional/idiopathic — commonest, ~90% of girls (no cause found) · CNS lesions (~30%): hypothalamic hamartoma, glioma, craniopharyngioma, tuberculoma/TB meningitis, encephalitis, hydrocephalus, trauma, cranial irradiation · Severe primary hypothyroidism (Van Wyk–Grumbach) · Secondary activation after prolonged peripheral sex-steroid exposure (CAH, McCune-Albright)
GnRH-independent (peripheral/pseudo) — Ovary	Granulosa cell tumour, theca cell tumour, Leydig cell tumour, androblastoma, functional follicular cyst, McCune-Albright syndrome
— Adrenal	Congenital adrenal hyperplasia (CAH), adrenal tumour
— Ectopic hCG source	Hepatoblastoma, chorioepithelioma/choriocarcinoma
— Iatrogenic	Exogenous oestrogen/androgen ingestion or exposure
Incomplete precocious puberty	Premature thelarche · premature pubarche/adrenarche · premature menarche

Clinical features

- ▶ **Central precocious puberty** — orderly Tanner-stage progression (thelarche → pubarche → growth spurt → menarche); accelerated linear growth and bone age; cycles may be ovulatory.
- ▶ **Hypothalamic hamartoma** — precocious puberty with characteristic **gelastic (laughing)** seizures.
- ▶ **McCune-Albright syndrome** — precocious puberty (vaginal bleeding often *precedes* thelarche) + **café-au-lait macules** (irregular, "coast-of-Maine" border, do not cross midline) + **polyostotic fibrous dysplasia**; may coexist with hyperthyroidism, Cushing syndrome, acromegaly.
- ▶ **Adrenal/ovarian androgen source or CAH** — heterosexual development: clitoromegaly, acne, hirsutism, deepening voice.
- ▶ **Premature thelarche** — isolated breast enlargement, unilateral or bilateral, usually age 2–4 years; growth rate and bone age **not** accelerated.
- ▶ **Premature pubarche/adrenarche** — isolated axillary/pubertic hair only.

- **Premature menarche** — isolated cyclic vaginal bleeding without other pubertal signs.

Investigations

Investigation	Purpose / finding
GnRH stimulation test — 100 µg GnRH SC/IV, serum LH before and after	Differentiates central from peripheral disease; a stimulated LH >15 mIU/mL is diagnostic of GnRH-dependent (central) precocious puberty ; central disease is confirmed, peripheral disease shows a suppressed (prepubertal) response
Serum oestradiol, testosterone, 17-OH progesterone, DHEA-S	Localises a peripheral sex-steroid source; raised 17-OHP/DHEA-S → CAH/adrenal pathology; raised testosterone → androgen-producing tumour
Serum hCG	Ectopic hCG-secreting tumour (hepatoblastoma, choriocarcinoma)
Thyroid profile (TSH, T4)	Excludes primary hypothyroidism (Van Wyk–Grumbach syndrome)
X-ray hand and wrist (non-dominant)	Bone age — acceleration is one of the earliest signs; single most useful screening test; normal bone age makes true precocity unlikely
Pelvic/abdominal ultrasound	Ovarian cyst/tumour, adrenal mass; postpubertal uterine configuration supports central disease
MRI/CT brain	Mandatory in all confirmed central precocious puberty (even without neurological signs) to exclude hamartoma or intracranial tumour
Skin examination	Café-au-lait macules of McCune-Albright syndrome

Management

Goals: (i) reduce gonadotropin secretion, (ii) block the peripheral action of sex steroids, (iii) slow growth rate and skeletal maturation to protect adult height, (iv) treat the underlying cause, (v) protect the child from sexual abuse.

GnRH-dependent (central) precocious puberty — **GnRH agonist is the drug of choice**. It causes an initial flare followed by pituitary desensitisation, suppressing FSH/LH, reversing the ovarian cycle, and causing regression of breast and pubic-hair changes.

Depot GnRH agonist	Dose
Leuprolide acetate	3.75–7.5 mg IM monthly, or 11.25 mg 3-monthly
Triptorelin	3.0–3.75 mg IM monthly, or 11.25 mg 3-monthly
Goserelin	3.6 mg SC monthly, or 9.8–10.8 mg 3-monthly

Depot GnRH agonist	Dose
Histrelin	50 mg subdermal implant, yearly

- ▶ Continue until the median age of normal puberty (~11 years); monitor every 3–6 months clinically and by bone age; adequacy of suppression = post-injection LH <3 IU/L.
- ▶ Where GnRH agonists are unavailable: **medroxyprogesterone acetate** 30 mg orally daily or 100–200 mg IM weekly (suppresses menses and breast development but does **not** slow skeletal maturation), or **danazol/cyproterone acetate**.

GnRH-independent (peripheral) precocious puberty — treat the cause:

- ▶ Ovarian or adrenal tumour → surgical excision.
- ▶ CAH → glucocorticoid replacement.
- ▶ McCune-Albright syndrome → aromatase inhibitor (letrozole/anastrozole) or anti-oestrogen (tamoxifen) for bleeding; bisphosphonates for symptomatic fibrous dysplasia; add a GnRH agonist if secondary central activation develops.
- ▶ Primary hypothyroidism → thyroxine replacement.
- ▶ Exogenous hormone exposure → stop the offending agent.
- ▶ Intracranial tumour/hamartoma → neurosurgery or radiotherapy where feasible (a GnRH agonist can control gelastic-seizure hamartomas without surgery).
- ▶ Premature thelarche/pubarche/menarche → reassurance and 6-monthly follow-up; no hormonal therapy unless progression to true precocious puberty occurs.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 8-15 — Flow diagram for the evaluation of precocious puberty in phenotypic females (Berek & Novak 16e, p.374)

High-yield exam pointers

- ▶ Cut-offs: girls — secondary sex characteristic before **8 years** or menarche before **10 years**; boys — before **9 years** with testicular volume >**4 mL**.
- ▶ 80% central / 20% peripheral; 90% of central cases in girls are idiopathic — but CNS pathology is far commoner in boys, so always image a boy's brain.
- ▶ McCune-Albright triad: precocious puberty + café-au-lait macules + polyostotic fibrous dysplasia; bleeding often precedes thelarche.
- ▶ GnRH stimulation test: 100 µg GnRH → stimulated LH >**15 mIU/mL** = central precocious puberty.
- ▶ Bone age X-ray (hand-wrist) is the single most useful, cheapest screening test — advanced bone age is the earliest sign.
- ▶ GnRH agonist = drug of choice for central disease (leuprolide/goserelin/triptorelin depot); medroxyprogesterone acetate/danazol are second-line and do not protect final height.

- ▶ Hamartoma → gelastic seizures; hypothyroidism-induced precocity → Van Wyk–Grumbach syndrome.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Modern ultrasensitive gonadotropin assays (Speroff 9e) place the upper normal limit for stimulated LH lower (around 3.3–5 IU/L), but the classically taught and examiner-expected cut-off for the RGUHS syllabus remains the **>15 mIU/mL** value given in DC Dutta's Gynaecology.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e.



Prolactin

Asked in: Paper I 14-Jul-2020 · Paper I Oct 2006 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Prolactin is a 199-amino-acid, single-chain polypeptide hormone (molecular weight ~23,000 Da) secreted by the acidophilic **lactotrophs** of the anterior pituitary, structurally related to growth hormone and human placental lactogen. Uniquely among anterior pituitary hormones, its secretion is under predominant **tonic inhibitory control** by hypothalamic dopamine rather than a stimulatory releasing hormone. Its principal physiological role is initiation and maintenance of lactation, and its pathological excess (**hyperprolactinaemia**) is one of the commonest endocrine causes of anovulation, amenorrhoea, and infertility.

Structure and secretion

- ▶ Gene on **chromosome 6**; receptor gene on chromosome 5 (single transmembrane-domain, cytokine-receptor superfamily; signals via the JAK-STAT pathway).
- ▶ Circulates as three molecular forms: "**little**" **prolactin** (monomer, ~90% of circulating hormone, most bioactive), "**big**" **prolactin** (dimer, low bioactivity), and "**big-big**" **prolactin/macroprolactin** (antibody-bound multimer, biologically inactive — accounts for 10–25% of reported "hyperprolactinaemia").
- ▶ Extrapituitary sites of synthesis: decidua/endometrium, myometrium, breast, and lymphocytes.

Regulation of secretion

Stimulate prolactin release	Inhibit prolactin release
Thyrotropin-releasing hormone (TRH) — the physiological link between primary hypothyroidism and hyperprolactinaemia	Dopamine — the physiological prolactin-inhibiting factor (PIF); released from hypothalamic arcuate/tuberoinfundibular neurons into the hypophyseal portal vessels, acting on lactotroph D2 receptors
Oestrogen (stimulates prolactin gene transcription)	Dopamine agonists (bromocriptine, cabergoline)
Vasoactive intestinal peptide (VIP), serotonin	Somatostatin (weak)
Suckling/nipple stimulation, sleep, stress, exercise, coitus	
Endogenous opioids (suppress hypothalamic dopamine)	

Because control is predominantly inhibitory, any lesion that interrupts dopamine transport down the pituitary stalk (tumour, stalk section, infiltration) **raises** prolactin — the opposite of what happens to every other anterior pituitary trophic hormone when the stalk is cut.

Physiological actions

- **Mammogenesis and lactogenesis** — drives synthesis of casein, lactose and milk lipids in alveolar cells; full lactation begins only after the postpartum fall in oestrogen/progesterone unmasks prolactin's action on the alveolar receptor; sustained by the suckling reflex.
- **Reproductive axis** — inhibits hypothalamic GnRH pulsatility, suppressing gonadotropin secretion and producing anovulation; this is the physiological basis of lactational amenorrhoea.
- **Luteal/ovarian function** — a role in human corpus luteum maintenance is suspected but not firmly established.
- **Amniotic fluid/fetal role** — decidual prolactin regulates amniotic fluid volume and electrolyte transport across the fetal membranes and may support fetal lung maturation and immune tolerance of the conceptus.
- **Immunomodulation** — acts as a cytokine on lymphocytes in addition to its classic endocrine role.

Hyperprolactinaemia — causes

Category	Causes
Physiological	Pregnancy, lactation/nipple stimulation, sleep, stress, exercise, coitus, high-protein meal

Category	Causes
Hypothalamic–pituitary	Prolactinoma (microadenoma <1 cm / macroadenoma ≥1 cm — the commonest functioning pituitary adenoma, ~40% of all pituitary tumours); craniopharyngioma; pituitary-stalk compression/section; empty sella syndrome; acromegaly and Cushing disease (co-secretion); lymphocytic hypophysitis
Endocrine	Primary hypothyroidism — raised TRH drives lactotroph hyperplasia; must be excluded/corrected before a pituitary cause is assumed; polycystic ovary syndrome (mild elevation in ~20%)
Drugs (dopamine antagonists/depletors)	Phenothiazines, risperidone, metoclopramide, domperidone, methyl dopa, reserpine, verapamil, H2-blockers (cimetidine, ranitidine), SSRIs/MAO inhibitors, oestrogens/combined oral contraceptives
Others	Chronic renal failure (reduced clearance), cirrhosis, chest-wall lesions/herpes zoster, idiopathic

Clinical features and diagnosis

- ▶ **Menstrual/reproductive:** secondary amenorrhoea (hyperprolactinaemia accounts for up to 30% of cases), oligomenorrhoea, luteal-phase defect, anovulatory infertility.
- ▶ **Galactorrhoea** — present in only about one-third of hyperprolactinaemic women, because milk secretion additionally requires background oestrogen, which is often low in these anovulatory women.
- ▶ **Mass effect** of a macroadenoma — headache, bitemporal hemianopia from optic chiasm compression.
- ▶ **Chronic hypo-oestrogenism** — dyspareunia, reduced bone mineral density.
- ▶ Level correlates with severity: 20–50 ng/mL → short luteal phase only; 50–100 ng/mL → oligomenorrhoea/amenorrhoea; >100 ng/mL → frank hypogonadism, usually prolactinoma.
- ▶ **Work-up:** normal non-pregnant baseline is roughly 10–25 ng/mL; a single stable random level below this excludes hyperprolactinaemia, while mildly raised levels (20–40 ng/mL) should be repeated before labelling the patient. Exclude pregnancy, primary hypothyroidism (TSH, T4) and offending drugs first. If the patient is asymptomatic with an isolated high level, exclude **macroprolactinaemia** by polyethylene glycol (PEG) precipitation. Contrast **MRI sella** is the imaging of choice once secondary causes are excluded or the level exceeds 100 ng/mL, with formal visual-field perimetry if a macroadenoma is found; a very high prolactin measured as only mildly elevated in a large tumour should raise suspicion of assay "hook effect," correctable by sample dilution.

Management

- ▶ Correct the underlying cause first — thyroxine for hypothyroidism; stop/substitute the offending drug where feasible.
- ▶ **Dopamine agonists are first-line for prolactinoma of any size**, normalising prolactin and shrinking more than 90% of tumours:

Drug	Starting dose	Titrated/maximum dose	Notes
Bromocriptine	1.25 mg at bedtime	up to 5 mg twice daily in resistant macroadenomas	short half-life (2–3 divided doses often needed); nausea, postural hypotension common; no valvulopathy risk; preferred if pregnancy is being attempted immediately
Cabergoline	0.25 mg twice weekly	up to 1.5 mg twice weekly	more effective and better tolerated than bromocriptine (fewer side effects, longer action); high cumulative doses linked to hypertrophic valvular heart disease

- ▶ Prolactin falls within 2–3 weeks; menses, ovulation and fertility return once the level normalises. A trial of drug discontinuation may be attempted after prolactin has been normal for ≥ 2 years with no residual tumour on MRI.
- ▶ **Surgery** (transnasal transsphenoidal adenectomy) — reserved for dopamine-agonist resistance/intolerance, or a large macroadenoma (>3 cm) in a woman wanting pregnancy despite drug response. Complications: cerebrospinal fluid leak, diabetes insipidus, meningitis, recurrence.
- ▶ **Radiotherapy** — for residual/inoperable macroadenoma; risk of delayed panhypopituitarism.
- ▶ **Pregnancy** — both dopamine agonists are non-teratogenic and safe in early pregnancy; the drug is usually stopped once pregnancy is confirmed in microadenoma, while macroadenomas are followed clinically each trimester (visual fields) and the drug restarted if the tumour becomes symptomatic.
- ▶ In an asymptomatic patient with mild hyperprolactinaemia who does not desire fertility and has no troublesome galactorrhoea, cyclic progestin or combined hormonal contraception may substitute for a mandatory dopamine agonist, since the goal is to correct hypo-oestrogenism, not the number itself.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 35.10 — Prolactin levels in 235 patients with galactorrhea, grouped by aetiology (pituitary tumours, idiopathic with/without amenorrhoea, drugs, hypothyroidism, empty sella, etc.) (Berek & Novak's Gynecology 16e, p.2157)

High-yield exam pointers

- ▶ Prolactin = 199-amino-acid polypeptide, ~23 kDa, gene on chromosome 6, secreted by anterior pituitary lactotrophs (acidophils).
- ▶ The ONLY anterior pituitary hormone under predominant tonic **inhibitory** control (dopamine/PIF) — pituitary stalk section therefore *raises* prolactin, unlike every other trophic hormone.
- ▶ TRH is the key physiological link between primary hypothyroidism and hyperprolactinaemia — always check TSH before attributing a raised prolactin to the pituitary.
- ▶ Prolactinoma is the commonest functioning pituitary adenoma (~40%); dopamine agonists are first-line for both micro- and macroadenoma.
- ▶ Doses to write: bromocriptine 1.25 mg at bedtime → up to 5 mg twice daily; cabergoline 0.25 mg twice weekly → up to 1.5 mg twice weekly.
- ▶ Only about one-third of hyperprolactinaemic women have galactorrhoea (milk secretion needs background oestrogen too).
- ▶ Cabergoline and bromocriptine are both non-teratogenic — safe to use for ovulation induction and in early pregnancy.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Reported non-pregnant normal ranges vary slightly by assay/textbook (Speroff's Clinical Gynecologic Endocrinology & Infertility 9e cites ~10–25 ng/mL; DC Dutta's Textbook of Gynaecology 7e cites ~1–20 ng/mL) — practically equivalent; use the assay's own reference range in clinical practice.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.

♦ ♦ ♦

Puberty menorrhagia

Asked in: Paper III Nov 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — *Puberty menorrhagia* (adolescent heavy menstrual bleeding) is abnormally heavy, prolonged, or irregular uterine bleeding occurring in the first few years after menarche, most commonly due to **anovulatory dysfunctional uterine bleeding (DUB)** from a transiently immature hypothalamic-pituitary-ovarian (HPO) axis. It accounts for the great majority of adolescent menstrual complaints, though bleeding disorders, endocrine disease and (rarely) structural or pregnancy-related causes must always be excluded.

Aetiopathogenesis

- ▶ Adolescents retain an intact oestrogen **negative**-feedback loop but lack the mature **positive**-feedback surge needed to trigger a luteinising hormone (LH) surge and ovulation — so most cycles in the first 2 years after menarche are anovulatory.
- ▶ Persistently rising, **unopposed oestrogen** (no corpus luteum, no progesterone) drives continued endometrial proliferation without secretory transformation.
- ▶ The endometrium outgrows its blood supply and undergoes **asynchronous, focal breakdown** rather than the coordinated shedding of an ovulatory cycle.
- ▶ An altered ratio of vasoconstrictor **prostaglandin F2α** to vasodilator **prostaglandin E2** in this abnormal endometrium further impairs haemostasis, producing heavy, prolonged bleeding.
- ▶ Regular ovulatory cycles are usually re-established once the HPO axis matures — spontaneous resolution is the rule, and most of these girls remain fertile.

Causes

Category	Examples
Anovulatory DUB (commonest, ~90–95%)	Immature HPO axis → unopposed oestrogen → endometrial hyperplasia
Coagulopathy	Idiopathic thrombocytopenic purpura (ITP — commonest bleeding disorder found), von Willebrand disease, leukaemia, other platelet defects
Endocrine/ovulatory dysfunction	Polycystic ovary syndrome (PCOS), hypo-/hyperthyroidism, hyperprolactinaemia
Structural (rare at this age)	Endometrial/cervical polyp, submucous fibroid, sarcoma botryoides, oestrogen-secreting ovarian tumour
Pregnancy-related	Threatened/incomplete abortion, ectopic pregnancy
Iatrogenic	Oral contraceptive pills, anticoagulants, NSAIDs/aspirin

Category	Examples
Other/not otherwise classified	Genital tract trauma, foreign body, sexual abuse, cervicitis or pelvic inflammatory disease

(This maps onto the FIGO/ACOG PALM-COEIN framework for abnormal uterine bleeding; in adolescents the COEIN — non-structural — causes dominate, while PALM structural causes are uncommon.)

Clinical evaluation

- ▶ **History:** heavy/prolonged bleeding (>7 days), short (<21 days) or long (>45 days) cycle intervals, clots/flooding, symptoms of anaemia (fatigue, pallor, breathlessness, palpitations). Evaluation is specifically indicated once the interval is <22 or >44 days, bleeding lasts beyond a week, or anaemia develops.
- ▶ **Clues to an underlying cause:** easy bruising, epistaxis, gum bleeding (coagulopathy); hirsutism, acne, obesity (PCOS); goitre, weight change (thyroid disease); galactorrhoea (hyperprolactinaemia).
- ▶ **Red flags suggesting a bleeding disorder** (screen before starting hormonal therapy):
 - ▶ Heavy bleeding since menarche
 - ▶ Family history of a bleeding disorder
 - ▶ Epistaxis in the last year / bruising >2 cm without injury
 - ▶ Bleeding after dental extraction or a minor wound
 - ▶ Bleeding requiring transfusion
 - ▶ Failure to respond to conventional treatment

Investigation	Purpose
Complete blood count + peripheral smear	Confirm/grade anaemia; screen for leukaemia
Platelet count, bleeding time, PT/aPTT	Screen for coagulopathy if red flags present
von Willebrand factor antigen/activity, factor VIII	Confirm von Willebrand disease in refractory/red-flag cases
Serum TSH, free T4; serum prolactin	Exclude thyroid dysfunction; hyperprolactinaemia
Urine/serum β -hCG	Exclude pregnancy-related bleeding
Pelvic ultrasonography (transabdominal; transvaginal only if sexually active)	Exclude structural lesion; assess endometrial thickness, ovarian morphology
Examination under anaesthesia + endometrial curettage	Reserved for bleeding refractory to therapy or suspected organic lesion; specimen sent for histopathology

Management

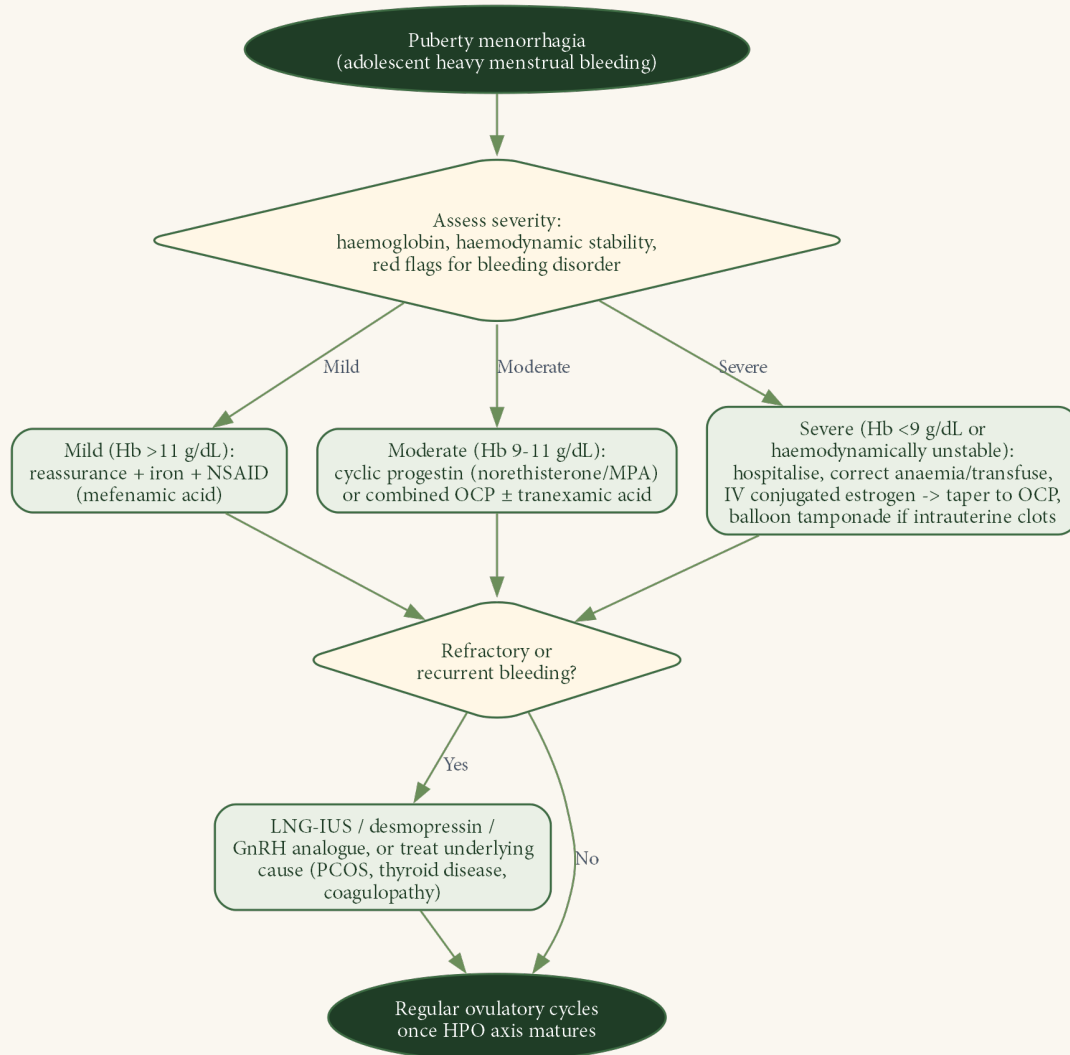
Girls need reassurance, psychological support and correction of anaemia (haematinics, transfusion if needed) at every level. Treatment is then graded by severity.

Severity	Definition	Management
Mild	Hb >11 g/dL, minimal disruption of activity	Reassurance + menstrual charting + iron; NSAID (e.g., mefenamic acid) during bleeding; review after 3–6 cycles
Moderate	Hb 9–11 g/dL, ongoing heavy/irregular bleeding	Cyclic progestin — norethisterone or medroxyprogesterone acetate (MPA) 5 mg three times daily until bleeding stops (usually 3–7 days), then continued to complete a 21-day course, repeated for 2–3 cycles; or low-dose monophasic combined oral contraceptive pill (COC), day 5–25, for 3 cycles (reduces menstrual blood loss by ~50%); tranexamic acid 1 g three times daily for up to 5 days during menses can be added (reduces blood loss by 30–60%)
Severe/acute	Hb <9 g/dL or haemodynamically unstable	Hospitalise, correct hypovolaemia, transfuse if indicated. High-dose hormonal control: conjugated equine estrogen 20–40 mg IV every 6–8 hours until bleeding is controlled, then switch to a combined OCP; if intrauterine clots impair uterine contraction, a uterotonic (misoprostol) or a 26F Foley catheter with a 30 mL intrauterine balloon for tamponade may be used. Examination under anaesthesia with curettage is reserved for bleeding refractory to hormonal therapy — rarely required in adolescents

Severity	Definition	Management
Refractory/long-term	Recurrent or underlying disease	Levonorgestrel-releasing intrauterine system (LNG-IUS) — reduces heavy bleeding by up to 90%; desmopressin nasal spray (1.5 mg/mL) for inherited bleeding disorders such as von Willebrand disease; short-term GnRH analogues in resistant cases; treat the specific underlying cause (PCOS, thyroid disease, coagulopathy)

Once the HPO axis matures, regular ovulatory cycles are usually re-established and hormonal therapy can be tapered off.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Severity-graded management algorithm for puberty menorrhagia, from initial assessment through refractory-case escalation to eventual resolution as the hypothalamic-pituitary-ovarian axis matures.

High-yield exam pointers

- ▶ Commonest cause = **anovulatory DUB** (~90–95%) from HPO-axis immaturity — unopposed oestrogen → endometrial hyperplasia → asynchronous breakdown.
- ▶ Second commonest identifiable cause of a **bleeding disorder** = **ITP**; also screen for von Willebrand disease.
- ▶ Drug doses to write verbatim: **norethisterone/MPA 5 mg TID** till bleeding stops (3–7 days) then complete 21 days; **conjugated equine estrogen 20–40 mg IV q6–8h** for emergency control; **tranexamic acid 1 g TID × 5 days**; **LNG-IUS** reduces HMB by up to 90%.

- ▶ Always exclude pregnancy (β -hCG) and screen for a coagulopathy before hormonal therapy, especially if bleeding began at menarche.
- ▶ Surgical intervention (D&C) is rarely needed in adolescents — reserved for hormone-refractory bleeding or suspected organic lesion; endometrial ablation is contraindicated (future fertility).
- ▶ Prognosis is good — most girls establish normal ovulatory cycles and remain fertile.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The FIGO/ACOG **PALM-COEIN** classification is now the preferred nomenclature for abnormal uterine bleeding (the older terms "puberty menorrhagia"/"dysfunctional uterine bleeding" remain standard examination usage); current international practice also favours tranexamic acid, cyclic progestins or a tapering combined oral contraceptive over routine high-dose IV oestrogen for acute bleeding, though the IV oestrogen regimen above remains textbook-cited for emergency control.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; FIGO/ACOG PALM-COEIN classification.



Role of laparoscopic surgeries in endometriosis

Asked in: Paper III 20-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — Endometriosis is the presence of endometrial-like glands and stroma outside the uterus, most often on the pelvic peritoneum, ovaries, and rectovaginal septum, affecting about 10% of women of reproductive age and causing dysmenorrhoea, dyspareunia, chronic pelvic pain, and infertility. Laparoscopy is central to its management — it is simultaneously the gold-standard diagnostic tool, the staging tool, and (in the same sitting) the primary therapeutic modality for both pain and infertility, largely replacing laparotomy except in the most advanced disease.

Role 1 — Diagnosis and staging

- ▶ **Gold-standard diagnosis** — direct visualisation of typical (powder-burn/black), subtle (red, vesicular) and white/fibrotic lesions, endometriomas, and adhesions; biopsy for histological confirmation. A positive biopsy confirms endometriosis, but a negative one does **not** exclude it.
- ▶ **Staging at the same sitting** — the revised American Society for Reproductive Medicine (rASRM/AFS) score grades the size and depth of peritoneal and ovarian implants and the degree of cul-de-sac obliteration and adhesions:

Stage	Points	Severity
I	1–5	Minimal
II	6–15	Mild
III	16–40	Moderate
IV	>40	Severe

- **Limitations of staging** acknowledged even by ASRM/ESHRE — subjective scoring, considerable inter- and intra-observer variability, and poor correlation with pain severity or fertility outcome. The **Endometriosis Fertility Index (EFI)**, which adds age, duration of infertility, prior pregnancy, and a "least function" tubo-ovarian score to the rASRM score, better predicts non-IVF pregnancy after surgical treatment.

Role 2 — Therapeutic surgery for pain (conservative, fertility-preserving)

Site	Laparoscopic procedure
Peritoneal lesions	Excision (scissors/laser) or ablation (bipolar diathermy/CO ₂ , KTP or argon laser) — equally effective for pain relief; excision is preferred where feasible because it permits histological confirmation
Ovarian endometrioma	Cystectomy (aspiration, then complete excision of the cyst wall from the ovarian cortex) is preferred over drainage-and-ablation of the cyst lining — the ESHRE guideline (2014) recommends cystectomy because it lowers recurrence of both pain and the cyst and gives a higher spontaneous pregnancy rate; for very large (>4 cm) or bilateral endometriomas threatening ovarian reserve, a staged three-step approach (drainage → 3 months GnRH-agonist suppression → cyst-wall ablation) is an alternative
Deep infiltrating endometriosis (rectovaginal nodule, bladder, ureter, bowel)	Complete one-step excision — uterosacral ligament resection, posterior vaginal wall/nodule excision, ureterolysis with stenting, segmental bowel resection-anastomosis as needed; reserved for centres with multidisciplinary expertise given the risk of bowel/ureteric injury
Adhesiolysis	Careful lysis to restore normal pelvic anatomy; adhesion-barrier agents are of uncertain benefit

Site	Laparoscopic procedure
Adjunct nerve-ablative procedures	Laparoscopic uterosacral nerve ablation (LUNA) adds no benefit when combined with excision/ablation of disease (Cochrane); presacral neurectomy (PSN) is an effective adjunct for midline dysmenorrhoea but demands high surgical skill and carries risk of bleeding, constipation, and urinary urgency

Role 3 — Therapeutic surgery for infertility

- ▶ **Minimal-to-mild endometriosis (Stage I–II)** — laparoscopic ablation/excision of lesions plus adhesiolysis gives a modestly higher spontaneous pregnancy rate than diagnostic laparoscopy alone (a large Canadian RCT: cumulative pregnancy 30.7% vs 17.7% at 36 weeks); benefit is small but reproducible and is why "see-and-treat" laparoscopy is standard.
- ▶ **Moderate-to-severe endometriosis (Stage III–IV)** — surgery restores distorted tubo-ovarian anatomy; no RCT proves a pregnancy benefit, but excision is recommended when anatomy is mechanically disrupted, with reported cumulative pregnancy rates of 24–30% at 9–12 months.
- ▶ **Ovarian endometrioma with infertility** — cystectomy gives a higher post-operative spontaneous pregnancy rate than ablation/drainage, so the ESHRE guideline again favours excision; however, cystectomy risks further loss of ovarian reserve (from inadvertent removal of normal cortex or thermal spread), so counselling and, in reduced-reserve patients, a more conservative ablative or staged approach should be discussed.
- ▶ If **spontaneous conception has not occurred within 2 years of surgery**, the couple should proceed to medically assisted reproduction (ovulation induction/IUI, or IVF).

Laparoscopy versus laparotomy, and role in definitive surgery

- ▶ Laparoscopy and laparotomy are **equally effective** for excising disease, but laparoscopy gives quicker recovery, better cosmesis, less post-operative pain, lower cost and morbidity, and fewer post-operative adhesions — it is therefore the preferred route in essentially all cases; laparotomy is reserved for the rare case of very advanced disease where laparoscopic access is not feasible.
- ▶ **Definitive surgery** (total hysterectomy with bilateral salpingo-oophorectomy and resection of all endometriotic tissue) is reserved for women who have completed childbearing, failed conservative medical/surgical treatment, or have no prospect of fertility benefit — this too is preferably performed laparoscopically when technically feasible.

Limitations and evidence caveats

- ▶ **Recurrence** of endometriosis/pain after conservative laparoscopic surgery is reported in roughly 20–40% by 5 years, with re-operation rates up to 25–50% in some series.

- ▶ **Peri-operative hormonal suppression** — a Cochrane review found no benefit from routine pre-operative hormone therapy, and the ESHRE guideline does not recommend it; post-operative hormonal suppression reduces pain recurrence but does not improve fertility and is generally avoided if conception is desired.
- ▶ A substantial **placebo response** to surgery is well documented (diagnostic laparoscopy alone relieves pain in up to 50% of patients), which complicates outcome interpretation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 26.3 — Removal of left ovarian endometrioma. (A) The endometrioma in the ovary (O), lateral to the uterus (U) (Berek & Novak 16e, p.1428)

High-yield exam pointers

- ▶ rASRM/AFS staging by points: I = 1–5, II = 6–15, III = 16–40, IV >40 — subjective, poor correlation with pain/fertility.
- ▶ **Cystectomy > drainage-and-ablation** for endometrioma — better pain and fertility outcome (ESHRE 2014); trade-off is ovarian reserve.
- ▶ **LUNA adds nothing** to excision/ablation (Cochrane); **presacral neurectomy** helps midline pain but has real morbidity.
- ▶ Minimal-mild disease: ablation + adhesiolysis beats diagnostic laparoscopy alone for fertility (Canadian RCT — 30.7% vs 17.7%).
- ▶ No spontaneous pregnancy 2 years after surgery → move to assisted reproduction.
- ▶ Laparoscopy is preferred over laparotomy in nearly all cases — equal efficacy, faster recovery, fewer adhesions.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The corpus (Berek & Novak 16e) cites the ESHRE guideline for the management of women with endometriosis (Dunselman et al., 2014); this is the version grounding the guideline-specific statements above.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; ESHRE guideline for the management of women with endometriosis (2014).



