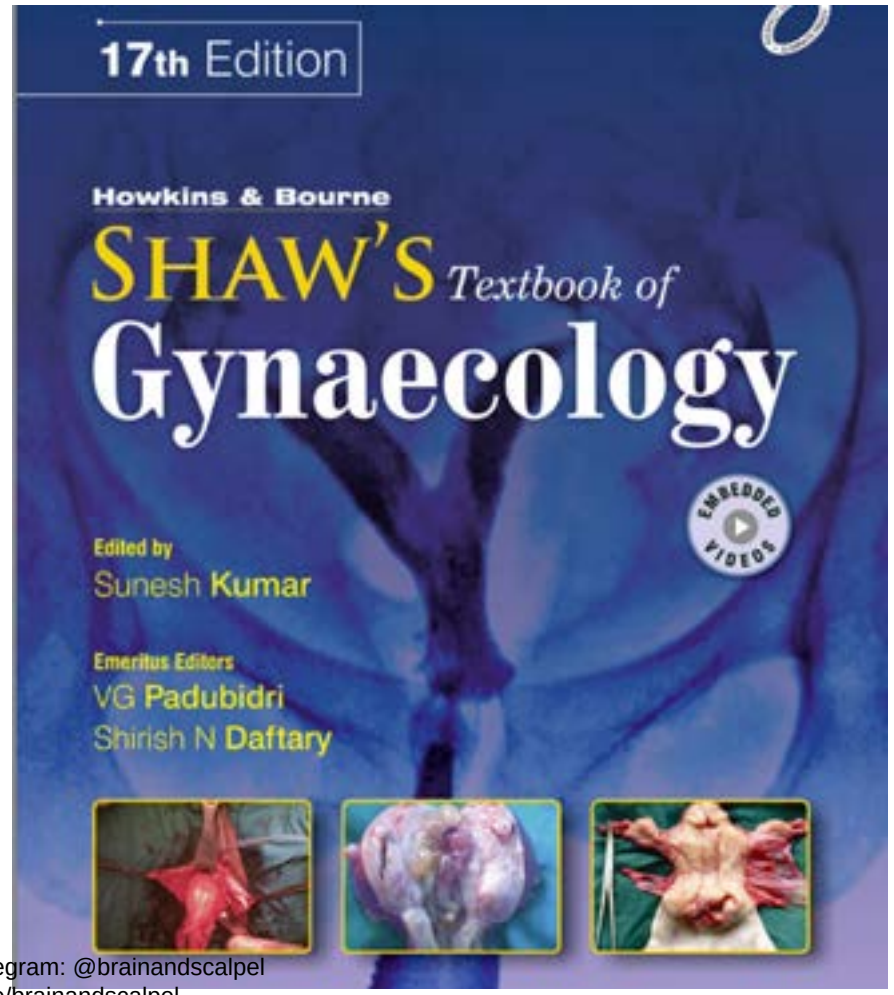
COMPILED MODULE: OBG SPECIAL



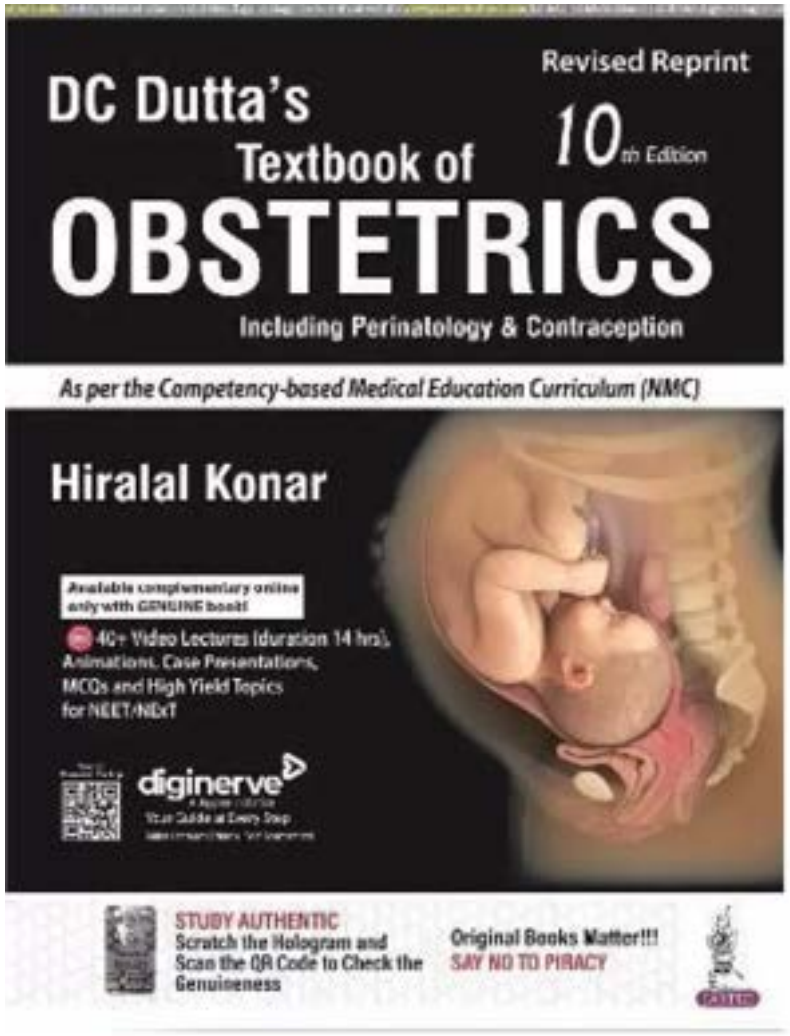
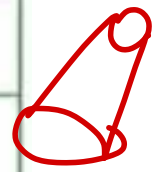


Table 27.1: Abnormal labor patterns, diagnostic criteria and methods of treatm

Labor phase	*Traditional criteria and treatment*		*Obstetrical care consensus criteria*	
Labor disorder	**Nulliparous**	**Multiparous**	**Nulliparous**	**Multiparous**
LATENT PHASE				
Prolongation disorder				
Prolonged latent phase.	>20 hr	>14 hr	▪ **Supportive care:** • Oxytocin or amniotomy. • **CD** not indicated.	▪ **Supportive care:** • Oxytocin or amniotomy. • **CD** not indicated.
ACTIVE PHASE				
Protraction disorders				
▪ Protracted active phase dilation. ▪ Protracted descent.	▪ <1.2 cm/hr ▪ <1 cm/hr	▪ <1.5 cm/hr ▪ <2 cm/hr	▪ **Expectant care.** ▪ **CD** for CPD.	**CD** not indicated.
Arrest disorders				
▪ Prolonged deceleration phase. ▪ Secondary arrest of dilation. ▪ Arrest of descent.	▪ >3 hr ▪ >2 hr ▪ >1 hr	▪ >1 hr ▪ >2 hr ▪ >1 hr	▪ **CD** for CPD. ▪ No CPD: Oxytocin.	**CD indications:** ▪ Ruptured membranes and no progress after 4 hours of adequate contractions. **OR**
▪ Failure of descent.	No descent in deceleration phase or second stage.			▪ No progress after 6 hr of inadequate contractions despite oxytocin stimulation.

[CD: Cesarean Delivery; CPD: Cephalopelvic Disproportion; (ACOG, Cohen)]

First stage of labor	
Definitions of the latent and active first stages of labor	5. The use of the following definitions of the latent and active first stages of labor is **recommended:** • The latent, first stage is a period of time characterized by painful uterine contractions and variable changes of the cervix, including some degree of effacement and slower progression of dilatation **up to 5 cm** for first and subsequent labors. • The active first stage is a period of time characterized by regular painful uterine contractions, a substantial degree of cervical effacement and more rapid cervical dilatation **from 5 cm until full dilatation** for first and subsequent labors.
Duration of the first stage of labor	6. Women should be informed that a standard duration of the latent first stage can vary widely from one woman to another. However, the duration of active first stage (from 5 cm until full cervical dilatation) usually does not extend beyond 12 hours in first labors, and 10 hours in subsequent labors. This is **recommended**.
Progress of the first stage of labor	7. Labor may not naturally accelerate until a cervical dilatation threshold of 5 cm is reached. Therefore, the use of medical interventions to accelerate labor and birth (such as oxytocin augmentation or cesarean section) before this threshold is **not recommended**, provided that fetal and maternal conditions are reassuring.
Clinical pelvimetry on admission	8. Routine clinical pelvimetry on admission in labor is **not recommended** for healthy pregnant women.
Routine assessment of fetal wellbeing on labor admission	9. Auscultation using a Doppler ultrasound device or Pinard fetal stethoscope is **recommended** for the assessment of fetal wellbeing on labor admission.
Perineal/pubic shaving	10. Routine perineal/pubic shaving prior to giving vaginal birth is **not recommended**.
Enema on admission	11. Administration of an enema for reducing the use of labor augmentation is **not recommended**.
Digital vaginal examination	12. Digital vaginal examination at interval of 4 hours is **recommended** for routine assessment of active first stage of labor in low-risk women.
Continuous cardiotocography during labor	13. Continuous cardiotocography is **not recommended** for assessment of fetal wellbeing in healthy pregnant women undergoing spontaneous labor.



Care option (selected)	*Recommendation status*
Intermittent fetal heart rate auscultation	14. Intermittent auscultation of the fetal heart rate with either a Doppler ultrasound device or Pinard fetal stethoscope is **recommended** for healthy pregnant women in labor.
Epidural analgesia for pain relief	15. Epidural analgesia is **recommended** for healthy pregnant women requesting pain relief during labor. This depends on a woman's preferences.
Opioid analgesia for pain relief	16. Parenteral opioids, such as fentanyl, diamorphine and pethidine, are **recommended** options for healthy pregnant women requesting pain relief during labor. This depends on a woman's preferences.
Relaxation techniques for pain management	17. Relaxation techniques such as including progressive muscle relaxation, breathings, music, mindfulness and other techniques are **recommended** for healthy pregnant women requesting pain relief during labor. This depends on a woman's preferences.
Manual techniques for pain management	18. Manual techniques, such as massage or application of warm packs, are **recommended** for healthy pregnant women requesting pain relief during labor. This depends on a woman's preferences.
Oral fluid and food	19. For women at low risk, oral fluid and food intake during labor are **recommended**.
Maternal morbidity and position	20. Encouraging the adoption of mobility and an upright position during labor in women at low risk is **recommended**.
Early amniotomy and oxytocin	21. The use of early amniotomy with early oxytocin augmentation for prevention of delay in labor is **not recommended**.
Antispasmodic agents	22. The use of antispasmodic agents for prevention of delay prevention of delay in labor is **not recommended**.

Second stage of labor	
Definition and duration of the second stage of labor	23. The use of the following definition and duration of the second stage of labor is **recommended** for practice: • The second stage is the period of time between full cervical dilatation and birth of the baby, during which the woman has an involuntary urge to bear down, as a result of expulsive uterine contractions. • Women should be informed that the duration of the second stage varies from one woman to another. In first labors, birth is usually completed within 3 hours whereas in subsequent labors, birth is usually completed within 2 hours.
Birth position (for women with or without epidural)	24. For women with or without epidural analgesia, encouraging the adoption of a birth position of the individual woman choice, including upright positions, is **recommended**.
Method of pushing	25. Women in the expulsive phase of the second stage of labor should **be encouraged and supported** to follow their own urge to push. This is **recommended**.
Techniques for preventing perineal trauma	26. For women in the second stage of labor, techniques to reduce perineal trauma and facilitate spontaneous birth (including perineal massage, warm compresses and a "hands on" guarding of the perineum) are **recommended**, based on a woman's preferences and options available to her.
Episiotomy policy	27. Routine or liberal use of episiotomy is **not recommended** for women undergoing spontaneous vaginal birth.
Fundal pressure	28. Application of manual fundal pressure to facilitate childbirth during the second stage of labor is **not recommended.**
Third stage of labor	
Prophylactic uterotonics	29. The use of uterotonics for the prevention of postpartum hemorrhage (PPH) during the third stage of labor is **recommended** for all births.
	30. Oxytocin (10 IU, IM/IV) is the **recommended** uterotonic drug for the prevention of postpartum hemorrhage (PPH).
	31. In settings where oxytocin is unavailable, the use of other injectable uterotonics (if appropriate, ergometrine/methylergometrine, or the fixed drug combination of oxytocin and ergometrine) or oral misoprostol (600 µg) is **recommended**.
Delayed umbilical cord clamping	32. Delayed umbilical cord clamping (not earlier than 1 minute after birth) is **recommended** for improved maternal and infant health and nutrition outcomes.
Controlled cord traction (CCT)	33. In settings where skilled birth attendants are available, CCT is **recommended.**
Uterine massage	34. Sustained uterine massage is **not recommended** as an intervention to prevent postpartum hemorrhage in women who have received prophylactic oxytocin.

infusion /im

Care option (selected)	*Recommendation status*
Care of the newborn	
Routine nasal or oral suction	35. Suctioning of the mouth and nose should not be performed in the case of neonates born through clear amniotic fluid who start breathing on their own after birth. It is **not recommended**.
Skin-to-skin contact	36. Newborns without complications should be kept in skin-to-skin contact with their mothers during the first hour after birth to prevent hypothermia and promote breastfeeding. This is **recommended**.
Breastfeeding	37. All newborns, including low birth-weight babies who are able to breastfed, should be put to the breast as soon as possible after birth when they are both clinically stable, and the mother and baby are ready. This is **recommended**.
Care of the women after birth	
Uterine tonus assessment	38. Postpartum abdominal uterine tonus assessment for early identification of uterine atony is **recommended** for all women.
Routine postpartum maternal assessment	39. All postpartum women should have regular assessment of vaginal bleeding, uterine contraction, fundal height, temperature and heart rate (pulse) routinely during the first 24 hours starting from the first hour after birth. Blood pressure should be measured shortly after birth, if normal, the second blood pressure measurement should be taken within 6 hours. Urine void should be documented within 6 hours. This is **recommended**.
Discharge following uncomplicated vaginal birth	40. After an uncomplicated vaginal birth in a healthcare facility, healthy mothers and newborns should receive care in the facility for at least 24 hours after birth. This is **recommended**.
Source: World Health Organization; 2020	

Flowchart 26.6: Scheme of management of cord prolapse.

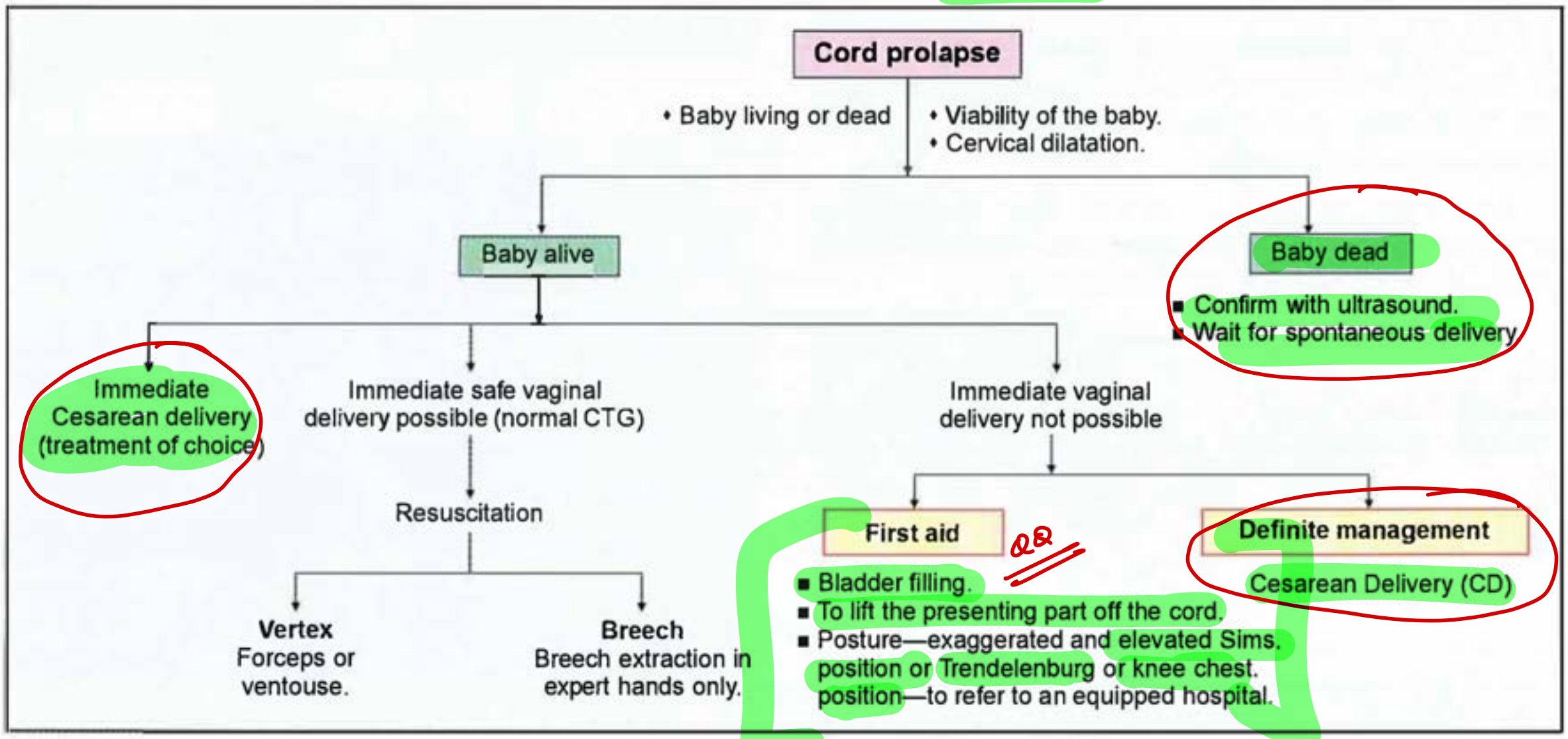


Table 25.1: Difference between constriction ring and retraction ring

	Constriction ring	Retraction ring
Nature	It is a manifestation of localized incoordinate uterine contraction.	It is an end result of tonic uterine contraction and retraction.
Cause	Undue irritability of the uterus.	Following obstructed labor.
Situation	Usually at the junction of upper and lower segment but may occur in other places. Once formed, the position does not alter.	Always situated at the junction of upper and lower segment. The position progressively moves upwards.
Uterus	▪ Upper segment contracts and retracts with relaxation in between; lower segment remains thick and loose **(Fig. 25.3)**. ▪ Polarity is abnormal.	▪ Upper segment is tonically contracted with no relaxation. The wall becomes thicker; lower segment becomes distended and thinned out **(Fig. 25.5)**. ▪ Polarity is normal.
Maternal condition	Almost unaffected unless the labor is prolonged.	Features of maternal exhaustion, sepsis appear early.
Abdominal examination	**a.** Uterus feels normal and not tender. **b.** Fetal parts are easily felt. **c.** Ring is not felt. **d.** Round ligament is not felt. **e.** FHS is usually present.	**a.** Uterus is tense and tender. **b.** Not easily felt. **c.** Ring is felt as a groove placed obliquely. **d.** Round ligaments are taut and tender. **e.** Usually absent.
Vaginal examination	**a.** Lower segment is not pressed by the presenting part. **b.** Ring is felt usually above the head. **c.** Features of obstructed labor are absent.	**a.** Lower segment is very much pressed by the forcibly driven presenting part. **b.** Ring cannot be felt vaginally. **c.** Features are present.
End result	**a.** Maternal exhaustion is a late feature. **b.** Fetal hypoxia usually appears late. **c.** Chance of uterine rupture is absent.	**a.** Maternal exhaustion and sepsis appear early. **b.** Fetal anoxia and even death are usually early. **c.** Rupture uterus in multigravidae is common.
Principle of treatment	To relax the ring followed by delivery of the baby or to cut the ring during cesarean section. Cesarean delivery and to cut the ring, if needed.	Cesarean delivery after excluding rupture uterus.

