RGUHS · MODEL ANSWER BANK

The questions RGUHS repeats — fully answered

RGUHS MS Obstetrics & Gynaecology — 2016-2026

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RECURRING-QUESTION ANSWER BANK

2006–2026

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

GROUNDED IN:

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 IV — Social Obstetrics, Family Welfare & Recent Advances

Contraception & family welfare

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A 16 year old adolescent comes to family planning clinical requesting contraception. Discuss the counselling and selection of contraceptives.

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

Definition — Adolescent contraceptive counselling is a confidential, non-judgemental assessment of a minor's sexual and reproductive history that leads to selection of a **medically eligible, effective, and acceptable** contraceptive method, with **long-acting reversible contraception (LARC — implant and intrauterine device)** recommended as first-line by the American College of Obstetricians and Gynecologists (ACOG) and the World Health Organization (WHO). In India this must be delivered within the medico-legal framework governing sexual activity under 18 years.

Counselling — approach, consent and legal framework

- **Private, confidential setting** — see the adolescent alone for part of the consultation; explain the limits of confidentiality before taking history.
- **Consent for examination** — a pelvic examination is *not* required before starting most methods (WHO); when an examination is needed, **consent from a parent/guardian is required for a minor or unmarried patient** (DC Dutta).
- **Medico-legal dimension (India)** — the age of consent for sexual intercourse is **18 years under the Protection of Children from Sexual Offences (POCSO) Act, 2012**; sexual activity with anyone below 18 is a statutory offence irrespective of "consent," and treating doctors are mandated reporters under Section 19. This must be explained sensitively — care (contraception, STI screening, pregnancy testing) is **never withheld or delayed**, and reporting is handled per institutional protocol/best-interest-of-the-child principle, not used to threaten or shame the patient.
- **Focused history** — menstrual pattern, sexual history (partner, consensual vs coerced), prior pregnancy/abortion, contraceptive use and failures, substance use, psychosocial support (school, family), and screen for contraindications (smoking, migraine with aura, seizure disorder, liver disease, thromboembolism).

- **Screening** — offer testing for sexually transmitted infections (STIs — chlamydia, gonorrhoea, HIV, syphilis) and a pregnancy test if indicated; discuss human papillomavirus (HPV) vaccination.
- **Method counselling** — explain mechanism, correct use, effectiveness, side effects, non-contraceptive benefits and reversibility of each option; stress **dual protection** (an effective method plus condom) for STI prevention.
- **Documentation and follow-up** — record informed consent and arrange review at 3 months, then annually, or sooner for side effects.

Factors guiding method selection

Factor	Effect on choice
Coital frequency/regularity	Infrequent coitus favours condom ± emergency contraception; regular sexual activity favours a continuous method
Need for discretion/privacy	Implant or intrauterine device (IUD) is concealable; daily pills or visible injections may be harder to hide from family
Compliance ability	Poor compliance favours LARC (implant/IUD) over daily pill
STI risk	Condom must always be added regardless of primary method chosen
Menstrual symptoms	Levonorgestrel intrauterine system (LNG-IUS) or combined pill helps heavy/painful periods
Contraindications	Smoking, migraine with aura, thrombophilia, uncontrolled hypertension → avoid oestrogen-containing methods
Desire for rapid return of fertility	All reversible methods restore fertility quickly except depot medroxyprogesterone acetate (DMPA), which may delay return by several months
Nulliparity/age <18	**Not** a contraindication to IUD or implant (WHO Medical Eligibility Criteria (MEC) Category 1–2)

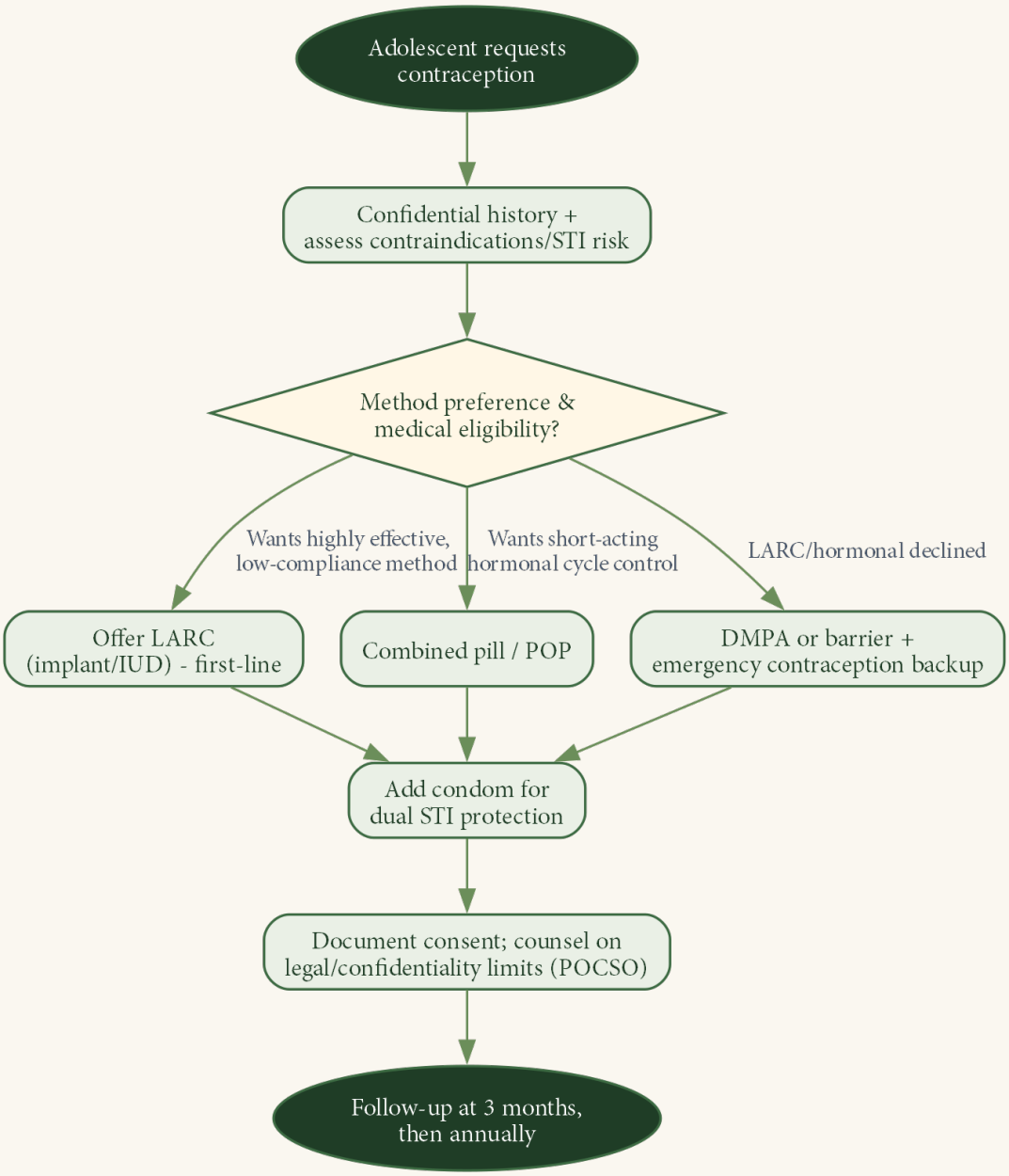
Contraceptive options for the adolescent

Method	Regimen/dose	Suitability for a 16-year-old	Key point
Implant (etonogestrel single-rod, subdermal)	Inserted subdermally in the arm; effective 3 years	**First-line/most effective** — 1-year continuation ~84%, failure <1%, better continuation than oral pills in adolescents	Discreet; rapid fertility return; irregular bleeding is main side effect
Copper IUD (Cu T 380A)	Intrauterine device; effective 10 years	Safe and effective in nulliparous/nulligravid adolescents; continuation rates equivalent to older women	Screen for STI before insertion; can increase menstrual flow
LNG-IUS	Intrauterine, releases levonorgestrel; effective ~5 years	Good where heavy/painful periods coexist	Continuation ~73% at 2 years, 46% at 5 years in adolescent cohorts
Combined oral contraceptive (COC) pill	Low-dose ethinyl estradiol (20–35 mcg) + progestin, one tablet daily	Contraceptive of choice for the sexually active adolescent when no contraindication (DC Dutta); WHO MEC Category 1 for age	Non-contraceptive benefits (cycle regularity, acne); needs daily compliance; avoid with smoking/migraine with aura
Progestogen-only pill (POP/minipill)	One tablet daily, no hormone-free interval	Alternative when oestrogen is contraindicated	Strict pill-timing compliance required
DMPA injectable	150 mg intramuscularly every 3 months	Alternative if LARC/pill declined	Reversible bone mineral density (BMD) loss, recovers within ~5 years of stopping; monitor with prolonged use
Condom (male/female)	Used with every act of intercourse	Mandatory as dual protection with any method above	Only method preventing STIs; user-dependent
Emergency contraception	Backup only, not for regular use	Must be offered/taught to every adolescent as a safety net	See below

Emergency contraception (offer to every adolescent as backup)

Option	Dose/regimen	Window
Levonorgestrel	0.75 mg two doses 12 hours apart, or both tablets (1.5 mg) as a single dose	Within 72 hours (efficacy retained up to 120 hours)
Copper IUD	Insertion as emergency contraceptive	Within 5 days of unprotected coitus; also provides ongoing contraception
Mifepristone	10 mg single dose	Day 27 of cycle, irrespective of number/day of intercourse

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for adolescent contraceptive counselling and method selection.

High-yield exam pointers

- **LARC (implant, IUD) = first-line for adolescents** per ACOG/WHO — highest efficacy and continuation, reversible.
- **Nulliparity/young age is NOT a contraindication to IUD** (WHO MEC 1–2) — a common false-DDx trap.
- **POCSO Act, 2012**: age of consent = 18 years; mandatory reporting by treating doctor; care is never denied while this is addressed.

- **Emergency contraception dose:** Levonorgestrel 0.75 mg × 2 (12 h apart) or 1.5 mg stat, within 72 h (up to 120 h); copper IUD up to 5 days; mifepristone 10 mg.
- **DMPA 150 mg IM 3-monthly** — reversible BMD loss is the key counselling point, not a contraindication.
- **Dual protection principle:** effective contraceptive + condom, always, for STI prevention.
- Minor's pelvic examination needs **parent/guardian consent**; most contraceptive methods do NOT need a pelvic exam before starting.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The Indian legal age-of-consent framework (POCSO Act, 2012) is general medico-legal knowledge relevant to Paper IV and is not found verbatim in the obstetric/gynaecological textbooks used for this answer.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e (contraceptive counselling, adolescent girls, emergency contraception); DC Dutta's Textbook of Obstetrics 9e (adolescent reproductive health, RCH); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (implants, IUD in nulliparous/adolescent women, DMPA); ACOG and WHO Medical Eligibility Criteria guidance on adolescent LARC use.

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Barrier contraception

Asked in: Paper IV 20-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Barrier methods are contraceptives that mechanically and/or chemically prevent viable sperm from reaching the cervical canal and upper genital tract, thereby blocking fertilisation. They are the oldest contraceptive techniques in use and are the **only reversible methods that also protect against sexually transmitted infections (STIs)**, though at the cost of a higher, user-dependent failure rate than hormonal or intrauterine methods.

Classification

Type	Examples
Mechanical — male	Male condom (latex, polyurethane, or "natural skin"/lamb-intestine)
Mechanical — female	Female condom (FC2), diaphragm, cervical cap (FemCap), Lea's Shield

Type	Examples
Chemical (vaginal contraceptives)	Spermicidal creams, jellies, foams, foaming tablets/suppositories, vaginal contraceptive film
Combination	Contraceptive sponge (spermicide + physical barrier); diaphragm/cap routinely combined with a spermicide

Mechanism, composition & correct use

Method	Composition/mechanism	Insertion	Removal
Male condom	Latex (0.3–0.8 mm; impermeable to sperm and STI pathogens) or polyurethane (thinner, latex-allergy option, higher breakage/slippage than latex)	Placed on the erect penis before any genital contact; foreskin retracted first; air squeezed from the reservoir tip	Held at the base and withdrawn while the penis is still erect, before detumescence, to prevent spillage
Female condom (FC2)	Nitrile sheath with a flexible inner ring (fitted behind the pubic symphysis like a diaphragm) and an outer ring covering the introitus/perineum; pre-lubricated, does not need spermicide	Inserted before intercourse; must **not** be used together with a male condom (friction causes slippage/tearing)	Outer ring twisted closed before withdrawal to prevent semen spill; can be washed/relubricated for limited reuse
Diaphragm + spermicide	Latex or silicone dome on a flexible metal/coil spring, fitted so one rim sits in the posterior fornix and the other behind the symphysis, covering the cervix; sized 50–105 mm (Dutta: 5–10 cm), fitted by a clinician	Spermicide placed in the dome and on the rim; inserted up to 6 hours before coitus (Dutta: up to 3 hours before)	Left in place ≥ 6 hours after coitus, not beyond 24 hours; extra spermicide added for repeat coitus without removal
Cervical cap (FemCap)	Silicone, sailor-cap shape fitting snugly over the cervix; sizes 22/26/30 mm (nulliparous vs parous); spermicide improves efficacy and reduces odour	Fitted directly over the cervix; check placement after each coital act	Left ≥ 8 hours after coitus; can remain up to 48 hours
Contraceptive sponge (Today)	Polyurethane disc impregnated with 1 g nonoxynol-9; absorbs semen and blocks the cervical os	Inserted (moistened) up to 24 hours before intercourse; gives continuous protection regardless of coital frequency	Left ≥ 6 hours after last coitus; total wear time not beyond 24–30 hours

Method	Composition/mechanism	Insertion	Removal
Spermicides alone	Surfactants — **nonoxynol-9**, octoxynol-9, benzalkonium chloride, menfegol — 60–100 mg/application, 2–12.5% concentration (e.g., Delfen cream: nonoxynol-9 12.5%); damage the sperm cell membrane	Cream/jelly/foam inserted high in the vagina 10–30 min (Dutta: ≥5 min for foam tablets) before coitus	Effective ≤ 1 hour (cream/jelly/foam up to 8 hours); must be reapplied before each further act; **postcoital douching is never a substitute** — sperm reach the tubes within seconds

Efficacy — first-year failure rates

Method	Perfect-use failure	Typical-use failure
Male condom	2%	13–15%
Female condom	5%	21%
Diaphragm + spermicide	16%	24%
Cervical cap + spermicide	~6% (nulliparous)	markedly higher in parous women
Spermicide alone	18%	28%
Sponge — nulliparous / parous	9% / 20%	14% / 27%
Withdrawal (coitus interruptus)	4%	18–20%
Fertility awareness-based methods	—	15–30%

DC Dutta's Textbook of Gynaecology 7e reports closely comparable Indian figures per hundred woman-years (condom 15, diaphragm 16, spermicide alone 18–29, female condom 5–21, sponge 9–32, withdrawal 20, fertility-awareness 20–30), confirming that all barrier methods have a materially higher typical-use failure rate than hormonal or intrauterine methods.

Advantages and disadvantages common to all barrier methods

Advantages	Disadvantages
Only reversible methods giving **STI/HIV protection** — condoms proven to reduce HIV transmission; barrier methods overall reduce PID/STI risk by ~50% (gonorrhoea, chlamydia, trichomoniasis, HSV, CMV)	Efficacy strongly **user- and coitus-dependent**; typical-use failure much higher than perfect-use
No systemic hormonal side effects; safe in most medical comorbidities	Must be used/applied with every act of intercourse — interferes with spontaneity

Advantages	Disadvantages
Reduce risk of cervical dysplasia/cancer and tubal infertility (via STI prevention)	Local irritation/allergic reactions (latex, spermicide); diaphragm/spermicide users have 2–3× higher urinary tract infection risk
Cheap, widely available, no prescription needed for condoms/spermicides/sponge	Diaphragm and cap require clinician fitting; require correct storage and technique
No effect on lactation; suitable as an immediate postpartum/interval method	Toxic shock syndrome risk (rare) with prolonged wear of female barrier devices — avoid in women with a past episode

Indications for barrier method use

- Spacing pregnancies, especially with infrequent/unpredictable intercourse.
- Contraindication or intolerance to combined hormonal contraception or an intrauterine device.
- **Dual protection** in women/couples at STI/HIV risk (alongside, not instead of, a highly effective method).
- **Bridging contraception** — first pill cycle, after IUD expulsion till refitting, and post-vasectomy till azoospermia is confirmed (~3 months).
- During partner treatment of trichomonal vaginitis, and male-factor immunological infertility (condom for ~3 months).
- Adolescents/occasional coitus needing a low-maintenance, non-prescription method; adjunct as breastfeeding-related amenorrhoea wanes.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig ? — Figs 36.16A to C: A. Female condom; B. Commonly used conventional contraceptive (Diaphragm); C. Vaginal contraceptive (Nonoxynol-9, 12.5%) (DC Dutta's Obstetrics 9e, p.545)*

Recent advances [RA]

- **Phexxi** (lactic acid + citric acid + potassium bitartrate) — non-hormonal vaginal pH-modulator gel, FDA-approved 2020; resists semen's alkalinising effect so normal vaginal acidity itself acts as the spermicide (Williams Obstetrics 26e).
- **Silicone one-size diaphragms (SILCS/Caya)** — no clinician fitting or prescription needed, latex-free (Speroff 9e).
- **Nitrile FC2 female condom** replaced latex FC1 — cheaper, retains in-vitro impermeability to HIV/CMV (Williams Obstetrics 26e; Speroff 9e).
- **Multipurpose prevention technologies (MPTs)** combining contraception with STI/HIV chemoprophylaxis remain investigational — phase-3 trials of candidate microbicides (Carraguard, BufferGel, ProGel2000) have not shown HIV protection, and nonoxynol-9 alone does not prevent HIV, gonorrhoea, or chlamydia (Speroff 9e).

- **National programme**: Government of India's free condom (Nirodh) distribution remains the largest contributor to barrier-method coverage; FOGSI emphasises dual-method counselling in STI/HIV-prevalent settings (DC Dutta's Textbook of Gynaecology 7e).

High-yield exam pointers

- Barrier methods = **only reversible methods with proven STI/HIV protection**; male condom is the *only* method proven to prevent HIV transmission.
- Typical-use failure hierarchy (best → worst): **male condom (13–15%)** < **female condom (21%)** < **diaphragm+spermicide (24%)** < **spermicide alone (28%)**.
- **Never** rely on postcoital douching — sperm reach the fallopian tubes within seconds.
- Diaphragm/cap timing to memorise: diaphragm in ≤6 h before, out ≥6 h (max 24 h) after; cap out ≥8 h after (max 48 h); sponge out ≥6 h after (max 24–30 h wear).
- Spermicide active agent to recall: **nonoxynol-9** — do not use alone if HIV/gonorrhoea/chlamydia prevention is the goal (no added protection over condoms).
- Recent-advance one-liner: **Phexxi (2020)** — non-hormonal pH-modulator vaginal gel, first new non-hormonal option in decades.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Failure-rate figures above are the current US Trussell/Guttmacher (2018–2020) estimates as tabulated in Williams Obstetrics 26e; DC Dutta's Gynaecology 7e gives closely similar Indian hundred-woman-year figures, so both sources may be quoted interchangeably in the exam.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e (Ch. 38 — Contraception: Barrier Methods, Table 38-1); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Ch. 24 — Barrier Methods of Contraception and Withdrawal); DC Dutta's Textbook of Gynaecology 7e (Ch. 30 — Contraception).

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Birth injuries

Asked in: Paper II Jun 2016 · Paper IV Oct 2008 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — A **birth injury** (birth trauma) is impairment of the neonate's body structure or function caused by mechanical forces — compression, traction, or shearing — acting on the fetus during labour

and delivery. Severity ranges from trivial skin marks to fatal intracranial, spinal, or visceral damage, and injury may involve **soft tissue (most common) and/or bone**.

Classification

Category	Structures affected	Examples
Soft tissue & scalp	Skin, subcutaneous fat, scalp	Lacerations, abrasions, fat necrosis, petechiae, caput succedaneum
Muscle	Sternocleidomastoid (SCM)	SCM haematoma → congenital torticollis
Skull & intracranial	Flat bones, meninges, brain	Cephalhematoma, subgaleal haematoma, linear/depressed fracture, subdural/subarachnoid/intraventricular haemorrhage
Peripheral nerve	Facial nerve; brachial plexus (Erb C5–C6, Klumpke C7–T1); phrenic (C3–C5); recurrent laryngeal; spinal cord	Facial palsy, Erb's/Klumpke's palsy, phrenic palsy, Horner syndrome
Bones & joints	Clavicle, humerus, femur, mandible, nasal bones; hip, shoulder, C5–C6	Greenstick/complete fractures; dislocations
Viscera	Liver, spleen, adrenal gland, kidney, testis	Subcapsular haematoma/rupture → haemoperitoneum
Eye	Conjunctiva, retina, vitreous	Subconjunctival/retinal/vitreous haemorrhage

Risk factors

Maternal / labour factors	Fetal factors	Delivery-related factors
Prolonged or obstructed labour; precipitate labour	Macrosomia	Instrumental delivery — forceps or vacuum (ventouse)
Cephalopelvic disproportion; inadequate/contracted pelvis	Abnormal presentation (breech, face/brow)	Manipulative delivery — internal podalic version, breech extraction
Oligohydramnios	Fetal anomalies	Difficult/uncoordinated shoulder dystocia management
—	Very low birth weight infant	Wrongly applied forceps (blades not over biparietal diameter)

Clinical types — features and management

Type	Cause / mechanism	Clinical features	Management
Caput succedaneum	Venous/lymphatic stasis in scalp over the girdle of contact	Diffuse, boggy swelling, **present at birth**, crosses suture lines; pits on pressure	None; resolves in 24–48 h
Cephalhematoma	Rupture of subperiosteal emissary/diploic vein	Firm, fluctuant swelling **limited by suture lines**; **never at birth**, appears at 12–24 h	Reassurance; no aspiration; treat anaemia/hyperbilirubinaemia; CT if neurological signs
Subgaleal haemorrhage	Emissary-vein rupture between galea and periosteum; linked to vacuum delivery	Diffuse boggy swelling crossing sutures, can spread to neck/orbits; may cause rapid hypovolaemic shock	Obstetric **emergency** — volume resuscitation, blood transfusion, correct coagulopathy
Skull fracture (linear/depressed)	Difficult/malapplied forceps; sacral promontory pressure in a flat pelvis	Linear — usually symptomless; depressed — pressure effect, neurological signs	Conservative if symptomless; neurosurgical elevation if depressed with pressure effect
Intracranial haemorrhage (subdural/subarachnoid/intraventricular)	Excessive moulding → tentorial tear; asphyxia; prematurity (germinal-matrix bleed)	Irritability, high-pitched cry, bulging fontanelle, seizures, apnoea, coma if massive	Cranial USG/CT; supportive care, correct coagulopathy/electrolytes, anticonvulsants (phenobarbitone/phenytoin); subdural tap or surgical evacuation if massive
Facial nerve palsy	Forceps-blade pressure, or nerve compressed against ramus of mandible	Affected eye stays open, no naso-labial fold, mouth drawn to unaffected side on crying; sucking normal	Eye protection with artificial tears; resolves within weeks

Type	Cause / mechanism	Clinical features	Management
Erb (Duchenne) palsy	Traction on neck during shoulder delivery/dystocia; **C5–C6** (± C7) roots	Arm adducted, elbow extended, forearm pronated, wrist flexed — **"waiter's tip"**; Moro reflex absent; may have ipsilateral phrenic palsy	Immobilise in neutral position, physiotherapy/passive movement; X-ray to exclude clavicle/humerus fracture; most recover in weeks
Klumpke's palsy	Lower plexus roots **C7, C8, T1**	Claw-hand, wrist extended, forearm supinated; **Horner syndrome** if T1 involved	Immobilisation, physiotherapy; recovery over weeks–months, may be permanent if avulsion
Phrenic nerve palsy (C3–C5)	Excessive neck stretching, often with Erb palsy	Respiratory distress, cyanosis, tachypnoea; paradoxical diaphragm movement on USG	Supportive — CPAP/ventilation; recovery in 1–3 months
SCM (sternomastoid) haematoma	Muscle-fibre rupture in difficult breech/shoulder dystocia	Firm mass at mid-SCM, appears 7–10 days after birth; transient torticollis	Conservative stretching physiotherapy (do not massage); surgery if persists beyond 6 months
Clavicle/humerus/femur fracture	Breech delivery, shoulder dystocia	Crepitus, reduced limb movement (pseudoparalysis), usually greenstick	X-ray; immobilisation ± closed reduction and casting; unites with callus in 2–4 weeks
Cervical spine fracture-dislocation	Acute hyperextension delivering the aftercoming head, or shoulder dystocia	Often fatal — cord/medullary compression	Prevention is key; little can be offered once it occurs

Type	Cause / mechanism	Clinical features	Management
Visceral injury (liver, spleen, adrenal, kidney)	Breech delivery, excessive abdominal handling	Pallor, abdominal distension, shock from haemoperitoneum	Correct hypovolaemia/coagulopathy; surgical repair as indicated

Investigations

Investigation	Purpose
Clinical examination	Diagnoses most soft-tissue and nerve injuries
Cranial ultrasonography	First-line for intracranial haemorrhage and cephalhematoma extent
CT/MRI brain	Neurological signs, depressed fracture with pressure effect, hypoxic–ischaemic injury
X-ray — skull, long bones, spine	Confirms fracture or dislocation
USG of diaphragm	Paradoxical movement confirms phrenic nerve palsy
Haemoglobin/haematocrit, serum bilirubin	Detects anaemia/hyperbilirubinaemia from sequestered blood
Coagulation profile	Before surgical intervention or if a bleeding diathesis is suspected

Prevention

- Partograph-based monitoring of labour; avoid prolonged/obstructed labour and undue delay before instrumental or caesarean delivery.
- Accurate diagnosis of cephalopelvic disproportion or malpresentation, with timely caesarean section rather than a forceful vaginal delivery.
- Correctly-applied forceps/vacuum — blades placed over the biparietal diameter, no excessive or prolonged traction.
- Anticipate and manage shoulder dystocia with a recognised manoeuvre sequence (e.g., McRoberts position, suprapubic pressure) rather than excessive lateral traction on the head and neck.
- Controlled, gentle delivery of the aftercoming head and shoulders in breech; prefer caesarean section for an unfavourable breech.
- Antenatal corticosteroids and *in-utero* transfer to a centre with a neonatal intensive care unit (NICU) when preterm delivery is anticipated.

- Vitamin K 1 mg intramuscularly to the neonate soon after birth in susceptible babies.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 33.8A and B — A. Facial palsy; B. Erb's palsy (DC Dutta's Obstetrics 9e, p.482)*

High-yield exam pointers

- Distinguish the three scalp swellings on sight: **caput** (crosses sutures, present at birth, gone in 24–48 h) vs **cephalhematoma** (limited by suture lines, appears at 12–24 h, resolves in 2–8 weeks) vs **subgaleal haemorrhage** (crosses sutures, can cause shock — obstetric emergency).
- **Erb's palsy = C5–C6**, "waiter's tip" posture, Moro absent; **Klumpke's palsy = C7, C8, T1**, claw-hand, **Horner syndrome** if T1 involved.
- **Phrenic nerve palsy (C3–C5)** often coexists with Erb's palsy — look for ipsilateral diaphragmatic paralysis on ultrasonography.
- **Vitamin K 1 mg IM** to the neonate soon after birth prevents haemorrhagic birth injury in susceptible babies.
- Clavicle is the **most commonly fractured bone** in birth trauma — usually greenstick, heals with callus in 2–4 weeks.
- Cervical spine fracture-dislocation from acute bending of the neck (aftercoming head/shoulder dystocia) is classically **instantaneously fatal** from medullary compression.

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

Ventouse (vacuum) application is stated by DC Dutta not to increase cephalhematoma incidence, but current teaching (Williams Obstetrics 26e) instead links vacuum-assisted delivery with a somewhat greater risk of cephalhematoma and of Erb/facial palsy than forceps or caesarean delivery.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Birth Injuries of the Newborn, Ch. 33); Williams Obstetrics 26e.

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Breast milk bank and its advantages and disadvantages

Asked in: Paper IV 02-Jun-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — A **human milk bank (breast milk bank)** is a service that recruits and screens lactating donors, then collects, pools, pasteurises, tests, stores and dispenses **donor human milk (DHM)** to infants who cannot get an adequate volume of their own mother's milk — chiefly preterm, low-birth-

weight (LBW) and sick neonates. In India this is organised as a two-tier public-health network of **Comprehensive Lactation Management Centres (CLMC)** at tertiary centres feeding satellite **Lactation Management Units (LMU)** at peripheral facilities.

Organisation and process of a milk bank

Step	What is done
1. Donor recruitment & counselling	Lactating mothers with a surplus, healthy singleton pregnancy outcome are counselled and consented
2. Donor screening	Health questionnaire + serology for **HIV, Hepatitis B, Hepatitis C, syphilis**; exclusion for active **tuberculosis**, smoking/alcohol/substance use, unsafe medication, and **cytomegalovirus (CMV)** risk to a vulnerable recipient
3. Milk expression & collection	Hygienic manual/pump expression into sterile containers; maintained on a cold chain during transport
4. Pooling	Milk from a screened donor is pooled in batches before processing
5. Pasteurisation	**Holder pasteurisation — 62.5 °C for 30 minutes** — inactivates HIV, CMV, hepatitis B/C and most bacteria while retaining most nutrients
6. Post-pasteurisation testing	Microbiological culture of a sample from every batch; batch released only if sterile
7. Storage	Frozen at **−20 °C**; expressed (unpasteurised) milk otherwise keeps refrigerated at 4 °C for 24 hours or at room temperature for up to 4 hours
8. Dispensing	Released on paediatrician's prescription, prioritised to preterm/very-low-birth-weight (VLBW) and sick neonates whose own mother's milk is unavailable or insufficient

Indications for donor human milk

- Preterm/VLBW infant whose own mother's milk is delayed (lactogenesis failure) or insufficient in volume.
- Sick or hospitalised neonate in the neonatal intensive care unit (NICU) at risk of **necrotising enterocolitis (NEC)**.
- Mother who has died, is critically ill, or is on a drug/chemotherapy incompatible with breastfeeding.
- Adopted infant or infant of a surrogate/commissioning mother.
- Bridging feed until relactation or induced lactation in the biological mother is established.

- Infant with feed intolerance who cannot tolerate formula.

Advantages

Advantage	Basis
Reduces necrotising enterocolitis	Cochrane 2024 update: donor milk instead of formula roughly **halves NEC risk** in very preterm/VLBW infants
Nutritional and immunological superiority over formula	Retains immunoglobulin A, lactoferrin, growth factors, oligosaccharides and easier digestibility versus formula
Bridges the gap until mother's own milk is established	Avoids formula exposure in the vulnerable early neonatal window
Supports WHO/UNICEF feeding hierarchy	Mother's own milk > pasteurised donor milk > formula — the accepted order of preference
Cost-effective in the NICU	Shortens length of stay/parenteral nutrition dependence compared with formula-related morbidity
Ethical option when mother's milk is unavailable	Applicable to maternal death, severe illness, relinquished or orphaned infants
Preserves breastfeeding culture	Reinforces exclusive human-milk feeding as the community norm rather than early formula introduction

Disadvantages / limitations

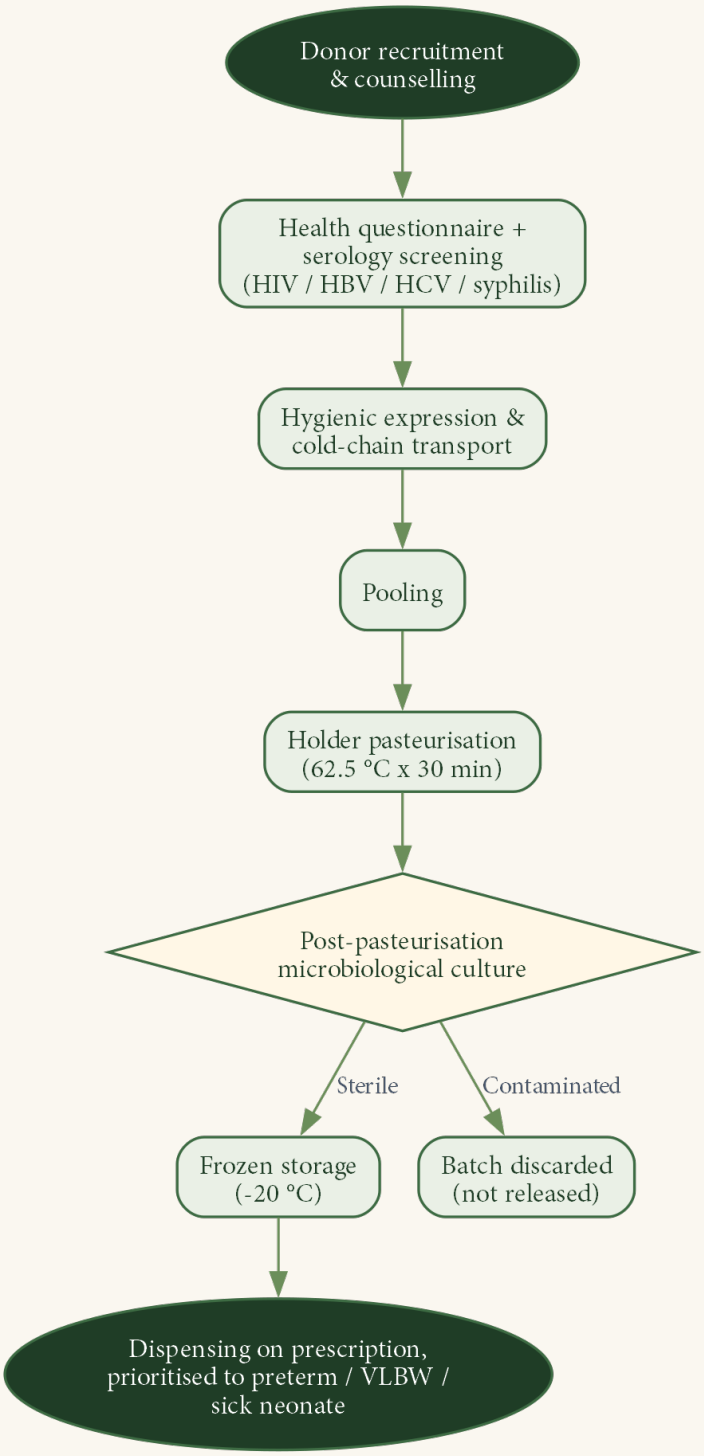
Disadvantage	Reason
Residual infection-transmission risk	HIV, CMV, hepatitis B/C if donor screening or pasteurisation is inadequate
Loss of bioactive components	Holder pasteurisation reduces (does not abolish) immunoglobulins, some vitamins and live maternal cells
Variable/suboptimal nutrient content for preterm needs	Donor milk (often from mothers of term infants, pooled, later-lactation) has lower protein/energy than a preterm infant needs — usually requires **fortification**
High infrastructure cost	Cold chain, pasteuriser, microbiology testing and trained staff are resource-intensive
Limited supply	Donor recruitment is difficult; demand from NICUs regularly exceeds availability

Disadvantage	Reason
Social/cultural/religious objections	Concerns akin to "milk kinship," stigma around sharing body fluids, parental reluctance
Regulatory and quality-control burden	Needs biological-product-level oversight (traceability, batch testing, consent documentation)

Recent advances [RA]

- **India's National Guidelines for Lactation Management Centres in Public Health Facilities** (Ministry of Health & Family Welfare, National Health Mission, 2017) created the CLMC + LMU network now running in the public sector; India's first (and Asia's first) human milk bank was set up at **Sion Hospital, Mumbai in 1989** by Dr Armida Fernandez, the template the national programme scaled up from.
- **WHO** convened a Guideline Development Group (2022–2023) to draft the first dedicated global WHO guideline on donor human milk banking, covering minimum safety/quality standards across the donor–recipient–product pathway; pending its release, the WHO/UNICEF Baby-Friendly Hospital Initiative already lists pasteurised donor milk as the preferred next-best option when the mother's own milk is unavailable.
- **Cochrane evidence** (Quigley M et al., Cochrane Database of Systematic Reviews, 2024 update, 12 RCTs, n = 2296): feeding very preterm/VLBW infants donor human milk instead of formula reduces necrotising enterocolitis risk by about half, though effect on sepsis or death is uncertain — this is the current evidence basis for prioritising donor milk in NICU protocols.
- The **COVID-19 pandemic** prompted interim safety add-ons (donor re-screening, enhanced personal protective equipment, tele-lactation counselling); milk banking continued uninterrupted because Holder pasteurisation inactivates SARS-CoV-2.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart: donor recruitment and counselling to serology screening, hygienic expression and cold-chain transport, pooling, Holder pasteurisation, post-pasteurisation culture (batch released only if sterile), frozen storage, and dispensing prioritised to preterm/VLBW/sick neonates.

High-yield exam pointers

- **Holder pasteurisation = 62.5 °C for 30 minutes** — the number to write.
- India's model: **CLMC** (tertiary) + **LMU** (peripheral) under the **2017 MoHFW/National Health Mission guidelines**.
- First Indian/Asian milk bank: **Sion Hospital, Mumbai, 1989** (Dr Armida Fernandez).
- **Cochrane 2024**: donor milk roughly **halves NEC risk** vs formula in VLBW/preterm infants.
- Expressed breast milk storage: **−20 °C up to 6 months / 4 °C up to 24 h / room temperature up to 4 h**.
- WHO/UNICEF feeding hierarchy: **mother's own milk > pasteurised donor milk > formula**.
- Screen donors for **HIV, hepatitis B/C, syphilis, active TB**; exclude smoking/alcohol/drug use.

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

DC Dutta's account of donor milk banking is brief and pre-dates both the 2017 Government of India lactation-centre guidelines and the 2024 Cochrane update; the recent-advances points above reflect the current national programme and evidence base and should be preferred over the textbook's dated framing.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (donor milk/screening/pasteurisation/storage); National Guidelines for Lactation Management Centres in Public Health Facilities, Ministry of Health & Family Welfare/National Health Mission, Government of India (2017); Cochrane Database of Systematic Reviews — Quigley M et al., donor human milk for preventing necrotising enterocolitis (2024 update); WHO/UNICEF Baby-Friendly Hospital Initiative.

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Briefly discuss the potential areas of legal problems in obstetrics

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

Definition — A doctor owes every patient a **duty of care** that must match the standard of a reasonably competent obstetrician at that time and place; failure to discharge this duty, by an act of **omission or commission**, constitutes negligence. Obstetric practice generates a disproportionate share of medico-legal claims because two lives — mother and fetus/neonate — are at risk simultaneously, and legal

problems arise from three broad sources: adverse clinical outcome, breach of statutory law, and breach of consent/confidentiality.

Areas of legal problems related to adverse clinical outcome

Category	Examples
Perinatal injury	Stillbirth and neonatal death; hypoxic brain damage (birth asphyxia); injury during vaginal breech delivery; injury following operative vaginal delivery (forceps/vacuum)
Maternal injury	Maternal trauma (genital tract injury, uterine rupture); maternal death; injury/complications of episiotomy; forgotten swab or instrument in the abdomen or vagina
Both mother and baby	Instrumental vaginal delivery; operative delivery (Caesarean section and its complications); anaesthetic complications

Areas of legal problems arising from statutory violation

Law	Obstetric relevance	Potential legal problem
MTP (Amendment) Act, 2021	Termination of pregnancy	Termination beyond the permitted gestational limit, by an unqualified practitioner, or at an unapproved place is a criminal offence; termination without valid consent
PC-PNDT Act, 1994 (amended 2003)	Prenatal diagnostic procedures (USG, amniocentesis, chorionic villus sampling)	Prenatal sex determination or disclosure of fetal sex, non-maintenance of Form F — criminal prosecution and cancellation of registration
Registration of Births and Deaths Act, 1969	Certification of birth/stillbirth/maternal death	Wrong certification of live birth versus stillbirth; delayed or false notification
Consumer Protection Act, 2019	Medical service rendered for a fee	"Deficiency of service" claim before the District/State/National Consumer Disputes Redressal Commission — medical services were brought under "service" by *Indian Medical Association v. V.P. Shantha* (1995)

Law	Obstetric relevance	Potential legal problem
Bharatiya Nyaya Sanhita (BNS), 2023, s.106(1) (earlier IPC s.304A)	Death caused by a negligent act	Criminal prosecution for causing death by a rash or negligent act; a registered medical practitioner performing a medical procedure in good faith with reasonable care is liable to a capped term (up to 2 years) versus the general provision (up to 5 years)

Areas of legal problems related to consent and confidentiality

- **Absent or invalid informed consent** before any procedure — surgery performed without consent is legally an assault; consent must be **written, specific, and voluntary**, signed by patient and physician, after explaining the diagnosis, nature of the operation, success rate, risks/complications, and alternatives (including the option of no treatment).
- **Sterilization operations** — husband's/spouse's consent is not legally mandatory in India, but failed sterilization and wrong-patient sterilization are frequent claims.
- **Consent in a minor** (below 18 years) **or a person of unsound mind** — written consent of a parent or legal guardian is mandatory; the woman's own consent alone is insufficient.
- **Breach of confidentiality** — disclosure of fetal sex, a genetic test result, HIV status, or any patient information to a third party without the patient's authorisation.
- **Inadequate disclosure during genetic counselling and prenatal diagnosis** — parents must receive accurate information on risk, testing options, and implications; privacy and autonomy must be protected.

Areas of legal problems related to documentation and system factors

- Illegible, incomplete, or retrospectively altered case records/partograph — the case record is the primary medico-legal evidence and must show date and time clearly.
- Deviation from an established, evidence-based management protocol without a documented reason.
- Inadequate training or supervision of junior staff/trainees in the labour ward, with seniors not available for consultation.
- Delay in seeking timely consultation with a colleague when a complication is anticipated or a difficulty is faced.
- **System errors** — inadequate staffing, operation theatre/blood bank access, or equipment, as opposed to an individual healthcare worker's error.

Measures to minimize medicolegal problems

- Clear, understandable **communication** with the patient and relatives about the management decision.
- **Informed, written consent** before any agreed procedure or investigation.
- Accurate, contemporaneous, and legible **documentation** of facts, date, and time in the patient's file.
- Strict adherence to an established, **evidence-based protocol**; any deviation must be documented with reasons.
- Careful **record maintenance** at the institutional level, as records may be needed later.
- Adequate **training and supervision** of juniors, with seniors available for consultation.
- Timely **consultation** with another specialist when difficulty is faced in patient care.
- Regular clinical **audit** and departmental meetings to update knowledge and improve quality of care.

High-yield exam pointers

- **Perinatal / Maternal / Both** — DC Dutta's three-way classification of common areas of legal threat in obstetrics; reproduce this framework first.
- **"Surgery without consent is an assault"** — a favourite examiner line; write it verbatim.
- **MTP (Amendment) Act, 2021**: up to 20 weeks — opinion of 1 registered medical practitioner (RMP); 20–24 weeks (notified special categories: rape/incest survivors, minors, change of marital status, disability, mental illness, fetal malformation, humanitarian settings) — opinion of 2 RMPs; beyond 24 weeks — only for substantial fetal abnormality diagnosed by a Medical Board.
- **PC-PNDT Act, 1994** (amended 2003) — prohibits sex *determination/disclosure*, not diagnosis of genetic/structural anomalies.
- ****_Indian Medical Association v. V.P. Shantha_ (1995)**** — brought paid medical services under the Consumer Protection Act.
- **IPC s.304A → BNS 2023 s.106(1)** — causing death by negligence; capped 2-year term for a registered medical practitioner acting in good faith versus the general 5-year term.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Textbook of Obstetrics 9e prints the pre-amendment MTP Act (20-week single limit, two-practitioner opinion beyond 12 weeks) and refers to the now-superseded Indian Penal Code; the current law is the MTP (Amendment) Act, 2021 and the Bharatiya Nyaya Sanhita, 2023, both reflected in the answer above.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Legal and Ethical Issues in Obstetric Practice; Preconception and Prenatal Diagnostic Techniques Act; Induction of Abortion/MTP); DC Dutta's Textbook of Gynaecology 7e (Preoperative Counseling and Informed Consent); MTP (Amendment) Act, 2021; PC-PNDT Act, 1994 (amended 2003); Consumer Protection Act, 2019; Bharatiya Nyaya Sanhita, 2023.

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Briefly outline the non contracetive uses of the combined oral contraceptive pill

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

Definition — The combined oral contraceptive (COC) pill contains an estrogen (usually ethinyl estradiol 20–35 µg) plus a progestin, and acts mainly by suppressing the hypothalamic-pituitary-ovarian axis to prevent ovulation. Because this same systemic hormonal action modifies the endometrium, cervical mucus, and ovarian/adrenal androgen output, the COC has well-documented therapeutic and prophylactic benefits quite apart from contraception — these are its "non-contraceptive" uses.

Menstrual-cycle and pain-related benefits

Problem	Benefit of COC	Mechanism / magnitude
Irregular cycles	Regular, predictable withdrawal bleed	Fixed hormone-free interval every cycle
Dysmenorrhoea	Reduced by about 40%	Anovulation + reduced endometrial prostaglandin
Menorrhagia / heavy menstrual bleeding (HMB)	Reduced by about 50%	Endometrial atrophy; NICE guideline NG88 (Heavy Menstrual Bleeding) lists COC as a first-line hormonal option when no pathology is found
Mittelschmerz	Abolished	Ovulation is suppressed
Iron-deficiency anaemia	Reduced	Less menstrual blood loss
Premenstrual syndrome (PMS) / premenstrual dysphoric disorder (PMDD)	Reduced severity	Best evidence with a drospirenone-containing COC (RCOG Green-top Guideline No. 48, *Management of Premenstrual Syndrome*, 2017); continuous/extended dosing outperforms the standard 21/7 cyclic regimen

Problem	Benefit of COC	Mechanism / magnitude
Endometriosis-associated pain and dysmenorrhoea	First-line hormonal suppression	Cyclic and continuous regimens equally effective; cheaper and better tolerated than gonadotropin-releasing hormone (GnRH) analogues, and maintains suppression after surgery

Protection against gynaecological malignancy

Cancer	Risk reduction with COC use	Note
Endometrial cancer	About 50%	Protection needs only 6 months–1 year of use and persists 10–15 years after stopping (DC Dutta's Gynaecology 7e)
Epithelial ovarian cancer	About 50%	Duration-dependent: pooled relative risk 0.69 for ever-use versus never-use, falling to 0.51 with more than 120 months' use [PMID 39261253]; protection is also demonstrated in BRCA1/2 mutation carriers, persisting beyond 15 years [PMID 33493488]
Colorectal cancer	About 40%	Population-level benefit shown in cohort data

No causal increase in cervical cancer has been established (relative risk about 1.1, likely confounded by sexual behaviour and human papillomavirus [HPV] exposure) — pill users should still have regular cervical cytology/HPV screening. Low-dose COC use is not associated with hepatocellular adenoma.

Protection against benign disease

Condition	Effect of COC
Pelvic inflammatory disease (PID)	Reduced — thickened cervical mucus limits ascending infection
Ectopic pregnancy	Reduced — anovulation prevents fertilisation
Functional ovarian cysts	Fewer new cysts (established clinical experience, though randomised trial evidence for treating an existing cyst is weak)
Benign breast disease (fibrocystic change, fibroadenoma)	Reduced

Condition	Effect of COC
Uterine fibroids	Growth not stimulated; menstrual blood loss from an existing fibroid is reduced
Bone mineral density	Increased BMD with long-term use; effect on fracture risk is inconsistent across studies
Rheumatoid arthritis	Some studies show reduced severity/progression; evidence is inconsistent

Androgen-excess and endocrine/therapeutic uses

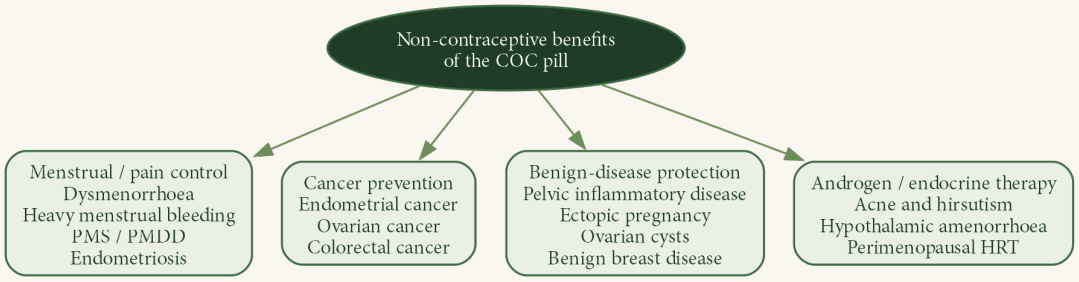
- **Acne and hirsutism** (including polycystic ovary syndrome) — COC raises hepatic sex-hormone-binding globulin (SHBG) and suppresses luteinising-hormone-driven ovarian androgen production, lowering free testosterone; benefit is comparable across low-dose formulations and is clinically evident after 6–12 months, best with an anti-androgenic progestin (cyproterone acetate, drospirenone).
- **Hypothalamic amenorrhoea** — provides oestrogen replacement together with contraception in women who still need contraception.
- **Prevention of menstrual (cyclic) porphyria** by suppressing ovulatory hormone fluctuation.
- **Control of anovulatory dysfunctional uterine bleeding**, acute and long-term.
- **Perimenopausal hormone replacement** — in a non-smoker with no cardiovascular risk factor, the low-dose pill can be continued (with monitoring) up to age 50, giving simultaneous contraception and hormone replacement therapy (HRT).

Recent advances [RA]

- A pooled systematic review/meta-analysis of 67 studies (2000–2023) confirmed a duration-dependent protective effect of COC against epithelial ovarian cancer: relative risk 0.69 for ever-use versus never-use, deepening to 0.51 with more than 10 years of use [PMID 39261253].
- An international cohort study in BRCA1/2 mutation carriers showed the same ovarian-cancer protection extends to this high-risk group, with the benefit persisting beyond 15 years after stopping the pill [PMID 33493488] — reassuring counselling data for high-risk women choosing COC for contraception or cycle control.
- RCOG Green-top Guideline No. 48 (2017) specifically recommends a drospirenone-containing COC, given continuously rather than cyclically, as evidence-based first-line hormonal therapy for PMS/PMDD, since older progestins (norethisterone, levonorgestrel) can themselves worsen mood symptoms.
- NICE guideline NG88 (Heavy Menstrual Bleeding: Assessment and Management) lists combined hormonal contraception alongside the levonorgestrel-releasing intrauterine system and tranexamic acid as first-line pharmacological options for HMB without structural or histological abnormality.

- Current American College of Obstetricians and Gynecologists (ACOG) counselling guidance emphasises actively discussing these non-contraceptive benefits, since fear of cancer and cardiovascular risk (rather than the actual, low, absolute risk) is a leading cause of pill discontinuation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Classification tree of the COC pill's four non-contraceptive benefit categories.

High-yield exam pointers

- Numbers to write: dysmenorrhoea ↓40%, menorrhagia ↓50%, endometrial cancer ↓50%, ovarian cancer ↓50%, colorectal cancer ↓40%.
- Cancer-protection rule: only 6 months–1 year of use needed; benefit persists 10–15 years after stopping.
- Drospirenone-containing COC, given continuously, is the evidence-based hormonal option for PMDD (RCOG Green-top 48).
- COC protects against ovarian cancer even in BRCA1/2 carriers.
- A healthy non-smoker can stay on low-dose COC to age 50 for dual contraception + HRT.
- NICE NG88 places COC among first-line options for heavy menstrual bleeding.

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

DC Dutta's percentage figures (40–50% risk reduction) are the standard values quoted in Indian postgraduate examinations; contemporary international meta-analyses express the same protective effect as a relative risk rather than a fixed percentage, and the two are consistent with each other.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; RCOG Green-top Guideline No. 48 (Management of Premenstrual Syndrome, 2017); NICE guideline NG88 (Heavy Menstrual Bleeding); PMID 39261253; PMID 33493488.

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Clinical features and management of Gonococcal infection

Asked in: Paper IV 28-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Gonorrhoea is a sexually transmitted infection (STI) caused by *Neisseria gonorrhoeae*, a gram-negative intracellular diplococcus, with an incubation period of 3–7 days. It preferentially invades columnar and transitional epithelium, so the primary sites are the endocervix, urethra, Skene's and Bartholin's glands (squamous epithelium resists invasion, hence no adult vaginitis, but vulvovaginitis can occur in childhood).

Clinical features

Local disease

- About 50% of infected women are asymptomatic; when present, symptoms are non-specific.
- Symptoms: dysuria (25%); excessive irritant mucopurulent vaginal discharge (50%); acute unilateral labial pain/swelling from Bartholin's gland involvement; rectal discomfort from associated proctitis; intermenstrual bleeding; pharyngeal infection from oro-genital contact.
- Signs: inflamed, swollen labia; mucopurulent vaginal discharge; congested external urethral meatus and Bartholin's duct openings, with purulent exudate expressible on pressure; tender fluctuant Bartholin's gland if abscess has formed; congested ectocervix with mucopurulent discharge at the external os on speculum examination.

Distant (disseminated) disease

- **Perihepatitis (*Fitz-Hugh–Curtis syndrome*)** — spread of infection to the liver capsule with right-hypochondrial pain and perihepatic adhesions; seen in 5–10% of acute pelvic inflammatory disease (PID), gonococcal or chlamydial.
- **Disseminated gonococcal infection (DGI)/gonococcal bacteraemia** — the classic *arthritis–dermatitis syndrome*: low-grade fever, migratory polyarthralgia, tenosynovitis, petechial/pustular skin lesions, septic arthritis; rarely endocarditis or meningitis.

Complications

- Ascending infection occurs in about 15% of untreated cervicitis to cause acute PID (endosalpingitis, by continuity/contiguity along the endometrial mucosa and via sperm/trichomonads carrying gonococci upward) — always essentially bilateral tubal disease.

- Sequelae: chronic PID, tubo-ovarian mass/abscess, tubal-factor infertility, ectopic pregnancy, chronic pelvic pain, dyspareunia, Bartholin's abscess.
- In pregnancy: mildly increased rates of preterm birth and preterm prelabour rupture of membranes; vertical transmission at delivery causes **gonococcal ophthalmia neonatorum** (up to ~30–40% of exposed neonates), which can progress to corneal scarring, perforation, and blindness if untreated; rarely neonatal disseminated infection or pneumonia.

Diagnosis

Investigation	Finding / purpose
Gram stain of urethral/cervical/Bartholin's discharge	Gram-negative intracellular diplococci — presumptive diagnosis
Culture (Thayer-Martin/modified Thayer-Martin medium)	Confirms diagnosis; allows antimicrobial susceptibility testing
Nucleic acid amplification test (NAAT) of endocervical/vaginal swab or first-void urine	Current preferred test; sensitivity and specificity ~95%; has largely replaced culture
Screen for co-infection	Syphilis serology (VDRL/RPR), *Chlamydia trachomatis* NAAT (co-infected in up to a third of cases), HIV

Management

Treatment (current CDC-recommended regimens)

Clinical setting	Regimen
Uncomplicated urogenital/rectal/pharyngeal gonorrhoea, non-pregnant	**Ceftriaxone 500 mg IM single dose** (body weight <150 kg); **1 g IM** if ≥150 kg. Add **doxycycline 100 mg PO BID × 7 days** if chlamydial infection has not been excluded
Pregnancy	Ceftriaxone 500 mg IM single dose (same weight rule); if chlamydia not excluded, add **azithromycin 1 g PO single dose** (doxycycline avoided in pregnancy)
Cephalosporin not available/contraindicated	Gentamicin 240 mg IM single dose **plus** azithromycin 2 g PO single dose
Disseminated gonococcal infection (arthritis–dermatitis syndrome)	Ceftriaxone 1 g IV/IM every 24 h, continued 24–48 h after clinical improvement, then step down to an oral agent (per sensitivity) to complete 7 days total; add azithromycin 1 g PO once for chlamydial cover
Gonococcal endocarditis	Ceftriaxone 1–2 g IV every 12 h for ≥4 weeks
Gonococcal meningitis	Ceftriaxone 1–2 g IV every 12 h for 10–14 days

Clinical setting	Regimen
Gonococcal ophthalmia neonatorum	Ceftriaxone 20–30 mg/kg IM single dose **plus** gentamicin 1% eye ointment; saline eye irrigation

Partner treatment and prevention

- Treat all sexual partners from the preceding 60 days empirically, simultaneously with the index patient.
- Both partners abstain from intercourse until therapy is complete and 7 days have passed.
- Counsel and screen for concurrent syphilis, chlamydia and HIV; use condoms until both partners are cleared.
- Universal ocular prophylaxis (erythromycin ointment/silver nitrate as per protocol) at birth for all neonates to prevent gonococcal ophthalmia neonatorum.

Follow-up

- Test-of-cure is not routinely required after a recommended ceftriaxone-based regimen for urogenital/rectal disease.
- Pharyngeal infection: test-of-cure at 1–2 weeks, since non-ceftriaxone regimens have higher failure rates there.
- Repeat testing at 3 months post-treatment is advised for all treated patients to detect reinfection.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 10.1 — Mode of spread in gonococcal infection (DC Dutta's Gynaecology 6e, p.144)*

High-yield exam pointers

- Organism: *N. gonorrhoeae*, gram-negative diplococcus; incubation 3–7 days; ~50% of women asymptomatic.
- Primary sites: endocervix, urethra, Skene's/Bartholin's glands; ascends in ~15% of untreated cervicitis to cause PID.
- Distant disease: perihepatitis (*Fitz-Hugh–Curtis*, 5–10%) and DGI = arthritis-dermatitis syndrome.
- Diagnosis ladder: Gram stain (presumptive) → culture on Thayer-Martin (confirmatory + sensitivity) → NAAT (current gold standard, ~95% sensitive/specific).
- Current CDC Rx = **ceftriaxone 500 mg IM single dose** (weight-based, not the older 250 mg) ± doxycycline (non-pregnant) or azithromycin (pregnant) for chlamydia cover.
- Always: treat partner, screen for syphilis/chlamydia/HIV, retest at 3 months; neonate gets ocular prophylaxis at birth.

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

DC Dutta's printed table reflects the older CDC schedule (ceftriaxone 250 mg IM with routine combined azithromycin **and** doxycycline); the current CDC 2021 guideline (as reflected in Williams Obstetrics 26e) recommends the weight-based 500 mg/1 g ceftriaxone single dose, adding doxycycline (or azithromycin only in pregnancy) solely when chlamydial infection has not been excluded.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (clinical features, local/distant disease, diagnosis, Bartholin's/PID complications); Williams Obstetrics 26e (current CDC-based treatment regimens, pregnancy-specific dosing, disseminated infection management, follow-up); guideline: CDC/Workowski (2021) Sexually Transmitted Infections Treatment Guidelines (as cited in Williams 26e, St Cyr 2020).

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Combined oral contraceptive pill

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

Definition — Combined oral contraceptives (COCs) are hormonal contraceptive pills containing an estrogen (usually ethinyl estradiol) plus a progestin, taken cyclically to suppress the hypothalamic-pituitary-ovarian axis and prevent ovulation. They are the most effective reversible method of contraception available, with a failure rate of 0.1-0.3 per 100 woman-years (HWY) with perfect use (typical-use failure ~7 per 100 woman-years).

Composition and classification

Generation	Estrogen (dose)	Progestin	Example brand
1st	Ethinyl estradiol (EE) ≥50 µg	Norethisterone/norethynodrel	Historical (Enovid) — high VTE risk, obsolete
2nd	EE 20-35 µg	Levonorgestrel, norgestimate	**Mala-N** (Govt. of India, free supply) — levonorgestrel 0.15 mg + EE 30 µg, 21 + 7 iron tablets; **Mala-D** (same composition, market sale)

Generation	Estrogen (dose)	Progestin	Example brand
3rd	EE 20-30 µg	Desogestrel, gestodene	Femilon, Loette (desogestrel 0.15 mg + EE 20 µg)
4th	EE 20-30 µg or estradiol valerate/estetrol	Drospirenone, dienogest, nomegestrol	Yasmin (drospirenone 3 mg + EE 30 µg); Qlaira/Natazia (4-phasic estradiol valerate + dienogest); Nextstellis (estetrol + drospirenone)

- **Low-dose pill** = EE <50 µg. **Monophasic** = fixed hormone dose throughout the cycle; **biphasic/triphasic** = progestin (± estrogen) dose stepped up through the cycle to reduce total steroid exposure while preserving cycle control.
- Standard pack: **21 active + 7 placebo/iron tablets** ("3 weeks on, 1 week off"), or 24+4/84+7/365-day continuous regimens (see Prescribing).

Mechanism of action

- **Inhibition of ovulation** — the progestin suppresses the mid-cycle luteinising hormone (LH) surge; the estrogen suppresses follicle-stimulating hormone (FSH) and prevents dominant follicle selection. Both act synergistically on the hypothalamic-pituitary axis to abolish pulsatile gonadotropin-releasing hormone (GnRH)-driven FSH/LH release.
- **Endometrial suppression** — the progestin produces stromal edema, decidual change, and glandular exhaustion, rendering the endometrium non-receptive to implantation; estrogen stabilises the endometrium and limits breakthrough bleeding ("cycle control").
- **Cervical mucus** — progestin thickens and reduces cervical mucus, impeding sperm penetration.
- **Tubal motility** — altered tubal peristalsis/secretion is a probable minor back-up mechanism if breakthrough ovulation occurs.

Patient selection — WHO Medical Eligibility Criteria (MEC)

No restriction (Category 1)	Relative — clinical judgement (Category 2/3)	Absolute contraindication (Category 4)
Age menarche-40 yr; post-abortion; anemia; HIV/AIDS (with condom); h/o ectopic pregnancy; endometriosis, fibroid, ovarian/endometrial cancer; dysmenorrhea, abnormal uterine bleeding; pelvic inflammatory disease; epilepsy; thyroid disease; varicose veins; tuberculosis; benign breast disease	Age ≥40 yr; smoker <35 yr; mild hypertension; gallbladder disease; diabetes without vascular disease; sickle cell disease; migraine without aura; cervical cancer/CIN; unexplained vaginal bleeding; hyperlipidemia; benign liver tumour; breastfeeding (6 weeks-6 months postpartum); heavy smoker (>20/day); past breast cancer	Current/past venous or arterial thrombosis; severe hypertension; stroke; ischemic/valvular heart disease; diabetes with vascular complications; **migraine with aura/focal neurological symptoms**; active liver disease, jaundice, hepatic adenoma/carcinoma; pregnancy; breastfeeding <6 weeks postpartum; major surgery with prolonged immobilisation; known/suspected estrogen-dependent neoplasia (e.g., breast cancer); smokers >35 years

Pre-pill work-up: history (migraine, thromboembolism, family history), blood pressure, breast and pelvic examination, and cervical cytology where indicated; a full pelvic/breast exam is not mandatory before starting in a healthy low-risk woman.

Prescribing regimen and missed-pill management

- **Starting the pill** — Day-1 start (first day of menses, protection immediate, no back-up needed); Day 2-5 start (add barrier back-up for 7 days); **Quick-start** (same day, any cycle day, after excluding pregnancy, with back-up for 7 days). Post-abortion: start immediately. Postpartum: non-lactating women from 3 weeks (WHO Category 4 before 21 days owing to postpartum venous thromboembolism [VTE] risk); lactating women should avoid combined pills until 6 months (progestin-only methods preferred).
- **Missed 1 active pill** (<24 h late) — take it immediately and continue the schedule; no back-up required.
- **Missed 2 pills in week 1-2** — take 2 pills on each of the next 2 days, continue schedule, and use back-up contraception for 7 days (consider emergency contraception if unprotected intercourse occurred in the preceding 5 days and pills were missed in week 1).
- **Missed 2 pills in week 3, or >2 active pills missed at any time** — finish the active pills in the current pack, omit the pill-free/placebo interval, start the next pack immediately, and use back-up contraception for 7 days.
- **Missed placebo/iron pill** — discard it and continue the schedule; no action needed.

- **Drug interactions** — enzyme-inducing drugs (rifampicin, phenytoin, carbamazepine, phenobarbital, griseofulvin, ritonavir) lower efficacy — use a higher-estrogen pill or an alternative method; COCs lower the efficacy of lamotrigine.
- **Extended/continuous use** — active pills continued for 84 days + 7 placebo days ("seasonal" bleed every 4 months), or continuously for 365 days, reduces withdrawal bleeding and further suppresses ovarian activity without loss of efficacy.

Non-contraceptive benefits and adverse effects

Non-contraceptive health benefits	Adverse effects
Regulation of cycle; ↓ dysmenorrhea (~40%) and menorrhagia (~50%); ↓ premenstrual syndrome	**Minor**: nausea, headache, mastalgia, breakthrough bleeding (settles by cycle 3-4), chloasma, acne (improves with anti-androgenic progestins)
Protection against pelvic inflammatory disease, ectopic pregnancy, functional ovarian cysts, benign breast disease, iron-deficiency anemia	**Venous thromboembolism (VTE)**: background risk 4-5/100,000 woman-years in non-users, rising 3-5-fold (≈15-30/100,000) with COC use — still lower than in pregnancy (≈60/100,000); highest risk factors are obesity, smoking, age >35, and inherited thrombophilia (factor V Leiden)
↓ Epithelial ovarian cancer risk ~40-50% (up to 80% with >10 years' use) and ↓ endometrial cancer risk ~50%, persisting 15-20 years after stopping; ↓ colorectal cancer ~40%	**Arterial thrombosis**: ischemic stroke/myocardial infarction risk raised mainly in smokers >35 years, uncontrolled hypertension, or migraine with aura
Increases bone mineral density	Cholestatic jaundice (rare); hypertension (reversible on stopping); no increase in hepatocellular adenoma with low-dose pills; small/uncertain effect on breast cancer risk during current use, which reverts after cessation

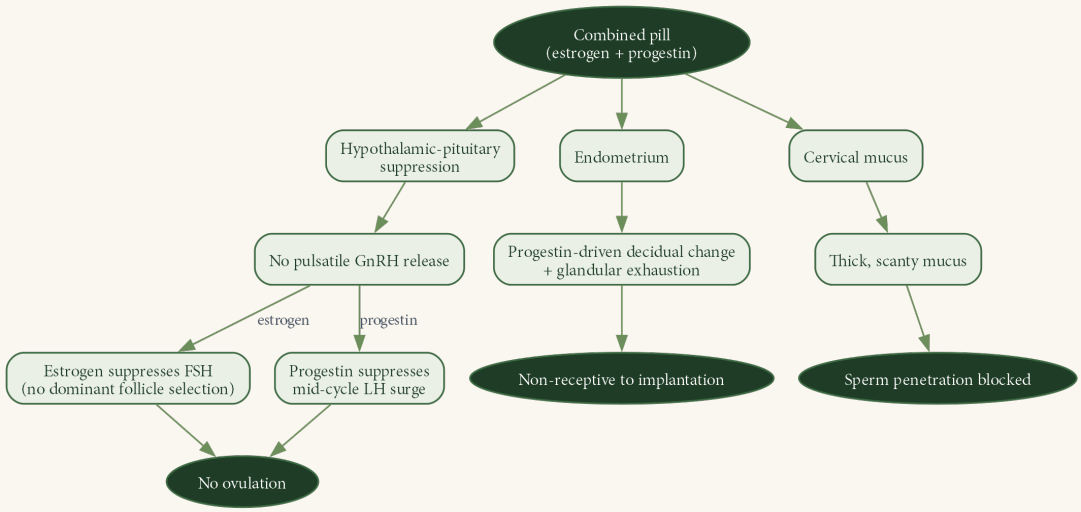
Danger signs mandating withdrawal (mnemonic ACHES) — **A**bdominal pain (severe), **C**hest pain/breathlessness, **H**eadache (severe/new, especially with aura), **E**ye problems (blurred vision/diplopia), **S**evere leg pain/swelling; also withhold ≥6 weeks before major surgery to reduce postoperative VTE risk.

Recent advances [RA]

- **Native-estrogen COC**: estetrol (E4) 14.2-15 mg + drospirenone 3 mg (Nextstellis/Drovelis), US FDA-approved April 2021. Estetrol selectively spares hepatic SHBG/angiotensinogen synthesis versus ethinyl estradiol, giving smaller haemostatic changes [Kluft C et al. *Contraception* 2017;95:140-147] with comparable efficacy/cycle control in phase-3 trials [Gemzell-Danielsson K et al. *BJOG* 2022;129:63-71]; pooled data suggest lower reported VTE rates than ethinyl-estradiol pills, though dedicated outcome trials are awaited.

- **WHO Medical Eligibility Criteria for Contraceptive Use, 6th edition (WHO, 2025)** and parallel **US MEC 2024 (CDC MMWR 2024;73[RR-4])** update several category assignments, superseding the widely-quoted 5th edition (2015).
- **US Selected Practice Recommendations for Contraceptive Use, 2024 (CDC MMWR 2024;73[RR-3])**: revised missed-pill algorithm; clarifies most non-rifamycin antibiotics do **not** need back-up contraception, unlike older teaching.
- **ACOG Practice Bulletin No. 206 (2019)** operationalises the US MEC framework for hormonal contraception in women with coexisting medical conditions.
- Four-phasic estradiol valerate/dienogest (Qlaira/Natazia) remains the main "natural-estrogen" alternative, approved for both contraception and heavy menstrual bleeding.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Three-branch mechanism-of-action flowchart: hypothalamic-pituitary suppression (no ovulation), endometrial decidualisation (blocks implantation), and cervical mucus thickening (blocks sperm penetration).

High-yield exam pointers

- Mala-N (Govt. of India, free) = levonorgestrel 0.15 mg + EE 30 µg, 21 active + 7 iron tablets.
- Missed 1 pill → no back-up; missed ≥2 pills → back-up × 7 days (± emergency contraception if week 1).
- ACHES mnemonic for danger signs requiring immediate stoppage.
- WHO MEC Category 4 = absolute contraindication (thrombosis, stroke, migraine with aura, uncontrolled hypertension, active liver disease, breast cancer, smoker >35, <21 days postpartum).
- VTE: baseline 4-5/100,000 woman-years → 3-5-fold with COC → still less than pregnancy (~60/100,000).

- Non-contraceptive benefit: ~50% reduction in endometrial and ovarian cancer risk, persisting 15-20 years after stopping.
- Perfect-use failure rate 0.1-0.3/100 HWY; typical use ~7/100 woman-years.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Older texts (e.g., DC Dutta) advise routine back-up contraception with broad-spectrum antibiotics such as ampicillin or doxycycline, but current CDC/ACOG guidance finds no evidence that non-rifamycin antibiotics reduce combined oral contraceptive efficacy and does not require this precaution.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e; DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; WHO Medical Eligibility Criteria for Contraceptive Use (6th ed., 2025); CDC US MEC/US SPR 2024; ACOG Practice Bulletin No. 206 (2019).

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Compensation for failure of family planning methods

Asked in: Paper IV 18-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Under India's National Family Planning Programme, sterilization (tubectomy/vasectomy) is offered free of cost as a permanent method, but no method is 100% effective. The Government of India therefore runs a no-fault indemnity scheme — currently the **Family Planning Indemnity Scheme (FPIS)** — that compensates the acceptor or family for death, failure, or complication following sterilization, and separately indemnifies the operating doctor/health facility against litigation arising from the same event.

Legal basis and evolution of the scheme

- **Origin:** Supreme Court order dated 1 March 2005 in *Ramakant Rai v Union of India* (Civil Writ Petition 209/2003) directed the Union and States to enforce uniform sterilization guidelines (empanelment of doctors, pre-op checklist, standard consent form, Quality Assurance Committees) and to institute an insurance cover for acceptors.
- **National Family Planning Insurance Scheme** launched w.e.f. 29 November 2005 (via Oriental Insurance Co.), revised repeatedly (2006, 2008, 2009, 2010, 2011, 2013).
- Renamed **Family Planning Indemnity Scheme (FPIS)**, effective **1 April 2013** — the insurance-company model was replaced by direct funding through State/UT **Programme Implementation**

Plans (PIPs) under the National Health Mission (NHM); this remains the scheme currently in force.

- Applies **uniformly, pan-India**, to every sterilization acceptor and to all empanelled/accredited doctors and health facilities (public, private, and NGO).

Compensation payable (FPIS, w.e.f. 1 April 2013)

Section	Contingency	Amount
I-A	Death following sterilization (including death during the operation) in hospital, or within **7 days** of discharge	**Rs. 2 lakh**
I-B	Death following sterilization within **8–30 days** of discharge	**Rs. 50,000**
I-C	Failure of sterilization (conception after the operation)	**Rs. 30,000**
I-D	Cost of treatment of a complication (including complication during the procedure); hospitalisation up to 60 days	Actual expense, **not exceeding Rs. 25,000**
II	Indemnity to the doctor/health facility against litigation for failure/death/complication (includes legal defence costs)	**Up to Rs. 2 lakh per case**, maximum **4 cases per doctor/facility per year**

- Sections I-A and I-B are paid **equally to the spouse and unmarried dependent children**; if there is no spouse, to the dependent children; in the absence of both, to the legal heir.
- Sections I-C and I-D are paid **directly to the beneficiary** (the acceptor).
- A claim under one section does not bar a claim under another for the same event, **except** that I-C and I-D may be combined.

Eligibility, claim procedure and documentation

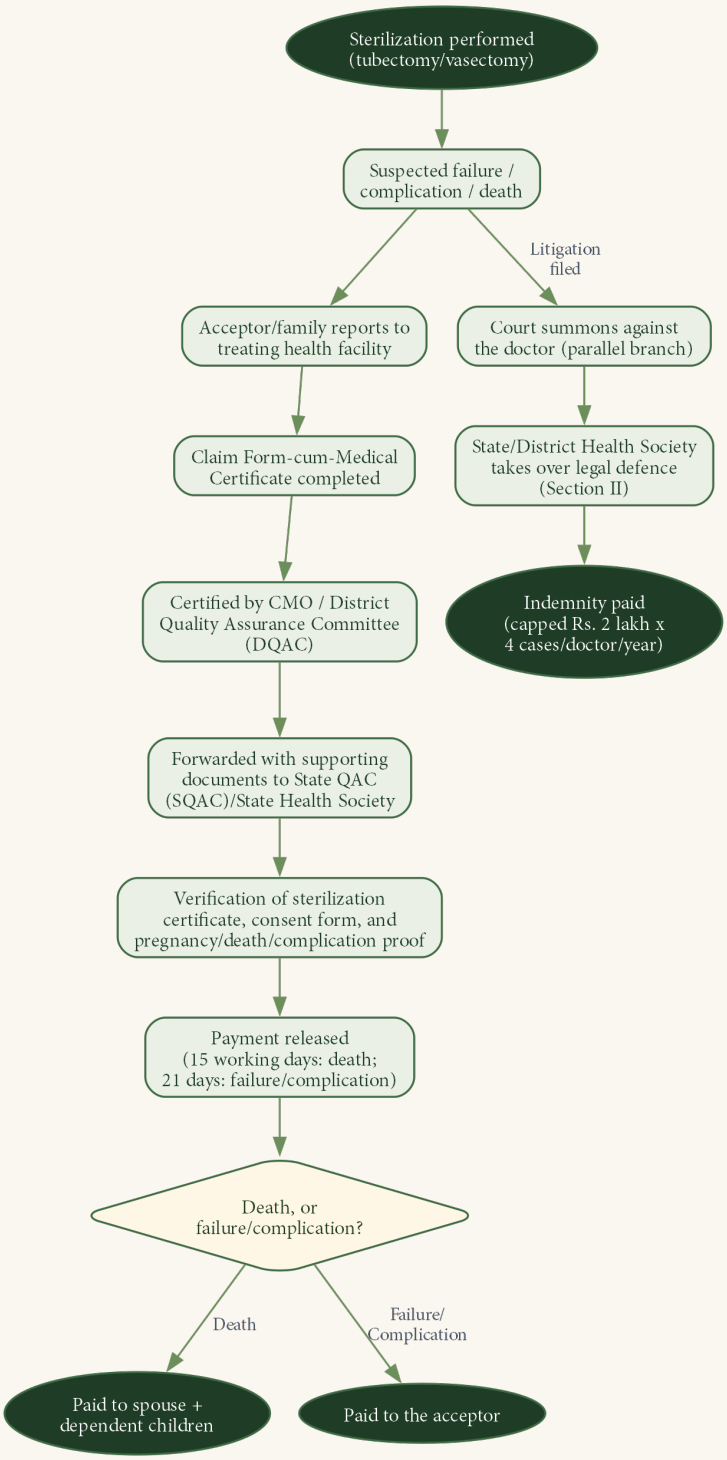
- **Eligible beneficiaries:** every person who has undergone sterilization after signing the standard Consent-cum-Application Form (proof of coverage).
- **Claim lodged** on a Claim-Form-cum-Medical-Certificate at the treating health facility as soon as failure/complication/death is detected.
- **Verification:** certified by the CMO/CDMO/DHO (or equivalent) as convener of the **District Quality Assurance Committee (DQAC)**, then forwarded to the **State Quality Assurance Committee (SQAC)**/State Health Society for payment.

- **Supporting documents:** sterilization certificate, consent form, and — depending on the claim — a urine/USG pregnancy report or birth certificate (failure), original bills/prescriptions (complication), or a death certificate (death).
- **Settlement timeline (stipulated): 15 working days** for death claims and **21 days** for failure/complication claims, counted from submission of all required documents.
- **Section II (doctor indemnity):** the doctor/facility must give written intimation on receiving a court summons/notice; the State/District Health Society then takes over the legal defence, subject to the Rs. 2-lakh/4-case annual cap.

Additional entitlements and medico-legal points

- **Free MTP on failure:** if a missed menstrual cycle occurs after sterilization, the acceptor is entitled to report within **2 weeks** and obtain a medical termination of pregnancy (MTP) free of cost — this is a standing clause of the FPIS consent form, independent of the cash compensation.
- **Full and final settlement:** accepting FPIS compensation is in full and final settlement of the claim; the acceptor/family waive any further compensation from a court of law for the same event (including cost of upbringing the child), **except** where negligence is separately established.
- **Failure ≠ negligence:** *State of Punjab v Shiv Ram* (2005) 7 SCC 1 — the Supreme Court held that the mere failure of a properly performed sterilization operation does not by itself amount to medical negligence, since no contraceptive method (including sterilization) offers an absolute guarantee; a claim for damages beyond the FPIS compensation succeeds only if a breach of the accepted standard of care (the *Bolam* test) is proved, not merely because pregnancy or childbirth followed.
- **Scope limited to sterilization:** the FPIS covers **only** tubectomy/vasectomy — death, failure, or complication following it. Failure of **temporary/spacing methods** (oral contraceptive pills, IUCD, condoms, injectables) is **not** covered by any statutory government indemnity scheme; an acceptor's only recourse for such failure is a civil suit for negligence, if applicable.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Main path: claim verified by DQAC/SQAC and paid to spouse+children (death) or the acceptor (failure/complication); parallel branch: a court summons against the doctor is defended by the State/District Health Society under Section II indemnity.

High-yield exam pointers

- Scheme name evolution: **National Family Planning Insurance Scheme (2005) → Family Planning Indemnity Scheme, FPIS (w.e.f. 1 April 2013)**, now funded through NHM State PIPs.
- Legal origin: Supreme Court order in *__Ramakant Rai v Union of India__* (1 March 2005).
- Amounts to write verbatim: Death ≤7 days **Rs. 2 lakh**; death 8–30 days **Rs. 50,000**; failure **Rs. 30,000**; complication (actual, capped) **Rs. 25,000**; doctor/facility indemnity **Rs. 2 lakh × max 4 cases/year**.
- Settlement timeline: **15 working days** (death) / **21 days** (failure or complication).
- Landmark case: *__State of Punjab v Shiv Ram__* (2005) 7 SCC 1 — sterilization failure alone is not negligence.
- FPIS covers **sterilization only**; free MTP if failure reported within **2 weeks** of a missed cycle.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> The Family Planning Indemnity Scheme is a Government of India/National Health Mission administrative scheme, not a clinical topic covered in Williams, Berek & Novak, Speroff, or DC Dutta; the figures above are the uniform national scheme (effective 1 April 2013) — a few states have since locally enhanced specific slabs (for example, some states pay a higher amount for sterilization failure), so a state-specific circular should be checked if the question names a state.

> **SOURCE & COVERAGE**
>
> Manual for the Family Planning Indemnity Scheme, Ministry of Health & Family Welfare, Government of India (effective 1 April 2013, implemented through National Health Mission State/UT Programme Implementation Plans); *Ramakant Rai v Union of India*, Supreme Court order dated 1 March 2005; *State of Punjab v Shiv Ram* (2005) 7 SCC 1. DC Dutta's Textbook of Obstetrics 9e and DC Dutta's Textbook of Gynaecology 7e were grepped but carry only a passing mention of this scheme — coverage note: this administrative-scheme topic sits outside the standard OBG spine texts and is grounded here against the official Government of India scheme manual instead.

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Complications and sequalae of medical termination of pregnancy

Asked in: Paper IV 18-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Medical termination of pregnancy (MTP) is the deliberate ending of a pregnancy before fetal viability by a registered medical practitioner, protected under the MTP Act 1971 (amended 2021), by a **pharmacological (medical)** method — mifepristone ± misoprostol — or a **surgical** method

(vacuum aspiration, dilatation and evacuation). Complications are conventionally grouped as **immediate** (during the procedure/first 24–48 hours) and **remote/late sequelae**, and are less (~5%) when performed before 8 weeks and roughly five-fold higher in the second trimester.

Immediate complications (general, any method)

- **Injury to the cervix** — laceration/tear, more with forcible or rapid dilatation.
- **Uterine perforation** — chiefly during dilatation and evacuation (D&E)/curettage; least with plastic-cannula vacuum aspiration.
- **Haemorrhage and shock** — from trauma, incomplete evacuation, uterine atony, or rarely coagulation failure.
- **Vasovagal/cervical shock** — during forcible cervical dilatation.
- **Thrombosis or embolism.**
- **Postabortal triad** — pain, bleeding and low-grade fever from retained products/clots; treat with antibiotics ± repeat evacuation.
- **Failed medical method / continuing pregnancy** (~1% with mifepristone–misoprostol) — must be actively completed surgically because a continuing pregnancy carries a teratogenic risk (misoprostol is associated with **Möbius sequence** and limb-reduction defects).
- **Rh isoimmunization** in an unprotected Rh-negative woman.
- **Anaesthetic complications** where general anaesthesia is used.

Complications specific to the method employed

Method	Regimen (as used)	Specific complications
Mifepristone + misoprostol (first-trimester medical method)	Mifepristone 200 mg oral day 1, then misoprostol 400 µg oral / 800 µg vaginal 24–48 h later	Nausea, vomiting, diarrhoea, prolonged/heavy bleeding; incomplete abortion (~2%); failure with continuing pregnancy (~1%); rare **fatal toxic shock** from *Clostridium sordellii/perfringens* — classically **afebrile**, with marked leukocytosis, haemoconcentration and rapid hypotension, needing aggressive antibiotics ± hysterectomy
Methotrexate + misoprostol	Methotrexate 50 mg/m^2 IM, misoprostol 800 µg vaginal 7 days later	Prolonged bleeding (up to several weeks); methotrexate is teratogenic if the method fails
Vacuum aspiration/suction evacuation	Up to 12 weeks	Retained products if uterus >10 weeks size; lowest perforation risk of all methods

Method	Regimen (as used)	Specific complications
Dilatation and evacuation (rapid/slow)	6–14 weeks	Cervical injury (more with rapid method); uterine perforation; complication rate ~5× that of first-trimester methods
Mid-trimester prostaglandins/oxytocin	Vaginal misoprostol, dinoprostone, or high-dose oxytocin infusion	Intractable vomiting/diarrhoea, fever, uterine pain, cervico-uterine injury; oxytocin — water intoxication, rarely convulsions
Intra-amniotic hypertonic saline	20% saline, 10 mL/week of gestation	Hypernatraemia, cardiovascular collapse if intravascular, pulmonary/cerebral oedema, renal failure, DIC — death rate 0–5/1000 instillations
Hysterotomy (rarely used)	Abdominal route	Immediate: haemorrhage/shock, anaesthetic complications, peritonitis, intestinal obstruction. Remote: menstrual abnormality, scar endometriosis (1%), incisional hernia, scar rupture in a subsequent pregnancy

Remote (late) sequelae

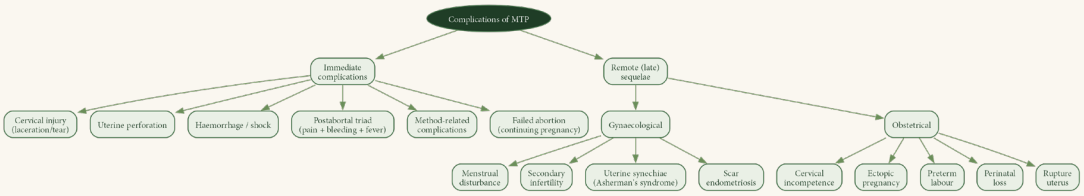
Gynaecological	Obstetrical
Menstrual disturbances	Recurrent mid-trimester abortion (cervical incompetence from over-dilatation)
Chronic pelvic inflammatory disease	Ectopic pregnancy (three-fold increase)
Secondary infertility (cornual tubal block)	Preterm labour
Scar endometriosis (~1%, after hysterotomy)	Fetal growth restriction/dysmaturity
Uterine synechiae (*Asherman's syndrome*) → secondary amenorrhoea	Increased perinatal loss
Chronic pelvic pain	Uterine rupture in a later pregnancy (after perforation/hysterotomy)
—	Rh isoimmunization if anti-D was not given
—	Failed abortion with continued (often malformed) pregnancy

Prevention of complications

- Choose the safest method for gestation — vacuum aspiration/medical method before 8–9 weeks carries the least morbidity.

- Confirm complete evacuation (tissue inspection, serial β-hCG, or ultrasound) before discharge; re-evacuate if the postabortal triad appears.
- Give **anti-D immunoglobulin within 72 hours** to every Rh-negative, non-sensitized woman — minimum 250 IU (50 µg) below 12 weeks and 500 IU (300 µg) at or beyond 12 weeks (RCOG Green-top Guideline No. 22).
- Screen/treat for lower genital tract infection, or give prophylactic doxycycline, before medical abortion to reduce serious infection.
- Counsel and offer **immediate post-abortion contraception** before discharge (same visit) to prevent repeat unintended pregnancy and repeat-abortion complications.
- Perform under adequate cervical priming (osmotic dilators/misoprostol) for D&E to reduce cervical injury and perforation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Classification tree of MTP complications — Immediate vs Remote (Gynaecological/Obstetrical) sequelae.

Recent advances [RA]

- **WHO Abortion Care Guideline, 2022** (consolidated update of self-management of medical abortion, WHO/SRH/22.1): mifepristone 200 mg + misoprostol 800 µg (buccal/vaginal/sublingual) is validated up to 12 weeks (70 days) gestation; routine pre-abortion ultrasound and post-abortion antibiotics are **not** required for eligible women, reducing unnecessary intervention-related morbidity.
- **Telemedicine/"no-test" medical abortion**: a UK national cohort of over 50,000 abortions (Aiken et al., *BJOG* 2021) found no-test telemedicine medical abortion at home to be as effective and safe as the traditional in-clinic, ultrasound-based pathway, with comparable rates of haemorrhage, infection and continuing pregnancy.
- **Immediate post-abortion contraception** (WHO Abortion Care Guideline, 2022, recommendations 41–47): same-visit initiation of any method including intrauterine device or implant is recommended to reduce repeat unintended pregnancy and repeat-abortion complications.
- **MTP (Amendment) Act, 2021 (India)**: extended the gestational limit to 24 weeks for special categories (survivors of sexual assault/rape/incest, minors, women with disability, and fetal-

anomaly cases via a state Medical Board), broadening access to earlier, safer termination and thereby reducing complications of unsafe/delayed abortion.

High-yield exam pointers

- Remember the split: **Immediate** (injury, perforation, haemorrhage, postabortal triad) vs **Remote — Gynaecological** (menstrual disturbance, infertility, synechiae) **vs Obstetrical** (ectopic, preterm labour, perinatal loss, rupture uterus).
- **Toxic shock with misoprostol = afebrile** + leukemoid reaction + haemoconcentration — a classic distractor (most sepsis is febrile).
- Anti-D dose: **250 IU <12 weeks, 500 IU ≥12 weeks**, within 72 hours.
- Failed medical abortion → **must complete surgically**; continuing pregnancy risks Möbius sequence/limb defects from misoprostol.
- Complication rate is ~5× higher in mid-trimester than first-trimester termination.
- MTP Act gestation limit: 20 weeks (general), **24 weeks (special categories, 2021 amendment)**, beyond 24 weeks only for substantial fetal anomaly via Medical Board.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's classical figures (e.g., 100 µg anti-D "standard dose") predate current RCOG/FOGSI weight-based dosing (250 IU/500 IU by gestation); the guideline-based doses above should be used in the exam and in practice.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Williams Obstetrics 26e; RCOG Green-top Guideline No. 22 (Anti-D Immunoglobulin); WHO Abortion Care Guideline 2022; MTP (Amendment) Act, 2021 (India).

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Components of emergency obstetrics care

Asked in: Paper IV 03-Oct-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Emergency Obstetric Care (EmOC) is the package of life-saving clinical interventions — the WHO/UNICEF/UNFPA "**signal functions**" — together with the drugs, trained personnel, blood, and referral-transport links needed to manage the major direct obstetric complications (haemorrhage, sepsis, hypertensive disorders, obstructed labour, complications of unsafe abortion) that cause most

maternal deaths. Because these complications arise unpredictably, EmOC is organised as **components delivered at defined facility levels**, not as risk-based screening alone.

1. Clinical (signal-function) component

Level	Signal functions	Facility
Basic EmOC (BEmOC) — 6 functions	Parenteral **antibiotics**; parenteral **oxytocics** (uterotonics); parenteral **anticonvulsants** (magnesium sulfate); **manual removal of placenta**; **removal of retained products of conception** (manual vacuum aspiration); **assisted vaginal delivery** (vacuum/forceps)	Primary health centre (PHC) — 24×7 delivery point
Comprehensive EmOC (CEmOC) — 8 functions	All 6 BEmOC functions + **surgery (caesarean section)** + **blood transfusion**	Community health centre (CHC)/First Referral Unit (FRU), district hospital

Indian FRU package (DC Dutta): the First Referral Unit provides Comprehensive EmOC — **anaesthetic service, vacuum/forceps delivery, blood transfusion, caesarean delivery, manual removal of placenta** — bundled with **safe abortion services** and **contraceptive services including sterilisation**, plus a working **referral-with-transport** link. India's package therefore broadens CEmOC into a full reproductive-health package.

2. Human-resource component

Level	Personnel	Role
Village/sub-centre	ASHA, ANM	Danger-sign recognition, first-line life-saving drugs, arranging transport
PHC	Medical officer, staff nurse	Basic EmOC (notified 24×7 delivery points)
FRU/CHC	Obstetrician, anaesthetist, trained nurse	Comprehensive EmOC
Skilled birth attendant (SBA)	Accredited doctor/nurse/midwife	Trained to manage normal labour, recognise complications, and administer specified life-saving drugs/interventions before referral

Level	Personnel	Role
Flying squad	Obstetrician + anaesthetist + nursing staff with sterilised packs and stored blood	Rushed by ambulance to a home delivery in antepartum/postpartum haemorrhage or eclampsia; performs manual removal of placenta and resuscitation en route to the referral hospital

3. Drug and life-saving-intervention component

Life-saving drugs and interventions that a trained skilled birth attendant is permitted to give/perform under the Reproductive & Child Health (RCH-II) programme before or during referral:

Drug	Indication
Misoprostol	Prevention of postpartum haemorrhage (PPH)
Injection oxytocin	Management of PPH
Injection magnesium sulfate	Eclampsia
Ampicillin + metronidazole	Puerperal/obstetric infection

Permitted life-saving **interventions**: digital removal of retained products of conception (bleeding incomplete abortion), **active management of the third stage of labour**, and maintaining a **partograph** for early diagnosis of prolonged/obstructed labour.

4. Infrastructure, blood, and referral-transport component

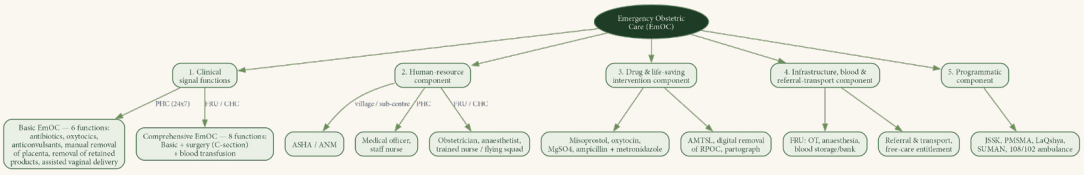
Component	What it provides
First Referral Unit (FRU)/CHC	Operation theatre, anaesthesia, labour room upgraded for CEmOC
Blood storage/blood bank	On-site blood transfusion, a mandatory CEmOC signal function
Referral & transport	Guaranteed, functioning two-way transport (ambulance/flying squad) linking sub-centre → PHC → FRU → district hospital
Free-care entitlement	Removes cost as a barrier to reaching/using EmOC

5. Programmatic component (national schemes that operationalise the above)

Programme	EmOC-relevant provision
JSSK — Janani Shishu Suraksha Karyakram (NHM)	Free institutional delivery incl. caesarean section, free drugs/diagnostics/blood, free two-way referral transport for mother and sick newborn
PMSMA — Pradhan Mantri Surakshit Matritva Abhiyan	Fixed-day (9th of every month) free comprehensive antenatal care to flag high-risk women early for timely referral to a CEmOC facility
LaQshya — Labour room Quality improvement Initiative	Certifies labour rooms/maternity operation theatres to national quality standards, strengthening functioning of CEmOC facilities
SUMAN — Surakshit Matritva Aashwasan	"Zero expense, zero denial" guarantee for every pregnant woman/newborn at a public facility, including EmOC and referral
National Ambulance Services (108/102)	Toll-free emergency and inter-facility referral transport component

A facility is counted as providing a functioning EmOC component only if it has actually performed **every** listed signal function in the preceding 3 months; the accepted population norm is a minimum of **5 EmOC facilities per 500,000 population (4 Basic + 1 Comprehensive)**.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart of the five EmOC components branching from the central node, each labelled with its facility level (house palette: cream/forest/gold).

High-yield exam pointers

- Signal functions = **"6 + 2 = 8"**: Basic EmOC has 6 (3 drug functions — antibiotics, oxytocics, anticonvulsants; 3 procedural — manual removal of placenta, removal of retained products, assisted vaginal delivery); Comprehensive EmOC = Basic + surgery + blood transfusion.
- India's FRU package = CEmOC + **safe abortion services + family planning/sterilisation + referral transport**.
- Life-saving drugs to write verbatim: **misoprostol** (PPH prevention), **oxytocin** (PPH treatment), **MgSO4** (eclampsia), **ampicillin + metronidazole** (infection).

- Life-saving interventions: digital removal of products of conception, **active management of third stage of labour**, **partograph**.
- Facility "functioning" only if all signal functions performed in the **last 3 months**; norm = **5 EmOC facilities/500,000 population (4 Basic + 1 Comprehensive)**.
- Scheme recall: JSSK = free care + transport; PMSMA = 9th-of-month ANC day; LaQshya = labour-room quality; SUMAN = zero expense/zero denial.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The on-disk DC Dutta's Obstetrics 9e fully supports the FRU-level Comprehensive EmOC package and the RCH-II life-saving drugs/interventions list; the WHO/UNICEF/UNFPA "6+2 signal function" terminology and the 5-facilities-per-500,000 population benchmark are standard global Safe Motherhood programme knowledge, and PMSMA/LaQshya/SUMAN post-date this textbook edition and are drawn from current Ministry of Health & Family Welfare programme knowledge.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; WHO/UNICEF/UNFPA — *Monitoring Emergency Obstetric Care: A Handbook*; Ministry of Health & Family Welfare, Government of India (JSSK, PMSMA, LaQshya, SUMAN).

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Condom tamponade

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

Definition — Condom tamponade (condom-catheter uterine balloon tamponade) is a low-cost, improvised form of intrauterine balloon tamponade in which a sterile condom (or surgical glove) is tied over a rubber/Foley catheter and inflated with sterile saline inside the uterine cavity to compress the placental bed. It is used as a second-line, temporising mechanical measure for **refractory atonic postpartum haemorrhage (PPH)** not responding to uterotonics and uterine massage, particularly where a commercial balloon (Bakri) is unavailable.

Indications

- **Atonic PPH refractory** to first-line uterotonics (oxytocin, ergometrine, 15-methyl PGF2α/carboprost, misoprostol) and bimanual uterine massage/compression.
- As the "**tamponade test**" in the RCOG "HEMOSTASIS" algorithm — a positive test (bleeding stops) predicts that laparotomy will not be needed.

- Bleeding from the atonic lower segment after evacuation of retained products or after mid-trimester miscarriage/termination.
- Low-resource peripheral centres without a commercial intrauterine balloon, as a **bridge to stabilisation and referral**.
- **Contraindicated/ineffective** when bleeding is from an unrepaired genital tract laceration, ruptured uterus, or coagulopathy — these must be excluded/treated first.

Equipment required

- Sterile **condom** (or a sterile surgical glove) and a **rubber/Foley catheter** or wide-bore nasogastric tube.
- Silk/linen thread or suture material to tie the condom neck to the catheter.
- Sterile normal saline, 500 mL–1 L, and a large (50 mL) syringe or an IV giving set.
- Sims speculum, vulsellum/sponge-holding forceps, antiseptic solution.
- Vaginal gauze pack (to prevent expulsion), Foley catheter for the bladder, and a drainage bag for the free end of the tamponade catheter.

Procedure

- Obtain **informed consent**; empty the bladder with an indwelling Foley catheter.
- **Assemble the device**: tie the mouth of the condom/glove firmly over the tip of the catheter with two circumferential ties about 1 cm apart (or a "bootstrapping" wrap) to prevent leakage/slippage; cut side-holes in the catheter within the condom so saline can flow into it.
- Under aseptic precautions, with adequate analgesia/anaesthesia, expose the cervix with a Sims speculum and steady it with a vulsellum on the anterior lip.
- Introduce the condom-catheter assembly through the cervical canal into the uterine cavity, guiding it (with a hand on the abdomen) until it lies snugly against the fundus.
- **Inflate slowly** with sterile saline via the syringe/IV set, using **200–500 mL**, until bleeding stops or the balloon becomes visible at the external os. Stop adding fluid once intra-balloon pressure exceeds arterial pressure and bleeding ceases through the cervix and the catheter drainage lumen — this is the **positive tamponade test**.
- **Pack the vagina** with gauze to prevent expulsion of the inflated device; secure the catheter to the thigh and connect its free end to a drainage bag to monitor ongoing bleeding.
- Start a **low-dose oxytocin infusion** (e.g., 40 units in 1 L normal saline) to keep the uterus contracted around the balloon, and give broad-spectrum antibiotic cover.
- **Monitor** pulse, blood pressure, fundal height (mark the fundus with a pen for reference), temperature 2-hourly, hourly urine output, and bleeding per vaginum/via the catheter lumen closely for the first hour, then regularly.

- If bleeding continues despite full inflation (**negative test**), proceed without delay to laparotomy — uterine compression sutures, stepwise devascularisation, or hysterectomy.
- If bleeding stops, continue observation; **deflate and remove after 4–6 hours** (up to 12–24 hours in some protocols) once the woman is haemodynamically stable, with the fundal height unchanged and no bleeding, and after arranging transfer if this was a bridge measure.

Mechanism of action

The inflated condom exerts direct hydrostatic (tamponade) pressure against the myometrial sinuses and open spiral arterioles at the placental implantation site, arresting venous and low-pressure arterial bleeding — the same principle as bimanual compression and uterine gauze packing — while the accompanying oxytocin infusion promotes myometrial retraction around the device.

Advantages and limitations

Advantages	Limitations
Extremely inexpensive; assembled from items available even in peripheral/rural centres	Condom wall is thin and lax compared with a purpose-made balloon and exerts less outward pressure, so it can slip or be expelled through the cervix
Avoids laparotomy/hysterectomy in most successfully-treated cases	Randomised trial evidence (Benin/Mali) found no reduction — and possibly worse outcomes — when used as an adjunct to misoprostol
Provides a rapid "tamponade test" that predicts need (or not) for surgery (sensitivity ~87%)	Risk of ascending infection, and rarely uterine perforation with rough insertion
Buys time for resuscitation and safe transfer to a higher centre	Does not treat traumatic, retained-tissue, or coagulopathic causes of PPH — these must be excluded first

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 28.4 — Uterine tamponade using Bakri balloon (DC Dutta's Obstetrics 9e, p.418)*
>
> A condom-catheter assembly is placed and inflated in the identical position shown — high in the uterine cavity, apposed to the fundus, with the free catheter end draining through the cervix and the vagina gauze-packed to prevent expulsion.

High-yield exam pointers

- Fill with **200–500 mL** sterile saline; leave in situ **4–6 hours** (occasionally up to 24 hours).
- **Tamponade test**: positive test (bleeding stops) has **~87% sensitivity** for avoiding laparotomy (Condous et al., 2003).

- First described by **Akhter S et al. (2003, Bangladesh)** — "Use of a condom to control massive postpartum haemorrhage."
- Considered a **first-line surgical/mechanical intervention** for atonic PPH before compression sutures, vessel ligation, or hysterectomy; can avoid hysterectomy in up to ~78% of cases (textbook figure).
- 'T' for tamponade balloon is a step within the "**HEMOSTASIS**" mnemonic for massive PPH management.
- Remember it is a **bridge/temporising** device, not definitive treatment — trauma and retained tissue must be excluded first.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Two randomised trials of the condom-catheter technique (notably the Benin/Mali trial, Dumont et al., BMJ Open 2017) as an adjunct to misoprostol showed no benefit and possibly worse outcomes compared with usual care, so current teaching frames condom tamponade as a resource-limited, evidence-uncertain bridge measure rather than a guideline-mandated intervention.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; Arias' High-Risk Pregnancy & Delivery 5e; Munro Kerr's Operative Obstetrics 13e.

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Cone biopsy

Asked in: Paper IV 17-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Cone biopsy (conization) is the surgical excision of a cone-shaped wedge of the cervix — apex directed into the endocervical canal, base at the ectocervix — that removes the entire transformation zone, the squamocolumnar junction and a variable length of endocervical stroma and mucosa. It serves both a **diagnostic** role (excludes invasion, defines glandular disease) and a **therapeutic** role (excises cervical intraepithelial neoplasia, CIN, or early invasive disease) in a single specimen suitable for serial histological sectioning.

Indications

Category	Indication
Diagnostic	Unsatisfactory colposcopy — squamocolumnar junction/upper limit of lesion not fully visualised

Category	Indication
	Discordance between cytology, colposcopy and directed punch biopsy (e.g., high-grade cytology with a normal/low-grade biopsy)
	Positive endocervical curettage (ECC)
	Punch biopsy cannot rule out microinvasion or invasive carcinoma from carcinoma-in-situ
	Suspected glandular lesion — **CIN 3 or atypical glandular cells/adenocarcinoma-in-situ (AIS)**, where colposcopy is unreliable
Therapeutic	Definitive excisional treatment of CIN 2–3 (HSIL)
	FIGO 2018 stage IA1 cervical cancer (invasion <3 mm, no lymph–vascular space invasion, LVSI) when fertility preservation is desired
	AIS in a woman desiring fertility, provided cone margins are clear, with close surveillance

Techniques

Technique	Method	Advantages	Drawbacks
Cold-knife conization (CKC)	Scalpel excision under general/regional anaesthesia	No thermal artefact — margins fully assessable; gold standard when invasion/glandular disease suspected	Needs anaesthesia/inpatient care; more blood loss
LEEP/LLETZ (loop electrosurgical excision/large loop excision of the transformation zone)	Wire-loop diathermy, colposcopy-guided, under local anaesthesia	Outpatient, quick, cheap, less blood loss; preferred for routine CIN 2–3	Thermal artefact may obscure the excision margin
Laser conization	CO_2 laser as a "scalpel" under colposcopic guidance, local anaesthesia	Outpatient; precise, less tissue damage/blood loss; earlier re-epithelialisation (3–4 weeks); fertility/pregnancy outcome least affected	Expensive equipment, needs expertise

Procedure (cold-knife conization)

- General anaesthesia; lithotomy position; cervix stained with Schiller's iodine or examined by colposcopy to map lesion margins.

- Haemostatic sutures placed at the **3 and 9 o'clock** positions on the cervix, ligating the descending cervical branches, to reduce blood loss.
- A circumferential incision is made outside the mapped lesion, and the cone is excised with its **apex kept below the internal os** — deep enough to clear endocervical disease, but not breaching into the uterine cavity (a shallower cone is chosen in younger women to limit later cervical incompetence/stenosis, a deeper cone when invasion or glandular disease is suspected).
- An orientation (marker) suture is placed at **12 o'clock** for the pathologist.
- Routine **endocervical curettage** of the canal above the cone apex (± uterine curettage if indicated) to sample residual disease.
- Cone bed haemostasis with interrupted circumferential sutures or electrocautery; the **Sturmdorf suture, though traditional, is avoided** as it distorts the cervix and hinders future colposcopy.
- The intact, oriented specimen is sent for **serial sectioning (minimum 6 sections)**, reporting depth/width of invasion (if any), LVSI, and status of the ectocervical, endocervical and deep stromal margins.

Complications

Timing	Complication
Immediate	Primary haemorrhage; rare uterine perforation
Early (7–10 days)	Secondary haemorrhage; pelvic infection
Late	Cervical stenosis → haematometra, dysmenorrhoea (especially postmenopausal women)
	Cervical incompetence → mid-trimester abortion, preterm labour in a subsequent pregnancy
	Reduced/absent cervical mucus → cervical-factor infertility
	Cervical dystocia in a future labour

The obstetric risk is **depth/volume dependent**: excision depth ≥10–12 mm and repeat treatment carry a materially higher risk of subsequent preterm birth and preterm rupture of membranes, which is why the smallest cone that safely clears disease is chosen, especially in women who have not completed childbearing.

Interpretation of margins and further management

Margin/ECC status	Residual disease risk	Action
Squamous CIN — both endocervical margin and ECC negative	~4%	Cytology ± colposcopy follow-up; repeat excision not routinely needed

Margin/ECC status	Residual disease risk	Action
Squamous CIN — endocervical margin alone positive	~22%	Close follow-up; repeat excision if fertility desired, hysterectomy if not
Squamous CIN — both margin and ECC positive	~33%	Repeat cone or hysterectomy strongly considered
AIS — margins negative	Preinvasive disease up to 25%, invasive up to 3%	Conservative follow-up acceptable if fertility desired; close surveillance
AIS — margins positive	Preinvasive disease up to 80%, invasive up to 7%	Repeat conization/hysterectomy recommended
FIGO stage IA1, no LVSI, clear margins	<1% nodal metastasis	Cone biopsy alone is definitive treatment; lymphadenectomy not required

If invasion is confirmed at the cone margin, hysterectomy is undertaken either **within 48 hours or delayed to 6 weeks** to avoid the higher morbidity of operating on an inflamed, healing cervix.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 35.1 — Cone biopsy (knife) (DC Dutta's Gynaecology 7e, p.507)*

Recent advances [RA]

- **ASCCP 2019 Risk-Based Management Consensus Guidelines** replaced the single-result 2012 consensus, basing the need for colposcopy, ablation or excisional conization on an individualised immediate/5-year cervical cancer risk estimate (combining current result with screening history) rather than a fixed cytology/HPV cut-off.
- **LEEP is now the preferred outpatient excisional method** for CIN 2–3 over cold-knife conization in most guidelines, given comparable oncological clearance with less blood loss, morbidity and cost; cold-knife/laser conization is reserved for suspected microinvasion, glandular (AIS) disease, or unsatisfactory colposcopy where margin integrity is paramount.
- Large meta-analyses (Kyrgiou et al., *BMJ* 2014 and 2016) confirmed that excisional treatment for CIN raises the risk of **preterm birth and preterm pre-labour rupture of membranes**, rising sharply with excision depth ≥10–12 mm — reinforcing "as shallow/narrow a cone as oncologically adequate" in women who have not completed their family.
- **Conservative surveillance (rather than immediate excision)** is now recommended for CIN 2 in women under 25 years, given high spontaneous regression and the small but real obstetric cost of excisional treatment (ACOG/ASCCP).

- **Primary high-risk HPV-based screening and HPV self-sampling** (WHO 2021 global cervical cancer elimination strategy) are improving pre-conization triage accuracy, reducing unnecessary diagnostic conizations.
- **Radical trachelectomy** (vaginal, abdominal, laparoscopic or robotic) has emerged as the fertility-sparing option for FIGO stage IA2/IB1 disease that exceeds what a cone biopsy alone can safely treat.

High-yield exam pointers

- Cone = transformation zone + squamocolumnar junction + endocervical stroma/mucosa, apex kept **below the internal os**.
- Diagnostic triggers: unsatisfactory colposcopy, discordant cytology/colposcopy/biopsy, positive ECC, suspected microinvasion or **AIS/AGC**.
- Therapeutic ceiling: **FIGO 2018 stage IA1, no LVSI, clear margins** — cone biopsy alone is curative, fertility-sparing, no lymphadenectomy needed (<1% nodal risk).
- Residual-disease numbers: squamous CIN **4%/22%/33%** (both negative / endocervical-margin-positive / both-positive); AIS **25%/3%** invasive-preinvasive with negative margins, **80%/7%** with positive margins.
- Late triad of complications: **stenosis, incompetence, infertility** (cervical-mucus loss).
- Positive margin → repeat cone/hysterectomy within **48 hours or after 6 weeks**.
- LEEP = preferred outpatient CIN 2–3 excision today; cold-knife/laser reserved for suspected invasion or glandular disease.

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

DC Dutta's Gynaecology 7e describes the classical cold-knife technique and the 2012-era ASCCP framework; current practice follows the 2019 ASCCP Risk-Based Management Consensus Guidelines and prefers LEEP for routine CIN 2–3, reserving cold-knife/laser conization for glandular or invasion-suspicious disease.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 35 — Operative Gynaecology; Ch. 23 — Premalignant Lesions); Berek & Novak's Gynecology 16e (Ch. 16 — Preinvasive Disease of the Cervix; Ch. 38 — Cervical and Vaginal Cancer); FIGO 2018 cervical cancer staging; ASCCP 2019 Risk-Based Management Consensus Guidelines; ACOG cervical cancer screening/management guidance.

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Contraceptive options for a woman with Hypertension

Asked in: Paper IV 28-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — In a hypertensive woman, contraceptive choice is decided not by the label "hypertension" alone but by three variables: whether blood pressure (BP) is controlled or uncontrolled, its absolute level, and whether vascular/target-organ disease coexists. Estrogen-containing methods raise hepatic angiotensinogen (renin-angiotensin substrate) and add arterial thromboembolic risk, so these three variables determine which methods stay safe. The World Health Organization Medical Eligibility Criteria (WHO MEC) for Contraceptive Use is the framework used to grade every method against this risk.

WHO Medical Eligibility Criteria (MEC) — the grading system

Category	Meaning	Practical rule
1	No restriction on use	Use the method freely
2	Advantages generally outweigh theoretical/proven risks	Use, with routine follow-up
3	Theoretical/proven risks usually outweigh advantages	Use only if no more suitable method is available, with clinical judgement and closer follow-up
4	Unacceptable health risk	Do **not** use the method

Contraceptive options by method (hypertension-graded)

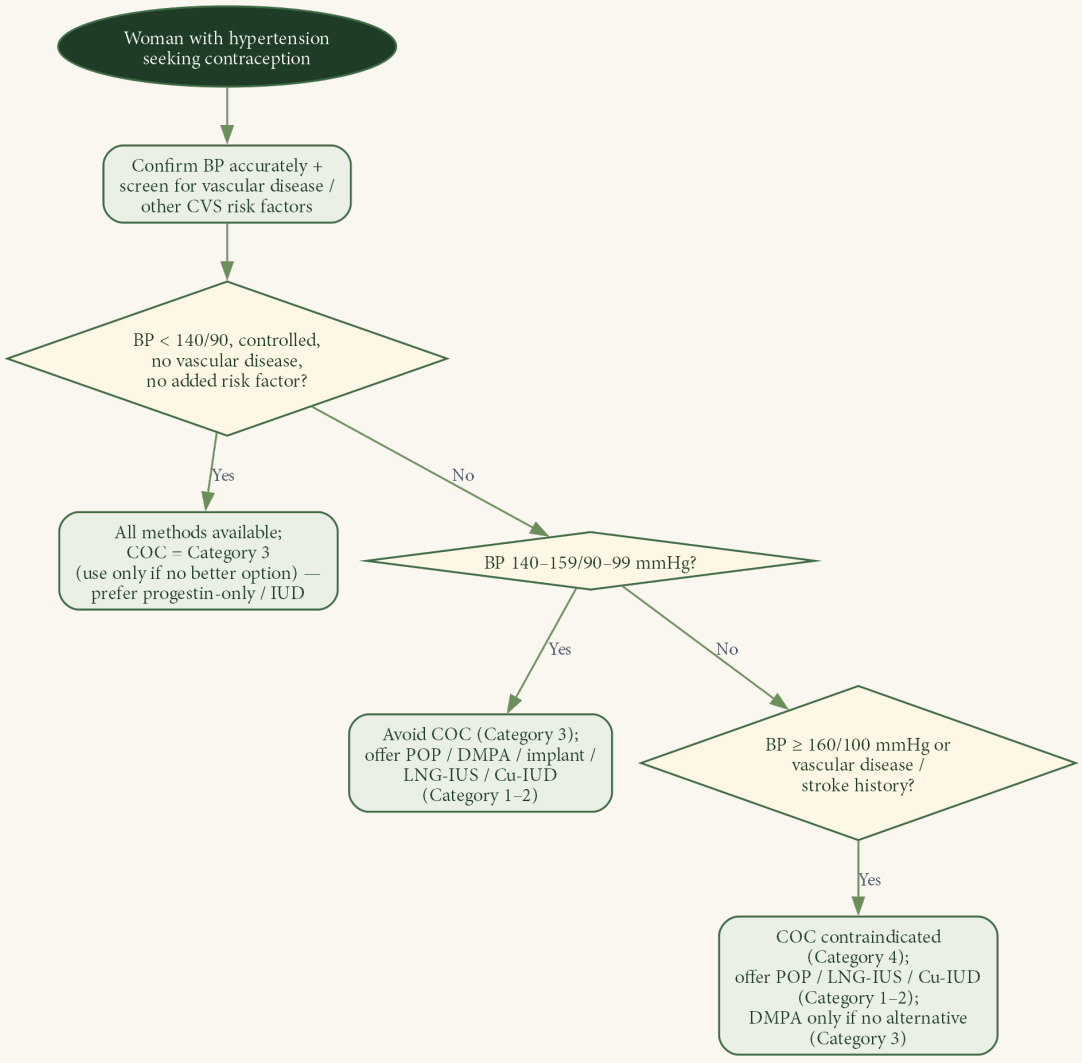
Method	Category — controlled/mild hypertension (BP < 160/100)	Category — severe hypertension (BP ≥ 160/100) or vascular disease	Remarks
Combined hormonal contraception — pill/patch/ring (COC/CHC)	3	4	Estrogen ↑ hepatic angiotensinogen → activates renin-angiotensin system, worsens BP and adds arterial (stroke, myocardial infarction) and venous thrombosis risk; DC Dutta lists **severe hypertension, arterial/venous thrombosis, and history of stroke as absolute (Category 4) contraindications**, mild hypertension as relative (Category 2–3)
Progestin-only pill (POP)	1	2	No consistent effect on BP; safe first-line, also compatible with lactation
Injectable progestin (DMPA/NET-EN)	2	3	Occasional small BP rise reported; avoid as first choice once vascular disease present
Etonogestrel/levonorgestrel subdermal implant	1	2	Speroff lists hypertension among conditions where implants "may be used" on clinical judgement
Levonorgestrel intrauterine system (LNG-IUS)	1	2	Minimal systemic progestin absorption; also treats any associated menorrhagia
Copper intrauterine device (Cu-IUD)	1	1	Unrestricted at any BP level — no hormonal or vascular effect; first-line if no distortion of the uterine cavity

Method	Category — controlled/mild hypertension (BP < 160/100)	Category — severe hypertension (BP ≥ 160/100) or vascular disease	Remarks
Barrier methods (condom, diaphragm) & fertility-awareness methods	1	1	Unrestricted; useful adjunct or bridge method
Female sterilization (tubal occlusion)	Method itself unrestricted	Defer till BP controlled	Risk is anaesthetic/operative, not contraceptive — control BP before surgery
Vasectomy (partner)	1	1	Unaffected by the woman's BP; a valid couple option

Selecting the method — stepwise approach

- Confirm BP with a correctly sized cuff, seated, on at least two occasions — never select a method on history of hypertension alone.
- Screen for vascular/end-organ disease (retinopathy, nephropathy, ischaemic heart disease) and for additional cardiovascular risk factors — smoking, age > 35 years, diabetes, migraine with aura — each of which independently pushes combined hormonal methods towards Category 4.
- **BP well controlled on treatment, no vascular disease, no other risk factor:** combined hormonal contraception remains Category 3 (use only if nothing more suitable) — progestin-only methods or an intrauterine device are still preferred first-line.
- **BP 140–159/90–99 mmHg:** avoid combined hormonal contraception; offer POP, DMPA/implant, LNG-IUS, or Cu-IUD (Category 1–2).
- **BP ≥ 160/100 mmHg, or vascular disease, or history of stroke/thromboembolism:** combined hormonal contraception is **absolutely contraindicated** (Category 4); offer POP, LNG-IUS, or Cu-IUD (Category 1–2); use injectable DMPA only if no better option (Category 3).
- **Postpartum hypertensive disorders** (gestational hypertension/pre-eclampsia): treat as controlled/uncontrolled hypertension once the diagnosis persists beyond 6 weeks; progestin-only methods and Cu-IUD are preferred during the puerperium regardless, since they are also compatible with breastfeeding.
- Reassess BP at every visit; withdraw any hormonal method immediately if BP rises to the severe range or new vascular/neurological symptoms (severe headache, visual disturbance, chest pain, leg swelling) appear.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for choosing contraception by blood-pressure category and vascular risk.

High-yield exam pointers

- WHO MEC scale: **1 = use freely, 2 = use with follow-up, 3 = use only if no better option, 4 = do not use.**
- Mechanism to write: estrogen → ↑ hepatic angiotensinogen → renin-angiotensin activation → BP rise + arterial thrombosis risk → basis for avoiding combined hormonal contraception.
- **Severe hypertension, arterial/venous thrombosis, history of stroke = absolute (Category 4) contraindication to combined oral contraceptives** (DC Dutta).
- First-line in hypertension: **progestin-only pill, DMPA/implant, LNG-IUS, or copper IUD** — all estrogen-free.
- **Copper IUD = Category 1 at any BP level** — always safe, no hormonal effect.

- Additional risk factors that push combined contraception to Category 4 even with mild hypertension: age > 35, smoking, diabetes, migraine with aura.
- Sterilization is safe as a method but must be deferred until BP is controlled — the risk is anaesthetic, not contraceptive.

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

The WHO Medical Eligibility Criteria (5th edition) stratifies hypertension by measured severity and by presence of vascular disease into Categories 1–4 for each method; DC Dutta's simplified "mild versus severe hypertension" table used above follows this same current classification philosophy.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Medical Eligibility Criteria table, Ch. 30 Contraception); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (implant eligibility, arterial/venous thrombosis risk with combined oral contraceptives); WHO Medical Eligibility Criteria for Contraceptive Use.

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Critically evaluate the Hysteroscopic Tubal Sterilisation Techniques?

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

Definition — Hysteroscopic (transcervical) sterilisation is a method of permanent female contraception in which a tubal-occlusive device or agent is placed at the uterotubal (proximal tubal) ostia under direct hysteroscopic vision, without any abdominal incision. It occludes the fallopian tube by inducing local

fibrosis or scarring rather than by mechanical division or clip application, and confirmation of bilateral occlusion by imaging is mandatory before the woman can rely on it for contraception.

Techniques

Technique	Principle	Device/agent	Confirmation test	Failure rate
Essure® (micro-insert coil)	Nickel–titanium outer coil with inner polyethylene terephthalate (polyester) fibres placed within the proximal fallopian tube spanning the uterotubal junction; the coil expands and anchors itself, and the polyester fibres provoke fibrotic tissue ingrowth that occludes the tubal lumen over about 3 months	Metallic microcoil (approximately 4 cm long, 2 mm diameter) inserted hysteroscopically, no anaesthesia required	Hysterosalpingogram (HSG) or pelvic X-ray/ultrasound at 3 months to confirm bilateral tubal occlusion; an alternative contraceptive method must be used until confirmed	Contraceptive failure <1% to 5% at long-term follow-up
Adiana® (two-step procedure)	Controlled thermal (radiofrequency) injury to the proximal tubal epithelium followed by insertion of a soft, non-absorbable silicone-matrix pellet that stimulates tissue ingrowth for permanent occlusion	Silicone elastomer matrix implant placed via hysteroscope after radiofrequency ablation	HSG at 3 months to confirm occlusion	Failure rate about 1.1% at 1 year

Technique	Principle	Device/agent	Confirmation test	Failure rate
Quinacrine pellet insufflation	Chemical sclerosant instilled into the uterine cavity/tubal ostia to provoke an inflammatory-fibrotic reaction occluding the tubal lumen	252 mg quinacrine pellet inserted transcervically through a hysteroscope, repeated once a month later in the proliferative phase	No universally standardised imaging confirmation	Pregnancy rate 2–3 per 100 woman-years; **World Health Organization (WHO) does not recommend it** because of a carcinogenic (mutagenic) concern

Critical evaluation

Domain	Strengths	Limitations/concerns
Anaesthesia & setting	Can be performed as an outpatient/office procedure without general anaesthesia, unlike laparoscopic or minilaparotomy sterilisation	Requires operator expertise in hysteroscopy; a learning curve exists before consistent bilateral placement is achieved
Invasiveness	No abdominal incision, no pneumoperitoneum, avoids risks of laparoscopic entry (bowel/vascular injury) and is suitable for women with multiple prior abdominal surgeries or obesity	Uterine perforation, device migration into the peritoneal cavity, and failure of bilateral placement can still occur
Efficacy	Placement success reaches approximately 96% with operator experience; long-term failure rate with Essure is low (2.6 pregnancies per 1,000 women at 5 years, with no reported ectopic pregnancies in this cohort)	Contraception is **not immediate** — a 3-month interval and a confirmatory imaging test (hysterosalpingogram) are mandatory before the device can be relied upon, and an interim contraceptive method is needed; a proportion of women never achieve confirmed bilateral occlusion and require a further procedure or fall back on laparoscopic sterilisation

Domain	Strengths	Limitations/concerns
Later complications	—	Chronic pelvic pain has been reported in 2–6% of women with Essure inserts, felt to result from tubal perforation, device migration, or a local reaction to the device itself; device removal (proximal linear salpingostomy or hysterectomy) is feasible but is **not curative in all symptomatic women**
Reversibility	—	Sterilisation is intended to be permanent; reanastomosis to reverse Essure sterilisation is technically difficult (coil embedded in the interstitial/intramural tube) and subsequent live-birth rates after attempted reversal range widely (0–27%), far worse than reversal of a clip- or ring-based tubal ligation
Regulatory history (the key "critical evaluation" point)	Initially approved (Essure by the US Food and Drug Administration [FDA] in 2002) as a non-incisional alternative to laparoscopic sterilisation, and adopted widely because of its office-based, anaesthesia-free profile	Post-marketing surveillance accumulated reports of chronic pain, perforation, device migration, and unintended pregnancy; the FDA required a boxed (black-box) warning and a mandatory patient decision checklist before implantation, and both the **Essure system and the Adiana Permanent Contraception system have now been withdrawn from the market** (Essure's US sales ended 31 December 2018; Adiana was withdrawn earlier for commercial reasons) — so neither device remains available for new patients today

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 54.53 — Hysteroscopic sterilisation using Essure™. (Jeffcoate's Principles of Gynaecology 9e, p.927)*

High-yield exam pointers

- **3 named techniques**: Essure (metal microcoil), Adiana (radiofrequency + silicone matrix), quinacrine pellet (chemical sclerosant, WHO does not recommend).
- **3-month rule**: occlusion is never immediate — confirm with hysterosalpingogram (HSG) at 3 months; use interim contraception until confirmed.
- **Numbers to write**: Essure failure <1–5%; Essure 5-year pregnancy rate 2.6/1000; Adiana failure ~1.1%; chronic pelvic pain with Essure 2–6%.
- **Both hysteroscopic devices (Essure and Adiana) are now withdrawn from the market** — this withdrawal, driven by post-marketing safety signals, is the crux of any "critical evaluation" answer.
- Mechanism common thread: all three techniques work by **inducing tubal fibrosis/occlusion**, not by mechanical division — this is why a delayed confirmatory test is essential.
- Reversal of hysteroscopic (especially Essure) sterilisation has a much poorer prognosis than reversal of clip/ring tubal ligation.

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

Both Essure and Adiana are no longer commercially available (withdrawn worldwide by the manufacturers following safety concerns and declining sales); current teaching should present them as historically important, now-discontinued techniques rather than as options to offer patients today.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e.

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Critically evaluate the role of different barrier contraceptive methods

Asked in: Paper IV 28-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Barrier contraceptives are non-hormonal, coitally-related methods that physically and/or chemically prevent sperm from reaching the cervix or upper genital tract. They include male and female

condoms, the diaphragm, the cervical cap (FemCap), the contraceptive sponge, and spermicides, used alone or in combination.

Types and mechanism of action

Method	Composition	Mechanism
Male condom	Latex, polyurethane, or "natural skin" (lamb intestine) sheath	Physical sheath collects semen; latex/polyurethane also block sperm and organisms (0.003 mm) causing sexually transmitted infections (STIs)
Female condom (Femidom/FC2)	Polyurethane/nitrile pouch, 17 cm, with an inner ring (apex of vagina) and outer ring (introitus)	Lines vagina and vulva; barrier to sperm and STI pathogens; woman-controlled
Diaphragm	Latex/silicone dome (50–105 mm) on a flexible metal spring rim, individually fitted	Covers cervix; must be used with spermicide in the dome and rim as it does not seal the fornices completely
Cervical cap (FemCap)	Silicone "sailor-cap" shape, 22/26/30 mm, fitted to parity	Snug suction fit directly over the cervix; spermicide raises first-year efficacy to about 6% failure
Contraceptive sponge (Today)	Polyurethane disc impregnated with 1 g nonoxynol-9	Releases spermicide continuously for 24 hours, absorbs ejaculate, and mechanically blocks the cervical os
Spermicides	Nonoxynol-9, octoxynol-9, benzalkonium chloride as creams/jellies/foams/films	Surfactant action disrupts the sperm cell membrane; weak independent chemical barrier

Contraceptive efficacy — failure rates (per 100 women, first year)

Method	Perfect use	Typical use
Male condom	2	13
Female condom	5	21
Diaphragm + spermicide	16	24
Spermicides alone	18	28
Sponge — nulliparous	9	14
Sponge — multiparous	20	27

(Trussell 2018 estimates, as tabulated in Williams Obstetrics 26e, Table 38-1.) All barrier methods fall in the "third tier" (condom) or "fourth tier, least effective" (diaphragm, spermicides, sponge) of

contraceptive efficacy, far below implants/intrauterine devices (perfect- and typical-use failure both <1%).

Advantages that justify their continued role

- **Only methods that protect against STIs/HIV** — barrier use halves the risk of chlamydia, gonorrhoea, trichomonas, herpes simplex, and cytomegalovirus transmission and reduces pelvic inflammatory disease (PID) and secondary tubal infertility; the **male condom is the only contraceptive proven to prevent HIV transmission**.
- **No systemic hormonal effects** — suitable when combined hormonal/progestin methods are contraindicated (thromboembolic risk, breast cancer, breastfeeding, migraine with aura).
- **Coitally related, reversible immediately**, require no prescription (condom, spermicide, sponge) or only periodic fitting (diaphragm, cap).
- **Reduced risk of cervical dysplasia and cervical cancer** with consistent barrier use.
- **Low cost, easy to carry, no partner cooperation needed for the female-controlled devices** (female condom, diaphragm, cap, sponge).
- **Useful adjunct/backup role** — bridging method after vasectomy until azoospermia is confirmed, after a missed pill, while awaiting intrauterine device (IUD) reinsertion, and in immunological infertility (3-month condom use to reduce antisperm antibody exposure).

Disadvantages and limitations

- **User- and coitus-dependent** — efficacy hinges on correct, consistent use every act; typical-use failure is 2- to 10-fold higher than perfect-use failure for every barrier method.
- **Interrupts coital spontaneity**; diaphragm/cap require prior fitting by a health professional and periodic resizing after weight change or vaginal delivery.
- **No protection against HIV** with diaphragm, cap, sponge, or spermicide used alone; frequent nonoxynol-9 use can cause vaginal/cervical mucosal micro-ulceration that may *increase* HIV acquisition risk — condom manufacturers have discontinued nonoxynol-9-lubricated condoms for this reason.
- **Local side effects** — latex allergy, vaginal irritation, and a 2- to 3-fold higher risk of urinary tract infection with diaphragm/spermicide use (urethral irritation by the rim, altered vaginal flora).
- **Toxic shock syndrome** — rare but described with prolonged retention; diaphragm should be removed by 24 hours, cap/sponge left no longer than 48 hours, and always kept in for a minimum 6–8 hours after the last coital act.
- **Spermicides alone are poor contraceptives** (typical-use failure approaching 30%) and must not be relied upon as sole protection against pregnancy or infection.

Critical evaluation of their overall role

- **Not first-line for women wanting maximal efficacy** — because typical-use failure (13–28%) is far higher than with long-acting reversible contraception (LARC), current counselling (tiered-efficacy approach) offers LARC first to women prioritising pregnancy prevention alone.
- **Indispensable for "dual protection"** — the concept, endorsed in current contraceptive teaching, of combining a highly effective hormonal method/LARC for pregnancy prevention with a barrier method (condom) for STI/HIV prevention in women not in a mutually monogamous relationship; this is the single strongest argument for retaining barrier methods in every contraceptive counselling encounter, even for women already using an IUD or pill.
- **Best-suited populations**: adolescents/couples with infrequent or unplanned coitus, women with contraindications to hormonal methods, immediate postpartum/lactating women, couples awaiting a permanent method, and any relationship with STI risk.
- **Public-health role** — in India's National Family Welfare Programme the free/subsidised male condom ("Nirodh") remains a mainstay of the cafeteria approach because it needs no medical supervision, is inexpensive, and also serves the national STI/HIV-control strategy.
- **Overall verdict** — barrier methods are safe, non-hormonal, and the sole STI-protective contraceptives, but their contraceptive role is best as an STI-prevention adjunct or as a bridging/backup method rather than as the sole method for a woman who cannot tolerate any failure risk; correct and consistent use is the chief determinant of success.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Figs 36.16A to C — A. Female condom; B. Commonly used conventional contraceptive (diaphragm) (DC Dutta's Obstetrics 9e, p.545)*

High-yield exam pointers

- Efficacy tiers to write verbatim: condom 2/13 (perfect/typical), female condom 5/21, diaphragm+spermicide 16/24, spermicide alone 18/28, sponge nulliparous 9/14, multiparous 20/27 (per 100 women-years).
- Only the **male condom** is proven to prevent HIV transmission — write this line explicitly.
- **Dual protection** = LARC/hormonal method (pregnancy prevention) + condom (STI/HIV prevention) — the key "critical role" answer.
- Toxic shock syndrome numbers: diaphragm out by 24 h; cap/sponge up to 48 h; all barrier devices in for a minimum 6–8 h after coitus.
- Spermicide (nonoxynol-9) — do NOT rely on alone; frequent use may raise HIV risk via mucosal irritation.
- FemCap efficacy improves to ~6% failure with added spermicide; cervical cap failure is higher in parous women.

- India: "Nirodh" — free/subsidised condom under the National Family Welfare Programme.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta expresses barrier-method failure as crude rates per hundred-woman-years (e.g., condom 15, diaphragm 16, sponge parous 32–20/nulliparous 16–9) that broadly parallel but are older than the perfect-use/typical-use pairs above; the table in this answer uses the current Trussell (2018) estimates reproduced in Williams Obstetrics 26e, which is the exam-current standard to quote.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e (Table 38-1, barrier methods chapter); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Chapter 24, barrier methods); DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e (Barrier Methods, Chapter 30).

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Critically evaluate the role of laparoscopic surgeries in gynecology

Asked in: Paper IV Jul 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — Laparoscopy (endoscopic or minimal access surgery, MAS) is visualisation and operative access to the peritoneal cavity through a fibreoptic telescope introduced via small abdominal ports after creating a pneumoperitoneum, usually with carbon dioxide. In gynaecology it has grown from a purely diagnostic tool for infertility and chronic pelvic pain into the preferred route for most benign operative procedures, but its role must be weighed against genuine limitations and, in oncological surgery, against recent trial evidence.

Scope: diagnostic and therapeutic indications

Category	Procedures
Diagnostic	Infertility work-up (tubal patency/chromopertubation, ovulation stigma), chronic pelvic pain, characterising a pelvic mass, acute abdomen (ectopic pregnancy, appendicitis; "gold standard" for confirming pelvic inflammatory disease), second-look after cancer surgery
Minor operative	Tubal sterilisation, adhesiolysis without bowel involvement, aspiration of a simple ovarian cyst, ovarian biopsy

Category	Procedures
Moderate operative	Ectopic pregnancy surgery (salpingostomy/salpingectomy/segmental resection), ovarian cystectomy, laparoscopic ovarian drilling for polycystic ovarian syndrome (PCOS), ablation/excision of endometriosis, myomectomy, laparoscopically assisted vaginal hysterectomy (LAVH)
Extensive/advanced	Total laparoscopic hysterectomy, laparoscopic radical hysterectomy with pelvic/aortic lymphadenectomy, retroperitoneal lymphadenectomy, sacrocolpopexy, excision of deep infiltrating endometriosis

Advantages versus disadvantages

Advantages	Disadvantages / limitations
Rapid postoperative recovery, quicker return to daily activity	Operating time may be longer, especially early in the learning curve
Less postoperative pain, reduced analgesic requirement	High initial equipment cost; outcome strongly depends on case selection and surgeon expertise
Shorter hospital stay, reduced overall cost of admission	Long learning curve; needs dedicated structured training
Reduced blood loss, less adhesion formation	Loss of tactile feedback and (in standard laparoscopy) two-dimensional imaging; counter-intuitive instrument motion
Minimal abdominal scarring, better cosmesis, higher patient satisfaction	Restricted instrument movement through a limited number of ports
Lower incisional-hernia risk than laparotomy	Complications, though infrequent, can be serious (vascular/bowel injury, gas embolism) and are specific to the technique

Contraindications

Preoperative screening must exclude these before laparoscopy is undertaken, and informed consent must always include permission for conversion to open surgery:

Contraindication
Severe cardiopulmonary disease
Haemodynamically unstable patient
Generalised peritonitis

Contraindication
Significant haemoperitoneum
Intestinal obstruction
Extensive peritoneal adhesions
Large pelvic tumour
Pregnancy beyond 16 weeks
Advanced or untreated malignancy
Ongoing therapeutic anticoagulation

Complications

Category	Complications
Specific to laparoscopy	Extraperitoneal insufflation (surgical/omental emphysema, cardiac arrhythmia); injury to major vessels or the inferior epigastric vessels; bowel injury from the Veress needle or trocar, especially with adhesions; mechanical or thermal injury to bladder/ureter; carbon dioxide gas embolism
Anaesthesia-related	Hypoventilation from pneumoperitoneum plus Trendelenburg positioning; hypercarbia and metabolic acidosis; basal lung atelectasis; cardiac arrest
General surgical	Haemorrhage, infection, wound dehiscence, port-site hernia

Mortality from diagnostic laparoscopy is low, about 5 per 100,000 procedures, and falls towards zero with surgeon experience; fatal causes are cardiac arrest, gas embolism, and unrecognised bowel injury.

Critical appraisal

- The benefit is procedure- and surgeon-dependent: for benign adnexal surgery, ectopic pregnancy, and hysterectomy the evidence consistently favours laparoscopy over laparotomy for pain, hospital stay, and recovery, but the margin narrows and complication risk rises outside high-volume centres — disadvantages are mainly related to case selection and the experience of the surgeon rather than to the technique itself.
- Every laparoscopic procedure must retain the option of open conversion if a complication or unexpected difficulty arises; "minimally invasive" is not a substitute for sound surgical judgement.
- The assumption that a minimally invasive approach is always at least as safe as an open one does not hold in oncological surgery or when a specimen of uncertain nature has to be retrieved intact

— this distinction, established by recent trial evidence (below), is central to a genuinely critical evaluation of the technique.

- Robotic assistance is often marketed as an automatic upgrade on conventional laparoscopy, but for benign gynaecological disease it has not been shown to add outcome benefit while adding substantial cost — so "minimally invasive" and "robotic" are not synonymous with "better."
- High capital and maintenance cost and the long learning curve restrict laparoscopic services largely to tertiary or urban centres, an access limitation relevant to India's family-welfare programme even though laparoscopic tubal sterilisation itself remains the single most widely performed gynaecological laparoscopic procedure nationally.

Recent advances [RA]

- **Oncologic safety of minimally invasive radical hysterectomy** — the Laparoscopic Approach to Cervical Cancer (LACC) randomised non-inferiority trial (Ramirez PT, Frumovitz M, Pareja R, et al. Minimally invasive versus abdominal radical hysterectomy for cervical cancer. N Engl J Med. DOI: 10.1056/NEJMoa1806395) found minimally invasive radical hysterectomy inferior to open radical hysterectomy for early cervical cancer — disease-free survival 86.0% versus 96.5% at 4.5 years, and overall survival 91.2% versus 97.1% at 3 years — with tumour-cell dissemination via the uterine manipulator or carbon dioxide pneumoperitoneum proposed as a mechanism. This finding reversed earlier enthusiasm for laparoscopic/robotic radical hysterectomy, and current oncologic practice favours the open route for radical hysterectomy in cervical cancer.
- **Tissue-retrieval safety** — an unsuspected uterine sarcoma is found in about 1 in 500–2500 women operated on for a presumed benign myoma; unconfined power morcellation risks intraperitoneal dissemination and upstaging of an occult malignancy, prompting a United States Food and Drug Administration safety communication restricting its unconfined use. Morcellation is now performed preferentially within a containment bag, through mini-laparotomy, or via posterior colpotomy, after careful preoperative risk stratification.
- **Sentinel lymph node (SLN) mapping** — indocyanine-green fluorescence-guided or radiocolloid (technetium-99)/blue-dye SLN detection at laparoscopy is recommended by National Comprehensive Cancer Network guidance for cervical tumours under 2 cm, aiming to omit full lymphadenectomy when the sentinel node is negative.
- **Emerging minimal-access variants** — single-incision laparoscopic surgery and vaginal natural-orifice transluminal endoscopic surgery (vNOTES) combine laparoscopic principles with a single umbilical or transvaginal port for further gains in cosmesis and recovery, though long-term comparative outcome data are still limited.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 36.2A to E — Laparoscopic instruments: telescope, trocar and cannula, Veress needle (DC Dutta's Textbook of Gynaecology 7e, p.524)*

High-yield exam pointers

- Mortality of diagnostic laparoscopy is about 5 per 100,000 procedures, falling towards zero with experience.
- LACC trial (NEJM, Ramirez et al.): minimally invasive radical hysterectomy disease-free survival 86.0% versus open 96.5% at 4.5 years — the single most examiner-favoured "critical evaluation" fact.
- Occult uterine sarcoma at surgery for a presumed benign myoma occurs in about 1 in 500–2500 cases — basis of the FDA power-morcellation warning.
- AAGL position: robotic surgery shows no proven benefit over conventional laparoscopy in benign gynaecological disease, at higher cost.
- Contraindications to recall: haemodynamic instability, peritonitis/haemoperitoneum, intestinal obstruction, extensive adhesions, large pelvic mass, advanced malignancy, anticoagulation, pregnancy beyond 16 weeks.
- Laparoscopic tubal sterilisation is the single most common gynaecological laparoscopic procedure performed in India.

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

The FDA power-morcellation caution and the LACC trial findings post-date most Indian textbook print editions, so follow current oncologic guidance — open radical hysterectomy, and containment-bag or non-morcellation tissue retrieval when malignancy risk exists — over older textbook enthusiasm for laparoscopic or robotic radical surgery.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Chapter 36, Endoscopic Surgery in Gynaecology — advantages, disadvantages, indications, contraindications, complications, robotic surgery); Berek & Novak's Gynecology 16e (LACC trial, occult-sarcoma/morcellation data, sentinel lymph node mapping per National Comprehensive Cancer Network guidance); Jeffcoate's Principles of Gynaecology 9e (contraindications, laparoscopic entry technique).

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Define Perinatal mortality and measures to prevent it

Asked in: Paper IV 17-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Perinatal mortality is the sum of **stillbirths** (fetal deaths after 28 completed weeks of gestation, birthweight ≥1000 g, with no sign of life at birth — no breathing, heartbeat, cord pulsation, or definite voluntary muscle movement) and **early neonatal deaths** (death of a liveborn infant within the first 7 completed days of life). The **perinatal mortality rate (PMR)** = (stillbirths + early neonatal deaths) ÷ total births (live + still) × 1000, and is a sensitive index of both the standard of obstetric/neonatal care and the effectiveness of a community's social and public-health measures. The World Health Organization (WHO) extends the lower limit of viability to a fetus of ≥500 g or ≥22 completed weeks (or crown–heel length ≥25 cm), but for international comparability only deaths of fetuses/infants weighing ≥1000 g are counted, since lower-weight deaths are grossly under-reported in developing countries.

Related definitions and indices

Index	Definition	Formula
Stillbirth (fetal death)	Birth after 28 completed weeks (≥1000 g) with no sign of life	Stillbirth rate = stillbirths ÷ total births × 1000
Early neonatal death	Death of a liveborn infant within the first 7 completed days of life	Counted within PMR
Late neonatal death	Death between day 8 and day 28 of life	Counted within neonatal mortality rate, not PMR
Neonatal death	Death of a liveborn infant within the first 28 completed days of life	Neonatal mortality rate = neonatal deaths ÷ live births × 1000
Perinatal mortality rate (PMR)	Stillbirths + early neonatal deaths	PMR = (stillbirths + early neonatal deaths) ÷ total births × 1000

Nearly 70–90% of perinatal deaths occur **before the onset of labour**; overall PMR is <10/1000 total births in developed countries versus about 26/1000 in India (DC Dutta 9e).

Major causes of perinatal mortality and matched interventions

Cause	Approx. share of perinatal deaths	Key proven interventions
Infections — sepsis, meningitis, pneumonia, neonatal tetanus, congenital syphilis	33%	Maternal tetanus toxoid immunisation; clean delivery ("three cleans"); warmth; early/exclusive breastfeeding; early recognition and treatment of infection

Cause	Approx. share of perinatal deaths	Key proven interventions
Birth asphyxia, birth trauma and hypothermia	28%	Skilled attendant at every birth; partograph-monitored labour; neonatal resuscitation; maintenance of warmth
Preterm birth and/or low birth weight	24%	Prevention/management of obstetric complications; antenatal corticosteroids; infection control; breastfeeding; warmth; referral to a special newborn care unit
Congenital malformations and others	15%	Preconception and genetic counselling; prenatal diagnosis; selective termination of an affected fetus

Measures to prevent perinatal mortality

- **Pre-pregnancy and antenatal care**
  - Pre-pregnancy health care, counselling and nutritional correction (anaemia, undernutrition).
  - Early registration of pregnancy (by 12 weeks) with at least 4 antenatal visits timed at ≤12 weeks, 14–26 weeks, 28–34 weeks, and 36 weeks (WHO/Government of India schedule).
  - **Risk approach**: systematic screening for high-risk pregnancy (extremes of maternal age, grand multiparity, twins, medical disorders) with mandatory institutional delivery for identified risk.
  - Genetic counselling and prenatal diagnosis in high-risk cases, with termination of an affected fetus where indicated — reduces deaths from congenital malformation.
  - Detection and treatment of anaemia, diabetes mellitus, infection and hypertensive disorders of pregnancy; routine tetanus toxoid immunisation and daily iron–folic acid supplementation for at least 100 days from the second trimester.
- **Intranatal care**
  - Institutional delivery (target ≥80%) with 100% of deliveries attended by a **skilled birth attendant**.
  - **"Three cleans"** — clean hands, clean perineum, clean cord/umbilical area — to prevent sepsis and neonatal tetanus.
  - Careful monitoring in labour (partograph) for early detection of hypoxia, prolonged/obstructed labour, and avoidance of traumatic vaginal delivery.
  - Functioning **emergency obstetric care (EmOC)** at first referral units — anaesthesia, blood transfusion, caesarean delivery, manual removal of placenta — backed by an effective referral and transport system.

- **Essential newborn care**
  - Clean delivery, immediate drying and warmth (prevention of hypothermia), resuscitation at birth.
  - Early and exclusive breastfeeding; Baby-Friendly Hospital practices.
  - Prompt referral of the sick, preterm, or low-birth-weight newborn to a special/neonatal care unit.
- **Community and programme level**
  - Family planning services to prevent unwanted and high-risk pregnancy; safe abortion services.
  - Community health education to increase utilisation of maternal and child health services.
  - Empowering skilled birth attendants (under RCH-II) to give life-saving drugs (misoprostol, oxytocin, magnesium sulfate, ampicillin, metronidazole) and perform life-saving interventions (active management of third stage, digital removal of retained products, partograph use) where referral is delayed.
  - Continued perinatal audit — autopsy/death review of every perinatal death, demographic surveillance, and regular interdepartmental perinatal-mortality meetings to guide corrective action.

Recent advances [RA]

- **Sustainable Development Goal (SDG) target 3.2**: every country to reduce the neonatal mortality rate to ≤12 per 1000 live births and under-5 mortality to ≤25 per 1000 live births by 2030.
- **WHO/UNICEF Every Newborn Action Plan (ENAP, 2014)** sets the matching global target of a **stillbirth rate ≤12 per 1000 total births** in every country by 2030, driven by quality intrapartum and newborn care.
- **India Newborn Action Plan (INAP, 2014)**, aligned with ENAP, commits India to single-digit neonatal mortality and single-digit stillbirth rates; the National Health Mission's 2030 goal for infant mortality is <12 per 1000 live births (DC Dutta 9e, Table 38.1).
- Programme delivery platforms operationalising these targets: **Janani Suraksha Yojana (JSY)** — cash incentive for institutional delivery; **Janani Shishu Suraksha Karyakram (JSSK)** — free delivery and newborn care (drugs, diagnostics, transport, diet); **Accredited Social Health Activists (ASHA)** linking villages to first referral units.
- WHO's **ICD-PM** (application of ICD-10 to deaths during the perinatal period, 2016) standardises cause-of-death classification, improving the quality of perinatal death audit used to target interventions.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 38.2 — Perinatal nomenclature (DC Dutta's Obstetrics 9e, p.590)*

High-yield exam pointers

- **PMR = (stillbirths + early neonatal deaths) ÷ total births × 1000.**
- Stillbirth = ≥28 weeks/≥1000 g with no sign of life; early neonatal death = death within 7 days of birth; both together make up perinatal deaths.
- WHO viability limit ≥500 g/≥22 weeks; international PMR comparisons still use the ≥1000 g cut-off.
- Leading causes (write in descending order): **infection 33% > birth asphyxia/trauma/hypothermia 28% > preterm/low birth weight 24% > congenital malformation 15%.**
- "**Three cleans**" (hands, perineum, cord) — the single cheapest intervention against sepsis and neonatal tetanus.
- India PMR ≈26/1000 vs <10/1000 in developed countries; SDG 2030 target: neonatal mortality rate and stillbirth rate both ≤12/1000.

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

Figures for India's perinatal mortality rate and the causes-of-death percentages above are as printed in DC Dutta's Obstetrics 9e; more recent Sample Registration System (SRS) bulletins show a continuing decline in India's neonatal and perinatal mortality, but an updated exact figure is not available in the corpus consulted.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Safe Motherhood, Epidemiology of Obstetrics: Perinatal Mortality, Stillbirths, Neonatal Deaths, RCH Interventions, Sustainable Development Goals); Williams Obstetrics 26e (Stillbirth — definitions and perinatal mortality data); WHO Every Newborn Action Plan (2014) and Sustainable Development Goals target 3.2, as cited in DC Dutta's Obstetrics 9e.

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Describe methods of implementing safe motherhood initiative

Asked in: Paper IV 19-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — The **Safe Motherhood Initiative (SMI)** was conceived by the WHO in 1987 at a conference in Nairobi, Kenya, as a global effort to reduce maternal deaths by at least half by 2000 AD (later extended to 2015), by improving women's health through a combination of health and non-health strategies. It operates through three implementing partners — **government agencies, non-government organisations, and other groups/individuals** — and is regarded as a **human-rights issue**, since maternal death reflects a "social disadvantage," not merely a health disadvantage.

Levels at which the initiative is implemented

Level of action	Specific methods
A. Health-sector action	Continuous risk assessment through pregnancy, labour and puerperium; a **skilled birth attendant** at every birth with a functioning referral system; **Emergency Obstetric Care (EmOC)** at field level/First Referral Unit (FRU) with blood-transfusion, laparotomy and caesarean facilities; joint specialist consultation for medical disorders (anaemia, diabetes, cardiac disease, hypertension); maternal-mortality review conferences; periodic refresher courses
B. Community, society & family action	Women's groups, healthcare professionals, religious leaders and regional/district **safe motherhood committees** mobilised to help women obtain essential obstetric care
C. Health-planner/policy-maker action	Community education and formation of local safe-motherhood committees; strengthening the referral system; written **management protocols** for obstetric emergencies; periodic audit of the healthcare-delivery system
D. Legislative & policy action	Nutrition, education and economic opportunity for girls/adolescents; removal of access barriers; **decentralisation** of maternity services; removal of gender-, age- and marital-status-based discrimination

Core service components delivered (continuum of care)

Component	Key measures
Antenatal care	Early registration (within 12 weeks); minimum 4 visits (WHO)/3 visits (Government of India) at ≤12, 14–26, 28–34 and 36 weeks; continuous risk approach to detect high-risk pregnancy; routine tetanus toxoid immunisation; supplementary iron-folic acid (IFA) daily for ≥100 days after the first trimester
Intranatal care	Institutional delivery (target 80% of cases) and 100% deliveries by a skilled person; the **"three cleans"** — clean hands, clean perineal area, clean umbilical-cord care
Postnatal care	Support to restore maternal health and care of the newborn; family-planning services to prevent unplanned pregnancy; safe abortion services; early and exclusive breastfeeding
Essential newborn care	Clean delivery; resuscitation at birth; prevention of hypothermia and infection; early/exclusive breastfeeding; the **Ten Baby-Friendly Hospital** steps; referral of the sick newborn

The Reproductive and Child Health (RCH) programme — India's implementing vehicle

RCH care is India's integrated, composite approach to implement safe motherhood, combining inputs from the Government of India (National Health Mission, National Population Policy) with donor agencies (World Bank, WHO, European Commission).

RCH intervention	Method of delivery
Safe motherhood	Risk assessment as a continued process through pregnancy, labour and puerperium, with referral to higher care when needed
RCH-II measures	Community Need Assessment Approach (CNAA); upgrading PHCs/CHCs and FRUs to comprehensive 24-hour emergency obstetric and newborn care; authorising **skilled birth attendants** to give specified life-saving drugs/interventions

Skilled birth attendant and Emergency Obstetric Care — the operational tool

A **skilled birth attendant (SBA)** — an accredited midwife, doctor or nurse trained to proficiency in managing normal pregnancy, labour and puerperium, and to identify complications and organise referral — is the frontline method of implementation.

Permitted life-saving drug	Indication
Misoprostol	Prevention of postpartum haemorrhage (PPH)
Injection oxytocin	Management of PPH
Injection magnesium sulfate (MgSO4)	Eclampsia
Ampicillin, metronidazole	Infection

The SBA is also permitted the life-saving **interventions**: digital removal of retained products of conception (incomplete abortion with bleeding), active management of the third stage of labour, and maintaining a partograph for early diagnosis of prolonged/obstructed labour.

Comprehensive EmOC at the FRU level provides: anaesthetic service, vacuum delivery, blood-transfusion facilities, caesarean delivery, manual removal of the placenta, safe-abortion services, contraceptive services (including sterilisation), and referral with transport.

National programmes operationalising safe motherhood in India

Programme	Launched	Method of implementation
National (Rural) Health Mission — NRHM/NHM	2005	Umbrella programme upgrading PHCs/CHCs/FRUs into 24-hour delivery centres
Janani Suraksha Yojana (JSY)	Under NRHM	Cash incentive for institutional delivery among rural/below-poverty-line women
Accredited Social Health Activist (ASHA)	Under NRHM	Village-level female link worker between beneficiary, ANM and FRU doctor
Janani Shishu Suraksha Karyakram (JSSK)	Under NHM	Free delivery (incl. caesarean), drugs, diagnostics, diet, blood and transport for mother and sick newborn

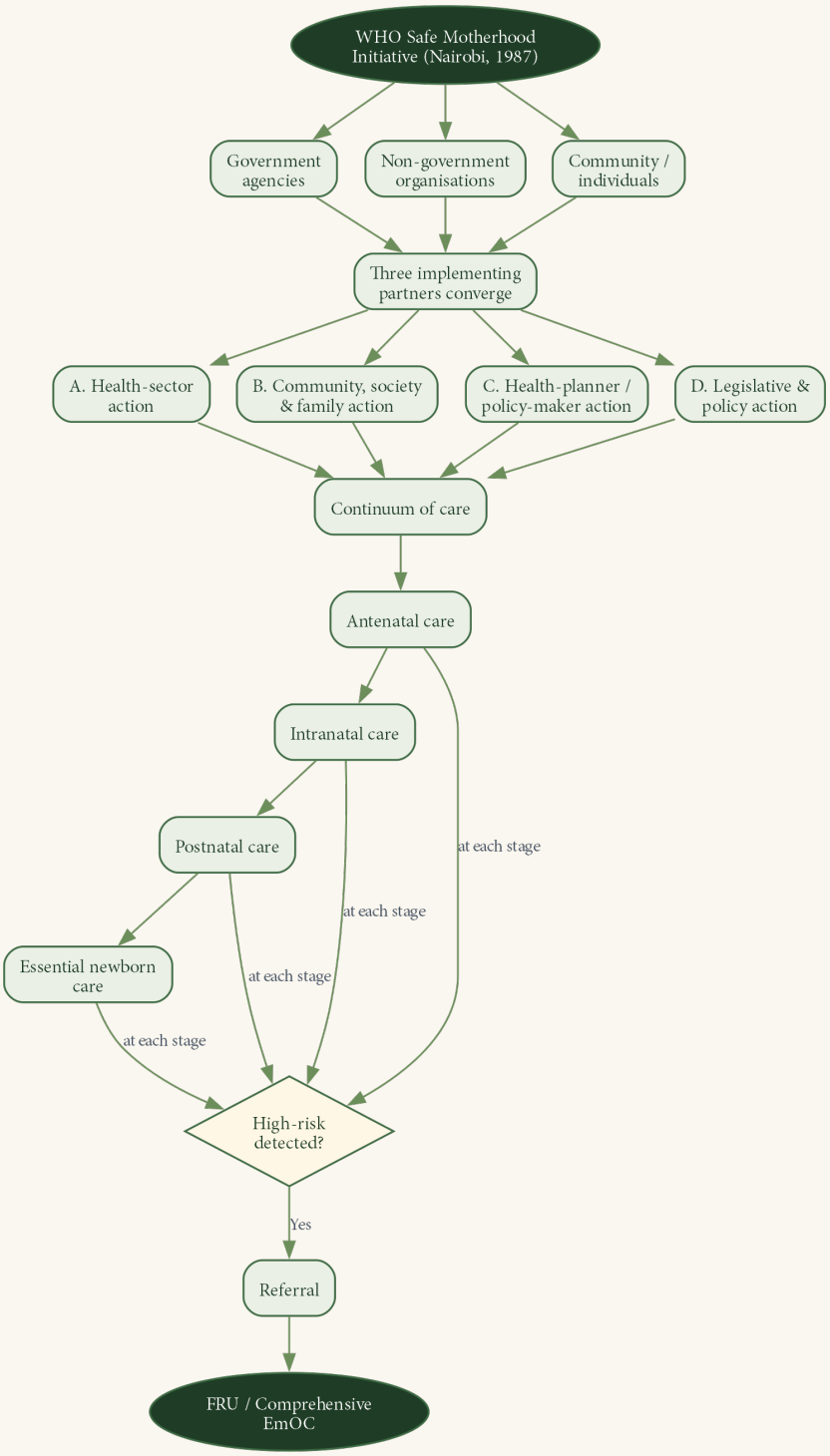
Recent advances [RA]

- WHO's **"Ending Preventable Maternal Mortality" (EPMM) strategy 2021–2030** reframes global implementation around five pillars: equity of access, universal comprehensive maternal/newborn

care, addressing all causes of maternal death/morbidity, health-system strengthening, and accountability for quality of care.

- WHO's **2016 antenatal-care guideline** upgraded the schedule from the older 4-visit "focused ANC" model to a **minimum 8-contact model**, shown to lower perinatal mortality.
- Newer Government of India implementation tools beyond JSY/JSSK/ASHA: **Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA, 2016)** — fixed-day free specialist antenatal check-up (9th of every month) in the 2nd/3rd trimester; **LaQshya (2017)** — labour-room/maternity-OT quality-improvement to cut intrapartum and immediate postpartum complications; **Surakshit Matritva Aashwasan (SUMAN, 2019)** — zero-expense, zero-denial, dignified-care guarantee at public facilities; **Anemia Mukt Bharat (2018)** — "6x6x6" life-cycle iron-folic-acid/deworming strategy; and the **National Midwifery Initiative (2018)** training Nurse Practitioners in Midwifery for respectful, evidence-based intrapartum care.
- India's MMR has fallen from 130 (SRS 2014–16) to 93 (SRS 2019–21) — ahead of the National Health Policy 2017 target of <100 by 2020 — though the SDG 3.1 target of <70 by 2030 still needs sustained implementation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart tracing SMI implementation from the three partners through the four action levels to the antenatal–intranatal–postnatal–newborn continuum of care, with high-risk cases branching to referral and comprehensive EmOC.