Semen Banking – how does it help the infertile couple?

Asked in: Paper IV May 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Semen banking is the collection, laboratory processing, and long-term cryopreservation (freezing and storage in liquid nitrogen at -196°C) of spermatozoa in a cryoprotectant medium, so that fertilising capacity is preserved for later use in intrauterine insemination (IUI) or in vitro fertilisation with intracytoplasmic sperm injection (IVF-ICSI). A bank may hold a man's own (autologous/husband's) semen for his future use, or a screened, quarantined donor inventory for therapeutic (artificial) insemination by donor (AID).

Technique of semen banking

- ▶ **Collection** — semen obtained by masturbation after 2–5 days of abstinence; several samples are banked on separate occasions to build an adequate reserve.
- ▶ **Semen analysis before freezing** — each sample is checked against WHO (2010) reference values: volume ≥ 1.5 mL, sperm concentration ≥ 15 million/mL, total count ≥ 39 million/ejaculate, progressive motility $\geq 32\%$, normal morphology $\geq 4\%$.
- ▶ **Sperm preparation** — sperm are separated from seminal plasma (removing prostaglandins and proteins that provoke uterine cramps) by the **swim-up** or **density-gradient centrifugation** technique.
- ▶ **Cryoprotectant addition** — the concentrated sperm suspension is mixed with a glycerol-egg-yolk-citrate extender that limits intracellular ice-crystal damage during freezing.
- ▶ **Freezing** — labelled straws/vials are cooled by a controlled slow-freeze (vapour-phase liquid-nitrogen) protocol.
- ▶ **Storage** — straws are stored submerged in liquid nitrogen at -196°C in a dedicated cryobank with duplicate labelling and a retrieval log.
- ▶ **Quarantine and re-testing (donor samples)** — the sample is sequestered for a minimum of **180 days** and released only after the donor re-tests negative for HIV.
- ▶ **Thaw and use** — on the treatment day the aliquot is thawed at 37°C , the post-thaw motile count is checked, and the sample is used for IUI or IVF-ICSI.

Donor screening before banking

Step	What is done
Personal & physical history	General health, family history, and high-risk sexual behaviour excluded
Genetic screening	Karyotype/carrier screening (e.g., cystic fibrosis) as indicated by ethnicity

Step	What is done
Infection screening	Syphilis, gonorrhoea, <i>Chlamydia</i> , cytomegalovirus, hepatitis B & C, HIV-1/2, HTLV-I/II — repeated every 6 months
Trial freeze–thaw	Sample is frozen and thawed to confirm it survives cryopreservation with adequate motility; this step alone excludes ~75% of candidate donors
Quarantine release	Sample released only after ≥ 180 days' sequestration and a repeat negative HIV test
Matching to recipient	Blood group, Rh type, and ethnicity matched to the husband/recipient couple

Guidelines for donor selection and quarantine follow the American Society for Reproductive Medicine (ASRM); sperm banks remain, at present, self-regulated.

Indications for semen banking

Category	Situation
Autologous (husband's) banking	Before chemotherapy, pelvic radiotherapy, or orchidectomy for testicular cancer (fertility preservation)
	Before vasectomy, or sperm collected at the time of vasectomy-reversal surgery
	Surplus sperm from surgical retrieval (PESA/MESA/TESE) in obstructive or non-obstructive azoospermia, banked for future IVF-ICSI cycles
	Anticipated hazardous exposure (occupational hazard, military deployment) or progressive illness threatening spermatogenesis
	Husband unable to be present on the day of ovulation induction/oocyte retrieval
Donor (AID) banking	Untreatable azoospermia or severe oligo-astheno-teratozoospermia in the husband
	Genetic disease in the husband transmissible to offspring
	Rh-sensitised woman with a homozygous Rh-positive husband, to avoid recurrent haemolytic disease of the newborn
	HIV-discordant couple, using HIV-negative frozen donor semen

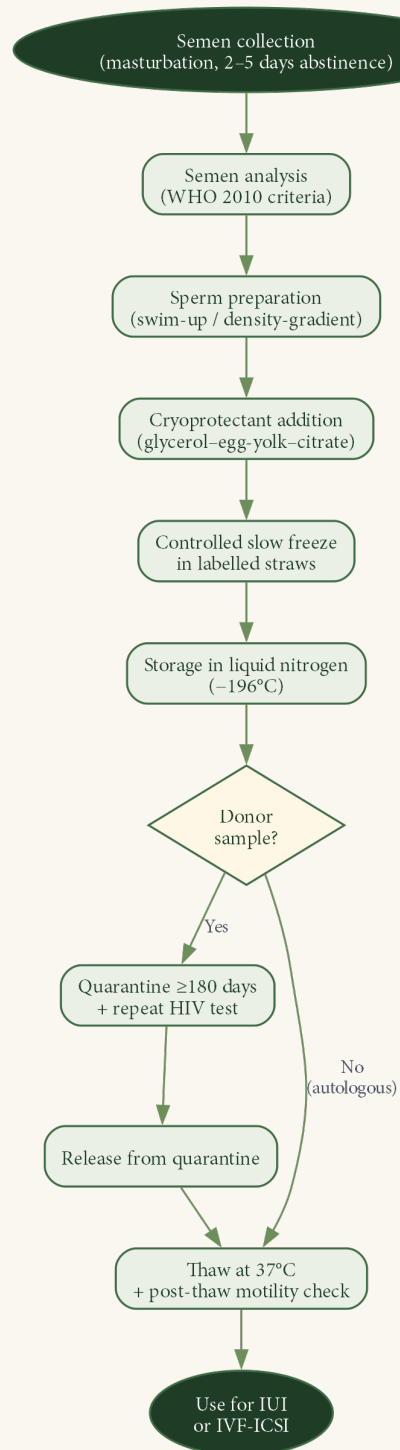
How semen banking helps the infertile couple

- ▶ **Converts an untreatable cause into a treatable one** — a screened, quarantined donor-semen bank makes AID immediately available for couples with untreatable azoospermia or a heritable genetic disease in the husband.
- ▶ **Preserves genetic fertility before gonadotoxic treatment** — sperm banked before chemotherapy, radiotherapy, or orchidectomy can later be thawed for IUI or IVF-ICSI once the man is cured, giving him and his partner a future biological child despite treatment-induced sterility.
- ▶ **Salvages a single surgical sperm-retrieval procedure** — once sperm are recovered by PESA/MESA/TESE/TESE, multiple aliquots are cryopreserved so several IVF-ICSI attempts are possible without repeating the surgery.
- ▶ **Gives logistic flexibility** — insemination or embryo transfer can be timed precisely to the wife's LH surge, hCG trigger, or oocyte retrieval without the husband needing to produce a fresh sample on that exact day, which helps when he is travelling, anxious, or unavailable.
- ▶ **Makes donor programmes safer** — the mandatory 180-day quarantine with repeat HIV testing (introduced after HIV seroconversion was documented in recipients of fresh donor semen in 1985) means cryopreserved, quarantined donor semen is now the only acceptable route for AID; fresh donor insemination is no longer recommended.
- ▶ **Allows matched, counselled donor selection** — blood group, Rh type, and ethnicity can be matched, reducing the risk of haemolytic disease of the newborn and of transmitting hereditary disorders.
- ▶ **Supports repeated treatment cycles** — banking several aliquots per donor lets a couple use the same donor across 4–6 insemination cycles, and preserves the option of the same donor for a future sibling.

Limitations of cryopreserved semen

- ▶ Freeze–thaw injury lowers motility and viability compared with fresh semen; frozen sperm survive less long in the female genital tract, making precise timing of IUI more critical than with fresh sperm.
- ▶ Fecundability per cycle with frozen sperm is generally lower than with fresh sperm.
- ▶ A minimum post-thaw motile count is needed for reasonable success (best results with >20 million motile sperm; a practical lower limit is ~10 million total motile sperm) — poor pre-freeze semen quality may not survive cryopreservation.
- ▶ Long-term cryostorage has a recurring cost, and raises legal/ethical questions (consent, posthumous use, donor anonymity, parentage).
- ▶ No screening protocol can exclude every transmissible agent; a small residual infective risk persists despite quarantine.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart of the semen-banking process from collection to clinical use, with the donor-only quarantine/HIV-retest branch highlighted.

High-yield exam pointers

- ▶ 180 days = donor-sperm quarantine period, released only after a repeat negative HIV test.

- ▶ Storage medium/temperature: **liquid nitrogen**, -196°C ; cryoprotectant = glycerol-egg-yolk-citrate extender.
- ▶ WHO (2010) lower reference limits to quote: volume 1.5 mL, concentration 15 million/mL, total count 39 million, progressive motility 32%, morphology 4% normal forms.
- ▶ Trial freeze-thaw excludes ~75% of candidate donors before acceptance.
- ▶ 1985 — documented HIV seroconversion from fresh donor insemination → origin of the current quarantine policy.
- ▶ Sperm-retrieval techniques whose yield is commonly banked: PESA, MESA, TESA, TESE.
- ▶ Minimum acceptable post-thaw total motile count for use $\approx$ 10 million (best results >20 million).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Donor-sperm quarantine/screening criteria described here follow current American Society for Reproductive Medicine (ASRM) practice as reflected in Speroff 9e; Indian texts (DC Dutta's Gynaecology) describe the same 180-day/HIV-retest principle without naming the guideline body.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; American Society for Reproductive Medicine (ASRM) donor-screening guidelines.



Surgical options in the treatment of male infertility

Asked in: Paper IV 28-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Surgical treatment of male infertility either (1) reconstructs an obstructed reproductive tract to restore sperm to the ejaculate, (2) corrects a varicocele that is impairing spermatogenesis, or (3) surgically retrieves sperm from the epididymis/testis for intracytoplasmic sperm injection (ICSI) when the tract cannot be reconstructed. Choice of procedure depends on whether azoospermia is obstructive or non-obstructive and on prior surgical history.

Indications for surgical treatment

Cause	Surgical option
Vasectomy / iatrogenic vasal injury (e.g. hernia repair)	Vasovasostomy or vasoepididymostomy
Epididymal-level obstruction	Vasoepididymostomy

Cause	Surgical option
Congenital bilateral absence of the vas deferens (CBAVD)	Not reconstructable — epididymal/testicular sperm retrieval + ICSI
Ejaculatory duct obstruction (cyst, calcification, scar)	Transurethral resection of the ejaculatory ducts (TURED)
Palpable varicocele with abnormal semen parameters	Varicocelectomy (microsurgical) or percutaneous embolisation
Cryptorchidism (undescended testis)	Orchidopexy
Non-obstructive azoospermia with sperm on biopsy	Testicular sperm extraction (conventional or microdissection) + ICSI
Coexisting hydrocele	Hydrocelectomy

Vasovasostomy and vasoepididymostomy (vasectomy reversal)

- ▶ Intraoperative microscopy of fluid from the testicular-end vas decides the procedure: if sperm (motile or non-motile) are seen, a **vasovasostomy** is done; if no sperm are found even after lavage, a **vasoepididymostomy** is done instead, implying obstruction at the epididymal level.
- ▶ **Vasovasostomy** — microsurgical, multilayer, mucosa-to-mucosa anastomosis of the two vasal ends under the operating microscope.
- ▶ **Vasoepididymostomy** — anastomosis of the vas to a healthy epididymal tubule proximal to the block, either end-to-side or by the newer tubule-intussusception technique, which has simplified the procedure and improved patency.
- ▶ Sperm obtained at the time of reversal are cryopreserved as a hedge against later failure.
- ▶ If azoospermia persists 6 months after reversal, the operation is considered a failure; options are a repeat vasovasostomy or surgical sperm retrieval with ICSI.

Outcome	Vasovasostomy	Vasoepididymostomy
Patency	~100%	50–85%
Pregnancy rate	50–60% (over ≥2 years)	40–50%
Repeat vasovasostomy after failure	Patency ~75%, pregnancy ~43%	—

Patency and pregnancy fall with longer time since vasectomy, especially beyond 15 years; about 60% develop antisperm antibodies, but these do not meaningfully reduce fecundability.

Varicocelectomy

A **varicocele** is abnormal dilation of the pampiniform plexus veins of the spermatic cord, causing scrotal hyperthermia and venous reflux that impair spermatogenesis. Repair is offered for a **palpable** varicocele

with abnormal semen parameters in a couple with normal or treatable female fertility, and in adolescents with ipsilateral testicular hypotrophy.

Technique	Route	Comment
Retroperitoneal (Palomo)	High ligation of internal spermatic vein	Simple; higher recurrence, no magnification
Inguinal (Ivanissevich)	Open inguinal	Moderate recurrence/hydrocele rate
Microsurgical inguinal/subinguinal	Open, operating microscope	Preferred — spares testicular artery and lymphatics, lowest recurrence and hydrocele rate
Laparoscopic	Clipping of internal spermatic vessels	Useful for bilateral disease
Percutaneous embolisation	Interventional radiology	No incision; more variable success than surgery

Surgical repair corrects over 90% of varicoceles (more consistent than embolisation); semen quality improves in most men, with the greatest benefit in large varicoceles. In a randomised trial, 60% of men conceived within one year after repair versus 10% of untreated controls. Best candidates are young men with a large varicocele and short duration of infertility; testicular atrophy, raised follicle-stimulating hormone (FSH), or severe oligo-/azoospermia predict a poor result. Complications include hydrocele formation, recurrence, and infection.

Surgical sperm retrieval for assisted reproductive technology (ART)

Procedure	Full form	Site	Anaesthesia	Key point
PESA	Percutaneous epididymal sperm aspiration	Epididymis (fine needle)	Local	Simple, repeatable; lower yield, less reliable cryopreservation
MESA	Microsurgical epididymal sperm aspiration	Epididymis (open)	General/regional	Highest yield; permits diagnosis and possible reconstruction; large numbers allow cryopreservation, avoiding repeat surgery

Procedure	Full form	Site	Anaesthesia	Key point
TESA/TEFNA	Testicular (fine-needle) sperm aspiration	Testis (percutaneous)	Local	Best suited to obstructive azoospermia with normal spermatogenesis
TESE (conventional)	Testicular sperm extraction	Testis (open biopsy)	General/regional	Used in obstructive and non-obstructive azoospermia
Micro-TESE	Microdissection testicular sperm extraction	Testis (open, operating microscope)	General/regional	Preferred for non-obstructive azoospermia — identifies larger tubules more likely to contain sperm while excising minimal tissue

- ▶ ICSI is used with all surgically retrieved sperm because such sperm typically has reduced motility and fertilising capacity.
- ▶ With obstructive azoospermia, sperm retrieval plus ICSI gives pregnancy rates of 24–64%; fresh and frozen-thawed sperm give comparable results.
- ▶ Karyotype, Y-chromosome microdeletion analysis (AZFa/AZFb/AZFc regions), and CFTR mutation testing (for CBAVD) should be offered before surgical retrieval and ICSI in azoospermic/severely oligospermic men, to counsel on transmission risk to offspring.
- ▶ Minimum interval before a repeat retrieval attempt is 3–6 months, to allow healing.

Other surgical options

- ▶ **Orchidopexy** — for cryptorchidism, ideally performed at 1–2 years of age to preserve spermatogenic potential; in adults with unilateral undescended testis and a normal contralateral testis, fertility is often preserved, and even bilateral orchidopexy in adulthood may permit spermatogenesis.
- ▶ **Transurethral resection of the ejaculatory ducts (TURED)** — for ejaculatory duct obstruction confirmed by transrectal ultrasonography or vasography; restores semen volume in about two-thirds of men and returns sperm to the ejaculate in about half of previously azoospermic men, allowing natural conception or intrauterine insemination (IUI) without ART.
- ▶ **Hydrocelectomy** — corrects a coexisting hydrocele; does not itself restore fertility.

- ▶ **Vibratory stimulation/electroejaculation** — a procedural (non-surgical) option for anejaculation from spinal cord injury or retroperitoneal lymph node dissection, followed by IUI or ICSI.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 39.5 — *Anatomy of male reproductive system showing procedure for vasectomy.* (Williams Obstetrics 26e, p.700)

Recent advances [RA]

The current reference is the **American Urological Association/American Society for Reproductive Medicine (AUA/ASRM) Guideline: Diagnosis and Treatment of Infertility in Men** (2020; amended 2024), which revised the thresholds for Y-chromosome microdeletion testing and clarified that testicular sperm may be used for ICSI even in men who are **not** azoospermic (e.g. cryptozoospermia or severe oligospermia with high sperm DNA fragmentation), rather than reserving surgical retrieval only for azoospermia. Micro-TESE is now favoured over conventional/percutaneous TESE for non-obstructive azoospermia: pooled data show sperm retrieval rates of roughly 50–60% with micro-TESE versus 30–40% with conventional TESE, with less testicular tissue excised and a lower risk of vascular injury. Sperm DNA fragmentation index (DFI) testing is increasingly used to select testicular over ejaculated sperm for ICSI in men with high DFI, since testicular sperm generally show less DNA fragmentation. Robot-assisted microsurgical vasovasostomy/vasoepididymostomy is an emerging technique aimed at improving anastomotic precision in complex reconstructions. Pre-chemotherapy/radiotherapy sperm and testicular-tissue cryopreservation ("onco-fertility") is now standard counselling before gonadotoxic treatment, and TESE after such treatment can still retrieve viable sperm in a proportion of men.

High-yield exam pointers

- ▶ Sperm seen in vasal fluid intraoperatively → vasovasostomy; no sperm even after lavage → vasoepididymostomy.
- ▶ Vasovasostomy: patency ~100%, pregnancy 50–60%. Vasoepididymostomy: patency 50–85%, pregnancy 40–50%.
- ▶ MESA = open + microscope + epididymis; PESA = percutaneous + epididymis; TESE = open + testis; TESA = percutaneous + testis; micro-TESE = microdissection, best for non-obstructive azoospermia.
- ▶ Microsurgical subinguinal/inguinal is the preferred varicocelectomy approach; surgery corrects >90% of varicoceles.
- ▶ Screen with karyotype + Y-chromosome microdeletion (AZFa/b/c) + CFTR before surgical sperm retrieval/ICSI in azoospermic men.
- ▶ Orchidopexy for cryptorchidism ideally by 1–2 years of age.

- ▶ TURED restores ejaculate volume in about two-thirds, and sperm to the ejaculate in about half, of azoospermic men with ejaculatory duct obstruction.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e states that varicocele surgery "is not helpful" for fertility — an older, simplified position; current evidence (Speroff 9e, Berek & Novak 16e, and the AUA/ASRM 2024 guideline) supports varicocelectomy in men with a palpable varicocele and abnormal semen parameters, with the greatest benefit in large varicoceles and short-duration infertility.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; AUA/ASRM Guideline — Diagnosis and Treatment of Infertility in Men (2020; amended 2024).



Tests for Ovulation

Asked in: Paper I 15-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Ovulation is the release of a mature oocyte from a ruptured Graafian follicle at mid-cycle. Tests for ovulation are the clinical, hormonal, sonographic and histological methods used to confirm that ovulation has occurred (and approximately when), chiefly in the work-up of infertility, luteal phase disorders and timed intercourse/assisted reproduction.

Classification of tests for ovulation

Category	Nature of evidence	Examples
Indirect (presumptive)	Inferred from end-organ or hormonal changes produced by post-ovulatory progesterone	Menstrual history, basal body temperature (BBT), cervical mucus study, vaginal cytology, serum/urinary hormone assays, endometrial biopsy, transvaginal sonography (TVS)
Direct	Actual visualisation of the ovulatory event	Laparoscopy — recent corpus luteum/stigma, or oocyte recovered from cul-de-sac fluid
Conclusive	Proof positive	Pregnancy

Indirect (presumptive) tests

Test	Timing	Principle / finding	Clinical value & limitation
Menstrual history	Throughout cycle	Regular 21–35 day cycles, mid-cycle spotting/pain (Mittelschmerz), premenstrual molimina	Simple, non-specific; only suggestive
Basal body temperature (BBT)	Daily, on waking, before rising	Progesterone is thermogenic; temperature rises 0.3–0.5°C (0.5–1°F) about 1–5 days after the LH surge, once progesterone exceeds ~3–5 ng/mL, giving a biphasic pattern	Cheapest test; confirms ovulation only retrospectively , cannot predict it in advance, and may rarely stay monophasic despite ovulation
Cervical mucus study	Day 12–14 (pre-ovulatory) vs day 21–23 (post-ovulatory)	Oestrogen produces clear, watery, stretchable mucus (Spinnbarkeit +) with a positive fern test ; progesterone abolishes stretchability and the fern pattern	Loss of ferning beyond day 22 = evidence of ovulation; persistence beyond day 22 suggests anovulation
Vaginal cytology (maturation index)	Single smear, day 25–26	Progesterone shifts the maturation index left — folded, clumped cells on a dirty background	Rarely used now; superseded by hormonal/sonographic tests
Urinary LH ("ovulation predictor") kit	Daily, started 2–3 days before the expected surge	ELISA detects the urinary LH surge (threshold ~35–50 mIU/mL)	Ovulation follows within 24–48 hours of a positive test; positive/negative predictive values ~92%/95%; false-positive rate ~7%; unreliable in irregular cycles
Serum LH	Daily assay at mid-cycle	Detects the LH surge directly	Ovulation occurs ~34–36 h after the surge begins, ~10–12 h after the LH peak; used mainly for IVF cycle timing

Test	Timing	Principle / finding	Clinical value & limitation
Serum oestradiol	Mid-cycle	Peaks ~24–36 h before ovulation, just before the LH surge	Used with LH for ART cycle monitoring
Mid-luteal serum progesterone	Best drawn ~1 week before the expected next period (day 21 only fits an ideal 28-day cycle)	A level >3 ng/mL (>10 nmol/L) confirms that ovulation has occurred	Simplest, most reliable, objective single test; low values do not reliably exclude ovulation (progesterone is secreted in pulses) and the level cannot grade corpus luteal quality. (A classical two-sample protocol — day 8 <1 ng/mL rising to >6 ng/mL by day 21 — is also described in Indian texts.)
Endometrial biopsy	Day 21–23 (or within 24 h of the period if the cycle is irregular)	Secretory transformation of an oestrogen-primed endometrium; subnuclear vacuolation is the earliest change (36–48 h post-ovulation)	Confirms that ovulation has occurred; historically also used to "date" the endometrium and diagnose luteal phase defect (see Note)
Transvaginal sonography (TVS)	Serial scans through mid-cycle	Tracks growth of the dominant follicle to a pre-ovulatory diameter of ~18–20 mm, followed by follicular collapse and free fluid in the pouch of Douglas	Most precise method for timing ovulation induction, IUI and IVF; can also detect a luteinized unruptured follicle (persistent follicle without collapse)

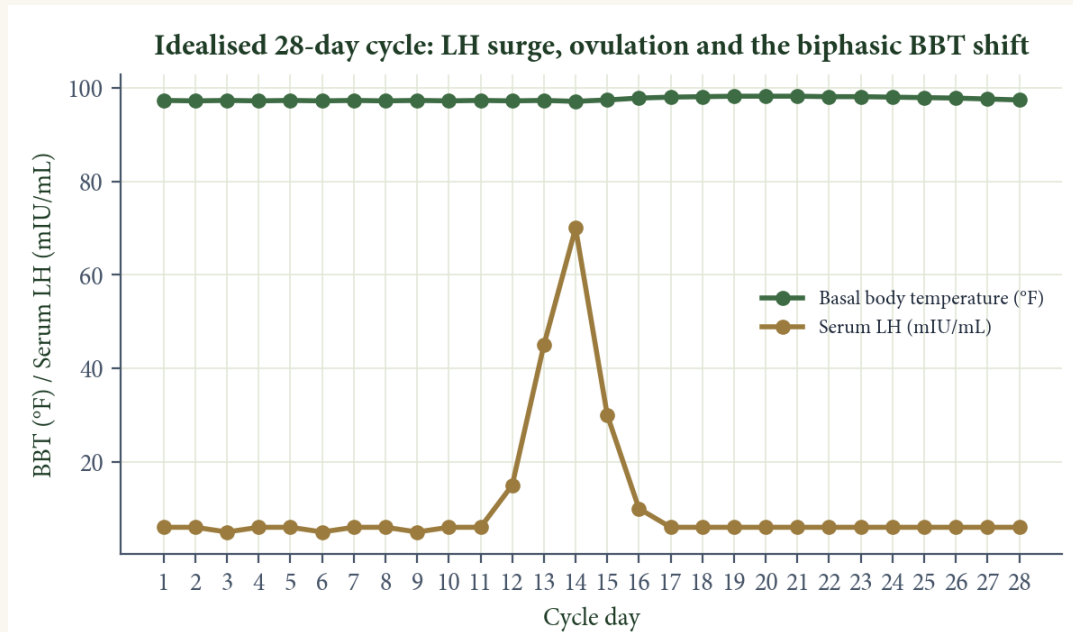
Follicle diameter and probability of ovulation (TVS, hCG-triggered cycles):

Follicle diameter	Probability of ovulation
≤14 mm	Occasional
15–16 mm	~40%
17–18 mm	~70%
19–20 mm	~80%
>20 mm	Virtually all

Direct and conclusive evidence

- ▶ **Laparoscopy** — the only *direct* evidence: visualisation of a recent corpus luteum with its ovulatory stigma, or retrieval of the oocyte/cumulus from aspirated cul-de-sac fluid.
- ▶ **Pregnancy** — the *conclusive*, surest proof that ovulation occurred in that cycle.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



LH surge peaks on day 14 (ovulation); the BBT nadir coincides with ovulation and is followed by a sustained $\sim 0.5\text{--}1^\circ\text{F}$ biphasic rise through the luteal phase, falling just before menses.

No anatomical figure is needed for this topic — the biphasic BBT/LH relationship above is the expected diagram.

High-yield exam pointers

- ▶ Write the **three-tier classification** first: Indirect (presumptive) → Direct → Conclusive — this is the examiner's expected skeleton.
- ▶ Numbers to reproduce exactly: BBT rise $0.3\text{--}0.5^\circ\text{C}$, 1–5 days after the LH surge; mid-luteal progesterone $>3\text{ ng/mL}$ (10 nmol/L) confirms ovulation; urinary LH-kit positivity → ovulation in 24–48 h; pre-ovulatory follicle **18–20 mm** on TVS.
- ▶ **Subnuclear vacuolation** = earliest histological sign of ovulation on endometrial biopsy (36–48 h post-ovulation).
- ▶ Only laparoscopic visualisation of the corpus luteum/stigma (or oocyte recovery) counts as **direct** evidence — everything else (BBT, mucus, hormones, biopsy, TVS) is indirect/presumptive.
- ▶ Mid-luteal serum progesterone is the simplest, most practical single office test; urinary LH kits and TVS folliculometry are used when precise timing is needed (IUI/IVF).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Endometrial biopsy/histologic "dating" of the endometrium to diagnose luteal phase defect — though still described in Indian texts including DC Dutta — was shown in large trials (cited in Speroff 9e) to be invalid by 2004 because dating could not discriminate fertile from infertile women, and is no longer used as a routine ovulation test; mid-luteal serum progesterone and TVS folliculometry are the current preferred objective methods.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e.



Tubal factor in Infertility

Asked in: Paper III 26-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Tubal factor infertility is the inability to conceive resulting from anatomical damage or functional impairment of one or both fallopian tubes that prevents ovum pick-up, sperm transport, fertilization, or embryo transport into the uterine cavity. It accounts for **25–35% of female infertility**, making it the single commonest identifiable female factor, and is confirmed by demonstrating tubal block or dysfunction on hysterosalpingography (HSG) and/or laparoscopy with chromopertubation.

Causes (aetiology)

Category	Causes	Mechanism of damage
Infective (commonest)	Pelvic inflammatory disease (PID) — <i>Chlamydia trachomatis</i> , <i>Neisseria gonorrhoeae</i> , mixed anaerobes; post-abortion/puerperal sepsis	Endosalpingitis → loss of cilia and mucosal folds → peritubal/intraluminal adhesions, fimbrial agglutination, hydrosalpinx
Genital tuberculosis	<i>Mycobacterium tuberculosis</i> , haematogenous spread from a primary lung/lymph node focus; tubes are the primary site of pelvic tuberculosis	Interstitial salpingitis → cornual block, tubal rigidity ("tobacco-pouch" fimbrial closure), endometrial synechiae
Endometriosis	Ectopic endometrial implants on tube/ovary	Peritubal adhesions, distortion of tubo-ovarian relationship impairing ovum pick-up even with a patent tube

Category	Causes	Mechanism of damage
Post-surgical	Previous tubal/ectopic surgery, ruptured appendix/appendicectomy, ovarian cystectomy, myomectomy, pelvic surgery for endometriosis	Peritubal adhesions from raw surgical surfaces
Sterilization	Prior tubal ligation (Pomeroy, rings, clips, diathermy)	Deliberate mid-tubal occlusion; reversal sought in ~1%
Congenital	Tubal atresia/agenesis (rare)	Absent or hypoplastic tube

Sites of tubal block and their significance

- ▶ **Proximal (cornual/interstitial) block** — 10–25% of blocks seen on HSG; up to 20–40% are *pseudo-obstruction* from cornual muscular spasm, mucus plugging, or debris rather than true disease — repeat HSG or hysteroscopic cannulation is used to confirm before committing to major surgery or IVF.
- ▶ **Mid-tubal (isthmic) block** — usually post-sterilization; amenable to microsurgical **tubotubal reanastomosis**.
- ▶ **Distal (fimbrial) block** — from PID/genital TB; the fimbriae become oedematous and phimotic, closing the abdominal ostium, and pent-up secretion converts pyosalpinx (pus becomes sterile by ~6 weeks) into **hydrosalpinx**, graded by tubal diameter as **mild (<15 mm)**, **moderate (15–30 mm)**, **severe (>30 mm)**.
- ▶ **Peritubal adhesions/perisalpingitis** — tube itself patent but "frozen" in adhesions, distorting fimbria–ovary relationship.

Clinical features

- ▶ Primary or secondary infertility, often the sole presenting complaint.
- ▶ History suggestive of an underlying cause — pelvic pain, vaginal discharge, dysmenorrhoea, past PID/STI, past abdominal/pelvic surgery, IUCD use, septic abortion, or known pulmonary/extragenital tuberculosis.
- ▶ Chronic pelvic pain or deep dyspareunia if hydrosalpinx/adhesions are present.
- ▶ Many women are entirely asymptomatic — tubal disease is discovered only on infertility work-up.
- ▶ Examination may show a fixed, retroverted uterus or a tender adnexal mass (tubo-ovarian mass) in advanced disease.

Investigations

Test	Timing	What it shows
Hysterosalpingography (HSG)	Proliferative phase, day 7–10 (after cessation of bleeding, before ovulation)	Site and side of block, cornual spasm, uterine cavity pathology (synechiae, submucous fibroid); classic " bilateral hydrosalpinx with fimbrial block " appearance
Insufflation/dye test (Rubin's test)	Post-menstrual phase	Historical; pressure fall, hissing sound, shoulder-tip pain confirm patency but not site — largely replaced by HSG
Laparoscopy + chromopertubation	Proliferative phase (periovulatory)	Gold standard/definitive test — direct visualization of peritubal adhesions, endometriosis, and dye (methylene blue) spill from the fimbrial end; done after male and ovulatory factors are excluded/corrected
Transvaginal sonography (TVS)/sonoHSG	Proliferative phase	Hydrosalpinx as a sausage-shaped, "beads-on-a-string"/"cogwheel" cystic adnexal mass; no radiation
Hysterosalpingo-contrast sonography (HyCoSy)	Proliferative phase	Alternative to HSG using contrast/gel; better for intrauterine pathology, avoids radiation
Fallopscopy / salpingoscopy	At laparoscopy/hysteroscopy	Direct study of tubal mucosal folds — helps select patients likely to benefit from surgery versus those who should go straight to IVF
Chlamydia antibody testing	Any time	Indirect, low-cost screen; a positive test raises suspicion of tubal damage from past silent chlamydial infection, particularly in unexplained infertility with a normal HSG

Management

Principle: treat any active infection first (antitubercular therapy for genital tuberculosis, antibiotics for active PID), then choose between **tuboplasty (reconstructive surgery)** and **in vitro fertilization (IVF)** based on site/severity of block, age, and ovarian reserve.

Site/lesion	Surgical option	Approximate outcome
Peritubal adhesions	Laparoscopic salpingo-ovariolysis (adhesiolysis)	Improves ovum pick-up; results best when adhesions alone, without mucosal damage
Proximal (cornual) block	Fluoroscopic-guided tubal cannulation or hysteroscopic-guided proximal tubal cannulation with a guide wire ± balloon tuboplasty	Patency restored in ~85%; overall pregnancy ~45–60%
Mid-tubal block (sterilization reversal)	Microsurgical tubotubal anastomosis (isthmic-isthmic best, isthmic-cornual for cornual block)	Pregnancy 50–82% depending on age, method of sterilization, and site of anastomosis; ectopic pregnancy risk 2–10% (higher after isthmic-ampullary anastomosis)
Distal (fimbrial) block	Fimbrioplasty (release of fimbrial adhesions/phimosis) or neosalpingostomy (creating a new tubal opening)	Overall tuboplasty pregnancy 15–60%; salpingolysis + fimbrioplasty ~65% in mild disease; cycle fecundability only 1–2%/month with severe distal disease, so surgery is reserved for young women with mild disease
Severe/irreparable distal disease or hydrosalpinx before IVF	Laparoscopic salpingectomy or proximal tubal occlusion ; hysteroscopic Essure coil occlusion is a second-line, less-effective alternative; ultrasound-guided hydrosalpinx fluid aspiration at oocyte retrieval is an option in women at high adhesion risk	A hydrosalpinx halves IVF implantation/pregnancy rates and raises miscarriage; pre-IVF salpingectomy nearly doubles the odds of an ongoing pregnancy (OR 2.14, 95% CI 1.23–3.73), and laparoscopic tubal occlusion is equally effective (OR 4.66 vs no intervention) — evidence from a 2010 systematic review of five randomized trials (646 women). Salpingectomy does not significantly lower ovarian reserve (AMH) except when done for a ruptured ectopic

Adjunct: hydrotubation (transcervical instillation of dexamethasone 4 mg with gentamicin 80 mg in 10 mL normal saline, in the proliferative phase for at least 3 cycles) may be used after tuboplasty or for flimsy fimbrial adhesions.