PPH

- Uterus atonic
  - Massage the uterus to make it hard.
  - To add oxytocin 10–20 units in 500 mL of normal saline, at the rate of 40 drops per minute.
  - Injection methergine 0.2 mg IV (slowly).
  - To examine the expelled placenta.
- Uterus remains atonic
  - Exploration of the uterus
  - Blood transfusion
  - To continue oxytocin drip
- Uterus atonic (medical management)
  - 15 methyl $PGF_{2\alpha}$ 250 µg IM/intramyometrial
    OR
  - Misoprostol 100 µg per rectum
    OR
  - Carbetocin 100 µg IM/IV
  - Tranexamic acid 1 g IV (WHO)
- Uterus atonic
- Uterine tamponade (mechanical)
  - Balloon tamponade (Fig. 28.4)
  - Bimanual compression (Fig. 28.3)
  - Tight intrauterine packing under anesthesia
- Uterus atonic
  - Uterine arterial embolization
  - Surgical methods

Uterus hard and contracted
↓
Traumatic
↓
Exploration
↓
Hemostatic sutures on the tear sites

Commonly used oxytocics in the management of PPH

Drug	Dose	Route	Dose frequency	Side effects	Contra-indications
Oxytocin	10–40 units in 1 L of crystalloid solution	First line: IV; Second line: IM (10 units)	Continuous IV	• Nausea • Water intoxication • Hyponatremia cerebral edema, convulsions	Not as IV bolus, otherwise none
Methergine	0.2 mg	First line: IM/IV; Second line: PO	Every 2–4 hours	• Nausea • Vomiting • Hypertension	• Hypertension • Pre-eclampsia
15 methyl $PGF_{2\alpha}$	0.25 mg	First line: IM; Second line: Intrauterine	Every 15–90 min (8 doses maximum)	• Nausea • Vomiting • Diarrhea	• Bronchial asthma • Active cardiac, renal or hapatic disease
Misoprostol (PGE_1) [Table 34.6, p. 468]	600–1000 µg	First line: SL; Second line: PR	Single dose	• Fever • Tachycardia	None
Tranexamic Acid (TXA)	1 g in 10 mL	IV	30 min	–	Avoid in patients with history of VTE.

Box 32.1: Doppler changes in fetal circulation and its correlation with progressive fetal hypoxia and acidosis (sequence of events).

Fetal circulation:

- **UA** : ↓EDV (UA PI ↑) (fetal hypoxia)
  ↓
- **MCA** : ↑Diastolic flow (MCA PI ↓)
  ↓
  Hypoxic response: Blood flow redistribution
  ↓
- **UA** : **Absent flow (AEDFV)**
  ↓
- **MCA** : ↑PSV
  ↓
- **UA** : Reverse flow (fetal hypoxia)
  ↓
- **DV** : Absent/Reversed flow (hypoxia/acidemia)
  ↓
- **UV** : Pulsatile flow (acidemia)

(UA: Umbilical Artery; MCA: Middle Cerebral Artery; DV: Ductus Venosus; UV: Umbilical Vein; AEDFV: Absent End Diastolic Flow Velocity)

UA → MCA → DV → UV

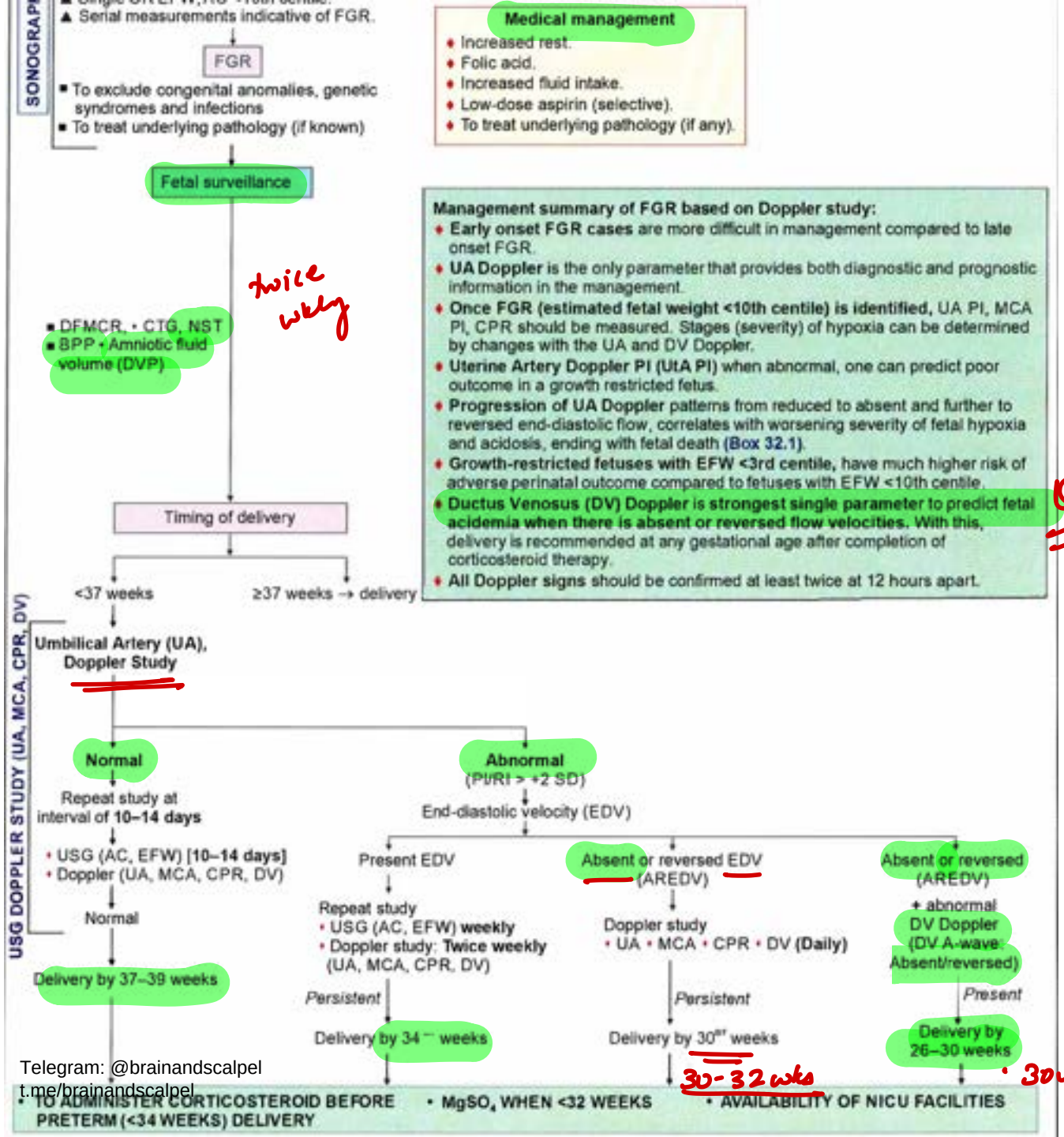
IUGR

early vs late preclamp

34 wks

Table 32.3: Features of early onset and late onset growth restricted fetuses.

Early onset: 20%	*Late onset: 80%*
Uniformly small	Head larger than abdomen.
Ponderal index (birth weight/Crown-heel length^3)—normal.	Low
HC: AC and FL: AC ratios—normal.	Elevated.
Etiology: ■ Genetic syndromes (5%), aneuploidy, triploidy, trisomy 13, 18. ■ Infection—intrinsic to fetus. ■ Early onset severe hypertension.	Chronic placental insufficiency—extrinsic to fetus, constilunally small.
Definition for fetal growth restriction	
Early-onset FGR (<32 weeks)	**Late-onset FGR (≥32 weeks)**
■ EFW or AC <3rd percentile. OR UA with AREDV. OR ■ EFW or AC <10th percentile, combined with one or more of the following: a. UA PI >95th percentile b. UtA PI >95th percentile (EFW: estimated fetal weight) FIGO–2021	■ EFW or AC <3rd percentile OR ■ **≥2 of the following three criteria:** a. EFW or AC <10th percentile. b. EFW or AC crossing percentiles; >2 quartiles on growth percentiles. c. CPR <5th percentile or UA PI >95th percentile.



QQ

absent 34
reversal 32
DV abN 30
} steroids

30-32 wks

• 30wks

Table 11.5: Fetal maturity tests.

Test	Positive cutoff value	Positive predictive value	Comments
TDx-FLM	>55	96–100%	Simple test.
L/S ratio	>2.0	95–100%	Large laboratory variation.
PG	"Present"	95–100%	Can use vaginal pooled sample.
Lamellar body counts	30–40,000	97–98%	Still investigational.
Optical density	OD 0.15	98%	Simple test.
Foam stability index	>47	95%	Affected by meconium, blood.

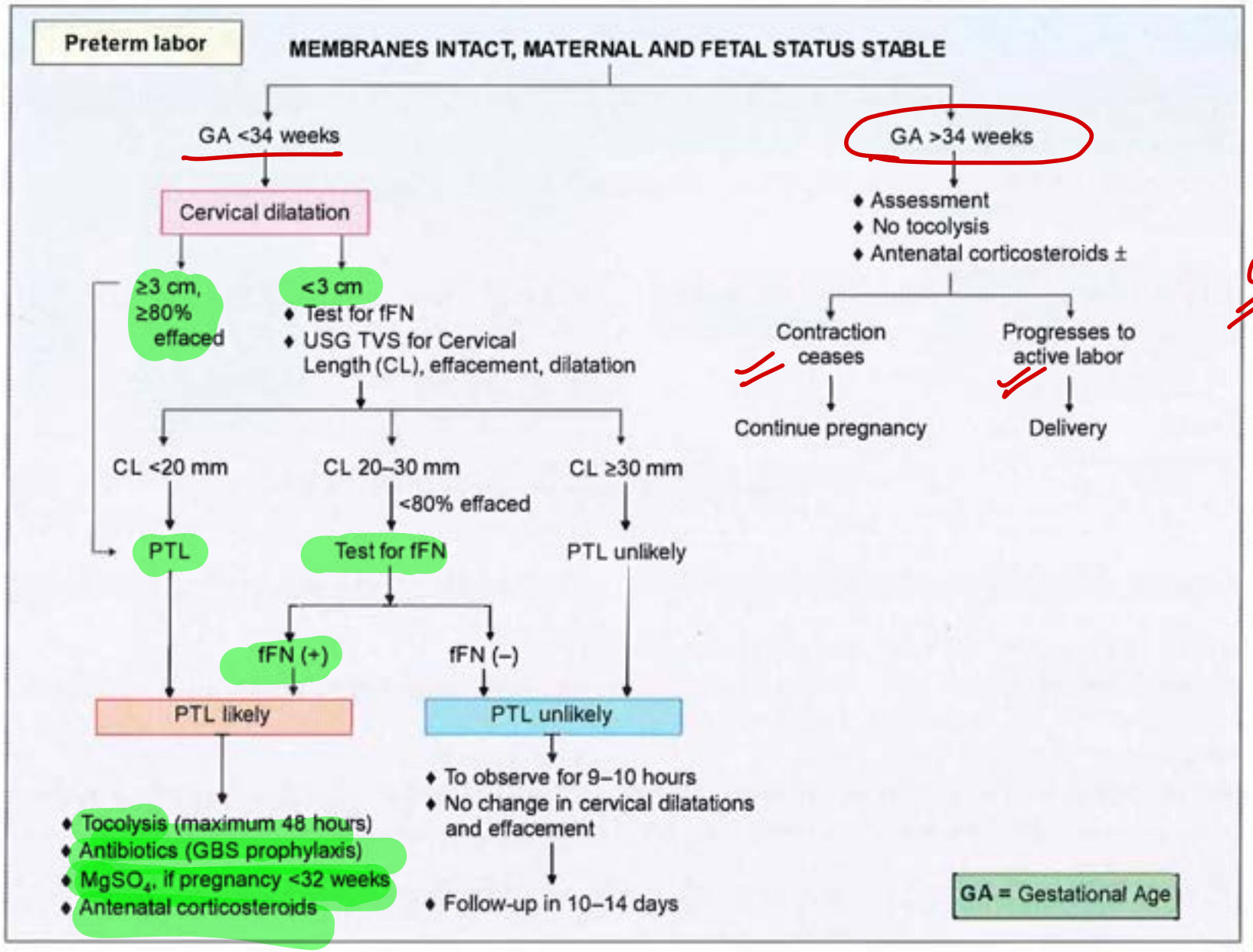
(FLM: Fetal Lung Maturity; L/S: Lecithin/Sphingomyelin; PG: Phosphatidylglycerol)

Table 22.1: Diagnostic tests for chorioamnionitis.

Test	Abnormal finding
Maternal WBC	>15000 cells/mm^3 with a preponderance of neutrophils.
Amniotic fluid glucose	≤10–15 mg/dL.
Amniotic fluid IL-6	≥7.9 ng/mL.
Amniotic fluid leukocyte esterase	≥1 reaction.
Amniotic fluid Gram stain	Any organism in an oil immersion field.
Amniotic fluid culture	Growth of any aerobic or anaerobic pathogen.

- **PROM** is defined as the rupture of membranes anytime beyond 24 weeks of pregnancy but before the onset of labor. PROM may be term or preterm (**PPROM**) when it occurs before 37 completed weeks of pregnancy.
- **Neonatal complications** after PROM is inversely related to the gestational age at the time of PROM and at delivery.
- **Fetal complications** after PROM include infection and fetal distress due to umbilical cord compression.
- **Neonatal complications** are RDS, NEC, IVH, Bronchopulmonary Dysplasia (BPD), PDA, sepsis and pulmonary hypoplasia.
- **Maternal complications** of PROM are: Chorioamnionitis, placental abruption, sepsis and maternal death, the birth weight at delivery.
- **Antenatal corticosteroid** therapy after PROM reduces the risk of RDS, IVH and NEC. It does not increase the risk of maternal and neonatal sepsis.

Flowchart 22.2: Management of a preterm labor.



PTL

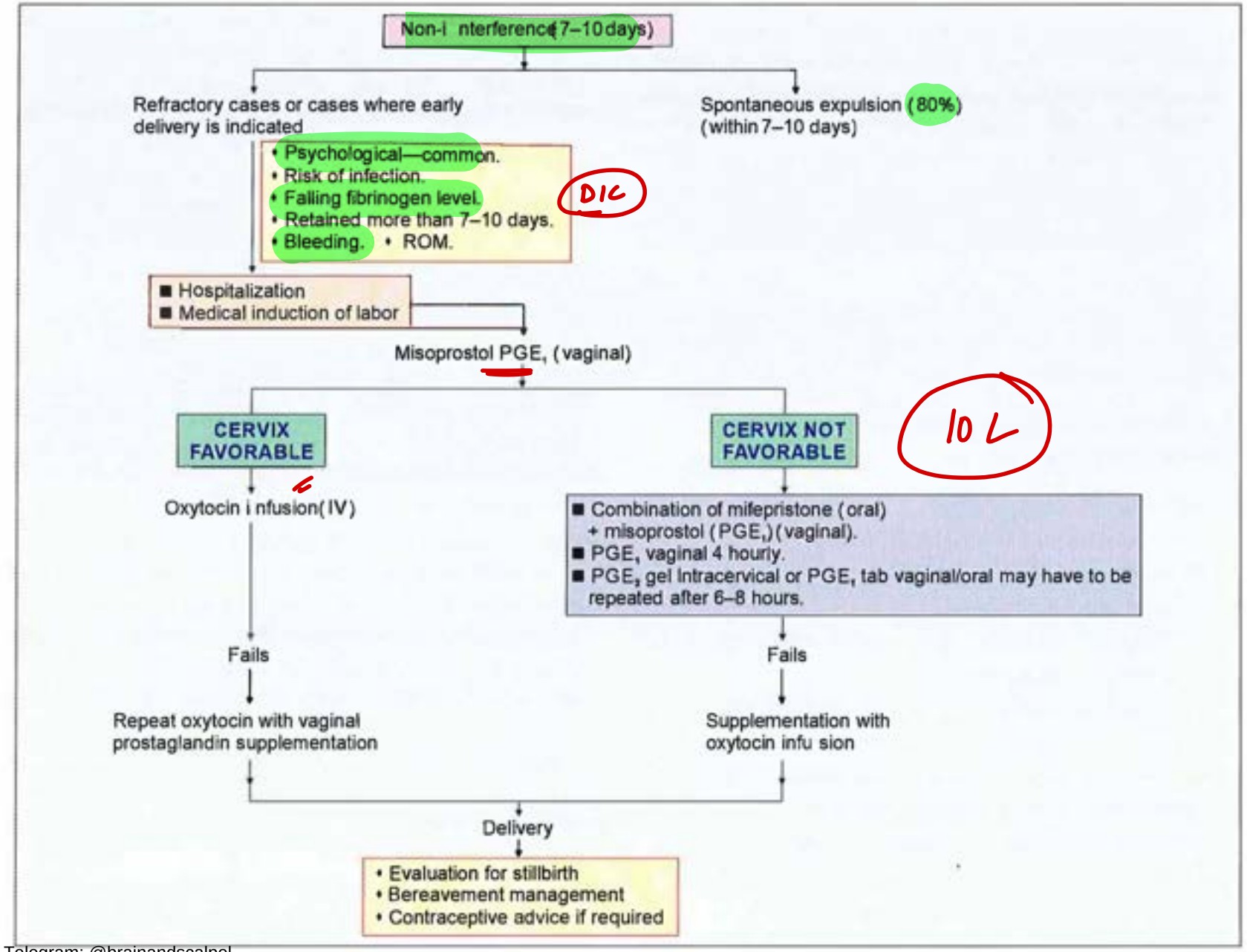
Regular uterine contractions with or without pain (≥4 every 20 minutes or >8 in 60 minutes) AND ♦ Cervical dilatation ≥2 cm OR ♦ Cervical effacement ≥80%. ♦ TVS: Cervical dilatation ≥20 mm and positive fFN. ♦ Pelvic pressure, backache and/or vaginal discharge or bleeding. ■ **Cervical length ≥30 mm, PTL is unlikely regardless of contraction frequency.**