High-yield exam pointers

- WHO Safe Motherhood Initiative — **Nairobi, 1987**; halve maternal deaths by 2000, extended to 2015; three partners — government, NGO, community/individuals.
- **Four levels of action**: Health sector – Community/family – Policy makers – Legislative (mnemonic "**H-C-P-L**").
- **Four service pillars**: Antenatal – Intranatal – Postnatal – Essential Newborn Care; "**three cleans**" — hands, perineum, cord.
- SBA-permitted **life-saving drugs**: misoprostol, oxytocin, MgSO4, ampicillin, metronidazole.
- **Comprehensive EmOC** at FRU = anaesthesia + blood transfusion + caesarean + manual removal of placenta + safe abortion + contraceptive services + referral transport.
- India scheme sequence: **NRHM/JSY/ASHA (2005) → JSSK → PMSMA (2016) → LaQshya (2017) → SUMAN (2019)**.

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

DC Dutta's Obstetrics 9e prints the RCH-II/JSY-era implementation framework and the SRS 2014–16 MMR of 130; it pre-dates PMSMA, LaQshya, Anemia Mukt Bharat and SUMAN, which are current National Health Mission methods of implementation cited above from Ministry of Health & Family Welfare scheme documents.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Safe Motherhood, Epidemiology of Obstetrics); Government of India, Ministry of Health & Family Welfare — National Health Mission scheme documents (JSY, ASHA, JSSK, PMSMA, LaQshya, SUMAN, Anemia Mukt Bharat); WHO — Ending Preventable Maternal Mortality strategy 2021–2030; WHO 2016 antenatal care guideline; Sample Registration System (SRS) bulletins.

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Describe temporary methods of contraception and their mode of action and noncontraceptive benefits

Asked in: Paper IV 18-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — Temporary (spacing) methods prevent conception reversibly, with prompt return of fertility on discontinuation, unlike permanent sterilization. They are grouped into hormonal, intrauterine, barrier, natural/fertility-awareness, and emergency methods.

Classification of temporary methods

Group	Methods
Combined hormonal	Combined oral contraceptive (COC) pill; combined injectable (Cyclofem, Mesigyna); transdermal patch; vaginal ring
Progestin-only hormonal	Progestin-only pill (POP/mini-pill); injectables (DMPA, NET-EN); subdermal implants (Norplant, Implanon/Nexplanon)
Intrauterine	Copper-bearing IUCD (Cu-T 380A, Cu-T 200, Multiload 375); levonorgestrel intrauterine system (LNG-IUS, Mirena)
Barrier	Male condom, female condom, diaphragm, cervical cap, spermicides, vaginal sponge
Natural/fertility awareness	Calendar (rhythm) method, basal body temperature (BBT) method, cervical mucus (*Billings*) method, symptothermal method, lactational amenorrhoea method (LAM), coitus interruptus
Emergency contraception	Levonorgestrel (LNG) regimen, combined estrogen–progestin (*Yuzpe*) regimen, copper-IUD

Hormonal methods — mode of action and noncontraceptive benefits

Method	Composition/regimen	Mode of action	Noncontraceptive benefits
COC pill	Ethinyl estradiol (EE) 20–35 mcg + a progestin, 21 active + 7 iron/placebo tablets (e.g., Mala-D/Mala-N: levonorgestrel 0.15 mg + EE 30 mcg)	Suppresses hypothalamic-pituitary-ovarian axis → blocks the mid-cycle LH surge → anovulation (principal action); thickens cervical mucus impeding sperm penetration; renders endometrium atrophic/hostile to implantation; slows tubal motility	Regularises cycles, less flow, less dysmenorrhoea, less anaemia; fewer ectopic pregnancies; less pelvic inflammatory disease (PID)/salpingitis; **reduces endometrial, ovarian and colorectal cancer risk**; less benign breast disease and fewer functional ovarian cysts; increases bone density; improves acne/hirsutism with anti-androgenic progestins; treats endometriosis-related pain
POP (mini-pill)	Low-dose progestin only, no pill-free interval; must be taken within 3 hours of the same time daily (missed if delayed beyond)	Thickens cervical mucus (main effect); variable anovulation; thin endometrium	No estrogen-related risk — safe in lactation (no effect on breast milk), smokers >35 years, hypertensives, migraine with aura
Injectables	**DMPA** 150 mg IM every 3 months (WHO schedule up to 4 months) or 300 mg every 6 months; **NET-EN** 200 mg IM every 2 months, both by deep Z-track technique	Suppresses LH surge → anovulation; thickened mucus; endometrial atrophy	Reduces menorrhagia/anaemia and endometrial cancer risk; improves seizure control in epilepsy; reduces sickle-cell crises; long-acting, coitus-independent, ideal for lactating women
Combined injectables	**Cyclofem**: DMPA 25 mg + estradiol cypionate 5 mg monthly; **Mesigyna**: NET-EN 50 mg + estradiol valerate 5 mg monthly	Same mechanism as COC, given IM monthly	Same as COC; fertility returns faster than with DMPA

Method	Composition/regimen	Mode of action	Noncontraceptive benefits
Subdermal implants	*Norplant* (6 levonorgestrel capsules); *Implanon/Nexplanon* (single rod, etonogestrel 68 mg, effective 3 years)	Anovulation + thickened cervical mucus + thin endometrium; sustained low-dose progestin release	Long-acting, coitus-independent, reversible; reduces menorrhagia; suitable where estrogen is contraindicated

Intrauterine devices — mode of action and noncontraceptive benefits

Device	Composition/duration	Mode of action	Noncontraceptive benefits
Copper IUCD (e.g., **Cu-T 380A** — 380 mm^2 copper, replacement at 10 years; Multiload 375 — 5 years)	Copper wire on stem and arms	Copper ions are directly toxic to sperm and ova; induces a sterile foreign-body inflammatory reaction in the endometrium with increased leukocytes and prostaglandins that impairs sperm transport, capacitation and fertilisation; endometrium rendered hostile to implantation	Highly effective, no systemic hormonal effect; risk of ectopic pregnancy is significantly reduced compared with no contraception (Cu-T 380A/LNG-IUS ≈ 0.02 per hundred woman-years)
LNG-IUS (Mirena)	52 mg levonorgestrel, effective 5 years	Local endometrial suppression/atrophy, thickened cervical mucus, variable inhibition of ovulation	Markedly **reduces menorrhagia and dysmenorrhoea** (first-line medical option for heavy menstrual bleeding, alternative to hysterectomy/ablation); useful in adenomyosis and as the progestin component of hormone replacement therapy; reduces endometrial hyperplasia risk

Barrier and natural/fertility awareness methods

Method	Mode of action	Noncontraceptive benefits
Male condom	Mechanical sheath prevents deposition of semen in the vagina	Protects against sexually transmitted infections (STIs) including HIV; reduces cervical dysplasia/human papillomavirus (HPV) transmission
Female condom	Lines the vagina, mechanical barrier	STI protection; female-controlled
Diaphragm (failure rate 16 per hundred woman-years)	Covers the cervix mechanically, used with spermicide	Reduces PID/STIs to some extent; protects against cervical precancer and cancer
Spermicides (nonoxynol-9; failure rate alone 18–29 per hundred woman-years)	Surfactant destroys the sperm membrane	Some antimicrobial action against STIs (not protective against HIV; frequent use may cause genital lesions increasing HIV risk)
Vaginal sponge (failure rate: parous 20–32, nulliparous 9–16 per hundred woman-years)	Releases spermicide, absorbs ejaculate, blocks the cervical os for 6 hours after coitus	Spermicidal antimicrobial effect as above
Fertility awareness/rhythm method (calendar, BBT, *Billings* mucus, symptothermal; failure rate 20–30 per hundred woman-years)	Abstinence during the calculated fertile window identified by cycle calendar, post-ovulatory temperature rise, or fertile-type cervical mucus	No cost, no side effects; only method acceptable to the Roman Catholic Church; requires partner cooperation
Lactational amenorrhoea method (LAM)	Exclusive breastfeeding maintains high prolactin, suppressing gonadotropin-releasing hormone (GnRH) pulsatility → anovulation	Effective only if exclusively breastfeeding, amenorrhoeic, and <6 months postpartum; promotes breastfeeding

Emergency contraception (on-demand temporary method)

Regimen	Dose	Mode of action	Time window
Levonorgestrel (LNG)	1.5 mg single dose (or 0.75 mg two doses 12 hours apart)	Inhibits or delays ovulation; alters cervical mucus	Within 72 hours (efficacy highest if taken early)
***Yuzpe* regimen**	2 tablets of ethinyl estradiol 50 mcg + levonorgestrel 0.25 mg, repeated 12 hours later	Same as above; more nausea/vomiting than LNG-only	Within 72 hours

Regimen	Dose	Mode of action	Time window
Copper-IUD	Standard Cu-T insertion	Toxic to sperm/ova, impairs fertilisation and implantation	Within 120 hours (5 days) — the most effective emergency method

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 55.35 — Principle of the Copper-T insertion technique (Jeffcoate's Principles of Gynaecology 9e, p.965)*

High-yield exam pointers

- COC principal action = anovulation via LH-surge suppression; POP/injectables/implants act mainly through cervical mucus + endometrial change.
- DMPA 150 mg IM 3-monthly; NET-EN 200 mg IM 2-monthly — write these doses verbatim.
- Cu-T 380A lasts 10 years; LNG-IUS (Mirena, 52 mg levonorgestrel) lasts 5 years and treats menorrhagia.
- COC noncontraceptive benefits mnemonic — "3 cancers down" (endometrial, ovarian, colorectal), less PID/ectopic, better cycle control.
- Emergency contraception: LNG 1.5 mg within 72 hours; copper-IUD within 120 hours is the most effective option.
- LAM is effective only with the "rule of 3": exclusive breastfeeding + amenorrhoea + <6 months postpartum.

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

Ethinyl estradiol dosing and pill generations, DMPA/NET-EN schedules, and IUCD replacement intervals above follow DC Dutta's Indian-standard figures cross-checked against Speroff 9e; newer international labelling for the levonorgestrel intrauterine system permits extended off-label use up to 6–8 years in some guidelines, but the licensed duration cited here (5 years) is retained as the exam-safe answer.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Jeffcoate's Principles of Gynaecology 9e.

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Describe the causes and preventive methods of severe acute maternal morbidity (SAMM)

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

Definition — Severe acute maternal morbidity (SAMM), synonymous with **maternal near-miss (MNM)**, is defined by the WHO as *"a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy."* A case is confirmed as MNM when the woman meets an organ-dysfunction-based identification criterion (cardiovascular, respiratory, renal, hepatic, coagulation, neurological or uterine — evidenced clinically, on investigation, or by a critical-care intervention); the CDC's parallel US concept, **severe maternal morbidity (SMM)**, is defined as "unintended events of labor and delivery resulting in serious short- or long-term consequences to a woman" and is tracked using 21 diagnosis/procedure indicators. For every maternal death, roughly 100–200 women experience SAMM, so near-miss surveillance is now used as a sensitive proxy for the quality of emergency obstetric care.

Causes of SAMM

Category	Conditions → organ dysfunction produced	Approx. share*
Obstetric haemorrhage	PPH (atony, trauma, retained tissue, coagulopathy), APH (abruption, praevia), ruptured ectopic → hypovolaemic shock, DIC, acute renal failure, cardiac arrest	20–25%
Sepsis	Puerperal sepsis, septic/unsafe abortion, chorioamnionitis → septic shock, ARDS, DIC, multi-organ failure	15–20%
Hypertensive disorders	Severe pre-eclampsia, eclampsia, HELLP → cerebral haemorrhage/oedema (stroke), hepatic rupture, pulmonary oedema, acute renal failure	12–15%
Unsafe-abortion complications	Uterine perforation, sepsis, haemorrhage	10–13%
Obstructed labour/rupture uterus	Cephalopelvic disproportion, malposition, scar dehiscence → combined haemorrhagic + septic shock, bladder/bowel injury	8%

Category	Conditions → organ dysfunction produced	Approx. share*
Embolism/anaesthetic-procedural	Amniotic fluid embolism, thromboembolism, failed intubation, high spinal block, cardiac arrest during procedure, hysterectomy → cardiorespiratory collapse	included in CDC-SMM list
Indirect (medical) causes	Anaemia with cardiac decompensation, pre-existing heart disease, viral hepatitis with hepatic failure, diabetic ketoacidosis, sickle-cell crisis, severe malaria	15–20% (anaemia alone)

*Share = approximate % contribution to major direct/indirect obstetric mortality-morbidity events (WHO/UNICEF/UNFPA data cited in DC Dutta's Obstetrics 9e) — the same conditions that define a near-miss also, if unrescued, cause death. The CDC's equivalent SMM indicator list (acute myocardial infarction, acute renal failure, ARDS, amniotic fluid embolism, cardiac arrest, DIC, eclampsia, hysterectomy, intracranial injury, puerperal stroke, pulmonary oedema, severe anaesthesia complications, sepsis, shock, sickle-cell crisis, thrombotic embolism, ventilation/tracheostomy) was met by 129 per 10,000 deliveries in a 50-million-record US analysis (CDC, 1998–2009).

Preventive methods

A. Antenatal (reduce the at-risk pool)

- Early registration (within 12 weeks); continuous risk screening at every antenatal contact — not a one-time assessment.
- Structured antenatal care — the WHO's 2016 model recommends a minimum of **8 antenatal contacts** (the older 4-visit schedule still printed in some textbooks is now superseded).
- Correct anaemia (routine iron-folic acid, treat hookworm/malaria/HIV); anaemia remains the single largest indirect contributor.
- Tetanus toxoid immunisation; joint specialist management of pre-existing cardiac disease, diabetes and hypertension.
- Universal access to family planning and safe, legal abortion services to prevent unwanted pregnancy and unsafe abortion.

B. Intranatal (safe delivery)

- **Skilled birth attendant** at every birth; the "three cleans" (hands, perineum, cord).
- Partograph (or WHO Labour Care Guide) to detect prolonged/obstructed labour early and refer in time.

- **Active management of the third stage of labour (AMTSL)** with a prophylactic uterotonic — **oxytocin 10 IU IM/IV** with delivery of the anterior shoulder — reduces PPH by about 60%.
- Life-saving drugs authorised for the skilled birth attendant: **misoprostol** (PPH prevention), **oxytocin** (PPH treatment), **MgSO4** (Pritchard/Zuspan regimen for eclampsia), **ampicillin + metronidazole** (sepsis), plus digital removal of retained products of conception.

C. Referral and Emergency Obstetric Care (rescue once a complication strikes)

- Functioning two-way referral chain: sub-centre → PHC → first referral unit (FRU), available 24×7.
- **Comprehensive EmOC** at every FRU — anaesthesia, blood transfusion, caesarean delivery, manual removal of placenta, safe abortion and contraceptive services.
- Blood bank/storage unit at every FRU; a massive-transfusion protocol for haemorrhagic shock.
- Emergency transport (India's JSSK/108 ambulance) with a **non-pneumatic anti-shock garment (NASG)** to stabilise hypovolaemic shock in transit.
- ICU/HDU admission and multidisciplinary critical care once an organ-dysfunction criterion is met.

D. Health-system and audit measures

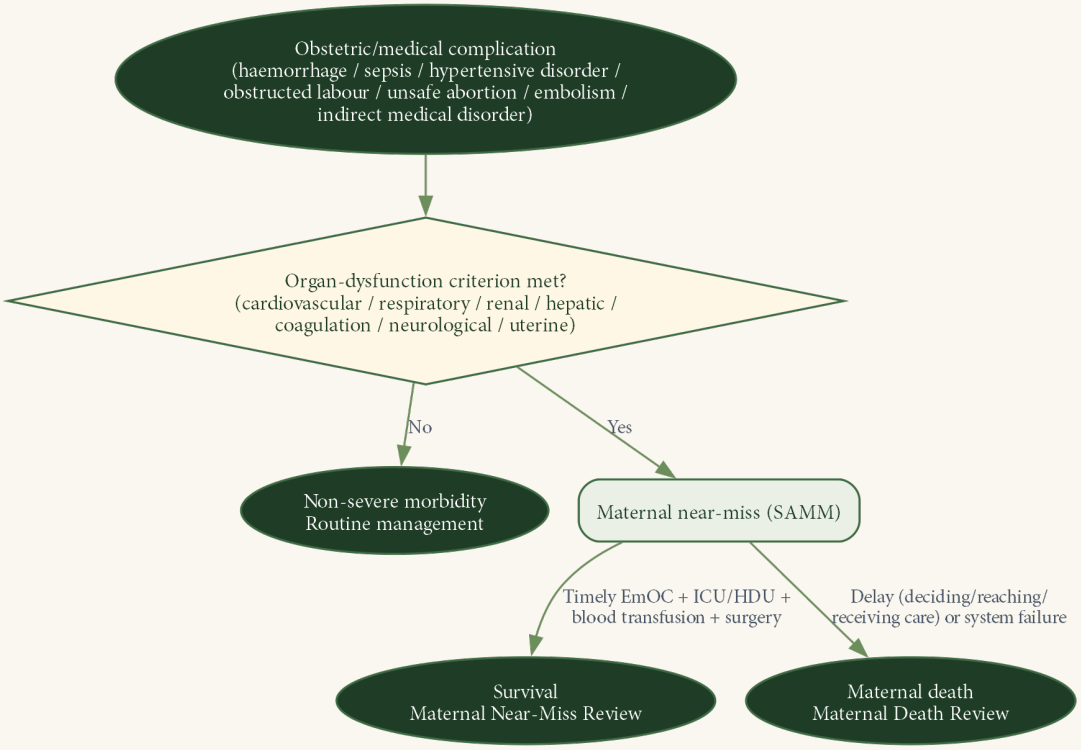
- **Maternal Near-Miss Review (MNMR)**, run alongside Maternal Death Review, to audit every SAMM case for avoidable factors — the classical "three delays" (deciding to seek care, reaching a facility, receiving care).
- Facility protocols and simulation drills for PPH, eclampsia and sepsis; periodic refresher training for obstetricians, general practitioners and midwives.
- Maternal morbidity/mortality conferences with system-level audit and policy feedback.

Recent advances [RA]

- **WOMAN trial** (Lancet, 2017): tranexamic acid 1 g IV within 3 hours of PPH onset cut death from bleeding by about a third; WHO's PPH treatment recommendation now includes tranexamic acid as first-line adjunct.
- **E-MOTIVE trial** (NEJM, 2023): a calibrated-drape-triggered early detection-and-response bundle (uterine massage + oxytocics + tranexamic acid + IV fluids + escalation) cut severe PPH/laparotomy/death by roughly 60% in a multicentre African trial — now shaping WHO's PPH care bundle.
- **WHO Labour Care Guide** (2020) replaces the classical partograph, using a 5th-centile action line to flag obstructed/prolonged labour before it becomes a near-miss event.
- **WHO Maternal and Perinatal Death Surveillance and Response (MPDSR)** technical guidance (2021) formally extends death review to systematic near-miss case review.

- **Government of India, MoHFW — Maternal Near-Miss Review Operational Guidelines** (2014): India's structured near-miss audit tool, modelled on the WHO near-miss approach, rolled out at FRUs and medical-college hospitals.
- **LaQshya** — Labour Room Quality Improvement Initiative (MoHFW, 2017): targets intrapartum/immediate-postpartum near-miss reduction (APH/PPH, eclampsia) in labour rooms and maternity operation theatres.
- **SUMAN** — Surakshit Matritva Aashwasan (MoHFW, 2019): zero-expense, dignified-care entitlement for every pregnant woman and newborn, addressing the first and third delays.
- **Non-pneumatic anti-shock garment (NASG)**: WHO-recommended for temporising haemorrhagic shock during transfer to a higher centre.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Continuum-of-severity flowchart: complication → organ-dysfunction decision → non-severe morbidity or SAMM near-miss → survival (MNMR) or death (MDR).

High-yield exam pointers

- Write the WHO definition verbatim: "nearly died but survived… during pregnancy, childbirth or within 42 days of termination of pregnancy."
- Quote the ratio: **for every maternal death, ~100–200 women experience SAMM** (near-miss:death ratio) — this is why near-miss audit is a quality-of-care indicator.

- Top-line causes in order for a 10-mark table: haemorrhage (20–25%) > sepsis/hypertension (12–20% each) > unsafe abortion (10–13%) > obstructed labour (8%); anaemia is the leading indirect cause.
- Four-tier prevention mnemonic: **Antenatal (screen/treat) → Intranatal (skilled attendant + AMTSL + life-saving drugs) → Referral/EmOC (blood bank + NASG) → Audit (Near-Miss Review).**
- Life-saving drugs to name verbatim: misoprostol, oxytocin, MgSO4 (Pritchard/Zuspan), ampicillin + metronidazole.
- Name-drop for extra marks: WOMAN trial, E-MOTIVE trial, WHO Labour Care Guide, MPDSR 2021, India's MNMR 2014 guidelines, LaQshya, SUMAN.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Obstetrics 9e states the near-miss identification rule as "minimum three criteria, one each from the clinical/investigation/intervention domains, OR any single criterion signifying cardiorespiratory collapse" — a textbook simplification; the original WHO near-miss tool (Say et al., 2009) classifies a woman as a near-miss if she meets even ONE organ-dysfunction-based criterion from any single domain (clinical, laboratory, or management-based).

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; WHO Maternal and Perinatal Death Surveillance and Response (MPDSR) technical guidance (2021); Government of India MoHFW Maternal Near-Miss Review Operational Guidelines (2014), LaQshya (2017) and SUMAN (2019); WOMAN trial (Lancet, 2017); E-MOTIVE trial (NEJM, 2023).

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Describe the physiology of implantation and discuss the causes of first trimester abortion

Asked in: Paper I 24-Sep-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Implantation (nidation) is the process by which the hatched blastocyst attaches to and embeds within a receptive, progesterone-primed endometrium, establishing the maternal-fetal interface. First trimester (early) abortion is expulsion or extraction of a previable embryo/fetus (weighing ≤500 g, attained by 22 weeks/154 days — WHO) occurring before 12–13 weeks of gestation.

Physiology of implantation

Event	Timing (post-fertilization / menstrual-cycle day)
Morula enters uterine cavity	Day 4 (16–64 cell stage)
Zona pellucida disappears; blastocyst forms	Day 4–5
Zona hatching; blastocyst attachment to endometrial surface	Day 5–6
Implantation begins (fundal, ant./post. wall)	**Day 6, = day 20 of menstrual cycle**
Differentiation into cyto- and syncytiotrophoblast	Day 6–7
Trophoblast invades endometrial sinusoids; uteroplacental circulation established	Day 10–11
Interstitial implantation complete, full decidual coverage	Day 10–11 (= day 24–25 LMP)

- **Endometrial receptivity ("window of implantation")** — Uterine receptivity is limited to cycle day 20–24, when the estrogen- and progesterone-primed secretory endometrium expresses **pinopodes**, integrins, leukaemia inhibitory factor (LIF), and colony-stimulating factor-1 (CSF-1). Adhesion potential declines after day 24 due to antiadhesive glycoprotein synthesis.
- **Apposition** — Initial, loose contact of blastocyst trophectoderm with the endometrial surface via pinopod-mediated absorption of glycogen/mucin-rich uterine fluid, which nourishes the blastocyst.
- **Adhesion** — Firmer physical contact mediated by adhesion molecules — **integrins, selectins, cadherins** (P-selectin, heparan sulfate proteoglycan, EGF, trophinin) — that interact with matching blastocyst receptors.
- **Penetration and invasion** — Histolytic syncytiotrophoblast erodes stromal cells and maternal capillary endothelium of the stratum compactum; lacunae form and fuse, allowing maternal blood to bathe the trophoblast (**interstitial implantation**, blastocyst ultimately covered on all sides by decidua). Further penetration is checked by maternal immune factors and sealed by a fibrin clot.
- **Trophoblast differentiation** — Inner mononuclear **cytotrophoblast (Langhans' layer)** and outer multinucleated **syncytiotrophoblast**; the latter synthesises human chorionic gonadotropin (hCG) from day 10, which rescues and maintains the corpus luteum (secreting ~40 mg progesterone/day) until placental steroidogenesis takes over around 8–10 weeks.
- **Decidual reaction** — Progesterone-driven transformation of endometrial stroma into decidual cells (compact, spongy, and thin basal layers), providing nutrition and controlling depth of trophoblast invasion; renamed **decidua basalis** (implantation bed → maternal placenta), **decidua capsularis** (overlying blastocyst), and **decidua vera/parietalis** (remaining uterine lining).

- Molecular signalling throughout is mediated by cytokines (interleukins-1, 3, 4, 5, 6, 10, 13), prostaglandins/COX-2, EGF and insulin-like growth factor (IGF), synthesised by both decidua and embryo.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 2.5 — Schematic representation showing interstitial implantation of the blastocyst in stratum compactum of the decidua (DC Dutta's Obstetrics 9e, p.47)*

Causes of first trimester abortion

Category	Approx. share	Key points
Genetic (chromosomal)	**~50%**	Commonest single cause. **Autosomal trisomy** most common (~50% of abnormal karyotypes; trisomy 16 commonest single trisomy, ~30%). **Monosomy X (45,X)** ~20% — single most common specific abnormality. **Polyploidy** ~22% (triploidy > tetraploidy). Structural rearrangements (translocation, deletion, inversion) 2–4%.
Endocrine & metabolic	10–15%	**Luteal phase defect** (deficient corpus luteal progesterone/poor endometrial response) impairs implantation/placentation; overt **thyroid dysfunction** (hypo- or hyperthyroidism, raised thyroid autoantibodies); poorly controlled **diabetes mellitus**.
Immunological	5–10%	**Antiphospholipid antibody syndrome** (lupus anticoagulant, anticardiolipin, β2-glycoprotein-1 antibodies) → trophoblast dysfunction, complement activation, uteroplacental thrombosis, fetal hypoxia. Skewed **Th1-dominant cytokine response** (interleukin-2, interferon, TNF) replacing the pregnancy-favourable Th2 pattern.

Category	Approx. share	Key points
Infection	~5%	Transplacental — viral (rubella, cytomegalovirus, HIV), parasitic (toxoplasma, malaria), bacterial (Ureaplasma, Chlamydia, Brucella).
Unexplained	40–60%	No factor identified despite work-up; risk rises with advancing maternal (and to a lesser extent paternal) age.

- Other contributors overlapping with early loss: **paternal factor** (sperm chromosomal translocation), **inherited thrombophilia** (factor V Leiden/protein C resistance is commonest), **premature rupture of membranes**, maternal cyanotic heart disease/haemoglobinopathy, and environmental exposures — smoking (carboxyhaemoglobin-mediated hypoxia), alcohol, ionising radiation, antineoplastic drugs, an intrauterine device *in situ* (not oral pills).
- **Mechanism:** the ovum dies first and is then expelled; before 8 weeks the entire ovum with decidual coverings is extruded intact (occasionally retained in the dilating cervical canal as a "cervical miscarriage").

High-yield exam pointers

- Implantation window = cycle **day 20–24**; blastocyst attaches day **6–7** post-fertilization; interstitial implantation complete by **day 10–11** (= day 24–25 LMP).
- Four stages mnemonic: **A-A-P-I** — Apposition → Adhesion → Penetration → Invasion.
- Three decidua parts: **basalis** (bed), **capsularis** (over blastocyst), **vera/parietalis** (rest of cavity).
- First-trimester abortion causes, quick recall: **G**enetic (50%) > **U**nexplained > **E**ndocrine (10–15%) > **I**mmunological (5–10%) > **I**nfection (5%).
- Chromosomal breakdown to write verbatim: autosomal trisomy ~50% (trisomy 16 commonest), monosomy X (45,X) ~20%, polyploidy ~22%, structural rearrangement 2–4%.
- Second-trimester causes are largely different (anatomic — cervical incompetence, Müllerian fusion defects, fibroid, synechiae) — do not mix these into a first-trimester answer.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Williams Obstetrics 26e gives similar but not identical breakdown figures (roughly half of all miscarriages euploid, half aneuploid; trisomy 50–60%, monosomy X 9–13%) — the DC Dutta percentages above are the figures conventionally reproduced in Indian postgraduate exams and are broadly concordant with Williams.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 2 — Fundamentals of Reproduction: Implantation, Trophoblast, Decidua; Chapter 16 — Hemorrhage in Early Pregnancy: Etiology of spontaneous abortion); Williams Obstetrics 26e (Chapter 5 — Implantation and Placental Development; Chapter 11 — Fetal factors in miscarriage), cross-checked for the chromosomal-abnormality percentages.

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Describe the physiology of trophoblastic implantation and its clinical significance

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

Definition — Implantation is the process by which the free blastocyst attaches to, and then invades, a hormonally-primed ("receptive") endometrium, beginning 6-7 days after fertilization. The invading trophoblast differentiates into an outer syncytiotrophoblast and inner cytotrophoblast, remodels the uterine spiral arteries to establish the uteroplacental circulation, and becomes the principal endocrine organ of pregnancy.

Stages of implantation

- **Apposition** — the blastocyst (100-250 cells) loses its zona pellucida and makes initial, loosely-adherent contact with the endometrial surface, usually on the upper posterior uterine wall.
- **Adhesion** — physical contact with the decidua strengthens through hormonally-regulated cell-adhesion molecules (integrins, L-selectin, trophinin). This is possible only during the "**window of implantation,**" the receptive phase of the endometrial cycle limited to **days 20-24** (secretory/mid-luteal phase); a mismatch between embryo age and endometrial receptivity underlies some cases of implantation failure after in vitro fertilisation (IVF).
- **Invasion** — by the 8th day post-fertilisation the trophoblast differentiates into an outer multinucleated **syncytiotrophoblast** (invasive, hormone-secreting, formed by fusion of underlying cells via the envelope protein *syncytin*) and an inner mononuclear **cytotrophoblast** (germinal layer, retains mitotic capacity). The syncytiotrophoblast penetrates the decidua, the inner third of the myometrium, and the uterine vasculature.

Trophoblast subtypes and their roles

Trophoblast type	Location	Principal role
Villous cytotrophoblast	Lines chorionic villi	Germinal layer; fuses to renew the syncytium throughout gestation

Trophoblast type	Location	Principal role
Villous syncytiotrophoblast	Covers villi, bathed by maternal blood in the intervillous space	Gas/nutrient exchange; synthesis of human chorionic gonadotropin (hCG), human placental lactogen (hPL), progesterone, oestrogen, pregnancy-associated plasma protein-A (PAPP-A)
Extravillous **interstitial** trophoblast	Invades decidua and inner third of myometrium	Anchors the placenta; invasion is limited by decidual natural killer (NK) cells to prevent excessive myometrial penetration
Extravillous **endovascular** trophoblast	Migrates down the lumen of the spiral arteries, replaces vascular endothelium	Converts narrow, muscular spiral arteries into dilated, low-resistance uteroplacental vessels

Spiral artery remodelling — the two-wave invasion

Uteroplacental vessel transformation is fetal trophoblast acting on maternal vasculature and proceeds in two waves (Williams Obstetrics 26e):

- **First wave (before 12 weeks)** — endovascular trophoblasts invade and modify spiral arteries up to the decidual-myometrial border; native endothelium undergoes apoptosis and is replaced by trophoblast, with fibrinoid replacing smooth muscle in the vessel media.
- **Second wave (12-16 weeks)** — invasion extends into the intramyometrial segments of the same spiral arteries, completing the conversion to wide-bore, low-resistance uteroplacental arteries and abolishing maternal vasomotor control at the implantation site.
- A zone of fibrinoid degeneration, **Nitabuch's layer**, forms where trophoblast meets decidua and normally limits further invasion; it is characteristically absent when the decidua is deficient, as in placenta accreta.

Endocrine function established at implantation

Once implanted, the syncytiotrophoblast begins secreting **hCG** by day 8 post-fertilisation; it is detectable in maternal serum by radioimmunoassay as early as **8-9 days post-fertilisation**, has a doubling time of **1.4-2 days** in early pregnancy, and peaks at roughly **50,000-100,000 mIU/mL between 60 and 70 days**, before declining to a low plateau. hCG rescues and maintains the corpus luteum (progesterone support) until placental steroidogenesis takes over near 7-9 weeks. This endocrine timeline is the physiological basis of urine/serum pregnancy testing and of hCG-based monitoring of ectopic pregnancy and gestational trophoblastic disease.

Clinical significance

Clinical entity	Link to implantation physiology	Significance
Infertility / recurrent implantation failure (IVF)	Embryo transfer outside the day 20-24 window of receptivity; defective integrin/cell-adhesion-molecule expression	Cause of failed IVF cycles; drives endometrial-receptivity testing before frozen embryo transfer
Ectopic (commonly tubal) pregnancy	Premature or ectopic trophoblastic activity implants the blastocyst outside the uterine cavity	Diagnosed and monitored by serial serum β-hCG (normal rise ≥ 53% in 48 h; a sub-optimal rise suggests ectopic pregnancy)
Pre-eclampsia and fetal growth restriction	Shallow/incomplete endovascular trophoblast invasion leaves spiral arteries narrow, muscular and high-resistance instead of wide-bore	Basis of abnormal uterine artery Doppler notching; underlies prophylactic low-dose aspirin (75-150 mg, commonly 81 mg per ACOG) from the first trimester in high-risk women
Placenta accreta spectrum	Defective decidua basalis with absent Nitabuch's layer allows trophoblast to invade abnormally deep into (increta) or through (percreta) the myometrium	Major cause of catastrophic postpartum haemorrhage; antenatal imaging and delivery planning are guided by this mechanism
Gestational trophoblastic disease (hydatidiform mole, choriocarcinoma)	Abnormal, excessive trophoblastic proliferation without normal villous vascularisation	Very high hCG levels; serial hCG follow-up detects persistent/malignant trophoblastic disease
Screening markers (PAPP-A)	PAPP-A is a syncytiotrophoblast product reflecting trophoblast function	Low first-trimester PAPP-A is associated with increased risk of pre-eclampsia, fetal growth restriction and aneuploidy

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 40.3 — Schematic representation of normal placental implantation shows proliferation of extravillous trophoblasts (Williams Obstetrics 26e, p.707)*

This figure contrasts normal implantation (extravillous trophoblast fully replacing the spiral arteriolar endothelium and muscular wall to create a dilated, low-resistance vessel) with pre-eclampsia (incomplete invasion leaving a small-calibre, high-resistance vessel) — label both panels alongside the two-wave invasion timeline.

High-yield exam pointers

- Three stages: **apposition** → **adhesion** → **invasion** (implantation begins day 6-7 post-fertilisation).

- **Window of implantation = endometrial cycle days 20-24.**
- Two-wave trophoblast invasion: **<12 weeks** (decidual segment) and **12-16 weeks** (intramyometrial segment).
- Two extravillous trophoblast types: **interstitial** (myometrium) and **endovascular** (spiral artery lumen).
- **Nitabuch's layer absent → placenta accreta spectrum.**
- **hCG:** detectable day 8-9, doubling time 1.4-2 days, peak 50,000-100,000 mIU/mL at 60-70 days.
- Shallow trophoblastic invasion is the mechanistic link between implantation physiology and **pre-eclampsia/fetal growth restriction** — hence prophylactic low-dose aspirin.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Some Indian textbook editions print the peak hCG concentration as "100-200 IU/mL," which is a units/order-of-magnitude discrepancy against the current standard value of approximately 50,000-100,000 mIU/mL at 60-70 days given in Williams Obstetrics 26e; the Williams figure is used above.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e (implantation stages, trophoblast differentiation, two-wave spiral artery invasion, hCG kinetics, pre-eclampsia mechanism, Nitabuch's layer/placenta accreta); DC Dutta's Textbook of Obstetrics 9e (trophoblast/decidua structure, hCG physiology); ACOG guidance on low-dose aspirin for pre-eclampsia prevention.

◆ ◆ ◆

Describe the recent developments in male contraception

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

Definition — Male contraception refers to fertility-regulating methods acting on the man — barrier, surgical, hormonal or non-hormonal — used alone or as the couple's chosen method. Unlike the cyclical, single-oocyte physiology of the female, spermatogenesis is continuous and gonadotrophin-dependent with very high intratesticular testosterone, which makes suppressing it to contraceptive

levels without abolishing libido and virilisation physiologically difficult; this is why development has lagged behind female methods.

Currently established methods

Method	Mechanism	Key points
Male condom	Barrier — prevents sperm deposition	Failure rate ~2–15/100 woman-years; only method also protecting against sexually transmitted infections (STIs) including HIV
Coitus interruptus	Withdrawal before ejaculation	High failure rate, user-dependent
Conventional (scalpel) vasectomy	Bilateral vas deferens ligation/excision	Failure rate ~0.15/100 woman-years (DC Dutta); not immediately sterile — semen persists in the distal vas, so **2 consecutive azoospermic semen analyses at 12 and 16 weeks** (or one at 16 weeks) must confirm sterility; additional contraception advised till then
No-scalpel vasectomy (NSV)	Vas delivered through a single midline puncture (ring clamp + dissecting forceps) instead of a scalpel incision	Fewer complications (haematoma, infection) than conventional vasectomy; equally effective; now the preferred technique in India

Recent hormonal developments (spermatogenic suppression)

Approach	Agents/regimen	Status & efficacy
Testosterone alone	Testosterone undecanoate (TU) monthly IM injection	Chinese multicentre trial (TU 500 mg IM monthly, n=1045): only 4.8% failed to suppress sperm count to $<1 \times 10^6$/mL; cumulative pregnancy rate 1.1/100 men at 30 months. Asian men suppress to azoospermia/oligospermia more reliably than Caucasian men (~86%)
Testosterone + progestin	TU injections + etonogestrel subdermal implant (or testosterone + levonorgestrel/cyproterone acetate/medroxyprogesterone acetate)	Adding a progestin improves suppression by adding negative feedback on gonadotrophins; combined-implant trial: only 3% failed to suppress sperm to $<1 \times 10^6$/mL

Approach	Agents/regimen	Status & efficacy
Transdermal combination gel — NES/T	Daily self-applied gel: segesterone acetate (Nestorone) + testosterone, applied to the shoulders/upper arms	International multicentre Phase 2b **efficacy** trial (Population Council/NICHD/University of Washington) enrolled 462 couples (completed accrual late 2022); earlier dose-finding work showed effective suppression of sperm production to contraceptive levels with normal libido/testosterone maintained and no serious adverse events; the most advanced hormonal candidate in clinical development, with Phase 3 anticipated once efficacy-phase results mature [Amory JK et al., *Contraception* 2023, PMID 37210024]
GnRH analogues	GnRH agonist/antagonist ± "add-back" testosterone	Suppress FSH/LH and testosterone, causing decline in sperm density/motility; loss of libido without add-back testosterone limits acceptability
Oral progestogenic androgens (investigational pill)	Dimethandrolone undecanoate (DMAU) and 11β-methyl-19-nortestosterone-17β-dodecylcarbonate (11β-MNTDC) — single molecules with combined androgenic + progestogenic activity	28-day placebo-controlled Phase 1 trials (University of Washington/Los Angeles Biomedical Research Institute) showed dose-dependent suppression of luteinising hormone (LH), follicle-stimulating hormone (FSH) and testosterone with acceptable tolerability and good acceptability (DMAU: 80% satisfied; 11β-MNTDC: 92.5% would recommend it); Phase 2 studies awaited before an oral "male pill" is possible [DMAU: *Contraception* 2020, PMID 32298717; 11β-MNTDC: *Contraception* 2021, PMID 34153318]

Recent non-hormonal developments (vas-occlusive)

Method	Mechanism	Status
Intravas device (IVD)	Two silicone plugs inserted into each vas deferens to block sperm transport	Reversible in principle (removable); contraceptive effectiveness still under study
RISUG (Reversible Inhibition of Sperm Under Guidance)	Styrene maleic anhydride in dimethyl sulfoxide (DMSO) injected into the vas lumen; coats the vas wall, disrupts sperm membrane on contact by a local pH/ionic effect, blocking transport without occluding the lumen	Developed in India (IIT Kharagpur); extended Phase III trial (n=303) reported ~97.6% azoospermia/contraceptive success with no major adverse effects; reversible by a second injection (dissolves the polymer); as of the latest reports, still pending final marketing approval from India's Drug Controller General
Vasalgel	Similar high-molecular-weight styrene-alt-maleic-acid polymer in DMSO injected into the vas; forms a soft gel permeable to fluid but not sperm	US analogue of RISUG; rapid, reversible restoration of sperm flow after intravas sodium bicarbonate injection shown in rabbit studies; human trials awaited
ADAM hydrogel	Water-soluble, biocompatible hydrogel injected into the vas under local anaesthesia (no-scalpel technique), producing temporary, non-permanent occlusion	First-in-human dose-ranging trial (Australia) showed >99% reduction in motile sperm within 30 days, favourable safety at 12 months, and early feasibility studies planned; developed by Contraline

Recent advances [RA]

- The **NES/T transdermal gel** (Phase 2b efficacy trial, 462 couples, Population Council/NICHD/University of Washington) is the most clinically advanced hormonal candidate, with Phase 3 planned once the efficacy-phase data mature [Amory JK et al., *Contraception* 2023, PMID 37210024].
- **RISUG** has completed an extended Indian Phase III trial (~97–100% efficacy, no major adverse effects) but marketing/regulatory clearance from the Drug Controller General of India remains pending; this and the oral progestogenic-androgen pills (DMAU, 11β-MNTDC — Phase 1, PMID 32298717/34153318) and the **ADAM hydrogel** (first-in-human data, PMID pending publication) together represent the four candidates closest to changing practice.
- Across all of them, the core physiological hurdle is unchanged: continuous, gonadotrophin-driven spermatogenesis with high intratesticular testosterone makes complete, reliably reversible suppression harder to achieve than ovulation suppression in women — which is why, after four

decades of research, vasectomy and the condom remain the only regulator-approved male methods.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 39.5 — Anatomy of male reproductive system showing procedure for vasectomy. (Williams Obstetrics 26e, p.700)*
>
> Also describe as a simple classification flowchart for revision: **Male contraception** → (1) *Established*: condom, coitus interruptus, vasectomy (conventional/no-scalpel) → (2) *Hormonal (investigational)*: testosterone alone → testosterone + progestin → transdermal NES/T gel → oral progestogenic-androgens (DMAU/11β-MNTDC) → (3) *Non-hormonal vas-occlusive (investigational)*: intravas device → RISUG → Vasalgel → ADAM hydrogel.

High-yield exam pointers

- Why male hormonal contraception is hard: continuous gonadotrophin-dependent spermatogenesis + very high intratesticular testosterone (unlike cyclical female ovulation).
- NSV = fewer complications than scalpel vasectomy; man is NOT sterile immediately — confirm with 2 semen analyses at 12 and 16 weeks (or 1 at 16 weeks).
- TU 500 mg IM monthly (Chinese trial, n=1045): suppression failure only 4.8%.
- **NES/T gel** (Nestorone/segesterone acetate + testosterone, transdermal, daily) — most advanced current candidate, Phase 2b/3.
- **DMAU** and **11β-MNTDC** — oral progestogenic-androgens, Phase 1/2, potential future "male pill".
- **RISUG/Vasalgel/ADAM** — non-hormonal, injected into vas deferens, reversible occlusion without excision; RISUG is Indian-origin (IIT Kharagpur), Phase III complete, regulatory approval pending.
- Only vasectomy and condom are currently approved, available methods; all hormonal/non-hormonal newer agents remain investigational.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> Recency caveat: RISUG's regulatory/marketing approval status and the NES/T gel's exact trial-completion dates continue to evolve year on year; the position stated here reflects the most recent published trial reports and should be cross-checked against current news at the time of the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Williams Obstetrics 26e. Recent advances: Gu Y et al., J Clin Endocrinol Metab 2009 (TU trial); Mommers E et al., J Clin Endocrinol Metab 2008 (implant + TU); Ilani N et al., J Clin Endocrinol Metab 2012 (Nestorone/testosterone gel); Guha SK et al., Contraception 1997 (RISUG Phase II); Waller D et al., Basic Clin Androl 2016–17 (Vasalgel); Amory JK et al., Contraception 2023, PMID 37210024 (NES/T Phase 2b trial design); Ayoub R et al., Contraception 2020, PMID 32298717 (DMAU 28-day trial); PMID 34153318 (11β-MNTDC 28-day trial, Contraception 2021); Contraline ADAM first-in-human trial reports (2023–24).

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Describe the relationship of law to doctor patient relationship. Why do many legal cases arise in obstetrics and gynaecology?

Asked in: Paper IV 28-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — The doctor–patient relationship is a fiduciary and (usually implied) contractual relationship in which the doctor owes the patient a legally enforceable duty of care; failure to discharge that duty to the accepted standard is medical negligence, remediable in tort, before the consumer forum, or — if gross — under criminal law. In obstetrics and gynaecology this relationship carries an unusually heavy medicolegal load because outcomes are judged against an expectation of a "normal" pregnancy/delivery, involve two lives simultaneously, and are governed by additional penal statutes unique to reproductive care.

How law frames the doctor–patient relationship

Legal basis	Principle
Contract law (Indian Contract Act, 1872)	An implied contract arises once a doctor accepts a patient for treatment; consideration is the fee for professional service.
Law of torts	Independent of contract, every doctor owes a duty of care to the patient; breach is a civil wrong (negligence) remedied by damages.

Legal basis	Principle
Consumer law	*Indian Medical Association v. V.P. Shantha* (1995, Supreme Court) held that medical service rendered for consideration is a "service," making the patient a "consumer" who may sue before the District/State/National Consumer Disputes Redressal Commission.
Criminal law	Gross/reckless negligence causing death is an offence — Section 304-A of the Indian Penal Code, now Section 106 of the Bharatiya Nyaya Sanhita, 2023 — a materially higher threshold than civil negligence.
Statutory/regulatory	Registration/conduct governed by the National Medical Commission Act, 2019; OBG practice additionally attracts the MTP Act, the PC&PNDT Act, and the Surrogacy/ART (Regulation) Acts, 2021.
Fiduciary/ethical duty	Built on trust; imports duties of confidentiality, disclosure, and acting in the patient's best interest beyond what a contract specifies.

Standard of care and the elements of negligence

- **Bolam test** (*Bolam v. Friern Hospital Management Committee*, 1957) — a doctor is not negligent if the treatment accords with a practice accepted as proper by a responsible body of medical opinion; refined by *Bolitho* (1997) to require that the accepted practice be logically defensible.
- **Four elements ("4 D's")** must all be proved: **D**uty of care owed → **D**ereliction (breach) → **D**irect causation → **D**amage suffered.
- **Res ipsa loquitur** ("the thing speaks for itself") applies where negligence is self-evident — e.g., a mop retained in the abdomen after tubectomy (*Achutrao Khodwa v. State of Maharashtra*, 1996) — shifting the burden onto the doctor to explain; the hospital/State is separately **vicariously liable** for staff negligence in the course of employment.
- **Civil vs criminal negligence** — *Jacob Mathew v. State of Punjab* (2005) held that criminal prosecution needs a materially higher degree of negligence than a civil claim, and mandated an independent medical opinion before arrest.

Consent, confidentiality, and OBG-specific liability

- **"Real consent" doctrine** — *Samira Kohli v. Dr. Prabha Manchanda* (2008): consent for a diagnostic procedure (diagnostic laparoscopy) does not extend to an unplanned therapeutic procedure (hysterectomy) performed in the same sitting unless it is immediately life-saving; each therapeutic step needs its own informed, written consent.

- **Sterilization failure** — *State of Punjab v. Shiv Ram* (2005): failure of a properly performed sterilization operation, by itself, is not negligence; compensation requires proof of a negligent act in performing the operation, not merely the fact of an unwanted pregnancy.
- **Confidentiality** — a professional/ethical duty (NMC Code of Ethics); exceptions exist for a court order, a notifiable disease, or protection of an identifiable third party at risk (*Mr 'X' v. Hospital 'Z'*, 1998 — Supreme Court permitted disclosure of HIV status to the patient's fiancée).

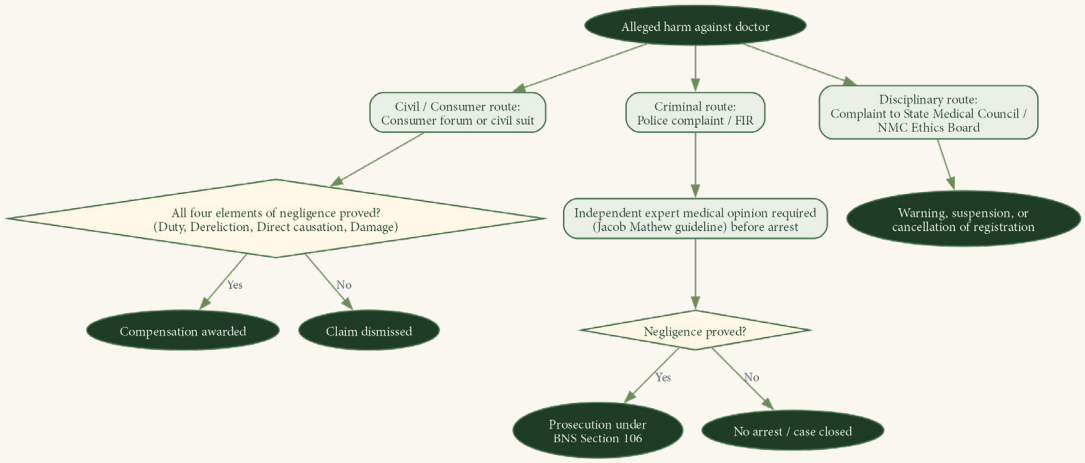
Why many legal cases arise in obstetrics and gynaecology

- **Two patients, one duty** — the obstetrician owes a simultaneous duty of care to mother and fetus/neonate; any adverse perinatal outcome is scrutinised as a possible lapse even when unavoidable.
- **Unpredictable, time-critical emergencies** — shoulder dystocia, cord prolapse, uterine rupture, and postpartum haemorrhage evolve within minutes, leaving little time for detailed consent discussion, yet are judged afterward with the benefit of hindsight.
- **"Perfect baby" expectation and catastrophic damages** — pregnancy is perceived as a physiological, not a disease, event, so any deviation from a healthy mother-and-baby outcome tends to be presumed the doctor's fault; perinatal brain injury/cerebral palsy claims are quantified over the child's entire expected lifespan, making obstetric litigation the costliest category of medical claims worldwide.
- **Documentation-dependent intrapartum monitoring** — continuous fetal heart rate/cardiotocography and partograph interpretation are central to labour care; DC Dutta's Obstetrics stresses that every manoeuvre in an emergency such as shoulder dystocia "must be documented correctly to avoid litigation."
- **Irreversible procedures and dedicated penal statutes** — sterilization failure and hysterectomy for benign disease permanently remove fertility, so harm cannot be undone; the PC&PNDT Act (non-bailable offence), the MTP Act, and the Surrogacy/ART Acts create strict, sometimes criminal, exposure unique to this specialty.
- **Named "areas of legal threat"** (DC Dutta's Obstetrics) — perinatal injury (stillbirth, neonatal death, brain damage, breech/instrumental delivery injury); maternal injury (trauma, death, episiotomy complications, retained packs/swabs); and combined injury (instrumental/operative delivery, anaesthesia).
- **High-volume, multidisciplinary team care with rising litigation-consciousness** — labour ward care involves residents, nurses, and anaesthetists, widening vicarious-liability exposure and handover gaps; fear of litigation is itself cited as a driver of rising caesarean delivery rates (defensive obstetrics).

Measures to minimize medicolegal risk

- Clear communication of the management plan to the patient/relatives; written informed consent before every procedure, explaining risks, alternatives, and likely complications.
- Contemporaneous, legible documentation (date and time); strict adherence to evidence-based protocol, with reasons recorded for any deviation.
- Adequate supervision/training of juniors, with senior availability for consultation, and prompt referral when in difficulty.
- Regular clinical audit to detect and correct system errors (DC Dutta's Obstetrics 9e).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Pathway of a medicolegal complaint against a doctor — civil/consumer, criminal, and disciplinary routes.

Recent advances [RA]

- **Bharatiya Nyaya Sanhita, 2023** (in force 1 July 2024) replaced IPC Section 304-A with Section 106; negligent death now attracts up to 5 years, but a registered medical practitioner performing a medical procedure retains the earlier 2-year cap — a carve-out won after medical-profession representation.
- **Consumer Protection Act, 2019** replaced the 1986 Act, revising pecuniary jurisdiction of the District/State/National Commissions and adding mediation for medical-service complaints.
- **NMC Registered Medical Practitioner (Professional Conduct) Regulations, 2023** replaced the 2002 Code of Ethics, updating norms on consent, documentation, and telemedicine liability.
- **MTP (Amendment) Act, 2021** and **Surrogacy/ART (Regulation) Acts, 2021** continue to generate fresh litigation, adding to the specialty's distinct statutory exposure.

High-yield exam pointers

- **4 D's of negligence** — Duty, Dereliction, Direct causation, Damage — all four required.

- **Bolam (1957) + Bolitho (1997)** — standard of care = accepted AND logically defensible practice.
- ****_IMA v. V.P. Shantha_ (1995) — medical service = "service" under the Consumer Protection Act.** _Samira Kohli_ (2008)** — "real consent"; diagnostic consent ≠ therapeutic consent.
- ****_Jacob Mathew_ (2005) — criminal negligence needs a higher threshold plus an independent medical opinion before arrest.** _State of Punjab v. Shiv Ram_ (2005)** — sterilization failure alone ≠ negligence.
- IPC Section 304-A → **BNS Section 106** — doctors retain a 2-year cap for a medical-procedure-related negligent act.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> Coverage note — DC Dutta's Obstetrics 9e (Chapter 40, "Legal and Ethical Issues in Obstetric Practice") supports the duty-of-care framework, named areas of legal threat, and risk-minimisation measures above; the specific case laws and statutory citations are standard Indian medical-jurisprudence knowledge taught alongside forensic medicine, not contained in the clinical OBG textbook corpus.

> **SOURCE & COVERAGE**
>
> DC Dutta's Textbook of Obstetrics 9e (Chapter 40, "Legal and Ethical Issues in Obstetric Practice," pp. 596–597) + standard medical jurisprudence: Indian Contract Act, 1872; Consumer Protection Act, 1986/2019; IPC Section 304-A/Bharatiya Nyaya Sanhita 2023 Section 106; National Medical Commission Act, 2019; Supreme Court judgments (*IMA v. V.P. Shantha* 1995; *Samira Kohli v. Dr. Prabha Manchanda* 2008; *Jacob Mathew v. State of Punjab* 2005; *Achutrao Khodwa v. State of Maharashtra* 1996; *State of Punjab v. Shiv Ram* 2005; *Mr 'X' v. Hospital 'Z'* 1998); MTP Act 1971 (amended 2021); PC&PNDT Act 1994; Surrogacy (Regulation) Act 2021; ART (Regulation) Act 2021.

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Discuss mechanism of action, side effects of combined oral contraceptive pills. Discuss the management of missing pill

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

Definition — Combined oral contraceptives (COCs) contain a synthetic estrogen (usually ethinyl estradiol, 20–35 μg in current low-dose formulations) together with a progestin (levonorgestrel/norgestimate = 2nd generation; desogestrel/gestodene = 3rd generation; drospirenone/dienogest/nomegestrol = 4th generation), taken as 21 active tablets followed by a 7-day

hormone-free or placebo interval. Correctly used, the failure rate (Pearl Index) is **0.1 per 100 woman-years**.

Mechanism of action

Component	Contraceptive action
Estrogen (ethinyl estradiol)	Suppresses **FSH** secretion by negative feedback on the hypothalamic–pituitary axis, so a dominant follicle is never recruited; also stabilises the endometrium and potentiates progestin-receptor synthesis, giving good cycle control (less breakthrough bleeding)
Progestin	Suppresses the mid-cycle **LH surge → anovulation (the principal contraceptive mechanism)**; thickens and reduces cervical mucus, blocking sperm penetration; produces static endometrial hypoplasia (stromal oedema, decidual change, glandular regression) non-receptive to blastocyst implantation; probably slows tubal motility/transport, a back-up mechanism if breakthrough ovulation occurs

Net effect: pulsatile GnRH-driven FSH/LH release is abolished, so follicular growth either fails to start or is not carried to ovulation; even if breakthrough ovulation occurs, the hostile mucus, atrophic endometrium and altered tubal transport prevent conception.

Side effects

Effect	Hormone	Note
Nausea, vomiting, headache	Estrogen	Transient, settles by cycle 2–3
Mastalgia/breast tenderness	Estrogen + progestin	Transient
Leg cramps	Progestin	
Weight gain (perceived)	Progestin (anabolic/androgenic)	Low-dose COCs cause no true weight increase
Chloasma	Estrogen	Cosmetic only
Acne	Progestin	Older androgenic progestins worsen it; low-dose levonorgestrel, desogestrel, drospirenone improve it
Breakthrough bleeding	Subthreshold hormone level; missed pills; malabsorption (vomiting/diarrhoea); enzyme-inducing drugs	Usually settles by cycle 3–4; add estrogen or double the active pill for 2–3 days if persistent

Effect	Hormone	Note
Post-pill amenorrhoea	Estrogen/progestin	> 6 months in < 1%; investigate as secondary amenorrhoea if > 12 months
Venous thromboembolism (VTE)	Estrogen	Overall risk ~3–4× non-users; per 100,000/year: no-COC use = 5, 2nd-generation COC ≈ 15, desogestrel/gestodene-containing COC ≈ 30, **pregnancy = 60**; risk factors — age > 35 + smoking, obesity, thrombophilia (factor V Leiden); falls with ethinyl estradiol 20 µg
Arterial thrombosis (MI, stroke)	Estrogen	Risk mainly in smokers, hypertensives, diabetics, age > 35 — avoid COC if multiple risk factors coexist
Hypertension	Estrogen (renin–angiotensin activation)	Rise mainly systolic; reverses 3–6 months after stopping
Cholestatic jaundice	Estrogen	Risk increased with past idiopathic jaundice of pregnancy/hepatitis
Neoplasia	Mixed	**Protective** against epithelial ovarian and endometrial cancer (~50% reduction each, lasting 10–15 years); no definite breast-cancer association at low dose; cervical cancer association inconclusive — continue cervical cytology/HPV screening
Death (overall)	—	≈ 1.5 per 100,000 users/year — very low

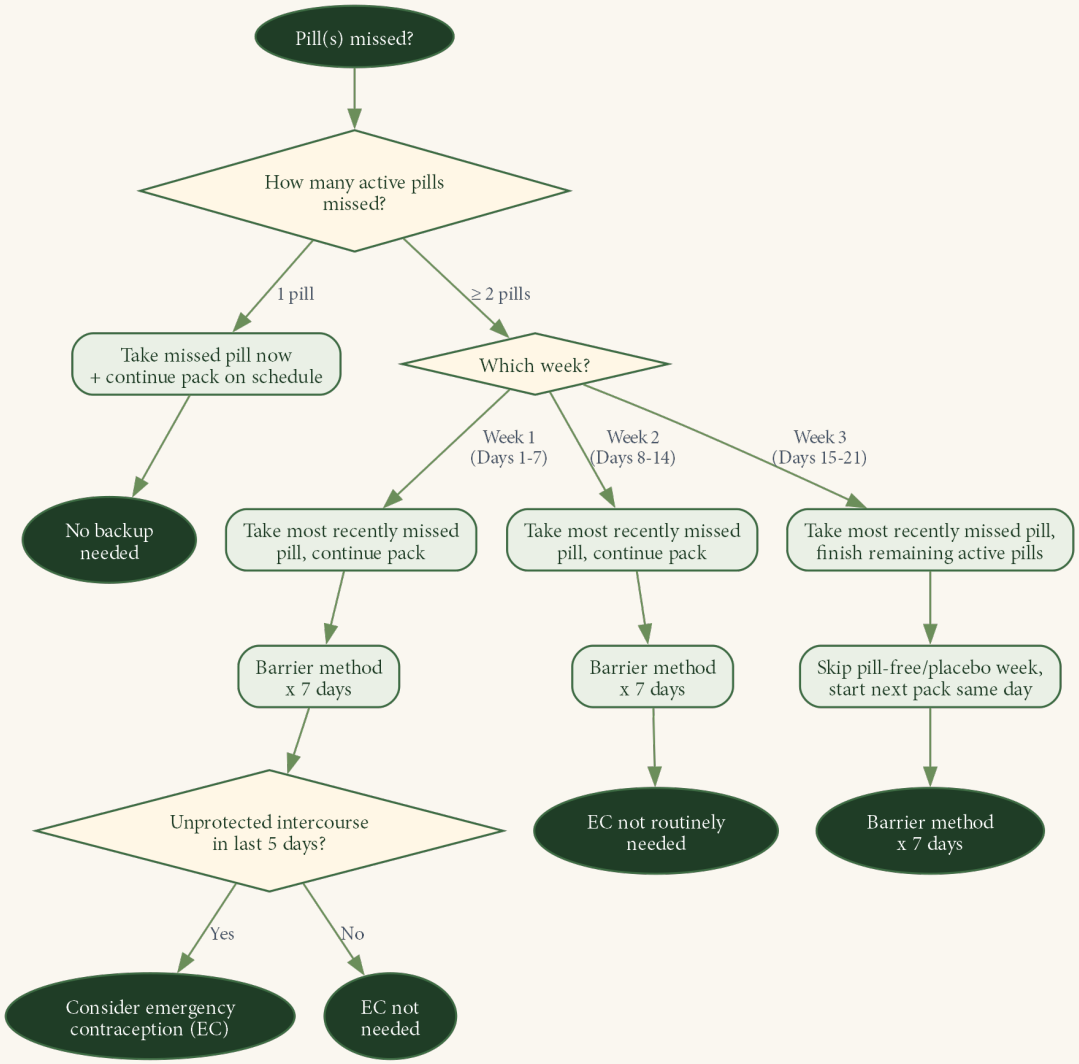
Management of missing pill

Lengthening of the pill-free interval — by omission, vomiting, or diarrhoea — increases breakthrough follicular activity and pregnancy risk; the response depends on **how many** pills are missed and **when** in the cycle.

Scenario	Action	Extra precaution	Emergency contraception (EC)
1 active pill missed (anywhere in the pack)	Take the missed pill immediately (two pills the same day if needed), continue the rest of the pack on schedule	None needed	Not needed
≥ 2 active pills missed in Week 1 (Days 1–7)	Take the **most recently missed** pill now (ignore earlier ones), continue the pack daily	Barrier method/abstain for **7 days**	**Consider EC** if unprotected intercourse occurred in the preceding 5 days (pill-free week or early Week 1)
≥ 2 active pills missed in Week 2 (Days 8–14)	Take the most recently missed pill now, continue the pack	Barrier method for 7 days	Not usually needed if Week-1 pills were taken correctly
≥ 2 active pills missed in Week 3 (Days 15–21)	Take the most recently missed pill now, finish the remaining active pills, **skip the pill-free/placebo week**, start the next pack immediately (no break)	Barrier method for 7 days	Not needed
Missed pill among the 7 **inactive/placebo tablets** (28-pill pack)	Discard the missed placebo(s); continue as scheduled and start the next pack on time	None	Not needed
Vomiting/diarrhoea within 2 hours of intake	Treat as a missed pill (repeat the dose)	Barrier for 7 days after the illness	As per the scenario above

General rule: the more pills missed, and the closer the omission is to the pill-free interval, the higher the risk of breakthrough ovulation — hence 7 days of back-up contraception, and emergency contraception specifically when the lapse falls in Week 1 with recent unprotected intercourse.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Missed COC pill decision tree — action, back-up contraception, and emergency-contraception need by number of pills missed and cycle week.

High-yield exam pointers

- Primary contraceptive mechanism = **progestin-mediated LH-surge suppression → anovulation**; estrogen's job is FSH suppression + cycle control.
- Pearl Index (perfect use) = **0.1 per 100 woman-years**.
- VTE per 100,000/year: no COC = 5, COC = 15–30, **pregnancy = 60** — pregnancy remains riskier than the pill.
- Estrogen-driven adverse effects: VTE, arterial thrombosis, hypertension, cholestatic jaundice, chloasma, nausea.
- Progestin-driven adverse effects: acne, weight perception, leg cramps, mood/libido change.

- **"1 pill late → just take it, no panic; ≥ 2 pills → 7 days barrier ± EC if in Week 1."**
- **Week-3 rule**: never take a break — skip the pill-free interval and start the next pack directly.
- COC gives ~50% protection against ovarian and endometrial cancer, lasting 10–15 years after stopping.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Both grounding texts state the same missed-pill scheme; DC Dutta's Gynaecology 7e and Speroff 9e are concordant, so no separate international guideline citation was needed for this rule.

> **SOURCE & COVERAGE**
> Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Oral Contraception chapter — mechanism of action, missed-pill guidance); DC Dutta's Textbook of Gynaecology 7e (Ch. 30 — Contraception: mechanism of action, adverse effects, missed-pill management table).

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Discuss the causes of Perinatal mortality. How to reduce Perinatal mortality?

Asked in: Paper IV 04-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — The **perinatal mortality rate (PMR)** = (stillbirths + early neonatal deaths) ÷ total births (live + still) × 1000, where a **stillbirth** is a fetus of ≥28 weeks/≥1000 g born with no sign of life and an **early neonatal death** is death of a liveborn infant within 7 completed days. PMR is a sensitive index of both obstetric/neonatal care quality and the community's social and public-health status; India's PMR (≈26/1000) remains far above the <10/1000 seen in developed countries (DC Dutta's Obstetrics 9e).

Causes of perinatal mortality by timing of death

70–90% of perinatal deaths occur **before the onset of labour** (antepartum/stillbirth); the rest occur intrapartum or in the early neonatal period.

Timing	Approx. share	Leading causes
Antepartum (stillbirth)	70–90% of perinatal deaths	Chronic hypoxia/uteroplacental insufficiency 30%; pregnancy complications — abruption, pre-eclampsia–eclampsia, Rh isoimmunisation, cervical insufficiency 30%; congenital malformation 15%; infection 5%; unexplained 20%

Timing	Approx. share	Leading causes
Intrapartum	Largely preventable component	Obstructed/prolonged labour, cephalopelvic disproportion, malpresentation, uterine rupture, cord prolapse/compression → acute hypoxia and birth trauma
Early neonatal (0–7 days)	Two-thirds linked to prematurity	Complications of prematurity/low birth weight (respiratory distress syndrome, intraventricular haemorrhage), sequelae of birth asphyxia (hypoxic-ischaemic encephalopathy), neonatal sepsis/tetanus, hypothermia, congenital anomalies

Overall causes across the perinatal period and matched interventions

Cause	Share of perinatal deaths	Proven interventions
Infections (sepsis, meningitis, pneumonia, neonatal tetanus, congenital syphilis)	33%	Maternal tetanus toxoid immunisation; clean delivery ("three cleans" — hands, perineum, cord); warmth; early/exclusive breastfeeding; early recognition and treatment
Birth asphyxia, trauma and hypothermia	28%	Skilled attendant at every birth; partograph-monitored labour; neonatal resuscitation; warmth maintenance
Preterm birth and/or low birth weight	24%	Prevention/management of obstetric complications; antenatal corticosteroids; infection control; breastfeeding; referral to a special newborn care unit
Congenital malformation and others	15%	Preconception/genetic counselling; prenatal diagnosis; selective termination of an affected fetus

(DC Dutta's Obstetrics 9e, Box 38.3 — the "important causes of perinatal mortality" framework.)

Predisposing (risk) factors

Category	Examples
Epidemiological	Maternal age <18 or >35 years, parity >5, low socioeconomic status, poor nutrition
Medical disorders	Anaemia (Hb <8 g/dL), hypertensive disorders, diabetes mellitus, malaria, HIV
Obstetric complications	Antepartum haemorrhage (especially abruption), pre-eclampsia–eclampsia, Rh isoimmunisation, cervical insufficiency
Complications of labour	Disproportion, malpresentation, abnormal uterine action, prelabour rupture of membranes
Fetoplacental	Multiple pregnancy, fetal growth restriction/low birth weight, congenital malformation, preterm labour/PPROM
Unexplained	~20% of stillbirths — no identifiable maternal, fetal, placental or obstetric cause

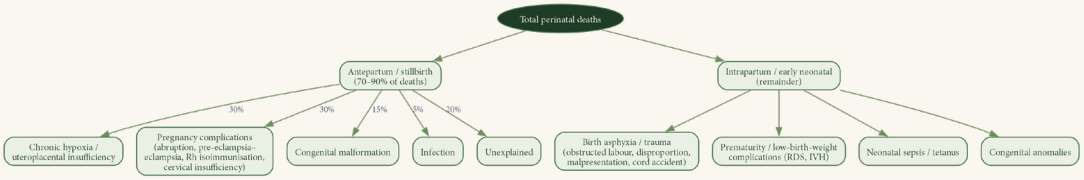
Measures to reduce perinatal mortality

- **Pre-pregnancy and antenatal care**
  - Pre-pregnancy health check-up, nutritional correction (anaemia, undernutrition) and counselling.
  - Early registration (by 12 weeks) with ≥4 antenatal visits (≤12, 14–26, 28–34 and 36 weeks — WHO/Government of India schedule); tetanus toxoid immunisation and daily iron–folic acid for ≥100 days.
  - **Risk-approach screening** for high-risk pregnancy (extremes of age, grand multiparity, twins, medical disorders) with mandatory institutional delivery.
  - Genetic counselling and prenatal diagnosis in high-risk cases, with termination of an affected fetus where indicated — reduces malformation-related deaths.
  - Detection and treatment of anaemia, diabetes, infection and hypertensive disorders of pregnancy.
  - Where preterm birth threatens before 34 weeks, a single course of **antenatal corticosteroid** — betamethasone 12 mg intramuscularly, 2 doses 24 hours apart, or dexamethasone 6 mg intramuscularly every 12 hours for 4 doses (betamethasone preferred, RCOG-2004) — halves neonatal respiratory distress syndrome, intraventricular haemorrhage and mortality.
- **Intranatal care**
  - Institutional delivery (target ≥80%) with 100% deliveries attended by a **skilled birth attendant**.

- **"Three cleans"** (hands, perineum, cord) to prevent sepsis and neonatal tetanus.
- Partograph-monitored labour for early detection of obstructed labour/hypoxia and avoidance of traumatic delivery.
- Functioning **emergency obstetric care** (anaesthesia, blood transfusion, caesarean delivery, manual removal of placenta) backed by an effective referral-and-transport system.

- **Essential newborn care**
  - Clean delivery, immediate drying and warmth, resuscitation at birth.
  - Early and exclusive breastfeeding; prompt referral of the sick, preterm or low-birth-weight newborn to a special newborn care unit.
- **Community and programme level**
  - Family planning services to prevent unwanted/high-risk pregnancy; safe abortion services.
  - Community health education to raise utilisation of maternal and child health services.
  - Empowering skilled birth attendants (under RCH-II) to give life-saving drugs (misoprostol, oxytocin, magnesium sulfate, ampicillin, metronidazole) where referral is delayed.
  - Continued **perinatal audit** — autopsy/death review of every perinatal death, demographic surveillance and regular interdepartmental perinatal-mortality meetings.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Classification of perinatal deaths by timing and cause, with the antepartum sub-shares as taught (DC Dutta 9e, Box 38.3).

Recent advances [RA]

- **Sustainable Development Goal (SDG) target 3.2**: every country to bring neonatal mortality to ≤12 and under-5 mortality to ≤25 per 1000 live births by 2030.
- **WHO/UNICEF Every Newborn Action Plan (ENAP, 2014)**: matching target of stillbirth rate ≤12 per 1000 total births in every country by 2030, driven by quality intrapartum and newborn care.
- **India Newborn Action Plan (INAP, 2014)**, aligned with ENAP, commits India to single-digit neonatal mortality and stillbirth rates.
- WHO's **ICD-PM** (2016) applies ICD-10 to the perinatal period, standardising cause-of-death classification and improving perinatal audit quality.

- The **NICHD Stillbirth Collaborative Research Network** (Williams Obstetrics 26e) classifies stillbirth causes into 8 categories — obstetric complications, placental abnormalities, fetal malformation, infection, umbilical cord abnormalities, hypertensive disorders, medical complications, undetermined — with a probable/possible cause identifiable in about three-fourths of cases, refining the older simple percentage tables.
- Indian delivery platforms: **Janani Suraksha Yojana (JSY)** (cash incentive for institutional delivery), **Janani Shishu Suraksha Karyakram (JSSK)** (free delivery/newborn drugs, diagnostics, transport, diet), **LaQshya** (Labour Room Quality Improvement Initiative, 2017 — quality-certifies labour rooms/maternity operation theatres to cut intrapartum stillbirths and early neonatal deaths), and **ASHA** workers linking villages to first-referral units.

High-yield exam pointers

- **PMR = (stillbirths + early neonatal deaths) ÷ total births × 1000**; 70–90% of deaths are antepartum.
- Antepartum causes (write in order): **chronic hypoxia 30% = pregnancy complications 30% > congenital malformation 15% > unexplained 20% > infection 5%.**
- Overall PNM causes (Box 38.3): **infection 33% > birth asphyxia/trauma/hypothermia 28% > preterm/LBW 24% > malformation 15%.**
- Antenatal corticosteroid for threatened preterm birth <34 weeks: **betamethasone 12 mg IM ×2 doses 24 h apart** (or dexamethasone 6 mg IM ×4 doses 12 h apart).
- "**Three cleans**" (hands, perineum, cord) — cheapest single intervention against sepsis/tetanus.
- SDG 2030 targets: neonatal mortality rate and stillbirth rate both **≤12/1000**.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> India's exact current perinatal/neonatal mortality figures are updated regularly by Sample Registration System (SRS) bulletins; the percentages above are the standard textbook (DC Dutta 9e) teaching framework, and an updated exact national figure is not available in the corpus consulted.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Safe Motherhood, Epidemiology of Obstetrics: Perinatal Mortality, Predisposing Factors, Prevention, RCH Interventions, Sustainable Development Goals); Williams Obstetrics 26e (Stillbirth — etiologies, NICHD Stillbirth Collaborative Research Network classification, antenatal corticosteroid therapy); WHO Every Newborn Action Plan (2014) and Sustainable Development Goals target 3.2, as cited in DC Dutta's Obstetrics 9e.

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Discuss the changing concepts and current concerns on maternal nutrition

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

Definition — Maternal nutrition is the totality of dietary intake and nutrient status of a woman before conception, throughout pregnancy and during lactation that is required to preserve her own health, support optimal fetal growth and permit successful breastfeeding. It was once viewed narrowly as "adequate calories during pregnancy"; it is now understood as a life-cycle continuum beginning in adolescence and extending through the **"first 1,000 days"** (conception to age 2 years), because both maternal undernutrition and overnutrition programme the offspring's lifelong risk of disease.

Changing concepts in maternal nutrition

Traditional concept	Current evidence-based concept
"Eating for two" — maximise caloric intake regardless of build	Individualised weight gain stratified by **pre-pregnancy body mass index (BMI)** (Institute of Medicine, IOM 2009) — both inadequate and excessive gain harm outcome
Nutrition addressed only once pregnancy is diagnosed	**Life-cycle/preconception approach** — adolescent girl → periconceptional nutrition optimisation → pregnancy → lactation → infant, the "first 1,000 days"
Deliberately restrict weight gain to keep the baby small and avoid cephalopelvic disproportion	Weight gain individualised by BMI; **undernutrition itself is a leading cause of intrauterine growth restriction (IUGR) and low birth weight (LBW)**, not a safeguard against obstructed labour
Single-nutrient supplementation — iron treated as sufficient on its own	Balanced approach — iron-folic acid (IFA) plus calcium, iodine and, in trials, multiple micronutrient supplementation (MMS)

Traditional concept	Current evidence-based concept
Birth weight seen only as an obstetric endpoint	**Developmental Origins of Health and Disease (DOHaD)*/Barker *hypothesis** — sub-optimal fetal nutrition programmes adult hypertension, atherosclerosis and type 2 diabetes
Nutrition problem = undernutrition only	Recognition of a coexisting problem of overnutrition — rising overweight/obesity and gestational diabetes mellitus (GDM) alongside persisting deficiency states
Nutrition care confined to the hospital antenatal clinic	**Community-based delivery** — Anganwadi/Integrated Child Development Services (ICDS), structured nutrition counselling at every antenatal contact (WHO antenatal care model)

Current recommended nutrient intake

Nutrient	Non-pregnant	Pregnancy (2nd half)	Lactation
Energy	2,200 kcal	2,500 kcal	2,600 kcal
Protein	50 g	60 g	65 g
Iron	18 mg	40 mg (supplemented)	30 mg (supplemented)
Calcium	500 mg	1,000 mg	1,500 mg
Iodine	150 µg	175 µg	200 µg
Folic acid	200 µg	400 µg	—
Vitamin D	200 IU	400 IU	400 IU

- **Iron-folic acid (IFA) prophylaxis**: ferrous sulfate 200 mg (60 mg elemental iron) with 1 mg folic acid daily from the 16th week onward once nausea has settled; the dose is increased to 2–3 tablets/day if haemoglobin (Hb) falls below 10 g%. National programmes deliver supplementary IFA daily for **at least 100 days beginning after the first trimester**.
- **Periconceptional folic acid**: 400 µg/day for all women of reproductive age; increased to **4 mg/day** in high-risk women (multifetal gestation, anticonvulsant therapy, haemoglobinopathy, prior neural-tube-defect pregnancy), started 1 month before conception and continued to 12 weeks.
- **Gestational weight gain by pre-pregnancy BMI** (IOM, 2009): underweight (BMI <18.5) — 12.5–18 kg; normal weight (18.5–24.9) — 11.5–16 kg; overweight (25.0–29.9) — 7–11.5 kg; obese (≥30.0) — 5–9 kg.

Current concerns in maternal nutrition

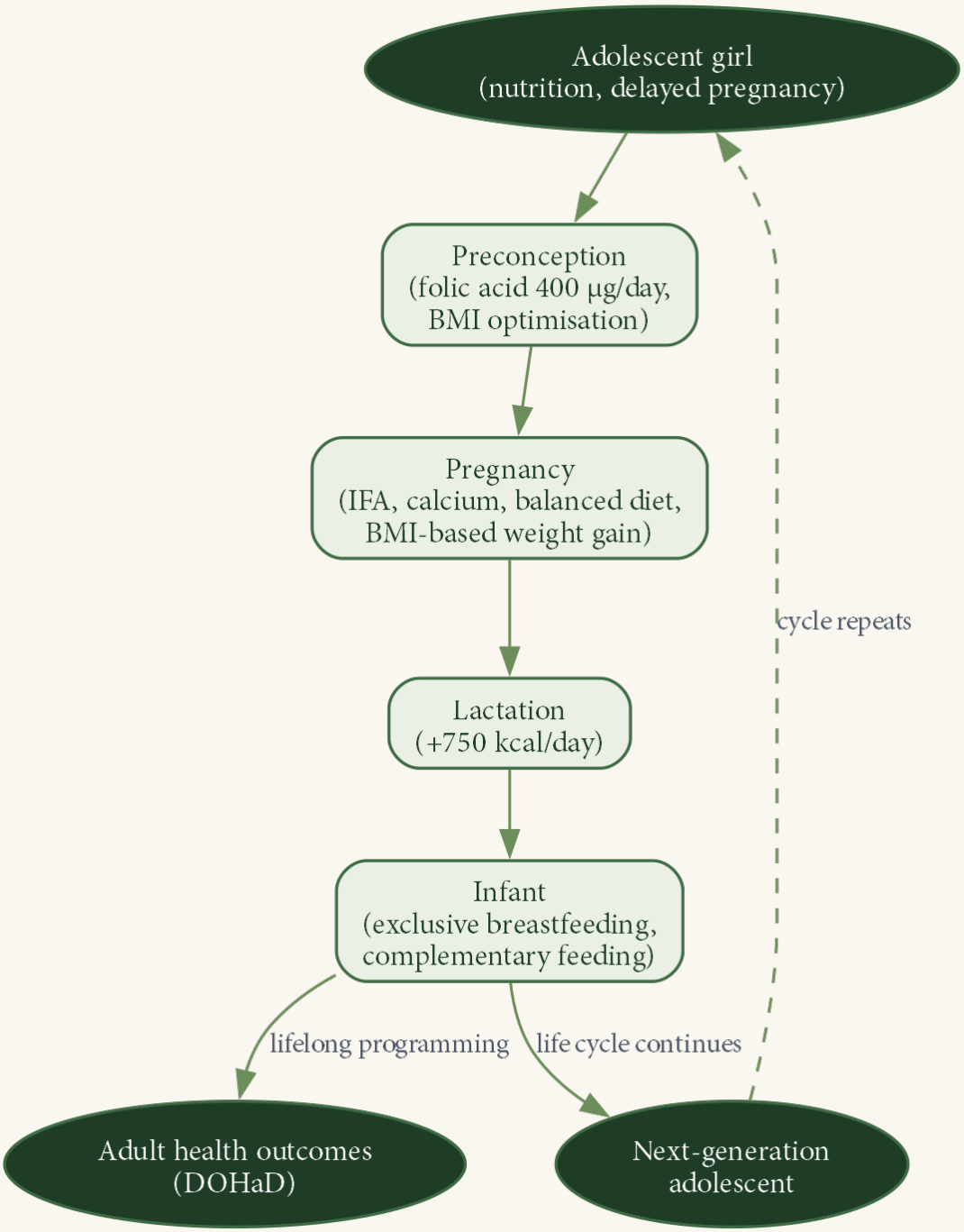
Concern	Impact	Current strategy
Chronic energy deficiency/low pre-pregnancy BMI	IUGR, LBW, preterm birth, impaired lactational reserve	Balanced protein-energy dietary supplementation; weight-gain monitoring at every visit
Anaemia (iron and folate deficiency)	Affects roughly half of pregnant women worldwide; remains a major indirect cause of maternal death	Routine IFA supplementation; treatment of hookworm, malaria and other coexisting infection
Micronutrient deficiencies — iodine, vitamin D, vitamin A, vitamin B12, calcium	Iodine deficiency → goitre/cretinism; calcium deficiency → higher pre-eclampsia risk in low-intake populations; vitamin A/B12 deficiency → impaired maternal and fetal health	Iodised salt, dietary diversification, targeted calcium/vitamin supplementation where intake is low
Adolescent pregnancy	Competing nutritional demands of a still-growing mother and her fetus; higher LBW/IUGR risk	Adolescent-focused nutrition and reproductive-health programmes; delaying age at first pregnancy
Emerging overnutrition — overweight/obesity, excessive gestational weight gain	Macrosomia, operative delivery, GDM, and later offspring obesity	BMI-stratified weight-gain counselling; universal GDM screening
Socioeconomic and gender determinants — food insecurity, intra-household food distribution disfavouring women, illiteracy	Perpetuates intergenerational undernutrition	Community nutrition delivery (ICDS/Anganwadi); girl-child nutrition and education

Recent advances [RA]

- **DOHaD/*Barker *hypothesis (*Barker**, 1992) — sub-optimal fetal nutrition is linked to higher adult risk of hypertension, atherosclerosis and type 2 diabetes; this evidence base is what shifted policy focus onto the "first 1,000 days" rather than the pregnancy trimester alone.
- The **WHO recommendations on antenatal care for a positive pregnancy experience (2016)** embed structured nutrition counselling, balanced protein-energy supplementation in undernourished populations, and daily oral IFA supplementation as core components of every antenatal contact.
- **Calcium supplementation for pre-eclampsia prevention is population-specific**: large trials in calcium-replete, low-risk US nulliparas showed no reduction in pre-eclampsia risk, whereas the WHO recommends calcium supplementation specifically for pregnant women in populations with low dietary calcium intake — the same intervention behaves differently depending on baseline nutritional status, which is why guideline recommendations must be applied population-wise rather than copied verbatim.

- **Multiple micronutrient supplementation** (MMS), covering the full range of vitamins and minerals rather than iron-folic acid alone, is under active evaluation as prophylaxis in undernourished populations, with trial evidence of reduced low-birth-weight and small-for-gestational-age rates compared with IFA alone.
- India's national strategy has evolved from isolated IFA distribution to a **life-cycle anaemia-reduction approach** layered onto community nutrition delivery through Anganwadi centres and a conditional maternity-benefit cash transfer for the first living child, reflecting a shift from a purely clinical to a multisectoral nutrition-security model.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Life-cycle/DOHaD continuum: adolescent nutrition carried through preconception, pregnancy, lactation and infancy, programming adult health outcomes and feeding forward into the next generation.

High-yield exam pointers

- "First 1,000 days" = conception to 2 years — the current policy window for maternal-and-child nutrition.

- *Barker*/DOHaD hypothesis: sub-optimal fetal nutrition programmes adult hypertension, atherosclerosis, type 2 diabetes.
- IOM 2009 weight-gain-by-BMI: <18.5 → 12.5–18 kg; 18.5–24.9 → 11.5–16 kg; 25–29.9 → 7–11.5 kg; ≥30 → 5–9 kg.
- IFA prophylaxis: 60 mg elemental iron + 1 mg folic acid/day from mid-pregnancy, 2–3 tablets if Hb <10 g%; national programme supplies IFA for ≥100 days after the first trimester.
- Periconceptional folic acid: 400 µg/day routine; 4 mg/day in high-risk women, 1 month before conception to 12 weeks.
- Exam buzz-phrase: coexisting undernutrition/micronutrient deficiency with rising obesity and GDM in the same population.
- Anaemia affects roughly half of pregnant women worldwide and remains a leading indirect cause of maternal death in India.

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

The specific WHO-recommended calcium dose for pre-eclampsia risk reduction in low-calcium-intake populations is standard current guideline content but was not located verbatim in the on-disk textbook corpus searched for this answer; Williams Obstetrics 26e's cited trials (which found no benefit) were conducted in calcium-replete US nulliparas, consistent with WHO's guidance being targeted at populations with low baseline dietary calcium intake — state the population caveat if citing a specific dose in the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 10 — Antenatal Care, Preconceptional Counseling and Care; Chapter 20 — Anemia Complicating Pregnancy; Chapter 38 — Safe Motherhood, RCH Interventions); Williams Obstetrics 26e (Chapter 10 — Prenatal Care; Chapter 47 — Fetal-Growth Restriction, Barker Hypothesis); WHO recommendations on antenatal care for a positive pregnancy experience (2016); Institute of Medicine, Weight Gain During Pregnancy: Reexamining the Guidelines (2009).

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Discuss the contraceptive choices for women with medical disorders

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

Definition — Contraceptive selection in a woman with a coexisting medical disorder must weigh the efficacy of a method against the extra risk her disease adds to that method — chiefly the

vascular/thrombotic risk of estrogen. The **World Health Organization (WHO) Medical Eligibility Criteria (MEC) for Contraceptive Use** (5th edition, 2015) is the framework used worldwide, and the equivalent **US MEC (CDC, 2016, periodically updated)**, to grade every method against every condition.

WHO Medical Eligibility Criteria (MEC) categories

Category	Meaning	Practical action
1	No restriction	Method usable without added precaution
2	Advantages generally outweigh theoretical/proven risks	Use, but with more careful follow-up
3	Risks generally outweigh advantages	Use only if no better/acceptable method available; needs clinical judgement + monitoring
4	Unacceptable health risk	Method **contraindicated**

Contraceptive choice by medical disorder

Medical disorder	Preferred/safe methods	Avoid / use with caution	Key rationale
Hypertension — well controlled, no vascular disease, <35 y, non-smoker	Progestin-only pill (POP), depot medroxyprogesterone acetate (DMPA), implant, copper intrauterine device (Cu-IUD), levonorgestrel intrauterine system (LNG-IUS) — MEC 1; low-dose combined oral contraceptive (COC) acceptable (MEC 2)	—	Estrogen effect on renin-angiotensin/BP is dose-related
Hypertension — uncontrolled, or with vascular disease/end-organ damage, or ≥35 y with another risk factor	POP, implant, Cu-IUD, LNG-IUS, sterilization	COC, patch, ring (MEC 4)	Estrogen multiplies stroke/myocardial infarction risk with hypertension
Diabetes mellitus, no vascular disease, <20 y duration	COC acceptable (MEC 2); POP, implant, Cu-IUD, LNG-IUS (MEC 1)	—	Low-dose formulations have negligible effect on glucose tolerance

Medical disorder	Preferred/safe methods	Avoid / use with caution	Key rationale
Diabetes with nephropathy/retinopathy/neuropathy, other vascular disease, or >20 y duration	POP, implant, Cu-IUD, LNG-IUS	COC/patch/ring (MEC 3–4)	Added arterial/thrombotic risk on a background of vasculopathy
Migraine **without** aura, <35 y, non-smoker	COC can be used (MEC 2)	Re-evaluate if aura develops or age >35	Vascular headache risk rises with age/smoking
Migraine **with** aura (any age)	POP, DMPA, implant, Cu-IUD, LNG-IUS	Estrogen-progestin methods absolutely avoided (MEC 4)	Aura is an independent marker of ischaemic stroke risk
Personal/close family history of venous thromboembolism (VTE), known thrombophilia (Factor V Leiden, prothrombin gene mutation)	POP, implant (MEC 2), Cu-IUD/LNG-IUS (MEC 1)	Estrogen-containing methods (MEC 4)	Estrogen and inherited thrombophilia act synergistically on clotting
Ischaemic heart disease, stroke, complicated valvular/congenital heart disease, peripartum cardiomyopathy with residual dysfunction	POP, implant (MEC 2), Cu-IUD (MEC 1; antibiotic cover if structural valve lesion), sterilization once family complete	Estrogen-containing methods (MEC 4)	Estrogen increases arterial thrombosis; uncorrected lesions add anaesthesia risk for sterilization
Systemic lupus erythematosus (SLE) with antiphospholipid antibodies or active nephritis	POP, implant, Cu-IUD	COC (MEC 4)	Antiphospholipid antibodies + estrogen compound thrombosis risk
SLE — stable/inactive, no antiphospholipid antibodies, no nephritis	Low-dose COC can be considered (MEC 2), per the OC-SELENA trial	Monitor disease activity	Stable disease without vascular markers tolerates estrogen
Epilepsy on enzyme-inducing anti-epileptic drugs (phenytoin, carbamazepine, phenobarbital, primidone, topiramate, oxcarbazepine, rifampicin)	Cu-IUD, LNG-IUS (MEC 1); DMPA 150 mg intramuscularly (IM) every 3 months (dose unaffected by hepatic enzyme induction)	COC, POP, implant — reduced contraceptive efficacy (MEC 3) unless higher-dose estrogen plus barrier back-up used	Enzyme induction lowers circulating steroid levels

Medical disorder	Preferred/safe methods	Avoid / use with caution	Key rationale
Sickle cell disease/sickle-C disease	DMPA preferred — reduces sickling and pain crises (MEC 1)	Low-dose COC acceptable (MEC 2) but theoretical thrombosis concern	DMPA has a disease-modifying benefit in sickle cell disease
Active viral hepatitis, severe cirrhosis, hepatocellular adenoma/carcinoma	Cu-IUD, barrier, sterilization	All steroidal methods — COC, POP, implant, DMPA (MEC 3–4)	Steroids are hepatically metabolised; impaired clearance and hepatic tumour risk
Current or past breast cancer	Cu-IUD, barrier, sterilization	All hormonal methods including LNG-IUS (MEC 4)	Breast cancer is hormone-sensitive
Heavy smoking (≥15 cigarettes/day)	Non-estrogen methods if <35 y (MEC 3 for COC)	COC absolutely avoided if ≥35 y (MEC 4)	Smoking + estrogen synergistically raises arterial thrombosis risk
Obesity / post-bariatric malabsorptive surgery	Implant, IUD (Cu or LNG-IUS), injectable, patch/ring (non-oral route)	Oral pills after malabsorptive bariatric surgery — unreliable absorption	Bypass/malabsorptive surgery reduces oral drug bioavailability
Immediate postpartum / breastfeeding	Progestin-only methods, Cu-IUD, LNG-IUS from birth or within 48 hours (postpartum intrauterine contraceptive device, PPIUCD); lactational amenorrhoea method (LAM) if criteria met	COC — avoid before 21 days (VTE risk) and, in breastfeeding women, preferably deferred to 6 weeks–6 months	Puerperal hypercoagulability adds to estrogen's thrombotic effect

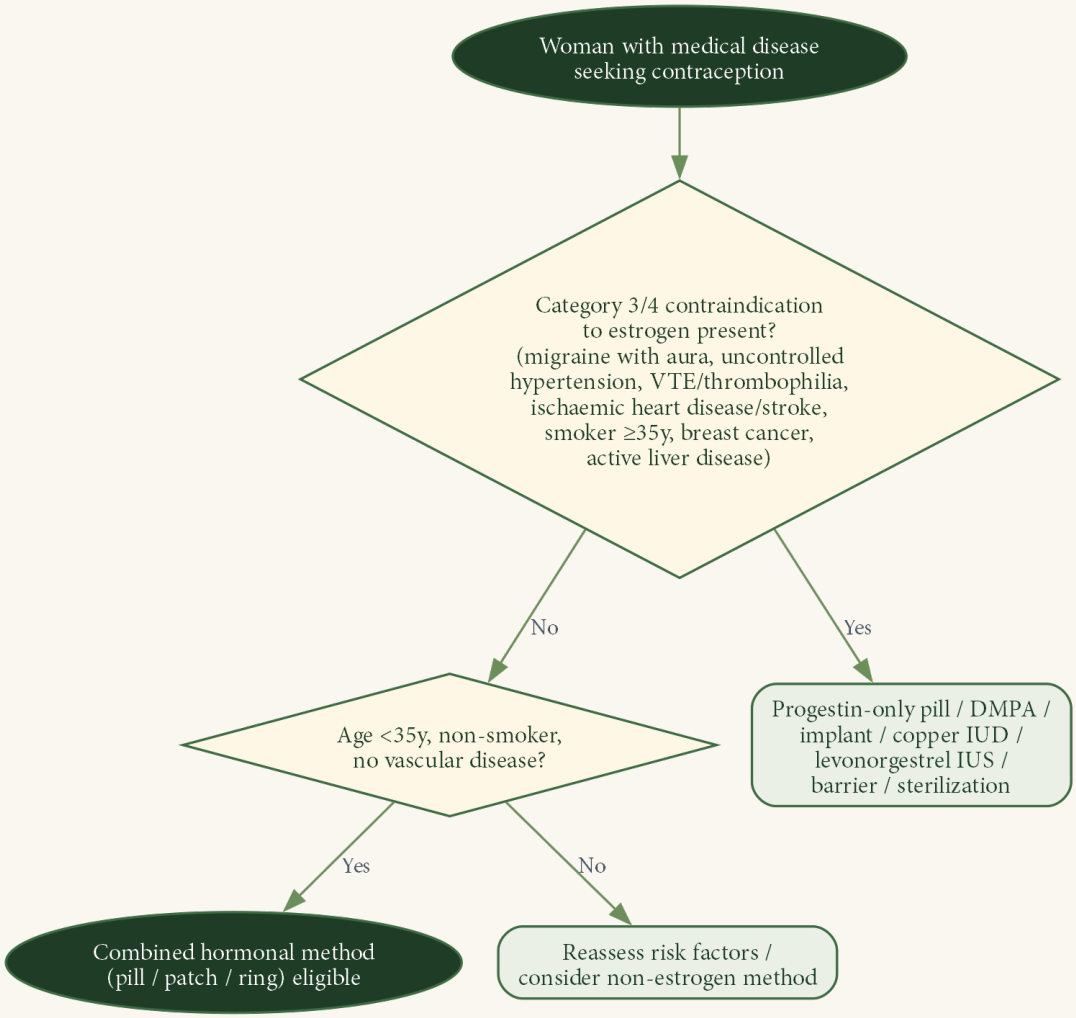
Special non-hormonal/India-specific option

- **Centchroman (Ormeloxifene, "Saheli")** — a non-steroidal selective estrogen-receptor modulator from the Central Drug Research Institute, Lucknow; 30 mg orally twice weekly for 3 months, then once weekly; acts by preventing implantation without suppressing ovulation. Useful for

women wanting to avoid steroidal hormones (e.g., diabetes, hypertension, lactation) but needs reliable weekly compliance and is not indicated where estrogen-sensitive disease is a concern.

- **Emergency contraception** (levonorgestrel or ulipristal acetate) and **barrier methods/sterilization** are Medical Eligibility Criteria Category 1 for virtually every medical condition and remain available whatever the underlying disease.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision-algorithm flowchart for choosing contraception in women with medical disease, branching first on estrogen contraindication (WHO/US MEC Category 3/4).

Recent advances [RA]

- **US Medical Eligibility Criteria (CDC)**, harmonised with WHO MEC, is periodically revised (2016; updated 2024) as safety data accrue on anticoagulated, post-bariatric and chronic-kidney-disease patients.

- **Opill (norgestrel 0.075 mg)** — first progestin-only pill approved for over-the-counter sale in the United States (FDA, July 2023); useful when combined hormonal contraception is Category 3/4 but a prescription-free method is wanted.
- **Segesterone acetate/ethinyl estradiol ring (Annovera)** — reusable one-year combined ring (FDA 2018); **DMPA-subcutaneous (Sayana Press)** — approved for home self-injection, reducing clinic visits.
- **Phexxi** (lactic acid/citric acid/potassium bitartrate vaginal gel, FDA 2020) — non-hormonal, on-demand method for absolute hormonal contraindications.
- India's National Family Planning Programme's **Antara scheme (2016)** provides free injectable depot medroxyprogesterone acetate at public facilities; **PPIUCD** insertion within 48 hours of delivery expands non-estrogen options in the government sector.

High-yield exam pointers

- Four **WHO MEC categories** (1 = no restriction → 4 = contraindicated) — the organising framework.
- **Migraine with aura = absolute contraindication to estrogen at any age** — the commonest tested exception.
- **Enzyme-inducing anti-epileptic drugs lower COC/POP efficacy**; depot medroxyprogesterone acetate (150 mg IM 3-monthly) and intrauterine methods are unaffected.
- **Depot medroxyprogesterone acetate improves sickling** in sickle cell disease — a disease-modifying effect.
- **Post-bariatric malabsorptive surgery → avoid oral pills**; use non-oral routes.
- Emergency contraception and copper intrauterine devices are Category 1 for almost every condition — the "always safe" fallback.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Depot medroxyprogesterone acetate carries a US Food and Drug Administration boxed warning on bone-mineral-density loss with prolonged (>2-year) use, which is reversible after stopping — worth a caveat, not a contraindication, in an otherwise eligible woman.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (contraindications to oral contraception, migraine, thrombophilia, epilepsy, systemic lupus erythematosus, sickle cell disease, minipill use in medical disease); DC Dutta's Textbook of Gynaecology 7e (Centchroman/Saheli); World Health Organization Medical Eligibility Criteria for Contraceptive Use, 5th edition; US Medical Eligibility Criteria (CDC).

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Discuss the role of Private Public partnership in RCH care

Asked in: Paper IV 28-Jun-2024 — RGUHS MS Obstetrics & Gynaecology

Definition — Reproductive and Child Health (RCH) Care is the integrated, composite national programme to improve the health of women and children in India, incorporating Government of India inputs (National Health Mission, National Population Policy) with donor-agency support (World Bank, WHO, UNICEF). A **Public-Private Partnership (PPP)** is a formal, contractual arrangement in which the government (steward and financier) engages private-sector hospitals, individual practitioners, corporates, or non-governmental organisations (NGOs) to plan, finance, deliver, or monitor a defined package of RCH services, sharing risk, cost, and accountability.

Why PPP is needed in RCH care

Government-sector gap	Contribution the private sector brings
Shortage of specialists (obstetricians, anaesthetists) at public first referral units (FRUs)	Large pool of qualified private obstetricians/gynaecologists, especially in urban and semi-urban areas
Limited bed strength and equipment for comprehensive emergency obstetric care (EmOC)	Established private hospital infrastructure, laboratories, blood banks, imaging
Poor last-mile referral transport	Private/NGO-run ambulance networks
Low institutional-delivery rates among poor and tribal women in underserved districts	Willingness to work under a package-payment or insurance model if government purchases care
Limited manpower for training, IEC (information-education-communication), and monitoring	NGO experience in community mobilisation, social marketing, and social franchising

Models of PPP in RCH care, with the named national scheme

Model	Mechanism	Named scheme (launch)	RCH goal served
Contracting-in	Government pays private specialists to work within a public facility	Empanelled private obstetricians/anaesthetists posted to district hospitals/FRUs	Comprehensive emergency obstetric care (EmOC)
Contracting-out	Government pays a private/NGO agency to deliver a whole service	108/102 ambulance transport (GVK-EMRI, Ziqitza) under **Janani Shishu Suraksha Karyakram (JSSK)**, 2011	Zero-expenditure referral transport, free drugs/diagnostics/blood/diet
Voucher/cash-transfer with private accreditation	Conditional cash incentive to the mother, redeemable at an accredited private facility in low-performing states	**Janani Suraksha Yojana (JSY)**, 2005 (under NHM)	Institutional delivery, skilled birth attendance
Package-payment for empanelled private providers	Fixed payment per delivery (including caesarean) to a private obstetrician for below-poverty-line (BPL)/tribal women, plus a transport allowance to the beneficiary	**Chiranjeevi Yojana**, Gujarat, 2005	Safe motherhood in districts with inadequate public FRUs
Volunteerism/pro-bono partnership	Private specialists donate a fixed clinic day	**Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)**, 2016 — free assured antenatal care on the **9th of every month**	Universal quality antenatal care, high-risk pregnancy pick-up
Purchaser-provider (insurance-based) model	Insurer/government reimburses empanelled private hospitals per treated case	**Ayushman Bharat–Pradhan Mantri Jan Arogya Yojana (PMJAY)**, 2018	Cashless secondary/tertiary obstetric-gynaecological care

Model	Mechanism	Named scheme (launch)	RCH goal served
Professional-body training partnership	Government partners a specialist society to train providers in both sectors	**PPIUCD programme** (FOGSI–Ministry of Health and Family Welfare) — postplacental (within 10 minutes), within 48 hours, intracesarean, or 4–6 weeks postpartum	Family planning, birth spacing
Social franchising	Private clinics operate under a common quality-assured brand with standardised protocols and training	NGO-supported maternal-child health franchise networks (e.g., USAID/PSI-backed models in high-focus states)	Standardised RCH service quality in the private sector
Corporate Social Responsibility (CSR)	Mandated 2% of average net profit spent on eligible social programmes	Section 135, Companies Act 2013	Funding for maternal-child health/nutrition projects
Regulatory PPP	Private units licensed, registered and monitored by government	Registration of private ultrasound/imaging centres under the PCPNDT Act	Prevention of sex-selective practices

RCH domains delivered through PPP

- **Safe motherhood** — private empanelment for institutional delivery and comprehensive EmOC (anaesthesia, caesarean, blood transfusion, manual removal of placenta) where public first referral units are overloaded.
- **Child survival** — private paediatric/neonatal units and diagnostic chains partnered under schemes such as Rashtriya Bal Swasthya Karyakram for child health screening and referral.
- **Adolescent reproductive health** — NGOs contracted for peer-education and counselling outreach that government staff cannot scale alone.
- **Family planning** — social marketing of condoms/oral pills through private pharmacies and NGOs; PPIUCD and post-partum sterilisation training partnerships with professional bodies (FOGSI).
- **Prevention and management of reproductive tract infections/sexually transmitted infections (RTI/STI)** — private laboratories empanelled for screening and confidential treatment under the RCH programme.

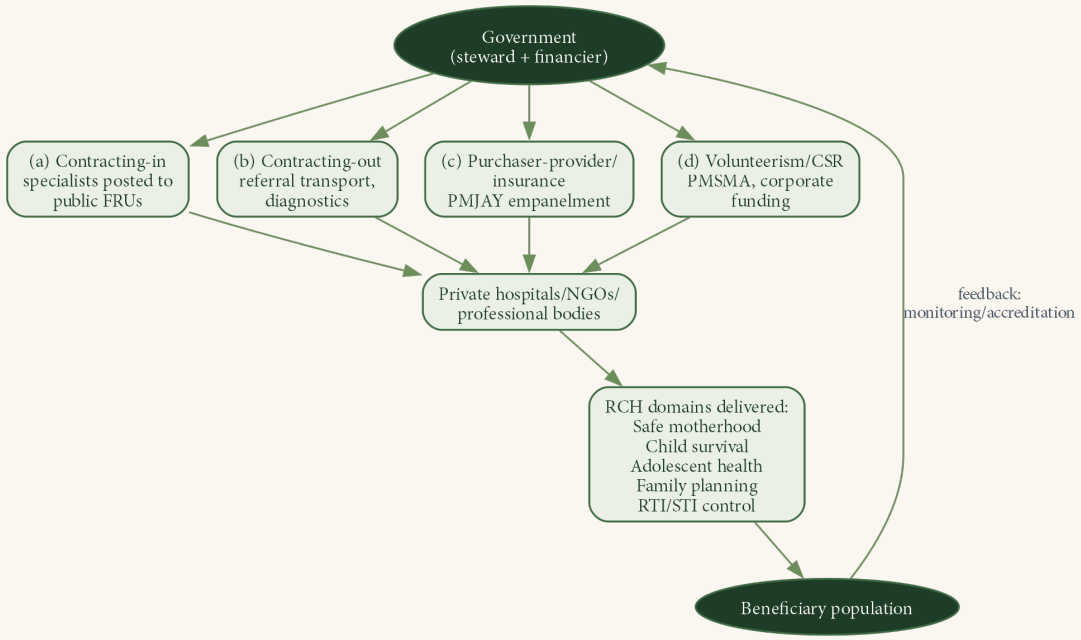
Advantages of PPP in RCH care

- Rapidly expands **institutional delivery and EmOC coverage** without waiting for public infrastructure to be built.
- Brings in **private-sector efficiency, technology, and specialist manpower** at lower incremental public cost than building new tertiary units.
- Improves **geographic and financial access** for the poor through accredited free/cashless care.
- Enables **task-specific specialisation** — e.g., ambulance logistics to transport operators, diagnostics to private labs — while government retains stewardship.
- Encourages **quality standardisation** through accreditation, social franchising, and professional-body training (FOGSI-led PPIUCD programme).

Challenges/limitations

- Weak monitoring and **quality assurance** of empanelled private providers.
- **Delayed reimbursement** discouraging sustained private participation (seen in PMJAY and Chiranjeevi-type package schemes).
- **Adverse selection** — private facilities may prefer low-risk cases, referring complicated cases back to public FRUs.
- Risk of **over-medicalisation** (unnecessary caesarean sections) under package-payment models.
- **Regulatory gaps** in remote/rural areas where private participation is commercially unattractive, perpetuating urban-rural inequity.
- Fragmented data systems make it hard to track private-sector RCH indicators within the National Health Mission's reporting framework.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Government channels four PPP mechanisms (contracting-in, contracting-out, purchaser-provider/insurance, volunteerism/CSR) through private hospitals/NGOs/professional bodies, which deliver the five RCH domains to the beneficiary population, with a monitoring/accreditation feedback loop back to government.

High-yield exam pointers

- **Chiranjeevi Yojana — Gujarat, 2005** — empanelled private obstetricians paid per delivery for BPL/tribal women; write the year and state.
- **JSY (2005)** vs **JSSK (2011)** — JSY is a cash incentive for institutional delivery; JSSK is a "zero expenditure" entitlement (drugs, diagnostics, blood, diet, transport).
- **PMSMA — 9th of every month** — private obstetrician volunteerism for free antenatal care; this specific date is a favourite recall point.
- **Ayushman Bharat–PMJAY (2018)** — world's largest government-funded health assurance scheme; insurance-based PPP for secondary/tertiary obstetric-gynaecological care.
- **CSR — Companies Act 2013, Section 135** — mandatory 2% of average net profit for eligible companies, often funding RCH/nutrition.
- **PPIUCD** — FOGSI–government partnership; timing windows: postplacental (within 10 minutes), within 48 hours, intracesarean, or 4–6 weeks postpartum.
- Group answer under: **rationale → models → named schemes → advantages → challenges** for a complete 10-mark structure.

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

DC Dutta's Obstetrics 9e covers the RCH programme's aims and interventions (safe motherhood, adolescent health, family planning, RTI/STI control) in detail but does not use the term "public-private partnership" explicitly; the named PPP schemes (Chiranjeevi Yojana, JSY, JSSK, PMSMA, Ayushman Bharat-PMJAY, CSR provisions) are standard Government of India/National Health Mission programme facts drawn from general social- and preventive-obstetrics knowledge rather than the OBG textbook corpus, since this is a health-systems/policy topic outside the scope of clinical obstetric textbooks.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38, "Reproductive and Child Health (RCH) Care" and "RCH Interventions" — RCH aims, National Health Mission, Janani Shishu Suraksha Karyakram, Accredited Social Health Activist, Emergency Obstetric Care, PPIUCD timing) + Government of India/National Health Mission programme facts (Chiranjeevi Yojana, Janani Suraksha Yojana, Pradhan Mantri Surakshit Matritva Abhiyan, Ayushman Bharat-Pradhan Mantri Jan Arogya Yojana, Companies Act 2013 CSR provision).

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Discuss the role of USG in today's gynec practice

Asked in: Paper IV 20-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Ultrasonography (USG) generates real-time images from high-frequency sound waves reflected at tissue interfaces; it was introduced into medicine by *Ian Donald* (Glasgow, 1950s). Because it is safe (non-ionizing), inexpensive, widely available and gives real-time and Doppler information, USG has become the **first-line imaging modality** in almost every domain of gynaecological practice — benign disease, infertility, oncology, emergencies and urogynaecology.

Modalities used in gynaecology

Modality	Technique	Principal use
Transabdominal sonography (TAS)	2.5–3.5 MHz, full bladder as acoustic window	Large masses (fibroid, ovarian tumour), obese patients
Transvaginal sonography (TVS)	5–8 MHz, probe close to organ, no full bladder needed	Detailed evaluation of pelvic organs within 10 cm; drawback — narrow vagina (virgins, postmenopausal atrophy, post-radiation stenosis)

Modality	Technique	Principal use
Transvaginal colour Doppler (TV-CDS)	Doppler waveform/pulsatility index	Vascularity of adnexal mass, tubo-ovarian pathology, torsion
3-D/4-D sonography	Volumetric acquisition	Ovarian volume, follicle counts, Müllerian anomalies, tumour volume
Saline infusion sonography (SIS)/sonohysterography	Saline instilled into cavity + TVS	Intracavitary polyp/submucous fibroid — more accurate than TVS alone
Sonohysterosalpingography / HyCoSy	Contrast instilled through cervix + TVS	Tubal patency — alternative to hysterosalpingography (HSG)
Transrectal / translabial / endoanal USG	Alternate probe routes	Narrow vagina; anal sphincter defect after obstetric injury
Interventional (USG-guided)	Needle guide on probe	FNAC, cyst/abscess aspiration, oocyte retrieval

Role in benign gynaecology, abnormal uterine bleeding (AUB) and infertility

Clinical problem	Role of USG
AUB structural work-up (FIGO **PALM-COEIN**, FIGO/ACOG 2011)	TVS ± SIS identifies **P**olyp, **A**denomyosis, **L**eiomyoma; SIS is superior to TVS for submucous fibroids/polyps (near-gold-standard)
Postmenopausal bleeding	Endometrial thickness < **4–5 mm** on TVS = atrophic, reassuring; thicker, polypoidal or fluid-filled cavity mandates endometrial biopsy
Missing IUCD	TAS/TVS localizes an intrauterine device or confirms expulsion/uterine perforation
Infertility — folliculometry	Dominant/mature follicle **18–20 mm**; peri-ovulatory endometrium **7–11 mm** (trilaminar ≥ 8–9 mm on day of hCG trigger favours implantation); antral follicle count on 2-D/3-D USG estimates ovarian reserve
Controlled ovarian stimulation monitoring	Serial TVS + serum estradiol track follicular growth; "necklace sign" (multiple small follicles) flags impending ovarian hyperstimulation syndrome (OHSS)
Tubal factor infertility	HyCoSy/sonosalpingography as an alternative to HSG
Assisted reproduction	USG-guided transvaginal oocyte retrieval is now the standard technique in IVF/GIFT

Role in gynaecological oncology — triage of an adnexal/pelvic mass

USG is the **first-line investigation for any pelvic mass**; it cannot give a tissue diagnosis but is highly accurate (>90%) at characterising a mass and stratifying malignancy risk before referral.

IOTA Group simple ultrasound "rules" (Timmerman et al., *Ultrasound Obstet Gynecol* 2000):

Feature	B-rule (benign)	M-rule (malignant)
Solid component	Largest solid part < 7 mm	Largest solid part > 7 mm
Ascites	Absent	Present
Papillary structures	< 4	≥ 4
Surface	Smooth	Irregular
Diameter	< 100 mm	≥ 100 mm
Blood flow	None	Very strong flow

Risk of Malignancy Index (RMI-I) = U × M × CA-125, where U (ultrasound score: 1 point each for multilocular cyst, solid areas, metastasis, ascites, bilaterality) = 0/1/3 for a score of 0/1/2–5, and M = 1 (premenopausal) or 3 (postmenopausal). **NICE CG122 (2011)** recommends calculating RMI in every suspected ovarian malignancy; an **RMI > 250** carries a high (~75%) risk of cancer and mandates referral to a gynaecological-oncology centre.

For endometrial carcinoma, TVS with colour Doppler shows an irregular thickened endometrial echo with increased/disorganised vascularity in addition to the thickness criteria above; CT/MRI are used to stage myometrial and nodal spread once diagnosis is confirmed.

Role in gynaecological emergencies and urogynaecology

- **Ectopic pregnancy** — TVS shows a **"tubal ring"** separate from the ovary with an empty uterine cavity; TV-CDS demonstrates peritrophoblastic flow in an unruptured tubal ring. A serum β-hCG **discriminatory zone of ~1500–2000 mIU/mL** is the level above which an intrauterine gestational sac should be visible on TVS if the pregnancy is intrauterine; failure to visualise one above this level, or an indeterminate scan, is labelled a "pregnancy of unknown location" needing serial hCG and repeat TVS.
- **Ovarian torsion** — enlarged ovary with absent/reduced venous and arterial flow on colour Doppler.
- **Pelvic inflammatory disease/tubo-ovarian abscess** — thickened, fluid-filled tubes ± a tubo-ovarian complex on TVS; also used to monitor response to antibiotic therapy, especially where laparoscopy is contraindicated.
- **Ruptured ectopic/haemoperitoneum** — free fluid in the pouch of Douglas.
- **Urogynaecology** — translabial/perineal/introital USG assesses bladder-neck mobility and levator-ani integrity in incontinence/prolapse work-up; **endoanal USG** detects internal/external

anal-sphincter defects after obstetric anal-sphincter injury (perineal body thickness > 12 mm is needed to maintain continence).

- **Interventional practice** — USG-guided FNAC of a mass/lymph node, aspiration of a chocolate cyst or tubo-ovarian abscess, and drainage of ascites, all use the same real-time needle-guide technique.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 10.5 — Transvaginal pelvic ultrasound demonstrating multiple uterine leiomyomas (Berek & Novak 16e, p.492)*

Recent advances [RA]

- **O-RADS US** (Ovarian-Adnexal Reporting and Data System) — a standardised lexicon and 5-tier ultrasound risk-stratification and management system for adnexal masses established by the American College of Radiology (2018) and validated in a multicentre consensus guideline (*Radiology* 2020;294:168–185); it is being adopted alongside/instead of RMI to reduce inter-observer variability in reporting.
- **IOTA simple rules** continue to be externally validated as a rapid bedside triage step complementing RMI and O-RADS, particularly where CA-125 is unavailable.
- **3-D/4-D transvaginal sonography** adds volumetric assessment of ovarian and tumour volume and better delineates Müllerian anomalies (septate/bicornuate uterus), refining pre-surgical planning.
- **Saline infusion sonography/HyCoSy** are increasingly used as outpatient, radiation-free alternatives to HSG and diagnostic hysteroscopy for tubal patency and intracavitary pathology.

High-yield exam pointers

- TAS needs a full bladder; TVS does not — remember the frequency contrast (2.5–3.5 MHz vs 5–8 MHz).
- Endometrial thickness cut-off: **< 4–5 mm** postmenopausal = atrophic/reassuring.
- Mature follicle **18–20 mm**; peri-ovulatory endometrium **7–11 mm** (trilaminar ≥ 8–9 mm at trigger).
- **RMI = U × M × CA-125**; RMI > **250** → refer to gynae-oncology (NICE CG122, 2011).
- IOTA "rules": solid part > 7 mm, ≥ 4 papillae, ascites, irregular surface, diameter ≥ 100 mm, strong flow = malignant (M-rules).
- Ectopic "tubal ring" on TVS; discriminatory hCG zone ≈ 1500–2000 mIU/mL.
- FIGO **PALM-COEIN** (ACOG 2011) — structural causes of AUB are imaged by TVS/SIS.

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

Reference-only: DC Dutta's Gynaecology (7e) content on ultrasonography predates O-RADS and the newer IOTA-model literature — the risk-stratification detail above follows the current ACR/NICE standard.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 10, Imaging Techniques); Jeffcoate's Principles of Gynaecology 9e (Ultrasonography in Gynaecology chapter); Berek & Novak's Gynecology 16e; Williams Obstetrics 26e; Te Linde's Operative Gynecology 13e. Guidelines: NICE CG122 (2011); FIGO/ACOG PALM-COEIN (2011); ACR O-RADS US consensus guideline (*Radiology* 2020).

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Discuss the various national health programmes and how to render essential obstetric care properly

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

Definition — Essential obstetric care (EOC) is the minimum package of antenatal, intranatal, postnatal and newborn-care services that must be universally available and accessible to prevent and manage the direct obstetric complications (haemorrhage, sepsis, hypertensive disorders, obstructed labour, unsafe abortion) responsible for most maternal deaths. In India, EOC is delivered and financed through the **National Health Mission (NHM)** and its component national health programmes, which together form the government's Safe Motherhood strategy.

National health programmes relevant to maternal & child health

Programme (launch/parent)	Key features
Reproductive & Child Health Programme (RCH-I 1997, RCH-II 2005)	Umbrella under the National Population Policy: safe motherhood, child survival, adolescent health, family planning, STI/RTI control
NRHM (2005) → National Health Mission (2013, incl. urban NUHM)	Village **ASHA**, 24×7 PHCs, upgraded **First Referral Units (FRUs)**
Janani Suraksha Yojana (JSY, 2005)	Cash incentive for institutional delivery + ASHA incentive
Janani Shishu Suraksha Karyakram (JSSK, 2011)	Free, cashless delivery (vaginal/caesarean), drugs, diet, diagnostics, blood, referral transport for mother and sick newborn up to 30 days

Programme (launch/parent)	Key features
Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA, 2016)	Fixed-day (9th of every month), free specialist ANC visit to flag high-risk pregnancy
LaQshya (2017)	Labour-room/maternity OT quality-of-care certification
SUMAN (2019)	"Zero expense, zero denial" guarantee, mother + sick infant up to 1 year
Pradhan Mantri Matru Vandana Yojana (PMMVY, 2017)	₹5,000 cash for first living child; wage-loss compensation
Anemia Mukt Bharat (2018)	"6×6×6" iron-folic acid/deworming/testing strategy
Mission Indradhanush (2014, intensified 2017)	Full immunization, incl. tetanus/diphtheria toxoid in pregnancy
MTP Act 1971, amended 2021	Safe abortion; limit raised to 24 weeks for specified categories, none for substantial foetal abnormality — targets unsafe abortion

Essential obstetric care — components and levels of provision

RCH "box of measures": early antenatal registration within 12 weeks, minimum 4 antenatal visits (Government of India schedule: 12, 14–26, 28–34, 36 weeks) with risk screening at each, tetanus toxoid and 100 days iron-folic acid; **three cleans** at delivery (hands, perineum, cord) with a **skilled birth attendant**; postnatal support and family-planning counselling; **essential newborn care** — resuscitation, warmth, early exclusive breastfeeding, referral of the sick neonate.

Signal function	Basic EmOC (BEmOC)	Comprehensive EmOC (CEmOC)
Parenteral antibiotics	Yes	Yes
Parenteral oxytocics (active management of third stage)	Yes	Yes
Parenteral anticonvulsants ($MgSO_4$ for pre-eclampsia/eclampsia)	Yes	Yes
Manual removal of placenta	Yes	Yes
Removal of retained products of conception	Yes	Yes
Assisted vaginal delivery (vacuum/forceps)	Yes	Yes
Blood transfusion	No	Yes

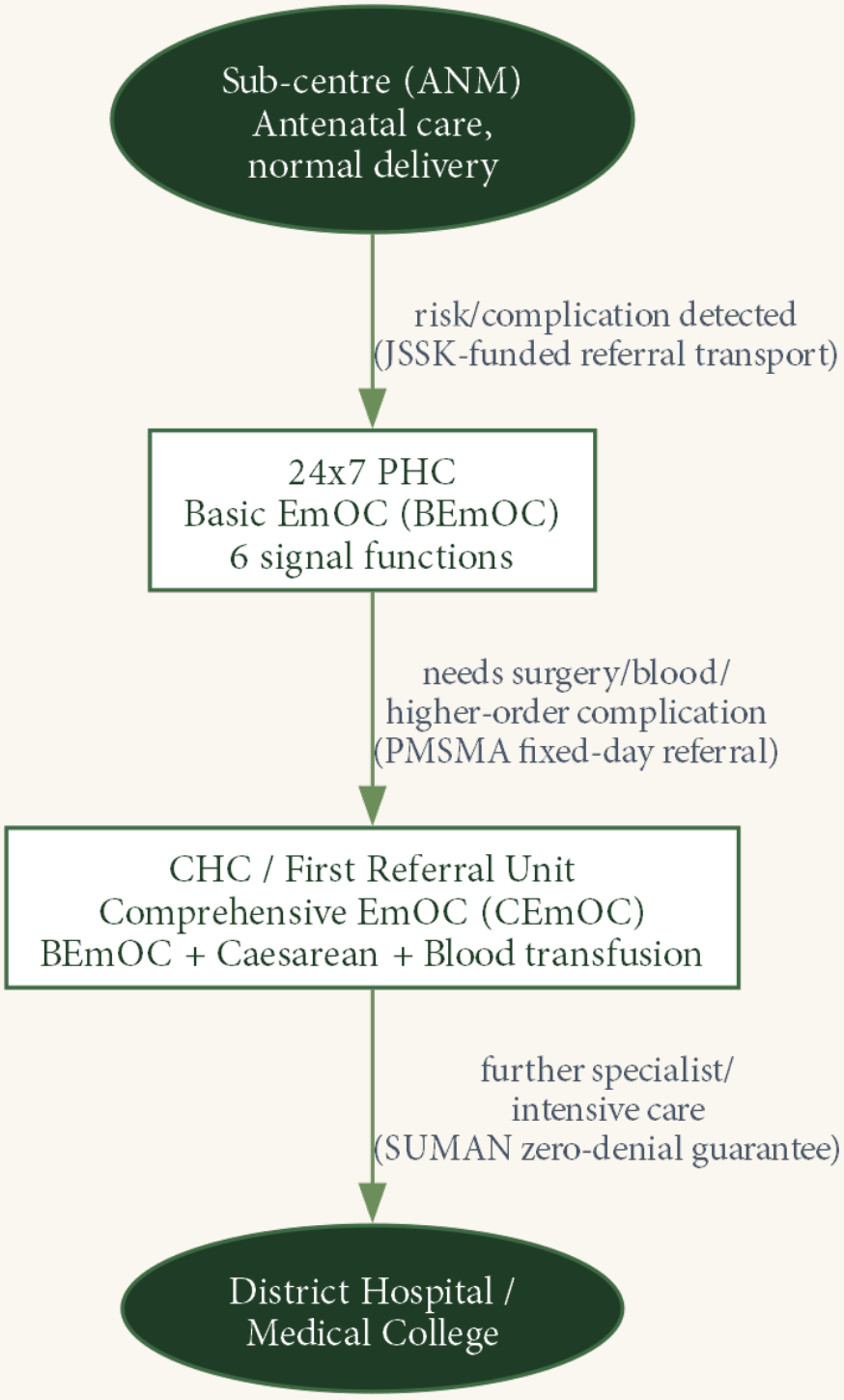
Signal function	Basic EmOC (BEmOC)	Comprehensive EmOC (CEmOC)
Caesarean section	No	Yes

BEmOC is expected at the 24×7 PHC level; CEmOC (BEmOC's six functions plus surgery and blood transfusion) is the mandate of the **FRU** — which additionally provides anaesthetic services, safe abortion, and sterilization/contraceptive services, with referral transport onward to the district hospital.

How to render essential obstetric care properly

- **Universal, risk-screened antenatal care** — early registration, the scheduled visits above (or the World Health Organization's 2016 model of a minimum of 8 antenatal contacts), continuous risk assessment through labour and puerperium, not a one-time check.
- **A skilled birth attendant at every birth**, using the **partograph** to detect prolonged/obstructed labour early and act before complications set in.
- **Functional three-tier referral system** — sub-centre (ANM-led basic antenatal care and normal delivery) → 24×7 PHC (BEmOC) → CHC/FRU (CEmOC) → district hospital/medical college, each tier with a clear, written **referral protocol** and assured transport (JSSK-funded ambulance/108 service).
- **Life-saving drugs at the peripheral level**, which RCH-II authorizes the skilled birth attendant to give before/during referral: **misoprostol** (postpartum haemorrhage prevention), **oxytocin** (active management of third stage/postpartum haemorrhage treatment), **magnesium sulfate** (eclampsia), **ampicillin and metronidazole** (sepsis) — plus digital evacuation for incomplete abortion.
- **Functional blood-storage units/blood banks** at every FRU, with an uninterrupted supply chain for CEmOC.
- **Tackling the "three delays"** — delay in deciding to seek care (community awareness through ASHA/Village Health and Nutrition Days), delay in reaching a facility (transport, geographic access), and delay in receiving adequate care once there (staffing, drugs, equipment, operationalized FRUs) — this framework should structure any system-level corrective action.
- **Maternal Death Surveillance and Response (MDSR)** and maternal mortality/near-miss review at every facility to identify avoidable factors and feed them back into corrective training and protocols.
- **Integrated family planning and safe-abortion services** to reduce unwanted pregnancy and unsafe abortion, which remain major preventable causes of maternal death.
- **Community, society and policy actions** — safe motherhood committees, health education, and periodic in-service refresher courses and mock drills in emergency obstetric care for obstetricians, medical officers, nurses and dais.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Referral pyramid for essential obstetric care, with the supporting government scheme annotated on each referral link.

Recent advances [RA]

- **LaQshya** (2017) certifies labour-room/maternity operation theatre quality against national standards, directly targeting intranatal EmOC quality [Ministry of Health & Family Welfare (MoHFW), Government of India, 2017].
- **SUMAN** (2019) consolidates JSY/JSSK entitlements into one zero-expense, zero-denial guarantee for every pregnant woman and sick infant up to one year, cutting the "delay in receiving care" [MoHFW, 2019].
- **PMSMA** (2016) scales specialist-led fixed-day antenatal screening to flag high-risk pregnancy for timely referral, now with tele-consultation add-ons in remote districts [MoHFW, 2016].
- **Anemia Mukt Bharat** (2018) targets India's largest single indirect cause of maternal death via the 6×6×6 iron-folic acid/testing strategy [MoHFW, 2018].
- **Midwifery-led care** — the Nurse Practitioner in Midwifery (Advanced Practice Midwife) initiative, aligned with Royal College of Obstetricians and Gynaecologists (RCOG)/Federation of Obstetric and Gynaecological Societies of India (FOGSI) advocacy for respectful, evidence-based intrapartum care, strengthens frontline EmOC skills while reducing unnecessary intervention.
- **Digital health** — the RCH portal, Kilkari/Mobile Academy for ASHA-ANM training, and e-Sanjeevani tele-consultation extend antenatal risk-screening and referral decision-support to under-served areas.
- **MTP Amendment Act 2021** widened safe-abortion access (limit 24 weeks for special categories; none for substantial foetal abnormality), reducing unsafe-abortion-related maternal deaths.

High-yield exam pointers

- BEmOC = 6 signal functions (parenteral antibiotics, oxytocics, anticonvulsants, manual removal of placenta, removal of retained products, assisted vaginal delivery); CEmOC = BEmOC + blood transfusion + caesarean section.
- Life-saving drugs authorized to the skilled birth attendant: **misoprostol, oxytocin, MgSO4, ampicillin, metronidazole**.
- Programme timeline to memorise: **JSY (2005) → JSSK (2011) → PMMVY/LaQshya (2017) → Anemia Mukt Bharat (2018) → SUMAN (2019)**.
- Referral pyramid: Sub-centre → 24×7 PHC (BEmOC) → CHC/FRU (CEmOC) → District hospital.
- "**Three delays**" model — decision, transport, treatment — the framework examiners expect when asked "how to render care properly."
- Government of India ANC schedule: visits at 12, 14–26, 28–34 and 36 weeks (minimum 4); tetanus toxoid + 100 days iron-folic acid.

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

The World Health Organization's 2016 antenatal care model recommends a minimum of 8 contacts rather than the older 4-visit schedule still printed in some Indian textbooks; state the current 8-contact model if asked specifically about the World Health Organization's antenatal care guideline, and the Government of India's operational 4-visit minimum if asked about the national programme schedule.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Safe Motherhood, Reproductive and Child Health Care, RCH interventions, life-saving drugs and interventions, Emergency Obstetric Care/First Referral Unit); Government of India, Ministry of Health & Family Welfare programme documents (National Health Mission, Janani Suraksha Yojana, Janani Shishu Suraksha Karyakram, Pradhan Mantri Surakshit Matritva Abhiyan, LaQshya, SUMAN, Pradhan Mantri Matru Vandana Yojana, Anemia Mukt Bharat, Mission Indradhanush, MTP Act 1971 as amended 2021); World Health Organization/United Nations Population Fund/United Nations Children's Fund Emergency Obstetric Care signal-function framework. Coverage note: the on-disk textbook corpus (Dutta, Williams, Berek, Speroff, Jeffcoate) does not name India's post-2016 schemes (PMSMA, LaQshya, SUMAN, Anemia Mukt Bharat) verbatim, as textbook editions lag government rollout; these are stated from standard, well-established Ministry of Health & Family Welfare programme facts.

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Emergency contraception

Asked in: Paper IV 03-Oct-2025 · Paper IV Jul 2016 · Paper IV Oct 2009 · Paper III Oct 2009 · Paper IV Apr 2008 · Paper IV Oct 2006 (7×) — RGUHS MS Obstetrics & Gynaecology

Definition — Emergency contraception (EC), also called postcoital or interceptive contraception, is the use of a drug or device to prevent pregnancy after an isolated episode of unprotected or inadequately protected intercourse. It must be started as soon as possible after the exposure, is not intended for routine/repeated use, and does not terminate an already-established pregnancy.

Indications

- Unprotected intercourse (no contraception used).
- Condom rupture, slippage, or leakage.
- Missed combined oral contraceptive (COC) pills or a progestin-only pill (POP) delayed more than 3 hours.
- Displacement, partial expulsion, or early removal of an intrauterine device (IUD).

- Sexual assault/rape.
- First act of intercourse, since it is characteristically unplanned.
- Failure of a barrier method, withdrawal, or a miscalculated "safe period."

Methods, doses and mechanism

The risk of pregnancy from a single act of mid-cycle unprotected coitus is about 8%; every EC method reduces this risk substantially if started promptly.

Method	Drug & dose	Timing window (from coitus)	Mechanism	Pregnancy/failure rate
Copper-IUD (Cu-IUD, e.g., CuT380A) — gold standard	Insertion (no drug)	Up to 5 days (120 h) after coitus, or up to 5 days after estimated ovulation	Copper ions are toxic to sperm/ovum; blocks fertilization and, if fertilization has occurred, implantation	~0.1% (most effective method; continues as 10-year contraception)
Progestin-only — levonorgestrel (LNG)	1.5 mg single dose, or 0.75 mg × 2 doses 12 h apart	Best within 72 h; efficacy persists (reduced) up to 120 h	Inhibits or delays ovulation	~1–2%
Selective progesterone-receptor modulator (SPRM) — ulipristal acetate (UPA)	30 mg single oral dose	Up to 120 h; the most effective oral method in the 72–120 h window	Delays/suppresses ovulation and follicular growth; delays endometrial maturation	~1–2% (modestly superior to LNG, especially beyond 72 h)
Combined estrogen–progestin (Yuzpe method)	Ethinyl estradiol 100 µg + levonorgestrel 0.5 mg per dose, given twice 12 h apart (e.g., 2 tablets of ethinyl estradiol 50 µg + norgestrel 0.25 mg, repeated after 12 h)	Within 72 h	Inhibits/delays ovulation	~2–3.5% (highest failure and most nausea/vomiting of the oral methods)

Method	Drug & dose	Timing window (from coitus)	Mechanism	Pregnancy/failure rate
Antiprogestin — mifepristone (RU-486)	Single oral dose, 10–100 mg (WHO trials show 10 mg as effective as higher doses; Indian texts commonly cite 100 mg)	As soon as possible; efficacy falls modestly if delayed to 5 days	Competitively blocks progesterone receptors, delaying ovulation and endometrial maturation	<1%

An oral antiemetic (e.g., meclizine 25–50 mg, or metoclopramide 10 mg) taken 1 hour before each dose reduces nausea/vomiting with the Yuzpe regimen; this is rarely needed with LNG or UPA, which cause far less nausea.

Mechanism of action and effectiveness — the current evidence

All the hormonal methods above act mainly by **inhibiting or delaying ovulation and by blocking fertilization**. Large trials and mechanistic studies find **no evidence that hormonal EC prevents implantation** once fertilization has occurred, and no effect once a pregnancy is established — hormonal EC is therefore **not an abortifacient**. The Cu-IUD is the exception: besides blocking fertilization it can also act after fertilization to prevent implantation, which is why it remains effective up to 5 days after coitus (or after ovulation). Efficacy of all oral methods falls the longer treatment is delayed — postponing a dose by even 12 hours raises the pregnancy risk by close to 50%, so treatment should never be deferred while awaiting an examination or pregnancy test.

Contraindications and precautions

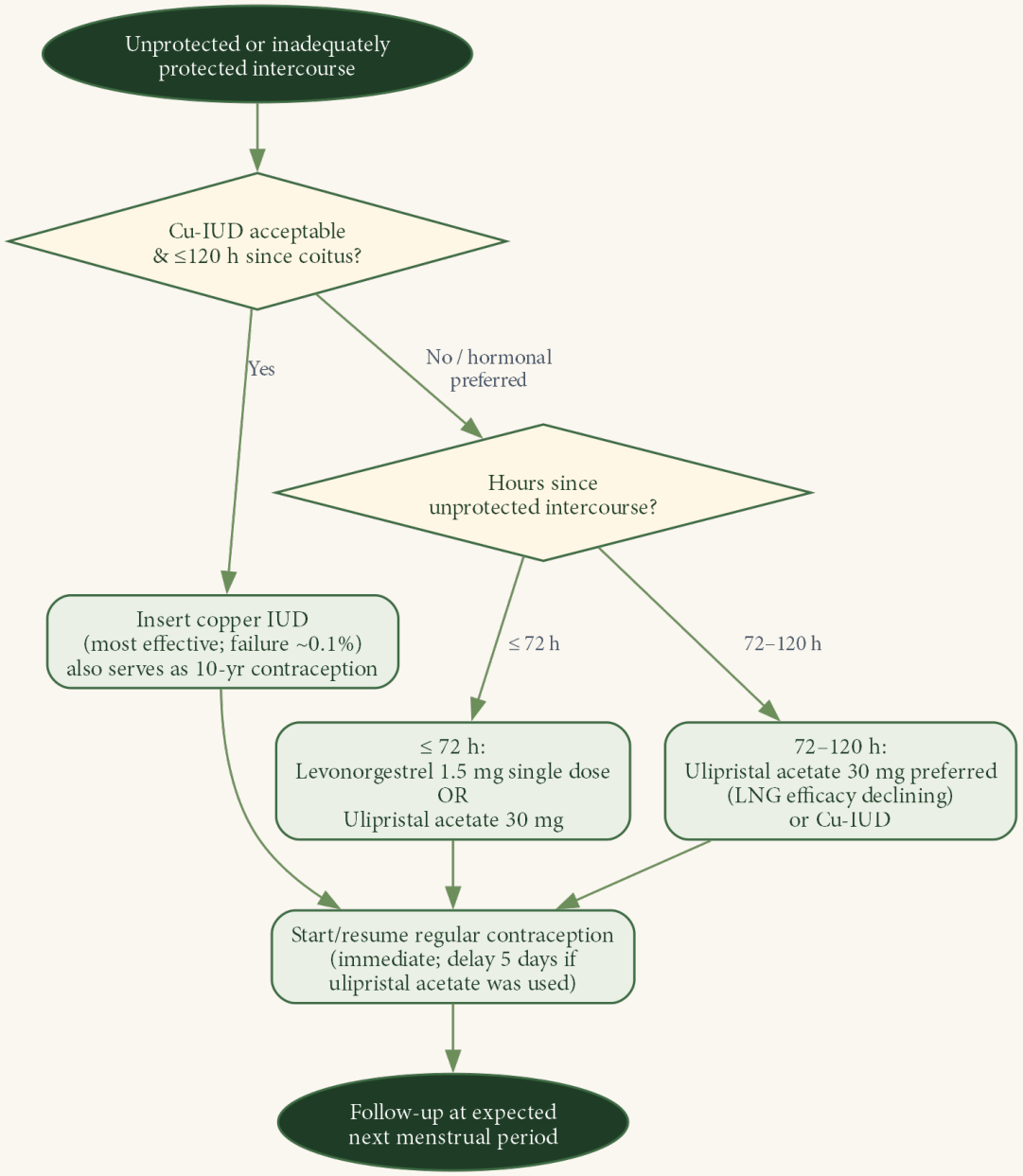
Method	Key precaution
Hormonal EC (LNG, UPA, Yuzpe)	No absolute contraindication except known hypersensitivity; pregnancy testing or pelvic examination is **not** required before dispensing. Ineffective (not harmful) if pregnancy is already established.
Yuzpe (COC-based)	Use cautiously in women with a personal or close family (parent/sibling) history of idiopathic venous thromboembolism — prefer LNG, UPA, or Cu-IUD instead.

Method	Key precaution
Ulipristal acetate	Avoid starting a progestin-containing contraceptive for 5 days afterwards (UPA competes at the progesterone receptor and its effect would be blunted); caution with severe hepatic dysfunction or severe asthma controlled by oral steroids.
Cu-IUD	Standard IUD contraindications apply — current pelvic infection/untreated STI, unexplained genital bleeding, confirmed pregnancy, distorted uterine cavity; less suitable when ongoing STI risk is high (e.g., some assault cases) unless treated first.

Counselling and follow-up

- Take the first dose as soon as possible — never wait for the next visit, examination, or pregnancy test.
- If vomiting occurs within 2 hours of an oral dose, repeat that dose.
- Advise a barrier method until the next menstrual period; EC gives no protection against sexually transmitted infections.
- Start (or resume) a regular contraceptive method immediately ("quick start"), **except** delay starting a progestin-containing method for 5 days after ulipristal acetate.
- Arrange follow-up around the expected next period; test for pregnancy if menses is delayed by more than a week, and consider ectopic pregnancy if pain or abnormal bleeding occurs.
- EC may be repeated within the same cycle if a further exposure occurs, but it is not intended as a routine or repeated method — offer effective ongoing contraception at every EC visit.
- If EC fails and pregnancy continues, no increase in fetal malformation has been demonstrated; counsel the woman on her options, including induced abortion if she wishes.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for emergency contraception method selection by time elapsed and Cu-IUD acceptability.

High-yield exam pointers

- Cu-IUD = single most effective EC (failure ≈0.1%), inserted up to 5 days after coitus/ovulation — also converts to a 10-year contraceptive.
- Levonorgestrel: **1.5 mg single dose** (or 0.75 mg × 2, 12 h apart) within 72 h, usable to 120 h with falling efficacy.
- Ulipristal acetate **30 mg single dose** — best oral choice in the 72–120 h window.

- Yuzpe (COC) method = ethinyl estradiol 100 µg + levonorgestrel 0.5 mg per dose × 2, 12 h apart — oldest method, highest failure and nausea.
- Mifepristone 10–100 mg single dose is an alternative antiprogestin option.
- Mechanism = inhibits/delays ovulation + blocks fertilization — **not** an abortifacient; no effect on an implanted pregnancy.
- Remember the **5-day rule**: no progestin-only contraceptive for 5 days after ulipristal acetate.

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

Older texts (including DC Dutta's) list "prevention of implantation" as a mechanism of hormonal emergency contraception, but current evidence (Williams Obstetrics; ACOG) shows levonorgestrel, ulipristal acetate and the Yuzpe method act only by delaying/inhibiting ovulation and blocking fertilization, with no post-fertilization or anti-implantation effect — only the copper-IUD reliably acts after fertilization.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; American College of Obstetricians and Gynecologists (ACOG, 2019, reaffirmed) guidance on emergency contraception provision.

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Emergency obstetric care

Asked in: Paper IV 25-Nov-2020 · Paper IV May 2015 · Paper IV Oct 2008 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — Emergency Obstetric Care (EmOC) is the set of life-saving clinical interventions ("signal functions") required to manage the major direct obstetric complications — haemorrhage, sepsis, hypertensive disorders (pre-eclampsia/eclampsia), obstructed labour and complications of unsafe abortion — that together cause most maternal deaths. Because these complications occur unpredictably even in low-risk women, universal access to EmOC through a functioning referral network — not risk-

screening alone — is now the core strategy of Safe Motherhood programmes (WHO/UNICEF/UNFPA).

Classification & signal functions (WHO/UNICEF/UNFPA framework)

Level	Signal functions	Typical facility
Basic EmOC (BEmOC) — 6 functions	1. Parenteral antibiotics 2. Parenteral oxytocics (uterotonics) 3. Parenteral anticonvulsants (magnesium sulfate) 4. Manual removal of placenta 5. Removal of retained products of conception (manual vacuum aspiration) 6. Assisted vaginal delivery (vacuum/forceps)	Primary health centre (PHC) — 24×7 delivery point
Comprehensive EmOC (CEmOC) — 8 functions	All 6 BEmOC functions + 7. Surgery (caesarean section) 8. Blood transfusion	Community health centre (CHC) / First Referral Unit (FRU), district hospital

A facility is counted as "functioning" only if it has actually performed **every** listed function in the preceding 3 months (WHO benchmark); the UN norm is a minimum of **5 EmOC facilities per 500,000 population** (4 BEmOC + 1 CEmOC).

Indian FRU package (DC Dutta): the FRU is expected to provide CEmOC (anaesthesia, vacuum/forceps delivery, blood transfusion, caesarean section, manual removal of placenta) **plus** safe abortion services and family planning/sterilisation, bundled with a working referral-and-transport link — i.e., the Indian package is CEmOC broadened to reproductive health services.

Organisation of EmOC in India (referral pyramid)

Level	Personnel	Capability
Village / sub-centre	ANM, ASHA	Danger-sign recognition, life-saving drugs (inj. oxytocin/misoprostol, loading-dose MgSO4) before referral, partograph, transport call
PHC (24×7 delivery point)	Medical officer, staff nurse	Basic EmOC (where notified)
CHC / First Referral Unit (FRU)	Obstetrician, anaesthetist	Comprehensive EmOC
District hospital / medical college	Specialists, ICU, blood bank	Comprehensive EmOC + intensive care

Barriers to timely EmOC — the "three delays" model (Thaddeus & Maine)

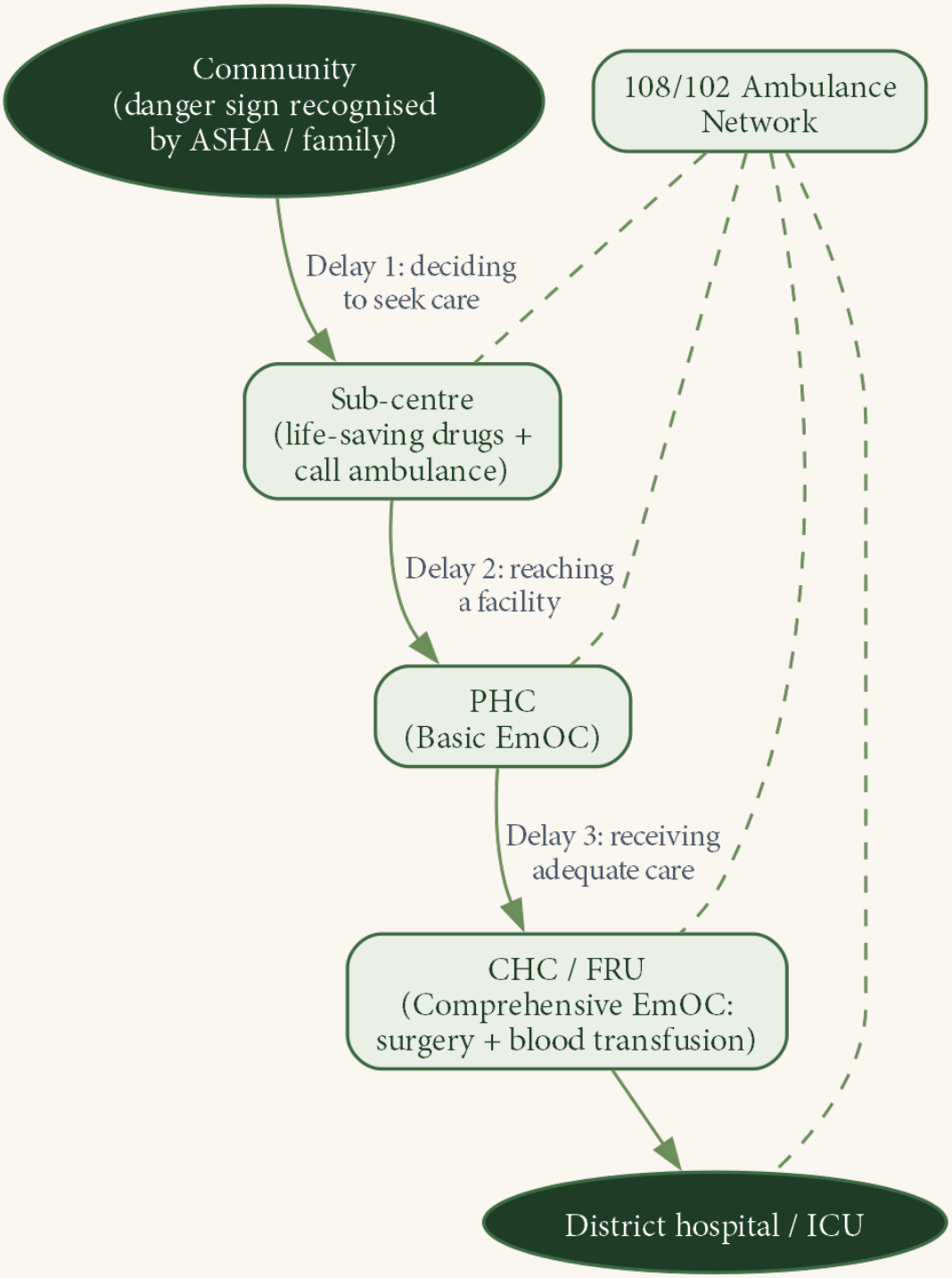
Delay	Key determinants	EmOC-linked remedy
1. Delay in **deciding** to seek care	Poor awareness of danger signs, low decision-making status of women, cost fear	Birth-preparedness counselling, ASHA link-worker, free-care schemes (JSSK)
2. Delay in **reaching** a facility	Distance, poor roads, absent transport	Toll-free ambulance (108/102), guaranteed referral transport
3. Delay in **receiving** adequate care at the facility	Shortage of skilled staff, blood, drugs, operation theatre; signal functions not actually available	Functioning BEmOC–CEmOC network, quality-certified labour rooms (LaQshya)

EmOC directly targets the **third delay**, while referral-transport and free-care schemes reduce the impact of the first two.

Recent advances [RA]

Programme (year)	EmOC-relevant provision
JSSK — Janani Shishu Suraksha Karyakram (2011, NHM)	Free institutional delivery incl. caesarean section, free drugs/diagnostics/diet/blood, and free two-way referral transport for mother and sick newborn (up to 30 days)
PMSMA — Pradhan Mantri Surakshit Matritva Abhiyan (2016)	Fixed-day (9th of every month) free comprehensive antenatal care with volunteer specialists, for early high-risk identification and timely referral to a CEmOC facility
LaQshya — Labour room Quality improvement Initiative (2017)	Upgrades labour rooms/maternity OTs to National Quality Assurance Standards; targets intrapartum stillbirth rate <1% and zero preventable maternal/newborn deaths; certifies and incentivises CEmOC facilities
SUMAN — Surakshit Matritva Aashwasan (2019)	"Zero expense, zero denial" guarantee for every pregnant woman and newborn at a public facility, including EmOC and referral
National Ambulance Services (108/102)	Toll-free emergency and inter-facility referral transport linking BEmOC sites to CEmOC/FRUs
Maternal Death Surveillance & Response (MDSR)	Confidential audit of every maternal death to identify avoidable gaps in EmOC delivery and feed corrective action back into the system

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Referral algorithm from community to district hospital/ICU, with the three delays on the connecting arrows and the 108/102 ambulance network linking every level.

High-yield exam pointers

- Signal functions = **"6 + 2 = 8"**: BEmOC has 6 (3 drugs — antibiotics, oxytocics, anticonvulsants; 3 procedures — manual removal of placenta, removal of retained products, assisted vaginal delivery); CEmOC = BEmOC + surgery + blood transfusion.
- A facility is "functioning" only if it performed all its signal functions in the **last 3 months**.
- UN benchmark: **5 EmOC facilities per 500,000 population** (4 Basic + 1 Comprehensive).
- **Three delays** (Thaddeus & Maine, 1994): deciding, reaching, receiving.
- India's FRU package = CEmOC + safe abortion + family planning + referral transport.
- Scheme recall: JSSK = free care + transport; PMSMA = 9th-of-the-month ANC day; LaQshya = labour-room quality; SUMAN = zero expense/zero denial.
- Direct causes of maternal death in order (India): haemorrhage > sepsis/hypertension > obstructed labour > unsafe abortion — each is what a specific EmOC signal function is designed to treat.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The on-disk DC Dutta's Obstetrics 9e fully covers the WHO signal-function EmOC framework and JSSK; SUMAN (2019) and LaQshya certification detail are drawn from standard Ministry of Health & Family Welfare programme knowledge, as this textbook edition predates their full rollout.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; WHO/UNICEF/UNFPA — *Monitoring Emergency Obstetric Care: A Handbook*; Ministry of Health & Family Welfare, Government of India (JSSK, PMSMA, LaQshya, SUMAN).

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Evaluate the role of laparoscopic surgeries in gynaecology

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

Definition — Laparoscopy (endoscopic or minimally invasive surgery) is visualisation and operation upon the peritoneal cavity through a fibre-optic telescope introduced via small abdominal punctures, after creating a pneumoperitoneum. First termed by *Jacobaeus* (1910); the *Veress* needle (1938) and *Raoul Palmer's* gas-distension/Trendelenburg technique (1947) made it practicable, and *Kurt Semm* and

Reich (first laparoscopic hysterectomy, 1989) established its operative scope. Today an estimated 80% of gynaecological operations can be performed endoscopically.

Diagnostic role

Indication	Use of laparoscopy
Infertility work-up	Gold-standard test for tubal patency — laparoscopy and chromopertubation (methylene blue dye); direct visualisation of peritubal/peri-ovarian adhesions, endometriosis, fibroids missed on ultrasound
Chronic pelvic pain	Detects endometriosis, adhesions, pelvic congestion, chronic PID — reserved for cases not settling on empirical treatment
Acute pelvic pain / acute abdomen	Differentiates ectopic pregnancy, ruptured ovarian cyst, torsion, appendicitis, salpingitis
Pelvic inflammatory disease (PID)	Considered the **gold standard** for confirming salpingitis; reserved for atypical cases or non-response to therapy
Unexplained/ambiguous adnexal mass	Differentiates ovarian tumour from pedunculated fibroid; directs further management
Anovulation/ovulation confirmation	Direct visualisation of a fresh corpus luteum/stigma
Müllerian anomalies	Confirms uterine contour (arcuate/bicornuate/septate) alongside hysteroscopy
Second-look after tuboplasty/oncology surgery	Assesses adhesion reformation or disease recurrence

Therapeutic (operative) role

Graded by complexity and surgeon competence:

Grade	Procedures
Minor	Tubal sterilization (Falope/Silastic ring, Filshie clip, bipolar coagulation); adhesiolysis without bowel; aspiration of simple ovarian cysts; ovarian biopsy
Moderate	Ectopic pregnancy — salpingostomy, segmental resection, salpingectomy, salpingo-oophorectomy; endometriosis ablation (diathermy/laser); ovarian drilling for PCOS (polycystic ovary syndrome); ovarian cystectomy; salpingo-ovariolysis; myomectomy; laparoscopic-assisted vaginal hysterectomy (LAVH)

Grade	Procedures
Extensive	Total laparoscopic hysterectomy (TLH); major (deep infiltrating) endometriosis excision; retroperitoneal pelvic/para-aortic lymphadenectomy; laparoscopic sacrocolpopexy for prolapse and continence procedures

Tubal sterilization — method-wise failure (10-year cumulative)

Method	Failure rate
Unipolar electrocoagulation	0.75%
Bipolar electrocoagulation	2.1%
Silastic (Falope) ring	1.7%
Filshie clip (titanium, silicone-lined; destroys ~4 mm of tube)	0.1%
Hulka-Clemens spring clip	highest among clip methods

The multicentre US CREST cohort corroborates this ranking (10-year cumulative pregnancies/1,000 procedures: unipolar 7.5, Silastic ring 17.7, bipolar 24.8, Hulka-Clemens 36.5), confirming clip/ring methods spare more tube for later reversal while unipolar coagulation is most effective but carries bowel-burn risk.

Advantages, limitations and contraindications

Advantages over laparotomy: rapid recovery; less postoperative pain and analgesic need; shorter hospital stay and cost; quicker return to activity; less adhesion formation; minimal, cosmetically superior scars; reduced blood loss; lower incisional-hernia risk; higher patient satisfaction.

Limitations: longer operating time in complex cases; steep learning curve and need for specialised training/equipment; counter-intuitive instrument motion; loss of tactile (haptic) feedback; two-dimensional (non-stereoscopic) view with conventional laparoscopy; high initial capital cost.

Contraindications

Absolute/relative contraindication
Severe cardiopulmonary disease
Haemodynamically unstable patient
Generalized peritonitis
Significant haemoperitoneum
Intestinal obstruction

Absolute/relative contraindication
Extensive peritoneal adhesions
Large pelvic tumour
Pregnancy beyond 16 weeks
Advanced malignancy
Uncorrected anticoagulation

Technique-related and general complications

Pneumoperitoneum is created via a Veress needle at the umbilicus (45° angulation) or Palmer's point (left midclavicular line, 3 cm below costal margin); correct placement is confirmed by the hanging-drop test, syringe-aspiration test and loss of liver dullness; intra-abdominal pressure must not exceed 20 mmHg (working pressure 12–15 mmHg) to avoid impaired venous return and diaphragmatic splinting.

Category	Complications
Specific to laparoscopy	Extraperitoneal (surgical/omental) emphysema; injury to major vessels (epigastric, mesenteric, omental); bowel injury (Veress needle/trocar, worse with adhesions); thermal injury to bowel/bladder/ureter; carbon dioxide gas embolism
Anaesthetic	Hypoventilation and basal atelectasis (pneumoperitoneum + Trendelenburg); hypercarbia/metabolic acidosis; bradycardia from vagal stimulation; cardiac output fall of 10–30%
General surgical	Haemorrhage; infection; port-site hernia; wound dehiscence

Overall mortality of diagnostic laparoscopy is about 5 per 100,000 procedures (cardiac arrest, gas embolism, unrecognised bowel injury being the principal causes), falling with operator experience.

Recent advances [RA]

- **Robotic-assisted laparoscopy** — a computer-interfaced console gives a stereoscopic (three-dimensional) view and wristed, seven-degree-of-freedom instrument motion that mimics the human hand, easing intracorporeal suturing; it shortens the learning curve for complex reconstructive and oncological procedures but with higher cost and no proven oncologic superiority over conventional laparoscopy.
- **Single-incision laparoscopic surgery (SILS)** — a single multi-instrument port (usually trans-umbilical, ~2.5–3 cm) performs the entire procedure with a further cosmetic benefit, at the cost of instrument crowding and a higher reported risk of port-site (umbilical) hernia [Berek & Novak 16e].

- **Minimally invasive radical hysterectomy in early cervical cancer — the LACC trial** (Ramirez et al., NEJM 2018): this randomised non-inferiority trial in stage IA1–IB2 (FIGO) cervical cancer found laparoscopic/robotic radical hysterectomy had significantly *lower* disease-free survival (86.0% vs 96.5% at 4.5 years) and overall survival (91.2% vs 97.1% at 3 years) compared with open radical hysterectomy, possibly related to tumour cell dissemination by the uterine manipulator or CO2 pneumoperitoneum. Current practice (ACOG/ESGO/NCCN) has therefore reverted to **open radical hysterectomy as the standard of care** for early-stage cervical cancer requiring radical surgery.
- **Sentinel lymph node mapping** with indocyanine green fluorescence has been incorporated into laparoscopic/robotic staging of endometrial and early cervical cancer, reducing the morbidity of complete lymphadenectomy while maintaining high sensitivity for nodal metastasis.
- **Energy-device evolution** — LigaSure, Enseal and the harmonic (ultrasonic) scalpel now provide vessel sealing up to 4–7 mm with minimal lateral thermal spread, improving haemostasis and shortening operative time over monopolar diathermy alone.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
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> ☐ *Fig 36.2A-E — Laparoscopic instruments: Telescope (0° and 30°), Veress needle, trocar and cannula with multifunctional valve (DC Dutta's Gynaecology 7e, p.524)*

High-yield exam pointers

- Landmark names: Jacobaeus (term "laparoscopy," 1910), Veress (spring-loaded needle, 1938), Palmer (pneumoperitoneum/Trendelenburg, 1947), Semm (operative laparoscopy), Reich (first laparoscopic hysterectomy, 1989).
- Pneumoperitoneum: intra-abdominal pressure must not exceed 20 mmHg; Veress placement confirmed by hanging-drop and syringe-aspiration tests.
- Palmer's point = left midclavicular line, 3 cm below costal margin — alternate Veress entry site when umbilical entry is risky (e.g., prior midline surgery).
- Sterilization failure ranking (lowest → highest): Filshie clip (0.1%) < Fallope/Silastic ring (1.7%) < unipolar coagulation (0.75%, but bowel-burn risk) < bipolar (2.1%) < Hulka-Clemens clip.
- Diagnostic laparoscopy mortality ≈ 5/100,000 procedures.
- **LACC trial (2018)**: minimally invasive radical hysterectomy is inferior to open radical hysterectomy in early cervical cancer — write this whenever the question probes "recent advances" or limitations of laparoscopy in oncology.
- Contraindication mnemonic: unstable haemodynamics, peritonitis, bowel obstruction, dense adhesions, large mass, pregnancy > 16 weeks, advanced malignancy, uncorrected coagulopathy.