IVF is the treatment of choice when disease is bilateral and severe, in older women (>35 years), after failed reconstructive surgery, when infertility persists >6–12 months after tubal surgery, or when proximal disease is due to *salpingitis isthmica nodosa* (cannulation contraindicated). IVF live-birth rates

for tubal factor infertility now generally exceed reconstructive-surgery success rates (10–35%) and carry a lower ectopic risk (surgery 5–20% vs IVF).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 38.72 — Hysterosalpingogram showing bilateral hydrosalpinx (fimbrial block); bilateral salpingostomy done (DC Dutta's Gynaecology 7e, p.570)

Label on the HSG sketch: cervical cannula, contrast-filled uterine cavity, both cornua, the dilated retort-shaped distal tubal segments (hydrosalpinx) with **absent peritoneal spillage**, contrasted against a normal study showing free peritoneal dye spill.

High-yield exam pointers

- ▶ Tubal factor = 25–35% of female infertility; PID is the single commonest cause; genital TB is an important cause in India (~10% of infertile women there).
- ▶ Hydrosalpinx grading by tubal diameter: **mild <15 mm, moderate 15–30 mm, severe >30 mm.**
- ▶ **Laparoscopy + chromopertubation = gold standard**; HSG and laparoscopy are complementary, not substitutes for each other.
- ▶ Pre-IVF **salpingectomy for hydrosalpinx nearly doubles ongoing pregnancy odds (OR 2.14, CI 1.23–3.73)** — write this number.
- ▶ Sterilization reversal (tubotubal anastomosis): pregnancy 50–82%, ectopic risk 2–10%.
- ▶ Cannulation for proximal block: patency ~85%, pregnancy 45–60%.
- ▶ Hydrotubation drug combination: **dexamethasone 4 mg + gentamicin 80 mg in 10 mL normal saline.**

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Corpus depth for a formal named guideline (e.g., a specific NICE/ESHRE tubal-factor pathway) was limited in the on-disk texts; management above is grounded in Speroff 9e's evidence tables and DC Dutta's Gynaecology 7e and reflects current ART-era practice rather than a single cited guideline document.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.

♦ ♦ ♦

Urogynaecology & pelvic floor

♦ ♦ ♦

Anatomy of pelvic floor

Asked in: Paper I 29-Jul-2021 · Paper I Oct 2009 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — The pelvic floor (**pelvic diaphragm**) is the musculofascial partition that separates the pelvic cavity above from the anatomical perineum below. It is formed chiefly by the **levator ani** and **coccygeus** muscles with their covering fasciae, reinforced anteriorly by the **perineal membrane** (urogenital diaphragm) and centrally by the **perineal body**. Together these structures support the pelvic viscera, maintain urinary/faecal continence, and guide the fetal head through the birth canal.

Layers of the pelvic floor

Layer (deep → superficial)	Components
Pelvic diaphragm	Levator ani (pubococcygeus, puborectalis, iliococcygeus) + coccygeus , covered above by the parietal layer of pelvic fascia and below by anal fascia
Perineal membrane (urogenital diaphragm)	Deep transverse perineal + sphincter urethrae membranaceae , sandwiched between its superior and inferior fascial layers; fills the urogenital triangle
Superficial perineal pouch	Bulbospongiosus, ischiocavernosus, superficial transverse perineal, Bartholin glands — deep to Colles fascia
Perineal body	Fibromuscular node where the pelvic floor and perineal muscles/fascia converge, between the vagina and anal canal

Levator ani — origin, insertion, gaps

Muscle part	Origin	Insertion / course
Pubococcygeus	Back of the pubic rami	Posterior fibres → anococcygeal raphe and coccyx; puborectalis fibres sling around the anorectal junction (puborectal sling); puboanalis fibres run into the anal canal wall; pubovaginalis fibres pass to the perineal body, forming the supporting "hammock" for urethra, vagina and rectum
Iliococcygeus	Arcus tendineus levator ani — the tendinous "white line" formed by a thickened condensation over obturator internus fascia, and the ischial spine	Anococcygeal raphe (levator plate) and coccyx

Muscle part	Origin	Insertion / course
Ischiococcygeus (coccygeus)	Ischial spine and sacrospinous ligament	Lower two pieces of sacrum and upper pieces of coccyx

- ▶ Two natural midline gaps: **hiatus urogenitalis** (anterior — transmits urethra and vagina) and **hiatus rectalis** (posterior — transmits rectum).
- ▶ The **levator plate/anococcygeal raphe** (presacral fascia + tendinous pubococcygeus plate + iliococcygeus raphe + superficial external anal sphincter fibres) forms a horizontal shelf behind the pelvic viscera.

Perineum and perineal body

- ▶ **Anatomical perineum** — bounded above by the inferior surface of the pelvic floor, below by skin between the buttocks and thighs, laterally by the ischiopubic rami/ischial tuberosities/sacrospinous ligaments, posteriorly by the coccyx.
- ▶ A line joining the ischial tuberosities divides it into:
 - **Urogenital triangle** (anterior) — pierced by the urethra and vagina; contains the superficial and deep perineal pouches — obstetrically important.
 - **Anal triangle** (posterior) — contains the anal canal, external anal sphincter, ischioanal fossa; no obstetric importance.
- ▶ **Perineal (obstetrical) body** — pyramidal, about 4 × 4 cm; base is covered by perineal skin, apex is continuous with the rectovaginal septum. Receives pubovaginalis, superficial and deep transverse perineal, bulbospongiosus and a few external anal sphincter fibres.
- ▶ Importance — supports the levator ani lying above it; indirectly buttresses the anterior vaginal wall, bladder and uterus through the posterior vaginal wall; is the structure torn in obstetric perineal injury and deliberately incised in episiotomy.

Fascia and levels of pelvic support (DeLancey, 1992)

Level	Vaginal segment	Structures involved	Defect if lost
I — upper	Vault / cervix	Uterosacral and Mackenrodt's (cardinal) ligaments	Uterovaginal prolapse, enterocele, vault prolapse
II — middle	Mid-vagina	Pubocervical fascia, arcus tendineus fasciae pelvis	Paravaginal / pararectal defects
III — lower	Distal vagina	Urogenital diaphragm, perineal muscles, perineal body, levator plate	Cystocele, rectocele, urinary incontinence

Blood and nerve supply

- ▶ **Arterial** — internal pudendal artery (via the pudendal/Alcock's canal) gives labial, perineal and inferior rectal branches to the perineum; inferior gluteal branches supply levator ani from above.
- ▶ **Venous** — corresponding venae comitantes draining to the internal pudendal and internal iliac veins.
- ▶ **Nerve supply** — classic teaching: **inferior rectal nerve and the perineal branch of the pudendal nerve (S2–S4)** supply the perineal surface, with direct twigs from S3–S4 to the pelvic surface; puborectalis also assists the external anal sphincter (see Note for the newer "levator ani nerve" description).

Functions of the pelvic floor

- ▶ Supports the bladder, uterus/vagina and rectum against increased intra-abdominal pressure — the pubovaginalis sling is the key supporting element.
- ▶ Maintains urinary and faecal continence: tonic (slow-twitch) fibres keep the urogenital hiatus narrow at rest; fast-twitch fibres give reflex/voluntary contraction (basis of Kegel pelvic-floor exercises).
- ▶ Guards the hiatus urogenitalis and, with the endopelvic fascia and perineal body, prevents pelvic organ prolapse.
- ▶ In labour — hypertrophies and becomes distensible in pregnancy; in the second stage the pubovaginalis and puborectalis relax and the levator ani is drawn up over the advancing head, facilitating anterior internal rotation of the presenting part; failure to relax at the crucial moment risks pelvic floor and perineal trauma.
- ▶ The levator plate acts as a horizontal "backstop" maintaining the normal vaginal axis; ischiococcygeus stabilises the sacroiliac and sacrococcygeal joints; the perineal body is steadied by the converging muscles.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 5.7 — *The pelvic diaphragm: muscles of the pelvic floor and their attachments to the bony pelvis (Berek & Novak 16e, p.166)*

High-yield exam pointers

- ▶ Levator ani = **pubococcygeus + puborectalis + iliococcygeus**; with **coccygeus** = pelvic diaphragm.
- ▶ Two hiatuses: urogenitalis (urethra + vagina) and rectalis (rectum).
- ▶ Perineal body $\approx 4 \times 4$ cm; base = perineal skin, apex = rectovaginal septum.
- ▶ DeLancey's 3 levels of support (1992) — write the level / structure / defect triad.
- ▶ Arcus tendineus levator ani = the "white line" over obturator internus fascia.

- ▶ Classic nerve supply: pudendal nerve (S2–4) + direct S3–4 twigs.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older texts (DC Dutta's Gynaecology 7e) teach the levator ani is supplied by the pudendal nerve (S2–4) with direct sacral twigs; Berek & Novak 16e describes newer neuroanatomic evidence for a separate "levator ani nerve" (S3–S5) running on the intrapelvic surface without a pudendal contribution — write the classic teaching as the exam answer and mention this only if asked to elaborate.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e (figure cross-reference).



Critically evaluate the method of diagnosis and management of nulliparous prolapse

Asked in: Paper III May 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Nulliparous (congenital) prolapse is uterovaginal descent occurring in a woman who has never delivered vaginally (including virgins and women delivered only by caesarean section), caused by an inherent congenital weakness of the pelvic supports — the cardinal-uterosacral ligament complex, endopelvic fascia and levator ani — rather than by obstetric trauma. It characteristically shows minimal or no cystocele and an elongated supravaginal cervix, has a strong familial tendency, and may present in teenage girls or be unmasked only at the menopause. Because childbearing is not the cause, both the diagnostic approach (excluding congenital mimics) and the management (uterus- and fertility-preserving surgery) differ from ordinary multiparous procidentia.

Why nulliparous prolapse is distinct

- ▶ **Congenital weakness of pelvic supports** — a reduced type I : type III collagen ratio, not birth injury, is the operative predisposing factor (DC Dutta's Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e).
- ▶ **No cystocele-first sequence:** the usual acquired chain (cystocele → cervical traction → retroversion → descent) does not apply; the uterus herniates down together with the inverted upper vagina.
- ▶ **Strong familial pattern;** association with Ehlers–Danlos syndrome and occult spina bifida — screen for both.

- ▶ **Bimodal presentation:** unmarried teenage girls, or unmasked only at the menopause when oestrogen withdrawal removes the "final straw."
- ▶ Prolapse in a young nulligravida is unusual and mandates excluding the congenital mimics below before the label is applied.

Clinical features

- ▶ Sensation of "something coming down"/mass at the introitus, worse on standing or straining, relieved completely by lying down.
- ▶ Dragging backache and low abdominal discomfort; difficulty walking or sitting, the mass sometimes needing manual reduction.
- ▶ Urinary symptoms (frequency, incomplete emptying, rarely retention) — usually **less prominent** than in acquired prolapse because cystocele is minimal.
- ▶ Decubitus ulcer with bleeding/discharge if long-standing and exposed; menstrual difficulty only if the elongated cervix obstructs outflow.
- ▶ **Examination:** dorsal position, then **standing**, with a **Valsalva manoeuvre** — essential, since the dorsal position alone underestimates the prolapse.

Method of diagnosis — a critical evaluation

Staging system	Basis	Critical evaluation
Clinical degrees (1st/2nd/3rd, DC Dutta)	External os position relative to the introitus	Simple, universally taught, adequate for routine bedside use; subjective, not site-specific, poor inter-observer reproducibility for audit/research
Baden-Walker halfway system	6 sites (urethrocele, cystocele, uterine/vault prolapse, enterocele, rectocele, perineal laceration) graded 0–4 relative to the hymen	More site-specific and quick at the bedside; still semi-quantitative with persistent inter-observer variation
POP-Q (International Continence Society/AUGS/SGS, 1996)	9 fixed points — Aa, Ba, C, D, Ap, Bp, genital hiatus (gh), perineal body (pb), total vaginal length (tvL) — measured in centimetres relative to the hymen	Current international reference standard: objective, reproducible, anatomical and site-specific; drawback is that it is time-consuming, needs training, and is rarely used at routine bedside review

POP-Q stage:

Stage	Description
0	No descent of pelvic organs

Stage	Description
I	Leading edge ≥ 1 cm above the hymen
II	Leading edge between 1 cm above and 1 cm below the hymen
III	Leading edge > 1 cm below the hymen, without complete eversion
IV	Essentially complete vaginal eversion

Differential diagnosis (particularly relevant in a young nulliparous woman):

Condition	Distinguishing feature
Congenital elongation of the cervix	Vaginal walls well supported (no wall descent); only the cervix descends
Chronic uterine inversion	Rectal exam: cup-shaped fundal depression; no separate cervix felt at the apex
Cervical fibroid polyp	Separate cervical os felt alongside the mass; probe passes into the cavity above it
Gartner's duct cyst (mimics cystocele)	Confined anterolateral cystic swelling; does not bulge with Valsalva

Targeted investigations:

Investigation	Purpose
Exam (dorsal + standing + Valsalva)	Confirm staging; exclude mimics above
Cervical cytology $\pm$ colposcopy	Mandatory before any repair — exclude malignancy
Pelvic ultrasound	Exclude coexisting uterine/adnexal pathology
Renal ultrasound/IVP	Long-standing cases: ureteric kinking $\rightarrow$ hydronephrosis
Urodynamics	If stress incontinence coexists — plan concurrent surgery
Spinal imaging/neuro exam	Screen for occult spina bifida

Management — a critical evaluation

Unlike the elderly multipara, management here is governed by two added priorities — **preserving the uterus/fertility** and **preserving coital function** — before definitive cure.

- **Pelvic floor muscle training** — limited value against congenital weakness; adjunct only in mild/early prolapse.

- **Vaginal pessary** (ring, Gellhorn, Hodge) — temporising, non-curative; used when surgery is deferred/declined or the patient is unfit; needs regular follow-up ± topical oestrogen.

Surgical options:

Operation	Principle	Advantage	Disadvantage/limitation
Fothergill (Manchester) operation	Cervical amputation + cardinal-ligament plication in front of cervix + anterior colporrhaphy ± posterior colpoperineorrhaphy	Effective for any degree, low recurrence	Amputation → infertility, cervical dystocia, preterm labour ; avoided if fertility desired
Shirodkar's modified Manchester	Uterosacral plication in front of cervix; no amputation	Fertility-preserving	Technically demanding
Abdominal cervicopexy/sling (Purandare's; variants: Shirodkar's, Khanna's, Soonawala's, Virkud's)	Rectus-sheath strip/Mersilene tape anchors the isthmus to the abdominal wall or presacral ligament	Operation of choice for nulliparous/congenital prolapse without cystocele — preserves uterus, fertility, menses	Abdominal scar/adhesions, sling erosion
Sacrospinous ligament fixation ± hysteropexy	Cervix/vault fixed to sacrospinous ligament, vaginal route	Preserves uterus, no laparotomy	Pudendal/sciatic nerve injury; recurrence ~3%
Vaginal hysterectomy + pelvic floor repair	Removes uterus, restores vault support	Definitive cure	Unsuitable if fertility desired; reserve for completed family/malignancy risk
Mesh-augmented repair	Polypropylene or biological graft	Useful in recurrent prolapse/connective-tissue disorder	Erosion, dyspareunia, sepsis, fistula

Berek & Novak's Gynecology 16e notes uterus-preserving prolapse surgery lowers mesh erosion, operative time, blood loss and stay versus concomitant hysterectomy, with no significant short-term recurrence difference — favouring uterine preservation first-line in the young nulliparous woman.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.6 — Ligamentous supports of uterus (DC Dutta's Gynaecology 7e, p.187)

Label the cardinal (Mackenrodt's) and uterosacral ligaments, pubocervical fascia, and levator ani — congenital deficiency of this complex is the operative lesion in nulliparous prolapse.

High-yield exam pointers

- ▶ **POP-Q** (ICS/AUGS/SGS, 1996): 9 points — Aa, Ba, C, D, Ap, Bp, gh, pb, tvl — staged 0–IV relative to the hymen; the current objective standard.
- ▶ Nulliparous prolapse = congenital weakness, minimal/no cystocele, elongated supravaginal cervix — screen for occult spina bifida.
- ▶ When fertility is desired and no cystocele: **abdominal cervicopexy/sling (Purandare's)** is the operation of choice, **not** Fothergill's (cervical amputation risks infertility/cervical dystocia).
- ▶ **Shirodkar's modified Manchester** = uterosacral plication **without** cervical amputation — fertility-sparing.
- ▶ Mandatory before any repair: cervical cytology ± colposcopy to exclude malignancy.
- ▶ Sacrospinous fixation risk: pudendal/sciatic nerve injury, gluteal pain; recurrence ~3%.
- ▶ Pessary is a bridge, not a cure — for deferred surgery, early pregnancy, puerperium, or the medically unfit.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta and Jeffcoate describe several eponymous abdominal sling variants (Purandare's, Shirodkar's, Khanna's, Soonawala's, Virkud's) that differ only in the route the tape or fascial strip takes to reach the uterine isthmus; the examinable principle is suspending the isthmus without cervical amputation, not each eponym's technical detail.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e. Guideline: International Continence Society/AUGS/SGS Pelvic Organ Prolapse Quantification (POP-Q) system (Bump et al., Am J Obstet Gynecol 1996).

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Critically evaluate the role of mesh in pelvic organ prolapse

Asked in: Paper III Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Mesh (graft) is a synthetic or biological sheet used to reinforce or replace deficient endopelvic fascia during pelvic organ prolapse (POP) surgery, placed either abdominally (sacrocolpopexy), transvaginally (anterior/posterior/apical kits), or as a midurethral sling for concurrent stress urinary incontinence (SUI). Its role has evolved sharply: abdominal sacrocolpopexy mesh remains a current standard for apical prolapse, whereas transvaginal mesh kits for prolapse repair were withdrawn from the United States market by the Food and Drug Administration (FDA) in April 2019 after safety concerns.

Types of mesh material

Type (Amid classification)	Material	Example	Pore size / absorbability	Comment
Type I	Macroporous, monofilament	Polypropylene (Prolene)	>75 µm, non-absorbable	Only synthetic type recommended — allows fibroblast/macrophage ingress, resists infection
Type II	Microporous	Expanded polytetrafluoroethylene (Gore-Tex)	<10 µm, non-absorbable	Higher infection risk; largely abandoned
Type III	Multifilament/composite	Braided polyester (Mersilene)	Mixed pore size	Higher erosion/infection than Type I
Absorbable synthetic	Polyglactin 910	Vicryl mesh	Absorbable	Lower erosion but higher recurrence
Biological	Autograft/allograft/xenograft	Fascia lata, cadaveric dermis, porcine dermis/small-intestine submucosa	Absorbable	Fewer erosions; higher failure over time

Clinical applications

Route	Typical use	Current status
Abdominal/laparoscopic/robotic sacrocolpopexy	Apical (vault) prolapse — Type I polypropylene mesh from vagina to anterior longitudinal ligament over S1	Still recommended; considered the durability benchmark for apical repair

Route	Typical use	Current status
Transvaginal mesh kits (anterior/posterior/apical)	Anterior or recurrent prolapse, connective-tissue disorders	Withdrawn from the US market (FDA order, April 2019); no longer commercially manufactured
Midurethral sling (retropubic TVT / transobturator TOT)	Concurrent SUI at POP surgery	Unaffected by the 2019 ban — remains a Class II (moderate-risk) device

Evidence for and against transvaginal mesh (critical evaluation)

Favours mesh (Cochrane data vs native-tissue repair)	Against mesh
Fewer awareness-of-prolapse symptoms (RR 0.7)	Overall reoperation rate higher (RR 1.4) — driven by an ~8% reoperation rate for mesh complications
Fewer anatomic recurrences (RR 0.4)	Mesh exposure/erosion in 2–19% after transvaginal POP mesh (vs 1–2% after midurethral sling)
Fewer reoperations specifically for prolapse recurrence (RR 0.5)	De novo dyspareunia, chronic pelvic/groin pain, vaginal discharge
Better anatomic support in the anterior compartment than native tissue	No Level I evidence base for managing mesh exposure — guided by expert opinion only
	Native-tissue repair has lower risk of de novo SUI and bladder injury

Net interpretation: mesh improves anatomical durability but trades this for a distinct, sometimes intractable, complication profile — the basis on which regulators judged risk to outweigh benefit for transvaginal placement.

Complications and their management

- ▶ **Mesh exposure/extrusion** (vaginal epithelium fails to cover the graft) — asymptomatic, small (<5 mm) exposures: expectant watch with a 6–12-week trial of vaginal estrogen; larger or symptomatic exposures: vaginal excision of exposed mesh with re-closure.
- ▶ **Erosion into bladder/urethra/rectum** — less common than vaginal exposure but harder to treat; needs cystoscopy/proctoscopy-guided partial or complete mesh excision.
- ▶ **Chronic pelvic pain/dyspareunia** — often multifactorial; multidisciplinary approach (pelvic-floor physiotherapy, trigger-point injection, analgesics) before surgical mesh revision/removal; counsel that pain may persist even after removal.
- ▶ **Visceral/vascular injury at insertion** — bladder perforation, ureteric kinking, bowel injury (trocar-passed arms); intraoperative cystoscopy mandatory.

- ▶ **Infection/chronic sepsis and fistula formation** (vesicovaginal, rectovaginal) — mesh removal usually required.
- ▶ **Recurrent prolapse despite mesh** — repeat surgery is technically harder once mesh is in situ.

Regulatory evolution and current status

Year	Action
2008	FDA Public Health Notification — surgeons/patients alerted to mesh erosion and exposure
2011	FDA Safety Communication — declared these complications "not rare"; ordered postmarket surveillance studies
2016	Transvaginal mesh reclassified from Class II (moderate-risk) to Class III (high-risk); premarket approval required
April 2019	FDA ordered all transvaginal mesh for prolapse repair withdrawn from the US market — risks judged to outweigh benefits

The American Urogynecologic Society and the American College of Obstetricians and Gynecologists (ACOG Committee Opinion No. 694) responded with guidance stressing detailed informed consent, disclosure of mesh-specific complications and alternatives, and mandatory specialised surgeon training wherever mesh (including sacrocolpopexy mesh, which is unaffected by the ban) continues to be used.

Patient selection

Suitable (historically, where mesh is still an option — e.g. sacrocolpopexy)	Contraindicated
Recurrent prolapse after native-tissue repair	Atrophic vaginal tissue
Prolapse with an underlying connective-tissue disorder	Active pelvic infection
High surgical risk for a more invasive alternative	Uncontrolled diabetes mellitus
	Obesity, smoking, prior pelvic radiotherapy

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 10.12 — RASC (robot-assisted sacrocolpopexy) mesh fixation during sacrocolpopexy (Te Linde's Operative Gynecology 13e, p.580)

High-yield exam pointers

- ▶ FDA timeline mnemonic: 2008 notify → 2011 "not rare" → 2016 Class III → 2019 market withdrawal (transvaginal POP mesh only).
- ▶ Only **Type I macroporous monofilament polypropylene** mesh is recommended — better infection/erosion resistance than microporous or multifilament types.
- ▶ Cochrane headline numbers: RR 0.4 anatomic recurrence (favours mesh), RR 1.4 overall reoperation (favours native tissue) — the crux of the "critical evaluation."
- ▶ Sacrocolpopexy mesh and midurethral sling mesh are **not** covered by the 2019 ban — only transvaginal POP-repair mesh kits are.
- ▶ Mesh exposure rate: transvaginal POP mesh 2–19% vs midurethral sling 1–2%.
- ▶ ACOG Committee Opinion No. 694 = "Management of Mesh and Graft Complications" — the go-to citation.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older textbook descriptions (including some Indian texts) present transvaginal mesh kits as a routine option for anterior/posterior prolapse; current practice follows the 2019 US FDA withdrawal and equivalent international regulatory caution, restricting synthetic transvaginal mesh use while sacrocolpopexy and midurethral sling mesh remain in use under strict informed consent.

SOURCE & COVERAGE

Te Linde's Operative Gynecology 13e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e. Guidelines: US FDA regulatory orders (2008, 2011, 2016, April 2019); ACOG Committee Opinion No. 694 ("Management of Mesh and Graft Complications"); American Urogynecologic Society mesh-use guidance.

♦ ♦ ♦

Define stress urinary incontinence. How will you manage it

Asked in: Paper III 26-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Stress urinary incontinence (SUI) is the involuntary leakage of urine from the external urethral meatus on effort or physical exertion, or on sneezing or coughing — occurring whenever intra-

abdominal pressure suddenly rises. When confirmed on urodynamic study as involuntary urethral loss of urine occurring when intravesical pressure exceeds maximum urethral closure pressure **in the absence of any detrusor contraction**, it is termed **genuine stress incontinence (GSI)** — the International Continence Society (ICS)/International Urogynecological Association (IUGA) standard.

Aetiopathogenesis

SUI is fundamentally anatomical — loss of the intra-abdominal position of the bladder neck and proximal urethra, so a rise in intra-abdominal pressure is no longer transmitted equally to bladder and urethra. Two overlapping mechanisms operate: **urethral hypermobility** (~80%) and **intrinsic sphincter deficiency (ISD)** (~20%).

Risk factor	Mechanism
Vaginal childbirth (prolonged 2nd stage, instrumental delivery, macrosomia)	Denervation/damage of pubocervical fascia and pelvic floor
Connective-tissue weakness (collagen defect)	Poor vesicourethral support
Pregnancy itself	Functional, high progesterone
Menopause/oestrogen deficiency	Atrophy of urethral supports, ↓ periurethral vascularity
Prior pelvic surgery (colporrhaphy, VVF repair, bladder-neck surgery)	Peri-urethral fibrosis
Obesity (BMI ≥ 30), chronic cough, constipation	Chronically raised intra-abdominal pressure
Increasing age, symphyseal trauma	Weakening of supports

Clinical features

- ▶ Involuntary loss of a **small** amount of urine, precisely coinciding with coughing, sneezing, laughing, or straining.
- ▶ **No preceding urge** to void; patient is fully aware of each leak.
- ▶ Rare in the supine position or during sleep (distinguishes it from urge incontinence/overactive bladder).
- ▶ Typically a multiparous, often obese, postmenopausal woman; symptoms frequently date from the last childbirth or a vaginal operation.
- ▶ Associated pelvic organ prolapse (cystocele/cystourethrocele) commonly seen on examination.

Clinical grading

Grade	Feature
I	Leakage only on cough/sneeze

Grade	Feature
II	Leakage with mild exertion (walking, climbing stairs)
III	Leakage even on simple change of posture

Differential diagnosis

Feature	Stress incontinence	Urge incontinence (sensory)	Overactive bladder
Preceding urge	Absent	Present	Present (except neurological disease)
Amount lost	Small	Large	Large
Control	Fully aware, can control	Aware, some control	Cannot control despite trying
Cystometry	Leak on cough, no rise in detrusor pressure	Normal	Involuntary detrusor contraction on filling

Investigations

Test	Purpose/finding in SUI
Midstream urine culture	Exclude UTI before invasive testing
Clinical stress test	Drops of urine seen at meatus on coughing, supine then standing, bladder full
Pad test (1-hour)	Weight gain > 1 g after standardised exertion = objective leakage
Frequency-volume (bladder) chart	3-day diary of intake, voids, leakage episodes
Post-void residual urine	Normal < 50 mL; excludes voiding dysfunction
Uroflowmetry	Normal flow (15–25 mL/sec), insignificant residual in SUI
Cystometry (filling + voiding)	Normal capacity, no detrusor contraction; leak on coughing/straining confirms GSI, excludes detrusor overactivity
Urethral pressure profilometry	Fall in urethral closure pressure on straining — pathognomonic of GSI
Valsalva leak-point pressure	Maximum urethral closure pressure < 20 cmH₂O defines intrinsic sphincter deficiency
Cystourethroscopy/videocystourethrography/transvaginal ultrasound	Reserved for failed prior surgery, haematuria, suspected fistula, or bladder-neck anatomy assessment

Urodynamics are not mandatory for uncomplicated SUI; indicated for mixed symptoms, voiding difficulty, neuropathy, or before repeat surgery.

Management

A. Preventive — avoidance of prolonged/traumatic second stage of labour, weight reduction to normal BMI, and control of chronic cough, constipation, diabetes, and chronic pulmonary disease.

B. Conservative (first-line, especially in mild–moderate SUI and women wishing to preserve fertility)

- ▶ **Supervised pelvic floor muscle training (PFMT/Kegel exercises)** — repeated voluntary contraction of the levator ani/rhabdosphincter, ≥ 8 –12 contractions per session, several sessions daily, for at least 3 months; strengthens the periurethral sphincter and restores closure pressure.
- ▶ **Biofeedback-assisted PFMT** with a vaginal pressure probe — best for minor GSI, especially soon after delivery.
- ▶ Vaginal weighted cones; pelvic-floor electrical (pudendal nerve) stimulation; vaginal support devices (pessaries, bladder-neck support prosthesis).
- ▶ Weight reduction in obese women; treatment of chronic cough/constipation.
- ▶ **Drug therapy** (adjunctive, modest benefit): topical vaginal oestrogen for postmenopausal atrophy; **duloxetine** (serotonin–noradrenaline reuptake inhibitor) raises urethral sphincter tone centrally, used when surgery is deferred/refused (nausea limits tolerability); periurethral bulking agents (bovine collagen, Teflon, calcium hydroxyapatite) injected cystoscopically suit minor ISD or surgery-unfit women, but effect is short-lived.

C. Surgical (definitive treatment; indicated when conservative measures fail or SUI is moderate–severe)

Principle: restore the bladder neck and proximal urethra to an intra-abdominal position and support the vesicourethral junction so intra-abdominal pressure is transmitted equally to bladder and urethra.

Procedure	Key points
Mid-urethral synthetic sling — current first-line surgery	
— Tension-free vaginal tape (TVT), retropubic route	Petros/Ulmsten; polypropylene tape tension-free under mid-urethra via retropubic space; cystoscopy mandatory; success ~90% at 3 years; risk of bladder perforation (3–9%)
— Transobturator tape (TOT)	Delorme; tape through obturator foramen, avoids retropubic space, no cystoscopy needed, day-care; efficacy comparable to TVT with fewer bladder/vascular injuries
— Single-incision "mini-slings"	8 cm mesh sub-urethrally without traversing retropubic/obturator space; minimally invasive

Procedure	Key points
Retropubic colposuspension	
— Burch colposuspension	Gold-standard open/laparoscopic; endopelvic fascia/lateral fornix sutured to ipsilateral iliopectineal (Cooper's) ligament; long-term success 80–90%; also corrects mild cystocele
— Marshall–Marchetti–Krantz (MMK)	Paraurethral fascia sutured to periosteum behind symphysis pubis; risk of osteitis pubis
Pubovaginal (sling) procedures	Autologous rectus fascia/fascia lata or synthetic sling around bladder neck under minimal tension; for recurrent/complicated ISD after failed primary surgery; success ~70%
Endoscopic bladder-neck suspension (Pereyra/Stamey/Raz)	Needle suspension of paravaginal tissue to rectus sheath cystoscopically; long-term success only ~50%; suited to frail elderly women
Kelly's anterior colporrhaphy/plication	Plication of pubocervical fascia beneath bladder neck; simple, corrects coexistent cystocele; success only 50–60%
Urethral bulking agents	For ISD or when anaesthesia contraindicated; effect wanes over time
Salvage procedures	Artificial urinary sphincter, urinary diversion — for repeatedly failed surgery

Choice is individualised by age, severity, coexistent prolapse, fertility wishes, and surgeon experience; mid-urethral slings (TVT/TOT) are now preferred worldwide over older suprapubic/needle-suspension techniques for equal-or-superior cure rates with lower morbidity.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 25.6 — Kinking of the urethra during stress, pulling the bladder neck upward and forward (DC Dutta's Gynaecology 7e, p.348)

High-yield exam pointers

- ▶ Definition: leak on **effort/exertion/cough/sneeze**, no preceding urge, small amount, patient fully aware.
- ▶ GSI = ICS/IUGA-confirmed SUI on urodynamics: leak with intravesical pressure > urethral pressure **without detrusor contraction**.
- ▶ Two mechanisms: **urethral hypermobility (80%)** vs **intrinsic sphincter deficiency, ISD (20%)** — ISD defined by maximum urethral closure pressure < 20 cmH₂O.
- ▶ Pad test positive = > 1 g weight gain in 1 hour.

- ▶ Grade I–III clinical grading (cough only → mild exertion → any posture change).
- ▶ Conservative first: PFMT (Kegel) for ≥ 3 months; drug option **duloxetine**.
- ▶ Surgery: **mid-urethral sling** (TVT/TOT) is current standard of care; **Burch colposuspension** remains the **gold-standard** open procedure.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older editions of DC Dutta's Gynaecology still list needle suspension (Pereyra/Stamey) and Kelly's plication as mainstream options; current practice (Berek & Novak 16e; AUA/SUFU and NICE guidance) favours the mid-urethral sling as first-line surgery for uncomplicated SUI, with Burch colposuspension as the standard open alternative.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 25 — Urinary Problems in Gynecology); Berek & Novak's Gynecology 16e (Urogynecology — Stress Urinary Incontinence chapter); Te Linde's Operative Gynecology 13e (Surgery for Stress Urinary Incontinence).



Describe De Lancey's classification of pelvic supports. Write a note on POP-Q grading of genital prolapse and its application

Asked in: Paper I 06-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — The vagina and uterus are held in position by a continuous, layered system of fascial (paracolpium) and muscular attachments running from the pelvic side-wall to the vaginal wall. *John O.L. DeLancey* (1992), from cadaveric dissection, described this as three biomechanical **levels of vaginal support** — Level I, II, and III — which explains why loss of a particular level predisposes to prolapse of a specific vaginal segment. The **Pelvic Organ Prolapse Quantification (POP-Q)** system, adopted by the

International Continence Society (ICS) in 1996, is the standardized, site-specific method used to measure and stage the resulting prolapse.