Fibronectin is a glycoprotein that binds the fetal membranes to the decidua. Normally it is found in the cervicovaginal discharge before 22 weeks and again after 37 weeks of pregnancy. Presence of fibronectin (>50 ng/ mL) in the cervicovaginal discharge **between 24 and 34 weeks** is a predictor of preterm labor. *When the test is negative it reassures that delivery will not occur within next 7 days.*

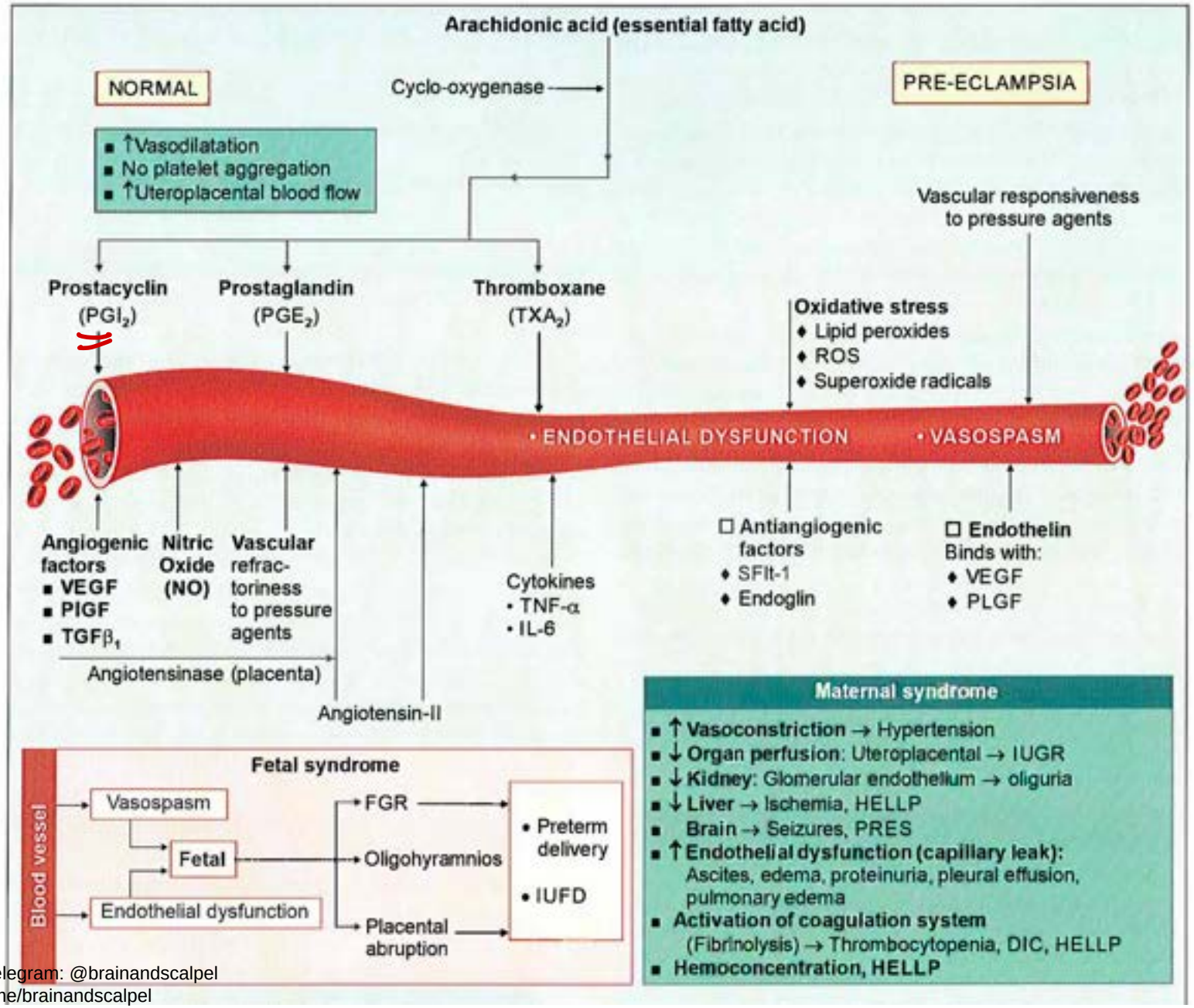
34-37 wks - late
32-34 - early
28-32 → v. early
<28 → extreme preterm

➤ **Presence of fetal fibronectin** in the cervicovaginal discharge (>50 ng/mL) between 22 and 34 weeks of pregnancy is a good predictor of preterm labor.

Flowchart 22.6: Scheme of management of IUFD.



Flowchart 18.1: Etiopathology of pre-eclampsia.



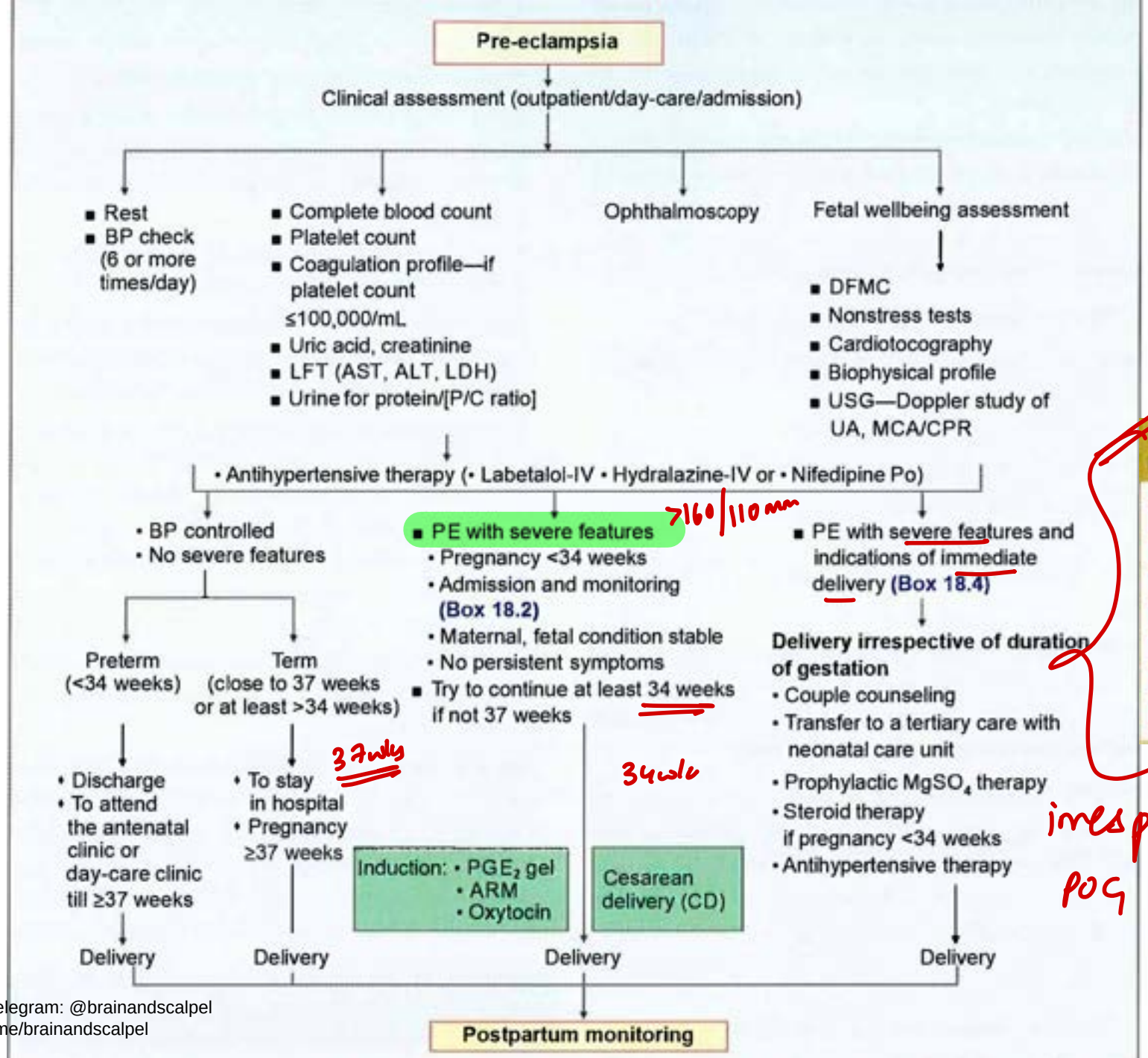
VASOSPASM ↑

endothelin AT-II

sFlt-1 TXA_2

vasodilator ↓

NO PGI_2



Box 18.4: Indications of delivery without delay in PE with severe features.

- Persistent symptoms of severe pre-eclampsia.
- Pulmonary edema/hypoxia (PaO_2 <95%).
- Hepatocellular injury: Increased AST, ALT (× twice the normal).
- Oliguria <500 mL/24 hours. ▪ Persistent cerebral symptoms.
- Abnormal coagulation profile.
- FGR with nonreassuring fetal status.
- Eclampsia. ▪ Serum creatinine >1.1 mg/dL.
- UA-Doppler: REDF.

Table 18.2: Commonly used drugs in the management of pre-eclampsia.

Drug	*Mode of action*	*Dose*	*Comments (Table 18.3)*
Labetalol	Adrenoceptor antagonist (α and β blockers).	100 mg tid or qid	To avoid in cases with asthma, heart block, bradycardia, myocardial disease.
Nifedipine	Calcium channel blocker.	10–20 mg bid	Causes tachycardia and headache.
Hydralazine	Vascular smooth muscle relaxant.	10–25 mg bid	Hypotension, headache, abnormal FHR tracings or **Table 18.3.**

Table 18.3: Commonly used drugs in the management of severe hypertension.

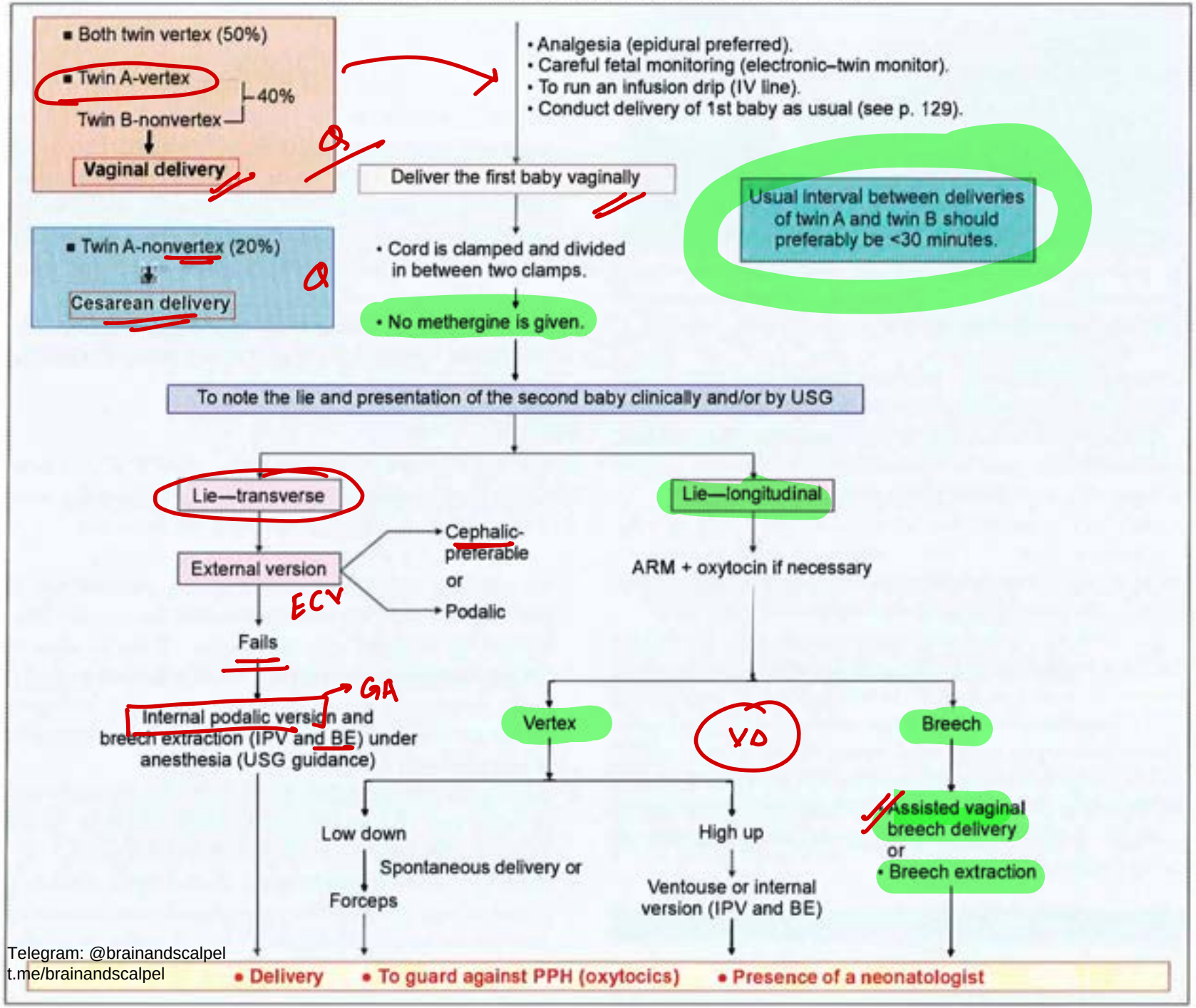
Drug	*Onset of action*	*Dose schedule*	*Maximum dose*	*Maintenance dose*	*Side effects*
Labetalol	5 min	10–20 mg IV every 10 minute.	300 mg IV	40 mg/h	Avoid in: asthma, myocardial disease, heart block, bradycardia.
Hydralazine	10 min	5 mg IV every 30 minute.	30 mg IV	10 mg/h	Maternal hypotension, headaches, abnormal FHR tracings.
Nifedipine	10 min	10–20 mg oral, can be repeated in 30 minute.	240 mg/24 h	4–6 hour interval	Reflex tachycardia and headache.
Nitroglycerin Sodium nitroprusside	0.5–5 min	5 µg/minute IV 0.25–5 µg/kg/minute IV.	Short-term therapy only when the other drugs have failed.		Flushing, hypovolemia, cyanide toxicity.

Box 18.7: Detection of magnesium toxicity.

- Loss of deep tendon reflexes.
- Decreased respiration rate (<16 per minute).
- Urine output (<30 mL/h).
- Chest pain, heart block, pulmonary edema.
- O_2 saturation monitoring (PaO_2 <95%).

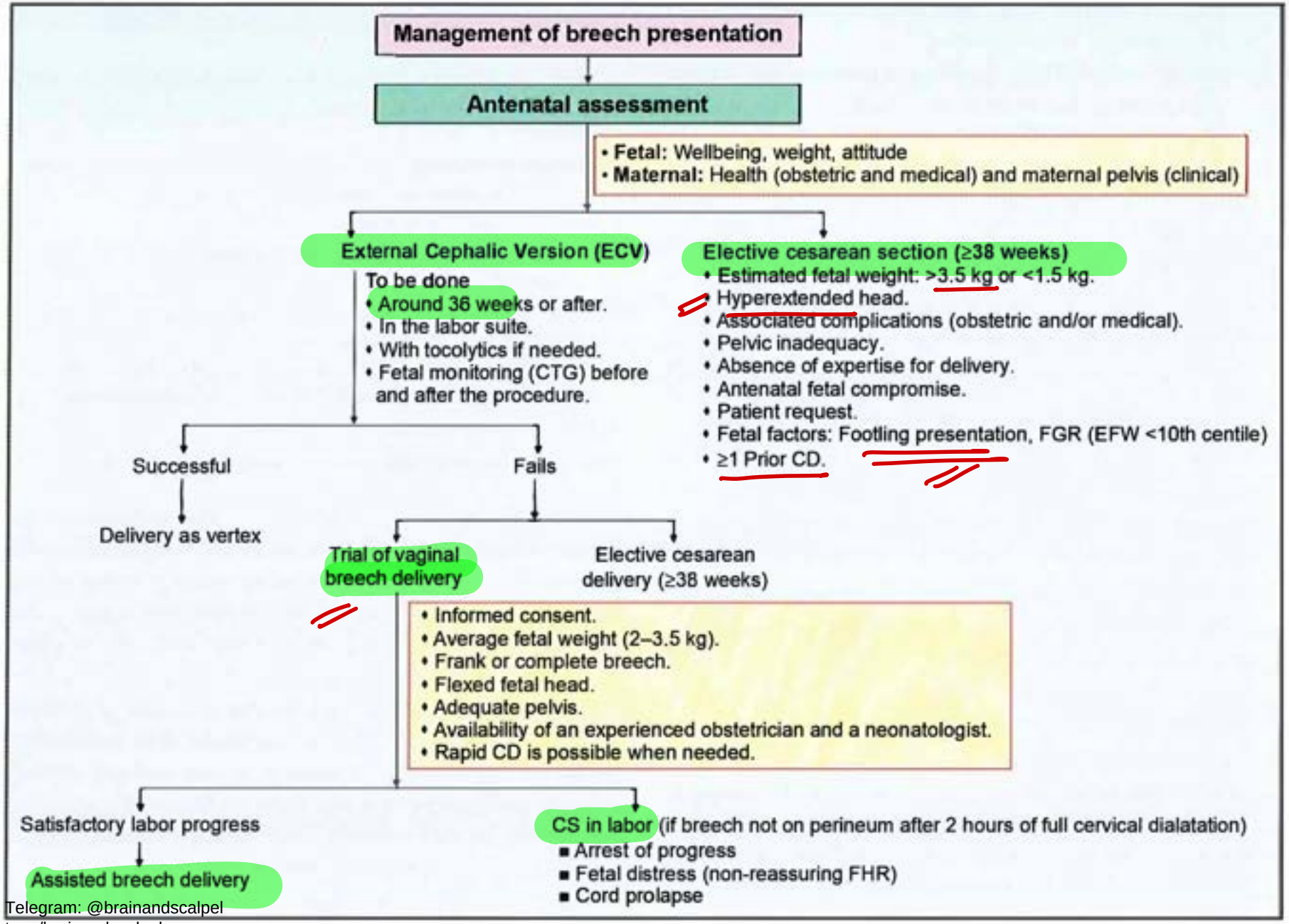
Box 18.8: Management for magnesium toxicity.