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

The sterilization failure percentages above (DC Dutta) match the larger US CREST cohort's per-1,000-procedure rates closely (e.g., bipolar 24.8/1,000 ≈ 2.5%, Silastic ring 17.7/1,000 ≈ 1.8%), confirming they remain current; the LACC trial finding is the key practice-changing recent advance and should be quoted whenever this topic is examined under Recent Advances.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Chapter 36, Endoscopic Surgery in Gynecology; Chapter 30, tubal sterilization); Berek & Novak's Gynecology 16e (CREST sterilization data; single-incision laparoscopic surgery; minimally invasive radical hysterectomy/LACC trial); Jeffcoate's Principles of Gynaecology 9e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Te Linde's Operative Gynecology 13e. Guideline note: current oncologic practice (post-LACC, 2018) favours open radical hysterectomy for early-stage cervical cancer.

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Failure of contraception – medico legal issues

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

Definition — Contraceptive failure is conception occurring in a woman using a temporary or permanent method of contraception, whether by correct ("method" failure) or incorrect ("user" failure) use; since no reversible or surgical method guarantees 100% efficacy, such failure raises two distinct medico-legal questions — the pregnant woman's statutory right to terminate the resulting unwanted pregnancy, and the treating doctor's potential liability for the failure itself, most often after tubal sterilization or vasectomy.

Magnitude and causes of failure

Method	Failure rate (pregnancies/100 woman-years)
No method	85
Natural methods (calendar/temperature/mucus)	25
Withdrawal	27
Male condom	15
Female condom	21
Diaphragm	16

Method	Failure rate (pregnancies/100 woman-years)
Combined oral contraceptive pill (COC)	0.1
Progestin-only pill (POP)	1
Copper T 380A intrauterine device (IUD)	0.8
Levonorgestrel intrauterine system (LNG-IUS)	0.1
Depot medroxyprogesterone acetate (DMPA)/norethisterone enanthate (NET) injectable	0.3
Implant (Implanon/Norplant)	0.01–0.05
Vasectomy	0.15
Tubectomy (tubal sterilization)	0.15

Tubal sterilization failure is technique-dependent: overall ~0.7%, lowest with the **Pomeroy technique** (0.1–0.5%), highest with **Madlener's technique** (1.5–7%); among laparoscopic methods, unipolar electrocoagulation is 0.75%, bipolar 2.1%, the Fallope ring 1.7%, and the **Filshie clip** the lowest at 0.1%. Failure is higher when done concurrently with hysterotomy or caesarean section.

Causes:

- **True (method) failure** — spontaneous tubo-tubal reanastomosis, fistula formation, incomplete occlusion/coagulation.
- **Technical error** — wrong structure ligated (round ligament for tube), inadequate segment excised, incomplete vas division.
- **Luteal-phase pregnancy** — an already-conceived but undetected pregnancy at the time of interval sterilization.
- **User failure** — missed pills, condom rupture/slippage, late patch/ring reinsertion, delayed DMPA injection, unprotected intercourse before vasectomy success is confirmed.
- **Drug interaction** — enzyme-inducing drugs (rifampicin, certain anticonvulsants) lowering COC efficacy.

Medico-legal recourse for the woman: the MTP Act

- **Statutory basis** — *Explanation II to Section 3(2)* of the Medical Termination of Pregnancy (MTP) Act, 1971 presumes that an unwanted pregnancy resulting from **failure of a contraceptive device or method** causes "grave injury to the mental health" of the woman, making it a valid, independent ground for termination — distinct from the risk-to-life, fetal-abnormality, and rape grounds.

- **Who it covers** — the original 1971 wording restricted this ground to a *"married woman or her husband."* The **MTP (Amendment) Act, 2021** replaced this with *"any woman or her partner,"* extending the contraceptive-failure ground to unmarried women as well.
- **Gestational limits (current law, post-2021 amendment):**

Gestation	Requirement
Up to 20 weeks	Opinion of 1 registered medical practitioner (RMP)
20–24 weeks	Opinion of 2 RMPs, restricted to specified categories under MTP Rule 3B (survivors of sexual assault/rape/incest, minors, change of marital status during pregnancy (widowhood/divorce), women with disabilities, mentally ill women, fetal malformation with substantial risk, humanitarian/disaster settings)
Beyond 24 weeks	Permitted only for substantial fetal abnormality, certified by a Medical Board

- **Consent** — only the pregnant woman's written consent is required; husband's consent is not needed. A minor (under 18 years) or a mentally ill woman requires the written consent of a guardian.
- **Confidentiality** — Section 5A bars disclosure of the woman's identity except to a person authorised by law.

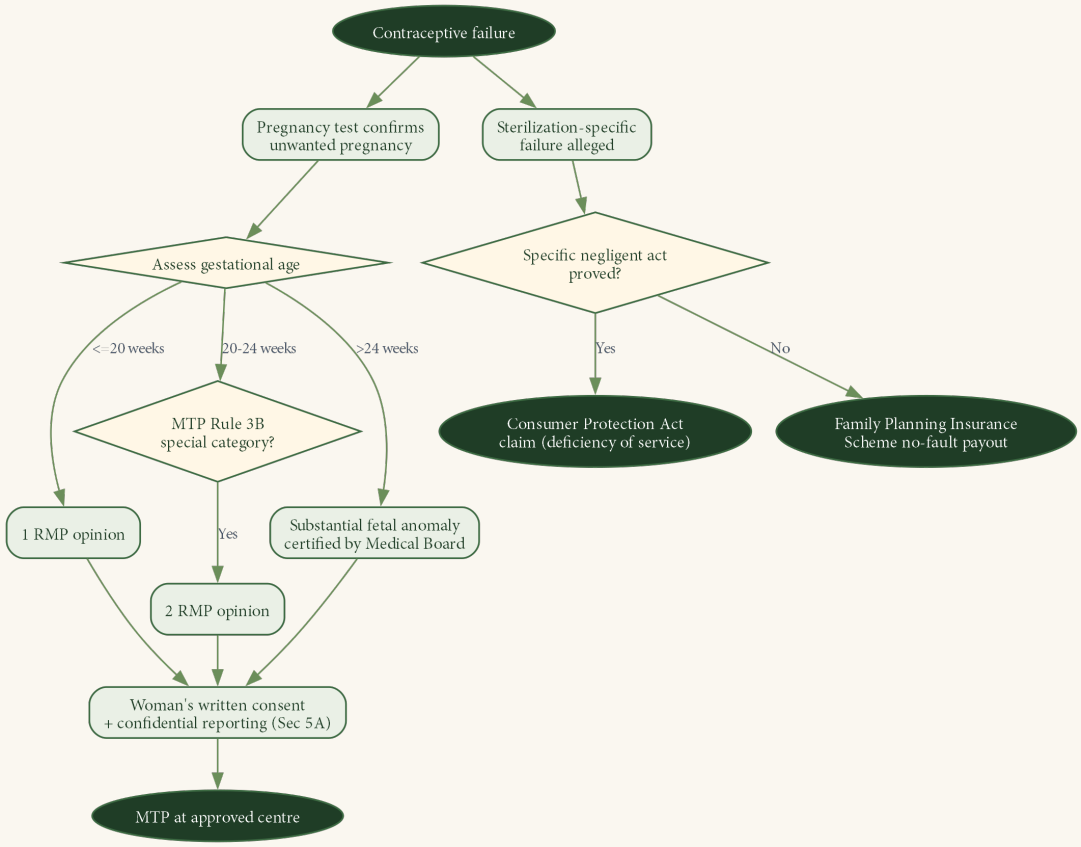
Medico-legal liability of the treating doctor

- **Does failure equal negligence?** No — since no sterilization technique is infallible, **failure by itself does not establish negligence**; negligence must be independently proved as a specific act (e.g., wrong structure ligated, incomplete occlusion, no confirmatory semen analysis after vasectomy).
- **Landmark Indian case law** (standard medico-legal teaching, not from the OBG corpus): *State of Punjab v. Shiv Ram* (Supreme Court of India, 2005) — sterilization failure alone is not proof of negligence, cannot alone found a tort claim; *State of Haryana v. Santra* (Supreme Court of India, 2000) — damages awarded where a specific negligent act (one tube left unoperated) was proved.
- **Consumer Protection Act** — medical treatment, including sterilization, is a "service"; a *proven deficiency* (inadequate counselling, no confirmatory test, defective technique) is actionable, but pregnancy after sterilization alone is not.
- **No-fault compensation** — the Government of India's **Family Planning Insurance Scheme** pays fixed compensation for death, complications, and failure of sterilization irrespective of proof of negligence; quantum is revised periodically.

Measures to minimise medico-legal risk

- **Detailed informed, written consent** before any permanent method — explaining permanency, the method-specific failure rate, alternatives, and the need for continued backup contraception until success is confirmed.
- **Confirm non-pregnant status** before interval sterilization (reliable contraceptive history in the preceding cycle and/or urine pregnancy test).
- **Confirm technique success** — semen analysis to document azoospermia after vasectomy (per institutional protocol, e.g., after 12 weeks/around 20 ejaculations) before declaring the couple protected; advise a barrier method until confirmed.
- **Careful surgical technique** — correct identification and adequate occlusion/excision of the tube (or vas), per the approved method (Pomeroy/Filshie clip preferred for lower failure).
- **Complete, contemporaneous documentation** of the structure identified, method used, and any technical difficulty encountered.
- **Counsel on emergency contraception** and the option of medical termination of pregnancy (MTP) if failure is suspected, so the woman can exercise her statutory right promptly.
- **Adherence to standard operating protocols** of the National Family Planning Programme and accredited-provider/quality-assurance norms for sterilization camps.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart of the woman's MTP pathway by gestational age (Explanation II, Section 3(2), MTP Act, as amended 2021) and, separately, the doctor's medico-legal liability pathway for alleged sterilization failure.

High-yield exam pointers

- **Explanation II, Section 3(2), MTP Act 1971** — the statutory basis for contraceptive failure as an independent ground for termination.
- **2021 amendment** — "married woman/her husband" → **"any woman/her partner"**; special-category upper limit raised **20 → 24 weeks** (2 RMP opinion); Medical Board needed beyond 24 weeks only for substantial fetal anomaly.
- **Pomeroy technique** lowest tubal-ligation failure (0.1–0.5%); **Filshie clip** lowest among laparoscopic methods (0.1%); overall tubectomy failure ≈ 0.7%.
- **Failure of sterilization ≠ negligence per se** — *State of Punjab v. Shiv Ram* (2005); negligence needs a specific proved act, as in *State of Haryana v. Santra* (2000).
- **Family Planning Insurance Scheme** = no-fault compensation for sterilization death/complication/failure.

- **Emergency contraception**: levonorgestrel 0.75 mg stat + 0.75 mg after 12 hours (or 1.5 mg single dose) within 72 hours (effective up to 120 hours); pregnancy rate 0–1%.
- Written, witnessed **informed consent + contemporaneous documentation** is the single strongest medico-legal safeguard for the treating doctor.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's text reflects the pre-2021 MTP framework (upper limit 20 weeks; ground restricted to a "married woman or her husband"); the current law is the MTP (Amendment) Act 2021, which raised the special-category limit to 24 weeks and extended the contraceptive-failure ground to any woman and her partner. Exact compensation figures under the Family Planning Insurance Scheme are revised periodically and are not verified against this corpus (which is medical, not statutory/policy, literature) — confirm the current notified amount before quoting a rupee figure.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Medical Termination of Pregnancy Act, 1971 as amended by the MTP (Amendment) Act 2021, and MTP Rules 2003 (amended 2021); Supreme Court of India — *State of Punjab v. Shiv Ram* (2005), *State of Haryana v. Santra* (2000); Government of India Family Planning Insurance Scheme. Coverage note: statutory/case-law detail is from standard medico-legal teaching, as this OBG textbook corpus does not itself carry statutory or case-law text.

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Female condoms

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

Definition — The female condom (marketed in its current nitrile form as the **FC2**) is a single-use, non-hormonal, female-controlled barrier contraceptive: a lubricated pouch that lines the vagina and part of the vulva before intercourse, held in place by a flexible inner ring fitted behind the pubic symphysis and an outer ring covering the introitus. It prevents fertilisation by keeping semen from reaching the cervix and vagina, and — because it also covers the external genitalia — offers broader protection against sexually transmitted infections (STIs), including HIV, than the male condom.

Structure, composition and evolution

Feature	FC1 (Reality®/Femidom)	FC2 (current device)
Material	Polyurethane	**Nitrile** sheath with a flexible polyurethane inner ring

Feature	FC1 (Reality®/Femidom)	FC2 (current device)
Length	17 cm pouch lining vagina + external genitalia	Same design, cheaper to manufacture
Rings	One ring at each end — smaller closed inner ring, larger open outer ring	Inner ring fitted under the symphysis like a diaphragm; outer (open) ring remains outside the vagina
Lubrication	Pre-lubricated with silicone; spermicide not required	Same — inner and outer sheath surfaces silicone-lubricated
Regulatory status	First female condom, US FDA-approved 1993	Only female condom currently marketed in the United States

- The inner ring is squeezed and the sheath is inserted into the vagina in the same manner as a diaphragm, with the closed end pushed as far as possible until the ring seats behind the symphysis, covering the cervix.
- About 2–3 cm of sheath and the outer ring are left outside the vagina, draping over the introitus and labia.
- Because nitrile (unlike latex) is not degraded by oil, both water- and oil-based lubricants can be added if desired.
- A structural-integrity study showed the sheath tolerates up to **eight cycles of washing, drying and relubrication**, though current regulatory labelling designates it for single use only.

Mechanism of action and correct use

- **Mechanical barrier** — the sheath lines the entire vagina and part of the vulva, physically preventing sperm from reaching the cervical mucus and upper genital tract, and blocking genital contact that transmits organisms such as HIV, herpes simplex virus, human papillomavirus, gonococci, chlamydia and trichomonads.
- Can be inserted well before intercourse (up to 8 hours), unlike the diaphragm which is timed close to coitus.
- The male partner must guide the penis into the sheath, not between the sheath and vaginal wall.
- A male condom must **never be used simultaneously** — friction between the two devices causes slippage, bunching and tearing of one or both.
- After intercourse and before standing up, the outer ring is **twisted to seal the pouch**, then gently withdrawn to prevent semen spillage.
- Discarded after single use (in the trash, not flushed).

Efficacy

Use pattern	First-year failure rate
Perfect use	5%
Typical use	21%

Efficacy is comparable to the diaphragm and cervical cap and is materially higher-failure than hormonal or intrauterine methods; the sheath is impervious in vitro to cytomegalovirus and HIV.

Advantages and disadvantages

Advantages	Disadvantages
Female-initiated — does not depend on male compliance; usable even if the partner refuses a condom	More cumbersome to insert than the male condom; comparatively **high rates of slippage/displacement**
Broader STI/HIV protection than the male condom (covers external genitalia/perineum too)	Higher unit cost limits large-scale programme uptake
No hormonal side effects; safe in lactation and immediately postpartum	Reduced sensation and aesthetic objection reported by some couples (visible outer ring; the older polyurethane FC1 also rustled)
Nitrile is not weakened by oil-based lubricants (unlike latex) — an option for latex allergy	Must never be combined with a male condom (friction → tearing)
Pre-lubricated; additional spermicide unnecessary	No clinician fitting needed, but correct insertion technique still needs teaching, and failure occurs if the penis is misdirected outside the sheath
No prescription or clinician fitting required — one size fits most women	Typical-use failure (21%) exceeds long-acting reversible methods

Indications for use

- Couples wanting **dual protection** against pregnancy and STIs/HIV, particularly when the male partner declines to use a condom.
- Latex allergy in either partner.
- Women wanting a female-controlled, non-hormonal, on-demand method without a clinician visit — unlike the diaphragm or cervical cap.
- High-STI-risk groups (e.g., sex workers, discordant couples) targeted by national dual-protection programmes.
- Bridging/interim contraception — e.g., awaiting IUD reinsertion, the first cycle of a new hormonal method, or post-vasectomy until azoospermia is confirmed.
- No systemic medical contraindications — being non-hormonal, it is suitable in virtually all women, including those who cannot use combined hormonal methods or an intrauterine device.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 38-3 — FC2 Female Condom insertion and positioning. A. The inner ring is squeezed for insertion. B. The inner ring is pushed inward with an index finger. (Williams Obstetrics 26e, p.690)*

Recent advances [RA]

- **FC2 (nitrile) has replaced FC1 (polyurethane/"Reality")** as the only female condom marketed in the United States — cheaper to manufacture, retains the same in-vitro impermeability to HIV/cytomegalovirus, and generates less rustling noise than the original polyurethane device (Williams Obstetrics 26e).
- **US FDA reclassification (2018)**: the female condom was down-classified from a Class III to a Class II device and renamed the **"single-use internal condom,"** easing the regulatory pathway for newer designs to reach the US market [US FDA, 2018 final rule].
- **WHO/UNFPA joint programming on female condoms** promotes prequalification of multiple manufacturers (FC2, Cupid, Woman's Condom, Velvet) to widen global public-sector procurement and reduce unit cost, which remains the principal barrier to programme scale-up.
- **India** — the government-run National Family Planning Programme has introduced the indigenously manufactured, WHO-prequalified **Cupid female condom** through the public health system in selected high-priority districts, with FOGSI (Federation of Obstetric and Gynaecological Societies of India) advocating dual-method counselling in STI/HIV-prevalent settings.
- **Multipurpose prevention technologies (MPTs)**, combining contraception with built-in antimicrobial/antiretroviral chemoprophylaxis, remain investigational; nonoxynol-9 co-formulations have not shown added protection against HIV, gonorrhoea or chlamydia (Speroff 9e).

High-yield exam pointers

- **FC2 = nitrile sheath + polyurethane inner ring + outer ring**; inner ring fits behind the symphysis "like a diaphragm," outer ring covers the introitus.
- Failure rate to write verbatim: **perfect use 5%, typical use 21%** (same range DC Dutta gives as 5–21/hundred-woman-years).
- **Never co-use with a male condom** — friction causes tearing/slippage; this is a favourite one-line MCQ/short-answer trap.
- Twist the outer ring before withdrawal to prevent semen spill — the single most commonly examined "correct use" step.
- Nitrile is oil-lubricant compatible (unlike latex) — a key distinguishing advantage to quote.
- Recent-advance one-liner: **FDA reclassified it as a "single-use internal condom" (Class II) in 2018.**

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

The FDA reclassification, WHO/UNFPA prequalification programme and India National Family Planning Programme details are general public-health knowledge rather than statements verified against the on-disk corpus books; cross-check the exact year/wording against a current WHO or FOGSI source before the exam if precise attribution is required.

SOURCE & COVERAGE

Williams Obstetrics 26e (Ch. 38 — Contraception: Barrier Methods, Fig. 38-3); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Ch. 24 — Barrier Methods of Contraception); DC Dutta's Textbook of Obstetrics 9e and DC Dutta's Textbook of Gynaecology 7e (Contraception chapters); Jeffcoate's Principles of Gynaecology 9e (Contraception chapter).

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First trimester MTP

Asked in: Paper IV 20-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Medical Termination of Pregnancy (MTP) is the deliberate ending of pregnancy, by medical or surgical means, before fetal viability, performed by a registered medical practitioner (RMP) under the legal protection of the MTP Act, 1971. **First-trimester MTP** is termination carried out up to 12 completed weeks of gestation, the period in which both drug-induced (medical) and minimally invasive surgical methods are safest and most effective.

Legal framework — MTP Act, 1971

Provision	Details
Gestational limit	Up to 20 weeks with the opinion of **1 RMP**; 20–24 weeks in specified categories of women with the opinion of **2 RMPs** (MTP Amendment Act, 2021); **no upper limit** if a Medical Board certifies substantial fetal abnormality
Indications	(i) Continuation would involve serious risk to the woman's life or grave injury to her physical/mental health (contraceptive failure is deemed to cause grave injury); (ii) substantial risk that the child would be born with serious physical/mental abnormality; (iii) pregnancy from rape (presumed grave mental injury)

Provision	Details
Consent	**Only the woman's written consent** is required — husband's consent is NOT needed; a minor (<18 years) or a mentally ill woman needs consent of a parent/legal guardian
Provider qualification	RMP who has assisted in ≥25 MTPs at an authorised centre, OR has 6 months' house-surgeoncy in obstetrics & gynaecology, OR holds a PG degree/diploma in the specialty
Place	Government hospital or a place/facility approved under the Act & Rules
Confidentiality	Termination is confidential; a report is sent to the Director of Health Services in the prescribed form — the woman's name/particulars cannot be disclosed except to a person authorised by law

Pre-abortion assessment

- Confirm gestational age — last menstrual period plus ultrasound (crown–rump length is most accurate before 12 weeks).
- History — menstrual/contraceptive history, medical/surgical illness, previous MTP or uterine surgery, allergy.
- General and pelvic examination; exclude ectopic pregnancy and pelvic infection.
- Investigations — blood group and Rh typing, haemoglobin; other tests as clinically indicated.
- Counselling — choice of method, expected course, failure/complication rates, and **post-abortion contraception**.
- Written informed consent as above.

Methods of first-trimester MTP (up to 12 weeks)

Medical	Surgical
Mifepristone alone or with misoprostol (PGE1)	Menstrual regulation
Methotrexate with misoprostol	Vacuum aspiration — manual (MVA) or electric (EVA)
Tamoxifen with misoprostol	Suction evacuation ± curettage
—	Dilatation and evacuation (D&E) — rapid or slow method

Medical regimen (mifepristone–misoprostol): mifepristone is a progestin antagonist that blocks the progesterone receptor and primes the myometrium/cervix; adding low-dose prostaglandin (misoprostol) improves efficacy.

- **Mifepristone 200 mg orally**, day 1.
- **Misoprostol 400 µg orally or 800 µg vaginally**, 36–48 hours later (day 3); patient observed in clinic ~4 hours, most expulsions occur within this window.
- Follow-up at 10–14 days to confirm complete abortion.
- Results: complete abortion in ~95%, incomplete in ~2%, no response in ~1%.
- The **mifepristone (1 tab, 200 mg) + misoprostol (4 tabs, 200 µg each) combipack is DGHS-approved for MTP up to 63 days of gestation** in India.
- Second-line: **methotrexate 50 mg/m² IM** (before 56 days) followed 7 days later by **misoprostol 800 µg vaginally** — cheaper but slower than mifepristone–misoprostol; repeat misoprostol at 24 hours if it fails, and confirm failure by ultrasound before proceeding to suction evacuation.
- Contraindications to mifepristone: age >35 years with heavy smoking, and long-term corticosteroid use.

Surgical methods:

- **Menstrual regulation** — aspiration of the endometrial cavity within 14 days of a missed period in a woman with a previously normal cycle; done as an outpatient/office procedure.
- **Vacuum aspiration (MVA/EVA)** — up to 12 weeks, with minimal cervical dilatation; a Karman's plastic cannula (up to 12 mm) is attached to a hand-operated 60 mL double-valve syringe (MVA) or an electric suction machine (EVA), creating a negative pressure of about **660 mm Hg**; takes 5–15 minutes; effective in 98–100%; less traumatic and safer than D&E.
- **Suction evacuation ± curettage** — similar principle using a suction machine with a plastic (Karman) or metal cannula; done under paracervical block, as an outpatient procedure, with minimal blood loss and low perforation risk (especially with a plastic cannula); not suitable beyond 10 weeks (higher chance of retained products).
- **Dilatation and evacuation (D&E)** — *rapid method*: sedation (diazepam) with paracervical block, uterus not more than 6–8 weeks (higher risk of cervical injury beyond this); *slow method*: cervical priming with laminaria tents/synthetic dilators (Dilapan, Lamicel) or vaginal misoprostol 400 µg 3 hours pre-operatively, followed by evacuation after ~12 hours — requires admission but causes less cervical trauma.

Complications of MTP

Timing	Complications
Immediate	Cervical laceration; uterine perforation (during D&E); haemorrhage/shock (trauma, incomplete abortion, atony, rarely coagulopathy); thrombosis/embolism; **post-abortal triad** of pain, bleeding and low-grade fever from retained products (needs antibiotics ± repeat evacuation); method-related effects (prostaglandin — vomiting, diarrhoea, cervicouterine injury)
Remote — gynaecological	Menstrual disturbance; chronic pelvic inflammation; infertility from cornual block; scar endometriosis (~1%); uterine synechiae (Asherman syndrome) with secondary amenorrhoea
Remote — obstetrical	Recurrent mid-trimester loss (cervical incompetence); ectopic pregnancy (three-fold increase); preterm labour; increased perinatal loss; Rh-isoimmunisation if unprotected; failed abortion with continuing pregnancy

Complications are fewest (~5%) when termination is done before 8 weeks by MVA or suction evacuation; first-trimester mortality is the lowest of all gestations (about 0.6 per 100,000 procedures).

Rh-negative women: give **anti-D immunoglobulin 100 µg IM within 72 hours** of any abortion in a non-immunised Rh-negative woman.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 16.4 — Manual vacuum aspiration syringe; the pinch valves are indicated by the arrow (Te Linde 13e, p.835)*

High-yield exam pointers

- MTP Act, **1971**; amended **2021** — 20 weeks (1 RMP) → 20–24 weeks for specified categories (2 RMPs) → no limit with Medical Board certification of substantial fetal abnormality.
- Husband's consent **NOT** required; minor/mentally ill needs guardian's consent.
- Combipack: **mifepristone 200 mg + misoprostol 800 µg**, DGHS-approved up to **63 days**.
- MVA: Karman cannula ≤12 mm, 60 mL syringe, **660 mm Hg** negative pressure, up to 12 weeks, 98–100% success.
- Complications least (~5%) if MTP done before **8 weeks** by MVA/suction.
- Anti-D **100 µg IM within 72 hours** in Rh-negative women.
- Three-fold increase in **ectopic pregnancy** risk after MTP is a classic remote complication.

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

The 20-week gestational ceiling reproduced in older textbook editions reflects the original 1971/1975 provisions; the current law is the MTP (Amendment) Act, 2021, which raised the limit to 24 weeks for specified categories of women and removed any upper limit where a Medical Board certifies substantial fetal abnormality — quote the current 2021 provisions in the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (MTP Act provisions, indications, medical and surgical methods, complications); MTP Act, 1971 and MTP (Amendment) Act, 2021.

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Government of India programmes for adolescent health

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

Definition — Adolescents (**10–19 years**, the WHO/Government of India age definition) form about one-fifth of India's population. The Government of India addresses their health through a multi-ministerial strategy anchored on the **Rashtriya Kishor Swasthya Karyakram (RKSK, 2014)** under the **National Health Mission (NHM)**, Ministry of Health & Family Welfare (MoHFW), and reinforced by dedicated nutrition, anaemia-control, menstrual-hygiene, girl-child-welfare and child-protection schemes run by MoHFW and the **Ministry of Women & Child Development (MWCD)**.

Rashtriya Kishor Swasthya Karyakram (RKSK) — flagship programme

Feature	Detail
Launch	**6 January 2014**, MoHFW, under the National Health Mission — operationalises the **National Adolescent Health Strategy (2014)**
Predecessor	Replaced the earlier, narrower **Adolescent Reproductive and Sexual Health (ARSH)** strategy (RCH-II era)
Target group	**10–19 years** — both sexes, married and unmarried, in-school and out-of-school
Approach	Shifts from a purely clinic-based, curative model to a **holistic, life-cycle, "positive youth development"** approach delivered where adolescents actually are (community, school, digital space)

Six strategic priorities of RKSK

Priority	Focus
Nutrition	Anaemia, undernutrition, obesity — linked to Weekly Iron and Folic Acid Supplementation (WIFS)
Sexual and reproductive health (SRH)	Delaying age at marriage/first pregnancy, contraceptive counselling, menstrual hygiene, safe abortion referral
Non-communicable diseases (NCDs)	Healthy diet, physical activity, tobacco/alcohol-related NCD risk
Substance misuse	Prevention and referral for tobacco, alcohol, drug abuse
Injuries and violence	Including road-traffic injury and **gender-based violence**
Mental health	Screening, counselling and referral for common adolescent mental-health problems

Delivery platforms

- **Community-based — Peer Educator ("Saathiya") approach**: one male and one female peer educator selected per **20 adolescents (≈1,000 population)** in a village/urban ward to disseminate health information and referrals.
- **Facility-based — Adolescent Friendly Health Clinics (AFHCs)**: fixed-day, fixed-time weekly clinics from the Sub-Centre up to the District Hospital, staffed by a trained Medical Officer/Auxiliary Nurse Midwife (ANM)/counsellor, offering confidential SRH, nutrition, mental-health and NCD services.
- **School-based**: Adolescent Education Programme with the Education department for in-school adolescents.
- **Digital**: **Saathiya Resource Kit and Saathiya App (2017)** — a peer-educator training tool and self-help app covering the six strategic priorities, backed by the toll-free **Saathiya Salaah** helpline.
- **Convergence**: with the Integrated Child Development Services (ICDS)/MWCD schemes for out-of-school adolescent girls, the Education department, and Panchayati Raj Institutions.

Allied Central Government schemes supporting adolescent health

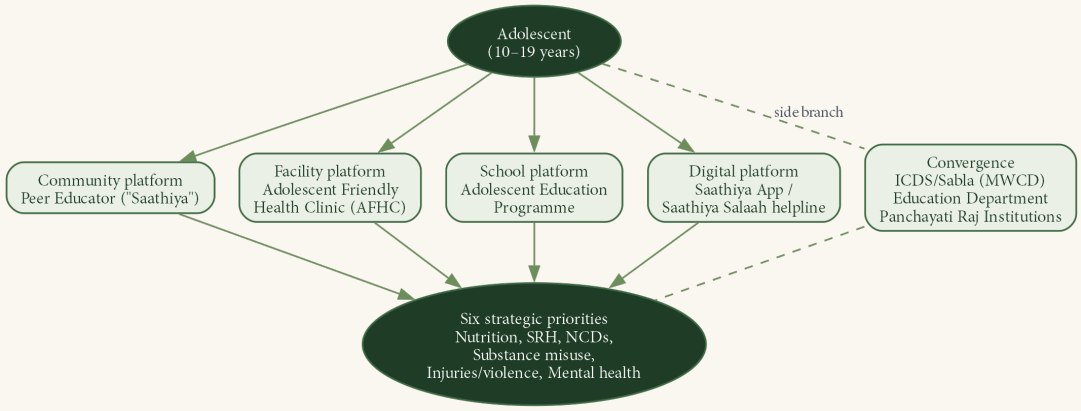
Scheme	Launch / Ministry	Target group	Key intervention
Weekly Iron and Folic Acid Supplementation (WIFS)	2012, MoHFW	10–19 years — school-going (classes VI–XII) and out-of-school girls (via Anganwadi)	Supervised **weekly** tablet (**100 mg elemental iron + 500 µg folic acid**) + **biannual albendazole 400 mg** deworming + nutrition/health education
National Deworming Day (NDD)	2015, MoHFW	1–19 years	Single-dose **albendazole 400 mg**, fixed day **10 February**, with a **10 August** mop-up round
Menstrual Hygiene Scheme (MHS)	2011, MoHFW	Rural adolescent girls 10–19 years	ASHA-delivered subsidised sanitary-napkin pack (6 pads at nominal cost) plus menstrual-hygiene and safe-disposal education
Scheme for Adolescent Girls ("Sabla")	2010, MWCD (ICDS/Anganwadi platform); merged the earlier Kishori Shakti Yojana and Nutrition Programme for Adolescent Girls	Out-of-school girls **11–14 years** (extended to 14–18 years in select districts)	Supplementary nutrition, iron-folic acid, health check-up and referral, nutrition/health education, life-skills education and vocational training
Anemia Mukt Bharat (AMB)	2018, MoHFW, under POSHAN Abhiyaan	Six life-stage groups, incl. adolescent boys and girls 10–19 years	**"6×6×6" strategy** (6 beneficiary groups × 6 interventions × 6 institutional mechanisms) — intensified WIFS, deworming, testing and treatment of anaemia
Rashtriya Bal Swasthya Karyakram (RBSK)	2013, MoHFW	0–18 years	Screening for the **"4 D's" — Defects at birth, Deficiencies, Diseases, Developmental delays** (including disability) via mobile health teams and referral to District Early Intervention Centres

Scheme	Launch / Ministry	Target group	Key intervention
School Health Programme (Ayushman Bharat)	2020, MoHFW + Ministry of Education	School-going adolescents	Trained teacher "Health & Wellness Ambassadors"; health promotion across 11 themes including SRH, substance abuse, injury and gender-based violence
Beti Bachao Beti Padhao	2015, MWCD + MoHFW + Ministry of Education	The girl child	Improve child sex ratio; ensure survival, protection and education of girls
Mission Parivar Vikas	2016, MoHFW	High total-fertility-rate districts	Delay age at marriage/first childbirth; contraceptive counselling for newly-weds; spacing methods

Legal and protective framework

- **Prohibition of Child Marriage Act, 2006** — minimum legal age of marriage 18 years (female), 21 years (male); underpins efforts to prevent adolescent pregnancy.
- **Protection of Children from Sexual Offences (POCSO) Act, 2012** — child-friendly reporting, investigation and trial for sexual offences against minors.
- **Pre-Conception and Pre-Natal Diagnostic Techniques (PC-PNDT) Act, 1994** — prohibits sex-selective diagnosis, indirectly protecting the girl child.
- **Medical Termination of Pregnancy (MTP) Act (amended 2021)** — safe, legal termination access relevant to adolescent unwanted pregnancy, subject to guardianship consent rules for minors.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

RKSK service-delivery model: the four delivery platforms all feed into the six strategic priorities, with a side-branch convergence link to ICDS/Sabla, the Education Department and Panchayati Raj Institutions.

High-yield exam pointers

- **RKSK launched 6 January 2014**, replacing the older **ARSH** strategy; age group **10–19 years**.
- **Six strategic priorities** — Nutrition, SRH, NCDs, Substance misuse, Injuries & violence, Mental health (mnemonic: **"N-S-N-S-I-M"**).
- **Peer educator ratio**: 1 male + 1 female **"Saathiya"** per **20 adolescents/1,000 population**.
- **WIFS dose**: weekly **100 mg elemental iron + 500 µg folic acid**, plus **biannual albendazole 400 mg** (National Deworming Day — 10 February, mop-up 10 August).
- **Sabla**: out-of-school girls **11–14 years** under **ICDS/MWCD**, not MoHFW.
- **Menstrual Hygiene Scheme**: ASHA-delivered subsidised pack of **6 sanitary napkins**.
- **Anemia Mukt Bharat "6×6×6"** strategy targets adolescents as one of six life-stage groups.

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

Government of India adolescent-health programme detail is public-health/policy content that the on-disk obstetrics-gynaecology spine texts (Williams, Berek & Novak, Speroff, Jeffcoate's) do not carry — they are international texts without Indian scheme names — and DC Dutta's Obstetrics 9e mentions "Adolescent and Reproductive Health" only as one general component of Reproductive and Child Health (RCH) care without naming RKSK, WIFS, Sabla or Anemia Mukt Bharat. The programme names, launch years, target groups and dose/frequency details above are therefore drawn from standing Ministry of Health & Family Welfare/Ministry of Women & Child Development policy documents (per established public-domain programme knowledge) rather than verified line-by-line against the textbook corpus.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Reproductive and Child Health Care: Adolescent and Reproductive Health). Ministry of Health & Family Welfare, Government of India programme documents — National Adolescent Health Strategy (2014)/Rashtriya Kishor Swasthya Karyakram operational framework, Weekly Iron and Folic Acid Supplementation Programme, National Deworming Day, Menstrual Hygiene Scheme, Anemia Mukt Bharat (POSHAN Abhiyaan), Rashtriya Bal Swasthya Karyakram, School Health Programme (Ayushman Bharat). Ministry of Women & Child Development — Scheme for Adolescent Girls ("Sabla"), Beti Bachao Beti Padhao. Prohibition of Child Marriage Act 2006; Protection of Children from Sexual Offences (POCSO) Act 2012. Coverage note as above.

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High Dependency Unit for safe motherhood

Asked in: Paper IV 18-Nov-2019 — RGUHS MS Obstetrics & Gynaecology

Definition — A High Dependency Unit (HDU) is an intermediate-level, obstetrician-led critical-care area — sited within or immediately adjacent to the labour ward/maternity operation theatre — that provides continuous one-to-one or one-to-two nursing, close haemodynamic monitoring and early-warning charting for a woman whose condition is unstable or at risk of deterioration but who does not yet need the organ-support facilities of a full intensive care unit (ICU). It is the essential "step-up/step-

down" link in the obstetric referral pyramid and a core infrastructure standard of India's safe motherhood strategy.

Why an HDU is central to safe motherhood

- Haemorrhage, hypertensive disorders (severe pre-eclampsia/eclampsia/HELLP syndrome) and sepsis are the leading direct causes of maternal death (~20–25%, 12–15% and 15–20% respectively); ~75% of obstetric ICU admissions are postpartum, and most deteriorations are preventable if recognised early.
- The WHO **maternal near-miss** concept — a woman who "nearly died but survived a complication of pregnancy, childbirth or within 42 days of its termination" — reflects the same iceberg: for every maternal death, roughly 15 women survive severe acute maternal morbidity (SAMM). An HDU converts potential near-misses/deaths into survivors by escalating care before irreversible organ failure.
- It shortens the "third delay" of the three-delays model (delay in receiving adequate care once at a facility) by providing enhanced monitoring at the point of care rather than only at a distant, referral-only ICU.
- It is now a mandatory quality standard under the Government of India's **LaQshya** (Labour Room Quality Improvement Initiative, Ministry of Health & Family Welfare, 11 December 2017), which requires a dedicated obstetric HDU/ICU at every government medical college and high-case-load district hospital/first referral unit (FRU).

Indications for step-up to HDU/ICU care

Category	Examples
Haemorrhage	Antepartum/postpartum haemorrhage, retained placenta with ongoing bleeding, ruptured uterus, abruption with coagulopathy
Hypertensive disorders	Severe pre-eclampsia, eclampsia, HELLP syndrome, uncontrolled blood pressure
Sepsis	Chorioamnionitis, puerperal or post-abortal sepsis, pyelonephritis with systemic response
Cardiopulmonary	Heart disease/peripartum cardiomyopathy, thromboembolism, amniotic fluid embolism, acute respiratory distress syndrome (ARDS)
Trauma/other	Trauma in pregnancy, major surgical complication needing close observation

(Categories adapted from DC Dutta's Obstetrics 9e, Box 39.8, "Common Indications for Admission to Obstetric ICU" — the same triggers mandate step-up to HDU before frank organ failure requires full ICU care.)

Trigger parameters for escalation

Parameter	Escalate/refer when
Heart rate	<40 or >130–150 bpm
Systolic blood pressure	<80 or >160 mmHg
Respiratory rate	>30–35/min
Oxygen saturation (SpO2)	<90–93%
Urine output	<30 mL/hour (oliguria)
Mental status	Altered/unresponsive, uncontrolled seizures
Temperature	>38°C or <36°C

(Synthesised from DC Dutta's Obstetrics 9e, Box 39.9, "Health Indicators for Admission to Obstetric ICU," and the National Partnership for Maternal Safety's Maternal Early Warning Criteria [Mhyre et al., Obstet Gynecol. 2014;124:782–786]; the UK Modified Early Obstetric Warning Score (MEOWS) chart uses the same vital-sign set for bedside surveillance.)

Location, staffing and equipment

- **Location** — within or immediately adjacent to the labour ward/operation theatre complex, not a physically distant ICU, so transfer for delivery or operative intervention is immediate.
- **Staffing** — obstetrician-led team; experienced obstetric nurses at a 1:1–1:2 nursing ratio; anaesthetist and physician/intensivist on call; neonatologist linkage for the newborn.
- **Monitoring equipment** — continuous electrocardiography (ECG), non-invasive/invasive blood pressure, pulse oximetry; bedside early-warning (MEOWS-type) chart; hourly urine output via indwelling catheter.
- **Resuscitation equipment** — two large-bore intravenous lines, infusion pumps, oxygen with delivery devices, crash cart with defibrillator; magnesium sulphate (eclampsia) and oxytocin/tranexamic acid (postpartum haemorrhage) immediately available.
- **Support services** — point-of-care haemoglobin/coagulation testing, uninterrupted blood bank/blood-component access, ventilator on standby, and a written protocol for further escalation to ICU or transfer to a higher centre.

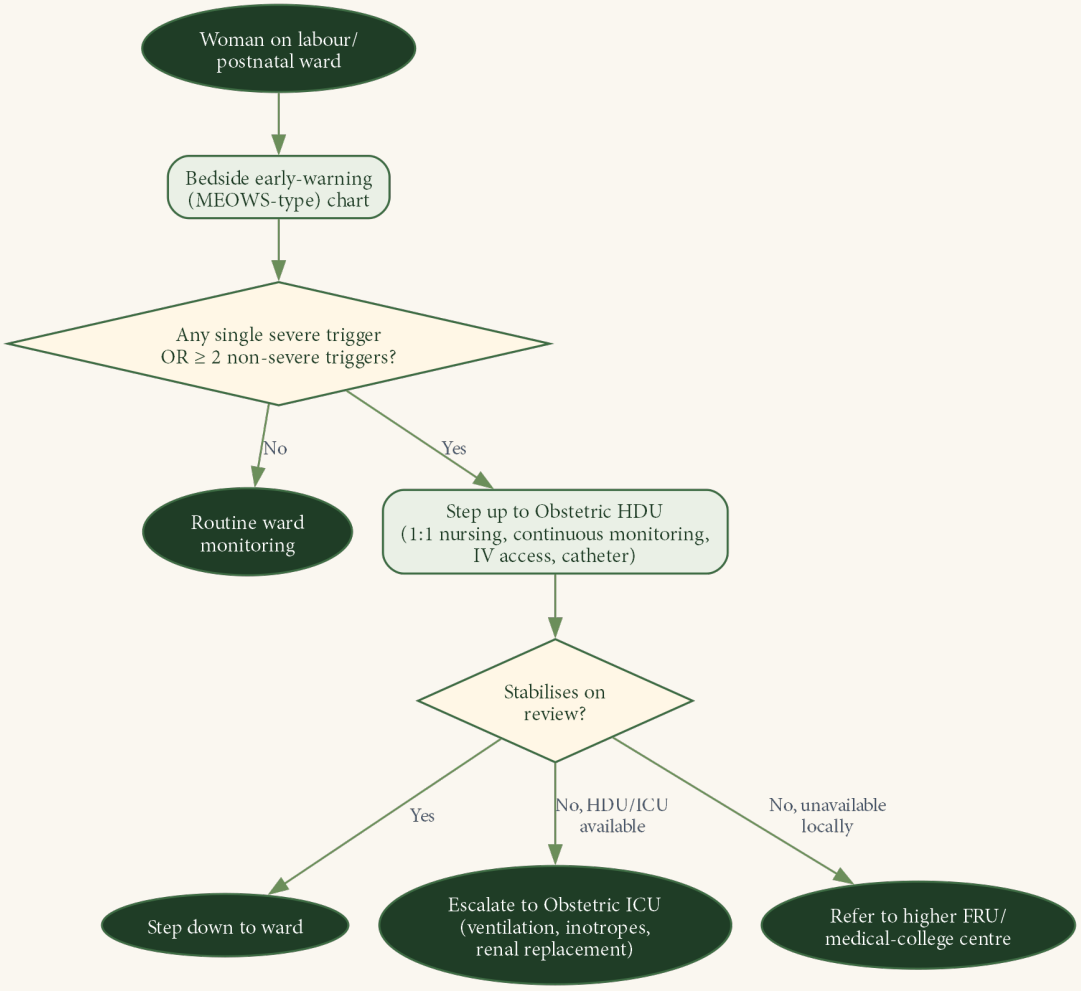
Levels of maternal care and referral linkage

Level	Facility (Indian referral pyramid)	Capability
Primary	Sub-centre/Primary Health Centre	Basic antenatal/intranatal care; no HDU — refers upward

Level	Facility (Indian referral pyramid)	Capability
First referral unit (FRU)/Community Health Centre	Comprehensive emergency obstetric care (EmOC)	Blood transfusion, caesarean section, basic stabilisation; HDU bed where upgraded
District hospital/medical college	LaQshya-mandated obstetric HDU	Dedicated obstetric HDU, often with ICU access, blood bank, round-the-clock operation theatre
Tertiary/regional perinatal centre	Obstetric ICU + HDU	Multidisciplinary intensivist-led ICU, organ support, subspecialty back-up

This mirrors the ACOG/SMFM risk-appropriate framework (Obstetric Care Consensus No. 9, "Levels of Maternal Care," Obstet Gynecol. 2019;134:e41–e55, correction 2023), which grades facilities as Birth Center, Level I (basic), Level II (specialty), Level III (subspecialty) and Level IV (regional perinatal health care centre), so a woman is cared for at the facility matched to her risk, with HDU/ICU capability concentrated at Level III–IV.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Escalation pathway from bedside early-warning trigger to obstetric HDU/ICU step-up, step-down or referral.

Recent advances [RA]

- **ACOG/SMFM Obstetric Care Consensus No. 9, "Levels of Maternal Care"** (Obstet Gynecol. 2019;134:e41–e55; correction 2023) replaced the 2015 consensus, formalising four risk-appropriate levels (Birth Center; I Basic; II Specialty; III Subspecialty; IV Regional) that concentrate HDU/ICU-capable obstetric critical care at higher-level centres.
- **Maternal Early Warning Criteria**, National Partnership for Maternal Safety (Mhyre et al., Obstet Gynecol. 2014;124:782–786), standardised the vital-sign/symptom triggers that prompt bedside review and HDU-level escalation.
- **Maternal Early Warning Trigger (MEWT) tool** (Shields et al., Am J Obstet Gynecol. 2016;214:527.e1–6): one "severe" trigger (e.g., heart rate >130/min, mean arterial pressure <55

mmHg, SpO2 <90%) or two "non-severe" triggers mandate HDU-style review, and this cut composite severe maternal morbidity on multicentre implementation.

- **India — LaQshya** (Ministry of Health & Family Welfare, 11 December 2017) made a dedicated obstetric HDU (and ICU where feasible) a certifiable quality standard for every government medical college and high-case-load district hospital/FRU; ~283 obstetric HDU/ICUs approved nationally to date.
- The **WHO Maternal Near-Miss approach** audits HDU/ICU case-mix and outcomes as a surrogate for maternal mortality review where deaths are too few for statistical power.

High-yield exam pointers

- HDU = intermediate/step-down care, within the labour ward, obstetrician + experienced-nurse led (1:1–1:2 nursing), between general ward and ICU.
- Triad of indications: haemorrhage, hypertensive disorders, sepsis; ~75% obstetric ICU admissions are postpartum.
- WHO near-miss = 1 clinical + 1 investigation + 1 intervention criterion, or any single cardiorespiratory-collapse criterion.
- LaQshya (MoHFW, 11 Dec 2017) → mandatory obstetric HDU/ICU at medical colleges/high-load FRUs; ~283 approved nationally.
- ACOG OCC-9 (2019) → Birth Center/Level I–IV risk-appropriate maternal care.
- Mnemonic for HDU essentials — "**MOVE-B**": **M**onitor (ECG/SpO2/BP), **O**xygen, **V**enous access ×2, **E**mergency drug tray, **B**ladder catheter with hourly output.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Obstetrics 9e attributes a three-tier "Level 1/2/3" critical-care classification to ACOG in which Level 2 is the HDU; the more commonly cited and currently examined international framework is the four-tier ACOG/SMFM "Levels of Maternal Care" (Birth Center, I–IV) — use whichever the question context (Indian FRU pyramid versus international levels) demands, without conflating the two numbering systems.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38, "Safe Motherhood, Epidemiology of Obstetrics"; Chapter 39, "Special Topics in Obstetrics — Critical Care in Obstetrics"); ACOG/SMFM Obstetric Care Consensus No. 9, "Levels of Maternal Care" (2019, correction 2023); National Partnership for Maternal Safety, Maternal Early Warning Criteria (Mhyre et al., 2014); Shields et al., Maternal Early Warning Trigger tool (2016); Government of India, Ministry of Health & Family Welfare, LaQshya guidelines (2017); WHO Maternal Near-Miss approach.

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HPV vaccination

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

Definition — Human papillomavirus (HPV) vaccination is prophylactic immunisation against the oncogenic and wart-causing genotypes of HPV, given before or soon after sexual debut to prevent HPV-related cervical intraepithelial neoplasia (CIN), cervical cancer, and anogenital warts. It is the primary-prevention pillar of the World Health Organization (WHO) strategy to eliminate cervical cancer, complementing secondary prevention (screening) and tertiary treatment of pre-invasive/invasive disease.

Vaccines available and antigenic coverage

Vaccine	Type	HPV genotypes covered	Coverage/benefit
Cervarix	Bivalent (2vHPV)	16, 18	~70% of cervical cancers
Gardasil	Quadrivalent (4vHPV)	6, 11, 16, 18	~70% of cervical cancers + genital warts (types 6, 11)
Gardasil 9	Nonavalent (9vHPV)	6, 11, 16, 18, 31, 33, 45, 52, 58	~90% of cervical cancers; only vaccine currently marketed in the United States
Cervavac	Quadrivalent (qHPV), indigenous	6, 11, 16, 18	India's first indigenously developed HPV vaccine (Serum Institute of India), Central Drugs Standard Control Organisation (CDSCO)-approved 2022

All are virus-like-particle (VLP) recombinant vaccines (L1 capsid protein), non-infectious, and produce type-specific humoral and local immunity; there is partial cross-protection against related genotypes (e.g., 31, 33, 45).

Indications, target age groups and dosing schedule

Age at first dose	Regimen	Remarks
9–14 years (target/routine age)	2 doses — 0 and 6–12 months	Routine recommended age; WHO (2022) also permits a single-dose schedule in this age band
15–26 years (catch-up)	3 doses — 0, 1–2, 6 months (bivalent 0, 1, 6; quadrivalent/nonavalent 0, 2, 6)	Recommended for all not previously vaccinated
27–45 years	3 doses, only after shared clinical decision-making	Not routinely recommended; American College of Obstetricians and Gynecologists (ACOG)/Advisory Committee on Immunization Practices (ACIP) endorse case-by-case use weighing likely benefit against prior HPV exposure
Immunocompromised/HIV-positive (any age)	3-dose schedule regardless of age at initiation	Reduced immunogenicity with fewer doses

Doses are given intramuscularly (deltoid). If the first dose is given before age 15, a 2-dose schedule suffices; if started at 15 years or later, or in an immunocompromised host, 3 doses are required.

Administration, contraindications and special situations

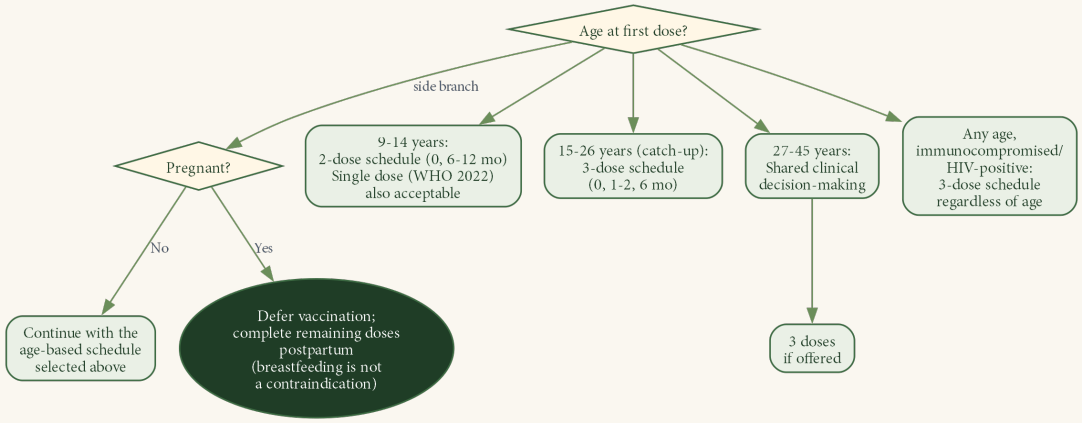
- **Route/site** — deep intramuscular injection into the deltoid.
- **Pregnancy** — not administered during pregnancy; if a woman is inadvertently vaccinated or found pregnant after starting the series, no adverse pregnancy outcome has been demonstrated, pregnancy need not be terminated, and remaining doses are simply deferred until after delivery.
- **Breastfeeding** — compatible; vaccination may proceed.
- **Contraindications** — hypersensitivity to a vaccine component (e.g., yeast in Gardasil), or moderate-to-severe acute illness (defer until recovery).
- **Does not replace screening** — because coverage is genotype-limited (even the nonavalent vaccine covers ~90%, not 100%, of oncogenic types) and because vaccination does not clear pre-existing infection, vaccinated women must continue cervical cancer screening (Papanicolaou smear/HPV DNA testing) per the standard age-based protocol.
- **Not therapeutic** — the vaccine is purely prophylactic; it has no effect on established HPV infection, condylomas, or CIN, so maximal benefit is obtained when given before sexual debut.

- **Safety** — generally safe and well tolerated; local injection-site pain/erythema and transient syncope (from anxiety/vasovagal response, warranting 15 minutes' observation post-injection) are the principal adverse effects.

Recent advances [RA]

- **WHO global cervical cancer elimination strategy (2020)** — endorsed by the World Health Assembly; sets 2030 targets of 90% of girls fully HPV-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 (the "90-70-90" targets).
- **WHO single-dose recommendation** — the WHO Strategic Advisory Group of Experts on Immunization (SAGE) reviewed trial and observational data showing comparable efficacy of a single dose to multi-dose schedules and updated the WHO position paper (Weekly Epidemiological Record, December 2022) to recommend a single-dose option for girls and women aged 9–20 years, retaining 2 doses for those ≥21 years and for immunocompromised/HIV-positive individuals.
- **ACIP shared clinical decision-making for adults 27–45 years** — formalised by the US Advisory Committee on Immunization Practices (Meites et al., MMWR 2019), adopted into current ACOG guidance.
- **Indian indigenous vaccine and national push** — Cervavac (Serum Institute of India), a quadrivalent vaccine, received CDSCO approval in 2022 and commercial launch in 2023, substantially lowering vaccine cost for national deployment; the Union Budget 2024–25 announced government encouragement of HPV vaccination for girls aged 9–14 years as part of cervical cancer prevention efforts, with the National Technical Advisory Group on Immunization (NTAGI) evaluating introduction into the Universal Immunization Programme.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Age-based HPV vaccination decision algorithm, with the pregnancy side-branch deferring remaining doses to postpartum.

High-yield exam pointers

- **Gardasil 9 genotypes** — 6, 11, 16, 18, 31, 33, 45, 52, 58 (mnemonic: "6-11 warts, 16-18 the big two cancer types, plus five more: 31-33-45-52-58").
- **Dose rule**: first dose **<15 years → 2 doses**; **≥15 years or immunocompromised → 3 doses**.
- Target/routine age **9–14 years**; catch-up to **26 years**; **27–45 years only with shared decision-making**.
- **Not given in pregnancy**; safe with breastfeeding; inadvertent exposure needs no intervention beyond deferring remaining doses.
- **WHO 90-70-90 by 2030**; **WHO single-dose option (2022)** for ages 9–20.
- Vaccination **never replaces screening** — genotype coverage is incomplete and the vaccine has no therapeutic effect on existing infection.
- India: **Cervavac** (Serum Institute of India, quadrivalent, CDSCO 2022) — indigenous, low-cost option driving the national rollout push for girls 9–14 years.

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

The three-dose month-intervals above follow the current package-insert/Advisory Committee on Immunization Practices standard (bivalent 0-1-6, quadrivalent/nonavalent 0-2-6); some older textbook editions print these intervals reversed, and the schedule above should be followed in the exam.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Gynaecology 7e; WHO Global Strategy to Accelerate the Elimination of Cervical Cancer as a Public Health Problem (2020); WHO position paper on HPV vaccines, Weekly Epidemiological Record (December 2022); ACOG Committee Opinion No. 809; Meites et al., MMWR 2019 (ACIP adult HPV vaccination update); CDSCO/Government of India (Cervavac approval 2022; Union Budget 2024–25).

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Hysterectomy and depression. Discuss the risk factors for depression after hysterectomy

Asked in: Paper IV 04-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Post-hysterectomy depression is a clinically significant depressive episode — persistent low mood, anhedonia, sleep and appetite disturbance, and impaired day-to-day functioning lasting beyond the expected weeks-long adjustment period — occurring after removal of the uterus. Well-controlled studies show that a hysterectomy performed for a definite indication does **not**, by itself, cause depression in a psychologically healthy woman; the risk instead clusters in women who carry one or more of the identifiable preoperative, operative, and psychosocial risk factors discussed below, with risk being highest in the first postoperative year.

Risk factors for depression after hysterectomy

Category	Risk factor	Why it predisposes
Psychiatric history	Personal or family history of depression, anxiety disorder, or other psychiatric illness — the single strongest predictor	Pre-existing vulnerability is unmasked/exacerbated by the physiological and psychological stress of major surgery
Personality/coping style	Neurotic, dependent, or poor-coping personality traits; catastrophising or health-anxious temperament	Reduced resilience to a major life event and surgical recovery
Age	Younger age at hysterectomy (under 35–40 years)	Loss of the uterus is felt more keenly against reproductive/identity milestones still ahead
Surgical indication	Hysterectomy performed for chronic pelvic pain or menorrhagia where no definite organic pathology is found on the specimen	The presenting symptom often persists, so the patient feels the operation has "failed," producing disappointment and somatisation

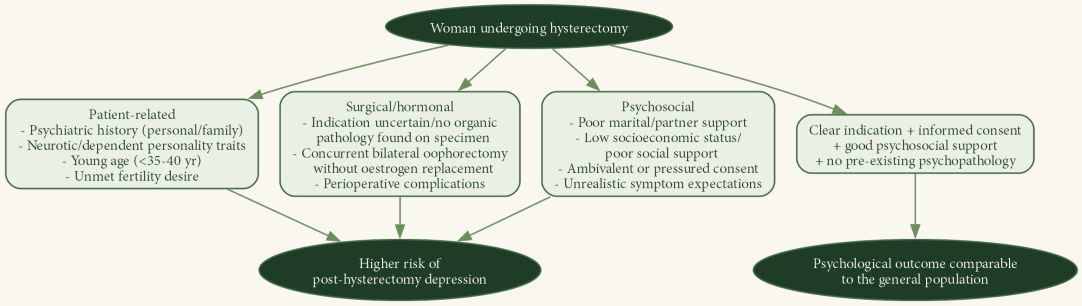
Category	Risk factor	Why it predisposes
Consent/decision-making	Ambivalence about surgery, surgery undertaken under family or social pressure rather than the woman's own informed choice, or inadequate preoperative counselling	An operation not fully "owned" by the patient predisposes to regret and low mood afterward
Fertility desire	Involuntary loss of childbearing capacity, especially in a young nulliparous woman or one who still desired more children	Grief reaction over lost fertility superimposed on the surgical stress
Concurrent oophorectomy	Bilateral salpingo-oophorectomy in a premenopausal woman, producing abrupt surgical menopause, particularly without oestrogen replacement	Sudden estrogen withdrawal (versus the gradual fall of natural menopause) is a recognised trigger for mood disturbance
Marital/relationship	Poor marital or partner relationship, lack of partner support, perceived threat to femininity, body image, or sexual identity	Removes a key buffer against postoperative psychological stress
Social support	Low socioeconomic status, poor social support network, multiple dependents with limited help during recovery	Prolongs practical and emotional strain of convalescence
Postoperative course	Perioperative complications, prolonged recovery, chronic postoperative pain, or new dyspareunia/sexual dysfunction	Ongoing physical morbidity is a direct driver of low mood
Expectations/attitude	Unrealistic expectation that hysterectomy will cure unrelated symptoms, or a pre-existing tendency to expect ill-health and be a frequent health-service user	Unmet expectation of "cure" precipitates disappointment and depressive symptoms

These risk factors converge on three common pathways: **unresolved psychological vulnerability** (past psychiatric illness, ambivalent consent, unrealistic expectations), **loss and identity threat** (young age, unmet fertility desire, altered body image/sexuality), and **abrupt hormonal or physical disruption** (surgical menopause without oestrogen replacement, complications, chronic pain) — occurring in a woman who lacks the buffering effect of good marital and social support.

Factors that do NOT independently raise risk (reassurance points)

Factor	Evidence
Route of hysterectomy (abdominal vs vaginal vs laparoscopic)	No consistent difference in psychological outcome between routes
A well-explained, clearly indicated hysterectomy (e.g., fibroids, prolapse, malignancy) in a psychologically healthy woman	In the absence of pre-existing psychopathology, indicated elective hysterectomy has few, if any, significant psychological sequelae, including depression
Natural cessation of menses per se	Longitudinal cohort data show menopause itself is not perceived negatively by most women; only the surgical-menopause subgroup showed excess symptoms, and this was attributed more to the underlying reason for surgery than to the operation or hormonal change itself

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Classification flowchart: patient-related, surgical/hormonal, and psychosocial risk factors converge on higher depression risk, while clear indication + informed consent + good support + no pre-existing psychopathology converges on a normal psychological outcome.

High-yield exam pointers

- Single strongest predictor to write first: **pre-existing psychiatric history** (personal or family history of depression/anxiety).
- Classic exam trap: hysterectomy itself is **not** depressogenic — "no organic pathology found" + poorly-indicated surgery + unmet symptom expectations is the true driver.
- Concurrent **bilateral oophorectomy** in a young woman **without oestrogen replacement** = surgical menopause = added mood risk.
- Route of surgery (abdominal/vaginal/laparoscopic) is **not** an independent risk factor — do not write this as a risk factor.

- Key line to reproduce: in the absence of pre-existing psychopathology, an indicated elective hysterectomy has **few, if any, significant psychological sequelae (including depression)**.
- Practical triad for the exam: poor marital/social support + ambivalent or pressured consent + unrealistic symptom expectations.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Standard texts (DC Dutta's Gynaecology) list "depression, psychiatric symptoms" only as a named remote complication of hysterectomy, without an itemised risk-factor list; the risk-factor profile above follows the psychological/sexual-sequelae discussion in Berek & Novak's Gynecology and Speroff's chapters on menopause and sexuality, supplemented by established psychiatric-gynaecological teaching on predictors of post-hysterectomy mood disturbance.

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

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Immunisation during pregnancy

Asked in: Paper IV Jul 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — Immunisation during pregnancy is the deliberate active (vaccine) or passive (immune globulin) stimulation of immunity, given to a pregnant woman to protect her, her fetus, and her neonate against vaccine-preventable infection. Inactivated, toxoid, subunit, and recombinant vaccines are safe at any trimester; live-attenuated vaccines carry a theoretical risk of transplacental fetal infection and are generally deferred to the postpartum period.

General principles

- **Inactivated/killed, toxoid, subunit (recombinant), and polysaccharide vaccines** are safe throughout pregnancy — they contain no replicating organism.
- **Live-attenuated vaccines are generally contraindicated** in pregnancy (theoretical teratogenic/infective risk); vaccinate the susceptible woman postpartum instead — breastfeeding is *not* a contraindication to receiving a live vaccine.
- **Two protective goals**: (a) shield the mother from infections with higher pregnancy morbidity (influenza, tetanus), and (b) protect the neonate before its own immune system matures, via transplacental IgG transfer (Tdap, tetanus toxoid) — hence routine vaccines are timed in the late second/third trimester for maximal antibody transfer.

- **Passive immunisation** (specific immune globulins) can be given at any gestation when indicated (post-exposure prophylaxis) — this is immunoprophylaxis, not active immunisation, and includes anti-D immunoglobulin for Rh-isoimmunisation prevention (a separate topic, not a vaccine).
- Vaccination status should be reviewed at every **preconception and first antenatal visit** (American College of Obstetricians and Gynecologists, ACOG, 2020).

Vaccines routinely recommended in every pregnancy

Vaccine	Timing / dose schedule	Purpose / comment
Influenza (inactivated or recombinant)	One dose intramuscularly (IM), **any trimester**, every flu season	Recommended for **all** pregnant women regardless of trimester (Williams 26e, Table 10-7); reduces severe maternal illness and confers passive protection to the infant <6 months, who is too young for its own vaccine
Tetanus-diphtheria-acellular pertussis (Tdap)	One IM dose **every pregnancy**, preferably **between 27 and 36 weeks**	Maximises transplacental pertussis-antibody transfer; recommended in every pregnancy irrespective of prior Tdap history (ACOG/Centers for Disease Control and Prevention, CDC)
Tetanus toxoid (unimmunised woman, low-resource setting)	0.5 mL IM, **2 doses 6 weeks apart**, first dose between **16 and 24 weeks**; if previously immunised, a single **0.5 mL IM booster in the third trimester**	Under India's tetanus-immunisation practice (DC Dutta 9e); protects against both maternal (puerperal) and neonatal tetanus

Vaccines given only for specific indications

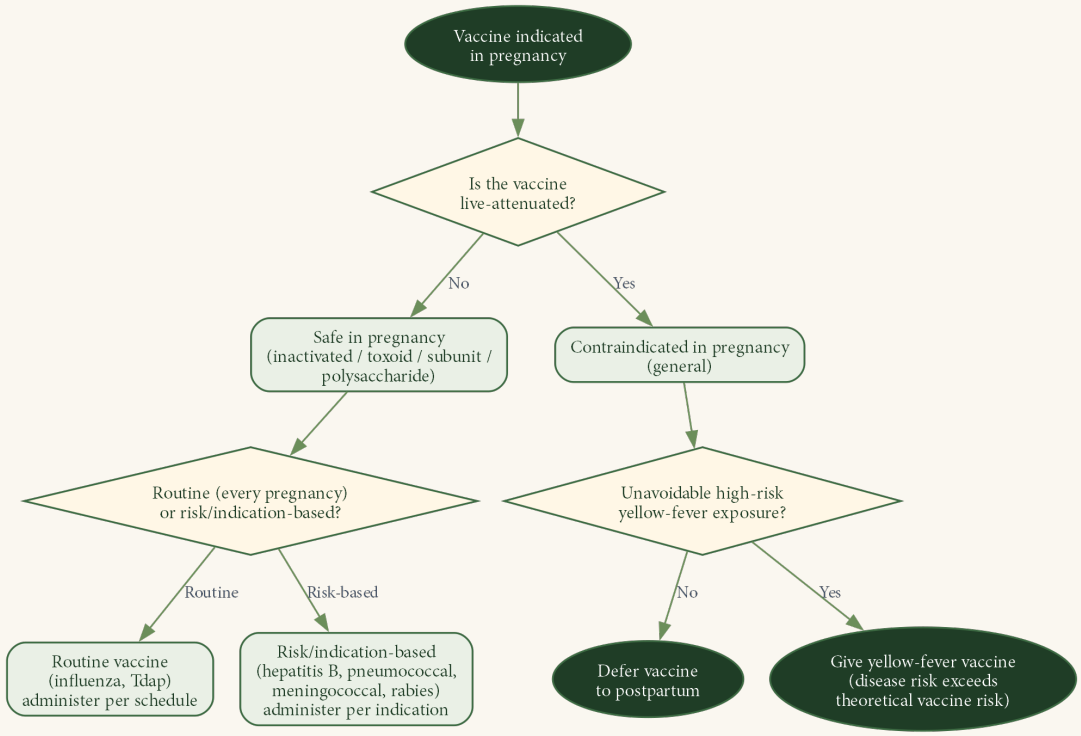
Vaccine	Indication in pregnancy	Dose	Comment
Hepatitis B	Risk of infection (chronic liver/kidney disease, multiple partners, healthcare exposure)	3-dose series IM at 0, 1, 6 months	Exposed neonate needs birth-dose vaccine + hepatitis B immune globulin
Pneumococcal	Chronic cardiac/lung/liver/metabolic disease	One lifetime dose PPSV23 (or PCV13 + PPSV23 8 weeks later if immunosuppressed/asplenic)	Indications unaltered by pregnancy

Vaccine	Indication in pregnancy	Dose	Comment
Meningococcal (MenACWY)	Outbreak, asplenia, complement deficiency	One dose (two if asplenic)	Antimicrobial prophylaxis added if significant exposure
Yellow fever (live)	Unavoidable travel to a high-risk endemic area	Single dose subcutaneous (SC)	Theoretical fetal risk is outweighed by the risk of yellow fever itself — the one live vaccine given selectively in pregnancy
Rabies	Post-exposure prophylaxis — indications unaltered by pregnancy	Per public-health protocol + rabies immune globulin	Killed-virus vaccine
Human papillomavirus (HPV), Hepatitis A, typhoid, anthrax	Generally deferred	—	Not routinely recommended in pregnancy; complete series postpartum if started before conception

Live-attenuated vaccines contraindicated in pregnancy

Vaccine	Status	Note
Measles-mumps-rubella (MMR)	Absolutely contraindicated	Check rubella immunity antenatally; vaccinate the susceptible woman postpartum and advise effective contraception for 1 month after
Varicella	Contraindicated	Teratogenicity is theoretical; no adverse outcome confirmed if inadvertently given; vaccinate postpartum
Zoster (herpes zoster)	Contraindicated	Theoretical risk only
Oral polio vaccine, Bacillus Calmette–Guérin (BCG)	Not routinely given	Reserved for outbreak or high-risk exposure
Smallpox (vaccinia)	Absolutely contraindicated	The only vaccine with *proven* (not merely theoretical) fetal harm

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm: live-attenuated status first, then routine-vs-indication-based dosing, with the yellow-fever exception carved out at the end.

Recent advances [RA]

- **Coronavirus disease 2019 (COVID-19) vaccination**: ACOG, CDC, and the World Health Organization (WHO) recommend COVID-19 vaccination (messenger RNA, mRNA, vaccines preferred) for all pregnant, lactating, and pregnancy-planning individuals; the US Food and Drug Administration extended authorisation/approval to pregnant women in 2021. The v-safe pregnancy registry of over 35,000 mRNA-vaccine recipients showed no increased risk of adverse pregnancy outcomes (Shimabukuro et al., *N Engl J Med* 2021;384:2273–2282, PMID 33882218); maternal infection itself raised rates of preterm birth, intensive-care unit admission, and maternal death (Williams Obstetrics 26e).
- **Maternal respiratory syncytial virus (RSV) vaccine**: the bivalent prefusion-F protein vaccine (RSVpreF) was approved by the US FDA in 2023 for a single dose at **32–36 weeks' gestation** to prevent RSV lower-respiratory-tract illness in infants up to 6 months, with roughly 80% efficacy shown in the MATISSE trial (Kampmann et al., *N Engl J Med* 2023;388:1451–1464, PMID 37018474). ACOG (2023) recommends either maternal RSVpreF vaccination *or* infant nirsevimab (a long-acting monoclonal antibody), not routinely both.
- **Evidence base for universal maternal Tdap**: the UK's national maternal pertussis programme (introduced 2012) demonstrated approximately 90% effectiveness in preventing infant pertussis

when Tdap was given ≥1 week before delivery (Amirthalingam et al., *Lancet* 2014;383:1521–1529, PMID 24534695) — the landmark evidence underpinning the current ACOG/Royal College of Obstetricians and Gynaecologists (RCOG)/WHO policy of Tdap in every pregnancy.

- **Group B Streptococcus (GBS) maternal vaccine**: candidate polysaccharide-conjugate GBS vaccines are in phase II/III trials (WHO Strategic Advisory Group of Experts, SAGE, roadmap) and are not yet licensed; if approved, they would reduce reliance on intrapartum antibiotic prophylaxis.

High-yield exam pointers

- Only **two** vaccines are recommended in *every* pregnancy: **influenza** (any trimester) and **Tdap** (27–36 weeks) — write both numbers.
- Indian tetanus-toxoid schedule (Dutta): **0.5 mL IM × 2 doses, 6 weeks apart, first dose at 16–24 weeks**; booster **0.5 mL IM in the third trimester** if previously immunised.
- Mnemonic for contraindicated vaccines: **"MMR-VZ-BOS"** — Measles-Mumps-Rubella, Varicella, Zoster, BCG/Oral polio, Smallpox — all live, all deferred to postpartum.
- **Yellow fever is the exception** — a live vaccine still given in pregnancy if unavoidable travel risk outweighs the theoretical vaccine risk.
- **Anti-D immunoglobulin ≠ vaccine** — it is passive immunoprophylaxis against Rh-isoimmunisation; do not conflate with active immunisation in the exam.
- Recent advances to name-drop: **COVID-19 mRNA vaccine (2021)** and **maternal RSVpreF vaccine at 32–36 weeks (2023, MATISSE trial)**.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's two-dose tetanus-toxoid schedule reflects India's historical immunisation practice; where combined Tdap is available, current ACOG/CDC practice is a single Tdap dose every pregnancy at 27–36 weeks rather than a separate toxoid series.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e (Table 10-7, Immunisation During Pregnancy and Postpartum); DC Dutta's Textbook of Obstetrics 9e. Guidelines: American College of Obstetricians and Gynecologists (ACOG); Centers for Disease Control and Prevention (CDC); World Health Organization (WHO).

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Injectable contraceptives

Asked in: Paper IV 04-Aug-2021 · Paper IV 20-Jul-2020 · Paper III Jul 2016 · Paper IV May 2011 (4×) — RGUHS MS Obstetrics & Gynaecology

Definition — Injectable contraceptives are long-acting, parenteral hormonal methods given intramuscularly or subcutaneously that suppress ovulation for weeks to months per dose, removing the need for daily compliance. They are classified as **progestin-only injectables** — depot medroxyprogesterone acetate (DMPA) and norethisterone enanthate (NET-EN) — and **combined injectable contraceptives (CICs)**, which add an estrogen. Correctly timed, their efficacy approaches that of sterilization.

Preparations, composition and dosing schedule

Preparation	Composition	Route	Dosing interval
DMPA (Depo-Provera)	Medroxyprogesterone acetate **150 mg**	Deep intramuscular (gluteal/deltoid), Z-track technique, site not massaged	Every **3 months** (WHO permits reinjection up to 4 months without loss of protection)
DMPA-SC (Depo-subQ provera 104)	Medroxyprogesterone acetate **104 mg**	Subcutaneous, anterior thigh/abdomen	Every **90 days**
NET-EN (Noristerat)	Norethisterone enanthate **200 mg**	Deep intramuscular	Every **2 months**
Cyclofem/Lunelle (CIC)	DMPA 25 mg + estradiol cypionate 5 mg	Intramuscular	**Monthly**, same calendar date (±3 days)
Mesigyna/Norigynon (CIC)	Norethisterone enanthate 50 mg + estradiol valerate 5 mg	Intramuscular	**Monthly**

The first injection is given **within the first 5 days of the menstrual cycle**, before a dominant follicle emerges; if given later, a backup method is required for 7 days. A same-day "Quick Start" is acceptable after pregnancy is excluded, again with 7 days' backup.

Mechanism of action

- **Suppresses the mid-cycle LH surge → inhibits ovulation** (the dominant action of DMPA/NET-EN; FSH and endogenous estrogen are not suppressed, so estrogen-deficiency symptoms are avoided).
- **Thickens and reduces cervical mucus**, blocking sperm penetration.
- Renders the **endometrium atrophic**, hindering blastocyst implantation.
- In CICs, the added estrogen also suppresses FSH/follicular growth, giving tighter cycle control and a more predictable monthly withdrawal bleed than progestin-only injectables.

Indications

- Long-acting, coitus-independent, private contraception; birth spacing of ≥1 year desired.
- Estrogen contraindicated, or an estrogen-free method preferred.
- Lactation — no adverse effect on milk volume or composition.
- Sickle cell disease; seizure disorder (high-dose DMPA raises the seizure threshold and helps catamenial epilepsy).
- Poor reliability with daily/coital methods — adolescents, disorganised lifestyle, intellectual disability.
- Perimenopausal women, or those who have completed childbearing but decline sterilisation.

Contraindications

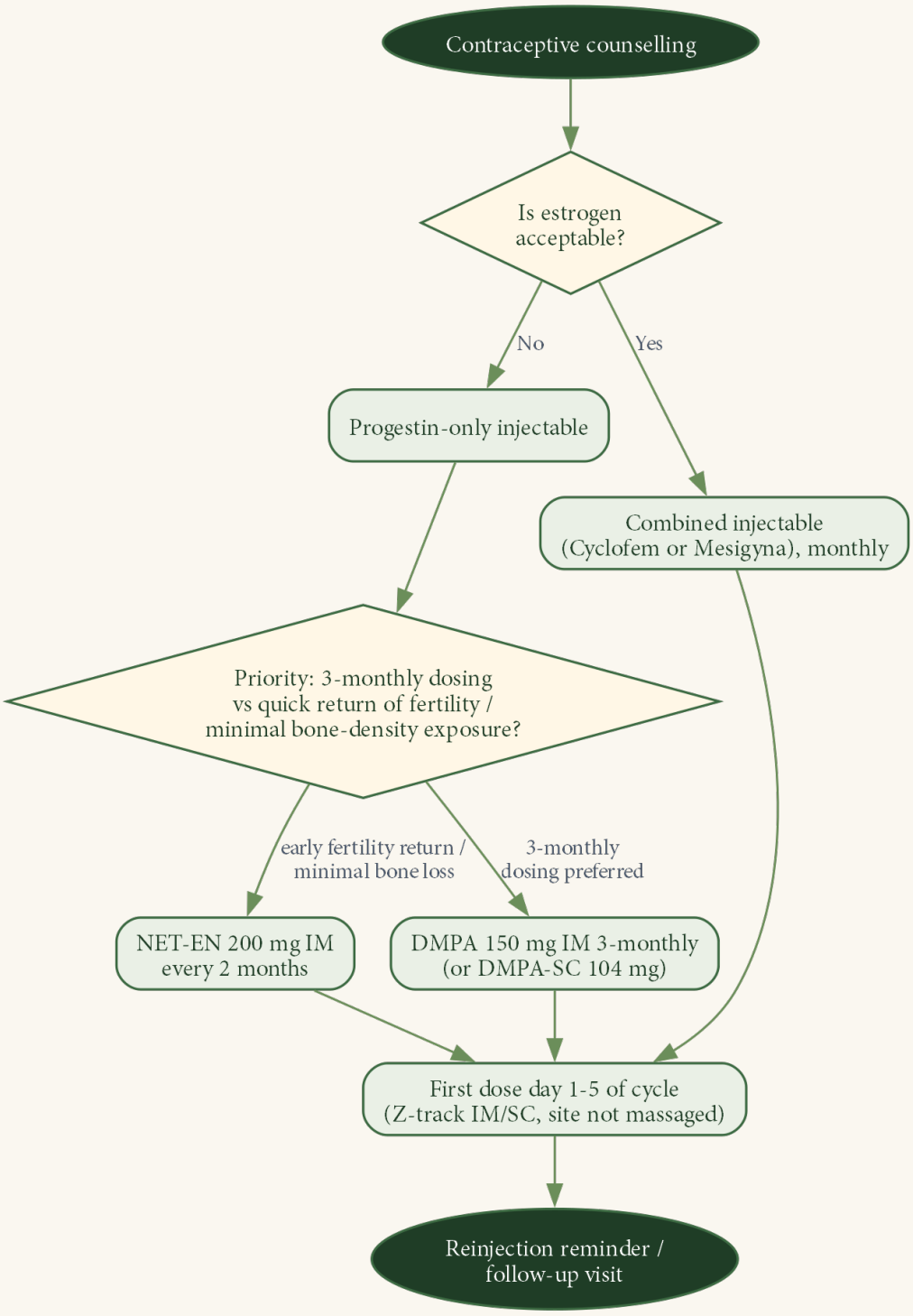
Absolute	Relative
Pregnancy	Severe cardiovascular disease
Unexplained genital bleeding	Desire for rapid return of fertility
Severe coagulation disorder	Risk factors for osteoporosis / long-term steroid use
Prior sex-steroid–induced liver adenoma / active severe liver disease	Severe depression
Current breast cancer	Difficulty attending for injections

Advantages and disadvantages

Advantages: highly effective — failure rate ≈**0.3 per 100 woman-years**, comparable to sterilisation; reduces menorrhagia and dysmenorrhoea; protective against endometrial cancer, pelvic inflammatory disease, ectopic pregnancy and ovarian cancer; safe and non-compliance-dependent in lactation; useful as an interim method before vasectomy takes effect; no estrogen-related risk, so suitable for smokers over 30, hypertensives, and women with congenital heart disease or sickle cell disease.

Disadvantages/side effects: irregular spotting/bleeding progressing to amenorrhoea with continued use; weight gain, headache, mood change; reversible loss of bone mineral density with long-term DMPA — largely restored within about 5 years of stopping (adolescents and perimenopausal women should be counselled and re-evaluated); delayed return of fertility after stopping DMPA, averaging **4–8 months**, whereas fertility returns quickly after NET-EN or a CIC; no protection against sexually transmitted infections.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision-algorithm flowchart from contraceptive counselling through the estrogen-acceptability branch to preparation choice, first-dose timing, and follow-up.

High-yield exam pointers

- DMPA **150 mg IM** every 3 months (WHO grace period to 4 months); DMPA-SC **104 mg** every 90 days.
- NET-EN **200 mg IM** every 2 months.
- CICs: **Cyclofem** (DMPA 25 mg + estradiol cypionate 5 mg) and **Mesigyna** (NET-EN 50 mg + estradiol valerate 5 mg) — both **monthly**.
- Mechanism triad: LH-surge suppression (anovulation) + thick cervical mucus + atrophic endometrium.
- First dose within day 1–5 of cycle; deep IM by Z-track, never massaged.
- Failure rate ≈0.3/100 woman-years — near-sterilisation efficacy.
- Return of fertility: quick after NET-EN/CIC, delayed 4–8 months after DMPA; bone density loss with DMPA is reversible over ~5 years.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's texts describe the standard DMPA interval as 3 months with a World Health Organization (WHO)-permitted extension to 4 months for a late reinjection; current WHO/FOGSI practice similarly treats a reinjection up to 4 weeks late as still protective, and a same-day "Quick Start" (after excluding pregnancy, with 7 days' backup) is now preferred over deferring to the next menstrual period.

> **SOURCE & COVERAGE**
> Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; DC Dutta's Textbook of Obstetrics 9e; World Health Organization (WHO) Medical Eligibility Criteria for Contraceptive Use.

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Injectable contraceptives – advantages and disadvantages

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

Definition — Injectable contraceptives are long-acting, reversible hormonal agents given intramuscularly (IM) or subcutaneously (SC) at fixed intervals to prevent conception. The **progestin-only injectables** — depot medroxyprogesterone acetate (DMPA) and norethisterone enanthate (NET-

EN) — are the most widely used; **combined (estrogen + progestin) monthly injectables** (Cyclofem, Mesigyna) are a less-used alternative with quicker cycle control.

Types and dosage schedule

Preparation	Route	Dose	Interval	First dose
DMPA (depot medroxyprogesterone acetate)	Deep IM, deltoid/gluteal, Z-track technique (not massaged)	**150 mg**	Every **3 months** (WHO grace period up to 4 months)	Within first 5 days of the cycle
DMPA-SC (Depo-subQ provera 104, Uniject)	SC, anterior thigh/abdomen	**104 mg**	Every **3 months** (90 days)	Within first 5 days of the cycle
NET-EN (norethisterone enanthate)	Deep IM	**200 mg**	Every **2 months**	Within first 5 days of the cycle
Combined — **Cyclofem**	IM	DMPA 25 mg + estradiol cypionate 5 mg	Monthly (same date each cycle)	Within first 5 days
Combined — **Mesigyna**	IM	NET-EN 50 mg + estradiol valerate 5 mg	Monthly (same date each cycle)	Within first 5 days

Mechanism of action

- **Inhibition of ovulation** — progestin blood levels are high enough to suppress the mid-cycle luteinising hormone (LH) surge; follicle-stimulating hormone (FSH) is not suppressed, so follicular growth continues and estrogen stays near early-follicular-phase levels, so estrogen-deficiency symptoms (vaginal atrophy, breast atrophy) do not occur.
- **Thickened, viscid cervical mucus** — blocks sperm penetration.
- **Endometrial atrophy** — unfavourable for blastocyst implantation.

Advantages

- **Highly effective** — failure rate 0–0.3 per 100 woman-years (comparable to sterilisation, the intrauterine device, and implants).
- **Coitus-independent and private** — no one but the user need know; no daily action, unlike the oral pill.
- **Infrequent dosing** — 3-monthly (DMPA/DMPA-SC) or 2-monthly (NET-EN) visits; ideal for women who cannot remember daily medication or who lead disorganised lives.

- **Estrogen-free** — avoids estrogen-related thromboembolic and vascular risk, so it is a good choice in smokers over 35 years, hypertensives, diabetics, women with congenital or valvular heart disease, and those with a past history of venous thromboembolism.
- **Safe in lactation** — does not reduce (and may modestly increase) milk volume, with negligible drug transfer to breast milk; can be started immediately postpartum.
- **Non-contraceptive benefits** — reduces menorrhagia and dysmenorrhoea; lowers the risk of endometrial cancer and (with ≥3 years' use) epithelial ovarian cancer, pelvic inflammatory disease (PID), ectopic pregnancy, and uterine fibroids; reduces frequency and severity of sickle-cell crises; raises the seizure threshold in epilepsy.
- **Efficacy unaffected by body weight or enzyme-inducing drugs**, unlike the combined pill.
- **Rapid onset**, effective within 24 hours if started in the correct window.

Disadvantages

- **Menstrual irregularity** — the leading cause of discontinuation. Irregular bleeding/spotting occurs in about 70% of users in year 1, falling to about 10% thereafter; amenorrhoea develops progressively (roughly 80% by 5 years of DMPA use). Persistent bleeding can be managed with a short course of exogenous estrogen or a non-steroidal anti-inflammatory drug.
- **Delayed return of fertility** — after stopping DMPA, blood levels take 6–8 months to clear; ovulation resumes over a much longer curve than after implants or pills, with a median delay of about 9–10 months and delay of up to 18 months in some users before fertility is regained. Return of fertility is quicker with NET-EN. This method is therefore poorly suited to women wanting an early planned pregnancy.
- **Reversible loss of bone mineral density** with prolonged use, from the relative hypo-estrogenic state; bone loss is regained after discontinuation (largely within 2 years). The US Food and Drug Administration issued a boxed warning (2004, retained in the revised 2010 package insert) advising against DMPA use beyond 2 years unless no other method is suitable — a caution most authorities regard as excessively conservative given the reversibility of the bone loss.
- **Weight gain** — a modest increase in body fat over years of use, more marked in obese adolescents.
- **No protection against sexually transmitted infections.**
- **Cannot be removed** once injected — side effects (bleeding, weight gain, mood change) persist until the drug clears naturally.
- **Other progestogenic effects** — headache, breast tenderness/mastalgia, acne, and mood change/depression (causal link debated).
- **Combined monthly injectables** carry additional estrogen-related risk and may inhibit lactation, and still require a monthly clinic visit.

Contraindications

Category	Conditions
Absolute	Pregnancy; unexplained genital bleeding; severe coagulation disorder/active thromboembolic disease; known or suspected breast cancer; active liver disease or prior sex-steroid–induced liver adenoma
Relative (World Health Organization Medical Eligibility Criteria — risks generally outweigh benefits)	Severe cardiovascular disease; uncontrolled hypertension; desire for early return to fertility; severe depression; risk factors for osteoporosis

The World Health Organization Medical Eligibility Criteria (WHO MEC) grade every contraceptive condition from Category 1 (no restriction) to Category 4 (unacceptable health risk); this framework is used to individualise the choice above.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> No matching textbook figure was found in the indexed corpus for this pharmacological topic; describe a labelled sketch instead — two injection-site panels: (1) deep intramuscular site (deltoid or gluteal, Z-track needle path angled to seal the injection tract and prevent leakage/local irritation) for DMPA 150 mg and NET-EN 200 mg; (2) subcutaneous site (anterior abdominal wall or anterior thigh, 45° needle angle into the fat layer) for DMPA-SC 104 mg. Annotate each with dose, interval, and "first dose within day 1–5 of cycle."

High-yield exam pointers

- **DMPA 150 mg IM every 3 months; DMPA-SC 104 mg SC every 3 months; NET-EN 200 mg IM every 2 months** — write the exact doses.
- Mechanism = **LH surge suppression** (anovulation) + thick cervical mucus + endometrial atrophy; FSH/estrogen NOT suppressed (no hypo-estrogenic symptoms).
- Failure rate **0–0.3/100 woman-years** — as effective as sterilisation.
- **US FDA 2004 black-box warning**: avoid DMPA beyond 2 years unless no alternative (bone density concern; bone loss is reversible).
- **Delayed return of fertility** (median ~9–10 months, up to 18 months) is the single biggest counselling point for spacing.
- WHO Medical Eligibility Criteria: 4-category system (1 = no restriction to 4 = unacceptable risk).
- Z-track IM technique; start within day 1–5 of the menstrual cycle (else backup contraception for 7 days).

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

DC Dutta's Obstetrics states the delay in return of fertility after DMPA as roughly 4–6 months, while Speroff's more recent, evidence-based account documents a longer and more variable delay (median ~9–10 months, occasionally up to 18 months); the current, better-referenced figure from Speroff is used above.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Obstetrics 9e; World Health Organization Medical Eligibility Criteria for Contraceptive Use.

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Interception

Asked in: Paper IV 18-Nov-2019 · Paper IV May 2011 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Interception (postcoital or emergency contraception) is the use of a drug or device to prevent pregnancy after a single episode of unprotected or inadequately protected intercourse, acting around the time of ovulation before conception becomes established. It is not intended as a routine method of contraception, does not terminate an already-established pregnancy, and must be started as soon as possible after the exposure.

Indications

- Unprotected intercourse — no method used at all.
- Condom rupture, slippage, or leakage.
- Missed combined oral contraceptive (COC) pills, or a progestin-only pill (POP) delayed by more than 3 hours.
- Displacement, partial expulsion, or early removal of an intrauterine device (IUD).
- Sexual assault or rape.
- First act of intercourse, since it is characteristically unplanned.
- Miscalculated "safe period" or a failed withdrawal method.

The risk of pregnancy after a single act of mid-cycle unprotected coitus is about 8%; every interceptive method substantially lowers this risk if started promptly.

Classification and methods

Method	Drug/device & dose	Timing window (from coitus)	Mechanism	Failure rate
Progestin-only — levonorgestrel (LNG, "E-pill")	0.75 mg × 2 doses, 12 h apart, or the two tablets combined as a single 1.5 mg dose	Best within 72 h; usable up to 120 h with falling efficacy	Inhibits or delays ovulation	0–1%
Combined estrogen–progestin (Yuzpe method)	Ethinyl estradiol 100 µg + levonorgestrel 0.5 mg per dose, twice 12 h apart (e.g., 2 tablets of ethinyl estradiol 50 µg + levonorgestrel/norgestrel 0.25 mg, repeated after 12 h)	Within 72 h	Inhibits/delays ovulation	2–3% (highest failure and most nausea of the oral methods)
Selective progesterone-receptor modulator (SPRM) — ulipristal acetate (UPA)	30 mg single oral dose	Up to 120 h; the most effective oral method in the 72–120 h window	Delays/suppresses ovulation and follicular growth; delays endometrial maturation	~1–2%
Antiprogestin — mifepristone (RU-486)	Single oral dose (WHO-trial evidence: 10 mg as effective as 25–600 mg; Indian texts commonly cite 100 mg)	As soon as possible; efficacy falls modestly if delayed to 5 days	Competitively blocks progesterone receptors, delaying ovulation and endometrial maturation	<1%
Copper IUD (Cu-IUD, e.g., CuT380A) — gold standard	Insertion (no drug)	Up to 5 days (120 h) after coitus, or up to 5 days after estimated ovulation	Copper ions toxic to sperm/ovum — blocks fertilization and, uniquely, also prevents implantation	~0.1% (most effective; can be retained as a 10-year contraceptive)

Mechanism of action

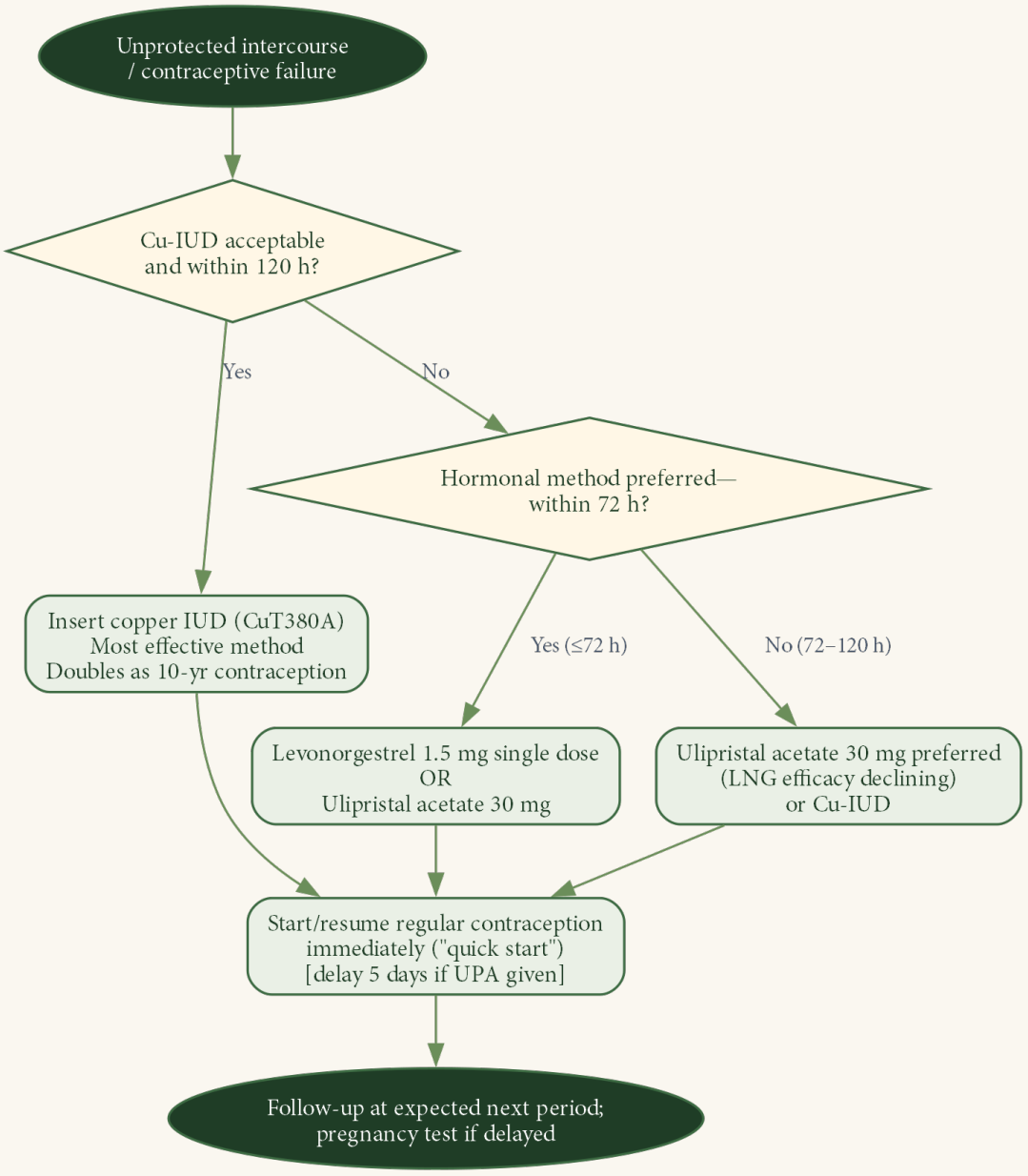
- Prevention or delay of ovulation when the drug is taken early in the cycle — the principal, best-supported mechanism for all hormonal methods.
- Interference with sperm transport/fertilization.
- Rendering the endometrium unfavourable to implantation — an older proposed mechanism, now attributed only to the copper IUD.

- Interference with corpus luteal function, or luteolysis.

Precautions, antiemesis and counselling

- An oral antiemetic (meclizine 25–50 mg, or metoclopramide 10 mg) taken 1 hour before each dose reduces nausea/vomiting; most useful with the Yuzpe regimen, rarely needed with LNG or UPA.
- If vomiting occurs within 2 hours of an oral dose, repeat that dose.
- Pregnancy testing or pelvic examination is not required before dispensing; interception is ineffective (not harmful) once pregnancy is already established.
- Avoid starting a progestin-containing contraceptive for 5 days after ulipristal acetate, since a progestin would blunt UPA's receptor action.
- Use the Yuzpe (COC-based) method cautiously in women with a personal or close family (parent/sibling) history of idiopathic venous thromboembolism — prefer LNG, UPA, or the copper IUD instead.
- No increase in fetal malformation has been demonstrated if interception fails and pregnancy continues; counsel the woman on her options, including induced abortion if she wishes.
- Start or resume a regular contraceptive method immediately ("quick start"); arrange follow-up around the expected next period, test for pregnancy if menses is delayed beyond a week, and consider ectopic pregnancy if pain or abnormal bleeding occurs.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Emergency-contraception decision algorithm from unprotected intercourse to follow-up.

High-yield exam pointers

- "Interception" = the classical term (DC Dutta) for postcoital/emergency contraception — prevents conception around ovulation, not a routine method.
- Levonorgestrel: **1.5 mg single dose** (or 0.75 mg × 2, 12 h apart) within 72 h, extendable to 120 h with declining efficacy.
- Ulipristal acetate **30 mg single dose** — best oral choice for the 72–120 h window.

- Yuzpe method = ethinyl estradiol 100 µg + levonorgestrel 0.5 mg per dose × 2, 12 h apart — oldest method, highest failure and nausea.
- Copper IUD = single most effective method (failure ≈0.1%), inserted up to 5 days after coitus/ovulation — the only method that also blocks implantation.
- Mechanism (current evidence) = inhibits/delays ovulation + blocks fertilization; hormonal methods are **not** abortifacients.
- Remember the **5-day rule**: no progestin-only contraceptive for 5 days after ulipristal acetate.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta lists mifepristone 100 mg and "prevention of implantation" as a mechanism of hormonal interception, but current evidence (Williams Obstetrics; ACOG) shows the WHO-trial dose of mifepristone is as low as 10 mg and that levonorgestrel, ulipristal acetate and the Yuzpe method act only by delaying/inhibiting ovulation and blocking fertilization, with no post-fertilization or anti-implantation effect — only the copper IUD reliably acts after fertilization.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Williams Obstetrics 26e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; American College of Obstetricians and Gynecologists (ACOG) guidance on emergency contraception.

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Janani Sishu Suraksha Yojana

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

Definition — The **Janani Shishu Suraksha Karyakram (JSSK)** — the scheme intended by this question's title — is a Government of India initiative launched on **1 June 2011** by the **Ministry of Health and Family Welfare (MoHFW)** under the **National Rural Health Mission (NRHM)**, now the **National Health Mission (NHM)**. It entitles every pregnant woman delivering in a public health institution, and every sick newborn/young infant, to **completely free ("zero-expenditure") and cashless care**, so that out-of-pocket expenditure never becomes a barrier to institutional delivery and newborn care.

Objectives

- Eliminate **out-of-pocket expenditure** for institutional delivery, the single biggest deterrent to hospital birth among the poor.
- Increase the **institutional delivery rate**, irrespective of the woman's economic status, age, or parity.

- Reduce the **maternal mortality ratio** (MMR) and **neonatal mortality rate** (NMR) by removing financial barriers to skilled birth attendance and sick-newborn care.
- Provide free **referral transport** so that delay in reaching a facility (the "third delay") does not cost lives.
- **Complement the Janani Suraksha Yojana (JSY)** — JSY gives a cash incentive to deliver in an institution; JSSK removes every remaining expense of that institutional stay.

Entitlements for pregnant women (during delivery, including caesarean section)

Free entitlement	Detail
Delivery, including caesarean section	No user charges of any kind
Drugs and consumables	Supplied free during the hospital stay
Diagnostics	Laboratory investigations, ultrasound as indicated
Blood	Free transfusion if required
Diet	Free during hospital stay — **3 days for a normal delivery, 7 days for a caesarean section**
Transport — home to institution	Free pick-up
Transport — inter-facility referral	Free if complication requires transfer to a higher centre
Transport — drop-back home	Free after discharge
Exemption from user charges	Applies to antenatal, intranatal and postnatal complications managed at the institution, not delivery alone

Entitlements for sick newborns and young infants

Free entitlement	Detail
Treatment	Free care for sick newborns up to **30 days** of life; extended to **sick infants up to 1 year** of age
Drugs and consumables	Free
Diagnostics	Free
Blood	Free transfusion if required
Transport — home to institution, inter-facility referral, and drop-back home	All free (mirrors the mother's transport entitlement)
Exemption from user charges	No fee for any service under the above heads

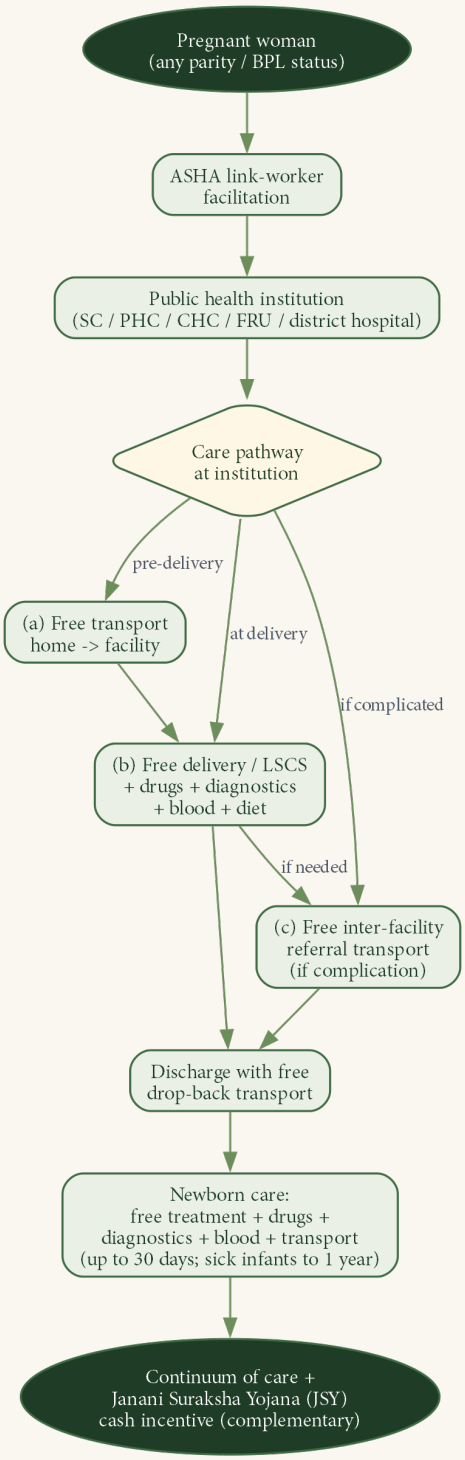
Eligibility and implementation features

- Available at **all public health institutions** — sub-centres, primary health centres (PHCs), community health centres (CHCs), first referral units (FRUs), district hospitals, and medical college hospitals — in both rural and urban areas.
- **Universal entitlement** — no restriction by age, parity, or number of living children, and no BPL/APL (below/above poverty line) distinction.
- Facilitated at village level by the **Accredited Social Health Activist (ASHA)**, who acts as a link worker between the beneficiary and the ANM/doctor at the facility, helping the woman actually claim every entitlement.
- Funded through the **NHM flexipool**; referral transport is commonly operationalised through contracted ambulance networks (e.g., 108/102 services).
- Designed as a **continuum-of-care** scheme — antenatal complication → institutional delivery → postnatal care → sick-newborn care — all under one umbrella of zero expenditure.

JSSK vs Janani Suraksha Yojana (JSY) — a frequently confused pair

Feature	JSY (2005)	JSSK (2011)
Nature of benefit	Conditional **cash transfer** to the mother	**Cashless free services** (no cash changes hands)
Scope	Incentive to deliver in an institution	Zero-expenditure delivery **plus** newborn/infant care
Eligibility conditions	Age/parity conditions apply in high-performing states; no restriction in low-performing states	**No** age, parity, or BPL/APL restriction — fully universal
Newborn coverage	Not covered	Sick newborns to 30 days, extended to sick infants to 1 year
Parent programme	NRHM, 2005	NRHM/NHM, 2011

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Policy pathway (not anatomical — no textbook figure applies): the zero-expenditure continuum from ASHA facilitation through free delivery/referral transport to free newborn care, complemented by the JSY cash incentive.

High-yield exam pointers

- **Launch: 1 June 2011**, MoHFW, Government of India, under NRHM (now NHM) — write the date and ministry.
- **Universal, no conditions** — the single biggest distinguishing fact versus JSY (which has age/parity conditions in high-performing states).
- Diet duration: **3 days normal delivery, 7 days caesarean section** — a favourite recall number.
- Newborn cover: **up to 30 days**, extended to **sick infants up to 1 year**.
- Mnemonic for the entitlement package — **"5 Ds + T"**: **D**elivery (incl. LSCS), **D**rugs, **D**iagnostics, **D**iet, blood (Donor), and **T**ransport (three-way: to, between, and back).
- **ASHA** is the facilitating link worker at village level.
- JSY = cash to the mother; JSSK = free services at the facility — state this contrast explicitly for full marks.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> The scheme's official Government of India name is **Janani Shishu Suraksha Karyakram (JSSK)**; "Karyakram" and "Yojana" both translate as "programme/scheme" and the two names are used interchangeably in state circulars and question papers, including this question's phrasing. DC Dutta's Obstetrics 9e references JSSK only briefly, in the context of ASHA facilitation of institutional delivery, without listing the full entitlement package; the entitlement details above are standard Government of India/National Health Mission programme facts (as also taught in preventive and social medicine), consistent with how this answer bank treats other named national schemes (JSY, PMSMA, PMJAY) that lie outside clinical textbook coverage.

> **SOURCE & COVERAGE**
>
> DC Dutta's Textbook of Obstetrics 9e (Chapter 38, "RCH Interventions" — ASHA link-worker facilitation of institutional delivery under NHM/JSSK) + Government of India/National Health Mission programme facts (Janani Shishu Suraksha Karyakram guidelines, Ministry of Health and Family Welfare, 2011; Janani Suraksha Yojana, 2005).

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Levonorgestrel Intrauterine System (LNG-IUS)

Asked in: Paper IV 19-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — The levonorgestrel intrauterine system (LNG-IUS) is a T-shaped, long-acting reversible contraceptive (LARC) that continuously releases the progestin levonorgestrel directly into the endometrial cavity from a reservoir on its vertical stem. It is a top-tier contraceptive (first-year failure

rate only 0.1%, perfect and typical use alike) and, because of its potent local endometrial action, also serves as an effective non-contraceptive treatment for several gynaecological conditions.

Description & composition

Feature	Mirena (LNG-IUS 20)
Frame	Flexible T-shaped polyethylene, barium-impregnated (radiopaque)
Steroid reservoir	Polydimethylsiloxane membrane around the vertical stem
Levonorgestrel content	52 mg
Release rate	~20 mcg/day initially, declining progressively (about half the initial rate by 5 years)
Dimensions / inserter	32 × 32 mm; insertion tube 4.4 mm diameter
FDA duration (contraception)	5 years on label (see Note for the current 8-year extension)

Device	LNG content	Release rate	FDA-approved duration	Comment
Mirena	52 mg	20 → 10 mcg/day	5 yr	Also FDA-approved for heavy menstrual bleeding (HMB), 5 yr
Liletta	52 mg	19.5 → 11.3 mcg/day	6 yr	Cost advantage over Mirena
Kyleena	19.5 mg	17 → 7.4 mcg/day	5 yr	Smaller device, 3.8 mm inserter — nulliparous-friendly
Skyla	13.5 mg	14 → 5 mcg/day	3 yr	Smallest device; contraception only

Mechanism of action

- **Endometrial decidualisation and glandular atrophy** — endometrium becomes thin and hostile to implantation.
- **Thickened cervical mucus** forms a viscous plug blocking sperm penetration and capacitation.
- **Sterile foreign-body inflammatory reaction** in the endometrium — locally gametotoxic/spermicidal, as with other IUDs.

- **Ovulation only partially suppressed** — cycles remain ovulatory in 50–75% of women after year 1; ovulation inhibition is therefore not the principal mechanism.
- Serum levonorgestrel is low (about half that of the subdermal implant); action is predominantly local, not systemic.

Indications

Category	Use
Contraception	Top-tier LARC; failure rate 0.1% (perfect = typical use)
Heavy menstrual bleeding (HMB)	First-line medical therapy; reduces menstrual blood loss up to 90–97%; 20–40% amenorrhoeic by 1 year
Dysmenorrhoea	Primary dysmenorrhoea and adenomyosis-related pain and uterine volume reduction
Endometriosis	Reduces endometriosis-associated pelvic pain; efficacy comparable to GnRH agonists
Endometrial protection	During tamoxifen therapy or postmenopausal oestrogen therapy (opposed HRT)
Endometrial hyperplasia (without atypia)	As effective as, and probably superior to, oral progestins
Early low-grade endometrial cancer	Fertility-sparing option in FIGO stage IA, grade 1 endometrioid carcinoma when surgery is high-risk
Leiomyoma-related HMB	Reduces bleeding and uterine/myoma volume (less effective with submucosal myomas)
Bleeding disorders/anticoagulation	Reduces HMB in von Willebrand disease and anticoagulated women

Contraindications

Common to all IUDs	Specific to LNG-IUS
Pregnancy or suspected pregnancy	Active liver disease or hepatic tumour
Distorted uterine cavity (fibroid, congenital anomaly)	Current or past breast cancer (progestin-sensitive)
Current pelvic inflammatory disease (PID) or postpartum/postabortal endometritis within 3 months	Severe arterial disease
Undiagnosed genital tract bleeding	
Known or suspected uterine/cervical malignancy	

Common to all IUDs	Specific to LNG-IUS
Significant immunosuppression	

Insertion — timing and technique

- **Interval insertion** — ideally 2–3 days after menses ends (soft, patent cervix); can be inserted any time in the cycle once pregnancy is confidently excluded.
- **Postabortal** — immediately after first-trimester surgical evacuation.
- **Postpartum** — post-placental (<10 minutes), intracaesarean, within 48 hours, or interval after 6 weeks; expulsion risk is higher the earlier the insertion, reflected in higher US Medical Eligibility Criteria (MEC) categories for early placement.
- **Breastfeeding (US MEC)** — <10 minutes postpartum: Category 2; 10 minutes to 4 weeks: Category 2; ≥4 weeks: Category 1.
- Counsel, confirm absence of contraindications, obtain consent; bimanual examination for uterine size/position.
- **No-touch** aseptic loading of the device into its inserter per the manufacturer's package insert; cervix cleansed with antiseptic, anterior lip held with a tenaculum, uterine sound passed to confirm depth and direction.
- Inserter carrying the device is passed to the fundus; arms are released, and the **withdrawal technique** is used — the device is held in place by the plunger while only the inserter tube is withdrawn.
- Threads are trimmed to 3–4 cm beyond the external os; an oral NSAID controls post-insertion cramping (lidocaine-prilocaine cream or paracervical block can ease insertion pain).
- **Follow-up**: strings checked after the next menses (4–6 weeks), then annually.

Complications

Complication	Key points
Cramping/pain	Common, transient; more marked in nulliparous women
Irregular spotting → amenorrhoea	Frequent in first 3–6 months, progressively decreasing; amenorrhoea in 20–40% by 1 year
Expulsion	Highest in the first month; cumulative rate ~8% at 3 years in nulligravid adolescents with Mirena
Perforation	~1 per 1000 insertions; risk increased with postpartum/lactational insertion

Complication	Key points
Pelvic inflammatory disease	Risk highest in the first 3 weeks post-insertion (Neisseria gonorrhoeae, Chlamydia trachomatis); retain device if mild-to-moderate PID improves within 48–72 hours of antibiotics, remove if not
Actinomyces colonisation	If asymptomatic, retain device, no treatment; if symptomatic (fever, pain, discharge), remove device and give antibiotics
Functional ovarian cysts	Usually asymptomatic; resolve spontaneously
Ectopic pregnancy	Absolute risk very low (device is highly effective), but if pregnancy occurs with the device in situ, a higher proportion are ectopic
Missing threads	Exclude pregnancy → transvaginal sonography (preferred) → hysteroscopy/gentle probing → plain X-ray if inconclusive

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 14.5 — Levonorgestrel T (Mirena) intrauterine device. (Berek & Novak 16e, p.785)*

Recent advances [RA]

- US FDA (August 2022) extended Mirena's contraceptive approval to **8 years**, based on the Mirena Extension Trial, which showed efficacy above 99% from year 6 through year 8 with no new safety signals.
- ACOG and the UK NICE guideline (NG88) endorse the LNG-IUS as **first-line pharmacological therapy for heavy menstrual bleeding**, ahead of tranexamic acid or combined hormonal contraceptives, before endometrial ablation or hysterectomy.
- A 2023 US multicentre trial (Obstetrics & Gynecology) confirmed high effectiveness of the 52-mg LNG-IUS for heavy menstrual bleeding even with obesity or nulliparity, with treatment success in about 91% of participants.
- Smaller Kyleena/Skyla systems with narrower 3.8-mm inserter tubes have broadened LARC access for nulliparous and adolescent patients.
- Emerging evidence supports LNG-IUS use for heavy menstrual bleeding in women with inherited bleeding disorders, such as von Willebrand disease, as an alternative to systemic hormonal therapy.

High-yield exam pointers

- "52–20–5": 52 mg levonorgestrel, ~20 mcg/day release, FDA label 5 yr for contraception (now 8 yr, 2022 extension).

- Top-tier LARC — failure rate 0.1%, perfect = typical use.
- Local mechanism, not ovulation suppression — ovulatory in 50–75% of cycles after year 1.
- ACOG/NICE first-line for heavy menstrual bleeding.
- PID risk clusters in the first 3 weeks after insertion.
- Perforation ≈ 1 in 1000 insertions.
- Avoid in active/past breast cancer and active liver disease — unlike the copper IUD.

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

Older texts describe Mirena as approved for 5 years, conventionally "replaced every 7 years"; the current (2022) US FDA label extends contraceptive use to 8 years — quote 8 years unless the question asks to contrast guideline evolution.

SOURCE & COVERAGE

Williams Obstetrics 26e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e (figure). Guidelines: US FDA (Mirena label extension, 2022); ACOG; NICE NG88 (heavy menstrual bleeding).

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Levonorgestrel intrauterine device

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

Definition — The levonorgestrel intrauterine device (LNG-IUD), also called the levonorgestrel-releasing intrauterine system (LNG-IUS), is a T-shaped long-acting reversible contraceptive (LARC) that continuously elutes the progestin levonorgestrel (LNG) from a steroid reservoir around its vertical stem into the endometrial cavity. It combines the mechanical "foreign-body" antifertility effect of an intrauterine device (IUD) with a potent local progestin action, giving near-sterilisation contraceptive efficacy plus extensive non-contraceptive therapeutic uses.

Description and composition

Device	Total levonorgestrel	Release rate	FDA-approved duration	Size / notes
Mirena (LNG-IUS 20)	52 mg	20 mcg/day, declining to half by year 5	5 years on the standard label; FDA-extended to **8 years** (2022)	32×32 mm, 4.4 mm inserter, tan thread

Device	Total levonorgestrel	Release rate	FDA-approved duration	Size / notes
Liletta	52 mg	19.5 mcg/day → 11.3 mcg/day by year 4	6 years on label; FDA-extended to **8 years** (Nov 2022)	32×32 mm, blue thread
Kyleena (LNG-IUS 12)	19.5 mg	17 mcg/day → 7.4 mcg/day at 5 years	5 years	28×30 mm, 3.8 mm inserter — suits nulliparous uterus
Skyla/Jaydess (LNG-IUS 8)	13.5 mg	14 mcg/day → 5 mcg/day at 3 years	3 years	28×30 mm — smallest inserter

In India, **Mirena is the LNG-IUS in standard use**; it is not distributed through the government free-supply channel. Efficacy is comparable to a sterilisation operation.

Mechanism of action

- **Endometrial suppression** — strong, uniform glandular atrophy and stromal decidualisation, hindering blastocyst implantation.
- **Cervical mucus** becomes thick and scanty, obstructing sperm penetration and capacitation.
- **Reduced tubal motility**, further limiting sperm–ovum contact.
- **Ovulation is only partly inhibited** — serum levonorgestrel is about half that of a subdermal implant, so ovulatory cycles persist in 50–75% of women after the first year regardless of bleeding pattern; contraception is therefore mainly a local, not a systemic anovulatory, effect. Serum progesterone is not raised.

Indications

Contraceptive	Non-contraceptive (therapeutic)
Long-acting reversible contraception, including in adolescents and nulliparous women (first-line per the American College of Obstetricians and Gynecologists, ACOG)	**Heavy menstrual bleeding/menorrhagia** — first-line medical therapy without structural/histological abnormality; cuts blood loss up to ~90–97%, comparable to endometrial ablation
Postpartum/postabortal and interval contraception	**Dysmenorrhoea, adenomyosis, endometriosis-related pain**
Women wanting an oestrogen-free method	**Endometrial hyperplasia without atypia** — medical treatment; alternative to hysterectomy in poor surgical candidates

Contraceptive	Non-contraceptive (therapeutic)
	Endometrial protection on tamoxifen or unopposed oestrogen hormone replacement therapy (HRT); progestin component of perimenopausal HRT

Contraindications

Absolute	Relative
Pregnancy, confirmed or suspected	Past ectopic pregnancy
Undiagnosed abnormal genital tract bleeding	Severe dysmenorrhoea
Current pelvic inflammatory disease (PID) or PID within 3 months; current sexually transmitted infection	Prior PID without a subsequent intrauterine pregnancy
Distorted uterine cavity (fibroid, congenital malformation)	Significant immunosuppression (caution; human immunodeficiency virus, HIV, infection is not a contraindication)
Current or past breast cancer, or other progestin-sensitive cancer	Within 6 weeks of caesarean delivery for interval-technique insertion
Active liver disease or hepatocellular tumour	Severe arterial disease
Trophoblastic disease; puerperal sepsis	

Insertion — timing and technique

- **Timing:** *Interval* — ideally 2–3 days after menstruation ends, but insertable any time once pregnancy is excluded. *Postabortal* — immediately after suction evacuation or spontaneous abortion. *Postpartum* — usually deferred to 6 weeks (uterine involution) to reduce expulsion. *Postplacental* — within 10 minutes of placental delivery, vaginal or caesarean; safe and immediately effective, but a higher expulsion rate.
- **Preliminaries:** exclude contraindications on history/examination; counsel and take written consent; outpatient, no anaesthesia, strict "no-touch" aseptic technique; an oral NSAID (e.g., ibuprofen 200–400 mg) 30 minutes beforehand reduces cramping.
- **Steps:** bimanual examination for uterine size/position → antiseptic cleansing → cervix held with a tenaculum → uterine sound passed to record cavity length → device (loaded per its instruction package) introduced to the fundus and arms released, held 20–30 seconds → inserter withdrawn while device is held in place → threads trimmed to 3 cm outside the external os.
- **Follow-up:** review at 4–6 weeks to confirm thread position, then annually; the woman self-checks the thread monthly after menses.

Complications and management

Complication	Key features / management
Cramping pain, vasovagal/syncopal attack	Transient; more common in nulliparous women; analgesics/antispasmodics
Uterine perforation	~1 per 1000 insertions; risk raised in the postpartum/lactating uterus; suspected if threads disappear with pelvic symptoms; confirmed by ultrasonography ± straight X-ray with a sound in situ; managed by hysteroscopic/laparoscopic removal
Expulsion	~10% by 1 year; higher after postabortal/postpartum insertion; a new device is usually retained on re-insertion
Irregular spotting → amenorrhoea	Spotting up to 6 months, evolving to progressive amenorrhoea in 20–30% by 1 year; reassure — efficacy unaffected
Pelvic inflammatory disease	Highest risk in the first 3 weeks (*Neisseria gonorrhoeae*, *Chlamydia trachomatis*); retain device during antibiotics for mild–moderate PID, remove if no improvement at 48–72 hours or tubo-ovarian abscess develops
Ectopic pregnancy	Absolute rate reduced versus non-users, but a higher proportion of method failures are ectopic
Functional ovarian cysts, actinomycosis colonisation	Cysts usually asymptomatic, resolve spontaneously; asymptomatic actinomycosis — retain device, no antibiotics; treat and remove only if symptomatic
Pregnancy with device in situ	Exclude ectopic first; if thread visible, remove device (lowers miscarriage/preterm birth/sepsis risk); if not visible, counsel on risks of continuing with device retained

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 14.5 — Levonorgestrel T (Mirena) intrauterine device. (Berek & Novak 16e, p.785)*

Recent advances [RA]

- The US Food and Drug Administration (FDA) extended Mirena's approved contraceptive duration from 5 to **8 years** (August 2022) and Liletta's to **8 years** (November 2022), based on extension-trial data showing >99% efficacy through years 6–8 with no new safety signal.

- The LNG-IUS has been shown **non-inferior to the copper IUD for emergency contraception** (Turok et al., *New England Journal of Medicine*, 2021), although it is not yet FDA-labelled for this indication.
- ACOG Committee Opinion No. 735 recommends LARC, including the LNG-IUS, as first-line contraceptive counselling for adolescents and nulliparous women, advising concurrent condom use since the LNG-IUS does not protect against sexually transmitted infections.
- ACOG Practice Bulletin No. 186 supports **immediate postplacental LNG-IUS placement** (within 10 minutes of placental delivery, vaginal or caesarean), contraindicated only by chorioamnionitis, puerperal sepsis or ongoing postpartum haemorrhage.
- Current guidance from the Federation of Obstetric and Gynaecological Societies of India (FOGSI) and the UK National Institute for Health and Care Excellence (NICE) positions the LNG-IUS as **first-line therapy for heavy menstrual bleeding** without structural/histological abnormality, before other medical or surgical options.

High-yield exam pointers

- Mirena: **52 mg** total levonorgestrel, released at **20 mcg/day**, T-shaped, 32×32 mm; labelled for **5 years**, FDA-extended to **8 years** (2022).
- Kyleena (19.5 mg/17 mcg per day/5 years) and Skyla/Jaydess (13.5 mg/14 mcg per day/3 years) are smaller — preferred for nulliparous women.
- Mechanism triad: endometrial atrophy + thick scanty cervical mucus + partial (not primary) ovulation suppression.
- First-line medical treatment for heavy menstrual bleeding — comparable in efficacy to endometrial ablation.
- Failure rate ≈**0.1–0.2 per 100 woman-years** — near-sterilisation efficacy.
- Absolute contraindications: current breast cancer, active liver disease/hepatic tumour, current PID, undiagnosed genital bleeding, pregnancy.
- Expect irregular spotting progressing to amenorrhoea in about a quarter of users by 1 year; perforation ≈1/1000 insertions.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Coverage note: DC Dutta's Textbook of Gynaecology 7e prints Mirena's approved duration as 5 years (used, off-label, to 7 years); the current FDA label (2022) extends approved use to 8 years — the extended figure is followed above per the newer safety data.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Williams Obstetrics 26e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e (figure); ACOG Committee Opinion No. 735; ACOG Practice Bulletin No. 186; FDA label updates for Mirena and Liletta (2022); FOGSI/NICE guidance on heavy menstrual bleeding.

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Long acting reversible contraceptives. And their non contraceptive benefits

Asked in: Paper IV 02-Jun-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Long-acting reversible contraceptives (LARC) are methods that give highly effective, fully reversible contraception for one year or more with a single act of insertion, requiring no ongoing user compliance. The American College of Obstetricians and Gynecologists (ACOG) restricts the term to **intrauterine devices (IUDs)** and **subdermal implants**, but DC Dutta's Obstetrics/Gynaecology (the Indian exam-standard texts) additionally group **progestin-only injectables** under LARC since they too are provider-administered and user-independent. ACOG recommends LARC as first-line contraceptive counselling for most women, including adolescents and nulliparous women, because of superior efficacy and continuation compared with short-acting methods.

Classification and features of LARC methods

Category	Device (brand)	Composition/dose	Mechanism	Approved duration	Failure rate (perfect/typical use, %)
Copper IUD	Copper T 380A (ParaGard)	380 mm^2 copper wire on stem + arms, non-hormonal	Sterile intrauterine inflammatory reaction, toxic to sperm/ovum; no ovulation suppression	10 years	0.6 / 0.8
Levonorgestrel intrauterine system (LNG-IUS), higher dose	Mirena; Liletta	52 mg levonorgestrel, releasing ~20 µg/day (declining)	Endometrial atrophy + thick cervical mucus; ovulation usually preserved	Mirena 5 yr (label); Liletta 6 yr (label)	0.1 / 0.1

Category	Device (brand)	Composition/dose	Mechanism	Approved duration	Failure rate (perfect/typical use, %)
LNG-IUS, lower dose (nulliparous-sized frame)	Kyleena (19.5 mg); Skyla/Jaydess (13.5 mg)	Releases 17 µg/day and 14 µg/day respectively	Same as above	Kyleena 5 yr; Skyla 3 yr	0.1–0.4 / 0.4
Subdermal implant (single rod)	Nexplanon (etonogestrel; replaced Implanon)	68 mg etonogestrel, releases ≥30 µg/day	Ovulation suppression + thick cervical mucus	3 years	0.1 / 0.1
Subdermal implant (two rods)	Jadelle (Norplant-II)	75 mg levonorgestrel/rod (150 mg total), 50 µg/day	Ovulation suppression + thick mucus	5 years	comparable to combined pills
Progestin-only injectable *(LARC per Indian texts only)*	DMPA (Depo-Provera) 150 mg IM, or 104 mg subcutaneous	Injected every 3 months	Ovulation suppression, endometrial atrophy, thick mucus	Repeat dosing every 3 months	0.2 / 4

Non-contraceptive benefits

Method	Non-contraceptive benefits
LNG-IUS	Marked reduction in menstrual blood loss/menorrhagia (as effective as endometrial ablation); reduces dysmenorrhea and premenstrual tension; used to treat endometrial hyperplasia (fertility-sparing option in early endometrial cancer) and adenomyosis/leiomyoma-related bleeding; protects the endometrium during tamoxifen therapy and during unopposed-estrogen hormone replacement therapy (HRT) around the menopausal transition; alternative to hysterectomy for menorrhagia/dysfunctional uterine bleeding; reduces pelvic inflammatory disease (PID) risk
Copper IUD	Non-hormonal — safe when estrogen/progestin is contraindicated and during lactation; the single most effective method of **emergency contraception** when inserted within 5 days of unprotected intercourse (failure 0–1%); lowers the absolute number of ectopic pregnancies compared with non-contracepting women

Method	Non-contraceptive benefits
Implants (etonogestrel/levonorgestrel)	Reduce dysmenorrhea; free of estrogen-related side effects; safe in lactation; probable reduction in endometrial and ovarian cancer risk (extrapolated from oral contraceptive/DMPA data); fewer functional ovarian cysts with etonogestrel (more complete ovulation suppression)
DMPA (progestin injectable)	Reduces menstrual blood loss and iron-deficiency anaemia; reduces dysmenorrhea; decreases endometrial cancer risk (comparable to combined pills); reduces epithelial ovarian cancer risk with ≥3 years' use; decreases development of uterine fibroids, ectopic pregnancy, and PID; **raises the seizure threshold** — useful in women on antiepileptics; reduces the **frequency and intensity of sickle-cell crises**; increases breast-milk quantity without affecting infant growth — safe and beneficial in lactation

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 14.4 — Copper T380A (ParaGard) intrauterine device. (Berek & Novak 16e, p.784)*
- ☐ *Fig 14.5 — Levonorgestrel T (Mirena) intrauterine device. (Berek & Novak 16e, p.785)*

For the implant, sketch a 4-cm flexible single rod (Nexplanon) lying subdermally in the inner upper arm, 8–10 cm proximal to the medial humeral epicondyle, between biceps and triceps — label the insertion device's needle bevel and the palpable rod after placement.

High-yield exam pointers

- LARC (ACOG) = **IUDs + implants**; DC Dutta additionally includes **progestin injectables** — state both classifications.
- Top-tier efficacy (failure ~0.1%, comparable to sterilization): **LNG-IUS and etonogestrel implant**.
- Durations to write verbatim: Copper T380A **10 yr**; Mirena/Liletta **5–6 yr label**; Kyleena **5 yr**; Skyla **3 yr**; Nexplanon **3 yr**; Jadelle **5 yr**.
- Mirena's "big three" non-contraceptive uses: **menorrhagia, adenomyosis/fibroid bleeding, endometrial hyperplasia** (fertility-sparing).
- DMPA's "big three" non-contraceptive uses: **sickle-cell crises ↓, seizure threshold ↑, endometrial/ovarian cancer protection**.
- Copper IUD = gold-standard non-hormonal emergency contraception, inserted within **5 days** of unprotected intercourse.

- ACOG Committee Opinion No. 735 (2018): LARC is **first-line** for adolescents/nulliparous women.

Recent advances [RA]

- The US FDA extended Mirena's approved contraceptive duration from 5 to **8 years** (August 2022), based on a phase 3 extension trial (362 women, contraceptive efficacy >99% from year 6 to year 8, no new safety signal).
- The FDA similarly extended Liletta's approved duration to **8 years** (November 2022), based on the ACCESS-IUS trial data (*American Journal of Obstetrics and Gynecology*, 2022).
- ACOG Committee Opinion No. 735 (2018, reaffirmed) recommends LARC (IUDs and implants) as first-line contraceptive counselling for adolescents, given superior efficacy, continuation, and satisfaction versus short-acting methods; it advises **dual method use (condoms)** alongside LARC since neither IUDs nor implants protect against sexually transmitted infections, including HIV.
- ACOG Practice Bulletin No. 186 (Long-Acting Reversible Contraception) endorses **immediate postpartum LARC**: IUD placement within 10 minutes of placental delivery at both vaginal and caesarean birth, and implant placement before hospital discharge regardless of breastfeeding status — contraindicated with chorioamnionitis, puerperal sepsis, or ongoing postpartum haemorrhage.
- The levonorgestrel-releasing intrauterine system has been shown non-inferior to the copper IUD for emergency contraception (Turok et al., *New England Journal of Medicine*, 2021), widening the emergency-IUD choice for women who also want the LNG-IUS's non-contraceptive benefits.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> Coverage note: Jadelle's duration is printed as 5 years in the current Williams Obstetrics 26e; DC Dutta's Obstetrics 9e prints an older figure of 3 years — the current manufacturer/FDA-approved duration of 5 years is followed above.

> **SOURCE & COVERAGE**
>
> Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e (figures); ACOG Committee Opinion No. 735 (2018); ACOG Practice Bulletin No. 186; US FDA label updates for Mirena and Liletta (2022).

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Management of missing copper T

Asked in: Paper IV Jul 2016 — RGUHS MS Obstetrics & Gynaecology

Definition — "Missing threads" is failure to visualize the tail (retrieval string) of an intrauterine contraceptive device (IUCD), such as the copper T, at the external cervical os on speculum examination. It affects roughly 1 in 20 users at some point and must be worked up systematically, because the device may simply be retracted, or may have been expelled, or may have perforated into the peritoneal cavity, or been carried upward by a pregnant uterus.

Causes of missing threads

Cause	Mechanism
Thread coiled inside the endocervical canal or cavity	Retracts after insertion, out of view at the os
Thread torn through	Sheared during a previous removal attempt or by cervical mucus
Device expelled, unnoticed by the patient	Partial or complete expulsion, often during menses
Uterine perforation	Device has migrated into the peritoneal cavity, omentum, or bowel serosa
Device pulled upward	The growing pregnant uterus displaces the device and its thread out of reach

Step 1 — before any instrumentation

- **Pregnancy test** — always done first; instrumenting a pregnant uterus can rupture membranes or cause miscarriage.
- **Assess for pelvic infection** — fever, adnexal or uterine tenderness, purulent discharge; if present, treat before removal attempts.

Step 2 — localize the device

Investigation	Purpose / finding
Gentle probing of the endocervical canal (artery forceps, cotton-tipped applicator, or cytobrush, rotated)	Retrieves a thread that is merely coiled just inside the os
Ultrasonography (transvaginal, or abdominal with a full bladder)	First-line — confirms the device within the cavity or shows it absent; preferred over radiography as it is safe and avoids radiation
Uterine sound (light plastic, not a heavy metal sound)	Confirms an intrauterine device by feel/deflection when ultrasonography is unavailable or equivocal

Investigation	Purpose / finding
Plain X-ray abdomen–pelvis, with a radiopaque sound left in the cavity, if ultrasonography is negative	All copper devices are radiopaque; distinguishes true expulsion (no device seen) from perforation/translocation (device seen outside the sound's outline)
Hysteroscopy	Direct visualization of the cavity with simultaneous retrieval; used when ultrasonography is inconclusive

Management by device location

A. Device within the uterine cavity

- Specially designed blunt IUCD hook, directed to the sonographically/sound-confirmed position.
- Uterine curette or narrow artery (Bozeman/alligator) forceps, opened widely on passing the internal os.
- **Hysteroscopic grasping under direct vision** — preferred where available; minimizes uterine trauma and confirms complete removal.

B. Device perforated / lying outside the uterus (peritoneal cavity, omentum, bowel serosa)

- **Operative laparoscopy** — removal of choice, usually under general anaesthesia.
- **Laparotomy** — reserved for dense adhesions, bowel/omental involvement, or a failed laparoscopic attempt.
- Any perforated device — including levonorgestrel-releasing systems — should be removed **promptly on diagnosis**; copper provokes progressive adhesion formation, so delay only increases surgical difficulty and the risk of bowel injury.

C. Device expelled (not seen on ultrasonography or X-ray) Reassure the patient; counsel on and offer a new device or an alternative contraceptive method.

D. Special situation — pregnancy with the device in situ

- Exclude **ectopic pregnancy and pelvic infection** first.
- **Thread visible** → remove the device immediately; the spontaneous-miscarriage rate with the device left in place (~50%) exceeds that after removal (~30%), and atraumatic early removal does not itself add further risk.
- **Thread not visible, pregnancy desired** → avoid blind intrauterine instrumentation (risk of membrane rupture); ultrasonography-guided retrieval (with saline or carbon-dioxide hysteroscopy) may be attempted only if it can be done atraumatically, otherwise the pregnancy is monitored closely — the risk of preterm labour and birth is roughly doubled when the device is retained, though congenital-malformation risk is not increased.
- **Infected, pregnant uterus with retained device** → start broad-spectrum antibiotics first, then remove the device promptly; monitor closely for septic shock.

- **Termination planned** → remove the device at the same sitting.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 30.8 — Hysteroscopic view of IUCD in uterine cavity. The threads are coiled inside (DC Dutta's Gynaecology 7e, p.416)*

Recent advances [RA]

- **Three-dimensional transvaginal ultrasonography** now outperforms conventional two-dimensional scanning for confirming true intrauterine device position and for detecting subtle malposition or partial embedding (Connolly & Fox, *J Ultrasound Med* 2022;41(6):1525–1536, PMID 34580900).
- Braaten et al. (*Obstet Gynecol* 2011;118(5):1014–1020, PMID 22015868) showed that a **malpositioned but still intracavitary** device carries a higher subsequent expulsion/pregnancy rate than a well-positioned one, but an asymptomatic, clearly intrauterine low-lying device does not automatically need removal — current practice has moved away from reflexively removing every "abnormally sited" device that is nonetheless intrauterine.
- The **FSRH (Faculty of Sexual & Reproductive Healthcare, UK) Clinical Guideline "Intrauterine Contraception"** (March 2023, amended January 2025), endorsed by the Royal College of Obstetricians and Gynaecologists, sets out a stepwise algorithm: do not assume expulsion until imaging is negative; ultrasonography showing the classic intrauterine "double-line" appearance confirms position; if ultrasonography is negative or equivocal, obtain a plain kidney–ureter–bladder X-ray — a device seen on X-ray but not within the cavity on ultrasonography is translocated and needs laparoscopic retrieval, while a device seen on neither has been expelled.
- **Office (outpatient) mini-hysteroscopy** is increasingly used as first-line "see-and-retrieve" management for a coiled or missing thread, allowing same-sitting confirmation and removal without general anaesthesia (FOGSI FOCUS: Intrauterine Device, 2019).
- The World Health Organization Medical Eligibility Criteria for Contraceptive Use continues to guide counselling on re-insertion eligibility once a missing-thread work-up is complete.

High-yield exam pointers

- Five causes to reel off: coiled thread, torn thread, silent expulsion, perforation, pregnancy-related upward migration.
- Pregnancy test **first**, always, before any probing or imaging.
- Ultrasonography is first-line (no radiation); an X-ray with a sound left in the cavity is the fallback that separates "expelled" from "perforated."
- Device in cavity → hysteroscopic/blunt-hook removal; device outside the uterus/perforated → laparoscopy (laparotomy if it fails).

- Pregnant with a visible thread → remove now; pregnant and infected → antibiotics first, then remove.
- All copper IUCDs are radiopaque — the basis of the X-ray fallback.

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

Older texts describe blind removal with a uterine curette or artery forceps once the device is localized by sound; current practice increasingly favours ultrasonography- or hysteroscopy-guided removal for greater accuracy and less trauma.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Williams Obstetrics 26e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; FSRH Clinical Guideline: Intrauterine Contraception (Mar 2023, amended Jan 2025); FOGSI FOCUS: Intrauterine Device (2019); PMID 22015868; PMID 34580900.

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Manual vacuum aspiration for MTP

Asked in: Paper IV 02-Jun-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Manual vacuum aspiration (MVA) is a surgical method of uterine evacuation for first-trimester medical termination of pregnancy (MTP) in which a flexible or rigid **Karman cannula**, passed through the cervix, is connected to a hand-held **60 mL double-valve plastic syringe** that generates suction manually — as opposed to electric vacuum aspiration (EVA), where the same cannula is driven by an electric pump. It is used up to **12 weeks** of gestation, is **98–100% effective**, and is performed as an outpatient procedure under local (paracervical block) anaesthesia in **10–15 minutes**.

Instrument and principle

Component (Fig.)	Description
Cylinder	Calibrated barrel, capacity **60 mL**
Plunger + plunger O-ring	Creates negative pressure (~600 mmHg) when withdrawn and locked
Collar stop	Locks the plunger fully retracted, storing the vacuum until released
Hinged (pinch) valve + valve liner	Opens/closes the vacuum pathway to the cannula on demand
Valve button and cap	Trigger and protective cap for the valve mechanism

Component (Fig.)	Description
Karman cannula	Flexible/semi-rigid plastic, sizes **4–12 mm**; size chosen to approximate cervical dilation/gestational age in weeks

Retracting the plunger against the locked collar stop charges the syringe with vacuum; opening the pinch valve after cannula insertion transmits this suction to the endometrial cavity, aspirating the products of conception.

Indications and eligibility

- **Surgical MTP up to 12 weeks** of gestation.
- **Incomplete or missed abortion** up to 12 weeks.
- **Molar pregnancy / blighted ovum** evacuation up to 12 weeks.
- **Menstrual regulation** (very early, pre-clinical pregnancy termination).
- **Endometrial sampling/biopsy.**
- **Uterine sampling in pregnancy of unknown location** — MVA of the aspirate for gross/histological chorionic villi helps distinguish a failed intrauterine pregnancy from an ectopic pregnancy when ultrasound is inconclusive.

Eligibility for MTP itself (grounds, RMP qualification, consent) is governed by the MTP (Amendment) Act, 2021 and is covered separately; MVA's own instrument-based ceiling is a uterine size of ≤ **12 weeks** (up to 12–14 weeks in experienced hands with an appropriately larger cannula).

Procedure

Pre-procedure

- Counsel, obtain written informed consent, and confirm gestational age/eligibility by history, examination and ultrasound if needed.
- Baseline haemoglobin and **Rh typing**; treat any obvious cervical infection first; give prophylactic **doxycycline 200 mg orally 1 hour before** the procedure.
- Analgesia: **paracervical block** (5 mL of 1–2% lidocaine at 4 and 8 o'clock, or 5-mL aliquots at 12, 3, 6, 9 o'clock) plus an oral/IM NSAID 30–60 minutes before is usually sufficient; general/regional anaesthesia only for selected cases.

Steps

- Bimanual examination to confirm uterine size, position and version.
- Bivalve speculum; clean the cervix and vagina with povidone-iodine.
- Grasp the anterior cervical lip with a tenaculum for traction.
- Sound the uterus for depth/axis; dilate with Hegar/Pratt/Hank dilators only if the chosen cannula will not pass — dilation (mm) approximates gestational weeks.

- Select an **8–12 mm Karman cannula** (too small a cannula risks missed products and a longer procedure).
- Charge the syringe (retract plunger, lock the collar stop) and attach it to the cannula.
- Advance the cannula gently to the fundus until resistance is felt, then release the pinch valve to activate suction.
- Aspirate by slowly rotating the cannula through 360° while moving it between fundus and os, covering the whole cavity, until no further tissue/froth returns and the uterus contracts (**gritty sensation** over bare myometrium = end-point).
- Recharge the syringe if suction is lost; a brief gentle sharp curettage may follow only if tissue seems retained.
- Rinse the aspirate in saline and inspect (backlit ± magnifying lens) to confirm villi and completeness.

Post-procedure

- Observe vitals briefly before outpatient discharge.
- **Anti-D immunoglobulin 300 µg (1500 IU) IM within 72 hours** if Rh-negative and unsensitised.
- Offer same-visit ("quick-start") contraception, including immediate post-abortion IUCD if desired.

Advantages over other evacuation methods

Feature	MVA
Anaesthesia	Local (paracervical block); no electricity/theatre required
Setting	Outpatient/office-based
Duration	10–15 minutes
Efficacy	98–100%
Blood loss / trauma	Minimal; less cervical/uterine injury than metal curette or D&E
Cost/portability	Simple, reusable, cheap; usable in rural centres without electricity (unlike EVA)
Drawback	Uterine size > **10–12 weeks** raises retained-products risk; not a substitute for D&E in larger uteri

Complications and contraindications

Complications	Contraindications
Cervical laceration/injury	Untreated acute pelvic infection/cervicitis

Complications	Contraindications
Uterine perforation (uncommon, risk rises with inexperience/larger gestation)	Uncorrected coagulopathy
Haemorrhage/shock (trauma, incomplete evacuation, atony)	Uterine size beyond the safe MVA range (> 12–14 weeks)
Postabortal triad — pain, bleeding, low-grade fever from retained products (treat with antibiotics ± repeat aspiration)	Suspected haemodynamically unstable ectopic pregnancy requiring immediate laparotomy rather than aspiration
Failed abortion with continuing pregnancy (rare, ~2% if products not clearly identified <6 weeks)	
Rh-isoimmunisation if anti-D omitted in a Rh-negative woman	

Complications overall are far fewer (~5%) than with mid-trimester termination, and lower than with sharp curettage/dilatation and evacuation, provided the procedure is completed before 8 weeks.

Recent advances [RA]

- **WHO Abortion Care Guideline (2022):** vacuum aspiration (manual or electric) and medication regimens should replace sharp curettage for uterine evacuation; a routine sharp "check curettage" after adequate aspiration is **not** recommended, as it adds trauma without improving completeness.
- **Task-sharing:** WHO (2022) states trained auxiliary nurses and nurse-midwives can safely perform aspiration where they already provide basic emergency obstetric care; an Indian equivalence study from Bihar and Jharkhand found nurse-performed MVA equally safe, effective, and acceptable (98%) to physician-performed MVA, evidence FOGSI's **Comprehensive Abortion Care (CAC) project** uses to advocate widening the trained MVA-provider base in India.
- **Same-visit contraception:** a landmark randomised trial (Bednarek et al., *NEJM*, 2011) and a subsequent Cochrane review (12 trials, > 7000 women) show immediate post-aspiration IUCD insertion is as safe as delayed interval insertion (no difference in infection/perforation), though with a modestly higher expulsion rate — supporting same-sitting ("quick-start") post-abortion contraception rather than deferring to a follow-up visit.
- **Ultrasound-guided MVA:** randomised comparisons of ultrasound-guided MVA versus EVA show comparable efficacy and adhesion rates, supporting sonographic guidance to reduce incomplete evacuation, particularly for less-experienced providers.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 16.4 — Manual vacuum aspiration syringe; the arrow indicates the pinch (hinged) valve (Te Linde 13e, p.835)*

High-yield exam pointers

- MVA = **hand-held 60 mL double-valve syringe** + **Karman cannula (4–12 mm)**; electric pump instead of hand syringe = **EVA**.
- Gestational ceiling: **up to 12 weeks** (up to 12–14 weeks with a larger cannula in experienced hands).
- **98–100%** effective, **10–15 minutes**, outpatient, under **paracervical block**.
- End-point of aspiration = **gritty sensation** + uterus contracting around the cannula + no further tissue return.
- Anti-D **300 µg (1500 IU) IM within 72 h** if Rh-negative.
- WHO (2022): aspiration/medical methods should **replace** sharp curettage; no routine "check curette."
- Complications ~5% if done before 8 weeks — far less than mid-trimester methods.

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

DC Dutta's Textbook of Obstetrics 9e states the MTP gestational ceiling as 20 weeks (pre-2021 position); the current statutory framework is the MTP (Amendment) Act, 2021 (covered in the separate MTP Act answer). MVA's own instrument-based limit — up to 12 (–14) weeks of uterine size — is unaffected by that legal ceiling and is the figure examinable for this question.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (MVA instrument, indications, advantages, complications); Williams Obstetrics 26e (aspiration technique, analgesia, cannula sizing); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (gestational limit, use in pregnancy of unknown location); WHO Abortion Care Guideline (2022); FOGSI Comprehensive Abortion Care Project.

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Methods and complications of second trimester MTP

Asked in: Paper IV 03-Oct-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Termination of pregnancy carried out between **13 and 20 weeks** of gestation (extendable to 24 weeks only for the specified categories under India's MTP Amendment Act, 2021) is called second-trimester or mid-trimester medical termination of pregnancy (MTP). No single method is universally

safe for all cases; **medical** (prostaglandin ± mifepristone) and **surgical** (dilatation and evacuation, intrauterine instillation, hysterotomy) options are used, and the complication rate is about **five times higher** than after first-trimester termination.

Methods — medical

Regimen	Dose & route	Outcome
Mifepristone + misoprostol	Mifepristone 200 mg oral; 36–48 h later misoprostol 800 µg vaginal, then 400 µg oral 3-hourly × 4 doses	97% success; median induction–abortion interval 6.5 h
Misoprostol alone	400–800 µg vaginal every 3–4 h; or 600 µg vaginal once then 200 µg oral 3-hourly; or 400 µg sublingual 3-hourly × 5 doses	Up to 100% success; mean interval 11–12 h
Gemeprost (PGE1 analogue)	1 mg vaginal pessary every 3–6 h × 5 doses in 24 h	~90% success; interval 14–18 h
Dinoprostone (PGE2)	20 mg vaginal suppository every 3–4 h, max 4–6 doses	Interval ~17 h with osmotic dilators; thermolabile, costly
Carboprost (15-methyl PGF2α)	250 µg IM every 3 h, max 10 doses	~90% success in 36 h; side effects (vomiting, diarrhoea) more; avoid in bronchial asthma
High-dose oxytocin	Up to 300 U in 500 mL dextrose-saline, drip increased to ≥50 mU/min	~80% effective alone; commonly used as an adjunct to the above

Failed medical MTP is defined as failure to achieve expulsion within **48 hours**; the live-birth rate with failed prostaglandin methods is 4–10%, and evacuation must then be completed surgically.

Methods — surgical

- **Dilatation and evacuation (D&E)** — the safer, faster option between ~13/14 and 20 weeks.
  - **Cervical preparation** (mandatory beyond ~14 weeks to avoid perforation/laceration): osmotic dilators (laminaria or Dilapan-S, placed several hours to 24 h before) and/or misoprostol/mifepristone priming.
  - Bimanual check, dilator removal, bivalve speculum, antiseptic prep, paracervical block.
  - Mechanical dilatation, then evacuation of fetus and placenta using **forceps combined with a suction cannula**, ideally under **ultrasound guidance** (reduces perforation rate).
  - Cavity exploration to confirm completeness; concurrent oxytocin infusion reduces blood loss; IUD can be placed at the same sitting if desired.
- **Intrauterine instillation of hyperosmotic solution** — 16–20 weeks.

- **Extra-amniotic:** 0.1% ethacridine lactate (~10 mL/week) or isotonic saline instilled transcervically via a no. 16 Foley catheter passed 10 cm above the internal os, balloon inflated with 10 mL saline and removed after 4 h; effective and less hazardous than intra-amniotic saline.
- **Intra-amniotic hypertonic saline (20%):** via transabdominal amniocentesis; volume instilled = **weeks of gestation × 10 mL**, given slowly at 10 mL/min; contraindicated in cardiac/renal disease or severe anaemia; watch for signs of intravascular injection (abdominal pain, headache, thirst, tingling) — stop and give rapid IV dextrose with a diuretic if these occur; prophylactic antibiotic (e.g., ampicillin 500 mg TDS × 3–5 days) is given. Success 90–95%; failure = no expulsion by 48 h.
- **Intra-amniotic hyperosmotic urea (40%, 80 g in 200 mL)** with an oxytocin drip is an alternative with fewer complications; combined with 15-methyl PGF2α it shortens the induction–abortion interval to ~13 h.

- **Hysterotomy** (abdominal) — reserved for failed medical TOP or when D&E is unsafe (lower-segment fibroid, uterine anomaly, scarred uterus with suspected accreta/percreta); should be combined with sterilisation. Immediate hazards: haemorrhage/shock, anaesthetic complications, peritonitis, intestinal obstruction. Remote hazards: menstrual abnormalities, scar endometriosis (1%), incisional hernia, scar rupture in a future pregnancy.

Rh-negative women who are unsensitised should receive **anti-D immunoglobulin 300 µg (1500 IU) IM within 72 hours** of the procedure (the standard dose for ≥13 weeks' gestation).

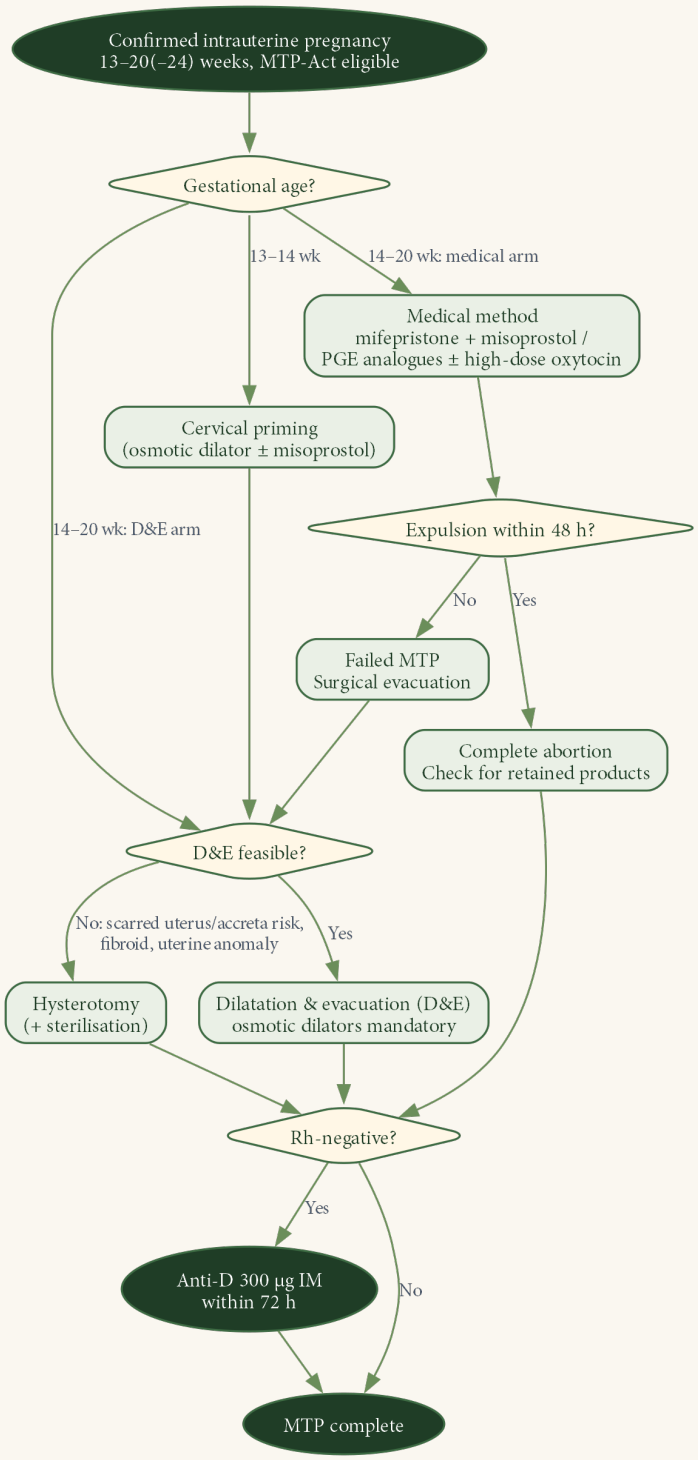
Complications of second-trimester MTP

Timing	Complication
Immediate — general	Cervical laceration/injury; uterine perforation (chiefly with D&E); haemorrhage and shock (trauma, incomplete evacuation, atony, coagulation failure); thrombosis/embolism; **postabortal triad** — pain, bleeding, low-grade fever from retained products (treat with antibiotics ± repeat evacuation)
Immediate — method-specific	Prostaglandins: intractable vomiting, diarrhoea, fever, uterine pain, cervicouterine injury. Oxytocin: water intoxication, rarely convulsions. Hypertonic saline: hypernatraemia, pulmonary/cerebral oedema, endotoxic shock, DIC, renal failure
Remote — gynaecological	Menstrual disturbances; chronic pelvic inflammation; infertility (cornual block); scar endometriosis (1%); intrauterine synechiae → secondary amenorrhoea

Timing	Complication
Remote — obstetric	Recurrent mid-trimester miscarriage (cervical incompetence); ectopic pregnancy (3-fold increase); preterm labour; fetal growth restriction; increased perinatal loss; scar/uterine rupture in a future pregnancy; Rh-isoimmunisation if prophylaxis omitted; failed abortion with continuing pregnancy
Mortality	5–6 times the first-trimester rate; concurrent tubectomy roughly doubles mortality

If no chorionic villi are seen on histopathology after evacuation, an ectopic pregnancy must be excluded with serial serum β-hCG and transvaginal ultrasound before the abortion is labelled "complete."

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Method-selection algorithm for second-trimester MTP by gestational window, with the Rh-status/anti-D check applied across all terminal arms.

High-yield exam pointers

- Second trimester = **13–20 weeks** (up to 24 weeks only for special categories, MTP Amendment Act 2021); >12 weeks needs opinion of **two** registered medical practitioners.
- Mifepristone 200 mg → misoprostol 800 µg vaginal then 400 µg oral 3-hourly ×4 = **97%** success, interval **6.5 h** — write this regimen verbatim.
- Extra-amniotic ethacridine lactate 0.1%: **10 mL/week**, via Foley No. 16, 10 cm above internal os.
- Intra-amniotic hypertonic saline volume = **gestational weeks × 10 mL**, infused at **10 mL/min**; failure defined at **48 h**.
- **Postabortal triad** = pain + bleeding + low-grade fever (retained products).
- Complications ~**5×** more than first trimester; mortality **5–6×** higher; tubectomy at same sitting **doubles** mortality.
- Anti-D **300 µg (1500 IU)** IM within 72 h for Rh-negative women.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Dutta's Obstetrics quotes an older 100 µg anti-D dose for post-abortal prophylaxis; the current standard (also reflected in Williams Obstetrics) for procedures at or beyond 13 weeks is 300 µg (1500 IU) IM, and the answer above follows the current standard.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; Te Linde's Operative Gynecology 13e (dilatation and evacuation technique and complications).

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Millennium development goals

Asked in: Paper IV 04-Aug-2021 · Paper IV 18-Nov-2019 · Paper IV Nov 2017 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — The **Millennium Development Goals (MDGs)** were eight time-bound, measurable global targets adopted by 189 United Nations member states at the **Millennium Summit, New York, September 2000**, to be achieved by **2015** using **1990 as the baseline year**. Two of the eight goals — **MDG 4 (reduce child mortality)** and **MDG 5 (improve maternal health)** — were pursued jointly as **maternal, newborn and child health** (MNCH) and are the goals directly relevant to obstetric practice.

The eight MDGs (2000–2015)

Goal	Statement
MDG 1	Eradicate extreme poverty and hunger
MDG 2	Achieve universal primary education

Goal	Statement
MDG 3	Promote gender equality and empower women
MDG 4	**Reduce child mortality**
MDG 5	**Improve maternal health**
MDG 6	Combat HIV/AIDS, malaria and other diseases
MDG 7	Ensure environmental sustainability
MDG 8	Develop a global partnership for development

MDG 4 and MDG 5 — targets and indicators

Goal	Target	Key indicators
MDG 4 — reduce child mortality	Reduce the **under-5 mortality rate by two-thirds** between 1990 and 2015	Under-5 mortality rate; infant mortality rate; proportion of 1-year-olds immunised against measles
MDG 5A — improve maternal health	Reduce the **maternal mortality ratio (MMR) by three-quarters** (75%) between 1990 and 2015	MMR; proportion of births attended by a **skilled birth attendant (SBA)**
MDG 5B — universal reproductive health	Achieve **universal access to reproductive health** by 2015	Contraceptive prevalence rate; adolescent birth rate; antenatal care coverage (≥1 visit, ≥4 visits); unmet need for family planning

The **Partnership for Maternal, Newborn and Child Health (PMNCH)** — WHO, UNICEF, UNFPA, World Bank and other agencies (2007) — coordinated the drive to cut maternal mortality by three-quarters and child mortality by two-thirds by 2015.

India's programme response — Reproductive and Child Health (RCH) care

- **Safe motherhood package** (Box 38.1, DC Dutta): early registration (within 12 weeks), a minimum of 4 antenatal visits (WHO)/3 visits (Government of India), risk approach to identify high-risk pregnancy, 100% institutional/skilled-attendant deliveries, "three cleans" at delivery, routine tetanus toxoid + iron-folic acid, active management of the third stage, and organised postnatal/newborn care with breastfeeding and referral.
- **Skilled birth attendant (SBA)** — an accredited doctor, nurse or midwife trained to manage normal pregnancy, labour and puerperium, identify complications and refer; permitted to give specified **life-saving drugs** — misoprostol and injection oxytocin (prevention/treatment of postpartum haemorrhage), injection MgSO4 (eclampsia), ampicillin and metronidazole

(infection) — and to perform **life-saving interventions**: digital removal of retained products, active management of third stage of labour, and maintaining a partograph.

