PIPADOR REVISION

MRCOG Part 1 Revision Notes

Development of the Ovaries

EMBRYOLOGY • LECTURE 59

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG Part 1 Revision Notes

Lecture 59: Development of the Ovaries

Embryology • Visual revision edition

COLOUR CODE USED THROUGHOUT THESE NOTES

OVARY	TESTIS (contrast)	GERM CELLS	MESONEPHROS / LIGAMENTS	CLINICAL

LEARNING OBJECTIVES — tick off as you go

- ☐ Describe the genital ridge, indifferent gonad and germ-cell migration.
- ☐ Explain the genetic switch to an ovary and its morphology.
- ☐ Describe ovarian descent and the gubernaculum's derivatives.
- ☐ Know the ovary's blood supply, lymph drainage and the ovarian fossa.
- ☐ Recognise Turner, Swyer, 46,XX gonadal dysgenesis, POI and ovotesticular DSD.

1 The Indifferent Gonad

IN ONE LINE: *Two ingredients: the GENITAL RIDGE (intermediate mesoderm / coelomic epithelium) and migrating GERM CELLS. Until ~week 7 the gonad looks the same in both sexes.*

The indifferent gonad (cross-section, ~week 5–6)

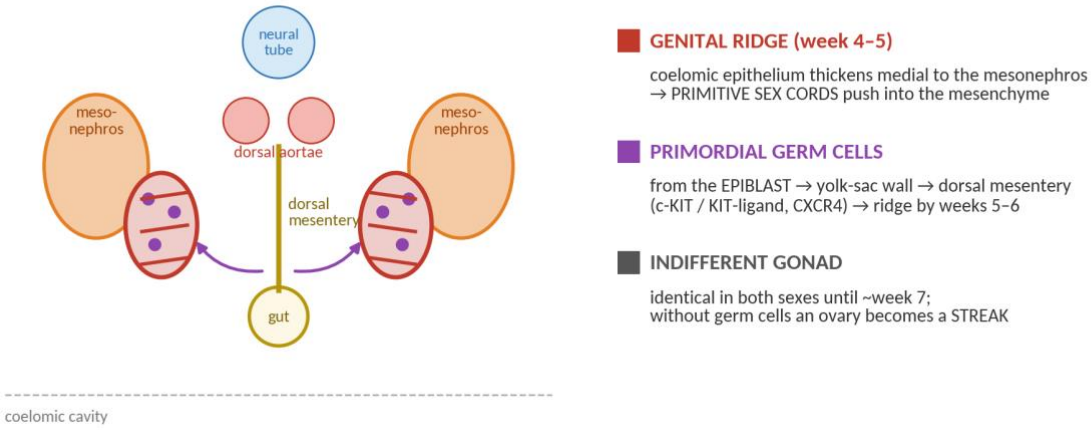


Figure 1. The indifferent gonad.