De Lancey's levels of pelvic (vaginal) support

Level	Supporting structures	Biomechanical role	Consequence of failure
Level I — apical (proximal suspension)	Paracolpium continuous with the cardinal–uterosacral ligament complex , suspending the cervix/vaginal apex to the sacrum and lateral pelvic side-wall	Vertical suspension of the vaginal apex	Uterine prolapse or post-hysterectomy vaginal vault prolapse ± enterocele
Level II — mid-vaginal (lateral attachment)	Paracolpium fusing the vaginal wall laterally to the arcus tendineus fasciae pelvis (anteriorly) and arcus tendineus levator ani (posteriorly); fibromuscular layer of the vaginal wall (older term "endopelvic fascia")	Horizontal lateral attachment stabilising the mid-vagina	Cystocele (anterior paravaginal defect) or rectocele (posterior defect)
Level III — distal (fusion)	Distal vagina fused: anteriorly to the urethra , laterally to the levator ani , posteriorly to the perineal body	Direct fusion/fixation of the distal vagina (no true suspension)	Urethral hypermobility , distal rectocele, deficient perineal body, widened genital hiatus

The **levator ani** supports all three levels indirectly by narrowing the genital hiatus and maintaining a near-horizontal vaginal axis (the "levator plate") over which the upper vagina rests; loss of levator tone widens the hiatus and transfers load onto the Level I–II ligaments, accelerating prolapse. Disruption of Level I predisposes to apical prolapse, while Level II/III defects predispose to anterior/posterior wall prolapse — all defective levels must be identified and repaired at reconstructive surgery.

POP-Q — points, measurements and staging

Nine reproducible points/measurements are recorded in centimetres relative to the **hymen** (fixed zero reference): negative = proximal (above), positive = distal (below/beyond) the hymen. All except total vaginal length (TVL) are measured at **maximal Valsalva strain**.

Point/measurement	Description	Range
Aa	Anterior wall, midline, 3 cm proximal to external urethral meatus (bladder neck)	-3 cm to +3 cm
Ba	Most dependent point of anterior wall between Aa and the vaginal cuff/anterior fornix	-3 cm to +TVL
C	Most dependent edge of the cervix or vaginal cuff (post-hysterectomy)	±TVL
D	Posterior fornix — level of uterosacral attachment to cervix; omitted if cervix absent	±TVL
Ap	Posterior wall, midline, 3 cm proximal to hymen	-3 cm to +3 cm
Bp	Most dependent point of posterior wall between Ap and posterior fornix	-3 cm to +TVL
gh (genital hiatus)	Mid-external urethral meatus to posterior midline hymen	typically ~2–4 cm
pb (perineal body)	Posterior margin of gh to mid-anal opening	typically ~2–4 cm
tvL (total vaginal length)	Greatest vaginal depth with apex reduced to normal position	—

The nine values are conventionally recorded as a 3 × 3 grid (Aa, Ba, C / gh, pb, tvL / Ap, Bp, D). A stage is then assigned from the single most-dependent point:

Stage	Criterion
0	No prolapse — Aa, Ap, Ba, Bp all at -3 cm and C/D between -(TVL) and -(TVL-2) cm
I	Most distal point >1 cm above the hymen (≤ -1 cm)
II	Most distal point within 1 cm proximal or distal to the hymen (-1 to +1 cm)
III	Most distal point >1 cm below the hymen but $\leq$ (TVL-2) cm
IV	Complete/near-complete vaginal eversion — most distal point > (TVL-2) cm

Application of POP-Q

- ▶ **Standardised, reproducible reporting** — replaces subjective older terms (cystocele/rectocele/1st–3rd degree/prolapsed) with fixed anatomic points, enabling uniform description between examiners and across institutions.
- ▶ **Site-specific quantification** — separately grades the anterior, apical, and posterior compartments rather than a single global grade, so a compartment-specific surgical plan can be made.
- ▶ **Research and outcome reporting** — the ICS/American Urogynecologic Society (AUGS)-endorsed system used as the primary anatomic outcome measure in prolapse trials and device studies, allowing objective pre- and post-operative comparison.
- ▶ **Surgical planning** — localises the defect to a DeLancey level, guiding the choice of repair (e.g., apical/Level I defect → sacrospinous fixation or uterosacral vault suspension; Level II paravaginal defect → anterior colporrhaphy/paravaginal repair; Level III → perineorrhaphy).
- ▶ **Symptom correlation** — prolapse at or beyond the hymen (stage II with leading point ≥ 0) is the anatomic threshold that correlates best with the onset of bulge symptoms, helping decide whether findings match the patient's complaints.
- ▶ **Longitudinal follow-up** — permits objective tracking of progression or recurrence over time and after conservative measures (pessary, pelvic floor therapy).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 5.23 — DeLancey levels of support (Berek & Novak 16e, p.213)
- Fig 30.9 — Standardization of terminology for female pelvic organ prolapse (POP-Q) classification (Berek & Novak 16e, p.1759)

High-yield exam pointers

- ▶ Draw the 3×3 grid: top row Aa–Ba–C, middle row gh–pb–tvL, bottom row Ap–Bp–D.
- ▶ Mnemonic for levels: **Level I** → vault/uterus, **Level II** → sides (cysto/rectocele), **Level III** → distal (urethral hypermobility/perineum).
- ▶ Hymen = fixed zero; **negative** = above, **positive** = below/beyond the hymen.
- ▶ Stage II is the commonly confused boundary: leading edge within ± 1 cm of the hymen.
- ▶ All points measured at **maximal Valsalva strain**, except TVL (measured with apex reduced).
- ▶ **Point D is omitted after hysterectomy** — no cervix, no uterosacral attachment point.
- ▶ POP-Q staging (0–IV) approved by the **International Continence Society**, based on Bump et al. (1996) standardization.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's classical descriptive "three-tier" system of uterine support (upper/middle/inferior tier) is often taught alongside DeLancey's biomechanical levels, but the two schemes are not numerically identical — DeLancey's Level I–III model of vaginal support is the classification this question asks for and the one referenced by current texts (including DC Dutta's own chapter, which cites "DeLancey 1992" for the biomechanical basis).

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e; DC Dutta's Textbook of Gynaecology 7e; ICS/AUGS Pelvic Organ Prolapse Quantification standardization (Bump RC et al., Am J Obstet Gynecol 1996;175:10–17).

♦ ♦ ♦

Describe supports of uterus and management of 24 yr old nullipara with 3rd degree uterine prolapse

Asked in: Paper III 20-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — The uterus is normally held anteverted-anteflexed, with the external os at the level of the ischial spines, by a **three-tier system** of ligaments, fascia and pelvic-floor muscle. **Third-degree uterine prolapse (procidentia)** is descent of the entire uterine body outside the vaginal introitus — the most severe grade of pelvic organ prolapse (POP).

Supports of the Uterus (three-tier system)

Tier	Structures	Role
Upper tier	Endopelvic fascia covering the uterus; round ligaments ; broad ligaments with pelvic cellular tissue	Act only as a "guy-rope," giving a steadying/positional effect (anteversion). No role in preventing descent.

Tier	Structures	Role
Middle tier — strongest, direct support	Pericervical ring (encircles supravaginal cervix, continuous with pubocervical fascia anteriorly, cardinal ligaments laterally, uterosacral + rectovaginal septum posteriorly) + condensed endopelvic (pelvic cellular) tissue forming the cardinal/Mackenrodt's ligament , uterosacral ligament and pubocervical ligament	Stabilises the cervix at the level of the interspinous diameter — the principal, hammock-like cardinal support of the uterus
Inferior tier — indirect support	Levator ani (pubococcygeus, iliococcygeus), levator plate , perineal body , urogenital diaphragm	Forms a horizontal shelf on which the uterus, upper vagina and rectum rest; guards the urogenital hiatus against raised intra-abdominal pressure

The pericervical ring and cardinal/uterosacral complex (middle tier) are the single strongest support — their overstretching during childbirth (premature bearing-down, instrumental delivery, prolonged second stage, fundal pressure) or congenital weakness (nulliparous/congenital prolapse) is the chief cause of uterine descent.

Grading of Uterine Prolapse

Degree	Findings
1st degree	Uterus descends from its normal position but the external os remains within the vagina
2nd degree	External os protrudes outside the introitus; uterine body remains inside the vagina
3rd degree (procidentia)	Entire uterine body (and cervix) lies outside the vaginal introitus

Diagnosis of third-degree prolapse is confirmed by **palpation** — a thumb placed anteriorly and fingers posteriorly above the protruding mass appose each other. The **Pelvic Organ Prolapse Quantification (POP-Q)** system, recommended by the International Continence Society, is the current objective, site-specific method used alongside this clinical grading and should be documented (points Aa, Ba, C, D etc., referenced to the hymen).

Assessment of this Patient

- **History** — bearing-down sensation/mass descending per vaginum, duration, urinary symptoms (incomplete emptying, stress/urge incontinence), bowel symptoms, backache,

ulceration/discharge/bleeding from the mass, and — crucial in a 24-year-old nullipara — **desire for future fertility**.

- ▶ **Examination** — dorsal position, then standing with Valsalva; separate labia to grade descent; bidigital apposition test for third degree; assess for associated cystocele, rectocele, enterocele, decubitus ulcer, cervical elongation, levator ani tone and perineal body integrity; per-speculum and bimanual pelvic examination to exclude coexisting pathology (fibroid, adnexal mass).
- ▶ **Investigations** — cervical cytology (Pap smear) to clear the cervix before any conserving surgery; urine routine ± ultrasound of kidney-ureter-bladder if long-standing procidentia (risk of ureteric kinking/hydronephrosis); biopsy of any suspicious decubitus ulcer.

Management

Because the patient is **young, nulliparous and wishes to preserve fertility**, the guiding principle is **uterus-conserving (fertility-sparing) surgery — hysterectomy is avoided**.

- ▶ **Conservative measures** (adjunct, not definitive for grade 3): pelvic-floor (Kegel) exercises, correction of aggravating factors — chronic cough, constipation, obesity, heavy lifting. A **vaginal pessary** may be used only as a temporising bridge if surgery must be deferred (e.g., pending fitness); it is not curative for procidentia.
- ▶ **Definitive surgery — uterus-preserving options:**
 - **Cervicopexy / Sling operation (Purandare's operation)** — the operation of choice for **congenital or nulliparous prolapse without cystocele**. Performed abdominally: strips of rectus sheath from either side are passed extraperitoneally and stitched to the anterior surface of the cervix with silk, pulling the cervix up mechanically. It fully preserves the uterus and fertility without any cervical amputation.
 - **Fothergill's (Manchester) operation** — used where prolapse coexists with cystocele/rectocele or supravaginal cervical elongation. Steps: preliminary dilatation and curettage → **low amputation of the cervix** (kept low specifically when future childbearing is wanted) → plication of the Mackenrodt's ligaments in front of the cervix (Fothergill's stitch) → anterior colporrhaphy → colpoperineorrhaphy. It preserves the uterus but carries recognised late complications relevant to this patient — **cervical stenosis/haematometra, cervical incompetence, infertility and cervical dystocia in labour** — so it is used cautiously, and avoided in favour of cervicopexy when there is no cervical pathology to justify amputation.
 - **Sacrohysteropexy (abdominal or laparoscopic)** — an evolving uterus-sparing apical suspension (mesh from the cervix/uterine isthmus to the sacral promontory), increasingly offered where uterine preservation with apical support is desired; comparative trial data (e.g., SUPeR) versus vaginal hysterectomy with uterosacral suspension are still maturing.

- **Pelvic floor repair (PFR)** — anterior colporrhaphy plus colpoperineorrhaphy — is added to whichever uterus-conserving procedure is chosen if a coexisting cystocele/rectocele or deficient perineum is present.
- ▶ **Fallback:** vaginal hysterectomy with PFR is reserved for an older woman whose family is completed — not appropriate as first-line here.
- ▶ **Postoperative care:** early ambulation, pelvic-floor exercises in the puerperium, treatment of any chronic cough/constipation, and follow-up for recurrence; the patient should be counselled about surveillance of the retained uterus and cervix and about obstetric follow-up for any future pregnancy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 1.21 — The main supporting ligaments of the uterus viewed from above (DC Dutta's Gynaecology 7e, p.37)

High-yield exam pointers

- ▶ **Three tiers:** Upper (round + broad ligaments — "guy ropes," no support) / Middle (pericervical ring + cardinal/Mackenrodt's + uterosacral + pubocervical — **strongest, direct support**) / Lower (levator ani + levator plate + perineal body — indirect support).
- ▶ 3rd degree = **procidentia** = whole uterus outside introitus; confirmed by the bidigital apposition test.
- ▶ Young nullipara + 3rd degree prolapse → **Cervicopexy/Sling (Purandare's operation)** is the classic answer, NOT hysterectomy.
- ▶ Purandare's operation: rectus sheath strips → extraperitoneal → sutured to anterior cervix, abdominal route.
- ▶ Fothergill's operation = D&C + low cervical amputation + Mackenrodt's plication (Fothergill's stitch) + anterior colporrhaphy + colpoperineorrhaphy; late risks — cervical incompetence, stenosis, dystocia, infertility.
- ▶ Vaginal hysterectomy + PFR = reserved for elderly/family-completed women.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

POP-Q is the modern International Continence Society objective staging system; the classic 1st/2nd/3rd-degree clinical grading used in this question remains the standard exam terminology and both may be documented together.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Describe the comprehensive assessment documentation of the patient with prolapse and How does traditional pelvic floor repair differ from site specific repair?

Asked in: Paper III 17-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Pelvic organ prolapse (POP) is descent of the anterior vaginal wall (cystocele/urethrocele), posterior vaginal wall (rectocele/enterocele), uterus/cervix, or vaginal vault (post-hysterectomy) from its normal anatomical position due to failure of the levator ani and endopelvic fascial (Level I–III, *DeLancey*) supports. Comprehensive assessment combines a symptom-directed history, a systematic compartment-wise pelvic examination staged and documented on the **Pelvic Organ Prolapse Quantification (POP-Q)** system (ICS/AUGS/SGS, 1996), and adjunct bladder/bowel/pelvic-floor testing.

History

- ▶ Presenting complaint: sensation of "something coming down" per vaginam, worse with standing/straining, relieved by lying down; pelvic dragging pain/backache; dyspareunia.
- ▶ Urinary (cystocele/urethrocele): incomplete emptying needing digital reduction to void, urgency/frequency, recurrent UTI, stress incontinence, rarely retention with upper-tract compromise.
- ▶ Bowel (rectocele/enterocele): difficulty evacuating requiring digital splinting of the posterior wall/perineum, fecal/flatal incontinence.
- ▶ Sexual function and desire for future fertility (governs conservative vs. surgical route and uterine preservation).
- ▶ Obstetric history: parity, birth weight, instrumental delivery, prolonged second stage, perineal tears.
- ▶ Risk factors: menopause/oestrogen deficiency, chronic cough (smoking/COPD), chronic constipation/straining, obesity, heavy manual labour, connective-tissue disorder, prior pelvic surgery, family history.

Examination

- ▶ **General** — body mass index, chronic cough/COPD, abdominal mass, signs of a neuromuscular cause.
- ▶ **Position** — dorsal lithotomy *and* standing/squatting with Valsalva; a negative dorsal finding must be re-checked on straining in the standing position before excluding prolapse.
- ▶ **Compartment-wise inspection** — a Sims'/half-speculum retracts one wall to isolate the other (retract posterior to assess anterior, and vice versa); a Baden retractor or ring forceps at 45° exposes the apex.

- ▶ **Anterior compartment** — cystocele bulge with transverse rugae, cough impulse, reducibility; elicit stress incontinence with a full bladder.
- ▶ **Middle/apical compartment** — cervical/vault descent; bimanual palpation $\pm$ uterine sound for cervical elongation; third-degree prolapse confirmed by apposing a thumb anteriorly and fingers posteriorly above the mass.
- ▶ **Posterior compartment** — rectovaginal exam distinguishes a rectocele (finger enters the bulge from the rectum) from an enterocele (bulge close to the cervix, above reach of the rectal finger).
- ▶ **Perineum and pelvic floor** — gaping introitus, perineal body length; palpate puborectalis/pubococcygeus at 4- and 8-o'clock for tone and contraction strength; rectal exam for anal sphincter tone.
- ▶ Note decubitus ulceration, uterine size/mobility, adnexal masses.

POP-Q staging and documentation

Nine points are measured in centimetres relative to the hymen (fixed zero); proximal = negative, distal/beyond = positive. All are measured at maximal Valsalva except total vaginal length (tvL), measured with the prolapse reduced.

Point	Description	Range
Aa	Anterior wall, 3 cm proximal to urethral meatus	-3 to +3 cm
Ba	Anterior wall, most dependent point above the cuff/cervix	-3 cm to +tvL
C	Cervix or vaginal cuff (post-hysterectomy)	$\pm$ tvL
D	Posterior fornix (uterosacral attachment); omitted if no cervix	$\pm$ tvL
Ap	Posterior wall, 3 cm proximal to hymen	-3 to +3 cm
Bp	Posterior wall, most dependent point above Ap	-3 cm to +tvL
gh / pb / tvL	Genital hiatus / perineal body / total vaginal length	measured directly

The nine values are **documented as a 3 $\times$ 3 grid** (the standard POP-Q chart) or as a single line of numbers in the fixed order Aa-Ba-C-D-Ap-Bp-tvL-gh-pb, e.g. -3, -3, -8, -10, -3, -3, 11, 4, 3:

Aa	Ba	C
gh	pb	tvL
Ap	Bp	D

Stage is then assigned by the **single most-dependent point**:

Stage	Criterion
0	Aa, Ap, Ba, Bp all at -3 cm; C/D between tvl and $-(\text{tvl}-2)$ cm
I	Leading point >1 cm above the hymen
II	Leading point within 1 cm proximal or distal to the hymen
III	Leading point >1 cm below the hymen but $\leq(\text{tvl}-2)$ cm
IV	Complete/near-complete eversion; leading point protrudes beyond $(\text{tvl}-2)$ cm

Adjunct assessment

Test	Purpose/finding
Urinalysis/culture	Exclude urinary infection before interpreting lower-urinary-tract symptoms
Post-void residual (PVR)	After voiding ≥ 150 mL, PVR ≤ 100 mL is acceptable; screens for obstructive voiding from the prolapse
Prolapse-reduction stress test (pessary/ring forceps/speculum blade, bladder full)	Unmasks occult stress incontinence hidden by urethral kinking
Urethral mobility (cotton-swab/goniometer)	Resting or straining angle $>30^\circ$ = hypermobility (present in most Stage II–IV POP)
Pelvic Floor Distress Inventory (PFDI-20)	Validated symptom-severity/quality-of-life questionnaire; quantifies bother and guides treatment choice
Imaging (ultrasound/MRI/defecography)	Not routine; reserved for suspected intussusception, occult rectal prolapse, or research use

Traditional versus site-specific pelvic floor repair

Both are native-tissue (non-mesh) transvaginal repairs performed after the same initial steps — Allis-clamp delineation of the prolapse, vasopressin/local-anaesthetic hydrodissection, midline incision of vaginal epithelium, and dissection of the fibromuscular (pubocervical/rectovaginal) layer off the overlying epithelium — but differ fundamentally in philosophy and suture placement.

Feature	Traditional (midline plication)	Site-specific (defect-directed) repair
Philosophy	Reinforces the whole attenuated fibromuscular sheet by plicating it centrally, regardless of where the actual break lies	Identifies and repairs only the discrete fascial tear/separation (lateral, distal, midline, or superior), restoring normal anatomy
Technique	Series of interrupted (occasionally running) plicating sutures placed transversely/longitudinally in the midline along the length of the defect	Intraoperative digital vaginal/rectal exam locates a focal "pocket"; sutures reapproximate only the edges of that identified tear
Anterior compartment example	Traditional anterior colporrhaphy (midline plication of pubocervical fascia)	Paravaginal repair — reattaches the detached lateral fascia to the arcus tendineus fasciae pelvis (3–6 sutures/side), vaginally or abdominally
Posterior compartment example	Traditional posterior colporrhaphy ± perineorrhaphy	Site-specific rectocele repair — suture reapproximation of the identified rectovaginal fascial tear
Effect on vaginal caliber	Tends to narrow the vagina/introitus — can worsen dyspareunia	Less narrowing — theoretical advantage for sexual function
Anatomic success	Anterior colporrhaphy 37–83%; posterior colporrhaphy 76–96% at 1 year	Paravaginal repair 67–100% (vaginal), 75–97% (abdominal); site-specific posterior repair 56–100%
Functional outcome	~70% improvement in obstructed-defecation symptoms (posterior repair)	~18% improvement in splinting symptoms — comparative reviews (e.g. <i>Grimes et al.</i>) show traditional posterior colporrhaphy achieves modestly better anatomic outcomes overall
Best suited for	Diffuse attenuation without a discrete palpable defect	A discrete, digitally palpable focal tear on examination

Both approaches similarly improve anatomic support and defecatory/urinary symptoms in comparative trials; graft/mesh augmentation of either in the posterior compartment lacks supporting evidence and is not recommended.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 30.9 — Standardization of terminology for female pelvic organ prolapse (POP-Q) classification (Berek & Novak 16e, p.1759)

High-yield exam pointers

- ▶ POP-Q = ICS/AUGS/SGS 1996 standard: 9 points relative to the hymen (fixed zero); document as the 3×3 grid or a line of 9 numbers (Aa–Ba–C–D–Ap–Bp–tvI–gh–pb).
- ▶ Stage is assigned by the **single most-dependent point** — "worst compartment rule."
- ▶ PVR ≤100 mL (after voiding ≥150 mL) = acceptable; urethral straining angle >30° = hypermobility.
- ▶ Mnemonic: **Traditional tightens the whole sheet; site-specific stitches only the split.**
- ▶ Success rates to recall: anterior colporrhaphy 37–83%; posterior colporrhaphy 76–96%; site-specific posterior repair 56–100%.
- ▶ Transvaginal synthetic mesh was reclassified Class III (high-risk) by the FDA in 2016 and ordered off the US market in 2019 — native-tissue repair remains standard of care.
- ▶ Assess and document the apex in every case — isolated anterior/posterior prolapse without apical involvement is uncommon; a concomitant apical procedure is usually required.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's classical clinical first-/second-/third-degree grading of uterine descent is still used for quick bedside description in India, but the POP-Q system is the current ICS/AUGS/SGS documentation standard expected in modern practice and in the exam.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (Ch. 30 — Pelvic Organ Prolapse); Te Linde's Operative Gynecology 13e (Ch. 32 — Surgery for Pelvic Organ Prolapse); DC Dutta's Textbook of Gynaecology 7e (Ch. 16 — Displacement of the Uterus); ICS/AUGS/SGS POP-Q standardization (Bump et al., 1996).

♦ ♦ ♦

Describe the physiology of micturition and management of vesico-vaginal fistula

Asked in: Paper I Nov 2018 — RGUHS MS Obstetrics & Gynaecology

Definition — Micturition is the coordinated neuromuscular process by which the bladder alternately stores and voids urine, governed by autonomic (sympathetic/parasympathetic) and somatic pathways

acting between the sacral cord (S2–S4) and the pontine/cortical micturition centres. A vesicovaginal fistula (VVF) is an abnormal epithelialised communication between the bladder and the vagina causing continuous, involuntary escape of urine per vaginum (true incontinence).

Physiology of micturition — storage phase

- ▶ Urine enters the bladder drop by drop from the ureters at **0.5–5 mL/minute**.
- ▶ **Receptive relaxation**: the detrusor stretches to accommodate volume while intravesical pressure stays low, at only about **10 cm H₂O even at 500 mL**.
- ▶ Continence during filling is maintained by: (i) tonic contraction of the proximal urethral musculature; (ii) reflex bladder-neck sphincter contraction whenever the detrusor stretches; (iii) spinal inhibition of the cholinergic detrusor-contracting pathway; (iv) **β-adrenergic** relaxation of the detrusor fundus with **α-adrenergic** contraction of the bladder-neck smooth muscle (internal sphincter), both sympathetically mediated; and (v) the external striated sphincter (slow-twitch fibres, pudendal nerve) as a second line of guard.

Physiology of micturition — voiding phase

- ▶ At a bladder volume of about **250 mL**, stretch receptors in the bladder wall (not a rise in pressure) signal fullness via afferents in **S2, S3, S4**.
- ▶ In the **untrained bladder** (infants), this sets off an automatic spinal reflex — the detrusor contracts and voiding occurs involuntarily.
- ▶ In the **trained adult**, the spinal reflex arc is held under voluntary control by the hypothalamus and the frontal cortex, acting through a **pontine micturition centre**; the urge can be suppressed until time and place are convenient.
- ▶ When voiding is initiated, cortical/hypothalamic inhibition is withdrawn: the detrusor contracts, raising intravesical pressure to **30–50 cm H₂O**, reciprocally relaxing the internal and external sphincters; voluntary contraction of the abdominal muscles raises the pressure further to about **100 cm H₂O**, completing bladder emptying.

Nerve supply	Origin	Transmitter / receptor	Action
Parasympathetic	S2–S4 (nervi erigentes/pelvic nerve)	Acetylcholine — muscarinic	Detrusor contraction → voiding
Sympathetic	T10–L2 (hypogastric/pelvic plexus)	Norepinephrine — β (bladder fundus), α (bladder base/urethra)	β: detrusor relaxation (storage); α: bladder-neck contraction (continence)
Somatic	Pudendal nerve (S2–S4)	Acetylcholine — nicotinic	Voluntary contraction of external striated sphincter

Management of vesicovaginal fistula

A vesicovaginal fistula is caused by obstructed labour (ischaemic bladder-base necrosis, 80–90% of cases in developing countries) or by gynaecological trauma — pelvic surgery, malignancy or radiation. Management proceeds through prevention, confirmation of diagnosis, conservative trial, and definitive repair.

Preventive — WHO Safe Motherhood Initiative (1987): antenatal screening of at-risk mothers, partograph-based early detection of obstructed labour and timely delivery, continuous bladder (Foley) drainage for 5–7 days after relief of obstruction, and meticulous bladder/ureter identification during pelvic surgery.

Confirm diagnosis before treating — the **three-swab (tampon) test** (vault/mid/introital swabs after intravesical methylene blue) localises the leak: middle swab stained = VVF; only the lowest swab stained = urethrovaginal fistula; uppermost swab wet but dye-free = ureterovaginal fistula. Cystoscopy notes the ureteric relation to a large fistula.

Immediate/conservative — On diagnosis, continuous per-urethral catheterisation for **4–8 weeks** allows unobstructed drainage and epithelialisation, achieving spontaneous closure in small fistulae (2 mm–2 cm) in about **50–60%** of cases.

Operative repair

- ▶ **Preoperative work-up:** assess site, size, number and margin fibrosis and urethral/ureteric involvement (metal catheter, cystoscopy); exclude rectovaginal fistula/complete perineal tear; check haemogram and renal function; improve general condition; treat vulval dermatitis and urinary infection, starting urinary antiseptics 3–5 days pre-operatively.
- ▶ **Timing:** elective repair at **3 months** after the causative delivery/injury, once oedema and infection have settled and tissue viability is demarcated; a clean surgical injury recognised within **24 hours** may be repaired immediately; otherwise wait 10–12 weeks; **radiation fistula is repaired only after 12 months.**
- ▶ **Route:** vaginal route is preferred (less blood loss, morbidity and hospital stay); transperitoneal or transvesical route is reserved for a high/fixed vault fistula, narrow vagina, fistula close to the ureteric orifices, previous failed repair, a large/complex fistula, or when an interpositional graft is planned.
- ▶ **Principles of surgery:** perfect asepsis and exposure; minimal excision of scar tissue at the margins; adequate mobilisation of the bladder off the vagina; tension-free, water-tight two-layer bladder closure; postoperative continuous bladder drainage.
- ▶ **Steps of flap-splitting repair (the standard technique):**
 - ▶ Incise around the fistula margin (Sims' position, Sims' speculum).
 - ▶ Dissect and mobilise the vaginal wall off the bladder; excise fibrous tissue at the margin.

- ▶ Close the bladder defect with interrupted **2-0 polyglactin (Vicryl)** sutures 3 mm apart, taking the muscle wall and excluding mucosa.
- ▶ Reinforce with a second interrupted layer (muscle and fascia), burying the first suture line.
- ▶ Appose the vaginal wall with interrupted sutures (Vicryl No. '0').
- ▶ Test the closure for water-tightness with intravesical dye.
- ▶ Maintain continuous bladder drainage via an indwelling catheter.
- ▶ **Special techniques: Latzko operation** — for a small, high vault fistula after total hysterectomy; produces a **partial colpocleisis** by dissecting vaginal mucosa off the bladder around the fistula, excising the tract, closing bladder mucosa (2-0 Vicryl) with two reinforcing layers, then the vaginal mucosa, with catheter drainage for 10–14 days. **Saucerization** (Sims, 1852) — paring and suturing a very small fistula without dissecting the bladder off the vagina. **Interpositional grafts** for large/complex fistulae — **Martius graft** (bulbocavernosus muscle + labial fat pad) for bladder-neck fistula; gracilis muscle, omental pedicle (transperitoneal) or peritoneal flap for others.
- ▶ **Suture materials:** 2-0 polyglactin (Vicryl) for bladder and vagina; 4-0 polydioxanone (PDS) on a 13 mm round-bodied needle for the ureter; 3-0 PDS on a 30 mm needle for bowel.
- ▶ **Postoperative care:** urinary antiseptics; continuous bladder drainage for **10–14 days**; after catheter removal, void 1-hourly, gradually increasing the interval; monitor fluid balance and catheter patency.
- ▶ **Discharge advice:** frequent voiding; avoid intercourse for **3 months**; defer pregnancy for **1 year**; any subsequent pregnancy needs mandatory hospital antenatal care and **delivery by caesarean section**.
- ▶ **If repair fails:** repeat local repair after 3 months (the fistula usually shrinks); the best chance of cure is at the first operation, so repeated failures should be referred to an experienced fistula-surgery team.

Criteria for successful repair (WHO, 2006)

Criterion	Good prognosis	Uncertain prognosis
Number of fistulae	Single	Multiple
Site	Vesicovaginal	Rectovaginal / mixed VVF+RVF
Size	< 4 cm	> 4 cm
Urethral involvement	Absent	Present
Vaginal scarring	Absent	Present
Tissue loss	Minimal	Extensive
Ureteric drainage	Into the bladder	Into the vagina

Criterion	Good prognosis	Uncertain prognosis
Circumferential defect	Absent	Present

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 26.1 — Types of genitourinary fistula: (1) Vesicovaginal (2) Vesicourethrovaginal (3) Urethrovaginal (4) Vesicocervical (5) Ureterovaginal (6) Vesicouterine (DC Dutta's Gynaecology 7e, p.363)

High-yield exam pointers

- ▶ Storage: intravesical pressure stays ~10 cm H₂O up to 500 mL (receptive relaxation); voiding pressure rises to 30–50 cm H₂O (detrusor) and up to ~100 cm H₂O with abdominal straining.
- ▶ Nerve supply triad: parasympathetic S2–S4 (voiding), sympathetic T10–L2 (storage), pudendal (voluntary external sphincter).
- ▶ Obstetric VVF = 80–90% of cases in developing countries; classic obstructed-labour fistula surfaces at day 7–14.
- ▶ Three-swab test: middle swab stained with dye = vesicovaginal fistula.
- ▶ Repair timing rule: wait 3 months, unless a clean surgical injury is recognised within 24 hours (immediate repair) or it is a radiation fistula (wait 12 months).
- ▶ Suture rule: 2-0 Vicryl for bladder/vagina; PDS for ureter and bowel.
- ▶ Latzko = partial colpocleisis for a post-hysterectomy vault fistula; Martius graft = bulbocavernosus + labial fat pad for a bladder-neck fistula.
- ▶ Any future pregnancy after successful VVF repair must be delivered by caesarean section.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The WHO 2006 prognostic criteria and 1987 Safe Motherhood Initiative principles cited above remain consistent with current WHO/FIGO obstetric-fistula guidance; no dose or timing figure here is contradicted by current practice.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (physiology of micturition, genitourinary fistula chapter); Berek & Novak's Gynecology 16e (fistula aetiology, extraurethral incontinence); Jeffcoate's Principles of Gynaecology 9e (post-hysterectomy fistula). Guideline: WHO Safe Motherhood Initiative (1987); WHO Obstetric Fistula prognostic criteria (2006).

♦ ♦ ♦

Describe uterine support and causes of genital prolapse

Asked in: Paper I 16-Dec-2023 — RGUHS MS Obstetrics & Gynaecology

Definition — The uterus is normally held anteverted-anteflexed, cervix pointing to the axis of the vagina, with the **external os at the level of the ischial spines**, by an integrated **three-tier system** of ligaments, endopelvic fascia and pelvic-floor muscle. **Genital (pelvic organ) prolapse** is descent of the uterus and/or vaginal walls (with bladder, rectum or bowel) through the urogenital hiatus, resulting from failure of one or more of these support tiers.

Supports of the Uterus (three-tier system)

Tier	Structures	Role
Upper tier	Endopelvic fascia covering the uterus; round ligaments ; broad ligaments with intervening pelvic cellular tissue	Act only as a "guy-rope," giving a steadying/positional effect that maintains anteversion. No role in preventing descent.
Middle tier — strongest, direct support	Pericervical ring — a collar of fibroelastic tissue around the supravaginal cervix, continuous with the pubocervical ligament /vesicovaginal septum anteriorly, cardinal (Mackenrodt's) ligaments laterally, and uterosacral ligaments + rectovaginal septum posteriorly — plus the condensed pelvic cellular tissue (endopelvic fascia) carrying the uterine vessels and nerves	Stabilises the cervix at the level of the interspinous diameter; this hammock-like cardinal–uterosacral–pubocervical complex is the principal support preventing uterine descent
Inferior tier — indirect support	Levator ani (pubococcygeus, iliococcygeus — pubovisceral fibres sling around urethra, vagina, rectum), the levator plate (horizontal shelf formed by fused medial levator fibres between anorectal junction and coccyx), perineal body , and urogenital diaphragm	Forms a horizontal shelf on which the rectum, upper vagina and uterus rest; guards the urogenital hiatus against raised intra-abdominal pressure

- ▶ The **middle tier is the single strongest support** — the pericervical ring anchoring the cardinal and uterosacral ligaments takes the entire weight of the uterus and upper vagina onto the levator plate.
- ▶ The **inferior tier is equally critical clinically**: when the levator ani loses tone (childbirth trauma, denervation, menopausal atrophy), the levator plate sags, the urogenital hiatus widens, and the

middle-tier ligaments — no longer resting on a horizontal shelf — are subjected to a vertical, unsupported strain that they eventually stretch and fail under.