- **Emergency Obstetric Care (EmOC)** — Comprehensive EmOC at First Referral Units (FRUs): anaesthesia, vacuum delivery, blood transfusion, caesarean delivery, manual removal of placenta, safe abortion and contraceptive services (including sterilisation), and referral transport.
- **Community outreach** — Accredited Social Health Activists (ASHA) under the National Health Mission (NHM) and *Janani Shishu Suraksha Karyakram* (JSSK) link villages to the Auxiliary Nurse Midwife (ANM)/doctor to promote institutional delivery.
- **Adolescent and reproductive health, gender issues, RTI/STI control** — addressed as cross-cutting determinants of maternal and child mortality (early marriage/motherhood, undernutrition, gender inequality, unsafe abortion).

Global and Indian progress by 2015 (MDG outcome)

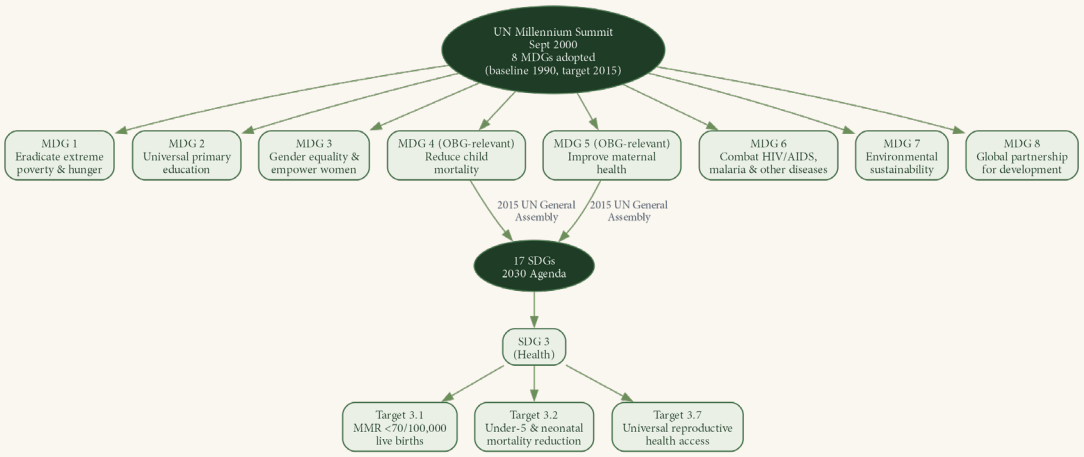
Parameter	Status at MDG endpoint (2015)
Global MMR	Declined to **216/100,000 live births** — an overall **44% reduction**, against a 75% target
Average annual rate of MMR reduction achieved	**2.3%**, well short of the required **5.5%/year**
Countries meeting MDG 5A (75% MMR reduction)	Only **9 of 95** countries; 39 countries achieved ≥50% reduction
Regional disparity	Developing-region MMR 239 vs developed-region MMR 12 per 100,000 (~20-fold gap); 99% of maternal deaths occurred in developing regions
India MMR	Fell from **178 (2010–2012) to 130 (2014–2016)**, Sample Registration System

Recent advances — from MDGs to the Sustainable Development Goals

- The **UN General Assembly, September 2015**, adopted the **"2030 Agenda for Sustainable Development"**, comprising **17 Sustainable Development Goals (SDGs)** that succeeded and expanded the 8 MDGs, integrating economic, social and environmental dimensions.
- Health is consolidated under a single goal, **SDG 3** ("ensure healthy lives and promote well-being for all at all ages"), with **13 targets and 26 proposed indicators**.
- **SDG Target 3.1**: reduce the global **MMR to <70/100,000 live births by 2030**; no country should have an MMR >140/100,000 (twice the global target). This requires an annual rate of reduction of at least **7.5%** — more than triple the 2.3%/year achieved during the MDG era.
- **SDG Target 3.2**: end preventable newborn and under-5 deaths — **neonatal mortality ≤12/1000** and **under-5 mortality ≤25/1000 live births** by 2030 (current global under-5 rate ≈42.5/1000).

- **SDG Target 3.7**: ensure universal access to sexual and reproductive healthcare, including family planning information/education, integrated into national strategies.
- **WHO's Strategies toward Ending Preventable Maternal Mortality (EPMM, 2015)** frame the SDG-era action plan around five pillars: address inequities in access to quality sexual/reproductive/maternal/newborn care; ensure universal, comprehensive care; address all causes of maternal mortality, morbidity and disability; strengthen health systems around women's and girls' needs; and ensure accountability for quality and equity.
- **India's National Health Mission — National Sociodemographic Goals (2030)** (Table 38.1, DC Dutta): total fertility rate <2.1, MMR <70/100,000, infant mortality <12/1000, antenatal care coverage 100%, institutional deliveries 80%, deliveries by skilled personnel 100%.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Timeline flowchart: Millennium Summit (2000) branching into the 8 MDGs, with MDG 4 and MDG 5 (the OBG-relevant goals) carrying forward through the 2015 UN General Assembly transition into the 17 SDGs / 2030 Agenda, drilling down to SDG 3 (Health) and its three key targets.

High-yield exam pointers

- 8 MDGs adopted at the **Millennium Summit 2000**; baseline **1990**, target year **2015**.
- **MDG 4** — cut under-5 mortality by ⅔; **MDG 5A** — cut MMR by ¾; **MDG 5B** — universal reproductive health access.
- 2015 outcome: global MMR **216/100,000** (44% fall, annual rate 2.3% vs required 5.5%); only **9/95** countries met the 75% target.
- MDGs → succeeded by **SDGs (2030 Agenda)**, adopted September 2015; health consolidated as **SDG 3**.
- Remember the SDG numbers: **MMR <70**, **neonatal mortality ≤12**, **under-5 mortality ≤25** (all per 1000/100,000 live births, by 2030); required annual MMR reduction **≥7.5%**.

- **EPMM (2015)** = 5 pillars: equity, universal care, all causes, health systems, accountability.
- India NHM 2030 goals: **TFR <2.1, MMR <70, IMR <12,** ANC 100%, institutional delivery 80%, SBA delivery 100%.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The MMR and progress figures above reflect the WHO/UN inter-agency estimates and Sample Registration System data reported at the MDG-to-SDG transition (up to 2015–16); more recent Sample Registration System bulletins show India's MMR has continued to decline further toward the SDG target of <70/100,000 live births.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Safe Motherhood, Epidemiology of Obstetrics: MDG/SDG sections, Box 38.1, Box 38.4, Table 38.1); UN Millennium Declaration 2000; UN 2030 Agenda for Sustainable Development (SDG 3); WHO Strategies toward Ending Preventable Maternal Mortality (EPMM), 2015.

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MTP Act

Asked in: Paper IV 18-Nov-2019 · Paper IV Nov 2016 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — The Medical Termination of Pregnancy (MTP) Act, 1971, as amended by the **MTP (Amendment) Act, 2021**, is the Indian statute that legalises termination of pregnancy by a **Registered Medical Practitioner (RMP)** on defined medical, eugenic, humanitarian, and social/contraceptive-failure grounds, subject to gestational-age ceilings, place-of-performance rules, and consent safeguards. It is read with the **MTP Rules, 2003** (as amended 2021), which prescribe the RMP's qualifications, the special categories eligible up to 24 weeks, and the Medical Board for pregnancies beyond 24 weeks.

Grounds and gestational limits for termination (Section 3)

Gestational age of pregnancy	Opinion required	Ground / condition
Up to 20 weeks	One RMP	Continuation would risk the woman's life or cause **grave injury to her physical or mental health**, OR substantial risk the child would be born with a serious physical/mental abnormality

Gestational age of pregnancy	Opinion required	Ground / condition
20 weeks to 24 weeks	Two RMPs	Only for the special categories of women prescribed under **Rule 3B** (below)
Beyond 24 weeks	Opinion of a **Medical Board**	Only where a **substantial foetal abnormality** is diagnosed by the Board (Section 3(2B)) — no upper gestational ceiling is prescribed
Any gestational age	One RMP	Termination **immediately necessary to save the woman's life** (Section 5)

- **Explanation I** — pregnancy caused by rape is presumed to constitute grave injury to the woman's mental health.
- **Explanation II (amended 2021)** — pregnancy caused by failure of a contraceptive method/device used by **"any woman or her partner"** (earlier restricted to a "married woman and her husband") is likewise presumed a grave injury to mental health; this extended the contraceptive-failure ground to unmarried women.

Registered Medical Practitioner (RMP) — who may perform MTP

An RMP must be on the State Medical Register with recognised training in obstetrics & gynaecology, satisfying **any one** of:

- Six months' house-surgeoncy in obstetrics & gynaecology, OR
- Six months' registration as a postgraduate student in obstetrics & gynaecology, OR
- A diploma or degree in obstetrics & gynaecology, OR
- Assisted an RMP in performing at least 25 MTPs (of which ≥5 by dilatation & evacuation) in an authorised training institute, with a certificate to that effect.

Special categories eligible for termination between 20 and 24 weeks (MTP Rules, 2003 — Rule 3B)

- Survivors of sexual assault, rape, or incest
- Minors
- Change of marital status during pregnancy (widowhood or divorce)
- Women with physical disability (major disability as defined under the Rights of Persons with Disabilities Act, 2016)
- Mentally ill women, including mental retardation

- Foetal malformation with substantial risk of being incompatible with life, or of the child suffering serious physical/mental handicap if born
- Women with pregnancy in humanitarian settings or disaster/emergency situations declared by the Government

Medical Board — termination beyond 24 weeks (Section 3(2B) & Rule 3C)

- Constituted by each State/UT Government: a **Gynaecologist**, a **Paediatrician**, a **Radiologist/Sonologist**, and any other member notified by the State Government.
- Examines the woman and her reports and gives its opinion, **within three days** of receiving the application, on whether the foetal abnormality is substantial and whether termination is warranted.
- Applicable **only** when the ground is substantial foetal abnormality; the 20/24-week ceilings under Section 3(2) do not apply once the Board approves.

Place, consent, confidentiality and penalties

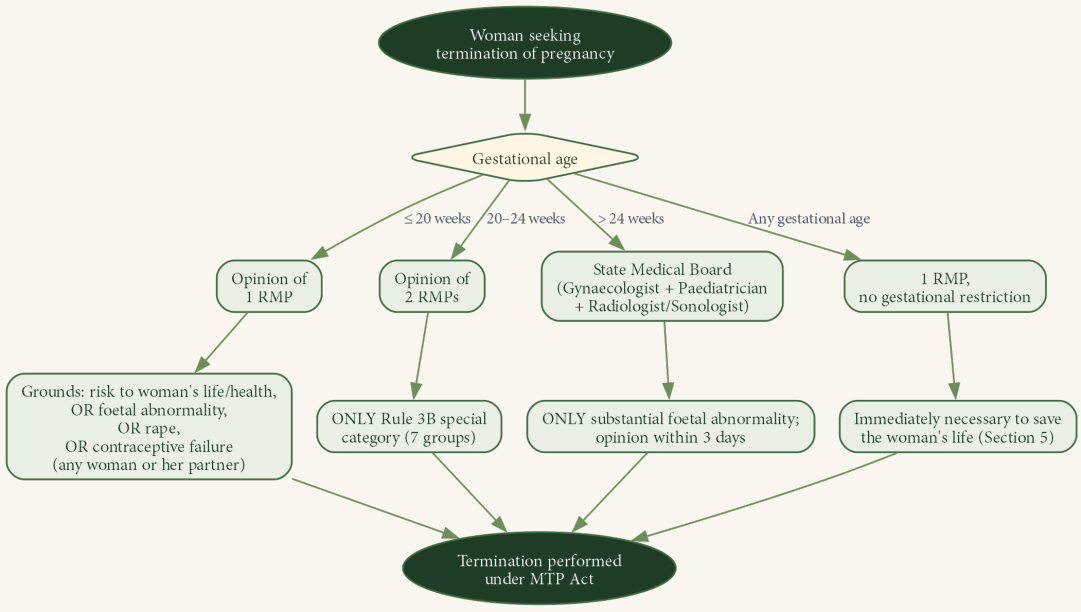
Provision	Requirement
Place (Section 4)	A Government hospital, or a place/clinical establishment approved for MTP by the Government or District Level Committee
Consent (Section 3(4))	Consent of the **pregnant woman alone** is sufficient; husband's/family's consent is **not** required. Written consent of a guardian is additionally required **only** if she is a minor (<18 years) or a "mentally ill person" as defined
Confidentiality (Section 5A, inserted 2021)	The RMP must not reveal the woman's name/particulars except to a person authorised by law; breach = imprisonment up to 1 year and/or fine
Penalty for termination outside the Act (Section 5)	Termination by a person who is not an RMP = rigorous imprisonment of **2–7 years**

Recent advances [RA]

- **MTP (Amendment) Act, 2021** (Act 8 of 2021, in force 24 September 2021): raised the single-RMP ceiling from 12 to 20 weeks, created the 20–24-week category restricted to Rule 3B women, dropped the "married woman" qualifier from the contraceptive-failure ground, and removed any upper gestational limit for Medical-Board-approved foetal-abnormality terminations.
- **MTP (Amendment) Rules, 2021** (G.S.R. 748(E), 12 October 2021): inserted Rule 3B (special 20–24-week categories) and Rule 3C (Medical Board composition and function).

- **Supreme Court,* X v. Union of India *(2022)**: held that distinguishing married from unmarried women for reproductive-rights purposes under Section 3(2)(b)/Rule 3B is unconstitutional; every woman is entitled to safe, legal termination on the same grounds — including contraceptive failure — irrespective of marital status, grounding this in the right to reproductive autonomy under Article 21.
- **WHO Abortion Care Guideline (2022)**: endorses simplified, rights-based abortion care and self-managed medical abortion up to 12 weeks without mandatory ultrasound; in India, Schedule H drug rules still restrict mifepristone/misoprostol dispensing to an RMP at an approved facility — teleconsultation-only prescription of these abortifacients is not permitted.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

MTP Act: gestational-age decision algorithm.

High-yield exam pointers

- Remember **"20-1, 24-2, Board-beyond"**: ≤20 weeks = 1 RMP; 20–24 weeks = 2 RMPs (Rule 3B only); beyond 24 weeks = Medical Board (foetal abnormality only).
- Rule 3B has **7 categories** — mnemonic **"SAMPLE-H"**: Sexual assault/rape/incest, Age (minor), Marital-status change, Physical disability, mentaL illness, fEtal abnormality, Humanitarian setting.
- Explanation II (2021): write **"any woman or her partner"** verbatim, not "married woman and her husband."
- Medical Board = Gynaecologist + Paediatrician + Radiologist/Sonologist; must opine within **3 days**.
- Consent = woman's own consent only; guardian's consent needed only if minor or mentally ill.

- *X v. Union of India* (2022) — landmark SC ruling extending all Section 3 grounds to unmarried women.
- Non-RMP termination = rigorous imprisonment **2–7 years**.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Textbook of Obstetrics 9e (in the corpus) prints the pre-2021 position — termination permitted up to 20 weeks with the opinion of two doctors required only beyond 12 weeks. The answer above follows the current Medical Termination of Pregnancy (Amendment) Act, 2021 and MTP (Amendment) Rules, 2021, which is the law examinable today.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e (original 1971 grounds, RMP qualifications, place/consent framework); Medical Termination of Pregnancy (Amendment) Act, 2021; MTP (Amendment) Rules, 2021; Supreme Court, *X v. Union of India* (2022); WHO Abortion Care Guideline (2022).

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Non contraceptive use of OCPs

Asked in: Paper IV 04-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Combined oral contraceptive pills (COCs) pair an oestrogen (usually ethinyl oestradiol) with a progestin to suppress ovulation, decidualise/atrophy the endometrium, and thicken cervical mucus. These same hormonal actions give COCs well-documented benefits that are independent of pregnancy prevention: some accrue **incidentally** during routine contraceptive use, while others make the COC a **first-line drug treatment** for a specific gynaecological disorder regardless of any need for contraception.

Non-contraceptive benefits of COCs

A. Improvement of menstrual abnormalities

Benefit	Basis / magnitude
Regulation of the menstrual cycle	Predictable, regular withdrawal bleeding
↓ Dysmenorrhoea	~40% reduction — anovulation + thinned endometrium → less prostaglandin release
↓ Menorrhagia	~50% reduction in menstrual blood loss — progestin-induced endometrial atrophy
↓ Premenstrual syndrome (PMS)	Possibly beneficial; evidence for premenstrual dysphoric disorder (PMDD) is less consistent

Benefit	Basis / magnitude
↓ Mittelschmerz	Ovulation is suppressed, so mid-cycle ovulatory pain does not occur
↓ Iron-deficiency anaemia	Secondary to reduced menstrual blood loss

B. Protection against health disorders

Benefit	Basis
↓ Pelvic inflammatory disease	Progestin thickens cervical mucus, limiting ascending infection
↓ Ectopic pregnancy	Ovulation suppression prevents fertilisation
↓ Fibroid-related bleeding	Low-dose COCs do not enlarge a pre-existing fibroid but reduce associated bleeding
↓ Hirsutism and acne	Oestrogen ↑ sex hormone–binding globulin (SHBG) → ↓ free testosterone
↓ Formation of functional ovarian cysts	Ovulation suppression (does not hasten resolution of an existing cyst)
↓ Benign breast disease	Fewer fibroadenomas and fibrocystic change
↑ Bone mineral density	↓ osteopenia and postmenopausal osteoporotic fracture risk with long-term use
Possibly ↓ autoimmune thyroid disease	Reported association, mechanism unclear
Possibly ↓ severity of rheumatoid arthritis	Ever-users show ~60% relative-risk reduction in case-control data

C. Prevention of malignancy

Cancer	Risk reduction	Duration / notes
Endometrial cancer	~50%	With ≥12 months' use, greatest benefit after >3 years; protective across all histologic subtypes; persists ≥20 years after stopping
Epithelial ovarian cancer	~40% overall, up to ~80% with >10 years' use	Persists ≥20 years after stopping; equal protection in women with a positive family history and in *BRCA1*/*BRCA2* mutation carriers
Colorectal cancer	~40%	Reported in long-term users; less precisely quantified than endometrial/ovarian protection

Therapeutic uses — COC prescribed as treatment

Indication	Why the COC is used
Dysfunctional (anovulatory) uterine bleeding	Progestin stabilises and atrophies a proliferative endometrium — "medical/hormonal curettage" for acute control
Polycystic ovary syndrome	Regularises withdrawal bleeding, protects the endometrium from unopposed-oestrogen hyperplasia, and reduces hyperandrogenism
Hypothalamic amenorrhoea	Provides cyclical oestrogen–progestin replacement while simultaneously contracepting
Prevention of menstrual (catamenial) porphyria	Suppresses the cyclical hormonal fluctuation that precipitates attacks
Control of bleeding in coagulation disorders / anovulatory dysfunctional bleeding	Hormonal haemostasis
Maintenance suppression of endometriosis-related pain after surgery or a gonadotropin-releasing hormone (GnRH) agonist	Cheaper and better tolerated than GnRH agonists for long-term suppression
Continuous or extended-cycle regimens (24 active/4 placebo, or 84 active/7 placebo tablets)	Reduces bleeding days and amount; the 84+7 regimen gives a "seasonal" withdrawal bleed only every 3–4 months, used specifically for menstrual migraine, catamenial (menstrual) seizures, and dysmenorrhoea

Recent advances [RA]

Continuous/extended-cycle dosing — eliminating or spacing the hormone-free interval — is an expanding non-contraceptive application: by suppressing follicle-stimulating hormone (FSH) and follicular activity more completely than the standard 21/7 cycle, it reduces menstrual migraine, catamenial epilepsy, dysmenorrhoea, and endometriosis-related pain, and is now used as first-line medical suppression before escalating to GnRH agonists. Return of ovulation and fertility is not delayed after stopping continuous dosing. Long-term registry follow-up continues to reconfirm that endometrial- and ovarian-cancer protection with combined oral contraception is duration-dependent and persists for at least two decades after discontinuation, including in *BRCA1*/*BRCA2* carriers — supporting COC use as an interim chemopreventive option in high-risk women awaiting risk-reducing surgery. The American College of Obstetricians and Gynecologists (ACOG) continues to endorse combined hormonal contraception as first-line therapy for endometriosis-associated pain and for polycystic-ovary-syndrome-related hyperandrogenism/anovulatory bleeding, and the World Health Organization's Medical Eligibility Criteria are used to individualise such non-contraceptive prescribing in women who carry relative risk factors.

High-yield exam pointers

- Numbers to reproduce: dysmenorrhoea ↓40%, menorrhagia ↓50%, endometrial cancer ↓50%, ovarian cancer ↓40% (up to 80% with >10 years' use), colorectal cancer ↓40%.
- Cancer protection needs ≥6–12 months' use and persists 10–20+ years after stopping — state both the threshold and the persistence.
- Mechanism to name for acne/hirsutism: oestrogen ↑ SHBG → ↓ free testosterone.
- PID protection is via **thick cervical mucus** (barrier to ascending infection), distinct from the anovulation that prevents ectopic pregnancy.
- "Definitely beneficial" therapeutic list (Speroff): DUB, dysmenorrhoea, mittelschmerz, endometriosis prophylaxis, acne/hirsutism, hypothalamic amenorrhoea, menstrual porphyria, bleeding dyscrasias.
- Extended regimen 84 active + 7 placebo → seasonal bleed every 3–4 months; used for menstrual migraine and catamenial epilepsy.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Textbook of Gynaecology 7e rounds the epithelial ovarian cancer protection to ~50% persisting 10–15 years; current data (Speroff 9e) refine this to ~40% overall protection, rising to ~80% with more than 10 years of use, persisting for at least 20 years after stopping — the figures above follow the current, more precise data.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e (Health Benefits of Combined Oral Contraceptives; Continuous or Extended Use of COCs); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Noncontraceptive Effects of Oral Contraception; Off-Label Uses of Steroid Contraception; Extended Regimens/Continuous Dosing); American College of Obstetricians and Gynecologists (ACOG) guidance on non-contraceptive indications for combined hormonal contraception; World Health Organization Medical Eligibility Criteria for Contraceptive Use.

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Non steroidal contraceptives

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

Definition — Non-steroidal (non-hormonal) contraceptives prevent conception **without administering exogenous steroid hormones** (estrogen/progestin). They act by mechanical/chemical barrier, copper-mediated spermicidal and anti-implantation effect, behavioural (fertility-awareness)

avoidance of the fertile period, a non-steroidal anti-estrogen (centchroman), or permanent surgical occlusion of the gametogenic pathway.

Classification

Group	Methods
Barrier — mechanical	Male condom, female condom, diaphragm, cervical cap
Barrier — chemical (spermicides)	Creams (nonoxynol-9), jellies, foam tablets, vaginal contraceptive sponge (Today)
Intrauterine (copper-bearing)	Cu-T 200, Cu-T 380A, Multiload Cu 250/375, GyneFix (frameless)
Fertility awareness-based (natural)	Calendar/rhythm (Ogino-Knaus) method, basal body temperature (BBT), cervical mucus (Billings) method, symptothermal method, coitus interruptus, lactational amenorrhea method (LAM)
Non-hormonal oral agent	Centchroman (Ormeloxifene, "Saheli"/"Chhaya")
Surgical (permanent)	Male — vasectomy (no-scalpel vasectomy, NSV); Female — tubal sterilization (mini-lap/laparoscopic)

Barrier methods

Method	Mechanism	Typical-use failure (per 100 women-years)
Male condom	Mechanical sheath; also protects against STIs	10–20
Female condom	Mechanical, woman-controlled	21
Diaphragm (+ spermicide)	Covers cervix, kept in situ ≥6 h post-coitus	16
Cervical cap	Fits snugly over cervix	Similar to diaphragm
Spermicides alone (nonoxynol-9)	Surfactant disrupts sperm and microbial membranes	21–30 (least effective)

Copper-bearing intrauterine devices (IUCDs)

Device	Copper load	Replacement interval
Cu-T 200 (B)	200 mm^2	4 years
Multiload Cu 250	250 mm^2 (60–100 µg Cu released/day)	3 years
Multiload Cu 375	375 mm^2	5 years

Device	Copper load	Replacement interval
Cu-T 380A	380 mm^2 total (314 mm^2 stem + arms)	**10 years**
GyneFix (frameless)	330 mm^2 — 6 copper beads on a thread anchored 1 cm into the fundus	5 years

- **Mechanism** — copper ions are directly spermicidal (impaired motility/capacitation) and provoke a sterile foreign-body endometrial inflammatory reaction hostile to fertilization/implantation; no effect on ovulation.
- **Efficacy** — Cu-T 380A has the lowest pregnancy rate of the copper devices (≈0.8 per 100 woman-years), comparable to hormonal methods.
- **Contraindications to insertion** — pelvic inflammatory disease (PID), suspected pregnancy, dysfunctional uterine bleeding (DUB), suspicious/malignant cervix.
- **Emergency contraception** — a copper IUD inserted within **5 days** of unprotected intercourse prevents implantation with a failure rate of 0–1%; it is the most effective ("gold standard") emergency contraceptive and can be retained for up to 10 years thereafter.

Fertility awareness-based (natural) methods

Method	Basis	Failure rate
Rhythm/calendar method	Abstinence during the calculated fertile window of the cycle	20–30 per 100 woman-years
Basal body temperature	Biphasic post-ovulatory temperature rise identifies the safe period	Used with other signs
Cervical mucus (Billings)	Clear, stretchy (spinnbarkeit) mucus signals the fertile phase	Used with other signs
Symptothermal	Combines BBT + mucus + calendar for accuracy	Lower than single-index methods
Coitus interruptus	Withdrawal before ejaculation	High, user-dependent
Lactational amenorrhea method (LAM)	Bellagio Consensus — effective only if **all three** hold: (1) fully/nearly-fully breastfeeding, (2) amenorrhoeic, (3) <6 months postpartum	Pregnancy rate 0.8% at 6 months, 4.4% at 12 months

Centchroman (Ormeloxifene) — the non-steroidal oral agent

- A **non-steroidal selective estrogen-receptor modulator** (SERM) developed by the Central Drug Research Institute (CDRI), Lucknow; included in India's National Family Welfare Programme since 1995.
- **Mechanism** — weak estrogen-agonist action on bone but potent anti-estrogenic action on endometrium and breast; causes asynchrony between blastocyst development and endometrial receptivity, preventing implantation. **Does not inhibit ovulation.**
- **Dose (verbatim)** — 30 mg orally **twice weekly for the first 3 months**, then **30 mg once weekly** for maintenance; a 60 mg loading dose lowers the failure rate further (~38% reduction).
- **Failure rate** — 1–2% with consistent use (up to 1–4 per 100 woman-years); slightly less effective than combined oral contraceptives.
- **Advantages** — no effect on ovulation, lipid, liver or coagulation profile; prompt return of fertility on discontinuation; can double as an emergency contraceptive.
- **Avoid in** — polycystic ovarian disease, hepatic/renal disease, tuberculosis; a tendency to oligomenorrhoea is the main side effect.

Surgical sterilization (permanent, non-hormonal)

Male — No-scalpel vasectomy (NSV):

- Vas is fixed through skin with a ringed clamp; punctured (not incised) with a sharp dissecting forceps; ~1 cm of vas mobilized, ligated at two points 1 cm apart with No. '00' chromic catgut, and the intervening segment excised; fascial interposition/diathermy reduces failure. No skin suturing needed.
- **The man is NOT sterile immediately** — stored distal sperm needs ~20 ejaculations to clear (~3 months). Semen is checked either once at 16 weeks, or twice at 12 and 16 weeks; sterility is confirmed only after two consecutive azoospermic reports.
- **Additional contraception (condom, or DMPA to the wife) must be used for 3–4 months** until sterility is confirmed.
- Complications: scrotal hematoma/sepsis (immediate); sperm granuloma, post-vasectomy pain syndrome, spontaneous recanalization (1 in 2000) (remote). No proven association with testicular/prostate cancer or cardiovascular disease.

Female — Tubal sterilization (mini-laparotomy or laparoscopic):

Technique	Failure rate
Pomeroy's (loop excised)	0.1–0.5% (lowest)
Madlener's (crushed, not excised)	1.5–7% (abandoned)
Irving's (buried tubal stump)	Low

Technique	Failure rate
Laparoscopic unipolar/bipolar coagulation	0.75% / 2.1%
Fallope ring / Filshie clip	1.7% / 0.1%
Overall tubal sterilization	**≈0.7%**

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 55.18 — Varieties of intrauterine contraceptive device (IUCD) seen in the ortho IUD collection. (Jeffcoate's Principles of Gynaecology 9e, p.965)*

Recent advances [RA]

- **Phexxi** — a lactic acid–citric acid–potassium bitartrate on-demand vaginal pH-modulator gel; US FDA-approved (2020) as a coitally-dependent non-hormonal contraceptive; efficacy data from the pivotal AMPOWER trial. Not yet incorporated into Indian national guidelines.
- **RISUG/"NISHTHA"** (Reversible Inhibition of Sperm Under Guidance) — a single intravasal injection of styrene maleic anhydride polymer developed at IIT Kharagpur; occludes and disrupts sperm on transit; reversible by a flushing injection; completed Phase III trials under Indian Council of Medical Research (ICMR) sponsorship — a promising indigenous non-hormonal male method still awaiting full regulatory (CDGI) marketing approval.
- Frameless and low-copper-load IUD designs (e.g., GyneFix) aim to reduce expulsion and pelvic cramping versus framed devices while retaining non-hormonal, long-acting efficacy.

High-yield exam pointers

- **Cu-T 380A**: 380 mm^2 copper, lasts **10 years**, failure ≈0.8/100 woman-years — the benchmark copper IUD.
- Copper IUD as **emergency contraception**: insert within **5 days**, failure 0–1%, gold standard EC.
- **Centchroman dose**: 30 mg twice weekly × 3 months → 30 mg once weekly; does NOT inhibit ovulation (implantation blocker).
- **NSV rule**: sterile only after **two consecutive azoospermic semen reports** (checked at 12 & 16 weeks); use backup contraception 3–4 months; ~20 ejaculations to clear stored sperm.
- **Sterilization failure**: Pomeroy 0.1–0.5% (best) vs Madlener 1.5–7% (abandoned); overall tubal sterilization ≈0.7%.
- **LAM = Bellagio 3 criteria**: fully breastfeeding + amenorrhoeic + <6 months postpartum.
- Remember: **LNG-IUS and hormonal implants/injectables are STEROIDAL — exclude them** from this answer.

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

Dutta and Jeffcoate figures are concordant on Cu-T 380A duration/failure and the centchroman regimen; where Indian textbooks cite slightly different centchroman failure ranges (1–2% vs 1–4 per 100 woman-years), both are stated as the corpus range rather than a single hard number.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Jeffcoate's Principles of Gynaecology 9e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Bellagio Consensus/LAM data); Berek & Novak's Gynecology 16e (figure).

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Non-contraceptive benefits of oral contraceptive agents

Asked in: Paper IV 20-Jul-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Beyond reversible contraception, combined oral contraceptives (COCs) confer well-documented "non-contraceptive" health benefits — control of menstrual disorders, protection against several benign gynaecological conditions, and reduced lifetime risk of specific cancers. These effects arise from sustained anovulation, endometrial suppression, and thickened cervical mucus.

Menstrual and symptom-related benefits

Benefit	Effect	Basis
Cycle regulation	Predictable, lighter withdrawal bleeding	Suppressed endogenous cycle
Dysmenorrhoea	Reduced by ~40%	Anovulation, thinner endometrium
Menorrhagia	Reduced by ~50%; corrects iron-deficiency anaemia	Endometrial atrophy
Premenstrual syndrome (PMS)/PMDD	Symptom reduction; a drospirenone–ethinyl estradiol formulation is specifically approved for PMDD	Stable circulating hormone levels
Mittelschmerz (mid-cycle ovulation pain)	Abolished	Anovulation
Menstrual (catamenial) porphyria	Attacks prevented	Cycle suppression

Protection against benign gynaecological & systemic disease

- **Pelvic inflammatory disease (PID):** risk of hospitalization reduced by ~50–60%; benefit requires ≥12 months' use and is limited to current users — thickened cervical mucus restricts ascending infection and lighter flow reduces the "culture medium."
- **Ectopic pregnancy:** fewer ectopic pregnancies overall through effective suppression of ovulation.
- **Endometriosis:** effective first-line medical suppression of pain and a good option for prophylaxis against recurrence after surgical or GnRH-analogue treatment.
- **Functional ovarian cysts:** clinically believed to reduce recurrent cyst formation, though randomized trials show no acceleration of resolution of an existing cyst.
- **Benign breast disease:** reduces nonproliferative disease, and low-dose pills used long-term also reduce proliferative disease.
- **Fibroid uterus:** low-dose COCs do not enlarge a pre-existing fibroid.
- **Hirsutism and acne:** progestin-mediated luteinizing hormone (LH) suppression plus oestrogen-driven rise in sex hormone–binding globulin (SHBG) lowers free testosterone; benefit is comparable across low-dose formulations.
- **Bone mineral density:** maintained or increased with use; a useful hormone-replacement option in hypothalamic amenorrhoea and hypo-oestrogenic athletes.
- **Rheumatoid arthritis:** ever-use is associated with reduced relative risk and possibly milder disease course in some (not all) studies — evidence is inconsistent.

Prevention of malignancy

Cancer	Risk reduction with COC use	Conditions for maximal benefit
Endometrial cancer	~50%	≥12 months' use (greatest with >3 years); protects all histologic subtypes; persists ≥20 years after stopping
Epithelial ovarian cancer	~40% overall, rising to ~80% with >10 years' use	Greatest in nulliparous women, positive family history, and *BRCA1/BRCA2* carriers; persists ≥20 years after stopping
Colorectal cancer	~40% (with ≥8 years' use); ~18% in pooled meta-analysis of all users	Effect strongest in recent users

Other established therapeutic (non-contraceptive) indications

- **Definitely beneficial:** dysfunctional uterine bleeding, dysmenorrhoea, mittelschmerz, endometriosis prophylaxis, acne/hirsutism, hormone therapy for hypothalamic amenorrhoea, prevention of menstrual porphyria, control of bleeding in dyscrasias/anovulatory states.

- **Possibly beneficial:** functional ovarian cysts, premenstrual syndrome.
- **Incidental benefits of effective contraception itself:** fewer unintended pregnancies translate into less induced abortion, less surgical sterilization, and fewer ectopic pregnancies at a population level.

Recent advances [RA]

- The Royal College of General Practitioners' Oral Contraception Study (Iversen et al., *American Journal of Obstetrics and Gynecology*, 2017), with over four decades of follow-up, found no overall increase in lifetime cancer risk among ever-users of COCs and confirmed that the reduced risks of colorectal, endometrial, and ovarian cancer persist for many years after stopping.
- Extended/continuous-cycle regimens (e.g., 84 active pills followed by 7 placebo pills, or continuous dosing with no pill-free interval) are now a recognized way to reduce withdrawal-bleeding-related symptoms and are believed to add to endometrial protection, while retaining the standard non-contraceptive benefit profile.
- COCs are increasingly used as guideline-endorsed first-line hormonal therapy for polycystic ovary syndrome-related hirsutism, acne, and cycle irregularity, and as an alternative to gonadotropin-releasing hormone (GnRH) analogues for endometriosis-associated pain, giving comparable relief without hypo-oestrogenic side effects.
- The same magnitude of ovarian-cancer risk reduction demonstrated in the general population is now also documented in *BRCA1*/*BRCA2* mutation carriers, supporting COC use in chemoprevention counselling for this high-risk group without a demonstrated increase in overall breast-cancer risk.
- Current professional guidance (e.g., ACOG's practice bulletin on noncontraceptive uses of hormonal contraceptives) formally endorses counselling patients on these benefits — improved compliance and continuation follow when patients understand that non-contraceptive benefits, not just contraceptive efficacy, are part of what the pill offers.

High-yield exam pointers

- Numbers to write: dysmenorrhoea ↓40%, menorrhagia ↓50%, endometrial cancer ↓50%, ovarian cancer ↓40% (↑ to 80% with >10 yr use), colorectal cancer ↓40%, PID hospitalization ↓50–60%.
- Duration rule for cancer protection: benefit needs ≥12 months' use and persists ≥20 years after stopping.
- Mnemonic for cancers prevented — "**EOC**": **E**ndometrial, **O**varian, **C**olorectal.
- Speroff's two-category framework: (1) incidental benefits of effective contraception (less abortion/sterilization/ectopic pregnancy) vs (2) therapeutic benefits of the hormones themselves.

- "Definitely beneficial" therapeutic list to reproduce: DUB, dysmenorrhoea, mittelschmerz, endometriosis prophylaxis, acne/hirsutism, hypothalamic amenorrhoea hormone therapy, menstrual porphyria prevention.
- *BRCA1/BRCA2* carriers get the same ovarian-cancer protection as the general population — a frequently tested point.

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

Older textbook editions (e.g., DC Dutta's Textbook of Gynaecology) round the ovarian-cancer benefit to a flat 50%; the more granular current data (Speroff's Clinical Gynecologic Endocrinology & Infertility 9e) show a ~40% overall risk reduction rising to ~80% with more than 10 years of use — the graded figure is preferred for discussion-type answers.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; ACOG practice guidance on noncontraceptive uses of hormonal contraceptives; Royal College of General Practitioners' Oral Contraception Study (Iversen et al., 2017).

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Ovarian transplant

Asked in: Paper IV 19-Nov-2021 · Paper IV May 2010 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Ovarian transplantation is the surgical harvesting of ovarian cortical tissue (which carries the primordial follicle pool), its cryopreservation, and later autotransplantation back into the same woman to restore ovarian endocrine function and fertility potential lost to gonadotoxic chemotherapy/radiotherapy or premature ovarian insufficiency (POI). It is the only fertility-preservation option available to prepubertal girls, since harvesting needs no prior ovarian stimulation and does not delay the start of cancer treatment. The thawed tissue is re-grafted either **orthotopically** (pelvis) or **heterotopically** (an extra-pelvic site).

Indications

Category	Examples
Malignancy needing gonadotoxic therapy	Leukaemia, lymphoma, breast cancer, pelvic sarcoma — before alkylating-agent chemotherapy or pelvic radiotherapy
Prepubertal girls with cancer	Prepubertal ovaries lack gonadotropin receptors, so stimulation-based methods (oocyte/embryo freezing) cannot be used

Category	Examples
Benign disease needing gonadotoxic treatment	Bone-marrow ablation before allogeneic transplant for aplastic anaemia, sickle-cell disease, thalassaemia; high-grade systemic lupus erythematosus (SLE)
Conditions reducing ovarian reserve	*Turner* syndrome, fragile-X premutation, family history of POI, recurrent ovarian torsion, bilateral endometrioma/teratoma excision
Elective fertility preservation	Postponed childbearing; no partner/donor sperm required, unlike the embryo route

Technique: harvesting, cryopreservation, storage

- **Harvesting** — laparoscopic ovarian cortical biopsy or partial oophorectomy, obtaining strips rich in primordial follicles; whole-ovary harvesting with its vascular pedicle is rarely attempted.
- **Cryopreservation** — two established methods:

Method	Features
Slow freezing	Long-established; has produced the majority of reported live births worldwide
Vitrification (rapid freezing)	Simpler technique; clinical outcomes not inferior to slow freezing; fewer live births reported so far but gaining popularity

- **Storage** — banked in liquid nitrogen at −196 °C until the patient is disease-free and ready for retransplantation.
- **Thawing and grafting** once endocrine restoration or conception is desired.

Sites/types of transplantation

Type	Site(s)	Features
Orthotopic	Remaining ovary, ovarian fossa, broad ligament, pelvic peritoneum	"Physiologic" site; permits **natural conception** without in-vitro fertilisation (IVF); first live birth after frozen-thawed orthotopic transplant reported by *Donnez* et al. (2004) and *Meirow* et al. (2005)

Type	Site(s)	Features
Heterotopic	Subcutaneous forearm, anterior abdominal wall, rectus muscle	Used when pelvic anatomy is distorted by adhesions or prior irradiation; less invasive, avoidable general anaesthesia; but yields **lower-quality oocytes/embryos** than orthotopic grafts owing to less favourable local temperature, pressure and blood supply
Whole-ovary autotransplantation	Vascular pedicle reanastomosed	Avoids cortical-strip ischaemia; technically demanding, higher risk of reseeding malignant cells and of cryoinjury during freezing of the larger tissue volume; a live birth after **fresh** (not frozen) whole-ovary transplant between monozygotic twins was reported by *Silber* et al. (2008), but no human live birth after **frozen-thawed** whole-ovary transplant has yet been reported

Comparison with other fertility-preservation methods

Method	Ovarian stimulation needed (delay)	Suitable for prepubertal girls	Status
Embryo cryopreservation	Yes (~2 weeks); needs partner/donor sperm	No	Established
Oocyte cryopreservation	Yes (~2 weeks)	No	Established
Ovarian tissue cryopreservation-transplantation	No — tissue removed immediately	Yes (only option)	Experimental (see Note)

Outcomes and complications

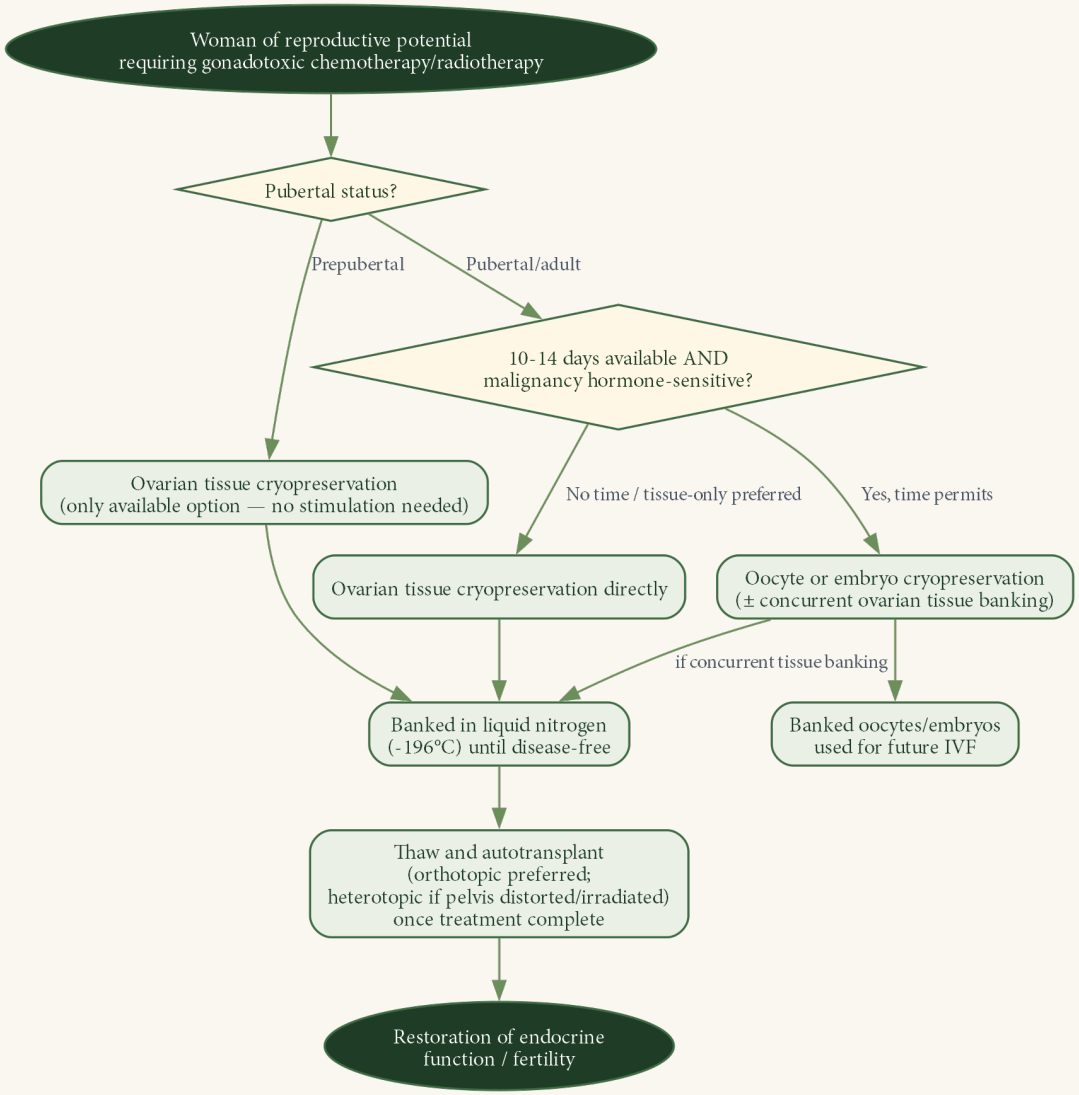
- Ovarian endocrine function is restored in **more than 95%** of grafts.
- **Over 130 live births** reported worldwide; pregnancy achieved in roughly **one-quarter to one-third** of transplants.
- **Post-transplant ischaemia** — revascularisation of the graft takes up to 5 days, causing follicular loss; this is the principal reason for reduced graft longevity.

- **Reintroduction of malignant cells** with the grafted tissue — a special concern in haematological malignancies such as leukaemia.
- Graft depletion over time, sometimes needing retransplantation of a further stored strip to maintain endocrine function.

Recent advances [RA]

- **In-vitro activation (IVA)** — mechanical fragmentation of ovarian cortex disrupts Hippo signalling, combined with AKT-stimulating drugs, to recruit resting primordial follicles; has produced live births in women with premature ovarian insufficiency (*Kawamura* et al.).
- **In-vitro follicle/oocyte maturation (IVM)** — primordial follicles or immature oocytes matured outside the body (*Telfer's* four-step human protocol); avoids re-grafting tissue that might harbour malignant cells, but remains experimental with unproven developmental competence of the resulting oocytes.
- **Artificial ovary** — isolated healthy follicles seeded onto a biodegradable scaffold or decellularised extracellular matrix and then transplanted, aiming to eliminate the risk of reintroducing malignant cells; successful in animal models, human data awaited.
- **Combined strategy** — a brief course of ovarian stimulation and oocyte retrieval immediately before tissue harvest (only where the malignancy is not hormone-sensitive), banking oocytes/embryos in addition to ovarian tissue.
- **Adjunct medical ovarian protection** — gonadotropin-releasing hormone (GnRH) agonists given during chemotherapy; meta-analyses suggest reduced chemotherapy-induced amenorrhoea and higher pregnancy rates, but evidence is conflicting, and the American Society for Reproductive Medicine (ASRM) states GnRH agonists must **not replace** proven fertility-preservation techniques.
- **Proangiogenic growth factors and stem-cell approaches** under study to hasten graft revascularisation and reduce ischaemic follicle loss after transplantation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision pathway for fertility preservation before gonadotoxic therapy.

High-yield exam pointers

- **Only** fertility-preservation option for prepubertal girls — no ovarian stimulation, no treatment delay.
- Orthotopic sites: remaining ovary / ovarian fossa / broad ligament / pelvic peritoneum — permits **natural conception**.
- Heterotopic sites: forearm, abdominal wall, rectus muscle — chosen when pelvis distorted/irradiated; poorer oocyte quality.
- First human live birth after frozen-thawed **orthotopic** ovarian tissue transplant: *Donnez* et al., 2004.

- Numbers to reproduce: endocrine restoration **>95%**; **>130** live births reported worldwide; pregnancy in **1/4 to 1/3** of transplants.
- Two freezing methods: **slow freezing** (most live births to date) vs **vitrification** (simpler, comparable outcomes).
- Chief complication: **post-transplant ischaemia** before revascularisation (up to 5 days) causing follicular loss.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Speroff 9e still labels ovarian tissue cryopreservation-transplantation "experimental," but the American Society for Reproductive Medicine's 2019 committee opinion has since removed that label for adult women given accumulating live-birth data — worth mentioning if the examiner probes current status.

> **SOURCE & COVERAGE**
> Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Chapter 29, Fertility Preservation); DC Dutta's Textbook of Gynaecology 7e (Assisted Reproductive Technology section); Williams Obstetrics 26e (oncofertility section, Chapter on medical/surgical complications).

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PC-PNDT Act

Asked in: Paper IV 19-Nov-2021 · Paper IV Nov 2016 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — The **Preconception and Prenatal Diagnostic Techniques (Prohibition of Sex Selection) Act** is India's central legislation regulating the use of genetic and imaging technology in pregnancy. Enacted in **1994** as the *Prenatal Diagnostic Techniques (Regulation and Prevention of Misuse) Act* (Rules 1996), it was renamed and strengthened by the **2003 amendment** to also ban sex selection **before conception** (at the gamete/embryo stage), after prenatal ultrasound and amniocentesis were widely misused for sex determination followed by female feticide, worsening the child sex ratio. It regulates genetic counselling centres, genetic laboratories and genetic clinics, restricts prenatal diagnostic techniques to specified medical indications, and criminalises sex determination/selection at every stage.

Objectives

- Prohibit **sex selection** before or after conception.
- Regulate **prenatal diagnostic techniques** so they are used only for detecting genetic/chromosomal/congenital disorders, never for sex determination.
- Prevent their **misuse for female feticide** and check the declining child sex ratio.

- Provide for **registration and monitoring** of genetic counselling centres, laboratories and clinics (including ultrasound clinics).

Key definitions

Term	Meaning under the Act
Genetic Counselling Centre	A facility that provides genetic counselling for prenatal diagnosis of, or prevention/management of, genetic/chromosomal disorders
Genetic Laboratory	Any place doing biochemical, cytogenetic or molecular tests for the above disorders
Genetic Clinic	Any facility using ultrasound/imaging machines or performing sampling for prenatal diagnostic procedures — **includes a mobile/vehicle-based unit**
Prenatal diagnostic procedures	Invasive techniques — **amniocentesis, chorionic villus sampling (CVS), fetoscopy, fetal blood/tissue sampling** and any other invasive method to detect the specified disorders
Prenatal diagnostic techniques	Prenatal diagnostic **procedures + tests** (including ultrasonography) done to detect the specified disorders
Sex selection	Any procedure, technique or test to increase the probability of a child of a particular sex, whether before or after conception

Permitted use of prenatal diagnostic techniques (Section 4)

Permitted ONLY to detect (list specified by the **Central Supervisory Board, CSB**):

- Chromosomal abnormalities
- Genetic metabolic diseases
- Haemoglobinopathies
- Sex-linked genetic diseases
- Congenital anomalies
- Any other condition the CSB specifies

Qualifying clinical condition (at least one, recorded in writing, before the procedure):

- Age of pregnant woman > **35 years**
- History of ≥ **2 spontaneous abortions/fetal loss**
- Exposure to **teratogenic agents** — drugs, radiation, infection, chemicals
- **Family history** of mental retardation, physical deformity (e.g. spasticity) or other genetic disease
- Any other condition the CSB specifies

- **Written informed consent** of the pregnant woman is mandatory before any procedure.
- **Communicating the sex of the fetus** to the woman, her relatives or anyone else, by any means (word, gesture, report), is absolutely prohibited (Sections 5 and 6).

Regulatory and monitoring structure

- **Central Supervisory Board (CSB)** — chaired by the Union Minister for Health & Family Welfare; reviews implementation nationally and advises the Central Government on policy.
- **State/UT Supervisory Board (SSB)** — mirrors the CSB at state level.
- **Appropriate Authority (AA)** — appointed for each district/region; grants, renews, suspends or cancels registration of genetic clinics/labs/counselling centres; investigates complaints; has the **powers of a civil court** (summoning witnesses, requisitioning records, evidence on affidavit).
- **Advisory Committee** — aids the Appropriate Authority in registration decisions; includes a gynaecologist/obstetrician, paediatrician, medical geneticist, radiologist/sonologist and a legal expert.
- Every genetic clinic/lab/counselling centre must be **registered** (fixed-term certificate, renewable) and must maintain and submit records (**Form F for every ultrasound in a pregnant woman**) to the Appropriate Authority.

Prohibitions and mandatory safeguards

- **Section 3A** — bans sex selection on a woman, man, or on any gamete/embryo/tissue derived from them, **before conception**.
- **Sections 5–6** — ban communicating/disclosing the sex of the fetus by any means.
- **Section 22** — bans **advertisement** (in any form/media) of facilities for prenatal sex determination.
- Sale, distribution, supply, rent or hire of an ultrasound machine/imaging equipment is prohibited to any facility **not registered** under the Act.
- Display of the mandatory notice — *"disclosure of the sex of the fetus is prohibited under law"* — at every registered clinic.

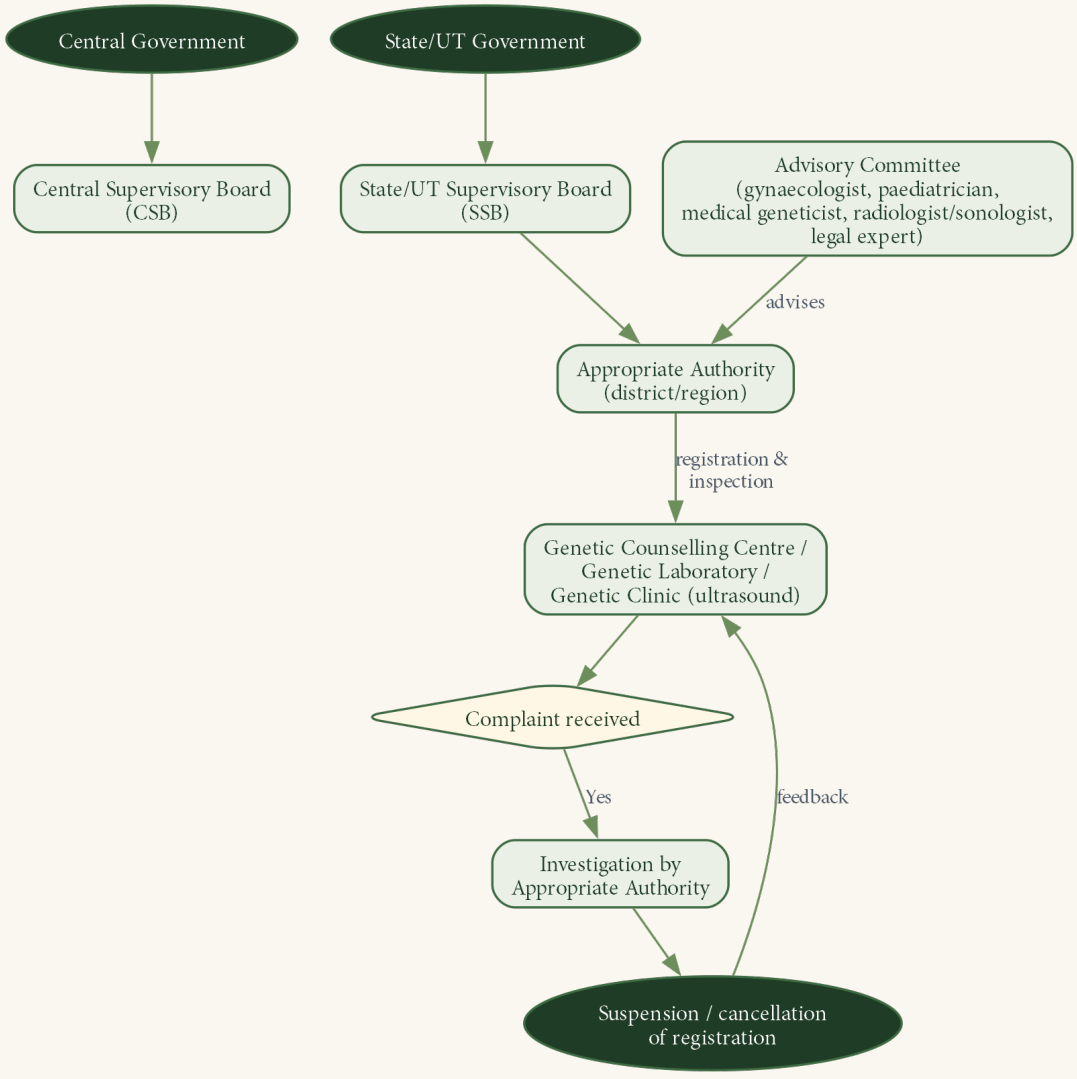
Offences and penalties

Offender	First offence	Subsequent offence
Doctor/genetic clinic (Section 23(1)) — same penalty for advertisement, Section 22	Imprisonment up to **3 years** + fine up to **₹10,000**	Imprisonment up to **5 years** + fine up to **₹50,000**; name struck off the State Medical Council register (5 years, then permanently)

Offender	First offence	Subsequent offence
Person seeking the test/sex selection — spouse/relative (Section 23(3))	Imprisonment up to **3 years** + fine up to **₹50,000**	Imprisonment up to **5 years** + fine up to **₹1,00,000**

- **Presumption clause (Section 24)** — the court presumes the woman was **compelled by her husband/relatives**; she is exempt from punishment unless disproved.
- All offences are **cognizable, non-bailable and non-compoundable** (2003 amendment).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Regulatory hierarchy and complaint-to-cancellation feedback loop under the PC-PNDT Act.

Recent advances [RA]

- **Judicial monitoring**: *CEHAT vs Union of India* (2001) and *Voluntary Health Association of Punjab vs Union of India* (2013–2016) — continuing Supreme Court oversight directing

states/UTs to notify Appropriate Authorities, inspect regularly and file compliance reports; enforcement remains largely court-driven.

- **PC-PNDT online portal** — a central web-based system links clinic registration and machine-wise **Form F** filing across states for real-time monitoring, replacing paper registers.
- **"Silent observer" tracking software**, fitted to ultrasound machines in several states, automatically logs every scan as a safeguard against unrecorded sex determination.
- **Decoy ("sting") operations** by Appropriate Authorities, using undercover pregnant "clients," are judicially upheld as valid evidence and remain the principal detection method.
- **Beti Bachao Beti Padhao** (2015, Ministries of Women & Child Development, Health & Family Welfare, and Education) — a converging social scheme, outside the Act, targeting the same decline in child sex ratio through community mobilisation and girl-child education in PC-PNDT "focus" districts.
- **Child sex ratio trend**: Census 2011 recorded **918 girls per 1,000 boys (0–6 years)**, the lowest since independence; recent Sample Registration System/NFHS-5 (2019–21) data show a modest recovery, credited partly to intensified enforcement plus Beti Bachao Beti Padhao.
- **Emerging challenge — non-invasive prenatal testing (NIPT)**: cell-free fetal DNA aneuploidy screening can reveal fetal sex as a by-product; laboratories are advised to withhold sex-chromosome information to stay compliant, and bringing NIPT explicitly under PC-PNDT rules is under policy discussion.

High-yield exam pointers

- Original Act **1994** (Rules 1996) → renamed/strengthened by **2003 amendment** (added "pre-conception," Section 3A).
- **6 permitted indications** (Section 4): chromosomal, genetic-metabolic, haemoglobinopathies, sex-linked genetic disease, congenital anomalies, "other" (CSB-specified).
- Qualifying conditions to recall: **age > 35 y, ≥ 2 prior abortions, teratogen exposure, family history** of genetic disease.
- Ladder: **CSB → SSB → Appropriate Authority (+ Advisory Committee) → registered clinic/lab/counselling centre.**
- Penalty escalation: doctor **3 y/₹10,000 → 5 y/₹50,000**; person seeking test **3 y/₹50,000 → 5 y/₹1,00,000**.
- **Section 24** "presumption" clause protects the pregnant woman from punishment unless compulsion is disproved.
- Offences: **cognizable, non-bailable, non-compoundable**.

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

DC Dutta's summary covers only the permitted indications, qualifying conditions and consent/non-disclosure requirement; the section numbers, regulatory ladder and penalty figures reflect standard Indian medical-jurisprudence/statutory teaching on the Act, since the on-disk OBG specialty texts do not reproduce the Bare Act.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Current Topics in Obstetrics — PC & PNDT Act). Standard Indian statutory/medical-jurisprudence teaching on the PC-PNDT Act, 1994 (amended 2003). Supreme Court of India: *CEHAT vs Union of India* (2001); *Voluntary Health Association of Punjab vs Union of India* (2013–2016). Beti Bachao Beti Padhao scheme (2015, MoHFW/WCD/MoE). Coverage note: the specialty corpus (Speroff 9e, Williams Obstetrics 26e, DC Dutta's Obstetrics 9e) carries only a brief summary of the Act; section numbers and penalty figures are standard statutory teaching not reproduced verbatim in the on-disk OBG texts.

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Pearl Index

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

Definition — The Pearl Index is a statistical measure of contraceptive efficacy devised by Raymond Pearl in 1933. It expresses the number of unintended (accidental) pregnancies occurring per 100 woman-years (HWY, hundred-woman-years) of exposure to a contraceptive method, allowing different methods to be ranked and compared on one common scale — the lower the index, the more effective the method.

Formula and worked calculation

- **Pearl Index = (Number of accidental pregnancies × 1,200) ÷ Total months of exposure from the onset of the method**, counted from start of use to either an unintended pregnancy, discontinuation, or end of the study.
- The multiplier is **1,300** instead of 1,200 if the denominator is recorded in menstrual **cycles** rather than calendar months (1,200 = 12 months × 100; 1,300 assumes ~13 cycles per year).
- Worked example (numbered):
- 100 women use a method, contributing 1,000 total woman-months of exposure.
- 5 unintended pregnancies occur during this period.
- Pearl Index = (5 × 1,200) ÷ 1,000 = **6 pregnancies per 100 woman-years**.

Comparative failure rates by method

The same formula is applied to derive the standard comparative table used for contraceptive counselling — lower values indicate a more reliable method.

Method	Pregnancy rate per 100 woman-years (Pearl Index, approx.)
No method	85
Natural methods (calendar/temperature/mucus)	25
Withdrawal	27
Lactational amenorrhoea method	2
Male condom	15
Female condom	21
Diaphragm	16
Copper-T 380A (IUCD)	0.8
Levonorgestrel-releasing IUS (LNG-IUS)	0.1
Combined oral contraceptive pill	0.1
Progestin-only pill	1
DMPA / NET-EN injectable	0.3
Norplant (LNG implant, 2-rod)	0.05
Etonogestrel implant (Implanon/Nexplanon)	0.01
Vasectomy	0.15
Tubectomy	0.15

- These are **blended 12-month figures**, not strictly separated into perfect-use versus typical-use categories: user-dependent methods (pill, condom) show a much wider real-world gap between perfect (correct-and-consistent) use and typical (actual) use than provider-dependent, "forgettable" long-acting reversible contraceptives (LARC — IUCD, implant), where the two figures nearly coincide because user compliance is not required once the device is placed.

Advantages of the Pearl Index

- Simple arithmetic — easy to calculate and understand at the bedside or in a clinic register.
- A single summary number that permits quick comparison of efficacy across dissimilar methods.
- Historically the standard metric quoted in regulatory contraceptive-trial reporting and product inserts.

- Useful for large-scale population surveillance where only aggregate exposure-time and pregnancy counts are available.

Limitations of the Pearl Index

- **Assumes a constant failure risk** throughout the period of use — untrue, since failure is highest in the first few months and declines thereafter as less-fertile or more-careful users continue (a "survivorship" effect).
- Cannot validly compare methods studied over **different durations** of exposure, because a lengthy study naturally accumulates a lower crude rate.
- Gives **no confidence interval**; a small sample or short exposure period can distort the figure.
- Ignores age, parity, coital frequency, and reasons for discontinuation.
- Tends to **overestimate** the failure rate of short trials and **underestimate** the true cumulative risk of pregnancy over several years of continued use.

Overcoming the limitation: life-table (actuarial) analysis

Because the Pearl Index's constant-risk assumption is invalid, the **life-table (actuarial) method**, and its modern refinement the **Kaplan–Meier cumulative failure analysis**, is used to calculate a failure rate for each successive month or year of use and derive a cumulative probability of pregnancy at any chosen duration.

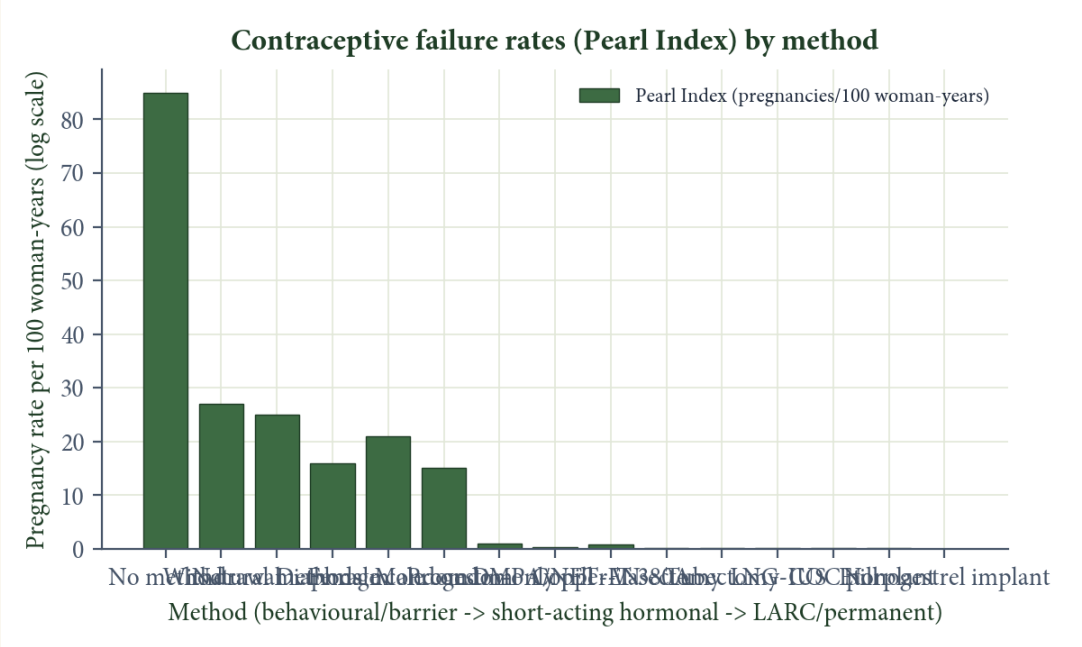
Feature	Pearl Index	Life-table / Kaplan–Meier analysis
Risk assumption	Constant over entire exposure	Allows risk to vary month-to-month
Comparability across durations	Poor — biased by study length	Good — gives failure rate at any specific interval
Handling of dropouts	Not accounted for	Censored at the time of exit
Output	Single crude rate per 100 woman-years	Cumulative failure curve over time
Current use	Still widely quoted for simplicity	Preferred in modern clinical trials for methodological rigour

Recent advances [RA]

- **Regulatory shift toward Kaplan–Meier reporting:** because the Pearl Index's flat-hazard assumption biases comparisons across trials of differing length, current contraceptive efficacy trials increasingly report **cumulative Kaplan–Meier pregnancy rates** alongside — or instead of — a single Pearl Index, particularly for newer long-acting reversible contraceptive devices.

- **Digital/fertility-awareness-based methods:** a prospective cohort of a smartphone-based fertility-awareness application reported a **perfect-use Pearl Index of 0.4 and a typical-use Pearl Index of 6.5 per 100 woman-years** — the first such app to be evaluated with this classical metric and subsequently granted regulatory clearance as a contraceptive method [Berglund Scherwitzl E, et al. *Contraception* 2017;96(6):420].
- **Newer LARC devices — ultra-low Pearl Indices:** postmarketing data show the etonogestrel single-rod implant with a Pearl Index of about **0.01**, and the 19.5-mg levonorgestrel-IUS (Kyleena) with a 5-year Pearl Index for **ectopic pregnancy of 0.18**, confirming that current LARC devices remain the most effective reversible methods available [Williams Obstetrics 26e].
- **Tiered-effectiveness counselling:** contemporary contraceptive-counselling frameworks now present methods in **effectiveness tiers** (most effective/LARC & sterilisation, moderately effective/short-acting hormonal, least effective/barrier & behavioural) derived from typical-use Pearl Index-type data, rather than quoting a single crude index, so as to counsel patients on the real-world perfect-use/typical-use gap.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Bands left-to-right: behavioural/barrier, short-acting hormonal, LARC/permanent methods — values from DC Dutta's Gynaecology 7e, Table 30.2.

High-yield exam pointers

- **Pearl Index = (accidental pregnancies × 1,200) ÷ total months of exposure**; use **1,300** if exposure is in menstrual cycles.
- Devised by **Raymond Pearl, 1933**; expressed as pregnancies per **100 woman-years (HWY)**.
- **Lower index = more effective method.**

- Chief limitation to write: **assumes constant risk over time** → overcome by **life-table (Kaplan–Meier) analysis**, which gives a cumulative failure rate.
- LARC methods (IUCD, implants) and sterilisation have Pearl Index < **1 per 100 woman-years** — the most effective reversible/permanent methods.
- Combined oral contraceptive pill and LNG-IUS both quote a Pearl Index of **0.1** with correct use.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The comparative-table figures above are DC Dutta's Gynaecology 7e approximate 12-month values combining perfect- and typical-use conditions; large modern registry and trial data (Williams Obstetrics 26e) report similarly low but device-specific Pearl Indices (0.1–0.8) for current copper and hormonal intrauterine devices.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e (Table 30.2); DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; Jeffcoate's Principles of Gynaecology 9e.

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Permanent methods of contraception

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

Definition — Permanent (terminal) methods of contraception are surgical procedures that produce irreversible, or only difficult-to-reverse, infertility by occluding/excising a segment of the fallopian tube in the woman (**female sterilization/tubectomy**) or the vas deferens in the man (**male sterilization/vasectomy**). They are offered to couples who have completed their family, and informed consent must record that the method is intended to be permanent.

Classification, indications & timing

Method	Route/technique	Usual timing
Female sterilization (tubectomy)	Abdominal — conventional laparotomy or minilaparotomy	Puerperal or interval
	Laparoscopic (ring/clip/electrocoagulation)	Interval only — **not within 6 weeks of delivery** or with an enlarged uterus
	Vaginal (posterior colpotomy)	Interval, uterus <12 weeks size
Male sterilization	Conventional (incisional) vasectomy	Any time

Method	Route/technique	Usual timing
	No-scalpel vasectomy (NSV)	Any time — now the preferred technique

- **Indications:** (i) family planning after the desired family size is achieved; (ii) socio-economic reasons; (iii) medical/therapeutic — cardiac disease, diabetes, chronic renal disease, hypertension, or a third repeat caesarean section/prolapse repair, where a further pregnancy would be hazardous.
- **Timing of tubectomy: Puerperal** — 24–48 hours after delivery (technically simple, but a slightly higher failure rate); **Interval** — beyond 6 weeks after delivery/abortion, ideally in the proliferative (post-menstrual) phase; **Concurrent with MTP** — done at the same sitting as medical termination of pregnancy.

Techniques of tubectomy

- **Minilaparotomy (mini-lap):** small (1.25–2 cm) suprapubic (interval) or subumbilical (puerperal) incision under local anaesthesia; uterus is elevated with an intrauterine elevator; the tube is hooked out through the incision and occluded by one of the techniques below; peritoneum closed by purse-string suture. It is the mainstay of the National Family Planning Programme — cheap, widely applicable, and low failure.
- **Occlusion techniques** (via laparotomy/minilap):

Technique	Principle	Failure rate
Pomeroy's	Loop of isthmus + proximal ampulla ligated with chromic catgut, 1–1.5 cm excised; absorbable suture lets the cut ends retract and seal independently	**0.1–0.5%** — lowest, commonest method
Madlener	Loop crushed with artery forceps and tied with non-absorbable silk; loop *not* excised	**1.5–7%** — abandoned in favour of Pomeroy's
Irving	Tube ligated and divided; proximal stump buried in the posterior myometrium	Very low
Uchida	Saline bleb raised subserosally, 3–5 cm of tube resected, proximal stump buried under serosa	Nil reported
Kroener	Fimbriectomy — ampullary/fimbrial end ligated and resected	Uncommon

- **Laparoscopic tubal occlusion** (single or double puncture, tube grasped at the junction of proximal and middle thirds):

Method	Mechanism	Failure rate
Filshie clip	Titanium, silicone-lined; destroys only **4 mm** of tube	**~0.1%** — lowest of the mechanical methods, best reversibility
Silastic (Falope/Yoon) ring	Silicone band strangulates a 2.5-cm avascular loop	**1–1.7%**
Hulka-Clemens spring clip	Plastic jaws + steel spring; destroys 3 mm of tube	Highest long-term cumulative failure among clips
Unipolar electrocoagulation	Tube desiccated ± transected	0.75%
Bipolar electrocoagulation	Safer (no ground plate) but needs ≥3 coagulation points	2.1% — higher than unipolar

Overall failure of tubal sterilization is about 0.7% (DC Dutta); the US Collaborative Review of Sterilization (CREST) study reports a **10-year cumulative failure of 1.85%** across all methods, higher in younger women. **Mortality** is ~72/100,000 procedures overall (laparoscopic 5–10/100,000 vs puerperal minilap 7/100,000).

No-scalpel vasectomy (NSV) — technique

- Written informed consent after counselling; local infiltration anaesthesia over the vas.
- Vas fixed midway between the testis and the base of the penis using a ring clamp (three-finger technique).
- Skin and vas sheath **punctured** (not incised) with a sharp-pointed dissecting forceps; the puncture is enlarged by spreading tissue.
- About 1 cm of vas is delivered, ligated at two points 1 cm apart with No. '00' chromic catgut, and the intervening segment excised.
- **Fascial interposition or diathermy** of the cut ends is done to reduce recanalization.
- No skin suture needed; procedure repeated on the opposite side; a scrotal support/pressure dressing is applied and the patient discharged after ~30 minutes.
- Heavy work/cycling avoided for 2 weeks; prophylactic antibiotic and analgesic given.

Confirmation of sterility: the man is not sterile immediately — sperm stored distal to the block takes ~3 months (~20 ejaculations) to clear. Additional contraception (condom, or depot medroxyprogesterone acetate to the wife) is mandatory until **semen analysis at 12 and 16 weeks** shows azoospermia on two consecutive samples.

Complications

	Immediate	Late/remote
Female sterilization	Anaesthetic complications; haemorrhage/broad-ligament haematoma; bowel, bladder or vascular injury (laparoscopic entry); wound sepsis	Failure with intrauterine or ectopic pregnancy; post-ligation syndrome (pelvic pain, menorrhagia, cystic ovaries); incisional hernia; dyspareunia (vaginal route); regret
Vasectomy/NSV	Scrotal haematoma; wound infection/cellulitis	Sperm granuloma; post-vasectomy pain syndrome; spontaneous recanalization (~1 in 2000); psychogenic impotence (no true physiological effect on libido/erection; no proven excess of testicular or prostate cancer)

Reversibility & counseling

- Sterilization is offered only after **adequate counselling** and informed consent affirming the couple understands its permanence, the (small) failure risk, and the reversible alternatives available.
- **Tubal reanastomosis:** pregnancy rate 50–82%, best with isthmic–isthmic anastomosis and with clip/ring methods (least tube destroyed); ectopic pregnancy risk after reversal is 3–7%.
- **Vasectomy reversal (vaso-vasostomy):** vasal patency restored in up to 90%, but the pregnancy rate is lower (~50–70%) and falls further with time elapsed since vasectomy.
- Vasectomy is simpler, safer, cheaper, and has a lower failure and mortality rate than tubectomy, and should be offered as first-choice when either partner is willing.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 30.14 — Laparoscopic tubal sterilization by Filshie clip. Filshie (GM Filshie) clip is made of titanium lined with silicone rubber; it is easier to apply and damage to the tube is less (DC Dutta's Gynaecology 7e, p.430)*

High-yield exam pointers

- **Pomeroy's** = commonest, lowest failure (0.1–0.5%); **Madlener** = abandoned (failure up to 7%).
- **Filshie clip** = titanium + silicone, destroys only 4 mm of tube, failure ~0.1%, best reversibility among mechanical methods.
- Laparoscopic sterilization: **not within 6 weeks postpartum**, not with an enlarged/adherent uterus.
- **NSV rule:** additional contraception until 2 consecutive azoospermic semen samples at 12 and 16 weeks.

- **CREST/US Collaborative Review of Sterilization:** 10-year cumulative tubal sterilization failure = 1.85%.
- Sterilization mortality: overall ~72/100,000; laparoscopic (5–10/100,000) vs puerperal minilap (7/100,000).
- Reversal pregnancy rates: tubal reanastomosis 50–82% (best isthmic–isthmic); vaso-vasostomy patency ~90% but pregnancy only ~50–70%.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's per-technique Indian-practice failure percentages and the CREST/US Collaborative Review of Sterilization's long-term cumulative rate (quoted from Speroff) measure different things — single-procedure failure versus 10-year cumulative failure — and are both given here because either framing can be asked in the exam.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e; DC Dutta's Textbook of Obstetrics 9e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (US Collaborative Review of Sterilization/CREST data).

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Persistent trophoblastic disease

Asked in: Paper III 17-Nov-2021 · Paper IV 20-Jul-2020 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Persistent trophoblastic disease, also called persistent (or postmolar) **gestational trophoblastic neoplasia (GTN)**, is diagnosed when trophoblastic tissue continues to proliferate and secrete human chorionic gonadotropin (hCG) after evacuation of a hydatidiform mole, or less often after an abortion, ectopic, or term pregnancy. It follows 15–20% of molar pregnancies and comprises persistent mole, invasive mole, choriocarcinoma, and the rare placental-site/epithelioid trophoblastic tumours.

Clinical features & diagnostic criteria (FIGO)

- Irregular/persistent vaginal bleeding, subinvolution of the uterus, and persistence of theca lutein cysts after molar evacuation.
- Metastatic symptoms: lung — cough, haemoptysis, dyspnoea; vagina — purplish suburethral nodule with brisk bleeding; brain — headache, seizure, focal deficit; liver — right-upper-quadrant pain, jaundice.

FIGO criterion for postmolar GTN (any one)
hCG plateaued (± 10%) over ≥4 values across ≥3 weeks (days 1, 7, 14, 21)
hCG rise >10% over ≥3 values across ≥2 weeks (days 1, 7, 14)
hCG persists beyond 6 months of mole evacuation
Histological diagnosis of choriocarcinoma

Classification of persistent GTN

Entity	Key distinguishing feature
Persistent/invasive mole (chorioadenoma destruens)	~15% of GTN; villi retained, deep myometrial penetration, no muscle necrosis; diagnosed at laparotomy/histology
Choriocarcinoma	3–5% of molar pregnancies; anaplastic sheets of cyto-/syncytiotrophoblast, **no villi**, necrosis + haemorrhage; the **only** type after a nonmolar (term/ectopic/abortion) pregnancy
Placental-site trophoblastic tumour (PSTT)	Intermediate trophoblast; low hCG but raised human placental lactogen (hPL, used for follow-up); **chemoresistant** — hysterectomy is primary treatment
Epithelioid trophoblastic tumour (ETT)	Resembles PSTT; chemoresistant; hysterectomy is primary treatment

Risk stratification & FIGO staging

WHO prognostic scoring as modified by FIGO (2000) — total score <7 = **low risk**, ≥7 = **high risk**:

Factor	0	1	2	4
Age (years)	<40	≥40	—	—
Antecedent pregnancy	Mole	Abortion	Term	—
Interval from pregnancy (months)	<4	4–6	7–12	≥13
Pretreatment hCG (IU/L)	$<10^3$	10^3–$<10^4$	10^4–$<10^5$	$\geq 10^5$
Largest tumour (cm)	<3	3–4	>5	—
Site of metastases	Lung, pelvis	Spleen, kidney	GI tract, liver	Brain

Factor	0	1	2	4
Number of metastases	—	1–4	5–8	>8
Prior chemotherapy	—	—	Single drug	Multiple drugs

FIGO anatomic staging (2000):

Stage	Extent
I	Confined to the uterine corpus
II	Extends outside the uterus but limited to genital structures (vagina, adnexa, broad ligament)
III	Extends to the lungs, with or without genital involvement
IV	All other metastatic sites (brain, liver, kidney, GI tract)

Reported clinically as combined **Stage : Score** (e.g., Stage III:6). Overall metastatic sites: lung ~80%, vagina 30%, pelvis 20%, brain and liver ~10% each.

Investigations

Test	Purpose
Serial serum β-hCG	Confirms diagnosis, guides staging and response
CBC, liver, renal, thyroid function	Baseline before chemotherapy
Chest X-ray	"Cannon-ball"/"snowstorm" shadows, pleural effusion (Stage III)
Chest CT	Detects micrometastases missed on X-ray (~40%)
USG/CT abdomen–pelvis	Uterine tumour bulk, hepatic metastases
CT/MRI brain	Cerebral metastases; CSF:serum hCG ratio <60 suggests brain involvement
Diagnostic uterine curettage	Reduces tumour bulk pretherapy; not required routinely for diagnosis — risk of brisk haemorrhage

Management

- **Low-risk disease** (Stage I, or Stage II/III with score <7):
  - Single-agent chemotherapy — **methotrexate–folinic acid (MTX-FA)**: MTX 1–1.5 mg/kg IM/IV on days 1, 3, 5, 7 with folinic acid 0.1–0.15 mg/kg IM on days 2, 4, 6, 8, course repeated every 7 days; **or** actinomycin D. (An alternative weekly-MTX-alone protocol, 30

mg/m² IM weekly, gives a lower remission rate than biweekly actinomycin D 1.25 mg/m² IV, so MTX is always combined with folinic acid rescue.)

- If resistant (hCG plateau/rise) — switch to the alternative single agent, or **triple/MAC therapy** (MTX + actinomycin D + cyclophosphamide) if still resistant to single agents, then combination EMA-CO.
- Hysterectomy with adjuvant single-agent chemotherapy if fertility is not desired, for PSTT/ETT (chemoresistant), or for intractable uterine bleeding; reduces the number of chemotherapy courses needed.

- **High-risk/metastatic disease** (score ≥7, or Stage IV): primary combination chemotherapy — **EMA-CO**:

Day	Drug	Dose
1	Etoposide	100 mg/m² IV infusion over 30 min
1	Actinomycin D	0.5 mg IV bolus
1	Methotrexate	100 mg/m² IV bolus, then 200 mg/m² IV infusion over 12 h
2	Etoposide, Actinomycin D	repeat day-1 doses
2	Folinic acid rescue	15 mg IM every 12 h × 4 doses, starting 24 h after MTX
8	Cyclophosphamide	600 mg/m² IV
8	Vincristine	1 mg/m² IV bolus

Repeat every 1–2 weeks; give 2–3 further consolidation cycles after the first normal hCG. EMA-EP (etoposide + cisplatin substituted on day 8) is used for disease resistant to EMA-CO.

- **Site-specific measures**: whole-brain radiotherapy (3,000 cGy) with concurrent combination chemotherapy ± intrathecal methotrexate for brain metastases (craniotomy only for bleeding/decompression); hepatic arterial infusion/embolisation or resection for liver metastases; thoracotomy for a resistant, viable pulmonary focus.
- Treatment is withheld if WBC <3,000/mm³, neutrophils <1,500/mm³, platelets <100,000/mm³, or significant hepatic/renal derangement.

Follow-up & prognosis

- Weekly β-hCG until 3 consecutive normal values (**remission**), then monthly for 12 months (low risk) and effective contraception throughout.
- **Response** = >10% hCG fall/cycle; **plateau** = ±10%/cycle; **resistance** = >10% rise in one cycle or plateau over 2 cycles.

- Cure is near 100% in low-risk and ~70–85% in high-risk metastatic disease; pregnancy is safe after 1 year post-chemotherapy, confirmed early by ultrasound, with hCG re-checked 6 weeks postpartum to exclude recurrence.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 24.12 — Histological section of invasive mole showing structures of villi with marked trophoblastic proliferation deep in the myometrium (DC Dutta's Gynaecology 7e, p.319)*

High-yield exam pointers

- FIGO diagnostic criteria for postmolar GTN — plateau/rise pattern of hCG, or persistence beyond 6 months.
- "GTN after a nonmolar pregnancy is always choriocarcinoma" — a favourite one-liner.
- WHO/FIGO score <7 low risk vs ≥7 high risk; report as combined **Stage:Score**.
- Low risk → single-agent MTX-FA/actinomycin D; high risk → **EMA-CO** (know the day-1/2/8 drug schedule).
- PSTT/ETT are chemoresistant — hysterectomy is the treatment.
- Follow-up: weekly hCG to 3 consecutive normals, then monthly × 12 months; contraception throughout; conceive only after 1 year.

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

Dutta's low/high-risk criteria (duration, initial hCG, site of metastasis, prior chemotherapy) are the older simplified classification; the WHO score modified by FIGO in 2000 is the scoring system used with current anatomic staging to select chemotherapy.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e (Chapter 41, Gestational Trophoblastic Disease).

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Post natal mental illness

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

Definition — Postnatal (puerperal) mental illness is any psychiatric disturbance arising in the puerperium; it spans a spectrum from the mild, self-limited **postpartum ("maternity") blues**, through **postpartum depression**, to the rare but life-threatening **postpartum psychosis**. Overall incidence of clinically significant postnatal mental illness in the first three months after delivery is 15–20%, driven

by sleep deprivation, the abrupt withdrawal of pregnancy hormones, and psychosocial stress of the new parenting role.

Classification & high-risk factors

Entity	Approx. incidence	Onset	Typical duration
Postpartum blues	~50% (range 26–84% by criteria used)	Day 3–5 postpartum	Few days; resolves by day 10
Postpartum depression	10–20%	Gradual, over first 4–6 weeks to 6 months	Weeks to months; untreated, 25% still depressed at 1 year
Postpartum psychosis	~1–2 per 1000 deliveries (0.1–0.26%)	Abrupt, usually within 2 weeks (often within days if pre-existing bipolar disorder)	2–3 months with treatment

Risk-factor group	Specific factors
Past history	Personal history of psychiatric illness, especially a prior puerperal (postpartum) psychiatric episode
Family history	Major psychiatric illness in the family, marital conflict, poor social situation
Present pregnancy/labour	Young maternal age, caesarean or difficult/operative labour, neonatal complications, unmet expectations
Other	Unmarried status, smoking, physical/verbal abuse, prior "maternity blues" episode (compounds risk of major depression)

Clinical features

Feature	Postpartum blues	Postpartum depression	Postpartum psychosis
Mood/affect	Emotional lability, tearfulness, mild anxiety	Persistent low mood, anhedonia, guilt/worthlessness	Fear, restlessness, confusion → mood-congruent mania or depression
Cognition/behaviour	Poor concentration, transient irritability	Loss of energy/appetite, insomnia, social withdrawal, poor concentration	Hallucinations, delusions, disorientation

Feature	Postpartum blues	Postpartum depression	Postpartum psychosis
Bonding/safety	Negative feelings toward infant may appear transiently	Reduced interest in infant, risk of insecure attachment	Delusions may prompt **suicidal or infanticidal ideation** (uncommon but life-threatening)
Course	Self-limited, no specific biochemical marker (low tryptophan noted)	Recurrence risk 50–70% in a future pregnancy	Recurrence risk high in next pregnancy (Williams: up to 50%; Dutta: 20–25%) and 10–15-fold risk of any postpartum recurrence if prior psychiatric illness

Diagnosis / screening

- **Clinical assessment** — differentiate normal puerperal adjustment from true psychiatric illness; assess cognitive symptoms (concentration), excessive anxiety/insomnia beyond normal newborn-care disruption, and always ask directly about suicidal/homicidal/infanticidal ideation.
- **Validated screening tools** (American College of Obstetricians and Gynecologists [ACOG] and US Preventive Services Task Force recommend screening at least once in the perinatal period):
  - **Edinburgh Postnatal Depression Scale (EPDS)** — 10-item, self-administered, <5 minutes; the most widely validated tool antenatally and postnatally.
  - Patient Health Questionnaire-9 (PHQ-9) and Center for Epidemiologic Studies Depression Scale (CES-D) — alternative validated instruments.
- **Diagnostic classification** uses the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) criteria for major depressive episode, bipolar disorder, or brief psychotic disorder, since postpartum psychosis is usually the postpartum presentation of an underlying bipolar illness (occasionally major depression or schizophrenia).
- Exclude organic causes of an acute confusional state (thyroid dysfunction, eclampsia/sepsis-related delirium, substance use) before labelling an acute presentation as puerperal psychosis.

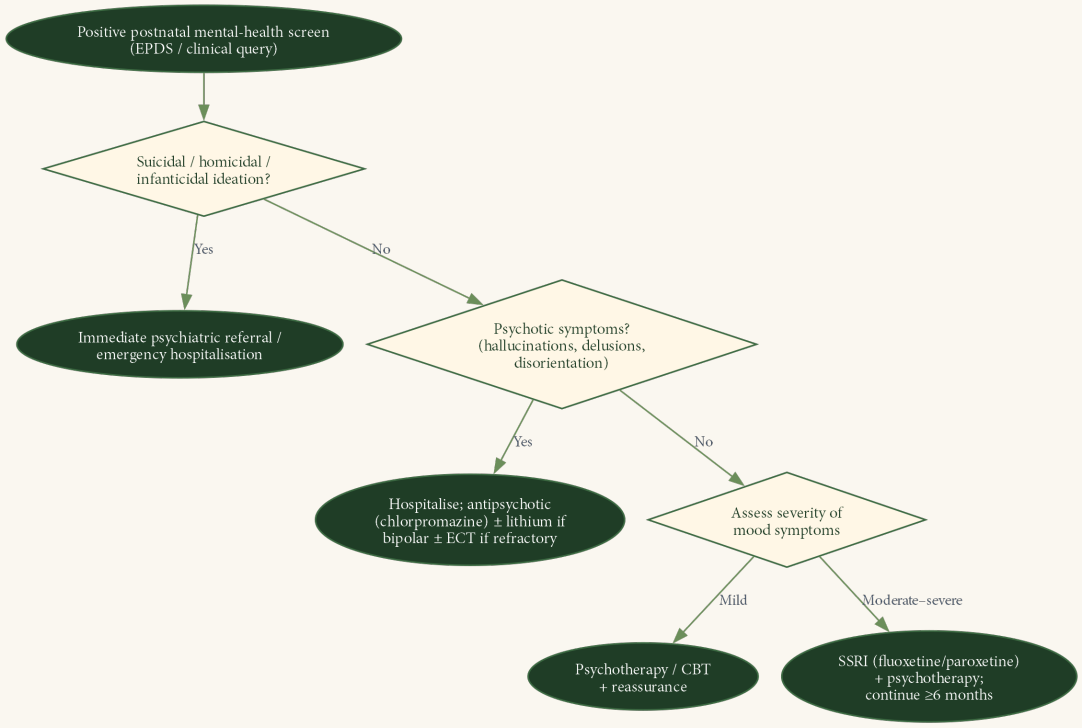
Management

- **Postpartum blues** — reassurance and psychological support from family; explain the self-limited, biochemical (hormone-withdrawal) basis; monitor for evolution into depression, since prior blues plus a current low mood carries a markedly higher risk of major depression.
- **Postpartum depression**
  - **Mild–moderate**: psychotherapy first-line — cognitive behavioural therapy or interpersonal psychotherapy; light-to-moderate exercise is a useful adjunct.

- **Moderate–severe**: a selective serotonin-reuptake inhibitor (SSRI) together with psychotherapy. **Fluoxetine or paroxetine** are preferred — effective, fewer side effects, and safe during breastfeeding. Continue for a minimum of 6 months after symptom improvement to prevent relapse; if response is suboptimal, switch to another SSRI or refer to psychiatry.
- An **oestrogen patch** has also been used as an adjunct.
- General supportive measures (as for blues) continue throughout.

- **Postpartum psychosis — psychiatric emergency**
  - Urgent psychiatric consultation and **hospitalisation**; temporary separation from the infant with nursing supervision if suicidal/infanticidal ideation is present.
  - **Chlorpromazine 150 mg stat, then 50–150 mg three times a day** for acute psychotic symptoms.
  - **Sublingual oestradiol 1 mg three times a day** produces significant improvement in some regimens.
  - **Electroconvulsive therapy (ECT)** if unresponsive to drugs, or in depressive psychosis.
  - **Lithium** is the mood stabiliser of choice for manic-depressive (bipolar) psychosis; **breastfeeding is contraindicated** while on lithium. Women with a past episode of postpartum psychosis are offered **prophylactic lithium immediately after delivery** given the high recurrence risk.
- **System-level prevention**: universal perinatal mental-health screening (EPDS at first antenatal visit and again postpartum), on-site mental-health counsellors at obstetric/postnatal clinics, and a clear emergency-referral pathway for suicidal/homicidal ideation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Postnatal mental-illness triage algorithm: safety (self/infant harm) first, then psychosis, then mood-severity-based treatment.

High-yield exam pointers

- Triad to write in order: **Blues (day 3–5, ~50%, self-limited) → Depression (weeks–6 months, 10–20%, SSRI) → Psychosis (<2 weeks, ~1–2/1000, emergency).**
- **EPDS = 10-item validated postnatal depression screening tool**, usable antenatally and postnatally; ACOG/USPSTF recommend at least one perinatal screen.
- Psychosis drug doses to reproduce: **chlorpromazine 150 mg stat then 50–150 mg TDS; sublingual oestradiol 1 mg TDS.**
- **Lithium = drug of choice for manic-depressive puerperal psychosis, but breastfeeding is contraindicated on it.**
- **Fluoxetine/paroxetine** = SSRIs of choice for postpartum depression — effective and safe in lactation.
- Recurrence is the exam trap: depression recurs in ~50–70% of future pregnancies; psychosis recurrence is high enough that **prophylactic lithium postpartum** is advised after a prior episode.
- Postpartum psychosis is usually **bipolar disorder**, not primary schizophrenia — say this explicitly if asked to classify.

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

Recurrence-risk figures for postpartum psychosis differ slightly between sources — DC Dutta's Obstetrics (9e) cites 20–25% recurrence in a subsequent pregnancy, while Williams Obstetrics (26e) cites a recurrence risk as high as 50%; the more recent Williams figure is followed above, with the older textbook range noted for completeness.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; American College of Obstetricians and Gynecologists (ACOG) Committee Opinion on screening for perinatal depression.

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Post-tubal ligation syndrome

Asked in: Paper IV 21-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Post-tubal ligation syndrome (PTLS) is a proposed symptom complex of **menstrual abnormality (menorrhagia, hypomenorrhea or irregular bleeding), pelvic pain (congestive dysmenorrhea) and cystic ovaries** occurring in some women after tubal sterilization. Older texts attribute it to disturbance of ovarian blood supply at surgery, but large controlled follow-up data — chiefly the CREST (Collaborative Review of Sterilization) study — show these symptoms are **not causally linked to sterilization itself**, so the "syndrome" is now regarded as a disputed entity rather than an accepted late complication.

Proposed symptom complex

Feature	Description
Menstrual abnormality	Menorrhagia, hypomenorrhea, or irregular/intermenstrual bleeding
Pelvic pain	Congestive dysmenorrhea, chronic pelvic pain
Ovarian change	Cystic (functional) ovaries on examination/imaging
Other	Alteration of libido; psychological symptoms (regret, anxiety over irreversibility)

Proposed pathophysiological theories

Theory	Mechanism suggested
Vascular theory	Excessive coagulation/ligation of tubal vessels adjacent to the mesosalpinx disrupts the utero-ovarian anastomosis, reducing ovarian blood flow and altering steroidogenesis; risk said to fall if mesosalpinx vessels are handled gently
Pill-masking theory	Many women stop combined oral contraceptives (COCs) at the time of sterilization; the COC had been suppressing a pre-existing menstrual disorder (dysmenorrhea, menorrhagia) that resurfaces and is wrongly attributed to surgery
Age-related theory	Women approaching the perimenopause naturally develop heavier, more irregular cycles independent of any tubal surgery
Psychological theory	Regret and altered body image after an irreversible procedure bias symptom perception and reporting
Technique-related	Devascularization is greater with unipolar electrocoagulation than with clips/rings or the classic Pomeroy ligation-excision, so symptoms have been reported more after coagulation methods

Evidence against a true syndrome — the CREST study

- **CREST (US Collaborative Review of Sterilization)** — the definitive prospective cohort addressing this question.
- **Design:** 9,514 women who underwent tubal sterilization were compared with 573 women whose partners had undergone vasectomy; both groups were followed for up to 5 years with annual standardized telephone interviews.
- **Findings:** sterilized women were **no more likely** to report persistent change in intermenstrual bleeding or cycle length than the vasectomy-partner controls.
- Sterilized women actually reported **fewer** days of bleeding, less amount of bleeding, and less menstrual pain than controls, but were slightly more likely to report cycle irregularity (odds ratio 1.6; 95% confidence interval 1.1–2.3).
- **Conclusion:** CREST provided good evidence that there is **no distinct "post-tubal ligation syndrome"** as a causal entity of sterilization.
- Older Indian texts (DC Dutta) still list "post-ligation syndrome" — menorrhagia, pelvic pain and cystic ovaries — as a recognized late complication of sterilization; current teaching (per CREST/Berek & Novak) is that this constellation reflects coincidental or pre-existing gynaecological pathology rather than a true operative sequela.

Differential diagnosis of the attributed symptoms

Symptom blamed on PTLS	Organic cause to actively exclude
Menorrhagia	Adenomyosis, leiomyoma, endometrial polyp/hyperplasia, anovulatory dysfunctional uterine bleeding, hypothyroidism
Pelvic pain/dysmenorrhea	Endometriosis, chronic pelvic inflammatory disease, pelvic adhesions (unrelated to sterilization), adenomyosis
Cystic ovary	Functional (follicular/corpus luteal) cyst unrelated to sterilization; exclude a true neoplasm if persistent or complex

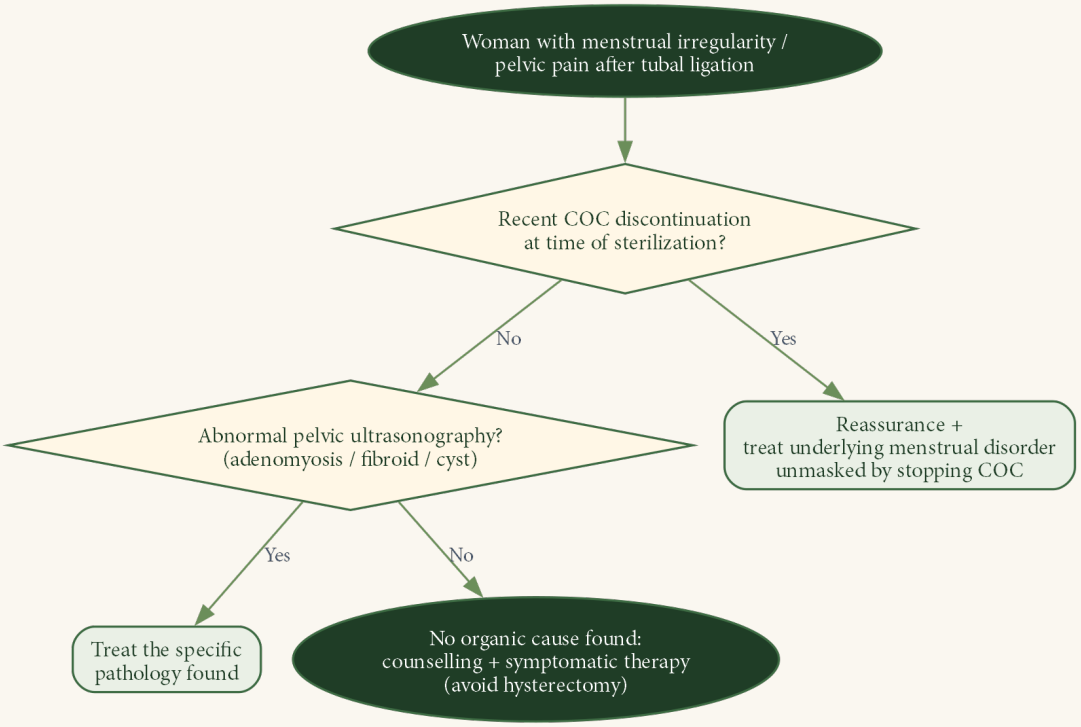
Evaluation of a woman presenting with these symptoms

- **History** — onset in relation to surgery, menstrual pattern *before* any COC use, sterilization technique used, and whether hormonal contraception was stopped at the time of the procedure.
- **General and pelvic examination** — uterine size/tenderness, adnexal mass.
- **Transvaginal ultrasonography** — look for adenomyosis, fibroid, ovarian cyst/mass, hydrosalpinx or peritubal adhesions.
- **Hormonal work-up** if anovulation is suspected (thyroid-stimulating hormone, prolactin).
- **Endometrial sampling** if age or bleeding pattern warrants exclusion of hyperplasia/malignancy.
- **Diagnostic laparoscopy** reserved for pelvic pain not explained on imaging.

Management

- **Counselling and reassurance** — explain that current evidence (CREST) does not support the sterilization procedure itself as the cause; the permanence of sterilization should already have been discussed at pre-operative consent.
- **Treat the organic cause actually identified** — e.g., standard protocol for adenomyosis/fibroid, endometrial hyperplasia, or PID if found on evaluation.
- **Symptomatic menorrhagia** — non-steroidal anti-inflammatory drugs during menses; **antifibrinolytic (tranexamic acid)**, which reduces menstrual blood loss by about 50% and is used as second-line therapy; a levonorgestrel intrauterine system for ongoing cycle control.
- **Symptomatic pelvic pain** — NSAIDs, hormonal cycle control where feasible, and psychological support/counselling for regret-related distress.
- **Persistent, large or complex ovarian cyst** — laparoscopic cystectomy after excluding neoplasia.
- **Hysterectomy** — reserved strictly for confirmed organic pathology (e.g., adenomyosis, fibroids) causing intractable menorrhagia or pain unresponsive to medical management; it should **not** be offered merely on a presumptive diagnosis of "post-ligation syndrome."

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for evaluating and managing symptoms attributed to post-tubal ligation syndrome.

High-yield exam pointers

- PTLS = menorrhagia + pelvic pain (congestive dysmenorrhea) + cystic ovaries alleged after sterilization.
- **CREST study**: 9,514 tubal-ligation women vs 573 vasectomy-partner controls, followed 5 years by annual interview.
- Sterilized women had **less** bleeding/pain but slightly **more** cycle irregularity (OR 1.6, 95% CI 1.1–2.3) — CREST concluded **no true "post-tubal ligation syndrome."**
- Key confounder to write: stopping COCs at sterilization unmasks a pre-existing menstrual disorder that the pill had been masking.
- Vascular theory implicates mesosalpinx vessel disturbance (more with coagulation than clip/ring/Pomeroy).
- Management principle: treat the organic pathology found, counsel and reassure — do not perform hysterectomy for the "syndrome" alone.

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

DC Dutta's texts still describe "post-ligation syndrome" as a recognized late complication of sterilization, whereas the CREST prospective cohort (cited in Berek & Novak) found no causal link — current teaching favours the CREST evidence, and this discrepancy is worth stating explicitly if asked to discuss controversy.

SOURCE & COVERAGE

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

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PPTCT program

Asked in: Paper IV 03-Oct-2025 · Paper II Sep 2007 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Prevention of Parent-to-Child Transmission (PPTCT) is India's national programme, run under the National AIDS Control Organisation's (NACO) National AIDS Control Programme (NACP), for early detection of HIV infection in pregnant women and their partners and for delivering antiretroviral therapy (ART) plus obstetric and infant-care interventions that cut transmission of HIV from mother to child. It was renamed from "Prevention of Mother-to-Child Transmission (PMTCT)" to PPTCT to bring the father into testing/counselling and reduce maternal stigma, and it aims to lower vertical transmission from an untreated baseline of 25–30% to under 2%, moving toward Elimination of Mother-to-Child Transmission (EMTCT).

Four-pronged strategy (WHO/NACO)

Prong	Strategy
1	Primary prevention of HIV infection among women of reproductive age
2	Prevention of unintended pregnancies in HIV-infected women (contraceptive counselling)
3	Prevention of transmission from an HIV-infected mother to her infant (ART + safe obstetric practice + infant prophylaxis)
4	Care, treatment and psychosocial support to the HIV-infected mother, her child and family

Programme components and service delivery

Component	Details
Point of testing	Integrated Counselling and Testing Centre (ICTC), co-located with every antenatal clinic — sub-centre, PHC, CHC and district hospital
Testing approach	**"Opt-out" testing** — offered routinely to every pregnant woman at the first antenatal visit; repeated in the third trimester/labour if the earlier test was negative or status is unknown
Test strategy	Whole-blood rapid antibody tests (NACO's ANC "Strategy I"); a single reactive rapid test is sufficient to start **same-day ART** in a pregnant woman ("test-and-treat"), with a differentiation/confirmatory test run in parallel for definitive counselling
Partner testing	Husband/partner offered testing and counselling at the same ICTC
ART initiation	**Lifelong ART the same day of diagnosis**, in any trimester, for every HIV-positive pregnant or breastfeeding woman **regardless of CD4 count or WHO clinical stage** — "Option B+"
Linked services	Testing for syphilis, hepatitis B and other STIs at the same ANC visit; linkage to the ART centre for lifelong follow-up

Antenatal, intrapartum and infant management

- **Antenatal** — ART started the same day as diagnosis; current NACO first-line regimen is **tenofovir (TDF) 300 mg + lamivudine (3TC) 300 mg + dolutegravir (DTG) 50 mg once daily** (**"TLD"**), continued lifelong (the earlier NACO/USDHHS first line, still seen in older texts, was TDF 300 mg + 3TC 300 mg + efavirenz (EFV) 600 mg). CD4 count and viral load are monitored; screen for opportunistic infections and, in women on ART, for gestational diabetes.
- **Intrapartum** — Continue the oral ART regimen through labour (sips of water). Add **IV zidovudine** if viral load is unknown or >1000 copies/mL, or the mother is not on ART: loading dose **2 mg/kg over 1 hour**, then **1 mg/kg/hr infusion until cord clamping** (start 4 hours before an elective caesarean). Avoid amniotomy, prolonged labour, multiple vaginal examinations, fetal scalp electrode/scalp pH sampling, and instrumental (vacuum) delivery. Mode of delivery follows obstetric indication — vaginal delivery is acceptable with maternal viral load ≤1000 copies/mL on ART; elective caesarean at 38 weeks (before labour or membrane rupture) is preferred when viral load is >1000 copies/mL or unknown.
- **Infant ARV prophylaxis** (started within 4 hours of birth, dosed by birth weight):

Infant risk category	Regimen	Dose	Duration
Low risk (mother on ART, virally suppressed)	Nevirapine (NVP) syrup, once daily	>2.5 kg: 15 mg; ≤2.5 kg: 10 mg	6 weeks
High risk (mother diagnosed late/not on ART/detectable viral load, or high-risk breastfeeding)	Dual prophylaxis — NVP once daily **plus** Zidovudine (ZDV) syrup twice daily	ZDV >2.5 kg: 15 mg BD; ≤2.5 kg: 10 mg BD (NVP dosing as above)	6 weeks (extend to 12 weeks in high-risk breastfeeding infants)

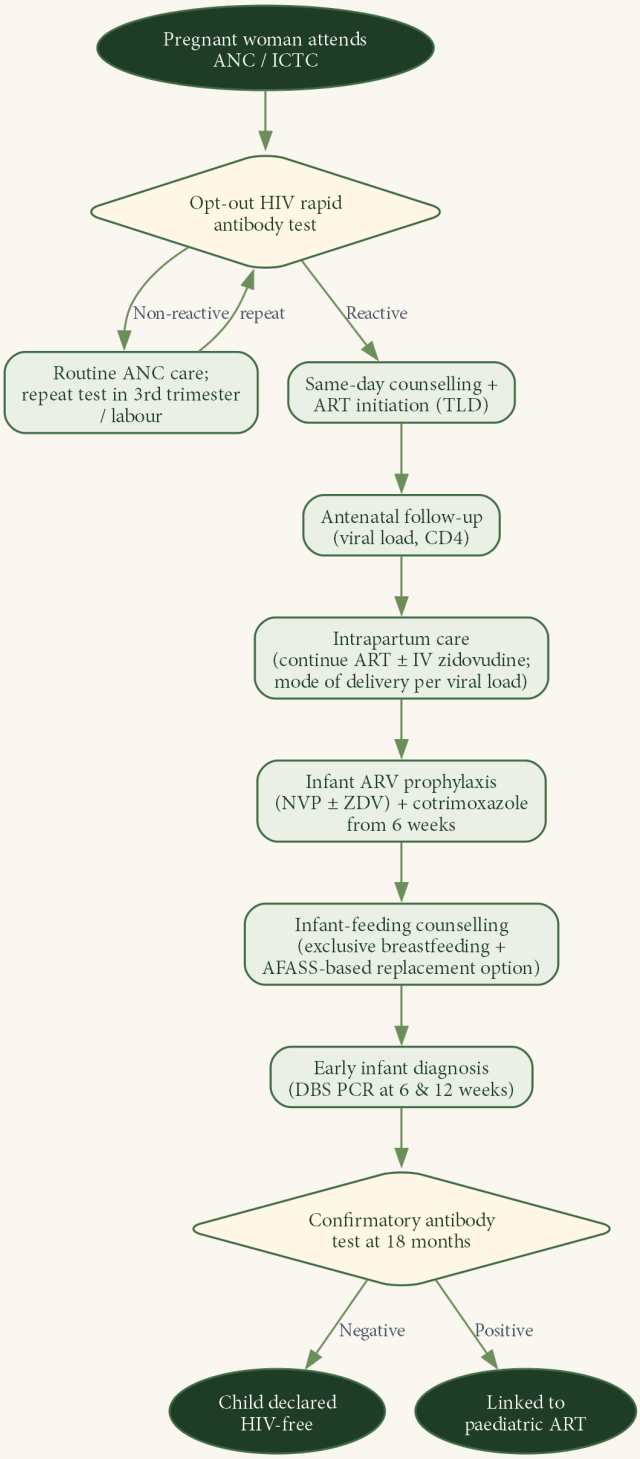
- **Cotrimoxazole prophylaxis** for the HIV-exposed infant from 6 weeks of age until HIV infection is excluded, to prevent *Pneumocystis* pneumonia and other opportunistic infections.
- **Infant feeding — Exclusive breastfeeding for the first 6 months** under ARV cover is the WHO/NACO-preferred choice in resource-limited settings, continued with complementary feeds to 12 months; mixed feeding in the first 6 months is avoided as it raises transmission risk. Replacement (formula) feeding is offered only when the **AFASS** criteria are met — **A**ffordable, **F**easible, **A**cceptable, **S**ustainable, **S**afe.
- **Early infant diagnosis (EID)** — Dried blood-spot sample for HIV DNA/RNA PCR at **6 weeks** of age (or first contact thereafter), with programme testing at Day 1, 6 weeks and 12 weeks; a reactive PCR is confirmed on a second sample. A final confirmatory HIV antibody (rapid) test is done at **18 months**, once transplacentally-acquired maternal antibody has cleared — a negative test at 18 months declares the child HIV-free.

Recent advances [RA]

- NACO's 2021 ART guidelines moved preferred first-line ART for **all** adults, including pregnant/breastfeeding women, to the **dolutegravir-based "TLD" regimen**, after the Tsepamo surveillance study (Botswana) showed periconceptional dolutegravir's absolute neural-tube-defect risk (~0.2–0.3%) is outweighed by its superior viral suppression and resistance barrier [NACO 2021; WHO 2019 dolutegravir guidance].
- **"Test-and-treat"** (same-day ART regardless of CD4/WHO stage) was adopted by NACO in 2017, in line with WHO's 2015 consolidated guidelines, replacing the older CD4-threshold Option A/B approach.
- **Point-of-care early infant diagnosis** platforms are shortening result turnaround versus the earlier centralised DBS-PCR pathway, enabling faster ART start in infected infants [WHO 2020 EID guidance].
- India is piloting **"triple elimination"** — combining PPTCT with elimination of mother-to-child transmission of syphilis and hepatitis B at the same ANC visit.

- Global EMTCT validation (WHO threshold: MTCT rate <5% breastfeeding / <2% non-breastfeeding populations) has been achieved by countries such as Cuba and Thailand; India's NACP-V continues scaling ICTC coverage and ART linkage toward this target.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

PPTCT service cascade — from opt-out ANC/ICTC testing through ART, intrapartum care, infant prophylaxis and feeding, to early infant diagnosis and final 18-month outcome.

High-yield exam pointers

- 4 prongs: primary prevention → avoid unintended pregnancy → prevent MTCT → care & support.

- **Option B+** = lifelong ART for every HIV-positive pregnant/breastfeeding woman regardless of CD4 — current NACO first line is **TLD** (tenofovir + lamivudine + dolutegravir).
- **Opt-out testing** at ICTC co-located with ANC; same-day ART on a single reactive rapid test.
- MTCT falls from **25–30% (untreated)** to **<2%** with the full PPTCT package (ART + safe obstetric practice + infant prophylaxis + safe feeding).
- Infant prophylaxis: NVP (± ZDV if high-risk) dosed by birth weight, for **6 weeks** (extend to 12 weeks in high-risk breastfeeding infants).
- **AFASS** criteria before replacement feeding is offered instead of exclusive breastfeeding.
- EID testing schedule to remember: **Day 1 → 6 weeks → 12 weeks (DBS PCR) → 18 months (confirmatory antibody)**.
- Intrapartum IV zidovudine dosing: **2 mg/kg loading over 1 hour, then 1 mg/kg/hr until cord clamping.**

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The textbook corpus (Williams/Dutta) covers clinical HIV-in-pregnancy management in depth but not India's PPTCT programme architecture by name; the programme structure (four prongs, ICTC opt-out testing, Option B+/TLD, EID schedule) is drawn from standard NACO/WHO PPTCT guidance, while every dose and clinical step above (ART regimen, IV zidovudine dosing, infant NVP/ZDV dosing, AFASS, testing timeline) is cross-checked against DC Dutta's Obstetrics 9e and Williams Obstetrics 26e.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; NACO PPTCT/National ART Guidelines; WHO PMTCT/EMTCT guidance.

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Preconception counseling

Asked in: Paper IV 28-Jun-2024 · Paper IV Apr 2006 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Preconception (preconceptional) counseling is the provision of biomedical, behavioural and social-health interventions to a woman/couple **before conception occurs**, aimed at identifying and correcting risk factors so that pregnancy begins in an optimal state of maternal health. Because organogenesis is essentially complete by the end of the first trimester — often before the woman even misses a period and registers for antenatal care — many preventive measures (folic acid, glycaemic control, teratogen avoidance) are effective **only if started before conception**. It is a core element of

preventive obstetrics and is best delivered opportunistically at any health-maintenance visit, including the postpartum "fourth-trimester" visit.

Objectives of preconceptional care

- Improve knowledge, attitudes and health behaviours of men and women regarding reproductive health.
- Ensure every woman of childbearing age receives evidence-based risk screening, health promotion and intervention **before** she conceives.
- Provide **interconception** care to prevent recurrence of an adverse outcome.
- Reduce racial and socio-economic disparities in pregnancy outcome (American College of Obstetricians and Gynecologists/Society for Maternal-Fetal Medicine).

Components of the preconceptional visit

- **History:** obstetric (prior loss, stillbirth, preterm birth, caesarean), medical/surgical, family/genetic, menstrual & reproductive (infertility, recurrent pregnancy loss), social (smoking, alcohol, substance use), and screening for intimate-partner violence.
- **Examination & baseline work-up:** weight/body mass index (BMI), blood pressure, general and pelvic examination, cervical cytology if due; haemoglobin, blood group & Rh, urine analysis, blood sugar, thyroid-stimulating hormone if indicated, HIV/VDRL/HBsAg, rubella and varicella immune status.
- **Immunisation:** rubella, varicella, hepatitis B and Tdap if non-immune. Toxoid/killed vaccines (tetanus, influenza, hepatitis B) are safe before and during pregnancy; **live vaccines (MMR, varicella)** are contraindicated once pregnant, so are given preconceptionally with contraception advised for **≥1 month** after the shot.
- **Medication review:** teratogenic drugs are stopped/switched — warfarin → heparin, angiotensin-converting enzyme (ACE) inhibitors/angiotensin receptor blockers (ARBs) stopped, oral hypoglycaemics → insulin, valproate avoided, methotrexate and isotretinoin stopped with an adequate washout.
- **Folic acid supplementation** (see table).
- **Lifestyle advice:** stop smoking/alcohol/drugs, optimise weight, moderate exercise, avoid pica and high-mercury fish.
- **Genetic counseling and carrier screening** where indicated, with discussion of prenatal diagnosis options.
- **Effective contraception** is continued until risk optimisation is complete and pregnancy is planned.

Folic acid dosing

Risk category	Dose	Timing
Average risk (all women planning pregnancy)	400–800 µg (0.4–0.8 mg) orally daily	Start ≥4 weeks before conception, continue through the first trimester
High risk — prior neural-tube-defect (NTD)-affected pregnancy, antiepileptic therapy, pregestational diabetes	**4 mg (4000 µg)** orally daily	Same schedule; reduces recurrent NTD risk by ~72% (MRC Vitamin Study)

Preconceptional counseling in specific high-risk conditions

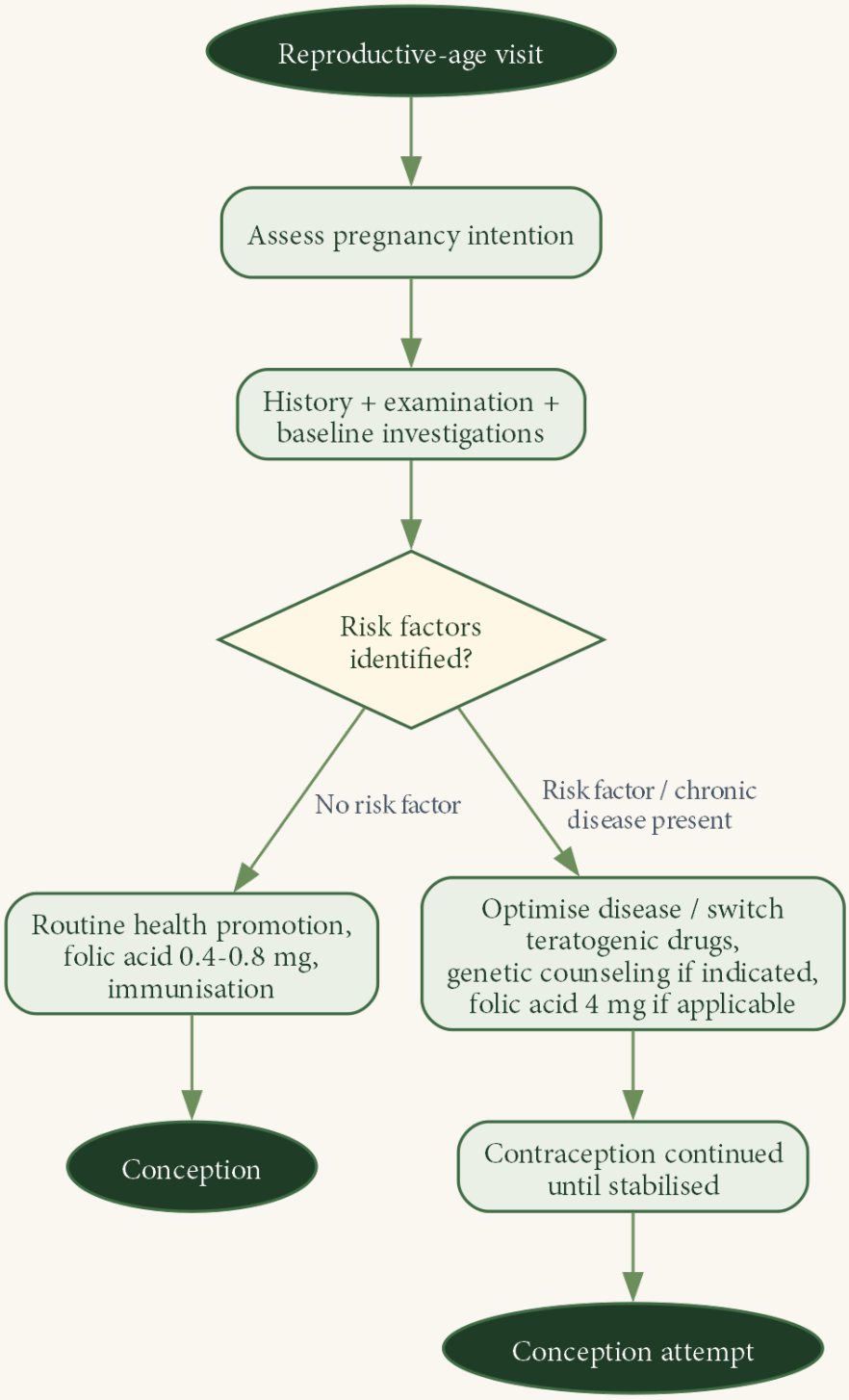
Condition	Key preconceptional recommendation
Pregestational diabetes	Target **glycosylated haemoglobin (HbA1c) <7%** before conception (American Diabetes Association/ACOG); screen for retinopathy, nephropathy; stop ACE inhibitors/ARBs
Epilepsy	Prefer **monotherapy** at the lowest effective dose; **avoid valproate** (highest malformation risk); folic acid 4 mg/day; taper antiseizure medication only if seizure-free 2–5 years, single seizure type, normal examination and electroencephalogram
Chronic hypertension	Assess for ventricular hypertrophy, retinopathy, renal disease; optimise blood pressure; stop ACE inhibitors/ARBs
Thyroid disease	Correct to euthyroid state; radioactive iodine (^{131}I) contraindicated within 1 year of a planned pregnancy
Cardiac disease	Counsel on maternal mortality risk and situations where pregnancy is contraindicated; switch teratogenic cardiac drugs
Systemic lupus erythematosus/rheumatoid arthritis	Plan conception during ≥6 months of disease remission; continue hydroxychloroquine; stop methotrexate, mycophenolate, cyclophosphamide, leflunomide
Renal disease	Optimise blood pressure preconceptionally; stop ACE inhibitors/ARBs
Phenylketonuria	Phenylalanine-restricted diet from **≥3 months before** conception; target blood phenylalanine **120–360 µmol/L**
Sickle cell disease/thalassaemia	Screen women of at-risk ancestry; test partner; offer prenatal diagnosis if both are carriers

Condition	Key preconceptional recommendation
Obesity/underweight	Calculate BMI yearly; screen for diabetes if BMI ≥25 kg/m^2; assess for eating disorder if BMI ≤18.5 kg/m^2

Limitations of preconceptional care

- Only a small proportion of women actually access it — poor public awareness is the chief barrier.
- Nearly half of all pregnancies are unplanned, so the "teachable moment" is missed.
- Adolescents, who carry disproportionate risk, rarely seek preconceptional counseling.
- Access is inequitable — women with less affluence/insurance receive less preconceptional care.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart of the preconceptional-visit pathway from risk assessment to conception.

Recent advances [RA]

- **American College of Obstetricians and Gynecologists (ACOG) Committee Opinion No. 762** (December 2018, reaffirmed 2020) formalised prepregnancy counseling as routine preventive

care, to be offered at any health-maintenance visit and explicitly at the postpartum "fourth-trimester" visit (ACOG/Society for Maternal-Fetal Medicine Obstetric Care Consensus, 2018).

- Carrier screening has shifted from purely **ethnicity-based** testing to **panethnic and expanded** panels (ACOG, 2020); sequencing-based expanded cystic-fibrosis panels detect roughly **30% more** at-risk couples than the older 23-mutation panel (Beauchamp, 2019).
- **First-trimester HbA1c** is now used as a graded predictor of major congenital malformation risk (Hinkle, 2018), reinforcing the <7% preconception HbA1c target and helping forecast gestational diabetes risk.
- Routine **pregnancy-intention screening** ("could you become pregnant in the next year?") is being promoted at every reproductive-age encounter to capture the ~45% of pregnancies that are unplanned (Manze, 2020).
- The World Health Organization's global consensus on preconception care (2013) reframes it as a life-course strategy — extending scope to adolescents and non-communicable-disease prevention, not merely fertility-linked care.

High-yield exam pointers

- Organogenesis is complete by end of the first trimester — preconception is the ONLY window some interventions work in.
- Folic acid: **0.4–0.8 mg** average risk; **4 mg** high risk (prior NTD, antiepileptic therapy, pregestational diabetes) — MRC trial showed 72% reduction in NTD recurrence.
- Diabetes: preconception **HbA1c <7%**.
- Epilepsy: monotherapy, avoid valproate, folic acid 4 mg.
- Live vaccines (MMR, varicella) contraindicated once pregnant — give before conception, contraception for ≥1 month after.
- PKU: phenylalanine 120–360 μmol/L, dietary control ≥3 months preconceptionally.
- Key citation: **ACOG Committee Opinion No. 762** (2018, reaffirmed 2020).

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Textbook of Obstetrics prints a blanket 4 mg/day folic acid recommendation for all women planning pregnancy, but current ACOG/CDC/USPSTF guidance reserves the 4 mg dose for high-risk women (prior neural-tube-defect pregnancy, antiepileptic therapy, pregestational diabetes) and recommends 0.4–0.8 mg for average-risk women — the higher dose has been followed here for the named high-risk indications.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; American College of Obstetricians and Gynecologists Committee Opinion No. 762 (Prepregnancy Counseling, December 2018, reaffirmed 2020) and Committee Opinion on carrier screening for genetic disorders (2020).

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Preconceptional counseling in Obstetric practice

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

Definition — Preconceptional (prepregnancy) counseling is the systematic assessment and risk-reduction intervention offered to a woman or couple **before** conception, aimed at identifying and modifying medical, genetic, nutritional, and social factors that could adversely affect maternal or perinatal outcome. It is emphasised because organogenesis is largely complete before most women recognise a missed period, and nearly 45% of pregnancies are unplanned — so waiting for the first antenatal visit is too late for interventions such as folic acid supplementation or teratogen withdrawal (American College of Obstetricians and Gynecologists [ACOG] Committee Opinion No. 762, December 2018, reaffirmed 2020).

Aims and ideal timing

- Reduce maternal mortality and morbidity from unrecognised or poorly controlled medical disease.
- Reduce congenital malformations, especially neural-tube defects (NTDs), through periconceptional folate.
- Optimise control of pre-existing disease (diabetes, epilepsy, thyroid, hypertension, cardiac disease, SLE) before the fetus is exposed to hyperglycaemia/teratogenic drugs.
- Elicit reproductive intention — routine **pregnancy intention screening** ("One Key Question" — do you want to become pregnant in the next year?) at every reproductive-age health visit.
- Best opportunities: periodic health-maintenance visits, family planning visits, and the postpartum "**fourth trimester**" visit, not only a dedicated preconception clinic.

Components of a preconceptional visit

Domain	Assessment / action
Medical history	Screen for hypertension (~11% prevalence), pregestational diabetes, thyroid disease, epilepsy, cardiac disease, SLE, thromboembolism; optimise control before conception

Domain	Assessment / action
Obstetric/reproductive history	Prior NTD, stillbirth, recurrent miscarriage, preterm birth; counsel on recurrence risk and prevention
Parental age	Advanced maternal age (aneuploidy risk) and advanced paternal age (de novo mutations, autism) discussed
Family/genetic history	Pedigree construction; ethnic-specific, pan-ethnic, or expanded carrier-screening panels; cystic fibrosis and spinal muscular atrophy carrier screening offered to **all** women (ACOG, 2017, reaffirmed 2020)
Social history	Tobacco, alcohol, substance use, intimate-partner violence, occupational/teratogen exposure
Nutrition/weight	Body mass index optimisation; weight-gain counselling; correct anaemia
Medication review	Stop/replace teratogens — ACE inhibitors/ARBs, warfarin, isotretinoin, sodium valproate, methotrexate, mycophenolate; switch to pregnancy-safer alternatives
Immunisation	Screen rubella and varicella immunity; vaccinate if non-immune
Infection screening	HIV, syphilis, hepatitis B surface antigen, rubella IgG

Folic acid and micronutrient supplementation

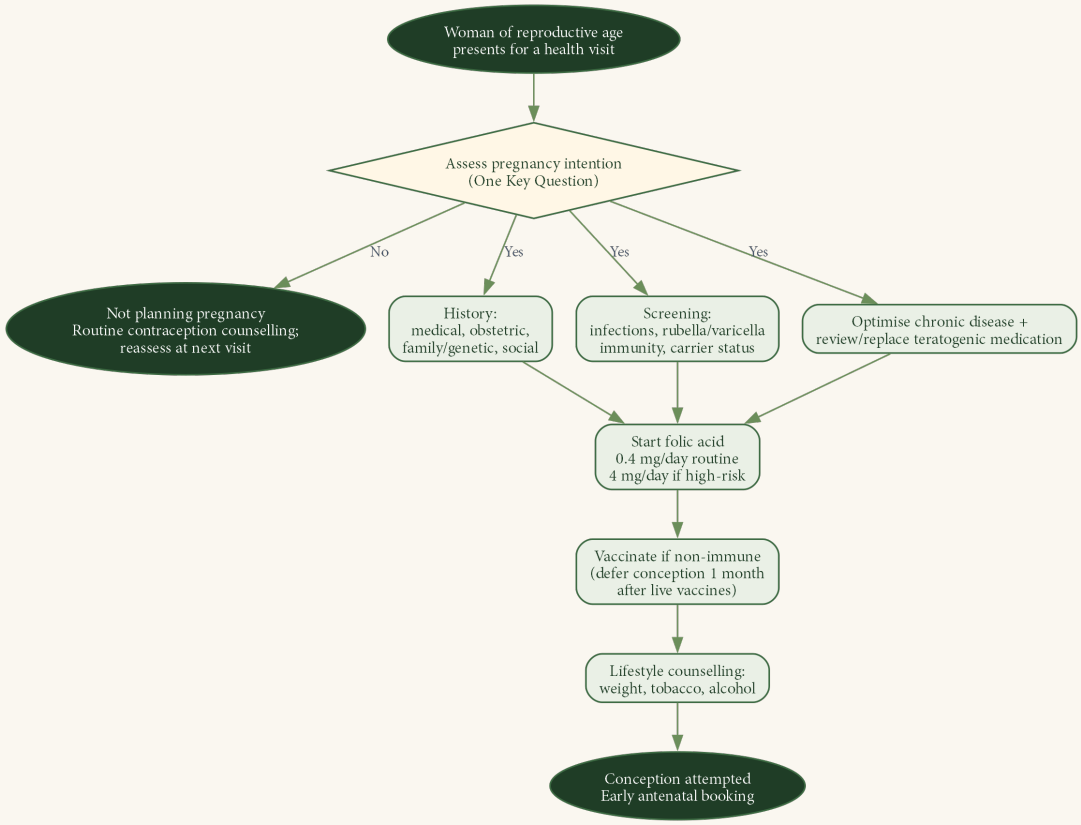
Risk category	Dose	Duration
Average risk (all women planning pregnancy)	**0.4 mg (400 µg)/day**	Start ≥4 weeks before conception, continue through the first trimester (Government of India recommends iron-folic acid)
High risk — prior neural-tube-defect-affected pregnancy, women on antiepileptic drugs	**4 mg/day**	Start 1 month before conception, continue through the first trimester

A daily 4-mg dose taken from the month before conception through the first trimester reduces the 2–5% NTD recurrence risk by more than 70%. High-dose folate should be a separate supplement, not achieved by multiplying multivitamin tablets, to avoid excess fat-soluble vitamin intake.

Preconceptional optimisation of specific high-risk conditions

Condition	Preconceptional target/intervention
Pregestational diabetes	Haemoglobin A1c goal <7% before conception (American Diabetes Association 2004, endorsed by ACOG 2018); switch oral hypoglycaemics to insulin; retinal and renal assessment; folic acid 4 mg/day
Epilepsy	Convert to monotherapy at the lowest effective dose where possible; avoid sodium valproate; folic acid 4 mg/day; discuss antiepileptic-drug teratogenicity and prenatal diagnosis
Thyrotoxicosis	Normalise thyroid function before conception; avoid radioactive iodine (^{131}I) if pregnancy is planned within 1 year
Chronic hypertension	Stabilise blood pressure; switch ACE inhibitor/ARB to labetalol, methyldopa, or nifedipine; assess for end-organ damage
Systemic lupus erythematosus	Plan conception only after ≥6 months of sustained remission; continue hydroxychloroquine; stop mycophenolate/methotrexate/cyclophosphamide
Structural cardiac disease/aortic pathology	Echocardiography ± cardiac CT/MRI; joint maternal–fetal medicine and cardiology counselling; risk stratify before conception
Haemoglobinopathy carrier (thalassaemia/sickle-cell trait)	Screen partner; if both carriers, counsel 25% risk of homozygous disease and discuss prenatal diagnosis (chorionic villus sampling)
Obesity	Weight optimisation before conception to lower risks of anomalies, gestational diabetes, and pre-eclampsia

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Preconceptional counseling workflow from intention screening to conception.

High-yield exam pointers

- Nearly **45%** of pregnancies are unplanned and organogenesis is complete before the missed period — counsel at *every* reproductive-age visit, not only at booking.
- Folic acid: **0.4 mg** routine vs **4 mg** high-risk (prior NTD/on antiepileptics) — both started **1 month before conception**, continued through the first trimester; high dose cuts recurrence by >70%.
- Diabetes: preconceptional **HbA1c < 7%** is the single most quoted number (American Diabetes Association 2004/ACOG 2018).
- Live vaccines (MMR, varicella) are **contraindicated in pregnancy** — give before conception or postpartum and avoid conception for **1 month** after; toxoid (tetanus) and killed/inactivated vaccines (influenza, pneumococcal, hepatitis B) are safe preconceptionally.
- Radioactive iodine (^{131}I) — avoid conception within **1 year** of treatment.
- Reference guideline: **ACOG Committee Opinion No. 762 ("Prepregnancy counseling"), December 2018, reaffirmed 2020.**

- Universal offer of cystic fibrosis + spinal muscular atrophy carrier screening; pan-ethnic/expanded carrier panels now preferred over ethnicity-restricted screening alone.

Recent advances [RA]

- **Formal guideline anchor**: ACOG Committee Opinion No. 762 (December 2018, reaffirmed 2020) consolidated prepregnancy counselling as a distinct standard-of-care visit rather than an informal add-on to antenatal booking.
- **Routine pregnancy-intention screening**: primary-care and obstetric visits now incorporate structured intention screening tools (e.g., "One Key Question") so counselling is triggered before conception even outside dedicated preconception clinics (Manze et al., 2020).
- **Shift from ethnicity-restricted to pan-ethnic/expanded carrier screening**: ACOG (2017, reaffirmed 2020) now accepts ethnic-specific, pan-ethnic, and expanded multi-condition carrier panels as equally valid strategies, and recommends cystic fibrosis and spinal muscular atrophy screening be offered to all women regardless of ethnicity.
- **Diabetes-specific evidence**: cohort data (Tieu et al., 2017; Yamamoto et al., 2018) confirm that structured preconceptional counselling in women with pregestational diabetes improves HbA1c control, folic acid compliance, and lowers the combined outcome of perinatal death or major congenital anomaly.
- **Postpartum ("fourth trimester") re-framing**: the postpartum visit is now explicitly promoted as a preconceptional-counselling opportunity for the next pregnancy, following the Presidential Task Force on Redefining the Postpartum Visit.
- Indian programmatic context: the Government of India's iron-folic acid supplementation strategy and FOGSI's advocacy for preconceptional anaemia correction extend this counselling framework to India's high background prevalence of anaemia and haemoglobinopathy carriage.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Randomised trial evidence for preconceptional counselling itself is sparse (withholding counselling would be unethical); benefit is chiefly demonstrated by before–after cohort comparisons, and DC Dutta's older folic-acid figures should be read alongside the current American College of Obstetricians and Gynecologists dosing above.

SOURCE & COVERAGE

Williams Obstetrics 26e (Chapter 9, "Preconceptional Counseling"); DC Dutta's Textbook of Obstetrics 9e (Chapter 10, "Preconceptional Counseling and Care"); American College of Obstetricians and Gynecologists Committee Opinion No. 762 (Prepregnancy counseling, December 2018, reaffirmed 2020); American Diabetes Association (2004) preconception care consensus.

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Reproductive and child health care

Asked in: Paper IV 03-Oct-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Reproductive and Child Health (RCH) care is an integrated, composite national approach to improve the health status of women and children in India. It draws on inputs from the Government of India (National Health Mission [NHM], National Population Policy) and support from donor agencies (World Bank, WHO, European Commission), and is delivered as a continuum from adolescence through pregnancy, childbirth and childhood.

Aims of RCH care

Aim	Core content
Safe motherhood	Quality antenatal, intranatal and postnatal care; risk approach; referral for high-risk cases
Child survival	Essential newborn care, exclusive breastfeeding, universal immunization
Adolescent health	Nutrition, delayed marriage/motherhood, reproductive health education
Family planning	Spacing and terminal methods, safe abortion services
Prevention/management of reproductive tract & sexually transmitted infections (RTI/STI)	Clean delivery/abortion practice, menstrual hygiene, syndromic RTI/STI management

RCH package — antenatal, intranatal and newborn/postnatal care

Antenatal care	Intranatal care	Essential newborn & postnatal care
Early registration of pregnancy (within 12 weeks)	Institutional delivery in 100% cases, by **skilled birth attendant**	Clean delivery and immediate resuscitation at birth

Antenatal care	Intranatal care	Essential newborn & postnatal care
Minimum 4 antenatal visits (WHO); Government of India minimum 4 (12, 14–26, 28–34 and 36 weeks)	**Three cleans** — hands, perineal area, umbilical area	Prevention of hypothermia and infection
Risk approach to identify high-risk pregnancy (continued through labour and puerperium, not once only)	Partograph maintained to detect prolonged/obstructed labour early	Early and exclusive breastfeeding; Ten Baby-Friendly Hospital Initiative steps
Tetanus toxoid immunization + supplementary iron-folic acid daily for ≥100 days from the first trimester	Strengthened referral system	Family planning counselling, safe abortion services, referral of sick newborn

Skilled birth attendant, life-saving drugs and emergency obstetric care

A **skilled birth attendant (SBA)** is an accredited health professional (midwife, nurse or doctor) trained to manage normal pregnancy, labour and puerperium, to recognise complications in mother/newborn, and to organise referral. Under RCH-II she is permitted to use specified **life-saving drugs and interventions**:

- **Life-saving drugs** — misoprostol (prevention of postpartum haemorrhage [PPH]), injection oxytocin (treatment of PPH), injection magnesium sulphate (eclampsia), ampicillin and metronidazole (infection).
- **Life-saving interventions** — digital removal of retained products (incomplete abortion with bleeding), active management of the third stage of labour, maintenance of a partograph.

	Basic emergency obstetric care (BEmOC)	Comprehensive EmOC (CEmOC) — at First Referral Units (FRUs)
Level	Sub-centre/PHC	FRU (CHC/sub-district hospital)
Signal functions	Parenteral antibiotics, oxytocics, anticonvulsants; manual removal of placenta/products; assisted vaginal delivery; neonatal resuscitation	All BEmOC functions **plus** anaesthesia, blood transfusion, caesarean delivery, contraceptive services including sterilization, and referral with transport

National strategies and programmes under the RCH umbrella

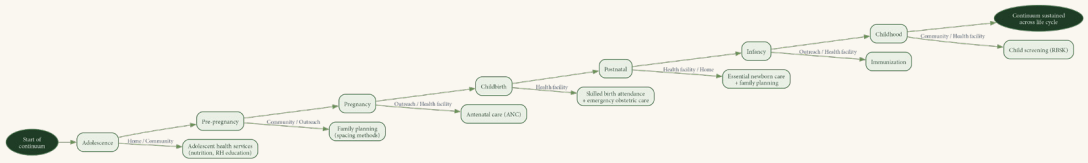
Programme	Year	Key feature
RCH Phase I	1997	Target-free approach; merged safe motherhood, child survival and family planning

Programme	Year	Key feature
RCH Phase II	2005	Community Needs Assessment Approach; upgraded FRUs for comprehensive EmOC; SBA empowered for life-saving drugs/interventions
National Rural Health Mission → National Health Mission (NHM)	2005 → 2013	Umbrella architecture for RCH plus disease control; village-level female link worker — **Accredited Social Health Activist (ASHA)**
Janani Suraksha Yojana (JSY)	2005	Conditional cash transfer to promote institutional delivery
Janani Shishu Suraksha Karyakram (JSSK)	2011	Free delivery (normal/caesarean), free drugs/diagnostics, free diet and free referral transport for mother and sick newborn (up to 30 days)
Rashtriya Bal Swasthya Karyakram (RBSK)	2013	Child screening for the "4 Ds" — defects at birth, deficiencies, diseases, developmental delay/disability
Rashtriya Kishor Swasthya Karyakram (RKSK)	2014	Adolescent (10–19 years) health — nutrition, sexual/reproductive health, mental health, injury and substance-abuse prevention
Mission Indradhanush	2014	Accelerated full-immunization coverage for unvaccinated/partially vaccinated children and pregnant women
Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)	2016	Free, fixed-day (9th of every month) specialist antenatal check-up, prioritising high-risk pregnancies
LaQshya (Labour room Quality improvement Initiative)	2017	Quality-of-care improvement in labour rooms and maternity operation theatres
Ayushman Bharat — Health & Wellness Centres + PM-JAY	2018	Comprehensive primary care platforms; insurance cover for secondary/tertiary care
Surakshit Matritva Aashwasan (SUMAN)	2019	Zero-expense, guaranteed, dignified, quality care for every pregnant woman and newborn

Recent advances [RA]

- **RMNCH+A strategic approach** (Reproductive, Maternal, Newborn, Child and Adolescent Health, 2013) reframes RCH as a **continuum of care**: across the life cycle (adolescence → pre-pregnancy → pregnancy → childbirth → postnatal period → infancy → childhood) and across care settings (home → community → outreach → health facility), with focused effort on identified High Priority Districts.
- **National sociodemographic goals — 2030** (Sustainable Development Goals/National Population Policy/NHM): total fertility rate <2.1, maternal mortality ratio <70/100,000 live births, infant mortality <12/1000 live births, antenatal care coverage 100%, institutional deliveries 80%, deliveries by skilled personnel 100%.
- **POSHAN Abhiyaan** (National Nutrition Mission) targets stunting, undernutrition, anaemia and low birth weight as determinants of child health outcomes, converging with RCH service delivery.
- **Digital health tools** (mobile-linked maternal death surveillance and response, e-tracking of high-risk pregnancies under PMSMA/RCH portal) are increasingly used to close last-mile gaps in RCH coverage.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

RMNCH+A continuum-of-care model: life-stage axis (Adolescence → Childhood) crossed with the care-setting axis (Home → Community → Outreach → Health facility), showing the RCH intervention delivered at each stage.

High-yield exam pointers

- 5 aims of RCH: **safe motherhood, child survival, adolescent health, family planning, RTI/STI control.**
- SBA life-saving drugs to write verbatim: **misoprostol (PPH prevention), oxytocin (PPH treatment), MgSO4 (eclampsia), ampicillin + metronidazole (infection).**
- "**Three cleans**" — hands, perineal area, umbilical area.
- BEmOC vs CEmOC — CEmOC adds anaesthesia, blood transfusion, caesarean section, sterilization services and referral transport, delivered at FRUs.
- Scheme-year pairs commonly asked: **JSY 2005, JSSK 2011, RBSK/RKSK 2013–14, Mission Indradhanush 2014, PMSMA 2016, LaQshya 2017, Ayushman Bharat 2018, SUMAN 2019.**

- 2030 goals: **TFR <2.1, MMR <70, IMR <12, institutional delivery 80%.**

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Coverage note: DC Dutta's Obstetrics 9e grounds the definition, aims, RCH package (Box 38.1), skilled-birth-attendant drug/intervention list, comprehensive EmOC list and the 2030 national goals table used above. Scheme-level details for the newer named programmes (Mission Indradhanush, RBSK, RKSK, PMSMA, LaQshya, Ayushman Bharat, SUMAN, POSHAN Abhiyaan) reflect current Government of India/National Health Mission programme documentation rather than itemised textbook content, since the corpus predates several of these launches.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Safe Motherhood, Epidemiology of Obstetrics; RCH Care and RCH Interventions, pp. 557–558). Government of India, Ministry of Health & Family Welfare — National Health Mission programme documents (RMNCH+A Strategy 2013; JSY; JSSK; Mission Indradhanush; RBSK; RKSK; PMSMA; LaQshya; Ayushman Bharat; SUMAN; POSHAN Abhiyaan).

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Reproductive and child health programme

Asked in: Paper IV 21-Nov-2022 · Paper IV May 2019 · Paper IV May 2015 · Paper IV Oct 2006 (4×) — RGUHS MS Obstetrics & Gynaecology

Definition — The **Reproductive and Child Health (RCH) programme** is India's integrated national strategy, launched in **October 1997**, that merged the **Child Survival and Safe Motherhood (CSSM)** programme (1992) with family planning and reproductive-tract-infection (RTI) services into a single continuum-of-care package for women and children. It replaced the earlier vertical, **target-based family planning approach with a target-free, need-based, client-centred approach**, and today runs as the RCH vertical of the **National Health Mission (NHM)** under the **Reproductive, Maternal, Newborn, Child, Adolescent Health and Nutrition (RMNCAH+N)** life-cycle strategy.

Evolution of the programme

- **Family Welfare Programme** (from 1952) — vertical, target-based family planning.
- **CSSM Programme** (1992) — added immunisation, diarrhoeal-disease control, acute respiratory infection (ARI) control and safe motherhood.
- **RCH Phase I** (Oct 1997) — merged CSSM + family planning + RTI/sexually transmitted infection (STI) care; **target-free approach** adopted.

- **RCH Phase II** (April 2005) — sector-wide, decentralised, outcome-based; launched under the **National Rural Health Mission (NRHM, 2005)**.
- **National Health Mission (NHM, 2013)** — NRHM merged with the **National Urban Health Mission (NUHM)**; RCH becomes an NHM vertical.
- **RMNCH+A strategy (2013) → RMNCAH+N (current)** — added **Adolescent** health and **Nutrition**; delivers care through a **"5×5" matrix** (5 life-stages × 5 priority interventions) across the reproductive age span.

Aims of the RCH programme

Aim	Target group
Safe motherhood	Pregnant and postpartum women
Child survival	Neonates and under-5 children
Adolescent reproductive and sexual health (ARSH)	10–19-year age group
Family planning	Eligible couples
Prevention and management of RTI/STI	Reproductive-age population

RCH interventions (component-wise)

Component	Key interventions
Safe motherhood	Early antenatal registration (<12 weeks); minimum **4 antenatal visits (WHO)** — India: 12, 14–26, 28–34 and 36 wk; tetanus toxoid + daily iron-folic acid (IFA) ≥100 days from the 2nd trimester; **"three cleans"** at delivery (hands, perineum, cord); **skilled birth attendant (SBA)** at every delivery; active management of the third stage of labour (AMTSL); postnatal + family-planning counselling; risk-based referral to **First Referral Units (FRUs)** for **Emergency Obstetric Care (EmOC)**
Child survival	Essential newborn care (warmth, resuscitation, prevention of infection, early exclusive breastfeeding), Ten Baby-Friendly Hospital steps, universal immunisation, ORS for diarrhoea, standard case management of ARI
Family planning	Spacing and terminal methods on a need-based, target-free basis; safe abortion services
ARSH	Peer education, menstrual hygiene, nutrition, delaying age at marriage/first pregnancy

Component	Key interventions
RTI/STI control	Syndromic case management; prevention through clean delivery, safe abortion and hygienic IUD insertion

Skilled birth attendant (SBA) — an accredited midwife/doctor/nurse trained to manage normal pregnancy, labour and puerperium, identify complications and organise referral. Under RCH-II, an SBA is permitted to give specified **life-saving drugs** — **misoprostol** (PPH prevention), **injection oxytocin** (PPH management), **injection MgSO4** (eclampsia), **ampicillin and metronidazole** (infection) — and to perform **life-saving interventions**: digital removal of retained products of conception (bleeding incomplete abortion), AMTSL, and maintaining a partograph. **Comprehensive EmOC at an FRU** = anaesthesia service, caesarean delivery, blood transfusion, manual removal of placenta, safe abortion, and sterilisation services, with transport for referral.

Key national schemes delivering RCH/NHM goals

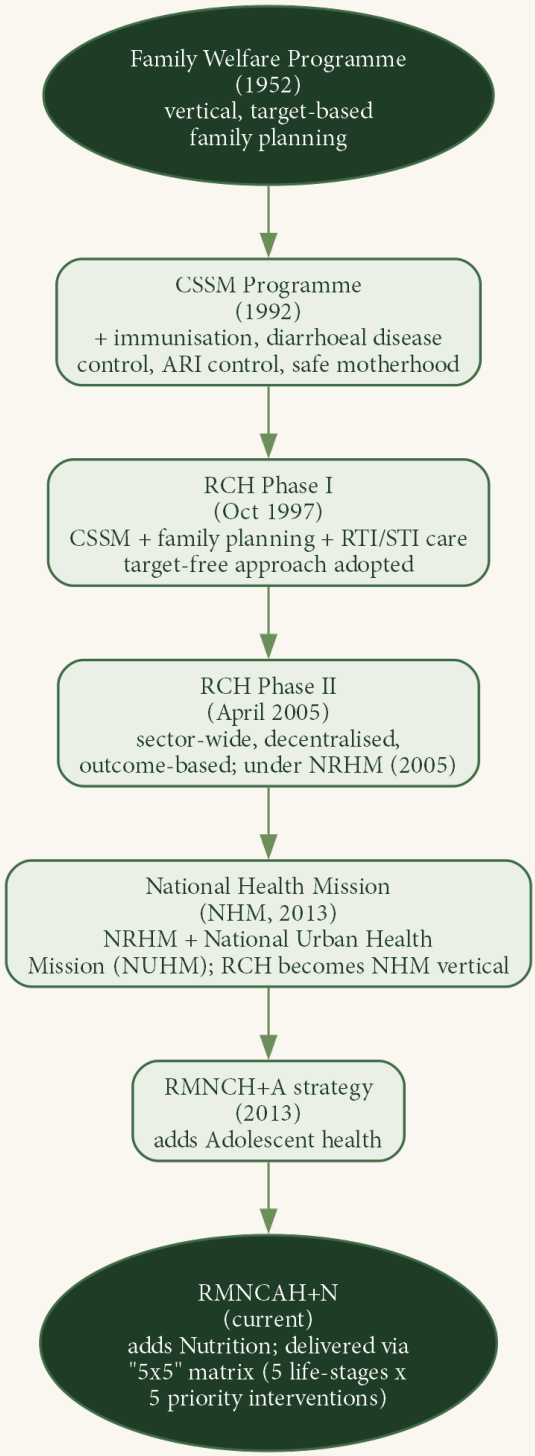
Scheme	Year	Purpose
Janani Suraksha Yojana (JSY)	2005	Conditional cash transfer promoting institutional delivery
Janani Shishu Suraksha Karyakram (JSSK)	2011	Free delivery, caesarean and newborn care — free drugs, diagnostics, diet, blood, transport
Rashtriya Bal Swasthya Karyakram (RBSK)	2013	Child screening for the "4 D's" — Defects at birth, Deficiencies, Diseases, Development delay
Rashtriya Kishor Swasthya Karyakram (RKSK)	2014	Adolescent health; peer educators (*Saathiya*)
Mission Indradhanush / Intensified Mission Indradhanush	2014 / 2017 onward	Accelerated full-immunisation coverage
Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)	2016	Free, fixed-day (9th of every month) specialist antenatal check-up; identifies high-risk pregnancy
LaQshya (Labour room Quality improvement initiative)	2017	Respectful, quality intrapartum and immediate postpartum care in labour rooms/maternity OTs
Pradhan Mantri Matru Vandana Yojana (PMMVY)	2017	Cash incentive for the first living child, to offset wage loss
POSHAN Abhiyaan (National Nutrition Mission)	2018	Reduce stunting, wasting, low birth weight and anaemia

Scheme	Year	Purpose
Surakshit Matritva Aashwasan (SUMAN)	2019	Zero-expense, zero-denial, assured quality maternal and newborn care
Ayushman Bharat	2018	Health & Wellness Centres for comprehensive primary care + PM-JAY insurance cover
PC-PNDT Act (amended)	1994 (2003)	Prohibits prenatal sex determination/sex-selective abortion
MTP Act (amended)	1971 (2021)	Legal safe abortion, gestational limit raised for specified categories

National goals (National Health Policy/SDG 2030, National Health Mission)

Parameter	Target
Total fertility rate	< 2.1
Maternal mortality ratio	< 70 per 100,000 live births
Neonatal mortality rate	< 12 per 1,000 live births
Antenatal care coverage	100%
Institutional deliveries	80%
Deliveries by skilled personnel	100%

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Evolution of the Reproductive and Child Health programme from the 1952 Family Welfare Programme to the current RMNCAH+N life-cycle strategy.

Recent advances [RA]

- **NFHS-5 (2019–21)**: institutional deliveries 88.6%, full child immunisation 76.4%, total fertility rate fell to 2.0 — below replacement level nationally for the first time [NFHS-5, MoHFW].
- **SRS bulletins**: MMR declined to 97/100,000 live births (2018–20) and under-5 mortality to 32/1,000, both converging on NHM 2030 targets [SRS, Registrar General of India].
- **Anaemia Mukt Bharat (2018)** — "6×6×6" strategy of intensified IFA supplementation and biannual deworming across the life cycle, targeting a major indirect contributor to maternal mortality.
- **Ayushman Bharat Digital Mission (2021)** — unique health ID (ABHA) enabling longitudinal digital linkage of maternal and child health records across RCH contact points.
- **Mission Indradhanush 5.0 / U-WIN portal** — real-time digital tracking of antenatal and childhood immunisation doses.
- **PM-JANMAN (2023)** — extends the RCH package (institutional delivery, immunisation, nutrition) to Particularly Vulnerable Tribal Groups.
- **WHO's 2016 ANC model** recommends 8 contacts across pregnancy (versus the older 4-visit focused model); India's schedule is progressively aligning while retaining the minimum 4-visit floor.
- **MTP (Amendment) Act, 2021** — gestational limit for termination raised to 24 weeks for specified vulnerable categories, widening safe-abortion access within RCH services.

High-yield exam pointers

- RCH launched **15 October 1997**, merging **CSSM (1992)** + family planning + RTI/STI care.
- **Target-free, need-based approach** replaced the target-based Family Welfare Programme just before RCH launch.
- **RCH-II (2005)** ran under **NRHM (2005)**; **NHM (2013)** = NRHM + NUHM; current umbrella strategy = **RMNCAH+N**.
- **5 aims**: Safe motherhood, Child survival, Adolescent health, Family planning, RTI/STI control.
- **SBA life-saving drugs**: misoprostol, oxytocin, MgSO4, ampicillin, metronidazole.
- **Scheme–year pairs** worth a one-line recall: JSY 2005, JSSK 2011, RBSK/RKSK 2013–14, PMSMA 2016, LaQshya/PMMVY 2017, POSHAN Abhiyaan 2018, Ayushman Bharat 2018, SUMAN 2019.
- **NHM 2030 goals**: MMR < 70, neonatal mortality < 12, TFR < 2.1, institutional delivery 80%, skilled attendance and ANC coverage 100% each.

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

DC Dutta's account reflects the RCH-II/NRHM era (2005–2015); scheme names and NFHS-5/SRS figures from 2016 onward are current Ministry of Health & Family Welfare/National Health Mission data not printed in the textbook edition on file.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Reproductive and Child Health Care, RCH Interventions, Table 38.1). Ministry of Health & Family Welfare/National Health Mission scheme documents (JSY, JSSK, RBSK, RKSK, PMSMA, LaQshya, PMMVY, POSHAN Abhiyaan, SUMAN, Ayushman Bharat, PM-JANMAN); NFHS-5 (2019–21); SRS bulletins; WHO 2016 ANC guideline; MTP (Amendment) Act 2021; PC-PNDT Act 1994. Coverage note: post-2015 scheme/survey detail draws on standard government-programme knowledge, since the corpus's DC Dutta edition does not extend past the RCH-II/NRHM period.

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Risk-reducing surgeries in patients with BRCA-positive genes

Asked in: Paper IV 03-Oct-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — *BRCA1* (chromosome 17q21) and *BRCA2* (chromosome 13q12–13) are tumour-suppressor genes; a confirmed pathogenic germline mutation confers a markedly elevated lifetime risk of breast and ovarian/tubal/peritoneal cancer compared with the general population. Risk-reducing (prophylactic) surgery — bilateral salpingo-oophorectomy, with or without bilateral mastectomy — is the single most effective risk-reduction strategy in confirmed carriers and is offered once genetic counselling is complete and childbearing/family planning is finished.

Lifetime cancer risk driving the decision

Cancer	BRCA1 carrier	BRCA2 carrier	General population
Breast (cumulative risk to age 70)	~57%	~49%	~12%
Ovarian/tubal/peritoneal (lifetime)	~54%	~23%	~1.4%

Risk-reducing salpingo-oophorectomy (RRSO)

- **Pre-requisites** — pathogenic *BRCA1/2* mutation confirmed on genetic testing after formal counselling; childbearing/family planning complete; informed consent covering surgical menopause, loss of fertility, and the post-operative hormone-replacement therapy (HRT) plan.
- **Timing** —

Carrier	Recommended age for RRSO
BRCA1	35–40 years (earliest age of onset of ovarian cancer)
BRCA2	40–45 years (later onset); may be individualised to the youngest age of ovarian cancer onset in the family

- **Route** — laparoscopic (preferred) or open bilateral salpingo-oophorectomy.
- **Operative steps** —
  - Thorough visual inspection of all peritoneal surfaces.
  - Peritoneal washings taken for cytology before any tissue manipulation.
  - **Complete excision of both ovary AND fallopian tube up to the pelvic brim/infundibulopelvic ligament** — no residual ovarian or tubal tissue left behind.
  - Entire specimen sent for **complete serial sectioning with full microscopic examination of the whole tube and ovary** (an occult early tubal/ovarian carcinoma is found in a small percentage of otherwise asymptomatic carriers).
- **Effect on risk** — reduces ovarian/tubal/peritoneal cancer risk by **~90%**; reduces subsequent breast cancer risk by **~50%** if performed premenopausally. Protection is not absolute — primary peritoneal carcinoma can still occur after RRSO.
- **After RRSO** — premenopausal women should be offered systemic HRT (oestrogen, plus a progestogen if the uterus is retained) up to the average natural age of menopause, to offset the cardiovascular and bone consequences of early surgical menopause, unless a personal history of oestrogen-receptor-positive breast cancer contraindicates it.