2 Becoming an Ovary

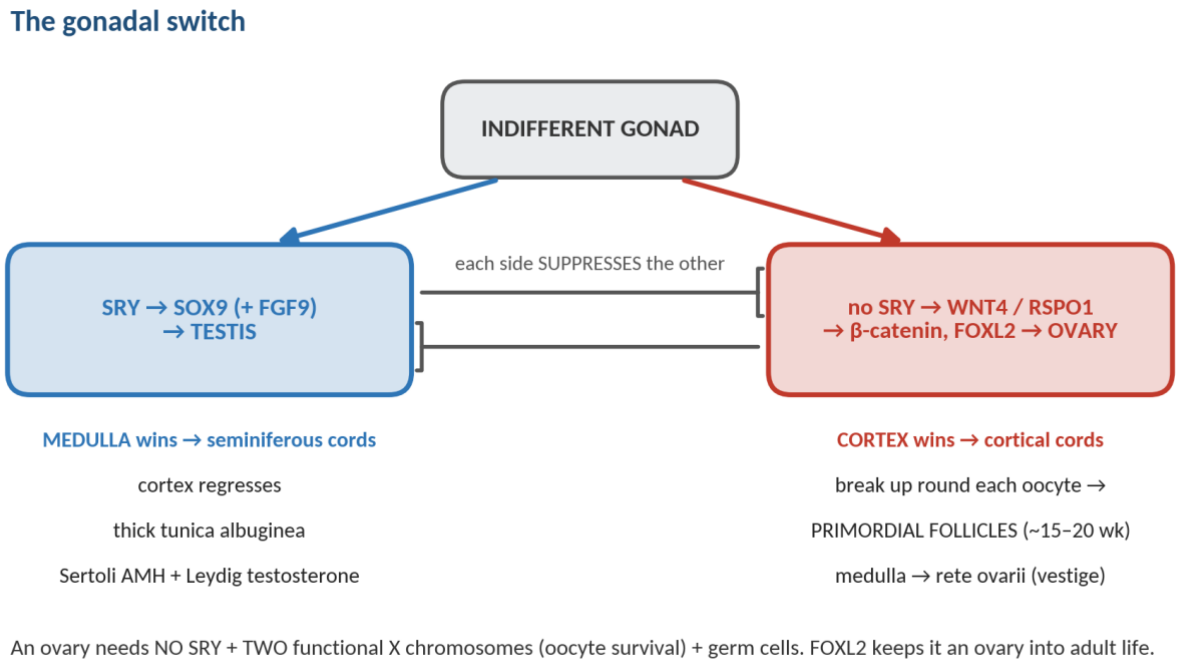


Figure 2. The gonadal switch.

Feature	Ovary
Genetics	No SRY (necessary, not sufficient) + two functional X + germ cells; WNT4, RSPO1, β-catenin, FOXL2 block the SOX9 testis pathway
Cords	Cortical (secondary) cords from ~week 7 break up round each oocyte → primordial follicles from ~15–16 weeks (oocyte arrested in diplotene + flat pre-granulosa)
Medulla	Regresses → rete ovarii (vestige)
Surface	Surface epithelium (from coelomic epithelium) over a thin tunica albuginea
Hormones	Fetal ovary relatively quiet; granulosa AMH from late gestation, highest in the mid-20s, then falls

MNEMONIC / MEMORY HOOK

'Ovary = Outside (cortex); testis = Tucked inside (medulla)' — which layer survives decides the gonad.

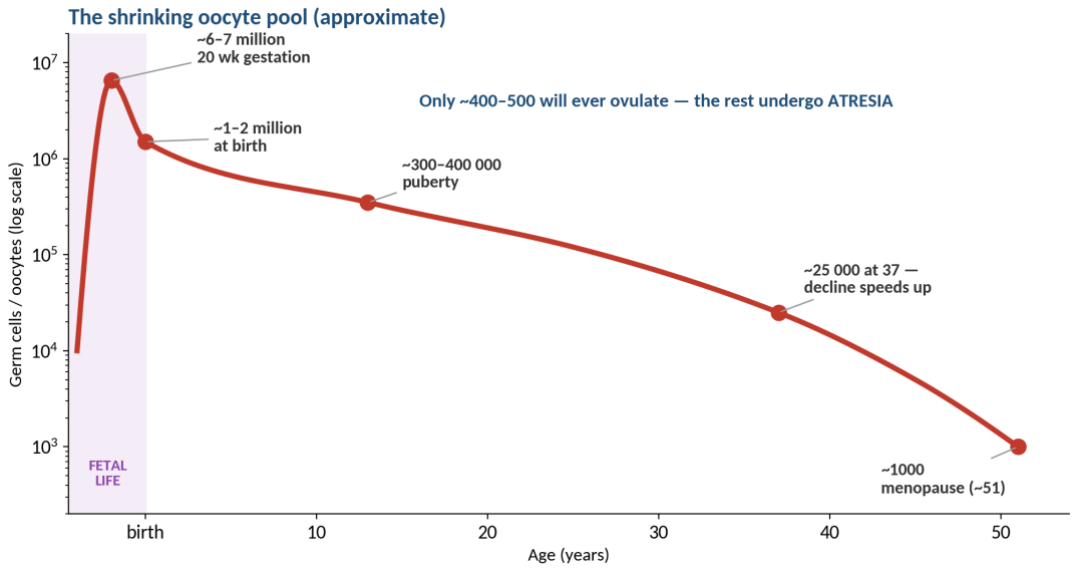


Figure 3. Germ-cell numbers through life (from Lecture 41).