- To stop magnesium therapy.
- Estimation of serum magnesium and creatinine levels.
- Injection calcium gluconate 10 mL (10% solution), IV slowly.
- Fluid loading and forced diuresis.



TWIN DELIVERY

Flowchart 26.3: Scheme for management of breech presentation.



Box 29.2: Classification of obstetric anal sphincter injury (RCOG–2007).

First degree: Injury to perineal skin only.

Second degree: Injury to perineum involving perineal body (muscles) but not involving the anal sphincter.

Third degree: Injury to perineum, involving the anal sphincter complex (both external and internal):

- 3a : <50% of EAS thickness torn.
- 3b : >50% of EAS thickness torn.
- 3c : Both EAS and IAS torn.

Fourth degree: Injury to perineum involving the anal sphincter complex (EAS and IAS) and anal epithelium **(Fig. 29.1)**.

INTRAPARTUM CARE

Management of an untreated women in labor at term: She should be given a start of nevirapine 200 mg, zidovudine 300 mg, lamivudine 150 mg bd and raltegravir 400 mg bd and to administer injection zidovudine IV for the duration of labor.

- **Elective cesarean delivery** reduces the risk of vertical transmission by about 50%. Avoidance of breastfeeding, HAART therapy and appropriate mode of delivery has reduced MTCT rates from 25–30% to <1%. Baby may be bathed immediately.
- **Planned cesarean delivery** is recommended (RCOG-2019) at 39 weeks for women taking HAART who have plasma viral load >50 mcopies/mL measured at 36 weeks.
- **Amniotomy and oxytocin augmentation** for vaginal delivery should be avoided whenever possible.
- **Invasive procedures** that might result in break in the skin or mucous membrane of the infants (procedures like attachment of scalp electrode and determination of scalp blood pH) are contraindicated. Instrumentation (ventouse) is avoided.
- **Delayed cord clamping** is safe and reduces neonatal anemia.
- **Intrapartum IV ZDV** is not advised for women receiving ART regiments with HIV RNA copies <50/mL near delivery.
- **Perioperative or peripartum broad spectrum antibiotics** should be given as per hospital protocol.
- **Caps, masks, gowns** and double gloves (PPE kits) should be worn. Protective eyewear (goggles) should be used.
- **Blunt tipped needles** should be used to avoid needle stick injury and washing on any blood contamination from the skin immediately. Appropriate sterilization of instruments and linens should be done.

Chemoprophylaxis: Chloroquine is given unless proved resistant. It is taken 300 mg base weekly, 2 weeks before travel and covering the period of exposure and 4 weeks after leaving the endemic zone. Mefloquine 5 mg/kg/week is the alternative drug in second and third trimesters when chloroquine is found resistant.

Treatment: Risks of malaria is life-threatening in pregnancy. So benefits of treatment **outweigh the potential risk of antimalarial drugs.** **Chloroquine**—600 mg base PO followed by 300 mg 12 hours later. Then 300 mg daily for next 2 days. To prevent relapse during pregnancy, 300 mg is to be taken weekly until delivery. For radical cure, **primaquine should be postponed** until pregnancy is over. **Parasites resistant to chloroquine** should be given **quinine** (10 mg salt/kg PO > every 8 hours for 7 days) under supervision. Patients with severe anemia may need blood transfusion. The antimalarial drugs when given in therapeutic doses, have got no effect on uterine contraction unless the uterus is irritable. **Folic acid 10 mg should be given daily to prevent megaloblastic anemia.**

Complicated malaria: Artesunate IV 2.4 mg/kg at 0, 12 and 24 hours, then daily thereafter. Oral therapy (2 mg/kg) is started when the patient is stable. Alternatively Quinine IV followed by oral therapy is given. Artesunate act very fast and resistance is rare. It is as effective as IV Quinine. Use is limited in the second or third trimesters of pregnancy only when other drugs are found resistant.

PLACE OF CESAREAN SECTION: Vaginal delivery is always preferred. Cesarean delivery is for obstetric indications.

CARDIAC INDICATIONS OF CESAREAN DELIVERY (CD)

- Coarctation of aorta.
- Aortic dissection or aneurysm.
- Dilated aortic root >4 cm.
- Warfarin treatment within two weeks.
- Severe symptomatic aortic stenosis.
- Recent myocardial infarction.
- Need for emergency valve replacement.

In coarctation of aorta, elective cesarean section is indicated to prevent rupture of the aorta or mycotic cerebral aneurysm. *The anesthesia should be given by expert anesthetist using either epidural (preferred) or general anesthesia.*

Table 10.3: Procedures of routine prenatal care.	
Initial obstetric visit	History taking and physical examination.
Investigations	▪ Blood for ABO and Rh type, antibody screen, CBC, rubella, Hb electrophoresis (if at risk for hemoglobinopathy), urine culture, VDRL, HBV, HIV, cervical cytology. ▪ USG to confirm gestational age, viability, and number of fetuses. ▪ Offer genetic testing based on personal or family history.
11–14 week gestation (TVS)	Aneuploidy screening option: first trimester screen (Ch. 12).
16–20 week gestation	Aneuploidy screening option: quadruple ("quad") screen, NIPT (Ch. 12).
18–22 week gestation	Ultrasound evaluation of fetal anatomy and placental location (routine).
24–28 week gestation	CBC, GDM screening.
36 week gestation	USG to verify fetal presentation, fetal growth profile.

TIFFA

Growth scan

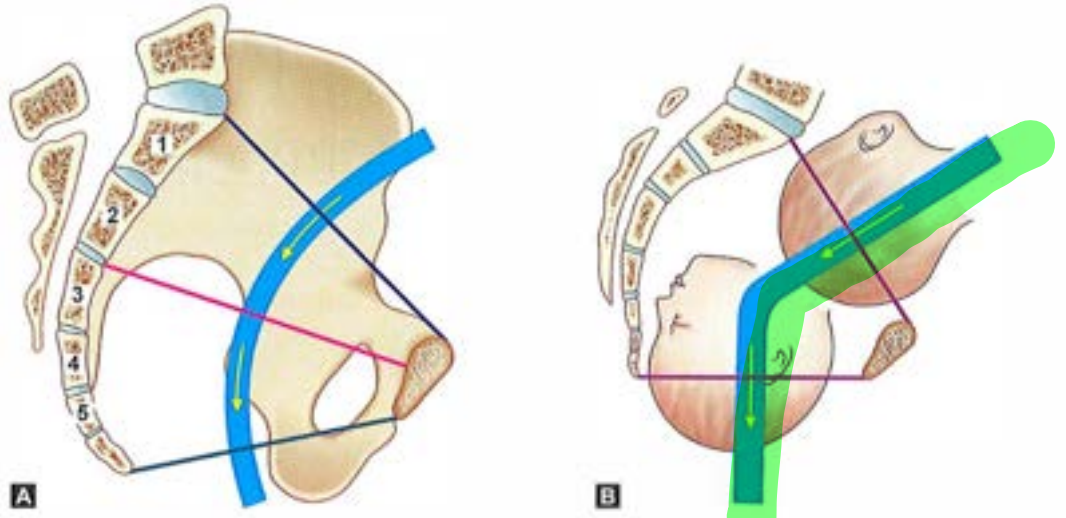
Fetal ECHO

↳ 22-24 wks

is measured above the symphysis pubis. **Following delivery, the fundus lies about 13.5 cm (5 1/2") above the symphysis pubis. During the first 24 hours, the level remains constant; thereafter, there is a steady decrease in height by 1.25 cm (0.5") in 24 hours, so that by the end of 2nd week the uterus becomes a pelvic organ.** The rate of involution thereafter slows down until by 6 weeks, the uterus becomes almost normal in size.

Box 9.1: Obstetric significance of plane of least pelvic dimension.

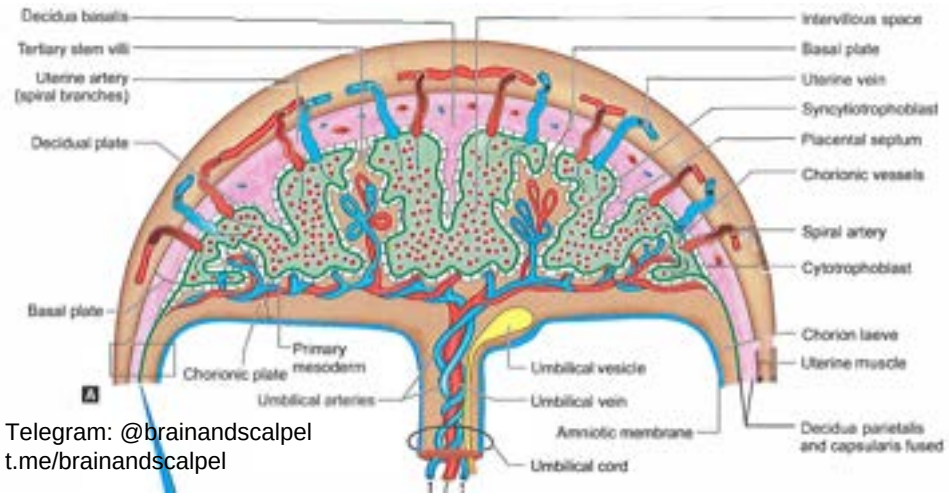
- It is the **narrowest** plane in the pelvis.
- This plane corresponds roughly to the **origin of levator ani** muscles **(Fig. 9.16)**.
- It is at this plane that the **internal rotation** of the fetal head occurs during labor.
- It marks the **beginning of the forward curve** of the pelvic axis **(Fig. 9.17)**.
- It is a landmark used for **pudendal nerve block** analgesia.
- This level of ischial spines indicate **station 'O'**.
- When the fetal head station is at 'O', **head is considered to be engaged**.
- **DTA** usually occurs at this plane.



Figs. 9.17A and B: Pelvic axis: **(A)** Axis of inlet, cavity and outlet are shown by arrows drawn perpendicular to the planes. The shaded area over the axis is the anatomical pelvic axis (curve of Carus); **(B)** Obstetric pelvic axis—as shown by the shaded area is directed downward and backward up to ischial spines and then directed forward.

POINTS

- **Human placenta** is a discoid (disk-shaped), deciduate (covered externally by decidual cells), labyrinthine (hugely branched villous tree) and hemochorial (maternal and fetal blood are separated by the chorionic tissue) type.
- **The placenta at term** has a diameter of 15–20 cm with two surfaces. Fetal surface appears smooth and glistening as it is covered with amnion. The maternal surface is rough, shaggy and is marked by cotyledons.
- **Intervillous Space (IVS)** is bounded internally by the chorionic plate and externally by the basal plate. The space is lined by syncytiotrophoblasts. IVS is filled with maternal blood **(Figs. 3.3 and 3.4)**.
- **Decidual septa** are the projections from the basal plate within the IVS. The areas between the septa are called cotyledons **(Figs. 3.3A and 3.7)**.
- **Placental circulation includes:** (a) uteroplacental (maternal blood reaching the IVS through the spiral arterioles) and (b) fetoplacental (following exchange, oxygenated blood is carried away by the umbilical vein). The blood flow in the IVS is 500–600 mL/min **(Table 3.1)**.
- **Placental barrier consists of the following layers:** (a) syncytiotrophoblasts, (b) cytotrophoblasts, (c) basement membrane, (d) stromal tissue and (e) endothelium of fetal capillaries **(Figs. 3.9 and 3.10A and B)**. It is about 0.025 mm thick and at term it is thinned out to 0.002 mm.
- **Trophoblast proliferation**, invasion and placental angiogenesis are dependent on oxygen mediation.
- **Trophoblast cells**, not covering the villous structure are the Extravillous Trophoblasts (EVT). EVT are of two types: (a) endovascular and (b) interstitial **(Fig. 3.6)**.
- **Failure of invasion** of extravascular trophoblasts results in pregnancy complications like pre-eclampsia and FGR.



Decidua
maternal - basalis
fetal - C/P

- **Hormones of the placenta** includes hypothalamic like hormones (CRH, GnRH, TRH), pituitary like hormones (ACTH, hCG, hCT, hPL). Others are: pregnancy proteins, growth factors (TGF-β) and steroid hormones (estrogens, progesterone, cortisol).
- **hCG** is a glycoprotein. β subunit of hCG is specific whereas α subunit is similar to LH, FSH and TSH.
- **hCG stimulates** corpus luteum, adrenal and thyroid glands and the placenta. Doubling time of hCG is 1.4–2 days. Between 60 and 70 days of pregnancy blood level of hCG reach maximum (100–200 IU/mL), thereafter it falls slowly to 10–20 IU/ mL.
- **Human placenta lactogen** antagonizes insulin action. It causes maternal lipolysis and promotes transfer of glucose and amino acids to the fetus.
- **Maternal serum levels of FSH and LH** are decreased significantly due to negative feedback inhibition from elevated levels of estrogen, progesterone and inhibin.
- **Steroid hormones** (estrogen and progesterone) together play an important role in the maintenance of pregnancy. They help physiological adaptation in all the body system including the changes in the breasts.
- **Daily iodine requirement during pregnancy** is increased to 200 µg/day (WHO). Gestational transient thyrotoxicosis in first trimester may be due to the thyrotrophic effect of hCG. During pregnancy maternal total T_4 and T_3 are increased but free T_4 and T_3 levels are unchanged. Maternal TSH remains normal.
- **Fetal thyroid** starts function after 12 weeks. Transient gestational thyrotoxicosis may be due to thyrotrophic effect of placental hCG. T_4 crosses the placenta and the fetus is dependent upon maternal T_4 supply for normal neurologic development. T_4 and TRH cross the placenta. TSH crosses very minimally.
- **Parathyroid Hormones (PTH)** do not cross the placenta but the calcium ions do cross against the concentration gradient.
- **The levels of total cortisol** (metabolically active) rise nearly three times compared to the nonpregnant values. This is mainly due to the marked rise in the levels of CRH, ACTH both from the pituitary and the placenta.
- **Pituitary gland** enlarges in pregnancy with the proliferation of prolactin producing cells. Sudden hypotension (PPH) may cause infraction (Sheehan syndrome) of the gland. Secretion of prolactin, CRH, and oxytocin rise significantly during pregnancy.
- **During pregnancy**, there is increased serum levels of: ACTH, aldosterone, deoxycorticosterone, CBG, and cortisol. Pregnancy is a state of physiologic hypercortisolism.

Table 2.1: Important events following fertilization.			
'0' hour	— Fertilization (day-15 from LMP).	10–11th days	— Trophoblasts invade endometrial sinusoids establishing uteroplacental circulation. — Interstitial implantation completed with entire decidual coverage.
30 hours	— 2-cell stage (blastomeres).		
40–50 hours	— 4-cell stage.		
72 hours	— 12-cell stage.		
96 hours	— 16-cell stage. Morula enters the uterine cavity.	13th day	— Primary villi.
5th day	— Blastocyst.	16th day	— Secondary villi.
4–5th days	— Zona pellucida disappears.	21st day	— Tertiary villi.
5–6th days	— Blastocyst attachment to endometrial surface.	21st–22nd days	— Fetal heart. Fetoplacental circulation.
6–7th days	— Differentiation of cyto- and syncytiotrophoblastic layers.	5.0 weeks	— EEC (gestational sac on USG).
10th day	— Synthesis of hCG by syncytiotrophoblast.	5.5 weeks	— Yolk sac.
9–10th days	— Lacunar network forms.	12th week	— Obliteration of EEC (Figs. 2.9A to C).

USG FHR 6-5 wk ↓

- **MRI is safe in pregnancy**; however, it is a good practice to avoid MRI during pregnancy, particularly for elective studies or in the first trimester (ACOG).
- **MRI is devoid of any ionizing radiation.**
- **IV gadolinium is contraindicated in pregnancy**. It should be used only if absolutely essential.
- **CT of the fetus should be avoided** in all the trimesters of pregnancy as the main concern is carcinogenesis. Risks of teratogenesis is less. CT pulmonary angiogram is the preferred modality for imaging of suspected pulmonary embolism.
- **Use of radiology** in obstetrics is very limited.
- **Exposure or radiation >15 rad** during second or third trimester or **>5 rad** in first trimester is hazardous. Patient needs to be counseled for elective termination of pregnancy.

Step 1: Left blade of the forceps is introduced first. The left handle is held by the three fingers (index, middle and the thumb) of the left hand. Thumb pressure is used to introduce the blade under guidance of the fingers of the right hand.

Step 2: Locking of the blades. Blades are locked easily when applied correctly **(bimalar, biparietal placement)**.

ep 5: The blades are removed. Head is delivered slowly. **Ritgen's maneuver is performed.**

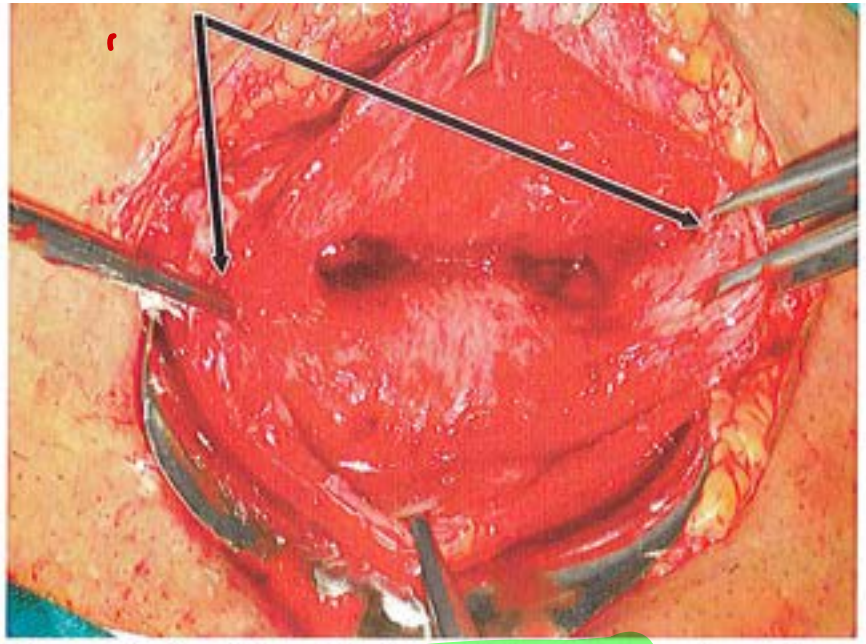
Step 6: Delivery of the shoulder. Note that the bisacromial diameter lies in the anteroposterior diameter of the outlet of the pelvis. Also note that the anterior shoulder is being released slowly from under the symphysis pubis.