Risk-reducing (bilateral) mastectomy

- Offered to a confirmed carrier as a patient-choice option — it is the single strongest individual risk-reduction measure for breast cancer.
- **Techniques**: total (simple) mastectomy, skin-sparing mastectomy, or nipple-sparing mastectomy, each combined with immediate implant-based or autologous reconstruction; nipple-sparing mastectomy is oncologically safe in carefully selected patients and gives better reconstructive satisfaction.
- **Effect on risk** — reduces breast cancer risk by **>90%**; not 100% protective because a small amount of ductal/glandular tissue always remains after any mastectomy technique.

- **Contralateral prophylactic mastectomy (CPM)** may be offered to a carrier who already has a unilateral breast cancer, to reduce metachronous contralateral cancer risk, achieve reconstructive symmetry, and avoid ongoing screening; no proven overall-survival benefit has been demonstrated except in particularly high-risk carriers.

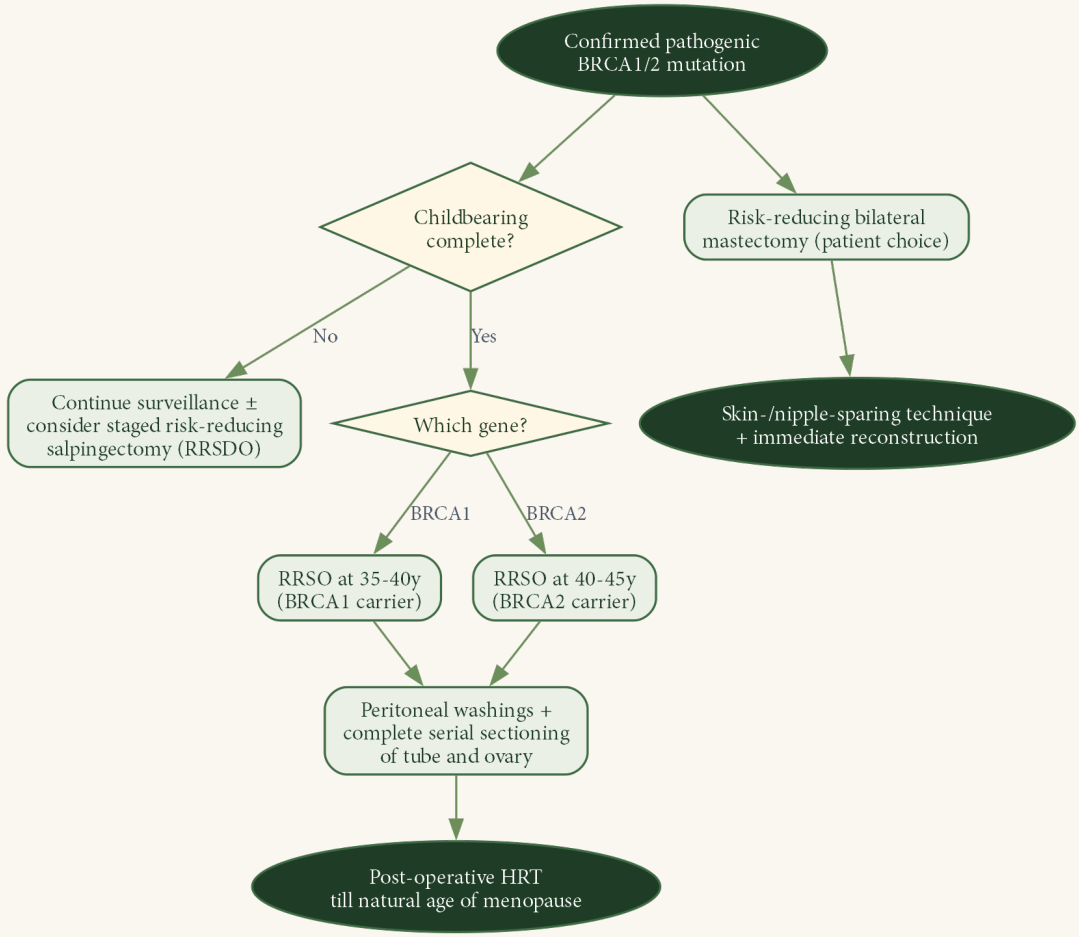
Staged alternative — risk-reducing salpingectomy with delayed oophorectomy (RRSDO)

- **Rationale**: many BRCA-related "ovarian" high-grade serous cancers arise from the fimbrial fallopian-tube epithelium, not the ovary itself; removing the tubes first defers the morbidity of early surgical menopause.
- Endorsed by RCOG/SGO as an alternative pathway for a premenopausal carrier — particularly a *BRCA2* carrier — who is not yet ready for oophorectomy: bilateral salpingectomy is performed once childbearing is complete, with definitive bilateral oophorectomy deferred to the standard risk-appropriate age.
- Still an interim/evolving strategy — the patient must be counselled that ovarian cancer risk is not fully eliminated until oophorectomy is eventually completed.

Adjunct — hysterectomy

- Not routinely required for a *BRCA* mutation alone; overall benefit is uncertain, as most studies show no increase in uterine/cervical cancer after RRSO.
- Individualise, and consider performing concurrently with RRSO if there is coexisting Lynch syndrome, anticipated long-term tamoxifen use (raises endometrial polyp/cancer risk), or a *BRCA1* carrier with a demonstrated higher risk of serous/serous-like endometrial cancer who prefers definitive surgery.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for risk-reducing surgery in confirmed BRCA1/2 carriers, showing the RRSO pathway (by gene and timing) alongside the parallel risk-reducing mastectomy option.

High-yield exam pointers

- *BRCA1* 17q21, *BRCA2* 13q12–13 — both tumour-suppressor genes, autosomal dominant inheritance.
- Breast cancer cumulative risk to age 70: *BRCA1* ~57%, *BRCA2* ~49% (vs ~12% general population).
- RRSO timing: *BRCA1* 35–40y; *BRCA2* 40–45y (individualise to family's age of onset).
- RRSO cuts ovarian/tubal cancer risk by ~90% and subsequent breast cancer risk by ~50%.
- Risk-reducing mastectomy cuts breast cancer risk by >90%.
- Mandatory operative point: excise tube + ovary to the pelvic brim, then complete serial sectioning (occult cancer found in a minority of specimens).
- RRSDO (salpingectomy now, oophorectomy deferred) = newer staged option to avoid early surgical menopause.

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

The age cut-offs and risk-reduction figures above follow ACOG Practice Bulletin No. 182 (Hereditary Breast and Ovarian Cancer Syndrome) as summarised in Berek & Novak 16e; DC Dutta's Gynaecology 7e independently cites the same bilateral salpingo-oophorectomy standard and additionally references RCOG/SGO guidance on the newer staged salpingectomy-first (RRSDO) approach.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; ACOG Practice Bulletin No. 182 (Hereditary Breast and Ovarian Cancer Syndrome); NCCN Guidelines (Genetic/Familial High-Risk Assessment, Breast, Ovarian, and Pancreatic).

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Role of robotic surgery in gynaecology

Asked in: Paper IV 20-Jul-2020 · Paper III May 2018 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Robotic-assisted laparoscopic surgery (RALS) is a form of facilitated minimally invasive surgery in which the surgeon operates from a remote console; the console translates the surgeon's hand and finger movements into precise, tremor-filtered motion of wristed instruments mounted on robotic arms docked to trocars on the patient. The only platform in wide gynaecological use is the **da Vinci Surgical System** (Intuitive Inc.), which received United States Food and Drug Administration (FDA) approval for hysterectomy in 2005. In gynaecology it is used for both benign and oncological procedures that demand extensive intracorporeal suturing, fine retroperitoneal dissection, or high precision in a confined pelvis.

Technology and components

Component	Function
Surgeon's console	Away from the patient; gives a stereoscopic (3-D) view (unlike the 2-D laparoscopic image); two hand controllers + foot pedals (clutch, camera focus, arm-swap, energy activation)
Patient-side robotic column/cart	Holds 3-4 robotic arms; docked to the patient's trocars ("docking"); arms always work *toward* the column, so column position (hip vs shoulder) is chosen by the site of surgery

Component	Function
EndoWrist instruments	Instrument tip is articulated with 7 **degrees of freedom**, mimicking the human wrist — enables intuitive movement (tip moves the same way as the surgeon's hand, unlike the counter-intuitive fulcrum effect of straight laparoscopic instruments)
Vision/fluorescence system	3-D high-definition camera; near-infrared fluorescence imaging (e.g., "Firefly") after **indocyanine green (ICG)** injection is used for sentinel-lymph-node mapping
Trocars	8-mm robotic ports (3-4) plus an assistant port; a bedside assistant trained in robotics is mandatory since the surgeon is away from the sterile field

Advantages over conventional laparoscopy

- **Stereoscopic 3-D vision** versus the 2-D laparoscopic image.
- **Intuitive, wristed movement** with 7 degrees of freedom — eliminates the counter-intuitive, fulcrum-reversed motion of rigid laparoscopic instruments.
- **Tremor filtration and motion scaling** — high precision valuable for ureteric anastomosis/reimplantation, vesicovaginal or rectovaginal fistula repair, retroperitoneal lymphadenectomy, and nerve-sparing dissection.
- **Easier intracorporeal suturing and knot-tying** — particularly benefits suture-intensive procedures such as myomectomy and sacrocolpopexy.
- **Shorter learning curve** than laparoscopy — operating time plateaus after roughly 20-50 robotic hysterectomies versus about 80 procedures for laparoscopic-assisted vaginal hysterectomy.
- **Reduced surgeon physical strain/ergonomic benefit** compared with straight-stick laparoscopy.
- Particularly useful in **obese patients**, long operations, and cases needing extensive dissection — operating time for robotic hysterectomy does not rise proportionately with body mass index the way it does with laparoscopy.

Applications in gynaecology

Domain	Procedures
Benign gynaecology	Simple hysterectomy; myomectomy (less blood loss than open, comparable to laparoscopy); adnexectomy/ovarian cystectomy (especially benefits obese patients); excision of stage III-IV pelvic endometriosis; tubal reanastomosis after sterilisation; sacrocolpopexy for vault prolapse (precise mesh suturing); appendectomy performed alongside another pelvic procedure

Domain	Procedures
Gynaecological oncology — endometrial cancer	Total hysterectomy + bilateral salpingo-oophorectomy + surgical staging ± pelvic/para-aortic lymphadenectomy; increasing use of **sentinel-lymph-node mapping** with cervical ICG injection instead of complete lymphadenectomy; particularly advantageous in morbidly obese patients
Gynaecological oncology — cervical cancer	Early-stage radical hysterectomy and nerve-sparing radical hysterectomy; fertility-preserving radical trachelectomy; retroperitoneal (pelvic ± aortic) lymphadenectomy before chemoradiation in advanced disease; pelvic exenteration for selected recurrent disease
Gynaecological oncology — ovarian cancer	Selected early/low-volume disease — primary cytoreduction, interval debulking, and secondary (recurrent-disease) cytoreduction in patients amenable to complete resection; multi-quadrant access (upper abdomen/diaphragm/aortic nodes) possible with newer platforms without repositioning the column

Limitations and complications unique to robotics

- **Absence of haptic (tactile) feedback** — the operator cannot feel tissue resistance or traction, so any arm outside direct visual control (especially the unused fourth/retracting arm) can injure bowel, bladder, ureter or vessels unnoticed.
- **Insulation failure** of monopolar/bipolar instrument shafts is more frequent than with laparoscopic instruments and causes unrecognised thermal bowel injury with delayed perforation.
- **Loss of pneumoperitoneum** is hazardous because the instruments are fixed to the robotic column through the trocars; sudden abdominal wall collapse can pull on or injure the trocar site.
- **Patient positioning injury** — pressure of the robotic arms on the thighs/arms, or patient sliding in steep Trendelenburg, causing nerve or soft-tissue injury.
- **High cost** — capital purchase, annual maintenance contract, and reusable instruments that expire after a fixed number of uses (some, e.g. vessel sealers, are single-use only).
- **Bulky system** requiring a large, dedicated operating room and a trained robotic team; longer docking/set-up time.
- Older platforms allow access to only the pelvis **or** the upper abdomen at a time without 180° rotation of the table/column — a constraint that is being overcome by newer multi-quadrant systems.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 28.11 — Trocar position for robotic pelvic surgery: optical trocar at the umbilicus, robotic trocars 10 cm lateral bilaterally, assistant port 3 cm cranial (Berek & Novak 16e, p.1640)*

Recent advances [RA]

- **LACC trial (Ramirez et al.,* NEJM *2018) — the international, multicentre randomised trial comparing minimally invasive (laparoscopic/robotic) with open radical hysterectomy in early cervical cancer (FIGO stage IA1 with lymphovascular invasion to IB1) was stopped early: minimally invasive surgery showed a lower disease-free survival (86.0% vs 96.5% at 4.5 years) and lower overall survival (91.2% vs 97.1% at 3 years) compared with open surgery. This practice-changing result is why current guidelines (National Comprehensive Cancer Network and the Society of Gynecologic Oncology/American College of Obstetricians and Gynecologists) now recommend the open abdominal approach as the standard route for radical hysterectomy in early-stage cervical cancer**, with minimally invasive/robotic surgery reserved for counselled, selected patients.
- **Sentinel-lymph-node mapping with indocyanine green fluorescence** (robotic near-infrared "Firefly" imaging) is now an NCCN-endorsed alternative to complete lymphadenectomy in clinical stage I endometrial cancer of all histologies/grades (sensitivity ≈ 97%, negative predictive value ≈ 99.6%) and is being adopted for early (<2 cm) cervical cancer too, reducing lymphoedema and operative morbidity.
- **Multi-quadrant single-docking platforms** (fourth-generation systems) now allow the robotic arms/boom to be rotated to reach both the pelvis and the upper abdomen (diaphragm, aortic nodes, omentum) without repositioning the operating table — extending robotic feasibility to advanced/recurrent ovarian cancer debulking.

High-yield exam pointers

- Only approved platform: **da Vinci** (Intuitive); FDA approval for hysterectomy — **2005**.
- Key differentiator from laparoscopy: **wristed EndoWrist instruments, 7 degrees of freedom, 3-D vision, intuitive (non-fulcrum) movement.**
- Biggest disadvantage to remember: **no haptic/tactile feedback** → unrecognised injury outside the visual field.
- **LACC trial (2018)** — MIS radical hysterectomy inferior to open for early cervical cancer; now guideline-changing.
- Learning curve plateau: **~20-50 robotic hysterectomies** (vs ~80 for LAVH).
- Sentinel node mapping uses **indocyanine green (ICG)** with near-infrared fluorescence camera.
- Best-suited indications: suture-intensive (myomectomy, sacrocolpopexy), fine dissection (fistula repair, nerve-sparing hysterectomy), and obese patients.

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

Older textbook descriptions (Dutta) predate the 2018 LACC trial and still frame minimally invasive/robotic radical hysterectomy for cervical cancer favourably; current guidance now favours the open approach for early-stage disease, and this shift should be stated explicitly in the exam answer.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e (Chapter 28, Robotics); DC Dutta's Textbook of Gynaecology 7e (Robotic Surgery in Gynecology); Te Linde's Operative Gynecology 13e (Chapter 10, Principles of Robotic Surgery); LACC trial (Ramirez et al., *New England Journal of Medicine*, 2018); NCCN guidance on sentinel-lymph-node mapping.

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Role of antioxidants in Pregnancy

Asked in: Paper IV May 2018 · Paper I Oct 2009 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Antioxidants are enzymatic (superoxide dismutase, catalase, glutathione peroxidase) or non-enzymatic (vitamins C, E, A and D, selenium, zinc) substances that neutralise reactive oxygen species (ROS) generated by placental oxidative metabolism. Normal pregnancy is itself a state of heightened oxidative stress, and an imbalance between ROS production and antioxidant defence — with resulting lipid peroxidation and endothelial injury — is central to the pathogenesis of **preeclampsia** and other placenta-mediated disorders; this is why antioxidant supplementation has been extensively trialled as a preventive strategy.

Oxidative stress in pregnancy — the pathophysiological rationale

- Establishment of the intervillous circulation (10–12 weeks) exposes the poorly-perfused placenta to a sudden rise in oxygen tension — an "ischaemia-reperfusion"-type insult that generates ROS and lipid peroxides.
- In normal pregnancy this is buffered by endogenous **antioxidant defence** (superoxide dismutase, catalase, glutathione peroxidase) plus dietary vitamins C and E, keeping oxidant and antioxidant activity in balance.
- In **preeclampsia**, defective trophoblastic invasion of the spiral arteries causes relative placental hypoperfusion; the resulting oxidative stress is associated with higher circulating lipid peroxides coupled with *decreased* antioxidant activity.
- This oxidant excess is linked to the release of antiangiogenic factors — soluble fms-like tyrosine kinase-1 (sFlt-1) and soluble endoglin (sEng), with falling placental growth factor (PlGF) and

vascular endothelial growth factor (VEGF) — producing the widespread maternal **endothelial dysfunction** that manifests as hypertension, proteinuria and the preeclampsia syndrome.

- This mechanistic link is the biological rationale for trialling exogenous antioxidant vitamins to restore the oxidant–antioxidant balance and prevent preeclampsia.

Antioxidants studied in pregnancy

Category	Examples	Proposed role
Enzymatic (endogenous)	Superoxide dismutase, catalase, glutathione peroxidase	Native ROS-scavenging system, physiologically upregulated in pregnancy
Vitamin antioxidants	Vitamin C (ascorbic acid), vitamin E (α-tocopherol), vitamin D	Most widely trialled for preeclampsia prevention
Other dietary/nutritional	Fish oil (omega-3 fatty acids), selenium, zinc, magnesium	Trialled as adjuncts; limited/no proven benefit
Investigational pharmacological	Statins (pravastatin), metformin	Act partly via antioxidant/anti-antiangiogenic pathways (see Recent advances)

Clinical evidence from randomised trials

Trial	Population	Intervention	Key finding
Spinnato et al., 2007	311 women, chronic hypertension	Vitamin C + vitamin E vs placebo	No reduction in preeclampsia (17% vs 20%)
CAPPS (Combined Antioxidant and Preeclampsia Prediction Studies), Roberts et al., 2010 — MFMU Network	~10,000 low-risk nulliparas	Vitamin C + vitamin E vs placebo	No reduction in preeclampsia rate
DAPIT (Diabetes And Preeclampsia Intervention Trial), McCance et al., 2010	762 women with type 1 diabetes	Vitamin C + vitamin E vs placebo, from first half of pregnancy	No overall benefit; possible benefit only in the subgroup with low baseline antioxidant status
Fish-oil supplementation trials	Various	Omega-3 fatty acids vs placebo	No benefit shown for preeclampsia prevention

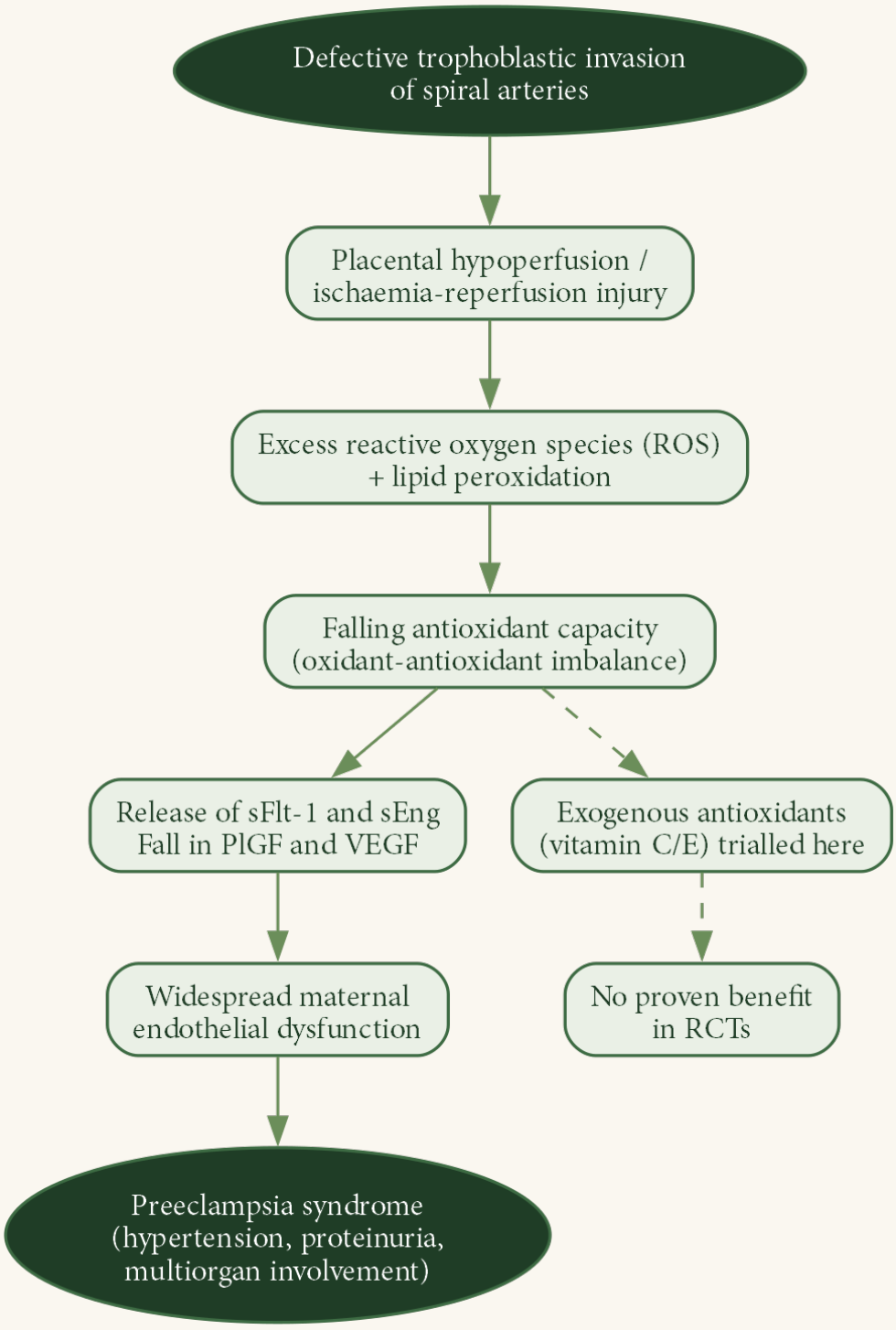
Current role and guideline position

- Pooled trial evidence (chronic-hypertension cohorts, low-risk nulliparas, and diabetic gravidas) consistently shows **no reduction in preeclampsia** with vitamin C and E supplementation.
- Accordingly, **ACOG, RCOG and WHO do not recommend routine antioxidant vitamin C/E supplementation** for the prevention of preeclampsia; it has no place in current antenatal prophylaxis protocols.
- The measures with proven benefit remain **low-dose aspirin** (81 mg daily, ACOG; 75–150 mg daily, RCOG/FOGSI — started between 12 and 16 weeks and continued until delivery in women at high risk) and **calcium supplementation** (1–2 g/day) in populations with low dietary calcium intake — neither of which acts primarily as an antioxidant.
- Outside preeclampsia, oxidative stress is also implicated in fetal growth restriction, recurrent pregnancy loss and preterm labour, but antioxidant supplementation trials in these settings have likewise not shown consistent, reproducible benefit.

Recent advances [RA]

- **Statins:** heme oxygenase-1 induction by statins reduces sFlt-1 release; animal data suggested a preventive effect on hypertensive disorders of pregnancy. The MFMU Network has piloted a randomised trial of **pravastatin** for preeclampsia prevention (Costantine, 2016), with definitive results awaited.
- **Metformin:** inhibits hypoxia-inducible factor-1α and lowers mitochondrial electron-transport-chain activity, thereby reducing sFlt-1 and sEng release. A preliminary study in pre-diabetic women found a lower incidence of severe preeclampsia with metformin versus placebo (Racine, 2021), but confirmatory trials are lacking.
- The overall trajectory of recent evidence has shifted research away from simple vitamin antioxidants (now guideline-discouraged) towards agents that modulate the **angiogenic–antiangiogenic and oxidative-stress axis** upstream (statins, metformin), reflecting a more mechanistic, targeted approach to preeclampsia prevention.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Causal pathway from defective trophoblastic invasion to the preeclampsia syndrome, with the antioxidant-trial intervention point branched off the oxidant–antioxidant imbalance node.

High-yield exam pointers

- Name the three key negative trials: **CAPPS** (Roberts 2010, MFMU, ~10,000 nulliparas), **DAPIT** (McCance 2010, type 1 diabetics), Spinnato 2007 (chronic hypertension) — all vitamin C + E vs placebo, all negative.
- One-line take-home: "oxidative stress is central to preeclampsia pathogenesis, but antioxidant vitamin supplementation does NOT prevent it."
- Contrast pair for the exam: aspirin + calcium = proven; vitamin C/E = disproven.
- Antiangiogenic markers to name: **sFlt-1, sEng ↑; PlGF, VEGF ↓**.
- Recent advances to cite for extra marks: pravastatin (MFMU pilot) and metformin — both act via the antiangiogenic/oxidative pathway, not as classical antioxidants.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Older textbook editions (including DC Dutta's) still list vitamins C and E, fish oil, magnesium and zinc as prophylactic options "of limited benefit," whereas current ACOG/RCOG/WHO guidance has moved to explicitly not recommending antioxidant vitamin supplementation for preeclampsia prevention.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e. Coverage note: the corpus's antioxidant-in-pregnancy evidence centres on preeclampsia prevention trials; dedicated trial-level data for antioxidants in fetal growth restriction, recurrent pregnancy loss and preterm labour were not found in the on-disk corpus and are described only in general terms above.

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Role of ethics in Obstetric practice

Asked in: Paper IV 02-Jun-2025 — RGUHS MS Obstetrics & Gynaecology

Definition — Medical ethics is the set of principles governing right conduct in the doctor–patient relationship. Obstetric practice is ethically distinct because care simultaneously engages two potential patients — the pregnant woman and her fetus — whose interests almost always converge but

occasionally appear to diverge, making informed consent, confidentiality and respect for autonomy central, everyday concerns rather than abstract theory.

Core principles of biomedical ethics in obstetric care

Principle	Meaning	Obstetric application
Autonomy	Patient's right to self-determination	Woman's right to accept or decline any recommended test/intervention (caesarean delivery, blood transfusion, sterilization) after full disclosure
Beneficence	Duty to act in the patient's best interest	Offering evidence-based intervention that benefits the mother and, once viable, the fetus
Non-maleficence	*"First, do no harm"*	Avoiding non-indicated intervention — e.g., unindicated caesarean delivery or induction
Justice	Fair, equitable distribution of care	Non-discriminatory access to antenatal and emergency obstetric care regardless of socioeconomic status

The pregnant woman and the fetus — two patients, one clinician

- The fetus is regarded as an ethical "**patient**" only once it is **viable** and presented for care — the *beneficence-based obstetric ethics* framework (Chervenak and McCullough) — not from conception onward.
- Before viability, decisions affecting only the woman (e.g., activity restriction, elective procedures) rest on her autonomy alone.
- After viability, obligations to mother and fetus ordinarily **converge** — what benefits one benefits the other; a genuine, irreconcilable maternal–fetal conflict is rare.
- Where a woman **declines** a recommended intervention (caesarean delivery for fetal indication, blood products in a *Jehovah's Witness*), her decision-making autonomy must be respected; the reasons for refusal and the information given are documented, and forced intervention is ethically and legally disfavoured (Williams Obstetrics 26e).

Ethical issues across obstetric practice

Domain	Ethical issue	Current position
Informed consent	Consent taken without full disclosure, or under duress	Consent is a **process**, not a document — disclose diagnosis, alternatives, risks/benefits and limitations before any procedure; obtain it in writing; an informed refusal must be honoured and documented (Williams Obstetrics 26e)
Confidentiality	Disclosure of genetic, HIV or adolescent reproductive information	No third-party disclosure without the patient's authorization (DC Dutta's Obstetrics 9e); in India this conflicts with the mandatory reporting duty under the **Protection of Children from Sexual Offences (POCSO) Act, 2012** for any sexual activity in a person under 18 years, creating tension with confidential adolescent reproductive care
Prenatal diagnosis & sex selection	Misuse of ultrasonography/genetic testing for female feticide	**Prohibition of Sex Selection (PC&PNDT) Act, 1994** (amended 2003) bans sex determination and its disclosure; testing is permitted only for chromosomal, genetic, metabolic or structural fetal abnormality; genetic clinics, laboratories and ultrasonography centres must be registered

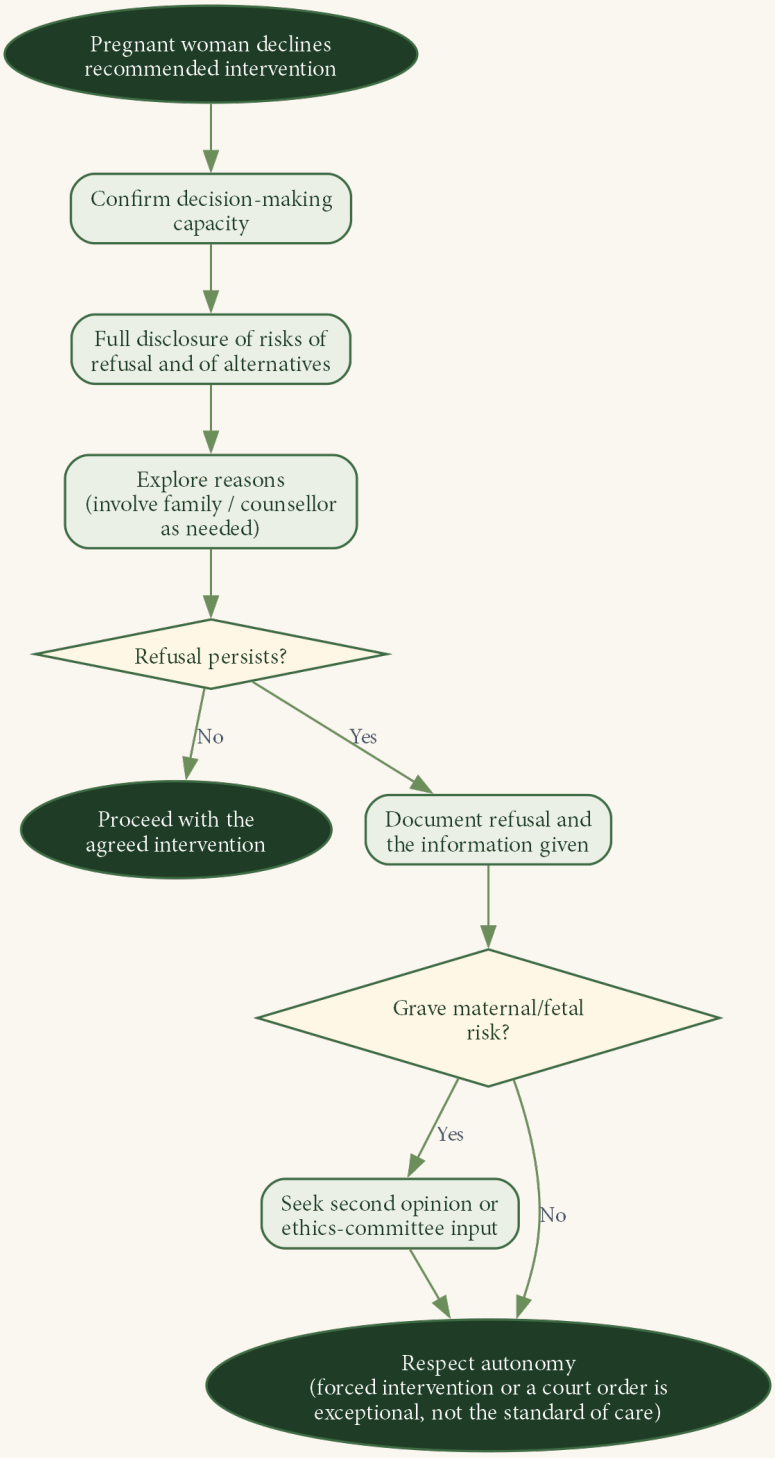
Domain	Ethical issue	Current position
Termination of pregnancy	Balancing reproductive autonomy against fetal viability	**Medical Termination of Pregnancy (MTP) Act, 1971**, as amended by the **MTP (Amendment) Act, 2021** — up to 20 weeks on one registered medical practitioner's opinion; 20–24 weeks for specified categories (survivors of sexual assault/incest, minors, change in marital status, fetal malformation, others notified) on two practitioners' opinion; beyond 24 weeks only for substantial fetal abnormality certified by a Medical Board; the woman's own consent is sufficient (a minor also needs guardian consent); records are confidential
Sterilization/family planning	Historical coercion in camp-based, quota-driven services	Fully informed, voluntary, written consent is mandatory; national policy has shifted from target-driven sterilization camps to a target-free, client-centred, quality-assured approach
Assisted reproduction & surrogacy	Commercial exploitation of surrogates/gamete donors	**Surrogacy (Regulation) Act, 2021** and **Assisted Reproductive Technology (Regulation) Act, 2021** ban commercial surrogacy, permit only altruistic surrogacy for eligible women/couples, mandate registration of ART clinics/banks, and prohibit sex selection in ART
Research in pregnancy	Exploitation of a vulnerable population, therapeutic misconception	Pregnant women are classed a vulnerable group under the **ICMR National Ethical Guidelines for Biomedical Research (2017)**, requiring additional safeguards; placebo-controlled trials are restricted wherever proven therapy exists

Domain	Ethical issue	Current position
Professional/legal conduct	Negligence, incomplete records	Duty of care per the prevailing standard; failure (by omission or commission) constitutes negligence; documentation, referral and audit reduce medicolegal risk (DC Dutta's Obstetrics 9e)

Safeguards against ethico-legal risk

- Clear, understandable communication of the management plan to the patient and relatives.
- Written informed consent before any procedure or investigation.
- Careful, contemporaneous documentation — date, time and signature.
- Strict adherence to evidence-based protocol; any deviation is documented with reasons.
- Adequate supervision and training of juniors, with senior availability for consultation.
- Timely consultation or referral to another specialty/colleague when in difficulty.
- Regular clinical audit and departmental review to detect and correct system errors (DC Dutta's Obstetrics 9e).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Approach to a pregnant woman declining a recommended intervention.

Recent advances [RA]

- **MTP (Amendment) Act, 2021** (in force 24 September 2021) widened access as summarised above; the Supreme Court (*X v Union of India*, 2022) read the contraceptive-failure clause to cover "any woman or her partner," extending it beyond married couples.
- **Surrogacy (Regulation) Act, 2021** and **ART (Regulation) Act, 2021** (both in force January 2022) ended unregulated commercial surrogacy and gamete donation; a subsequent 2023 amendment permitted donor gametes where either intending parent has a qualifying medical indication.
- The **National Medical Commission's Registered Medical Practitioner (Professional Conduct) Regulations, 2023** replaced the Indian Medical Council's 2002 Code of Ethics Regulations, updating norms on informed consent, telemedicine and conflict of interest for all registered doctors, including obstetricians.
- **FIGO's Committee for the Ethical Aspects of Human Reproduction and Women's Health** continues to issue guidance on emerging concerns — non-invasive prenatal genomic testing, fetal reduction, conscientious objection and cross-border surrogacy — increasingly referenced in Indian postgraduate teaching.
- The above statutory positions are anchored by **ACOG Committee Opinions**: No. 695 (sterilization — ethical issues), No. 690 and No. 410 (ethical issues in genetic/genomic testing), and No. 633 (ethical issues in substance-use disorders) — each stresses non-directive counselling, non-coercion and non-discrimination.

High-yield exam pointers

- Four principles — **Autonomy, Beneficence, Non-maleficence, Justice**.
- Fetus becomes an ethical "patient" only from **viability** onward (beneficence-based obstetric ethics — *Chervenak and McCullough*).
- **MTP Act 2021**: ≤20 weeks/1 opinion; 20–24 weeks/2 opinions (specified categories only); >24 weeks only via Medical Board-certified fetal abnormality; the woman's consent alone suffices.
- **PC&PNDT Act** bans sex *determination*, not abortion — a separate law from the MTP Act; the two are frequently confused.
- Informed consent is a **process**, not a signed form; an informed refusal must be respected and documented, never overridden by force.
- Sterilization and ART/surrogacy consent must be written, voluntary and non-coerced; **commercial surrogacy has been banned since 2021**.

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

Coverage note — the Medical Termination of Pregnancy Act, PC&PNDT Act, and Surrogacy/ART Act positions above reflect the current (2021–23) statutory framework; DC Dutta's 9th edition predates these amendments and should be read alongside the current statutes, not in place of them.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; American College of Obstetricians and Gynecologists (ACOG) Committee Opinions No. 410, No. 633, No. 690, No. 695; Medical Termination of Pregnancy Act, 1971 (as amended 2021); Preconception and Prenatal Diagnostic Techniques (PC&PNDT) Act, 1994 (as amended 2003); Surrogacy (Regulation) Act, 2021; Assisted Reproductive Technology (Regulation) Act, 2021; National Medical Commission Registered Medical Practitioner (Professional Conduct) Regulations, 2023.

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Role of trained birth attendant

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

Definition — A **trained birth attendant (TBA)** is a traditional/community birth attendant (usually the local *dai*) who has undergone a short, structured government training programme in clean and safe delivery practices, danger-sign recognition and referral, but who is **not** an accredited health professional. She is distinct from a **skilled birth attendant (SBA)** — an accredited midwife, nurse or doctor educated and trained to proficiency in managing normal pregnancy, labour and puerperium, who can also identify complications and organise referral. The TBA concept was central to rural maternal care before India's health system shifted its policy emphasis to ensuring an SBA at every birth.

Tiers of birth attendance

Tier	Who	Training	Capability
Untrained/traditional dai	Local elderly woman, learns by apprenticeship	None	Conducts home delivery empirically; no clean-delivery discipline; cannot recognise or manage emergencies

Tier	Who	Training	Capability
Trained birth attendant (TBA)	The same *dai*, given short government orientation	Few days' structured training + a **delivery kit**	Clean delivery, basic danger-sign recognition, referral; **cannot** give parenteral oxytocics/anticonvulsants or manage haemorrhage/obstructed labour
Skilled birth attendant (SBA)	ANM/staff nurse/midwife/doctor	Formal pre-service + in-service midwifery education	Manages normal labour independently; under RCH-II is permitted specified life-saving drugs and interventions before referral

Training of the trained birth attendant

- Conducted at the **primary health centre/sub-centre** level by the auxiliary nurse midwife (ANM) or lady health visitor (LHV), historically under the Dai Training Scheme and later folded into the Child Survival and Safe Motherhood (CSSM, 1992) and Reproductive and Child Health (RCH) programmes.
- Short-duration orientation (of the order of days, not months) covering recognition of pregnancy, hygienic (clean) delivery technique, umbilical cord care, and identification of an abnormal/prolonged labour requiring referral.
- Each trained *dai* is issued a **disposable delivery kit** (soap, a new blade to cut the cord, cord ties, a clean plastic sheet) to enforce the **"three cleans"** — clean hands, clean perineum and clean cord/umbilical care — which is the single most effective intervention a TBA can deliver to cut puerperal and neonatal sepsis.
- Periodic **refresher training and supervision** by the ANM/medical officer, with a simple reporting/record-keeping requirement (births, referrals, deaths) linking the TBA to the formal health system.

Antenatal role

- Identifies pregnancy early in the community and **motivates registration** for antenatal care at the sub-centre/primary health centre.
- Encourages the minimum antenatal-visit schedule, tetanus toxoid immunisation and daily iron-folic acid supplementation.
- Performs simple **risk screening** (age, parity, prior bad obstetric history, anaemia, oedema, malposition) and refers high-risk women to the ANM/medical officer rather than managing them herself.

- Reinforces **birth-preparedness and complication-readiness** counselling — planned place of delivery, arranged transport, blood donor identification.

Intranatal role

- Conducts **clean home delivery** using the kit — the "three cleans" (hands, perineal area, cord/umbilical area) — to minimise puerperal sepsis and neonatal tetanus.
- Provides simple comfort and support in normal labour; does **not** perform internal (vaginal) examinations, does **not** administer oxytocics/ergometrine, and does **not** attempt to hasten delivery.
- Recognises **danger signs** — prolonged labour, malpresentation, antepartum/postpartum haemorrhage, retained placenta, convulsions — and arranges **prompt referral** to the first referral unit (FRU) rather than persisting at home.
- Under the WHO-endorsed community distribution programme, a trained attendant may give **oral/rectal misoprostol 600 µg** for prevention of postpartum haemorrhage when delivery occurs at home without a skilled attendant, followed by uterine massage and prompt transfer.

Postnatal, newborn and health-education role

- Provides basic postnatal observation of the mother — bleeding, fever, involution — and refers abnormal findings.
- Delivers **essential newborn care**: keeping the baby warm and dry, early and exclusive breastfeeding, clean cord-stump care, and recognising newborn danger signs (poor feeding, lethargy, fever/hypothermia, convulsions) for referral.
- Acts as a **health educator and link worker** — promotes birth spacing/family planning, nutrition, immunisation and hygiene, and reports births, stillbirths and deaths to the ANM/sub-centre for vital-statistics recording.
- Bridges the community and the formal system, complementing (and today largely superseded by) the **Accredited Social Health Activist (ASHA)**, who performs an overlapping community-linkage role under the National Health Mission (NHM).

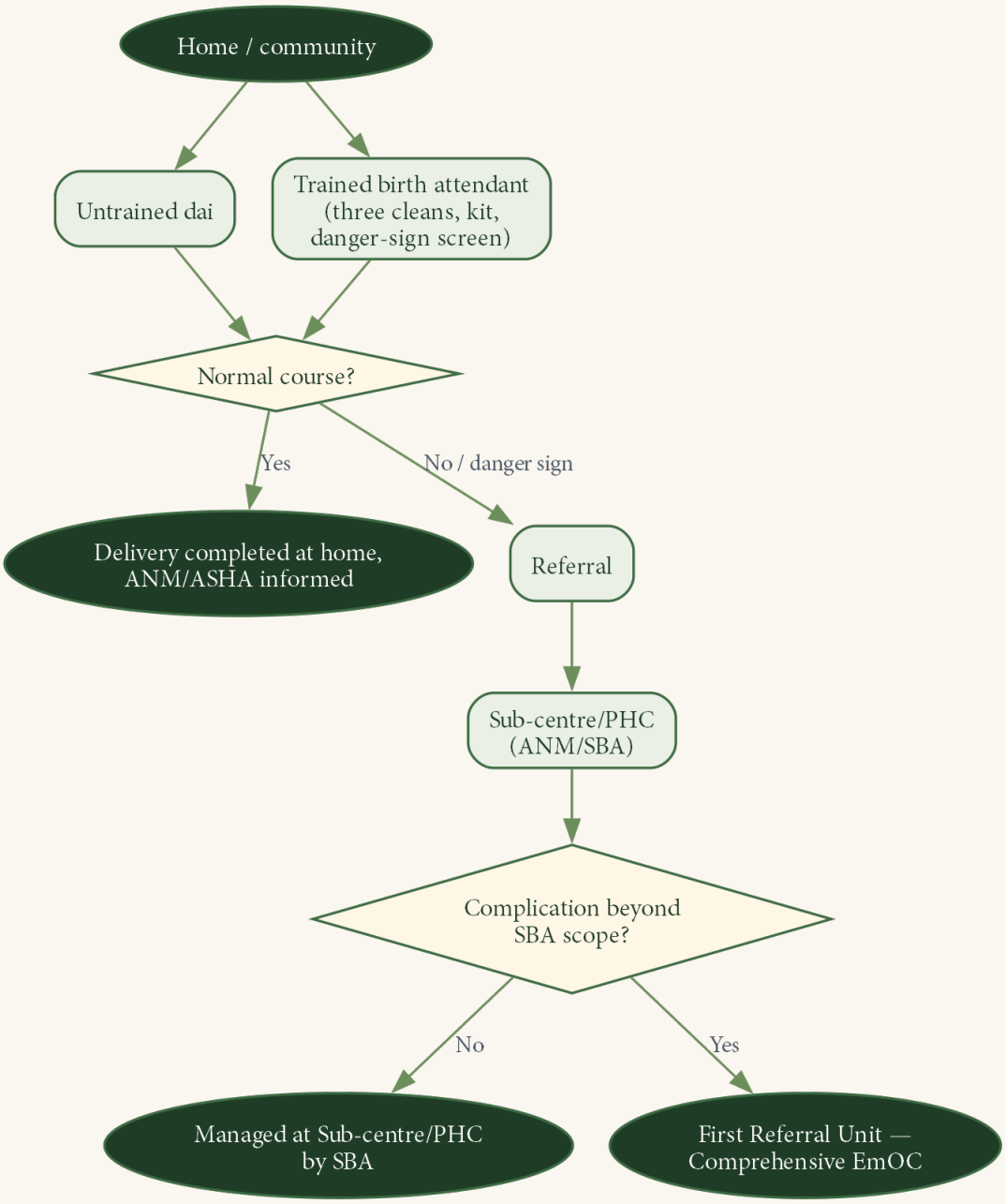
Limitations of the TBA and the shift to skilled attendance

Limitation	Consequence
Cannot give parenteral oxytocics, anticonvulsants or IV fluids	Cannot treat postpartum haemorrhage or eclampsia
Cannot perform assisted delivery, manual removal of placenta or caesarean section	Obstructed labour and retained placenta remain fatal without timely referral
Limited literacy/diagnostic skill	Delay in recognising an emergency (first of the "**three delays**")

Limitation	Consequence
No formal accreditation or continuing supervision	Inconsistent quality; poor compliance with referral advice

Global evidence (WHO/International Confederation of Midwives (ICM)/International Federation of Gynecology and Obstetrics (FIGO) joint statement, 2004) established that **training TBAs alone does not reduce maternal mortality**, since most direct obstetric deaths (haemorrhage, sepsis, hypertensive disorders, obstructed labour) need parenteral drugs and emergency surgery a TBA cannot provide. Policy therefore shifted to **"a skilled birth attendant at every birth," backed by a functioning referral system and Comprehensive EmOC** at the first referral unit (anaesthesia, blood transfusion, caesarean delivery, manual removal of placenta, safe abortion/sterilisation). India operationalises this through the NHM, ASHA and Janani Suraksha Yojana (JSY), incentivising institutional delivery over home delivery even by a trained *dai*.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart: community-level dai/TBA pathway branching at "Normal course?" to home delivery vs. referral, then at the sub-centre/PHC branching at "Complication beyond SBA scope?" to management at PHC vs. escalation to the First Referral Unit for Comprehensive EmOC.

Recent advances [RA]

- WHO/ICM/FIGO joint statement (2004) formally redefined policy away from isolated TBA training toward universal skilled attendance plus referral capacity.

- Cochrane review of TBA-training trials (Sibley et al., CD005460, updated 2012) found training improved TBA knowledge, referral behaviour and clean-delivery practice, with the greatest perinatal-mortality benefit where TBAs still attend most births and skilled care remains inaccessible — a **bridging, not a substitute**, role.
- WHO's 2012 postpartum-haemorrhage recommendations permit **community health workers/trained attendants to administer misoprostol** for home-birth PPH prevention, task-shifting one life-saving drug to this cadre.
- India's NHM now channels the TBA's community-linkage function through the **ASHA worker**, backed by JSY (2005) and JSSK (2011), targeting 100% skilled attendance in line with SDG 3.1 (maternal mortality ratio <70/100,000 live births by 2030).

High-yield exam pointers

- TBA = trained community *dai*; **not** an accredited professional — contrast with the WHO definition of **skilled birth attendant (SBA)**.
- Core TBA tool = the **delivery kit** enforcing the **"three cleans"** (hands, perineum, cord).
- TBA's ceiling: recognise-and-refer only; **no oxytocics, no internal exam, no assisted delivery**.
- One drug exception: **misoprostol 600 µg PO/PR** for home-birth PPH prevention (WHO 2012, community health worker administration).
- Key policy line for the exam: **"training the TBA does not reduce MMR — ensuring a skilled attendant at every birth does"** (WHO/ICM/FIGO 2004).
- India's modern equivalent link-worker cadre = **ASHA** (NHM, 2005), backed by JSY/JSSK.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Textbook of Obstetrics 9e briefly names the *dai* and the skilled birth attendant but does not carry a dedicated section on the TBA training curriculum, which is classically taught in Community/Preventive and Social Medicine; the training-programme detail above is standard public-health teaching cross-checked against WHO guidance and National Health Mission documents.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Safe Motherhood, RCH Interventions); WHO/ICM/FIGO joint statement, "Making pregnancy safer: the critical role of the skilled attendant" (2004); WHO recommendations for the prevention and treatment of postpartum haemorrhage (2012); Cochrane Database of Systematic Reviews, CD005460 (Sibley et al.); Government of India, Ministry of Health & Family Welfare — National Health Mission (JSY, JSSK, ASHA) scheme documents.

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Selective foeticide is unjustified in the twenty first century. Debate this statement

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

Definition — Selective feticide is the deliberate termination of a pregnancy after a specific fetal characteristic is identified on prenatal testing. The term covers two ethically and legally distinct practices: (1) **sex-selective feticide** — termination performed solely because the fetus is female, which is illegal and indefensible; and (2) **medically indicated selective termination** — termination or selective fetal reduction performed for a lethal/serious fetal anomaly, or to improve survival of co-fetuses in a multifetal pregnancy, which is lawful and ethically accepted. The debate on this statement must be conducted separately for each.

Arguments supporting the statement — sex-selective feticide is unjustified

Domain	Argument
Ethical	Violates non-maleficence and justice; discriminates against a fetus solely for its sex — described internationally as "gendercide"
Legal	Explicitly banned under the Preconception and Prenatal Diagnostic Techniques (Prohibition of Sex Selection) Act, 1994, amended up to Feb 2003 (PC&PNDT Act); sex selection is not a recognised ground under the Medical Termination of Pregnancy (MTP) Act
Human rights	Contravenes the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and the girl child's right to life; a manifestation of son preference and patriarchal bias

Domain	Argument
Demographic/social	Skews the sex ratio, fuelling trafficking of women, cross-region "bride buying," polyandry, and violence against women
Professional	A doctor who determines or discloses fetal sex, or performs sex-selective termination, faces registration cancellation and criminal prosecution (Medical Council of India Code of Ethics; PC&PNDT Act penal clauses)
Public health	Undermines decades of family-welfare and girl-child programmes; fewer surviving girls further devalues the girl child, perpetuating the cycle

Counter-arguments — situations where selective termination is medically & ethically justified

Situation	Justification
Lethal or serious fetal anomaly (e.g., anencephaly, trisomy 13/18, uncorrectable structural defect)	Couple's reproductive autonomy + avoidance of a non-survivable/severely handicapped life; permitted under the MTP Act's "substantial fetal abnormality" ground on a Medical Board's opinion, with **no statutory upper gestational limit** for this ground
Multifetal pregnancy reduction (MPR) in higher-order gestation (triplets or more)	Lowers fetal number to improve survival of the remaining fetuses; typically done in the **late first trimester** — intracardiac/intrathoracic **potassium chloride** for a fetus with its own chorion, or cord occlusion/radiofrequency ablation for a shared-chorion (monochorionic) fetus (Williams Obstetrics 26e; ACOG 2020)
Selective reduction/termination for a discordant anomalous or severely growth-restricted co-twin, severe twin-to-twin transfusion syndrome, or twin reversed arterial perfusion (acardiac twin)	Protects the healthy co-fetus and the mother; usually performed later (second trimester) than MPR because the anomaly is often not fully delineated earlier
Maternal life-threatening indication in a multifetal pregnancy	Continuing all fetuses risks the mother's life — covered under the MTP Act ground of grave injury to physical/mental health

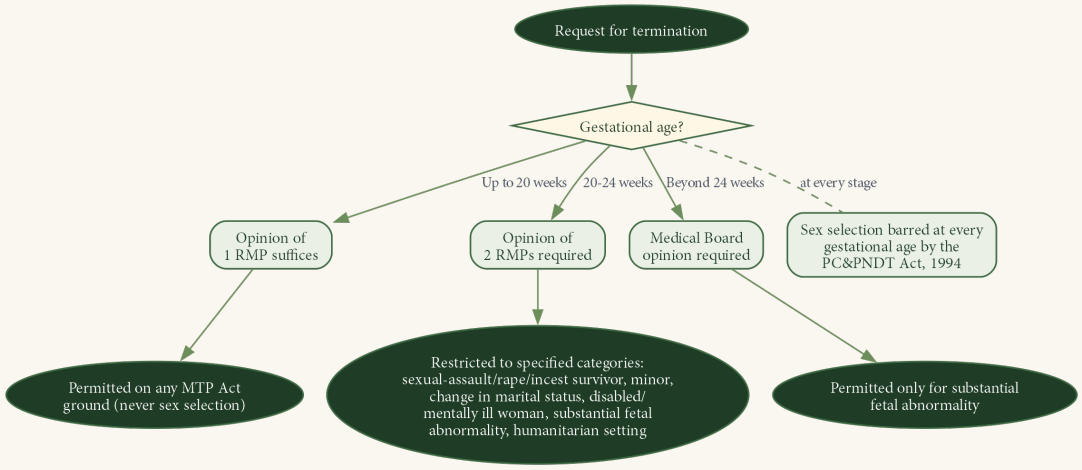
Legal framework governing selective feticide in India

Act/provision	Key points
PC&PNDT Act, 1994, amended up to Feb 2003	Prohibits sex selection before or after conception; regulates registration of genetic clinics, laboratories and counselling centres; prenatal diagnostic techniques are permitted **only** to detect chromosomal abnormalities, genetic metabolic disease, haemoglobinopathies, sex-linked genetic disease, or congenital anomalies in a woman meeting specified criteria (age >35 years, ≥2 previous miscarriages/fetal loss, teratogen/radiation exposure, family history of genetic disease) — never to determine or disclose fetal sex; disclosure of sex to anyone is banned, and advertising sex-selection services (Section 22) is a punishable offence
MTP Act, 1971, as amended by the MTP (Amendment) Act, 2021 & MTP Rules, 2021	Up to **20 weeks** — opinion of 1 registered medical practitioner (RMP) suffices; **20–24 weeks** — opinion of 2 RMPs, restricted to specified categories (survivors of sexual assault/rape/incest, minors, change of marital status during pregnancy, women with disabilities, mentally ill women, substantial fetal abnormality, humanitarian/disaster settings); **beyond 24 weeks** — permitted only for a substantial fetal abnormality certified by a state Medical Board, with no gestational age cap specified for this ground. Sex selection is **not** a ground under this Act at any gestation
Judicial enforcement	Supreme Court directions in *CEHAT v Union of India* (2001) and *Voluntary Health Association of Punjab v Union of India* (2013–16) mandated strict registration and monitoring of ultrasound clinics to enforce the PC&PNDT Act

Balanced view

The statement holds true for **sex-selective feticide**: in the 21st century, with a functioning legal framework (PC&PNDT Act, MTP Act), accessible contraception, and international consensus on gender equity, there is no medical or ethical justification for terminating a pregnancy solely because the fetus is female — it remains an unjustifiable, illegal act of gender discrimination. However, when "selective feticide" is used loosely for termination of a lethal/serious fetal anomaly, or for multifetal pregnancy reduction/selective termination performed on sound medical indication with informed consent, it is legally sanctioned and ethically accepted as an exercise of reproductive autonomy and beneficence. The debate is correctly won *for* the statement only when confined to sex selection; it does not extend to anomaly-based selective termination.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Legal pathway for termination of pregnancy in India (MTP Act 2021), with the sex-selection bar applying at every gestational age.

High-yield exam pointers

- PC&PNDT Act **1994, amended Feb 2003**; MTP Act **1971**, MTP (Amendment) Act **2021** + Rules 2021.
- Gestational cut-offs to write verbatim: **≤20 weeks — 1 RMP; 20–24 weeks — 2 RMPs, specified categories only; >24 weeks — Medical Board, substantial fetal abnormality only, no age cap**.
- Sex selection is barred at **every** gestational age — it is never a ground under the MTP Act.
- MPR technique: intracardiac/intrathoracic **potassium chloride** (own-chorion fetus) or cord occlusion/radiofrequency ablation (monochorionic fetus), best done in the **late first trimester**.
- Landmark case: *CEHAT v Union of India* (2001) — Supreme Court enforcement directions for the PC&PNDT Act.
- Child sex ratio (0–6 years) fell from 927 (2001 Census) to about 918 (2011 Census); Government response — **Beti Bachao Beti Padhao** scheme (2015).

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

Statutory demographic figures (child sex ratio, sex ratio at birth) are cited as approximate, contemporaneous public-health data from the Census of India and National Family Health Survey rather than corpus-verified textbook figures; DC Dutta's Obstetrics 9e still prints the pre-2021 MTP Act (20-week limit only) — the pathway above reflects the current MTP (Amendment) Act, 2021.

Recent advances [RA]

- **Non-invasive prenatal testing (NIPT)** using cell-free fetal DNA can reveal fetal sex from around 10 weeks via a simple maternal blood sample, opening a covert route for sex selection outside PC&PNDT-regulated ultrasound/genetic-clinic services; regulatory guidance now extends the sex-non-disclosure mandate to any technique that can reveal fetal sex, not ultrasound alone.
- Active-enforcement measures — GPS-enabled "silent observer" devices on registered ultrasound machines in several states and centralised PC&PNDT online tracking software — flag undeclared scans.
- **FIGO's** Committee for the Ethical Aspects of Human Reproduction and Women's Health classifies non-medical sex selection as discrimination against women irrespective of technique (ultrasound, preimplantation genetic testing, or NIPT), while distinguishing it from legitimate termination for a sex-linked genetic disease; **WHO** similarly holds that termination for fetal sex alone breaches gender equity.
- National Family Health Survey (NFHS-5, 2019–21) sex-ratio-at-birth data, an improvement over NFHS-4, are used to track programme impact.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (MTP Act provisions; PC&PNDT Act, 1994 amended 2003); Williams Obstetrics 26e (multifetal pregnancy reduction, selective reduction/termination technique, ACOG 2020); Preconception and Prenatal Diagnostic Techniques (Prohibition of Sex Selection) Act, 1994; Medical Termination of Pregnancy Act, 1971 and MTP (Amendment) Act, 2021 & Rules, 2021 (Government of India). Coverage note: the corpus textbooks carry limited direct discussion of sex-selective feticide/PC&PNDT specifics beyond DC Dutta's Obstetrics chapter; current statutory details of the 2021 MTP amendment and judicial enforcement history are drawn from established legal/public-health knowledge rather than the textbook corpus.

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Sexual dysfunction

Asked in: Paper IV 04-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Sexual dysfunction is a disturbance in one or more phases of the sexual response cycle (desire, arousal, orgasm) or genito-pelvic pain associated with intercourse, causing significant personal distress. Per the American Psychiatric Association's Diagnostic and Statistical Manual, 5th edition (DSM-5), a diagnosis requires symptoms present for at least 6 months, occurring in almost all (approximately 75%) sexual encounters, causing clinically significant distress, and not better explained by a non-sexual psychiatric disorder, a substance/medication effect, or relationship distress; each disorder is further specified as lifelong or acquired, and generalised or situational.

Classification (DSM-5)

Category	Core features	Older/equivalent terms merged
Female sexual interest/arousal disorder (FSIAD)	Absent/reduced sexual interest, erotic thoughts/fantasies, initiation, excitement/pleasure, and genital or non-genital sensations, in almost all encounters	Hypoactive sexual desire disorder (HSDD) + sexual aversion disorder + female sexual arousal disorder (FSAD)
Female orgasmic disorder	Marked delay in, infrequency of, absence of, or reduced intensity of orgasm on almost all occasions; selective serotonin reuptake inhibitors (SSRIs) are a frequent cause	—
Genito-pelvic penetration disorder (GPPPD)	Marked difficulty with vaginal penetration, marked vulvovaginal/pelvic pain on attempted penetration, marked fear/anxiety about pain, or involuntary pelvic-floor muscle tightening	Dyspareunia + vaginismus

Vaginismus is classically **primary** — penetration has never been achieved, vagina anatomically normal, cause is psychosexual/phobic — or **secondary** — appears after childbirth, surgery, or a local painful lesion, usually transient once the cause is removed.

Etiology

Category	Causes
Hormonal/biological	Menopausal or lactational estrogen deficiency (genitourinary syndrome of menopause, GSM), bilateral oophorectomy, hyperprolactinaemia, hypothyroidism, anaemia/chronic illness
Drug-induced	SSRIs, antipsychotics, lithium, antihypertensives (beta-blockers), combined oral contraceptive pills, phenytoin, opioids, chronic alcohol use
Gynaecologic/obstetric	Endometriosis, chronic pelvic inflammatory disease (PID), pelvic organ prolapse, provoked vestibulodynia (PVD — commonest cause of premenopausal dyspareunia, 15–18%), episiotomy/perineal scar or obstetric anal sphincter injury, radical pelvic surgery/hysterectomy, pelvic radiotherapy, female genital mutilation (FGM)
Psychological	Depression, anxiety, poor body/genital self-image, past sexual or physical abuse
Relationship/context	Partner's sexual dysfunction, poor sexual communication, infertility-work-up stress, "mechanical" intercourse focused only on conception
Male-factor (contributes to the couple's distress)	Erectile dysfunction, premature ejaculation, congenital penile defect, poor coital technique

GPPPD (dyspareunia) further localises by site:

Site of pain	Typical causes
Superficial/entry	Narrow introitus, tight hymen, Bartholin's cyst, tender perineal scar, vulvitis, vestibulodynia
Vaginal	Vaginitis, vaginal septum, scarred vault, atrophic vaginitis
Deep	Endometriosis (especially rectovaginal septum), chronic cervicitis/PID, fixed retroverted uterus, ovary prolapsed in the pouch of Douglas

Clinical evaluation

- **History** — open with a normalising screening question tailored to context (routine gynaecological visit, before surgery/hormone therapy, antenatal, postpartum, perimenopause, chronic illness); establish duration, primary vs secondary, generalised vs situational, and take a biopsychosocial history from both partners (together and separately) — sexual response before/after onset, reaction of each partner, previous help sought, reason for presenting now.

- **Dyspareunia-specific history** — whether vaginal entry is possible at all; whether arousal occurs when penetration is attempted; exact timing of pain (partial entry, full entry, deep thrusting, movement, ejaculation, post-coitally); whether any occasions are pain-free.
- **Physical examination** — performed only with a clear indication and after explanation: general survey (anaemia, thyroid signs, disability), external genitalia (lichen sclerosus, sparse pubic hair suggesting low androgen), introitus (atrophy, scarring, vestibular allodynia), pelvic-floor tone, and bimanual examination (cul-de-sac/uterosacral nodularity or tenderness, fixed retroverted uterus).
- **Investigations** — hormonal profile (estradiol, thyroid, prolactin) if indicated; a serum testosterone level is **not diagnostic** and should not be used to label hypoactive sexual desire disorder; the Female Sexual Function Index (FSFI) questionnaire; pelvic ultrasound/laparoscopy if organic deep dyspareunia is suspected; examination under anaesthesia (EUA) for primary vaginismus to confirm normal vaginal calibre.

Management

The **PLISSIT model** structures stepwise care:

- **Permission** — validate the woman's concern and confirm the clinic is an appropriate place to discuss it.
- **Limited Information** — correct myths and explain normal sexual physiology and the circular sexual response cycle.
- **Specific Suggestions** — targeted non-pharmacological, pharmacological, or surgical measures (below).
- **Intensive Therapy (referral)** — for childhood-rooted psychosexual issues, couple communication problems, or male-partner dysfunction.

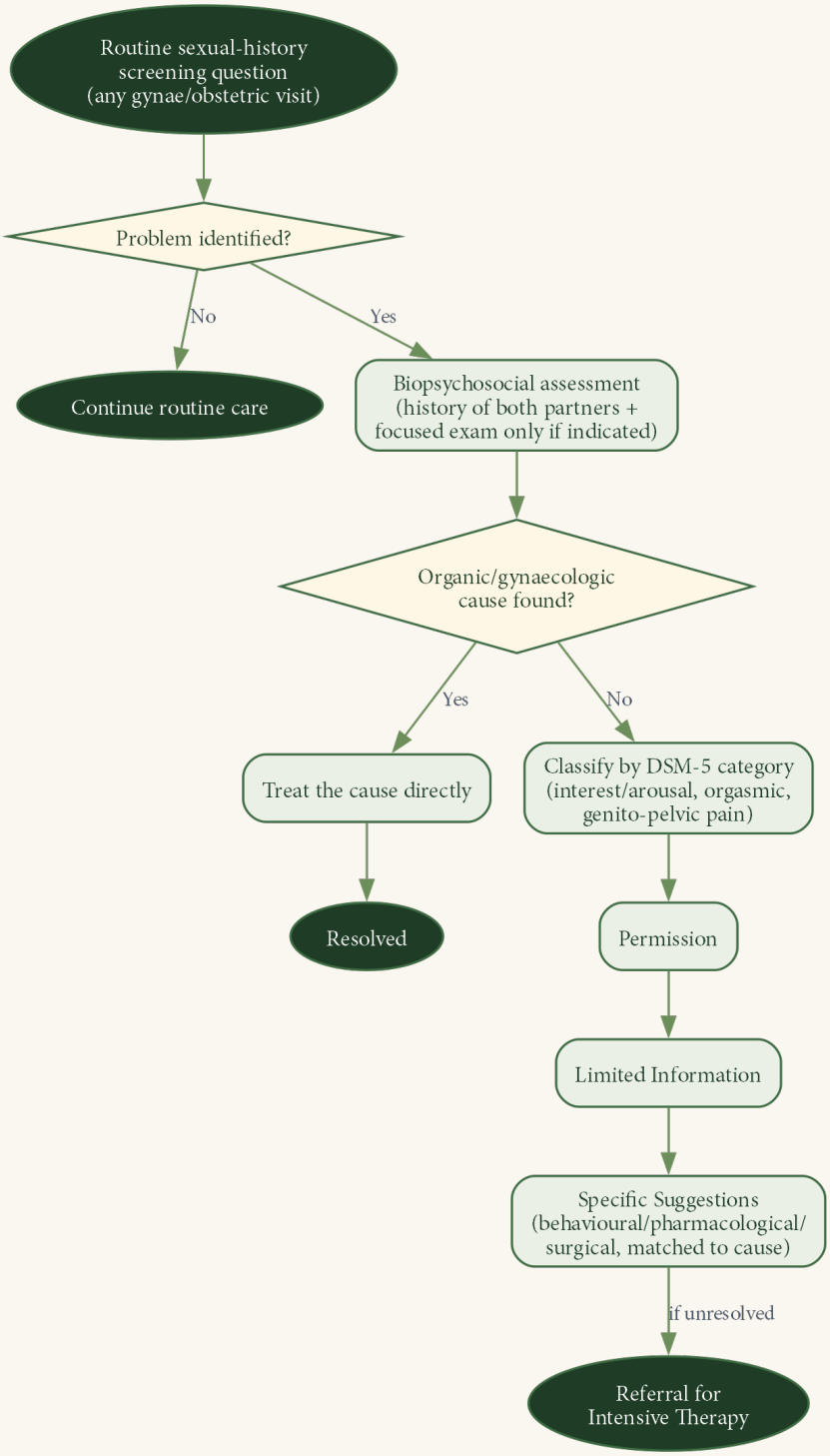
Non-pharmacological/surgical measures:

- Cognitive behavioural therapy (CBT) or mindfulness-based CBT (MBCT) — Grade B evidence (2015 International Consultation on Sexual Medicine) for low desire; best outcomes when the partner is included.
- Graduated vaginal dilators (daily, 10–15 minutes) for vaginismus/introital stenosis; hymenectomy or Fenton's operation for a rigid hymen or narrow introitus; perineoplasty for a tender perineal scar.
- Pelvic-floor physiotherapy for hypertonic pelvic floor/vestibulodynia; vestibulectomy for refractory provoked vestibulodynia.
- Treat the underlying cause — switch the offending contraceptive or antidepressant, treat endometriosis/PID, correct a fixed retroversion, or defibulate Type III FGM after counselling.

Pharmacological options for genitourinary/atrophy-related dysfunction:

Agent	Regimen	Indication
Local vaginal estrogen (estriol/conjugated equine estrogen cream or tablet)	Low-dose intravaginal, daily initially then twice weekly	GSM-related dyspareunia/atrophic vaginitis
Vaginal dehydroepiandrosterone (DHEA, prasterone)	6.5 mg (0.50%) intravaginal insert once daily	Postmenopausal vulvovaginal atrophy with sexual dysfunction
Ospemifene	60 mg orally once daily	Vulvovaginal atrophy-related dyspareunia (selective estrogen-receptor modulator)
Topical lidocaine	Applied to vestibule 10 minutes before penetration, wiped off, then a lubricant applied	Provoked vestibulodynia
Testosterone (off-label)	If used, titrate to a serum level of 20–80 ng/dL	HSDD — current evidence is insufficient to recommend routine use

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

PLISSIT ladder (Permission -> Limited Information -> Specific Suggestions -> Intensive Therapy referral) with an organic-cause side-branch at the assessment step.

Recent advances [RA]

Flibanserin (5-HT1A agonist/5-HT2A antagonist) is FDA-approved for premenopausal HSDD as a daily bedtime dose, contraindicated with alcohol and CYP3A4 inhibitors; meta-analyses show only ~0.5 extra satisfying sexual event/month over placebo, against sedation/hypotension in ~29% versus 9% on placebo — modest benefit, real safety burden. Bremelanotide, a melanocortin-receptor agonist given as an as-needed subcutaneous autoinjector ≥45 minutes before anticipated activity, was FDA-approved (2019) for the same indication; it postdates this bank's textbook editions and is included from the established prescribing record, not the library corpus. Vaginal hyaluronic acid is non-inferior to twice-weekly estriol for GSM-related dyspareunia, with benefit within 2 weeks. Fractional micro-ablative CO2 laser has early reports of benefit up to 2 years for vulvovaginal atrophy, though long-term safety data are limited. Mindfulness-based therapy meta-analyses show improvement across desire, arousal, orgasm, and pain, greatest for desire and subjective arousal. Professional consensus still holds that routine testosterone therapy for female sexual dysfunction is **not** recommended, given unresolved long-term lipid/cardiovascular and endometrial/breast safety concerns despite decades of off-label use.

High-yield exam pointers

- DSM-5 recognises only 3 female disorders: FSIAD, orgasmic disorder, GPPPD — merging HSDD+FSAD and dyspareunia+vaginismus.
- Diagnostic rule: symptoms ≥6 months + distress + present in ≥75% of occasions.
- PLISSIT = **P**ermission, **L**imited **I**nformation, **S**pecific **S**uggestions, **I**ntensive **T**herapy.
- A serum testosterone level does **not** diagnose HSDD — never order it as a diagnostic test.
- Provoked vestibulodynia is the commonest cause of premenopausal dyspareunia (15–18%).
- First-line for GSM-related dyspareunia = local vaginal estrogen; flibanserin/bremelanotide are for premenopausal HSDD only.
- Primary vaginismus → EUA to confirm normal vaginal calibre before assuming no organic cause.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> Coverage note: doses/regimens for local estrogen, vaginal DHEA (prasterone), ospemifene, testosterone, flibanserin, and lidocaine above are corpus-verified against Speroff 9e and Berek & Novak 16e; bremelanotide is included from its established FDA prescribing record since it postdates the current library editions.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Williams Obstetrics 26e; American Psychiatric Association DSM-5.

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Still births

Asked in: Paper IV 21-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — A stillbirth (intrauterine fetal death, IUFD) is the delivery of a fetus, after the period of viability, that shows no sign of life at birth — no heartbeat, umbilical-cord pulsation, or voluntary muscle movement. India (RCH programme) and the World Health Organization (WHO) define it as fetal death at or after **28 completed weeks of gestation** (birth weight ≥1000 g); WHO's lower viability threshold for international perinatal comparisons is **22 completed weeks/≥500 g**, while the United States (NCHS) uses ≥20 weeks or ≥350 g by state law — so cut-offs vary between countries.

Classification

Type	Timing of death	Pathological feature
Antepartum ("macerated") stillbirth	Before onset of labour — 70–90% of cases	Retained dead fetus undergoes aseptic **maceration**: epidermal blistering/peeling from 12–24 h after death, progressive autolysis of ligaments and viscera
Intrapartum ("fresh") stillbirth	During labour	Delivered soon after death — no time for maceration; skin intact
Early fetal death	20/22–27 weeks	Counted separately from stillbirth in most national statistics
Late fetal death (true stillbirth)	≥28 weeks	The reportable "stillbirth" of Indian and WHO statistics

Etiology

Roughly 70–90% of fetal deaths occur before labour begins, from chronic (usual) or acute (rare) placental insufficiency; in 20–35% no cause is found even after full evaluation.

Category	Approx. share	Examples
Maternal (5–10%)	Hypertensive disorders, diabetes, maternal infection (malaria, syphilis, hepatitis, influenza), hyperpyrexia (>39.4°C), antiphospholipid syndrome/thrombophilias, obstructed/abnormal labour, post-term pregnancy, SLE	
Fetal (25–40%)	Chromosomal abnormalities, major structural anomalies, Rh-isoimmunisation, non-immune hydrops, fetal growth restriction, intrauterine infection	
Placental (20–35%)	Placental abruption, placenta praevia, cord accidents (prolapse, true knot, nuchal cord), twin-to-twin transfusion syndrome, placental insufficiency	
Iatrogenic	External cephalic version, drug toxicity (e.g., quinine overdose)	
Unexplained/idiopathic (20–35%)	No fetal, placental, maternal, or obstetric cause found on thorough work-up	

Diagnosis

Clinical

- **Symptom** — cessation of previously-felt fetal movements.
- Regression of positive breast changes of pregnancy.
- Per-abdomen: fundal height smaller than gestation, diminished uterine tone/flaccidity, Braxton-Hicks contractions not felt, no fetal movements on palpation, fetal heart sounds absent (Doppler more sensitive than stethoscope), cardiotocography shows a flat trace.
- **Egg-shell crackling** of the fetal head — a late sign.

Investigations

Test	Finding
Real-time sonography (earliest and most reliable)	Absence of all fetal motion, including cardiac activity, over a careful 10-minute observation is strong presumptive evidence; oligohydramnios and collapsed cranial bones are later features

Test	Finding
Straight X-ray abdomen (rarely used now)	*Spalding sign* — overlapping cranial bones from liquefied brain and softened sutures, appears ~7 days after death; hyperflexion of the spine; crowding of rib shadows; *Robert's sign* — gas in the fetal heart/great vessels, may appear as early as 12 hours
Blood fibrinogen/PT	Checked twice weekly if the dead fetus is retained beyond 2 weeks, to detect evolving coagulopathy

Recommended evaluation once stillbirth is confirmed (Dutta; ACOG/SMFM Obstetric Care Consensus No. 10, Feb 2020): complete blood count, ABO/Rh grouping, Kleihauer-Betke test, VDRL/syphilis serology, postprandial glucose/HbA1c, renal and thyroid profile, viral serology, lupus anticoagulant and anticardiolipin antibodies; **chromosomal microarray analysis (CMA)** of fetal/placental tissue (preferred over conventional karyotyping — it does not require dividing/live cells, so it succeeds even on macerated tissue); fetal autopsy with whole-body photographs, fetogram/skeletal X-ray or MRI if autopsy is declined; and gross/microscopic **placental examination** (weight, meconium staining, malformations). Routine heritable-thrombophilia screening in an unselected population is **not** recommended.

Management

- **Breaking the bad news** sensitively to the mother and family; anticipate guilt and medico-legal anxiety.
- **Expectant (non-interference)** — safe if membranes are intact and there is no infection/coagulopathy: ~80% deliver spontaneously within 2 weeks of death; check fibrinogen twice weekly.
- **Indications for early intervention** — psychological distress, evidence of intrauterine infection, prolongation beyond 2 weeks, falling fibrinogen.
- **Induction of labour** (delivery is always by medical induction, never expectant beyond this point once indicated):

Regimen	Dose
Mifepristone + misoprostol (first-line)	Oral mifepristone 200 mg single dose, followed by intravaginal misoprostol (PGE1) 25 µg 4-hourly (induction–delivery interval ≈8 h); mifepristone 600 mg/day for 2 days can also be used alone
Misoprostol alone	25–50 µg vaginally (preferred) or orally, repeated every 4 hours
Prostaglandin E2	Vaginal gel/pessary high in the posterior fornix, repeated every 6–8 hours; may be supplemented with oxytocin

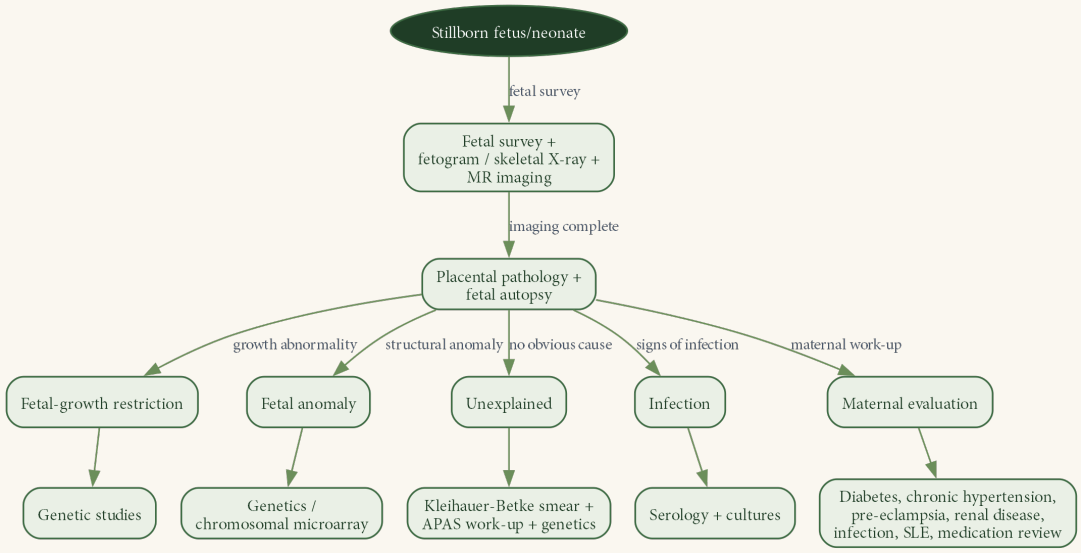
Regimen	Dose
Oxytocin infusion	Start 5–10 U in 500 mL Ringer's solution IV; if it fails, escalate next day to 20 U in 500 mL Ringer's solution run at 30 drops/min (≈80 mU/minute)
Previous caesarean	PGE2 gel is safe with one prior lower-segment caesarean section (LSCS); risk of scar rupture is slightly higher with two prior LSCS

- **Caesarean section** is reserved for rare indications — two or more prior LSCS, major-degree placenta praevia, transverse lie.
- **Complications** — psychological distress; ascending infection (especially *Clostridium welchii* once membranes rupture); **disseminated intravascular coagulation** if retained >4 weeks (10–20% risk, from gradual thromboplastin absorption from the dead placenta/decidua); uterine inertia, retained placenta, and postpartum haemorrhage during labour.
- **Suppression of lactation** — cabergoline (dopamine agonist) 1 mg single oral dose; avoid in pre-eclampsia/hypertension.
- **Bereavement care** — dedicated support through labour and puerperium, keepsakes/photographs if desired, chaplaincy/counsellor involvement, postnatal-ward stay minimised; review at 6 weeks to discuss investigation results and future-pregnancy counselling.

Prevention and the next pregnancy

- Overall stillbirth **recurrence risk is 0–8%** (Dutta); Williams reports a roughly five-fold higher risk after a prior stillbirth, highest for recurrence with placental insufficiency, growth restriction, or hypertensive disease.
- **Preconception**: counselling, correction of the identified adverse factor (diabetes, hypertension, thrombophilia control), smoking cessation, weight optimisation, genetic counselling if a familial condition exists.
- **Antenatal surveillance in the next pregnancy**: detailed anatomy scan at 18–20 weeks; serial growth scans from 28 weeks; daily kick counts from 28 weeks; antepartum fetal surveillance (non-stress test/biophysical profile) from 32 weeks, or 1–2 weeks before the gestational age of the prior loss.
- **Timing of delivery**: induction at 39 weeks is recommended (minimises further stillbirth risk) unless an earlier obstetric indication intervenes.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Evaluation of a stillborn fetus — five parallel diagnostic branches after fetal survey, imaging, and placental/autopsy work-up.

High-yield exam pointers

- Definition line: "no sign of life at birth, at or beyond 28 completed weeks/≥1000 g (India/WHO)"; WHO viability floor 22 weeks/500 g.
- Causes mnemonic — **Maternal (5–10%) : Fetal (25–40%) : Placental (20–35%) : Iatrogenic : Unexplained (20–35%)**.
- X-ray signs to name: **Spalding sign** (skull-bone overlap, ~7 days), **Robert's sign** (gas in fetal heart, ~12 h).
- Induction doses to write: mifepristone 200 mg + misoprostol 25 µg vaginally 4-hourly; oxytocin escalation to 20 U in 500 mL Ringer's at 30 drops/min (80 mU/min).
- DIC risk if retained **>4 weeks (10–20%)**; cabergoline **1 mg single dose** for lactation suppression.
- Recent-advance flag: **chromosomal microarray (CMA)** now preferred over karyotyping (ACOG/SMFM, 2020) — works on non-dividing/macerated tissue.
- Recurrence risk **0–8%**; next pregnancy delivery recommended at **39 weeks**.

Recent advances [RA]

- **ACOG/Society for Maternal-Fetal Medicine, Obstetric Care Consensus No. 10 (February 2020), "Management of Stillbirth"** — current reference standard for evaluation: recommends chromosomal microarray analysis over conventional karyotyping (no live cells needed, higher diagnostic yield on macerated tissue), and advises **against** routine heritable-thrombophilia screening in an unselected stillbirth population.

- **NICHD Stillbirth Collaborative Research Network (SCRN)** — a standardised, population-based protocol (autopsy + placental histology + fetal karyotype/microarray) identified a probable or possible cause in **76%** of stillbirths, versus much lower yield with limited work-up; leading obstetrical causes were placental abruption, multifetal-gestation complications, and preterm labour/rupture before viability.
- **Genomic sequencing** — exome sequencing of unexplained stillbirths (normal microarray, no maternal/obstetric cause) attributed roughly **8.5%** to single-gene (Mendelian) disorders, an emerging diagnostic frontier beyond microarray.
- **Perinatal bereavement care and palliative care** — global consensus recommendations for structured bereavement support, and a distinct perinatal palliative-care pathway for fetuses with life-limiting anomalies (ACOG Committee Opinion No. 786, 2019), reflecting growing emphasis on family-welfare and psychological outcomes alongside cause-finding.
- **COVID-19 pandemic data** are mixed on whether stillbirth risk rose overall, with signals of greater risk concentrated in low-resource settings — an evolving area under continued surveillance rather than a settled recommendation.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Dutta's induction regimen (mifepristone/misoprostol/oxytocin doses above) is the current, guideline-consistent approach; the choice of chromosomal microarray over karyotyping and the recommendation against routine thrombophilia screening reflect the 2020 ACOG/SMFM update, which supersedes older teaching that favoured universal karyotyping and thrombophilia panels.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e (Chapter 35, "Stillbirth"); American College of Obstetricians and Gynecologists/Society for Maternal-Fetal Medicine, Obstetric Care Consensus No. 10, "Management of Stillbirth" (February 2020), as cited in Williams Obstetrics 26e.

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SUMAN INITIATIVE

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

Definition — Surakshit Matritva Aashwasan (SUMAN) is a Government of India initiative of the Ministry of Health and Family Welfare (MoHFW), launched under the National Health Mission (NHM) on 10 October 2019 at the 13th Conference of the Central Council of Health and Family Welfare, New Delhi. It guarantees free ("zero-expense"), dignified, "zero-denial" quality maternal and

newborn care at every public health facility, converging India's existing maternal-child health schemes under one service-guarantee umbrella to end all preventable maternal and newborn deaths.

Vision, goal, objectives & beneficiaries

- **Vision:** a responsive health-care system that achieves zero maternal and infant deaths through quality care delivered with dignity and respect.
- **Goal:** to end all preventable maternal and newborn deaths in India.
- **Beneficiaries:** (1) all pregnant women; (2) all mothers up to 6 months post-delivery; (3) all sick newborns and infants up to 1 year of age.
- **Objectives:**
- Provide high-quality medical, surgical and emergency care in a dignified, respectful manner as per the SUMAN service package, at no cost to the beneficiary.
- Use institutional and community platforms to build awareness of SUMAN entitlements.
- Strengthen the grievance-redressal mechanism using client feedback.
- Orient and build the capacity of service providers to deliver the SUMAN package.
- Ensure reporting and review of every maternal and infant death.

Broad pillars of the initiative

Pillar	Key components
Service guarantee	Janani Suraksha Yojana (JSY — cash incentive for institutional delivery), Janani Shishu Suraksha Karyakram (JSSK — free entitlements for pregnant women/sick infants), Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA — free antenatal care on the 9th of every month), LaQshya (labour-room quality improvement), Mother's Absolute Affection (MAA, breastfeeding), home-based mother/newborn care
Health-system strengthening	Labour room/OT, obstetric high-dependency/ICU, newborn care corner, newborn stabilisation unit, special newborn care unit, staffing, drugs/diagnostics, referral transport, Centres of Excellence
Monitoring & reporting	Service Guarantee Charter, grievance redressal, client-feedback capture
Community awareness	Village Health, Sanitation & Nutrition Committees, Self-Help Groups, SUMAN volunteers/champions

Pillar	Key components
Incentives & IEC	Awards for first responders/champions; IEC/BCC (education/behaviour-change-communication) drives on "zero preventable maternal & newborn deaths"

SUMAN service-guarantee packages (tiered facility model)

Facilities are identified and notified into three ascending tiers; each tier's package is added on top of the one below it, so a Comprehensive Emergency Obstetric & Newborn Care (CEmONC) facility guarantees everything in the Basic and Basic Emergency Obstetric & Newborn Care (BEmONC) packages plus its own additions.

Tier (facilities)	Added maternal care	Added newborn care	Added family-planning/abortion care
Basic (Health & Wellness Centre-Sub Centre/PHC, PHC, Urban PHC)	Antenatal care (≥4 visits + 1 PMSMA) + postnatal care; basic complication and breast-condition management; high-risk identification/referral; skilled birth attendance (delivery-point sub-centres); pre-referral stabilisation of eclampsia/PPH/shock	Essential newborn care + resuscitation; birth-dose immunisation; referral of at-risk/sick newborn; neonatal sepsis management; community-level diarrhoea/pneumonia management	Condoms, oral contraceptive pills, pregnancy-test kits; confidential counselling; safe-abortion referral with post-abortion follow-up
BEmONC (non-FRU CHC, Urban CHC, other hospitals)	Assisted vaginal delivery; episiotomy/suturing; emergency stabilisation with assured CEmONC referral; 48-hour postnatal stay; sterilisation (if available)	Antibiotics for preterm labour/membrane rupture; newborn stabilisation unit; LBW (≥1800 g) management; phototherapy; Kangaroo Mother Care	Medical abortion (PHC level) and manual vacuum aspiration/medical methods (CHC level), per the Medical Termination of Pregnancy Act

Tier (facilities)	Added maternal care	Added newborn care	Added family-planning/abortion care
CEmONC (Medical College, District/Sub-District Hospital, FRU-CHC)	Full CEmONC signal functions; comprehensive management of eclampsia, sepsis, PPH, retained placenta, shock, obstructed labour, severe anaemia; caesarean/surgery; blood bank; elimination of mother-to-child HIV/syphilis transmission with linked antiretroviral therapy	Special newborn care unit; LBW (≤1800 g) management; care of all sick newborns except ventilation/major surgery; referral for Level-III care	Medical/surgical abortion to 20 weeks; management of incomplete/spontaneous abortion and complications

Throughout every tier runs the essential package: respectful maternity care (birth companion, choice of position), clean water/sanitation, zero out-of-pocket expense, safe-motherhood booklet/Mother-Child Protection card, conditional cash transfer (JSY/Pradhan Mantri Matru Vandana Yojana), and a trained provider (midwifery/skilled birth attendant/newborn-care training).

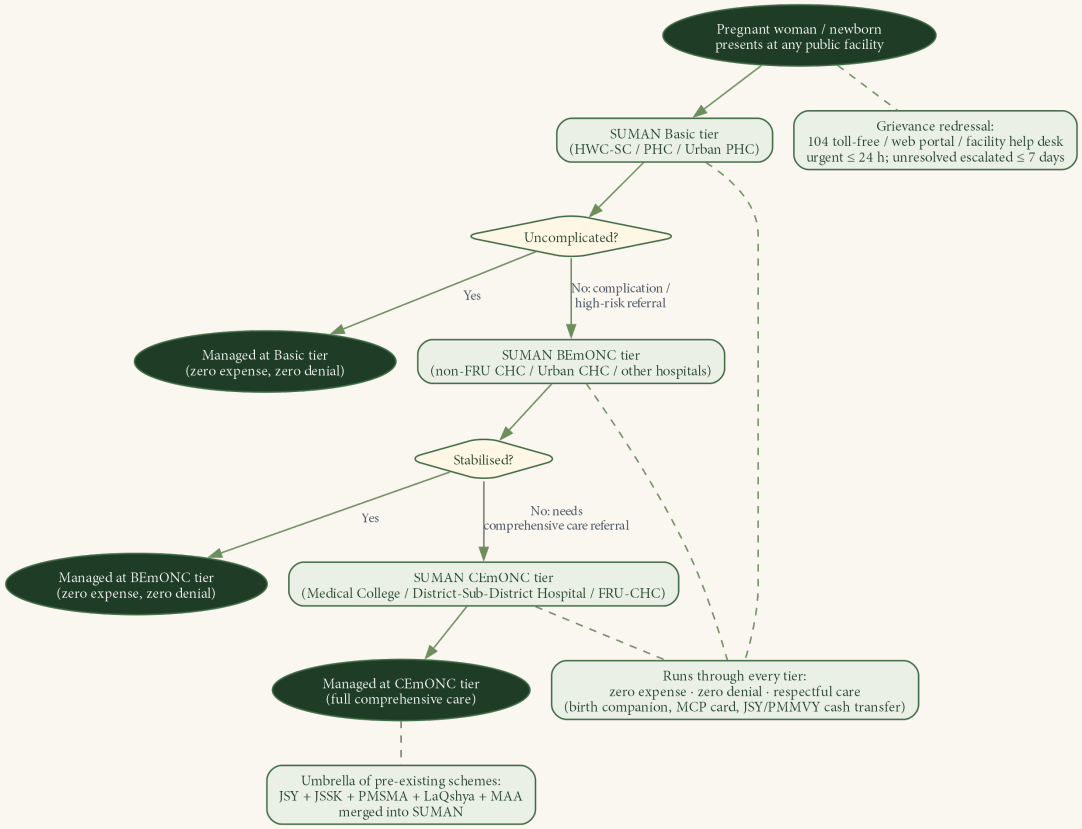
Grievance redressal & governance

- **Three-component mechanism:** toll-free call centre (104), web portal, and facility help desk (at high case-load sites) — the existing 104 mechanism and health helpline were integrated under SUMAN.
- Urgent grievances are to be resolved preferably **within 24 hours**; an unresolved grievance is escalated to district/state level **within 7 days**, with a synopsis placed before the SUMAN committees.
- **Institutional framework:** National → State → District → Block SUMAN committees; the National committee meets biannually and is responsible for overall guidance, monitoring state performance, and ensuring budgetary provision for SUMAN in state Programme Implementation Plans.
- **Quality assurance:** every notified facility must attain National Quality Assurance Standards (NQAS) certification of its SUMAN-delivering departments — state-level certification is expected first, followed by national-level certification within 6 months of notification.
- The **first responder** who reports a maternal death is incentivised with ₹1,000.

Recent advances [RA]

- **Maternal, Perinatal, Child Death Surveillance and Response (MPCDSR)** — a digital platform launched 17 September 2021 that captures every maternal, perinatal and child death (up to 5 years) for reporting, review and cause-of-death analysis on real-time dashboards.
- **SUMAN web portal** — lists notified Basic/BEmONC/CEmONC facilities with their NQAS status, hosts online grievance registration and 104-based maternal-death reporting, and registers SUMAN volunteers/champions.
- **Community linkage** — a SUMAN volunteer is registered at every Anganwadi centre, sub-centre, Health & Wellness Centre and PHC to connect beneficiaries to entitlements; the best performer is felicitated as a SUMAN champion.
- **Phased roll-out** — states were mandated to complete facility identification/notification within 3 years of launch, prioritising medical colleges/district hospitals and NQAS/LaQshya-certified units first; thousands of CEmONC, BEmONC and Basic facilities have since been notified nationwide.
- SUMAN now anchors India's wider Reproductive, Maternal, Newborn, Child, Adolescent Health and Nutrition (RMNCAH+N) strategy, aligned to the Sustainable Development Goal target of a maternal mortality ratio under 70 per 100,000 live births by 2030 — India's Sample Registration System MMR had already fallen from 556 (1990) to 113 per 100,000 live births, with Kerala, Maharashtra, Tamil Nadu, Telangana and Andhra Pradesh already meeting this target.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart of the SUMAN referral ladder (Basic → BEmONC → CEmONC) with the cross-cutting service guarantee, grievance-redressal, and scheme-convergence elements shown as linked side boxes.

High-yield exam pointers

- Launched **10 October 2019**, 13th Central Council of Health & Family Welfare conference, New Delhi — MoHFW/National Health Mission.
- Motto: **zero expense + zero denial + respectful care**, for zero preventable maternal and newborn deaths.
- Beneficiaries: pregnant women + mothers up to **6 months** post-delivery + sick infants up to **1 year**.
- Three facility tiers mirroring the obstetric-care ladder: **Basic → BEmONC → CEmONC**.
- Grievance redressal: toll-free **104**; urgent grievance resolved in **24 hours**; escalation in **7 days**.
- MPCDSR digital surveillance software launched **17 September 2021**; first-responder incentive **₹1,000**.
- SUMAN = umbrella over **JSY + JSSK + PMSMA + LaQshya + MAA**.

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

Facility-notification counts and committee/launch dates above are from the 2021 MoHFW/National Health Mission SUMAN status briefing; the core framework (zero expense, zero denial, three-tier package) is unchanged, but current notified-facility numbers should be checked on the SUMAN web portal if an exact figure is asked.

SOURCE & COVERAGE

Ministry of Health & Family Welfare/National Health Mission — SUMAN Guideline, 2020 (Web Version); MoHFW/National Health System Resource Centre, "Overview of SUMAN" briefing, 2021. DC Dutta's Textbook of Obstetrics 9e (cross-referenced for JSY/JSSK as pre-existing safe-motherhood schemes). Coverage note: SUMAN is a post-2019 Government of India programme not covered in the obstetric textbook editions in this corpus; the answer is grounded in the official MoHFW/NHM SUMAN guideline and briefing documents.

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Surrogacy

Asked in: Paper IV May 2019 · Paper IV Oct 2008 (2×) — RGUHS MS Obstetrics & Gynaecology

Definition — Surrogacy is an arrangement in which a woman (the **surrogate**/gestational carrier) carries and delivers a pregnancy on behalf of another individual or couple (the **intending parent(s)**), with the explicit intention of handing over the child after birth. In **traditional surrogacy** the surrogate's own oocyte is fertilised (by intrauterine insemination), so she is the genetic as well as the birth mother; in **gestational surrogacy** an embryo created by *in-vitro* fertilisation (IVF) from the intending couple's (or donor) gametes is transferred into the surrogate's uterus, so she has no genetic link to the child. Only gestational surrogacy is now medically practised and, in India, legally permitted.

Types and indications

Feature	Traditional surrogacy	Gestational surrogacy
Oocyte source	Surrogate's own egg	Intending mother's (or donor) egg
Genetic link of surrogate to child	Present	Absent
Technique	Intrauterine insemination (IUI) with intending father's/donor sperm	Controlled ovarian stimulation + IVF, then embryo transfer
Legal status in India	Not permitted	Only form permitted (altruistic only)

- Absolute/irreparable uterine factor infertility — congenital (müllerian agenesis, Mayer–Rokitansky–Küster–Hauser syndrome) or acquired (prior hysterectomy, refractory Asherman syndrome, multiple myomas distorting the cavity).
- Recurrent unexplained pregnancy loss or repeated implantation failure despite repeated ART cycles, with a structurally adequate uterus excluded as the cause.
- Medical conditions in which pregnancy poses a serious/life-threatening risk (e.g., severe cardiac disease, pulmonary hypertension).

Eligibility criteria — Surrogacy (Regulation) Act, 2021 (India)

Criterion	Intending couple	Surrogate mother
Citizenship/status	Indian citizens; legally married man and woman (marriage subsisting ≥ 5 years); a widow/divorcee ("intending woman") is separately eligible under later amendment	Indian citizen
Age	Wife 23–50 years, husband 26–55 years	Ever-married woman with a child of her own, aged 25–35 years
Relationship to couple	—	Must be a **close relative** of the intending couple
Fertility/medical status	Certified infertility of one/both partners by a District Medical Board	Certified medically and psychologically fit for surrogacy
Existing children	No surviving child (biological, adopted, or surrogate) — exception if the surviving child is mentally/physically challenged or has a life-threatening disorder	Can act as a surrogate **only once** in her lifetime; may not donate her own gametes
Compensation	—	**Altruistic only** — no monetary reward beyond medical expenses and insurance cover; commercial surrogacy is a criminal offence

Before any procedure, the couple must obtain a **certificate of essentiality** (infertility certificate + Magistrate's parentage/custody order + surrogate insurance) and a **certificate of eligibility** for both parties from the "appropriate authority." Registered clinics are supervised by the **National/State Surrogacy Boards**. Commercial surrogacy, exploitation, abandonment, or sex-selection attract imprisonment up to 10 years and a fine up to ₹10 lakh. The child is deemed the biological child of the intending couple/woman with all rights of a natural child.

Procedure of gestational surrogacy

- Legal formalities — certificates of essentiality and eligibility, notarised agreement, court parentage order, surrogate insurance.
- Screening — surrogate (general/gynaecological exam, infection screen: HIV, hepatitis B/C, VDRL; uterine cavity assessment; psychological evaluation) and gamete source (infection and heritable-disease screen).
- Controlled ovarian stimulation and oocyte retrieval from the source; fertilisation by IVF/ICSI to create embryos.
- Endometrial preparation of the surrogate with sequential exogenous estrogen then progesterone, synchronised to embryo development, as in an oocyte-donation cycle.
- Embryo transfer — usually a single blastocyst, to minimise multifetal pregnancy.
- Luteal-phase support (progesterone ± estrogen) until the luteo-placental shift (~10–12 weeks).
- Antenatal care as a pregnancy of usual (or higher, if multiple) obstetric risk, through to delivery and handover of the child per the court-ordered parentage arrangement.

Ethical and legal issues, and complications

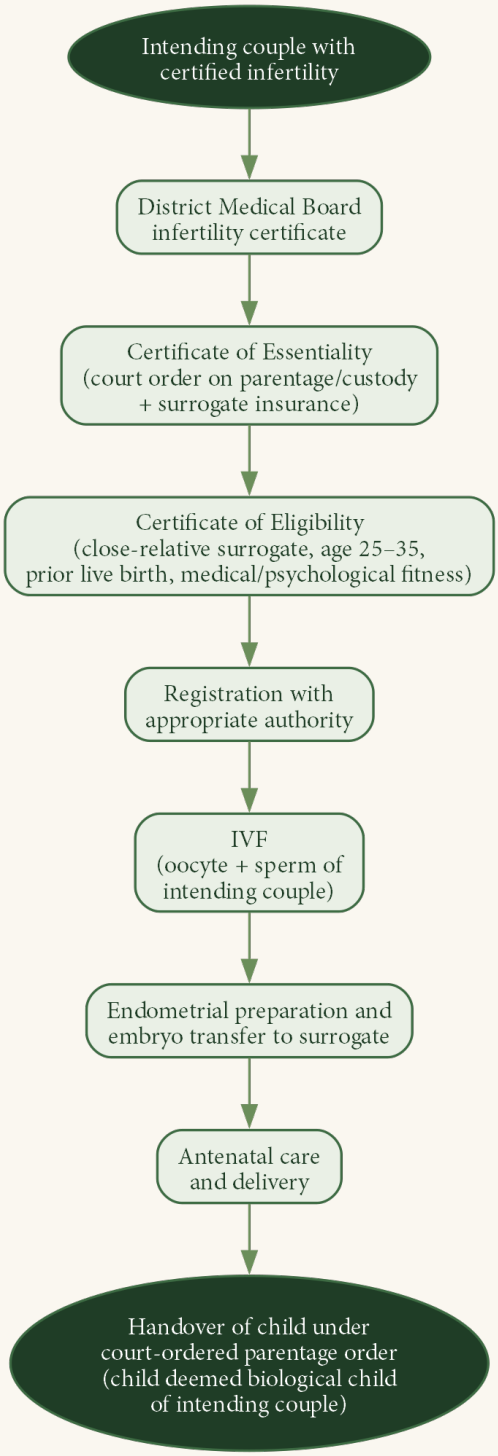
- Exploitation/commodification of a woman's reproductive capacity — the principal reason commercial surrogacy is banned in India.
- Obstetric risk borne entirely by the surrogate — pregnancy-induced hypertension, gestational diabetes, postpartum haemorrhage, multifetal pregnancy if more than one embryo is transferred.
- Psychological difficulty of relinquishing the child; pre-procedure counselling of all parties is essential.
- Disputes over legal parentage/custody if the couple separates, dies, or refuses a disabled child.
- Citizenship/parentage disputes in historical cross-border arrangements (a major driver of India's 2021 legislation).
- Religious/socio-cultural objections to third-party gamete/gestation arrangements in some communities.

Recent advances [RA]

- **Surrogacy (Regulation) Act, 2021** and the companion **Assisted Reproductive Technology (Regulation) Act, 2021** — India's first dedicated statutory framework, in force since 25 January 2022, replacing the earlier unregulated commercial-surrogacy industry with an altruistic-only model.
- Subsequent amendment rules have permitted **donor oocyte or sperm** for the intending couple where medically indicated (with at least one gamete from the couple), and extended eligibility to a single "intending woman" (widow/divorcee) using her own oocyte with donor sperm — reflecting ongoing regulatory recalibration.

- **National Surrogacy Board** and **State Surrogacy Boards** are now operational, with mandatory registration of surrogacy/ART clinics.
- International trend toward restricting commercial surrogacy for foreign nationals (e.g., Thailand, Nepal, Cambodia) after exploitation scandals; most regulating jurisdictions now permit altruistic surrogacy only.
- **Uterus transplantation** is an emerging alternative to gestational surrogacy for absolute uterine factor infertility, with the first live birth reported after uterus transplantation (Brännström et al., *Lancet* 2015), though it remains experimental with significant donor and recipient morbidity.
- Increasing use of **preimplantation genetic testing (PGT-A/PGT-M)** before embryo transfer in surrogacy cycles to select euploid/unaffected embryos and reduce miscarriage risk to the surrogate.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Legal–clinical pathway for gestational surrogacy in India, from infertility certification to child handover.

High-yield exam pointers

- Traditional surrogacy = surrogate's own egg (IUI, genetic link present); **gestational surrogacy** = IVF embryo, no genetic link to surrogate — only gestational surrogacy is legal in India.
- **Surrogacy (Regulation) Act, 2021** (in force 25-Jan-2022): **altruistic only**, commercial surrogacy banned.
- Surrogate must be a **close relative**, ever-married with a child of her own, aged **25–35 years**, can be a surrogate only **once**.
- Intending couple: married Indian couple, wife 23–50 / husband 26–55 years, certified infertility, no surviving child (except disability/life-threatening-illness exception).
- **Certificate of essentiality + certificate of eligibility** mandatory before any surrogacy procedure.
- Penalty for commercial surrogacy/exploitation/abandonment: imprisonment up to **10 years** + fine up to **₹10 lakh**.
- Classic indications: MRKH syndrome, post-hysterectomy, severe cardiac/pulmonary disease precluding pregnancy.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The Surrogacy (Regulation) Act, 2021 and its rules are India-specific legislation not covered in the Western spine textbooks (Williams, Berek & Novak, Speroff, Te Linde) in this corpus; the provisions above are stated from the Act's established public text — verify the latest Ministry of Health & Family Welfare notification, since the donor-gamete and single-woman provisions have been revised more than once since 2021.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e; Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e ("Gestational Carrier Surrogacy"); Surrogacy (Regulation) Act, 2021 and Assisted Reproductive Technology (Regulation) Act, 2021 (Government of India).

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Transfusion protocol

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

Definition — A transfusion protocol is the standardised sequence of steps — recognising the indication, performing compatibility testing, selecting the correct blood component in the correct dose, and (once bleeding is life-threatening) triggering a pre-defined fixed-ratio **Massive Transfusion Protocol (MTP)**

— that ensures rapid, safe blood replacement in a pregnant or puerperal woman. It is central to reducing haemorrhage-related maternal mortality.

Indications for transfusion in obstetrics

Clinical setting	Indication
Antenatal anaemia	Haemoglobin (Hb) <7 g/dL at any gestation (symptomatic/decompensating anaemia); severe anaemia persisting beyond 36 weeks — to build reserve before labour; anaemia **refractory** to oral/parenteral iron; anaemia with cardiac decompensation or associated infection
Peripartum/postpartum haemorrhage (PPH)	Ongoing obstetric haemorrhage with haematocrit <25% — rapid packed-cell infusion recommended; haemorrhagic shock; to replace measured/ongoing blood loss
Consumptive coagulopathy (abruption, amniotic fluid embolism, sepsis, HELLP)	Fresh-frozen plasma (FFP)/cryoprecipitate/platelets guided by coagulation profile — target fibrinogen >100 mg/dL, platelets >50,000/μL
Exchange transfusion (rarely used)	Cardiac failure from severe anaemia; severe anaemia requiring surgery; packed-cell volume <13% near term

Pre-transfusion protocol (steps)

- **Informed consent**, explaining risks and alternatives.
- **Type and screen** — ABO/Rh grouping plus antibody screen against standard reagent red cells; performed routinely on admission in labour for any woman at significant haemorrhage risk (prediction of who will bleed is poor).
- **Crossmatch** actual donor units once transfusion is anticipated or bleeding is occurring — uses donor erythrocytes rather than standardised cells and is the definitive compatibility test.
- **Positive patient identification** and bedside compatibility check at issue and immediately before infusion.
- **Select the component** appropriate to the indication — whole blood is now rarely used; packed red blood cells (PRBC)/FFP/cryoprecipitate/platelets are used selectively.
- **Premedicate** in chronic severe anaemia — antihistaminic (e.g., promethazine 25 mg IM) and a diuretic (e.g., furosemide 20 mg IM) 2 hours before, to reduce reaction risk and cardiac overload.
- **Control the rate** — 80–100 mL per sitting at ~10 drops/min in chronic anaemia, not repeated within 24 hours (to allow circulatory readjustment); free, rapid infusion in acute haemorrhagic shock.

- **Monitor** pulse, respiration, temperature and basal crepitations throughout, and observe for delayed reactions for several hours after.
- **Document** unit numbers, times and any reaction.

Blood components used and their properties

Component	Volume/unit	Key contents	Effect of 1 unit	Compatibility
Whole blood (fresh)	~500 mL	RBC + plasma + factors + platelets	Raises fibrinogen ~12.5 mg/dL; adds 10,000–15,000 platelets/mm^3	ABO/Rh
PRBC	~300 mL (250 RBC + 50 plasma)	Red cells	Hb ↑ by 1 g/dL; haematocrit ↑ by 3%	Must be ABO compatible
Fresh-frozen plasma	~250 mL	Fibrinogen, antithrombin III, factors V, XI, XII	Fibrinogen ↑ by 5–10 mg/dL	ABO/Rh compatible
Cryoprecipitate	~40 mL (from thawed FFP)	Fibrinogen, factor VIII, von Willebrand factor, factor XIII	Fibrinogen ↑ by 5–10 mg/dL (low volume — not for volume replacement)	—
Platelet concentrate	~50 mL/unit	Platelets	Count ↑ by ~7,500–10,000/µL per random-donor unit	ABO/Rh specific; single-donor apheresis preferred (lower immunogenic risk)

Massive transfusion protocol (MTP)

- **Trigger**: activated once **4–5 units of PRBC have been given within about 2 hours**, or when massive ongoing/anticipated blood loss is recognised — this speeds product delivery and helps avoid dilutional coagulopathy.
- **Fixed-ratio regimens** (products released as pre-set packs rather than ordered individually):
- **Simple ratio** — 6 units PRBC : 4 units FFP : 1 unit platelet concentrate (**6:4:1**), with cryoprecipitate added as needed.
- **Round-based protocol** (e.g., Parkland Hospital obstetric MTP) — repeating rounds of 5 units PRBC + 3 units FFP, with a 6-pack of pooled platelets added on alternating rounds and 1 unit of cryoprecipitate added periodically; over several rounds this approximates a **PRBC:FFP:platelet ratio of roughly 1:1:1**.

- **Adjuncts**: tranexamic acid (TXA) 1 g IV; recombinant activated factor VIIa (rFVIIa) 60–100 µg/kg IV (onset 10–40 min, half-life ~2 hours); fibrinogen concentrate in refractory hypofibrinogenaemia.
- **Autologous options**: intraoperative **cell salvage** ("cell saver") — blood from the operative field is filtered and red cells re-infused; reduces exposure to infective/immunological risk of donor blood and has not shown an increased risk of amniotic fluid embolism in trials, though it has not consistently reduced allogeneic transfusion rates. Pre-donated autologous blood is reserved for rare blood types/unusual antibodies.

Monitoring and complications of transfusion

Category	Features	Note
Acute haemolytic/immune reaction	Fever, hypotension, tachycardia, dyspnoea, flank/chest pain, flushing, haemoglobinuria	**Stop the transfusion immediately**; treat hypotension/hyperkalaemia; induce diuresis; alkalinise urine
Febrile/allergic/anaphylactic	Urticaria, chills, bronchospasm	Antihistamines, slow/stop rate
Transfusion-related acute lung injury (TRALI)	Severe dyspnoea, hypoxia, pulmonary oedema within 6 hours	Supportive; may need ventilation
Transfusion-associated circulatory overload (TACO)	Dyspnoea, pulmonary oedema (commonest cause of transfusion-related death, ~1%)	Diuretics, slow rate, cardiac monitoring
Infective	Bacterial (Yersinia, Pseudomonas — more with platelets stored at room temperature), viral (HIV/HBV/HCV/CMV — now rare with screening), parasitic (malaria)	Screening minimises risk
Metabolic/other	Fluid overload, hypothermia, hyperkalaemia, hypocalcaemia, acidosis	Warmed blood, calcium if massive transfusion

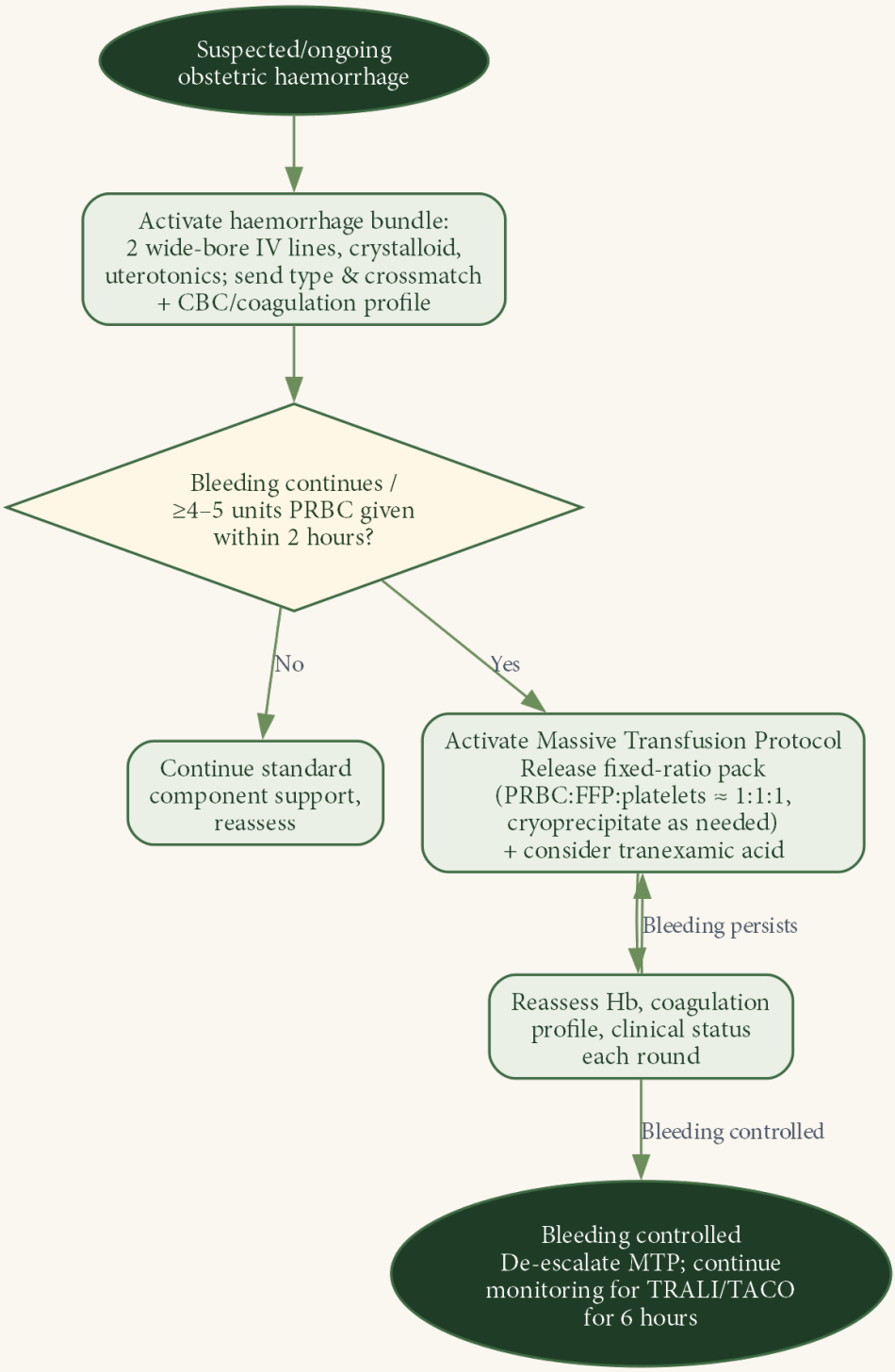
Recent advances [RA]

- **Viscoelastic point-of-care assays** — thromboelastography (TEG) and rotational thromboelastometry (ROTEM) profile clot formation and lysis in real time from whole blood, guiding targeted component replacement during massive transfusion; pregnancy-specific reference ranges (reflecting the physiological hypercoagulable state) are now validated, though value is limited in torrential haemorrhage requiring minute-to-minute decisions.
- **Tranexamic acid (WOMAN trial, 2017)** — a randomised trial of PPH after vaginal or caesarean birth showed a 1-g IV dose of TXA plus standard care reduced death from obstetric

haemorrhage to 1.2% versus 1.7% with standard care alone; benefit is greatest when given early after bleeding onset.

- **Patient blood management** — antenatal correction of iron-deficiency anaemia (IV iron) to build reserve and reduce reliance on allogeneic transfusion; restrictive (vs liberal) transfusion thresholds show comparable outcomes in critically ill patients, informing individualised obstetric thresholds.
- **Fibrinogen concentrates** (e.g., pooled virus-inactivated concentrates) as an alternative source of fibrinogen replacement to cryoprecipitate in selected centres.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Massive transfusion protocol activation algorithm in obstetric haemorrhage.

High-yield exam pointers

- MTP trigger: **4–5 units PRBC within 2 hours** (or anticipated massive loss).
- Ratio to write: **PRBC:FFP:platelets = 1:1:1** (round-based protocol) or Dutta's simple **6:4:1**.

- 1 unit PRBC → Hb **+1 g/dL**, haematocrit **+3%**.
- 1 unit FFP/cryoprecipitate → fibrinogen **+5–10 mg/dL** each; 1 unit platelets → count **+7,500–10,000/μL**.
- Target in DIC/consumptive coagulopathy: fibrinogen **>100 mg/dL**, platelets **>50,000/μL**.
- Tranexamic acid **1 g IV** — WOMAN trial mortality benefit.
- Transfusion reaction → **stop the transfusion first**, then treat.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> The exact fixed-ratio regimen quoted varies by protocol/source — Dutta's Indian-exam-standard 6:4:1 versus the round-based, approximately-1:1:1 protocol described in Williams Obstetrics 26e — either is acceptable if the source logic (fixed pre-released packs to avoid dilutional coagulopathy) is explained.

> **SOURCE & COVERAGE**
>
> DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e. (Guideline context: RCOG and ACOG both endorse fixed-ratio massive transfusion protocols and early tranexamic acid for obstetric haemorrhage management; corpus used here is textbook-based, so guideline text itself was not directly grepped.)

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Tubal recanalisation

Asked in: Paper IV May 2019 · Paper IV Oct 2009 · Paper III Oct 2009 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — Tubal recanalisation (tubal reanastomosis, colloquially "reversal of sterilization") is a reconstructive microsurgical procedure that excises the blocked or damaged tubal segment and re-establishes patency and continuity of the fallopian tube by end-to-end anastomosis, performed to restore fertility in a woman who regrets a prior tubal sterilization or has an isolated proximal/mid-tubal block.

Indications and patient selection

Favourable factors	Unfavourable factors
Age < 35 years	Age > 35–40 years, diminished ovarian reserve
Sterilization by **ring (Falope/Yoon) or clip (Filshie/Hulka)**	Sterilization by **cautery**, especially multiple-burn electrocoagulation
Short interval since sterilization	Reversal attempted > **5 years** after sterilization

Favourable factors	Unfavourable factors
Isthmic–isthmic anastomosis feasible	Isthmic–ampullary anastomosis (higher ectopic risk)
Adequate final reconstructed tube length	Reconstructed tube < **4 cm**; bilateral hydrosalpinx > 3 cm
No other infertility factor; fertile male partner	Coexisting male factor, endometriosis, or ovulatory disorder
Couple desires ≥ 2 further pregnancies	Only one further child desired (favours IVF instead)

(Speroff 9e; DC Dutta's Gynaecology 7e; Williams Obstetrics 26e)

Preoperative evaluation

- **Counselling** of the couple — the permanence discussed at sterilization must be revisited, along with reversal success rates, cost, ectopic risk, and **in-vitro fertilisation (IVF)** as an alternative.
- **Semen analysis** of the male partner before committing to surgery.
- **Hysterosalpingography (HSG)** to assess the proximal tubal stump and confirm the site/method of prior sterilization.
- **Diagnostic laparoscopy** if the sterilization method is unknown or other pelvic pathology (adhesions, hydrosalpinx) is suspected — fewer than 5% of women turn out to have truly irreparable tubes.
- Assessment of **ovarian reserve** and age, since age is the single most important prognostic factor for a live birth after reversal.

Principles and technique

Tuboplasty is the umbrella term for finer reconstructive tubal operations; recanalisation/reanastomosis is the specific operation used after sterilization.

Procedure	Use
Adhesiolysis (salpingo-ovariolysis)	Division of peritubal/periovarian adhesions
Fimbrioplasty / fimbriolysis	Release of fimbrial phimosis or agglutinated fimbriae
Salpingostomy (terminal "cuff")	Creates a new ostium in a completely occluded distal tube
Tubotubal anastomosis	Diseased/ligated mid-segment is resected and the healthy ends joined end-to-end — the operation of choice for reversal of tubal ligation
Tubocornual anastomosis	For cornual block — the healthy distal tube is anastomosed to the patient's own interstitial (cornual) segment

Operative steps, following microsurgical principles (by laparotomy, laparoscopy, or robot-assisted laparoscopy):

- Excise the occluded/damaged segment (the clipped, ringed, or cauterised stump) back to healthy, patent tube on both sides; confirm distal patency by chromopertubation.
- Approximate the mesosalpinx first so the tubal ends are aligned without tension.
- A temporary intraluminal splint (fine nylon) may be threaded across the anastomosis to guide alignment; if left in situ it is removed within 48 hours to limit mucosal damage.
- Anastomose in layers under **8–10× magnification** — mucosa-to-mucosa, then muscularis, then serosa — using **4–5 interrupted 8-0 polyglactin sutures**.
- Irrigate with **Ringer's lactate with added heparin or hydrocortisone** to reduce adhesion formation; minimal tissue handling and meticulous haemostasis throughout give the best results (microsurgical technique performed laparoscopically gives the best overall outcome).
- Adjuncts: prophylactic antibiotics, adhesion-barrier agents (Interceed/Seprafilm), and postoperative **hydrotubation** — gentamicin 80 mg + dexamethasone 4 mg in 10 mL distilled water, instilled transcervically in the post-menstrual phase.

Results

Route / scenario	Pregnancy or live-birth rate	Ectopic pregnancy rate
Reversal of tubal ligation, overall	50–82%	3–7%
Microsurgical reanastomosis via laparotomy	44–82% live birth	2–10% (higher isthmic–ampullary than isthmic–isthmic)
Laparoscopic tubal anastomosis (microsurgical principles)	25–53%	comparable to laparotomy
Robot-assisted tubal anastomosis	comparable to open microsurgery; longer operating time, shorter hospital stay/recovery	possibly increased
Reversal of hysteroscopic (Essure) sterilization	0–27% live birth	—

(DC Dutta's Gynaecology 7e; Speroff 9e; Williams Obstetrics 26e)

Complications and factors for poor outcome

- **Ectopic pregnancy** — the most important specific complication; risk is highest with an isthmic-ampullary anastomosis.
- Anastomotic re-stenosis or failure, pelvic infection, and adhesion reformation.

- General laparotomy/laparoscopy risks — haemorrhage, visceral injury, anaesthetic complications.

Factors predicting a poor outcome:

- Dense pelvic adhesions.
- Loss of fimbriae.
- Bilateral hydrosalpinx > 3 cm.
- Length of the reconstructed tube < 4 cm.
- Reversal performed > 5 years after the sterilization operation.
- Presence of another coexisting infertility factor.

Recent advances [RA]

- **Laparoscopic microsurgical anastomosis** by experienced surgeons gives pregnancy rates (25–53%) approaching laparotomy, with faster recovery (Speroff 9e, citing Yoon et al., *Fertil Steril* 1999).
- **Robot-assisted tubal reanastomosis** facilitates fine intracorporeal suturing for surgeons less experienced in open microsurgery; comparative series (Rodgers et al., *Obstet Gynecol* 2007; Dharia Patel et al., *Fertil Steril* 2008; Falcone et al., *Fertil Steril* 2000) report pregnancy rates comparable to open surgery with shorter hospital stay, though operating time is longer and ectopic risk may be marginally higher.
- A large **population-based cohort** (Malacova et al., *Fertil Steril* 2015) confirmed durable live-delivery rates after tubal sterilization reversal, reinforcing age as the dominant prognostic variable.
- **Reversal of hysteroscopic (Essure) sterilization** carries a distinctly lower and more variable live-birth rate (0–27%) than reanastomosis after clip/ring/Pomeroy ligation, because it requires cornual resection and uterotubal reimplantation rather than a simple tubotubal repair (Fernandez et al. 2014; Monteith et al., *Obstet Gynecol* 2014).
- With **IVF success rates now exceeding 40% per cycle**, tubal reanastomosis and IVF are competing options: reanastomosis is favoured for young women with a fertile partner, no other infertility factor, and desire for more than one further child; IVF is favoured for older women, severe tubal damage, or coexisting infertility factors (Speroff 9e).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 17.6 — Tubotubal anastomosis. Placement of four to five interrupted sutures using 8–0 polyglactin (under 10× magnification) (DC Dutta's Gynaecology 7e, p.222)*

High-yield exam pointers

- Best-case combination = **ring/clip sterilization + isthmic-isthmic anastomosis + age < 35 + reconstructed tube ≥ 4 cm** → pregnancy rate up to 82%.
- Sutures: **4–5 interrupted 8-0 polyglactin**, under **10× magnification**.
- Hydrotubation fluid = **gentamicin 80 mg + dexamethasone 4 mg in 10 mL distilled water**, given post-menstrual phase.
- Poor-outcome sextet: dense adhesions, lost fimbriae, hydrosalpinx > 3 cm, tube < 4 cm, > 5 years since sterilization, coexisting infertility factor.
- Ectopic risk after reanastomosis = **2–10%**, higher with isthmic-ampullary repair.
- Essure reversal live-birth rate (0–27%) is much lower than tubal-ligation reversal — do not equate the two.

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

DC Dutta's figures for reversal pregnancy and ectopic rates agree closely with Speroff 9e and Williams Obstetrics 26e for this topic — no material textbook-versus-current-evidence discrepancy was found.

SOURCE & COVERAGE

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

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Tubal sterilization – various routes and their advantages

Asked in: Paper IV 17-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Tubal sterilization (tubectomy) is a permanent surgical method of contraception in which both fallopian tubes are occluded — by ligation-resection, mechanical clips/rings, electrocoagulation, or transcervical microinserts — so that ovum and sperm can no longer meet. It is the commonest

method of terminal contraception worldwide and the mainstay of India's National Family Welfare Programme, done by an abdominal, laparoscopic, vaginal, or hysteroscopic route.

Routes and their timing

Route	Variants	Usual timing
Abdominal	Conventional laparotomy; **minilaparotomy** (mini-lap)	Puerperal (24–48 h post-delivery) or interval (>3 months after delivery/abortion, ideally proliferative phase)
Laparoscopic	Single- or double-puncture	Interval period, concurrent with MTP, or **not within 6 weeks of delivery** (dilated, oedematous tubes)
Vaginal	Posterior colpotomy (± with vaginal plastic repair)	Interval only; uterus <12 weeks size, no adnexal mass
Hysteroscopic/transcervical	Essure microinsert, quinacrine pellets (both non-surgical)	Interval, outpatient, no anaesthesia
Concurrent	With caesarean section or MTP	At the time of the primary procedure

Surgical techniques by route

- **Pomeroy's method** (abdominal, commonest) — a loop of mid-tube (isthmus/proximal ampulla) is held up, ligated at its base with No. '0' chromic catgut, and 1–1.5 cm of the loop excised; absorption of catgut lets the cut ends retract widely apart. Failure rate **0.1–0.5%** — lowest of the ligation techniques.
- **Parkland method** — mesosalpinx is separately perforated and the isolated ~2.5 cm tubal segment is ligated proximally and distally before excision, avoiding the initial apposition of cut ends inherent to Pomeroy's.
- **Irving method** — tube ligated and divided; the proximal (medial) stump is buried into a myometrial tunnel in the posterior uterine wall, the distal stump into the mesosalpinx.
- **Uchida technique** — saline injected subserosally to raise a bleb; tube ligated and 3–5 cm resected; proximal stump buried under the serosa, distal stump left open — virtually no reported failures; basis of the mini-lap popularised by Uchida (Japan, 1961).
- **Madlener's method** — the tubal loop is merely crushed and tied (not excised); technically easiest but **failure rate 1.5–7%**, so it is now abandoned.
- **Kroener fimbriectomy** — the fimbrial end is ligated and resected; rarely used.
- **Laparoscopic occlusion** — via single- or double-puncture technique: **Silastic (Falope/Yoon) ring** at the proximal-middle junction of the tube; **Filshie clip** (titanium, silicone-lined, destroys only 4

mm of tube); **Hulka-Clemens spring clip**; or **unipolar/bipolar electrocoagulation** of 2–3 cm of tube (bipolar safer but less effective than unipolar).

- **Vaginal (colpotomy) ligation** — tube delivered through a posterior colpotomy incision and ligated (usually Pomeroy-type); needs additional vaginal-surgery skill.
- **Hysteroscopic transcervical methods** — **Essure**: a metal-polyester microinsert placed at the proximal tubal ostium, causing fibrotic occlusion confirmed by hysterosalpingogram at 3 months; **quinacrine pellets**: instilled into the fundus via an IUD-type inserter to sclerose the ostia (WHO advises against routine use over carcinogenesis concerns).
- **Total salpingectomy** — increasingly preferred at caesarean section, postpartum, or interval surgery over partial tubectomy where feasible, for its added ovarian-cancer risk reduction (below).

Advantages by route

Route	Key advantages	Main limitation
Abdominal (conventional laparotomy)	Simple, can be done by any surgeon competent in general surgery; suits puerperal timing when uterus is easily accessible at the umbilicus; no special equipment	Larger incision, longer hospital stay (5–6 days)
Minilaparotomy	Small (1.5–2 cm) incision under **local anaesthesia**; least equipment/maintenance cost; can be done at **any time** — puerperium, interval, or with MTP; practically no contraindication; mainstay of camp-based national programmes; discharge in 24–48 h	Reversibility poorer (adhesions, tubal length loss); longer operative time than laparoscopy
Laparoscopic	Minimal scar, minimal pain, ambulatory (discharge in 3–4 h), rapid return to activity; direct visual confirmation of correct structure grasped; allows pelvic inspection for incidental pathology; best reversibility with clips/rings (only 4 mm tube destroyed with Filshie clip)	Needs costly equipment and a specially trained surgeon; contraindicated in cardiopulmonary disease, dense adhesions, gross obesity; small risk of major vessel/bowel injury

Route	Key advantages	Main limitation
Vaginal (colpotomy)	No visible abdominal scar; short hospital stay; convenient in obese women	Longer operating time, needs vaginal-surgery expertise, higher infection (abscess ~1%) and failure rates; laparotomy may be needed if difficulty arises
Hysteroscopic/transcervical	No incision at all; outpatient, often without anaesthesia; ideal for poor surgical candidates	Delayed efficacy (needs interval confirmation of occlusion); Essure withdrawn from the market (2018) after adverse-event reports

Failure rates (grounding check)

- Overall tubal sterilization failure ≈ **0.7%** in the short term (Pomeroy's lowest at 0.1–0.5%; Madlener's highest at 1.5–7%) — DC Dutta.
- Laparoscopic method-wise: unipolar coagulation 0.75%, bipolar 2.1%, Falope ring 1.7%, Filshie clip 0.1%.
- The **US Collaborative Review of Sterilization (CREST)** followed 10,863 women and found a **10-year cumulative failure rate of 18.5/1000 (≈1.85%)** across all tubal methods, with the spring clip having the highest and unipolar coagulation/postpartum partial salpingectomy/Filshie clip among the lowest cumulative rates; about 30% of post-sterilization pregnancies are ectopic.

Recent advances [RA]

- **Opportunistic/risk-reducing salpingectomy** — because most pelvic serous (ovarian/tubal/peritoneal) cancers arise in the fimbria, ACOG (Committee Opinion No. 774, 2019) and the Society of Gynecologic Oncologists recommend discussing bilateral **total salpingectomy** in place of tubal ligation for sterilization in average-risk women, whenever abdominopelvic surgery, caesarean delivery, or hysterectomy is being performed; tubal ligation alone lowers ovarian cancer risk by about 30%, while salpingectomy may lower it by 42–78%, with no proven increase in operative morbidity or loss of ovarian reserve, though it adds 5–10 minutes of operating time.
- **Essure withdrawal** — the hysteroscopic Essure coil was withdrawn from the US market in 2018–2019 after reports of chronic pelvic pain (2–6% of insertions), perforation, and device migration; women with retained devices desiring removal are managed by laparoscopic salpingectomy or linear salpingostomy with device retrieval.
- **Access to postpartum sterilization** — ACOG (Committee Opinion No. 827, 2021) highlights consent-timing and insurance barriers that cause many women who request postpartum tubal ligation to miss the procedure, and recommends counselling and consent well before labour together with flexible scheduling.

- **PYQ relevance** — this exact question (routes and advantages) is a recurring RGUHS Paper IV (Social Obstetrics/Family Welfare) topic, reflecting its national-programme importance.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 14.10 — Pomeroy technique for tubal sterilization. A: Ligation of loop of fallopian tube. B: Subsequent transection and retraction of tubal ends (Berek & Novak 16e, p.829)*

High-yield exam pointers

- Four routes to recall in order: **abdominal (laparotomy/mini-lap) → laparoscopic → vaginal (colpotomy) → hysteroscopic/transcervical**.
- Mini-lap = mainstay of India's family welfare camps: cheapest, any-time, local anaesthesia, no special equipment.
- Pomeroy = commonest technique, failure **0.1–0.5%**; Madlener abandoned (failure up to 7%); Uchida = basis of mini-lap.
- Laparoscopic devices: Falope ring, Filshie clip (destroys only 4 mm tube — best for reversal), Hulka-Clemens spring clip, uni-/bipolar coagulation.
- CREST study: **10-year cumulative failure ≈1.85%** across all methods; ~30% of failures are ectopic.
- Recent advance: **opportunistic/total salpingectomy** now preferred over partial tubectomy for added ovarian-cancer risk reduction (ACOG CO 774, 2019).

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

Failure-rate figures quoted from DC Dutta's Gynaecology 7e (short-term/method-wise rates) and from Williams Obstetrics 26e citing the US Collaborative Review of Sterilization (10-year cumulative rate) describe different follow-up horizons, not a factual conflict; the cumulative CREST figures are the current benchmark cited in counselling.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Williams Obstetrics 26e; Berek & Novak's Gynecology 16e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; ACOG Committee Opinions No. 774 (2019) and No. 827 (2021).

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Vaccination in pregnancy

Asked in: Paper IV Nov 2016 · Paper I Nov 2016 · Paper IV Apr 2008 (3×) — RGUHS MS Obstetrics & Gynaecology

Definition — Vaccination in pregnancy is the deliberate antenatal administration of an antigenic preparation (inactivated/killed organism, toxoid, subunit or recombinant antigen, or — rarely, under strict risk-benefit assessment — a live-attenuated agent) to protect the mother from a specific infection and, for several vaccines, to transfer protective maternal antibody transplacentally to the neonate. **Live-attenuated vaccines are generally contraindicated** because of a theoretical risk of transmissible infection/teratogenicity to the fetus, whereas inactivated, toxoid, subunit and recombinant vaccines are not associated with adverse fetal outcomes and are safe antenatally.

Classification and the governing principle

Type	Examples relevant to pregnancy	Safety in pregnancy
Live-attenuated	MMR (measles, mumps, rubella), varicella, zoster, oral polio, yellow fever, intranasal live influenza (LAIV), smallpox (vaccinia), BCG	**Contraindicated** — theoretical fetal risk; give postpartum
Inactivated/killed whole-organism	Injectable (inactivated) polio, inactivated influenza (IIV), rabies	Safe — not associated with adverse fetal outcome
Toxoid	Tetanus, diphtheria (as in Tdap)	Safe — actively recommended every pregnancy
Subunit / recombinant / polysaccharide-conjugate	Hepatitis B, hepatitis A, pneumococcus, meningococcus, HPV (not recommended, but not teratogenic if inadvertently given), recombinant/mRNA COVID-19	Safe; given if indicated by risk or routine recommendation

Vaccines contraindicated in pregnancy

Vaccine	Reason / comment
Measles, mumps, rubella (MMR)	Contraindicated; congenital rubella syndrome has never been documented after inadvertent vaccination — not an indication for termination
Varicella, zoster	Contraindicated; teratogenicity theoretical, no adverse outcome reported to date
Oral polio (live)	Not routinely used; inactivated (injectable) form preferred

Vaccine	Reason / comment
Yellow fever	Contraindicated except unavoidable travel to a high-risk endemic area (risk of disease outweighs theoretical vaccine risk)
Smallpox (vaccinia)	Contraindicated in the woman **and** her household contacts — the only vaccine with proven fetal harm
HPV vaccine	Not recommended; complete/continue the series postpartum

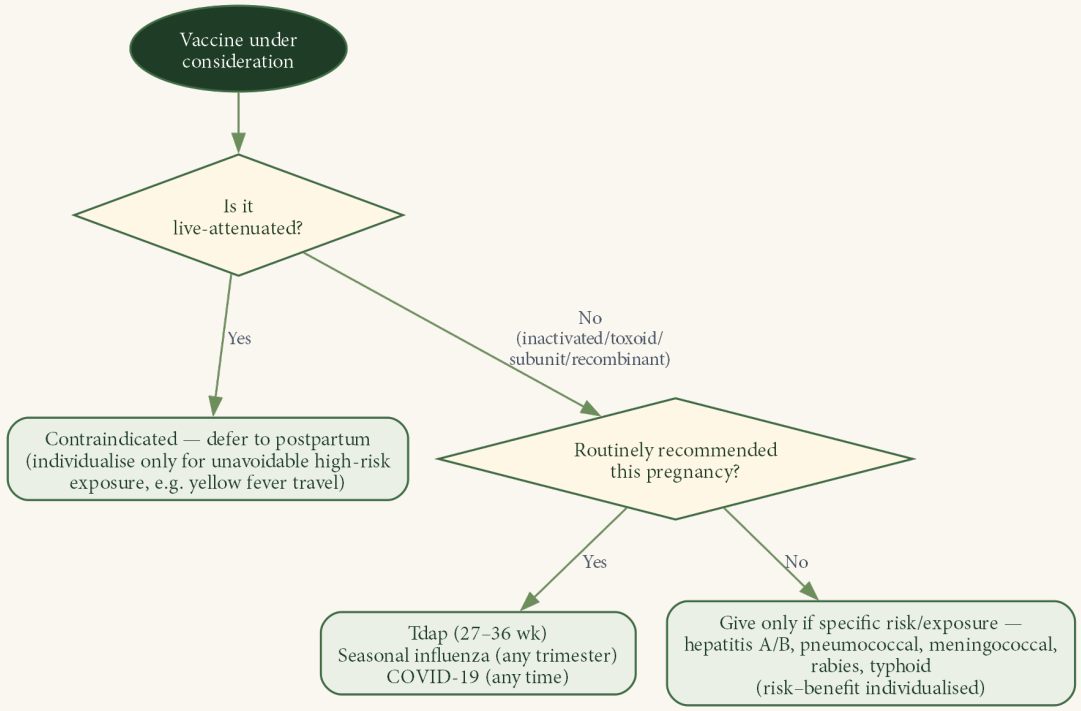
Vaccines recommended / given in pregnancy

Vaccine	Indication	Dose & schedule
Tetanus-diphtheria-acellular pertussis (Tdap)	Recommended in **every** pregnancy	Single dose IM, preferably **27–36 weeks** gestation, to maximise passive antibody transfer to the neonate; primary series (unvaccinated) = 2 doses 1–2 months apart + 3rd dose 6–12 months later
Tetanus toxoid (TT)/Td — Indian ANC programme	Universal, protects mother and neonate against tetanus	**Unimmunised**: 0.5 mL IM, 2 doses 6 weeks apart, 1st dose between **16–24 weeks**; **previously immunised**: single 0.5 mL IM booster in the last trimester
Influenza (inactivated, IIV, or recombinant, RIV)	All pregnant women during flu season (October–May), any trimester	One dose IM every year; **live intranasal (LAIV) must not be used** in pregnancy
COVID-19 (mRNA/recombinant)	ACOG/SMFM recommend vaccination of all eligible pregnant and lactating women	Per current primary/booster schedule; common reactions — injection-site pain, headache, fatigue, myalgia, low-grade fever
Hepatitis B	Pre-/post-exposure in women at risk (chronic liver/renal disease, high-risk exposure)	3-dose series IM at 0, 1, 6 months; exposed newborn needs birth-dose vaccine + hepatitis B immune globulin
Hepatitis A	Pre-/post-exposure if at risk (travel, chronic liver disease)	2-dose series IM, 6 months apart
Pneumococcus, meningococcus	Only for specific indications (chronic cardiac/lung/renal disease, asplenia, outbreak exposure) — not routine	Per standard adult schedule

Special situations

- **Inadvertent live-vaccine exposure** (e.g., MMR/varicella given before pregnancy was recognised): reassure — risk is theoretical; termination of pregnancy is **not** indicated; counsel on avoiding conception for ~1 month after any live vaccine.
- **Travel vaccines** (yellow fever, typhoid, rabies, Japanese encephalitis): individualise — weigh risk of the endemic disease against the theoretical vaccine risk; inactivated/killed formulations are preferred where a choice exists.
- **Rabies post-exposure prophylaxis**: pregnancy does not alter the indication, dose, or route — vaccinate as in the non-pregnant state, with rabies immune globulin as indicated.
- **Immunocompromised or high-risk women** (asplenia, chronic disease, HIV): additional indicated vaccines (pneumococcal, meningococcal, hepatitis B) are given per risk, never live vaccines.
- **Postpartum catch-up**: any live vaccine deferred in pregnancy (MMR, varicella) is given immediately postpartum; breastfeeding is **not** a contraindication to maternal vaccination with any of the above.
- **Needle-stick/occupational exposure in health-care workers**: hepatitis B vaccination and avoidance of blood-to-blood contact is advised regardless of pregnancy status.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart — approach to vaccination in a pregnant woman.

Recent advances [RA]

- **Maternal respiratory syncytial virus (RSV) vaccination** — a bivalent prefusion-F (RSVpreF) vaccine, given as a single IM dose at **32–36 weeks** gestation, was shown in the phase III MATISSE trial (Kampmann et al., *NEJM* 2023) to reduce severe RSV lower-respiratory-tract illness in infants during their first 90–180 days of life; it is now endorsed for seasonal maternal administration by ACOG, representing the newest addition to the antenatal immunisation schedule.
- **COVID-19 vaccine safety data in pregnancy** — the CDC's v-safe pregnancy registry and case-control analyses (Shimabukuro, 2021; Zauche, 2021, both *NEJM*) found no increase in miscarriage risk with mRNA COVID-19 vaccination, and Adhikari & Spong (*JAMA* 2021) summarised the evidence supporting ACOG/SMFM's (2021) recommendation that all eligible pregnant and lactating women receive the vaccine — reversing the initial exclusion of pregnant women from pivotal trials.
- **Maternal Group B Streptococcus (GBS) conjugate vaccine** candidates are in phase II/III trials, aimed at preventing early-onset neonatal GBS disease through transplacental antibody transfer, analogous to Tdap — not yet licensed.

- **WHO SAGE prioritisation**: pregnant women remain in the highest-priority group for seasonal inactivated influenza vaccination in WHO's global immunisation strategy, given the disproportionate risk of severe influenza-related morbidity/mortality in pregnancy.

High-yield exam pointers

- Rule to write first: **live-attenuated = contraindicated; killed/toxoid/subunit/recombinant = safe** in pregnancy.
- Tdap dose: single IM dose, **27–36 weeks**, every pregnancy (ACOG); India's TT/Td programme: unimmunised → 2 doses 0.5 mL IM 6 weeks apart, 1st at **16–24 weeks**; previously immunised → 1 booster in last trimester.
- Influenza: **IIV/RIV yes, LAIV no** — any trimester, flu season.
- Inadvertent live-vaccine exposure is **not** an indication for termination of pregnancy.
- New 2023 addition: maternal **RSV vaccine at 32–36 weeks** (MATISSE trial).
- COVID-19 vaccine: ACOG/SMFM recommend it for all eligible pregnant/lactating women; no increased miscarriage risk shown.
- Smallpox (vaccinia) is the only vaccine with **proven** fetal harm.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Obstetrics 9e describes only the classical tetanus toxoid regimen; the combined Tdap formulation (with acellular pertussis, timed 27–36 weeks) is the current ACOG/CDC standard and should be quoted alongside the Indian TT/Td schedule in the exam.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e (Table 9-3 Immunization Resources; Table 10-7 Recommendations for Immunization During Pregnancy and Postpartum; Chapter 67 — influenza and coronavirus infection); DC Dutta's Textbook of Obstetrics 9e (Antenatal Care — Immunization); American College of Obstetricians and Gynecologists / Society for Maternal-Fetal Medicine (2021) statement on COVID-19 vaccination; CDC v-safe pregnancy registry (Shimabukuro 2021; Zauche 2021, *NEJM*); Kampmann et al., MATISSE trial, *NEJM* 2023 (maternal RSV vaccine).

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What are reasons for high perinatal mortality in India? How can we reduce it?

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

Definition — The perinatal mortality rate (PMR) is the number of stillbirths (fetal deaths at ≥28 weeks' gestation or birthweight ≥1000 g) plus neonatal deaths within the first 7 completed days of life, expressed per 1000 total births. It is the single most sensitive index of the standard of antenatal, intranatal and immediate newborn care in a population. India's PMR remains high — about 20–24 per 1000 total births by recent Sample Registration System (SRS)/National Family Health Survey (NFHS-5, 2019–21) estimates, down from ~26/1000 a decade earlier — against <10/1000 in developed countries.

Reasons for high perinatal mortality in India

Category	Contributing factors
Socio-demographic	Illiteracy and poverty; low female literacy and gender bias against the girl child; teenage (<18 y) or elderly (>35 y) pregnancy; grand multiparity (>5); rural residence with poor access; unregulated fertility and closely spaced pregnancies
Health-system/access ("delays")	Delay in deciding to seek care; delay in reaching a facility (poor transport/referral chain); delay in receiving adequate care on arrival (understaffed/under-equipped first referral units, FRUs). Compounded by low antenatal-care coverage, unskilled birth attendance, under-use of the partograph, and inadequate emergency obstetric care (EmOC)
Maternal nutritional/medical	Anemia (Hb <8 g/dL); hypertensive disorders of pregnancy (pre-eclampsia–eclampsia); diabetes mellitus; infections — malaria, HIV, syphilis, urinary tract infection
Obstetric complications	Antepartum haemorrhage (abruptio placentae, placenta previa); cervical insufficiency; premature/prolonged rupture of membranes; multiple pregnancy; obstructed/prolonged labour and malpresentation; Rh isoimmunization
Fetoplacental/neonatal	Prematurity and low birth weight (mortality ~50% when birthweight <2 kg); congenital malformations and chromosomal anomalies; intrauterine growth restriction; birth asphyxia and birth trauma; neonatal sepsis, tetanus, hypothermia
Unexplained	~20% of stillbirths have no identifiable maternal, fetal, placental or obstetric cause

Proportionate contribution (DC Dutta, Box 38.3): infections (sepsis, meningitis, pneumonia, neonatal tetanus, congenital syphilis) 33%; birth asphyxia, trauma and hypothermia 28%; preterm birth/low birth weight 24%; congenital malformations 15%. Among **antepartum** deaths specifically: chronic hypoxia 30%, pregnancy complications 30%, congenital malformations 15%, infection 5%, unexplained 20%.

Measures to reduce perinatal mortality

1. Pre-pregnancy and adolescent health

- Genetic counselling and prenatal diagnosis in high-risk couples; correction of anemia and nutritional deficiencies before conception; birth-spacing/family-planning services to prevent unwanted and closely spaced pregnancies; adolescent reproductive health education.

2. Antenatal care

- Early registration of pregnancy (within 12 weeks); minimum 4 antenatal visits (WHO)/at least 3 per Government of India schedule; risk screening with prompt referral of high-risk cases; iron-folic acid and calcium supplementation; tetanus toxoid immunization; detection and treatment of anemia, hypertension, diabetes and infection.
- **Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA, 2016)** — free, fixed-day (9th of every month) antenatal check-up with specialist input to identify and follow up high-risk pregnancies.

3. Intranatal care

- Skilled birth attendant at every delivery; institutional delivery for all (100% target); "three cleans" — clean hands, clean perineum, clean cord-cutting surface/instrument; universal partograph use for early detection of obstructed/prolonged labour.
- Functional basic and comprehensive EmOC at primary health centres/community health centres and FRUs, with life-saving drugs — **misoprostol** (prevention of postpartum haemorrhage), **oxytocin** (treatment of postpartum haemorrhage), **magnesium sulfate** (eclampsia) — and interventions such as active management of the third stage of labour and manual removal of placenta.
- **LaQshya — Labour Room Quality Improvement Initiative (2017)** — upgrades labour room and maternity-OT quality of care to cut preventable intrapartum maternal and newborn deaths and stillbirths.

4. Essential and special newborn care

- Essential newborn care at birth — drying/warmth, resuscitation, early and exclusive breastfeeding, cord and eye care, prevention of hypothermia and infection; Kangaroo Mother Care for low-birth-weight babies; prompt referral of sick/preterm neonates to a Special Newborn Care Unit (SNCU).

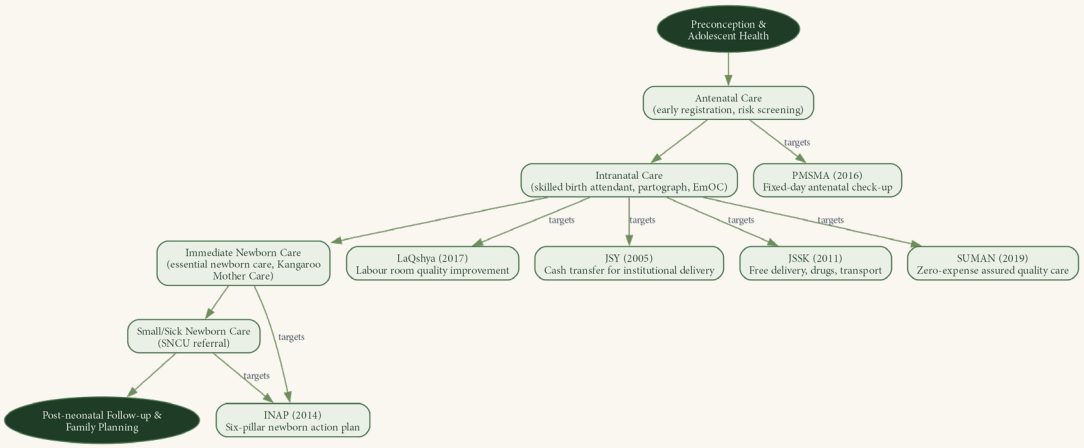
5. National programmes and policy framework

- **Janani Suraksha Yojana (JSY, 2005)** — conditional cash transfer to promote institutional delivery.
- **Janani Shishu Suraksha Karyakram (JSSK, 2011)** — free delivery (including caesarean), drugs, diagnostics, blood, diet and free transport for mother and sick newborn.
- **Surakshit Matritva Aashwasan (SUMAN, 2019)** — zero-expense, assured, dignified quality care for every pregnant woman and newborn at a public facility, with zero tolerance for denial of services.
- **Rashtriya Bal Swasthya Karyakram (RBSK)** — child screening for the "4 Ds" (defects at birth, deficiencies, diseases, developmental delays).
- **Anemia Mukt Bharat** and **POSHAN Abhiyaan** — address the nutritional determinants of low birth weight and preterm birth.
- **India Newborn Action Plan (INAP, launched September 2014)** — sets the target of a "single-digit" neonatal mortality rate and stillbirth rate by 2030, delivered through six pillars: pre-conception/antenatal care, intrapartum care, immediate newborn care, care of the healthy newborn, care of the small/sick newborn, and care beyond newborn survival — implemented within the Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A) framework of the National Health Mission.

6. Community and health-system strengthening

- Empower ASHA (Accredited Social Health Activist) workers as community links for antenatal tracking, birth preparedness and referral; strengthen the referral system and transport (108/102 ambulance services); community health education on safe motherhood, breastfeeding and newborn danger signs; perinatal death audit/autopsy of every perinatal loss to identify preventable factors; strengthen civil registration for accurate vital statistics.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Continuum of care to reduce perinatal mortality in India, with supporting national schemes branching off at the stage each targets.

High-yield exam pointers

- PMR = (stillbirths + neonatal deaths <7 days) / 1000 total births; stillbirth = fetal death ≥28 weeks or birthweight ≥1000 g showing no sign of life.
- Box 38.3 percentages: infections 33%, birth asphyxia/trauma/hypothermia 28%, preterm/LBW 24%, congenital malformations 15%.
- Antepartum death breakdown: hypoxia 30%, pregnancy complications 30%, malformations 15%, infection 5%, unexplained 20%.
- Three delays model: delay in decision to seek care, delay in reaching facility, delay in receiving care at facility.
- Life-saving drugs to memorise: misoprostol (PPH prevention), oxytocin (PPH treatment), MgSO4 (eclampsia).
- Scheme-year pairing: JSY 2005 → JSSK 2011 → INAP 2014 → PMSMA 2016 → LaQshya 2017 → SUMAN 2019.
- Sustainable Development Goal (SDG) 2030 targets: neonatal mortality rate ≤12/1000 live births; under-5 mortality ≤25/1000 live births; maternal mortality ratio <70/100,000 live births.

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

Older textbook editions cite India's perinatal mortality rate as ~26/1000 total births and describe only Janani Suraksha Yojana/Janani Shishu Suraksha Karyakram; the newer national programmes (India Newborn Action Plan, LaQshya, Pradhan Mantri Surakshit Matritva Abhiyan, Surakshit Matritva Aashwasan) post-date most textbook editions and are drawn from current National Health Mission guidance — cite the scheme names and years given here.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Safe Motherhood, Epidemiology of Obstetrics); Williams Obstetrics 26e; National Health Mission, Government of India (India Newborn Action Plan 2014; LaQshya 2017; Pradhan Mantri Surakshit Matritva Abhiyan 2016; Surakshit Matritva Aashwasan 2019; Janani Suraksha Yojana 2005; Janani Shishu Suraksha Karyakram 2011); Sample Registration System 2020; National Family Health Survey-5 (2019–21).

◆ ◆ ◆

What are the standards of sterilization? Describe the various sterilization techniques in male and female

Asked in: Paper IV 04-Aug-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Sterilization is a **permanent surgical method of contraception** that purposefully and irreversibly destroys the reproductive capacity of an individual without affecting sexual function or hormonal status. The operation is called **vasectomy** in the male (occlusion of the vas deferens) and **tubectomy/tubal occlusion** in the female (occlusion of the fallopian tubes).

Standards of sterilization (National Family Welfare Programme)

Sterilization is a Government-sponsored terminal method, and quality is regulated through defined client, provider, facility and post-operative standards.

Domain	Standard
Client eligibility	Reproductive/marital age group, mentally competent to understand permanence; at least one living child generally required (relaxed for a medical hazard, e.g. severe cardiac disease); client must be fit for anaesthesia and surgery

Domain	Standard
Informed consent	Voluntary, written consent on the prescribed form after counselling on **permanence**, **failure rate**, **alternatives**, and that **reversal is not guaranteed**; spousal consent is not legally mandatory for a competent adult
Provider & facility	Only a **trained/certified surgeon** operates — laparoscopic sterilization needs specific certification; functioning OT/Fixed-Day Static Services with resuscitation, referral back-up and **sterilised/high-level-disinfected instruments**
Pre-operative work-up	History/examination to exclude contraindications (severe anaemia, uncontrolled hypertension/diabetes, active pelvic infection, pregnancy); haemoglobin, urine albumin/sugar
Post-operative follow-up	Minimum observation before discharge (shorter under local anaesthesia); follow-up at 24 hours, 7 days, 6 weeks; semen confirmation after vasectomy
Quality assurance	District/State QA Committees audit every sterilization death/complication/failure; a **Family Planning Indemnity Scheme** compensates the client and indemnifies the provider

Male sterilization — vasectomy

Vasectomy is bilateral resection and ligation of a segment of vas deferens, done as an outpatient/camp procedure under local anaesthesia.

- **Counselling and written consent** after explaining permanence, failure rate and the need for temporary contraception until sterility is confirmed.
- **Conventional vasectomy** — a small scrotal incision over each vas, the vas is delivered, a segment excised, and the cut ends ligated (± fascial interposition).
- **No-Scalpel Vasectomy (NSV)** — popularised by Li Shunqiang (China, 1991) and now the standard technique in the Indian national programme:
  - Vas is fixed against the skin with a ring (extracutaneous) clamp midway between the testis and the penile base.
  - Skin and vas sheath are **punctured** (not incised) with the sharp point of a specially designed dissecting forceps; the puncture is spread, not cut.
  - The vas is delivered, ~1 cm mobilised, and **ligated at two points 1 cm apart with No. '00' chromic catgut**; the intervening segment is excised.
  - **Fascial interposition or diathermy** of the divided ends reduces the failure/recanalisation rate.

- No skin suture is needed; a pressure dressing and scrotal support are applied; the same steps are repeated on the other side.

- **Post-operative advice** — additional contraception for **about 3 months (roughly 20 ejaculations)**; azoospermia is confirmed by **semen analysis at 12 and 16 weeks** (or a single test at 16 weeks) before the couple relies on vasectomy alone.

Advantages of NSV: less bleeding/haematoma, faster, fewer complications, quicker recovery — but it requires specific training.

Parameter	Value
Failure rate	~0.15%
Immediate complications	Scrotal haematoma, wound sepsis
Remote complications	Sperm granuloma, post-vasectomy pain syndrome, psychological impotence, spontaneous recanalisation (~1 in 2000) — **no increase in testicular cancer or ischaemic heart disease**
Reversal (vaso-vasostomy)	Up to 90% patency but only ~50% pregnancy rate

Female sterilization — timing and approaches

Female sterilization (**tubectomy**) occludes both fallopian tubes and may be done:

- **Puerperal** — within 24–48 hours of delivery (technically simple; combines recovery from delivery and surgery).
- **Interval** — beyond 6 weeks after delivery/abortion, ideally in the **proliferative (post-menstrual) phase** to exclude an early pregnancy.
- **Concurrent with MTP** (medical termination of pregnancy) — common in urban centres.

The approach may be **abdominal** (conventional minilaparotomy or laparoscopic), **vaginal** (posterior colpotomy), or **transcervical/hysteroscopic**.

Female sterilization — techniques

Minilaparotomy: 2–3 cm sub-umbilical (puerperal) or suprapubic (interval) incision; a uterine elevator brings the tube to the incision; tube delivered with Allis/Babcock forceps and occluded by a technique below; peritoneum closed with a purse-string suture.

Technique	Principle	Failure rate
Pomeroy	Isthmo-ampullary loop ligated at its base with No. '0' chromic catgut, 1–1.5 cm excised; cut ends separate as the suture absorbs — most widely used	0.1–0.5%

Technique	Principle	Failure rate
Modified Parkland	Avascular mesosalpingeal window made; segment doubly ligated with 0-chromic and ~2 cm excised — avoids apposition of cut ends seen with Pomeroy	Low, comparable to Pomeroy
Irving	Divided between ties; proximal stump buried in myometrium, distal stump in mesosalpinx	Very low
Uchida	Subserosal saline bleb raised, 3–5 cm resected; proximal stump buried under serosa, distal left open	Lowest reported
Madlener	Loop crushed and tied with non-absorbable silk, **not excised** — abandoned	1.5–7%
Kroener	Fimbriectomy — excision of fimbrial end	Uncommon

Laparoscopic sterilization: local anaesthesia, single- or double-puncture technique — pneumoperitoneum via Veress needle, tube grasped at the **junction of proximal and middle thirds**, occluded by a **silastic (Falope) ring**, a **Filshie clip** (titanium/silicone-lined, destroys only ~4 mm tube, failure ~0.1%), or **electrocoagulation** (bipolar safer than unipolar but higher failure ~2.1%).