- **Correlate (DeLancey, 1992)** — the same anatomy is described internationally as three **levels of vaginal support**: Level I (paracolpium — cardinal–uterosacral complex, suspending the vaginal apex/cervix — equivalent to the middle tier); Level II (paracolpium attached laterally to the arcus tendineus fasciae pelvis and levator ani fascia, supporting the mid-vagina); Level III (fusion of the distal vagina to the urethra anteriorly, levators laterally, and perineal body posteriorly). Loss of Level I causes uterine/vault prolapse; loss of Level II/III causes anterior and posterior wall prolapse (cystocele/rectocele) respectively.

Causes of Genital Prolapse (Aetiology)

Category	Factors
Anatomical/mechanical	Gravitational stress of human bipedal posture; anterior inclination of the pelvis directing intra-abdominal force onto the hiatus; stress of parturition (internal rotation) causing maximal damage to puborectal levator fibres; pelvic-floor weakness inherent to the urogenital hiatus and the obstetric axis passing through it; inherent (genetic) weakness of supporting structures
Predisposing — Acquired	Vaginal delivery is the single most important predisposing factor (rare after caesarean section). Injury occurs via: (i) premature bearing-down before full cervical dilatation; (ii) forceps/ventouse delivery with forceful traction; (iii) prolonged second stage of labour; (iv) fundal pressure to deliver the placenta; (v) precipitate labour — each overstretches the Mackenrodt's and uterosacral ligaments. Also: overstretching/tears of the endopelvic fascial sheath and perineum; imperfect perineal repair with poor collagen healing; neuromuscular (pudendal nerve) damage to the levator ani during childbirth; subinvolution of supports (asthenic women, early return to strenuous activity, closely-spaced repeated childbirths)
Predisposing — Congenital	Congenital weakness of supports — responsible for nulliparous prolapse or prolapse after an easy vaginal delivery; connective-tissue disorders with a decreased type-I : type-III collagen ratio; association with occult spina bifida and other neurological abnormalities

Category	Factors
Aggravating factors	Postmenopausal oestrogen-deficiency atrophy and poor collagen repair with age; raised intra-abdominal pressure (chronic cough as in chronic obstructive pulmonary disease, chronic constipation, heavy weight-lifting occupations); asthenia/undernutrition; obesity and smoking; increased uterine weight (fibroid, myohyperplasia); multiparity

- ▶ These factors are conventionally grouped as **anatomical**, **predisposing (acquired or congenital)**, and **aggravating** — aggravating factors act mainly where the supports are *already* weakened by a predisposing cause, tipping latent laxity into clinically evident prolapse.
- ▶ Net effect: overstretched/broken cardinal–uterosacral ligaments and endopelvic fascia, combined with a sagging, denervated levator plate and a widened urogenital hiatus, allow the uterus and vaginal walls to be pushed down by intra-abdominal pressure into (and through) the vaginal canal.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.6 — Ligamentous supports of uterus (DC Dutta's Gynaecology 7e, p.187)

High-yield exam pointers

- ▶ **Three tiers:** Upper (round + broad ligaments — "guy ropes," positional only, **no support**) / Middle (pericervical ring + cardinal/Mackenrodt's + uterosacral + pubocervical — **strongest, direct support**) / Lower (levator ani + levator plate + perineal body — indirect support, horizontal shelf).
- ▶ External os normally sits at the **level of ischial spines** — the reference point for grading descent.
- ▶ DeLancey Levels I/II/III = international correlate of the Indian three-tier system (Level I = apex/cervix, II = mid-vagina, III = distal vagina/perineal body).
- ▶ Vaginal delivery = single most important acquired predisposing factor; prolapse is rare after caesarean section.
- ▶ Mnemonic for acquired injury during labour: **premature bearing-down, instrumental delivery, prolonged 2nd stage, fundal pressure, precipitate labour** — all overstretch cardinal/uterosacral ligaments.
- ▶ Congenital prolapse = nulliparous or easy-vaginal-delivery prolapse; screen for occult spina bifida.
- ▶ Aggravating (not causative) factors: menopausal atrophy, chronic cough/constipation, obesity, fibroid-heavy uterus, multiparity.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DeLancey's biomechanical "levels of support" (Berek & Novak's Gynecology 16e) is the internationally used descriptive framework and maps directly onto the upper/middle/lower tier terminology used in Indian textbooks; either terminology is acceptable if the underlying structures and their roles are stated correctly.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Discuss the evaluation and management of stress urinary incontinence

Asked in: Paper III Nov 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — Stress urinary incontinence (SUI) is the involuntary leakage of urine on effort or exertion, or on sneezing or coughing, as defined by the International Continence Society (ICS). When leakage is confirmed urodynamically — intravesical pressure exceeding maximum urethral pressure in the absence of detrusor contraction — it is termed genuine stress incontinence (GSI). The basic defect is urethral sphincter incompetence, due to urethral hypermobility (loss of urethrovesical support, ~80%) or intrinsic sphincter deficiency (ISD, a weak sphincter mechanism itself, ~20%).

Risk factors

Category	Factors
Obstetric/mechanical	Vaginal delivery, prolonged second stage, instrumental delivery, macrosomia — pelvic floor and pudendal nerve denervation
Anatomical	Congenital connective-tissue/collagen weakness; associated cystocele/cystourethrocele
Hormonal	Postmenopausal oestrogen deficiency — periurethral vascular and collagen atrophy
Chronic strain	Obesity (BMI ≥30), chronic cough (smoking/COPD), chronic constipation/straining, heavy lifting
Iatrogenic	Prior anterior colporrhaphy, VVF repair, continence surgery, symphysiotomy/pubis fracture
Other	Increasing age

Clinical evaluation

History

- ▶ Characteristic leak — small volume, synchronous with cough/sneeze/exertion, no preceding urge, rarely nocturnal, patient fully aware of the loss
- ▶ Screen for mixed symptoms — urgency, frequency, nocturia (suggests coexisting overactive bladder and changes management)
- ▶ Obstetric and prior pelvic/continence surgery history
- ▶ Comorbidities — diabetes, chronic pulmonary or neurological disease; drugs (diuretics, sedatives)
- ▶ A 3-day bladder (frequency–volume) diary — voiding pattern and functional bladder capacity

Examination

- ▶ General — body mass index; brief neurological screen (perineal sensation, bulbocavernosus reflex, integrity of S2–S4)
- ▶ Abdominal and pelvic examination with a full bladder — assess for cystocele/cystourethrocele
- ▶ **Cough stress test** — a few drops of urine escape the external meatus synchronous with cough (repeat standing if negative supine); the key clinical confirmatory sign
- ▶ **Q-tip test** — historic test for urethral hypermobility (>30° deflection of a lubricated cotton swab at the bladder neck on straining); imprecise and no longer used routinely

Investigations

Test	Purpose / finding
Midstream urine microscopy and culture	Exclude urinary tract infection before invasive testing
One-hour pad test	Objective quantification; weight gain ≥ 1 g is positive
Post-void residual (catheter or ultrasound)	Normal <50 mL; raised residual suggests voiding dysfunction
Uroflowmetry	Normal peak flow 15–25 mL/s, negligible residual, in pure SUI; low flow (<15 mL/s) with high detrusor pressure suggests outflow obstruction
Multichannel filling/voiding cystometry	Confirms GSI — leak on cough/strain with no rise in detrusor pressure; indicated for mixed symptoms, voiding difficulty, neuropathy, or prior failed surgery
Valsalva leak-point pressure (VLPP)	<60 cm H ₂ O indicates intrinsic sphincter deficiency
Urethral pressure profilometry	Maximum urethral closure pressure <20 cm H ₂ O = ISD

Test	Purpose / finding
Cystourethroscopy	Selected cases — haematuria, suspected fistula/mesh erosion, recurrent disease
Imaging (translabial ultrasound, videocystourethrography, MRI)	Bladder-neck funnelling; sling/mesh position in recurrent or complicated cases

Formal urodynamics is not mandatory before conservative therapy or an uncomplicated first continence operation in a woman with classic history and a positive cough stress test (AUA/SUFU 2017; NICE NG123, 2019) — it is reserved for mixed, complicated, or recurrent presentations.

Grading and mechanism

Clinical grade	Leakage occurs with
Grade I	Cough or sneeze only
Grade II	Mild exertion (walking, lifting, rising from sitting)
Grade III	Minimal exertion or a mere change of posture

Mechanism	Urethral hypermobility (~80%)	Intrinsic sphincter deficiency (~20%)
VLPP	Normal/high	<60 cm H ₂ O
Maximum urethral closure pressure	Normal	<20 cm H ₂ O
Surgical implication	Mid-urethral sling or colposuspension effective	Better served by bulking agent, sling, or artificial sphincter

Management

Aim: restore urethrovesical support/sphincter competence; correct reversible triggers (urinary infection, chronic cough, constipation, obesity) first; individualise to grade, mechanism, and the woman's fertility/surgical wishes.

► Conservative (first-line, all grades)

- Lifestyle — weight reduction (5–10% loss) if BMI ≥30, reduce caffeine, treat chronic cough/constipation, stop smoking
- Supervised pelvic floor muscle training (PFMT/Kegel exercises) for at least 3 months — 8–12 slow contractions, three sets daily; Grade-A first-line therapy
- Biofeedback-assisted PFMT and weighted vaginal cones for reinforcement
- Electrical stimulation of pudendal afferents in poorly-motivated or postnatal women
- Vaginal continence pessary/support device when surgery is deferred, declined, or in pregnancy/postpartum

- Vaginal (topical) oestrogen for postmenopausal atrophy — improves urgency/frequency and tissue quality but is not curative for SUI; systemic hormone replacement therapy is not recommended and may worsen SUI (HERS trial; Cochrane review)
- ▶ **Pharmacological (second-line, when surgery is unsuitable or declined)**
 - **Duloxetine 40 mg orally twice daily** — a serotonin–noradrenaline reuptake inhibitor that raises urethral sphincter tone via increased pudendal motor neuron activity; offered only when surgery is deferred/contraindicated because of side effects (nausea, insomnia, dizziness); not approved for SUI by the US FDA
- ▶ **Surgical (definitive, moderate–severe SUI failing conservative therapy)**
 - **Mid-urethral sling — first-line surgery** (AUA/SUFU 2017): retropubic tension-free vaginal tape (TVT) or transobturator tape (TOT); synthetic mesh placed tension-free under the mid-urethra; 80–90% cure at 3–5 years; TVT needs intra-operative cystoscopy (bladder perforation 3–9%); TOT avoids the retropubic space (less bladder injury, small risk of obturator neurovascular injury)
 - **Autologous pubovaginal (fascial) sling** — rectus fascia or fascia lata; used when mesh is declined/contraindicated, for ISD, or revision surgery; success ~70%, more voiding dysfunction
 - **Open or laparoscopic Burch colposuspension** — endopelvic fascia/lateral vaginal fornix sutured to the ipsilateral Cooper's (iliopectineal) ligament; long-standing gold-standard alternative, 80–90% success at 5 years; useful when concurrent abdominal/pelvic surgery is planned
 - **Periurethral bulking agents** (collagen, calcium hydroxylapatite, polyacrylamide hydrogel) injected cystoscopically — minimally invasive option for ISD, recurrent SUI, or high anaesthetic risk; lower, less durable cure rates; may need repeat injection
 - **Artificial urinary sphincter** — salvage option for severe, refractory ISD after failed prior surgery

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 25.8 — TVT procedure with needles in position; the tape is left tension-free under the urethra (DC Dutta's *Textbook of Gynaecology* 7e, p.352)

High-yield exam pointers

- ▶ ICS definition: leak on effort/exertion/cough/sneeze; "genuine" only after urodynamic confirmation (leak with no detrusor contraction)
- ▶ 80:20 rule — urethral hypermobility (80%) vs intrinsic sphincter deficiency (20%); ISD = VLPP <60 cm H₂O or MUCP <20 cm H₂O
- ▶ Clinical grades I–III: cough → mild exertion → mere posture change

- ▶ First-line conservative = supervised PFMT ≥ 3 months; first-line drug = duloxetine 40 mg BID; first-line surgery = mid-urethral sling (TVT/TOT)
- ▶ Burch colposuspension = 80–90% success at 5 years, traditional alternative to mesh sling
- ▶ Positive pad test = ≥ 1 g/hour weight gain; normal post-void residual < 50 mL; normal uroflow 15–25 mL/s

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Retropubic and transobturator mesh slings underwent regulatory scrutiny for erosion and chronic pain (UK NICE-mandated pause, 2018–2019; US FDA safety communications), so current informed consent must cover mesh-specific risks alongside non-mesh alternatives (autologous sling, colposuspension, bulking agent), per NICE NG123 (2019) and AUA/SUFU (2017).

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e. Guidelines: International Continence Society (ICS) terminology; AUA/SUFU (2017) guideline on the surgical management of female SUI; NICE NG123 (2019, UK).



Discuss the management of post hysterectomy uretero vaginal fistula and its prevention

Asked in: Paper III 18-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — A ureterovaginal fistula (UVF) is an abnormal epithelialised communication between the ureter and the vagina, almost always resulting from unrecognised ureteric injury during pelvic surgery — abdominal hysterectomy is the single commonest cause, injury occurring chiefly where the ureter is clamped with the cardinal ligament/uterine artery pedicle or at the vaginal vault. Overall incidence of ureteric injury is 0.5–1% of pelvic operations, and about 75% of all iatrogenic ureteric injuries follow gynaecological surgery. Unlike vesicovaginal fistula (VVF), the bladder is intact, so the patient continues to void normally per urethra while simultaneously leaking urine per vaginum.

Confirming the diagnosis before treatment

Management depends on the timing, side and level of injury, so this must be established first.

Test	Finding
Three-swab (tampon) test	Uppermost (vault) swab soaked with urine but unstained by dye; the lower two fistula swabs remain dry — differentiates UVF from VVF (middle swab stained) and urethrovaginal fistula (lower swab stained)
Intravenous indigo carmine test	If the vaginal urine is unstained on the three-swab test, indigo carmine is given intravenously; the vaginal urine turns blue within 4–5 minutes, confirming UVF
Cystoscopy	No spurt/efflux of urine from the ureteric orifice on the affected side; identifies the side and assesses trigonal involvement
Retrograde ureteric catheterisation	Catheter arrests at the site of injury; if it can be negotiated across, it becomes the first step of stenting
Excretory urography (IVU) / CT urogram	Confirms side and site, outlines the fistulous tract, and shows hydronephrosis/renal function
Renal ultrasound	Non-invasive; detects hydronephrosis and retroperitoneal urinoma

Management

Choice between conservative and surgical treatment depends on: time of detection (intra-operative vs early vs late postoperative), type/severity of injury (kink/ligation vs partial or complete transection vs thermal), anatomical level, and the patient's general/renal condition.

Conservative (first-line if the ureter is in continuity and diagnosed early)

- ▶ **Ureteric (double-J) stent** placed retrogradely (cystoscopic) or antegradely, left in situ for **4–12 weeks** — the initial treatment of choice when the fistula shows ureteric patency.
- ▶ Success is strongly time-dependent: stenting closes about **82% of fistulae presenting <1 month** from the causative surgery versus only **33% of older fistulae**; median successful stent duration in reported series is around 10 weeks.
- ▶ If a stent cannot be passed, or in the presence of sepsis/obstruction, a **percutaneous nephrostomy** is done to divert urine and rest the ureter before planning definitive repair.
- ▶ Treat coexisting urinary infection; correct anaemia and electrolytes before any operative step.

Surgical (definitive repair) — indicated when stenting fails, the ureter cannot be re-negotiated, or there is complete transection.

- ▶ **Timing:** an injury recognised at the time of hysterectomy is repaired **immediately** (best outcome). A fistula diagnosed early, with healthy tissue and no sepsis, may be repaired without a

mandatory wait; classically, when tissues are oedematous/infected, definitive repair is deferred **6–12 weeks** to allow inflammation to settle, mirroring VVF practice.

- **Principles:** mobilise the ureter without stripping its sheath (preserves longitudinal blood supply); tension-free, watertight, mucosa-to-mucosa anastomosis with fine **4-0 polydioxanone (PDS)** on a **13 mm needle**; anastomosis is stented internally with a double-J catheter; a passive extraperitoneal drain is left at the repair site.

Level of injury	Operation
Upper/middle-third ureter	Ureteroureterostomy — end-to-end spatulated anastomosis over a stent after adequate mobilisation of both ends
Lower-third ureter (commonest — near the cardinal ligament/vault, the classic post-hysterectomy site)	Ureteroneocystostomy (ureteric reimplantation) with psoas hitch — bladder dome is mobilised and hitched to the psoas muscle so the ureter reaches it tension-free; reimplanted through a submucosal tunnel to prevent vesico-ureteric reflux
Longer gap / injury near the pelvic brim	Boari–Ockerblad bladder flap — an obliquely raised bladder flap is tubed and the ureter reimplanted into it without tension
Extensive ureteric loss, or failed reimplantation	Ureteroileal interposition , or transureteroureterostomy (anastomosis to the contralateral ureter)
Irreparable ureter with a non-functioning kidney	Nephrectomy — a last resort

Postoperatively the double-J stent is retained about 4–6 weeks, the drain removed once output falls with no leak, and healing/renal function confirmed by IVU or renogram before stent removal.

Prevention

Pre-operative

- Identify high-risk cases before surgery — cervical/broad-ligament fibroid, endometriosis, adnexal mass, malignancy, previous pelvic surgery/irradiation — and obtain an intravenous urogram or CT urogram to define the ureteric course and any congenital anomaly.
- Correct anaemia and treat any infection; consider **preoperative ureteric catheter/stent placement** in an anticipated difficult dissection to aid intraoperative palpation.

Intraoperative

- Adequate incision and exposure — inadequate access is a common cause of blind clamping.
- **Direct visualisation and/or palpation of the ureter** throughout its pelvic course before any pedicle is clamped, rather than clamping blind.
- Gentle dissection that preserves the peri-ureteric sheath and its longitudinal blood supply — over-stripping devascularises the ureter even without direct injury.

- ▶ Clamp and ligate the cardinal ligament/uterine vessel pedicle **close to the uterus/cervix**, avoiding wide lateral bites; control any bleeding by pressure and exposure rather than blind reclamping (reclamping carries a higher injury risk than the primary clamp).
- ▶ Mobilise the bladder adequately off the cervix and anterior vaginal wall before securing the vaginal angle, since the terminal ureter runs directly on the anterior fornix.
- ▶ Use energy sources (monopolar/bipolar diathermy) cautiously near the ureteric tunnel — thermal injury has a delayed, insidious presentation.
- ▶ Visualise the ureter before placing the posterior peritonisation suture.
- ▶ **Intraoperative cystoscopy with an intravenous dye** (indigo carmine 40 mg/5 mL, or sodium fluorescein) to confirm bilateral ureteric efflux and bladder integrity before closure — increasingly practised as a routine step, particularly after vaginal and laparoscopic hysterectomy, since it detects most unsuspected injuries before the patient leaves the operating room.
- ▶ If an injury is recognised on the table, **repair it immediately** — outcomes are far better than after a delayed diagnosis.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 1.10 — The relation of the ureter to the uterine artery ("water under the bridge") (DC Dutta's Textbook of Gynaecology 7e, p.26)

Also sketch a brief management-algorithm flowchart: *Suspected post-hysterectomy urine leak per vaginum* → three-swab test + IV indigo carmine → confirm UVF and side (cystoscopy/IVU/CT urogram) → ureter in continuity and fistula <1 month old → trial of double-J stent (4–12 weeks) → healed (stent removal, confirm on IVU) OR failed/stent cannot be passed → percutaneous nephrostomy ± definitive repair by level of injury (ureteroureterostomy / ureteroneocystostomy + psoas hitch / Boari flap).

High-yield exam pointers

- ▶ Distinguishing sign: UVF patient **voids normally per urethra** while leaking per vaginum (bladder intact); VVF has continuous leak with no voiding urge.
- ▶ Three-swab test: **upper swab wet, dye-negative = ureteric**; confirm with IV indigo carmine (vaginal urine turns blue in 4–5 minutes).
- ▶ Stent success is time-critical: **82% if <1 month old** vs 33% for older fistulae; stent left **4–12 weeks**.
- ▶ Level dictates operation — upper/mid-third: **ureteroureterostomy**; lower-third (commonest site): **ureteroneocystostomy + psoas hitch ± Boari flap**.
- ▶ Repair principles: tension-free, watertight, **4-0 PDS**, internal double-J stent, extraperitoneal drain.
- ▶ Prevention triad for the exam: **identify (direct vision) → clamp/ligate close to the uterus → confirm patency (intraoperative cystoscopy + IV dye)**.

- If a stent cannot be negotiated: **percutaneous nephrostomy** before definitive repair.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Classic teaching defers definitive surgical repair by 6–12 weeks once oedema/infection settle, but contemporary series (cited in Berek & Novak) support an early trial of ureteric stenting and, where repair is still needed, earlier surgery once sepsis is controlled, rather than a fixed mandatory wait.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e.



Discuss the uses of mechanical devices in the management of stress incontinence

Asked in: Paper IV Nov 2017 — RGUHS MS Obstetrics & Gynaecology

Definition — Stress urinary incontinence (SUI) is involuntary leakage of urine on effort, exertion, coughing or sneezing, caused by urethral hypermobility and/or intrinsic sphincter deficiency (ISD). Mechanical devices are non-surgical, reversible conservative aids — placed in the vagina or urethra — that mechanically support the bladder neck/urethra or occlude the urethral lumen to prevent leakage; they are used as a first-line or bridge option before, instead of, or between surgical procedures.

Indications and Patient Selection

Category	Detail
Severity	Grade I–II genuine stress incontinence (leakage on cough/sneeze or mild exercise) with mild-to-moderate urethral hypermobility
Patient preference	Wishes to avoid, delay, or is unfit for surgery (high anaesthetic risk, elderly, comorbid disease)
Reproductive plans	Wants to preserve fertility — device is removable and does not preclude future pregnancy/delivery
Postpartum	Recent delivery with poor pelvic floor tone, before definitive surgical decision
Activity-limited SUI	Leakage only during specific high-impact activity (sport, exercise) — occlusive urethral insert used episodically

Category	Detail
Contraindications	Active vaginal infection, mucosal erosion/ulceration, poor manual dexterity for self-insertion, latex allergy (latex-containing devices), inability to attend follow-up

Classification of Mechanical Devices

Category	Examples	Principle
Vaginal — support (long-term)	Ring pessary (with/without support), incontinence dish, incontinence dish/ring with support, Suarez ring, PelvX ring, <i>Introl</i> (bladder-neck support prosthesis), continence guard	Sit in the vagina and elevate the bladder neck/urethrovesical junction, correcting hypermobility and buttressing the urethra during raised intra-abdominal pressure
Vaginal — adjunct to pelvic floor muscle training (PFMT)	Weighted vaginal cones (20–100 g)	Inserted and retained by voluntary levator contraction; act as a biofeedback tool to teach correct pelvic floor squeeze, not a permanent continence aid
Urethral — occlusive	Urethral plug, Reliance urinary control insert, Autocath 100, FemSoft urethral insert	Mechanically occlude the urethral lumen/meatus; self-inserted and removed by the patient before voiding
Newer self-fit disposable devices	Uresta, Impressa	Vaginal support devices supplied with a home sizing kit or inserted tampon-style without a clinic visit

Individual Devices — Mechanism, Fitting and Use

- ▶ **Ring pessary (with or without support)** — silicone, hinged for folding; easiest to insert/remove; elevates the bladder neck and corrects mild-to-moderate hypermobility. Commonest device used for SUI, including with mild coexisting prolapse.
- ▶ **Incontinence dish / dish with support** — bowl-shaped pessary giving firmer bladder-neck elevation; used when pelvic organ prolapse coexists with SUI.
- ▶ ****Introl bladder-neck support prosthesis**** — flexible silicone bag with two blunt prongs at one end; elevates the urethrovesical angle like a surgical bladder-neck (Pereyra-type) colposuspension. Side effects: vaginal abrasion, cystitis.
- ▶ **Continence guard** — hydrophilic polyurethane foam that expands ~30% on absorbing moisture, supporting the urethra; single-use/short-term.

- ▶ **Weighted vaginal cones (20–100 g)** — graduated set inserted twice daily for ~15 minutes; retained only by voluntary pelvic floor contraction, so acts as a biofeedback aid to correct PFMT technique rather than a structural support device.
- ▶ **Urethral plug / Reliance urinary control insert** — thermoplastic elastomer device with a metal plate, soft stalk, and one or two terminal spheres; the proximal sphere sits at the bladder neck, the distal sphere at the point of maximal urethral pressure, reducing urine forced into the proximal urethra on raised intra-abdominal pressure (Nielsen design, 1990).
- ▶ **Autocath 100** — silver-coated surgical-steel cylinder with a spring-loaded plunger regulating urine flow through it.
- ▶ **FemSoft urethral insert** — soft, balloon-tipped catheter-like insert placed in the urethra and removed before voiding; suited to episodic, activity-related SUI (for example, athletes who leak only during a sport). Limited long-term by a roughly one-third incidence of urinary tract infection.
- ▶ **Fitting (any vaginal device)** — examine in lithotomy position, bladder empty; size by digital examination/ring forceps; select the smallest device retained on standing, Valsalva and cough while a finger can still sweep between device and vaginal wall; confirm voiding with device in place; teach self-insertion/removal.

Efficacy, Complications and Follow-up

Aspect	Finding
Comparative trial (pessary vs behavioural therapy vs combination)	Behavioural (PFMT) therapy gave greater satisfaction and fewer bothersome symptoms at 3 months; by 12 months results were similar across all three arms
Patient-reported outcome with continence pessary	About 40% of women reported being "much/very much better" and 50% were satisfied with pessary treatment; benefit of adding PFMT was additive short-term but this advantage waned by 1 year
Device preference	Women with prior pelvic surgery tended to prefer ring pessaries; those without prior surgery had a more even split between ring and space-filling (Gellhorn-type) devices
Cochrane evidence	Systematic reviews conclude there is little controlled-trial evidence for long-term sustained benefit of mechanical devices in urinary incontinence
Complications	Vaginal discharge/odour, mucosal erosion or abrasion, failure to retain or expulsion, cystitis (with <i>Introl</i>), urinary tract infection (with urethral inserts used long-term), voiding difficulty if oversized

Aspect	Finding
Follow-up	Review at 1–2 weeks after fitting, then 4–6 weeks; thereafter every 6–12 months if the patient manages the device herself, or every 4–12 weeks if the clinician removes/cleans it

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 38.48 — Ring pessary (DC Dutta's Gynaecology 7e, p.556)

Recent advances [RA]

- ▶ **Self-fit disposable vaginal devices** — Uresta (supplied with a home sizing kit) and Impressa (a tampon-applicator-style device that provides additional support at the lateral vaginal fornices) allow women to select and insert a continence device at home without an initial clinic visit, improving access to conservative therapy.
- ▶ **Digital biofeedback device** — the Leva pelvic health system (Renovia Inc.) is a motion-sensor intravaginal device paired with a smartphone application that gives real-time feedback on pelvic floor muscle contractions during exercises; a randomised trial found significantly more women reported being "much/very much improved" with Leva-guided training than with standard written/video home PFMT instruction (44.1% versus 28.8%).
- ▶ **Long-term outcome data on urethral inserts** — extended follow-up of the FemSoft urethral insert shows a durable reduction in incontinence episodes but a clinically significant rate of urinary tract infection with prolonged use, limiting it chiefly to episodic/activity-related SUI rather than continuous daily wear.
- ▶ **Evidence synthesis** — Cochrane reviews on mechanical devices and on pessaries for incontinence (Lipp, Shaw and Glavind; Bugge and colleagues) continue to find the randomised evidence base thin, and current guideline documents (for example, the National Institute for Health and Care Excellence's NICE NG123, 2019, on urinary incontinence and pelvic organ prolapse in women) position vaginal support/continence devices as one conservative option — alongside supervised PFMT — for women who wish to avoid or delay surgery, rather than as a substitute for surgery once significant intrinsic sphincter deficiency is confirmed.

High-yield exam pointers

- ▶ Two device families: **vaginal** (support the bladder neck/urethra — ring pessary, dish, *Introl*, continence guard) versus **urethral** (occlude the lumen — plug, Reliance insert, Autocath 100, FemSoft).
- ▶ **Ring pessary** = commonest, easiest to fit/remove; best for Grade I–II GSI with hypermobility.
- ▶ **Introl** = silicone bag + 2 prongs → elevates urethrovesical angle like a surgical colposuspension.

- ▶ **Continence guard** = hydrophilic foam, swells ~30% on hydration.
- ▶ **Vaginal cones 20–100 g** = biofeedback adjunct to PFMT, not a stand-alone continence device.
- ▶ **Autocath 100** = silver-coated steel cylinder with a spring-loaded plunger.
- ▶ Trial numbers to recall: pessary ≈ 40% "much better", 50% satisfied; Leva RCT 44.1% vs 28.8% "much/very much improved".

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Mechanical devices are conservative/bridge measures with limited long-term controlled-trial evidence of sustained benefit; definitive cure of significant urethral hypermobility or intrinsic sphincter deficiency still rests on surgery (midurethral sling being the current standard).

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Cochrane reviews on mechanical devices/pessaries for urinary incontinence; NICE NG123 (2019).



Enumerate the cause of female urinary incontinence. Discuss the management of any one types of female incontinence

Asked in: Paper IV 20-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — The International Continence Society (ICS) defines urinary incontinence as objectively demonstrable, involuntary loss of urine sufficient to cause a hygienic or social problem. By mechanism

it is divided into **urethral (true) incontinence** — stress, urge/overactive bladder, mixed, and overflow — and **extraurethral incontinence** from fistula or an ectopic ureter.

Causes and classification of female urinary incontinence

Category	Type	Principal causes / mechanism
Urethral	Stress urinary incontinence (genuine stress incontinence, GSI)	Urethral hypermobility (~80%) — childbirth trauma damaging the pelvic floor/pubocervical fascia, denervation of the sphincter; intrinsic sphincter deficiency (~20%) — ageing, postmenopausal oestrogen deficiency, prior anterior repair/bladder-neck or anti-incontinence surgery, radiation, symphyseal trauma
	Urge incontinence / overactive bladder (detrusor overactivity)	Idiopathic (majority); neurogenic — multiple sclerosis, spinal cord injury, cerebrovascular accident, early parkinsonism, diabetic neuropathy; psychosomatic; following prior incontinence surgery
	Mixed incontinence	Coexistent GSI and detrusor overactivity — found together in 10–15% on urodynamic testing
	Overflow incontinence	Chronic retention from an atonic/acontractile detrusor (diabetic autonomic neuropathy, lower motor neuron lesion) or bladder outlet obstruction (large cystocele, pelvic mass, postoperative oedema/reflex sphincter spasm); anticholinergic or sedative drugs
	Functional and other	Urinary tract infection, cognitive or motor impairment limiting toileting, congenital (epispadias)

Category	Type	Principal causes / mechanism
Extraurethral	Acquired	Vesicovaginal, urethrovaginal or ureterovaginal fistula — obstructed labour, pelvic/gynaecological surgery, radiotherapy, advanced malignancy, genitourinary tuberculosis
	Congenital	Ectopic ureter opening below the external urethral sphincter

Reversible/predisposing factors — "DIAPPERS"

- Delirium
- Infection (urinary tract infection)
- Atrophic urethritis/vaginitis
- Pharmacological (diuretics, sedatives, anticholinergics, alpha-blockers)
- Psychological (depression, anxiety)
- Excessive urine output (diabetes, excess fluid intake, diuretics)
- Restricted mobility
- Stool impaction

Non-reversible risk factors add to these: vaginal childbirth/parity, obesity (BMI ≥ 30), advancing age, chronic cough/pulmonary disease and smoking, and previous pelvic or incontinence surgery.

Management of stress urinary incontinence (chosen type)

Stress urinary incontinence (SUI) is the commonest type and is managed stepwise — preventive → conservative → medical → surgical — individualised by severity, age, fitness and urodynamic findings. **Preventive** measures include avoiding prolonged/traumatic second stage of labour and correcting obesity, diabetes and chronic cough.

Conservative measures

- Weight reduction and treatment of chronic cough/constipation.
- **Supervised pelvic floor muscle training (PFMT/Kegel exercises)** — squeeze-and-release of the levator ani/vagina, 10–15 contractions per set, >50 contractions/day, continued for several months; first-line for mild SUI, especially soon after childbirth.
- **Biofeedback-assisted PFMT** — visual/auditory feedback of vaginal pressure change via a vaginal probe.
- **Vaginal cones** (weighted 20–100 g) and **electrical stimulation** of the pudendal nerve to activate pelvic floor muscles.

- Vaginal devices — continence pessary or bladder-neck support prosthesis.

Medical therapy

Drug	Dose	Mechanism / role
Local vaginal oestrogen	e.g., estriol cream/pessary	Reverses postmenopausal urogenital atrophy contributing to SUI
Imipramine	10–25 mg orally, twice daily	α-adrenergic action raises urethral and bladder-neck tone
Duloxetine (SNRI)	Not licensed for SUI (FDA-approved only for depression/chronic pain/anxiety)	Centrally increases pudendal motor-neuron activity, raising urethral sphincter tone; trial evidence shows efficacy comparable to PFMT, but nausea, insomnia and dizziness limit first-line use
Periurethral bulking agents	Bovine collagen, Teflon, calcium hydroxyapatite or polyacrylamide hydrogel, injected peri-/transurethrally under cystoscopic guidance	Increases functional urethral length/coaptation; benefit is short-lived; suited to intrinsic sphincter deficiency (maximum urethral closure pressure <20 cmH ₂ O) or patients unfit for surgery

Surgical management — principle: restore the bladder neck and proximal urethra to the intra-abdominal pressure zone and support the urethrovesical junction against funnelling on strain.