Step 3: Direction of pull: First—downwards and backwards until the head is in perineum. Straight and horizontal (seen) towards the operator.

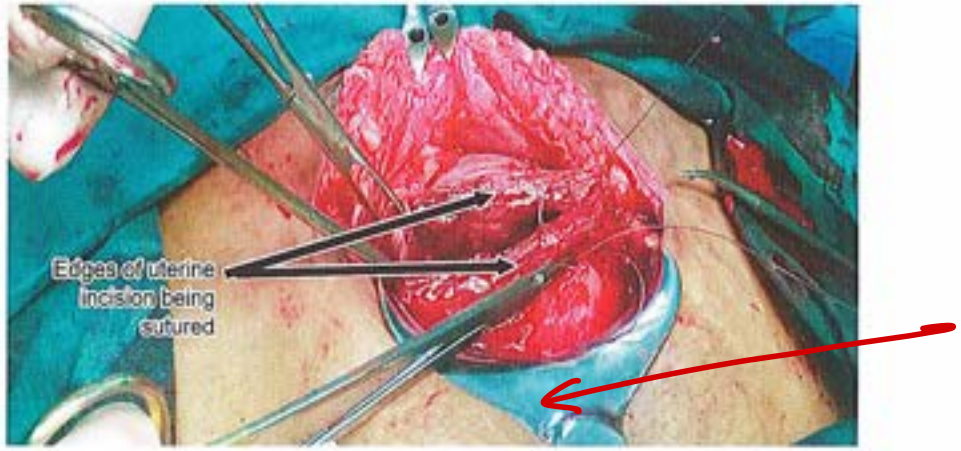
Step 4: Pull is now changed and directed upwards and forwards towards the mother's abdomen. The head is delivered slowly by extension.

p 7: Delivery of the trunk and that of the baby is done completely.

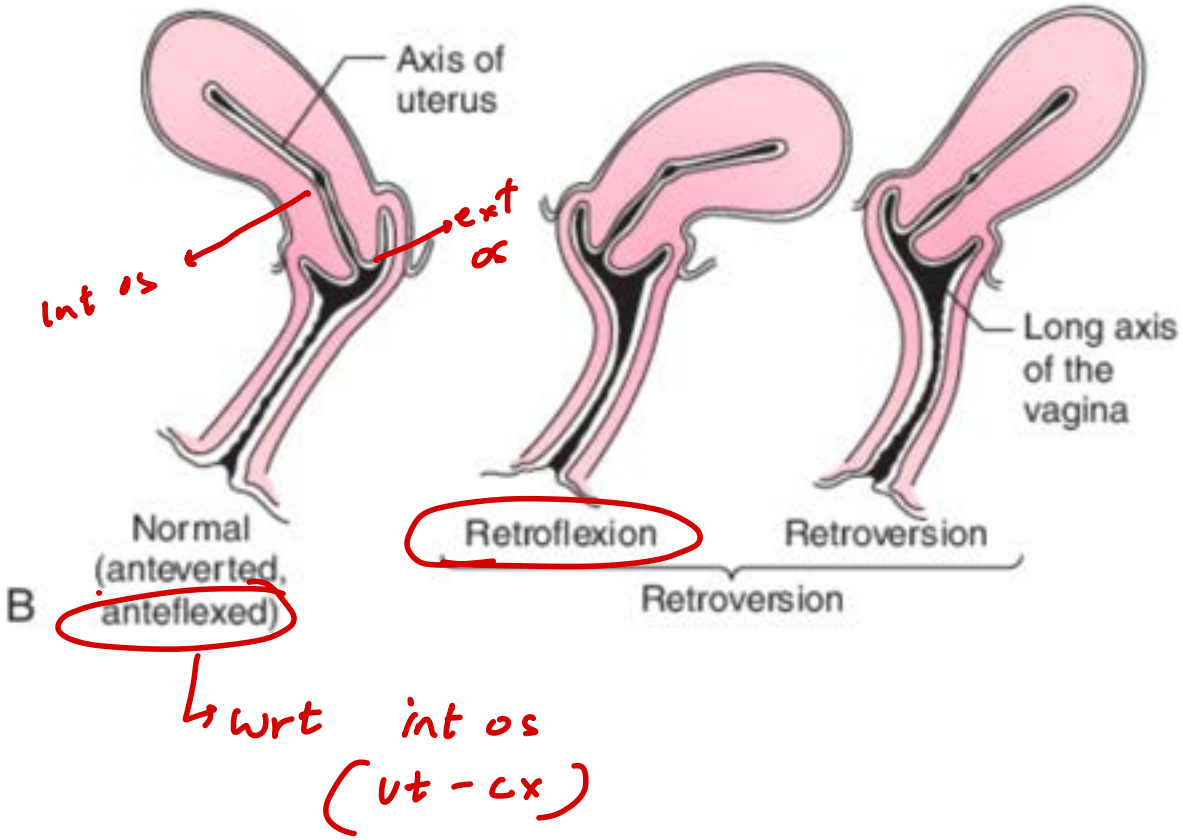
Step 8: Immediate care of the newborn is done. Cord clamping and Apgar rating is done.



Step 9: The uterine wound is seen following delivery. Usually four Allis's tissue forceps (Green Armytage forceps) are used to hold the incision margins, two (one each) on the angles of incision. Another two (one each) on the upper and lower uterine flap.



Step 10: Suturing of the uterine wound. It is done in two or three layers. It may be done keeping the uterus in the abdominal cavity or delivering it out (eventration). **Suture material is No. '0' chromic catgut or Vicryl-0 with round bodied needle.** A continuous running suture taking deeper muscles is made. A similar suture is placed taking the superficial muscles overlapping the first layer. Nonclosure of the visceral peritoneum is preferred.



int os

ext os

↳ wrt int os (ut - cx)

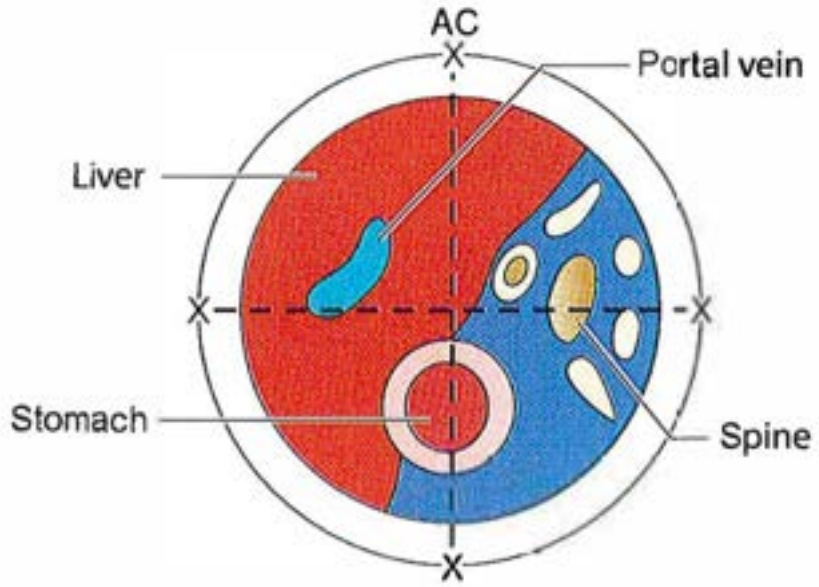


Fig. 41.4: Level for fetal Abdominal Circumference (AC).

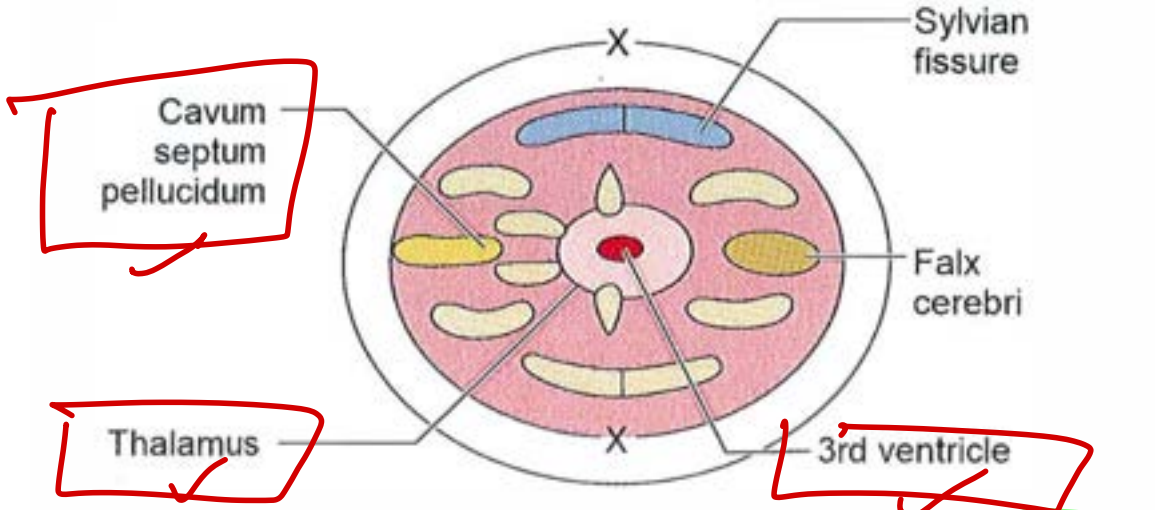


Fig. 41.3: Level for the measurement of Head Circumference (HC) and Biparietal Diameter (BPD).

Medroxyprogesteroneacetate (SAYAnA PRESS): Injection 104 mg/0.65 mL. It is available as a pre-filled single dose injector. The injector needs to be activated by pushing the needle shield firmly towards the port, before use. The medicine appears white and uniform. The suspension is to be shaken vigorously just before use. It is given by *SC injection* into the anterior thigh or abdomen *every 3 months* (12–14 weeks). It is administered by a healthcare professional or by the woman herself.

Depo-SubQ provera 104 (Uniject) contains 104 mg of DMPA. It is given *subcutaneously* over the anterior thigh or abdomen at

REVERSIBLE INHIBITION OF SPERM UNDER GUIDANCE (RISUG)

NEWER TECHNIQUES

New nonsclerotic occlusive copolymer of styrene maleic anhydride (SMA) – lowers pH of semen and alters sperm transportation and morphological changes in the sperms. This copolymer is injected in the lumen of vas deferens under ultrasound guidance with the help of a fine hypodermic needle. Its action begins immediately and action can be reversed subsequently by injection of another copolymer which neutralizes its action.

Chemical sclerosing agents such as 90% ethanol, 3.6% formaldehyde, silver nitrate, hydrogen peroxide, acetic acid can eliminate the need of surgery, are effective and easily administered. However, the consequence of intravascular injection and excessive destruction of the vas by even a slight increase of instillation can be disastrous and the procedure is irreversible.

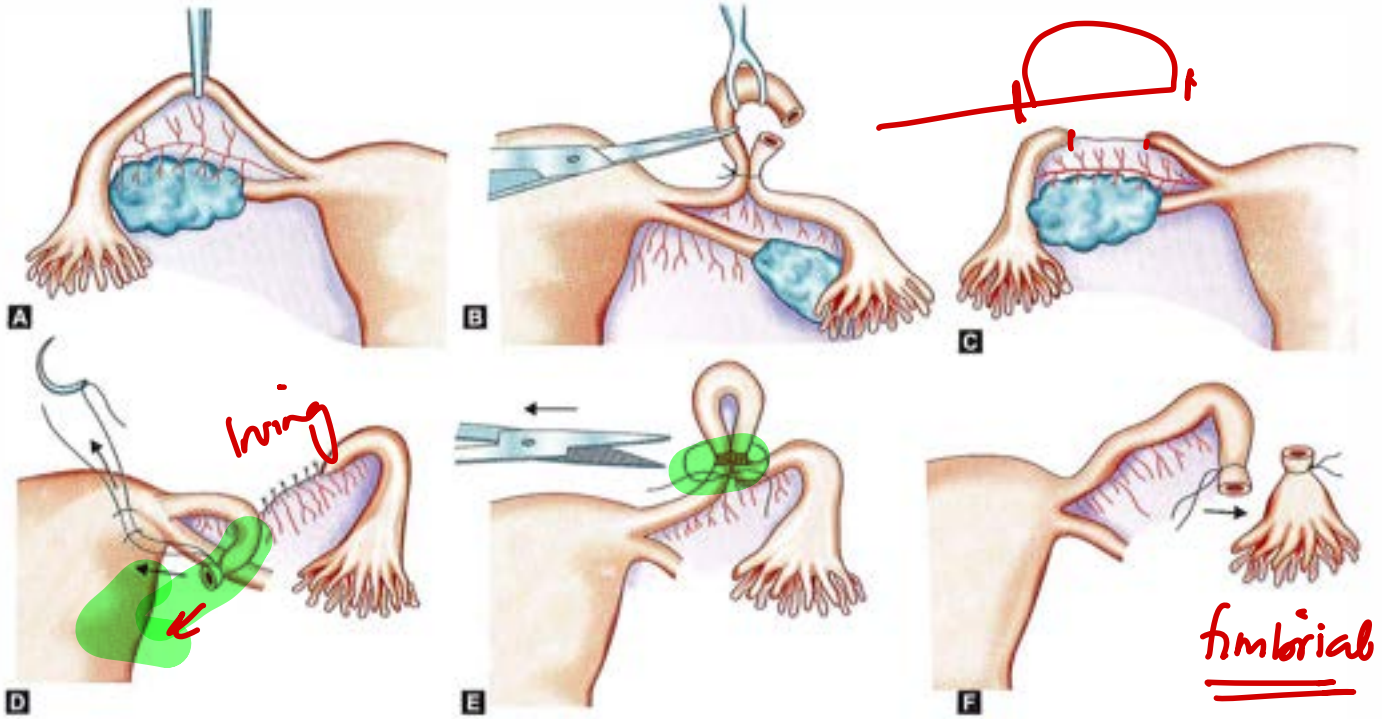
Occlusive plugs and intravasal devices are still in the experimental stage.

Plugs

A device called 'SHUG' consists of two flexible silicon plugs connected by a nylon thread which lies outside the vas. This thread prevents migration of plugs and allows easy removal through a small incision.

Contraindications to vasectomy are as follows:

- Local skin infection
- Varicocele, hernia
- Undescended testis



Figs. 36.14A to F: Steps of tubectomy by **Pomeroy's method**: **(A)** A segment of the fallopian tube is lifted up; **(B)** The loop is ligated with chromic catgut and is cut (about 1.5 cm); **(C)** End result of the operation—note wide separation; **(D) Irving procedure:** The medial cut end is buried in the myometrium posteriorly and the distal cut end is buried in the mesosalpinx; **(E) Madlener procedure**; **(F) Kroener procedure:** The ampullary end of the tube is ligated and resected.

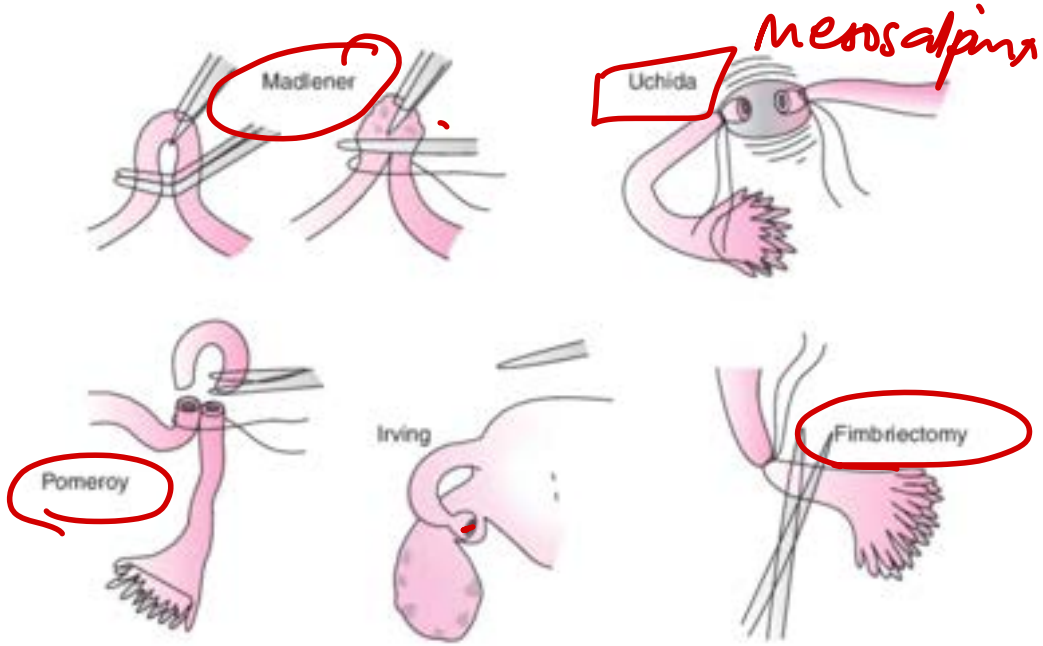


Figure 19.19 Different surgical techniques of sterilization.