Vaginal route (posterior colpotomy): suited to interval uterus <12 weeks; needs vaginal-surgery skill; risks haemorrhage/rectal injury but short stay, useful in obesity.

Transcervical/hysteroscopic: a microcoil (e.g. Essure) placed into each tubal ostium induces fibrotic occlusion, confirmed by hysterosalpingogram at 3 months (see Recent advances — now withdrawn).

Overall failure rate of tubal sterilization is ~0.7%; mortality is ~7 per 100,000 for puerperal ligation and 5–10 per 100,000 for laparoscopic procedures. Late sequelae include chronic pelvic pain, menstrual irregularity/"post-ligation syndrome," and a higher (15–50%) chance that any subsequent pregnancy is ectopic. Reversal (tubotubal anastomosis) achieves pregnancy rates up to 80% with clips/rings.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> - ☐ *Fig ? — Steps of tubectomy by Pomeroy's method: A. A segment of the fallopian tube is lifted up (DC Dutta's Gynaecology 7e, p.429)*
> - ☐ *Fig 30.12 — Method of no-scalpel vasectomy (NSV) operation (DC Dutta's Gynaecology 7e, p.427)*

Recent advances [RA]

- **Opportunistic/total salpingectomy over tubal occlusion**: most pelvic serous carcinomas are now thought to arise in the distal fallopian tube, so ACOG (2019) and the Society of Gynecologic

Oncologists (2015) recommend **discussing bilateral salpingectomy** — at caesarean, at any abdominopelvic surgery, or as the sterilization method itself — since tubal occlusion alone lowers ovarian-cancer risk by only ~30% (Rice 2012; Sieh 2013) versus 42–78% with salpingectomy (Gockley 2018), with no demonstrated added morbidity or ovarian-reserve penalty (Williams Obstetrics 26e).

- **Essure hysteroscopic microinsert withdrawn**: following FDA safety communications on chronic pain, perforation and migration, Bayer discontinued Essure worldwide (2018–2019); no longer an available option though still described in older texts.
- **RISUG/Vasalgel**: an Indian, non-hormonal, injectable, reversible male contraceptive (polymer instilled into the vas) has completed multi-centric Indian trials as a long-acting alternative to vasectomy; verify current regulatory-approval status locally before quoting it as established.
- **Robotic-assisted tubal reanastomosis** improves precision for reversal surgery where available, with outcomes comparable to conventional microsurgery.

High-yield exam pointers

- Male = **vasectomy**; female = **tubectomy** — write this line first.
- NSV steps: **ring clamp → puncture (not cut) → ligate 1 cm apart with '00' chromic catgut → fascial interposition**; confirm sterility by semen analysis at **12 & 16 weeks**.
- Pomeroy failure **0.1–0.5%**; Madlener failure **1.5–7%** (abandoned); Filshie clip failure **0.1%**; overall tubal sterilization failure **~0.7%**.
- Timing triad for female sterilization: **puerperal (24–48 h), interval (>6 weeks, proliferative phase), concurrent with MTP**.
- Ectopic pregnancy risk after sterilization failure: **15–50%**.
- Recent advance one-liner: **salpingectomy > tubal occlusion for ovarian-cancer risk reduction (ACOG 2019)**.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The "standards of sterilization" content above reflects the well-established framework of India's National Family Welfare Programme (eligibility, consent, provider/facility and quality-assurance standards) taught in preventive & social medicine; it is not found verbatim in the OBG textbook spines on disk, so numeric eligibility cut-offs should be cross-checked against the current programme circular before being quoted as exact figures in an exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e (Chapter 39, Sterilization). Guideline: ACOG Committee Opinion (2019) on salpingectomy for ovarian-cancer risk reduction; Society of Gynecologic Oncologists (2015).

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What are the various methods of contraception? Discuss advantages and disadvantages of barrier contraception

Asked in: Paper IV 21-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Contraception denotes all temporary or permanent measures, mechanical, chemical, hormonal, surgical or behavioural, used by a couple to prevent pregnancy resulting from the coital act. **Barrier contraception** refers to methods that physically or chemically prevent sperm from reaching the cervix/ovum — mechanical (condom, diaphragm, cervical cap) or chemical (spermicides), used alone or in combination.

Classification of contraceptive methods

Category	Methods
A. Temporary (spacing) methods	
1. Natural/fertility-awareness-based	Calendar (rhythm) method, basal body temperature method, cervical mucus (Billings) method, symptothermal method, lactational amenorrhoea method (LAM), coitus interruptus (withdrawal)
2. Barrier methods	Mechanical — male condom, female condom, diaphragm, cervical cap; Chemical — spermicidal creams/jellies/foam tablets/sponge; Combination of the two
3. Intrauterine contraceptive devices (IUCDs)	Non-hormonal copper devices (Cu-T 380A, Multiload 375); hormonal — levonorgestrel intrauterine system (LNG-IUS, Mirena)
4. Hormonal contraception	Combined oral contraceptives (COC); progestin-only pill (POP); injectables (DMPA, NET-EN); subdermal implants (Etonogestrel implant, Jadelle); combined patch; combined vaginal ring
5. Emergency contraception	Levonorgestrel 0.75 mg (two doses 12 h apart, or 1.5 mg single dose); ulipristal acetate 30 mg single dose; combined (Yuzpe) regimen; copper IUD (gold standard, within 5 days)

Category	Methods
B. Permanent (terminal) methods	Female sterilization (tubectomy — minilap/laparoscopic); male sterilization (vasectomy — conventional/no-scalpel)

WHO effectiveness tiers (pregnancies per 100 woman-years): most effective <2% — implants, IUDs, sterilization; very effective 3–9% — injectables, COC/POP, LAM; effective 10–20% — condom, diaphragm, fertility-awareness methods; least effective 21–30% — spermicides alone.

Barrier methods — types and mechanism

Barrier methods act by preventing sperm deposition in the vagina or preventing sperm penetration through the cervical canal, by mechanical occlusion, chemical spermicidal action, or both.

Type	Examples
Mechanical — male	Condom (latex/polyurethane sheath)
Mechanical — female	Female condom (Femidom), diaphragm, cervical cap (FemCap)
Chemical (vaginal contraceptives)	Spermicidal creams/jellies (nonoxynol-9), foam tablets, contraceptive sponge
Combination	Mechanical device + spermicide together (increases efficacy)

Failure rates of barrier methods (first year of use)

Method	Perfect-use failure (%)	Typical-use failure (%)
Male condom	2	13
Female condom	5	21
Diaphragm + spermicide	16	24
Cervical cap (with spermicide)	6–9 (nulliparous)	up to 2× diaphragm rate in parous women
Spermicide alone	18	28
Contraceptive sponge	9 (nulliparous)/20 (parous)	14 (nulliparous)/27 (parous)

Advantages and disadvantages — male condom

Advantages	Disadvantages
Cheap, no medical contraindications, no systemic side effects	May accidentally slip off or rupture during coitus

Advantages	Disadvantages
Easy to carry, simple to use, disposable, no prescription needed	Reduces sexual sensation/pleasure for some couples
Protects against sexually transmitted infections — gonorrhoea, chlamydia, human papillomavirus (HPV), HIV	Latex allergy in a minority of users
Reduces pelvic inflammatory disease, tubal infertility, ectopic pregnancy and cervical cell abnormalities	Requires motivation/cooperation at every act; must be discarded after a single use
Useful when coitus is infrequent/irregular, or as an interim method (post-vasectomy, pill initiation, lost IUD)	Interruption of coitus to apply it

Precautions: use a fresh condom for every act; apply before any genital contact; leave a reservoir at the tip; withdraw while still erect, grasping the base.

Advantages and disadvantages — female barrier methods (diaphragm, cervical cap, female condom)

Method	Advantages	Disadvantages
Diaphragm	Cheap; reusable over a long period; reduces pelvic inflammatory disease/sexually transmitted infections to some extent; protects against cervical precancer/cancer	Requires a clinician to fit and measure the correct size; risk of vaginal irritation, abrasion and urinary tract infection; unsuitable with uterine prolapse; must be combined with a spermicide and left in ≥ 6 hours after coitus
Cervical cap (FemCap)	Can be left in place longer (up to 48 hours); need not be used with spermicide (though adding it improves efficacy); alternative for women with vaginal wall laxity who cannot retain a diaphragm	Fitting is technique-dependent (correct in ~80%); less effective than the diaphragm, especially in parous women; most common failure is dislodgement during intercourse; foul-smelling discharge if worn beyond 24 hours
Female condom (Femidom)	Female-controlled; protects against sexually transmitted infections including cytomegalovirus, HIV, hepatitis B; can be inserted well before intercourse; polyurethane is suitable for latex-allergic couples	Expensive; cosmetically less acceptable; requires practice for correct placement; slightly higher failure rate than the male condom

Advantages and disadvantages — chemical/vaginal spermicides

Advantages	Disadvantages
No prescription needed; woman-controlled; adds lubrication	High failure rate when used alone (18–28% typical use)
Enhances efficacy of condom/diaphragm when combined	Must be reapplied before each act; short window of maximal effectiveness (~1 hour for cream/jelly)
Some antimicrobial/spermicide-microbicide action against sexually transmitted infections	Local allergic/irritant reactions in vagina or vulva; frequent use of nonoxynol-9 can cause genital mucosal lesions that may increase HIV transmission risk

Overall advantages and disadvantages of barrier contraception as a class

- **Advantages:** coitus-related (used only when needed), no systemic hormonal side effects, widely available without prescription (except diaphragm/cap fitting), reversible with immediate return of fertility, and — uniquely among contraceptive methods — the only class that also protects against sexually transmitted infections and their sequelae (pelvic inflammatory disease, tubal infertility, ectopic pregnancy, cervical dysplasia).
- **Disadvantages:** relatively higher failure rates than hormonal methods/intrauterine devices, dependent on correct and consistent use with every act of intercourse, may interrupt spontaneity, and some methods (diaphragm, cap) require professional fitting.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig — Female condom and commonly used diaphragm (DC Dutta's Obstetrics 9e, p.545)*

High-yield exam pointers

- Classification: Temporary (natural, barrier, IUCD, hormonal, emergency) vs Permanent (tubectomy, vasectomy) — WHO effectiveness tiers <2% / 3–9% / 10–20% / 21–30%.
- Barrier = **only** method class protecting against STIs — always state this as the key selling point.
- Male condom failure: perfect use 2%, typical use 13% (Williams 26e Table 38-1).
- Diaphragm always needs spermicide + retained ≥ 6 hours post-coitus; cervical cap can stay up to 48 hours.
- Toxic shock syndrome is a rare but described risk of diaphragm/cervical cap left in prolonged.
- Nonoxynol-9 spermicide: frequent use → genital lesions → paradoxically ↑ HIV acquisition risk.

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

Failure-rate figures above are the current Williams Obstetrics 26e (US, perfect-use/typical-use) values; DC Dutta's texts print older Pearl-Index (per-hundred-woman-years) figures for the same methods (e.g., condom 15, diaphragm 16) which are broadly concordant but derived differently — either figure is acceptable in the exam if labelled correctly.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 30 — Contraception); DC Dutta's Textbook of Obstetrics 9e (Contraception chapter, barrier methods figure); Williams Obstetrics 26e (Ch. 38 — Contraception, Table 38-1); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (Barrier Methods — Cervical Cap, Lea's Shield).

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What is cafeteria approach in family planning? Discuss how you will counsel the couple for various family planning methods

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

Definition — The **cafeteria approach** in family planning is the policy and clinical principle of offering every eligible couple the **entire range ("basket") of temporary (spacing) and permanent (terminal) contraceptive methods simultaneously**, so the couple makes an **informed, voluntary choice** matched to their own age, parity, health and social circumstances — rather than being steered by a health worker, camp, or programme target toward one particular method. It replaced India's earlier method-specific, target-oriented Family Welfare Programme and underlies the **target-free approach** (RCH Phase I, 1997) and the **Community Needs Assessment Approach (CNAA)** (RCH Phase II, 2005).

Cafeteria approach — core principles

- **Voluntarism and informed choice** — no coercion, and no incentive/disincentive is tied to any single method.
- **Full range of methods available concurrently** at every service point — barrier methods, combined/progestin-only hormonal methods, IUCD/levonorgestrel intrauterine system (LNG-IUS), permanent sterilization (male and female), and emergency contraception — rather than single-method camps (e.g., sterilization-only or IUCD-only drives).
- **Method-neutral service delivery**, replacing the earlier sterilization/IUCD-centred numerical target system.

- **Client-centred, not provider-centred** — the method offered is matched to the individual's reproductive intent (spacing versus limiting), medical eligibility, and acceptability, and may change at different phases of reproductive life.
- Underpinned by the **"quality of care" framework** (Bruce–Jain, 1990): choice of methods, complete information to the client, provider technical competence, good interpersonal relations, mechanisms for continuity/follow-up, and an appropriate constellation of services.
- Requires **trained, non-judgemental counsellors** and assured **commodity availability of every method** at the facility ("commodity security") — a basket that exists only on paper defeats the approach.

Counselling the couple — framework and steps

A structured, client-centred sequence (the **GATHER** framework) is followed for every couple, regardless of which method is eventually chosen:

- **Greet** — welcome the couple together, ensure privacy and confidentiality, and build rapport with both partners.
- **Ask** — take a reproductive, menstrual, medical/surgical and obstetric history; establish breastfeeding status, sexually transmitted infection (STI) risk, and — most importantly — whether the couple wants to **space** or **limit** further childbirth, and any prior contraceptive use/discontinuation.
- **Tell** — explain, method by method, from the **entire cafeteria** (not a preselected subset): mechanism of action, effectiveness, correct use, advantages, and side effects. The WHO (2007) effectiveness tiers are a useful counselling anchor — implants, IUCDs and sterilization: **<2 pregnancies/100 woman-years**; injectables, lactational amenorrhoea, combined pills, progestin-only pills: **3–9**; male/female condom, diaphragm, fertility-awareness methods: **10–20**; spermicides alone: **21–30**.
- **Help** — help the couple weigh the options against criteria that matter to them: safety, effectiveness, side effects, cost, reversibility, frequency of coitus, need for STI protection, and lactation status. **Acceptability and willingness to use the method correctly and consistently is the single most critical determinant** of real-world effectiveness.
- **Explain** — apply the **WHO Medical Eligibility Criteria (MEC)** to screen out unsafe choices for that individual (Category 1: no restriction; 2: benefits generally outweigh risks; 3: risks usually outweigh benefits; 4: unacceptable health risk); clarify danger signs and how/when to switch methods.
- **Return** — obtain **informed (verbal, documented) consent**, provide the chosen method or refer, and schedule a **structured follow-up visit** to review side effects, continuation, and offer a method change without stigma if needed.

Method-wise counselling essentials

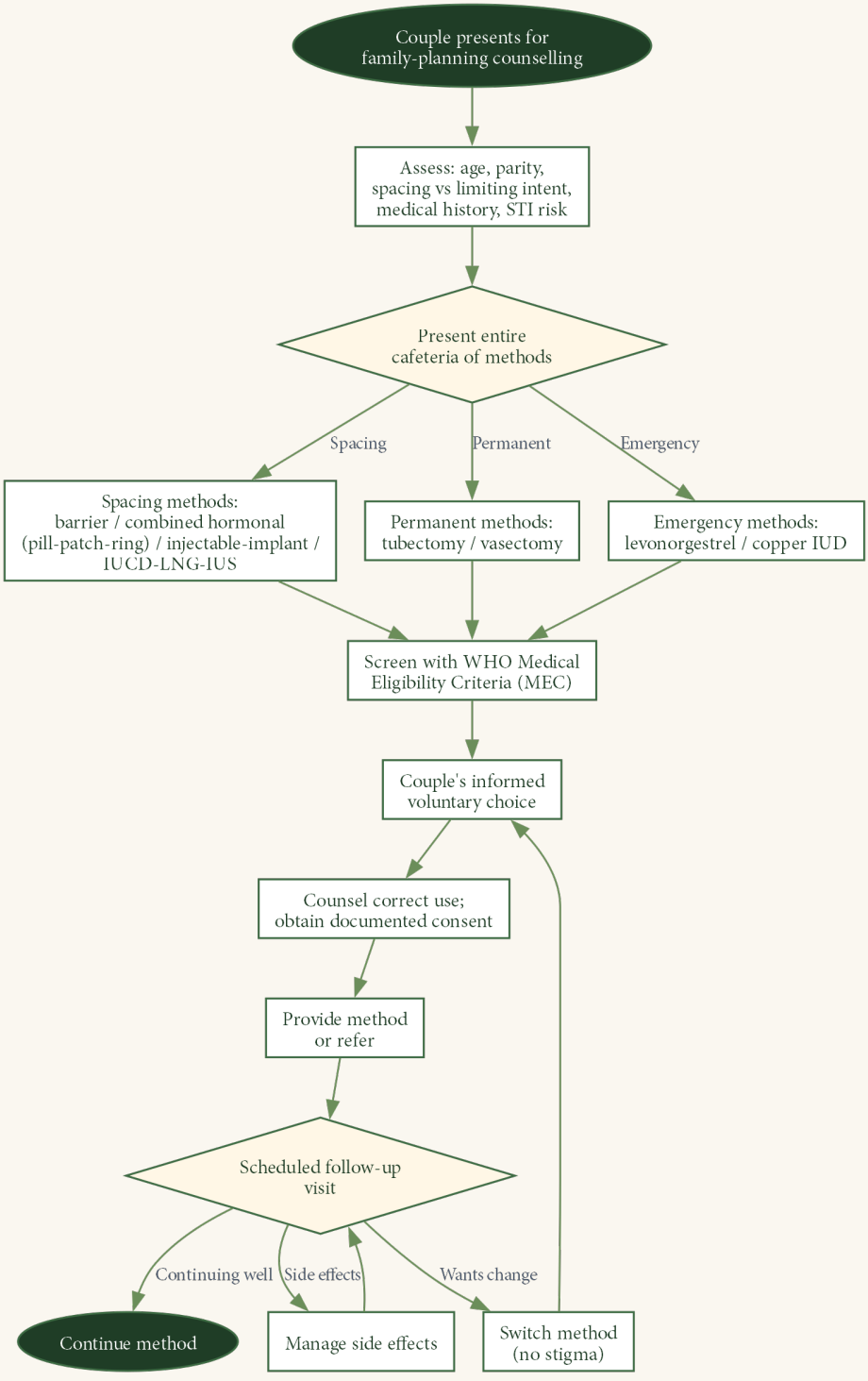
Category	Methods	Failure rate (per 100 woman-years)	Key counselling point
Barrier	Male/female condom, diaphragm, spermicide	Condom (M) 15, condom (F) 21, diaphragm 16, spermicide alone 18–29	Also protects against STIs/PID; must be used correctly with every act of coitus
Combined hormonal	Combined oral contraceptive (COC), patch, vaginal ring	0.1 (perfect use)	Missed-pill rules; avoid in smokers >35 years and those on enzyme-inducing drugs
Progestin-only	Progestin-only pill, DMPA (150 mg IM 3-monthly, or 300 mg 6-monthly), Implanon (68 mg etonogestrel, 60→30 µg/day over 3 years)	0.01–1	Safe in lactation; counsel on amenorrhoea and delayed return of fertility with DMPA
Intrauterine	Cu-T 380A (replaced every 10 years), LNG-IUS (52 mg, 20 µg/day, effective 5–7 years)	0.1–0.8	Screen for pelvic infection/distorted cavity first; can be inserted intra-/postpartum or at interval
Permanent	Tubectomy (Pomeroy's method), no-scalpel vasectomy	0.15 (both)	Counsel as **irreversible**; obtain detailed informed consent (below)
Emergency	Levonorgestrel 0.75 mg × 2 doses 12 hours apart (or 1.5 mg single dose) within 72 hours (up to 120 hours); copper IUD within 5 days	0–1	Not a regular method; discuss mechanism and arrange a follow-up pregnancy test

Sterilization-specific counselling must additionally cover: (1) the desire and consent of the individual partner undergoing the procedure; (2) choice of procedure/route; (3) failure rate; (4) risks and side effects; (5) **reversibility** — pregnancy rates after reversal are high (~80%) following clip/ring tubal occlusion, and vasal patency is restored in up to 90% after vasectomy reversal though pregnancy rates remain only ~50%; and (6) equally effective **reversible long-acting alternatives** (LNG-IUS, Cu-T 380A, implant) offered before the couple commits to a permanent method. India's programme conventionally offers permanent sterilization once the couple has **two living, immunized children**, individualized to the couple's circumstances.

Counselling by reproductive life-phase

Phase	Preferred method(s)	Counselling point
Adolescent/newly married	Low-dose COC (method of choice); DMPA or implant as alternative	Ensure confidentiality; add condom for dual STI protection
Postabortal	Pill ideal; IUCD an alternative	Start as soon as the abortion process is completed
Postpartum, non-lactating	Start after 3 weeks — pill, IUCD, DMPA or implant	DMPA/implant avoid estrogen-related risk
Postpartum, lactating	Combined pill withheld; minipill, DMPA, or postpartum IUCD	Fully breastfeeding + amenorrhoeic gives lactational-amenorrhoea protection <2% for the first 6 months
Interval, <35 years	Pill or IUCD, by choice	>35 years or smoker — prefer IUCD/injectable/implant over the pill
Family completed, sterilization deferred	LNG-IUS, Cu-T 380A, or implant	Offer as a "reversible-sterilization"-equivalent option
Perimenopausal/older	Low-dose pill (if low-risk) till menopause, or progestin-only pill/DMPA/LNG-IUS	Add barrier method if STI risk persists; emergency contraception still needed until menopause is confirmed

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart of cafeteria-approach counselling, from initial assessment through the full method basket, WHO Medical Eligibility Criteria screening, informed choice, and structured follow-up.

Recent advances [RA]

- India's National Family Planning Programme has widened the free public "cafeteria" with **Antara** (subcutaneous injectable DMPA) and **Chhaya** (once-weekly Centchroman/ormeloxifene, also marketed as *Saheli*), offered alongside condoms, oral pills, IUCD and sterilization — reducing the historical counselling bias toward sterilization/IUCD alone.
- **Postpartum intrauterine contraceptive device (PPIUCD)** services — insertion postplacental (within 10 minutes of placental delivery), intracaesarean, or within 48 hours postpartum — are now integrated into cafeteria counselling at the time of institutional delivery, capturing the "teachable moment" for spacing before discharge.
- Non-hormonal male methods under trial widen future counselling choice: **RISUG** (Reversible Inhibition of Sperm Under Guidance — an Indian, IIT Kharagpur-developed polymer instilled into the vas deferens) and its US analogue **Vasalgel**.
- The **WHO Medical Eligibility Criteria for Contraceptive Use** is the current structured tool applied during cafeteria counselling to match method safety to the individual client's risk profile, superseding older blanket contraindication lists.
- Field-level strategies under high-focus-district family planning drives operationalise the cafeteria approach by ensuring **simultaneous availability of every method** (spacing and permanent) at fixed-day static/mobile camps, rather than leaving it a policy statement alone.

High-yield exam pointers

- Cafeteria approach = **entire basket of methods offered together, informed voluntary choice, no target/method bias** — the operational corollary of the target-free approach (1997)/CNAA (2005).
- Name the **Bruce–Jain quality-of-care framework** (6 elements) when asked "how do you ensure good family-planning services."
- Counselling mnemonic to write: **GATHER** — Greet, Ask, Tell, Help, Explain, Return.
- WHO effectiveness tiers to recall: **<2 / 3–9 / 10–20 / 21–30** pregnancies per 100 woman-years.
- **WHO Medical Eligibility Criteria categories 1–4** — the screening tool used during counselling.
- Sterilization counselling checklist: **desire, procedure, failure rate, risks, reversibility, alternatives** — always with documented informed consent.
- Emergency contraception doses: **levonorgestrel 0.75 mg × 2 (12 h apart) or 1.5 mg stat, within 72 h (up to 120 h)**; **copper IUD most effective, within 5 days**.

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

Coverage note: the policy years quoted (target-free approach 1997, Community Needs Assessment Approach 2005) and current scheme names (Antara, Chhaya) follow standard Indian National Family Welfare Programme/RCH teaching consistent with this bank's Reproductive and Child Health Programme answer; they are newer than the on-file textbook editions. Method doses, failure rates and counselling content above are grounded in DC Dutta's Gynaecology 7e.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Chapter 30 — Contraception; "Contraceptive Counseling and Prescription"; "Sterilization Counseling"); DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; WHO Medical Eligibility Criteria for Contraceptive Use.

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What steps will you take to reduce the rising litigation in gynaecology?

Asked in: Paper IV 17-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Litigation in gynaecological practice is a legal proceeding — a civil complaint of negligence/"deficiency in service" before a Consumer Forum, a criminal complaint, or a complaint to the medical regulatory body — brought by a patient alleging that the gynaecologist failed the standard of care a reasonably competent practitioner would have exercised, causing her harm. Since medical services were brought within the ambit of the Consumer Protection Act, 1986 (*Indian Medical Association v V.P. Shantha*, 1995), and with rising patient awareness, wider use of invasive/operative gynaecological procedures, and commercialisation of care, litigation against gynaecologists has been steadily increasing.

High-risk areas that generate litigation in gynaecological practice

Area	Common allegation
Sterilisation (tubal ligation)	Failure → unwanted ("wrongful") conception
Hysterectomy for benign disease	Unnecessary surgery / removal of reproductive organs without adequate justification
Laparoscopic or open pelvic surgery	Visceral injury — bowel, bladder, ureter; vascular injury
Extension of a consented procedure (e.g., diagnostic laparoscopy → hysterectomy/oophorectomy)	Surgery performed without **specific, real consent** for the extended procedure

Area	Common allegation
Retained sponge/instrument	Foreign body left in the abdomen or vagina
Missed or delayed diagnosis	Ectopic pregnancy, gynaecological malignancy
MTP/abortion	Failed termination with continuing pregnancy; procedure-related complications
Anaesthesia / blood transfusion	Anaesthetic accident; transfusion reaction
Poor communication or incomplete records	Perceived negligence even without a technical error, once trust breaks down

Steps — patient communication and informed consent

- **Empathetic, unhurried communication** in a language the patient understands — explain the diagnosis, the proposed procedure, its alternatives, expected benefit, and realistic risks/complications before any decision is taken.
- **Written, specific informed consent** for every investigation/procedure — consent must be for the *exact* procedure planned; a diagnostic-procedure consent does **not** cover an unplanned therapeutic extension (e.g., oophorectomy during a consented laparoscopy) unless that extension was itself explained and consented to beforehand.
- Counsel explicitly for procedures with a known failure rate (sterilisation) or foreseeable complication (adhesions, visceral injury in laparoscopy) so the patient's expectation matches the real risk.
- Where a conflict or doubt over the plan of management arises, involve the patient's family and, where relevant, take a second signature/witness on the consent form.

Steps — documentation, protocols and institutional safeguards

- **Contemporaneous, legible, dated and timed case notes** of history, examination, investigation results, and the reasoning behind each management decision; any deviation from a standard protocol must be documented with the reason.
- **Careful record maintenance** — case sheets, operative notes, swab/instrument counts, and the consent form itself preserved for the legally mandated retention period, as these are the doctor's principal evidence if a complaint is filed later.
- **Strict adherence to evidence-based standard treatment protocols** (FOGSI/ACOG/RCOG-based) for common gynaecological presentations and operative steps; use of a formal surgical safety checklist (WHO Surgical Safety Checklist) with mandatory sponge-and-instrument count before abdominal/pelvic closure.
- **Adequate training and supervision** of postgraduates/residents in the operating room and labour ward, with a senior available for consultation; **second opinion/consultation** with a colleague whenever a case is difficult, unusual, or high-risk.

- **Regular clinical audit** — periodic, confidential review of adverse outcomes and near-misses (the audit cycle: select topic → set standard → measure practice → implement change → re-audit) to correct systemic errors before they recur and cause harm.
- **Professional indemnity insurance** for every practising gynaecologist, and a hospital-level quality-assurance/risk-management committee with defined credentialing/privileging for specific operative procedures.

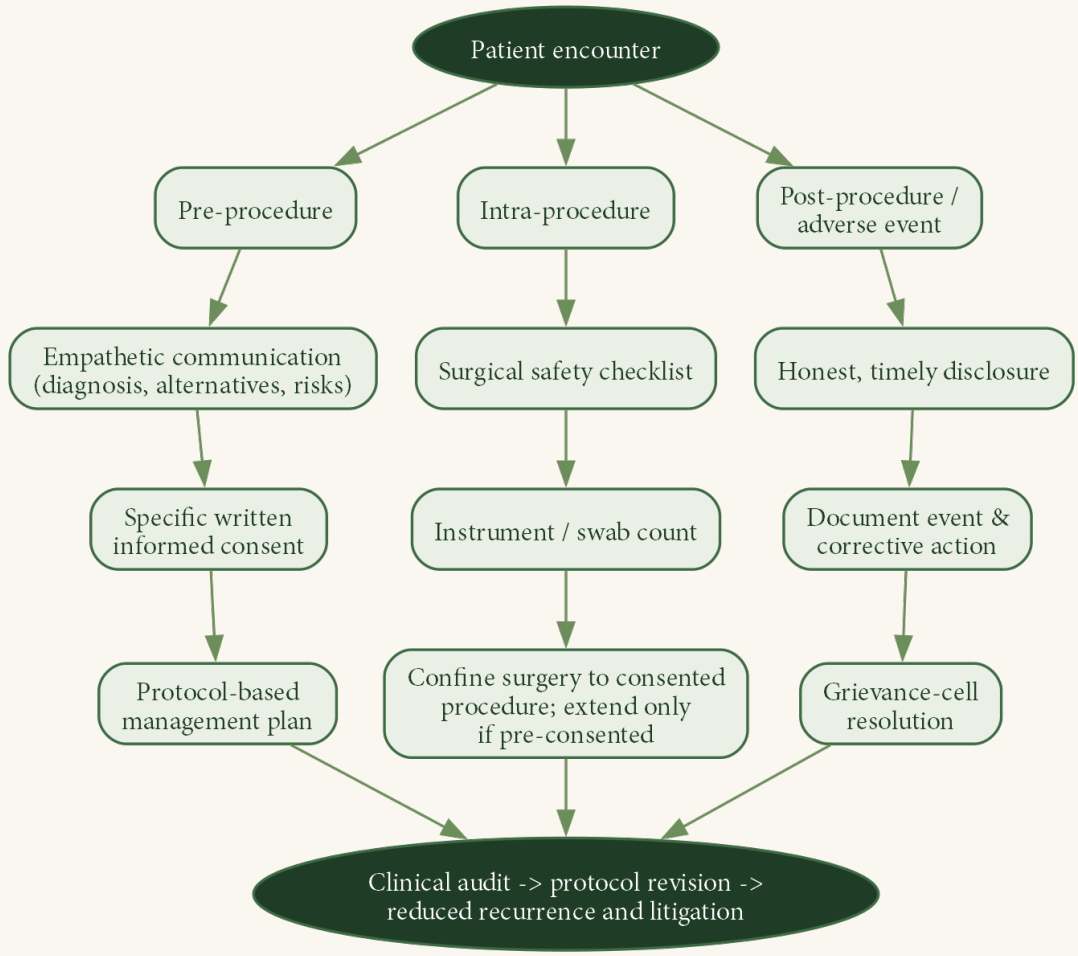
Steps — handling adverse events and legal/regulatory awareness

- **Timely, honest disclosure** of an unanticipated adverse outcome to the patient/family, with an explanation of what happened and how recurrence will be prevented — concealment or a defensive silence increases both distress and the likelihood of litigation.
- A functioning **patient-grievance redressal cell** within the institution to resolve complaints informally and promptly, before they escalate to a legal forum.
- Avoid **purely defensive practice** (unnecessary investigations or over-treatment done only to guard against litigation) — rational, protocol-based care is both better medicine and a stronger legal defence.
- Working knowledge of the **Consumer Protection Act** (1986, replaced 2019), the **National Medical Commission's Code of Ethics**, the **MTP Act, 1971 (amended 2021)**, and the **PCPNDT Act, 1994**, with strict compliance on their mandatory documentation (MTP Form-1, PCPNDT Form-F), since a statutory/documentation lapse is itself an independent ground for action even without clinical negligence.

Recent advances [RA]

- ***Samira Kohli v Dr Prabha Manchanda* (Supreme Court, 2008)** — the leading Indian precedent directly on gynaecological consent: a hysterectomy performed on an unconscious patient who had consented only to a diagnostic laparoscopy/laparotomy was held to be without "real consent," establishing that consent for one procedure cannot be treated as consent for a more radical, unconsented extension.
- ***Jacob Mathew v State of Punjab* (Supreme Court, 2005) — laid down that a doctor is criminally liable for negligence only for** gross negligence**, applying a Bolam-type "reasonably competent professional" standard, and required a prior departmental/expert opinion before a criminal case is registered against a doctor — a safeguard against frivolous criminal complaints.
- Wider adoption of **electronic medical records and e-consent** (accelerated by the National Medical Commission's 2020 telemedicine practice guidelines) improves the completeness and tamper-resistance of documentation used in a doctor's defence.
- **FOGSI's clinical practice recommendations/GCPRs** and society-level "do's and don'ts" advisories are increasingly used by Indian gynaecologists as the working evidence base cited in both practice and defence against litigation.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Litigation-reduction pathway in gynaecological practice — pre-procedure, intra-procedure and post-procedure/adverse-event streams converging into a common audit-and-protocol-revision loop.

High-yield exam pointers

- One-line answer core: **communication + specific written consent + documentation + protocol adherence + audit + indemnity + honest disclosure** — write all seven.
- Consent must match the *exact* procedure — quote ***Samira Kohli v Dr Prabha Manchanda* (2008)** for "no consent for extension of surgery."
- Criminal liability needs **gross negligence** (Bolam standard) — *Jacob Mathew v State of Punjab* (2005).
- High-risk list to name: sterilisation failure, unnecessary hysterectomy, laparoscopic visceral injury, retained sponge/instrument, missed ectopic/malignancy.
- Name the Acts: Consumer Protection Act (1986/2019), MTP Act 1971 (amended 2021), PCPNDT Act 1994.

- Audit cycle: standard → measure → change → re-audit.

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

The Indian medico-legal case law and statutes above are standard MS OBG curriculum content but are not present in the (predominantly Western) textbook corpus consulted; the core clinical measures (communication, written consent, documentation, protocol adherence, audit, consultation) are grounded in DC Dutta's Obstetrics 9e "Measures to Minimize the Medicolegal Problems" and Berek & Novak 16e's ethics chapter, and should be cross-checked against the current Bar Council/Medical Council judgments before an examination if precise citation years are required.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 40, "Legal and Ethical Issues in Obstetric Practice" — duty of care, common areas of legal threat, measures to minimize medicolegal problems, audit in obstetrics); Berek & Novak's Gynecology 16e (Chapter on medical ethics — informed consent, confidentiality, record keeping, disclosure of medical errors); Consumer Protection Act, 1986/2019; MTP Act, 1971 (amended 2021); PCPNDT Act, 1994; *Samira Kohli v Dr Prabha Manchanda* (2008); *Jacob Mathew v State of Punjab* (2005).

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Recent advances

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Discuss recent advances in gynaecology

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

Definition — Recent advances in gynaecology span five domains that have most changed practice: cervical cancer prevention/screening, gynaecological oncology treatment, minimally invasive and reconstructive surgery, reproductive endocrinology/infertility, and contraception. Each has moved

from an older textbook standard to a newer, evidence-based, guideline-endorsed one within the last decade.

Recent advances in cervical cancer prevention & screening

Advance	Detail
9-valent HPV vaccine (Gardasil-9)	Covers HPV 6/11/16/18 + 5 additional oncogenic types (31/33/45/52/58); non-inferior antibody response to the quadrivalent vaccine, with efficacy 97–100% for vaccine-type cervical intraepithelial neoplasia
High-risk HPV (hrHPV) DNA testing	Molecular HPV testing is now validated as (i) triage of equivocal (ASC-US) cytology, (ii) co-testing with cytology, and (iii) a **stand-alone primary screening** modality — a shift from cytology-only Pap screening
Liquid-based cytology	Reduces unsatisfactory-sample rate by 70–90% versus conventional smear
FIGO 2018 staging revision (carcinoma cervix)	Imaging and pathological findings are now permitted (previously clinical-only); horizontal spread removed from Stage IA (depth of invasion alone used); **Stage IB split into IB1 (<2 cm), IB2 (2–4 cm), IB3 (≥4 cm)** — reflecting fertility-sparing surgery eligibility; a new **Stage IIIC** added for pelvic/para-aortic nodal metastasis (IIIC1 pelvic nodes, IIIC2 para-aortic nodes)

Recent advances in gynaecological oncology treatment

Advance	Detail
PARP inhibitor maintenance therapy	Olaparib and niraparib approved for maintenance after response to platinum-based chemotherapy in platinum-sensitive recurrent ovarian cancer, regardless of *BRCA* status (greater benefit with germline/somatic *BRCA* mutation). In the NOVA trial, niraparib prolonged progression-free survival to 21 months vs 5.5 months (placebo) in the germline-*BRCA* group
Immune checkpoint inhibitors	Pembrolizumab (anti-PD-1) shows activity in PD-L1-positive and mismatch-repair-deficient (dMMR)/microsatellite-instability-high (MSI-H) endometrial cancer

Advance	Detail
Sentinel lymph node (SLN) mapping	Standardised cervical injection of indocyanine green with fluorescence imaging (or blue dye) in clinical Stage I endometrial cancer gives 97.2% sensitivity and 99.6% negative predictive value on multicentre trial data, allowing selective nodal assessment instead of routine complete pelvic ± para-aortic lymphadenectomy, reducing lymphoedema/lymphocyst morbidity
Molecular classification of endometrial cancer (TCGA)	Four prognostic groups — **POLE-ultramutated**, **MSI-hypermutated**, **copy-number-low**, **copy-number-high (p53-abnormal)** — now guide adjuvant treatment intensity alongside traditional histology/grade

Recent advances in minimally invasive & reconstructive surgery

- **Robot-assisted laparoscopic surgery** — used for myomectomy, hysterectomy, and sacrocolpopexy; offers 3D vision, wristed instrumentation and improved ergonomics, though outcome data versus conventional laparoscopy remain mixed for many procedures.
- **Single-port (single-incision) laparoscopic surgery** — reduces the number of abdominal incisions/scars for adnexal and uterine procedures.
- **Vaginal natural-orifice transluminal endoscopic surgery (vNOTES)** — hysterectomy/adnexal surgery performed through the vagina using laparoscopic instruments, avoiding abdominal incisions.
- **Urogynaecological safety re-evaluation** — the transvaginal mesh kits used for pelvic organ prolapse repair were reclassified/withdrawn by the US FDA (2019) after safety concerns; native-tissue repair or abdominal (open/laparoscopic/robotic) sacrocolpopexy with mesh is now preferred over transvaginal mesh kits.

Recent advances in reproductive endocrinology, infertility & fertility preservation

Advance	Detail
Letrozole for ovulation induction	This aromatase inhibitor is now considered the **first-line ovulation-induction agent** (ahead of clomiphene citrate) for anovulatory infertility, including polycystic ovary syndrome, with higher live-birth rates in comparative trials

Advance	Detail
Preimplantation genetic testing (PGT)	**PGT-A** (aneuploidy screening, formerly PGS) and **PGT-M** (monogenic disease, formerly PGD) now use trophectoderm biopsy at the blastocyst stage rather than cleavage-stage blastomere biopsy, improving diagnostic accuracy
Elective single embryo transfer + time-lapse embryo monitoring	Reduces multiple-pregnancy rate after IVF while maintaining pregnancy rates, aided by continuous embryo-morphology monitoring for selection
Fertility preservation	Oocyte cryopreservation and ovarian tissue cryopreservation are now realistic options offered before gonadotoxic chemotherapy/radiotherapy or risk-reducing gonadectomy

Recent advances in contraception

Advance	Detail
Levonorgestrel intrauterine system (LNG-IUS)	Beyond contraception (releases levonorgestrel over 5 years, >99% efficacy), now first-line medical therapy for heavy menstrual bleeding (up to 97% reduction in blood loss) and an adjunct in endometriosis-related pain and adenomyosis — termed "medical hysterectomy" for its endometrial effect
Etonogestrel subdermal implant	Single-rod, 3-year long-acting reversible contraceptive (LARC) with rapid return of fertility on removal
Subcutaneous self-administered DMPA	Allows patient self-injection, improving access and continuation compared with clinic-administered intramuscular depot medroxyprogesterone acetate

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 38.3 — FIGO Cervical Cancer Staging (2018) (Berek & Novak 16e, p.2458)*

High-yield exam pointers

- **FIGO 2018 (cervix)**: imaging/pathology now allowed; IB split into IB1/IB2/IB3 by size; new Stage IIIC for nodal disease.
- **TCGA endometrial groups**: POLE-ultramutated (best prognosis) → MSI-hypermutated → copy-number-low → copy-number-high/p53-abnormal (worst prognosis).
- **NOVA trial**: niraparib maintenance, PFS 21 vs 5.5 months (gBRCA-mutated platinum-sensitive relapse).

- **Sentinel lymph node mapping** = indocyanine green + cervical injection, replacing routine full lymphadenectomy.
- **Letrozole** > **clomiphene** as first-line ovulation-induction agent.
- **PGT-A/PGT-M** = trophectoderm (blastocyst) biopsy, not cleavage-stage.
- **FDA 2019** — transvaginal mesh kits for prolapse withdrawn from the market.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Gynaecology 7e and the older FIGO/TNM tables in some sources predate the 2018 cervical and TCGA-based endometrial molecular staging changes; the FIGO 2018 (cervix) and TCGA molecular-classification framework (endometrium) reproduced above are the current standard and should be followed over older editions.

> **SOURCE & COVERAGE**
> Berek & Novak's Gynecology 16e (Ch. 16 — Preinvasive Disease; Ch. 8 — Molecular Biology of Gynecologic Cancer; Ch. 37 — Endometrial Cancer; Ch. 38 — Cervical Cancer; Ch. 26 — Minimally Invasive Surgery; Ch. 21 — Pelvic Organ Prolapse); Speroff's Clinical Gynecologic Endocrinology & Infertility 9e (ovulation induction; preimplantation genetic testing; fertility preservation); DC Dutta's Textbook of Gynaecology 7e (LNG-IUS in heavy menstrual bleeding); ACOG Practice Advisory on FDA Reclassification of Mesh for Pelvic Organ Prolapse.

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Lymphatic drainage of cervix and newer FIGO staging of carcinoma cervix

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

Definition — The cervix drains along the uterine vessels into a primary ring of pelvic lymph node groups and thence into secondary retroperitoneal groups; this map is the anatomical basis of nodal spread in carcinoma cervix. FIGO (International Federation of Gynecology and Obstetrics) staging is the internationally accepted system for staging carcinoma cervix, revised in 2018 to allow imaging and pathological findings to refine the stage, replacing the purely clinical 2009 system.

Lymphatic drainage of the cervix

Group	Nodes	Comment
Primary group	Parametrial nodes	Inconsistent; lie within the parametrium alongside the uterine vessels

Group	Nodes	Comment
	Obturator (hypogastric) nodes	Floor of the obturator fossa; most frequently the **first node group involved**
	Internal iliac nodes	Along the internal iliac vessels
	External iliac nodes (anterior and medial group)	Along the external iliac vessels
	Sacral (presacral) nodes	Over the sacral promontory; drain the posterior cervical lymphatics directly
Secondary group	Common iliac nodes → para-aortic (superior lumbar) nodes	Receive efferents from **all** primary groups; para-aortic node involvement defines FIGO Stage IIIC2

- All primary-group afferents run with the uterine vessels; the fundus/upper body of the uterus drains separately (ovarian route to para-aortic nodes; round-ligament route to superficial inguinal nodes) and is **not** part of the cervical pattern above.
- Clinically, this sequence (parametrial/obturator/internal iliac/external iliac/sacral → common iliac → para-aortic) explains why parametrial extension and pelvic node metastasis precede para-aortic spread, and why radical hysterectomy for cervical cancer includes pelvic (± para-aortic) lymphadenectomy.

FIGO staging of carcinoma cervix (2018 revision)

Stage	Description
I	Carcinoma strictly confined to the cervix (extension to the corpus disregarded)
IA	Invasive carcinoma diagnosable only by microscopy; maximum depth of invasion <5 mm
IA1	Stromal invasion <3 mm in depth
IA2	Stromal invasion ≥3 mm and <5 mm
IB	Invasive carcinoma with measured deepest invasion ≥5 mm, limited to the cervix
IB1	≥5 mm depth, and <2 cm in greatest dimension
IB2	≥2 cm and <4 cm in greatest dimension
IB3	≥4 cm in greatest dimension

Stage	Description
II	Invades beyond the uterus but not to the lower third of the vagina or the pelvic wall
IIA	Upper two-thirds of vagina involved, no parametrial invasion (IIA1 <4 cm; IIA2 ≥4 cm)
IIB	Parametrial invasion, not up to the pelvic wall
III	Involves the lower third of vagina, and/or extends to the pelvic wall, and/or causes hydronephrosis/non-functioning kidney, and/or involves pelvic/para-aortic nodes
IIIA	Lower third of vagina involved, no extension to pelvic wall
IIIB	Extension to pelvic wall and/or hydronephrosis/non-functioning kidney
IIIC	Pelvic and/or para-aortic lymph node involvement, irrespective of tumour size/extent (record as *r* = imaging or *p* = pathology confirmed)
IIIC1	Pelvic lymph node metastasis only
IIIC2	Para-aortic lymph node metastasis
IV	Extended beyond the true pelvis, or biopsy-proven mucosal involvement of bladder/rectum
IVA	Spread to adjacent pelvic organs
IVB	Spread to distant organs

When in doubt, the **lower** stage is assigned; the stage is not revised after treatment begins.

What changed — FIGO 2009 vs FIGO 2018

Feature	FIGO 2009	FIGO 2018
Basis of staging	Clinical examination only	Clinical **plus** imaging (CT/MRI/PET) and pathology where available
Stage IA	Depth ≤5 mm **and** horizontal spread ≤7 mm	Horizontal spread removed; **only depth of invasion** used
Stage IB	Two tiers — IB1 ≤4 cm, IB2 >4 cm	Three tiers — IB1 <2 cm, IB2 2–4 cm, IB3 ≥4 cm (IB1 reflects the cut-off for fertility-sparing surgery)

Feature	FIGO 2009	FIGO 2018
Lymph node status	Not part of staging	New **Stage IIIC** — IIIC1 (pelvic nodes) / IIIC2 (para-aortic nodes), regardless of tumour size, with *r*/*p* notation

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 2.3 — Schematic representation of the lymphatic drainage of the cervix (DC Dutta's Gynaecology 7e, p.43)*

Recent advances [RA]

- **Sentinel lymph node (SLN) mapping** now supplements the classic node map above in early cervical cancer. Dye (methylene blue/indocyanine green) or radiolabelled technetium-99 is injected directly into the cervix, usually at the **3 and 9 o'clock** positions; the sentinel node is identified intra-operatively by visual, fluorescence, or gamma-probe detection.
- Sentinel nodes localise **medial to the external iliac, ventral to the internal iliac (hypogastric), or in the upper obturator space** — i.e., within the primary group described above, confirming the anatomical map.
- Detection rate 80–100%; sensitivity 65–87%; negative predictive value 90–97% (combined dye-plus-radiotracer technique performs best). The National Comprehensive Cancer Network (NCCN) recommends the technique be considered for tumours **<2 cm** (Stage IB1); a negative SLN can allow omission of full pelvic lymphadenectomy, though its role in early-stage disease continues to be defined.
- The **2018 FIGO revision itself** is the other major recent advance in this area — for the first time allowing radiological/pathological nodal confirmation (r/p) to upstage a case to IIIC, reflecting the prognostic weight of nodal disease.

High-yield exam pointers

- Primary group mnemonic — **P-O-I-E-S**: **P**arametrial (inconsistent) – **O**bturator (first node commonly involved) – **I**nternal iliac – **E**xternal iliac – **S**acral; secondary group = common iliac → para-aortic.
- 2018 changes to write verbatim: (i) IA — horizontal spread dropped, depth alone used; (ii) IB split into **IB1 <2 cm / IB2 2–4 cm / IB3 ≥4 cm**; (iii) new **Stage IIIC** (IIIC1 pelvic / IIIC2 para-aortic nodes) with *r*/*p* notation.
- "When in doubt, assign the lower stage" — a favourite one-liner.
- SLN injection sites: **3 and 9 o'clock** of the cervix; NCCN cut-off for use: tumour **<2 cm**.
- Cervical cancer staging remains principally **clinical** (unlike endometrial/ovarian cancer, which are surgically staged), even after the 2018 revision.

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

DC Dutta's Textbook of Gynaecology 7e reproduces the pre-2018 FIGO (2009) staging table; the 2018 revision (Bhatla N, Berek JS, Cuello Fredes M, et al. FIGO Committee Report, Int J Gynecol Obstet 2019) is now current and is the version presented above, per Berek & Novak's Gynecology 16e.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (lymphatic drainage of the cervix, Fig. 2.3); Berek & Novak's Gynecology 16e (FIGO 2018 staging, Table 38-1; sentinel lymph node evaluation); FIGO Committee Report (Bhatla et al., 2019).

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Newer concepts in ovulation induction

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

Definition — Ovulation induction (OI) is pharmacological stimulation of a single dominant (or few) ovarian follicles to ovulation in women with anovulatory infertility — World Health Organization (WHO) Group I hypogonadotropic hypogonadism, Group II hypothalamic-pituitary dysfunction (chiefly polycystic ovary syndrome, PCOS), or clomiphene-resistant anovulation — distinct from "controlled ovarian stimulation" for in vitro fertilisation (IVF), which deliberately recruits multiple follicles. The classical ladder of clomiphene citrate → human menopausal gonadotropin (hMG)/human chorionic gonadotropin (hCG) has been reshaped over the last decade by the newer agents,

individualised gonadotropin protocols and ovarian hyperstimulation syndrome (OHSS)-prevention strategies below.

Newer first-line pharmacological agents

Agent	Mechanism	Regimen	Key evidence
Letrozole (aromatase inhibitor)	Blocks aromatase → transient fall in oestrogen → loss of negative feedback → endogenous rise in follicle-stimulating hormone (FSH); no peripheral anti-oestrogenic effect on endometrium/cervical mucus (unlike clomiphene)	2.5 mg (up to 7.5 mg) orally, cycle day 3–7, for 5 days	**Pregnancy in Polycystic Ovary Syndrome II (PPCOS II)** randomised controlled trial: cumulative live birth 27.5% (letrozole) vs 19.1% (clomiphene), rate ratio 1.44 (95% CI 1.10–1.87); higher monthly ovulation rate, fewer multiple pregnancies; half-life ~48 hours vs clomiphene's several weeks (Legro et al., *N Engl J Med* 2014;371:119)
Insulin sensitisers — metformin, myo-inositol + D-chiro-inositol (40:1 ratio)	Improve peripheral insulin sensitivity → lower hyperinsulinaemia-driven ovarian androgen excess	Metformin 500 mg once daily, up-titrated over 4–6 weeks to 1500–2550 mg/day	**PPCOS I**: clomiphene alone superior to metformin alone (live birth 22.5% vs 7.2%); combination not superior to clomiphene alone for live birth. Now used as an *adjunct* in insulin-resistant/obese PCOS, not routine monotherapy
Dopamine agonist (cabergoline)	Suppresses hyperprolactinaemia, restores pulsatile gonadotropin-releasing hormone (GnRH)	0.25–0.5 mg twice weekly	First-line for hyperprolactinaemia-related anovulation; also repurposed as an OHSS-prevention drug (below)

Newer, individualised gonadotropin protocols

- **Low-dose step-up ("low-slow") protocol** — start 37.5–75 IU/day FSH; increase only in small increments after 7–14 days of no response — reduces multifollicular development and OHSS, particularly in PCOS.

- **Step-down protocol** — start high (150–225 IU/day), taper once a dominant follicle emerges, mimicking the physiological narrow "FSH window."
- **Individualised starting dose** — algorithms using antral follicle count (AFC)/anti-Müllerian hormone (AMH) and body weight, rather than a fixed dose for every patient, to select the starting FSH dose and reduce cycle cancellation/OHSS.
- **Long-acting FSH — corifollitropin alfa**: FSH α-subunit fused to the hCG β-carboxy-terminal peptide; half-life ~95 hours vs 32 hours for recombinant FSH. A single 100 μg (≤60 kg) or 150 μg (>60 kg) injection sustains multifollicular growth for a week, mainly for ovarian stimulation in assisted reproductive technology (ART), cutting the daily-injection burden.
- **GnRH antagonist co-treatment** (cetrorelix/ganirelix) — added once a leading follicle emerges to block a premature LH surge; shorter and more patient-friendly than the classical long GnRH-agonist down-regulation protocol, and a prerequisite for the OHSS-prevention strategies below.

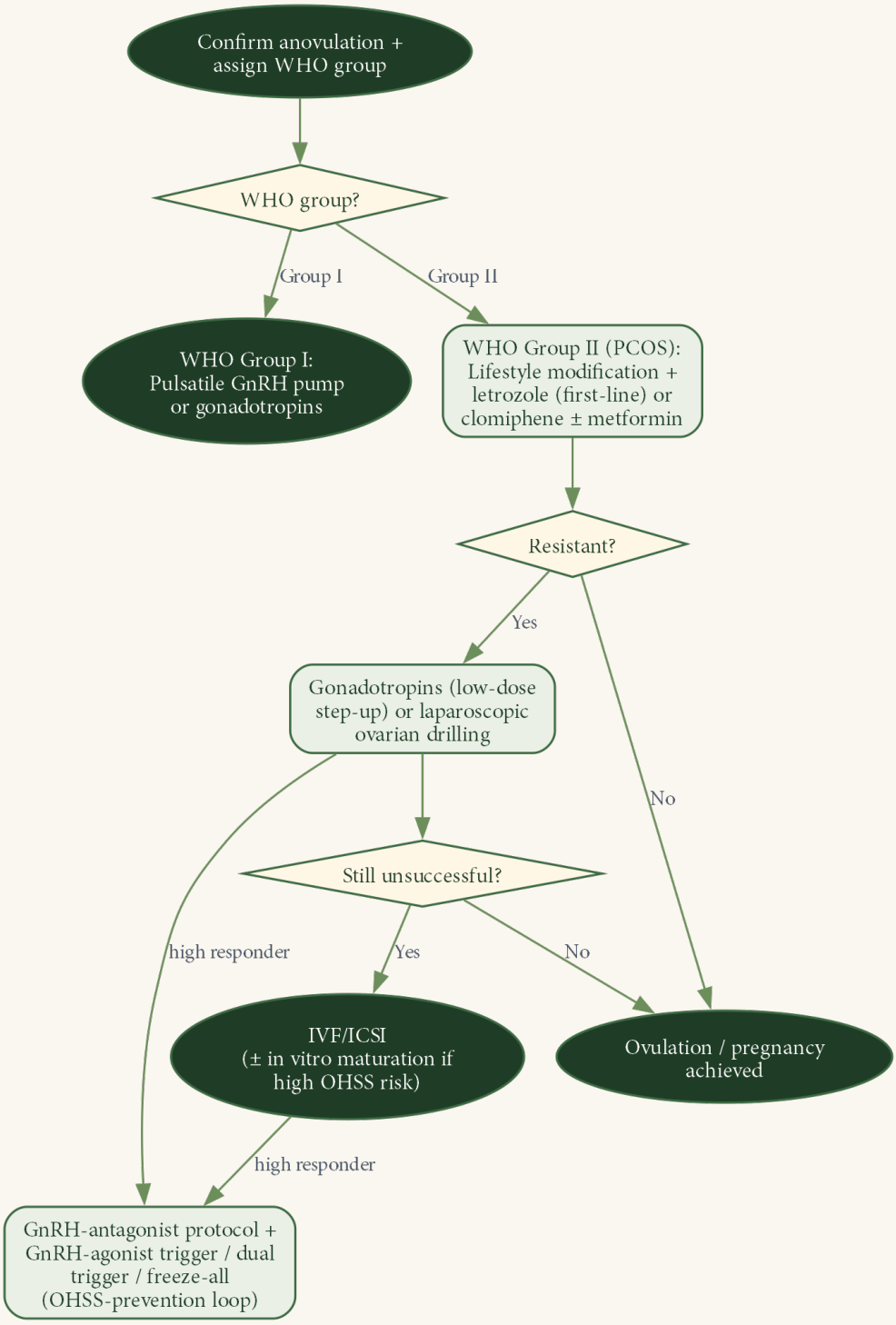
Newer OHSS-prevention strategies ("OHSS-free" practice)

- **GnRH agonist trigger** (instead of hCG) in a GnRH-antagonist–primed cycle — produces a short endogenous LH/FSH surge and avoids the prolonged luteotrophic action of hCG.
- **"Dual trigger"** — GnRH agonist plus low-dose hCG together, intended to improve oocyte maturity while still limiting OHSS (benefit over agonist trigger alone remains debated).
- **Freeze-all ("segmentation") strategy** — cryopreserve all oocytes/embryos and defer transfer to a later frozen cycle in high responders, avoiding the "late OHSS" precipitated by an ensuing pregnancy.
- **Cabergoline 0.5 mg/day for up to 7 days after the trigger** — reduces vascular endothelial growth factor (VEGF)-mediated capillary permeability.
- **"Coasting"** — continue the GnRH analogue but withhold further gonadotropin for 1–3 days until serum oestradiol falls, before triggering.
- Combining two or more of the above gives the closest approach to "OHSS-free" practice, especially when fresh embryo transfer is omitted.

Newer techniques for resistant/anovulatory infertility

Technique	Indication	Key points
Laparoscopic ovarian drilling (LOD)	Clomiphene-resistant PCOS; not obese; no other infertility factor	Unipolar electrocautery or laser, 3–6 punctures per ovary (avoiding the tubo-ovarian surface to limit adhesions); lowers intra-ovarian androgen and inhibin levels, raises FSH; ovulation in 40–90%, live birth comparable to gonadotropin therapy but far fewer multiple pregnancies (1% vs 16%); poor results if body mass index (BMI) >30 kg/m^2
In vitro maturation (IVM) of oocytes	PCOS at high OHSS risk; urgent fertility preservation before gonadotoxic chemotherapy	Immature (germinal-vesicle) oocytes retrieved from minimally stimulated antral follicles and matured in culture for 24–48 hours before intracytoplasmic sperm injection (ICSI); "follicular priming" with FSH ± a single hCG dose (10,000 IU) 36 hours before retrieval improves oocyte yield; implantation/pregnancy rates remain lower than conventional IVF
Pulsatile GnRH pump	Hypothalamic (WHO Group I) anovulation with an intact pituitary and ovary	GnRH 2.5–20 μg/pulse every 60–90 minutes via a programmable intravenous or subcutaneous minipump; reproduces a physiological endogenous LH surge — the lowest OHSS and multiple-pregnancy rates of any OI method; limited today mainly by pump unavailability

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Ladder of ovulation induction in anovulatory infertility, by WHO group, with the OHSS-prevention side-loop for high responders.

High-yield exam pointers

- **PPCOS II**: letrozole > clomiphene for live birth in PCOS — 27.5% vs 19.1%, rate ratio 1.44 (memorise the numbers).
- Letrozole 2.5 mg (max 7.5 mg), day 3–7 × 5 days; clomiphene 50 mg (max 150 mg), day 3–5 (or 2–5) × 5 days.
- Low-dose step-up 75 IU/day (low-slow 37.5–75 IU/day) vs step-down 150–225 IU/day.
- hCG trigger when the lead follicle is 16–20 mm; ovulation ~36–40 hours later.
- "OHSS-free" ART = GnRH-antagonist protocol + GnRH-agonist trigger ± freeze-all.
- Corifollitropin alfa = single-injection long-acting FSH, half-life ~95 hours, sustains stimulation for a week.
- LOD: 3–6 unipolar punctures per ovary for clomiphene-resistant PCOS — same live-birth rate as gonadotropins but far fewer multiples.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> DC Dutta's Gynaecology 7e still presents clomiphene citrate as the initial ovulation-inducing agent with letrozole as an adjunct/alternative; current trial evidence (PPCOS II) supports letrozole as the first-line agent for anovulatory infertility due to PCOS — the guideline-based sequence above should be followed in the exam.

> **SOURCE & COVERAGE**
>
> Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; International evidence-based guideline for the assessment and management of polycystic ovary syndrome (Teede et al., *Fertility and Sterility* 2018;110:364).

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Newer developments in male contraception methods

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

Definition — Male contraception currently rests on only two established, widely deployable options — the barrier **condom** and surgical **vasectomy** — with no reversible, non-surgical method comparable to the female pill, IUD, or implant. *Newer developments in male contraception* are investigational methods that either **(1) reversibly suppress spermatogenesis by hormonal negative feedback**, or **(2)**

block/damage sperm transport or production by non-hormonal, largely vas-directed, means, with the goal of an effective, rapidly reversible method that does not impair libido or sexual performance.

Classification of newer methods

Approach	Principle	Examples
Hormonal suppression	Exogenous testosterone ± a progestin suppresses pituitary LH/FSH by negative feedback, switching off spermatogenesis while testosterone itself maintains libido and virilisation	Testosterone undecanoate (TU) alone; TU + etonogestrel implant; Nestorone + testosterone transdermal gel
GnRH-analogue suppression	A GnRH agonist/antagonist directly suppresses gonadotropins and testosterone; "add-back" testosterone is needed to preserve libido	GnRH analogue + testosterone add-back
Non-hormonal, vas-directed/injectable	An intravasal agent physically or chemically blocks sperm transport without touching the hypothalamic-pituitary-gonadal axis	RISUG; Vasalgel; intra-vas device (IVD)
Non-hormonal, spermatotoxic	Direct pharmacological inhibition of spermatogenesis at the seminiferous tubule	Gossypol
Newer investigational oral agents	Novel steroidal/non-steroidal molecules in early-phase human trials	DMAU; 11β-MNTDC; YCT-529 (see Recent advances)

Hormonal methods

Agent/regimen	Mechanism	Efficacy / trial data	Key side effects
Testosterone undecanoate (TU) 500 mg IM monthly, alone	Testosterone's own negative feedback suppresses LH/FSH-driven spermatogenesis while maintaining libido and sexual performance	Chinese multicentre trial, 1,045 men: only 4.8% failed to suppress sperm count below 1×10^6/mL; cumulative pregnancy rate 1.1 per 100 men at 30 months. Asian men achieve azoospermia/oligospermia with TU alone far more consistently than Caucasian men (~86%)	Acne, weight gain, mood/libido change (usually increased)

Agent/regimen	Mechanism	Efficacy / trial data	Key side effects
TU injections + etonogestrel subdermal implant	Adding a progestin deepens gonadotropin suppression, improving efficacy in men (e.g. Caucasian populations) who respond less completely to testosterone alone	Only 3% failed to suppress sperm count below 1×10^6/mL, versus placebo implant/injection	Acne, night sweats, libido change, weight gain
Nestorone (progestin) + testosterone transdermal gel	Same feedback-suppression principle delivered transdermally, avoiding injections	89% of men achieved suppression to $\leq1\times10^6$/mL sperm concentration, with minimal side effects	Minimal reported side effects
GnRH analogue + testosterone "add-back"	GnRH analogue suppresses LH/FSH and endogenous testosterone directly; add-back testosterone offsets the resulting side effect	Produces a decline in sperm density and motility	Marked loss of libido if add-back is omitted — the main reason this approach is unacceptable to most men

Non-hormonal methods

Agent	Mechanism	Status / efficacy	Limitations
RISUG (reversible inhibition of sperm under guidance)	Styrene maleic anhydride injected into the vas deferens creates an incompatible intraluminal pH and disrupts sperm, blocking transport	Developed in India; studied in preclinical and human trials	Regulatory approval and long-term reversibility data still awaited
Vasalgel	A related high-molecular-weight styrene-alt-maleic-acid polymer dissolved in dimethyl sulfoxide, injected into the vas; sets as a soft gel that lets fluid pass but blocks sperm	Rabbit studies show azoospermia after injection, with rapid restoration of sperm flow after a sodium bicarbonate flush (reversible in animal models)	Studied only in animal models so far; human trials planned in the United States
Intra-vas device (IVD)	Two plugs are placed inside each vas deferens to mechanically obstruct sperm transport	Plugs are retrievable, so the method is potentially reversible	Contraceptive effectiveness still being studied

Agent	Mechanism	Status / efficacy	Limitations
Gossypol	A cottonseed-derived compound that acts directly on the seminiferous tubules to inhibit spermatogenesis	Discovered and used in China	Fatigue, decreased libido, delayed recovery of sperm count after stopping; serious toxicity — **hypokalaemic paralysis and cardiac arrhythmias** — has limited its use

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ▢ *Fig 39.5 — Anatomy of male reproductive system showing procedure for vasectomy. (Williams Obstetrics 26e, p.700)*
>
> Label the vas deferens as the shared anatomical target of vasectomy, RISUG, Vasalgel, and the intra-vas device — all newer non-hormonal methods act at this single site, unlike hormonal methods, which act at the hypothalamic-pituitary-testicular axis.

Recent advances [RA]

- **YCT-529** — a non-hormonal oral retinoic-acid-receptor-alpha antagonist that blocks vitamin-A-dependent spermatogenesis without altering the testosterone axis; completed a first-in-human Phase 1 safety trial, the first oral non-hormonal male contraceptive candidate to reach human testing.
- **Dimethandrolone undecanoate (DMAU)** and **11β-methyl-19-nortestosterone-17β-dodecylcarbonate (11β-MNTDC)** — single-molecule oral steroids combining androgenic and progestational activity, developed through the US NICHD/CONRAD male contraceptive programme; Phase 1 trials showed gonadotropin and testosterone suppression with acceptable short-term tolerability, and larger efficacy trials are ongoing.
- Refined vas-occlusive hydrogels descended from the RISUG/Vasalgel principle (e.g. the Contraline "ADAM" device) have entered early human feasibility studies, with azoospermia reported in initial participants; reversal data are awaited.
- None of these newer agents is yet licensed by a national regulator (US FDA or Indian CDSCO); condom, vasectomy, and — where locally available — TU-based hormonal regimens remain the only currently deployable male methods.

High-yield exam pointers

- One-line frame: two arms — **hormonal** (suppress spermatogenesis via testosterone ± progestin/GnRH analogue) vs **non-hormonal** (block/damage sperm — RISUG, Vasalgel, IVD, gossypol).

- Number to write: TU 500 mg IM monthly trial — 1,045 men, only 4.8% failed suppression, pregnancy rate 1.1/100 men at 30 months.
- **RISUG** = India's own contribution — styrene maleic anhydride, intravasal injection, pH-based sperm inactivation, precursor to Vasalgel.
- Gossypol toxicity trigger words: **hypokalaemic paralysis + cardiac arrhythmia**.
- GnRH analogue alone fails clinically because of loss of libido — remember "add-back testosterone" as the fix.
- None of the newer agents (DMAU, 11β-MNTDC, YCT-529, hydrogel vas devices) is yet approved for clinical use.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's account of male contraception (testosterone/GnRH analogue/gossypol/intra-vas device) is the older didactic summary; the combined-regimen efficacy data and investigational oral agents above are drawn from the more current literature (Berek & Novak 16e and general recent trial reports), as this bank's corpus does not yet carry a dedicated post-2020 male contraception chapter.

> **SOURCE & COVERAGE**
> Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Williams Obstetrics 26e (figure). Coverage note: the Recent advances entries (YCT-529, DMAU, 11β-MNTDC, Contraline ADAM) reflect general knowledge of published Phase 1 trial reports rather than the on-disk textbook corpus, which does not yet cover these post-2020 candidates.

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Newer oral contraceptives and non-contraceptive benefits

Asked in: Paper IV 19-Nov-2021 — RGUHS MS Obstetrics & Gynaecology

Definition — Newer oral contraceptives are combined oral contraceptive (COC) and progestin-only pill (POP) formulations built around third- and fourth-generation progestins and natural-estrogen components (estradiol valerate, estetrol), together with modified dosing regimens, designed to lower the androgenic and metabolic burden of first- and second-generation pills while keeping contraceptive

efficacy unchanged. Beyond preventing pregnancy, these agents give well-documented non-contraceptive health benefits that are now an independent indication for prescribing them.

Generations of progestins used in oral pills

Generation	Ethinyl estradiol (E) dose	Representative progestin(s)	Distinguishing property
1st	≥50 mcg	Norethindrone, norethynodrel	Historic; highest androgenic/metabolic load
2nd	20–35 mcg	Levonorgestrel, norgestimate	Effective, cheap; more androgenic
3rd	20–30 mcg	Desogestrel, gestodene	"Lipid-friendly" — least effect on lipids/SHBG, but higher venous thromboembolism (VTE) risk than 2nd generation
4th	E or natural estrogen	**Drospirenone**, dienogest, nomegestrol acetate, nestorone, trimegestone	Nonethylated estranes/pregnanes; antiandrogenic; drospirenone additionally antimineralocorticoid

Annual nonfatal VTE per 100,000 users: no combined oral contraceptive (COC) use 5, 2nd-generation COC 15, COC with desogestrel/gestodene 30, pregnancy 60.

Newer combined pill formulations

Formulation	Composition	Key feature
Drospirenone 24/4 pill	Ethinyl estradiol 20 mcg + drospirenone 3 mg, 24 active/4 placebo	Antiandrogenic + antimineralocorticoid; drospirenone is a spironolactone analogue — monitor serum potassium, avoid in renal/adrenal/hepatic dysfunction
Estradiol valerate–dienogest quadriphasic	Estradiol valerate falling 3→1 mg over 26 days + dienogest 2 mg (days 3–7) then 3 mg (days 8–24)	First "natural-estrogen" COC; four-phase dosing gives ovulation inhibition and cycle control comparable to a standard monophasic pill

Formulation	Composition	Key feature
Estradiol–nomegestrol acetate	Estradiol 1.5 mg + nomegestrol acetate 2.5 mg, 24 active/4 placebo	Nomegestrol acetate has no glucocorticoid/mineralocorticoid activity and no androgenicity, but more irregular bleeding
Estetrol–drospirenone	Estetrol (E4) 14.2 mg + drospirenone	Newest natural estrogen — a fetal-liver-derived estrogen that is orally active with distinct, more selective hepatic receptor binding than ethinyl estradiol
Triphasic pill	Levonorgestrel/ethinyl estradiol doses stepped up across the cycle	Aims to cut total progestin dose per cycle; cycle control is similar to monophasic pills, so the theoretical metabolic advantage is not clinically proven
Extended/continuous regimen	84 active + 7 placebo tablets (or 24 active/4 placebo packs)	Withdrawal bleed only every ~3–4 months ("seasonal" bleed); shorter hormone-free interval reduces breakthrough ovulation and bleeding

Newer progestin-only and non-hormonal oral options

- **Drospirenone-only pill** — 4 mg, taken for 24 consecutive days of a 28-day pack (progestin withdrawal for the last 4 days minimises irregular bleeding); unlike the older norethindrone-only minipill, it **reliably inhibits ovulation** and gives a 24-hour missed-pill window — the same margin as COCs.
- **Desogestrel-only pill** — 0.075 mg daily, continuous; missed-pill window 12 hours.
- **Centchroman (ormeloxifene)** — a non-steroidal compound with potent antiestrogenic and weak estrogenic activity, developed by the Central Drug Research Institute (CDRI), Lucknow; 30 mg orally twice a week for the first 3 months, then once weekly. It prevents implantation by creating asynchrony between the developing embryo and the endometrium and does **not** inhibit ovulation. It is distributed free under India's National Family Welfare Programme (brand "Chhaya"/"Saheli") and is also useful (weak estrogenic/antiestrogenic action) in dysfunctional uterine bleeding, endometrial hyperplasia and endometriosis.

Non-contraceptive benefits

Category	Benefit	Approximate magnitude
Menstrual	Cycle regulation, less dysmenorrhea, less menorrhagia/anemia, less premenstrual syndrome (PMS) and mittelschmerz	Dysmenorrhea reduced ~40%; menstrual blood loss reduced ~50%
Infective/anatomic	Less pelvic inflammatory disease (thick cervical mucus barrier), fewer ectopic pregnancies, faster resolution of functional ovarian cysts, less benign breast disease	—
Endocrine/dermatologic	Improves acne and hirsutism by raising sex hormone–binding globulin (SHBG) and lowering free testosterone; most marked with antiandrogenic 3rd-/4th-generation progestins; drospirenone-containing pills give modest benefit in premenstrual dysphoric disorder (PMDD)	—
Gynaecological disease	First-line medical therapy for endometriosis-related pain and maintenance suppression after surgery or gonadotropin-releasing hormone (GnRH) agonist treatment; cheaper and better tolerated than GnRH agonists; limits fibroid-related bleeding	—
Skeletal/rheumatological	Increased bone mineral density; some protection against rheumatoid arthritis	Evidence for fracture protection is inconsistent
Oncological	Reduced endometrial cancer, reduced epithelial ovarian cancer, reduced colorectal cancer	~50% reduction in endometrial and ovarian cancer risk, ~40% reduction in colorectal cancer risk; protection needs ≥6–12 months use and persists 10–15 years after stopping

These benefits are recognised by the American College of Obstetricians and Gynecologists (ACOG) as an independent reason to prescribe combined hormonal contraception even without a contraceptive need.

Recent advances [RA]

Estetrol–drospirenone is the newest "native-estrogen" combined pill: estetrol is synthesised by the fetal liver and, unlike ethinyl estradiol, binds selectively to hepatic estrogen receptors with less stimulation of clotting-factor and lipid protein synthesis; early comparative data suggest a more favourable haemostatic and lipid profile, though mature long-term venous thromboembolism (VTE) outcome data are still awaited. The US Food and Drug Administration issued a Drug Safety Communication (2012) flagging a modestly higher VTE risk with drospirenone-containing COCs compared with levonorgestrel-containing COCs; subsequent case-control studies confirmed this signal, and the American College of Obstetricians and Gynecologists (2021) now recommends individualised risk–benefit counselling, particularly around the perioperative period, when prescribing these pills. Among progestin-only pills, the drospirenone-only 24/4 regimen is the first minipill demonstrated to reliably inhibit ovulation, narrowing the efficacy gap with combined pills while avoiding estrogen exposure. A norgestrel-only progestin pill also became the first oral contraceptive approved for non-prescription, over-the-counter sale in the United States, a policy-level advance aimed at widening contraceptive access.

High-yield exam pointers

- Generation ladder: 1st (≥50 mcg estrogen) → 2nd (levonorgestrel/norgestimate) → 3rd (desogestrel/gestodene, "lipid-friendly") → 4th (drospirenone/dienogest/nomegestrol acetate, antiandrogenic).
- Drospirenone = spironolactone analogue → antiandrogenic + antimineralocorticoid → monitor serum potassium; avoid in renal, adrenal or hepatic dysfunction.
- Name the newer natural-estrogen pills: estradiol valerate–dienogest (quadriphasic) and estetrol–drospirenone.
- VTE gradient to write: no-COC 5 < 2nd-gen 15 < desogestrel/gestodene 30 < pregnancy 60 per 100,000 women-years.
- Numbers to reproduce: dysmenorrhea ↓40%, menstrual blood loss ↓50%, endometrial and ovarian cancer ↓50%, colorectal cancer ↓40%, protection lasting 10–15 years.
- Centchroman/ormeloxifene: CDRI Lucknow, once-weekly non-hormonal pill, does not inhibit ovulation, free under India's Family Welfare Programme.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> For reference only: DC Dutta's editions record the classic generation-wise progestin classification and benefit percentages used above; the newer natural-estrogen combinations (estradiol valerate–dienogest, estetrol–drospirenone) and their comparative VTE data are drawn from the current Williams Obstetrics 26e and Speroff 9e, since older textbook editions predate these formulations.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; American College of Obstetricians and Gynecologists (ACOG) Committee Opinion on non-contraceptive benefits of hormonal contraception; US FDA Drug Safety Communication (2012) on drospirenone-associated VTE risk.

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Newer progestogens

Asked in: Paper I 19-Nov-2020 — RGUHS MS Obstetrics & Gynaecology

Definition — Progestogens (progestins) are natural or synthetic compounds that reproduce the secretory, antiestrogenic and antigonadotropic actions of progesterone. "Newer" progestogens are third- and fourth-generation synthetic molecules — desogestrel, gestodene, norgestimate/etonogestrel, drospirenone, dienogest, nomegestrol acetate, nestorone (segesterone acetate) and trimegestone — engineered for greater progesterone-receptor selectivity with markedly less androgenic, and in some cases antiandrogenic or antimineralocorticoid, activity than the older estranes.

Classification by chemical structure

Structural class	Representative agents
Natural	Progesterone
Pregnanes (17-OH-progesterone esters)	17α-hydroxyprogesterone caproate, medroxyprogesterone acetate, chlormadinone acetate, cyproterone acetate, megestrol acetate
Norpregnanes (19-norprogesterones)	**Nomegestrol acetate**, **nestorone (segesterone acetate)**, **trimegestone**, demegestone, promegestone
Retroprogesterone	Dydrogesterone
Estranes (19-nortestosterone)	Norethisterone, norethisterone acetate, norethynodrel, ethynodiol diacetate, lynestrenol
Gonanes (13-ethyl 19-nortestosterone)	Levonorgestrel, **desogestrel/etonogestrel**, **gestodene**, **norgestimate/norelgestromin**
Nonethylated estrane	**Dienogest**
Spironolactone derivative	**Drospirenone**
Unsaturated 19-nor steroid	Gestrinone

Generation-wise (epidemiological) classification

Generation	Structural origin	Progestins	Signature property
1st	Estranes + early pregnanes	Norethisterone family, medroxyprogesterone acetate, chlormadinone acetate	Highest residual androgenicity
2nd	Gonanes from testosterone	Levonorgestrel, norgestrel	Potent, cheap; more androgenic
3rd	Gonanes	Desogestrel, gestodene, norgestimate/norelgestromin, etonogestrel	Higher progesterone-receptor selectivity, less androgenic
4th	Nonethylated estranes / norpregnanes	**Drospirenone, dienogest**, nestorone, nomegestrol acetate, trimegestone	Antiandrogenic; drospirenone additionally antimineralocorticoid

Individual newer progestogens — properties and formulation

Progestogen	Distinguishing pharmacology	Formulation / dose
Drospirenone	Spironolactone analogue; high mineralocorticoid-receptor affinity → antimineralocorticoid + antiandrogenic; can cause hyperkalemia	3 mg with ethinylestradiol 30 mcg (combined pill); drospirenone-only pill 4 mg for 24 of 28 days (Slynd)
Dienogest	Hybrid estrane–pregnane (cyanomethyl instead of ethinyl at C17); antiandrogenic, minimal lipid/carbohydrate effect	2 mg/day monotherapy for endometriosis pain; 2–3 mg with estradiol valerate as a quadriphasic pill
Nomegestrol acetate	Potent progestational activity, antiandrogenic, no glucocorticoid or mineralocorticoid activity	2.5 mg with estradiol 1.5 mg, 24/4 regimen
Nestorone (segesterone acetate)	Nonandrogenic 19-norprogesterone; destroyed by first-pass metabolism, so effective only by non-oral routes; compatible with lactation	Vaginal ring with ethinylestradiol (Annovera) — one ring reused for 13 cycles/1 year; subdermal implant
Trimegestone	High progestational potency, minimal androgenicity	Used in hormone therapy (HT) regimens

Progestogen	Distinguishing pharmacology	Formulation / dose
Etonogestrel	Active 3-keto metabolite of desogestrel	Subdermal single-rod implant releasing ≥30 mcg/day for 3 years (Nexplanon); combined vaginal ring with ethinylestradiol (NuvaRing)
Levonorgestrel	Most androgenic of the newer group but the most extensively validated	Levonorgestrel-releasing intrauterine system (LNG-IUS); emergency contraception; two-rod subdermal implants
Gestrinone	Unsaturated 19-nor-steroid; antigonadotropic, androgenic	2.5 mg twice weekly for endometriosis

Newer LNG-IUS options

Device	LNG content	FDA-approved duration
Mirena	52 mg	5 years (extended use up to 8 endorsed by some bodies)
Liletta	52 mg	6 years
Kyleena	19.5 mg	5 years
Skyla/Jaydess	13.5 mg	3 years

Clinical uses across obstetrics & gynaecology

- **Contraception** — combined pills, progestin-only pills, implants, LNG-IUS, vaginal rings.
- **Endometriosis** — dienogest 2 mg/day; also LNG-IUS and gestrinone.
- **Abnormal/dysfunctional uterine bleeding** — cyclic norethisterone or medroxyprogesterone acetate; LNG-IUS reduces menstrual blood loss by up to 97%.
- **Luteal-phase support and threatened/recurrent miscarriage** — natural micronized progesterone 100 mg vaginally daily, started 2 days after ovulation and continued to 10–12 weeks of gestation.
- **Hormone therapy (HT)** — progestogen added to unopposed estrogen in a woman with a uterus, to prevent endometrial hyperplasia (dydrogesterone, nomegestrol acetate, trimegestone, LNG-IUS).
- **Premenstrual syndrome/PMDD** — drospirenone-containing pill; dydrogesterone 5 mg twice daily, days 5–24.
- **Endometrial hyperplasia/well-differentiated endometrial carcinoma** — high-dose progestogen (medroxyprogesterone acetate or 17α-hydroxyprogesterone caproate) in receptor-positive tumours.

Advantages of newer progestogens over older agents

- Reduced androgenicity → less acne, hirsutism, weight gain and adverse effect on lipids.
- Antiandrogenic agents (drospirenone, dienogest, nomegestrol acetate, cyproterone acetate) additionally treat acne, hirsutism and polycystic ovary syndrome (PCOS)-related symptoms.
- Drospirenone's antimineralocorticoid action avoids fluid retention and benefits premenstrual dysphoric disorder (PMDD).
- Higher progesterone-receptor selectivity gives better cycle control with fewer off-target endocrine effects.
- Non-oral delivery (implant, LNG-IUS, ring) bypasses first-pass hepatic metabolism, permits long-acting reversible contraception and improves compliance.

Adverse effects / safety concerns

Concern	Detail
Venous thromboembolism (VTE)	Baseline risk in non-users is 4–5 events per 100,000 woman-years; combined pill use raises this 3- to 5-fold; desogestrel-, gestodene- and drospirenone-containing pills carry a further modestly higher risk than levonorgestrel-containing pills
Hyperkalemia	With drospirenone — check serum potassium in the first month if co-administered with NSAIDs, ACE inhibitors, angiotensin-receptor blockers, potassium-sparing diuretics; avoid in renal, adrenal or hepatic dysfunction
Irregular bleeding	Common with dienogest, progestin-only pills and LNG-IUS in the first 3–6 months
Residual androgenicity	Least with 4th-generation agents, but not completely absent with any 19-nortestosterone derivative

High-yield exam pointers

- Generation ladder: 1st (estranes/early pregnanes) → 2nd (levonorgestrel) → 3rd (desogestrel, gestodene, norgestimate) → 4th (drospirenone, dienogest, nomegestrol acetate, nestorone, trimegestone).
- Drospirenone = spironolactone analogue → antiandrogenic + antimineralocorticoid → monitor serum potassium.
- Dienogest dose to write: 2 mg/day for endometriosis.
- Nestorone/segesterone acetate is orally inactive — non-oral routes only (ring/implant); safe in lactation.
- VTE gradient: no-pill 5 < 2nd-gen 15 < 3rd/4th-gen ~30 < pregnancy 60 per 100,000 women-years.

- LNG-IUS durations: Mirena/Liletta 5–6 years, Kyleena 5 years, Skyla 3 years; Nexplanon (etonogestrel) 3 years.
- Micronized progesterone 100 mg vaginal daily for luteal support/recurrent miscarriage, 2 days post-ovulation to 10–12 weeks.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> 17α-Hydroxyprogesterone caproate (Makena), long used to prevent recurrent preterm birth, failed to show benefit in the confirmatory PROLONG trial; the US Food and Drug Administration's Center for Drug Evaluation and Research recommended its withdrawal in 2020, and the product was subsequently withdrawn from the US market, though the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine had supported continued selective use pending that decision.

> **SOURCE & COVERAGE**
> Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Williams Obstetrics 26e; DC Dutta's Textbook of Gynaecology 7e; DC Dutta's Textbook of Obstetrics 9e.

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Newer surgical techniques for stress incontinence

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

Definition — Genuine stress incontinence (GSI)/stress urinary incontinence (SUI) is, per the International Continence Society (ICS), involuntary leakage of urine when intravesical pressure exceeds maximum urethral pressure in the absence of detrusor contraction, confirmed on urodynamic study. Surgery aims to restore the bladder neck/proximal urethra to the intra-abdominal pressure zone and to support the vesico-urethral junction against funnelling; the last two decades have shifted practice from open retropubic suspensions and traditional slings to minimally invasive **mid-urethral synthetic slings**, injectable bulking agents, and laparoscopic approaches.

Classification of surgical treatment for SUI

Era	Procedures
Traditional (older)	Anterior colporrhaphy with Kelly's urethral plication; Marshall–Marchetti–Krantz (MMK) retropubic urethropexy; pubovaginal (autologous fascia/rectus sheath) sling; endoscopic bladder-neck suspension (Pereyra/Stamey/Raz)

Era	Procedures
Newer (current standard)	Open/laparoscopic **Burch colposuspension**; retropubic mid-urethral sling — **tension-free vaginal tape** (TVT); **transobturator tape** (TOT); **single-incision (mini-) slings**; **urethral bulking agents**

Newer techniques — principle and technique

Technique	Route / principle	Key operative steps	Outcome
Laparoscopic Burch colposuspension	Retropubic; endopelvic fascia/lateral vaginal fornix sutured to ipsilateral iliopectineal (Cooper's) ligament — same principle as open Burch (1961), still the abdominal "gold standard"	Laparoscopic access to space of Retzius; 2–3 sutures placed each side; mobile vaginal vault essential; corrects mild coexistent cystocele	Long-term (≥5 yr) success ~70–90%; equivalent to open Burch with less morbidity
Retropubic mid-urethral sling (TVT)	Bottom-up; polypropylene tape laid tension-free under the mid-urethra (not sutured to any structure), free ends passed through the retropubic space and out via two suprapubic stab incisions	1–2 cm mid-urethral vaginal incision → specially curved needles passed along the back of the pubic bone bilaterally → mandatory intra-operative **cystoscopy** to exclude bladder perforation	~90% objective and 87% subjective cure maintained at 17-year follow-up
Transobturator tape (TOT) (Delorme, 2001)	Mid-urethral; tape passed through the obturator foramen (inside-out or outside-in) acting as a hammock, avoiding the retropubic space	2 cm vaginal incision; tunnel created to the obturator foramen bilaterally; day-care procedure, can be done under local anaesthesia; cystoscopy not mandatory	Cure, quality-of-life and satisfaction rates comparable to TVT
Single-incision (mini-) slings / microslings	A short (~8 cm) polypropylene tape anchored in the obturator internus fascia or retropubic space through **one** mid-urethral incision only — no groin/suprapubic exit wounds	Avoids both the retropubic space and the obturator canal, reducing visceral/vascular injury risk	High short-term cure; long-term data still limited/inferior versus TVT/TOT

Technique	Route / principle	Key operative steps	Outcome
Urethral bulking agents	Submucosal injection around the proximal urethra to improve coaptation — office/day-care option for poor surgical candidates	Cystoscopically guided peri-/trans-urethral injection of calcium hydroxylapatite, cross-linked polydimethylsiloxane, or bovine collagen	Subjective improvement 66–90%, objective 25–73% at 12 months; benefit declines beyond 2 years; repeat injections often needed

Complications and comparative points

Technique	Characteristic complications
TVT	Bladder perforation (3–9%), retropubic haematoma, postoperative voiding dysfunction/urgency, mesh erosion; rare bowel/vascular injury
TOT	Groin/thigh pain, mesh erosion (more common than TVT); obturator neurovascular injury and bladder injury are rare
Mini-sling	Recurrent urinary tract infection, urge incontinence, voiding difficulty
Bulking agents	Urinary tract infection, retention, erosion/migration of injected material

- Retropubic (TVT) sling is preferred for a fixed, immobile urethra (intrinsic sphincter deficiency) and mixed incontinence, and gives somewhat better long-term efficacy.
- Transobturator (TOT) route is favoured with prior bowel/pelvic adhesive disease and has fewer bladder/vascular events (but more groin pain).
- Mid-urethral slings are now more effective than Burch colposuspension for cure of SUI and as effective as the autologous pubovaginal sling, with lower morbidity than either.

> **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]

- The **AUA/SUFU 2017 guideline** on surgical treatment of female SUI recommends a retropubic or transobturator mid-urethral sling as first-line surgery; single-incision mini-slings may be offered only after informing the patient that robust short-, medium- and long-term outcome data are still lacking compared with TVT/TOT [Kobashi et al., *J Urol* 2017;198:875–883].
- **Regulatory distinction (important, often confused):** the US FDA's 2016 reclassification of surgical mesh to a Class III "high-risk" device, and its later 2019 market-removal order, apply to

transvaginal mesh kits for pelvic organ prolapse repair — full-length mid-urethral slings placed for SUI remain Class II devices and are unaffected; they continue to be recommended as first-line SUI surgery.

- A 2017 Cochrane review confirms open/laparoscopic Burch and other retropubic colposuspensions remain durable (~70% success at ≥5 years), and that mid-urethral slings are non-inferior to colposuspension with quicker recovery.
- Emerging/adjustable options: adjustable retropubic slings (e.g. Remeex-type systems) permit post-operative tensioning for a failed or recurrent case; evidence base is still small.
- Non-mesh "regenerative" options — periurethral autologous stem-cell injection, transurethral radiofrequency collagen denaturation, and vaginal laser therapy — are marketed for SUI, but Cochrane data show **no proven benefit over sham/conventional treatment**; these are not established alternatives to mid-urethral slings or bulking agents.

High-yield exam pointers

- TVT (Ulmsten, 1996) = retropubic, bottom-up, mandatory cystoscopy, bladder perforation 3–9%.
- TOT (Delorme, 2001) = through obturator foramen, no cystoscopy needed, day-care, less bladder injury but more groin pain.
- Burch colposuspension = suture to Cooper's (iliopectineal) ligament = abdominal "gold standard."
- Mini-slings = one incision, no exit wounds, but Cochrane says inferior/insufficient long-term evidence.
- Bulking agents = office procedure for poor surgical candidates; benefit wanes after 2 years.
- Remember: FDA mesh ban = pelvic organ prolapse mesh, NOT midurethral SUI slings.

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

DC Dutta's classification of these procedures is concordant with current Western literature; the only caveat is that FDA mesh restrictions target transvaginal prolapse-repair mesh, not midurethral slings for stress incontinence, which remain unrestricted and first-line.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; AUA/SUFU surgical treatment of female SUI guideline (2017); Cochrane reviews on mid-urethral slings, single-incision slings, urethral bulking agents, and vaginal laser/radiofrequency (2017).

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Recent advances in contraception

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

Definition — "Recent advances" in contraception refers to newer devices, formulations and delivery systems introduced within existing method classes (long-acting reversible contraception, hormonal pills/ring/patch/injectables, emergency contraception, permanent sterilization, male methods) that improve efficacy, duration, user-convenience or access compared with older options. They are grouped below by method class.

1. Long-acting reversible contraception (LARC) — newer devices

Class	Device (brand)	Key feature	Duration
Levonorgestrel intrauterine system (LNG-IUS)	*Mirena* — LNG 52 mg	Original high-dose system	5 years
LNG-IUS	*Liletta* — LNG 52 mg	Lower-cost equivalent	6 years
LNG-IUS	*Kyleena* — LNG 19.5 mg	Smaller frame, lower dose	5 years
LNG-IUS	*Skyla/Jaydess* — LNG 13.5 mg	Smallest frame — nulliparous women	3 years
Copper IUD	*ParaGard* (Cu 380 mm^3)	Non-hormonal, highest copper load	10 years
Frameless Cu-IUD	*GyneFix* — 6 copper beads (330 mm^2 Cu) on a polypropylene thread knotted into the fundal myometrium	Reduced expulsion, dysmenorrhoea and infection; suited to the nulligravid uterus	5 years
Subdermal implant	*Nexplanon* — single-rod etonogestrel 68 mg, radiopaque	Replaced *Implanon*; pre-loaded inserter reduces deep/vascular placement	3 years
Subdermal implant	*Jadelle* (Norplant-II) — 2 rods, 75 mg levonorgestrel each, releasing 50 mcg/day	Easier insertion/removal than 6-rod Norplant	3 years

2. Newer hormonal contraceptives — pill, ring, patch, injectable

Route	Newer agent	Key advance
Progestin-only pill	**Drospirenone-only pill** (*Slynd*) 4 mg	24-hour missed-pill window (vs 3 hours for older POPs); reliably inhibits ovulation

Route	Newer agent	Key advance
Vaginal ring (combined)	*NuvaRing* — ethinylestradiol 15 µg + etonogestrel 120 µg/day	21 days in-situ, 7 days out; avoids first-pass metabolism
Vaginal ring (combined, reusable)	*Annovera* — segesterone acetate + ethinylestradiol	One ring reused for 13 cycles (≈1 year); 3 weeks in/1 week out
Vaginal gel (non-hormonal)	*Phexxi* — lactic acid + citric acid + potassium bitartrate	On-demand, coitally-timed acidifying gel; buffers seminal alkalinisation
Oral pill (over-the-counter)	*Opill* — norgestrel 0.075 mg	First fully OTC daily progestin-only pill (US FDA, 2023); not yet marketed in India
Injectable	**DMPA-SC** (*Sayana Press*) 104 mg subcutaneous	Pre-filled auto-disable syringe; can be self-administered at home
Combined injectable	DMPA 25 mg + estradiol cypionate 5 mg (*Cyclofem*); NET-EN 50 mg + estradiol valerate 5 mg (*Mesigyna*)	Monthly, quicker return of fertility than progestin-only depots

3. Emergency contraception — options and doses

Drug	Dose	Pregnancy rate
Levonorgestrel (POP)	0.75 mg stat + 0.75 mg after 12 h, or 1.5 mg single dose; within 72 h (up to 120 h with reduced efficacy)	0–1%
Copper IUD (gold standard)	Insertion within 5 days of unprotected intercourse	0–1%
Ulipristal acetate (selective progesterone-receptor modulator)	30 mg single oral dose, effective up to 120 h, efficacy maintained closer to ovulation	0–1%
Combined *Yuzpe* regimen — ethinylestradiol 50 µg + norgestrel 0.25 µg	2 tablets stat + 2 tablets after 12 h	0–2%
Mifepristone (RU-486)	100 mg single dose	0–0.6%

4. Advances in permanent (sterilization) methods

- **No-scalpel vasectomy** (NSV) — popularised by *Li Shun-Qiang* (China, 1991); tiny puncture over the stretched vas skin under local anaesthesia; fewer complications (scrotal haematoma, wound sepsis) than conventional scalpel vasectomy.

- **Hysteroscopic transcervical sterilization** — *Essure* (nickel-titanium microcoil with polyethylene terephthalate fibres, inducing tubal fibrosis, confirmed by hysterosalpingogram at 3 months) and *Adiana* (radiofrequency thermal tubal damage + silicone pellet) were introduced as incisionless alternatives to laparoscopic tubal ligation.
- **Laparoscopic mechanical occlusion** — Filshie clip and Falope (silastic) ring remain the standard incisional alternative to Pomeroy tubectomy.

5. Male contraception — methods under trial

Method	Mechanism	Status
RISUG (Reversible Inhibition of Sperm Under Guidance)	Styrene maleic anhydride injected into the vas deferens; creates an incompatible luminal pH and blocks sperm transport	Developed in India (*Sujoy K. Guha*, IIT Kharagpur); studied in human trials
Vasalgel	Similar high-molecular-weight styrene-alt-maleic-acid polymer gel, USA	Studied in animal models; reversible with bicarbonate flush
Hormonal male contraception	Testosterone ± progestin (injection/gel/implant) suppresses spermatogenesis	Suppresses sperm density to ≤1 × 10^6/mL in trials
Intra-vas device (IVD)	Two plugs implanted in each vas to block sperm transport	Reversible; efficacy under study

6. Programmatic advances — India's National Family Planning Programme

- **Antara** — injectable DMPA (subcutaneous), provided free of cost.
- **Chhaya** — free once-a-week Centchroman/Ormeloxifene (Saheli), a non-steroidal antiestrogenic pill developed by the Central Drug Research Institute, Lucknow; acts by preventing implantation without inhibiting ovulation.
- **PPIUCD services** — postplacental (within 10 minutes of placental delivery), intracaesarean, or within 48 hours postpartum insertion of the Cu-IUD, expanding immediate postpartum LARC uptake.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 30.17 — Frameless intrauterine devices (IUD) (GyneFix) (DC Dutta's Gynaecology 7e, p.436)*

High-yield exam pointers

- LNG-IUS durations to memorise: *Skyla* 3y → *Kyleena/Mirena* 5y → *Liletta* 6y → Cu-T (*ParaGard*) 10y.
- *Nexplanon* (replaced *Implanon*) = single-rod etonogestrel 68 mg, radiopaque, 3 years.

- Emergency contraception: Cu-IUD = most effective ("gold standard"); ulipristal acetate 30 mg works up to 120 hours and outperforms levonorgestrel closer to ovulation.
- **RISUG = India's indigenous male contraceptive** (IIT Kharagpur); **Vasalgel = its US analogue** — both non-hormonal vas-occlusive polymers.
- India's National Family Planning Programme: **Antara = injectable DMPA**; **Chhaya = Centchroman**, both free of cost.
- Centchroman (*Saheli*) is unique — it prevents implantation and does NOT inhibit ovulation.
- Hysteroscopic sterilization devices (*Essure*, *Adiana*) were once cited as "recent advances" but have since been withdrawn from the market — know their mechanism, but do not recommend them as current first-line options.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> *Essure* and *Adiana* were discontinued by their manufacturers on safety grounds (pain, perforation, migration) in most countries including the USA (2018–2019), a fact newer than the textbook editions on file; *Opill* (over-the-counter norgestrel) and DMPA-SC self-injection (*Sayana Press*) are recent FDA-level approvals also not yet reflected in the on-disk textbook editions and are drawn from general current knowledge rather than the corpus.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e; DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; U.S. Medical Eligibility Criteria for Contraceptive Use, CDC 2016 (parallels WHO Medical Eligibility Criteria).

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Miscellaneous (unmapped)

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Abnormal Thyroid function tests in pregnancy and Gynecological disorders

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Thyroid function tests (TFTs) — serum thyroid-stimulating hormone (TSH), free thyroxine (fT4), and free triiodothyronine (fT3) — are termed "abnormal" when any value falls outside the appropriate reference range. In pregnancy this is complicated because normal gestational physiology (a rise in thyroxine-binding globulin, TBG, and weak thyrotropin (TSH)-receptor cross-stimulation by human chorionic gonadotropin, hCG) itself shifts TFTs, so trimester-specific ranges —

not standard non-pregnant ranges — must be used. In gynaecology, abnormal TFTs are a common, easily reversible cause of anovulation, abnormal uterine bleeding (AUB), and infertility.

Physiological changes in pregnancy that alter TFTs

Change	Mechanism	Effect on TFTs
Rise in TBG	Oestrogen-driven hepatic synthesis; doubles by ~20 weeks, then plateaus	Total T4/T3 rise; **free** T4/T3 remain normal
hCG–TSH-receptor cross-stimulation	hCG shares the α-subunit with TSH; peaks with hCG at 8–10 weeks	Transient **TSH suppression** with high-normal/raised fT4 in the first trimester (physiological "gestational hyperthyroxinaemia")
Increased renal iodine clearance + fetal iodine transfer	Glomerular filtration rises; fetal thyroid needs iodine from ~12 weeks	Relative iodine deficiency if dietary intake is inadequate
Placental type-3 deiodinase	Degrades maternal T4/T3 before fetal transfer	Greater maternal thyroxine turnover

Using the non-pregnant reference range (TSH 0.4–4.0 mU/L) in pregnancy misclassifies patients: about a quarter of normal pregnancies have a physiologically raised TSH above the non-pregnant 97.5th centile missed as "abnormal," while first-trimester physiological TSH suppression is falsely read as hyperthyroidism. Trimester-specific (or laboratory/population-specific) TSH nomograms must therefore be used (American Thyroid Association [ATA], 2017); if unavailable, a pragmatic upper TSH limit of 4.0 mU/L is used.

Interpreting the abnormal TFT pattern

TSH	Free T4	Free T3	Diagnosis
High	Low	—	Overt (primary) hypothyroidism
High	Normal	—	Subclinical hypothyroidism
Normal	Low	Normal	Isolated maternal hypothyroxinaemia (pregnancy-specific)
Low	Low	Low/Normal	Secondary (central) hypothyroidism — pituitary/hypothalamic cause
Low	High	—	Overt hyperthyroidism/thyrotoxicosis

TSH	Free T4	Free T3	Diagnosis
Low	Normal	Normal	Subclinical hyperthyroidism
Low/Normal	Normal	High	T3-toxicosis

Abnormal TFTs in pregnancy — causes and significance

Direction	Common causes	Maternal/fetal significance
Hyperthyroidism	*Graves disease* (commonest; TSH-receptor stimulating antibodies)	Miscarriage, preterm birth, pre-eclampsia, heart failure, thyroid storm; TSH-receptor antibodies cross the placenta → fetal/neonatal thyrotoxicosis
	Gestational transient thyrotoxicosis / hyperemesis gravidarum (hCG-driven, seen in 2–15% of early pregnancies)	Self-limiting; TSH/fT4 normalise by mid-pregnancy; antithyroid drugs are **not** indicated
	Gestational trophoblastic disease (hydatidiform mole)	Very high hCG over-stimulates the TSH receptor — biochemical hyperthyroidism in 25–65% of molar pregnancies; resolves rapidly after evacuation
	Toxic nodular goitre, subacute thyroiditis	Uncommon in the reproductive age group
Hypothyroidism	*Hashimoto thyroiditis* (commonest; anti-thyroid peroxidase [anti-TPO] antibodies)	Infertility, higher miscarriage rate; overt disease → pre-eclampsia, abruption, preterm birth
	Post-ablative (post-radioiodine/thyroidectomy) Graves disease	Higher replacement-dose requirement
	Iodine deficiency	Maternal and fetal hypothyroidism; impaired fetal neurodevelopment
	Under-replacement in a known hypothyroid woman, or antithyroid-drug overtreatment in a Graves patient	Preventable — dose review needed

Abnormal TFTs in gynaecological disorders

Clinical setting	TFT abnormality	Mechanism/significance
Chronic anovulation / secondary amenorrhoea	TSH high (hypothyroid) or low (hyperthyroid)	Serum TSH (with prolactin) is a first-line test in every amenorrhoea work-up; correcting thyroid status restores ovulatory cycles
Hypothyroidism-induced hyperprolactinaemia/galactorrhoea	TSH high, prolactin high	Sustained hypothalamic thyrotropin-releasing hormone (TRH) drives pituitary lactotropes; resolves with levothyroxine, not a dopamine agonist
Abnormal uterine bleeding (AUB)	TSH high or low	Thyroid dysfunction is a recognised systemic cause of ovulatory-dysfunction AUB (AUB-O in the FIGO PALM-COEIN classification, 2011); thyroid profile is part of the standard AUB work-up
Infertility, luteal phase defect, recurrent pregnancy loss	Subclinical hypothyroidism; raised anti-TPO titres	Treated to improve fecundity and reduce miscarriage risk once identified
Suspected PCOS	TSH screened to exclude thyroid disease	Thyroid dysfunction is a differential/co-existing cause of oligo-anovulation and must be excluded before labelling PCOS
Premature ovarian insufficiency	Coexistent Hashimoto thyroiditis	Part of autoimmune polyglandular failure — screen thyroid antibodies
Dermoid cyst of ovary (mature cystic teratoma)	Ectopic functioning thyroid tissue (struma ovarii)	Rarely produces genuine biochemical/clinical hyperthyroidism

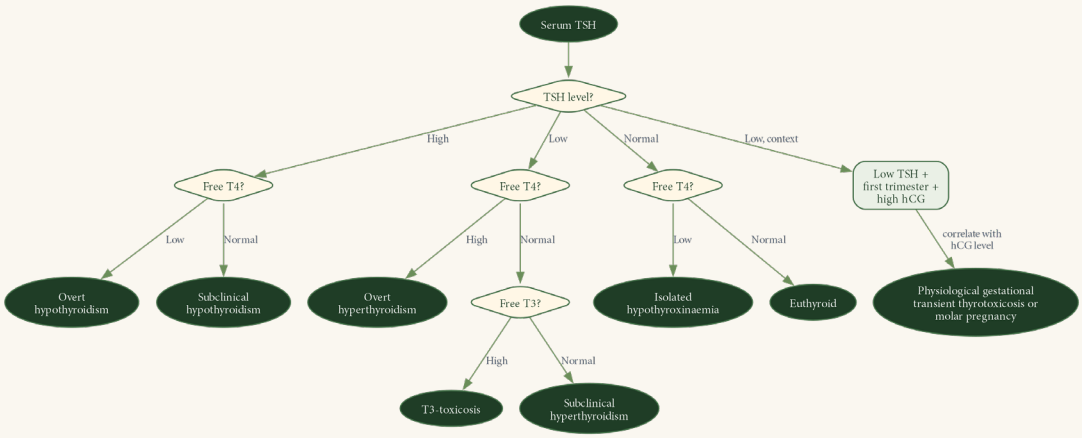
Management principles

- **Overt hyperthyroidism (Graves)** — thionamide: propylthiouracil (PTU) 50–150 mg orally three times daily (up to 300–450 mg/day, occasionally 600 mg/day) through the first trimester; switch to methimazole (initial 10–20 mg/day, maintenance 5–10 mg/day) from the second trimester (PTU:methimazole dose ratio 20:1) — ATA 2017. Titrate to keep free T4 high-normal; recheck every 4–6 weeks.
- **Thyroid storm/thyrotoxic heart failure** (Parkland protocol) — PTU 1000 mg loading dose then 200 mg every 6 hours; 1–2 hours later start iodine (sodium iodide 500–1000 mg IV every 8

hours, or potassium iodide/Lugol solution 5–10 drops orally every 8 hours; lithium carbonate 300 mg every 6 hours if iodine-allergic); dexamethasone 2 mg IV every 6 hours (or hydrocortisone 100 mg IV every 8 hours) for 24 hours; propranolol 10–40 mg orally every 4–6 hours for rate control.

- **Gestational transient thyrotoxicosis/hyperemesis-associated hyperthyroidism** — supportive care only; antithyroid drugs are not warranted (ACOG, 2020).
- **Subclinical hyperthyroidism** — no antithyroid treatment in pregnancy; periodic surveillance only.
- **Radioactive iodine (^{131}I)** — absolutely contraindicated in pregnancy and lactation; avoid conception for 6 months after ablative therapy.
- **Overt hypothyroidism** — levothyroxine 1–2 µg/kg/day (≈ 100 µg/day), increased in 25–50 µg increments to a target TSH of about 2.5 mU/L; recheck TSH every 4 weeks in the first half of pregnancy and at least once in the third trimester (ACOG, 2020).
- **Subclinical hypothyroidism / isolated hypothyroxinaemia** — treat if anti-TPO-antibody positive, symptomatic, or associated with infertility/menstrual dysfunction; the ATA (2017) does not recommend routine levothyroxine for isolated hypothyroxinaemia as trial evidence shows no neurodevelopmental benefit.
- **Gynaecological hypothyroid-related anovulation, AUB, or galactorrhoea** — levothyroxine replacement alone restores ovulation/menses and normalises prolactin.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart for interpreting abnormal TFTs in pregnancy from the TSH/free T4/free T3 pattern, with a side branch for the hCG-driven gestational-transient-thyrotoxicosis/molar-pregnancy pattern.

High-yield exam pointers

- hCG–TSH-receptor cross-reaction physiologically **suppresses TSH and raises fT4** in the first trimester — use trimester-specific ranges, not non-pregnant ranges.
- PTU for the first trimester → switch to methimazole thereafter (ratio 20:1); PTU risk = hepatotoxicity, methimazole risk = embryopathy (aplasia cutis, choanal/oesophageal atresia).
- Radioiodine (^{131}I) is absolutely contraindicated in pregnancy/lactation.
- Levothyroxine dose ≈ 1–2 µg/kg/day (~100 µg); target TSH ≈ 2.5 mU/L; dose requirement rises in pregnancy (roughly a third of women need an increase).
- Serum TSH + prolactin are first-line tests in every case of amenorrhoea, AUB, or infertility.
- Hydatidiform mole → massive hCG cross-stimulates the TSH receptor → biochemical hyperthyroidism in up to 65% of moles; resolves after evacuation.
- FIGO PALM-COEIN (2011): thyroid dysfunction sits under "AUB-O" (ovulatory dysfunction).

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

DC Dutta's normal-range table (TSH 0.4–5 mU/L) reflects standard non-pregnant assay values; current ATA (2017)/ACOG (2020) guidance requires trimester-specific or laboratory-derived ranges for interpreting pregnancy TFTs, and this current standard should be followed in the exam answer.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; American Thyroid Association (ATA) 2017 guidelines for thyroid disease in pregnancy; American College of Obstetricians and Gynecologists (ACOG), 2020; FIGO PALM-COEIN classification of AUB, 2011.

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Causes and Management of Deep Transverse Arrest

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Deep transverse arrest (DTA) is a malposition disorder of the second stage in which the fetal head is deep in the pelvic cavity (at or below the level of the ischial spines) with the sagittal suture fixed in the transverse (bispinous) diameter, and there is no further descent despite good uterine contractions for about ½–1 hour after full cervical dilatation. It represents the end-result of an incomplete forward (anterior) rotation of an oblique occiput-posterior position — the occiput rotates through only ⅛ of a circle instead of the full ⅜ needed to reach the anterior — or of primary non-rotation of an occiput-transverse position.

Causes

Category	Causes
Pelvic (commonest)	Android or anthropoid pelvis; prominent ischial spines; flat or assimilation sacrum; convergent side walls; narrow subpubic arch; mid-pelvic contraction
Fetal	Persistent deflexion of the head (occiput-posterior mechanism) presenting a larger diameter (occipitofrontal, 11.5 cm) that engages and rotates poorly; fetal macrosomia; asynclitism
Uterine	Weak or incoordinate uterine contractions — inadequate force for flexion and rotation of the head
Soft tissue / iatrogenic	Laxity of the pelvic floor muscles (grand multiparity, epidural analgesia blunting the reflex bearing-down/rotatory force); early rupture of membranes with drainage of liquor, immobilising the fetal trunk and preventing the shoulders from following the occiput's rotation

Diagnosis

Per abdomen:

- Fetal back felt in the maternal flank, limbs anteriorly; fetal heart sounds heard away from the midline
- Head may feel incompletely engaged where deflexion persists

Per vaginam (confirmatory):

- Head deep in the pelvic cavity, engaged, but arrested — no descent for ≥½–1 hour of good contractions after full dilatation of the cervix
- Sagittal suture lies in the transverse (bispinous) diameter of the pelvis
- Anterior fontanelle (bregma) palpable centrally/anteriorly; posterior fontanelle not felt
- Caput succedaneum and moulding often obscure the sutures/fontanelles late in labour — locate the fetal ear; the unfolded pinna points towards the occiput
- Pelvic assessment at and below the level of arrest — ischial spines, side walls, sacrum, subpubic arch, and bi-ischial (outlet transverse) diameter

Note on timing: Dutta's operational cut-off of ½–1 hour without descent is the classical Indian teaching; the current ACOG Obstetric Care Consensus (2019) allows a longer trial of pushing before labelling second-stage arrest — at least 3 hours in a nullipara and 2 hours in a multipara (each extended by about an hour with epidural analgesia) — provided contractions are adequate and the mother and fetus remain stable.

Management

Principles: (1) early diagnosis; (2) full abdominal + vaginal reassessment of fetal size, position, station, and pelvic adequacy at the level of arrest; (3) judicious, timely intervention — an arrested head left unattended progresses to obstructed labour.

Assessment at reassessment	Line of management
Pelvis adequate + average-size baby + adequate liquor + operator skilled in rotational delivery	Trial of operative vaginal delivery (methods below)
Pelvis contracted (especially mid-pelvic contraction) OR big baby OR inadequate liquor OR operator not skilled in rotation	**Caesarean section** — safer at this stage
Fetus already dead	Craniotomy (destructive operation), only if the vaginal route is otherwise safe

Methods of operative vaginal delivery (in a suitable case):

- **Ventouse (vacuum extraction):** cup applied over the flexion point to promote flexion; rotation of the occiput towards anterior occurs spontaneously with descent on traction. Excessive traction force must be avoided. Best suited when arrest is due to weak contractions or poor pelvic-floor tone with an otherwise adequate pelvis.

- **Manual rotation followed by forceps extraction:** the occiput is rotated manually (whole-hand or half-hand method) until it lies behind the symphysis pubis, then forceps are applied in that corrected position. Requires an adequate pelvis, an average-size baby, and adequate liquor.
- **Rotational (Kielland) forceps — rotation and extraction:** performed only by an expert. Advantages over manual rotation: no accidental displacement of the head, no risk of cord prolapse, and rotation is possible at, above, or below the level of obstruction depending on the type of pelvis.
- **Caesarean section:** always preferred whenever the case is unsuitable for manual or instrumental rotation, or when the operator is not skilled in rotational vaginal delivery — "otherwise caesarean delivery is always preferred" over a difficult rotational attempt.

Third stage and after delivery:

- DTA and its correction carry an increased risk of postpartum haemorrhage and genital tract trauma — give a prophylactic oxytocic (e.g., intravenous ergometrine 0.25 mg with delivery of the anterior shoulder) and perform a liberal mediolateral episiotomy to reduce the risk of a complete perineal tear.
- After any instrumental delivery, meticulously inspect the cervix, vagina, and perineum for injury.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 22.6 — Mechanisms of labor for the left occiput transverse position, lateral view (Williams Obstetrics 26e, p.437)*

High-yield exam pointers

- DTA = sagittal suture stuck in the **transverse (bispinous)** diameter, head deep in the pelvis, arrested ≥½–1 hour after full dilatation.
- Remember the rotation numbers: normal anterior rotation of the occiput is **⅜ of a circle**; in DTA only **⅛** is completed.
- Four causes to reproduce fast: pelvic architecture (spines/sacrum/side walls), deflexion of the head, weak contractions, lax pelvic floor.
- **Kielland forceps** = minimal pelvic curvature + sliding lock — the classic rotational forceps for occiput-transverse/posterior → occiput-anterior.
- Golden safety rule for the exam: if the pelvis is inadequate, the baby is big, or the operator is not skilled in rotation — **caesarean section**, not a difficult rotational delivery.
- Anticipate postpartum haemorrhage and perineal/cervical trauma after correction of DTA — prophylactic oxytocic + liberal episiotomy + post-delivery genital tract inspection.

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

DC Dutta's classical operative options (manual and Kielland rotation) remain examinable, but current practice increasingly favours vacuum extraction or straight forceps plus a lower threshold for caesarean section over rotational forceps, since the specific skill for rotational forceps is now less commonly trained; likewise, the current ACOG-recommended second-stage duration before diagnosing arrest (nulliparae ≥3 hours, multiparae ≥2 hours, longer with epidural analgesia) is more liberal than the traditional ½–1 hour cut-off quoted in Indian textbooks.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e (including its Obstetric Care Consensus-derived second-stage arrest criteria, Table 23-2).

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Causes of maternal mortality & their prevention

Asked in: Paper IV 13-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — A **maternal death** (WHO/ICD-10) is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration or site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but **not** from accidental or incidental causes. The **maternal mortality ratio (MMR)** = number of maternal deaths ÷ number of live births × 100,000, and is the single most sensitive index of a country's obstetric-care quality.

Classification and causes of maternal death

Class	Share	Definition
Direct obstetric death	~75%	Death from complications of pregnancy, labour, puerperium or their management (includes suicide)
Indirect death	~25%	Pre-existing/intercurrent disease aggravated by the physiological load of pregnancy
Non-obstetric (fortuitous/coincidental) death	—	Unrelated cause (road accident, unrelated infection) — excluded from MMR

Cause	Approx. share	Mechanism / what prevents it
Haemorrhage — mostly postpartum; also antepartum (abruption, previa), retained placenta, abortion complications, ruptured ectopic	20–25%	Correct antenatal anaemia; skilled attendant at birth; active management of third stage of labour (AMTSL) with a timely oxytocic; blood-transfusion readiness
Sepsis/infection — following prolonged/obstructed labour, prelabour rupture of membranes, unclean delivery practice	15–20%	Skilled attendant; "three cleans" (hands, perineum, cord); prompt antibiotics
Hypertensive disorders — pre-eclampsia/eclampsia	12–15%	Early antenatal detection and timely referral; magnesium sulfate for seizure prophylaxis/treatment
Anaemia (indirect, but the single most important contributory cause in developing countries)	15–20%	Routine iron–folic acid supplementation; deworming; treat malaria/HIV; admit if haemoglobin ≤7 g/dL
Unsafe abortion	10–13%	Access to contraception and legal safe-abortion services; post-abortion antibiotics and care
Obstructed labour — cephalopelvic disproportion, malpresentation	8%	Partograph use for early detection; timely referral for operative delivery
Other indirect causes — viral hepatitis (endemic, high case-fatality), cardiac disease, diabetes, thyroid disease	5–10%	Safe drinking water/hygiene, immunisation, joint specialist care, appropriate referral

Factors that increase risk (the "avoidable factors")

- **Age** — highest safety at 20–25 years; risk rises in adolescence (pre-eclampsia, cephalopelvic disproportion, uterine inertia) and is **3–4-fold higher at ≥35 years**.
- **Parity** — risk **3-fold higher at parity ≥5** (postpartum haemorrhage, malpresentation, ruptured uterus more frequent); lowest risk is the second pregnancy.
- **Socioeconomic strata** — mortality ratios are consistently higher in the lowest strata.
- **Antenatal care** — women with the highest mortality (grand multiparas, low socioeconomic status) are precisely those who least use antenatal services.
- **Substandard care** — care below the accepted local standard, including staff or laboratory/blood-bank shortage.

- **The "three delays" model** (Thaddeus & Maine; adopted by WHO) frames how these factors kill: **Delay 1** — deciding to seek care (poor recognition of danger signs, low decision-making power of women, cost); **Delay 2** — reaching a facility (distance, transport, geography); **Delay 3** — receiving adequate care once there (staff, blood, operation theatre shortage). Every prevention action below is aimed at breaking one of these three delays.

Prevention — "Actions for Safe Motherhood"

Prevention is a coordinated, long-term effort spanning the health system, the community and national policy — never a one-time intervention.

- **Essential obstetric care (RCH package):** early registration (≤12 weeks); a minimum of 4 antenatal visits (WHO)/3 visits (Government of India schedule); **continuous risk assessment** through pregnancy, labour and puerperium; institutional delivery by a **skilled birth attendant**; "three cleans" at delivery; AMTSL; partograph in every labour; early exclusive breastfeeding; family-planning counselling.
- **Emergency obstetric care (EmOC): basic EmOC** at the peripheral/field level (parenteral oxytocics, antibiotics, anticonvulsants, manual removal of placenta, assisted vaginal delivery); **comprehensive EmOC** at the First Referral Unit (FRU) — adding caesarean section, blood transfusion and laparotomy — backed by a functioning referral-transport system (breaks Delay 2 and 3).
- **Empowering the skilled birth attendant:** permitted (RCH-II) to give life-saving drugs — **misoprostol** (PPH prevention), **injection oxytocin** (PPH treatment), **injection magnesium sulfate** (eclampsia), **ampicillin and metronidazole** (infection) — and to perform digital removal of retained products in incomplete abortion, AMTSL and partograph charting.
- **Health-sector systemic actions:** joint specialist consultation for medical disorders in pregnancy (anaemia, cardiac disease, diabetes, hepatitis, hypertension); **maternal-death-review conferences**; written emergency protocols; periodic refresher training; periodic system audit.
- **Community, society and family action:** women's groups, safe-motherhood committees, ASHA/link-worker demand generation for institutional delivery (breaks Delay 1).
- **Policy, legislative and gender action:** girl-child education, nutrition and delayed age at marriage/childbirth; removal of access barriers and gender/social discrimination; decentralisation of services to reach rural/marginalised women; national-policy assurance of safe-abortion and post-abortion care.

Recent advances [RA]

- **Global trend:** WHO/UNICEF/UNFPA/World Bank *Trends in Maternal Mortality 2000–2020* (2023) — global MMR fell from 339 to 223 per 100,000 live births; global lifetime risk of maternal death is now about 1 in 210.

- **India's trend:** Sample Registration System (SRS) special bulletins show progressive decline beyond the 130 (2014–16) figure printed in older textbook editions — 113 (2016–18), 103 (2017–19), 97 (2018–20), 93 (2019–21), 88 (2021–23), and the latest **87 (2022–24)** per 100,000 live births — below the National Health Policy target of 100 but still above the **SDG 3.1 target of <70 by 2030**.
- **WHO Ending Preventable Maternal Mortality (EPMM)** strategy (2021–2030): address inequities in access; ensure universal, comprehensive reproductive-maternal-newborn care; tackle all causes of maternal death, morbidity and disability; strengthen health systems; ensure accountability for quality of care.
- **Surveillance:** Maternal Death Surveillance and Response (MDSR, WHO 2013) and India's facility/community-based Maternal Death Review (MDR) guidelines mandate real-time notification and root-cause review of every maternal death.
- **Government of India platforms:** *Janani Suraksha Yojana* (JSY) — cash incentive for institutional delivery; *Janani Shishu Suraksha Karyakram* (JSSK) — free delivery/caesarean, drugs, diagnostics, diet, transport; *Pradhan Mantri Surakshit Matritva Abhiyan* (PMSMA) — free fixed-day (9th of every month) antenatal check-up; *LaQshya* (Labour room Quality improvement Initiative) — quality-of-care certification for labour rooms/maternity operation theatres; *Surakshit Matritva Aashwasan* (SUMAN) — zero-expense assured maternity/newborn care; *Anemia Mukt Bharat* — 6x6x6 life-cycle anaemia-control strategy.
- **Evidence-based practice change:** early **tranexamic acid** (within 3 hours of postpartum haemorrhage onset) reduces bleeding-related death and is WHO-recommended (WOMAN trial, *Lancet* 2017); non-pneumatic anti-shock garments aid stabilisation during referral transport.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 38.1 — Important causes of maternal deaths (WHO, 2003–09) (DC Dutta's Obstetrics 9e, p.586)*

High-yield exam pointers

- Maternal death = death **within 42 days** of pregnancy termination, cause related to/aggravated by pregnancy, excluding accidental/incidental death; MMR is per **100,000 live births**.
- Classify first: **Direct (75%) / Indirect (25%) / Fortuitous**, then list causes in descending order — **haemorrhage (20–25%) > anaemia/infection (15–20% each) > hypertension (12–15%) > unsafe abortion (10–13%) > obstructed labour (8%)**.
- Memorise the "**three delays**": deciding to seek care → reaching a facility → receiving care there — map every prevention measure onto one of these.
- Life-saving drugs an SBA may give: **misoprostol, oxytocin, MgSO4, ampicillin, metronidazole**.
- Four levels to structure "prevention": **essential + emergency obstetric care → health-sector systems → community → policy/legislative**.

- Current SDG target: **MMR <70/100,000 live births by 2030**; India's latest SRS figure is **87 (2022–24)**.

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

Dutta's textbook prints India's MMR as 130 (SRS 2014–2016) and the cause-of-death percentages as WHO 2003–09 data; the more recent SRS bulletins (cited above) show a continuing decline and should be quoted as the current figure if the examiner asks "what is today's MMR".

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 38 — Safe Motherhood, Epidemiology of Obstetrics); Williams Obstetrics 26e; Arias' High-Risk Pregnancy & Delivery 5e (ICD classification of maternal death); WHO/UNICEF/UNFPA/World Bank Group, *Trends in Maternal Mortality 2000–2020* (2023); WHO Ending Preventable Maternal Mortality (EPMM) strategy and Maternal Death Surveillance and Response guidance; Registrar General of India SRS Special Bulletins on Maternal Mortality; Government of India National Health Mission (JSY/JSSK/PMSMA/LaQshya/SUMAN/Anemia Mukt Bharat) programme documents.

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Causes, diagnosis and treatment of Acute PID

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Acute pelvic inflammatory disease (PID) is a spectrum of infection and inflammation of the upper genital tract — endometrium, fallopian tubes, ovaries, and pelvic peritoneum/parametrium — resulting from ascending spread of micro-organisms from the cervicovaginal canal. It is unrelated to pregnancy or surgery, and includes **endometritis, salpingitis, pelvic peritonitis, tubo-ovarian abscess (TOA) and parametritis**; cervicitis alone is not classified as PID.

Causes (Aetiology)

Acute PID is almost always a **polymicrobial** ascending infection.

Organism group	Examples	Approximate share
Primary (sexually transmitted)	*Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Mycoplasma genitalium/hominis*	*N. gonorrhoeae* ~30%, *C. trachomatis* ~30%, *M. hominis* ~10%
Secondary aerobic	*E. coli*, group B *Streptococcus*, *Staphylococcus*, non-haemolytic streptococci	endogenous vaginal flora, ascend once the cervical barrier is breached

Organism group	Examples	Approximate share
Secondary anaerobic	*Bacteroides fragilis/bivius*, *Peptostreptococcus*, *Peptococcus*, bacterial-vaginosis-associated organisms (*Gardnerella vaginalis*)	co-infection rises with concurrent bacterial vaginosis

Risk factors

- Menstruating teenagers; wider cervical ectopy favours colonisation by *C. trachomatis*/*N. gonorrhoeae*.
- Multiple sexual partners; partner with urethritis or a sexually transmitted infection (STI).
- Non-use of barrier contraception.
- Previous episode of acute PID.
- Intrauterine device (IUD) insertion, especially within the first 3 weeks.
- Iatrogenic instrumentation — endometrial biopsy, uterine curettage, hysterosalpingography (accounts for ~15% of cases; ~85% are spontaneous, sexually acquired infection).

Route of spread: ascending mucosal continuity along the cervix–endometrium–tube axis (sperm/trichomonads act as carriers), and reflux of infected menstrual blood into the tubes.

Diagnosis

Clinical features

- Bilateral lower abdominal and pelvic pain, dull, appearing at or soon after menstruation — more acute in onset with gonococcal infection (~3 days) than chlamydial infection (5–7 days).
- Fever, malaise, headache; abnormal/purulent vaginal discharge; irregular or heavy vaginal bleeding (associated endometritis); nausea/vomiting; deep dyspareunia.
- Right hypochondrial pain from associated perihepatitis (**Fitz-Hugh–Curtis syndrome**) in 5–10% of acute salpingitis.
- Signs: temperature > 38.3 °C; bilateral lower abdominal tenderness; cervical motion tenderness and bilateral adnexal/fornix tenderness ± a palpable adnexal mass on bimanual examination; mucopurulent cervical discharge on speculum examination.

Clinical diagnostic criteria (CDC 2021)

Tier	Criteria
Minimum (any one, empiric treatment threshold)	Uterine tenderness, adnexal tenderness, or cervical motion tenderness

Tier	Criteria
Additional (increase specificity)	Oral temperature > 38.3 °C; abnormal mucopurulent cervical/vaginal discharge; abundant white blood cells on saline microscopy of vaginal fluid; elevated erythrocyte sedimentation rate (ESR)/C-reactive protein (CRP); laboratory-confirmed cervical gonorrhoea or chlamydia
Definitive	Histopathological endometritis on endometrial biopsy; transvaginal sonography (TVS)/MRI showing thickened, fluid-filled tubes ± tubo-ovarian complex ± free pelvic fluid; laparoscopic findings consistent with PID

Investigations

Test	Purpose/finding
Gram stain + culture of cervical/urethral/Bartholin discharge	Gram-negative intracellular diplococci suggest gonococcal infection; not specific for chlamydia
Nucleic acid amplification test (NAAT)	Confirms *N. gonorrhoeae*/*C. trachomatis* — treatment should not await this result
Complete blood count, ESR, CRP; syphilis/HIV serology	Leucocytosis > 10,000/mm^3, ESR > 15 mm/h (correlates with laparoscopic severity); serology screens both partners
Transvaginal sonography	Dilated, fluid-filled tubes, free pelvic fluid, or tubo-ovarian mass; useful when bimanual examination is limited
Culdocentesis	Peritoneal fluid white cell count > 30,000/mL supports acute PID
Laparoscopy	**Gold standard**; graded mild (oedematous, mobile tubes)/moderate (fimbrial pus, reduced mobility)/severe (pyosalpinx, TOA); "violin-string" perihepatic adhesions suggest chlamydial aetiology

Differential diagnosis

Feature	Acute salpingitis	Acute appendicitis	Disturbed ectopic pregnancy
Pain	Bilateral lower abdomen	Peri-umbilical shifting to right iliac fossa	Unilateral lower abdomen
Amenorrhoea/bleeding PV	Unrelated	Unrelated	Usually present
Temperature	Markedly raised	Slightly raised	Not raised

Feature	Acute salpingitis	Acute appendicitis	Disturbed ectopic pregnancy
Pulse	Proportionate to temperature	Out of proportion to temperature	Persistently raised despite normal temperature
Per-vaginam findings	Bilateral fornix tenderness ± mass	Tenderness high on right fornix	Unilateral fornix mass/tenderness to Pouch of Douglas

Treatment

Principles: treat empirically without awaiting microbiology (broad-spectrum cover for *N. gonorrhoeae*, *C. trachomatis*, anaerobes and streptococci); prevent infertility/tubal sequelae; prevent reinfection by treating partners.

Outpatient antibiotic therapy (CDC 2021)

Regimen	Drugs
A	Ceftriaxone 500 mg IM single dose (1 g if body weight ≥ 150 kg) + doxycycline 100 mg PO twice daily × 14 days + metronidazole 500 mg PO twice daily × 14 days
B	Cefoxitin 2 g IM single dose with probenecid 1 g PO concurrently + doxycycline 100 mg PO twice daily × 14 days + metronidazole 500 mg PO twice daily × 14 days
C	An alternative parenteral third-generation cephalosporin (e.g. ceftizoxime, cefotaxime) + doxycycline + metronidazole as above

Reassess at 48–72 hours; hospitalise if no clinical improvement.

Indications for hospitalisation: suspected tubo-ovarian abscess; severe illness (high fever, vomiting, peritonism); surgical emergency (e.g. appendicitis) cannot be excluded; failure of/intolerance to oral therapy; coexisting pregnancy; HIV infection/immunocompromise.

Inpatient (parenteral) antibiotic therapy (CDC 2021)

Regimen	Drugs
A	Ceftriaxone 1 g IV every 24 h (or cefoxitin 2 g IV every 6 h, or cefotetan 2 g IV every 12 h) + doxycycline 100 mg PO/IV every 12 h + metronidazole 500 mg IV/PO every 12 h

Regimen	Drugs
B	Clindamycin 900 mg IV every 8 h + gentamicin 2 mg/kg IV/IM loading dose, then 1.5 mg/kg every 8 h (or 3–5 mg/kg once daily)
Alternative	Ampicillin-sulbactam 3 g IV every 6 h + doxycycline 100 mg PO/IV every 12 h

Continue parenteral therapy for at least 24–48 hours after clinical improvement, then switch to oral doxycycline (with metronidazole if a tubo-ovarian abscess is present) to complete a total 14-day course.

Indications for surgery

- Generalised peritonitis or ruptured tubo-ovarian abscess.
- Pelvic/tubo-ovarian abscess not responding to intravenous antibiotics within 48–72 hours — image-guided (ultrasound/CT) percutaneous or laparoscopic drainage is preferred over laparotomy where feasible.
- Persistent pelvic mass or diagnostic uncertainty needing laparoscopic clarification.

Prevention of reinfection and follow-up: treat all sexual partner(s) from the preceding 60 days empirically for gonorrhoea/chlamydia regardless of symptoms, with abstinence until therapy is complete in both; retest for gonorrhoea/chlamydia at 3 months. The only unequivocal proof of tubal patency after treatment is a subsequent intrauterine pregnancy.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 41.1 — Algorithm for management of pelvic inflammatory disease. (Te Linde 13e, p.2175)*

High-yield exam pointers

- Acute PID = polymicrobial: **N. gonorrhoeae + C. trachomatis + anaerobes/aerobes**; only ~15% follow instrumentation (IUD/biopsy/HSG).
- CDC **minimum criteria** (any one = start empiric treatment): uterine, adnexal, or cervical motion tenderness — do not wait for laboratory confirmation.
- **Laparoscopy = gold standard**; graded mild/moderate/severe.
- Outpatient: **ceftriaxone 500 mg IM + doxycycline 100 mg BID + metronidazole 500 mg BID, all × 14 days**.
- Inpatient Regimen A (cephalosporin + doxycycline + metronidazole) vs Regimen B (**clindamycin + gentamicin**).
- Hospitalise if: TOA suspected, pregnant, HIV-positive, surgical emergency uncertain, or oral therapy fails at 48 h.
- Fitz-Hugh–Curtis syndrome = perihepatitis in 5–10% of acute salpingitis.

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

Older textbook tables (DC Dutta's Gynaecology 7e, citing CDC 2006/2010) print ceftriaxone 250 mg IM with metronidazole as an optional addition; the current CDC Sexually Transmitted Infections Treatment Guidelines, 2021 (aligned with RCOG Green-top Guideline No. 32, 2019) increase the ceftriaxone dose to 500 mg IM and add metronidazole routinely to both outpatient and inpatient regimens for anaerobic/bacterial-vaginosis coverage — the regimens above reflect this current standard.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Ch. 11 — Pelvic Infection); Berek & Novak's Gynecology 16e (Ch. 15 — Pelvic Inflammatory Disease); Te Linde's Operative Gynecology 13e (management algorithm, Fig. 41.1); CDC Sexually Transmitted Infections Treatment Guidelines, 2021; RCOG Green-top Guideline No. 32 (2019).

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Chorioamnionitis

Asked in: Paper IV 13-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — *Chorioamnionitis* is infection/inflammation of the chorion, amnion, amniotic fluid and often the placenta and fetus, usually ascending from the lower genital tract. A 2015 NICHD workshop renamed the spectrum **intra-amniotic infection and inflammation — "Triple I"** (intrauterine inflammation, infection, or both), a terminology adopted by the American College of Obstetricians and Gynecologists (ACOG Committee Opinion 712, 2017, reaffirmed) because histological/microbiological infection and clinical fever do not always coexist.

Aetiology and risk factors

Category	Risk factors
Membrane/labour related	Prolonged rupture of membranes (>18 hours), preterm premature rupture of membranes (PPROM), prolonged labour
Obstetric interventions	Multiple digital vaginal examinations, internal fetal/uterine monitoring (scalp electrode, intrauterine pressure catheter)

Category	Risk factors
Maternal	Nulliparity, meconium-stained amniotic fluid, genital tract colonisation with **group B* Streptococcus *(GBS)** or sexually transmitted pathogens, bacterial vaginosis, epidural analgesia (fever of non-infective origin can mimic Triple I)
Other	Alcohol/tobacco use, obesity, prior chorioamnionitis

Pathogenesis and microbiology

- **Ascending route (commonest)** — vaginal/cervical organisms cross an already-ruptured (or even intact) membrane, colonise the chorioamnion, then the amniotic fluid, and finally reach the fetus (aspiration/swallowing of infected liquor) and umbilical cord (**funisitis**).
- Less common routes: haematogenous (e.g., *Listeria*), retrograde from the peritoneal cavity via the fallopian tubes, and iatrogenic (amniocentesis, chorionic villus sampling).
- **Polymicrobial** — genital mycoplasmas (*Ureaplasma*, *Mycoplasma hominis*), GBS, anaerobes (*Bacteroides*, *Prevotella*), *Gardnerella vaginalis*, and *Escherichia coli*.
- The fetal inflammatory response (raised amniotic/fetal IL-6, funisitis on placental histology) — not the maternal fever alone — drives most of the neonatal morbidity, including the link to cerebral palsy.

Clinical features and diagnostic criteria

Clinical (overt) chorioamnionitis — maternal fever plus one or more of: uterine tenderness, foul-smelling/purulent amniotic fluid or vaginal discharge, maternal tachycardia (>100/min), fetal tachycardia (>160/min), maternal leukocytosis (>15,000/mm^3). Fever is the single most reliable sign; leukocytosis alone is not diagnostic (physiological rise in labour).

ACOG (2017/2019, adopting the NICHD Triple I nomenclature) grades intrapartum fever as follows:

Category	Criteria
Isolated maternal fever	Temperature 38.0–38.9 °C (100.4–102 °F), **no** additional risk factor, with or without persistence
Suspected Triple I	Temperature ≥39.0 °C once, **or** 38.0–38.9 °C **plus** one risk factor (low parity, multiple digital exams, internal monitors, meconium fluid, GBS/genital-tract pathogens)
Confirmed Triple I	Suspected criteria **plus** positive amniotic fluid Gram stain/glucose/culture, **or** placental histopathology showing acute inflammation/funisitis

Investigations

Test	Purpose/finding
Complete blood count	Leukocytosis, left shift (supportive, non-specific)
C-reactive protein	Rises with infection; adjunct, not diagnostic alone
Continuous cardiotocography	Fetal tachycardia, reduced variability
Amniocentesis (research/selected cases)	Gram stain, glucose <14 mg/dL, positive culture, raised IL-6 — confirms infection
High vaginal/endocervical swab, blood culture	Identify causative organism, guide therapy if refractory
Placenta and cord for histopathology after delivery	Confirms funisitis/acute chorioamnionitis retrospectively

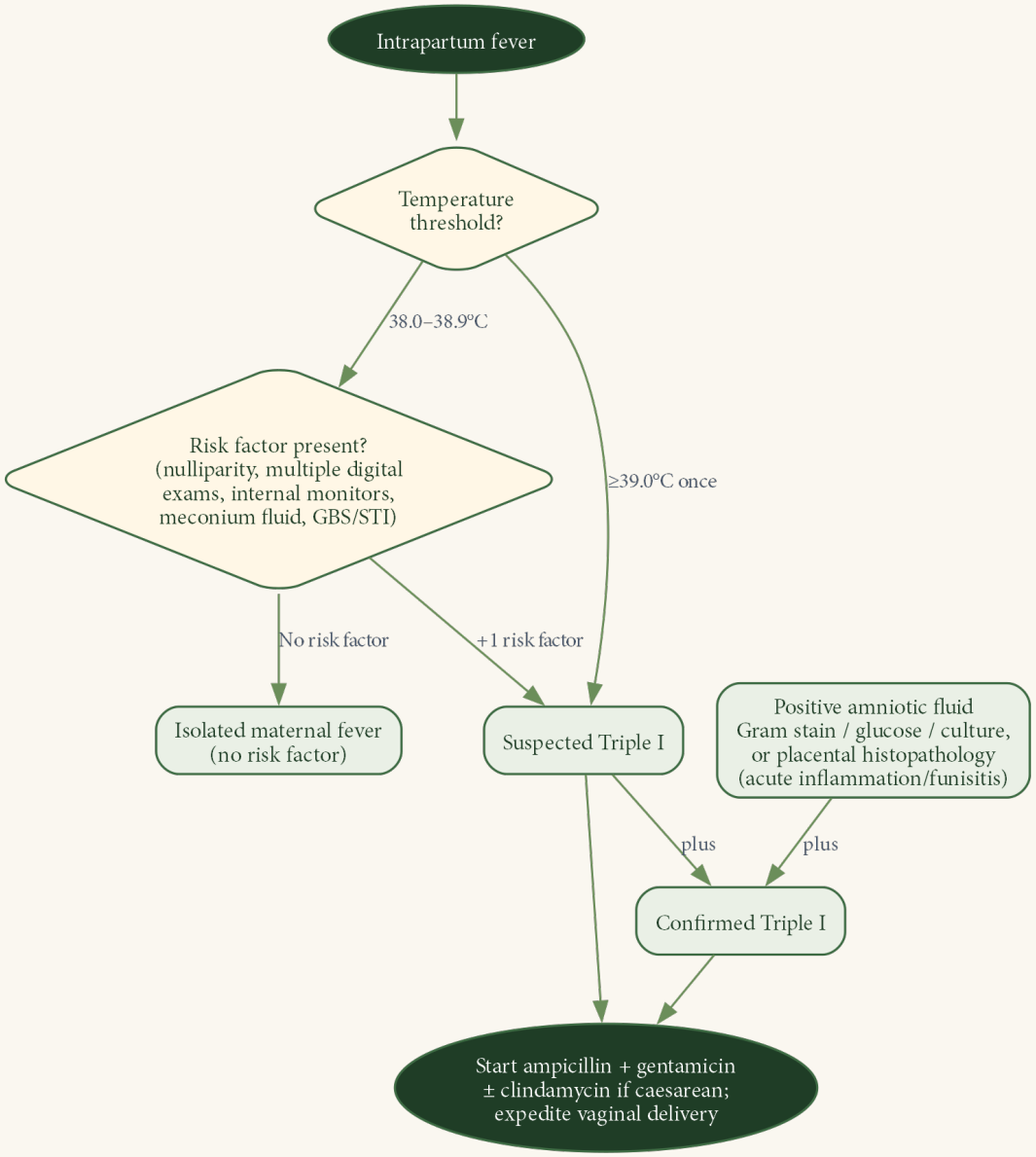
Management

- **Do not delay treatment for delivery** — start intravenous antibiotics as soon as suspected/confirmed Triple I is diagnosed, regardless of GBS status.
- **Standard intrapartum regimen** (ACOG-endorsed, mirrors the regimen used for post-partum pelvic infection): **ampicillin 2 g IV every 6 hours plus gentamicin** (5 mg/kg IV once daily, or 1.5 mg/kg IV every 8 hours).
- **If caesarean delivery is performed**, add **anaerobic cover** after cord clamping — **clindamycin 900 mg IV every 8 hours** (or metronidazole 500 mg IV every 8 hours) — because anaerobes (*Bacteroides*) are common in post-caesarean pelvic infection.
- **Penicillin allergy**: substitute clindamycin + gentamicin (± vancomycin if anaphylactic-type allergy or MRSA colonisation).
- **Route of delivery** — infection alone is **not** an indication for caesarean section; **vaginal delivery is preferred**, augmenting labour with oxytocin as needed; caesarean is reserved for standard obstetric indications.
- **Antipyretics** (paracetamol) for temperature ≥39 °C to reduce fetal tachycardia and oxygen demand.
- **Continuous electronic fetal monitoring**; expedite delivery for non-reassuring fetal status.
- **Post-partum**: continue antibiotics until the mother is afebrile and asymptomatic for 24–48 hours; after vaginal delivery a single additional post-partum dose usually suffices, whereas after caesarean the anaerobic-cover regimen is typically continued to that end-point.
- **Neonatal side**: inform the paediatric team; the neonate is risk-stratified (clinical status, gestational age, laboratory work-up) for possible empirical antibiotics and sepsis screen, since Triple I is a major early-onset neonatal sepsis risk factor.

Complications

Maternal	Fetal/neonatal
Dysfunctional labour, increased caesarean rate	Early-onset neonatal sepsis, pneumonia
Post-partum haemorrhage from uterine atony (infected myometrium contracts poorly)	Respiratory distress syndrome
Endomyometritis, wound infection, pelvic abscess	Intraventricular haemorrhage, periventricular leukomalacia
Septic pelvic thrombophlebitis, bacteraemia, rarely maternal sepsis/death	Fetal inflammatory response syndrome/funisitis → cerebral palsy risk
	Stillbirth/neonatal death (severe cases)

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Diagnostic-and-management ladder for intrapartum fever, from isolated maternal fever through suspected/confirmed Triple I to empirical antibiotic therapy.

High-yield exam pointers

- Modern term: **Triple I** (intrauterine inflammation/infection, or both) — NICHD workshop 2015, ACOG Committee Opinion 712 (2017).
- Temperature ladder: **≥39.0 °C alone** OR **38.0–38.9 °C + 1 risk factor** = suspected Triple I; **38.0–38.9 °C with no risk factor** = isolated maternal fever.
- Antibiotics **first, before delivery** — never wait: **ampicillin 2 g IV q6h + gentamicin 5 mg/kg OD (or 1.5 mg/kg q8h)**; add **clindamycin 900 mg IV q8h** if caesarean (anaerobic cover).

- Chorioamnionitis is **not** an indication for caesarean section by itself — aim for vaginal delivery.
- Fetal inflammatory response/**funisitis** links this condition to neonatal sepsis and cerebral palsy — the key exam "why it matters" fact.
- Avoid **amoxicillin-clavulanate** for expectant PPROM antibiotic prophylaxis — associated with increased neonatal necrotising enterocolitis (ORACLE I trial).

Recent advances [RA]

- **Terminology and diagnostic overhaul**: Higgins RD, Saade G, Polin RA, et al. "Evaluation and Management of Women and Newborns With a Maternal Diagnosis of Chorioamnionitis: Summary of a Workshop." *Obstet Gynecol.* 2016;127(3):426 — introduced the Triple I framework later adopted by ACOG Committee Opinion 712 (2017, reaffirmed), replacing the single ≥38 °C "clinical chorioamnionitis" criterion still printed in older textbook editions.
- **Adjunctive azithromycin at unscheduled caesarean delivery**: Tita AT et al., the C/SOAP trial, *N Engl J Med.* 2016;375:1231–1241 (PMID 27682034) — a single 500 mg IV dose of azithromycin added to standard cefazolin prophylaxis at intrapartum/non-elective caesarean reduced the composite of endometritis, wound infection and other maternal infectious morbidity by roughly 40–50%; now widely incorporated into peri-caesarean prophylaxis protocols for women in labour or with ruptured membranes, a population that overlaps substantially with chorioamnionitis risk.
- **Avoidance of amoxicillin-clavulanate**: the ORACLE I trial (Kenyon S et al., *Lancet* 2001; long-term follow-up 2008) showed increased neonatal necrotising enterocolitis with amoxicillin-clavulanate used for PPROM latency antibiotics — this combination remains contraindicated for that indication.
- **Biomarker-guided diagnosis**: amniotic fluid interleukin-6 and point-of-care/molecular (PCR-based) assays for microbial invasion of the amniotic cavity are under active research to better separate sterile intra-amniotic inflammation from true infection, refining the "confirmed Triple I" category beyond Gram stain/culture, though not yet routine bedside practice.
- **Fetal inflammatory response and neurodevelopment**: cohort and biomarker studies continue to strengthen the funisitis–fetal inflammatory response syndrome–cerebral palsy association, reinforcing prompt antibiotic therapy and delivery as neuroprotective steps rather than purely anti-infective ones.

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

Older textbook editions (including Indian standard texts) still describe "clinical chorioamnionitis" using the single ≥38 °C (100.4 °F) fever criterion; current ACOG practice layers this against additional risk factors and, where available, amniotic-fluid or placental confirmation under the Triple I framework — this answer follows the current framework and flags the difference here.

SOURCE & COVERAGE

Williams Obstetrics 26e; Arias' High-Risk Pregnancy & Delivery 5e; DC Dutta's Textbook of Obstetrics 9e; ACOG Committee Opinion 712 (2017, reaffirmed); NICHD workshop (Higgins et al., *Obstet Gynecol* 2016); Tita et al., C/SOAP trial, *N Engl J Med* 2016.

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Chorionic villus biopsy

Asked in: Paper IV 13-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Chorionic villus sampling (CVS), also called chorionic villus biopsy, is a first-trimester invasive prenatal diagnostic procedure in which a small amount of villous tissue is aspirated from the chorion frondosum (the future placenta) under continuous real-time ultrasound guidance, for cytogenetic, DNA-based, or biochemical study of the fetus. It gives a definitive result by 10–13 weeks 6 days of gestation, considerably earlier than genetic amniocentesis.

Indications

Category	Examples
Maternal age	Advanced maternal age (≥35 years at expected delivery)
Screen-positive pregnancy	High-risk first-trimester combined test — nuchal translucency + pregnancy-associated plasma protein-A (PAPP-A) + free beta-hCG; or a high-risk cell-free DNA (cfDNA) screen needing diagnostic confirmation
Family/obstetric history	Previous child with a chromosomal anomaly; a parent carrying a balanced or Robertsonian translocation
Mendelian disorder risk	Couple at risk of a single-gene disorder identifiable by DNA analysis — thalassaemia, sickle cell disease, cystic fibrosis, Tay–Sachs disease, haemophilia

Category	Examples
Need for early, definitive diagnosis	When termination of pregnancy is being considered and a first-trimester result is required

Timing and prerequisites

- **Transcervical CVS (TC-CVS):** 10 weeks to 13 weeks 6 days of gestation only.
- **Transabdominal CVS (TA-CVS):** 10 weeks to term (later in pregnancy it is used as a "placental biopsy").
- **Never before 9–10 completed weeks (≈70 days post-LMP):** sampling earlier than this is linked to limb-reduction defects and oromandibular-limb hypogenesis.
- **Prerequisites:** informed consent with genetic counselling; ultrasound confirmation of viability, gestational age, and placental location; maternal blood group/Rh status; exclusion of active genital infection or bleeding.

Technique

Feature	Transabdominal CVS (TA-CVS)	Transcervical CVS (TC-CVS)
Position/instrument	Supine; **18–20-gauge spinal needle**	Lithotomy, bladder partially filled; flexible ~27 cm polyethylene catheter with a blunt, malleable stainless-steel stylet
Route	Percutaneous, through the abdominal and uterine wall directly into the chorion frondosum, under continuous transabdominal ultrasound	Per-vaginam, along the endocervical canal/extraovular space, parallel to the chorionic membrane, into the chorion frondosum, avoiding the decidua basalis
Aspiration	Needle/catheter connected to a **20 mL syringe containing ~5 mL tissue-culture medium**; gentle "to-and-fro" suction yields **15–25 mg of villi**	Same syringe/medium; suction applied while the catheter is withdrawn
Aftercare	**Anti-D immunoglobulin 50 micrograms intramuscularly** to Rh-negative, unsensitised women; watch for bleeding, liquor leakage, fever	Same

Both routes are equally safe and effective in experienced hands. **TC-CVS is avoided** when there is active vaginal bleeding/spotting, active lower genital-tract infection (genital herpes, cervicitis), extreme

uterine ante-/retroflexion, cervical myoma, or a uterine malformation precluding safe catheter passage — TA-CVS is used instead in these settings.

Complications

Complication	Frequency / notes
Procedure-related fetal loss	Current guideline-cited rate **0.1–0.3%**, comparable to genetic amniocentesis
Vaginal spotting/bleeding	Commonest complication; more frequent after TC-CVS than TA-CVS
Limb-reduction defect / oromandibular-limb hypogenesis	Only when CVS is performed **before 9–10 weeks**; not increased at or after 10 weeks
Discordant/false-positive karyotype	**2–3%**, from confined placental mosaicism or maternal decidual cell contamination — needs confirmatory amniocentesis
Chorioamnionitis, rupture of membranes, feto-maternal haemorrhage	Rare; give anti-D immunoglobulin if Rh-negative

Results and CVS vs amniocentesis

Karyotype turnaround: **direct villous preparation 24–48 hours**; long-term culture 10–14 days. CVS karyotype reflects the true fetal karyotype in about **98%** of cases.

Parameter	CVS	Genetic amniocentesis
Timing	10 wk–13 wk 6 d (TC) / 10 wk–term (TA)	After 15 weeks (early amniocentesis at 12–14 weeks not recommended)
Tissue sampled	Trophoblast (villi)	Fetal fibroblasts + amniotic fluid
Karyotype result	Direct 24–48 h; culture 10–14 days	Culture 3–4 weeks
Accuracy	Accurate; confined placental mosaicism may need confirmatory amniocentesis	Highly accurate
Termination of pregnancy, if indicated	First-trimester — safer, less traumatic	Second-trimester — more traumatic, physically and psychologically

Recent advances [RA]

- **Chromosomal microarray analysis (CMA)** is now offered on every CVS specimen rather than karyotyping alone — it detects clinically significant copy-number variants in an additional ~1%

of fetuses with an otherwise normal karyotype, and is preferred whenever a fetal structural anomaly is present (ACOG).

- **Cell-free DNA (cfDNA) screening/non-invasive prenatal testing (NIPT)** from maternal plasma (from ≥10 weeks) is now the leading first-line aneuploidy screen; its uptake has cut CVS volumes by roughly 70% and amniocentesis volumes by nearly 50% since 2012 (Larion et al., as cited in Williams Obstetrics 26e) — but a high-risk cfDNA result still requires diagnostic confirmation by CVS or amniocentesis before an irreversible decision (ACOG, 2012).
- **Rapid aneuploidy testing** (quantitative fluorescence PCR or fluorescence in situ hybridisation) on CVS tissue gives a limited trisomy 21/18/13/X/Y result within 24–48 hours, run alongside CMA/karyotyping.
- **Prenatal exome/genome sequencing** on villous tissue is increasingly used when a fetal structural anomaly is seen on ultrasound but the chromosomal microarray is normal.
- **Contemporary safety data** (large meta-analyses cited in Williams Obstetrics 26e, e.g. Salomon et al., 2019) show the procedure-related loss rate for CVS is now similar to that of amniocentesis (about 0.1–0.3%), overturning older teaching that CVS carried a distinctly higher loss rate.
- CVS therefore remains the preferred **diagnostic** (not screening) test whenever an early, single-gene, or biochemical diagnosis is required — it complements rather than is replaced by cfDNA screening.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 12.1 — Chorionic villus sampling—transabdominal method (DC Dutta's Obstetrics 9e, p.132)*
- ☐ *Fig 1.11 — Technique for transcervical chorionic villus sampling (Arias' High-Risk Pregnancy 5e, p.57)*

High-yield exam pointers

- TC-CVS: **10 wk – 13 wk 6 d only**; TA-CVS: **10 wk to term**.
- Never before **9–10 completed weeks** — limb-reduction/oromandibular-limb hypogenesis risk.
- **15–25 mg villi** aspirated into a **20 mL syringe with 5 mL tissue-culture medium**.
- Karyotype: **direct prep 24–48 h; culture 10–14 days**.
- **Anti-D 50 micrograms IM** to every Rh-negative, unsensitised woman after the procedure.
- Discordant/false-positive rate **2–3%** (confined placental mosaicism/maternal cell contamination) → confirm with amniocentesis.
- Procedure-related fetal loss now quoted as **~0.1–0.3%**, essentially equal to amniocentesis.

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

Older texts (e.g. DC Dutta's Obstetrics 9e) quote a CVS fetal loss rate of 0.5–1%; large contemporary meta-analyses cited in Williams Obstetrics 26e put the current procedure-related loss rate at 0.1–0.3%, similar to amniocentesis — use the current figure in the exam.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; Arias' High-Risk Pregnancy & Delivery 5e; American College of Obstetricians and Gynecologists (ACOG) statements on prenatal diagnostic testing as cited in Williams Obstetrics 26e (2012, 2018, 2020).

◆ ◆ ◆

Current status of role of cervical encirclage in Pregnancy

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Cervical encirclage (cerclage) is a non-absorbable purse-string suture placed around a mechanically weak cervix at the level of the internal os to prevent painless second-trimester dilation, membrane prolapse and expulsion of an immature fetus. It is offered only for a defined indication, not as a universal preterm-birth-prevention procedure.

Indications — the three accepted categories

Type	Criterion	Current evidence/status
History-indicated (elective/prophylactic)	Classic history of ≥1 painless second-trimester loss with a competent-cervix-excluding work-up; diagnosis of exclusion	Randomised data (MacNaughton, 1993; ~1300 women) show cerclage reduced delivery before 33 weeks from 17% to 13% in equivocal-history women; benefit is clearest with a truly classic history

Type	Criterion	Current evidence/status
Ultrasound-indicated (therapeutic)	Singleton, prior spontaneous preterm birth, transvaginal cervical length **<25 mm** before 24 weeks' gestation, ± funnelling	Benefit only if there is a **prior spontaneous preterm birth** — Owen (2009): no benefit overall, but cervical length <15 mm delivered before 35 weeks less often with cerclage (30% vs 65%); Berghella (2011) individual-patient-data meta-analysis confirmed benefit in this subgroup; a short cervix **without** prior preterm birth gains **no advantage** from cerclage (Berghella, 2017)
Physical-examination-indicated ("rescue"/emergency)	Painless cervical dilation with bulging/visible membranes, no labour, infection or ruptured membranes, usually before 23–24 weeks	Improves perinatal outcome versus expectant management (Ehsanipoor systematic review, 2015), but failure rate is high — only ~44% with bulging membranes at cerclage reach 28 weeks (Chasen, 1998)

Contraindications

- Active vaginal bleeding.
- Ruptured membranes.
- Chorioamnionitis / intrauterine infection.
- Uterine contractions/active labour or severe uterine irritability.
- Cervical dilation greater than 4 cm.
- Fetal death or a lethal fetal anomaly.

Technique — comparison of the three operations

Feature	McDonald	Shirodkar (modified)	Transabdominal
Approach	Vaginal purse-string	Vaginal, with mucosal incision	Laparotomy or laparoscopy at the isthmus
Suture	No. 1–2 monofilament (nylon/polypropylene) or 5-mm Mersilene tape, placed submucosally without incision	5-mm Mersilene tape passed submucosally after a transverse anterior incision; bladder pushed cephalad; mucosa closed over the buried tape	Mersilene tape tied at the uterine isthmus, medial to the uterine vessels

Feature	McDonald	Shirodkar (modified)	Transabdominal
Complexity/removal	Simple; snipped and removed vaginally at term	More complex; tape often left buried (retained) with subsequent caesarean delivery	Left in situ permanently; delivery is always by caesarean
Indication niche	Default vaginal cerclage	Alternative vaginal technique; comparable success	Hypoplastic/absent cervix, or **prior failed transvaginal cerclage**
Key trial	—	—	MAVRIC trial (Shennan, 2020): preterm birth <32 weeks was **8%** with transabdominal versus **38%** with either vaginal technique in women with a prior failed vaginal cerclage

Both vaginal operations claim an ~80–90% success rate. Evidence is insufficient to recommend routine perioperative antibiotic prophylaxis or tocolysis with any cerclage (ACOG, 2020).

Timing

- **Elective (history-indicated):** 12–14 weeks — after first-trimester aneuploidy/viability screening, before the usual window of predestined early loss.
- **Rescue:** up to 23–24 weeks; beyond this the risk of inducing labour or rupturing membranes rises sharply.
- **Transabdominal:** ideally placed pre-conceptionally or in the first trimester (11–13 weeks).
- **Removal:** 36–37 weeks' gestation, or earlier if labour, preterm rupture of membranes or infection supervenes; left in place if caesarean is already planned and removed intraoperatively.