Procedure	Principle	Outcome / key complications
Burch colposuspension (retropubic, 1961)	Paravaginal fascia/lateral vaginal fornix sutured to the ipsilateral iliopectineal (Cooper's) ligament	Gold standard ; 80–90% success at 5 years; open or laparoscopic; complications — detrusor overactivity, retention, bladder/urethral injury
Retropubic mid-urethral sling — tension-free vaginal tape (TVT) (Petros 1993, Ulmsten 1996)	Polypropylene tape passed tension-free under the mid-urethra via the retropubic space; mandatory intra-operative cystoscopy	80–90% success at 3 years; complications — bladder perforation (3–9%), urgency, retention, mesh erosion
Transobturator tape (TOT) (Delorme, 2001)	Tape passed through the obturator foramen, avoiding the retropubic space, to support the urethra as a hammock	Efficacy and quality-of-life comparable to TVT; less bladder/vascular injury; no cystoscopy required

Procedure	Principle	Outcome / key complications
Single-incision minislings	Short (~8 cm) mesh anchored beneath the mid-urethra only, without retropubic or obturator passage	High cure rates; least invasive; avoids visceral/vascular injury
Kelly's cystourethroplasty (plication) (Howard Kelly, 1914)	Vaginal plication of the pubocervical fascia under the bladder neck/proximal urethra with mattress sutures	Simple, corrects a coexistent cystocele; suited to elderly/unfit patients; long-term success only 50–60%
Marshall–Marchetti–Krantz (MMK, 1949)	Paraurethral/paravesical fascia sutured to the back of the symphyseal periosteum	Complications — osteitis pubis, haemorrhage, voiding difficulty; largely superseded
Pubovaginal sling (autologous rectus fascia/fascia lata, or synthetic)	Sling passed around the bladder neck, compressing the urethrovesical junction like a hammock	Reserved for recurrent/intrinsic sphincter deficiency cases; ~70% success; risk of voiding dysfunction
Endoscopic bladder-neck suspension (Pereyra–Raz–Stamey)	Paraurethral/paravesical tissue suspended to the rectus sheath under cystoscopic guidance	~50% long-term success; specially suited to elderly women
Salvage procedures	Artificial urinary sphincter; urinary diversion	Reserved for intractable, multiply-failed cases

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 25.8 — TVT procedure with needles in position. The tape is left tension-free under the urethra (DC Dutta's Gynaecology 7e, p.352)

Recent advances [RA]

- ▶ **Single-incision minislings** — third-generation mid-urethral slings avoiding retropubic or transobturator passage — offer comparable cure rates to TVT/TOT with reduced visceral and vascular injury risk.
- ▶ **Duloxetine** trial data show efficacy for SUI equal to supervised PFMT, but it remains without regulatory approval for this indication, limiting it to selected, refractory, surgery-averse patients.
- ▶ **Third-line therapy for the overactive-bladder/urge component**, now standard when conservative and anticholinergic/mirabegron therapy fail: **intradetrusor onabotulinumtoxinA (Botox) 100 units**, injected cystoscopically at ~20 sites (mostly supratrigonal), effect lasting 6 months to 2 years (risk: self-catheterisation, urinary tract infection); **sacral neuromodulation (InterStim)**, an implanted S3 nerve-root electrode with long-term success up to 54%; **percutaneous tibial nerve stimulation (PTNS)**.

- ▶ **Mirabegron**, the first FDA-approved (2012) **β3-adrenoceptor agonist**, relaxes the detrusor via the sympathetic pathway; avoids anticholinergic dry mouth/constipation but is used cautiously in uncontrolled hypertension.
- ▶ Global regulatory scrutiny of **synthetic vaginal mesh** (from 2019) has targeted transvaginal mesh used for **pelvic organ prolapse** repair because of erosion/pain complications; the mid-urethral sling for SUI is a distinct, still-recommended procedure, though informed consent must now specifically address mesh-related risk.

High-yield exam pointers

- ▶ SUI mechanism: **urethral hypermobility** (~80%) + **intrinsic sphincter deficiency** (~20%); diagnosis of "GSI" requires urodynamic confirmation.
- ▶ **DIAPPERS** mnemonic for reversible/functional incontinence causes.
- ▶ **Burch colposuspension** = **gold standard** (sutured to Cooper's/iliopectineal ligament); **TVT** (1996) and **TOT** (2001) are the current first-line minimally invasive surgeries.
- ▶ **Kelly's plication** (1914) — simple vaginal procedure but only 50–60% long-term success.
- ▶ Intrinsic sphincter deficiency = maximum urethral closure pressure < **20 cmH₂O** → bulking agents or obstructive sling, not standard colposuspension.
- ▶ OAB third-line ladder: **Botox 100 U intradetrusor** → **sacral neuromodulation/PTNS**; **mirabegron** = first β3-agonist (2012).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's Gynaecology 7e covers the surgical ladder (Kelly's plication, MMK, TVT/TOT, pubovaginal sling) in depth but is thinner on third-line overactive-bladder therapy; those points (mirabegron, onabotulinumtoxinA, sacral neuromodulation) were cross-checked against Berek & Novak's Gynecology 16e.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e. Definitions per the International Continence Society (ICS); drug-approval facts per US FDA records (mirabegron 2012, onabotulinumtoxinA for overactive bladder).



Management of 20 years old unmarried girl presents with the uterine prolapse

Asked in: Paper III 23-Nov-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Uterine prolapse is descent of the uterus (with the cervix as the leading part) down the vaginal axis toward or beyond the introitus, due to failure of its supports (uterosacral–cardinal/Mackenrodt's ligament complex, endopelvic fascia, levator ani). In a **20-year-old unmarried (nulliparous)** woman there has been no vaginal delivery, so this is **nulliparous/congenital prolapse** — a distinct entity from the common multiparous type — and it dictates a management plan built around preserving the uterus, fertility, and coital/vaginal function.

Why prolapse occurs without childbirth — aetiology to confirm

Category	Mechanism
Congenital weakness of supports	Inherent (genetic) weakness of the uterosacral–Mackenrodt's ligament complex and endopelvic fascia; the uterus herniates down along with an inverted upper vagina, and a cystocele is typically absent
Connective tissue disorder	Reduced type I : type III collagen ratio — generalised connective-tissue laxity
Occult spina bifida	Must always be actively looked for, with associated neurological deficits, when prolapse occurs in a nulliparous girl
Chronically raised intra-abdominal pressure	Chronic cough (COPD/tuberculosis), constipation, heavy weight-lifting, pelvic mass

Assessment and staging

- ▶ **History** — dragging/something-coming-down sensation worse on standing/straining and relieved by lying down, backache, difficulty voiding/incomplete bladder emptying, dyspareunia; ask specifically about chronic cough, constipation and occupation (weight-lifting).
- ▶ **General examination** — body mass index, signs of a myopathy/neuropathy (look for spina bifida occulta — sacral dimple/tuft of hair), chronic airway disease.
- ▶ **Pelvic examination** — in dorsal and standing position with Valsalva; per speculum and bimanual to confirm the uterus is the descending organ and note whether a cystocele/rectocele coexists (usually absent in the congenital type); rule out a decubitus ulcer.
- ▶ **Staging** — record BOTH the classical clinical degree and, preferably, the objective POP-Q system (International Continence Society).

Classical clinical degree	Finding
First degree	Uterus descends from its normal position; external os remains above the introitus
Second degree	External os protrudes outside the introitus; uterine body still within the vagina
Third degree (procidentia)	Cervix, body and fundus all lie outside the introitus, with eversion of the vagina

POP-Q stage	Description
0	No descent of pelvic organs
I	Leading edge >1 cm above the hymenal ring
II	Leading edge between 1 cm above and 1 cm below the hymen
III	Leading edge >1 cm beyond the hymen, without complete eversion
IV	Complete eversion of the vagina

Principles governing management in this patient

- ▶ Treat only if **symptomatic**; asymptomatic/mild prolapse can be observed with general measures.
- ▶ **Uterus- and fertility-conserving** approach is mandatory — she is unmarried and nulliparous; **hysterectomy has no place** here (it is reserved for the perimenopausal woman with family completed).
- ▶ Any procedure must preserve **vaginal calibre and coital function** for future marital life.
- ▶ Correct reversible aggravating factors (chronic cough, constipation) before and after surgery.
- ▶ If a **decubitus ulcer** is present, treat it first — vaginal pack soaked in antiseptic/oestrogen cream and manual reduction — before definitive surgery.

Stepwise management

- ▶ **General/preventive measures** — treat chronic cough and constipation; avoid heavy weight-lifting; counsel on delaying pregnancy till adequately treated.
- ▶ **Conservative management** (mild/first-degree prolapse, or while awaiting definitive surgery):
 - **Pelvic floor (Kegel) exercises** to strengthen the levator ani.
 - **Ring pessary** as a temporising measure only — it does not cure prolapse, only stretches the genital hiatus and relieves symptoms; used while awaiting surgery, if surgery is refused, or the patient is unfit.
- ▶ **Definitive surgery** — **the uterus-conserving operation of choice**:

Indication	Operation
Congenital/nulliparous prolapse without cystocele (this patient)	Cervicopexy or sling operation (Purandare's operation) — abdominal route
Prolapse with associated cystocele/rectocele where uterine preservation is still desired	Fothergill's (Manchester) operation — vaginal route, involves cervical amputation

- ▶ **Cervicopexy/sling operation (Purandare's operation) — principal steps:**
 - ▶ Transverse abdominal incision.
 - ▶ Two strips of rectus sheath (~1.5 cm wide) are raised, keeping their lateral attachment intact at the lateral border of rectus muscle.
 - ▶ Peritoneal cavity opened in the midline; bladder peritoneum dissected off to expose the uterine isthmus.
 - ▶ The free (medial) ends of the fascial strips are drawn down between the leaves of the broad ligament to the isthmus and sutured firmly to it with silk, after correcting uterine position.
 - ▶ Bladder peritoneum repaired; abdomen closed in layers.
 - Non-absorbable synthetic tape (Mersilene/Gore-Tex) is now often used instead of fascial strips.
 - This operation pulls the cervix up mechanically and **preserves the uterus, vaginal length, and virginity/coital function** — ideal for this patient.
- ▶ **Fothergill's (Manchester) operation** is reserved for cases with a genuine cystocele/rectocele needing repair; it amputates part of the cervix, so it is used cautiously (only low amputation) if future childbearing is still desired, and is generally **avoided in an unmarried girl** whenever the sling operation alone can correct the descent.
- ▶ **Follow-up** — pelvic floor exercises continued postoperatively; treat any residual urinary symptoms; contraceptive counselling to avoid pregnancy too soon after repair.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 30.9 — Standardization of terminology for female pelvic organ prolapse (POP-Q) classification (Berek & Novak 16e, p.1759)

High-yield exam pointers

- ▶ Key phrase to write first: prolapse in an unmarried/nulliparous woman = **congenital/nulliparous prolapse**, usually **no cystocele**; always exclude **occult spina bifida**.
- ▶ Operation of choice = **cervicopexy/sling operation (Purandare's operation)** — abdominal, rectus-sheath strips sutured to the cervix at the isthmus.
- ▶ **Hysterectomy is contraindicated** in this age/marital/parity group — it is reserved for elderly women with family completed.

- ▶ POP-Q stages 0–IV (hymen = fixed zero reference point) vs the classical clinical first/second/third degree (procidentia) — quote both.
- ▶ Ring pessary **does not cure** prolapse; it is only a temporising/symptomatic measure.
- ▶ Manchester (Fothergill's) operation involves **cervical amputation** — use with caution, and generally avoided here in favour of the sling operation.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Older textbook descriptions still favour fascial (rectus sheath) strips for the sling operation; many contemporary operative accounts substitute non-absorbable synthetic tape (Mersilene/Gore-Tex) for the same cervicopexy principle.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e.



Management of prolapse uterus in a 30-year-old multiparous woman

Asked in: Paper III 19-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Uterine prolapse is the descent of the uterus and cervix down the vaginal axis, from its normal anatomical position towards or through the vaginal introitus, due to weakness of its supports (uterosacral–cardinal ligament complex, pelvic floor). In a young multiparous woman it is usually **traumatic** (childbirth injury to the levator ani and endopelvic fascia), and management must weigh **preservation of the uterus and reproductive function** against definitive cure.

Staging (degree of prolapse)

System	Grading
Clinical (traditional) degrees	1st degree — uterus descends but external os stays above the introitus. 2nd degree — external os protrudes outside the introitus, uterine body still inside vagina. 3rd degree (procidentia/complete prolapse) — cervix, body and fundus all lie outside the introitus, with vaginal eversion
POP-Q (Pelvic Organ Prolapse Quantification) — International Continence Society system; objective, site-specific, uses the hymenal ring as the fixed zero point	Stage 0 — no descent. Stage I — leading edge >1 cm above hymen. Stage II — leading edge from 1 cm above to 1 cm below hymen. Stage III — >1 cm below hymen, but no complete eversion. Stage IV — complete vaginal eversion

POP-Q is the currently recommended objective system and should be used alongside the clinical degree for documentation.

Factors governing choice of treatment in THIS patient

- ▶ **Age 30 years** — reproductive life not over; uterus- and fertility-preserving options are preferred over hysterectomy unless family is definitely complete.
- ▶ **Multiparity** — supports are already weakened by vaginal delivery; further childbirth risks recurrence, so effective contraception/counselling on timing of future pregnancy is part of management.
- ▶ **Degree of prolapse, type (cystocele/rectocele/enterocele), presence of stress incontinence, patient's desire for uterine conservation, and fitness for surgery.**

Conservative management

Indicated for: mild (1st-degree/POP-Q I–II) prolapse, prolapse detected in early pregnancy, patient unwilling for surgery, or while awaiting definitive surgery. Pessary is offered as first-line therapy to any symptomatic woman regardless of stage before deciding on surgery.

- ▶ **General measures** — avoid heavy lifting, chronic cough, constipation (straining); treat any contributing cause; advise adequate birth spacing/contraception in this multiparous woman to avoid another vaginal delivery worsening the prolapse.
- ▶ **Pelvic floor muscle training (Kegel exercises)** — supervised, regular contractions of the levator ani; strengthens residual pelvic floor tone, useful for mild degrees and as an adjunct.
- ▶ **Vaginal pessary** (ring, Gellhorn, shelf) — mechanically supports the uterus by stretching the genital hiatus; does **not cure** the prolapse, only relieves symptoms. Requires periodic removal/cleaning and review for vaginal ulceration.
- ▶ **Local estrogen** — of more benefit in postmenopausal atrophic tissue; limited role at age 30 with normal estrogen status.

Surgical management — the definitive treatment of choice here

Because this patient is only 30 and multiparous (not necessarily family-complete), **uterus-conserving surgery is preferred** over hysterectomy whenever the anatomy permits; vaginal hysterectomy is reserved for women who have completed childbearing or in whom the uterus itself is diseased.

Clinical situation	Operation of choice
Uterovaginal prolapse with cervical elongation/cystocele/rectocele, family not complete , wants uterus retained	Fothergill's (Manchester) operation
Uterovaginal prolapse, family completed , elderly, or coexisting uterine disease (fibroid, DUB)	Vaginal hysterectomy with pelvic floor repair (Ward–Mayo operation)

Clinical situation	Operation of choice
Congenital/nulliparous-type prolapse, uterus descended but vaginal walls well supported, young woman desiring fertility	Cervicopexy / sling operation (Purandare's operation, abdominal route)
Young woman wanting apical support without hysterectomy, adequate vaginal length	Sacrospinous hysteropexy (vaginal, cervix/uterosacral ligaments fixed to the sacrospinous ligament) or vaginal uterosacral hysteropexy
Associated cystocele/rectocele/relaxed perineum (almost always present)	Pelvic floor repair (anterior colporrhaphy + colpoperineorrhaphy) done together with the above

- ▶ **Fothergill's (Manchester) operation** — designed specifically to correct uterine descent while preserving the uterus; ideal for this patient.
 - Preliminary dilatation and curettage (assesses cervical elongation, removes unhealthy endometrium, ensures drainage).
 - Amputation of the elongated supravaginal cervix (kept low if future childbearing is wanted).
 - Plication of the Mackenrodt's (cardinal) ligaments in front of the amputated cervix, shortening and re-suspending them — the **Fothergill's stitch** passes vaginal skin → Mackenrodt's ligament → cervical stroma (both sides) and ties anteriorly, anteverting the uterus.
 - Covering of the raw posterior cervical stump by the posterior vaginal flap (**Sturmdorf suture**, or Bonney's method).
 - Anterior colporrhaphy (repair of cystocele).
 - Colpoperineorrhaphy (± vaginal sterilization if family is complete).
 - **Complications:** haemorrhage; bladder/rectal injury; retention of urine/cystitis; dyspareunia; **cervical stenosis with haematometra; infertility and cervical incompetence** (from cervical amputation — relevant counselling point in a woman of reproductive age); cervical dystocia in a subsequent labour; recurrence of prolapse.
- ▶ **Sacrospinous hysteropexy** — an alternative uterus-conserving apical repair: the cervix/uterosacral ligament stumps are sutured to the sacrospinous ligament (usually right-sided) via the posterior vaginal wall, restoring apical support without amputating the cervix; a well-studied option where fertility preservation with an intact cervix is prioritised. Concurrent anterior colporrhaphy/enterocele repair is done first, and partial trachelectomy is added only if the cervix is markedly elongated.
- ▶ **Cervicopexy/sling (Purandare's) operation** — abdominal route: strips of rectus sheath (or non-absorbable tape) passed extraperitoneally through the broad ligament are fixed to the uterine isthmus/cervix, pulling the uterus up; used for congenital/nulliparous prolapse without significant cystocele.

- ▶ **Vaginal hysterectomy with pelvic floor repair** — offered instead if she has definitely completed her family, or if there is coexisting uterine pathology requiring removal; includes correction of any enterocele, fixation of the uterosacral/cardinal ligament pedicles to the vaginal vault (to prevent future vault prolapse), and repair of cystocele/rectocele/perineum.
- ▶ **Mesh augmentation** — synthetic (polypropylene) or biological grafts are used selectively for recurrent prolapse or connective-tissue-disorder-related prolapse; avoided as routine first surgery, particularly in a young woman, because of mesh-erosion, dyspareunia and chronic-sepsis risk.
- ▶ **Coexisting stress urinary incontinence** — assessed with the prolapse reduced (urodynamics); if demonstrable, a mid-urethral sling (transobturator tape) or Burch colposuspension is done concurrently.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 30.9 — Standardization of terminology for female pelvic organ prolapse (POP-Q) classification (Berek & Novak 16e, p.1759)

High-yield exam pointers

- ▶ Three clinical degrees vs 5-point **POP-Q** (0–IV, hymen = zero); always state both.
- ▶ Young + multiparous + wants fertility → **Fothergill's (Manchester) operation** is the classic exam answer; know its 5 composite steps (D&C → cervical amputation → Mackenrodt's plication/Fothergill's stitch → anterior colporrhaphy → colpoperineorrhaphy) and its late complications (cervical stenosis/haematometra, infertility, cervical incompetence).
- ▶ Vaginal hysterectomy with PFR = "Ward–Mayo operation," reserved for family-completed/elderly women or diseased uterus — **not** the operation of first choice in a 30-year-old.
- ▶ Sling/cervicopexy (**Purandare's operation**) = nulliparous/congenital prolapse without cystocele, abdominal route.
- ▶ Sacrospinous hysteropexy = modern uterus-conserving alternative to hysterectomy, well studied in the literature.
- ▶ Pessary is symptom relief only, never curative; offered as first-line trial before deciding on surgery.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Sacrospinous and uterosacral hysteropexy are increasingly used uterus-conserving alternatives internationally with outcomes comparable to vaginal hysterectomy with vault suspension; the corpus texts (DC Dutta's Gynaecology 7e) emphasise the classical Fothergill/Purandare options, so both are given here for completeness.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e.



Mrs. VA, 35, presented with history of mass descending per vaginam. She has a 5 years old girl and is keen on having another child. What are the conservative surgeries for prolapse? which surgeries are associated with reproductive complications and what are the complications?

Asked in: Paper III 29-Sep-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — "Conservative" surgery for prolapse means a **uterus- and fertility-preserving** operation (as opposed to vaginal hysterectomy with pelvic floor repair) — appropriate here because Mrs VA is 35, has completed only one pregnancy, and desires further childbearing. Choice of operation is dictated by her age, parity and future reproductive wish (DC Dutta's Gynaecology 7e).

Conservative (uterus-preserving) surgeries for prolapse

Operation	Route	Principle
Fothergill's (Manchester) operation	Vaginal	Amputation of the elongated cervix + plication/shortening of Mackenrodt's (cardinal) ligaments in front of the cervix + anterior colporrhaphy + colpoperineorrhaphy
Cervicopexy / sling operation (Purandare's operation)	Abdominal	Two strips of rectus sheath, passed extraperitoneally through the leaves of the broad ligament, are sutured to the anterior surface of the cervix at the isthmus, mechanically pulling the uterus up; may be combined with a Moskowitz procedure. Non-absorbable tape (Mersilene/Gore-Tex) may replace fascial strips
Sacrospinous hysteropexy	Vaginal	Cervix (or uterosacral ligaments) transfixed to the sacrospinous ligament, preserving the uterine corpus

Operation	Route	Principle
Abdominal sacrohysteropexy	Abdominal	Cervix/uterine isthmus suspended to the anterior longitudinal ligament over the sacral promontory with non-absorbable mesh, analogous to sacral colpopexy but with uterus retained
Pelvic floor exercises / ring pessary	Non-surgical	Interim/definitive conservative option while childbearing is still desired; not a "surgery" but the first-line conservative measure to offer before any operation

Not appropriate here: vaginal hysterectomy with pelvic floor repair and Le Fort's colpocleisis are both contraindicated in Mrs VA — the former removes the uterus and the latter obliterates the vagina, precluding future vaginal intercourse/delivery; both are reserved for women who have completed their family.

Which of these carry reproductive complications, and what are they

Operation	Reproductive complications
Fothergill's (Manchester) operation	Cervical stenosis (from Sturmdorf-suture fibrosis) → hematometra, dysmenorrhoea; cervical incompetence from the amputation weakening the internal os → recurrent mid-trimester abortion/preterm labour, may need cervical cerclage in a subsequent pregnancy; cervical dystocia in labour (fibrosed, non-compliant cervix) → failure to progress/prolonged labour, often needs caesarean section; infertility (cervical-factor, from stenosis obstructing sperm ascent, and post-D&C endometrial injury)
Cervicopexy/sling operation (Purandare's, abdominal)	Uterus is tethered anteriorly to the rectus sheath/tape at the isthmus; as pregnancy advances the growing uterus is restrained by the sling, risking adhesions to bowel/bladder/abdominal wall , malposition, and a technically difficult repeat abdominal delivery — elective caesarean section with adhesiolysis is usually required for subsequent pregnancy and delivery
Sacrospinous hysteropexy	Direct pregnancy data are limited; the fixed apical suspension can restrict uterine mobility/ascent in later pregnancy and risks recurrence of prolapse under the gravid uterine load — elective caesarean section is generally preferred over vaginal delivery

Operation	Reproductive complications
Abdominal sacrohysteropexy (mesh)	Non-absorbable mesh fixed to the cervix/isthmus risks mesh erosion, dyspareunia and infection ; a subsequent pregnancy risks mesh-related dystocia, so caesarean delivery is preferred to avoid mesh disruption or obstructed labour

Fothergill's operation is the one with the best-documented and most specific reproductive/obstetric complications (cervical stenosis, incompetence and dystocia) and is the classic "conservative surgery with reproductive complications" expected in this answer.

Applying this to Mrs VA

- ▶ First offer the **non-surgical option** — pelvic floor (Kegel) exercises ± a ring pessary — so that surgery can be deferred until her family is complete, since any conservative operation still carries some risk to a future pregnancy.
- ▶ If she opts for surgery now:
 - **Cervical elongation present** (uterovaginal descent with a long supravaginal cervix) → **Fothergill's operation** is the standard choice.
 - **No cervical elongation, mainly uterine descent in a young/nulliparous-type prolapse** → **Cervicopexy/sling (Purandare's) operation** is preferred, as it does not amputate the cervix.
- ▶ Whichever conservative operation is chosen, she must be counselled **before** surgery that a future pregnancy will need close antenatal surveillance for cervical incompetence (cerclage may be required after Fothergill's) and that **caesarean section is the usual mode of delivery** after either operation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.18A–D — Principal steps of Fothergill's (Manchester) operation: cervical amputation, Sturmdorf suture covering the posterior lip, and plication of Mackenrodt's ligaments in front of the cervix (DC Dutta's Gynaecology 7e, p.199)

High-yield exam pointers

- ▶ Conservative = **uterus/fertility preserving**: Fothergill's, cervicopexy/sling (Purandare's), sacrospinous hysteropexy, sacrohysteropexy.
- ▶ Vaginal hysterectomy + PFR and Le Fort's colpocleisis are **not** offered when future childbearing/coitus is wanted.
- ▶ Fothergill's steps mnemonic: **D&C** → **cervical amputation** → **Mackenrodt's plication** (Fothergill's stitch) → **anterior colporrhaphy** → **colpoperineorrhaphy**.

- ▶ Fothergill's late complications to write verbatim: **dyspareunia, cervical stenosis with hematometra, infertility, cervical incompetence, cervical dystocia in labour, recurrence of prolapse.**
- ▶ Purandare's operation = rectus sheath sling to the cervix via the broad ligament — think "sling" whenever the stem says congenital/nulliparous prolapse in a young woman.
- ▶ Any uterus-conserving prolapse operation in a woman still planning pregnancy → counsel for likely **caesarean section** in the next pregnancy.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Te Linde 13e notes the Manchester procedure is now considered to have a "limited place in modern gynaecology," with sacrospinous and uterosacral hysteropexy favoured as newer uterus-preserving options — but Fothergill's remains the operation of choice in Indian exam practice (DC Dutta) for a young woman with cervical elongation who wants to preserve fertility.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Te Linde's Operative Gynecology 13e.



Nulliparous prolapse

Asked in: Paper III Nov 2017 · Paper I Nov 2016 · Paper III Oct 2010 · Paper III Oct 2009 (4×) — RGUHS MS Obstetrics & Gynaecology

Definition — Nulliparous (congenital) prolapse is descent of the uterus, cervix and upper vagina in a woman who has never delivered vaginally, resulting from an inherent congenital weakness of the ligamentous and muscular supports of the uterus — the transcervical (Mackenrodt's) and uterosacral ligaments and the levator ani — rather than the obstetric trauma that produces the usual prolapse. It is grouped, along with recurrent prolapse, vault prolapse and prolapse with urinary/faecal incontinence, under **complex prolapse**.

Aetiopathogenesis

Feature	Nulliparous (congenital) prolapse	Usual acquired (obstetric) prolapse
Basic defect	Inherent (genetic) weakness of the supports — a decreased type I collagen ratio in the endopelvic fascia/ligaments	Ligament, levator and pudendal-nerve injury from vaginal delivery

Feature	Nulliparous (congenital) prolapse	Usual acquired (obstetric) prolapse
Antecedent event	None, or only one easy vaginal delivery	Difficult/prolonged second stage, instrumental delivery, precipitate labour, premature bearing-down, fundal pressure to deliver the placenta
Associated anomaly	Occult spina bifida and other neurological anomalies must be looked for	Not specific
Cystocele	Usually absent — the uterus descends with the upper vagina inverting on itself, en masse	Usually present — precedes/accompanies the uterine descent (traction effect)
Typical patient	Young, nulliparous woman	Multiparous, older woman
Degree at presentation	Often high-grade (2nd/3rd degree, procidentia) — no cystocele to buttress the descent	Variable

Clinical features

- ▶ Sensation of "something coming down" per vaginum, worse on standing or straining, relieved on lying down.
- ▶ Dragging low-back/pelvic pain.
- ▶ A mass protruding at or beyond the introitus — since there is no cystocele, the protruding mass is the everted vault carrying the cervix/uterus, not a bulge confined to the anterior vaginal wall.
- ▶ Urinary and bowel symptoms are usually **absent or mild** (no cystocele or rectocele to cause voiding difficulty or incomplete defaecation) — this is a useful pointer distinguishing it from the acquired type.
- ▶ Dyspareunia; blood-stained or purulent discharge if a decubitus ulcer develops on the exposed cervix or vaginal skin.

Diagnosis and differential diagnosis

- ▶ History — nulliparity, age at onset, absence of an antecedent difficult delivery; family history of a connective-tissue disorder.
- ▶ General examination for an **occult spina bifida** — sacral dimple, tuft of hair or lipoma over the sacrum, and a focused lower-limb neurological and perineal-sensation check.
- ▶ Pelvic examination in dorsal and standing positions with a Valsalva manoeuvre — note the absence of an anterior-wall bulge (no cystocele) and descent of the cervix/uterus together with an inverted upper vagina.

- ▶ Stage the prolapse with the **POP-Q (Pelvic Organ Prolapse Quantification)** system, recommended by the International Continence Society as the objective, site-specific staging method: Stage 0 = no descent; I = leading edge >1 cm above the hymen; II = within 1 cm of the hymen (−1 to +1); III = beyond the hymen without complete vaginal eversion; IV = complete eversion of the vagina.

Differentiating point	Nulliparous prolapse	Congenital elongation of cervix	Chronic uterine inversion
Vaginal fornices	Everted, drawn down with the mass	Deep and narrow, preserved	Absent — no fornix identifiable around the mass
Uterine body	Descends with the cervix; normal size on bimanual palpation/sounding once reduced	Normal size and position; only the vaginal part of the cervix is elongated	Not felt per abdomen; a cupped or absent fundus is the hallmark
Leading part	External os, identifiable/palpable	Conical elongated cervix, external os visible	No os or opening seen at the tip of the mass
Uterine sound	Confirms a normal-length cavity once reduced	Elongated cervical canal but normal cavity length	Cannot be passed the normal distance to the fundus

Management

Conservative (young/unmarried woman, mild degree, pregnancy, or patient unfit/unwilling for surgery):

- ▶ Pelvic floor (Kegel) exercises — of limited benefit, since the weakness here is constitutional and not one of tone alone.
- ▶ **Ring/shelf pessary** — does not cure the prolapse; relieves symptoms by stretching the hiatus urogenitalis. Used as a temporising measure until marriage/childbearing is complete or while awaiting surgery.

Definitive treatment is surgical. Because there is no cystocele, a standard anterior colporrhaphy/pelvic floor repair is not the operation indicated; the operation of choice is **cervicopexy (sling operation)**, also called **Purandare's operation**, which mechanically hitches the cervix up through the abdominal route while preserving the uterus and fertility.

Principal steps of cervicopexy (Purandare's operation):

- ▶ Transverse suprapubic abdominal incision through skin and fat.
- ▶ Two strips of rectus sheath (about 1.5 cm wide) are raised on each side, keeping their lateral attachment at the lateral border of the rectus muscle intact.

- ▶ Peritoneal cavity is opened in the midline; bladder peritoneum is dissected off and the uterine isthmus exposed by mobilising the bladder.
- ▶ The medial ends of the fascial strips are passed extraperitoneally between the leaves of the broad ligament down to the level of the uterine isthmus (technique as in Gilliam's ventrosuspension).
- ▶ The free ends are fixed to the anterior surface of the uterine isthmus with a firm silk stitch, after correcting the uterine position.
- ▶ Bladder peritoneum is repaired and the abdomen closed in layers; a **Moskowitz procedure** (obliteration of the pouch of Douglas) may be added to pre-empt enterocele.
- ▶ Non-absorbable synthetic tape (Marlex or Gore-Tex) is now often substituted for the fascial strips.

Other options, chosen by age, fertility wish and degree of prolapse:

- ▶ **Vaginal hysterectomy with pelvic floor repair** — reserved for the older woman whose family is complete; sacrifices fertility and is avoided as first-line in the young nulliparous patient.
- ▶ **Sacrohysteropexy** (uterus suspended to the sacral promontory with mesh, open or laparoscopic) — a modern uterus- and fertility-preserving alternative to cervicopexy.
- ▶ If **stress urinary incontinence** coexists, concurrent anti-incontinence surgery is added — transobturator tape (vaginal route) or Burch colposuspension (abdominal route).

Complications: stress urinary incontinence is the important recognised sequel of cervicopexy; as with any pelvic-suspension surgery, haemorrhage, bladder or rectal injury, and postoperative urinary retention or infection may occur.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.4A,B — A. Supports of the uterus; B. Prolapse of the uterus due to weakness of the supporting structures (DC Dutta's Gynaecology 7e, p.186)

High-yield exam pointers

- ▶ Nulliparous prolapse = **congenital prolapse** — inherent weakness of the uterine supports, NOT birth trauma; always look for an **occult spina bifida**.
- ▶ Hallmark: **no cystocele** — the uterus and inverted upper vagina descend together, so urinary/bowel symptoms are typically absent.
- ▶ Operation of choice: **cervicopexy/sling (Purandare's) operation** — rectus-sheath strips (or Marlex/Gore-Tex tape) taken extraperitoneally through the broad ligament to the uterine isthmus, abdominal route, uterus- and fertility-preserving.
- ▶ Classic differential: **congenital elongation of the cervix** — deep, narrow fornices, normal-sized and normally positioned uterine body, unassociated with prolapse.
- ▶ Pessary is temporising, not curative — bridges the gap before marriage/childbearing or before surgery.

- Belongs to the **complex prolapse** group, along with recurrent prolapse, vault prolapse and prolapse with incontinence.
- Stage with **POP-Q** (ICS); may combine cervicopexy with a **Moskowitz procedure** to pre-empt enterocele.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Berek & Novak's Gynecology 16e and Te Linde's Operative Gynecology 13e do not carry a dedicated discussion of nulliparous/congenital prolapse or the Purandare cervicopexy — this entity and its eponymous operation are described in the Indian exam-standard text, DC Dutta's Gynaecology, and remain current practice for a young nulliparous woman with a uterus-only (no cystocele) prolapse.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; International Continence Society POP-Q staging system.