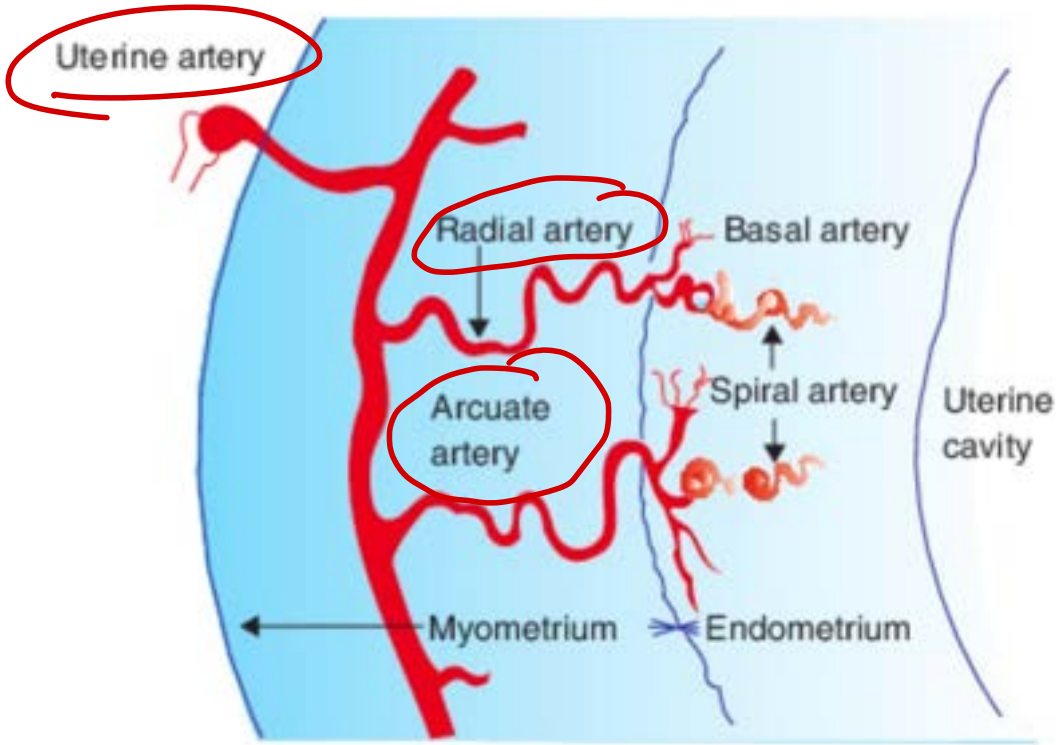


Figure 2.23 The uterine artery and its branches in the uterus.

Table 2.2 Supports of the Genital Organs

Level I	Uterosacral ligaments and cardinal ligaments support the uterus and vaginal vault
Level II	Pelvic fascia and paracolpos which connect the vagina to the white line on the lateral pelvic wall through arcus tendinous
Level III	Levator ani muscles support the lower one-third of vagina

The following are the branches of the uterine artery:

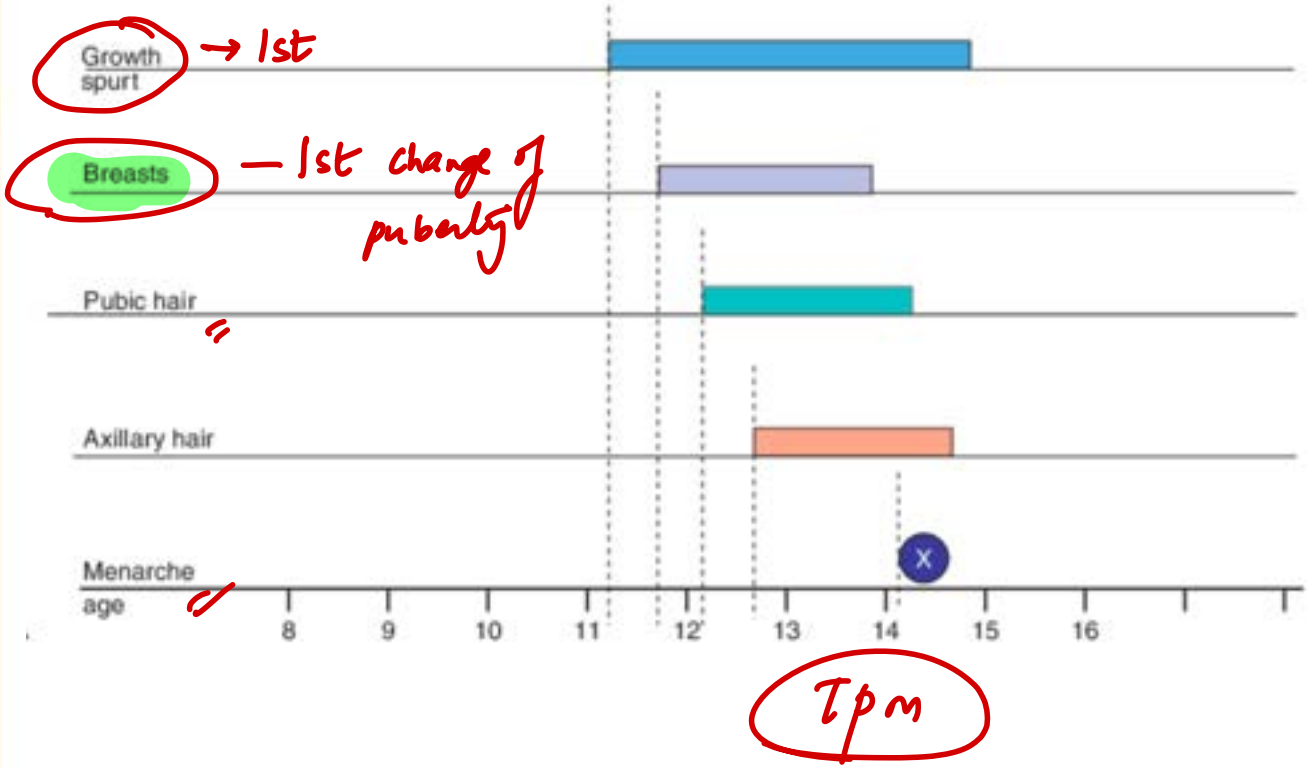
- Ureteric
- Descending vaginal – these unite to form the anterior and posterior azygos artery of the vagina
- Circular cervical
- Arcuate → radial → basal → spiral and straight arterioles of the functional layer of the endometrium
- Anastomosis with the ovarian artery

Uterine
Arcuate
↳ radial
↳ basal
↳ spiral

UAR BEST

Table 4.1 Effects of Oestrogen and Progesterone on the Female Genital Tract

Organ	Oestrogen	Progesterone
Breasts	Ductal/stromal growth	Alveolar growth
Vagina	Superficial cells with glycogen	Intermediate cells
Cervix	Abundant mucus thin, viscous, penetrable to sperms	Thick tenacious mucus, impenetrable to sperms
Uterus	Myohyperplasia	Myohyperplasia
Endometrium	Proliferative endometrium	Secretory endometrium
Fallopian tube	Secretion	Increased peristaltic movements
Ovary	No action	No action



UNEXPLAINED INFERTILITY

Infertility is labelled as unexplained when no obvious factor is found in male and female partner. Approximately 10% of infertility accounts for this subcategory of infertility. However, the more we investigate in depth lesser becomes the proportion of unexplained infertility. Common conditions which may account for unexplained infertility are immunological factors, clinical or subclinical

Table 10.2 Differentiating Features of Primary and Secondary Dysmenorrhoea

Differentiating Features	Primary	Secondary
Onset	Within 2 years of menarche	20–30 years, maybe pre- and postmenstrual
Description	Cramping – hypogastrium, back, inner thighs	Variable dull ache
Symptomatology	Nausea, vomiting, diarrhoea, headache, fatigue	Dyspareunia, infertility, menstrual disorders
Pelvic findings	Normal	Variable, depending on cause
Aetiology	Excessive myometrial contraction, ischaemia, excessive prostaglandin production	Endometriosis, PID, adenomyosis, fibroids, pelvic vein congestion
Management	Reassurance, analgesics, NSAIDs, antispasmodics, OC pills, in rare cases, surgery – Cotte's operation or laparoscopic uterosacral nerve ablation (LUNA)	Treatment directed to the cause

QQ

<72hrs prior to menses

- resolve after menses.

HORMONE REPLACEMENT THERAPY AND RISK OF BREAST CANCER

- The risk of breast cancer is not increased up to 3 years of HRT and 5 years of oestrogen alone replacement therapy.
- Lower risk is seen with use of dydrogesterone in HRT.
- HRT can cause recurrence of breast cancer and is therefore contraindicated in a woman who has been treated for breast cancer. Tibolone is safe.
- HRT increases the density of breast tissue and impedes screening programme of mammography subsequently.
- Breast cancer developing following HRT is of low grade with good prognosis.

HORMONE REPLACEMENT THERAPY AND ENDOMETRIAL CARCINOMA

- ERT can cause well-differentiated carcinoma of endometrium.
- Minimum of 12 days of progesterone added to ERT reduces the risk of endometrial cancer to 2%.
- Combined oestrogen and progesterone provides a better protection against endometrial cancer.
- Tibolone is a safe drug and does not cause endometrial hyperplasia.
- Raloxifene, unlike tamoxifen exercises antioestrogen action on endometrium.
- The risk of cancer with ERT is dose and duration depen-

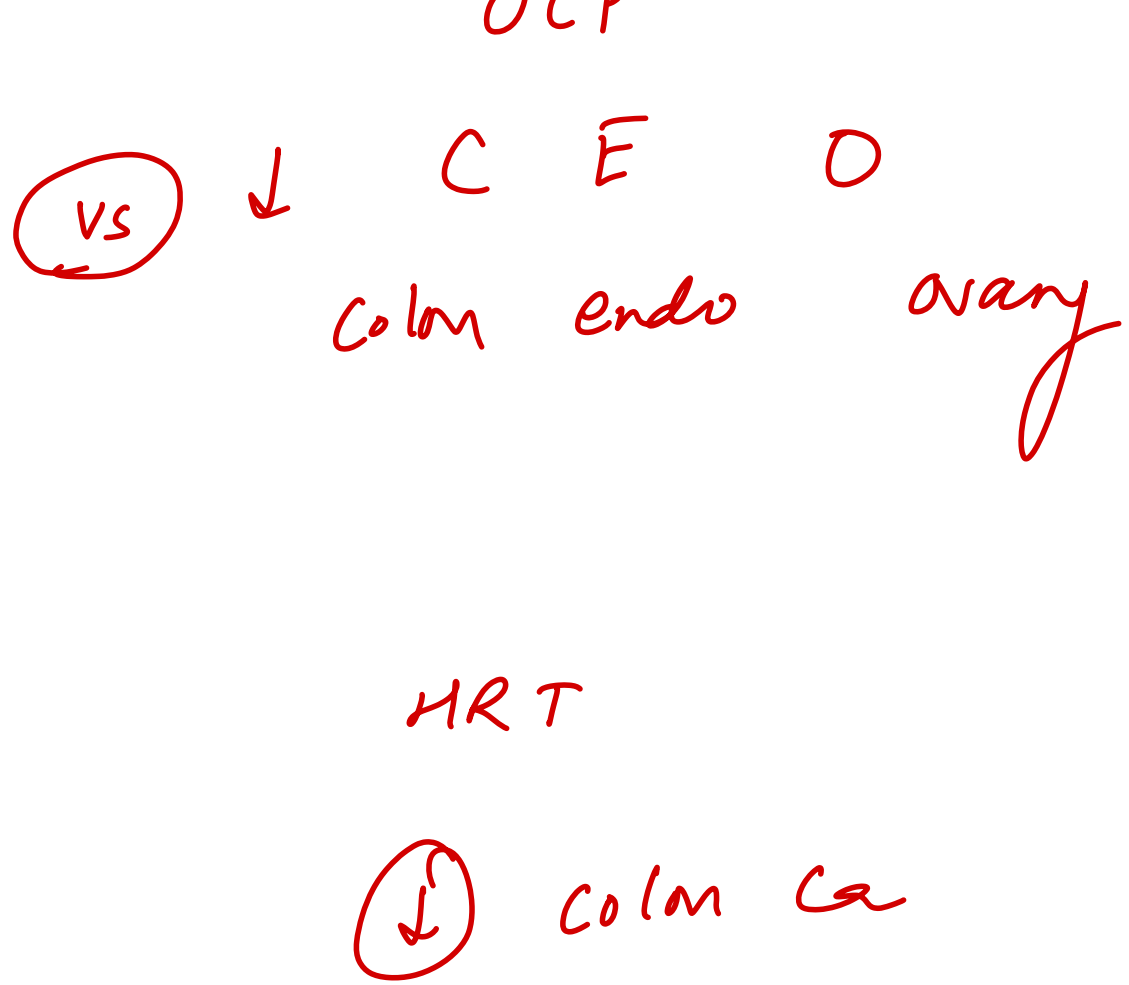


Table 15.3 Varieties of SERMs and Comparison of their Therapeutic Effects

Therapy	Hot Flashes Insomnia	Genital Atrophy	Endometrial Proliferation	Ovulation	Osteoporosis	Breast Cancer	CVD
Oestrogen[a] ERT/HRT	↑	↑	NA	NA	↑	↑	↑
Clomifen	NA	↑	↑	↑	NA	NA	NSC
Tamoxifen	↑	↑	↑	NA	↑	↑	↑
Raloxifene	↑	NSC	↑	NA	↑	↑	↑
Genistein	↑	↑	NSC	NA	↑	NSC	↑
Centchroman	NA	NSC	NSC	NSC	↑	↑	NSC

[a]Estrogen alone are used following hysterectomy.
CVD, cardiovascular disease including deep venous thrombosis; NA, not applicable in the clinical situation; NSC, no significant change.

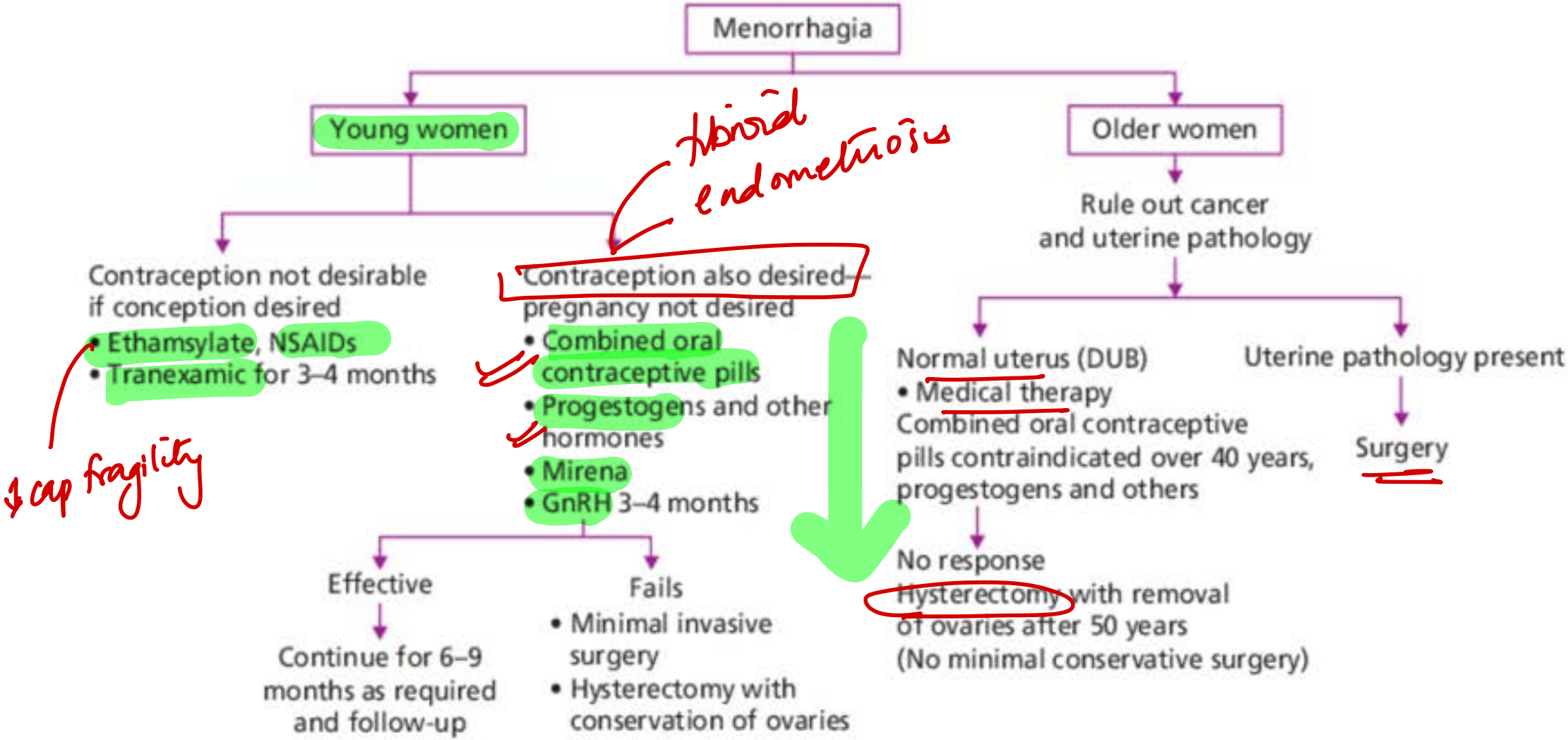


Figure 11.6 Management of menorrhagia.

Hysteroscopic Endometrial Ablation. These procedures should be performed soon after the menstrual period or the endometrium is thinned out by giving progestogens, danazol or GnRH for 4–6 weeks before the procedure. The patient needs to be selected and contraindications are as noted below:

- Uterine size > 12 weeks (12 cm) (volume > 30 mL)
- Uterine fibroid
- Scarred uterus (previous surgery)
- Young woman desirous of pregnancy
- Adenomyosis – TCRE can cause dysmenorrhoea
- Genital infection
- Uterine cancer or preinvasive cancer, atypical hyperplasia

TCRE under general anaesthesia using hysteroscope destroys 4–5 mm endometrium and forms uterine synechiae. The earlier monopolar electrode is replaced by a bipolar electrode (VERSAPOINT™).

Complications are as follows:

- Anaesthetic complications.
- Fluid imbalance with fluid overload (glycine 1.5%), pulmonary oedema, hypertension, hyponatremia, anaphylactic reaction with dextran, haemolysis and at times death.
- Uterine, bowel and bladder injury with burns and vaginal fistula.
- Embolism, infection and haemorrhage.
- Menorrhagia recurs in 25% cases by the end of 3 years and needs repeat TCRE or hysterectomy.
- Dysmenorrhoea in a few women, and haematometra due to cervical stenosis.

Radiofrequency-Induced Thermal Endometrial Ablation. It is a blind procedure using radiofrequency electromagnetic thermal energy which destroys the endometrium at 66°C. A 0.6-mm metallic probe is inserted transcervically under

HYSTERECTOMY

Hysterectomy for AUB is required:

- If medical/MIS fails or menorrhagia recurs.
- In older women more than 40 years not desirous of childbearing, and who opt for hysterectomy as a primary treatment or ablation fails.