Current status of the role of cerclage

- **Place among alternatives** — For a singleton pregnancy with prior spontaneous preterm birth and cervical length <25 mm before 24 weeks, current practice (ACOG, 2021) allows **cerclage or vaginal progesterone** as individualised options; neither is mandated over the other.
- **Cervical pessary** — Trial evidence for the Arabin pessary is conflicting (positive in PECEP, null in later trials); it is not established as equivalent to cerclage and is currently limited to research protocols by the Society for Maternal-Fetal Medicine (2017).
- **Multifetal gestation** — cerclage for an incidentally short cervix in twins gives no benefit and may worsen outcome; it is not recommended outside individualised, evolving research indications.

- **Rescue cerclage** — retains a defined but limited role; appropriate counselling about the high failure rate with advanced dilation/bulging membranes is essential.
- **Transabdominal cerclage** — increasingly used, with the MAVRIC trial establishing its superiority specifically after a failed transvaginal cerclage, at the cost of greater operative morbidity (bladder/vessel injury, need for caesarean delivery, laparotomy for removal or delivery-related evacuation).
- **Adjuncts** (17α-hydroxyprogesterone caproate, tocolytics, antibiotics) are used in some centres but are not supported by strong trial evidence.

Complications

- Slipping or cutting-through of the suture.
- Chorioamnionitis.
- Preterm rupture of membranes.
- Preterm labour/abortion.
- Cervical laceration or (rarely) uterine rupture if the stitch is not removed before labour.
- Cervical scarring/dystocia requiring caesarean delivery.
- Transabdominal-specific: bladder/ureteric injury, haemorrhage, and the obligatory need for caesarean delivery and repeat surgery for removal.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig — Cerclage operation: A. McDonald's technique; B. Shirodkar's technique (DC Dutta's Obstetrics 9e, p.190)*

High-yield exam pointers

- Three indications: **history- / ultrasound- / physical-examination(rescue)-indicated** cerclage.
- Ultrasound cut-off: cervical length **<25 mm** before 24 weeks, **only if prior spontaneous preterm birth**.
- Timing: elective **12–14 weeks**; rescue up to **23–24 weeks**; remove at **36–37 weeks**.
- McDonald = simple purse-string, no bladder dissection; Shirodkar = tape buried under mucosa, bladder reflected.
- MAVRIC trial: transabdominal **8%** vs transvaginal **38%** preterm birth <32 weeks after failed vaginal cerclage.
- Contraindications mnemonic: **bleeding, ROM, infection, irritability/labour, dilation >4 cm, lethal anomaly.**
- No benefit from cerclage for short cervix alone without prior preterm birth, and no benefit (possible harm) in twins.

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

DC Dutta's Obstetrics 9e still frames cervical incompetence largely as a stand-alone clinical diagnosis; current ACOG/RCOG practice reframes it as part of a preterm-birth-syndrome continuum and individualises the choice between cerclage, vaginal progesterone and cervical pessary based on obstetric history and cervical length.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; Arias' High-Risk Pregnancy & Delivery 5e; American College of Obstetricians and Gynecologists (ACOG) guidance on cerclage for cervical insufficiency (2021); RCOG Green-top Guideline No. 60, Cervical Cerclage.

◆ ◆ ◆

Define septic in abortion and its etiology. What is the clinical grading and management of septic abortion?

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

Definition — Septic abortion is any abortion (spontaneous or induced) associated with clinical evidence of infection of the uterus and its contents. It is diagnosed when there is a rise of temperature to at least 38°C (100.4°F) persisting for 24 hours or more, together with offensive or purulent vaginal discharge and other evidence of pelvic infection such as lower abdominal pain and uterine tenderness. Most septic abortions follow incomplete abortion, and the great majority occur after unsafe illegally induced abortion, though infection can rarely follow a spontaneous miscarriage.

Etiology

A. Predisposing/precipitating factors

Factor	How it causes sepsis
Unsafe induced abortion by an unskilled person or in a substandard setting	Lack of asepsis/antisepsis; the single largest cause of grade III sepsis
Incomplete evacuation / retained products of conception	Retained tissue acts as a nidus for bacterial growth
Instrumentation with unsterile instruments	Direct introduction of organisms into the uterine cavity
Inadvertent genital tract injury	Uterine perforation or bowel injury during interference allows spread to the peritoneum

Factor	How it causes sepsis
Introduction of irritant pastes/foreign bodies	Chemical injury and tissue necrosis predispose to infection
Pre-existing lower genital tract infection (vaginosis, cervicitis, STI)	Ascending spread once the cervix is instrumented or open
Delay in seeking care, anemia, poor nutrition, low socioeconomic status	Reduced host resistance; delayed recognition of complications

B. Causative organisms (mode of infection) — usually the woman's own endogenous vaginal flora (about 80% of cases); exogenous introduction accounts for the rest. **Mixed aerobic-anaerobic infection is the rule.**

Type	Organisms
Aerobic	*Escherichia coli*, *Klebsiella*, *Staphylococcus* (including MRSA), *Pseudomonas*, group A beta-haemolytic *Streptococcus* (usually exogenous)
Anaerobic	*Bacteroides fragilis*, anaerobic streptococci, *Clostridium welchii* (*perfringens*), *Clostridium tetani*

Infection spreads chiefly by the **ascending route** from the cervix/vagina into the uterine cavity and beyond; rarely it is haematogenous. Pathologically: in ~80% infection stays confined to the conceptus/decidua; in ~15% it produces endomyometritis or spreads to the parametrium, tubes, ovaries or pelvic peritoneum; in ~5% there is generalized peritonitis and/or endotoxic shock.

Clinical grading

Grade	Extent of spread	Typical setting
Grade I	Infection localized to the uterus (decidua/myometrium)	Commonest; usually follows spontaneous or safely-managed incomplete abortion
Grade II	Infection spreads beyond the uterus to the parametrium, tubes, ovaries or pelvic peritoneum	Follows delayed treatment or unsafe interference
Grade III	Generalized peritonitis and/or endotoxic shock, jaundice or acute renal failure	Almost always follows illegal/unsafe induced abortion; accounts for most sepsis deaths

Management

General measures (all grades)

- **Hospitalize and isolate** the patient.

- Take a **high vaginal/cervical swab** for Gram stain, aerobic and anaerobic culture, and sensitivity **before** doing a per-speculum/vaginal examination.
- **Vaginal examination** to assess the abortion process and extent of spread; **assign a clinical grade**.
- Baseline work-up: haemoglobin, total/differential white cell count, blood grouping (ABO/Rh), urine analysis and culture; ultrasonography of pelvis/abdomen for retained products, foreign body, free fluid or pelvic abscess.
- In severe cases: blood culture (if chills/rigors), serum electrolytes, C-reactive protein, serum lactate (**≥4 mmol/L indicates tissue hypoperfusion**), coagulation profile, and plain X-ray abdomen/chest if bowel injury or pulmonary complications are suspected.
- Give **prophylactic antigas-gangrene serum 8,000 units** and **antitetanus serum 3,000 units** intramuscularly if there is a history of unsafe interference; analgesics/sedatives and blood transfusion as needed.

Principles: control sepsis → remove the source of infection → give supportive therapy to restore homeostasis → reassess response.

Grade-wise antibiotics and surgery

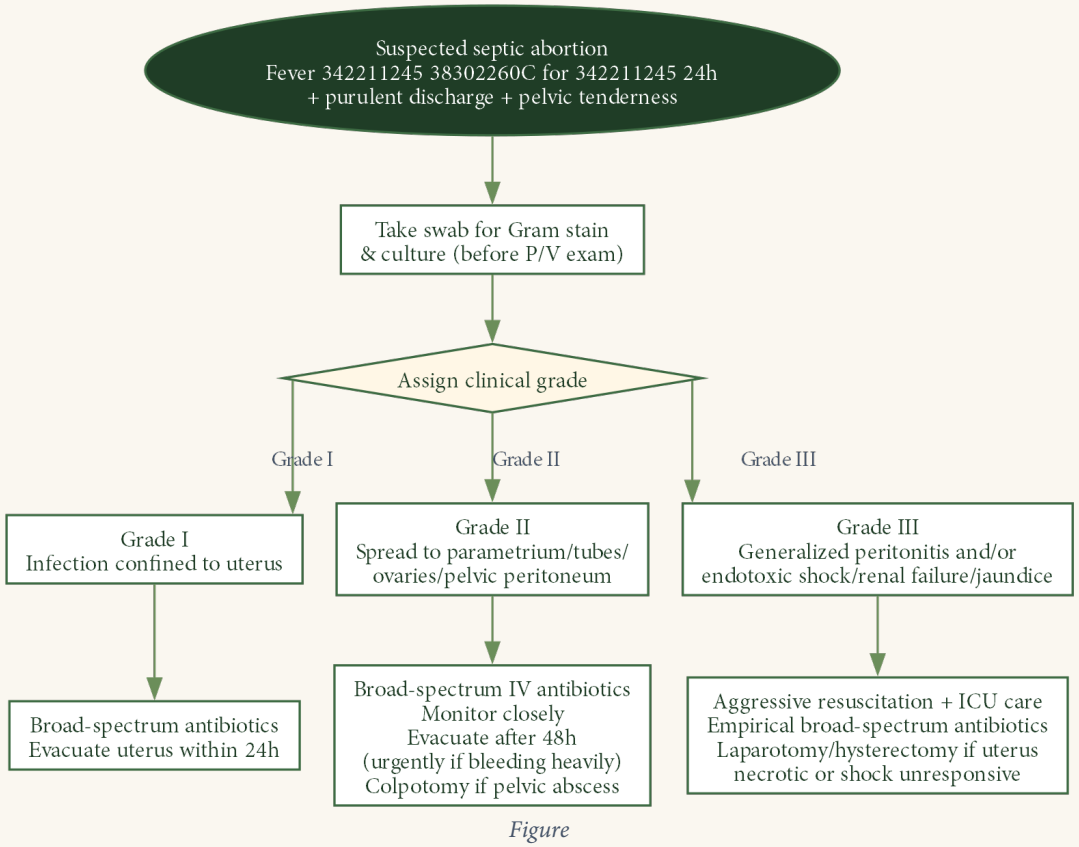
Grade	Antibiotics	Uterine evacuation	Additional measures
I	Broad-spectrum antibiotics (as below)	Within 24 hours of starting antibiotics (urgently if bleeding is heavy)	Gentle evacuation to remove the nidus of infection
II	**Piperacillin-tazobactam or a carbapenem PLUS intravenous clindamycin** (broadest empirical cover); add **vancomycin/teicoplanin** for MRSA; **gentamicin 3–5 mg/kg single dose** if renal function is normal; **metronidazole** for anaerobic cover	Deferred for **at least 48 hours** until infection is controlled/localized, unless bleeding is excessive	Clinical monitoring of pulse, respiration, temperature, urine output, abdominal tenderness/mass, CVP; **posterior colpotomy** to drain a pelvic abscess (boggy mass in the pouch of Douglas with rectal tenesmus)
III	Same broad-spectrum combination, started empirically and revised on culture sensitivity	Evacuation once stabilized; laparotomy takes priority if indicated	Aggressive resuscitation for endotoxic shock/organ dysfunction; **ICU care**

Indications for laparotomy/hysterectomy: uterine or suspected bowel injury; intra-abdominal/intrauterine foreign body seen on imaging or felt per fornix; unresponsive peritonitis suggesting a collection of pus; septic shock or oliguria not responding to conservative treatment; uterus too large to evacuate safely per vaginam; a necrotic uterus. Hysterectomy is done irrespective of parity,

by an experienced surgeon with a skilled anaesthetist; adnexa are removed or conserved depending on the pathology found; even if laparotomy reveals no obvious lesion, simple drainage of pus improves outcome.

Indications for ICU management: persistent hypotension or rising serum lactate (≥4 mmol/L) — cardiovascular; pulmonary oedema or need for mechanical ventilation — respiratory; need for renal dialysis; impaired consciousness; multiorgan failure, hypothermia or acidosis.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Management-algorithm flowchart for suspected septic abortion, graded I–III.

High-yield exam pointers

- Definition triad: fever ≥38°C for ≥24h + offensive/purulent discharge + pelvic pain/tenderness.
- Grading: **Grade I** = uterus only; **Grade II** = parametrium/tubes/ovaries/peritoneum; **Grade III** = generalized peritonitis/endotoxic shock/renal failure/jaundice.
- Mixed aerobic-anaerobic, mostly endogenous vaginal flora; name *Cl. welchii* and *Cl. tetani* as classic anaerobes of unsafe abortion.
- Antibiotic combo to write verbatim: **piperacillin-tazobactam or carbapenem + IV clindamycin** (± vancomycin/teicoplanin for MRSA); **gentamicin 3–5 mg/kg** single dose; **metronidazole** for anaerobes.

- ATS **3,000 units** + antigas-gangrene serum **8,000 units** IM if history of unsafe interference.
- Evacuation timing is grade-dependent: Grade I within 24h; Grade II deferred 48h unless bleeding.
- Serum lactate ≥4 mmol/L = tissue hypoperfusion, an ICU trigger; necrotic uterus = absolute hysterectomy indication.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The antibiotic combination and dosing above (piperacillin-tazobactam/carbapenem plus clindamycin, with gentamicin and metronidazole options) is the current broad-spectrum empirical regimen and matches Williams Obstetrics 26e's recommendation of prompt broad-spectrum antibiotics for septic abortion; the grade I/II/III clinical classification itself is the standard teaching framework used across Indian obstetric texts.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e.

◆ ◆ ◆

Describe normal events from fertilization to implantation. Discuss how this is brought about in assisted reproduction to achieve pregnancy

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Fertilization is fusion of a capacitated spermatozoon with a mature secondary oocyte, almost always in the **ampulla of the fallopian tube**, forming a diploid zygote. The zygote cleaves, forms a blastocyst, and **implants (nidation)** in the secretory-phase endometrium around the **20th day of a regular 28-day cycle** (6th day post-fertilization). Assisted reproductive technology (ART) reproduces each of these steps — ovulation control, gamete union, and embryo transfer — outside or partly outside the body when natural conception fails.

Events from Fertilization to Implantation

- **Gamete transport** — the oocyte (fertilizable life span **12–24 hours**) is picked up by tubal fimbriae and swept to the ampulla; of hundreds of millions of ejaculated sperm (fertilizable life span **48–72 hours**), only 300–500 reach the ovum, taking only a few minutes to traverse the tube.
- **Capacitation** — physiochemical activation of sperm in the female genital tract (**2–6 hours**): cyclic-AMP–dependent phosphorylation, rise in intracellular pH (Ca^{2+} influx/H^{+} efflux), rendering the sperm hypermotile and fertilization-competent.

- **Acrosome reaction** — sperm plasma membrane fuses with the outer acrosomal membrane, releasing hyaluronidase/acrosin that digest the **corona radiata** and **zona pellucida** (binding **ZP3**, then **ZP2**).
- **Fusion and block to polyspermy** — one sperm fuses with the oolemma; cortical granule exocytosis produces the **zona reaction (hardening)** and oolemma block preventing polyspermy.
- **Completion of meiosis** — the oocyte completes its **second meiotic division**, extruding the second polar body; male and female pronuclei form and unite at the cell centre restoring the diploid number (46) — the **zygote**. The sperm's sex chromosome (X or Y) determines fetal sex.
- **Cleavage** — mitotic division without volume increase: 2-cell (~30 h), 4-cell (40–50 h), 8–16-cell, and **morula** (mulberry-like cluster), which enters the uterine cavity through the narrow uterotubal ostium on **day 4** (16–64-cell stage).
- **Blastocyst formation** — fluid seeps through zona canaliculi, cavitating the morula (**day 5**); outer polar cells become **trophectoderm** (→ chorion), inner apolar cells become the **inner cell mass** (→ embryo proper). **Zona hatching** (lysis/disappearance of the zona, day 4–5) allows trophectoderm–endometrium contact.
- **Implantation (nidation)** — four stages, occurring near the fundus:
  - **Apposition** — endometrial **pinopods** absorb glycogen/mucin-rich uterine fluid, nourishing the blastocyst.
  - **Adhesion** — trophoblast binds endometrium via integrins, selectins, cadherins.
  - **Penetration** — histolytic invasion through stromal cells; syncytiotrophoblastic lacunae form and fuse with eroded maternal capillaries, establishing early nutrition.
  - **Invasion** — deepening interstitial implantation (blastocyst fully covered by decidua), completed by **day 10–11**, arrested by maternal immunological factors; entry point sealed by fibrin/epithelium.
- **Decidual reaction** — progesterone-driven stromal-to-decidual transformation of endometrium, mediated by **LIF, EGF, IGF, interleukins (3,4,5,6,10,13), prostaglandins, COX-2**.

Time from fertilization	Event
0 hour	Fertilization (day 14–15 of cycle)
30 hours	2-cell stage
40–96 hours	4- to 16-cell stage; morula enters uterine cavity (day 4)
Day 5	Blastocyst; zona pellucida disappears
Day 5–6	Blastocyst attaches to endometrial surface (day 20 of cycle)

Time from fertilization	Event
Day 10–11	Trophoblast invades endometrial sinusoids → uteroplacental circulation; implantation complete
Day 13 / 16 / 21	Primary / secondary / tertiary chorionic villi
Day 21–22	Fetal heart; fetoplacental circulation begins

Assisted Reproduction to Achieve Pregnancy

Assisted reproductive techniques (ART) replicate the same biological sequence — controlled ovulation, gamete union, and embryo–endometrium apposition — with laboratory or intratubal assistance.

Technique	Principle	Best indication
Intrauterine insemination (IUI)	Washed, capacitated sperm (motile count ≥1 million, ideally >10 million) deposited directly into the uterine cavity, timed to ovulation	Cervical factor, mild male factor, unexplained infertility
In-vitro fertilization–embryo transfer (IVF-ET) (Steptoe & Edwards, 1978)	Oocytes and sperm combined *in vitro*; resulting embryo transferred to the uterus	Tubal factor, endometriosis, unexplained infertility
Intracytoplasmic sperm injection (ICSI) (Van Steirteghem, 1992)	Direct microinjection of a single sperm into the oocyte cytoplasm	Severe oligospermia/asthenospermia/teratospermia, antisperm antibodies
Gamete intrafallopian transfer (GIFT)	Oocytes + sperm placed laparoscopically into the fallopian tube; fertilization occurs *in vivo*	Unexplained infertility with normal tubes
Zygote intrafallopian transfer (ZIFT)	Day-1 zygote placed into the tube	Failed GIFT / normal tubes

Steps of an IVF-ET cycle (recreates gamete maturation → fertilization → implantation):

- **Pituitary down-regulation** — GnRH agonist (e.g., leuprolide) started long-luteal (day 21 of prior cycle) or short "flare" (cycle day 2–4, 1.0 mg daily, then 0.5 mg daily) protocol to prevent a premature LH surge; **GnRH antagonists** (cetrorelix, ganirelix) are alternatively co-started with stimulation for immediate, reversible suppression. Adequate down-regulation: serum estradiol <40 pg/mL, no follicle >10 mm.
- **Controlled ovarian stimulation (COS)** — exogenous gonadotropins (urinary/recombinant FSH, hMG), alone or with clomiphene citrate, drive multifollicular growth.

- **Monitoring** — serial transvaginal ultrasound follicle tracking and serum estradiol from day 8; endometrial stripe ≥8–9 mm (trilaminar) is optimal.
- **Ovulation trigger** — once ≥2 follicles reach 17–18 mm and estradiol >250 pg/mL per follicle, **hCG 5,000–10,000 IU IM** (or recombinant hCG 250 µg) is given to complete oocyte maturation.
- **Oocyte retrieval** — transvaginal ultrasound-guided needle aspiration **36 hours after hCG**, before spontaneous ovulation, under conscious sedation.
- **Fertilization** — 50,000–100,000 capacitated sperm added per oocyte (conventional IVF) or single-sperm microinjection (ICSI); fertilization (two pronuclei) confirmed at 16–18 hours.
- **Embryo transfer** — embryo at the **6–8-blastomere stage, ~3 days** after fertilization, is transferred transcervically near the fundus using a soft catheter; **not more than 3 embryos** transferred to limit multiple pregnancy; surplus embryos cryopreserved.
- **Luteal-phase support** — progesterone from the day after retrieval: micronized progesterone 200 mg orally/vaginally thrice daily, or progesterone-in-oil 50 mg IM daily, for ~14 days (± supplemental hCG 1,500–2,500 IU), until quantitative β-hCG confirms pregnancy.

Results: IVF-ET live-birth rate ≈33% per retrieval; ICSI fertilization rate 60–70%, pregnancy rate 20–40% per transfer. Risks: multiple pregnancy, ovarian hyperstimulation syndrome (OHSS), ectopic pregnancy, and a modestly higher miscarriage rate — congenital malformation risk is not significantly increased over spontaneous conception.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 2.6 — Diagrammatic representation of the events—ovulation, fertilization and implantation (DC Dutta's Obstetrics 9e, p.48)*

High-yield exam pointers

- Fertilization site: **ampulla**; oocyte life span 12–24 h, sperm 48–72 h.
- Implantation on **day 6 post-fertilization = day 20 of cycle**; completed by day 10–11 (day 24–25 from LMP).
- Four stages of nidation: **apposition → adhesion → penetration → invasion**.
- hCG trigger dose **5,000–10,000 IU**; retrieval **36 h** later.
- Embryo transfer at **6–8-cell stage, day 3**; max **3 embryos**.
- Luteal support: micronized progesterone **200 mg TDS** or progesterone-in-oil **50 mg IM daily** × 14 days.
- ICSI indication mnemonic: severe **O**ligospermia, **A**sthenospermia, **T**eratospermia, antisperm antibodies.

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

Cetrorelix/ganirelix (GnRH-antagonist) protocols are increasingly favoured over the agonist long/flare protocols described in older texts because they shorten stimulation and lower OHSS risk with comparable live-birth rates; the core embryological sequence and transfer technique are unchanged.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 2 — Fundamentals of Reproduction: fertilization, cleavage, blastocyst, implantation, decidua); DC Dutta's Textbook of Gynaecology 7e (Chapter 17 — assisted reproductive techniques: IUI, IVF-ET, ICSI, GIFT/ZIFT protocols and doses).

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Describe the anatomical changes in the urinary tract during pregnancy. Risk factors and prevention of urinary tract injuries at caesarean section

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Pregnancy produces predictable, hormonally and mechanically driven anatomical changes in the kidney, ureter, and bladder — collectively termed **physiological hydronephrosis/hydroureter of pregnancy** — that must be distinguished from true obstructive uropathy. These same anatomical shifts, together with scarring from prior surgery, alter the operative field at **caesarean section (CS)** and predispose to iatrogenic **bladder and ureteric injury**, which is why recognised risk factors and a standardised preventive technique are essential.

Anatomical changes in the urinary tract during pregnancy

Structure	Change	Clinical significance
Kidney	Length increases by ~**1 cm** on imaging; glomerular filtration rate (GFR) rises up to 25% by 2 weeks post-conception and ~**50%** by early second trimester; renal plasma flow rises ~**50–80%**, greatest in the first trimester	Serum creatinine falls to ~**0.5 mg/dL** (a value ≥0.8–0.9 mg/dL, though "normal" outside pregnancy, is already suggestive of renal disease in pregnancy); glucosuria and mild proteinuria (up to 260–300 mg/24 h) can be physiological; size and GFR return to normal postpartum

Structure	Change	Clinical significance
Ureter	Dilatation (**hydroureter**) and pelvicalyceal dilatation (**hydronephrosis**) develop above the pelvic brim once the uterus rises out of the pelvis and rests on/compresses the ureters at the brim; **more marked on the right side in ~86% of women**; ureteral elongation with kinking ("S"-shaped curves)	Mechanism: **dextrorotation** of the gravid uterus compresses the right ureter more than the left, which is cushioned by the sigmoid colon; the dilated right ovarian venous plexus crosses obliquely over the right ureter and adds compression; progesterone-mediated relaxation of the ureteric muscularis contributes. Mimics obstructive uropathy on ultrasound/IVP — elective pyelography should be deferred to ≥12 weeks postpartum; retained urine in the dilated tract causes 24-h collection errors and more virulent ascending infection
Bladder	Little change before 12 weeks; thereafter, pelvic hyperaemia and hyperplasia of bladder muscle/connective tissue **elevate the trigone and thicken the interureteric ridge**, producing progressive **deepening and widening of the trigone**; mucosa itself is unchanged apart from increased vascularity and tortuosity	Intravesical pressure rises from **~8 to ~20 cm H_2O** by term; functional and anatomical urethral length increase (~5–7 mm) and maximal intraurethral pressure rises from **~70 to ~93 cm H_2O**, preserving continence — but at least half of women still develop some degree of stress incontinence by the third trimester; the enlarging uterus displaces the bladder anterosuperiorly out of the true pelvis, altering the surgical field at CS

Risk factors for urinary tract injury at caesarean section

Bladder laceration complicates **~2 per 1000** CS deliveries and ureteral trauma **~0.3 per 1000**; the bladder dome is injured most often, the trigone less commonly.

Category	Risk factors
Prior surgery/scarring	**Previous caesarean delivery(ies)** with dense adhesion of the bladder to the lower-segment scar; other pelvic/abdominal adhesive disease (endometriosis, prior pelvic surgery)

Category	Risk factors
Abnormal placentation	**Placenta accreta spectrum (morbidly adherent placenta)**, especially with anterior/lower-segment placenta over a previous scar
Operative urgency/stage	**Emergency CS**; CS performed in **second-stage labour** with a deeply impacted fetal head (vs first-stage) — the stretched, oedematous lower segment and descended bladder are harder to define and mobilise safely
Extent of surgery	**Caesarean (peripartum) hysterectomy** — ureteric risk rises further when complicated by placenta accreta spectrum; repair of **lateral extensions** of the hysterotomy into the broad ligament or vagina, where the ureter runs close to the uterine vessels
Technical	Incorrect identification of the vesicouterine plane, hysterotomy placed too low relative to the degree of cervical dilatation, and blind clamping of bleeding points during control of haemorrhage

Prevention of urinary tract injuries at caesarean section

- **Preoperative planning** — identify the above risk factors at booking; image (ultrasound ± MRI) and plan a multidisciplinary approach for suspected placenta accreta spectrum; keep the bladder catheterised and empty throughout surgery.
- **Correct anatomical orientation** — palpate the fundus before hysterotomy to detect uterine dextro-/laevorotation and centre the incision, avoiding lateral extension into the uterine vessels (and the ureter that runs beneath them).
- **Careful bladder-flap creation** — after the transverse peritoneal incision at the vesicouterine reflection, separate the bladder from the lower segment by **blunt or sharp dissection in the vesicouterine space**; this moves the bladder away from the planned hysterotomy site and limits laceration if an unintended inferior extension occurs during delivery of the fetus. If the plane is obscured by dense adhesions from a prior CS, **sharp dissection is preferred**; if unclear, the bladder can be identified by **distending/"back-filling" it with fluid via the Foley catheter**.
- **Limit caudad dissection** to under ~5 cm unless a caesarean hysterectomy is planned or anticipated, in which case **extended bladder mobilisation is deliberately performed** to reduce the risk of cystotomy during the hysterectomy.
- **Correct hysterotomy level** — placed relatively higher when cervical dilatation is advanced/complete, to avoid lateral extension into the cervix, vagina, or paracervical tissues bearing the ureter.
- **Identify the ureters before ligating pedicles** — during control of lateral extension bleeding or during caesarean hysterectomy, the ureter (which passes beneath the uterine artery) must be

visualised or palpated before clamps/ligatures are placed; individualised preoperative ureteric stent placement may be considered in anticipated complex placenta accreta spectrum surgery.

- **Intraoperative vigilance** — a clear-fluid gush or a palpable Foley bulb at the operative field should raise suspicion of cystotomy; confirm with retrograde instillation of dilute sterile infant formula or methylene-blue-stained saline through the catheter.
- **If ureteral injury is suspected** — give IV dye (methylene blue 50 mg over 5 minutes, avoided in glucose-6-phosphate dehydrogenase deficiency because of methemoglobinaemia risk, or IV sodium fluorescein 25–50 mg) and directly inspect the pelvis for extravasation or absent ureteric jets; pass a ureteral catheter/stent if patency needs confirming (ureteral injury typically occurs at or below the pelvic brim, ~13 cm from the ureteric orifice).
- **Prompt, layered repair when injury does occur** — cystotomy is closed in two to three layers with 2-0/3-0 (delayed-)absorbable suture (mucosal inverting layer plus muscularis reinforcement), with **continuous bladder drainage for 7–14 days**; routine uropathogen antibiotic prophylaxis during drainage is not required. Ureteric injury needs specialist (urology/uro-gynaecology) repair over a stent.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 30.17 — The bladder is dissected sharply from the lower uterine segment (Williams Obstetrics 26e, p.577)*

High-yield exam pointers

- Physiological hydroureter/hydronephrosis is **right > left in ~86%** — dextrorotated uterus + right ovarian vein complex compression + sigmoid-colon cushioning of the left ureter.
- GFR up **~50%**, renal plasma flow up to **~80%**; serum creatinine physiologically falls to **~0.5 mg/dL** — a "normal" non-pregnant value (≥0.9 mg/dL) already signals renal disease in pregnancy.
- Bladder changes: trigone elevated & thickened, intravesical pressure **8→20 cm H_2O**, intraurethral pressure **70→93 cm H_2O** — yet stress incontinence still common by the third trimester.
- CS urinary injury rates to quote: **bladder ~2/1000, ureter ~0.3/1000**; dome injured more often than trigone.
- Bladder-flap dissection in the vesicouterine space is the single key preventive step; extend it further only when hysterectomy is planned.
- Key numbers for ureteric injury: orifice-to-pelvic-brim distance **~13 cm**; injury occurs at/below the brim; dye options — methylene blue (caution G6PD deficiency) or sodium fluorescein.

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

DC Dutta's Textbook of Obstetrics 9e gives concordant figures (renal plasma flow +50–75%, kidney +1 cm, right-sided dextrorotation compression) and reports bladder injury repair with 2-0 chromic catgut and 7–10 days' drainage — a minor technique variant on the same principle as the current Williams closure described above; there is no specific ACOG/RCOG/FOGSI guideline dedicated to this operative-technique topic, so grounding is textbook-based.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; Munro Kerr's Operative Obstetrics 13e.

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Describe the degenerative changes in fibroid uterus

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — A uterine fibroid (leiomyoma/fibromyoma) is a benign monoclonal tumour of smooth muscle and fibrous connective tissue arising in the myometrium. Because the central part of a growing myoma is relatively **avascular**, it frequently outgrows its blood supply and undergoes secondary, or **degenerative, changes** — the commonest cause of the varied clinical presentation and imaging appearance of an otherwise benign tumour.

Types of degeneration in a fibroid uterus

Type	Who/when it occurs	Mechanism	Gross appearance	Microscopy
Hyaline degeneration — commonest (**65%**)	Any size fibroid except very small ones; tumours rich in connective tissue	Central, least-vascular part of the tumour loses blood supply	Firm tumour becomes **soft, elastic**; cut surface shows irregular homogeneous areas with **loss of the whorled pattern**	Hyaline change of both muscle and fibrous tissue
Cystic degeneration	Post-menopausal women; common in **interstitial** myomas	Liquefaction of previously hyalinised areas	Cystic spaces with irregular, ragged walls; a large isolated cystic myoma may mimic an **ovarian cyst or pregnancy**	Cystic spaces without an epithelial lining

Type	Who/when it occurs	Mechanism	Gross appearance	Microscopy
Fatty degeneration	At or after menopause	Follows hyaline change	Yellow, greasy cut surface	Fat globules deposited within muscle cells
Calcific degeneration (~10%)	Subserous pedunculated myomas or postmenopausal fibroids; usually follows fatty degeneration	Precipitation of calcium carbonate/phosphate	If the whole tumour calcifies it is called a **"womb stone"**; seen as a calcified shadow on a plain X-ray pelvis	Calcium deposition in degenerated tissue
Red (carneous) degeneration — *necrobiosis*	Large myomas, classically the **second half of pregnancy and puerperium**	Rapid tumour growth outstrips blood supply → **haemorrhagic infarction**; probably vascular, not infective	Dark, "raw-beef" cut surface, often with cystic spaces; **fishy odour** (fatty acids); colour from haemolysed red cells and haemoglobin	Necrosis with **thrombosed vessels** but no extravasation of blood
Necrosis	Submucous polyp or pedunculated subserous fibroid	Circulatory inadequacy	Central or surface necrosis; may be a portal for ascending infection	Coagulative necrosis
Atrophy	Menopause (oestrogen withdrawal) or after delivery, once a pregnancy-induced enlargement recedes	Loss of oestrogenic support	Reduction in tumour size	Reduced cellularity

Type	Who/when it occurs	Mechanism	Gross appearance	Microscopy
Sarcomatous (malignant) change — rare (~0.1%)	Any fibroid, more often postmenopausal with rapid growth	Not a transformation of the existing myoma — genetic/comparative-genomic-hybridisation studies show **leiomyosarcoma is a distinct, de-novo neoplasm**, not malignant change within a pre-existing fibroid	Tumour becomes **soft**; cut surface **yellowish with haemorrhage and cystic change**; whorled pattern is **lost**	Increased mitoses, nuclear atypia, coagulative tumour cell necrosis

Clinical features by type of degeneration

- **Hyaline / fatty / atrophic** degeneration — usually **asymptomatic**; found incidentally on cut section of a removed specimen.
- **Cystic degeneration** — presents as a soft, sometimes rapidly enlarging pelvic mass that can mimic an ovarian cyst or early pregnancy.
- **Calcific degeneration** — a hard, "stony" mass ("womb stone"); may be picked up incidentally on a plain abdominal X-ray.
- **Red (carneous) degeneration** — classic presentation is **acute, focal abdominal pain and tenderness over the myoma in the second half of pregnancy**, often with **low-grade fever, mild tachycardia and leukocytosis**; must be distinguished from torsion of a pedunculated myoma, appendicitis and placental abruption.
- **Necrosis** — seen with submucous/pedunculated myomas; if the surface sloughs (typically after delivery or abortion), **secondary infection** with foul discharge can follow.
- **Sarcomatous change** — suspect with **rapid growth**, especially in a postmenopausal woman, new pelvic pain, or abnormal uterine bleeding.

Differentiating benign degeneration from leiomyosarcoma

Investigation	Degenerating (benign) fibroid	Leiomyosarcoma
Transvaginal ultrasound + colour Doppler	Heterogeneous echotexture; anechoic areas (cystic degeneration); hyperechoic shadowing foci (calcific)	Irregular margins, increased/central vascularity

Investigation	Degenerating (benign) fibroid	Leiomyosarcoma
MRI with gadolinium (Gd-DTPA), arterial phase (40–60 s)	**Decreased perfusion, little/no enhancement**	**Increased vascularity and enhancement**
Serum LDH (+ isoenzymes) with Gd-DTPA MRI	Normal/low; combined criteria reported **100% specificity, PPV, NPV and diagnostic accuracy** for excluding leiomyosarcoma	Elevated
Diffusion-weighted MRI (apparent diffusion coefficient, ADC)	**Higher ADC value**	**Significantly lower ADC** (sensitivity 100%, specificity 90% in a comparative series)

Management

- **Asymptomatic hyaline, fatty, calcific or atrophic degeneration** — no treatment needed; once a myoma is diagnosed, routine sonographic surveillance is not required unless a complication is suspected.
- **Red (carneous) degeneration in pregnancy** — conservative: rest, hydration and **non-narcotic analgesics**; observation, as an infarcted myoma is essentially a **diagnosis of exclusion**; symptoms usually settle within a few days. Myomectomy in pregnancy is reserved for highly selected cases; surgery is rarely required.
- **Diagnostic uncertainty** (cannot exclude torsion of a pedunculated subserosal myoma, appendicitis, or an adnexal mass) — surgical exploration/laparoscopy.
- **Suspected sarcomatous change** — imaging red flags (rapid growth, poor-arterial-phase-differentiating features, low ADC) with or without raised LDH warrant **total hysterectomy with the specimen sent for histopathology**; **morcellation must not be used** when malignancy is known or suspected.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 38.82A — Specimen of a uterus, tubes, and ovaries cut opened to show multiple fibroids; the fibroid is cut to show calcific degeneration ("womb stone") (DC Dutta's Gynaecology 7e, p.574)*
  - Companion **Fig 38.82B** (same page) is the corresponding **plain X-ray of the pelvis** showing the calcified outline of the same fibroid — draw/label both the gross specimen and the X-ray shadow side by side to illustrate calcific degeneration.

High-yield exam pointers

- **Hyaline 65%** (commonest), **calcific 10%, sarcomatous ~0.1%** (rarest) — write these three numbers.
- **"Womb stone"** = totally calcified fibroid.

- **Red/carneous degeneration = necrobiosis**, classically **2nd half of pregnancy/puerperium**; acute pain + low-grade fever + mild leukocytosis; managed conservatively with analgesics and observation.
- Cystic degeneration can mimic an **ovarian cyst or pregnancy**.
- Leiomyosarcoma is a **distinct de-novo tumour**, not a malignant transformation of a fibroid — a common exam trap.
- MRI (Gd-DTPA enhancement pattern) + serum LDH ± diffusion-weighted ADC value distinguish benign degeneration from leiomyosarcoma.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> For reference only: some editions still teach sarcomatous change as "malignant degeneration" of a fibroid, but genetic and comparative-genomic-hybridisation studies (as reported in Berek & Novak's Gynecology 16e) show leiomyosarcoma arises independently rather than from an existing leiomyoma — state the current understanding if asked to elaborate.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e (Table 20.3 secondary changes in fibroids; Table 20.5 complications of fibroids); Berek & Novak's Gynecology 16e (fibroid degeneration in pregnancy, MRI/LDH/ADC differentiation from leiomyosarcoma, morcellation caution); Williams Obstetrics 26e (red/carneous degeneration in pregnancy — clinical features and conservative management).

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Discuss amniotic fluid dynamics in normal pregnancy and its significance in obstetrics

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Amniotic fluid (liquor amnii) is the clear, faintly alkaline fluid filling the amniotic cavity, of mixed fetal and maternal origin. Its volume is maintained by continuous, near-equal **production and resorption** through the amnion, fetal skin, fetal urinary and respiratory tracts, and the placental surface — a dynamic equilibrium rather than a static pool — and both its volume and composition are important, non-invasively assessable markers of fetal wellbeing.

Dynamics — formation, circulation & turnover

- The **entire fluid volume is exchanged roughly every 3 hours**, demonstrated by radioactive-sodium clearance studies after intra-amniotic injection; presence of lanugo and squames in fetal meconium confirms that swallowed fluid passes from gut to fetal plasma.

Gestational phase	Main production route(s)	Main resorption route(s)
First half of pregnancy	**Transmembranous** flow across the amnion; **transcutaneous** flow across non-keratinised fetal skin (until keratinisation at 22–25 weeks); **intramembranous** flow from maternal decidua/placental surface	Same three routes operate in reverse; fetal urine is not yet a major contributor
Second half of pregnancy	**Fetal urination** (~1000 mL/day by term); **fetal lung fluid secretion** (~350 mL/day)	**Fetal swallowing** (~500–1000 mL/day, average ~750 mL); **intramembranous flow** across fetal vessels on the placental surface (~400 mL/day, driven by fluid hypotonicity); transmembranous flow (minimal)

- **Osmolality:** maternal and fetal plasma are iso-osmolar (~280 mOsm/L); amniotic fluid is progressively **hypotonic** (~250–260 mOsm/L at term) because of dilution by hypotonic fetal urine — a fluid osmolality near 250 mOsm/L is a traditional marker of fetal maturity. Maternal dehydration raises maternal osmolality and favours net fluid movement fetus → mother → amniotic compartment (via the pathways above), explaining why oral hydration is used therapeutically in oligohydramnios.
- Failure of any resorptive step (impaired fetal swallowing from a CNS lesion or gastrointestinal obstruction) or excess production (open neural tube defect, non-immune hydrops) disturbs this balance and produces hydramnios; conversely reduced production (renal agenesis/obstruction) or fluid loss (membrane rupture) produces oligohydramnios.

Volume dynamics across gestation & sonographic assessment

Gestation	Approximate amniotic fluid volume
10 weeks	~30 mL
16 weeks	~200 mL
34–36 weeks (peak)	~800 mL–1 L
Term (40 weeks)	~600–800 mL
Post-term (43 weeks)	~200 mL

- Volume is assessed **semi-quantitatively on ultrasound** by the **single/deepest vertical pocket (DVP)** — a fluid-only pocket ≥1 cm wide, free of cord/fetal parts — or the **amniotic fluid index (AFI)**, the sum of the deepest pocket in each of the four uterine quadrants (umbilicus, symphysis pubis and fundus as reference landmarks).
- Normal range: **DVP 2–8 cm**; **AFI ~5–24/25 cm**.

- **Oligohydramnios**: DVP <2 cm or AFI <5 cm (below the 5th centile); complete absence of a measurable pocket = **anhydramnios**.
- **Hydramnios/polyhydramnios**: DVP >8 cm or AFI >24–25 cm (above the 95th centile), graded mild/moderate/severe.

Significance in obstetrics — antenatal

Clinical role	Basis / application
Mechanical & developmental protection	Shock-absorber against trauma; permits free fetal movement and musculoskeletal/lung development; prevents amnion–fetal adhesions; maintains even fetal temperature
Fetal surveillance	AFI/DVP is a scored component of the **biophysical profile (BPP)** and the **modified BPP** (non-stress test + AFI); an AFI <5 makes the modified BPP non-reassuring and signals chronic uteroplacental insufficiency
Diagnostic sampling (amniocentesis)	Fetal karyotyping/genetic diagnosis; **alpha-fetoprotein** markedly raised with open neural tube defects; **fetal lung maturity testing** (lecithin:sphingomyelin ratio, lamellar body count, phosphatidylglycerol); bilirubin optical density (ΔOD450, Liley chart) in Rh isoimmunisation
Marker of underlying disease	**Oligohydramnios** → fetal growth restriction, renal agenesis/obstructive uropathy, ruptured membranes, postmaturity, drug effect (NSAIDs, ACE inhibitors). **Polyhydramnios** → fetal structural/chromosomal anomaly (anencephaly, oesophageal/duodenal atresia, facial cleft), hydrops fetalis, maternal diabetes, twin–twin transfusion syndrome
Therapeutic use of the fluid compartment	**Amnioreduction** (slow decompression, ~500 mL/hour) for symptomatic polyhydramnios; **amnioinfusion** for oligohydramnios/meconium-stained liquor in labour; historically, intra-amniotic instillation for mid-trimester termination

Significance in obstetrics — intrapartum

- The forewaters, bulging ahead of the presenting part, form a **hydrostatic wedge** with the membranes that aids mechanical dilatation of the cervix.
- Intact membranes equalise intrauterine pressure during contractions and protect placental (uteroplacental) circulation from being compromised.
- The fluid cushion **guards the umbilical cord** against compression during contractions.

- At full dilatation, the gush of liquor **flushes the birth canal**; its bacteriostatic property helps limit ascending infection.
- **Artificial rupture of membranes (amniotomy)** is used to induce or augment labour once the presenting part is engaged.
- **Meconium staining** of liquor during labour is a clinical marker of fetal hypoxia/distress — thin staining suggests recent, thick/particulate staining suggests more prolonged compromise — and guides intrapartum monitoring and neonatal preparedness.
- Forceful entry of fluid into a breached uterine/venous sinus (e.g., at membrane rupture or placental separation) is the mechanism of the rare but catastrophic **amniotic fluid embolism**.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 3.12 — Amniotic fluid volume is measured to determine AFI (DC Dutta's Obstetrics 9e, p.62)*
- Additionally sketch/flowchart the production–resorption cycle: **Production** [fetal urination → fetal lung fluid secretion → transmembranous/transcutaneous transudation] feeding into a central "**Amniotic fluid pool**" node, balanced by **Resorption** [fetal swallowing → intramembranous flow across fetal placental vessels → transmembranous flow], with an arrow showing continuous turnover (~3-hourly exchange).

High-yield exam pointers

- Daily volumes to write verbatim: urination ~1000 mL, lung fluid ~350 mL, swallowing ~750 mL (500–1000), intramembranous flow ~400 mL.
- Volume trajectory: 30 mL (10 wk) → 200 mL (16 wk) → peak 800 mL–1 L (34–36 wk) → 600–800 mL (term) → ~200 mL (43 wk).
- Turnover: whole pool replaced every ~3 hours.
- Cutoffs: oligohydramnios = DVP <2 cm / AFI <5 cm; hydramnios = DVP >8 cm / AFI >24–25 cm.
- Osmolality ~250 mOsm/L at term = maturity marker; maternal/fetal plasma ~280 mOsm/L.
- AFI/DVP is the ultrasound component of the modified biophysical profile.

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

Dutta's classical "fluid changed every 3 hours" teaching and the Williams 26e compartmental production–resorption table describe the same continuous-turnover physiology from two eras of evidence (isotope-clearance versus kinetic/dye-dilution studies) and are complementary, not contradictory.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e.

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Discuss peripartum thromboprophylaxis in a patient with prosthetic valve with pregnancy

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — A mechanical prosthetic heart valve is inherently thrombogenic, and the physiological hypercoagulable state of pregnancy further raises the risk of valve thrombosis, systemic embolism, and stroke. Peripartum thromboprophylaxis means an individualised, continuous anticoagulation strategy — warfarin (a vitamin-K antagonist), unfractionated heparin (UFH), or low-molecular-weight heparin (LMWH) — carried through pregnancy, labour, delivery, and the puerperium, with the regimen deliberately changed at defined time-points to balance maternal thromboembolic risk against fetal teratogenic and haemorrhagic risk. Bioprosthetic (porcine) valves do not require long-term anticoagulation and are not the focus here.

Anticoagulant options — comparative maternal and fetal outcomes

Regimen	Maternal composite outcome*	Fetal composite outcome†
Warfarin (VKA) throughout pregnancy	5%	39%
LMWH throughout pregnancy	16%	14%
LMWH in 1st trimester → warfarin	16%	16%
UFH in 1st trimester → warfarin	16%	34%

*Maternal death, valve failure, thromboembolism. †Miscarriage, fetal death, congenital malformation. (Cohort of 800 women with a mechanical heart valve; Williams Obstetrics 26e.)

Warfarin is the most effective anticoagulant against valve thrombosis but crosses the placenta and is teratogenic/fetopathic; heparins do not cross the placenta but carry a higher risk of maternal valve thrombosis — this trade-off drives every trimester-wise choice below. Low-dose unfractionated heparin alone is definitely inadequate for a mechanical valve and is not used.

Trimester-wise regimen and monitoring

Period	Preferred regimen	Monitoring target
Weeks 6–12 (organogenesis window)	Warfarin dose needed ≤5 **mg/day**: continue warfarin with weekly INR. Warfarin dose >5 **mg/day**: substitute adjusted-dose UFH or therapeutic LMWH for weeks 6–12, then resume warfarin	Weekly INR (target range individualised by the cardiology team to valve type/position); UFH — activated partial thromboplastin time (aPTT) ≥2× control; LMWH — anti-Xa level 0.8–1.2 U/mL, 4–6 hours post-dose
2nd and 3rd trimester	Resume/continue warfarin (weekly INR) **or** continue adjusted-dose LMWH/UFH; add **aspirin 75–100 mg/day** to every regimen	Same INR/aPTT/anti-Xa targets; monthly review
~2 weeks before planned delivery (around 36 weeks)	Switch oral warfarin to therapeutic LMWH or IV UFH, which can be turned on and off rapidly	As above

Embryopathy risk is dose-dependent: **<3%** with a warfarin dose ≤5 mg/day versus **>8%** with a dose above this, which is the basis for the trimester-6–12-week substitution rule (ACC/AHA).

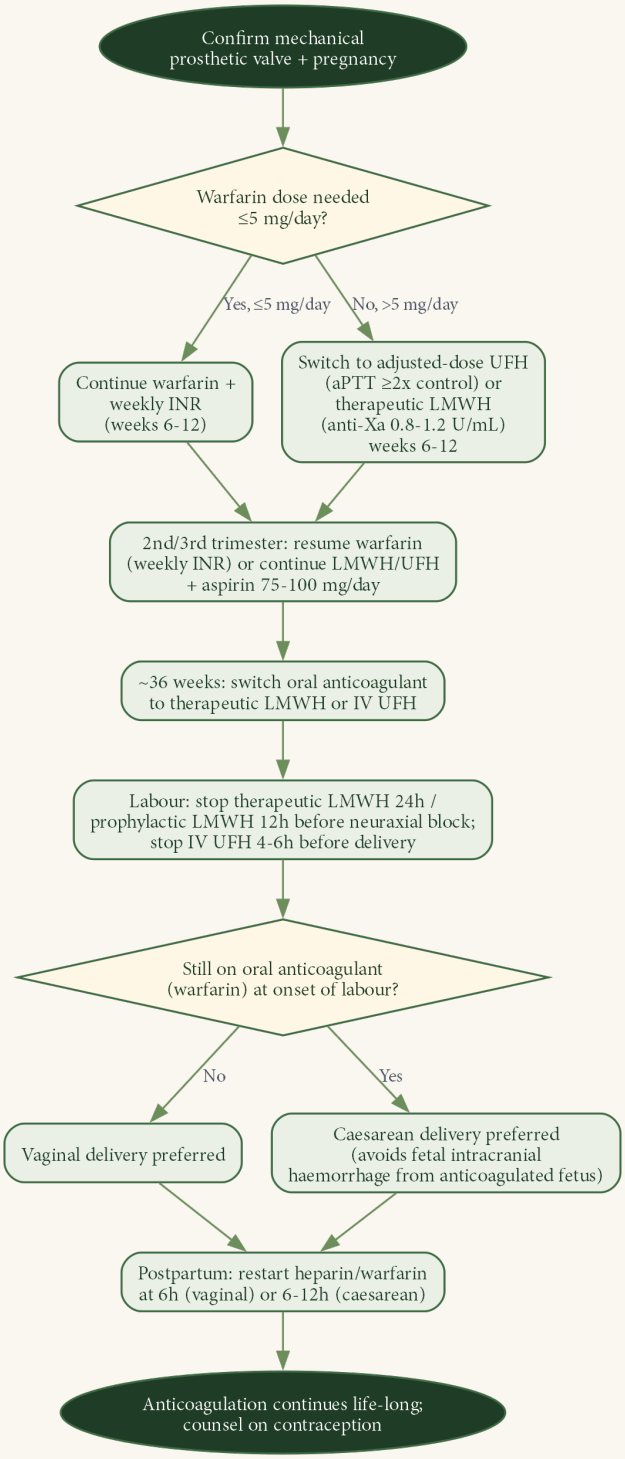
Peripartum (labour and delivery) management

- **Plan the delivery** (induction or scheduled caesarean) so anticoagulation can be discontinued in a controlled fashion rather than awaiting spontaneous labour on full anticoagulation.
- In the final 1–2 weeks, run **IV unfractionated heparin infusion** — its short half-life allows the drug to be stopped **4–6 hours before** the anticipated delivery and clotting to normalise quickly.
- If **therapeutic-dose LMWH** is still on board when labour starts, neuraxial (epidural/spinal) anaesthesia needs a minimum **24-hour delay** after the last therapeutic dose (only **12 hours** for a prophylactic dose) — Society for Obstetric Anesthesia and Perinatology consensus — to avoid spinal/epidural haematoma.
- Vaginal delivery with heparin bridging is generally preferred. If labour occurs while the patient is still on an **oral anticoagulant (warfarin)**, **caesarean delivery** is preferred over vaginal delivery, because vaginal delivery of an anticoagulated fetus carries a risk of neonatal intracranial haemorrhage from head trauma.
- **Emergency reversal:** for warfarin, give fresh-frozen plasma ± vitamin K; for heparin still active with major bleeding, IV **protamine sulfate** reverses its effect. Counsel that regional anaesthesia may not be safe in this situation.

Postpartum resumption and long-term care

- **After vaginal delivery:** restart warfarin or heparin about **6 hours** later if haemostasis is secure.
- **After caesarean delivery:** ACOG recommends resuming UFH/LMWH **6–12 hours** post-operatively; some units wait at least **24 hours** after major surgery given the inherent bleeding risk.
- Warfarin, UFH, and LMWH are all **compatible with breastfeeding** — none accumulate in breast milk or produce a neonatal anticoagulant effect.
- Anticoagulation continues **life-long** — pregnancy does not remove the mechanical valve's requirement for permanent anticoagulation; counsel on contraception, since a future pregnancy carries the same risk profile.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Peripartum anticoagulation algorithm for a pregnant woman with a mechanical heart valve, from confirmation of the valve/pregnancy through the weeks-6–12 warfarin-dose decision, trimester-wise regimen, delivery-mode decision, and life-long postpartum continuation.

High-yield exam pointers

- Trade-off to write first: **warfarin throughout = best maternal outcome (5% valve thrombosis/death) but worst fetal outcome (39%); LMWH throughout = the reverse (16% / 14%)** — Williams Table 52-6.
- Dose cut-off: warfarin **≤5 mg/day → embryopathy <3%; >5 mg/day → embryopathy >8%**.
- Monitoring numbers: UFH **aPTT ≥2× control**; LMWH **anti-Xa 0.8–1.2 U/mL** at 4–6 hours post-dose.
- Add **aspirin 75–100 mg/day** to every regimen.
- Neuraxial delay after LMWH: **12 hours (prophylactic dose) / 24 hours (therapeutic dose)**.
- Postpartum restart: **~6 hours after vaginal delivery; 6–12 hours after caesarean**.
- Bioprosthetic (porcine) valves need **no long-term anticoagulation** — distinguish this from mechanical valves if the stem is ambiguous.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> DC Dutta's Obstetrics 9e states only that thromboembolism risk is higher with LMWH than with warfarin and refers the reader to ACOG guidance; current data (Williams Obstetrics 26e; 2018 European Society of Cardiology guidelines) refine this into the specific maternal-versus-fetal trade-off and the warfarin-dose-dependent, 6–12-week substitution algorithm given above, which should be used for the exam answer.

> **SOURCE & COVERAGE**
>
> Williams Obstetrics 26e (Table 52-6 and Figure 52-3 anticoagulation algorithm, citing the American College of Cardiology/American Heart Association 2014 valvular heart disease guideline and American College of Obstetricians and Gynecologists 2018 guidance; Society for Obstetric Anesthesia and Perinatology consensus on neuraxial timing); DC Dutta's Textbook of Obstetrics 9e; Arias' High-Risk Pregnancy & Delivery 5e (2018 European Society of Cardiology Guidelines for the management of cardiovascular diseases during pregnancy, Regitz-Zagrosek et al., Eur Heart J 2018).

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Discuss the advances in the management of severe pre-eclampsia and anti hypertensive therapy

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Severe pre-eclampsia is pre-eclampsia — new-onset hypertension (blood pressure, BP ≥140/90 mmHg after 20 weeks) with proteinuria (≥300 mg/24 h or protein:creatinine ratio ≥0.3) — accompanied by one or more **severe features**. The American College of Obstetricians and Gynecologists

(ACOG) Task Force (2013) and Practice Bulletin No. 222 (2020) abandoned the term "mild pre-eclampsia": disease is now classified only as **with** or **without severe features**, and oedema/proteinuria quantity are no longer used to grade severity.

Severe features (defines the disease, drives management)

Parameter	Severe threshold
Blood pressure	Systolic ≥160 mmHg or diastolic ≥110 mmHg, confirmed on 2 occasions ≥15 min apart
Platelets	<100,000/μL
Serum creatinine	>1.1 mg/dL or doubling of baseline (no prior renal disease)
Liver transaminases	≥2× upper limit of normal, or severe persistent right-upper-quadrant/epigastric pain
Cerebral/visual	Persistent headache unresponsive to analgesia, or visual disturbance
Pulmonary oedema	Present

Principles of management and advances in timing of delivery

The four-point philosophy is unchanged; delivery-timing evidence has been refined:

- Prevent/control convulsions — magnesium sulfate.
- Control dangerously high BP — antihypertensive agents.
- Avoid diuretics and fluid overload (patients are intravascularly contracted despite oedema) — restrict intravenous fluid to ~80 mL/hour.
- Deliver — the only definitive cure.

Gestational age at diagnosis	Current recommendation
<24 weeks	Expectant care carries ~87% perinatal mortality and major maternal morbidity (Sibai series) — counsel toward delivery/termination
24–33+6 weeks, maternal/fetal stable	Expectant management only at a tertiary centre with daily maternal/fetal surveillance; betamethasone 12 mg IM ×2, 24 h apart. MEXPRE Latin trial: **no added neonatal benefit**, more abruption/small-for-gestational-age with prolongation 28–34 weeks — criteria now applied strictly, individualised

Gestational age at diagnosis	Current recommendation
≥34-0/7 weeks, or any gestational age with a precluding criterion (uncontrolled severe hypertension, eclampsia, pulmonary oedema, HELLP syndrome, disseminated intravascular coagulation, new/worsening renal dysfunction, abruption, non-reassuring fetal testing)	Deliver after maternal stabilisation; do **not** delay delivery to complete a corticosteroid course

Seizure prophylaxis — magnesium sulfate (locked regimens and advances)

Regimen	Loading dose	Maintenance dose
Zuspan/Sibai (intravenous)	4–6 g in 100 mL IV fluid over 15–20 min	1–2 g/hour IV infusion
Pritchard (intramuscular)	4 g (20% solution) IV over 3–5 min (≤1 g/min) **plus** 10 g (50%) deep IM, 5 g in each buttock via a 3-inch 20-gauge needle (+1 mL 2% lidocaine to reduce pain)	5 g (50%) deep IM in alternate buttock every 4 hours

- Repeat only if patellar reflex present, respiratory rate >12–14/min, urine output ≥30 mL/hour (or >100 mL/4 h); recurrent seizure — additional 2 g IV slow bolus (may repeat once more in a large woman).
- Therapeutic level 4–7 mEq/L (4.8–8.4 mg/dL). Toxicity: patellar reflex lost ~7 mEq/L (9 mg/dL) → respiratory depression >10 mEq/L (12 mg/dL) → cardiac arrest >25 mEq/L (30 mg/dL). Antidote: 10% calcium gluconate 10 mL (1 g) IV over 3 minutes ± furosemide to accelerate excretion.
- Continued 24 hours after delivery or the last convulsion, whichever is later.
- Evidence: the MAGPIE trial (2002, >10,000 women, ~26% with severe pre-eclampsia) showed a 58% reduction in eclampsia versus placebo (2.7% vs 1.1%) and lower maternal mortality (3.1% vs 4.9% with alternative anticonvulsants); the Collaborative Eclampsia Trial confirmed superiority over phenytoin and diazepam for recurrent-seizure control.
- **Advance — fetal neuroprotection:** a meta-analysis of 5 randomised trials (~6,145 infants) showed antenatal magnesium sulfate reduces gross motor dysfunction/cerebral palsy in very preterm infants — extending its use, as a separate lower-dose regimen, to anticipated preterm birth even without severe features.
- **Advance:** routine serum magnesium assay is no longer recommended (ACOG/RCOG) — clinical monitoring (reflexes, respiratory rate, urine output, pulse oximetry ≥96%) suffices unless renal function is impaired.

Antihypertensive therapy — acute control of severe hypertension (BP ≥160/110, confirmed ≥15 min)

Drug	Regimen	Caution
Labetalol IV	10–20 mg bolus, then double the dose (20 → 40 → 80 mg) every 10–20 min to a maximum 220 mg/cycle; or infusion 1–2 mg/min	Avoid in asthma, cardiac failure, bradycardia
Hydralazine IV/IM	5–10 mg initial, repeat 5–10 mg every 15–20 min to a total ~30 mg; or infusion 0.5–10 mg/hour	Reflex tachycardia, overshoot hypotension with fetal decelerations
Nifedipine oral	10 mg, repeat 10–20 mg after 20–30 min	Sublingual route contraindicated — precipitous hypotension/fetal distress

- **Advance:** treatment should start within 30–60 minutes of confirmed acute-onset severe hypertension (ACOG Practice Bulletin 222, 2020).
- **Advance:** ACOG (2020) and pooled trial data now regard labetalol, hydralazine and oral nifedipine as **equally effective first-line agents** for acute control — choice is guided by clinician familiarity and contraindications (e.g. asthma favours avoiding labetalol), not by superiority of one drug.

Antihypertensive therapy — oral maintenance during expectant management

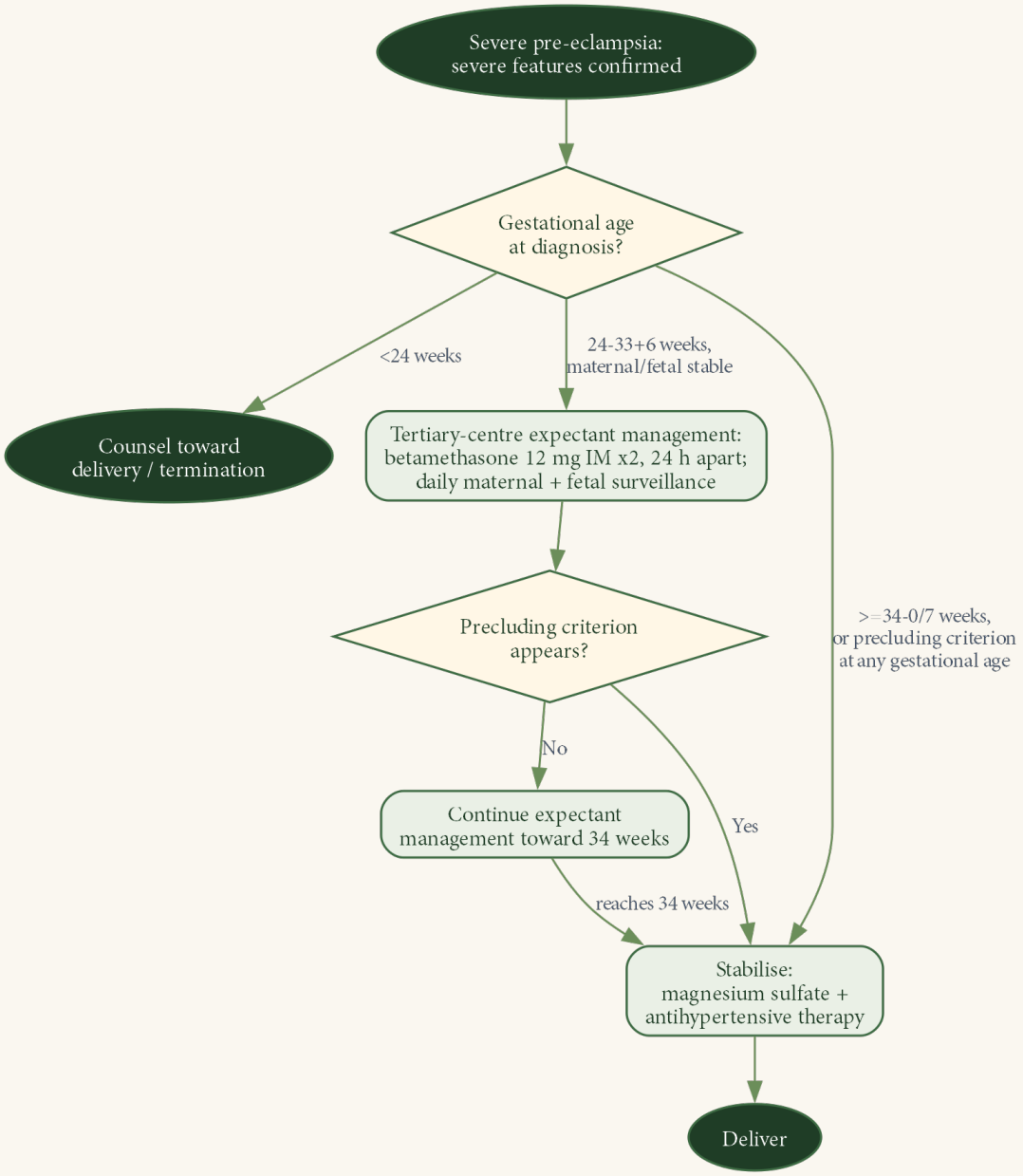
Drug	Dose	Comment
Labetalol	200–2,400 mg/day in 2–3 divided doses	First-line oral agent
Nifedipine (extended-release)	30–120 mg/day	Preferred over repeated short-acting dosing for maintenance; immediate-release reserved for acute control
Methyldopa	500–3,000 mg/day	Safety data to 7.5 years' follow-up in offspring, but second-line — sedation, depression

- ACE inhibitors, angiotensin-receptor blockers, renin inhibitors and mineralocorticoid-receptor antagonists remain **contraindicated** (fetotoxic).
- Target during expectant management: systolic 140–155 mmHg, diastolic 90–105 mmHg — over-correction risks placental hypoperfusion.

Advances in prediction and prevention (upstream of severe disease)

- **Aspirin prophylaxis:** the ASPRE trial (Rolnik et al., 2017) — low-dose aspirin from 11–14 weeks to 36 weeks cut preterm pre-eclampsia by ~62%. ACOG (2018/2020) now recommends low-dose aspirin (81 mg in US practice) from 12–28 weeks (ideally before 16 weeks) for ≥1 high-risk factor (prior pre-eclampsia, chronic hypertension, pregestational diabetes, renal disease, autoimmune disease, multifetal gestation) or ≥2 moderate-risk factors (nulliparity, obesity, family history, age ≥35 years).
- **Combined first-trimester screening** (maternal factors + mean arterial pressure + uterine artery pulsatility index + serum placental growth factor/pregnancy-associated plasma protein-A) detected 82.4% of preterm pre-eclampsia versus 40.8% by NICE risk-factor screening alone at the same 10% screen-positive rate (SPREE study) — used to select women for aspirin prophylaxis.
- **Angiogenic biomarkers:** placental soluble fms-like tyrosine kinase-1 (sFlt-1) rises and placental growth factor (PlGF) falls before clinical severe disease; a rising sFlt-1:PlGF ratio helps triage women likely to progress to severe pre-eclampsia during expectant management, though it does not replace standard clinical/laboratory severe-feature criteria.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision algorithm for severe pre-eclampsia: gestational age at diagnosis routes to termination counselling, tertiary-centre expectant management, or stabilisation-then-delivery, with any precluding criterion forcing immediate delivery.

High-yield exam pointers

- Two magnesium regimens: **Zuspan/Sibai (IV)** 4–6 g load + 1–2 g/hour vs **Pritchard (IM)** 4 g IV + 10 g IM load, then 5 g IM every 4 hours.
- Toxicity ladder: reflex loss ~7 mEq/L → respiratory depression >10 mEq/L → cardiac arrest >25 mEq/L; antidote — 1 g (10 mL 10%) calcium gluconate IV over 3 min.

- BP ≥160/110 sustained 15 min = treat within 30–60 min; ACOG says labetalol, hydralazine and oral nifedipine are equally acceptable first-line.
- 34-0/7 weeks is the delivery cut-off for severe features; deliver at any gestational age if a precluding criterion appears.
- MAGPIE trial — 58% reduction in eclampsia with magnesium sulfate versus placebo.
- Aspirin 81 mg from 12–28 weeks in high-risk women — ASPRE trial, ~62% reduction in preterm pre-eclampsia.
- sFlt-1:PlGF ratio — emerging adjunct, not a replacement, for triaging disease progression.

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

The RCOG Green-top Guideline No. 10A recommends a lower 4 g magnesium loading dose and a 1 g/hour maintenance infusion (versus the 4–6 g/1–2 g/hour used in the USA) — where guidelines differ, state the regimen you name and be consistent; DC Dutta's Obstetrics 9e mirrors the same Zuspan/Pritchard doses used above.

SOURCE & COVERAGE

Williams Obstetrics 26e; Arias' High-Risk Pregnancy & Delivery 5e; DC Dutta's Textbook of Obstetrics 9e; ACOG Practice Bulletin No. 222 — Gestational Hypertension and Preeclampsia (2020); ACOG Hypertension in Pregnancy Task Force Report (2013); RCOG Green-top Guideline No. 10A — The Management of Severe Pre-eclampsia/Eclampsia (2006, reviewed 2010).

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Discuss the common intracranial abnormalities that can occur in the fetus and management in pregnancy and labour

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Fetal intracranial abnormalities are structural malformations of the fetal brain and cranium arising from failure of neural tube closure, disordered neuronal proliferation/migration, or obstructive/destructive CSF pathology. They range from uniformly lethal (anencephaly) to variably disabling (hydrocephalus, encephalocele), and materially alter the conduct of pregnancy (screening,

counselling, termination vs continuation) and of labour (malpresentation, cephalopelvic disproportion from macrocephaly, obstructed labour).

Common intracranial abnormalities

Abnormality	Key features (ultrasound/pathology)	Associations
Anencephaly/acrania–exencephaly sequence	Absent cranial vault and telencephalon above the orbits; angiomatous brain tissue; "shower-cap" cranial contour in late 1st/early 2nd trimester; incidence ~1 in 1,000 births	Hydramnios (70%, impaired swallowing); uniformly lethal
Encephalocele	Herniation of meninges (cranial meningocele) or meninges + brain (encephalocele) through a cranial defect, typically occipital midline	*Meckel-Gruber syndrome* (cystic renal dysplasia + polydactyly); non-midline defect suggests amnionic-band sequence
Spina bifida/myelomeningocele with Chiari II	Open vertebral arch defect with herniated meningeal sac ± neural roots; cranial signs — "**lemon sign**" (frontal bone scalloping) + "**banana sign**" (anterior cerebellar curvature, effaced cisterna magna) from caudal cerebellar herniation	80–90% of myelomeningocele infants need a ventriculoperitoneal (VP) shunt; incidence ~1 in 2,000 births
Hydrocephalus/ventriculomegaly	Excess CSF (0.5–1.5 L) in the ventricles with cranial enlargement; atrial width graded **mild 10–12 mm, moderate 13–15 mm, severe >15 mm** (Society for Maternal-Fetal Medicine, 2018); dangling choroid plexus in severe cases	Aqueductal stenosis, agenesis of corpus callosum, TORCH infection, aneuploidy (~1/3 of cases); incidence ~1 in 2,000 deliveries
Dandy-Walker malformation	Cerebellar vermian agenesis, enlarged posterior fossa, elevated tentorium, cisterna magna communicating with the 4th ventricle	Ventriculomegaly (30–40%), other anomalies (~50%), aneuploidy (~40%)
Holoprosencephaly	Failure of forebrain (prosencephalon) cleavage — **alobar** (fused thalami, single monoventricle), **semilobar**, **lobar** forms	Strong link with trisomy 13; midline facial anomalies (cyclopia, cleft)

Abnormality	Key features (ultrasound/pathology)	Associations
Agenesis of the corpus callosum	Widely separated frontal horns, rounded occipital horns (**colpocephaly**) giving a teardrop-shaped ventricle; absent cavum septum pellucidum	Often isolated (normal outcome in ~70%) but linked to >200 genetic syndromes and aneuploidy
Microcephaly	Head circumference (HC) ≥3 SD below the mean raises suspicion; pathological microcephaly confirmed only at ≥5 SD below the mean (SMFM, 2016)	TORCH/Zika infection, genetic syndromes, teratogen exposure
Choroid plexus cyst	Small intraventricular cyst seen in 1–2% of chromosomally normal pregnancies; benign normal variant on its own	Soft marker for trisomy 18 if associated with other structural anomalies

Management in pregnancy

- **Screening and diagnosis.** Maternal serum alpha-fetoprotein (MSAFP) at 16–18 weeks detects ~90% of anencephaly and ~80–89% of open spina bifida; the detailed mid-trimester anomaly scan (18–20 weeks) evaluates the transventricular (atrial width), transthalamic (biparietal diameter/HC, lemon sign) and transcerebellar (cerebellum, cisterna magna, banana sign) planes, and the entire spine in transverse section.
- **Further work-up.** Targeted neurosonography ± fetal MRI (better delineates posterior fossa, corpus callosum and cortical detail); amniocentesis for karyotype/chromosomal microarray and TORCH studies, given the substantial aneuploidy association of several of these lesions (see table).
- **Multidisciplinary counselling.** Fetal medicine, neonatology, paediatric neurosurgery and clinical genetics jointly counsel the couple on prognosis, recurrence risk and options.
- **Pregnancy continuation decisions.** For lethal anomalies (anencephaly, alobar holoprosencephaly, severe/progressive hydrocephalus with a thin cortical mantle) confirmed before viability, termination of pregnancy is offered; if diagnosed later or the couple continues the pregnancy, perinatal palliative care counselling is offered (American College of Obstetricians and Gynecologists, 2019), and delivery is planned at a tertiary centre with neonatal surgical back-up.
- **Fetal therapy.** Open in-utero myelomeningocele repair is offered when Management of Myelomeningocele Study (MOMS) trial criteria are met — singleton fetus 19.0–25.9 weeks, upper lesion boundary between T1 and S1 confirmed on MRI, evidence of hindbrain herniation, normal karyotype, and no unrelated fetal anomaly (severe kyphosis, maternal body mass index >35 kg/m^2, and contraindications to surgery exclude). Prenatal repair roughly halves the need for

postnatal VP shunting and improves the composite motor/functional outcome compared with standard postnatal repair, at the cost of maternal risks (membrane rupture, preterm birth, and uterine scar risk in future pregnancies); women who undergo it are delivered by caesarean section because of the hysterotomy scar.

- **Prevention.** Periconceptional folic acid, 0.4 mg/day from at least 1 month before conception to 12 weeks, reduces neural tube defect (NTD) incidence by up to 85%; women with a previously affected pregnancy (recurrence risk ~3–4%) or on antiepileptic drugs are stepped up to 4 mg/day, which brings the recurrence risk down to roughly 2%.
- **Surveillance of milder lesions.** Isolated mild ventriculomegaly and isolated agenesis of the corpus callosum carry a good prognosis (normal development in ≥70–90%) and are followed with serial growth/neuro-scans to detect progression rather than acted on immediately.

Management in labour

- **Plan the route of delivery on the specific lesion.** For antenatally-diagnosed hydrocephalus, if the biparietal diameter is <10 cm or the HC is <36 cm, vaginal delivery may be attempted; larger heads, or any case with disproportion, need decompression or caesarean section.
- **Decompression (cephalocentesis) for hydrocephalus causing obstructed labour.** Once labour is established and the cervix is 3–4 cm dilated, the bladder is emptied and CSF is drained transcervically with a sharp-pointed scissors or a wide-bore (17-gauge) long needle through the dilating cervix (vertex presentation) or through the suboccipital region under two-finger guidance (aftercoming head in breech); alternatively, CSF can be aspirated trans-abdominally under ultrasound guidance. This reduces head size sufficiently to allow safe vaginal birth and is also performed just before uterine incision if caesarean is chosen.
- **Anencephaly in labour.** Labour is often prolonged because the uterus is relatively refractory to oxytocin (low fetal-adrenal-derived estriol/cortisol precursor); vaginal prostaglandin E2 gel is effective for induction/augmentation in resistant cases. Face or breech malpresentation and shoulder dystocia are common; because the fetus is non-viable, shoulder dystocia is managed by **cleidotomy** (deliberate division of one or both clavicles) rather than the standard manoeuvres used for a viable fetus.
- **Undiagnosed/neglected cases.** If hydrocephalus or another major anomaly is discovered only after obstructed labour has set in, decompression as above (or, rarely, a destructive operation for a dead fetus) is used to relieve obstruction; a booked, antenatally diagnosed case should never reach this stage — the uterus in such neglected cases is at risk of rupture even before full cervical dilatation because of gross thinning and over-stretching of the lower segment.
- **Non-lethal, non-obstructive lesions** (isolated mild ventriculomegaly, encephalocele, closed spina bifida without disproportion) are delivered by the standard obstetric route on obstetric indications alone; caesarean delivery is reserved for cases with a fetal-surgery hysterotomy scar, macrocephaly, or a coexisting obstetric indication.

- **At delivery**, a paediatrician/neonatal surgical team should be present when the lesion is potentially treatable (myelomeningocele closure, VP shunt planning), and undue head traction or difficult instrumental delivery over a large or fragile fetal head is avoided.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 27.5B — Sonogram showing hydrocephalus (DC Dutta's Obstetrics 9e, p.409)*

- Also sketch the two cranial "soft signs" of open spina bifida side by side: a **lemon-shaped skull** (concave, scalloped frontal bones on a transthalamic axial view) and a **banana-shaped cerebellum** (anteriorly curved cerebellar hemispheres with an effaced cisterna magna on a transcerebellar axial view) — label both and note they reflect caudal traction of the hindbrain (Chiari II malformation).

High-yield exam pointers

- MSAFP at 16–18 weeks detects ~90% anencephaly, ~80–89% open spina bifida; anomaly scan at 18–20 weeks looks at transventricular/transthalamic/transcerebellar planes.
- Ventriculomegaly grading by atrial width: mild 10–12 mm / moderate 13–15 mm / severe >15 mm (SMFM 2018).
- Folic acid: 0.4 mg/day routine (from 1 month preconception to 12 weeks); step up to 4 mg/day if prior NTD-affected pregnancy or on antiepileptics.
- Cephalocentesis for obstructed labour with hydrocephalus: cervix 3–4 cm dilated, 17-gauge needle/sharp scissors; vaginal delivery permitted if BPD <10 cm or HC <36 cm.
- Anencephaly: oxytocin-resistant labour (low estriol) → vaginal PGE2 gel; shoulder dystocia managed by cleidotomy, not standard manoeuvres.
- MOMS trial: open fetal myelomeningocele repair at 19.0–25.9 weeks halves VP-shunt need and improves motor outcome versus postnatal repair, but mandates caesarean delivery thereafter.
- Lemon sign + banana sign = Chiari II/open spina bifida signature on ultrasound.

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

DC Dutta's descriptions of intrapartum cephalocentesis and destructive operations for hydrocephalus reflect practice for late-diagnosed or unbooked obstructed labour, which is now uncommon where antenatal anomaly scanning is routine; with early antenatal diagnosis, most tertiary centres plan termination, a scheduled caesarean, or in-utero fetal surgery (per MOMS criteria) rather than an intrapartum destructive procedure.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e. Guidelines: American College of Obstetricians and Gynecologists (2017, fetal surgery counselling; 2019, perinatal palliative care); Society for Maternal-Fetal Medicine (2016, microcephaly; 2018, ventriculomegaly). Landmark trial: Management of Myelomeningocele Study (MOMS), Adzick et al., 2011.

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Discuss the diagnosis and management of pyrexia of 38.6°C 6 days after delivery

Asked in: Paper II 08-Apr-2026 — RGUHS MS Obstetrics & Gynaecology

Definition — Puerperal (postpartum) pyrexia is a rise of temperature to 100.4°F (38°C) or more, recorded orally, on two separate occasions 24 hours apart, excluding the first 24 hours, within the first 10 days after delivery. A temperature of 38.6°C on day 6 satisfies this definition, and by convention **is presumed to be genital-tract sepsis until proved otherwise**, though several extragenital sources must be actively excluded.

Causes of postpartum pyrexia (differential diagnosis)

The classic **"7 W's"** mnemonic organises the causes by system:

Mnemonic	System/cause	Typical timing	Key distinguishing clue
Womb	Endometritis/endomyometritis, pelvic cellulitis, parametritis, pelvic abscess	Day 3–10	Subinvoluted, tender uterus; offensive, copious lochia; foul odour
Water	Urinary tract infection — cystitis, pyelonephritis	Day 3–5	Dysuria, frequency, suprapubic/loin tenderness; history of catheterisation
Wound	Perineal/episiotomy or caesarean wound infection, wound dehiscence	Day 4–7	Localised redness, swelling, purulent discharge, gaping wound
Weaning (breast)	Engorgement, mastitis, breast abscess	Day 3 (engorgement) to 2–4 weeks (mastitis)	Unilateral hot, red, tender breast quadrant

Mnemonic	System/cause	Typical timing	Key distinguishing clue
Wind	Atelectasis, pneumonia (post-anaesthesia)	Day 1–2	Usually earlier than day 6; cough, breathlessness, crepitations
Walk (legs/pelvis)	Deep vein thrombosis, septic pelvic thrombophlebitis	Day 7–10 (or persisting fever)	Calf pain/swelling; swinging fever unresponsive to antibiotics
Wonder drug/Others	Drug fever; recrudescence of malaria/tuberculosis; pharyngitis, gastroenteritis	Any day	No focus found; relative bradycardia with drug fever; thick smear for malaria

Diagnostic approach

- **History** — antenatal risk (anaemia, malnutrition, diabetes, HIV), intrapartum risk (prolonged rupture of membranes >18 hours, prolonged/obstructed labour, repeated vaginal examinations, traumatic delivery, caesarean delivery, retained placental bits, postpartum haemorrhage), lochia character, breastfeeding difficulty, urinary and respiratory symptoms, calf pain, travel/malaria-endemic exposure.
- **Examination** — general (pulse out of proportion to fever suggests severe sepsis; chills/rigor), breast, abdomen and uterine height/tenderness, perineal/vaginal/caesarean wound inspection, bimanual and per-rectal examination for parametrial induration or a fornix mass, calf examination for thrombophlebitis, chest auscultation.

Investigation	Purpose/finding
High vaginal + endocervical swab	Aerobic/anaerobic culture and sensitivity — identify organism
Midstream "clean-catch" urine	Culture and sensitivity for UTI
Complete blood count	Leukocytosis (15,000–30,000/µL suggests metritis); thrombocytopenia suggests septicaemia/DIC
Blood culture	If fever with chills/rigor, or temperature >102°F — higher bacteraemia yield
Peripheral thick smear	To exclude malarial recrudescence
Pelvic ultrasound	Retained products of conception, pelvic/parametrial abscess, image-guided sampling, Doppler for venous thrombosis

Investigation	Purpose/finding
CT/MRI pelvis	If diagnosis unclear or septic pelvic thrombophlebitis suspected
Chest X-ray	Suspected pulmonary Koch's lesion, atelectasis, pneumonia
Serum urea/electrolytes, lactate	Baseline before laparotomy; lactate ≥4 mmol/L flags severe sepsis

Management

General measures

- Isolate the patient, especially if group A haemolytic *Streptococcus* is cultured.
- Maintain fluid and calorie intake (intravenous if needed) and correct anaemia (oral iron or transfusion).
- Indwelling catheter if urinary retention (also monitors output).
- Chart pulse, respiration, temperature, lochia, and fluid balance.

Empirical antibiotics (started pending culture) — the underlying diagnosis is treated as puerperal sepsis/endometritis until proved otherwise:

Regimen	Dose	Comment
Gentamicin	2 mg/kg IV loading, then 1.5 mg/kg IV every 8 hours (once-daily 5 mg/kg dosing also acceptable)	Combined with clindamycin — "gold standard," 90–97% efficacy
Clindamycin	900 mg IV every 8 hours	Covers anaerobes
Metronidazole	0.5 g IV every 8 hours	Added for anaerobic cover if clindamycin unavailable
+ Ampicillin	Added if sepsis, suspected enterococcus, or no response by 48–72 hours	Broadens gram-positive/enterococcal cover
Severe/refractory sepsis	Piperacillin-tazobactam or a carbapenem + clindamycin	Broadest empirical cover; vancomycin/teicoplanin added for MRSA

Treatment is continued until the patient is afebrile for at least 24–48 hours, usually a total of 7–10 days; nearly 90% respond within 48–72 hours. Persistent fever beyond this mandates a search for a parametrial phlegmon, an abscess, an infected haematoma, or septic pelvic thrombophlebitis.

Cause-directed management

- **Endometritis/parametritis** — IV antibiotics as above; if retained products of conception >3 cm on ultrasound, evacuate under antibiotic cover after 24 hours (products ≤3 cm may be left alone).
- **Pelvic/parametrial abscess** — drain by colpotomy under ultrasound guidance, or percutaneously.
- **Perineal/wound infection or dehiscence** — remove stitches to allow drainage, sitz baths and antiseptic dressing, debride necrotic tissue, secondary suture once infection is controlled; culture-directed antibiotics.
- **Necrotising fasciitis** (rare, life-threatening) — aggressive debridement of all necrotic tissue plus high-dose broad-spectrum IV antibiotics; do not delay surgery.
- **Septic pelvic thrombophlebitis** — IV heparin for 7–10 days in addition to antibiotics.
- **Urinary tract infection** — culture-directed antibiotics, adequate hydration.
- **Mastitis** — continue breastfeeding/emptying the breast, dicloxacillin 500 mg orally every 6 hours for at least 7 days (erythromycin if penicillin-allergic), analgesia; if a **breast abscess** forms, drain by a radial incision (or ultrasound-guided percutaneous aspiration).
- **Septic/endotoxic shock or intensive-care indications** (hypotension, oliguria, rising creatinine, lactate ≥4 mmol/L, thrombocytopenia, ARDS, hypothermia) — fluid/electrolyte and respiratory support, inotropes, source control, and ICU management.
- **Laparotomy/hysterectomy** — reserved for unresponsive peritonitis, uterine rupture/perforation, gangrenous uterus, gas gangrene, or multiple abscesses.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 11.2 — Mode of spread in postabortal or puerperal infection (DC Dutta's Gynaecology 7e, p.130)*

High-yield exam pointers

- Definition numbers: **≥38°C, twice, 24 hours apart, excluding first 24 hours, within first 10 days.**
- Mnemonic for causes: **7 W's** — Womb, Water, Wound, Weaning, Wind, Walk, Wonder drug.
- "Puerperal pyrexia = genital sepsis until proved otherwise" — write this line.
- Gold-standard empirical regimen: **clindamycin 900 mg IV q8h + gentamicin 2 mg/kg loading then 1.5 mg/kg IV q8h** (add ampicillin for sepsis/enterococcus or no response by 48–72 h).
- Retained products rule: **≤3 cm — observe; >3 cm — evacuate after 24 h of antibiotics.**
- Mastitis: **dicloxacillin 500 mg PO q6h × 7 days**; continue breastfeeding.
- ICU red flags: hypotension, oliguria, lactate ≥4 mmol/L, thrombocytopenia, ARDS.

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

The clindamycin–gentamicin ("gold standard") regimen and the antibiotic escalation ladder above match current American College of Obstetricians and Gynecologists/Williams practice, so Dutta's dosing here needs no correction; only newer extended-spectrum agents (piperacillin-tazobactam, carbapenems) are additions for severe or refractory sepsis.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e.

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Discuss the management of primigravida with breech presentation at 38 weeks gestation

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

Definition — Breech presentation is a longitudinal lie in which the fetal buttocks and/or lower limbs (the podalic pole) occupy the lower pole of the uterus and present at the pelvic brim; it is the commonest malpresentation, found in 2–5% of singleton pregnancies at term (Williams Obstetrics 26e). In a primigravida at 38 weeks — beyond the gestation at which spontaneous version is likely but still before labour — management proceeds in four steps: confirm the diagnosis and type, offer external cephalic version (ECV), select the safer route of delivery (weighing nulliparity as an unproven-pelvis caution rather than an absolute bar), and execute that route with a plan for its specific complications.

Confirmation of diagnosis and antenatal work-up

Type of breech	Frequency	Distinguishing feature
Frank (extended) breech	~65–70%, especially in primigravidae (tight abdominal wall, early engagement)	Hips flexed, knees extended; feet lie close to the head
Complete (flexed) breech	~10%	Both hips and knees flexed
Incomplete/footling breech	~10–15%	One or both hips extended; a foot or knee lies lowest — highest cord-prolapse risk

- **Abdominal (Leopold) examination:** fundal grip feels a soft, broad, irregular mass (breech); head is felt as a hard, round, ballotable mass in one flank; fetal heart sounds are loudest above the umbilicus.

- **Vaginal examination** (if in labour): no sutures/fontanelles felt; ischial tuberosities, sacrum and anus palpable in a line (vs the triangular mouth/malar eminences of a face); finger withdrawn from the anus may be meconium-stained.
- **Ultrasonography is mandatory** to confirm presentation and type, estimate fetal weight, grade the degree of head flexion/extension (exclude a hyperextended "star-gazing" fetus), assess liquor volume and placental site, and exclude a fetal anomaly (anencephaly, hydrocephalus).
- Screen for contraindications to version and to vaginal birth: placenta praevia, oligohydramnios, ruptured membranes, uterine anomaly, growth restriction, severe pre-eclampsia.

External cephalic version (ECV) — first-line at 38 weeks if uncomplicated

Parameter	Detail
Timing	Attempted before labour once ≥37 0/7 weeks; still appropriate at 38 weeks (ACOG Practice Bulletin No. 221, 2020)
Success rate	~50–60% overall (Williams Obstetrics 26e); higher with multiparity, unengaged breech, non-anterior placenta, adequate liquor
Tocolysis	Subcutaneous **terbutaline 0.25 mg** relaxes the uterus and raises the success rate (Williams Obstetrics 26e)
Rh prophylaxis	**Anti-D immunoglobulin** given to all Rh D–negative women (risk of fetomaternal haemorrhage)
Monitoring	Non-stress test/CTG before and after; performed only where immediate emergency caesarean delivery is available
Contraindications	Placenta praevia/antepartum haemorrhage, ruptured membranes, multifetal gestation, severe pre-eclampsia, uterine malformation, major fetal anomaly, hyperextended head, non-reassuring CTG (DC Dutta's Obstetrics 9e)
If successful	Await spontaneous labour; immediate induction is discouraged (higher caesarean rate)
If failed/declined/contraindicated	Proceed to route-of-delivery decision below

Selecting the route of delivery

Because pelvic adequacy is unproven in a nullipara, clinical pelvic assessment (with CT/MR pelvimetry as adjunct, not X-ray) is mandatory in every primigravida being considered for vaginal breech birth (DC Dutta's Obstetrics 9e); nulliparity itself is a caution, not an outright contraindication, provided the criteria below are met.

Favours caesarean section	Favours a trial of vaginal breech delivery
Estimated fetal weight <2500–2800 g or >3800–4000 g	EFW within this range
Footling/incomplete breech (cord-prolapse risk up to 15%)	**Frank breech** (best fetal outcome, lowest prolapse risk)
Hyperextended fetal head	Well-flexed head
Contracted or clinically inadequate pelvis	Adequate clinical pelvimetry
No operator experienced in vaginal breech delivery, or no facility for immediate caesarean/anaesthesia/neonatal resuscitation	Experienced accoucheur, anaesthetist and neonatologist present; continuous electronic monitoring available
Patient preference for caesarean; associated complication (severe pre-eclampsia, IUGR, oligohydramnios)	Informed consent for trial of labour; uncomplicated pregnancy
Zatuchni–Andros score (parity, gestational age, estimated weight, prior breech delivery, cervical dilatation, station) **<4** — poor prognosis	Zatuchni–Andros score **≥4**

- The **Term Breech Trial** (Hannah, 2000; 2083 women, planned caesarean vs planned vaginal) showed planned caesarean lowered perinatal mortality (3/1000 vs 13/1000) and serious neonatal morbidity (1.4% vs 3.8%) — the finding that shifted global practice toward caesarean delivery for term breech.
- The **PREMODA** study (>8000 women with strict selection criteria) found no difference in corrected neonatal mortality between routes, supporting vaginal breech delivery as a reasonable option when candidates are carefully selected.
- Current guidance — **ACOG Committee Opinion No. 745 (2018)** and the **RCOG Green-top Guideline on breech presentation (2017)** — states planned caesarean modestly lowers perinatal risk versus planned vaginal breech birth, but a well-selected, well-counselled woman with a skilled team may still be offered vaginal delivery. **Induction of labour is not routinely recommended** for breech presentation.
- In practice, the overall caesarean rate for breech now ranges 80–100% in most units (DC Dutta's Obstetrics 9e).

Planned caesarean section

- Booked at **≥39 completed weeks** where possible, to avoid neonatal respiratory morbidity of early delivery, unless labour or another indication supervenes first.
- Group and cross-match blood; routine pre-operative work-up as for any caesarean delivery.

- At delivery, gentle extraction technique identical to a skilled assisted vaginal breech delivery is still required — breech extraction through the hysterotomy can cause the same fetal trauma as a vaginal delivery if rushed.
- Anti-D for Rh-negative mothers if not already given.

Vaginal breech delivery — conduct of labour (if selected)

- **First stage:** manage as normal labour; vaginal examination at onset (pelvic assessment) and immediately after membrane rupture (exclude cord prolapse); intravenous access, blood grouped and cross-matched; continuous electronic fetal monitoring; epidural analgesia preferred; cautious oxytocin augmentation only if no disproportion suspected.
- **Indications for caesarean section in labour:** arrest of labour progress, non-reassuring fetal heart rate, cord prolapse/presentation, or a complicated presentation first seen in advanced labour.
- **Second stage — assisted breech delivery** (method of choice; spontaneous delivery is not preferred; breech extraction is reserved for a second twin or emergencies):
  - Lithotomy only once the breech distends the perineum; empty the bladder; **episiotomy is essential in a primigravida** (facilitates delivery and reduces head compression).
  - **"Never pull from below, push from above"** — a "hands-off"/"hands-poised" approach until the trunk delivers to the umbilicus by maternal effort and fundal pressure alone.
  - **Extended legs:** deliver by flexion and abduction at the knee (pressure in the popliteal fossa).
  - **Arms:** if flexed, hook down each elbow once the axilla is visible; if extended/nuchal, use **Lovset's manoeuvre** — rotate the trunk (grasped over the bony pelvic girdle, thumbs on the sacrum) through 180° so the posterior shoulder, which lies below the sacral promontory, is brought anterior below the symphysis and delivered, then rotate back for the other arm.
  - **Aftercoming head** (deliver over 1–2 minutes; never rush): *Burns–Marshall* method (baby allowed to hang, suprapubic pressure, then swung in an arc); modified *__Mauriceau–Smellie–Veit__ *manoeuvre (two fingers on the malar bones for jaw flexion, other hand's fingers on the shoulders for traction); or Piper forceps** applied from below for the head in the pelvic cavity.
- **Third stage:** routine active management; oxytocin given intramuscularly after delivery of the head/body.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 26.11A–H — Mechanism of labor in breech presentation: Right Sacroanterior (RSA) (DC Dutta's Obstetrics 9e, p.381)*

High-yield exam pointers

- Frank breech is commonest in primigravidae (~70%) and is the safest type for vaginal delivery; footling carries the highest cord-prolapse risk (up to 15%).

- ECV: offer from 37 weeks, 50–60% success, terbutaline 0.25 mg SC tocolysis, anti-D if Rh-negative — never omit these two.
- Term Breech Trial numbers to write verbatim: perinatal mortality 3/1000 (planned CS) vs 13/1000 (planned vaginal); serious neonatal morbidity 1.4% vs 3.8%.
- Nulliparity = caution, not contraindication — clinical pelvic assessment is mandatory before offering vaginal breech birth in a primigravida.
- Golden rule of assisted breech delivery: "**never pull, always push from above**"; episiotomy is essential in a primigravida.
- Extended arms → Lovset's manoeuvre; aftercoming head → Burns–Marshall / Mauriceau–Smellie–Veit / Piper forceps.
- Zatuchni–Andros score ≥4 favours vaginal delivery; <4 predicts a poor outcome.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Obstetrics 9e uses older estimated-fetal-weight cut-offs (<1.5 kg or >3.5 kg) for caesarean selection in breech, while current American College of Obstetricians and Gynecologists/Royal College of Obstetricians and Gynaecologists guidance uses the wider 2500–2800 g to 3800–4000 g range quoted above — follow the current range.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; Arias' High-Risk Pregnancy & Delivery 5e; ACOG Committee Opinion No. 745 (2018); ACOG Practice Bulletin No. 221 (2020); RCOG Green-top Guideline on breech presentation (2017).

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Discuss the methods and scope of assisted reproductive techniques

Asked in: Paper IV 13-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Assisted reproductive technology (ART) denotes all procedures that involve laboratory handling of gametes or embryos outside the body — from intrauterine insemination (IUI) through in-vitro fertilisation (IVF) and its derivatives — to establish a pregnancy when natural conception has failed. It extends treatment to tubal, ovulatory, male-factor, unexplained and genetic causes of infertility, and to fertility preservation and third-party reproduction.

Principal steps of an ART (IVF) cycle

- **Pituitary down-regulation** — GnRH agonist (long-luteal protocol from day 21 of the preceding cycle) or GnRH antagonist (cetrorelix/ganirelix, added once the lead follicle reaches ~14 mm)

prevents a premature LH surge; in the short "flare" protocol, leuprolide acetate 1.0 mg/day (cycle day 2–4) is stepped down to 0.5 mg/day once stimulation begins.

- **Controlled ovarian stimulation (COS)** — started once down-regulated (estradiol < 40 pg/mL, no follicle > 10 mm) using exogenous gonadotropins (urinary/recombinant FSH, human menopausal gonadotropin) ± clomiphene citrate; dose individualised to ovarian reserve.
- **Monitoring** — serial transvaginal sonography and serum estradiol from day 8; an 8–9 mm trilaminar endometrium is optimal.
- **Ovulation trigger** — hCG 5,000–10,000 IU IM (or recombinant hCG 250 mcg) once ≥ 2 follicles reach 17–18 mm with estradiol > 250 pg/mL/follicle; retrieval follows 36 hours later.
- **Oocyte retrieval** — transvaginal ultrasound-guided needle aspiration under intravenous sedation.
- **Fertilisation** — conventional co-incubation (IVF), ICSI, or in-vivo fertilisation after gamete/zygote transfer into the tube (GIFT/ZIFT).
- **Embryo transfer** — a soft catheter places the day-3 (6–8 blastomere) or day-5 (blastocyst) embryo transcervically near the fundus; not more than 3 embryos per cycle.
- **Luteal support** — micronized progesterone 200 mg orally/vaginally three times daily, or progesterone-in-oil 50 mg IM daily, for ~14 days ± supplemental hCG 1,500–2,500 IU.

Methods — the ART techniques

Technique	Principle	Key indication	Result
IUI (husband's/donor sperm — AIH/AID)	washed, capacitated sperm placed transcervically around ovulation, usually with superovulation	hostile cervical mucus, mild oligo-/asthenospermia, unexplained infertility, need for donor sperm	pregnancy rate 20–40% per cycle; cumulative 50–60% over 3–6 cycles
IVF-ET *(Steptoe & Edwards, 1978)*	oocyte and sperm co-incubated in vitro; embryo transferred to the uterus	tubal disease, endometriosis, unexplained infertility, failed ovulation induction, ovarian failure (donor oocyte), absent functional uterus (surrogacy), genetic risk (with PGT)	pregnancy rate 20–35% per oocyte retrieval; take-home baby rate ~15–20% per procedure

Technique	Principle	Key indication	Result
ICSI *(Van Steirteghem, 1992)*	a single sperm is micro-injected directly into the oocyte cytoplasm	severe oligospermia (< 5 million/mL), asthenospermia, teratospermia, obstructive azoospermia, antisperm antibodies, failed fertilisation on IVF	fertilisation rate 60–70%; pregnancy rate 20–40% per embryo transfer
GIFT *(Asch, 1984)*	oocytes and sperm placed laparoscopically into a patent fallopian tube; fertilisation is in vivo	unexplained infertility with normal tubes (contraindicated if tubal disease)	pregnancy rate up to 27–30%
ZIFT *(Devroey, 1986)*	day-1 zygote placed into the tube laparoscopically or trans-cervically under ultrasound	alternative to GIFT for male factor, or failed GIFT	29–30%, comparable to IVF; higher ectopic risk than IVF
Oocyte/embryo donation	donor gametes used with recipient endometrium primed by sequential estrogen then progesterone	premature ovarian failure, surgically absent ovaries, poor ovarian reserve, genetic disease	live-birth rate ~55%
Gestational (carrier) surrogacy	an embryo of the couple is transferred into a surrogate's uterus, not the intended mother's	irreparable uterine factor, prior hysterectomy, pregnancy contraindicated by maternal disease, recurrent unexplained loss	dependent on embryo quality/carrier factors
Cryopreservation (oocyte/embryo/ovarian tissue/sperm)	vitrification (preferred) or slow freezing, stored at −196 °C	surplus embryo/oocyte storage, fertility preservation before chemo-/radiotherapy	embryo survival > oocyte survival after thaw
Preimplantation genetic testing (PGT/PGD)	biopsy of polar body, blastomere, or trophectoderm before transfer	known aneuploidy risk, single-gene disorder, structural chromosomal rearrangement	avoids transfer of an affected/aneuploid embryo
In-vitro maturation (IVM)	immature oocytes retrieved and matured in culture, then fertilised (usually by ICSI)	polycystic ovarian syndrome, reducing ovarian hyperstimulation risk	lower gonadotropin requirement

Scope of ART

Infertility factor	Preferred ART method
Tubal disease, endometriosis, ovulatory dysfunction	IUI with superovulation → IVF-ET
Male factor (oligo-/astheno-/teratospermia, obstructive azoospermia)	ICSI ± surgical sperm retrieval (TESE/MESA/PESA)
Combined or unexplained infertility	IVF ± ICSI
Known genetic/chromosomal risk	IVF with PGT/PGD
Premature ovarian failure, absent/removed ovaries, repeated ART failure	Donor oocyte/embryo IVF
Absent or non-functional uterus, medical contraindication to pregnancy	Gestational surrogacy
Impending gonadotoxic chemo-/radiotherapy	Oocyte/embryo/ovarian-tissue cryopreservation

ART's scope is bounded by cost, need for a sophisticated laboratory, and its own complications — miscarriage (~18%), multiple pregnancy (~31%), ectopic/heterotopic pregnancy (~0.9%), and ovarian hyperstimulation syndrome (rare, potentially life-threatening) — though congenital malformation risk is **not** raised above the general population. In India its legal scope is now set by the **ART (Regulation) Act, 2021** and **Surrogacy (Regulation) Act, 2021**, which mandate clinic/bank registration under a National Registry and permit only altruistic surrogacy.

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 17.9 — Technique of intracytoplasmic sperm injection (ICSI) (DC Dutta's Gynaecology 7e, p.227)*

Recent advances [RA]

- **Preimplantation genetic testing for aneuploidy (PGT-A)** has moved from blastomere biopsy with FISH — abandoned after the American Society for Reproductive Medicine (ASRM) and European Society of Human Reproduction and Embryology (ESHRE) jointly advised against it when trials showed *lower* live-birth rates — to trophectoderm biopsy with next-generation sequencing (NGS)/array comparative genomic hybridisation for comprehensive chromosomal screening, now the standard platform.
- A 2017 multicentre randomised trial (34 clinics, 4 countries) found PGT-A gave **no benefit** at age 25–34 years but a significant live-birth improvement at 35–40 years (51% vs 37%) — its benefit is age/prognosis-dependent, not universal.
- **Mosaic embryos** on comprehensive screening are no longer automatically discarded: transferred (when no euploid embryo exists), they have produced healthy, villus-confirmed euploid live births, reshaping counselling.

- **Vitrification** has replaced slow-freeze cryopreservation, giving higher post-thaw survival and underpinning routine elective frozen-embryo transfer and oncofertility preservation.
- The **freeze-all** strategy is evidence-based: Chen ZJ et al. (*NEJM* 2016, PCOS) and Shi Y et al. (*NEJM* 2018, ovulatory women) showed frozen embryo transfer cuts OHSS risk with comparable or better live-birth rates than fresh transfer.
- **In-vitro maturation (IVM)** is expanding as a low-gonadotropin, OHSS-sparing option in PCOS and urgent pre-chemotherapy fertility preservation.
- **Time-lapse/AI-assisted morphokinetic selection** is being evaluated as a non-invasive adjunct for embryo selection.
- **India:** the ART (Regulation) Act, 2021 and Surrogacy (Regulation) Act, 2021 mandate clinic/bank registration under a National Registry and permit only altruistic surrogacy for a close relative of an infertile, legally married couple.

High-yield exam pointers

- Pioneers/years: Louise Brown 1978 (Steptoe & Edwards, IVF); ICSI 1992 (Van Steirteghem); GIFT 1984 (Asch); ZIFT 1986 (Devroey).
- ICSI mnemonic: severe **O**ligo-**A**stheno-**T**erato-spermia + obstructive azoospermia + failed IVF fertilisation.
- GIFT needs patent tubes; GIFT/ZIFT carry a higher ectopic-pregnancy risk than IVF.
- India: ART (Regulation) Act 2021 + Surrogacy (Regulation) Act 2021 — altruistic surrogacy only, mandatory National Registry.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> DC Dutta's Gynaecology 7e quotes internally variable IVF success figures across sections; the take-home-baby rate is used here as the exam-safe, registry-consistent number.

> **SOURCE & COVERAGE**
>
> DC Dutta's Textbook of Gynaecology 7e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Assisted Reproductive Technology (Regulation) Act, 2021 and Surrogacy (Regulation) Act, 2021 (India).

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Discuss the risk factors for complications of caesarean section and steps to reduce the complications

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Caesarean section (CS) complications are the maternal and fetal morbidities that follow abdominal delivery, arising from the operation itself, the anaesthesia, or the obstetric indication that necessitated surgery. Their likelihood is raised by identifiable **patient, labour, placental/uterine, and operative risk factors**, and a structured pre-, intra-, and postoperative care bundle significantly reduces their incidence.

Risk factors for complications of caesarean section

Category	Risk factors	Complication(s) more likely
Patient-related	Obesity (body mass index ≥30), extremes of maternal age, anaemia, poor nutrition/low socioeconomic status, diabetes/gestational diabetes mellitus, smoking, prior venous thromboembolism (VTE) or thrombophilia	Surgical site infection (SSI), wound dehiscence, VTE, anaesthetic complications
Labour/membrane-related	Prolonged labour, prolonged rupture of membranes, multiple vaginal examinations, chorioamnionitis, internal fetal monitoring, meconium-stained liquor, general anaesthesia, emergency (versus elective) surgery	Endometritis (post-CS metritis), wound infection, neonatal sepsis
Placental/uterine	Placenta praevia, placenta accreta spectrum (risk rises steeply with each prior CS, especially with coexisting praevia), polyhydramnios, macrosomia, multiple gestation, grand multiparity, prior ≥2 caesarean deliveries	Uterine atony, postpartum haemorrhage (PPH), peripartum hysterectomy
Operative/technical	Adhesions from previous abdominal/pelvic surgery, classical or T/J-shaped uterine incision, prolonged operating time, hysterotomy extension, repeat CS, surgeon inexperience	Bladder, ureteric or bowel injury; haemorrhage; scar rupture in a future pregnancy

Category	Risk factors	Complication(s) more likely
Anaesthesia-related	General anaesthesia (versus regional), difficult airway, full stomach/emergency surgery	Aspiration pneumonitis (Mendelson syndrome), hypotension, spinal headache

Steps to reduce complications

A. Preoperative

- Confirm gestational age before elective surgery; the American College of Obstetricians and Gynecologists (ACOG, 2020) advises scheduled caesarean delivery on maternal request not be performed before 39 completed weeks.
- Informed consent covering procedure, risks, and (for a scarred uterus) the option of trial of labour after caesarean.
- Enhanced-recovery-after-surgery (ERAS) fasting: stop solids ≥6 hours and allow clear liquids up to 2 hours before surgery; routine bowel preparation is not recommended.
- Aspiration prophylaxis: oral sodium citrate (Bicitra) 30 mL as a single dose plus an intravenous H2-receptor antagonist before regional or general anaesthesia.
- Hair removal only if obscuring the field, by clipping (not shaving) on the day of surgery; skin antisepsis with chlorhexidine-alcohol (preferred over povidone-iodine).
- Antibiotic prophylaxis: a single intravenous β-lactam dose within 60 minutes before skin incision — cefazolin 1 g standard, 2 g if maternal weight ≥80 kg, 3 g if ≥120 kg (Centers for Disease Control and Prevention, 2017; ACOG, 2020); penicillin-allergic patients receive clindamycin 900 mg plus an aminoglycoside 5 mg/kg. Add azithromycin 500 mg intravenously (extended-spectrum prophylaxis) for women in labour or with ruptured membranes, which lowers SSI and endometritis rates. A single 15 mg/kg dose of vancomycin is added for known methicillin-resistant Staphylococcus aureus colonisation.
- Venous thromboembolism risk assessment: pneumatic compression stockings before surgery for all women not already anticoagulated; add pharmacological prophylaxis (enoxaparin 40 mg subcutaneously once daily) when additional risk factors (obesity, prior VTE, immobility, emergency surgery) are present.
- Correct anaemia and optimise glycaemic control; treat chorioamnionitis before surgery when present.

B. Intraoperative

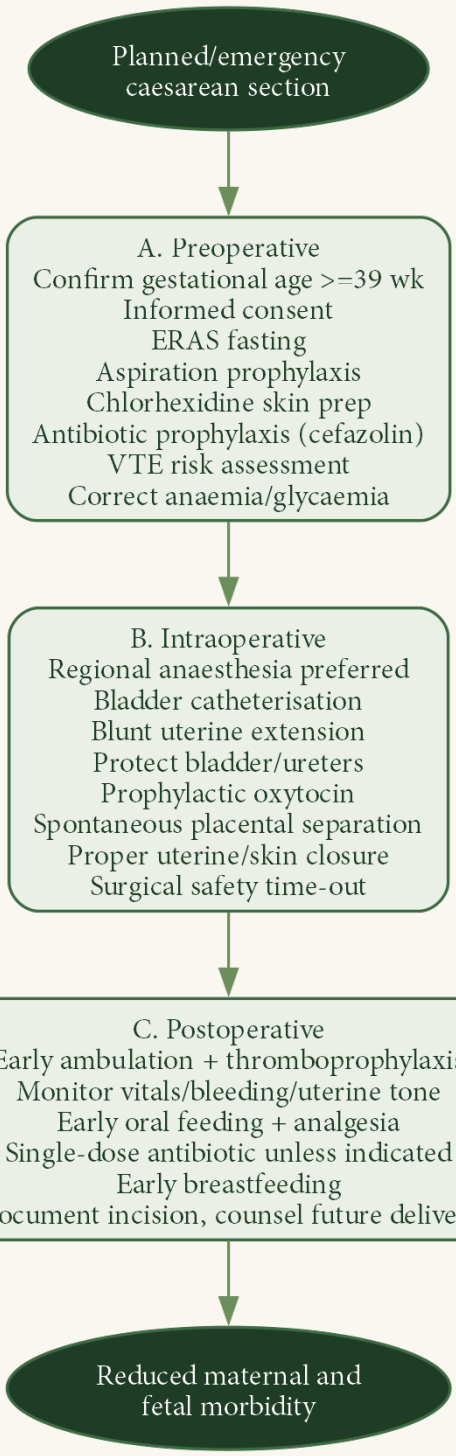
- Prefer regional over general anaesthesia where feasible to reduce aspiration risk; position with left lateral tilt to avoid aortocaval compression.
- Indwelling bladder catheterisation to keep the bladder decompressed away from the hysterotomy line.

- Blunt (finger) rather than sharp extension of the transverse lower-segment incision to limit uncontrolled lateral tears into uterine vessels.
- Careful dissection with identification/protection of the bladder and ureters, especially at repeat surgery with adhesions (ureteric orifice lies roughly 13 cm from the pelvic brim).
- Prophylactic oxytocin infusion (20 units per litre of crystalloid) begun immediately after delivery of the baby to prevent atony; misoprostol, methylergometrine, or carbetocin are alternatives.
- Allow spontaneous placental separation with controlled cord traction rather than routine manual removal — this lowers blood loss and endometritis risk.
- Close the uterine incision with one or two layers of continuous 0 or No. 1 absorbable suture; non-closure of the peritoneum is preferred (no proven benefit to closure).
- Close subcutaneous tissue if its thickness exceeds 2 cm to minimise seroma/haematoma; close skin with a subcuticular suture rather than staples (lower wound-separation rate).
- Complete instrument, sponge, and needle counts with a formal surgical "time-out" per surgical safety protocol.

C. Postoperative

- Early ambulation and leg exercises, continued mechanical ± pharmacological thromboprophylaxis until discharge/full mobilisation.
- Monitor pulse, blood pressure, vaginal bleeding, and uterine tone closely for the first 6–8 hours to detect atony/PPH early.
- Early oral feeding and stepwise diet advancement; multimodal analgesia to encourage early mobilisation.
- A single prophylactic antibiotic dose suffices for most cases; extend only if a therapeutic indication (e.g., established infection) exists.
- Early breastfeeding initiation once the mother is stable.
- Document the uterine incision type and counsel on mode of delivery and scar-rupture risk in a future pregnancy before discharge.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Flowchart: "Bundle to reduce complications of caesarean section" — Preoperative, Intraoperative, and Postoperative phases in sequence, each listing its key measures, converging on reduced maternal and fetal morbidity.

High-yield exam pointers

- Cefazolin dosing tiers: **1 g standard, 2 g if ≥80 kg, 3 g if ≥120 kg**, given within 60 minutes before incision.
- Penicillin allergy: **clindamycin 900 mg + gentamicin 5 mg/kg**; add **azithromycin 500 mg IV** if in labour/ruptured membranes.
- Prophylactic thromboprophylaxis dose: **enoxaparin 40 mg SC once daily**.
- Oxytocin for atony prevention: **20 units per litre crystalloid infusion** after delivery.
- Ureteric injury incidence **~1 in 1000** caesarean deliveries; ureter lies **~13 cm** from the pelvic brim.
- Scar rupture risk in a future pregnancy: **lower-segment 0.5–1.5%** versus **classical 4–9%** (T/J-shaped incision 2–6%).
- Overall CS-related maternal mortality **6–22 per 100,000 procedures**; leading causes — haemorrhage/shock, anaesthetic hazards, infection, thromboembolism.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Textbook editions (DC Dutta) print antibiotic and thromboprophylaxis practice patterns that are now superseded by the current CDC/ACOG weight-based cefazolin dosing and enoxaparin-based regimens cited above; the doses given here are the current standard.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; American College of Obstetricians and Gynecologists (ACOG) guidance on cesarean delivery infection prevention and venous thromboembolism prophylaxis; Centers for Disease Control and Prevention (2017) surgical site infection prevention guideline.

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Etiology and prediction of preterm labour

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Preterm labour (PTL) is labour with regular uterine contractions (at least one every 10 minutes) accompanied by progressive cervical dilatation and effacement, occurring after the period of viability but before completion of 37 weeks (<259 days) of gestation, counted from the first day of the last menstrual period. The lower limit of viability is not uniform — 20 weeks in developed countries, 28

weeks in many developing countries including India. Preterm birth complicates 10–15% of pregnancies and is the single largest contributor to perinatal mortality and morbidity.

Etiology

In about 50% of cases no cause is found; the remainder is multifactorial. Diverse antecedents funnel into a few overlapping final pathways — intrauterine infection/inflammation, uterine overdistension, decidual haemorrhage, and maternal–fetal stress — that converge on premature cervical ripening and myometrial activation.

Category	Causes / risk factors
Obstetric history	Previous spontaneous preterm birth or mid-trimester loss (**strongest single predictor**, ~30–35% recurrence risk); pregnancy after assisted reproductive technique (ART); recurrent induced abortion/dilatation and evacuation; short inter-pregnancy interval
Cervical insufficiency	Congenital — Müllerian anomaly, in-utero diethylstilbestrol exposure; acquired — cone biopsy/LLETZ (risk rises with excision depth >10 mm), trachelectomy, cervical laceration (forceps/precipitate labour); connective tissue disorders (Ehlers–Danlos, Marfan syndrome)
Uterine factors	Congenital uterine anomaly (bicornuate/septate/unicornuate), fibroid; overdistension from multiple pregnancy (~40% of twins deliver preterm) or polyhydramnios
Genital tract infection/inflammation	Bacterial vaginosis, group B streptococcus, chlamydia, mycoplasma; asymptomatic bacteriuria/recurrent urinary tract infection; ascending or subclinical chorioamnionitis — histological chorioamnionitis is found in >70% of deliveries at 20–24 weeks versus 16% at 34 weeks
Maternal pregnancy complications	Pre-eclampsia, antepartum haemorrhage (placenta praevia/abruption), preterm prelabour rupture of membranes, polyhydramnios
Maternal medical/surgical illness	Chronic hypertension, diabetes, decompensated cardiac disease, severe anaemia, low body mass index, periodontal disease, acute febrile illness (pyelonephritis, appendicitis)
Behavioural/social	Smoking, maternal stress, low socioeconomic and nutritional status

Category	Causes / risk factors
Fetal and placental	Multiple pregnancy, congenital malformation, intrauterine death; placental infarction, thrombosis, praevia or abruption
Iatrogenic	Indicated preterm delivery for maternal or fetal compromise (e.g., severe pre-eclampsia, fetal growth restriction)
Idiopathic (~50%)	No identifiable cause — presumed premature activation of the normal parturition cascade

Prediction of preterm labour

Predictor class	Parameter	Cut-off / clinical utility
Clinical	Previous spontaneous preterm birth/late miscarriage	Strongest predictor; ~30–35% recurrence
Clinical	Symptoms of threatened PTL	Regular uterine contractions with pelvic pressure, backache, watery or blood-stained vaginal discharge
Biophysical	Uterine contraction frequency	>4 contractions/hour
Biophysical	Bishop score	>4 is a favourable/predictive score
Biophysical	Transvaginal ultrasound cervical length (TVS CL)	<25 mm is the accepted cut-off (<10th percentile at 14–18 weeks); PTL is very unlikely if CL >30 mm regardless of contractions; sensitivity 60–80% and positive predictive value ~70% in women with a prior preterm birth; in twin gestation, CL <20 mm has a 100% predictive value for birth before 28 weeks
Biochemical	Fetal fibronectin (fFN), qualitative	Positive if >50 ng/mL in cervicovaginal fluid, tested between 22 and 34 weeks; positive predictive value only ~16%, but a **negative test gives <1% risk of delivery within 14 days** — its chief clinical value is ruling out imminent labour

Predictor class	Parameter	Cut-off / clinical utility
Biochemical	Quantitative fFN	Multiple thresholds (10/50/200/500 ng/mL) improve prediction over the qualitative test; combining with cervical length improves risk stratification
Biochemical	Other biomarkers	Placental alpha-microglobulin-1 (PAMG-1) — reported superior to fFN, especially in symptomatic women; phosphorylated insulin-like growth factor–binding protein-1 (phIGFBP-1); cervicovaginal interleukin-6, interleukin-8, tumour necrosis factor-alpha

- Combining a biophysical test (cervical length) with a biochemical test (fFN or PAMG-1) predicts better than either alone, particularly in symptomatic women.
- Universal cervical-length screening of low-risk asymptomatic women is **not** recommended, as screening performance is poor in that population (American College of Obstetricians and Gynecologists, 2021); targeted transvaginal cervical-length screening is instead recommended for women with a prior spontaneous preterm birth (Society for Maternal-Fetal Medicine, 2016).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 14.6 — Transvaginal ultrasound image of a foreshortened cervix with funnelling of the internal os, the key sonographic predictor of preterm labour (Williams Obstetrics 26e, p.271)*

High-yield exam pointers

- About 50% of preterm labour is **idiopathic**; the rest funnels through infection, uterine overdistension, decidual haemorrhage, or maternal–fetal stress.
- Strongest single predictor = **previous spontaneous preterm birth** (~30–35% recurrence risk).
- Biophysical predictor triad: uterine contractions **>4/hour**, Bishop score **>4**, transvaginal cervical length **<25 mm**; PTL is unlikely if cervical length **>30 mm**.
- Fetal fibronectin **>50 ng/mL** (tested 22–34 weeks) is positive; low positive predictive value (~16%) but a **negative test excludes delivery within 14 days** — used to rule out, not rule in.
- PAMG-1 outperforms fFN in symptomatic women; quantitative fFN thresholds refine risk further.
- Universal cervical-length/fFN screening is not for every low-risk woman — reserve it for those with a prior preterm birth.

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

Fetal fibronectin testing windows vary slightly between sources (DC Dutta cites 22–34 weeks in one place and 24–34 weeks in another; Arias' High-Risk Pregnancy cites 23–34 weeks) — the figure used above (>50 ng/mL, 22–34 weeks) is the value most consistently applied in current practice.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; Arias' High-Risk Pregnancy & Delivery 5e; American College of Obstetricians and Gynecologists (2021); Society for Maternal-Fetal Medicine (2016).

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Evaluate the evidence-based role of endometrial ablation and endometrial ablation as an alternative to hysterectomy

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Endometrial ablation (EA) is the surgical destruction of the endometrium, including the basal layer and cornual endometrium, to control chronic heavy menstrual bleeding (HMB) without removing the uterus. It is offered to women who have completed childbearing and have failed or cannot tolerate medical therapy, as a conservative, uterus-preserving alternative to hysterectomy.

Patient selection — indications and contraindications

	Criteria
Indications	Ovulatory or anovulatory HMB (AUB-O/AUB-E) refractory to medical therapy; family completed, no desire for future fertility; uterine cavity normal or not larger than a 10-week gestation size; no significant intracavitary pathology; woman wants to avoid a longer surgery/preserve the uterus
Absolute contraindications	Desire for future fertility; pregnancy; endometrial carcinoma or atypical hyperplasia; active pelvic infection; postmenopausal bleeding of undetermined cause

	Criteria
Relative contraindications / cautions	Submucous fibroid or polyp >3 cm (remove first or concurrently); adenomyosis (not a contraindication but higher failure/post-ablation pain); prior tubal ligation (risk of post-ablation tubal sterilisation syndrome); age <45 years at ablation (higher re-intervention rate); markedly enlarged cavity (>10–12 cm sounded length) — better suited to a resectoscopic or hydrothermal technique

Techniques

- **First-generation (resectoscopic) ablation** — done under hysteroscopic vision with a continuous-flow resectoscope: **rollerball/barrel electrode** (coagulates to ~4 mm depth), **loop resection** (transcervical resection of the endometrium, TCRE — the loop must shave the basal layer with the superficial endometrium or regeneration causes failure), **vaporising electrode**, or **Nd:YAG laser** ablation (destruction to 4–5 mm depth, producing a "therapeutic Ashermann's syndrome"). Requires greater operator skill; used when concurrent hysteroscopic myomectomy or septal resection is needed.
- **Second-generation (non-resectoscopic, "global") devices** — disposable, do not require a resectoscope, need less skill, and can often be done as an office/day-care procedure under local anaesthesia:
  - **Thermal balloon** — hot saline (~87 °C) inflated against the cavity wall for 8–10 minutes; no cervical dilatation needed; first-line, day-care basis.
  - **NovaSure (bipolar radiofrequency mesh)** — expandable bipolar mesh delivers radiofrequency energy to create a confluent lesion in ~90 seconds; contraindicated in a cavity <4 cm, active PID, or prior classical caesarean section.
  - **Microwave endometrial ablation (MEA)** — electromagnetic heat energy, 75–80 °C, ablates to ~6 mm depth in 2–3 minutes.
  - **Hydrothermal ablation (circulating hot fluid)** and **cryoablation** — other FDA-approved second-generation options; hydrothermal ablation is preferred over a purely non-hysteroscopic device when the cavity is large or irregular, since free fluid reaches the whole surface.
  - **Pretreatment:** a GnRH agonist or danazol for 3–6 weeks thins the endometrium before treatment (not required for bipolar-radiofrequency devices, which titrate to tissue impedance).

Evidence base — efficacy and outcomes

Outcome	Evidence
Bleeding reduction	Up to ~90% of women report improvement in menstrual blood loss
Amenorrhea rate	Reported range ~20–70% (Te Linde 13e); ~30–90% depending on technique and follow-up duration, with 40–50% a useful figure to counsel patients (Berek & Novak 16e)
Patient satisfaction	75–95% satisfied with the procedure at 1 year
Overall clinical success (amenorrhea + significant reduction in flow)	70–80% (DC Dutta 7e): ~30–40% amenorrhoeic, another ~50% with markedly reduced flow
Need for re-intervention	~10% require a repeat ablation or subsequent hysterectomy in shorter series; larger long-term cohorts report up to 25% undergoing hysterectomy within 2–5 years, rising further by 5 years of follow-up
Resectoscopic vs non-resectoscopic techniques	Comparable success rates and complication profiles between the gold-standard endometrial resection and the various non-resectoscopic devices (systematic evidence synthesis, Cochrane)

Endometrial ablation as an alternative to hysterectomy

- **Randomised comparative evidence** shows both approaches relieve HMB effectively and produce similar patient satisfaction in the short term, but they are **not clinically equivalent long-term substitutes**: in a randomised trial comparing endometrial ablation with hysterectomy, **29% of women assigned to ablation had crossed over to hysterectomy by 60 months**, because ablation controls bleeding without removing the source of future pathology (recurrent AUB, undiagnosed fibroid growth, adenomyosis).
- **Advantages of ablation over hysterectomy** — day-care or short-stay procedure (many second-generation devices under local anaesthesia); shorter operating time and faster return to normal activity; lower immediate morbidity (no laparotomy/vaginal surgical wound, lower blood loss, lower risk of visceral/ureteric injury); avoids surgical menopause risk from concomitant oophorectomy; more cost-effective in the short-to-medium term.
- **Advantages of hysterectomy** — a **definitive, one-time cure** for HMB with no risk of recurrent bleeding or need for re-treatment; is the appropriate choice when endometrial hyperplasia with atypia, malignancy, or large/symptomatic fibroids coexist, since ablation does not treat or reliably exclude these.

- **Contraception still required after ablation** — the endometrium is not fully and uniformly destroyed, so pregnancy (with a high complication rate if it occurs) remains possible; ablation is not a sterilisation procedure.
- **Net evidence-based position:** endometrial ablation is an effective, minimally invasive, uterus-conserving **first-line surgical option** for women who have failed medical therapy for HMB and completed childbearing, with high short-term satisfaction; but a clinically significant minority (up to a quarter to a third over several years) will eventually require hysterectomy, so the woman must be counselled that ablation reduces — but does not eliminate — the eventual likelihood of hysterectomy, and that hysterectomy remains the definitive option when structural pathology or malignancy risk coexists.

Complications

Complication	Approximate incidence
Uterine perforation	<1.3% overall; higher with resectoscopic (~1.3%) than non-resectoscopic techniques (~0.3%)
Haemorrhage (intra-/post-operative)	<3%
Haematometra (post-ablation cervical/cornual scarring trapping blood)	0.3–2.4%, higher with resectoscopic technique
Pelvic/genital infection	<2%
Fluid overload / electrolyte imbalance	With hypotonic distension media in resectoscopic procedures
Post-ablation tubal sterilisation syndrome (PATSS)	Up to 10% of women with a prior tubal ligation — cyclical pain from occult bleeding into obstructed cornual stumps
Thermal skin/vaginal burns	Reported specifically with hydrothermal ablation systems
Delayed diagnosis of endometrial cancer	A theoretical concern — ablation can mask abnormal bleeding and hinder future endometrial sampling, so hyperplasia/malignancy must be excluded before the procedure

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 26.41 — Resectoscopic endometrial ablation (REA) techniques: coagulation with a rolling ball or barrel electrode, and vaporisation or cutting-loop resection (Berek & Novak 16e, p.1500)*

High-yield exam pointers

- **First-generation = resectoscopic** (rollerball, loop/TCRE, laser); **second-generation = non-resectoscopic/global** (thermal balloon, NovaSure, microwave, hydrothermal, cryoablation) — examiners commonly ask this classification.
- Depth of endometrial destruction to remember: **4–5 mm** (roller ball/laser) sufficient to prevent regeneration (basal layer destroyed).
- Key numbers to write: overall success **70–80%**, amenorrhea **30–40%** (with a further ~50% having reduced flow), satisfaction **75–95% at 1 year**, up to **25% need hysterectomy within 2–5 years** (RCT figure: **29% by 60 months**).
- **NovaSure contraindicated**: cavity <4 cm, active PID, prior classical caesarean section.
- **Endometrial sampling mandatory before ablation** to exclude hyperplasia/carcinoma — ablation can mask, not treat, malignant bleeding.
- Ablation is **not contraception** — pregnancy after ablation carries a high complication rate.
- Pretreatment: **GnRH agonist/danazol 3–6 weeks** to thin the endometrium (not needed for bipolar-radiofrequency devices).

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

Exact amenorrhea/hysterectomy re-intervention figures vary by study and follow-up duration across sources (Te Linde 13e vs Berek & Novak 16e vs DC Dutta's Gynaecology 7e); the ranges above are quoted as reported rather than reconciled to one number. Current guideline bodies (National Institute for Health and Care Excellence, Royal College of Obstetricians and Gynaecologists) favour offering second-generation ablation over first-generation techniques where locally available, as it can be performed under local anaesthesia with shorter operating time; this is standard current practice rather than a corpus-cited figure.

SOURCE & COVERAGE

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

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Evaluation and management of Intrauterine death of fetus

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Intrauterine fetal death (IUFD)/stillbirth is death of the fetus **in utero** beyond the period of viability — conventionally a birth weight ≥500 g or gestation ≥20–22 completed weeks — occurring either before labour (antepartum, the vast majority) or during labour (intrapartum). Antepartum death usually results in delivery of a **macerated stillbirth**; death during labour delivers a **fresh stillbirth**.

Causes of IUFD

Category	Causes
Maternal (5–10%)	Hypertensive disorders (pre-eclampsia/eclampsia); diabetes mellitus; maternal infections (malaria, syphilis, toxoplasma, hepatitis, influenza); hyperpyrexia (temperature >39.4 °C); **antiphospholipid syndrome** (lupus anticoagulant, anticardiolipin antibodies → decidual vasculopathy, intervillous thrombosis); thrombophilias (factor V Leiden, protein C/S deficiency, hyperhomocysteinaemia); systemic lupus erythematosus; abnormal/obstructed labour, ruptured uterus; post-term pregnancy
Fetal (25–40%)	Chromosomal abnormalities and major structural anomalies; Rh-isoimmunisation; non-immune hydrops fetalis; fetal growth restriction
Placental (20–35%)	Placental abruption and placenta praevia (acute placental insufficiency); cord accidents (prolapse, true knot, cord round the neck); twin-to-twin transfusion syndrome; chronic uteroplacental insufficiency
Iatrogenic	Complication of external cephalic version; drug toxicity (e.g. quinine overdose)
Unexplained (25–35%)	No cause identified despite thorough clinical and laboratory evaluation

Clinical diagnosis

Symptom: Absence of fetal movements previously felt by the mother — the presenting complaint in almost all cases.

Signs:

- Retrogression of the positive breast changes of pregnancy.
- Fundal height smaller than, or static/regressing against, the period of gestation.
- Diminished uterine tone — uterus feels flaccid; Braxton-Hicks contractions no longer felt.

- No fetal movements felt on abdominal palpation.
- Fetal heart sounds absent — hand-held Doppler is more sensitive than a fetal stethoscope; cardiotocography shows a flat, non-reactive trace.
- **Egg-shell crackling** feel of the fetal head — a late sign.

Confirmatory investigations

Investigation	Findings
Real-time ultrasonography (gold standard, earliest confirmation)	Absence of fetal cardiac activity and of all fetal movement over a careful 10-minute observation period; later — oligohydramnios and collapsed/overlapping cranial bones
Plain X-ray abdomen (rarely used now)	*__Spalding sign__ — *irregular overlapping of the cranial bones from liquefying brain matter, appears ~7 days after death; hyperflexion of the fetal spine; crowding of rib shadows;* **Robert's sign*** — gas shadow in the fetal heart/great vessels, may appear as early as 12 hours
Cardiotocography	Flat trace, no baseline variability

Evaluation to determine the cause (stillbirth work-up)

Component	Details
Maternal blood	Complete blood count; ABO/Rh grouping and antibody screen; **Kleihauer-Betke test** (fetomaternal haemorrhage); random glucose/HbA1c; thyroid profile; VDRL/syphilis serology; lupus anticoagulant and anticardiolipin antibodies; thrombophilia screen only if clinically indicated
Fetal genetic testing	Chromosomal microarray analysis (preferred over conventional karyotyping — also detects abnormalities in non-dividing macerated tissue) via amniocentesis before delivery, or cord blood/placental block/fetal tissue after delivery; parental karyotype if an unbalanced translocation is found
Fetal examination	Weight, length, head circumference; whole-body and facial/profile photographs; babygram (full fetal radiograph) or postmortem MRI if parents decline a full autopsy
Autopsy	Full external and internal examination — the single most valuable test; identifies structural anomalies/dysmorphism in up to a third of stillbirths

Component	Details
Placenta, cord, membranes	Gross and histopathological examination by a perinatal pathologist — cord length/insertion/knots, infarcts, villitis, meconium staining

Management

- **Break the bad news** sensitively; explain that vaginal delivery by induction — not emergency caesarean — is the usual and safest route.
- **Expectant (non-interference) management** — appropriate with intact membranes and no infection/coagulopathy; about **80%** deliver spontaneously within 2 weeks of death; check plasma **fibrinogen twice weekly** while awaiting labour.
- **Indications for active induction** — patient/psychological preference; uterine infection; falling fibrinogen or other coagulopathy; retention beyond 2 weeks; a maternal condition (e.g. severe pre-eclampsia) that itself mandates delivery.
- **Induction regimens:**

Regimen	Dose
Mifepristone + misoprostol (recommended first-line; RCOG Green-top Guideline No. 55)	Oral mifepristone 200 mg single dose, followed 24–48 hours later by misoprostol (PGE1) 25 µg intravaginally every 4 hours
Misoprostol alone	25–50 µg vaginally (more effective than oral) or orally, repeated every 4 hours
Vaginal PGE2 gel/pessary	Placed high in the posterior fornix for an unfavourable cervix; repeat after 6–8 hours; may be supplemented with oxytocin
Oxytocin infusion	Start with 5–10 units in 500 mL Ringer's lactate IV if cervix favourable; if induction fails, escalate the next day to 20 units in 500 mL run at 30 drops/minute (~80 mU/minute)

Use misoprostol with caution and a reduced dose after one previous lower-segment caesarean section; risk of scar rupture is slightly higher with two or more prior caesarean sections.

- **Role of caesarean section** — limited; reserved for major placenta praevia, transverse lie, or two or more previous caesarean sections.
- **Anticipate and treat complications** — maintain asepsis once membranes rupture (risk of *Clostridium welchii* sepsis in retained dead tissue); check fibrinogen/PT/aPTT twice weekly if retention exceeds 2 weeks, since **silent DIC** develops in 10–20% retained beyond 4 weeks; actively manage the third stage (risk of uterine inertia and postpartum haemorrhage).
- **Anti-D immunoglobulin** to all Rh-negative, non-sensitised women.

- **Postpartum and bereavement care** — single-dose **cabergoline 1 mg** for lactation suppression (avoid in pre-eclampsia/hypertension); avoid recovery on a ward with mothers of live infants; bereavement counselling; review investigation results and discuss recurrence risk and future-pregnancy planning at the 6-week visit.
- **Subsequent pregnancy** — preconceptional counselling and correction of any identified cause; early dating scan; anomaly scan at 18–20 weeks; serial growth scans and daily kick counts from 28 weeks; antenatal surveillance from 32 weeks (or 1–2 weeks before the gestation of the prior stillbirth); planned delivery by 39 weeks absent other indications.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 22.2 — Straight X-ray of abdomen showing single fetus with marked irregular overlapping of the skull bones (Spalding sign) and hyperflexion of the spine (DC Dutta's Obstetrics 9e, p.331)*
- ☐ *Fig 35.3 — Flow chart for stillbirth evaluation: maternal history and examination → laboratory tests → fetal, placental and autopsy work-up (Williams Obstetrics 26e, p.642)*

High-yield exam pointers

- Causes to recall by category: **Maternal 5–10% · Fetal 25–40% · Placental 20–35% · Unexplained 25–35%.**
- Radiological triad on a plain film: *__Spalding sign__ *(overlapping skull bones, ~7 days), hyperflexed spine,* __Robert's sign__* (gas in fetal heart/vessels, as early as 12 hours) — largely replaced by real-time ultrasound (absent cardiac activity over 10 minutes).
- ~80% deliver spontaneously within 2 weeks of expectant management; silent **DIC** risk if retained >4 weeks (10–20%) — monitor **fibrinogen twice weekly**.
- First-line induction: **mifepristone 200 mg oral + misoprostol 25 µg vaginal 4-hourly** (RCOG Green-top 55).
- Oxytocin regimen to write: start **5–10 U/500 mL**; escalate next day to **20 U/500 mL at 30 drops/min (~80 mU/min)**.
- Chromosomal microarray > conventional karyotyping for genetic testing of macerated tissue; autopsy is the single most valuable diagnostic test.
- Cabergoline **1 mg single dose** for lactation suppression; avoid in pre-eclampsia/hypertension. Give **anti-D** if Rh-negative.

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

Definitions vary by source: DC Dutta's Obstetrics uses birth weight ≥500 g or beyond 22 weeks as the practical cut-off for IUFD, whereas the US National Vital Statistics System (cited in Williams Obstetrics 26e) classifies fetal deaths as early (<20 weeks), intermediate (20–27 weeks) and late (≥28 weeks); use the definition your examiner's syllabus follows.

SOURCE & COVERAGE

DC Dutta's Textbook of Obstetrics 9e (Chapter 22 — Intrauterine Fetal Death); Williams Obstetrics 26e (Chapter 35 — Stillbirth); Munro Kerr's Operative Obstetrics 13e (induction of labour, citing RCOG Green-top Guideline No. 55); RCOG Green-top Guideline No. 55, *Late Intrauterine Fetal Death and Stillbirth* (2010).

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FIGO staging of ovarian carcinoma, How do you manage a case of stage II B ovarian carcinoma?

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Epithelial ovarian carcinoma is staged surgically at laparotomy using the FIGO 2014 system, which applies equally to ovarian, fallopian-tube, and primary peritoneal carcinoma because most high-grade serous cancers arise from a common distal fallopian-tube precursor. **Stage IIB** denotes tumour involving one or both ovaries (or primary peritoneal cancer) with extension to pelvic intraperitoneal tissues other than the uterus or tubes — i.e., disease confined below the pelvic brim but beyond the adnexa. Management combines comprehensive surgical staging with maximal cytoreduction and platinum–taxane adjuvant chemotherapy.

FIGO staging of carcinoma ovary (FIGO 2014)

Stage	Definition
I	Tumour confined to the ovaries (or tubes)
IA	Limited to 1 ovary/tube, capsule intact, no surface tumour, negative washings
IB	Both ovaries/tubes, otherwise as IA
IC1	Surgical spill intra-operatively
IC2	Capsule rupture before surgery, or tumour on ovarian/tubal surface
IC3	Malignant cells in ascites or peritoneal washings
II	Tumour involves 1 or both ovaries with pelvic extension (below the pelvic brim) or primary peritoneal cancer
IIA	Extension and/or implants on uterus and/or fallopian tubes
IIB	**Extension to other pelvic intraperitoneal tissues**

Stage	Definition
III	Tumour involves 1/both ovaries with cytologically/histologically confirmed spread to peritoneum outside the pelvis and/or retroperitoneal lymph node metastasis
IIIA1	Positive retroperitoneal nodes only (i ≤10 mm; ii >10 mm metastasis)
IIIA2	Microscopic extrapelvic peritoneal involvement ± positive nodes
IIIB	Macroscopic extrapelvic peritoneal metastasis ≤2 cm ± positive nodes
IIIC	Macroscopic extrapelvic peritoneal metastasis >2 cm ± positive nodes (includes capsule of liver/spleen)
IV	Distant metastasis (excludes peritoneal spread)
IVA	Pleural effusion with positive cytology
IVB	Hepatic/splenic parenchymal metastasis or extra-abdominal spread (including inguinal nodes)

A tumour that would otherwise qualify as stage I but has dense adhesions with histologically proven tumour cells in the adhesions is upgraded to stage II.

Pre-operative evaluation of stage IIB disease

Step	Purpose
Serum CA-125	Baseline value and to monitor therapeutic response; >35 U/mL supports epithelial malignancy
Transvaginal sonography + contrast CT abdomen–pelvis/chest	Assess extent of disease, nodal spread, pleural effusion, resectability
Complete blood count, renal & liver function, coagulation profile	Fitness for major cytoreductive surgery and platinum-based chemotherapy
Referral to a gynaecological-oncology multidisciplinary team	All suspected ovarian malignancies should be managed by a gynaecologic oncologist
Counselling and informed consent	Explain hysterectomy, bilateral salpingo-oophorectomy, staging extent, and loss of fertility

Surgical management — comprehensive staging laparotomy with cytoreduction

- **Vertical (midline) incision** for complete exploration and to minimise tumour rupture.

- Aspirate **ascitic fluid for cytology**; if none is present, take **peritoneal washings** (100 mL saline) from the pelvis, paracolic gutters, and subdiaphragmatic space.
- **Systematic clockwise exploration** of all peritoneal and visceral surfaces — liver, bowel, omentum, diaphragm, and para-aortic region.
- **Total abdominal hysterectomy with bilateral salpingo-oophorectomy.**
- **Infracolic omentectomy.**
- **Excision of all pelvic peritoneal implants** (the extra-adnexal deposits that define stage IIB), aiming for no visible residual disease.
- **Pelvic and para-aortic lymph node dissection/sampling.**
- **Random peritoneal biopsies and diaphragmatic scrapings** even when no gross disease is seen — occult microscopic metastasis is found in 10–40% of grossly early-stage (stage I–II) disease.
- **Appendicectomy** if the histology is mucinous.
- Goal is **optimal cytoreduction** — no gross residual tumour, or at minimum residual disease <1 cm; survival improves progressively as residual tumour volume falls.

Adjuvant chemotherapy

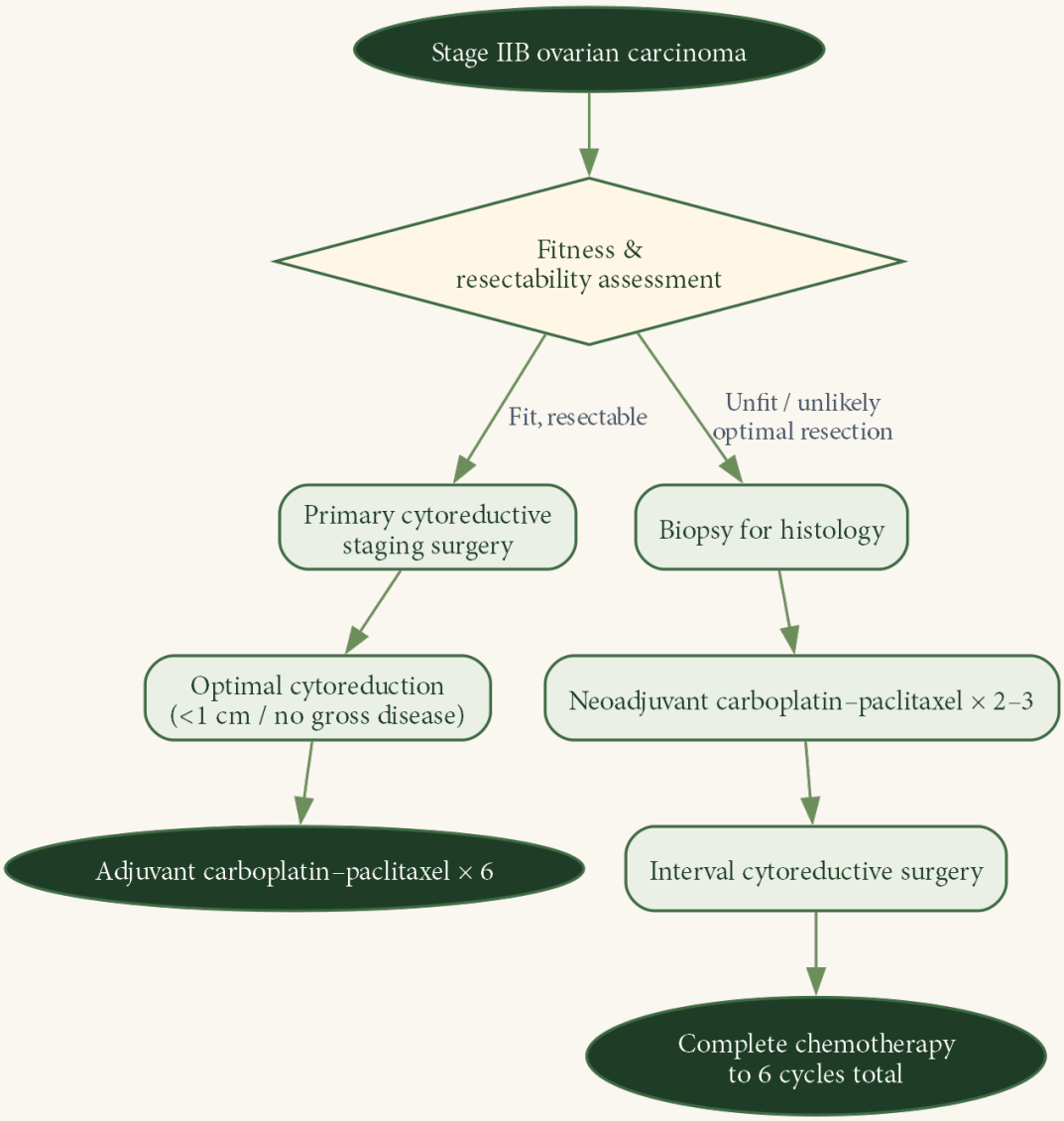
Drug	Dose	Route	Interval	Cycles
Carboplatin	AUC 5–6	IV, day 1	Every 3 weeks	6
Paclitaxel	175 mg/m^2 (over 3 hours)	IV, day 1	Every 3 weeks	6

All stage IIB patients receive adjuvant combination platinum–taxane chemotherapy (only stage IA/IB grade-1 disease is observed without chemotherapy).

Special considerations in stage IIB

- **Fertility-sparing surgery is not appropriate** — disease extends beyond the adnexa, so the uterus and contralateral ovary/tube must be removed; conservative surgery is reserved for unilateral stage IA disease in a woman desiring fertility.
- **Neoadjuvant chemotherapy with interval debulking** is an option if the patient is unfit for major surgery or optimal primary cytoreduction is unlikely (poor performance status, extensive pelvic fixation, comorbidity): 2–3 cycles of carboplatin–paclitaxel, reassessment, interval cytoreductive surgery, then completion of chemotherapy to a total of 6 cycles.
- **Germline BRCA1/2 testing and genetic counselling** should be offered to every woman with epithelial ovarian carcinoma, since nearly 40% of BRCA-associated cases have no family history.
- **Follow-up:** clinical examination and serum CA-125 every 2–4 months for 2 years, 6-monthly for the next 3 years, then annually; CT imaging if recurrence is suspected.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision-algorithm flowchart for stage IIB ovarian carcinoma management by fitness/resectability.

High-yield exam pointers

- FIGO 2014 staging is **unified** across ovarian, fallopian-tube and primary peritoneal carcinoma.
- **IIA = uterus/tubes; IIB = other pelvic tissues** — memory cue "A for Adnexa, B for Beyond the adnexa."
- **Optimal cytoreduction** = no gross residual disease, or residual <1 cm.
- Standard adjuvant regimen: **carboplatin AUC 5–6 + paclitaxel 175 mg/m² IV, every 3 weeks × 6 cycles.**

- CA-125 threshold **>35 U/mL** suggestive of epithelial ovarian malignancy; used for monitoring and follow-up.
- Occult microscopic metastasis in **10–40%** of grossly early-stage (I–II) disease justifies full staging even when disease looks confined.
- Offer **BRCA1/2 testing** to all epithelial ovarian cancer patients.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Some Indian textbook chemotherapy tables list carboplatin 400 mg/m^2 (or AUC 5) with paclitaxel 135 mg/m^2; the internationally accepted current standard, reflected in Berek & Novak's Gynecology 16e, is carboplatin dosed to AUC 5–6 with paclitaxel 175 mg/m^2 intravenously every 3 weeks for 6 cycles — use this dose in the exam.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e; FIGO Committee on Gynecologic Oncology staging for carcinoma of the ovary, fallopian tube and peritoneum (FIGO 2014).

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How do you investigate and treat a breast lump in 40 years old woman?

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — A breast lump is a discrete palpable mass distinct from the surrounding breast tissue. After the age of 40 the incidence of breast carcinoma rises sharply, so every new lump at this age must be regarded as malignant until proved otherwise, even though the differential still includes several benign conditions. Diagnosis rests on the **triple assessment** (clinical examination, imaging, pathology), and treatment is decided only after tissue diagnosis and, if malignant, staging.

Differential diagnosis

Diagnosis	Typical setting	Distinguishing feature
Fibroadenoma	Usually 20–35 yr (uncommon at 40)	Firm, smooth, mobile, painless — the "breast mouse"
Breast cyst / fibrocystic change	35–50 yr, premenopausal	Tender, fluctuates with the cycle, often bilateral/multiple
Phyllodes tumour	40–50 yr	Rapidly enlarging, may become large; leaf-like pattern on histology

Diagnosis	Typical setting	Distinguishing feature
Fat necrosis	Any age, history of trauma	Firm, may mimic malignancy, skin tethering
Duct ectasia / periductal mastitis	Perimenopausal	Subareolar mass, thick nipple discharge, nipple retraction
Breast abscess	Lactating/infective	Painful, red, tender, fluctuant, febrile
Carcinoma breast	**Risk rises steeply after 40**	Hard, irregular, fixed lump; nipple retraction; skin dimpling/peau d'orange; axillary nodes

Clinical evaluation

- **History** — duration and rate of growth of the lump, pain, nipple discharge (colour, uni-/bilateral, single or multiple ducts), skin change, menstrual/parity history, family history of breast or ovarian cancer, prior chest irradiation.
- **High-risk factors** to elicit: early menarche, late menopause, nulliparity, late first birth (>35 yr), never breastfed, obesity, combined oral contraceptive/oestrogen replacement use, atypical hyperplasia, and a family history suggesting *BRCA1/BRCA2* mutation.
- **Examination** — inspection (contour, symmetry, skin dimpling, nipple retraction/discharge, peau d'orange) with the patient's arms relaxed and then pressed on the hips to contract pectoralis major; systematic quadrant-wise palpation in upright and supine positions; and palpation of the axillary and supraclavicular nodes.

Investigations — the triple assessment

- **Clinical breast examination** (as above).
- **Imaging**
  - **Mammography** — the first-line image at 40 years (ACOG recommends starting annual/biennial mammographic screening from age 40); two views (craniocaudal + mediolateral oblique) per breast; graded by the **Breast Imaging Reporting and Data System (BI-RADS)**.
  - **Ultrasonography** — complements mammography; best test to separate a cystic from a solid mass; first choice if the woman is under 30, pregnant, or lactating.
  - **MRI** — reserved for problem-solving or a genetically high-risk breast (>20% lifetime risk).
- **Tissue diagnosis** — fine-needle aspiration cytology (FNAC, cheap, quick, false-negative rate up to 20%) has been largely replaced by **core-needle biopsy (CNB)**, which gives histology plus oestrogen/progesterone receptor and HER2 status with sensitivity >95%; open (excisional/incisional) biopsy is reserved for an inconclusive CNB.

BI-RADS category	Meaning	Action
0	Incomplete	Further imaging needed
1	Negative	Routine screening
2	Benign finding	Routine screening
3	Probably benign	Short-interval follow-up
4	Suspicious	Biopsy
5	Highly suggestive of malignancy	Biopsy
6	Biopsy-proven malignancy	Treat

If any **one** of the three components — clinical examination, imaging, or pathology — suggests malignancy, the lump is excised/biopsied regardless of the other two: a concordant benign triple carries <1% risk of cancer, a concordant malignant triple ~99%.

Staging work-up once carcinoma is confirmed

- Complete blood count, liver and renal function, chest radiograph.
- Bilateral mammography ± breast MRI; oestrogen receptor (ER), progesterone receptor (PR) and HER2/neu status on the biopsy specimen.
- CT chest/abdomen, bone scan or PET-CT — only for locally advanced, symptomatic, or high-risk disease, not for early operable cancer.
- **TNM staging (AJCC/UICC)**: T1 ≤2 cm, T2 2–5 cm, T3 >5 cm, T4 chest-wall/skin invasion or inflammatory carcinoma; N1 mobile ipsilateral axillary nodes, N2 fixed/matted axillary nodes, N3 infra-/supraclavicular or internal mammary node involvement; M0/M1 — grouped into overall Stage 0–IV, which drives the treatment plan.

Management

Benign lump

Diagnosis	Treatment
Simple cyst	Ultrasound-confirmed → needle aspiration; excise only if fluid is bloody, thick, a residual mass persists, or the cyst recurs
Fibroadenoma	Observe 6-monthly if <3 cm, imaging-benign, and patient <35 yr (risk of malignancy <0.2%); **excise** (or vacuum-assisted/cryoablation) if the patient is >35 yr (as here), the lump is enlarging, or FNAB is inconclusive

Diagnosis	Treatment
Fibrocystic disease / mastalgia	Reassurance, well-fitting brassiere, paracetamol/NSAIDs; refractory cases — **danazol 100–200 mg/day** or **tamoxifen 10 mg/day in the luteal phase**
Duct ectasia/papilloma with discharge	Microdochectomy / subareolar duct excision
Abscess	Incision and drainage + antibiotics

Malignant lump (carcinoma) — staged multimodality treatment

- **Early/operable disease (Stage I–II)**: breast-conservation surgery (wide local excision/quadrantectomy with tumour-free margins) plus whole-breast radiotherapy, **or** modified radical mastectomy when breast conservation is unsuitable (multicentric disease, large tumour-to-breast ratio, prior chest irradiation, or patient preference).
- **Axillary staging**: sentinel lymph-node biopsy if the axilla is clinically node-negative; axillary lymph-node dissection if node-positive.
- **Locally advanced disease (Stage III)**: neoadjuvant chemotherapy to downstage the tumour, followed by surgery and adjuvant therapy.
- **Adjuvant systemic therapy**, chosen by receptor profile:
  - ER/PR-positive — endocrine therapy: **tamoxifen 20 mg/day for 5–10 years** (premenopausal) or an aromatase inhibitor (postmenopausal).
  - HER2-positive — trastuzumab-based targeted therapy added to chemotherapy.
  - Triple-negative, node-positive, or high-grade disease — anthracycline–taxane-based combination chemotherapy.
- **Metastatic disease (Stage IV)**: palliative systemic therapy ± radiotherapy for symptom control; surgery reserved for toilet mastectomy or local complications.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 19.1 — Raising the arm reveals retraction of the skin of the lower outer quadrant caused by a scirrhous carcinoma (Berek & Novak 16e, p.1060)*

Also sketch the triple-assessment decision pathway as a flowchart: **Breast lump** → parallel arms **Clinical breast examination**, **Mammography/USG (BI-RADS)**, and **FNAC/core biopsy** → **all three concordant benign** (observe/reassure) versus **any one suspicious** (biopsy/excise) → **carcinoma confirmed** → **TNM stage** → branch to **BCS + radiotherapy / mastectomy ± SLNB–ALND** (Stage I–II), **neoadjuvant chemotherapy** → **surgery** (Stage III), or **palliative systemic therapy** (Stage IV).

High-yield exam pointers

- **Triple assessment** = clinical examination + imaging (mammography/USG, BI-RADS) + pathology (FNAC/core biopsy); concordant-benign triple → risk of cancer <1%.
- At **40 years, mammography** (not USG) is the first-line image; **BI-RADS 4/5 = biopsy mandatory**.
- **Core-needle biopsy > FNAC** — gives histology and receptor status; false-negative <5% vs ~20% for FNAC.
- **Any postmenopausal breast lump = carcinoma until proved otherwise.**
- **Fibroadenoma >35 years or enlarging → excise** — the age-based exception to the usual "observe" rule.
- Receptor triad **ER/PR/HER2** decides adjuvant therapy — tamoxifen/aromatase inhibitor, trastuzumab, or chemotherapy.
- **Sentinel lymph-node biopsy** has replaced routine axillary clearance in a clinically node-negative axilla.

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

DC Dutta's Textbook of Gynaecology limits itself to diagnosis of the breast lump and explicitly defers the definitive oncological treatment protocol to general-surgery texts; the TNM staging and adjuvant-therapy scheme above follow current AJCC/oncology practice since the obstetrics-and-gynaecology source texts in this corpus do not carry a full breast-cancer treatment chapter.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (Diseases of the Breast, Evaluation of a Breast Lump); Berek & Novak's Gynecology 16e (Breast Disease chapter — imaging, BI-RADS, core-needle biopsy); ACOG breast-cancer screening recommendations; AJCC/UICC TNM staging (current oncology standard). Coverage note: the OBG spine texts cover breast-lump diagnosis in depth but defer definitive carcinoma treatment to surgical-oncology texts, as stated above.

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How is brachytherapy given? Describe the complications

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Brachytherapy (Greek *brachys* = short distance) is a technique of radiotherapy in which a sealed radioactive source is placed within or close to the tumour — intracavitary (uterine tandem + vaginal ovoids/colpostats), interstitial (needles/seeds within tissue), or intraperitoneal — so that a very high dose is delivered to the tumour while normal tissue is spared by rapid fall-off of dose with distance (**inverse square law**). It is the cornerstone boost treatment for carcinoma cervix, given together with external beam radiotherapy (EBRT).

How brachytherapy is given

- **Patient preparation** — examination under anaesthesia to assess tumour extent, bladder catheterisation, vaginal packing with gauze around the applicators to push bladder and rectum away from the source and reduce their dose.
- **Applicator insertion** — under anaesthesia, a hollow **intrauterine tandem** is passed into the uterine cavity and **vaginal ovoids/colpostats** (or a ring) placed in the vaginal fornices, held in the classic **tandem-and-ovoid (Manchester)** geometry.
- **After-loading technique** — applicators are first inserted empty ("cold"); an X-ray/CT/MRI check confirms position; the radioactive source is then loaded afterwards, manually or (preferably) by a **remote-control afterloader**, which keeps staff out of the radiation field. **Fletcher-Suit** is the widely used afterloading applicator system today.
- **Radioactive sources** used: Radium-226 (historical), Caesium-137, Cobalt-60, and — in modern high-dose-rate (HDR) practice — **Iridium-192**, loaded by a robotic remote afterloader.
- **Dose-rate systems**:
  - **Low dose rate (LDR)**: ~0.4–1 Gy(40–100 cGy)/hour; requires hospital admission, prolonged immobilisation (1–3 days) and DVT prophylaxis.
  - **High dose rate (HDR)**: > 12 Gy/hour (~100 cGy/minute); delivered in a few minutes on an outpatient basis over several fractions — now the commonest modern practice.

- **Pulsed dose rate (PDR)**: Ir-192 HDR source pulsed to mimic LDR radiobiology; uncommon, needs admission.

- **Classical (2D, point-based) technique** — three historic systems are described (Table).