Sling surgeries for stress urinary incontinence

Asked in: Paper III 16-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — A sling procedure places a strip of synthetic mesh or autologous fascia beneath the urethra (mid-urethra) or bladder neck to restore the suburethral "hammock" support and increase outlet resistance during rises in intra-abdominal pressure. Midurethral synthetic slings — tension-free vaginal tape (TVT, retropubic) and transobturator tape (TOT) — have replaced Burch colposuspension as the

current surgical gold standard for stress urinary incontinence (SUI), because sling surgery also corrects intrinsic sphincter deficiency (ISD) in addition to urethral hypermobility.

Classification of sling procedures

Category	Level of placement	Material	Examples
Midurethral synthetic sling	Mid-urethra	Monofilament polypropylene mesh	TVT (retropubic, Ulmsten 1996); TOT (transobturator, Delorme 2001, "in-to-out"/"out-to-in"); single-incision mini-slings (microslings, 8 cm mesh, no retropubic/obturator passage)
Pubovaginal (bladder-neck) sling	Bladder neck/proximal urethra	Autologous — rectus sheath (Aldridge procedure) or fascia lata; or inorganic — Silastic, Marlex, Gore-Tex	Combined vaginal + abdominal (retropubic) approach
(Comparator, not a sling)	Retropubic space	Native endopelvic fascia	Burch colposuspension, MMK — historic gold standard, now second-line to slings

Indications and preoperative evaluation

- ▶ Urodynamically confirmed SUI (hypermobility and/or ISD) after failed conservative therapy (pelvic floor muscle training, lifestyle measures).
- ▶ SUI with predominant ISD or a fixed, immobile urethra — retropubic sling preferred over Burch or TOT.
- ▶ SUI with concomitant pelvic organ prolapse — prolapse repair combined with sling at the same sitting.
- ▶ Recurrent/failed prior surgery (Burch, needle suspension) — sling is the preferred salvage option.
- ▶ Urethral loss after diverticulectomy or urethrovaginal fistula repair — autologous pubovaginal sling preferred over synthetic mesh.
- ▶ Preoperative work-up: type of incontinence on history; cough stress test/Valsalva test to confirm instantaneous leakage; post-void residual (>200 mL suggests voiding dysfunction/detrusor weakness); voiding diary; pelvic floor and prolapse assessment; urodynamic study (multichannel

cystometry, Valsalva leak-point pressure) — not mandatory in uncomplicated SUI, but indicated when symptoms and examination are discordant, in mixed incontinence, or before repeat surgery; correction of reversible factors (urinary tract infection, vaginal atrophy — topical oestrogen) and informed counselling on risks, benefits and expected cure rates.

Surgical technique

1. Retropubic midurethral sling (TVT)

- ▶ Lithotomy position, regional/general anaesthesia; Foley catheter inserted.
- ▶ 1.5–2 cm mid-urethral vaginal incision; para-urethral tunnels dissected on each side.
- ▶ Specially curved needles/trocar passed bottom-up from the vaginal incision through the retropubic space (space of Retzius), hugging the back of the pubic bone, and out through two suprapubic stab incisions; the bladder is deflected to the opposite side using a rigid guide in the Foley catheter to reduce the risk of cystotomy.
- ▶ The polypropylene tape is laid tension-free under the mid-urethra in a "U" shape — it is **not sutured** to any structure; continence results from urethral coaptation/kinking on straining.
- ▶ Cystoscopy is **mandatory** at the end to exclude bladder perforation.
- ▶ Tape ends trimmed flush with the skin; vaginal incision closed.

2. Transobturator tape (TOT)

- ▶ 2 cm mid-urethral vaginal incision; a tunnel is created laterally toward the obturator foramen on each side.
- ▶ A multifilament/polypropylene tape is passed through the obturator foramen — "outside-in" (needle enters at the groin skin crease, exits into the vagina) or "inside-out" (vagina to groin), avoiding the retropubic space.
- ▶ Tape is placed tension-free as a "hammock" beneath the mid-urethra; a spacer (e.g. artery forceps) between urethra and tape prevents over-tensioning and postoperative retention.
- ▶ Cystoscopy is **not mandatory** since the bladder is not traversed; can be done as day-care surgery under local anaesthesia.

3. Autologous pubovaginal (fascial) sling

- ▶ Harvest a 12–16 cm × 2 cm strip of rectus fascia (or fascia lata) through a low transverse suprapubic incision.
- ▶ Vaginal incision 2 cm below the urethral meatus; sharp and blunt dissection to the pubic bone, entering the space of Retzius bilaterally, staying lateral to avoid the urethra, bladder and ureters.
- ▶ A ligature carrier passed from the abdominal wound through the retropubic space delivers each end of the fascial strip; the sling is positioned beneath the bladder neck.
- ▶ Sutures are tied tension-free above the rectus sheath, leaving a two-to-three finger-breadth gap (a closed scissors should pass between sling and urethra) to prevent bladder-neck obstruction.

- Cystoscopy confirms bladder/ureteric integrity; vagina and abdominal wound closed; Foley catheter left in situ.

Complications

Complication	TVT (retropubic)	TOT (transobturator)	Autologous pubovaginal sling
Bladder perforation	Most common — 3–9%	Rare (retropubic space avoided)	Rare
Voiding dysfunction/urinary retention	Occurs; may need sling revision	Lower than TVT	Higher — may need self-catheterisation
Mesh/sling erosion	Present (delayed)	Higher rate than TVT	Sling erosion (if inorganic material used)
Vascular/bowel injury	Rare but serious (major vessel, bowel)	Very rare	Rare
Groin/thigh pain	Absent	Characteristic complaint	Absent
Other	Retropubic haematoma, urgency	Obturator neurovascular injury (rare), urinary tract infection	Detrusor overactivity

Comparative outcomes and choice of sling

Feature	TVT	TOT	Autologous pubovaginal sling
Cure rate	~80–90% at 3 years; 71% at 11.5 years	Comparable short/medium-term results to TVT; long-term data less robust	>80% continent beyond 5 years
Best suited for	ISD, mixed urinary incontinence, fixed/immobile urethra	Previous bowel/pelvic adhesive disease, avoiding retropubic space	ISD, urethral diverticulectomy/fistula repair, failed synthetic sling, or where mesh is undesirable
Evidence grade	Grade A (both TVT and TOT) — recommended over mini-slings, which lack robust long-term evidence	Grade A	As effective as midurethral slings; more effective than Burch when ISD predominates

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 24.9 — Vaginal tape procedures showing retropubic and transobturator placement (TVT and TOT) (DC Dutta's Gynaecology 6e, p.421)

High-yield exam pointers

- Mid-urethral slings (TVT/TOT) have replaced Burch colposuspension as the **current gold standard** for SUI — Grade A evidence.
- TVT = retropubic route, needle "bottom-up," mandatory cystoscopy, bladder perforation 3–9%.
- TOT = transobturator route (in-to-out/out-to-in), no cystoscopy needed, characteristic groin/thigh pain, avoids retropubic space.
- Autologous pubovaginal sling: rectus fascia strip, tied tension-free with a 2–3 finger-breadth/scissors-width gap — preferred when ISD predominates or mesh is contraindicated.
- Sling surgery treats ISD **and** hypermobility; Burch treats hypermobility only.
- Cystoscopy is mandatory after any retropubic passage (TVT, pubovaginal sling), optional after TOT.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Following safety concerns, the US FDA's 2019 order applies to transvaginal mesh used for pelvic organ prolapse repair, not to synthetic midurethral slings for stress urinary incontinence, which remain a recommended first-line surgical option in current guidance; patients undergoing any mesh sling should still be counselled on mesh-specific complications and offered the autologous fascial sling or colposuspension as non-mesh alternatives.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e.

♦ ♦ ♦

Stress incontinence

Asked in: Paper III 29-Sep-2025 · Paper III Apr 2008 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Stress urinary incontinence (SUI), or genuine stress incontinence (GSI), is defined by the International Continence Society (ICS) as involuntary loss of urine coincident with a rise in intra-abdominal pressure (coughing, sneezing, laughing, exertion) **in the absence of a detrusor contraction**.

It is a purely anatomic/mechanical disorder of urethral sphincter competence, and the diagnosis is confirmed only by urodynamic study.

Classification

Basis	Types
ICS classification of urinary incontinence	Urethral — genuine stress incontinence (GSI), detrusor overactivity (DO), mixed (GSI+DO), overflow incontinence, functional/other (UTI, congenital epispadias). Extraurethral — acquired (vesical/urethral/ureteral fistula) or congenital (ectopic ureter)
Mechanism	Urethral hypermobility (~80%) — descent of bladder neck/proximal urethra out of the intra-abdominal pressure zone; Intrinsic sphincter deficiency (ISD, ~20%) — low-pressure urethra, maximum urethral closure pressure (MUCP) <20 cmH ₂ O or abdominal leak-point pressure (ALPP) <60 cmH ₂ O, with or without hypermobility
Clinical grade	Grade I — leak only on cough/sneeze; Grade II — leak on mild exertion; Grade III — leak with mere change of posture

Etiology and risk factors

Category	Factors
Developmental	Genetic collagen/connective-tissue weakness of bladder-neck supports
Childbirth	Pelvic-floor and pubocervical fascia trauma, pudendal denervation — more common after vaginal delivery in a gynecoid (least in android) pelvis
Hormonal	Pregnancy (progesterone effect); postmenopausal estrogen deficiency causing atrophy of supports and reduced periurethral vascularity
Trauma/surgery	Symphysis pubis fracture/symphysiotomy; fibrosis after anterior colporrhaphy, VVF repair or bladder-neck surgery
Other	Increasing age; obesity (BMI ≥30); chronic cough, constipation, heavy lifting (chronically raised IAP)

Clinical features and differential diagnosis

- ▶ Leakage of urine is **brief**, coincides precisely with the moment of raised intra-abdominal pressure (cough/sneeze/laugh/exertion), and is **not preceded by urge**.

- ▶ Amount of loss is **small**; patient is **fully aware** of each episode; rarely occurs supine or during sleep.
- ▶ **Local examination** (with full bladder): variable cystocele/cystourethrocele; **stress (cough) test** — a few drops of urine seen escaping the meatus on coughing (repeat standing if supine test negative); **Q-tip test** — $>30^\circ$ elevation of a lubricated cotton swab in the urethra on straining suggests hypermobility, but the test is imprecise and now rarely used.

Feature	Stress incontinence	Urge incontinence (sensory)	Detrusor instability
Trigger	Coincides with stress; no prior urge	Urge precedes uncontrolled leak	May occur abruptly, even with a non-full bladder
Amount	Small	Large	Large
Awareness	Fully aware	Aware of urge	Often unaware
Associated	Normal micturition	Urgency, frequency	Frequency, nocturia

Investigations and diagnosis

Aim: confirm diagnosis and exclude other pathology. Urodynamic study is not mandatory when SUI is the sole symptom, but is indicated for mixed GSI/overactive-bladder symptoms, associated frequency/nocturia/voiding difficulty, neuropathy, or previous failed surgery.

Test	Finding/purpose
Midstream urine	Exclude UTI before any invasive test; hematuria needs cytology/cystourethroscopy/IVU
1-hour pad test	Weighed pad + provocative exercise for 1 hour; gain ≥ 1 g = positive
Frequency-volume (bladder) chart	Voids, leak episodes, fluid intake over ≥ 3 days
Post-void residual	Normal <50 mL; raised suggests retention/overflow
Uroflowmetry	Normal peak flow 15–25 mL/sec ; normal and near-nil residual in pure SUI
Cystometry	Normal in GSI — leak on coughing with no detrusor pressure rise; a detrusor contraction during filling indicates overactive bladder instead
Urethral pressure profile / MUCP	Marked fall in urethral closure pressure on straining is pathognomonic of GSI
Valsalva (abdominal) leak-point pressure	Lowest pressure at which leak occurs; ALPP <60 cmH₂O or MUCP <20 cmH₂O = intrinsic sphincter deficiency

Test	Finding/purpose
Cystourethroscopy	Hematuria, suspected neoplasm/fistula, urgency-frequency work-up
Videocystourethrography / transvaginal endosonography	Bladder-neck funnelling, descent of urethrovesical junction; used mainly for failed prior surgery

Management

Conservative (first-line)

- ▶ Treat reversible contributors — weight reduction to BMI <30, control of chronic cough/constipation, diabetes and neurological disease.
- ▶ **Supervised pelvic floor muscle training (PFMT/Kegel exercises)** — repeated squeeze-and-release of the levator/perineal muscles, 10–15 repetitions per session, >50 contractions/day, continued for several months; strengthens the striated periurethral sphincter and is the recommended first-line therapy before surgery is considered.
- ▶ **Biofeedback-assisted PFMT** — vaginal-probe pressure feedback to improve technique; most useful for minor GSI soon after delivery with poor pelvic tone.
- ▶ Vaginal devices — pessaries, bladder-neck support prosthesis, or weighted vaginal cones (20–100 g) to passively train pelvic floor tone.
- ▶ Electrical stimulation of the pudendal nerve to activate pelvic floor muscles.
- ▶ Drugs — **duloxetine** (a serotonin–noradrenaline reuptake inhibitor) increases urethral sphincter tone and bladder storage via a central action; effective but not first-line because of nausea, insomnia and dizziness, and not licensed specifically for SUI. **Imipramine 10–25 mg orally twice daily** (α-adrenergic/anticholinergic action) is an alternative. Systemic estrogen is **not** recommended purely for incontinence (large trials show it may worsen SUI); topical vaginal estrogen may help coexisting atrophic urgency/frequency.
- ▶ Periurethral bulking agents (bovine collagen, Teflon, calcium hydroxyapatite, polyacrylamide hydrogel) injected cystoscopically — best for minor GSI/ISD or where anaesthesia risk precludes surgery; effect is short-lived compared with surgery.

Surgical (when conservative measures fail or SUI is significant)

Principle: elevate and support the bladder neck/proximal urethra so it lies back within the intra-abdominal pressure zone, and increase functional urethral length.

Procedure	Technique	Outcome/notes
Burch colposuspension (retropubic)	Endopelvic fascia/lateral vaginal fornix sutured to the ipsilateral iliopectineal (Cooper's) ligament; open or laparoscopic	Long-standing gold-standard ; 5-year success 80–90%; complications — detrusor overactivity, retention, bladder/urethral injury

Procedure	Technique	Outcome/notes
Marshall–Marchetti–Krantz (MMK)	Paraurethral/paravesical fascia sutured to the periosteum behind the symphysis pubis	Complications include osteitis pubis, hemorrhage, voiding difficulty
Mid-urethral sling — TVT (retropubic; Petros & Ulmsten)	Synthetic tape passed tension-free under the mid-urethra via the retropubic space; cystoscopy done intra-operatively	80–90% success at 3 years; complications: bladder perforation (3–9%), mesh erosion, retention
Mid-urethral sling — TOT (transobturator; Delorme)	Tape passed through the obturator foramen, avoiding the retropubic space; no cystoscopy required	Similar success/satisfaction to TVT with fewer bladder/vascular injuries; day-care surgery
Pubovaginal (traditional) sling	Autologous (rectus fascia/fascia lata) or synthetic material looped around the bladder neck, fixed to rectus sheath, tension-free	Reserved for ISD or failed prior surgery; success ~70–90%; risk of voiding dysfunction
Endoscopic bladder-neck suspension (Pereyra/Stamey/Raz)	Paraurethral tissue suspended to rectus sheath under cystoscopic guidance	Long-term success only ~50%; largely superseded
Anterior colporrhaphy/Kelly plication	Plication of pubocervical fascia under the bladder neck	Simple but long-term success only 50–60%; not recommended as a primary SUI operation on current evidence
Salvage procedures	Artificial urinary sphincter, urinary diversion	Reserved for repeated surgical failure

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 25.6 — Kinking of the urethra during stress pulling the bladder neck upward and forward (DC Dutta's Gynaecology 7e, p.348)

High-yield exam pointers

- ▶ ICS definition: involuntary leak on raised IAP **without a detrusor contraction** — urodynamics confirms.
- ▶ 80% hypermobility vs 20% intrinsic sphincter deficiency (MUCP <20 cmH₂O / ALPP <60 cmH₂O).
- ▶ Bedside triad to write: stress/cough test, 1-hour pad test (≥1 g positive), post-void residual <50 mL.
- ▶ Cystometry is **normal** in pure GSI — leak on cough with no detrusor pressure rise (this distinguishes it from detrusor overactivity).
- ▶ Conservative first: supervised PFMT for several months before surgery.

- ▶ Surgical gold standard = **Burch colposuspension**; current minimally invasive standard = **mid-urethral sling (TVT/TOT)**.
- ▶ Kelly plication/anterior colporrhaphy alone is outdated for SUI — poor long-term cure.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Transvaginal synthetic mesh restrictions/withdrawals that followed international regulatory safety reviews applied to mesh used for **pelvic organ prolapse repair**, not to mid-urethral slings for stress incontinence, which remain a recommended option after informed discussion of alternatives; some centres favour a renewed laparoscopic Burch where mesh-averse patients are counselled.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 25 — Urinary Problems in Gynecology); Berek & Novak's Gynecology 16e (Ch. 29 — Urinary Incontinence); Te Linde's Operative Gynecology 13e (Ch. 33 — Surgery for Stress Urinary Incontinence).



Surgical management of stress urinary incontinence

Asked in: Paper IV 03-Oct-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Stress urinary incontinence (SUI), or genuine stress incontinence (GSI), is defined by the International Continence Society (ICS) as involuntary leakage of urine on effort, exertion, coughing or sneezing, occurring when intravesical pressure exceeds the maximum urethral closure pressure **in the absence of a detrusor contraction**, confirmed on urodynamic study. Surgery corrects the underlying urethral hypermobility (~80% of cases) or intrinsic sphincter deficiency (ISD, ~20%) once conservative therapy (supervised pelvic floor muscle training ± duloxetine) has failed or is declined.

Principles, objectives and indications for surgery

- ▶ **Principles** — restore the bladder neck and proximal urethra as intra-abdominal structures lying within the abdominal pressure zone; support the urethrovesical junction against funnelling when intravesical pressure rises; increase functional urethral length/coaptation.
- ▶ **Indications** — failed or refused conservative therapy; predominant, urodynamically-confirmed SUI; SUI coexisting with pelvic organ prolapse needing concurrent repair; ISD (fixed, immobile urethra).
- ▶ **Pre-operative work-up** — urodynamic study is not mandatory for pure SUI, but is indicated for mixed symptoms (SUI + overactive bladder), associated frequency/nocturia/voiding difficulty, suspected neuropathy, or previous failed anti-incontinence surgery.

Classification of surgical options

Category	Procedures	Current standing
Mid-urethral sling	Retropubic tension-free vaginal tape (TVT); transobturator tape (TOT); single-incision mini-sling	First-line/current gold standard
Retropubic colposuspension	Burch colposuspension (open/laparoscopic); Marshall-Marchetti-Krantz (MMK)	Burch = mesh-free alternative; MMK abandoned
Traditional (pubovaginal) sling	Autologous fascia lata/rectus sheath; allograft; synthetic	Reserved for ISD, failed prior surgery, mesh-averse women
Urethral bulking agents	Polydimethylsiloxane (Macropastique), calcium hydroxylapatite (Coaptite), carbon-coated zirconium beads (Durasphere)	Poor surgical candidates/office procedure
Obsolete	Kelly plication/anterior colporrhaphy; needle suspension (Pereyra/Stamey/Raz)	No role in modern SUI surgery
Salvage	Artificial urinary sphincter; urinary diversion	Only after repeated failure

Mid-urethral sling — surgical steps (TVT vs TOT)

- ▶ Dorsal lithotomy position; Foley catheter empties the bladder; a 1.5 cm anterior vaginal wall incision is made over the mid-urethra.
- ▶ Bilateral paraurethral tunnels are created with Metzenbaum scissors up to the pubic bone.
- ▶ **TVT (retropubic route)** — the bladder is deviated with a catheter guide; the trocar is passed **bottom-up**, hugging the back of the pubic symphysis through the space of Retzius, exiting two suprapubic stab incisions; **cystoscopy is mandatory** to exclude bladder perforation and confirm ureteric efflux.
- ▶ **TOT (transobturator route)** — the trocar passes outside-in or inside-out through the obturator foramen and genitofemoral crease, avoiding the retropubic space; cystoscopy is not routinely required.
- ▶ The tape is left **tension-free** against a spacer (e.g., a Hegar dilator) under the mid-urethra — never sutured, never tightened (over-elevation causes retention).
- ▶ A voiding trial is performed before discharge; both are short-stay/day-care procedures.

Feature	TVT (retropubic)	TOT (transobturator)
Route	Space of Retzius	Obturator foramen

Feature	TVT (retropubic)	TOT (transobturator)
Cystoscopy	Mandatory	Not required
3-year success	80–90%	Comparable to TVT
5-year reoperation	Lower	Higher
Key complications	Bladder perforation (3–9%), retropubic bleeding, voiding dysfunction	Groin/leg pain, mesh erosion, rare obturator neurovascular injury

Retropubic colposuspension (Burch) and Marshall-Marchetti-Krantz

- ▶ **Burch colposuspension** — via a low abdominal (open or laparoscopic) approach into the space of Retzius; the peri-urethral endopelvic fascia (or lateral vaginal fornix) on each side is elevated with a vaginal finger and fixed with **two non-absorbable figure-of-8 sutures per side** to the ipsilateral Cooper's (iliopectineal) ligament; a **suture bridge must remain** — tying down completely over-corrects and causes bladder-neck obstruction/retention. Cystoscopy confirms no intravesical suture and bilateral ureteric efflux.
- ▶ **MMK** — sutures instead anchor the paraurethral fascia to the periosteum of the pubic symphysis; **now abandoned** because of osteitis pubis (~0.7%) and inferior durability.
- ▶ **Complications** — voiding dysfunction, detrusor overactivity, bladder/urethral injury, and a higher subsequent risk of pelvic organ prolapse (enterocele) than after a sling.
- ▶ Long-term (5-year) success 80–90% for Burch; it is now reserved for women needing concurrent open/laparoscopic abdominal surgery or who want a mesh-free option.

Pubovaginal (traditional) sling and urethral bulking agents

- ▶ **Autologous fascial sling** (rectus sheath/fascia lata, occasionally synthetic) is passed around the bladder neck and fixed to the rectus sheath under minimal tension, acting as a hammock; indicated for ISD, failed prior surgery, reduced vaginal capacity, or mesh-averse patients. Long-term retreatment is lower than after Burch, at the cost of higher early voiding dysfunction, urgency and urinary tract infection.
- ▶ **Urethral bulking agents** are injected peri-/trans-urethrally under cystoscopic guidance to improve mucosal coaptation; best suited to poor surgical candidates, anticoagulated or elderly women, or a fixed/immobile urethra. Subjective success is 66–90% at 1 year, but the effect is short-lived and repeat injection is often needed; complications include urinary retention, erosion and migration of the implant.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 25.7A,B — Colposuspension (Burch operation): a. Burch colposuspension; b. Marshall-Marchetti-Krantz procedure; c. colposuspension using the white line of pelvic fascia (DC Dutta's Gynaecology 7e, p.352)

Recent advances [RA]

- ▶ **AUA/SUFU guideline**, *Surgical Treatment of Female Stress Urinary Incontinence* (J Urol 2017;198(4):875–883, reaffirmed 2023) — recommends a retropubic or transobturator mid-urethral sling as the first-line surgical option after shared decision-making; a mini-sling should be offered only with informed consent about limited long-term data.
- ▶ **TOMUS trial** (multicentre RCT) — retropubic vs transobturator sling: objective success 80.8% vs 77.7%, no significant difference; both remain the recommended default.
- ▶ **SISTER trial** — autologous fascial pubovaginal sling vs open Burch colposuspension: lower 5-year retreatment with the sling (2% vs 12%, $p < 0.0001$), despite greater early wound/voiding morbidity — the trial that restored the fascial sling as a viable mesh-free option.
- ▶ **Abdel-Fattah et al. non-inferiority RCT** (adjustable mini-slings Ajust/Altis vs full-length slings) — non-inferior on success, quality of life and safety at 36 months, but more reoperations (8.7% vs 4.6%) and dyspareunia (11.7% vs 4.8%).
- ▶ **Bulkamid (polyacrylamide hydrogel) vs mid-urethral sling RCT** (3-year follow-up) — lower subjective cure (25% vs 60%) but fewer complications (acute retention 3% vs 10%), supporting bulking agents as a lower-morbidity alternative rather than a sling substitute.
- ▶ **Mesh-safety/regulatory timeline** — the US FDA's 2016 Class-III reclassification and April-2019 market withdrawal applied to **transvaginal mesh kits used for pelvic organ prolapse**, not to synthetic mid-urethral slings for SUI; the FDA (2011), AUGS, SUFU, ACOG and IUGA continue to affirm mid-urethral sling safety and efficacy — a frequent exam trap.
- ▶ **Laparoscopic/robot-assisted Burch** — comparable short-term outcomes to the open procedure, but long-term robotic data remain limited; used far less since the mid-urethral sling era.

High-yield exam pointers

- ▶ Current surgical gold standard = **mid-urethral sling** (TVT or TOT) — Grade A evidence, ~80–90% success at 3 years.
- ▶ Burch = **suture endopelvic fascia to Cooper's ligament**, leaving a "suture bridge"; MMK = **fascia to pubic periosteum** → osteitis pubis (abandoned).
- ▶ TVT needs **mandatory cystoscopy** (retropubic route, bladder-perforation risk); TOT does **not** (obturator route, groin/leg pain and mesh erosion instead).
- ▶ Kelly plication, needle suspension (Pereyra/Stamey/Raz), and MMK — memorise as "**no role in modern SUI surgery**."
- ▶ SISTER trial: fascial sling retreatment 2% vs Burch 12% at 5 years.

- ▶ FDA's 2019 mesh withdrawal = **POP mesh kits only**, **NOT mid-urethral slings** for SUI.
- ▶ Salvage-only options: artificial urinary sphincter, urinary diversion.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's success-rate figures for MMK/Burch match current Berek & Novak/AUA-SUFU data, so no correction is needed here; the one exam caveat is the FDA mesh terminology — the 2019 withdrawal covered prolapse-repair mesh kits, not the polypropylene tape used in mid-urethral slings for SUI.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e; DC Dutta's Textbook of Gynaecology 7e; AUA/SUFU Guideline on Surgical Treatment of Female Stress Urinary Incontinence (2017, reaffirmed 2023); US FDA safety communications (2011–2019).



Urinary retention in gynaecology

Asked in: Paper III Jul 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — Urinary retention is the inability to empty the bladder despite the desire and effort to void. **Acute retention** is inability to void for more than 12 hours necessitating catheterisation; **chronic retention** is incomplete bladder emptying with a post-void residual (PVR) that persists over time — the American Urological Association (AUA) White Paper (2017) defines clinically significant chronic retention as PVR >300 mL documented on two separate occasions over more than 6 months. Normal desire to void occurs at a bladder volume of 150–200 mL, with a functional bladder capacity of 400–500 mL; normal PVR is <50 mL.

Causes and mechanisms

Mechanism	Gynaecological causes
Failure of detrusor contraction	Postoperative bladder atony (overdistension); denervation after radical hysterectomy (Wertheim's operation — parasympathetic S2–S4 fibres in parametrium cut); neurological disease (multiple sclerosis, diabetic neuropathy, Parkinson's disease — detrusor-sphincter dyssynergia); drugs (epidural/spinal anaesthesia, opioids, anticholinergics, tricyclic antidepressants); psychogenic (fear, hysteria, embarrassment); Fowler's syndrome (young women, impaired urethral sphincter relaxation)

Mechanism	Gynaecological causes
Failure of internal sphincter to open (bladder-neck obstruction)	Pelvic tumour impacting the bladder base — retroverted gravid uterus , impacted uterine leiomyoma/cervical fibroid in the pouch of Douglas, impacted ovarian or broad-ligament tumour, fetal head in obstructed labour; overtight urethrocystopexy/colposuspension or a too-tight midurethral sling
Spasm of the external (voluntary) urethral sphincter	Perineal injury/repair (perineorrhaphy, episiotomy repair), postoperative vaginal packing, urethritis, nervousness/unaccustomed posture
Mechanical obstruction of the urethra	Urethral angulation with high-grade pelvic organ prolapse/procidentia; urethral stricture/stenosis after fistula repair or caruncle excision; paraurethral cyst/abscess; carcinoma of urethra, vulva or vagina; calculus or foreign body (rare)

Key mechanism note: in retroverted gravid uterus, impacted fibroid or the fetal head in labour, the classical teaching that the urethra is "elongated and stretched" is incorrect — lateral urethrocystography shows the urethrovesical junction stays at its normal level behind the symphysis pubis; retention occurs because the mass prevents the posterior urethrovesical angle from opening, obstructing the internal sphincter.

Diagnostic clues by clinical setting

Period of life	Associated feature	Likely diagnosis
Postmenarchal, primary amenorrhoea	Cyclical pain, no bleeding	Cryptomenorrhoea (haematocolpos)
Reproductive age, short secondary amenorrhoea	12–16 weeks' gestation	Retroverted gravid uterus (incarceration)
Reproductive age, menorrhagia	Pelvic mass in pouch of Douglas	Uterine leiomyoma impacted in POD
Childbearing age, no menstrual upset	Pelvic mass	Impacted ovarian, cervical or broad-ligament tumour
Irregular bleeding with pain	Adnexal mass	Pelvic haematocoele
Irregular bleeding with fever	Tender adnexal mass	Pelvic abscess

Clinical features

- ▶ Suprapubic fullness, pain and distress out of proportion to a "full-bladder" sensation.
- ▶ Inability to pass urine despite persistent straining; overflow — frequent dribbling/incontinence once the bladder decompensates.

- ▶ Obstructive voiding symptoms preceding frank retention: hesitancy, straining to void, slow/intermittent stream, feeling of incomplete emptying, splinting/digitation of the vagina to void (classic in prolapse).
- ▶ Suprapubic percussion/palpation reveals a tense, tender, dull swelling arising out of the pelvis — the diagnostic sign of a full bladder.
- ▶ Systemic features if neglected: recurrent urinary tract infection (UTI), overflow incontinence, and — if chronic — bilateral hydronephrosis and renal impairment.

Investigations

Test	Purpose/finding
Catheterisation and post-void residual (PVR)	Confirms retention; normal residual <50 mL. A single-catheterisation PVR >300 mL, or repeated retention, defines a significant problem
Bladder diary (3 days)	Frequency, voided volumes, functional capacity
Ultrasonography (bladder scan)	Non-invasive PVR estimation; also detects pelvic mass causing obstruction and upper-tract dilatation
Uroflowmetry	Low peak flow rate with prolonged voiding time in obstructive/atonic patterns
Cystometry (filling and voiding urodynamics)	Large bladder capacity with no detrusor pressure rise on attempted voiding (atonic/underactive detrusor) or high detrusor pressure with low flow (bladder-outlet obstruction)
Cystoscopy	Excludes urethral polyp, stricture, stone, tumour, foreign body
Pelvic examination + imaging (ultrasound/MRI)	Identifies impacted pelvic mass — fibroid, ovarian tumour, retroverted gravid uterus, haematocolpos
Renal function tests + renal ultrasound/CT urogram	In chronic retention, per the AUA White Paper, to exclude hydronephrosis and renal compromise before planning treatment

Management

- ▶ **Immediate decompression** — per-urethral catheterisation (continuous free drainage); this is the first step regardless of cause. Clamping/intermittent release does not speed recovery of detrusor tone — continuous drainage for 48 hours or more is preferred to let an overstretched bladder recover.
- ▶ **Treat the specific cause**
 - *Retroverted gravid uterus (incarceration)*: catheterise first to empty bladder → manual reduction of the uterus with the patient in the knee-chest (genupectoral) position, or under

anaesthesia if manual reduction fails; a well-fitted vaginal (Hodge) pessary may be used to maintain anteversion once reduced.

- *Impacted fibroid/ovarian tumour/pelvic mass*: catheterise, then definitive surgical removal of the mass (myomectomy/oophorectomy/laparotomy as indicated).
 - *Postoperative retention (vaginal/perineal surgery, anterior colporrhaphy, perineorrhaphy)*: continuous catheter drainage; remove after 48–72 hours and check PVR — if >100 mL (preferably keep <50 mL), reinstitute continuous drainage rather than intermittent clamping.
 - *After radical hysterectomy or extensive pelvic dissection (denervation injury)*: prolonged indwelling catheter or, preferably, **clean intermittent self-catheterisation (CISC)** until spontaneous voiding recovers (may take weeks); a suprapubic catheter is an alternative that allows trials of voiding without repeated recatheterisation.
 - *High-grade pelvic organ prolapse*: trial of vaginal pessary or surgical prolapse repair to relieve urethral angulation/kinking — voiding usually normalises after correction of the prolapse.
 - *Tight continence surgery (colposuspension/midurethral sling)*: expectant management with indwelling catheter or CISC; if retention persists beyond about 3 weeks, sling loosening/transection or urethrolisis is indicated.
- ▶ **General bladder-training measures** (non-obstructive, atonic bladder): change of posture, Credé's manoeuvre (manual suprapubic expression), double voiding, timed voiding, and pelvic-floor physiotherapy/bladder retraining for chronic non-neurogenic retention.
 - ▶ **Drug therapy** — cholinergic agonists (e.g. bethanechol) or alpha-adrenergic blockers to reduce bladder-outlet resistance have been used for detrusor underactivity or outlet resistance, but the evidence for benefit is weak and inconsistent; they are adjuncts, not primary treatment.
 - ▶ **Refractory/idiopathic retention (e.g. Fowler's syndrome)**: sacral neuromodulation is effective in a substantial proportion of patients when conservative measures and self-catheterisation fail.
 - ▶ **Surveillance**: low-risk, asymptomatic chronic retention can be followed with yearly urinalysis/urine culture without active intervention; symptomatic patients (recurrent UTI, worsening residual) need active treatment as above.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 57.15A — Retention of urine caused by tumours impacted in the pelvis: the urethrovesical junction stays at its normal level behind the symphysis pubis; voiding fails because the posterior urethrovesical angle cannot open (Jeffcoate's *Principles of Gynaecology* 9e, p.1040)

High-yield exam pointers

- ▶ Acute retention = no void for >12 hours; chronic retention (AUA 2017) = PVR >300 mL on two occasions over >6 months.
- ▶ Four mechanisms: (1) detrusor failure, (2) internal-sphincter/bladder-neck obstruction by a pelvic mass, (3) external-sphincter spasm, (4) mechanical urethral obstruction.