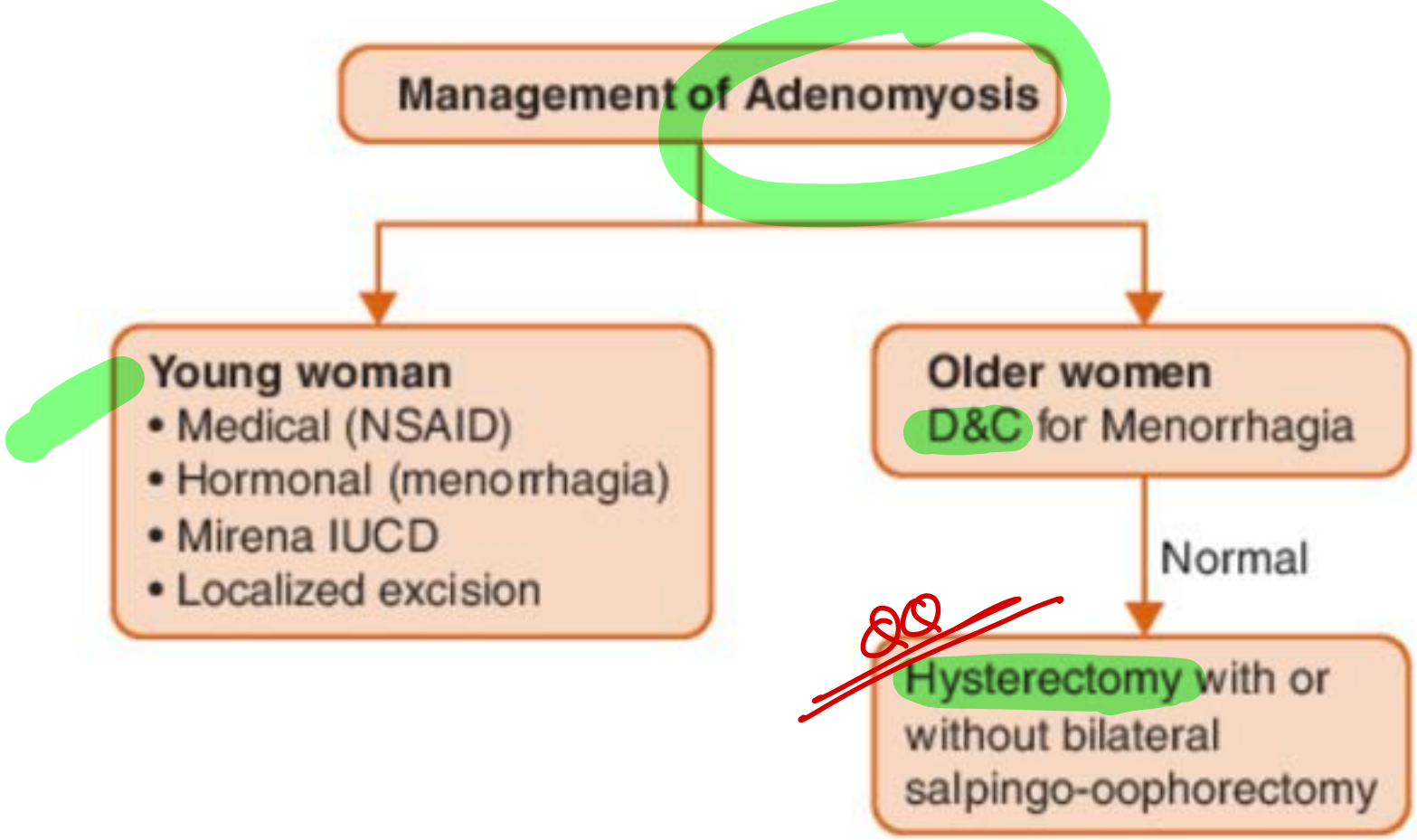


Figure 14.16 Management of adenomyosis.

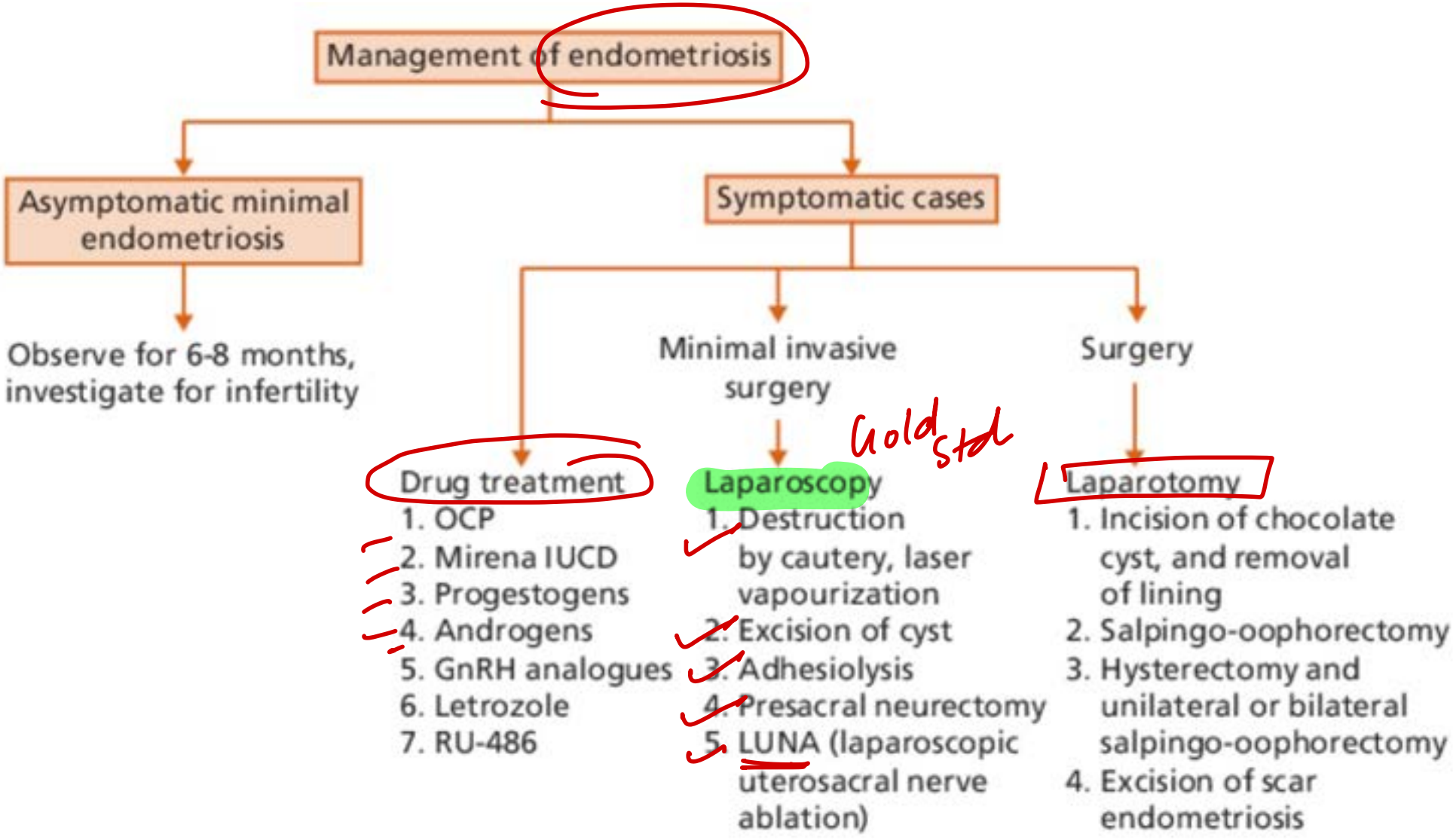
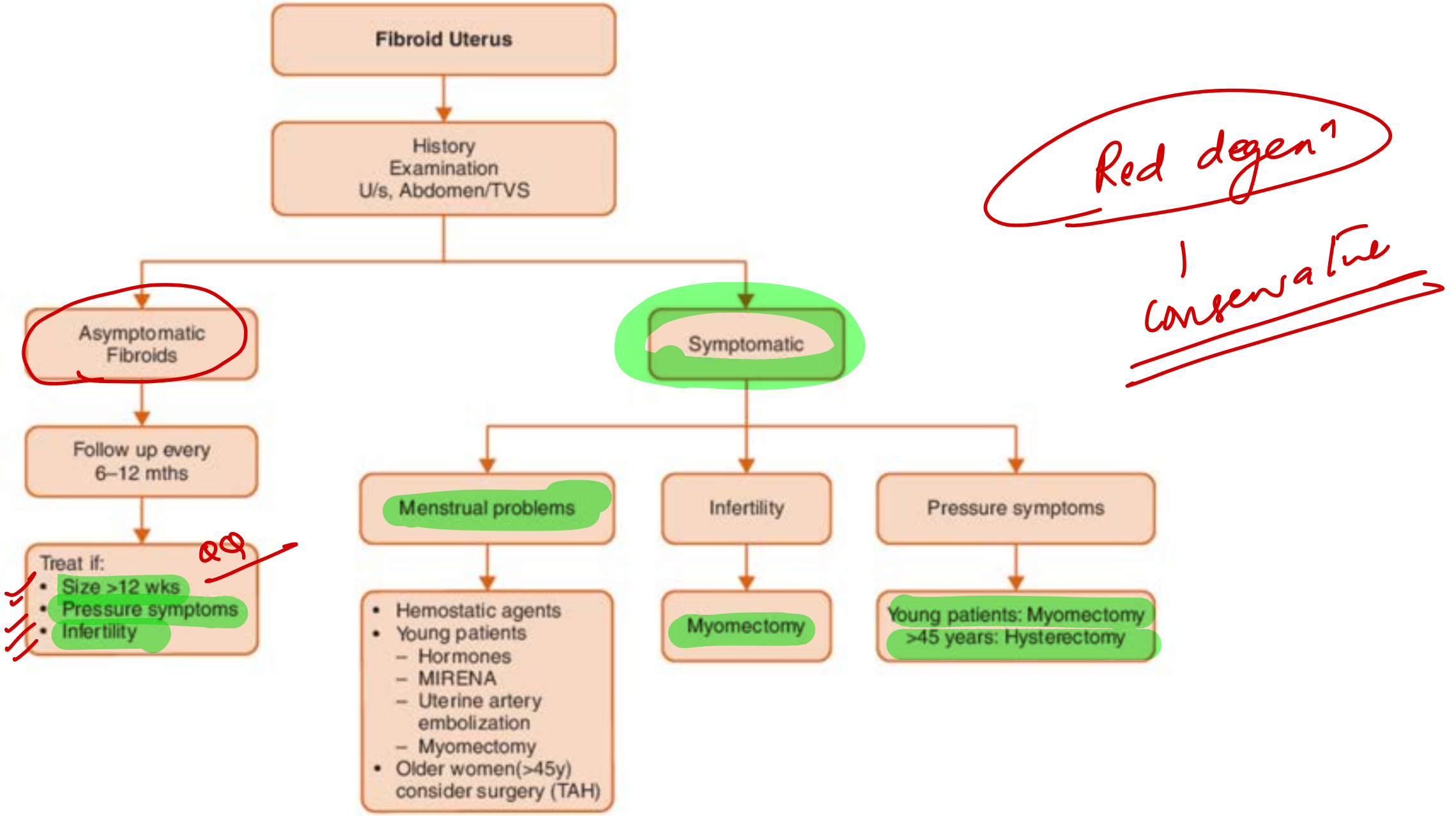


Figure 14.9 Management of endometriosis.



Management of Fibroid uterus

Table 24.2 Clinical Features of PCOS

Clinical Features	Hormonal	Sequelae

• Young woman
• Central obesity
  • BMI > 30 kg/cm²
  • Waist line > 88 cm
• Oligomenorrhoea, amenorrhoea
• Infertility (20%)
• Hirsutism
• Acanthosis nigricans due to insulin resistance; thick pigmented skin over the nape of neck, inner thigh and axilla
• Most androgen come from ovary
• ↑fasting insulin > 10 mIU/L
	• ↑E_2 level
	• ↑ LH levels
	• ↑ FSH/LH ratio
	• ↑Androgens
	• Testosterone, epi-androstenedione, ↑ dehydro-epiandrosterone
	• 17-α-hydroxyprogesterone > 300 ng/dL
	• Testosterone > 2 ng/mL
	• Prolactin ↑
	• Sex hormone–binding globulin (SHBG) ↓
	• ↓E_2/oestrone (E_1) ratio
	• F. glucose/insulin ratio < 4.5
		• Diabetes (15%)
		• Cardiovascular Disease (CVO)
		• Lipidaemias
		• Hypertension
		• Endometrial cancer
		• Breast cancer
		• Premature ovarian failure following surgery

FSH constant

Ultrasound is diagnostic of PCOS.

- It confirms the enlarged ovaries, their size and increased stroma. Ovarian volume will be more than 10 mm^3.
- It shows 12 or more small follicles each of 2–9 mm in size placed peripherally.
- It helps to rule out ovarian tumour.
- It can also show endometrial hyperplasia, if present.

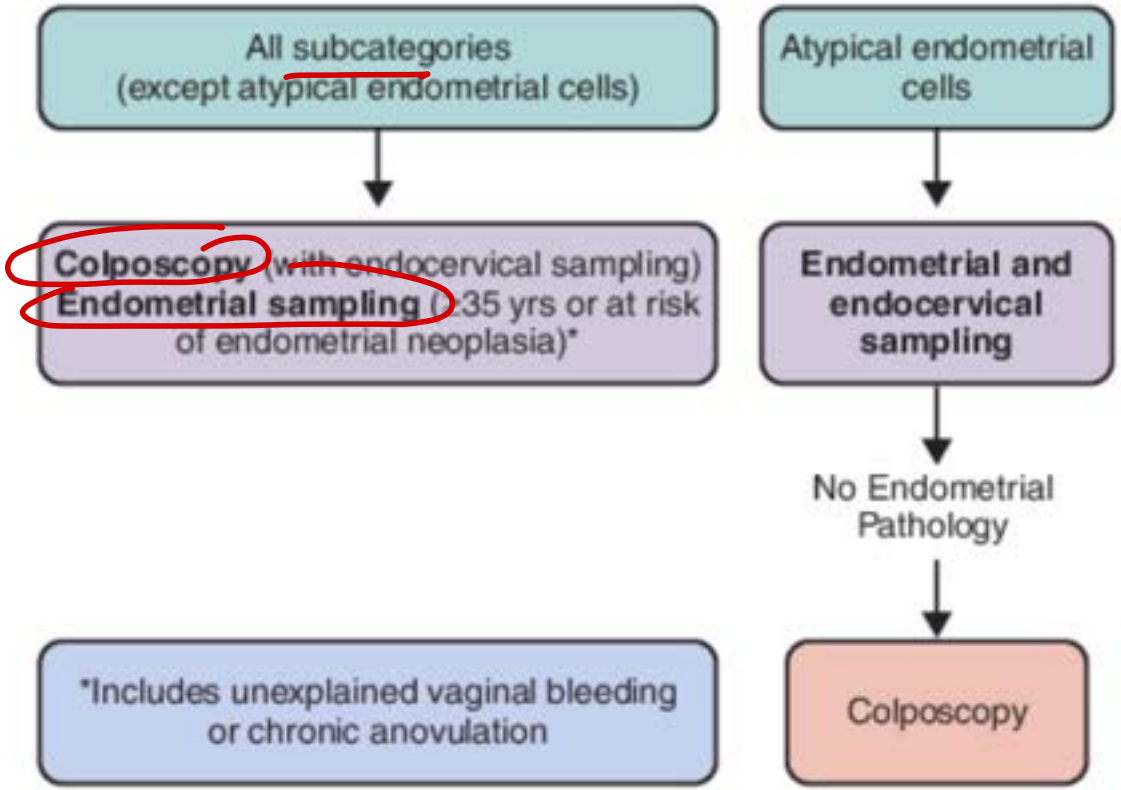


Figure 33.13A Women with Atypical Glandular Cells.

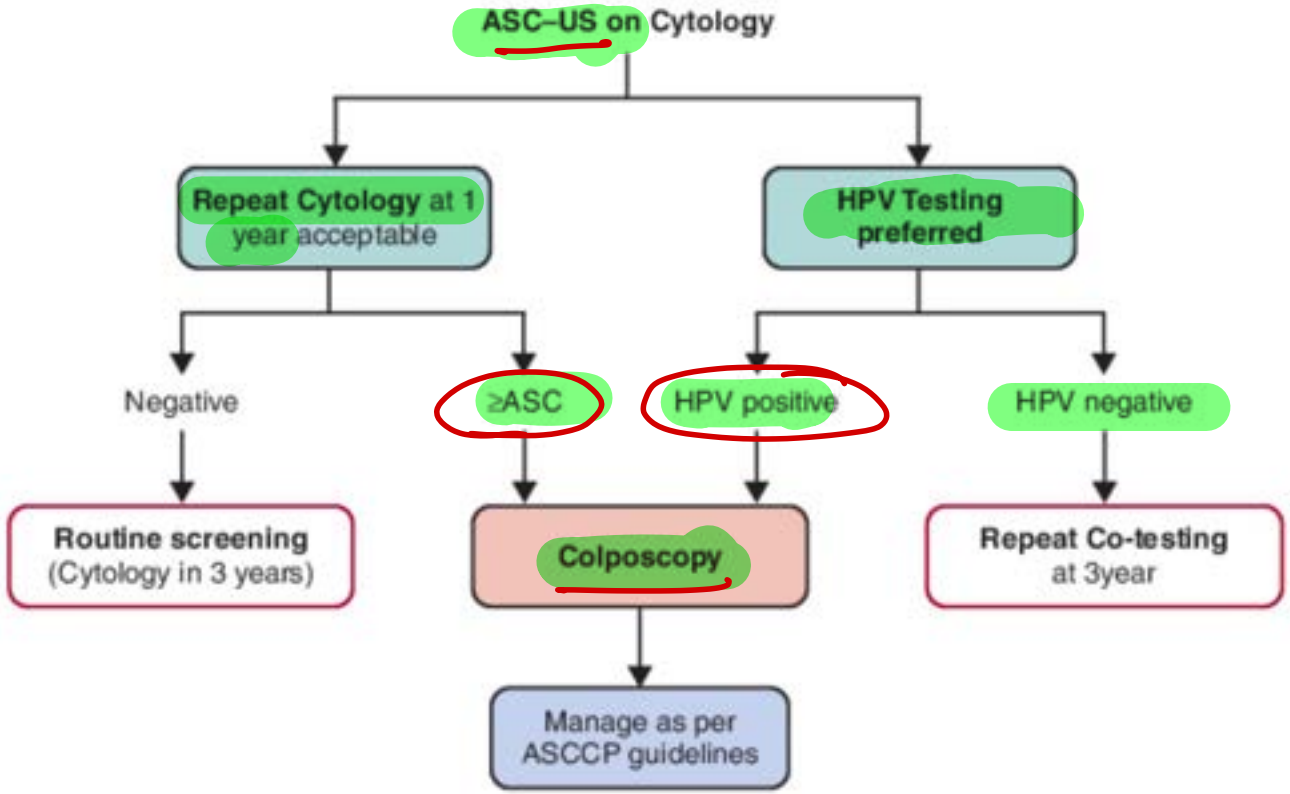


Figure 33.13C Atypical squamous cells-US.