3 Descent and Ligaments

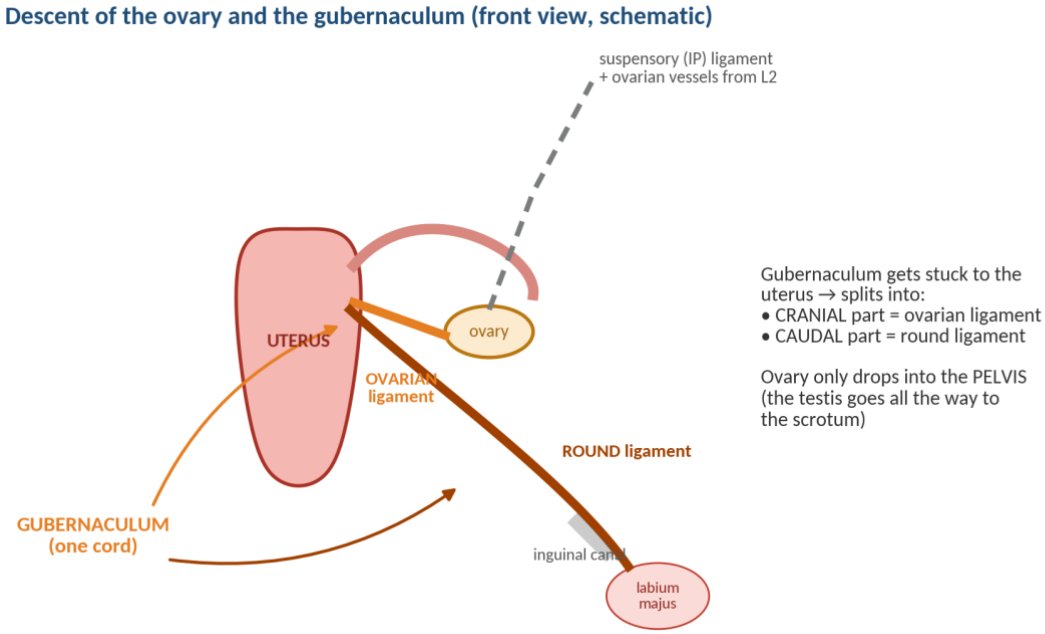


Figure 4. Gubernaculum → ovarian + round ligaments.

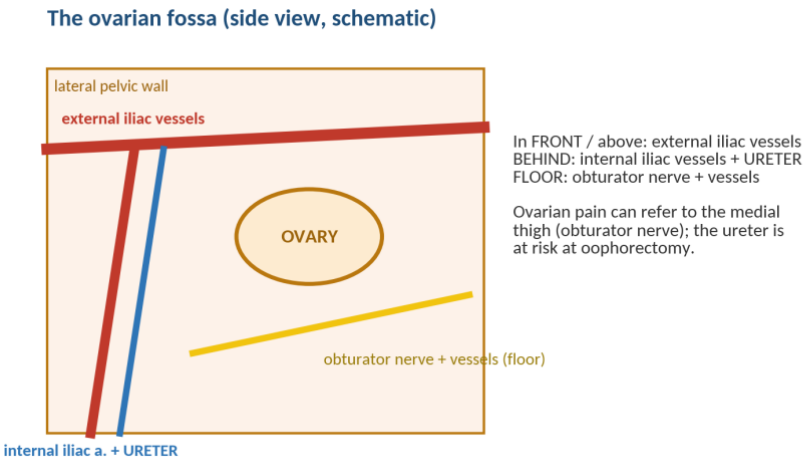


Figure 5. The ovarian fossa.

4 Blood Supply and Lymph

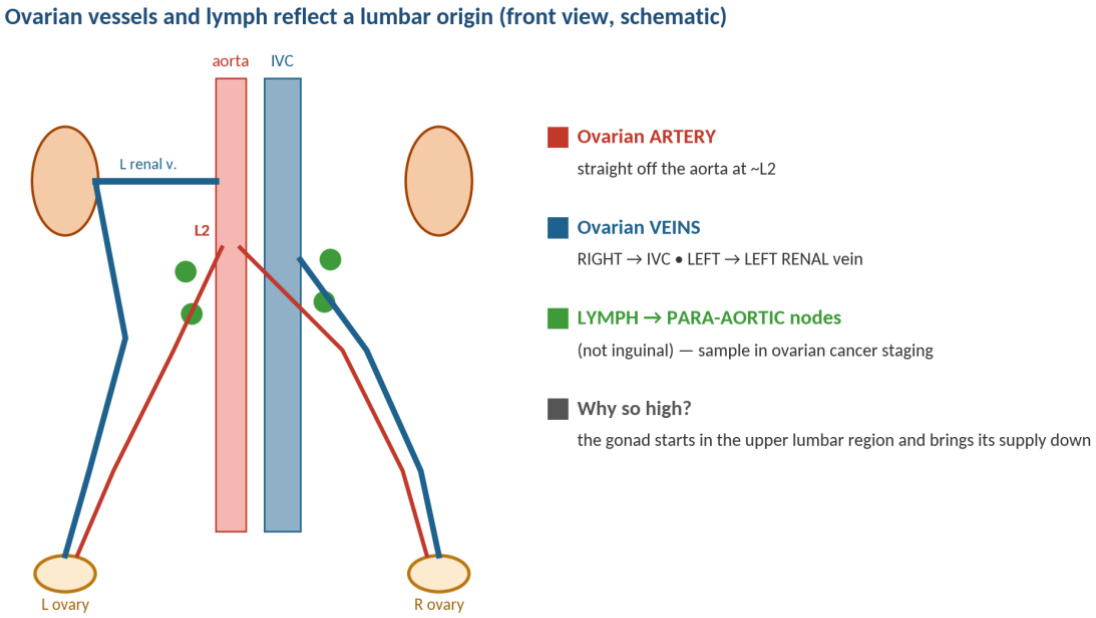


Figure 6. Lumbar origin, lumbar supply.