Technique	Source arrangement	No. of applications	Duration
Paris	Intrauterine tandem 33.3 mg; vaginal ovoids 13.3 mg × 2–3	One	~96–120 hours
Manchester (modification of Paris)	Intrauterine tandem 30–50 mg; vaginal colpostats 30–50 mg	Two	72 hours each, 1 week apart
Stockholm	Intrauterine tandem 50 mg; vaginal plaque 65–80 mg	Three	24–28 hours each, weekly

- **Dose prescription — classical 2D**: dose is specified at **Point A** (2 cm cephalad and 2 cm lateral to the external os — the crossing of uterine artery and ureter) and **Point B** (2 cm cephalad and 5 cm lateral, at the obturator lymph node). Typical doses: **Point A 7,000–8,000 cGy**, **Point B ~2,000–6,000 cGy**; bladder/rectal dose is limited to < 6,000–7,000 cGy. The remaining dose to the parametrium/nodes is made up with EBRT (about 4,000–5,000 cGy over 4–5 weeks, 1.8–2.2 Gy/fraction, 5 days/week).
- **Modern 3D image-guided adaptive brachytherapy (IGABT)** — CT/MRI is repeated with the applicator in place before each fraction; dose is prescribed volumetrically to the **high-risk clinical target volume (HR-CTV) D90** rather than to a fixed point. Cumulative dose targets are **8,500–9,500 cGy EQD2** (GEC-ESTRO) or **8,000–9,000 cGy** (American Brachytherapy Society), given as 4–5 HDR fractions added to EBRT; organ-at-risk limits (D2cc) are bladder < 90 Gy, rectum/sigmoid < 75 Gy EQD2. IGABT (per the EMBRACE studies) improves local control and halves toxicity compared with 2D planning.
- **Sequencing with EBRT**: small tumours (Stage IB < 2 cm) may receive intracavitary treatment first; bulkier tumours receive EBRT first (5 weeks) to shrink the growth and correct anatomical distortion, with brachytherapy introduced around week 4, followed by removal of applicators after each fraction.
- **Newer applicators**: combined intracavitary–interstitial devices (needles added to a tandem-and-ring/ovoid) allow adequate dosing of bulky or irregular tumours, reducing the need for morbid perineal-template techniques (Syed, MUPIT).

Complications of brachytherapy

Type	Complication	Notes/management
Immediate/procedural	Uterine perforation during tandem insertion (~9%)	Commoner in elderly patients and after prior conization; if recognised, remove an LDR tandem, observe for bleeding/peritonitis; intraoperative ultrasound guidance reduces the risk
	Fever (2–6 hours after insertion)	Usually from infected necrotic tumour; exclude perforation, give IV broad-spectrum antibiotics (cephalosporin ± aminoglycoside); if HDR, reposition and complete the short treatment, then remove applicators
Early (acute, at 2,000–3,000 cGy)	Anorexia, nausea, vomiting, lassitude, fever	Antiemetics, antihistamines
	Diarrhoea (radiation enteritis), abdominal cramps	IV fluids/electrolyte correction, antidiarrhoeals, antispasmodics
	Leukopenia, thrombocytopenia, anaemia	Haematinics, blood transfusion, G-CSF
	Cystitis, frequency, haematuria	Urinary antiseptics, analgesics
	Vulval skin reaction (moist desquamation)	Keep area dry, 1% aqueous gentian violet
Late (chronic — vasculitis/fibrosis, months–years later)	Vaginal fibrosis and stenosis, dyspareunia	Vaginal dilators, oestrogen cream; minimised with megavoltage/modern technique
	Radiation cystitis, ureteric stricture	Recurrence must be excluded (FNA/CT); stenting, ureterolysis if fibrotic
	Bowel stricture, proctosigmoiditis, rectal bleeding (radiation proctopathy)	Sucralfate enemas first line; argon plasma coagulation/laser for refractory bleeding
	Small-bowel obstruction/fistula	More common after prior abdominal surgery/adhesions; TPN, nasogastric decompression, surgery if needed

Type	Complication	Notes/management
	Fistula — vesicovaginal or rectovaginal	Overall bowel/bladder fistula rate 1.4–5.3%; rectovaginal fistula < 2%; usually appears 1–2 years after treatment; difficult to repair locally — flap repair (bulbocavernosus/omental) or diversion (colostomy/urinary diversion); colpocleisis may be an alternative
	Pathological fracture (radiation osteoporosis)	Treated as any fracture; union not impaired
	Malabsorption with megaloblastic anaemia	Folic acid
	Ovarian failure/radiation menopause	Ovarian transposition (ovariopexy) out of the radiation field can prevent this if planned before treatment
	Second malignancy (rare, long-term)	Long-term surveillance

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 31.3 — Tandem (center) and two ovoids placement for carcinoma cervix (Manchester technique) (DC Dutta's Gynaecology 7e, p.440)*

High-yield exam pointers

- **Point A** = 2 cm up + 2 cm lateral to external os (uterine artery–ureter crossing); **Point B** = 2 cm up + 5 cm lateral (obturator node) — draw this on the tandem-and-ovoid figure.
- Three classical systems: **Paris (continuous, ~96–120 h), Manchester (two applications, 72 h × 2), Stockholm (three applications, 24 h × 3, weekly)**.
- Doses to memorise: **Point A 7,000–8,000 cGy; Point B ~2,000 cGy**; modern 3D IGABT targets **HR-CTV D90 8,500–9,500 cGy EQD2**.
- **HDR (Ir-192, >12 Gy/hr, outpatient) vs LDR (Cs-137, <0.4–1 Gy/hr, inpatient)** — HDR is current standard; comparable survival/complications on Cochrane review.
- Complications mnemonic — **early**: GI/GU mucosal (nausea, diarrhoea, cystitis); **late**: **fibrosis, fistula (vesicovaginal/rectovaginal), stenosis, stricture** — the "4 F/S" of chronic radiation injury.
- Uterine **perforation ~9%** at tandem insertion — a commonly asked stand-alone complication.
- **Fistula rate 1.4–5.3%** (bowel/bladder) — quote this figure if asked for numbers.

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

Historic doses/systems (Paris, Manchester, Stockholm, radium-based Point A/B prescribing) remain examiner-favourite recall points even though current practice has largely shifted to Iridium-192 high-dose-rate, image-guided 3D adaptive brachytherapy prescribing dose to tumour volume (HR-CTV D90) rather than to fixed points, per GEC-ESTRO/American Brachytherapy Society and the EMBRACE protocols.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (brachytherapy techniques, Point A/B dosimetry, radiation reaction table); Berek & Novak's Gynecology 16e (HDR/LDR/PDR, image-guided adaptive brachytherapy, GEC-ESTRO/American Brachytherapy Society dose constraints, complication rates including uterine perforation, fistula, proctopathy).

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Hysterosalpingography

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Hysterosalpingography (HSG) is a radiographic contrast study in which a radio-opaque dye is instilled transcervically under fluoroscopic (image-intensifier) control to outline the uterine cavity and fallopian tubes. It is an outpatient, office-based procedure done without general anaesthesia, and is a first-line investigation in the infertility work-up for assessing tubal patency and uterine cavity morphology.

Indications and contraindications

Indications	Contraindications
Tubal factor infertility — assess tubal patency, and the side/site of block; follow-up after tuboplasty	Active **pelvic infection** or pelvic inflammatory disease (PID)
Detection of **uterine malformations** — unicornuate, bicornuate, septate, didelphys	Known **hydrosalpinx** (risk of flaring latent infection)
Diagnosis of **intrauterine synechiae** (Asherman's syndrome)	**Adnexal mass** suggestive of active PID
Incidental detection of **submucous fibroid, endometrial polyp, or nodular/beaded tube** (salpingitis isthmica nodosa/tuberculosis)	**Pelvic tenderness** on bimanual examination
Detection of a **translocated intrauterine device (IUD)**	**Pregnancy** (confirmed or suspected)

Indications	Contraindications
Confirmation of **tubal occlusion** after sterilisation (e.g., Essure)	**Suspected pelvic tuberculosis** in the active phase
Cervical incompetence — funnelling/widening of the internal os on a lateral view	**Abnormal (active) uterine bleeding**
Suspected **vesico-uterine fistula** (*Youssef's syndrome*) — lateral view, if history of cyclical haematuria	—

Timing, preparation and technique

- **Timing:** cycle day 6–10 — i.e., 2–5 days after cessation of menstrual bleeding and before ovulation — to avoid disturbing an early pregnancy and to minimise infection risk.
- **Antibiotic prophylaxis: doxycycline 100 mg orally twice daily**, starting 1–2 days before the procedure and continued for **5 days**; particularly indicated when tubal disease is suspected or found (risk of post-procedure salpingitis is higher, ~10%, when distal tubal block is demonstrated).
- **Analgesia:** a pre-procedure NSAID (30–60 minutes before) is usually sufficient; no anaesthesia is required.

Steps:

- Patient empties her bladder and is placed in the dorsal position with buttocks at the edge of the table; a bimanual examination is done first.
- A posterior vaginal speculum is introduced; the anterior lip of the cervix is held with an Allis/vulsellum forceps and a uterine sound passed to note the length and direction of the cavity.
- An HSG cannula (acorn cannula, cervical vacuum cup, or balloon catheter) attached to a syringe of contrast dye is fitted to the cervix; **5–10 mL** of dye is instilled slowly under fluoroscopic guidance.
- The speculum and forceps are removed, but the cannula is retained in place.
- Two radiographic films are taken — one during filling to show the uterine cavity and tubal contours, and a delayed film after 10–15 minutes to demonstrate peritoneal spillage (confirming tubal patency); additional oblique views are taken if the cavity looks abnormal or the tubes overlap.

Contrast media

Feature	Water-soluble (e.g., meglumine diatrizoate)	Oil-based (ethiodized oil)
Absorption	Rapid	Slow

Feature	Water-soluble (e.g., meglumine diatrizoate)	Oil-based (ethiodized oil)
Peritoneal irritation	Negligible	More (granuloma risk)
Risk if extravasated (intravasation)	No embolism risk	Rare oil embolism (pulmonary/cerebral)
Tubal mucosal detail	Better visualisation	Better resolution of tubal architecture but obscures fine mucosal detail
Uterine cramping	More	Less
Post-HSG fertility benefit	Comparable in older trials	**Higher live-birth rate** with combined expectant management/IUI in a large randomised trial (rate ratio 1.38, 95% CI 1.17–1.64)

Findings and interpretation

HSG appearance	Diagnosis
Symmetrical triangular cavity + bilateral peritoneal spillage	Normal uterus, bilateral tubal patency
Y-shaped cavity, two divergent upper horns	Bicornuate or septate uterus (need ultrasonography/MRI/laparoscopy to differentiate the two)
Single tubular cavity deviated to one side, one tube	Unicornuate uterus
Irregular filling defect(s), scalloped margins, or reduced/obliterated cavity	Intrauterine synechiae (Asherman's syndrome), submucous fibroid, or endometrial polyp
Beaded tube with variable filling density; intravasation of dye into venous/lymphatic channels	Genital tuberculosis (tubercular endometritis/salpingitis)
Non-filling of one or both cornua, no spillage	Cornual (proximal) tubal block — true block or "cornual spasm" (repeat HSG, or IM atropine, helps distinguish)
Dilated, retort-shaped tube retaining dye, no spillage	Hydrosalpinx / distal (fimbrial) tubal block
Widened/funnelled internal os on traction, lateral view	Cervical incompetence

Complications

Immediate	Delayed/remote
Uterine perforation and haemorrhage (from sound/cannula)	Flare-up of pelvic infection (**1–3%**)
Vasovagal attack	Acute salpingitis, especially if distal block is present (~10%) — mandates doxycycline prophylaxis
Peritoneal irritation and lower abdominal/shoulder pain	Rare hyperthyroidism from iodine absorption (oil-based media, case reports)
Intravasation of dye into venous/lymphatic channels (more marked in tubercular endometritis)	—
Rare oil embolism (pulmonary/cerebral) with oil-based contrast	—

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 17.3 — Hysterosalpingogram showing bilateral peritoneal spillage (DC Dutta's Gynaecology 7e, p.215)*

High-yield exam pointers

- One-liner: "fluoroscopic contrast study of the uterine cavity and tubes done transcervically to assess tubal patency and uterine morphology."
- Best timing to write: **cycle day 6–10** (2–5 days after menses stops), before ovulation.
- Numbers to quote: dye volume **5–10 mL**; doxycycline **100 mg BD × 5 days** starting 1–2 days before HSG; **atropine sulfate 0.6 mg IM** abolishes cornual spasm before repeating a study reported as blocked.
- Versus laparoscopy (gold standard for tubal factor): HSG sensitivity ≈94%, specificity ≈92% for tubal occlusion — **HSG and laparoscopy are complementary, never substitutes** for one another.
- HSG cannot assess peritubal adhesions, endometriosis, or ovarian pathology (needs laparoscopy); laparoscopy cannot assess the uterine cavity/tubal lumen (needs HSG/hysteroscopy).
- Contraindication mnemonic: active Pelvic infection/PID, Pregnancy, pelvic Tuberculosis (suspected), pelvic Tenderness/mass, abnormal uterine Bleeding.

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

Older teaching favoured water-soluble contrast as the safer default; a large, methodologically sound randomised trial (2017) found significantly higher live-birth rates after HSG with oil-based contrast, so current evidence supports oil-based media where available and not contraindicated.

SOURCE & COVERAGE

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

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Indications & complications of peripartum hysterectomy

Asked in: Paper II 17-Nov-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Peripartum (obstetric/caesarean) hysterectomy is removal of the uterus at the time of, or within the immediate period following, caesarean or vaginal delivery, performed as a life-saving procedure to control intractable obstetric haemorrhage or other complications when conservative measures have failed, are contraindicated, or are inappropriate for the clinical situation.

Indications

Category	Specific conditions	Notes
Uterine atony (~29% of cases)	Haemorrhage refractory to uterotonics (oxytocin, ergometrine, carboprost, misoprostol), bimanual compression, uterine tamponade (balloon), compression sutures (*B-Lynch*) and pelvic vessel ligation/embolisation	Commonest single indication historically; subtotal hysterectomy usually suffices
Abnormal placentation / placenta accreta spectrum (~38%, now the leading cause overall)	Placenta accreta, increta, percreta; morbidly adherent placenta with placenta praevia	Rising in step with rising caesarean rates; ideally a **planned** procedure, placenta left in situ
Uterine rupture (~12%)	Scar dehiscence (previous caesarean/myomectomy), obstructed labour, injudicious oxytocin/misoprostol use	Total hysterectomy usually needed if the tear extends to lower segment/cervix
Extensive genital tract lacerations	Cervical tears with extension, broad-ligament haematoma, colporrhexis	
Puerperal sepsis	Grossly infected/gangrenous uterus unresponsive to antibiotics	
Chronic/irreducible uterine inversion	Inversion not correctable by *Huntington/Haultain* manoeuvres	

Category	Specific conditions	Notes
Large uterine fibroid	Big fibroid in a parous woman causing atony/uncontrolled haemorrhage at caesarean	
Ectopic pregnancy	Cornual or cervical pregnancy with uncontrollable bleeding	

- **Risk factors:** prior caesarean delivery/deliveries (dose-response with number of scars), placenta praevia, grand multiparity, advanced maternal age, induced or augmented labour, instrumental/operative delivery, multifetal gestation.
- **Subtotal vs total:** subtotal hysterectomy is faster, causes less blood loss, and carries less risk of bladder/ureteric injury — it is preferred for atony/trauma confined to the uterine body. **Total** hysterectomy is required when the bleeding source lies in the lower segment or cervix (placenta praevia, cervical laceration, lower-segment rupture) or with a morbidly adherent placenta involving the lower segment. Roughly half to two-thirds of peripartum hysterectomies performed are total.
- **Common exam gotcha:** a *Couvelaire uterus* (uteroplacental apoplexy of severe concealed abruption) is **not, by itself,** an indication for hysterectomy — the myometrial haematoma rarely impairs uterine contractility. Hysterectomy is reserved for a Couvelaire uterus only when atony or disseminated intravascular coagulation coexists and is unresponsive to conservative measures.

Complications

Timing	Complication	Detail
Intraoperative	Massive haemorrhage	Average blood loss often exceeds 3 litres; about 90% of women need blood transfusion
Intraoperative	Bladder injury/cystotomy	Commonest urinary tract injury; risk higher with prior caesarean(s), adhesions, and morbidly adherent placenta
Intraoperative	Ureteric injury	Less common than bladder injury but carries higher medicolegal risk; occurs at the pelvic brim, during uterine artery clamping, or where the ureter enters the bladder
Intraoperative	Bowel injury	Uncommon; related to dense adhesions

Timing	Complication	Detail
Intraoperative	Need for salpingo-oophorectomy	Required in up to a quarter of cases because of large, adherent adnexal vessels
Intraoperative	Disseminated intravascular coagulation	From ongoing consumptive coagulopathy of massive haemorrhage
Postoperative	Febrile morbidity/pelvic infection	Common after prolonged surgery and blood loss
Postoperative	Pelvic haematoma/abscess	May need drainage
Postoperative	Vesicovaginal or ureterovaginal fistula	From unrecognised bladder/ureteric injury
Postoperative	Venous thromboembolism	Risk increased by prolonged surgery, immobility, and transfusion
Postoperative	ICU admission, reoperation for persistent bleeding	Reflects the severity of the underlying haemorrhage
Postoperative	Maternal mortality	2.5% in high-resource settings, up to 12% in low-resource settings
Postoperative	Loss of fertility, psychological trauma	Counselling and debriefing are advised before discharge
Postoperative	Anaesthetic/transfusion-related complications	Hypotension, transfusion reaction, transfusion-related acute lung injury, electrolyte disturbance from massive transfusion
Postoperative	Wound complications	Infection, dehiscence — related to prolonged surgery and emergency setting

- Complication rates (blood loss, transfusion, urinary tract injury) are **lower with a planned/elective** peripartum hysterectomy than with an emergency procedure — an argument for early recourse to hysterectomy once conservative measures have clearly failed, rather than repeated, ineffectual attempts that delay definitive control and risk irreversible coagulopathy.

High-yield exam pointers

- Two leading indications to name first: **placenta accreta spectrum** (~38%) and **uterine atony** (~29%); uterine rupture accounts for ~12%.
- **Blood loss >3 L, ~90% transfused** — the single most quotable fact for "complications."
- **Maternal mortality 2.5% (high-resource) to 12% (low-resource settings).**

- **Subtotal = faster/less blood loss/less bladder-ureter injury** (atony); **Total = mandatory for lower-segment/cervical bleeding source or morbidly adherent placenta.**
- Bladder injury is the commonest intraoperative complication; ureteric injury is rarer but more litigious.
- Second-consultant/multidisciplinary involvement before proceeding to hysterectomy in postpartum haemorrhage is a guideline-endorsed safety step.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> Older textbook descriptions frame this mainly as an emergency "caesarean hysterectomy" for atony; current guidance (ACOG's placenta accreta spectrum guidance and RCOG Green-top Guideline No. 52 on postpartum haemorrhage) instead emphasises antenatal identification of accreta spectrum, planned multidisciplinary total hysterectomy with the placenta left in situ, and a second consultant's involvement before proceeding to hysterectomy for haemorrhage — an approach that lowers blood loss and urinary tract injury compared with emergency surgery.

> **SOURCE & COVERAGE**
>
> Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; Munro Kerr's Operative Obstetrics 13e; Arias' Practical Guide to High-Risk Pregnancy and Delivery 5e (South Asian Perspective); guidelines: ACOG (placenta accreta spectrum), RCOG Green-top Guideline No. 52 (postpartum haemorrhage).

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Indications for operative hysteroscopy and the complications of various procedures

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Operative (therapeutic) hysteroscopy is direct endoscopic visualization of the uterine cavity, using a distension medium to separate the walls, combined with mechanical, electrosurgical, or laser instruments passed through an operating sheath to treat intracavitary pathology. It converts many

conditions that formerly required laparotomy or hysterectomy into a same-day, cavity-preserving procedure.

Indications for operative hysteroscopy

Procedure	Indication
Polypectomy	Endometrial polyp causing abnormal uterine bleeding or infertility; hysteroscopic excision is superior to blind curettage/polyp forceps (up to 68% residual polyp with blind removal)
Myomectomy	Submucous leiomyoma (ESGE/European Society of Hysteroscopy type 0 – entirely intracavitary, or type 1 – <50% intramural) causing menorrhagia or infertility; type 2 (≥50% intramural) is a relative indication, better suited to laparoscopic/open myomectomy
Synechiolysis	Lysis of intrauterine adhesions (*Asherman's syndrome*) presenting with hypomenorrhoea/amenorrhoea, infertility or recurrent pregnancy loss
Metroplasty	Resection of a uterine septum in a septate uterus presenting with infertility or recurrent miscarriage
Endometrial ablation / resection (TCRE)	Heavy menstrual bleeding refractory to medical therapy, as an alternative to hysterectomy, in women who have completed childbearing
Removal of foreign body / IUCD	Retained intrauterine device with missing threads
Tubal cannulation	Proximal tubal block (mucus plug or spasm) — catheter passed under hysteroscopic guidance up to the interstitial tube
Hysteroscopic sterilization	Tubal occlusion by destroying the interstitial tube (Nd:YAG laser/electrocoagulation) or by microinsert (Essure) — see Note
Targeted biopsy / hemostasis	Directed biopsy of suspected endometrial pathology; laser coagulation of an endometrial haemangioma/arteriovenous malformation causing resistant bleeding
Caesarean-scar (niche) repair	Resection/fulguration of a symptomatic isthmocele causing postmenstrual spotting or infertility, in women not planning further pregnancy

Complexity grading (*RCOG*, 1994): Level 1 — diagnostic hysteroscopy, simple polyp/IUCD removal; Level 2 — proximal tubal cannulation, minor synechiolysis, pedunculated fibroid/large polyp; Level 3 — septal resection, major synechiolysis, TCRE, submucous myoma resection.

Complications common to operative hysteroscopy

Complication	Key facts
Uterine perforation	Commonest operative complication (~0.76%); highest during septal resection (final cut near fundus), myomectomy and synechiolysis; sign — sudden loss of distension. Perforation by an activated laser/electrode is more dangerous (thermal bowel/bladder injury) than by scissors and mandates laparoscopy/laparotomy to exclude visceral injury
Fluid overload / dilutional hyponatraemia	Risk highest with hypo-osmolar media (**glycine 1.5%**, sorbitol 3%); absorption of ~1000 mL glycine lowers serum Na^+ by ~10 mEq/L. *ACOG* Committee on Gynecologic Practice: stop the case at a **750 mL** deficit (hypo-osmolar fluid, elderly/comorbid patient), **1000 mL** deficit (hypo-osmolar fluid, other patients), or **2500 mL** deficit (isotonic fluid, e.g. normal saline). Manage with stat serum sodium, loop diuretic (furosemide), ICU care ± hypertonic saline for severe hyponatraemia
Gas/air embolism	CO_2 used only for diagnostic work with a dedicated hysteroscopic (not laparoscopic) insufflator; air embolism from vapourized tissue during electrosurgery presents as falling end-tidal CO_2 and a "millwheel" murmur — stop the procedure immediately
Haemorrhage	Intraoperative — controlled by raising medium pressure above arterial pressure, ball/needle electrode coagulation (30–40 W); persistent bleeding — intrauterine balloon (2–5 mL, up to 10 mL), left 6–12 hours; pulsatile arterial bleeding needs embolization/hysterectomy. Delayed bleeding — endometrial slough after ablation
Infection	Uncommon (<1%); prophylactic antibiotics not routinely recommended (*ACOG*)
Cervical injury / false passage	From over-dilatation; misoprostol priming reduces stenosis-related trauma
Equipment/electrosurgical failure, anaesthetic complications	Occur in a significant minority of operative cases; checklist-based equipment verification recommended

Overall complication rate is low (0.22–0.28% across large multicentre series) but rises sharply from diagnostic (~0.13%) to operative procedures (~0.95%), with **synechiolysis carrying the highest single-procedure rate (~4.5%)**.

Complications specific to individual procedures

Procedure	Procedure-specific complication
Polypectomy	Incomplete excision/residual polyp; minor bleeding at the pedicle
Myomectomy	Perforation (highest with central/fundal or type 2 myomas), haemorrhage, prolonged fluid absorption in large resections, need for a staged "second-look" procedure for incomplete resection, delayed expulsion of a retained intramural fragment
Metroplasty (septal resection)	Highest perforation risk of all hysteroscopic procedures at the fundal septum–myometrium junction; bleeding
Synechiolysis (Asherman's)	Highest overall complication rate of any hysteroscopic procedure; perforation, re-formation of adhesions, risk of uterine rupture in a subsequent pregnancy if perforation occurred
Endometrial ablation/resection (TCRE)	Haematometra/pyometra if ablation extends to the internal os with cervical stenosis; **post-ablation tubal sterilization syndrome (PATSS)** — cyclical pain from occult bleeding into obstructed cornua, in up to 10% with prior tubal ligation; masking of endometrial cancer symptoms (progestin therapy preferred over ablation in high-risk women); treatment failure needing hysterectomy in up to 25% by 2–5 years
Tubal cannulation	Tubal perforation; rare ectopic pregnancy
Hysteroscopic sterilization	Tubal/uterine perforation, device (coil) migration into the abdomen/pelvis, persistent pelvic pain — see Note

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 15.11 — The shaving technique for the elimination of a submucosal myoma using an angulated loop electrode via the resectoscope (Te Linde 13e, p.778)*

High-yield exam pointers

- Mnemonic for indications — "**PMS-MATS**": Polyp, Myoma, Synechiae, Metroplasty, Ablation, Tubal cannulation, Sterilization.
- Fluid deficit stop-points: **750 / 1000 / 2500 mL** (hypo-osmolar–high-risk / hypo-osmolar–other / isotonic).

- Glycine 1.5%, sorbitol 3%, mannitol 5% = hypo-osmolar; normal saline = isotonic (used only with bipolar systems).
- Highest perforation risk: **septal resection** (fundal end); highest overall complication rate: **synechiolysis**.
- ESGE submucous myoma grading: **G0/G1 → hysteroscopic; G2 → laparoscopic/open** is the usual cut-off for operability.
- **PATSS** = post-ablation tubal sterilization syndrome; suspect in a woman with prior tubal ligation and new cyclical pain after ablation.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Essure (hysteroscopic tubal microinsert) is a classic textbook indication for hysteroscopic sterilization, but the manufacturer halted US sales in 2018 after reports of perforation, coil migration and persistent pain; women already fitted may retain the device, but it is no longer placed as new practice.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e; Te Linde's Operative Gynecology 13e; Berek & Novak's Gynecology 16e. Guideline reference: RCOG (levels of hysteroscopic complexity, 1994); American College of Obstetricians and Gynecologists (ACOG) Committee on Gynecologic Practice (fluid-deficit limits) and ACOG Practice Bulletin No. 800 (2020, use of hysteroscopy).

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Laparoscopic surgery- complications and prevention

Asked in: Paper IV 13-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Laparoscopic surgery is minimal-access surgery in which the peritoneal cavity is visualised through a fibreoptic telescope introduced via small abdominal-wall incisions after a pneumoperitoneum is created with carbon dioxide (CO2). Although it reduces incisional morbidity

compared with laparotomy, blind entry, gas insufflation, altered patient positioning and energy-source dissection each carry distinct, largely preventable complications.

Classification & complications

Category	Complication	Cause/mechanism	Recognition
Entry-related	Major vessel injury (aorta, vena cava, common iliac vessels), mesenteric/omental or inferior epigastric vessel injury	Blind Veress needle/trocar passage — thin patients, under-angled insertion, dense adhesions	Sudden hypotension, blood on aspiration, expanding retroperitoneal haematoma
Entry-related	Bowel injury	Veress needle or trocar traversing adherent/adjacent bowel	Faeculent aspirate at insertion; a missed injury presents as delayed peritonitis
Entry-related	Extraperitoneal insufflation	Pre-peritoneal placement of needle/trocar	Asymmetrical distension, surgical/omental emphysema, high opening pressure
Insufflation-related	Carbon dioxide gas embolism	Direct intravascular CO_2 entry through a misplaced needle or an open venous sinus	Sudden hypotension, arrhythmia, abrupt fall in end-tidal CO_2, "mill-wheel" murmur
Insufflation-related	Hypercarbia/respiratory acidosis; capnothorax/capnomediastinum	Peritoneal CO_2 absorption; gas tracking through a diaphragmatic defect	Rising end-tidal CO_2; subcutaneous emphysema; cardiorespiratory instability
Positioning/anaesthesia	Cardiac arrhythmia/bradycardia; cardiac output may fall 10–30%	Vagal stimulation from visceral traction/peritoneal stretch; raised intra-abdominal pressure reducing venous return	Bradycardia at the time of insufflation
Positioning/anaesthesia	Hypoventilation, basal atelectasis	Pneumoperitoneum plus steep Trendelenburg limiting diaphragmatic excursion	Falling oxygen saturation, raised airway pressure

Category	Complication	Cause/mechanism	Recognition
Energy-device/electrosurgical	Thermal injury to bowel, bladder or ureter	Direct contact, insulation failure, or capacitive coupling of monopolar current outside the field of view	Frequently a delayed presentation — peritonitis on day 3–5 after an apparently uneventful procedure
Procedure-specific	Tumour dissemination/upstaging	Uncontained power morcellation of an unsuspected uterine sarcoma	Occult uterine sarcoma is quoted at roughly 1 in 500–2,500 hysterectomies/myomectomies done for presumed fibroids
General surgical	Haemorrhage, port-site infection, port-site hernia, wound dehiscence	As for any surgery; hernia risk rises sharply once a fascial port defect exceeds 10 mm	Standard surgical-site signs

Mortality of diagnostic laparoscopy is quoted at about **5 per 100,000 procedures**, falling markedly with operator experience; the leading fatal causes are cardiac arrest, gas embolism and an unrecognised bowel injury. The Royal College of Obstetricians and Gynaecologists (RCOG) estimates serious entry-related complications occur in roughly **1 in 1,000** laparoscopies.

Prevention

A. Patient selection and pre-operative

- Assess for prior midline surgery, extremes of body mass, or a large pelvic mass — choose an alternative primary entry site (**Palmer's point** — left subcostal margin, midclavicular line, 3 cm below the costal margin, after gastric decompression) rather than blind umbilical entry when infra-umbilical adhesions are suspected.
- Empty the bladder with a Foley catheter; decompress the stomach if indicated, to reduce the risk of visceral puncture.
- Ensure the surgeon, assistant and theatre-nursing team are trained and credentialed in laparoscopic technique before independent practice (RCOG Green-top Guideline No. 49, 2008).
- Informed consent must include the possibility of conversion to laparotomy.

B. Safe entry technique

- Use a sharp, pre-tested Veress needle at the infra-umbilical crease, held at 45° (up to 90° in obesity), directed towards the hollow of the sacrum, with the anterior abdominal wall lifted.

- Confirm correct placement before insufflation — hanging-drop test, syringe/saline aspiration test, and an **opening pressure <8–10 mmHg**; pressure, not gas volume, is the criterion recommended for judging safe intraperitoneal placement.
- Start insufflation at a low flow rate (~1 L/min); keep intra-abdominal pressure below 20 mmHg — most insufflators auto-cut-off gas flow at 15–20 mmHg.
- Use **open (Hasson) entry** or a visualised **optical/direct-entry trocar** instead of blind Veress-needle entry when adhesions are anticipated, in previous midline-scar patients, or at extremes of body habitus.
- Place secondary/accessory ports under direct laparoscopic vision, lateral to the inferior epigastric vessels, with transillumination of the abdominal wall.

C. Intra-operative

- Inspect the entry site and adjacent viscera immediately after the primary port is placed, to exclude an occult injury before proceeding.
- Keep the active electrode of a monopolar instrument in view at all times; prefer bipolar energy near bowel/ureter/bladder; use the lowest effective power and check instrument insulation before each use.
- Positively identify the ureter before desiccating any pedicle (uterine artery, infundibulopelvic ligament).
- Extract tissue only in a containment (in-bag) system whenever malignancy cannot be reliably excluded; avoid uncontained power morcellation in peri-/postmenopausal women or when imaging/tumour markers raise suspicion.
- Ensure meticulous haemostasis and re-inspect all port sites for bleeding under direct vision before deflating the pneumoperitoneum; close the fascia of any port ≥10 mm.

D. Post-operative

- Maintain vigilance for delayed thermal bowel injury — peritonitis on day 3–5 after an initially uneventful discharge is the classic trap.
- Early mobilisation and thromboprophylaxis, since pneumoperitoneum and lithotomy positioning are risk factors for venous stasis.

> **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)*

Recent advances [RA]

- RCOG Green-top Guideline No. 49 (2008; a joint update with the British Society for Gynaecological Endoscopy is in progress) and a Cochrane review (Ahmad et al.) found no single entry technique — Veress needle, direct trocar, open/Hasson, or optical — proven superior for

preventing major vascular or visceral injury; choice should follow surgeon training and experience, with entry confirmed by pressure rather than gas volume.

- The US FDA issued a safety communication (2014) discouraging uncontained power morcellation for presumed fibroids, after data showed an occult uterine sarcoma prevalence of roughly 1 in 500–2,500 women operated for "benign fibroids"; contained in-bag electromechanical morcellation is now the advocated approach where morcellation cannot be avoided.
- Robot-assisted laparoscopy — three-dimensional vision, wristed instruments, tremor filtration — is reported to enhance surgical accuracy and dexterity and reduce complications compared with conventional laparoscopy, particularly for ureteric anastomosis, deep endometriosis excision and retroperitoneal lymphadenectomy, though absence of tactile feedback and cost remain limiting.
- Indocyanine-green fluorescence angiography is increasingly used intraoperatively for real-time ureteric and vascular identification during laparoscopic hysterectomy and endometriosis surgery, aimed at reducing unrecognised thermal or mechanical injury.
- Single-incision/reduced-port laparoscopic surgery is being explored to further lower trocar-entry injury and improve cosmesis, though comparative safety data against conventional multiport laparoscopy remain limited.

High-yield exam pointers

- Classify complications as **entry-related / insufflation-related / positioning-anaesthetic / electrosurgical / procedure-specific / general surgical** — examiners reward this framework.
- Safe Veress-needle placement checks: **hanging-drop test, syringe/saline aspiration, opening pressure <8–10 mmHg**, loss of liver dullness.
- **Palmer's point** = left subcostal margin, midclavicular line, 3 cm below the costal margin — standard alternative entry site.
- Diagnostic laparoscopy mortality ≈**5/100,000**; serious entry-related complications ≈**1/1,000** (RCOG).
- Bowel/ureteric thermal injury classically presents **late (day 3–5)**, not intraoperatively.
- FDA (2014) power-morcellation warning — occult sarcoma risk ≈**1/500–2,500** — in-bag (contained) morcellation is the prevention answer to write.
- No single laparoscopic entry method (Veress/direct trocar/open) is proven superior — Cochrane evidence.

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

Textbook (DC Dutta-style) teaching lists complications mainly by mechanism — extraperitoneal insufflation, vascular/bowel/organ injury, electrosurgical injury, gas embolism — without a separate "prevention" framework; the structured entry-technique safeguards and contained-morcellation recommendation above reflect current RCOG (Green-top 49) and US FDA guidance layered onto that base.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Te Linde's Operative Gynecology 13e; Berek & Novak's Gynecology 16e; RCOG Green-top Guideline No. 49 (2008); US FDA Safety Communication (2014).

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Management of HIV positive pregnancy

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — An HIV-positive pregnancy is one complicated by maternal infection with human immunodeficiency virus (HIV-1/HIV-2), where the central obstetric goal is prevention of mother-to-child transmission (PMTCT) through antiretroviral therapy (ART), viral suppression, planned mode of delivery and safe infant feeding. Untreated vertical transmission is 15–45%; combination ART with PMTCT measures brings this below 1–2%.

Antenatal (prepartum) management

Step	Details
Screening	Universal **opt-out** HIV testing at first antenatal visit (all pregnant women informed and tested unless they decline); repeat in the third trimester (before 36 weeks) if high-risk or in high-prevalence areas
Baseline work-up	CD4+ T-lymphocyte count; HIV RNA (**viral load**); resistance testing if RNA ≥500–1000 copies/mL; CBC, renal and liver function; screening for hepatitis B/C, syphilis, chlamydia, gonorrhoea, trichomoniasis, HSV, CMV, toxoplasmosis; baseline chest X-ray and TB testing (PPD/IGRA); dating ultrasound
Partner testing	Husband/partner offered serological testing

Step	Details
Disclose & counsel	Effect of HIV on pregnancy, perinatal transmission, drug side effects, mode of delivery, infant feeding options

Antiretroviral therapy (ART) — started as early as possible in **every** HIV-positive pregnant woman, regardless of CD4 count or viral load, using **at least 3 drugs** (never monotherapy, to limit resistance):

Scenario	Regimen
ART-naïve	Two NRTIs + a ritonavir-boosted protease inhibitor **or** an integrase inhibitor. Preferred NRTI pairs: abacavir/lamivudine, tenofovir (TDF)/emtricitabine, or TDF/lamivudine. Preferred boosted PI: atazanavir/ritonavir or darunavir/ritonavir. Preferred integrase inhibitor: **dolutegravir** or raltegravir (dolutegravir not within 2 h of iron/calcium/prenatal vitamins)
Already on ART	Continue current regimen if viral suppression is adequate and drugs are tolerated (avoid didanosine, stavudine, full-dose ritonavir)
Prior ART, not current	Resistance testing done, but ART re-started without waiting for the result
India (NACO first-line, as printed in Dutta)	Tenofovir 300 mg + Lamivudine (3TC) 300 mg + Efavirenz 600 mg once daily fixed-dose combination

Monitoring: repeat HIV RNA 2–4 weeks after starting/changing ART, then monthly until undetectable, then every 3 months, and again at 34–36 weeks to plan delivery; CD4 count at booking and every 3–6 months.

Intrapartum management

Mode of delivery is decided from the most recent viral load:

Viral load	Recommended mode	Source
>1000 copies/mL or unknown	Scheduled (elective) caesarean at **38 weeks**, before labour/ROM	ACOG 2020 / Williams
≤1000 copies/mL	Vaginal delivery permitted; caesarean not routinely indicated; await spontaneous labour, no induction for HIV alone	ACOG 2020
>50 copies/mL despite HAART	Elective caesarean at 38 weeks	RCOG Green-top 2010
<50 copies/mL on HAART	Planned vaginal delivery is an option	RCOG Green-top 2010

Viral load	Recommended mode	Source
Labour/ROM already established with high/unknown load	Individualised; caesarean preferred if still in early labour	ACOG 2020

Elective caesarean reduces vertical transmission by roughly 50% when the viral load is high.

Intravenous zidovudine (ZDV): 2 mg/kg loading dose infused over 1 hour, then 1 mg/kg/hour continuous infusion until delivery/cord clamping. Start at onset of labour for a vaginal birth, or 3–4 hours before a scheduled caesarean. May be omitted only if the woman is strictly adherent to oral ART with a documented viral load <50 copies/mL at 34–36 weeks.

Other intrapartum precautions:

- Avoid artificial rupture of membranes (amniotomy) and oxytocin augmentation where possible.
- Avoid fetal scalp electrode placement and fetal scalp pH sampling.
- Avoid instrumental (ventouse/forceps) delivery and routine episiotomy unless obstetrically indicated.
- Shorten the active phase (augmentation when genuinely needed) to reduce the duration of exposure.
- Standard precautions for staff — double gloves, gowns, eye protection, blunt-tipped needles, mechanical suction of the neonate's airway.
- For postpartum haemorrhage use **oxytocin and prostaglandin analogues**; avoid **methylergometrine/ergot alkaloids**, which interact with protease inhibitors and NNRTIs to cause severe vasoconstriction.

Postpartum and neonatal management

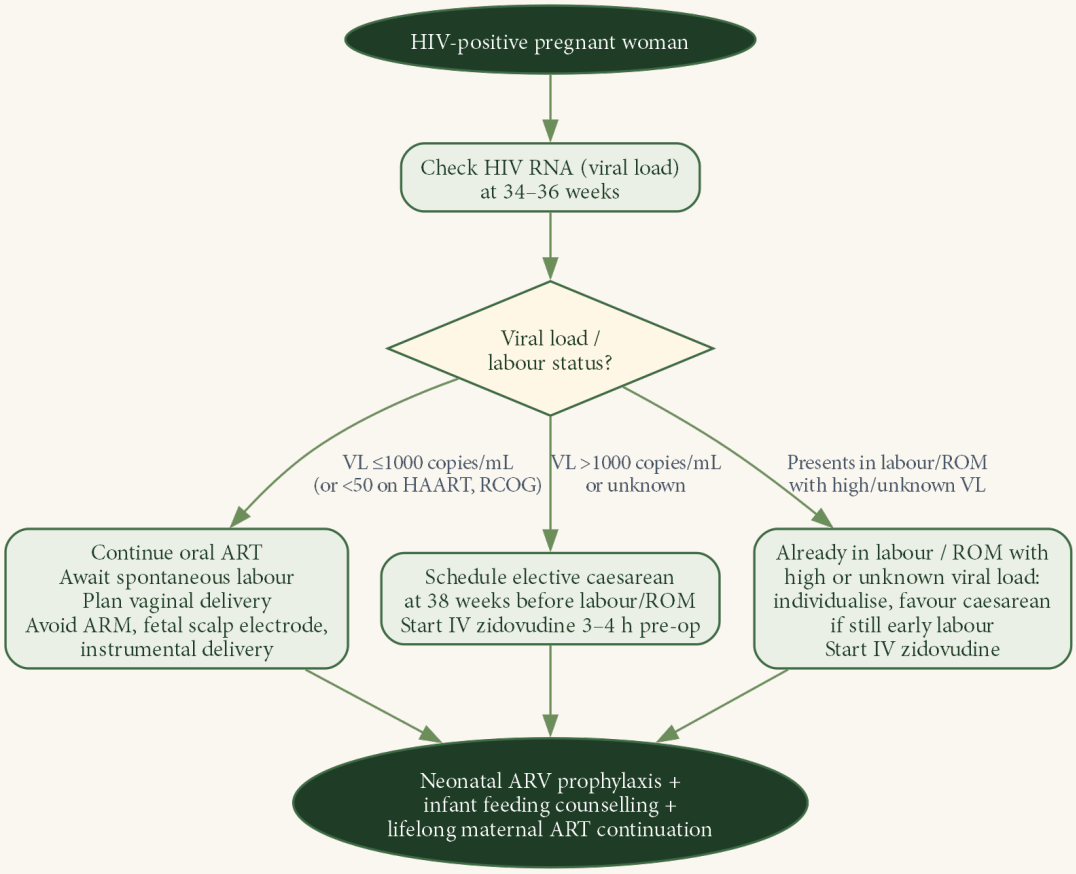
- **Mother**: continue ART lifelong (not stopped postpartum) for maternal health and to keep viral load suppressed before any future pregnancy; transition to routine adult HIV care; contraceptive counselling (barrier methods reduce transmission; combined oral contraceptives may interact with ARVs; copper IUCD/LNG-IUS are safe).
- **Infant feeding**: exclusive formula feeding is preferred where safe, feasible, affordable, sustainable and safe (AFASS) water/formula supply exists; where it does not, the WHO recommends **exclusive breastfeeding with ARV cover** (to mother or infant) for the first 6 months, since mixed feeding carries the highest transmission risk.
- **Neonatal ARV prophylaxis** (started within hours of birth, regardless of feeding choice):

Birth weight	Zidovudine syrup	Alternative: Nevirapine
>2.5 kg	15 mg twice daily for 4–6 weeks	15 mg once daily for 4–6 weeks
≤2.5 kg	10 mg twice daily for 4–6 weeks	10 mg once daily for 4–6 weeks

High-risk neonates (mother untreated/detectable load) receive combination (HAART-like) prophylaxis.

- **Infant follow-up testing**: virological testing at day 1, 6 weeks, and 12 weeks; a confirmatory HIV antibody test at **18 months** (once maternal antibody has cleared) declares the child HIV-free if negative.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision flowchart for mode-of-delivery selection and convergence on neonatal/maternal follow-up in HIV-positive pregnancy.

High-yield exam pointers

- Opt-out screening at booking; repeat third trimester if high-risk.
- ART = minimum **3 drugs**, started immediately regardless of CD4/viral load; never monotherapy.
- Intrapartum IV zidovudine: **2 mg/kg loading over 1 h, then 1 mg/kg/hr** until cord clamping.
- Delivery cut-off to remember: **viral load >1000 copies/mL (or unknown) → elective LSCS at 38 weeks**; ≤1000 (or <50 on RCOG criteria) → vaginal delivery permitted.
- Avoid amniotomy, fetal scalp electrode/pH sampling, instrumentation, and prolonged labour.

- Neonatal zidovudine syrup dosed by birth weight (>2.5 kg vs ≤2.5 kg) for 4–6 weeks; confirmatory test at 18 months.
- **Never give ergot alkaloids** (methylergometrine) for PPH in women on protease inhibitors/NNRTIs — use oxytocin/prostaglandins instead.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The efavirenz-based first-line regimen above is the one printed in DC Dutta's Obstetrics 9e (citing USDHHS 2014/NACO 2013); current WHO and NACO guidance has since moved to a dolutegravir-based first-line regimen for pregnant women, which textbook editions on this shelf have not yet updated.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; Arias' High-Risk Pregnancy & Delivery 5e. Guidelines cited: ACOG (2020); RCOG Green-top Guideline (2010); WHO PMTCT guidance; NACO (India).

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Management options in Placenta Accreta

Asked in: Paper II 09-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Placenta accreta is part of the placenta accreta spectrum (PAS), in which the trophoblast attaches directly to the myometrium because of a defective/absent decidua basalis and *Nitabuch's layer*. By depth of invasion it is graded **accreta** (villi touch myometrium), **increta** (villi invade myometrium), and **percreta** (villi penetrate the serosa and adjacent organs, usually the bladder). The commonest risk factors are placenta praevia and prior caesarean delivery, and management is dictated chiefly by antenatal diagnosis, depth/topography of invasion, and the woman's desire for future fertility.

Principles of management (preoperative planning)

- **Confirm the diagnosis antenatally** — grey-scale + colour Doppler ultrasound (loss of retroplacental clear zone, lacunae, uterovesical hypervascularity, bridging vessels); MRI reserved for posterior placenta, suspected parametrial/bladder invasion, or inconclusive ultrasound.
- **Refer to a tertiary "centre of excellence"** with a multidisciplinary team (MDT) — obstetrician/gynaecologic-oncology surgeon, anaesthetist, interventional radiologist, urologist, transfusion specialist, neonatal ICU — per **ACOG/SMFM Obstetric Care Consensus No. 7 (2018)** and **RCOG Green-top Guideline No. 27a (2018–19)**; MDT care reduces blood loss and transfusion.

- **Plan timing of delivery** — elective, unruptured membranes, before labour: **ACOG/SMFM (2018)** recommend individualised delivery, generally **34+0–35+6/37 weeks**; **RCOG Green-top 27a** recommends **35+0–36+6 weeks**.
- **Arrange resources** — cross-matched blood/blood products, cell salvage, ICU bed, consent that includes hysterectomy, and counselling on fertility-preserving options.
- Consider **preoperative ureteric catheterisation/stenting** if bladder/parametrial invasion is suspected (aids identification, not universally advocated).
- Consider **preoperative placement of intra-arterial balloon catheters** (internal iliac or infrarenal aortic) to be inflated after fetal delivery — evidence for benefit is inconsistent (ACOG 2018 gives no firm recommendation for/against).

Intraoperative surgical options

Option	What it involves	Best suited to	Key risk/limitation
Caesarean hysterectomy (gold standard)	Uterine incision away from the placenta (fundal/high posterior), deliver fetus, leave placenta *in situ*, proceed directly to hysterectomy	Anterior PAS, percreta/increta, family complete	Haemorrhage, bladder/ureteric injury, longest operating time
Leaving the placenta* in situ* (conservative)	Cord cut close to insertion, uterus closed, placenta left to resorb over weeks–months	Unanticipated PAS found intraoperatively, desire for fertility, resources for hysterectomy unavailable	≥10–20% need delayed hysterectomy for sepsis/hemorrhage; **ACOG (2018) regards this as investigational**
Triple-P procedure (Chandraharan)	*P*erioperative placental localisation → pelvic *d*evascularisation (balloon occlusion of internal iliac branches) → *p*lacental non-separation with myometrial excision and repair, without hysterectomy	Localised anterior PAS not involving the trigone	Future pregnancy not recommended; limited long-term data
One-step conservative (resection) surgery (Palacios-Jaraquemada)	En-bloc excision of the placenta with the invaded myometrium after devascularisation, then uterine repair in two layers	Focal/limited invasion, strong desire for fertility, experienced surgeon	Technically demanding; best outcome data for fertility preservation

Option	What it involves	Best suited to	Key risk/limitation
Focal excision + oversewing	For a small area of partial/focal accreta after vaginal birth or at caesarean — remove accessible placental tissue, oversew bleeding sinuses, oxytocics/intrauterine tamponade	Focal accreta, minor invasion	Hysterectomy if uterus fails to contract (preferred in multiparae)

Steps of caesarean hysterectomy for PAS

- Midline vertical laparotomy; hysterotomy (fundal/high posterior or classical) sited to **avoid the placenta**.
- Deliver the fetus; clamp and cut the cord close to its placental insertion — **do not attempt manual placental removal**.
- Close the hysterotomy; do **not** disturb the placenta further.
- **Superior devascularisation** — divide/ligate the round ligaments and utero-ovarian pedicles.
- **Bladder mobilisation** — develop a wide bladder flap, ligating the vesico-uterine neovascularity (may need the *Pelosi manoeuvre*); if the bladder is invaded, perform cystotomy under direct vision with ureteric catheters placed.
- Ligate the uterine arteries; complete hysterectomy (retrograde/subtotal technique if lower/parametrial invasion makes an anterior approach unsafe).
- Repair any cystotomy in two layers; leave a urinary catheter 7–10 days with a cystogram before removal.

Adjunctive haemostatic measures

Measure	Role	Note
Intra-arterial balloon occlusion (internal iliac/infrarenal aortic)	Reduces distal arterial pressure during dissection	Evidence for reduced blood loss is inconsistent; risk of thrombosis/limb ischaemia
Uterine/internal iliac artery embolisation	Controls ongoing haemorrhage, may avert hysterectomy	No proven benefit for prophylactic ligation
Tranexamic acid	Antifibrinolytic adjunct for obstetric haemorrhage — **1 g IV**, per the WOMAN trial dose used in current practice	Given alongside standard PPH bundle, not a substitute for surgery
Cell salvage / massive transfusion protocol	Reduces allogeneic transfusion requirement	Should be pre-arranged, not improvised

Postoperative care (if placenta left in situ)

- Prophylactic **antibiotics** (amoxicillin–clavulanic acid, or clindamycin if penicillin-allergic).
- Serial **ultrasound ± MRI** to track resorption; **serum β-hCG is not a reliable marker** once the placenta is retained.
- Counsel that **delayed hysterectomy** may still be required for secondary haemorrhage or sepsis.
- **Methotrexate or uterine artery embolisation to hasten resorption is not recommended** — evidence of benefit is lacking and both add toxicity/complication risk.
- Thromboprophylaxis once haemodynamically stable (typically from ~12 hours postoperatively).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 43.10 — Placenta accreta spectrum. A. Placenta accreta. B. Placenta increta. C. Placenta percreta (Williams Obstetrics 26e, p.775)*

High-yield exam pointers

- Three depths: **accreta / increta / percreta** — spell out each in the answer.
- Delivery timing: **ACOG/SMFM 34–37 wk (individualised)**; **RCOG 35+0–36+6 wk.**
- Gold standard = **caesarean hysterectomy with placenta left in situ**, never attempt manual removal.
- Name the fertility-sparing options: **leaving placenta in situ**, **Triple-P procedure**, **one-step conservative resection**.
- Adjuncts: balloon occlusion, embolisation, **tranexamic acid 1 g IV**.
- Conservative management = **ACOG: investigational**; ~10–20%+ eventually need delayed hysterectomy.
- No proven role for **methotrexate** or **prophylactic embolisation** in hastening resorption.

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

Older textbook chapters (e.g., DC Dutta) describe uterine artery embolisation or methotrexate as options "for conservation of the uterus," but current guidance (ACOG 2018, Munro Kerr 13e) states there is no proven benefit for either in aiding placental resorption, so the current-guideline position is followed above.

SOURCE & COVERAGE

Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; Arias' High-Risk Pregnancy & Delivery 5e; Munro Kerr's Operative Obstetrics 13e. Guidelines: ACOG/SMFM Obstetric Care Consensus No. 7 (2018) on placenta accreta spectrum; RCOG Green-top Guideline No. 27a (2018–19); FIGO consensus guidelines on PAS (Jauniaux et al., 2018).

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Megaloblastic anemia

Asked in: Paper IV 13-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Megaloblastic anemia is anemia due to impaired DNA synthesis in erythroid precursors, producing large, immature nuclei with normally-maturing cytoplasm ("nuclear-cytoplasmic asynchrony") — the **megaloblast** — in the bone marrow. It results from deficiency of **folic acid and/or vitamin B12 (cobalamin)**. In pregnancy it is **almost always due to folic acid deficiency**, because pregnancy raises folate demand nearly four-fold while true vitamin B12 deficiency remains rare (large hepatic B12 stores, only ~1 in 8500 anemic gravidas).

Aetiology

Deficiency	Causes
Folic acid	Inadequate intake (hyperemesis, poor diet, over-cooked vegetables); increased demand (multifetal gestation — 8-fold, increased maternal red cell mass); malabsorption (tropical sprue, jejunal resection); increased utilization (infection, hemolytic states, hemoglobinopathy, hookworm/peptic ulcer bleeding); failure of utilization (anticonvulsants, sulfasalazine); diminished storage (hepatic disease, vitamin C deficiency); unmasked by iron therapy alone in a previously borderline-folate patient
Vitamin B12	Strict vegetarian diet; gastritis, gastrectomy, bariatric surgery, ileal resection/bypass; Crohn disease; drugs — combined oral contraceptives, metformin, proton pump inhibitors; Addisonian pernicious anemia (autoimmune, anti-intrinsic-factor — very rare in pregnancy, onset usually >40 years); bacterial overgrowth

Daily requirement rises from 50–100 µg (folate) and 2 µg (B12) non-pregnant to **400 µg folate and 3 µg B12 in pregnancy** (Dutta; Williams concurs at 400 µg/day folate).

Clinical features

- Onset insidious, usually revealed in the **third trimester** or early puerperium.
- Anorexia, protracted vomiting; occasional diarrhoea; unexplained low-grade fever.
- **Pallor** disproportionate to visible blood loss.
- **Glossitis** and mouth ulceration (about one-third of cases).
- Haemorrhagic patches on skin/conjunctiva (thrombocytopenia).
- Hepatosplenomegaly (may be difficult to palpate over the gravid uterus).
- **Pre-eclampsia** roughly 2.5 times more frequent than background rate.

Diagnosis

Test	Finding
Haemoglobin	Usually <10 g/dL
Peripheral smear / buffy coat	**Hypersegmented neutrophils** (≥5 lobes), macrocytosis, anisocytosis, giant polymorphs, megaloblasts, Howell–Jolly bodies
Red cell indices	**MCV >100 fL**, MCH raised (>33 pg), **MCHC normal**
Counts	Associated leukopenia and thrombocytopenia
Serum/red-cell folate	Serum folate <2 ng/mL and/or red-cell folate <150 ng/mL confirms folate deficiency (red-cell folate is the better tissue index)
Serum vitamin B12	<100 pg/mL diagnostic of B12 deficiency
Homocysteine / methylmalonic acid	Raised homocysteine + normal methylmalonate → **folate** deficiency; raised methylmalonate (± raised homocysteine) → **B12** deficiency — used to differentiate when both are borderline
Bone marrow	Megaloblastic erythropoiesis (rarely needed for diagnosis)
Serum bilirubin	May be mildly raised (ineffective erythropoiesis)

Complications

Maternal	Fetal
Miscarriage, pre-eclampsia (↑2.5×)	Fetal growth restriction
Postpartum haemorrhage risk, infection	Prematurity
Failure to respond to iron alone	Abruptio placentae

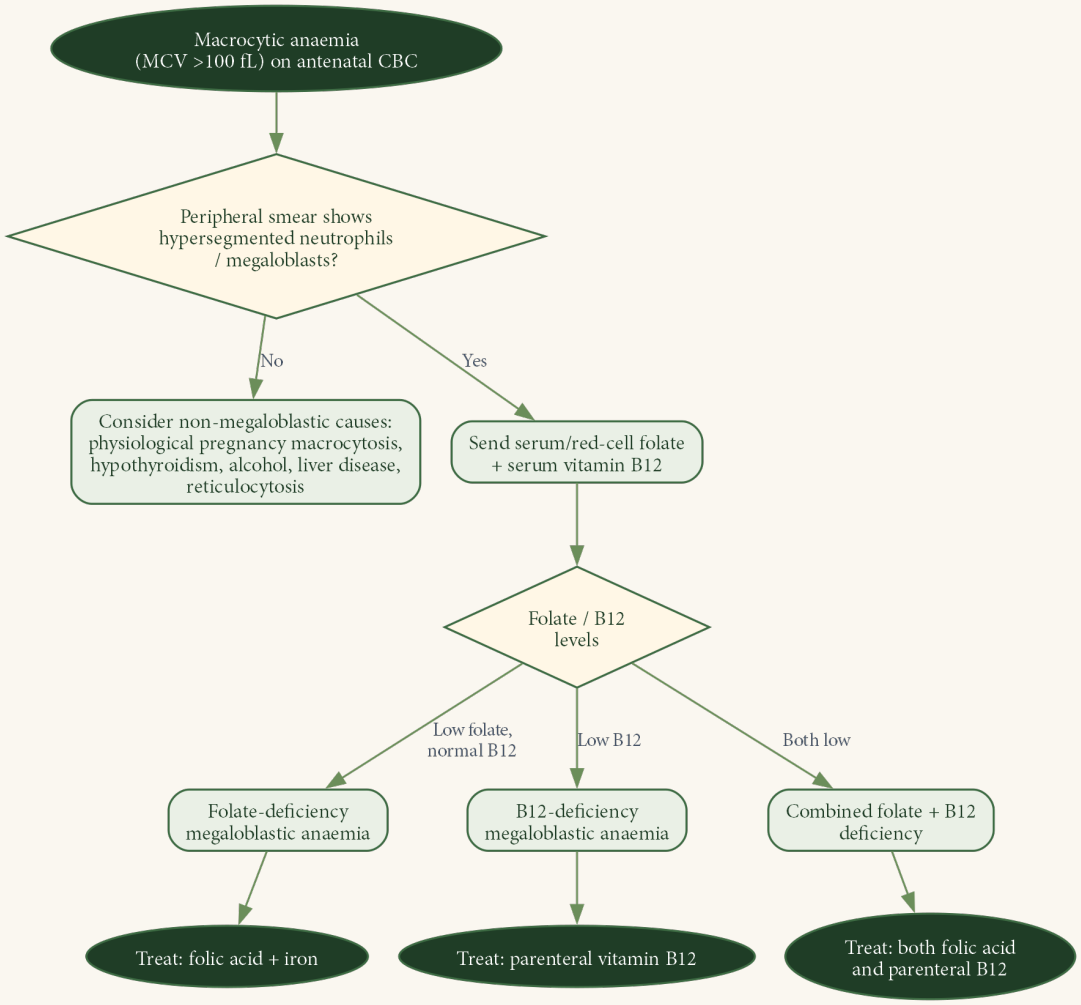
Maternal	Fetal
—	Neural tube defects, cleft lip/palate (preconceptional folate deficiency is specifically linked to neural tube defects)

The fetus and placenta preferentially extract folate from the maternal circulation, so the fetus is rarely anaemic despite severe maternal deficiency — but malformation risk (especially neural tube defects) still rises.

Management

Situation	Regimen
Prophylaxis — all pregnant women	Folic acid **400 µg (0.4 mg) orally daily**, started pre-conceptionally where possible
Prophylaxis — high-risk (multifetal pregnancy, anticonvulsant therapy, haemoglobinopathy, chronic infection, or prior neural-tube-defect pregnancy)	Folic acid **4–5 mg daily**; for a prior neural-tube-defect pregnancy, start **≥1 month pre-conception** and continue to 12 weeks
Curative — folic acid deficiency	Oral folic acid **1 mg/day with iron** typically improves the anaemia in 7–10 days (Dutta); if response is inadequate, step up to **4–5 mg/day**, continued for at least 4 weeks post-partum (Dutta 4 mg/day; Williams: 5–15 mg/day with iron). **Never give folic acid alone — always co-prescribe iron**, and exclude/cover B12 deficiency first (unopposed folate can correct the blood picture while allowing B12-deficiency neuropathy to progress)
Curative — B12 deficiency	Parenteral **cyanocobalamin 1000 µg weekly for 6 weeks, then 1000 µg intramuscularly monthly** (Arias); total gastrectomy patients need 1000 µg IM monthly for life (Williams). Dutta describes a lower alternative of 100 µg IM daily/alternate-day if response to folate alone is inadequate
Response monitoring	Reticulocyte rise by day 4–7; hypersegmentation resolves in ~2 weeks; rising Hb, leukocyte and platelet counts confirm response

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Diagnostic approach to macrocytic anaemia in pregnancy.

Recent advances [RA]

- **WHO Antenatal Care Guideline (2016)** recommends daily oral iron-folic acid supplementation (30–60 mg elemental iron + 400 µg folic acid) for all pregnant women to reduce maternal anaemia, puerperal sepsis, low birth weight, and preterm birth, extending the older iron-only model.
- **Anemia Mukt Bharat (Government of India, Ministry of Health & Family Welfare, 2018)** — the national "6x6x6" intensified strategy — mandates a daily iron-folic acid tablet (100 mg elemental iron + 500 µg folic acid) for pregnant and lactating women for 180 days, alongside biannual deworming and point-of-care haemoglobinometry at every antenatal visit.
- **Large-scale food fortification**: India's mandatory rice fortification (iron + folic acid + vitamin B12) rolled out through the Public Distribution System, ICDS and PM POSHAN aims to reduce population-level folate/B12 deficiency; mandatory folic-acid fortification of cereal grain in

several countries has independently cut neural-tube-defect prevalence by roughly a quarter to a third.

- **ACOG** guidance on anaemia in pregnancy reinforces universal haemoglobin screening at the first prenatal visit and again at 24–28 weeks, with reflex investigation of red-cell indices (macrocytosis) and folate/B12 levels when anaemia fails to respond to first-line oral iron.
- **Diagnostic refinement**: serum **holotranscobalamin** (the metabolically active B12 fraction) is increasingly used as a more sensitive early marker of true B12 deficiency than total serum B12, reducing false reassurance from a "borderline-normal" total B12 level.
- Oral high-dose B12 (1000–2000 µg/day) has been shown non-inferior to intramuscular replacement in non-pregnant cohorts; extrapolation to pregnancy is cautious but increasingly used where injectable access is limited.

High-yield exam pointers

- **400 µg (0.4 mg)** = prophylactic dose for all pregnant women; **4–5 mg** = high-risk prophylaxis/treatment dose.
- **MCV >100 fL + hypersegmented neutrophils (≥5 lobes)** = the classic peripheral-smear hallmark.
- **Never** treat with folic acid alone without covering/excluding B12 deficiency — risk of masking subacute combined degeneration.
- Folate deficiency in pregnancy is far commoner than B12 deficiency (≈1 in 8500 anaemic gravidas has true B12 deficiency).
- Reticulocyte response: **4–7 days**; parenteral B12 regimen: **1000 µg weekly ×6, then monthly**.
- Preconceptional folate deficiency → neural tube defects — the basis for periconceptional folic acid prophylaxis.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
>
> Cited doses vary slightly across standard texts (Dutta's curative folic acid 4 mg/day vs Williams' 5–15 mg/day vs Arias' 1 mg/day and 0.4 mg prophylactic/5 mg high-risk); all are textbook-accepted ranges rather than a contradiction, and current national practice (Anemia Mukt Bharat) uses 0.5 mg folic acid combined with iron for routine antenatal prophylaxis.

> **SOURCE & COVERAGE**
>
> DC Dutta's Textbook of Obstetrics 9e; Williams Obstetrics 26e; Arias' High-Risk Pregnancy & Delivery 5e; WHO Antenatal Care Guideline (2016); Anemia Mukt Bharat, Government of India (2018); ACOG anaemia-in-pregnancy guidance.

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Methotrexate – pharmacokinetics, side effects, dosage, and uses in Obstetrics and Gynecology

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Methotrexate (MTX) is a folic acid antagonist (antimetabolite) that competitively and tightly binds dihydrofolate reductase (DHFR), blocking reduction of dihydrofolate to the active tetrahydrofolate. This halts de novo purine and thymidylate (pyrimidine) synthesis, arresting DNA, RNA, and protein synthesis in rapidly dividing cells such as trophoblast. In Obstetrics and Gynaecology it is the first-line medical agent for ectopic pregnancy and a mainstay chemotherapeutic for gestational trophoblastic neoplasia (GTN); it is a potent teratogen and is contraindicated in a wanted intrauterine pregnancy.

Pharmacokinetics

Parameter	Feature
Absorption	Oral bioavailability is dose-dependent and saturable — near-complete (~90%) at low doses, falling at higher doses; intramuscular (IM) absorption is complete and bioequivalent to intravenous (IV) dosing — hence IM is the preferred route for ectopic pregnancy
Protein binding	~50% bound to plasma albumin; displaced by salicylates, sulfonamides, and phenytoin, raising free-drug toxicity
Distribution	Crosses the placenta (teratogenic); sequesters in third-space fluid (ascites, pleural effusion), which prolongs elimination and toxicity; poor cerebrospinal fluid penetration at conventional doses (high-dose or intrathecal MTX used for central nervous system disease)
Metabolism	Minimal hepatic hydroxylation to 7-hydroxymethotrexate (less soluble, can precipitate in renal tubules at high dose); intracellularly converted to polyglutamates, which are retained and prolong cytotoxic action
Excretion	Predominantly renal — glomerular filtration plus active tubular secretion, 60–90% excreted unchanged within 24 hours; a small biliary/faecal fraction undergoes enterohepatic recirculation
Half-life	Biphasic — initial ~2–4 hours, terminal ~8–10 hours at low dose; prolonged by renal impairment, third-spacing, and drugs competing for tubular secretion (non-steroidal anti-inflammatory drugs [NSAIDs], salicylates, probenecid, penicillins)

Parameter	Feature
Rescue agent	Leucovorin (folinic acid) bypasses the dihydrofolate reductase block and restores tetrahydrofolate to normal cells, limiting toxicity without reversing the antitumour effect

Side effects and toxicity

System	Effect
Gastrointestinal	Stomatitis, mucositis, nausea, diarrhoea, hepatotoxicity (transaminase elevation)
Haematological	Bone marrow suppression — leukopenia, thrombocytopenia, megaloblastic anaemia
Renal	Nephrotoxicity from tubular precipitation of the hydroxy-metabolite, worsened by dehydration or high dose
Pulmonary	Interstitial pneumonitis
Skin	Photosensitivity dermatitis — sunlight exposure must be avoided during treatment
Reproductive/fetal	Teratogenic — fetal methotrexate-aminopterin syndrome (craniosynostosis with "clover-leaf" skull, wide nasal bridge, low-set ears, limb and growth abnormalities); excreted in breast milk and accumulates in neonatal tissue
Ectopic-pregnancy series (Williams)	Separation pain in 65–75% (mild, begins day 3–5, relieved by analgesics; 20% need evaluation to exclude rupture); transient liver-enzyme rise ~12%; stomatitis ~6%; gastroenteritis ~1%; rare bone-marrow depression

Contraindications (Ob-Gyn use)

Absolute	Relative
Known/desired intrauterine pregnancy, ruptured ectopic or haemodynamic instability, breastfeeding, immunodeficiency, hepatic/renal/haematological dysfunction, active pulmonary disease, peptic ulcer disease, known MTX hypersensitivity	Ectopic mass >3.5–4 cm, embryonic cardiac activity on ultrasound, initial serum β-human chorionic gonadotropin (β-hCG) >5,000 mIU/mL (lower success)

During therapy, patients avoid folate-containing vitamins (compete for MTX binding), NSAIDs (delay renal excretion), alcohol (hepatotoxicity), sunlight (dermatitis), and intercourse (risk of rupturing the ectopic mass) (American College of Obstetricians and Gynecologists [ACOG], 2019).

Dosage in Obstetrics and Gynaecology

Indication	Regimen
Ectopic pregnancy — **single-dose** (preferred; ACOG/American Society for Reproductive Medicine [ASRM])	MTX 50 mg/m² body surface area (BSA) IM, day 1. Serum β-hCG on days 1 (baseline), 4, and 7. If fall <15% between day 4 and 7, repeat an equivalent dose (needed in ~20–25%); once ≥15% decline is achieved, weekly β-hCG until undetectable
Ectopic pregnancy — **two-dose**	MTX 50 mg/m² IM on days 0 and 4; if <15% decline, repeat the pair on days 7 and 11, checking β-hCG on days 4, 7, 11, 14
Ectopic pregnancy — **multidose**	MTX 1 mg/kg IM/IV on days 1, 3, 5, 7 alternating with leucovorin (folinic acid) 0.1 mg/kg IM on days 2, 4, 6, 8; stop once ≥15% β-hCG decline occurs between two values (up to 4 MTX doses), then weekly surveillance
GTN — **single-agent** (nonmetastatic/low-risk)	MTX 1–1.5 mg/kg IM/IV days 1, 3, 5, 7 with folinic acid 0.1–0.15 mg/kg IM days 2, 4, 6, 8; course repeated every 7 days until β-hCG undetectable, then 2–3 consolidation courses
GTN — **combination (MAC)** for higher-risk low-risk disease	Same methotrexate/folinic acid schedule plus actinomycin D 12 mg/kg IV days 1–5 and cyclophosphamide 3 mg/kg IV days 1–5, repeated every 2 weeks
GTN — **EMA-CO** (poor-prognosis/metastatic disease), MTX component	MTX 100 mg/m² IV bolus followed by 200 mg/m² IV infusion over 12 hours on day 1, with folinic acid 15 mg IM every 12 hours for 4 doses starting 24 hours after the MTX bolus; part of the alternating etoposide–actinomycin D/cyclophosphamide–vincristine cycle repeated every 1–2 weeks
Prophylactic chemotherapy after evacuation of high-risk hydatidiform mole	Methotrexate course every 14 days until β-hCG becomes negative, followed by 3 further consolidation courses (selected "at-risk" cases only)
Medical abortion (when mifepristone unavailable)	MTX 50 mg/m² IM or orally, followed by vaginal misoprostol several days later — a slower alternative to the mifepristone–misoprostol regimen

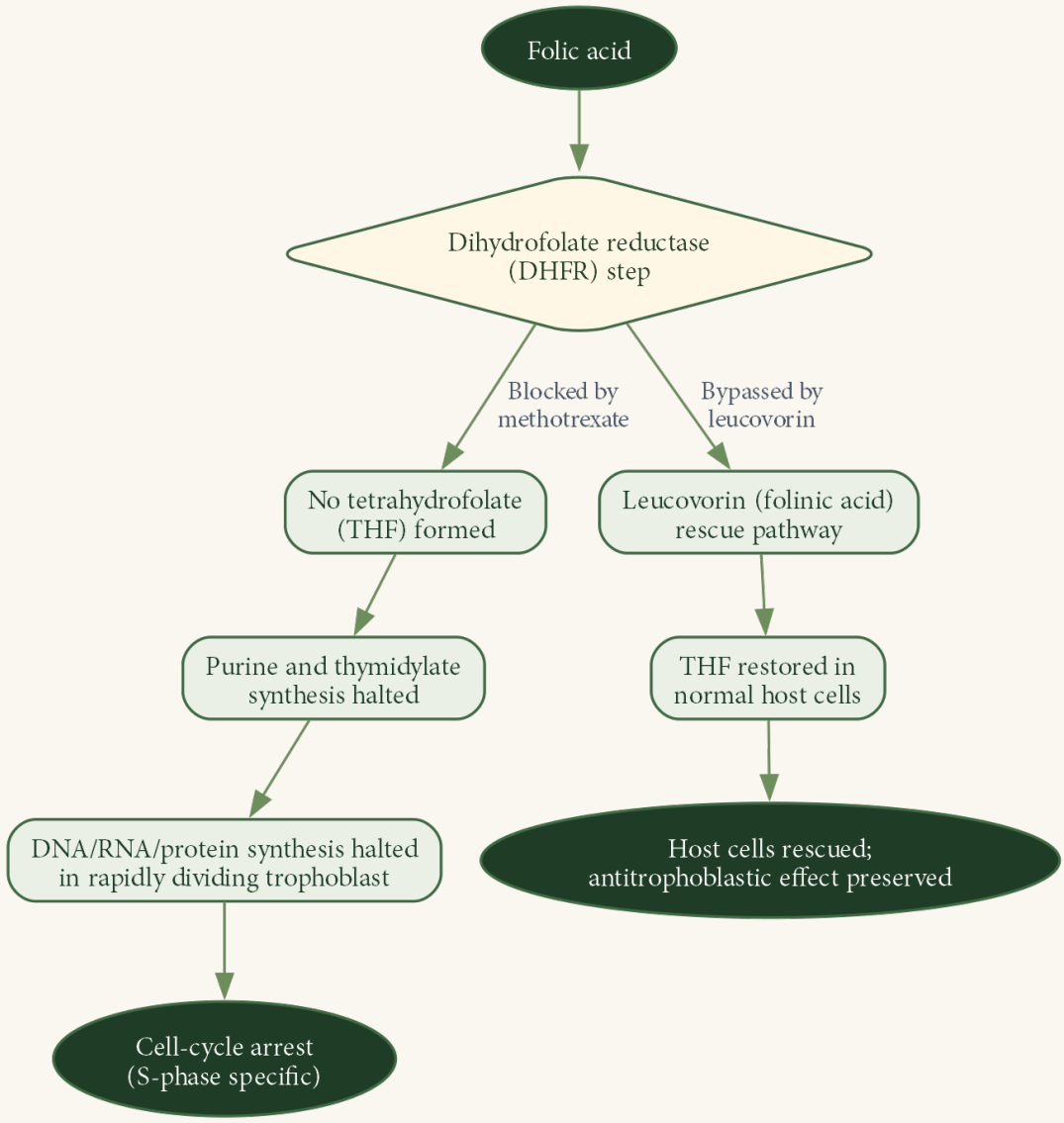
Renal function, complete blood count, and liver function tests are checked before each dose and surveillance β-hCG is never omitted, since delayed clearance sharply raises toxicity.

Uses in Obstetrics and Gynaecology

- First-line medical therapy for an unruptured, haemodynamically stable **tubal ectopic pregnancy** meeting size/β-hCG criteria; also used for non-tubal ectopics — cervical, interstitial, caesarean-scar, and abdominal pregnancy.

- Single-agent chemotherapy for **nonmetastatic/low-risk GTN** (invasive mole, low-risk choriocarcinoma).
- Component of combination regimens (MAC; EMA-CO) for higher-risk and metastatic GTN.
- **Prophylactic chemotherapy** after evacuation of a high-risk hydatidiform mole in selected "at-risk" women.
- Alternative medical **termination-of-pregnancy** regimen with misoprostol when mifepristone is unavailable.
- Adjunct treatment of residual trophoblastic tissue after conservative surgery for abdominal/interstitial pregnancy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Mechanism of methotrexate at the dihydrofolate reductase step, showing the leucovorin (folinic acid) rescue bypass.

High-yield exam pointers

- Mechanism in one line: folate antagonist → inhibits dihydrofolate reductase → blocks purine/pyrimidine synthesis → S-phase specific.
- Ectopic pregnancy first-line: **single-dose MTX 50 mg/m² IM** (ACOG/ASRM); the "day 1–4–7" rule — repeat dose if β-hCG falls <15% between day 4 and 7.
- Best prognostic factor for single-dose success: low initial β-hCG (<1,000 mIU/mL → 1.5% failure; 5,000–10,000 mIU/mL → 14.3% failure).
- Antidote/rescue = **leucovorin (folinic acid)**.

- Avoid folate vitamins, NSAIDs, alcohol, sunlight, and intercourse during treatment.
- GTN single-agent regimen: MTX 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, repeated every 7 days.
- Teratogenic syndrome name: **fetal methotrexate-aminopterin syndrome**; delay conception ≥3 months after ectopic treatment and ≥1 year after GTN chemotherapy.

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

Pharmacokinetic parameters (absorption, protein binding, half-life, renal handling) reflect standard clinical pharmacology teaching and are not separately re-derived from the obstetrics/gynaecology corpus; all obstetric/gynaecological dosing regimens above are grounded in the cited texts.

SOURCE & COVERAGE

Williams Obstetrics 26e; Berek & Novak's Gynecology 16e; DC Dutta's Textbook of Gynaecology 7e; American College of Obstetricians and Gynecologists (ACOG) criteria for medical management of ectopic pregnancy; American Society for Reproductive Medicine (ASRM) Practice Committee guidance on medical treatment of ectopic pregnancy.

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Pelvic cellular tissue and its significance

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Pelvic cellular tissue (**endopelvic fascia**) is the loose, fatty, fibro-areolar connective tissue with scattered unstriated muscle fibres that fills every available space between the pelvic peritoneum above and the pelvic floor below, surrounding the pelvic viscera, vessels, nerves and ureter. It is not one discrete structure but a continuous sheet that locally condenses into named ligaments and septa; its specific distribution around the cervix, vaginal vault and broad ligament is termed the **parametrium**.

Location and layers of pelvic fascia

Layer	Character	Key relations
Fascia on the **pelvic wall**	Tough, membranous; covers obturator internus and piriformis, attached to bone margins	Pelvic **nerves lie external** to it, **vessels lie internal** to it
Fascia on the **pelvic floor**	Loose; parietal layer runs down from the arcus tendineus (white line)	Merges with the visceral layer covering the anal canal

Layer	Character	Key relations
Fascia covering the **pelvic viscera**	Not condensed; loose areolar tissue	Allows distension of bladder, uterus and rectum — this visceral layer **is** the pelvic cellular tissue proper

Distribution — the parametrium and its condensations

- Fills the space between the pelvic peritoneum and the levator ani around the vaginal vault, the supravaginal cervix and between the two peritoneal leaves of the broad ligament — this component is specifically named the **parametrium**.
- Contains the terminal (juxtacervical) part of the **ureter**, the **uterine vessels**, the **paracervical (uterovaginal) autonomic nerve plexus**, and pelvic **lymphatics**, all embedded in loose fat and areolar tissue.
- Near the cervicovaginal junction it condenses into a circular **pericervical ring**, from which the middle-tier ligaments fan out — **Mackenrodt's (cardinal/transverse cervical)**, **uterosacral**, and **pubocervical** ligaments, plus the **rectovaginal septum**. (Full origin/insertion detail of these ligaments is covered under "Supports of the uterus"; here the condensations matter only as the anatomical basis for the significance below.)

Clinical and surgical significance

- **Mechanical support** — together with the levator ani and perineal body, the condensed cellular tissue is the principal factor holding the uterus, bladder and vagina in position; its overstretching or tearing during childbirth, or its atrophy with age, is a major cause of **pelvic organ prolapse**.
- **Protective sheath for vessels and the ureter** — the loose areolar tissue packs around the uterine and vaginal vessels and around the ureter as it runs beneath the uterine artery inside the cardinal ligament ("**water under the bridge**"). This makes the ureter vulnerable to injury during clamping of the uterine pedicle, at the infundibulopelvic ligament, and at the vaginal angle during hysterectomy.
- **Pathway for spread of pelvic infection** — because the tissue planes are continuous, infection of the pelvic cellular tissue (**parametritis**) tracks beyond the pelvis: to the **perinephric region along the ureter**, to the **buttock along the gluteal vessels**, to the **thigh along the external iliac vessels**, and to the **groin along the round ligament**. Parametritis is one limb of the pelvic inflammatory disease spectrum, producing a tender, indurated mass that pushes the uterus to the opposite side.
- **Pathway for spread of malignancy** — carcinoma of the cervix spreads directly through the parametrium into the paracervical and paravaginal tissue and may surround and compress the ureter, causing hydroureter, hydronephrosis and eventually uraemia — a recognised cause of death in advanced disease. The extent of parametrial invasion is staging-defining: **FIGO Stage**

IIB = obvious parametrial invasion; extension to the pelvic side wall and/or hydronephrosis/a non-functioning kidney = **Stage IIIB**.

- **Surgical plane in radical surgery** — in **radical (Wertheim's) hysterectomy** for cervical cancer, wide excision of the parametrium, paracolpium and periureteric tissue together with pelvic lymphadenectomy is the defining step. Extensive parametrial dissection also divides the vesical autonomic nerve fibres (S2–S4) that travel through it, which is why post-operative bladder atony/denervation is a recognised complication.
- **Change in pregnancy** — the cellular tissue undergoes marked physiological hypertrophy and oedema in pregnancy, widening the pelvic spaces to accommodate uterine growth and permitting cervical softening and effacement in labour; the same laxity, however, allows rapid spread of puerperal sepsis along identical planes.
- **Diagnostic value on bimanual/rectal examination** — the character of parametrial induration helps distinguish inflammation from malignancy: **smooth and tender** induration favours inflammatory parametritis (treat with antibiotics before reassessing), while **nodular, non-tender** induration favours malignant infiltration — an assessment best made **per rectum**.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 1.20 — Schematic diagram showing pelvic muscles, fascia and cellular tissue as seen from the front (DC Dutta's Gynaecology 7e, p.35)*

High-yield exam pointers

- Pelvic cellular tissue = **endopelvic fascia**; its distribution around the cervix/vaginal vault/broad ligament = **parametrium**.
- Parametrial contents mnemonic — **U-V-N-L**: **U**reter, **V**essels (uterine), **N**erve plexus (paracervical), **L**ymphatics.
- Condensations at the pericervical ring form the middle-tier ligaments — **Mackenrodt's, uterosacral, pubocervical** ("**MUP**").
- Four routes of spread of parametritis: **perinephric (ureter) → buttock (gluteal vessels) → thigh (external iliac vessels) → groin (round ligament)**.
- Parametrial invasion = **FIGO Stage IIB** cervical cancer; pelvic side-wall extension/hydronephrosis = **Stage IIIB**.
- "**Water under the bridge**" — the ureter passes beneath the uterine artery inside the cardinal ligament — classic site of iatrogenic ureteric injury.
- Marked **hypertrophy in pregnancy** widens the pelvic spaces for labour but also facilitates rapid puerperal sepsis spread.

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

FIGO revised cervical cancer staging in 2018 to allow imaging/pathological confirmation of nodal disease (adding Stage IIIC), but the parametrial-invasion definition of Stage IIB quoted above is unchanged from the clinical staging printed in the textbook. Full ligament origin/insertion detail is intentionally not repeated here — see the companion answer "Supports of the uterus" for that table.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e (pelvic fascia and cellular tissue, pp.17–18; parametritis, p.142; FIGO cervical cancer staging, p.282); DC Dutta's Textbook of Obstetrics 9e (Chapter 1, pp.9–12); Berek & Novak's Gynecology 16e (endopelvic fascia/parametrium, pp.223–224); Te Linde's Operative Gynecology 13e (ureter–uterine artery relation, "water under the bridge").

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Principles of tubal microsurgery

Asked in: Paper IV 13-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Tubal microsurgery is reconstructive surgery on the fallopian tube performed under optical magnification (operating microscope or loupes), using atraumatic tissue handling, fine non-reactive sutures and meticulous haemostasis, so as to restore normal tubal anatomy, luminal continuity and function with minimal tissue trauma and postoperative adhesion formation. It underlies operations for tubal-factor infertility — sterilization reversal, proximal/mid-tubal block, and mild distal (fimbrial) disease — offered as a fertility-restoring alternative or adjunct to in-vitro fertilisation (IVF).

Basic principles of microsurgical technique

Principle	How it is achieved in practice
Optical magnification	Operating microscope or surgical loupes used through dissection and suturing; anastomotic sutures are placed under ~**10× magnification** (DC Dutta 7e, Fig 17.6) so mucosal, muscular and serosal coats are identified and aligned individually
Atraumatic tissue handling	Fine, non-crushing micro-instruments; gentle traction; continuous irrigation with warm heparinised Ringer's lactate to prevent tissue desiccation

Principle	How it is achieved in practice
Meticulous haemostasis	Bleeding points controlled by fine-point (bipolar) coagulation or pin-point ligature rather than mass electrocautery — char and haematoma both provoke adhesions
Minimum exposed suture material	Fine, non-reactive, monofilament suture (**6-0 to 8-0 polyglactin/Prolene**), knots buried, minimal suture left exposed in the peritoneal cavity
Tension-free, layered anatomical approximation	Mucosa-to-mucosa, muscularis-to-muscularis, serosa-to-serosa closure; the mesosalpingeal gap is repaired first to relieve tension on the anastomotic line, and multiple interrupted sutures (not a single stitch) are used to avoid luminal malalignment
Intraluminal stenting/splinting	A temporary fine splint/stent across the anastomosis maintains correct axial orientation of the two segments during suturing; if left in situ it is withdrawn within **48 hours** to limit further mucosal damage
Adhesion prevention	Copious irrigation, avoidance of glove powder/talc, covering raw serosal surfaces, adhesion-barrier agents (Interceed/Seprafilm), and postoperative **hydrotubation** (gentamicin 80 mg + dexamethasone 4 mg in 10 mL distilled water, instilled transcervically in the post-menstrual phase)
Preservation of vascularity	Dissection kept close to the tube to preserve its blood supply running in the mesosalpinx from the uterine and ovarian vessels

Speroff 9e names the first four of these — magnification, minimal tissue trauma, minimal exposed suture, and meticulous haemostasis — as the core "basic microsurgical principles" whose adherence governs the outcome of any reconstructive tubal (or pelvic) operation.

Patient selection and preoperative workup

Favourable	Unfavourable
Age < 35 years; sterilization by **ring/clip** (not cautery)	Age > 35–40; multiple-burn cauterisation
No other infertility factor; fertile male partner	Coexisting male-factor, endometriosis, or ovulatory disorder
Isthmic–isthmic segments feasible; reconstructed tube ≥ 4 cm	Isthmic–ampullary anastomosis; tube < 4 cm; bilateral hydrosalpinx > 3 cm

Preoperative steps: counselling on permanence/success rates/IVF alternative; semen analysis of partner; hysterosalpingography (HSG) to localise the block; diagnostic laparoscopy with chromopertubation (±

falloposcopy) when the sterilization method is unknown or other pathology is suspected — fewer than 5% of tubes turn out truly irreparable.

Scope of tubal microsurgical procedures

Procedure	Indication
Adhesiolysis (salpingo-ovariolysis)	Peritubal/periovarian adhesions
Fimbrioplasty/fimbriolysis	Fimbrial phimosis or agglutination
Salpingostomy (neosalpingostomy)	Completely occluded distal (fimbrial) tube
Tubotubal anastomosis	Mid-tubal block, classically sterilization reversal
Tubocornual anastomosis	Cornual (proximal) block — healthy tube reimplanted into the interstitial segment

Advantages and outcomes of microsurgical technique

Adherence to these principles gives measurably better results than conventional (macro) tubal surgery: "microsurgical techniques give better result due to minimal tissue handling and damage, perfect haemostasis and minimal adhesion formation; laparoscopic surgery gives the best result" (DC Dutta's Gynaecology 7e).

Procedure (laparoscopic microsurgical)	Pregnancy rate
Salpingo-ovariolysis	65%
Fimbrioplasty	32%
Tubotubal anastomosis (sterilization reversal)	75%
Tubocornual anastomosis	55%
Microsurgical sterilization reversal, overall (Speroff 9e)	45–82%; ectopic risk 2–10%
Distal tubal reconstruction — mild disease / severe disease with hydrosalpinx	>50% / 10–35%, ectopic 5–20%

Factors predicting poor outcome regardless of technique: dense pelvic adhesions, lost fimbriae, bilateral hydrosalpinx > 3 cm, reconstructed tube < 4 cm, reversal attempted > 5 years after sterilization, and a coexisting infertility factor.

Recent advances [RA]

- **Laparoscopic microsurgical anastomosis** by experienced surgeons yields pregnancy rates (25–53%) approaching open microsurgery, with faster recovery; the American Society for Reproductive Medicine restricts this approach to surgeons with extensive training in both

laparoscopic suturing and conventional tubal microsurgery, since the technical demands of replicating microsurgical principles laparoscopically are formidable (Te Linde 13e).

- **Robot-assisted laparoscopic tubal reanastomosis** applies the same principles (vasopressin-assisted haemostasis at the stumps, chromopertubation, intraluminal stenting, mesosalpingeal-gap closure, then 7-0/8-0 sutures) while easing intracorporeal suturing for less-experienced surgeons. The largest published cohort (97 women, age 24–47) reported 71% pregnancy and 62% live-birth rates at 2 years, with strongly age-dependent cumulative live birth: ≤35 years 88%, 36–39 years 66%, 40–42 years 43.8%, ≥43 years 8%; tubal anastomosis remained the more cost-effective option below age 41, IVF beyond it (Te Linde 13e).
- **Hysteroscopic/fluoroscopic tubal cannulation** for proximal block avoids microsurgery altogether: a 2017 pooled meta-analysis reported clinical pregnancy 27%, live birth 22%, ectopic 4%, but a reocclusion rate near 30% (Speroff 9e).
- **Position relative to IVF**: as ART success has risen, indications for reconstructive tubal microsurgery have narrowed to sterilization reversal in young women with a fertile partner and no other infertility factor, mild distal disease in the young, and proximal block after failed cannulation — "under virtually all other circumstances, IVF is the best choice" (Speroff 9e).

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 17.6 — Tubotubal anastomosis. Placement of four to five interrupted sutures using 8–0 polyglactin (under 10× magnification) (DC Dutta's Gynaecology 7e, p.222)*

High-yield exam pointers

- Speroff's microsurgical triad to quote verbatim: **magnification + minimal tissue trauma/exposed suture + meticulous haemostasis**.
- Suture: **6-0 to 8-0** non-reactive monofilament; layered mucosa→muscularis→serosa closure; splint removed by **48 hours**.
- Hydrotubation fluid = **gentamicin 80 mg + dexamethasone 4 mg in 10 mL distilled water**, post-menstrual phase.
- Laparoscopic microsurgical pregnancy rates: salpingo-ovariolysis 65%, fimbrioplasty 32%, **tubotubal anastomosis 75%**, tubocornual anastomosis 55%.
- Robotic reanastomosis cost-effectiveness crosses over at **age 41** (surgery better below, ART better above).
- Best-outcome combination = ring/clip sterilization + isthmic–isthmic anastomosis + age < 35 + tube ≥ 4 cm.

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

The corpus has no single dedicated "principles of microsurgery" chapter for the tube; this answer synthesizes the microsurgical-principle statements Speroff makes for reconstructive pelvic/tubal surgery generally with the tube-specific technique detailed for reanastomosis in Te Linde 13e and DC Dutta's Gynaecology 7e.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; Te Linde's Operative Gynecology 13e; DC Dutta's Textbook of Gynaecology 7e.

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Radiotherapy principles and protocol for Carcinoma cervix stage III

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Stage III carcinoma cervix (FIGO 2018) is disease that involves the lower third of the vagina and/or extends to the pelvic wall and/or causes hydronephrosis or a non-functioning kidney, and/or shows pelvic and/or para-aortic lymph node metastasis (stage IIIC), irrespective of primary tumour size. Because parametrial/pelvic-wall fixation and nodal spread make radical surgery unfeasible and incomplete, **primary concurrent chemoradiation** — external beam radiotherapy (EBRT) plus brachytherapy with a radiosensitising platinum drug — is the standard curative treatment.

FIGO 2018 sub-staging of stage III

Sub-stage	Extent
IIIA	Lower third of vagina involved, no extension to pelvic wall
IIIB	Extension to pelvic wall and/or hydronephrosis/non-functioning kidney
IIIC1	Pelvic lymph node metastasis only (r = imaging, p = pathology confirmed)
IIIC2	Para-aortic lymph node metastasis (with or without pelvic nodes)

Principles of radiotherapy

- **Two complementary components** are always combined: **EBRT** irradiates the whole pelvis — primary tumour, parametria, pelvic side wall and regional (obturator, iliac ± para-aortic) nodes,

and shrinks the central tumour; **brachytherapy** delivers an intracavitary boost dose to the cervix/upper vagina with a steep dose fall-off that spares the adjacent bladder and rectum — a dose brachytherapy alone cannot achieve at depth and EBRT alone cannot achieve without excess bowel/bladder toxicity.

- **Sequencing:** EBRT is usually given first (4–5 weeks) to regress the tumour and reduce anatomical distortion, with brachytherapy introduced from around week 4; the **total overall treatment time should not exceed ~8 weeks**, since prolongation of therapy lowers pelvic control and survival.
- **Dose-point concept (classical 2D dosimetry): Point A** is 2 cm cephalad and 2 cm lateral to the external os (the site where the uterine artery crosses the ureter); **Point B** is 2 cm cephalad and 5 cm lateral to the midline at the same plane (approximates the obturator node region). Point A conventionally receives 7000–8000 cGy and Point B about 6000 cGy from the combined EBRT + brachytherapy course, with bladder/rectal dose kept under 6000–7000 cGy.
- **Chemosensitisation:** concurrent platinum chemotherapy sensitises tumour cells to radiation and treats sub-clinical micrometastases; GOG protocols 85, 120 and 123 established that cisplatin-based concurrent chemoradiation (CCRT) is superior to radiation with hydroxyurea or to radiation alone across stages IIB–IVA, and this is the accepted standard for stage III disease.
- **Modern refinement:** image-guided adaptive brachytherapy (IGABT) — MRI/CT-based volumetric planning of the high-risk clinical target volume (D90) — has replaced 2D point-based prescription in well-resourced centres, improving local control and halving toxicity; intensity-modulated radiotherapy (IMRT) for the EBRT component similarly conforms dose to the target while sparing bowel, bladder and bone marrow.
- **Isotopes/technique:** low-dose-rate (LDR, e.g. caesium-137) afterloading requires inpatient admission over 1–3 days; high-dose-rate (HDR) remote afterloading with iridium-192 delivers the fraction in minutes as an outpatient with less staff radiation exposure — outcomes are comparable. Classical applicator geometries are the Paris, Manchester (most widely used; Fletcher–Suit afterloading system) and Stockholm techniques, using an intrauterine tandem with vaginal ovoids/colpostats.

Treatment protocol for stage III disease

- **Pre-treatment work-up:** correct anaemia (improves tumour oxygenation and radiosensitivity); examination under anaesthesia; MRI pelvis ± PET-CT for tumour/nodal extent; renal function and ultrasound/IVU to confirm hydronephrosis; cystoscopy/proctoscopy if bladder or rectal involvement is suspected; baseline squamous cell carcinoma antigen (SCC-Ag).
- **External beam radiotherapy:** whole-pelvis field using a linear accelerator (≥4 MeV) — **45–50 Gy in 25 fractions over 5 weeks**. If **stage IIIC2** (para-aortic nodes positive), the field is extended cranially (extended-field radiotherapy to cover the para-aortic chain), accepting higher gastrointestinal toxicity.

- **Concurrent chemotherapy: weekly cisplatin 40 mg/m² intravenously** given alongside EBRT (usually 5–6 cycles) — the standard cisplatin-based concurrent chemoradiation regimen for locally advanced (stage IIB–IVA) cervical cancer.
- **Brachytherapy boost:** introduced once EBRT has adequately shrunk the tumour (~week 4); intracavitary tandem-and-ovoid (Manchester-type) application. Cumulative dose target: **7000–8000 cGy to Point A** (2D method) or, with modern 3D IGABT, **85–95 Gy EQD2 to the D90 of the high-risk target volume**, keeping bladder D2cc <90 Gy and rectum/sigmoid D2cc <75 Gy (GEC-ESTRO recommendations).
- **Stage IIIC2:** extended-field EBRT with chemosensitisation, followed by systemic chemotherapy, since para-aortic nodal disease is beyond brachytherapy's reach and carries the worst prognosis.
- **Response assessment and follow-up:** pelvic examination (progressive cervical/vaginal shrinkage expected up to 3 months) and imaging at 3 months; 3-monthly review for 2 years, then 6-monthly, with cytology/FNA of any suspicious area for early detection of persistent or recurrent disease.

Complications of pelvic radiotherapy

System	Complication
Bowel	Radiation enteritis, stricture, fistula (small bowel tolerance is lowest, ~4500 cGy)
Bladder/ureter	Cystitis, fibrosis, vesicovaginal fistula
Vagina	Fibrosis, stenosis, dyspareunia
Ovary	Radiation menopause (ovarian transposition out of field can be done if ovarian preservation is desired)
Marrow	Pancytopenia, worsened by concurrent chemotherapy

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

☐ *Fig 31.3 — Tandem (center) and two ovoids placement for carcinoma cervix (Manchester technique). Point A and Point B marked (DC Dutta's Gynaecology 7e, p.440)*

High-yield exam pointers

- Stage III (FIGO 2018) = pelvic wall/lower-third vagina/hydronephrosis, **plus new IIIC1 (pelvic nodes)/IIIC2 (para-aortic nodes)** sub-stage.
- Point A = 2 cm up + 2 cm lateral to external os (uterine artery crossing ureter); Point B = 2 cm up + 5 cm lateral (obturator node).
- EBRT dose: **45–50 Gy/25 fractions/5 weeks**; Point A cumulative dose **7000–8000 cGy**.

- Concurrent chemo = **cisplatin 40 mg/m² weekly**.
- Total treatment time ≤ 8 weeks — delay worsens pelvic control.
- IIIC2 → extended-field RT + chemosensitisation + systemic chemotherapy.
- HDR (Ir-192) = outpatient, minutes per fraction; LDR (Cs-137) = inpatient, days.

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

The 2018 FIGO revision (used above) added imaging/pathology-based tumour measurement and the IIIC nodal sub-stage; older texts printed under the 2009 FIGO system do not have IIIC1/IIIC2 and stage cervical cancer purely on clinical extent.

SOURCE & COVERAGE

DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e (FIGO 2018 staging revision; GOG 85/120/123 concurrent chemoradiation trials).

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Role of urodynamic studies in female incontinence

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Urodynamic studies are objective, pressure- and flow-based tests of lower urinary tract (bladder storage and voiding) function, performed as an adjunct to history, examination and simple bladder tests (cough stress test, voiding diary, post-void residual). Terminology follows the International Continence Society (ICS) 2002 standardisation.

Indications for urodynamic study

Clinical situation	Why urodynamics is used
Mixed stress + urge symptoms, or diagnosis unclear despite history, examination, voiding diary and cough stress test	Objectively separates **urodynamic stress incontinence (USI)** from **detrusor overactivity (DO)** so treatment targets the correct mechanism
Voiding difficulty / raised post-void residual (PVR)	Detects detrusor underactivity or outlet obstruction before continence surgery is offered
Previous failed anti-incontinence surgery or recurrent leakage	Defines the mechanism of persistent/recurrent incontinence (intrinsic sphincter deficiency, obstruction, new-onset DO)
Prolapse surgery planned in a woman with no incontinence symptoms, or a negative cough test	Unmasks **occult stress incontinence** (prolapse reduced during testing) — informs counselling on a concurrent prophylactic sling/Burch procedure

Clinical situation	Why urodynamics is used
Associated neurological disease (multiple sclerosis, spinal injury)	Characterises detrusor–sphincter behaviour (neurogenic DO, dyssynergia, acontractile detrusor)

Not routinely required for a woman with straightforward stress incontinence, a positive cough stress test, urethral hypermobility, normal PVR, stage ≤ II prolapse and no prior surgery — a basic office evaluation is sufficient before a midurethral sling. The randomised VALUE trial (Nager et al.) showed no difference in surgical outcome between office assessment alone and multichannel urodynamics in this uncomplicated group.

Components of the study

Simple urodynamics	Complex urodynamics
Uroflowmetry + PVR + single-channel filling cystometry with cough/Valsalva provocation	Above **plus** multichannel filling cystometry (Pves, Pabd, Pdet), urethral pressure profilometry, pressure–flow (voiding) study, sphincter electromyography (EMG) ± video (fluoroscopic) urodynamics
Suffices when predominant stress incontinence is clinically clear-cut	Reserved for mixed/complex symptoms, neurological disease, or failed prior surgery

What each test shows

Test	Normal value / parameter	Diagnostic significance
Post-void residual (PVR)	< 50 mL	Raised PVR → voiding dysfunction/outlet obstruction; checked before any other test
Uroflowmetry	Peak flow > 15 mL/sec (normal range 15–25 mL/sec); continuous bell-shaped curve	Reduced, interrupted flow with high voiding pressure → outflow obstruction; normal flow with leakage on cough → supports stress incontinence
Filling cystometry	First desire to void 150–250 mL; strong desire > 250 mL; cystometric capacity 400–600 mL; stable detrusor pressure (**Pdet = Pves – Pabd**), 0–15 cmH2O during filling	Involuntary detrusor contraction on filling = **detrusor overactivity**; leakage on cough/Valsalva with **no** detrusor contraction = **urodynamic stress incontinence**
Urethral pressure profilometry (maximum urethral closure pressure, MUCP)	Normal MUCP > 40 cmH2O	MUCP < 20 cmH2O indicates **intrinsic sphincter deficiency (ISD)** — influences choice of continence procedure

Test	Normal value / parameter	Diagnostic significance
Valsalva leak-point pressure (VLPP)	Normal cut-off > 60 cmH2O	Low VLPP = poor sphincteric function (ISD); leakage only at high VLPP suggests a hypermobility-type mechanism
Pressure–flow (voiding) study	Maximum detrusor pressure during voiding < 50 cmH2O	Detects detrusor underactivity/acontractile detrusor and bladder outlet obstruction — predicts risk of postoperative voiding dysfunction or retention
Video-urodynamics (fluoroscopy + simultaneous pressure/flow)	—	Shows bladder-neck funnelling and urethrovesical descent linked to pressure events; reserved for complex or recurrent cases, not routine
Sphincter electromyography (EMG)	Activity rises on filling, falls on voiding	Detects detrusor–sphincter dyssynergia in neurogenic bladder

Clinical role in decision-making

- Confirms the *type* of incontinence (USI vs DO vs mixed) when clinical assessment is inconclusive, so pelvic-floor training/anticholinergics or anti-incontinence surgery is correctly targeted.
- Unmasks occult stress incontinence when prolapse is manually reduced during testing, guiding the discussion on a concurrent prophylactic sling/Burch colposuspension at the time of prolapse repair.
- Predicts postoperative voiding dysfunction/retention risk by identifying pre-existing outlet obstruction or detrusor underactivity before continence surgery.
- Defines the mechanism of recurrent or persistent incontinence after failed prior surgery, directing the choice of re-do procedure.
- Guides the surgical option chosen: a low MUCP/ISD favours a sling or bulking agent over a retropubic urethropexy, whereas normal urethral function with hypermobility responds well to a standard midurethral sling.
- Characterises the neuropathic bladder (neurogenic detrusor overactivity, detrusor–sphincter dyssynergia, acontractile detrusor) in women with neurological disease, guiding decisions on intermittent self-catheterisation and anticholinergic therapy.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS

- ☐ *Fig 25.4A,B — Radiographic tracing of the bladder and urethra: A. At rest; B. During micturition (DC Dutta's Gynaecology 7e, p.347)*

High-yield exam pointers

- ICS 2002 terminology: "genuine stress incontinence" → **urodynamic stress incontinence**; "detrusor instability" → **idiopathic detrusor overactivity**; "detrusor hyperreflexia" → **neurogenic detrusor overactivity**.
- Core equation: **Pdet = Pves − Pabd**.
- Numbers to reproduce: PVR < 50 mL; cystometric capacity 400–600 mL; peak flow > 15 mL/sec; MUCP normal > 40 cmH2O, ISD < 20 cmH2O; VLPP normal > 60 cmH2O.
- Escalation order: Uroflowmetry → PVR → filling Cystometry → urethral Pressure profile/VLPP → voiding pressure-flow study → EMG/video-urodynamics.
- Complex urodynamics is **not** mandatory before a midurethral sling for straightforward, objectively-confirmed stress incontinence (VALUE trial evidence).
- Cystoscopy is a separate test that should accompany, but is not itself part of, the urodynamic study.

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

DC Dutta's figures (used above) are drawn from the same voiding-cystourethrogram principle that underlies modern video-urodynamics; current practice replaces routine fluoroscopy with multichannel pressure/flow measurement except in complex or recurrent cases.

SOURCE & COVERAGE

Berek & Novak's Gynecology 16e; Te Linde's Operative Gynecology 13e; DC Dutta's Textbook of Gynaecology 7e; International Continence Society 2002 standardisation of lower urinary tract terminology.

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Rubella in pregnancy

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Rubella (German measles) is an acute exanthematous illness caused by an RNA **togavirus** (genus *Rubivirus*), spread by respiratory droplets. In a susceptible pregnant woman it crosses the placenta to infect the fetus, and — because it is one of the most complete human teratogens — produces

the **congenital rubella syndrome** (CRS), a multisystem constellation of malformations whose severity depends chiefly on the gestational age at maternal infection.

Maternal infection — clinical features

- **Incubation period** 12–23 days; transmission rate to nonimmune contacts ~80%.
- **Prodrome/rash:** mild febrile illness with a generalized **maculopapular rash** starting on the face and spreading to trunk and extremities.
- **Associated features:** arthralgia/polyarthritis, head-and-neck **lymphadenopathy**, conjunctivitis, malaise.
- **25–50% of infections are asymptomatic** — a subclinical maternal illness does not exclude fetal infection.
- Viraemia precedes the rash by about a week; the patient is infectious from a few days before to about 7 days after rash onset.

Effect on the fetus — congenital rubella syndrome (CRS)

Fetal infection is transplacental and can occur throughout pregnancy, but the **risk and severity of defects fall steeply with advancing gestational age** at the time of maternal infection (Miller et al., 1982 — cited in Williams Obstetrics):

Gestational age at maternal infection	Risk of fetal defects
< 12 weeks	up to 90%
13–14 weeks	~50%
By the end of the 2nd trimester (~20 weeks)	~25%
After 20 weeks	defects rare

System	CRS features
Cardiac	Patent ductus arteriosus, pulmonary artery/valve stenosis, septal defects
Ocular	Cataract, microphthalmia, pigmentary retinopathy, glaucoma
Auditory	Sensorineural deafness — the **single commonest** CRS defect
Central nervous system	Microcephaly, intellectual disability, meningoencephalitis
Haematological/reticuloendothelial	Thrombocytopenia, purpuric ("blueberry-muffin") skin lesions, hepatosplenomegaly, hepatitis, jaundice
Skeletal	Radiolucent (metaphyseal) bone disease

System	CRS features
Growth	Fetal growth restriction, low birth weight

Other outcomes of first-trimester infection include miscarriage and stillbirth. Infants with CRS **shed live virus in urine and nasopharyngeal secretions for many months** and are infectious to susceptible contacts.

Diagnosis

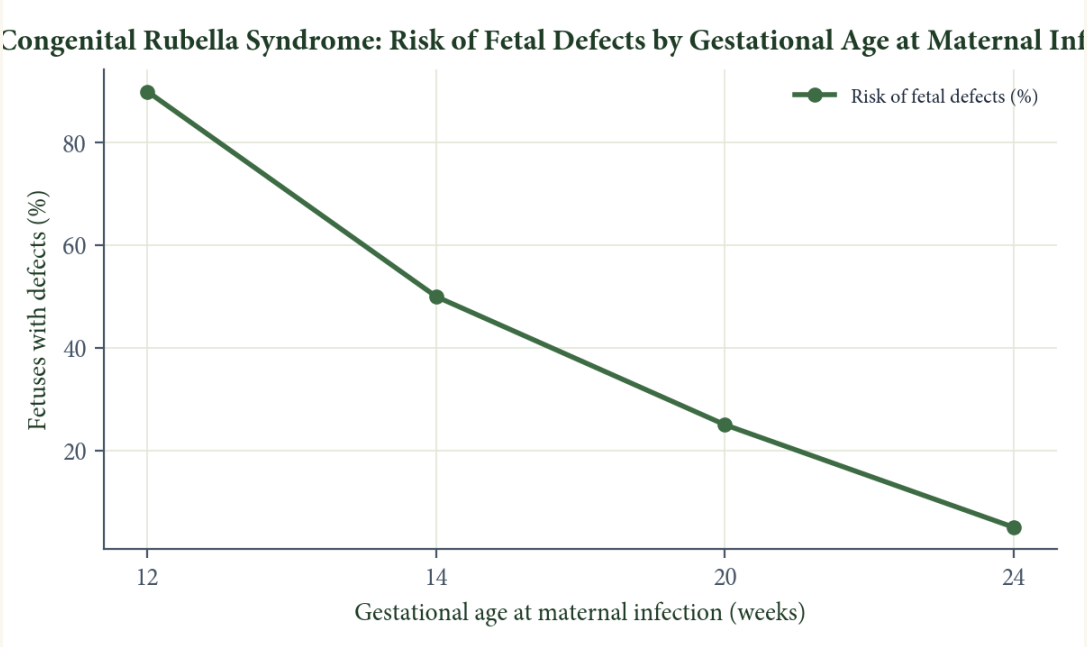
Test	Finding / purpose
Maternal rubella-specific **IgM** (ELISA)	Positive 4–5 days after rash onset, persists ~6 weeks — indicates recent infection; reinfection can give a transient low-titre IgM without fetal risk, and false positives occur in low-prevalence populations
Maternal rubella **IgG**	Documents past infection/immunity; checked as a baseline antenatal screen
IgG avidity testing	High avidity → infection >2–3 months earlier; low avidity → recent infection
Viral culture / RT-PCR (urine, throat swab, blood, CSF)	Confirms active infection, positive up to 2 weeks after rash
Targeted ultrasound	Screens for cardiac defects, cataract, microcephaly, hepatosplenomegaly, growth restriction once maternal infection is confirmed
Amniocentesis with rubella RNA **PCR** on amniotic fluid (or chorionic villi/fetal blood)	Confirms fetal infection when ultrasound suggests anomaly or growth delay; best performed after 21–22 weeks and ≥6 weeks after maternal infection

Management and prevention

- **No specific antiviral treatment exists** — maternal rubella is managed supportively (antipyretics, rest); **droplet precautions for 7 days after rash onset**.
- **Post-exposure prophylaxis:** IVIG within 5 days of exposure in a nonimmune contact may lessen maternal illness but does **not** reliably prevent fetal infection.
- On **confirmed maternal infection**, counsel the couple using the gestational-age risk table above; refer to a maternal–fetal medicine specialist and arrange targeted ultrasound ± amniocentesis-PCR.
- In India, confirmed rubella infection carrying a **substantial risk of serious fetal abnormality** is an accepted ground for **medical termination of pregnancy under the MTP Act, 1971 (amended 2021)**; the decision is individualised, with informed consent, within the legally permitted gestational limit.

- **Universal antenatal screening:** rubella **IgG immunity status is checked at the first antenatal visit** in every pregnant woman, alongside hepatitis B, syphilis and HIV.
- **Prevention by vaccination:** MMR is a **live-attenuated vaccine and is contraindicated in pregnancy**; it is offered to non-immune women pre-conceptionally or immediately postpartum, with effective contraception advised for **1 month before/after vaccination**. Inadvertent vaccination in early pregnancy is **not** an indication for termination — no confirmed case of vaccine-induced CRS has been reported.
- Sustained population immunity through universal childhood MMR immunization (India's National Immunization Schedule: MMR-1 at 9 months) reduces circulating virus and the pool of susceptible women of reproductive age.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Steep fall in fetal defect risk from ~90% at <12 weeks to negligible after 20 weeks (Miller et al., 1982; Williams Obstetrics 26e).

Risk of fetal defects falls steeply with advancing gestational age at maternal rubella infection — the exam-favourite "earlier infection = worse outcome" concept.

High-yield exam pointers

- ***Gregg's triad* (1941) — the original description of CRS:** cataract + cardiac defect + sensorineural deafness**.
- Risk of fetal defects by gestational age at infection: **<12 wk ≈ 90% → 13–14 wk ≈ 50% → ~20 wk ≈ 25% → after 20 wk rare** (Miller, 1982).
- **Sensorineural deafness** is the single commonest CRS abnormality.

- Diagnosis of recent maternal infection = **rubella IgM**; confirm fetal infection by **PCR on amniotic fluid**.
- **MMR is a live vaccine — contraindicated in pregnancy**; avoid conception for 1 month after vaccination; accidental vaccination in pregnancy is **not** grounds for termination.
- **Confirmed first-trimester maternal infection** is an accepted **MTP Act** ground for termination in India.
- Rubella **IgG (immunity)** status is a routine part of the first antenatal-visit screen, alongside HBsAg, VDRL and HIV.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> Older Indian texts (DC Dutta's Obstetrics 9e) quote a simpler month-wise risk figure (≈60% in month 1, 25% in month 2, 10% in month 3); the gestational-age table above from Williams Obstetrics 26e (based on Miller et al., 1982, and endorsed by the American College of Obstetricians and Gynecologists) is the current, more precise standard and should be used in the exam.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e; DC Dutta's Textbook of Obstetrics 9e; Medical Termination of Pregnancy Act, 1971 (amended 2021, India).

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Significance of estimation of Antimüllerian hormone, Follicle-stimulating hormone, Prolactin and insulin resistance in Gynaecology

Asked in: Paper I 07-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — These four are basal endocrine/metabolic parameters estimated in the gynaecological evaluation of anovulatory infertility, amenorrhoea and polycystic ovary syndrome (PCOS). Each probes a different axis — ovarian follicular reserve (antimüllerian hormone, AMH), the hypothalamic-pituitary-ovarian axis (follicle-stimulating hormone, FSH), lactotroph function (prolactin), and the metabolic derangement that drives ovarian hyperandrogenism (insulin resistance).

Antimüllerian hormone (AMH)

AMH is a transforming growth factor-β (TGF-β) family glycoprotein secreted by granulosa cells of preantral and small antral follicles (<6 mm); it is measurable on any day of the cycle and declines progressively with age, becoming undetectable near menopause.

Clinical use	Significance
Ovarian reserve testing	Most reliable single biochemical marker of ovarian reserve, superior to FSH — directly reflects the size of the growing follicle cohort
Predicting response to controlled ovarian stimulation (COS)/IVF	Low AMH (assay-dependent threshold 0.2–0.7 ng/mL) predicts poor response (high specificity, low-moderate sensitivity); high AMH predicts hyper-response and ovarian hyperstimulation syndrome (OHSS) risk — used to individualise gonadotropin dose
Adjunct diagnostic marker in PCOS	Granulosa cells of the excess small antral follicles in PCOS secrete 2–3× normal AMH; a level ≥5 ng/mL has high specificity (~97%) and has been proposed as a surrogate for polycystic ovarian morphology on ultrasound, though not yet validated for routine replacement of follicle count
Fertility-preservation counselling	Assesses baseline and post-treatment ovarian reserve before chemotherapy, pelvic radiotherapy, or ovarian surgery (e.g., endometrioma cystectomy)
Diagnosis of premature ovarian insufficiency (POI)	Undetectable/very low AMH in a woman with amenorrhoea supports a diagnosis of POI
Tumour marker	AMH, together with inhibin, is a recognised marker for **granulosa cell tumour** of the ovary — used at diagnosis and to detect recurrence on follow-up

Follicle-stimulating hormone (FSH)

Basal FSH (drawn on cycle day 2–4) is the traditional test of the pituitary-ovarian axis and classifies anovulation by the World Health Organization (WHO) scheme.

Clinical use	Significance
Classifying anovulatory disorders (WHO groups)	**Group I** — hypogonadotropic hypogonadal (low/low-normal FSH, low estradiol): hypothalamic amenorrhoea, *Kallmann* syndrome. **Group II** — normogonadotropic normoestrogenic (normal FSH): commonest group (75–85%), includes PCOS. **Group III** — hypergonadotropic hypogonadism (elevated FSH): ovarian failure/POI/menopause
Ovarian reserve screening	Day 2–4 FSH >10 IU/L is concerning for diminished ovarian reserve; has high specificity (80–100%) but low sensitivity (10–30%) for poor response to gonadotropin stimulation. Wide intra- and intercycle variation — a single value is unreliable and should be repeated

Clinical use	Significance
Diagnosing gonadal failure vs hypothalamic-pituitary cause of amenorrhoea	In a well-oestrogenised woman, a moderately elevated FSH (10–15 IU/L) flags diminished reserve; a persistently and markedly elevated FSH with amenorrhoea before age 40 supports POI, whereas a low/normal FSH points to a functional hypothalamic or pituitary cause
LH:FSH ratio	A reversed ratio (luteinising hormone, LH, higher than FSH; historically >2:1) is a classic supportive clue for PCOS, but obesity reduces its reliability and it is not a formal diagnostic criterion
Clomiphene citrate challenge test (CCCT)	Day-3 and day-10 FSH bracketing clomiphene citrate 100 mg/day (days 5–9); an exaggerated day-10 rise can unmask diminished reserve missed on basal testing, though it adds little over AMH/antral follicle count and is used less often now

Prolactin

Prolactin estimation is indicated in all women with amenorrhoea, oligomenorrhoea, galactorrhoea, or unexplained infertility, since hyperprolactinaemia is one of the commonest causes of anovulation.

Serum prolactin	Clinical significance
Normal (<15–20 ng/mL)	Excludes hyperprolactinaemia
Mildly elevated (20–50 ng/mL)	May only cause a short luteal phase; repeat before labelling as abnormal (transient rises with sleep, stress, breast examination, meals)
Moderately elevated (50–100 ng/mL)	Frequently causes oligomenorrhoea or amenorrhoea
Markedly elevated (>100 ng/mL)	Frank hypogonadism with low oestrogen — genitourinary atrophy, bone loss; raises suspicion of a prolactinoma

- **Exclude confounders first** — hypothyroidism (check thyroid-stimulating hormone, TSH), dopamine-antagonist drugs, and macroprolactinaemia (confirmed by polyethylene-glycol precipitation) before ordering imaging.
- **Imaging** — magnetic resonance imaging (MRI) of the sella is indicated when elevation is not explained by drugs/hypothyroidism, to exclude a pituitary micro-/macroadenoma or hypothalamic mass.
- **Treatment** — dopamine agonists restore ovulation in most women: **bromocriptine** starting 1.25 mg at bedtime (up to 5 mg twice daily for macroadenomas) or **cabergoline** starting 0.25 mg twice weekly (up to 1.5 mg twice weekly), titrated against serial prolactin levels; cabergoline is better

tolerated and more convenient but carries a small long-term risk of valvular heart disease at higher cumulative doses.

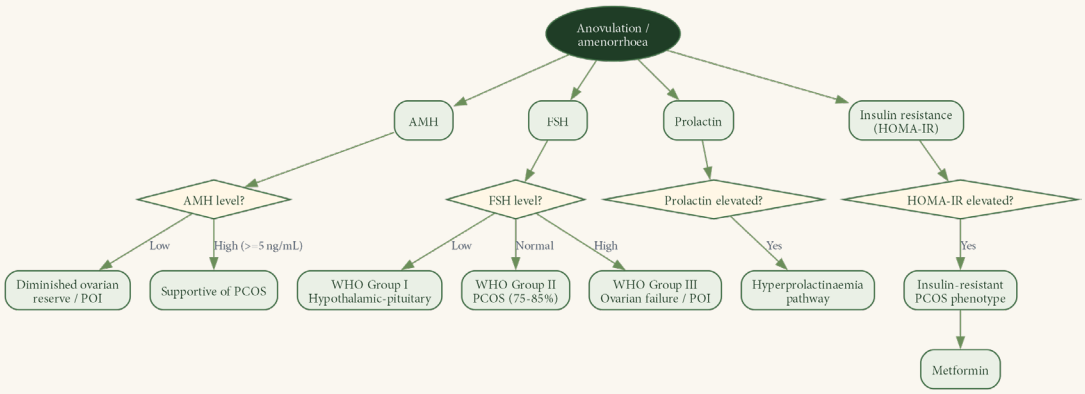
Insulin resistance

Insulin resistance is the pivotal metabolic abnormality linking obesity to ovarian hyperandrogenism in PCOS: hyperinsulinaemia stimulates theca-cell androgen production directly and via increased free insulin-like growth factor-1 (IGF-1), and suppresses hepatic synthesis of sex hormone-binding globulin (SHBG), raising free androgen levels.

Test	Threshold suggesting insulin resistance
Fasting serum insulin	>20–30 mIU/mL
Fasting glucose : insulin ratio	<4.5
Homeostatic model assessment (HOMA-IR) = (fasting glucose [mg/dL] × fasting insulin [mU/mL]) / 405	>3.2–3.9
Quantitative insulin sensitivity check index (QUICKI)	<0.33
Clinical pointers	Acanthosis nigricans, central obesity, body mass index (BMI) >25 kg/m^2, waist:hip ratio >0.85

- **Significance in PCOS** — present in a substantial proportion of women with PCOS (more marked in obese than lean phenotypes) and is central to the pathogenesis of anovulation, hyperandrogenism and the metabolic sequelae of the syndrome.
- **Screening role** — identifies women at risk of impaired glucose tolerance, type 2 diabetes mellitus, dyslipidaemia and the metabolic syndrome, warranting an oral glucose tolerance test (OGTT) and lipid profile.
- **Therapeutic implication** — guides use of the insulin sensitiser **metformin**, which improves insulin sensitivity, aids weight reduction, lowers androgen levels, and restores ovulation in combination with lifestyle modification.
- **Long-term prognostic value** — predicts later cardiovascular disease, type 2 diabetes, and endometrial hyperplasia/carcinoma risk from chronic anovulation and unopposed oestrogen, informing long-term surveillance.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Hormonal work-up of anovulatory infertility/amenorrhoea: parallel AMH/FSH/Prolactin/HOMA-IR testing branching to their diagnostic interpretations.

High-yield exam pointers

- AMH ≥5 ng/mL → supportive of PCOS; AMH (with inhibin) is also a tumour marker for **granulosa cell tumour**.
- Day 2–4 FSH >10 IU/L → diminished ovarian reserve; FSH is the basis of the WHO Group I/II/III classification of anovulation.
- Prolactin ladder: <20 normal / 20–50 short luteal phase / 50–100 oligo-amenorrhoea / >100 hypo-oestrogenic, think macroadenoma.
- First-line dopamine agonist doses: bromocriptine 1.25 mg nocte; cabergoline 0.25 mg twice weekly.
- HOMA-IR >3.2–3.9 or fasting glucose:insulin ratio <4.5 = insulin resistance.
- Reversed LH:FSH ratio (>2:1) — classic but non-diagnostic PCOS clue, unreliable in obesity.
- Metformin is the insulin-sensitiser of choice for PCOS-associated insulin resistance.

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

AMH assay results can differ by up to 40% between commercial kits and are lowered by combined hormonal contraceptive or gonadotropin-releasing hormone (GnRH) agonist use, so values must always be interpreted against the assay used and recent medication history.

SOURCE & COVERAGE

Speroff's Clinical Gynecologic Endocrinology & Infertility 9e; DC Dutta's Textbook of Gynaecology 7e; Berek & Novak's Gynecology 16e (granulosa cell tumour marker use).

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What are the causes of vault prolapse? Management of a case of vault prolapse in a 65 years old woman?

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Vaginal vault prolapse is descent of the vaginal apex (the vault/cuff left after hysterectomy) towards or beyond the introitus, representing loss of apical (level I) support. It is almost always **posthysterectomy** (vaginal or abdominal) and is accompanied by an **enterocele in about 70% of cases**, with variable cystocele/rectocele.

Causes (aetiology)

Category	Factors
Anatomical	Human bipedal posture (gravitational stress); anterior inclination of the pelvis directing intra-abdominal force onto the hiatus; wide urogenital hiatus; inherent (genetic) weakness of supports
Predisposing — acquired	Vaginal delivery trauma to cardinal/uterosacral ligaments, endopelvic fascia, levator ani and pudendal nerve — from premature bearing-down, forceps/ventouse traction, prolonged second stage, fundal pressure for placental delivery, precipitate labour; poor perineal repair
Predisposing — congenital	Connective-tissue disorder (reduced type I collagen ratio); occult spina bifida
Aggravating	Postmenopausal oestrogen deficiency/atrophy and poor collagen repair with age; raised intra-abdominal pressure (chronic cough/COPD, constipation, weight-lifting occupation); obesity, smoking; large uterus/fibroid; multiparity
Specific to vault (secondary) prolapse	**Undetected enterocele at the time of the index hysterectomy**; inadequate primary repair — failure to fix the cardinal/uterosacral pedicles to the vaginal angles at closure; vault prolapse is more frequent after **vaginal** than abdominal hysterectomy; incidence quoted as 0.1–10% post-hysterectomy

Uterine prolapse and vault prolapse share the same neuromuscular injury mechanism; the vault is simply the "level I" apex left unsupported once the uterus/cervix has been removed.

Assessment of this 65-year-old woman

- History: parity/mode of delivery, prior hysterectomy (route, date), symptoms — dragging sensation/mass descending per vaginum, difficulty voiding/incomplete emptying, stress incontinence, obstructed defecation, dyspareunia or coital status, chronic cough/constipation.
- Examination in dorsal and standing position with Valsalva; identify enterocele (bulge high in posterior fornix, expands on cough), cystocele, rectocele; look for decubitus ulcer on the exposed vault.
- **Stage the prolapse by POP-Q** (Pelvic Organ Prolapse Quantification — International Continence Society, site-specific, anatomical; reference points Aa, Ba, C/vaginal cuff, D, gh, pb, tvl):

POP-Q Stage	Description
0	No descent of pelvic organs
I	Leading edge ≥1 cm above the hymenal ring
II	Leading edge from 1 cm above to 1 cm below the hymen
III	Beyond 1 cm past the hymen, but without complete eversion
IV	Essentially complete eversion of the vagina

- Evaluate fitness for anaesthesia/surgery (age 65 — comorbidities, cardiorespiratory reserve).
- Assess occult/overt stress urinary incontinence (SUI) with the prolapse reduced (urodynamics) — concurrent anti-incontinence surgery is planned if positive.
- Ask about sexual activity/coital wish — this determines whether an obliterative (colpocleisis) option is acceptable.

Management

Conservative

- Vaginal pessary (ring/Gellhorn) — an option while awaiting surgery or if unfit for surgery; not generally the definitive treatment for vault prolapse.
- Local (vaginal) oestrogen to improve tissue quality before pessary/surgery in this postmenopausal woman.

Surgical — Transvaginal approach

- **Repair of enterocele with pelvic floor repair (PFR)** — sac dissected high, ligated at the neck; **McCall culdoplasty** approximates the uterosacral/pararectal pedicles across the midline to

obliterate the pouch of Douglas and support the vault, combined with anterior colporrhaphy and colpoperineorrhaphy for associated cystocele/rectocele.

- **Sacrospinous colpopexy (fixation)** — vault suspended, usually unilaterally, to the coccygeus–sacrospinous ligament complex (right side) via the pararectal space using a suture-capturing device (e.g., Miya hook); good results but risk of buttock/gluteal pain (pudendal/sciatic nerve), and vaginal shortening/axis change.
- **Le Fort's (partial) colpocleisis** — denudation and apposition of anterior/posterior vaginal flaps leaving two lateral drainage channels; reserved for the very elderly/frail patient unfit for longer surgery, uterus already absent (as here), normal Pap smear, no other pelvic pathology; can be done under local/regional anaesthesia.
- **Complete colpocleisis** (after hysterectomy) — circumferential denudation with purse-string closure of the vault; simple, safe, effective for the woman **no longer interested in coital function** — a strong option at 65 years if sexually inactive.

Surgical — Abdominal/laparoscopic approach

- **Sacrocolpopexy** — the vaginal vault is suspended to the anterior longitudinal ligament in front of the S3 vertebra using a non-absorbable graft (polypropylene/Mersilene mesh), performed by laparotomy, laparoscopy, or robot-assisted; today regarded as the durable, "gold-standard" apical repair — lower recurrence, less repeat surgery and less postoperative dyspareunia than native-tissue vaginal repair, and now increasingly offered as primary (not only salvage) surgery, with a minimally invasive approach preferred where expertise/fitness allow.

Steps of abdominal sacral colpopexy

- Open abdomen (vertical/transverse) or laparoscopic/robotic ports.
- Incise posterior peritoneum over the sacral hollow, retracting the rectosigmoid laterally; identify and protect the right ureter and presacral vessels.
- Grasp the vaginal vault angles with Allis forceps; attach a Y-shaped non-absorbable mesh to the anterior and posterior vaginal walls with permanent/delayed-absorbable sutures.
- Fix the free limb of the mesh to the anterior longitudinal ligament at S1–S3 under appropriate (not excessive) tension.
- Peritonealise over the mesh to keep it fully retroperitoneal (prevents bowel adhesion/obstruction).
- Concurrent hysterectomy is not needed here (vault only); a Burch colposuspension or mid-urethral sling is added if SUI is confirmed.

Choosing the option for this 65-year-old

- Sexually active, medically fit → **sacrospinous colpopexy** (vaginal) or **sacrocolpopexy** (abdominal/laparoscopic) preserving vaginal calibre; sacrocolpopexy favoured for advanced-stage or recurrent prolapse given its lower recurrence.

- Sexually inactive, medically frail/high anaesthetic risk → **colpocleisis** (Le Fort-type or complete) — quick, low-morbidity, high success.
- Mesh (synthetic polypropylene, macroporous, monofilament) improves durability of both vaginal and abdominal apical repairs but carries risks of erosion/exposure, dyspareunia and infection; avoided in atrophic tissue, active pelvic infection, uncontrolled diabetes, smokers, and after pelvic radiotherapy.

Complications of vault-prolapse surgery

- Intraoperative — haemorrhage, bladder/rectal injury (may lead to vesicovaginal/rectovaginal fistula), ureteric injury (sacrocolpopexy).
- Early postoperative — urinary retention, vault cellulitis/pelvic abscess, thromboembolism.
- Late — recurrence (~3% after sacrospinous fixation), dyspareunia, mesh erosion/exposure (~3–4% with sacrocolpopexy), new/persistent SUI, nerve injury pain (pudendal/sciatic after sacrospinous fixation).

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 16.20 — Vault prolapse following vaginal hysterectomy. Scar is seen in the center (DC Dutta's Gynaecology 7e, p.202)*

High-yield exam pointers

- Vault prolapse = post-hysterectomy apical loss of support; **enterocele coexists in ~70%**.
- Cause table: acquired (vaginal delivery trauma) vs congenital predisposing factors + aggravating factors (menopause, raised intra-abdominal pressure, obesity); plus the vault-specific cause — **missed enterocele/inadequate vault fixation at the index hysterectomy**.
- Stage with **POP-Q (ICS)**: Stage 0–IV keyed to the hymenal ring (leading edge ≥1 cm above / within ±1 cm / >1 cm beyond / complete eversion).
- Vaginal options: enterocele repair + McCall culdoplasty, sacrospinous colpopexy, Le Fort/complete colpocleisis.
- Abdominal option: **sacrocolpopexy to the anterior longitudinal ligament at S3** with non-absorbable mesh — now the durable/"gold-standard" apical repair.
- At 65 years the pivot question is always: **sexually active + fit → reconstructive (sacrospinous/sacrocolpopexy); sexually inactive + frail → obliterative (colpocleisis).**
- Always test for occult SUI before finalising the plan — add Burch/sling if positive.

SOURCE & COVERAGE

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

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What are the risk factors for uterine rupture during trial of labour after caesarean delivery? How would you counsel the patient with the history of prior uterine rupture?

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

Definition — Trial of labour after caesarean delivery (TOLAC) is an attempt at vaginal birth in a woman with a prior caesarean delivery; a successful outcome is a vaginal birth after caesarean (VBAC). Uterine rupture is a full-thickness disruption of the uterine wall — usually at the site of the prior hysterotomy scar — with or without extrusion of the fetus/placenta; when the myometrium separates but the overlying visceral peritoneum stays intact, it is called uterine dehiscence (incomplete rupture), a lesser and usually asymptomatic entity.

Risk factors for uterine rupture during TOLAC

Category	Risk factors
Prior scar	Classical or T-shaped incision (highest risk); low vertical incision extending into the fundus; **multiple (≥2) prior low transverse caesareans**; single-layer, non-locked closure of the prior hysterotomy; unknown/unconfirmed incision type; **prior uterine rupture** (greatest recurrence risk)
Labour management	Induction of labour, especially with **prostaglandins** (misoprostol/dinoprostone); augmentation with **oxytocin, particularly high-dose (>20 mU/min)**; obstructed or dysfunctional labour/cephalopelvic disproportion; prolonged second stage; instrumental delivery
Interpregnancy interval	Short interdelivery interval **<18–24 months** (about threefold higher rupture risk)
Maternal/fetal factors	Advanced maternal age; obesity; macrosomia (estimated fetal weight >4000 g); multifetal pregnancy; single/unmarried status; education <12 years

Category	Risk factors
Coexisting obstetric contraindications	Placenta previa/accreta; current malpresentation; pre-eclampsia; prior transfundal uterine surgery (e.g., myomectomy entering the cavity); prior open maternal–fetal surgery
Facility/consent factors	Inadequate obstetric/anaesthesia staff or blood-bank cover for an emergency caesarean within 30 minutes; home birth; patient refusal of TOLAC

Rupture risk by type of prior uterine incision (Williams Obstetrics 26e, Table 31-4):

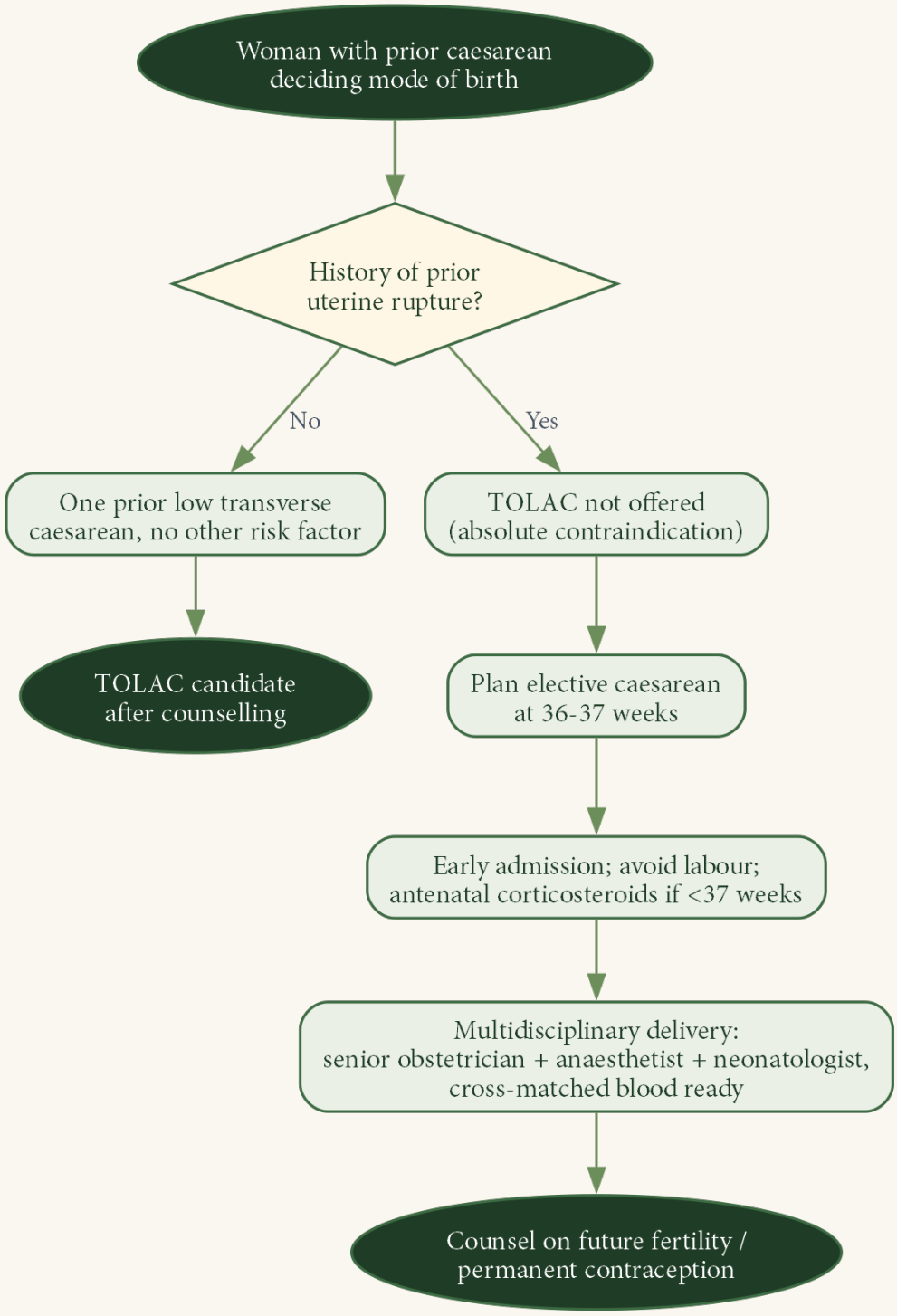
Prior incision	Estimated rupture rate
One low transverse	0.2–0.9%
Multiple low transverse	0.9–1.8%
Low vertical (not extending into fundus)	1–7%
Classical	2–9%
T-shaped	4–9%
Prior uterine rupture — lower segment	2–6%
Prior uterine rupture — upper uterus (fundal)	9–32%

Counselling the patient with a history of prior uterine rupture

- **State clearly that TOLAC is contraindicated.** A prior uterine rupture is an absolute contraindication to any future trial of labour (Williams Obstetrics 26e Table 31-2; DC Dutta's Obstetrics 9e Table 23.3) — this pregnancy, and all future ones, must be delivered by planned caesarean before labour begins.
- **Explain the recurrence risk in plain terms.** If the earlier rupture and repair involved the lower uterine segment, recurrence risk is about 2–6%; if it involved the upper uterus/fundus, recurrence risk rises to 9–32% — many times higher than the <1% baseline risk after a single low transverse scar. Recurrent rupture threatens catastrophic maternal haemorrhage, hysterectomy, and fetal hypoxic injury or death, so the objective is to prevent labour from starting at all.
- **Plan an elective (planned) caesarean delivery at 36 0/7–37 0/7 weeks' gestation**, earlier than a routine repeat caesarean (39 weeks), because rupture can occur spontaneously before labour onset — this is the current American College of Obstetricians and Gynecologists (ACOG, 2021) recommendation for women with a prior classical incision or prior uterine rupture.
- **Admit early** (around 36 weeks, or sooner if any warning symptom appears) so that delivery can be expedited; advise the patient not to travel away from a facility with immediate caesarean capability and to avoid home birth.
- **Give antenatal corticosteroids** if delivery at <37 weeks is anticipated, per routine protocol.

- **Teach warning signs requiring immediate presentation:** constant or severe abdominal pain, scar-site tenderness, per-vaginal bleeding, sudden maternal tachycardia/hypotension, or reduced fetal movements — any of these may signal spontaneous (pre-labour) scar dehiscence or rupture.
- **Ensure multidisciplinary, tertiary-level care** — senior obstetrician, anaesthetist, and neonatologist involved in planning; cross-matched blood and an operating theatre available on short notice; document the informed-consent discussion explicitly recording that TOLAC was not offered and why.
- **Discuss future fertility.** Each additional pregnancy compounds recurrence risk and, with repeated caesareans, the risk of placenta accreta spectrum. If the family is complete, offer **permanent contraception (bilateral tubal ligation)** at the time of this caesarean; if further childbearing is desired, advise an interpregnancy interval of at least 18–24 months and reiterate that every future delivery must again be a planned caesarean before labour.
- **Provide psychological support** — a uterine rupture is a frightening, life-threatening event; address the patient's (and family's) anxiety, answer questions in simple language, and reinforce that the plan above is specifically designed to prevent recurrence.

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Decision flowchart: prior uterine rupture routes to the unbranching "not offered → elective CS at 36–37 weeks → early admission → multidisciplinary delivery → future-fertility counselling" pathway, contrasted with a single prior low-transverse scar routing to TOLAC candidacy.

High-yield exam pointers

- TOLAC = trial of labour after caesarean; VBAC = successful vaginal birth after caesarean; rupture = complete (all layers) vs dehiscence (peritoneum intact).
- **Prior uterine rupture = absolute contraindication to TOLAC** — the single most testable line in this question.
- Recurrence risk: **lower-segment repair 2–6%; upper-segment/fundal repair 9–32%** (Williams Table 31-4) — contrast with 0.2–0.9% for a single low transverse scar.
- Deliver **electively at 36 0/7–37 0/7 weeks**, before labour onset (ACOG 2021) — same timing recommended for prior classical incision.
- Induction (especially prostaglandins) and oxytocin augmentation (>20 mU/min) independently raise rupture risk — never use in a woman with prior rupture.
- Interdelivery interval <18–24 months roughly triples rupture risk during a subsequent TOLAC.
- Counselling checklist mnemonic: **C**ontraindicate TOLAC → **E**lective CS at 36–37 wk → **A**dmit early/avoid labour → **M**ultidisciplinary team → **F**uture fertility/contraception ("CEAM-F").

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> DC Dutta's Obstetrics 9e cites RCOG-2007/ACOG-2004-era recommendations for TOLAC selection; current standard-of-care guidance is ACOG's Vaginal Birth After Cesarean Delivery practice bulletin and RCOG's Green-top Guideline on birth after previous caesarean birth, both of which continue to list prior uterine rupture as an absolute contraindication to TOLAC — cite the current guideline by name in the exam rather than the older editions.

> **SOURCE & COVERAGE**
> Williams Obstetrics 26e (Chapter 31, Prior Cesarean Delivery — Tables 31-1, 31-2, 31-4); DC Dutta's Textbook of Obstetrics 9e (Chapter 23, Vaginal Birth after Previous Cesarean Delivery — Tables 23.2, 23.3); current guidance per American College of Obstetricians and Gynecologists (ACOG) and Royal College of Obstetricians and Gynaecologists (RCOG) Green-top guidance on birth after previous caesarean delivery.

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What are the various types of hormonal contraceptives? Discuss the mechanism of action, their advantages and disadvantages

Asked in: Paper IV 13-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Hormonal contraceptives are steroid-based reversible methods — estrogen combined with a progestin, or a progestin alone — that prevent pregnancy chiefly by suppressing ovulation,

thickening cervical mucus, and rendering the endometrium non-receptive to implantation. They are delivered orally, by injection, as a subdermal implant, transdermally, vaginally, or via a levonorgestrel-releasing intrauterine system (LNG-IUS), and are among the most effective reversible methods of contraception available.

Types of hormonal contraceptives

Category	Method	Composition / dose
Combined (estrogen + progestin)	Combined oral contraceptive (COC) pill	Ethinylestradiol (EE) 20–35 µg + a progestin (levonorgestrel/desogestrel/drospirenone); e.g., Mala-N: levonorgestrel 0.15 mg + EE 30 µg, 21 active + 7 iron tablets
	Combined injectable (monthly)	DMPA 25 mg + estradiol cypionate 5 mg (Cyclofem); norethisterone enanthate (NET-EN) 50 mg + estradiol valerate 5 mg (Mesigyna)
	Combined vaginal ring	EE 15 µg + etonogestrel 120 µg/day for 3 weeks (NuvaRing)
	Transdermal patch	EE + norelgestromin, applied weekly for 3 weeks with a patch-free week
Progestin-only	Progestin-only pill (POP/"mini-pill")	Levonorgestrel 75 µg / desogestrel 75 µg / norethisterone 350 µg, taken daily without a break
	Injectable progestin	Depot medroxyprogesterone acetate (DMPA) 150 mg IM 3-monthly (WHO: up to 4 months); NET-EN 200 mg IM 2-monthly; Depo-subQ 104 mg SC 3-monthly
	Subdermal implant	Implanon/Nexplanon — single rod, etonogestrel 68 mg, effective 3 years; Norplant-II/Jadelle — 2 rods, 75 mg levonorgestrel each, effective 3 years
	Levonorgestrel-releasing IUS	Mirena (LNg 52/5) — 52 mg levonorgestrel reservoir, licensed for 5 years
Emergency contraception (hormonal)	Progestin-only	Levonorgestrel 0.75 mg × 2 doses 12 hours apart (or 1.5 mg single dose), within 72 hours (may be used up to 120 hours)
	Selective progesterone-receptor modulator (SPRM)	Ulipristal acetate 30 mg single dose, within 120 hours

Category	Method	Composition / dose
	Combined (Yuzpe method)	EE 100 µg + levonorgestrel 0.5 mg, 2 doses 12 hours apart, within 72 hours

Mechanism of action

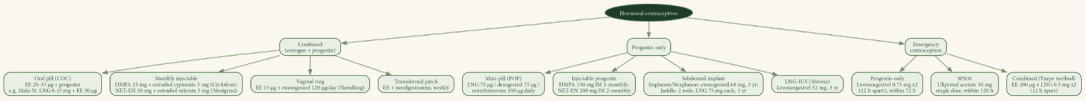
Method	Mechanism
COC	(1) **Inhibits ovulation** — estrogen suppresses follicle-stimulating hormone (FSH) and blocks follicular recruitment; progestin suppresses the mid-cycle luteinizing hormone (LH) surge; together they halt pulsatile gonadotropin-releasing hormone (GnRH) release (2) **Static endometrial hypoplasia**, non-receptive to the blastocyst (3) Thick, viscid, scanty **cervical mucus** blocking sperm penetration (4) Possibly alters tubal motility/transport
POP (norethindrone-only)	Predominantly thickens cervical mucus + endometrial atrophy; does **not** reliably inhibit ovulation — ovulation is suppressed in only about half the cycles, so a strict same-time dosing schedule (missed-pill window 3 hours) is essential
Injectable progestin (DMPA/NET-EN)	Suppresses the mid-cycle LH surge → reliable **anovulation** (primary mechanism), plus thick cervical mucus and endometrial atrophy
Implants	Inhibit ovulation in ~90% of cycles in the first year, with a supplementary effect on the endometrium (atrophy) and cervical mucus (thick)
LNG-IUS	High local intrauterine levonorgestrel concentration causes endometrial suppression/atrophy and thick cervical mucus; ovulation is usually **not** suppressed — the effect is predominantly local, not systemic
Emergency contraceptives	Delay or inhibit ovulation (LH-surge suppression); may impair fertilisation; render the endometrium unfavourable for implantation. Ulipristal, a progesterone-receptor modulator, can also delay follicular rupture even after the LH surge has begun, giving it the lowest failure rate (1–2%) among oral methods, compared with the Yuzpe (combined) method (2–3.5%)

Advantages and disadvantages

Method	Advantages	Disadvantages
COC	Highly effective (failure rate 0.1/100 woman-years); good cycle control; reduces dysmenorrhoea (40%), menorrhagia (50%), pelvic inflammatory disease, ectopic pregnancy, and functional ovarian cysts; protects against ovarian and endometrial cancer (~50% reduction each, persisting 10–15 years after stopping); rapid return of fertility	Requires daily compliance ("3 weeks on, 1 week off"); venous thromboembolism risk 3–4× baseline (higher with desogestrel/gestodene-containing pills); contraindicated in smokers >35 years, hypertension, migraine with aura, and past thromboembolism; efficacy reduced by enzyme-inducing drugs (rifampicin, most anticonvulsants) and broad-spectrum antibiotics
POP	Safe in lactation ("lactation pill"), and in women with hypertension, diabetes, smoking habit, migraine, or a history of thromboembolism; no estrogen-related side effects	Strict same-time dosing (3-hour missed-pill window with the norethindrone-only pill); irregular bleeding/spotting or amenorrhoea in 20–30%; functional ovarian cysts; failure rate 0.5–2/100 woman-years
Injectable progestin (DMPA/NET-EN)	3-monthly dosing removes the need for daily compliance; safe in lactation; reduces menorrhagia, dysmenorrhoea, endometrial cancer risk, pelvic inflammatory disease, ectopic pregnancy, and sickle-cell crises	Delayed return of fertility (4–8 months after stopping DMPA; quicker with NET-EN); reversible loss of bone mineral density with long-term use; weight gain, depression, headache; irregular bleeding/amenorrhoea
Implants	Highest efficacy among reversible methods (Pearl index 0.01–0.06); 3–5-year duration; rapid return of fertility on removal — regarded as "reversible sterilisation"	Frequent irregular bleeding/spotting/amenorrhoea (the leading reason for discontinuation); trained personnel required for insertion/removal; upfront cost
LNG-IUS	Reduces menstrual blood loss (useful in menorrhagia); 5-year licensed duration; immediate return of fertility on removal; endometrial protection	Insertion-related discomfort or vasovagal reaction, rare uterine perforation; initial irregular spotting; expulsion; no protection against sexually transmitted infection

Method	Advantages	Disadvantages
Emergency contraception	Effective "last-chance" method after unprotected coitus, condom failure, or sexual assault	Not a regular contraceptive method; nausea/vomiting (marked with the Yuzpe method); less effective than the copper intrauterine device; efficacy declines the later it is taken after coitus

DIAGRAMS TO DRAW — IMAGE SUGGESTIONS



Figure

Classification of hormonal contraceptives by composition, with representative doses at each leaf.

Recent advances [RA]

- **Drospirenone-only pill (Slynd)** — a newer progestin-only pill (drospirenone 4 mg, 24 active + 4 placebo tablets) that, unlike the traditional norethindrone-only mini-pill, reliably inhibits ovulation and offers a 24-hour missed-pill window matching combined pills, instead of the traditional 3-hour window (Williams Obstetrics 26e, citing Archer 2015; Duijkers 2016).
- **Annovera** — a one-year, reusable combined vaginal ring (segesterone acetate 0.15 mg/day + ethinylestradiol 0.013 mg/day) worn 3 weeks in/1 week out for up to 13 cycles, extending the ring option beyond the monthly NuvaRing (US FDA-approved; Williams Obstetrics 26e).
- **Twirla** — a newer combined transdermal patch (ethinylestradiol + levonorgestrel), an alternative to the norelgestromin-based patch.
- **Over-the-counter access to emergency contraception** — the single-dose levonorgestrel pill is now available without a prescription to all reproductive-age individuals, reflecting a broader push to widen emergency contraception access (Williams Obstetrics 26e).
- **LNG-IUS for emergency contraception** — early efficacy data find the levonorgestrel-IUS non-inferior to the copper IUD for emergency contraception, though it is not yet formally adopted for this indication (Turok, 2021, as cited in Williams Obstetrics 26e).
- **Efficacy ranking of oral emergency methods**: ulipristal acetate (1–2% failure) is superior to the Yuzpe combined-hormone method (2–3.5% failure) (Cleland, 2014, as cited in Williams Obstetrics 26e).

High-yield exam pointers

- Triple mechanism of COC: **F**SH suppression (no follicle) → **L**H suppression (no ovulation) → thick **M**ucus + atrophic endometrium ("FLM").

- DMPA dose: **150 mg IM every 3 months** (WHO allows up to 4 months); NET-EN **200 mg IM every 2 months**.
- Implanon/Nexplanon: **etonogestrel 68 mg**, single rod, **3 years**; Mirena LNG-IUS: **52 mg levonorgestrel**, **5 years**.
- Emergency contraception doses: levonorgestrel **0.75 mg × 2 (12 h apart)** within 72 h (up to 120 h); ulipristal **30 mg single dose** within 120 h; copper IUD is the **gold-standard**, most effective EC.
- COC failure rate **0.1/100 woman-years**; venous thromboembolism risk **3–4× non-users**.
- WHO Medical Eligibility Category 4 (absolute contraindication) for COC: circulatory disease, active liver disease, migraine with aura, pregnancy, estrogen-dependent cancer.

> **NOTE — FOR REFERENCE, NOT TO BE WRITTEN IN THE EXAM**
> The norethindrone-only mini-pill does not reliably inhibit ovulation and needs a 3-hour missed-pill window, whereas newer progestin-only pills (desogestrel-, drospirenone-based) inhibit ovulation more consistently and allow a longer window — a distinction older textbook descriptions of "the" progestin-only pill do not always make explicit.

> **SOURCE & COVERAGE**
> DC Dutta's Textbook of Gynaecology 7e; Williams Obstetrics 26e; Speroff's Clinical Gynecologic Endocrinology & Infertility 9e.

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What is adenomyosis? What are the ultrasound features of adenomyosis? Role of conservative management of adenomyosis

Asked in: Paper III 11-May-2022 — RGUHS MS Obstetrics & Gynaecology

Definition — Adenomyosis is a benign uterine condition in which endometrial glands and stroma extend directly into the myometrium, at least one low-power microscopic field deep to the endometrial-myometrial junction, with surrounding reactive smooth-muscle hyperplasia. It may be **diffuse**

(common) or **focal/adenomyoma** (localised nodular form) and frequently coexists with pelvic endometriosis (30–40%) and leiomyoma.

Aetiopathogenesis & clinical features

Risk factor / association	Detail
Parity	90% are parous; repeated childbirth disrupts the endometrial-myometrial junction
Age	Peak age >40 years (80%)
Uterine trauma	Vigorous curettage, prior caesarean section or myomectomy
Hormonal	Excess/unopposed oestrogen effect
Junctional zone (JZ) disruption	Genetic, immune, or traumatic breakdown of the JZ allows secondary infiltration of basal endometrium into the inner myometrium

- **Asymptomatic** in about one-third — an incidental finding on imaging or hysterectomy specimen.
- **Menorrhagia (~70%)** — from increased uterine cavity/surface area, associated endometrial hyperplasia, and defective antegrade sub-endometrial myometrial contractility.
- **Dysmenorrhoea (~30%)**, progressive and colicky, worse with deeper (≥80%) myometrial penetration of ectopic foci, due to retrograde contractions, local oedema and prostaglandins.
- **Dyspareunia / urinary frequency** from a tender, enlarged uterus.
- **Subfertility and miscarriage** — abnormal junctional-zone contractility, impaired sperm/embryo transport, and altered endometrial immune milieu.
- **Signs** — diffusely, uniformly enlarged, soft, tender uterus, usually not exceeding a 12–14-week gravid size; mobility and adnexa are normal unless endometriosis/fibroid coexists.

Ultrasound features of adenomyosis

Transvaginal sonography (TVS) with colour Doppler is the first-line imaging test; reported accuracy is 68–86%, falling with coexistent fibroids or purely focal disease.

TVS feature	Description
Globular, asymmetrically enlarged uterus	Diffuse enlargement, often more marked posteriorly
Loss of the normal 3-zone myometrial echo pattern	Subendometrial hypoechoic halo/zone thickening — the most characteristic sign
Heterogeneous myometrial echotexture	Poorly marginated, mixed echogenicity
Myometrial cysts ("honeycomb"/"Swiss-cheese" pattern)	Multiple small anechoic myometrial cysts

TVS feature	Description
"Venetian-blind" fan-shaped shadowing	Linear striations radiating from the endometrium, from adjacent smooth-muscle hyperplasia
Ill-defined endometrial-myometrial junction	Irregular, blurred interface, no discrete capsule (unlike a fibroid)
Increased/translesional myometrial vascularity	On colour Doppler, diffusely increased flow within affected myometrium (unlike the peripheral rim vascularity of a fibroid)

- **MRI correlate (used when TVS is equivocal or to differentiate from fibroid):** junctional-zone (JZ) thickness ≤8 mm excludes adenomyosis; JZ ≥12 mm (nonuniform) to >15 mm is diagnostic; ectopic endometrial foci appear as T2-hyperintense cystic spots within a low-signal thickened JZ.
- Ultrasound/MRI findings support a clinical diagnosis; **histological confirmation is possible only at hysterectomy.**

Role of conservative management of adenomyosis

Conservative (uterus-preserving) management — medical therapy and fertility/organ-sparing procedures — is offered to symptomatic women who wish to retain the uterus for fertility, avoid major surgery, or are poor surgical candidates; hysterectomy remains the only definitive cure and is reserved for parous women who have completed childbearing.

Medical option	Regimen	Role
NSAIDs (e.g., mefenamic acid)	During menstruation	First-line for pain and to reduce menstrual blood loss
Levonorgestrel intrauterine system (LNG-IUS)	52 mg device releasing levonorgestrel 20 μg/day, effective 5 years (licensed), often used to 7 years	Reduces menorrhagia and dysmenorrhoea substantially — regarded as a "medical hysterectomy"; first choice when future fertility is not immediately desired
Danazol-loaded IUD	300–400 mg intrauterine device	Improves menorrhagia/dysmenorrhoea with minimal systemic absorption/side effects
Combined oral contraceptives / cyclic progestins	Cyclic or continuous	Modest symptom relief; less effective than LNG-IUS

Medical option	Regimen	Role
GnRH agonists (± add-back therapy)	Depot preparations, short courses	Induce hypo-oestrogenic amenorrhoea, shrink the uterus and relieve pain — useful as a pre-operative/pre-ART bridge in women desiring fertility; add-back oestrogen-progestin limits bone loss and vasomotor symptoms on longer courses

- **Adenomyomectomy** — surgical excision of the adenomyoma with myometrial reconstruction (laparotomy or laparoscopic); uterus- and fertility-preserving.
- **Uterine artery embolisation (UAE)** — occludes blood supply to the adenomyotic myometrium, reducing uterine volume and bleeding; an alternative to surgery in women wishing to avoid hysterectomy, though pregnancy after UAE carries added obstetric risk.
- **Magnetic resonance-guided focused ultrasound (MRgFUS)** — non-invasive focused high-energy ultrasound causing coagulative necrosis of adenomyotic tissue; minimally invasive with fewer complications than UAE, but contraindicated with abdominal wall scars, very large uteri, or when future fertility is desired.
- **Endometrial ablation** — may help superficial disease with heavy bleeding but is not effective for deep adenomyosis and does not address dysmenorrhoea from deep foci.

Conservative measures give good symptomatic relief and preserve fertility potential but do not remove the underlying disease, so recurrence of symptoms is common; **hysterectomy is advised once childbearing is complete or conservative measures fail.**

> **DIAGRAMS TO DRAW — IMAGE SUGGESTIONS**
>
> ☐ *Fig 38.78 — Sonographic view of adenomyosis showing diffusely enlarged uterus with cystic spaces (DC Dutta's Gynaecology 7e, p.572)*

High-yield exam pointers

- Definition: ectopic endometrial glands + stroma in myometrium, ≥1 low-power field deep to endometrial-myometrial junction; diffuse or focal (adenomyoma).
- Classic patient: parous, age >40, uterus enlarged but rarely beyond 12–14 weeks' size, no capsule (unlike fibroid).
- TVS triad to write: subendometrial hypoechoic halo + myometrial cysts ("Swiss-cheese"/honeycomb) + heterogeneous echotexture with "Venetian-blind" shadowing.
- MRI cut-offs: JZ ≤8 mm excludes, JZ ≥12 mm (nonuniform)/>15 mm confirms adenomyosis.
- LNG-IUS numbers: 52 mg total levonorgestrel, releases 20 µg/day, "medical hysterectomy."

- Conservative surgical options: adenomyomectomy, UAE, MRgFUS — fertility-sparing alternatives to hysterectomy.
- Hysterectomy = only definitive cure, for parous women who have completed family.

SOURCE & COVERAGE

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

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