AGC → ⊕endometrial samp/EA/ECC

QQ

PAP → ASC-US / ASC-H / LSIL / HSIL → Colposcopy

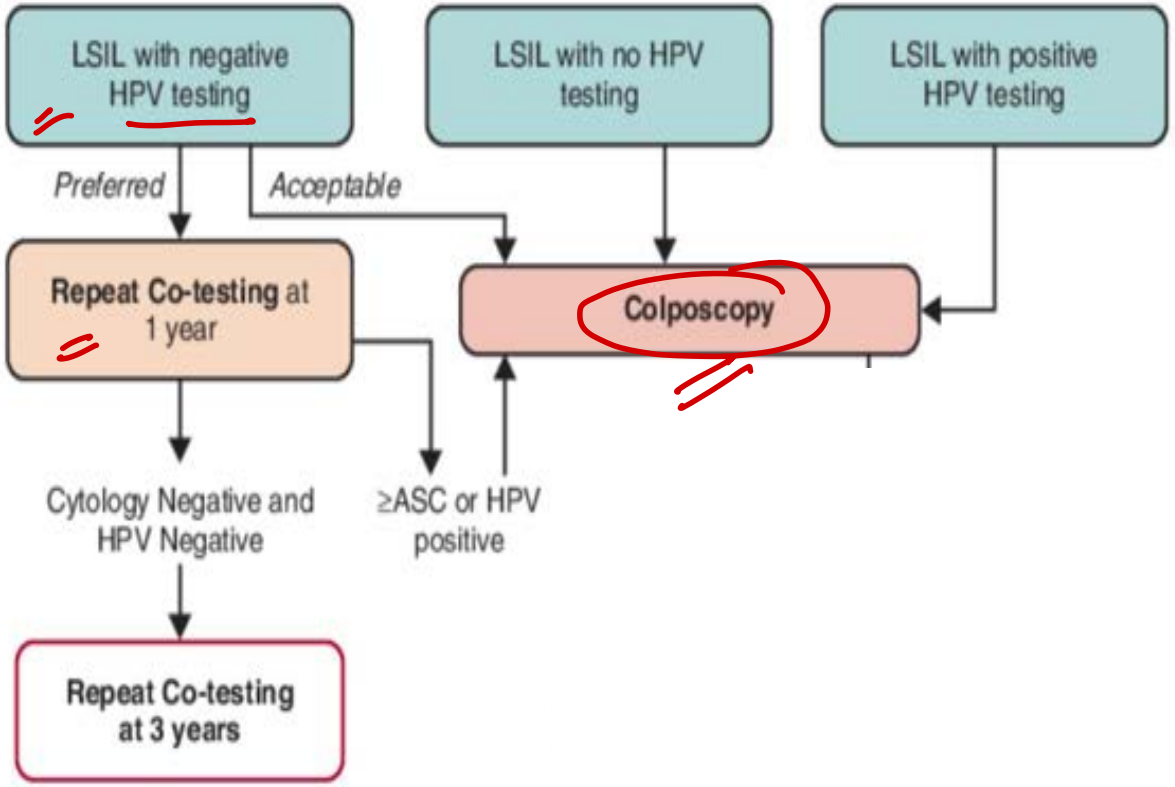


Figure 33.13E Low-grade squamous intraepithelial lesion.

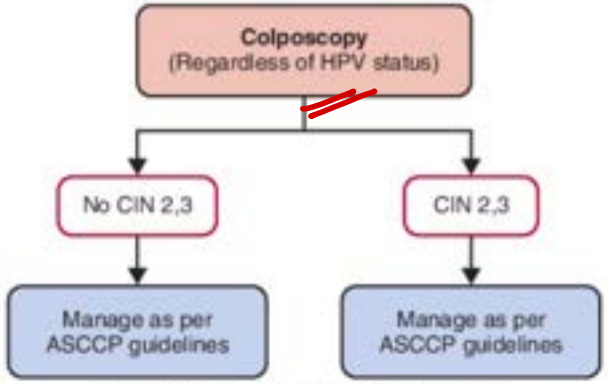
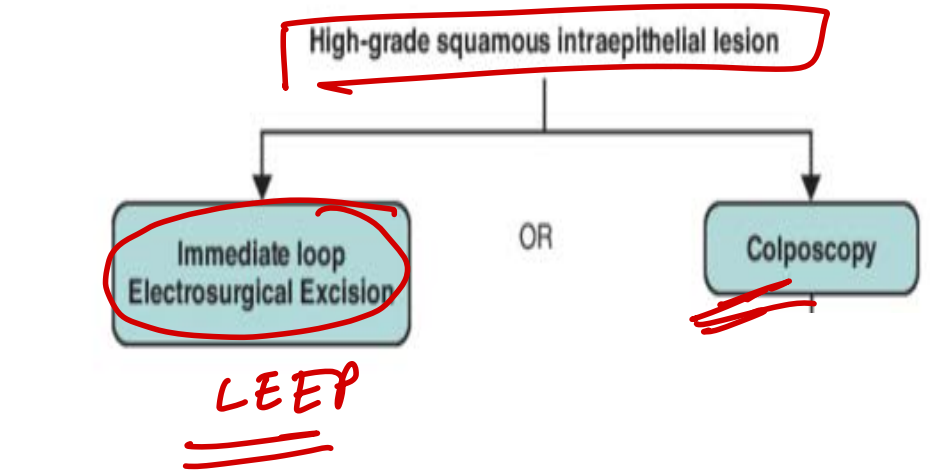
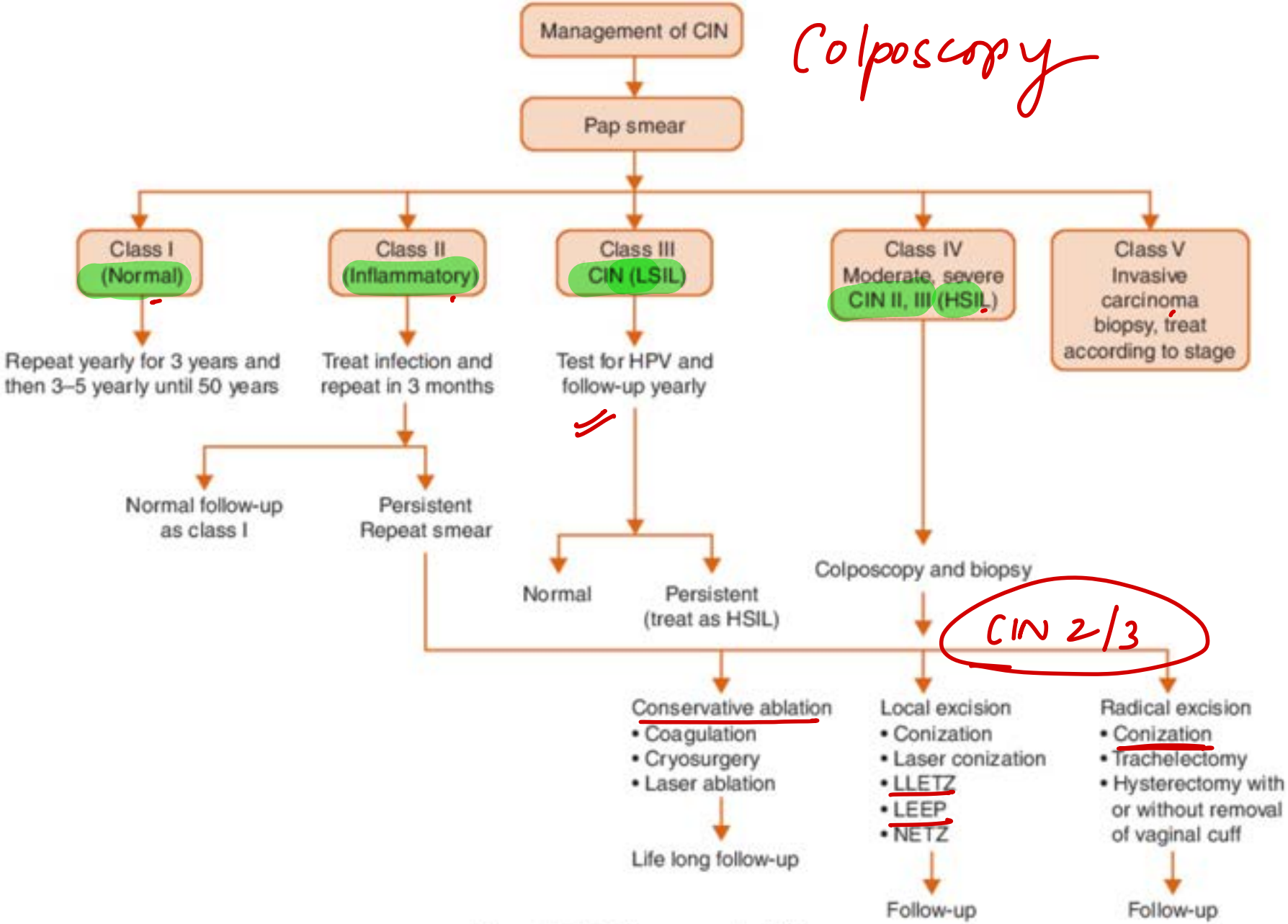


Figure 33.13B Atypical squamous cells-H.



- *CIN 2+ is found at colposcopy in 60% HSIL*
- *This justifies immediate excision for –*
  - *those who are at risk for loss to follow-up*
  - *who have completed childbearing*

Figure 33.13D High-grade squamous intraepithelial lesion.



Colposcopy

CIN 2/3

Figure 33.19 Management of CIN.

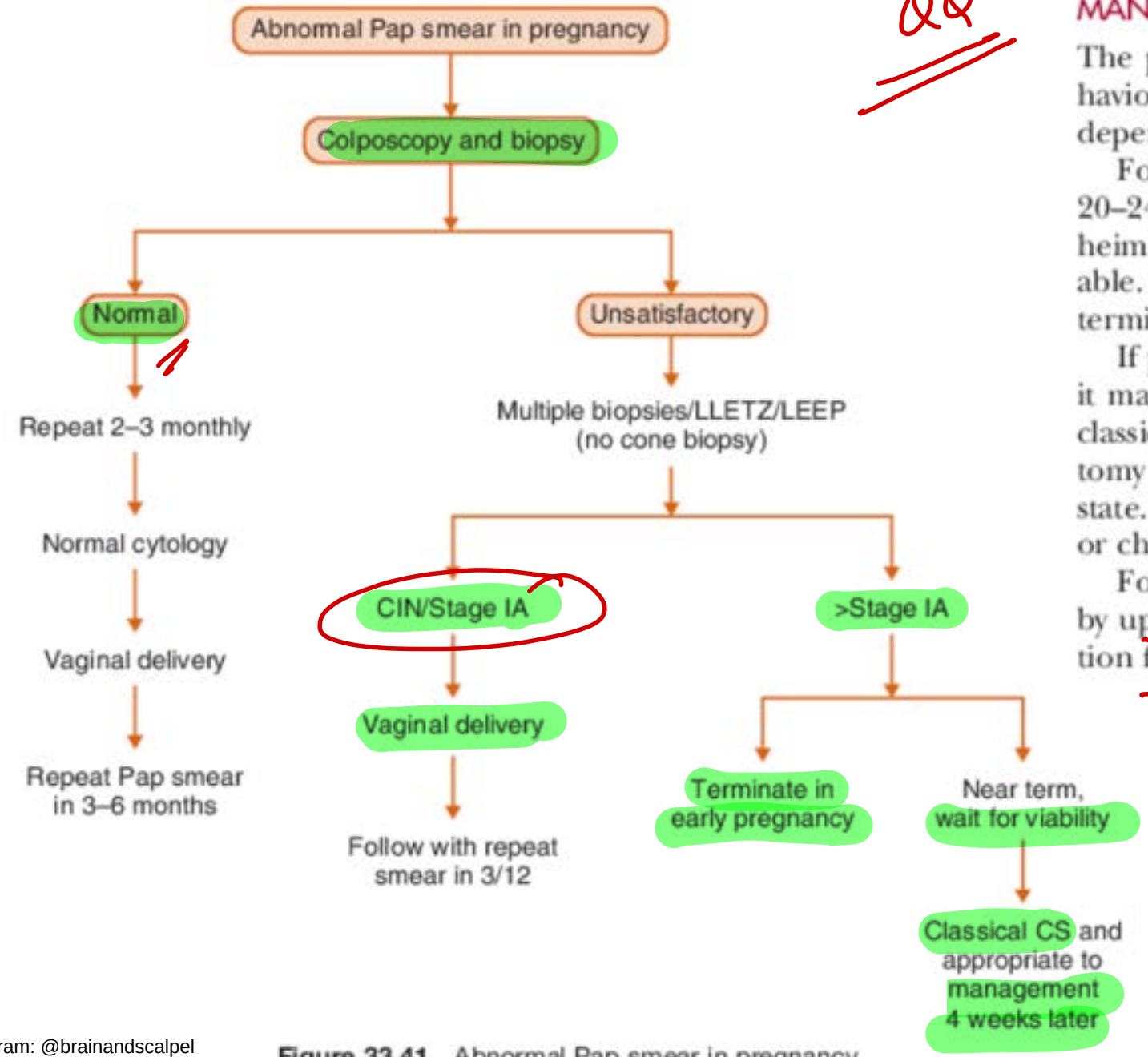


Figure 33.41 Abnormal Pap smear in pregnancy.

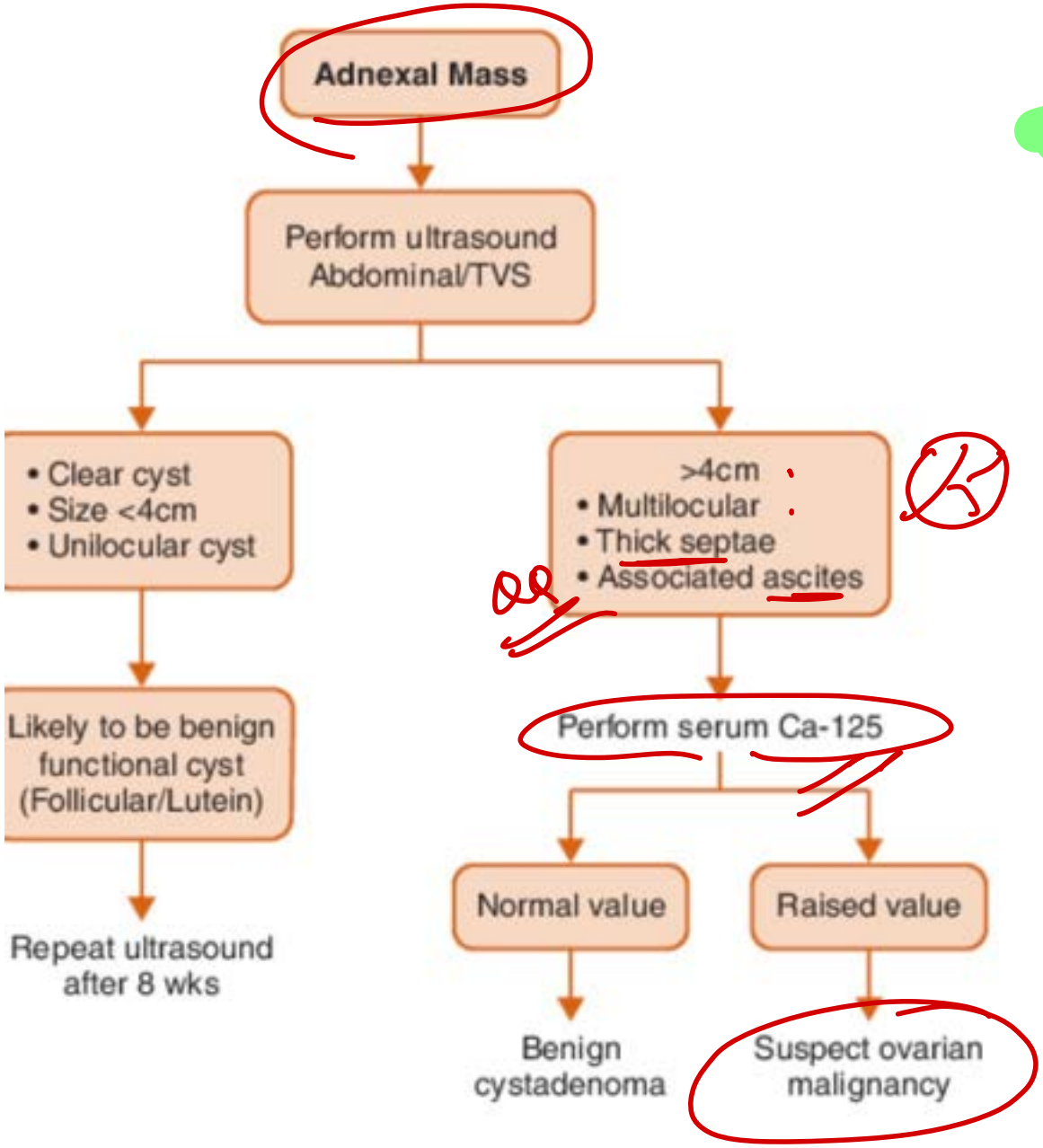
MANAGEMENT IN PREGNANCY

The pregnancy does not appear to alter the biological behaviour of the tumour, and treatment, therefore, depends on stage of the disease and duration of pregnancy.

For Stage Ib or IIa cancer of the cervix detected before 20–24 weeks of pregnancy, a surgical treatment by Wertheim's hysterectomy (Type III radical hysterectomy) is desirable. Alternately, primary radiotherapy is also feasible after termination of pregnancy by upper segment hysterotomy.

If pregnancy is more than 24 weeks or approaching term, it may be prudent to wait until the fetus is viable. Elective classical caesarean delivery is followed by radical hysterectomy in the same sitting or radiotherapy as in a nonpregnant state. Breast-feeding is usually avoided during radiotherapy or chemotherapy.

For advanced disease, it is better to terminate pregnancy by upper segment hysterotomy or a classical caesarean section followed by radical chemoradiation.



FOLLICULAR CYST

If any cyst persists for longer than 3 months, or size increases to > 7 cm, the possibility of a neoplastic cyst must be kept in mind, and the patient investigated.

3-7cm → Observe

>7cm → Sx

TUBAL INSUFFLATION CANNULA (RUBIN CANNULA)

It is used to introduce dye in uterine cavity during hysterosalpingography or diagnostic laparoscopy (Fig. 44.3).

Figure 44.3 Rubin's Cannula.

- Redo - OBG

- GT 1 - 9

- GT 2 - 10

- GT 3 - 19