- ▶ Classic gynaecological cause = impacted pelvic tumour (retroverted gravid uterus, fibroid, ovarian tumour) — the urethra is NOT elongated; the posterior urethrovesical angle just fails to open.
- ▶ Normal residual urine <50 mL; recatheterise/continuous drainage if postoperative residual >100 mL.
- ▶ Postoperative retention is commonest after vaginal/perineal surgery (anterior colporrhaphy, perineorrhaphy) and after radical hysterectomy (S2–S4 parametrial denervation).
- ▶ Management ladder: catheterise → treat the cause → CISC if prolonged → pessary/prolapse repair if obstructive → sacral neuromodulation for refractory idiopathic retention (Fowler's syndrome).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Cholinergic agents (bethanechol) and alpha-blockers are still described for retention in older texts, but current evidence (including Cochrane review data) shows they have little proven benefit and are not primary therapy.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e; AUA White Paper on Nonneurogenic Chronic Urinary Retention (Stoffel et al., J Urol 2017).



Various treatment modalities for stress urinary incontinence and characteristics of an ideal continence procedure

Asked in: Paper III 30-May-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Stress urinary incontinence (SUI), also called genuine stress incontinence (GSI), is the involuntary leakage of urine on effort, exertion, coughing, or sneezing. The International Continence Society (ICS) defines it urodynamically as involuntary loss of urine when intravesical pressure exceeds the maximum urethral pressure **in the absence of detrusor activity**. Treatment is escalated from

conservative to pharmacological to surgical, chosen according to severity, urodynamic findings, patient's age/fertility wish, and fitness for anaesthesia.

Conservative (non-surgical) management — first-line for all patients

Modality	Technique / regimen	Comment
Lifestyle modification	Weight reduction in obese women; reduce caffeine/alcohol; smoking cessation; individualised fluid intake guided by a 3-day bladder diary	A 10% weight loss gives >50% improvement in SUI symptoms
Pelvic floor muscle training (PFMT / Kegel exercises)	Supervised contraction of pubococcygeus/rhabdosphincter — hold 3 seconds, 10–15 contractions/session, 3 sessions/day, continued for several months	Strengthens voluntary peri-urethral striated muscle; does not strengthen involuntary bladder-base/proximal urethral muscle (for which surgery is needed)
Biofeedback	Visual/auditory feedback of vaginal pressure via a vaginal probe during PFMT	Best suited for minor GSI with poor pelvic tone after recent delivery
Electrical stimulation	Pudendal nerve stimulation via vaginal/anal probe	Adjunct when patient cannot generate an adequate voluntary squeeze
Vaginal devices	Pessaries (incontinence ring/dish), bladder-neck support prosthesis, weighted vaginal cones (20–100 g)	Support the bladder neck/urethra; a randomised trial showed comparable long-term satisfaction to behavioural therapy
Urethral devices	Urethral insert (e.g., FemSoft), inserted and removed around voiding	Useful for episodic/exertional SUI (e.g., competitive athletes)

Pharmacological treatment

Drug	Dose	Mechanism / role
Duloxetine (SNRI)	40 mg orally twice daily	Increases pudendal motor neuron firing to the striated urethral sphincter via central serotonin/noradrenaline reuptake inhibition; offered as a non-surgical option or when surgery is declined/contraindicated (NICE), not a first-line agent because of nausea, dizziness, insomnia

Drug	Dose	Mechanism / role
Imipramine (tricyclic)	10–25 mg orally twice daily	α -adrenergic action improves urethral and bladder-neck tone; variable success, used mainly in mixed stress/urge incontinence
Topical vaginal estrogen	Local application in postmenopausal women	Improves peri-urethral tissue tone/atrophy-related symptoms; systemic estrogen (with/without progestin) is <i>not</i> recommended — large trials (WHI, HERS) showed it <i>worsens</i> stress incontinence

Surgical treatment modalities

Procedure	Principle / technique	Route	Outcome / key points
Burch colposuspension (<i>retropubic urethropexy</i>)	Peri-urethral endopelvic fascia/lateral vaginal fornix sutured to the ilio-pectineal (Cooper's) ligament	Open (suprapubic) or laparoscopic	Long-standing gold-standard comparator; 5-year success ~70–90%; complications: detrusor overactivity, urinary retention, bladder/urethral injury
Marshall–Marchetti–Krantz (MMK)	Para-urethral/para-vesical fascia sutured to the periosteum of the pubic symphysis	Retropubic (open)	Historic alternative to Burch; specific complication — osteitis pubis
Mid-urethral synthetic sling — TVT (retropubic) and TOT (transobturator)	Tension-free polypropylene tape placed under the mid-urethra, supporting it as a "hammock" without suturing to any structure	Minimally invasive, vaginal, day-care, local/regional anaesthesia	Current procedure of choice (AUA); short-term cure ~90%, long-term ~80%; TVT — higher bladder-perforation/retropubic bleeding risk (cystoscopy mandatory); TOT — higher groin pain/mesh erosion, no cystoscopy needed

Procedure	Principle / technique	Route	Outcome / key points
Single-incision ("mini") slings	Short mesh anchored in obturator internus fascia via one mid-urethral incision, no exit punctures	Vaginal	Least invasive but Cochrane evidence shows inferior/insufficient long-term data — not preferred over standard TVT/TOT
Autologous pubovaginal (fascial) sling	Rectus fascia or fascia lata placed at the bladder neck, ends fixed to rectus sheath under minimal tension	Combined vaginal + abdominal	Reserved for intrinsic sphincter deficiency/recurrent SUI; higher cure than Burch but more voiding dysfunction, urgency, and UTI
Peri-urethral bulking agents	Injection of collagen/calcium hydroxylapatite/polydimethylsiloxane submucosally around the proximal urethra, transurethral or peri-urethral, cystoscopic guidance	Office/day-care, no anaesthesia needed	For poor surgical candidates, high residual urine, or elderly/anaesthesia-unfit women; lower durable cure — repeat injections often needed
Endoscopic bladder-neck suspension (Pereyra/Stamey/Raz needle suspension)	Para-urethral tissue sutured to rectus sheath under cystoscopic guidance	Combined vaginal-abdominal, minimal dissection	Long-term success only ~50%; largely abandoned — no longer recommended after randomised trials
Anterior colporrhaphy / Kelly's plication	Plication of pubocervical fascia around bladder neck with mattress sutures	Vaginal	Historic, simple, corrects co-existent cystocele; not recommended as a primary SUI cure — long-term success only 50–60%
Salvage procedures	Artificial urinary sphincter; urinary diversion	—	Reserved for refractory intrinsic sphincter deficiency after failure of all other options

Characteristics of an ideal continence procedure

- Restores the bladder neck and proximal urethra to their normal position within the intra-abdominal pressure zone, so raised intra-abdominal pressure is transmitted equally to bladder and urethra.

- ▶ Corrects urethral hypermobility and supports the vesico-urethral junction without over-correction (avoids obstructive voiding dysfunction).
- ▶ High, durable, reproducible long-term cure/success rate supported by good-quality (Grade A) evidence.
- ▶ Minimally invasive — short operating time, can be done under local/regional anaesthesia, short hospital stay/day-care feasible.
- ▶ Low peri-operative morbidity and a low rate of complications (bladder/urethral injury, mesh/sling erosion, chronic pain, de novo detrusor overactivity).
- ▶ Technically simple with a short learning curve, so outcomes are reproducible across surgeons of varying experience.
- ▶ Should not create new problems — no de novo urgency, dyspareunia, or pelvic organ prolapse.
- ▶ Applicable to a wide range of patients, including the elderly or medically unfit for major/prolonged surgery.
- ▶ Cost-effective, using inexpensive and easily available materials.
- ▶ Amenable to correction of coexistent pelvic organ prolapse where present, without added morbidity.
- ▶ Preserves future fertility/childbirth potential and pelvic floor anatomy in younger women.
- ▶ Allows easy salvage/re-do surgery if it fails, without compromising subsequent options.

No single procedure fulfils every criterion for every patient — the mid-urethral sling (TVT/TOT) currently comes closest for uncomplicated SUI with urethral hypermobility, while Burch colposuspension and the autologous fascial sling remain important alternatives, particularly when synthetic mesh is contraindicated or declined.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 25.8 — TVT procedure with needles in position. The tape is left tension-free under the urethra (DC Dutta's Gynaecology 7e, p.352)

High-yield exam pointers

- ▶ ICS definition of GSI: leakage when intravesical pressure > maximum urethral pressure, **no detrusor activity**.
- ▶ Conservative first-line: PFMT (3 sec hold × 10–15 reps × 3/day) ± biofeedback; 10% weight loss → >50% symptom improvement.
- ▶ Duloxetine 40 mg PO BD — only SNRI used for SUI; not first-line (side effects).
- ▶ Burch colposuspension = historic gold standard (Cooper's ligament); mid-urethral sling (TVT/TOT) = current procedure of choice (AUA).
- ▶ MMK → osteitis pubis; TVT → bladder perforation (cystoscopy mandatory); TOT → groin pain/mesh erosion.

- ▶ Anterior colporrhaphy/Kelly's plication and needle suspension (Pereyra/Stamey/Raz) are now **not recommended** as primary SUI cures.
- ▶ Remember characteristics of ideal procedure as: anatomical restoration + durable cure + minimally invasive + low complications + reproducible + no new morbidity.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Current guidance (NICE NG123, AUA/SUFU) favours a shared-decision approach between mid-urethral synthetic sling and autologous fascial sling/Burch colposuspension because of past concerns over transvaginal mesh complications; DC Dutta's Gynaecology, being an older Indian text, still lists needle suspension and Kelly's plication as active options that current evidence (Berek & Novak 16e) no longer recommends as primary surgery.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e; NICE guideline NG123 (urinary incontinence and pelvic organ prolapse in women); AUA/SUFU guideline on surgical treatment of SUI.



Vault prolapse

Asked in: Paper III May 2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Vault prolapse is descent of the vaginal apex (the vaginal cuff scar after hysterectomy, or the posterior fornix in a uterus-in-situ vagina) towards or through the introitus, resulting from failure of its apical supports (uterosacral-cardinal ligament complex). It is usually accompanied by an **enterocele** (~70% of cases) and may coexist with cystocele/rectocele.

Aetiology and risk factors

Category	Factors
Pre-existing weakness	Congenital/developmental weakness of pelvic floor fascia (most important factor); connective tissue disorders (Ehlers-Danlos); deep uterovesical/uterorectal pouches; short vagina
Childbirth	Multiparity, prolonged second stage, instrumental delivery, denervation injury to the levator ani/pudendal nerve; vaginal birth is the dominant obstetric risk
Chronic raised intra-abdominal pressure	Chronic cough (COPD), constipation/straining, heavy lifting, obesity, pelvic mass

Category	Factors
Iatrogenic (surgical)	Enterocoele/apical support not addressed at the index hysterectomy ; vault prolapse is commoner after subtotal than total hysterectomy; altered vaginal axis after a Burch colposuspension or Marshall-Marchetti-Krantz procedure (iatrogenic enterocoele)
Menopause/ageing	Oestrogen deficiency causing collagen and connective-tissue atrophy

Classification — POP-Q staging

The Pelvic Organ Prolapse Quantification (POP-Q) system (International Continence Society/AUGS/SGS, 1996) is the current standard; it measures 6 vaginal points (Aa, Ba, C, D, Ap, Bp) plus genital hiatus, perineal body and total vaginal length (TVL) in centimetres relative to the hymen (0), with descent above the hymen negative and below positive. **Point C = the vault/cervix** — the key point in vault prolapse.

Stage	Definition
0	No prolapse; Aa, Ap, Ba, Bp all at -3 cm and C/D between -(TVL) and -(TVL-2)
I	Most distal point >1 cm above the hymen
II	Most distal point within 1 cm proximal or distal to the hymen
III	Most distal point >1 cm below the hymen but $\leq$ (TVL-2) cm
IV	Complete/near-complete eversion; most distal point $>$ (TVL-2) cm

Clinical features

- **Symptoms:** a lump/mass felt at or protruding from the introitus, worse on standing/straining and relieved by lying down; dragging low backache; pelvic pressure/heaviness ("bearing-down" sensation); dyspareunia.
- **Coexisting compartment symptoms:** incomplete bladder emptying/voiding difficulty or urinary retention (with cystocele); incomplete rectal emptying, need for digital splinting (with rectocele/enterocoele).
- **Complications of a chronically exposed vault:** keratinisation of the exposed vaginal epithelium; decubitus ulceration of the dependent part with contact bleeding; rarely incarceration/irreducibility; hydroureteronephrosis and renal impairment from ureteric kinking in long-standing, large prolapse.

- **Examination:** vault mass on straining/Valsalva, best assessed with a Sims speculum splinting the anterior and posterior walls in turn, and repeated erect if the supine finding does not match symptoms; bimanual and rectovaginal examination to detect an associated enterocele (cough impulse felt in the pouch of Douglas) and to assess levator plate integrity.

Investigations

Investigation	Purpose
POP-Q examination (supine ± standing straining)	Objective staging, reproducible follow-up
Urine culture	Exclude urinary tract infection
Urodynamic study	Detect occult/masked stress urinary incontinence before apical repair
Renal ultrasound / serum creatinine	Screen for hydronephrosis in stage III–IV prolapse
Pap smear/endometrial assessment (if uterus present) or vault cytology	Exclude coexisting cervical/vault pathology, especially before an obliterative procedure

Management

Principles: correct symptoms, restore normal vaginal axis and apical support, and address any coexisting compartment defect and enterocele in the same operation — failure to repair an enterocele at the index surgery is the classic cause of recurrent vault prolapse.

A. Conservative (asymptomatic, unfit for surgery, or awaiting surgery)

- Pelvic floor muscle training for mild (stage I–II) prolapse.
- Vaginal oestrogen in atrophic postmenopausal mucosa to improve tissue quality before pessary use or surgery.
- Vaginal **pessary**: ring pessary (with support) for stage I–II; space-filling **Gellhorn** or cube pessary for advanced stage III–IV prolapse (cube must be removed daily; Gellhorn can stay up to 6–8 weeks); regular review for erosion/discharge.

B. Surgical — apical (vault) suspension procedures

Procedure	Route	Principle	Key points
Sacrospinous ligament fixation (SSLF)	Vaginal, extraperitoneal, usually unilateral (right side)	Vaginal apex sutured to the sacrospinous ligament ~2 cm medial to the ischial spine	Enterocele sac excised first; deflects vagina posteriorly; risk of pudendal/sciatic nerve entrapment causing buttock pain, and of haemorrhage from pudendal vessels

Procedure	Route	Principle	Key points
McCall culdoplasty (posterior culdoplasty)	Vaginal, intraperitoneal, at time of vaginal hysterectomy	Internal (permanent) + external (delayed absorbable) sutures plicate both uterosacral ligaments and obliterate the cul-de-sac, suspending the vault	Standard prophylactic step at every vaginal hysterectomy to prevent later vault prolapse and enterocele
Uterosacral ligament (vaginal vault) suspension	Vaginal, intraperitoneal, bilateral	Vault sutured to the uterosacral ligaments near the ischial spine level	Mandatory intraoperative cystoscopy to confirm ureteric patency — ureteric kinking/injury reported in up to ~1–11%
Abdominal/laparoscopic/robotic sacrocolpopexy	Abdominal (open, laparoscopic or robot-assisted)	Y-shaped polypropylene mesh bridges the vaginal apex (anterior and posterior) to the anterior longitudinal ligament over the sacral promontory (S1)	Considered the durable "gold standard" for apical support with the highest long-term anatomical success; carries a small but real risk of mesh erosion/exposure requiring re-operation
Le Fort (partial) colpocleisis	Vaginal, obliterative	Anterior and posterior vaginal epithelium denuded and sutured together, obliterating the vaginal canal, with narrow lateral channels preserved for drainage	Reserved for the elderly, medically unfit patient who has no further wish for coital function; short operating time, low morbidity; endometrial/cervical surveillance is compromised thereafter, so pre-operative endometrial assessment is advised if uterus is present

C. Associated repairs performed concurrently: anterior colporrhaphy (cystocele), posterior colporrhaphy and perineorrhaphy (rectocele/deficient perineum), and formal enterocele sac excision — always combined with whichever apical procedure is chosen.

Complications

- ▶ Of the prolapse itself: decubitus ulceration, keratinisation, incarceration, hydroureteronephrosis/renal failure (untreated, long-standing).
- ▶ Of surgery: haemorrhage, ureteric or bladder injury, rectal injury, mesh erosion/exposure (sacrocolpopexy), buttock pain/nerve entrapment (sacrospinous fixation), recurrent prolapse, dyspareunia, de novo stress urinary incontinence.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

□ Fig 16.20 — Vault prolapse following vaginal hysterectomy. Scar is seen in the cen (DC Dutta's Gynaecology 7e, p.202)

Also sketch the six POP-Q points (Aa, Ba, C, D, Ap, Bp) relative to the hymen with genital hiatus, perineal body and total vaginal length labelled (Berek & Novak 16e, Fig 30.9, p.1759).

High-yield exam pointers

- ▶ Vault prolapse = enterocele in ~70% — always look for and repair it, or it recurs.
- ▶ POP-Q point C = cervix/vaginal cuff — the apical point that defines vault prolapse staging.
- ▶ Commoner after **subtotal** than total hysterectomy (retained cervix acts like an intussusception apex).
- ▶ Vaginal apical options: **SSLF** (posterior deviation, buttock-pain risk), **uterosacral suspension** (mandatory cystoscopy), **McCall culdoplasty** (prophylactic, done with vaginal hysterectomy).
- ▶ Abdominal **sacrocolpopexy with Y-mesh to the sacral promontory** = gold standard for durability; trade-off is mesh erosion risk.
- ▶ **Le Fort colpocleisis** for the elderly, sexually inactive, high-risk patient — obliterative, not reconstructive.
- ▶ Pessary choice by stage: **ring** (I–II, support) vs **Gellhorn/cube** (III–IV, space-filling).

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

The POP-Q system (ICS/AUGS/SGS, 1996) has superseded the older Baden-Walker halfway grading system used in older textbook editions; modern practice and trials (as reflected in Berek & Novak 16e and Te Linde 13e) are described using POP-Q.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e.



Vesicovaginal fistula

Asked in: Paper III 15-Apr-2026 · Paper III Oct 2009 (2x) — RGUHS MS Obstetrics & Gynaecology

Definition — Vesicovaginal fistula (VVF) is an abnormal epithelialised communication between the bladder and the vagina, allowing continuous involuntary leakage of urine into the vagina (true incontinence). It is the commonest genitourinary fistula, with an incidence of about 0.2–1% among gynaecological admissions in referral hospitals of developing countries.

Aetiology

Category	Cause	Mechanism / notes
Obstetric (80–90% in developing countries)	Obstructed/prolonged labour (ischaemic)	Fetal head compresses bladder base against pubic symphysis → pressure necrosis → sloughing 3–5 days after delivery
	Instrumental delivery (destructive operations, forceps, especially Kielland's)	Direct traumatic injury, evident soon after delivery
	Caesarean section (especially repeat) or caesarean hysterectomy for ruptured uterus	Direct injury or bladder wall caught in a suture
Gynaecological (>80% of cases in developed countries)	Total abdominal/vaginal hysterectomy (benign or malignant disease), anterior colporrhaphy, Gartner's cyst excision	Incorrect bladder–cervix plane dissection, blunt dissection, faulty vault suturing
	Trauma	Pointed-object injury, criminal-abortion instrumentation, pelvic fracture, forgotten pessary
	Malignancy	Direct spread from carcinoma cervix, vagina or bladder
	Radiation	Endarteritis obliterans → ischaemic necrosis; delayed, typically 1–2 years after therapy
	Infective	Genital tuberculosis, lymphogranuloma venereum, schistosomiasis, actinomycosis

Classification

By complexity — Elkins (1999):

Feature	Simple	Complicated
Size	Up to 3 cm	> 3 cm
Location	High vaginal	Mid-vaginal
Bladder involvement	Supratrigonal	Trigonal
Pelvic malignancy / prior radiation	Absent	Present
Vaginal length	Normal	Shortened

By site: (1) juxtacervical/vault (supratrigonal bladder to vagina); (2) mid-vaginal (bladder base/trigone to vagina) — the classic obstetric fistula; (3) juxtaurethral (bladder neck $\pm$ upper urethra); (4) subsymphysial (circumferential tissue loss around bladder neck/urethra, fixed to bone).

Clinical features

- ▶ **Continuous painless leakage of urine per vaginum** with loss of urge to void — the cardinal symptom; a small fistula may leak only in certain positions.
- ▶ **Timing:** direct surgical injury leaks from day 1 post-operatively; obstetric fistula manifests at 7–14 days; post-laparoscopic-hysterectomy VVF may appear days to weeks later.
- ▶ **Vesicocervical/vesicouterine fistula:** may remain continent but complain of cyclical haematuria at menstruation (menouria).
- ▶ Ammonia-smelling watery vaginal discharge; vulvar excoriation, sloddenness and pruritus vulvae.
- ▶ **Associated findings:** complete perineal tear or recto-vaginal fistula, foot-drop (sacral nerve root compression by the fetal head), secondary amenorrhoea (hypothalamic, resolves after successful repair).
- ▶ On speculum (Sims' position, ballooned vagina): visible fistula opening, prolapsed bladder mucosa through a large fistula, or a puckered dimple in a tiny one.

Diagnosis and investigations

Test	Finding / purpose
Dye test	Vagina swabbed dry; methylene blue instilled into bladder via catheter — dye seen at the fistula confirms VVF
Three-swab (tampon) test	Three swabs placed at vault, mid-vagina and introitus; dye instilled into bladder, patient ambulates 5 min
— top swab wet with urine, dye-negative; lower two dry	Ureterovaginal fistula

Test	Finding / purpose
— middle swab dye-stained; top and lower dry	Vesicovaginal fistula
— lower swab dye-stained; upper two dry	Urethrovaginal fistula
Metal catheter per urethra	Emerging through the fistula confirms VVF and urethral patency
Examination under anaesthesia	Air bubbles through a tiny fistula on coughing in knee-chest position; probe exploration
Cystourethroscopy	Confirms diagnosis; maps fistula relation to ureteric orifices and bladder neck; mandatory before repair of a large fistula
Intravenous urography / retrograde pyelography	Diagnose/localise a coexisting ureterovaginal fistula
CT urogram / MRI / ultrasound	Complex fistulae with ureteric or bowel involvement
Hysterosalpingography (lateral view)	Vesicouterine fistula with cyclical haematuria (Youssef syndrome)

Management

Prevention — antenatal screening for at-risk mothers, partograph-guided monitoring and timely relief of obstructed labour, 5–7 days of continuous bladder drainage after obstructed labour/difficult instrumental delivery, and meticulous bladder-plane dissection during pelvic surgery.

Conservative (immediate on diagnosis) — continuous per-urethral catheter drainage for 4–8 weeks; achieves spontaneous closure in 50–60% of small fistulae (2 mm–2 cm) with minimal tissue damage.

Timing of surgical repair

- ▶ Obstetric fistula: repair after **3 months**, once oedema, infection and slough have settled; an uncomplicated fistula without infection may be repaired earlier without the routine wait.
- ▶ Surgical (direct-injury) fistula recognised within 24 hours and small: **immediate repair**; otherwise wait 10–12 weeks.
- ▶ Radiation fistula: repair only after **12 months** from completion of radiotherapy.
- ▶ Failed repair: re-attempt after a further 3 months — the fistula is often smaller and the best chance of cure is always the first well-planned operation.

Principles of surgery — correct pre-operative assessment, timely repair, tension-free closure, well-vascularised healthy margins, watertight multilayer closure tested with dye, and effective post-operative bladder drainage.

Pre-operative work-up — assess site/size/number/mobility/fibrosis; urethral catheterisation for urethral involvement; cystoscopy for ureteric relations; exclude recto-vaginal fistula/complete perineal tear; correct anaemia and urinary infection; urinary antiseptics 3–5 days pre-operatively.

Route of repair

Route	Indication
Vaginal	Most fistulae if accessible; less blood loss, morbidity and hospital stay
Transvesical/transperitoneal (abdominal)	High fixed vault fistula, fistula close to ureteric orifices, large/complex fistula, previous failed repair, or when an interposition graft is needed

Surgical techniques

- ▶ **Flap-splitting (layer) repair** — incision around the fistula → separate vaginal wall from bladder → excise minimal scar → close bladder in two layers with interrupted 2-0 polyglactin (Vicryl), excluding mucosa in the first layer, muscle/fascia in the second → close vagina with interrupted sutures.
- ▶ **Saucerization (J Marion Sims, 1852)** — for a very small fistula: paring of margins and direct closure without dissecting the bladder off the vagina, done in Sims' position with Sims' speculum.
- ▶ **Latzko operation** — for a small, high post-hysterectomy vault fistula: partial colpocleisis around the fistula; bladder mucosa approximated with interrupted 2-0 Vicryl, two further layers appose muscle/fascia, vaginal mucosa closed last; catheter drainage 10–14 days.
- ▶ **Interposition (tissue) grafts** for large/recurrent fistula: **Martius graft** (bulbocavernosus muscle + labial fat pad) for bladder-neck fistula; gracilis muscle, omental pedicle (transperitoneal) or peritoneal flap for others.
- ▶ Suture material: polyglactin (Vicryl) 2-0 for bladder and vagina; polydioxanone (PDS) 4-0 for ureter; 3-0 PDS for bowel.

Post-operative care — continuous catheter drainage 10–14 days; urinary antiseptics; gradual re-training of voiding interval after catheter removal; avoid intercourse 3 months, defer conception 1 year; subsequent pregnancy delivered by **elective caesarean section**.

Special situations — malignant/post-radiation fistula: urinary diversion (ileal conduit), anterior exenteration or colpocleisis; infective fistula: treat infection first; fistula recognised intra-operatively: repair immediately in two layers.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 26.1 — Types of genitourinary fistula: (1) Vesicovaginal (2) Vesicourethrovaginal (3) Urethrovaginal (4) Vesicocervical (5) Ureterovaginal (6) Vesicouterine (DC Dutta's Gynaecology 7e, p.363)

High-yield exam pointers

- ▶ Cardinal symptom: continuous, painless per-vaginal urine leakage with **no urge to void**.
- ▶ Three-swab test: **top wet = ureteric; middle stained = vesical; lower stained = urethral**.

- ▶ Elkins (1999) simple vs complicated: cut-off **3 cm**, supratrifigonal vs trifigonal.
- ▶ Timing rule: obstetric fistula → **3 months**; recognised surgical injury → immediate (<24 h) or **10–12 weeks**; radiation fistula → **12 months**.
- ▶ Conservative catheter drainage (4–8 weeks) cures **50–60%** of small (2 mm–2 cm) fistulae.
- ▶ Latzko = partial colpocleisis for small high vault fistula; Martius graft = labial fat + bulbocavernosus for bladder-neck fistula.
- ▶ Post-repair delivery must be by **caesarean section**.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

DC Dutta's timing figures are the long-standing Indian obstetric-fistula teaching; contemporary reviews (Te Linde 13e) show comparable success with earlier repair (within weeks) once infection/inflammation has settled, so timing is individualised on tissue assessment rather than a fixed calendar rule alone.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Te Linde's Operative Gynecology 13e; Berek & Novak's Gynecology 16e.



What is DeLancey's classification of supports of uterus? What are different surgical options in young patient with uterine prolapse?

Asked in: Paper III 02-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — *DeLancey's classification* (1992, cadaveric study) describes pelvic organ support as three biomechanical **levels** — apical suspension, lateral attachment, and distal fusion — provided by the endopelvic fascia (paracolpium), uterosacral-cardinal ligament complex and levator ani; loss of a given level produces the corresponding site-specific prolapse. Uterine prolapse in a young, often nulliparous woman is typically a **Level I (apical) support defect** from congenitally weak uterosacral-cardinal

ligaments rather than obstetric trauma, so surgery must conserve the uterus (or at least the cervix) wherever possible instead of proceeding straight to hysterectomy.

DeLancey's Levels of Pelvic Support

Level	Supporting structures	Anatomical attachment	Effect when lost
Level I — apical suspension	Paracolpium = cardinal–uterosacral ligament complex	Suspends cervix/upper vagina to the sacrum and lateral pelvic side-wall	Uterine/vault prolapse, enterocele
Level II — lateral attachment	Paracolpium attaching mid-vagina laterally	To the arcus tendineus fasciae pelvis (ATFP) and superior fascia of levator ani	Cystocele (anterior) / rectocele (posterior)
Level III — distal fusion	Direct fusion of the distal vagina	Anteriorly to the urethra, laterally to the levator ani, posteriorly to the perineal body	Urethral hypermobility, deficient perineum, widened introitus

- ▶ The **levator ani** reinforces all three levels by narrowing the genital hiatus and keeping the vaginal axis near-horizontal; weak levator tone and a widened hiatus throw extra load onto Level I/II structures and drive progressive apical prolapse.
- ▶ Clinical use: prolapse is usually multicompartmental, so examination and surgical planning are described level-by-level rather than by "grade" alone.

Surgical Options in a Young Patient with Uterine Prolapse

Principle: preserve the uterus/cervix (and hence fertility) wherever the prolapse and any coexistent pathology permit; hysterectomy is reserved for women who have completed childbearing or have other uterine pathology.

Operation	Route	Principle / technique	Notes	Key complications
1. Fothergill's (Manchester) operation	Vaginal	Amputation of the elongated cervix + plication of Mackenrodt's (cardinal) ligaments in front of the (shortened) cervix, using the Fothergill stitch, + anterior colporrhaphy + colpoperineorrhaphy	Corrects descent with cystocele/rectocele and cervical elongation while conserving the uterine body; a low amputation is used if further childbearing is planned	Cervical incompetence/stenosis, mid-trimester loss in a future pregnancy

Operation	Route	Principle / technique	Notes	Key complications
2. Cervicopexy / sling operation (Purandare's operation)	Abdominal	Two strips of rectus sheath (or non-absorbable Marlex/Gore-Tex tape), passed extraperitoneally through the broad ligament, are sutured to the anterior surface of the uterine isthmus/cervix , pulling the uterus up and forward (technique analogous to Gilliam's ventrosuspension)	Operation of choice for congenital or nulliparous prolapse without cystocele ; cervix is not amputated, so fertility is fully preserved; can be combined with a Moskowitz procedure if enterocele coexists	Standard laparotomy risks; recurrence if underlying ligament weakness is severe
3. Vaginal sacrospinous hysteropexy	Vaginal	Cervix or uterosacral ligament stumps are transfixed to the sacrospinous ligament (usually right side), under direct vision via the pararectal space	One of the best-studied uterus-conserving apical procedures; perform a partial trachelectomy first if there is cervical elongation, else recurrence risk is high	Buttock/gluteal pain (pudendal or sciatic nerve), rectal or pelvic-vessel injury, recurrence ~3%
4. Vaginal uterosacral hysteropexy	Vaginal	Uterosacral ligaments are plicated/shortened and re-attached at the cervix via a posterior colpotomy	Alternative native-tissue apical suspension without cervical amputation; apical success comparable to vaginal hysterectomy with uterosacral suspension	Ureteric kinking/injury (uterosacral sutures placed close to ureter)

Operation	Route	Principle / technique	Notes	Key complications
5. Abdominal / laparoscopic sacrohysteropexy	Abdominal or laparoscopic	Non-absorbable mesh anchors the cervix/isthmus to the anterior longitudinal ligament over the sacral promontory (uterine equivalent of sacrocolpopexy)	Durable apical support without touching the cervix; laparoscopic route lowers morbidity, gaining favour in women who still desire pregnancy	Mesh erosion/exposure, stress urinary incontinence

- ▶ Whichever uterus-conserving route is chosen, **stress urinary incontinence, if present, is evaluated with urodynamics** and treated concurrently (e.g., transobturator tape or Burch colposuspension).
- ▶ **Pelvic floor repair (anterior colporrhaphy + colpoperineorrhaphy)** is added to any of the above whenever cystocele/rectocele/deficient perineum coexists — it corrects vaginal wall descent, not the uterine descent itself.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- Fig 30.1 — Levels of support. DeLancey's biomechanical levels: level I, proximal suspension; level II, lateral attachment; and level III, distal fusion (Te Linde 13e, p.1592)

High-yield exam pointers

- ▶ **DeLancey 1992** — three levels: **I = Suspension** (uterosacral–cardinal complex), **II = Attachment** (arcus tendineus fasciae pelvis), **III = Fusion** (perineal body/urethra).
- ▶ Loss of Level I → apical/uterine prolapse & enterocele; Level II → cystocele/rectocele; Level III → urethral hypermobility/gaping introitus.
- ▶ Young + wants fertility → **avoid hysterectomy**; choose cervicopexy (Purandare's), sacrospinous hysteropexy, uterosacral hysteropexy, or sacrohysteropexy.
- ▶ **Purandare's cervicopexy** = classic answer for **congenital/nulliparous prolapse without cystocele** — rectus sheath strips to the cervix/isthmus.
- ▶ **Fothergill's operation** amputates the cervix — write "**low amputation** if reproduction desired," but note the risk below.
- ▶ Combine with **Moskowitz procedure** for enterocele; add **PFR** whenever cystocele/rectocele coexists.

NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM

Cervical amputation in Fothergill's operation carries a recognised risk of cervical incompetence, stenosis and mid-trimester loss in a subsequent pregnancy, so most current teaching favours a cervix-sparing option (cervicopexy/sacrospinous or uterosacral hysteropexy) over Fothergill's when the patient still intends to conceive.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Fothergill's/Manchester operation; Cervicopexy/Sling — Purandare's operation; Moskowitz procedure); Te Linde's Operative Gynecology 13e (DeLancey levels of support, Fig. 30.1; sacrospinous and uterosacral hysteropexy; sacrohysteropexy); Berek & Novak's Gynecology 16e (DeLancey levels of vaginal support, Fig. 5-23).