EXAM HOOK

Ovarian **lymph drains to the PARA-AORTIC nodes** — why ovarian cancer staging includes para-aortic sampling. **Left ovarian vein → left renal vein; right → IVC.** Innervation via the ovarian plexus (T10–T11) — ovarian pain can be felt periumbilically.

5 Disorders of Ovarian Development

Condition	Key points
Turner (45,X / mosaic)	Oocytes form but undergo accelerated atresia → streak gonads. Short stature, webbed neck, lymphoedema, coarctation / bicuspid aortic valve, horseshoe kidney. Pregnancy (often egg donation) carries aortic dissection risk — cardiac assessment first. Some mosaics have brief ovarian function

Condition	Key points
Swyer (46,XY complete gonadal dysgenesis)	Streak gonads, female internal and external genitalia, normal/tall stature; SRY changes in a minority, other genes (e.g. NR5A1) in most; gonadoblastoma risk → gonadectomy
46,XX gonadal dysgenesis	e.g. FSHR, NR5A1, BMP15, FOXL2 (blepharophimosis with POI) → hypergonadotrophic hypogonadism
Premature ovarian insufficiency	Loss of ovarian function before 40: 45,X, FMR1 premutation (55–200 CGG), autoimmune, galactosaemia, chemo/radiotherapy, surgery, idiopathic
Ovotesticular DSD	Both ovarian and testicular tissue (often an ovotestis); 46,XX commonest; also 46,XX/46,XY chimerism
Persistent Müllerian duct syndrome	46,XY male with testes (often undescended) plus uterus and tubes — AMH or AMH-receptor defect
Ectopic / accessory ovary	Rare; along the path of descent

6 Clinical Correlates

OVARIAN RESERVE

- **AMH** (pre-antral + small antral granulosa) — main marker
- **Antral follicle count** on TVS
- Early-follicular FSH rises as reserve falls
- Guides IVF dosing and fertility preservation

FERTILITY PRESERVATION

- Oocyte / embryo freezing
- **Ovarian tissue cryopreservation** — established, especially before puberty or when treatment can't wait; live births after cortex re-graft
- GnRH analogues may reduce chemotherapy damage (breast cancer)

SURGERY

- **Ureter** runs behind the ovarian fossa — at risk at oophorectomy
- The **IP (suspensory) ligament** carries ovarian vessels and lymphatics — clamped at oophorectomy

PCOS

- Many small antral follicles (arrested growth), thick tunica albuginea, stromal hyperplasia
- Rotterdam: ≥ 20 follicles per ovary (2023 guideline) or ≥ 10 mL volume

★ PEARL

Turner = 45,X, streak gonads, SHORT. Swyer = 46,XY, streak gonads, normal/TALL, gonadoblastoma risk → remove gonads.

Ovarian lymph → **para-aortic**; ovarian artery from the aorta at **L2** — the ovary 'remembers' where it started.

7 MRCOG Exam Pearls — Last-Minute Page

Numbers to know

Wk 4–5 Genital ridge	**Wk 5–6** Germ cells arrive	**Wk 7** Sex differentiation	**~15–16 wk** First primordial follicles
6–7 million Peak germ cells (20 wk)	**L2** Ovarian artery origin	**< 40 y** POI	**55–200** FMR1 premutation repeats

HIGH-YIELD CHECKLIST

- ☐ Genital ridge (coelomic epithelium, medial to mesonephros) + germ cells from the epiblast via the yolk sac.
- ☐ Indifferent until ~week 7; no germ cells → streak ovary.
- ☐ No SRY + two X + WNT4/RSPO1/FOXL2 → ovary; cortex survives, medulla → rete ovarii.
- ☐ Primordial follicles from ~15–16 weeks.
- ☐ Gubernaculum → ovarian ligament + round ligament; ovary stops in the pelvis.
- ☐ Ovarian fossa: external iliacs in front, internal iliacs + ureter behind, obturator nerve in the floor.
- ☐ Ovarian artery L2; left vein → renal vein; lymph → para-aortic.
- ☐ Turner vs Swyer; PMDS = 46,XY male with uterus.
- ☐ POI < 40 years — FMR1 premutation 55–200 repeats.
- ☐ AMH + AFC = ovarian reserve; ovarian tissue freezing established.

Self-assessment — cover the right-hand column

Question	Answer
Two origins of the ovary?	Genital ridge (coelomic epithelium/mesoderm) + germ cells
Genes promoting the ovarian pathway?	WNT4, RSPO1, β-catenin, FOXL2
Which layer survives in the ovary?	Cortex (medulla → rete ovarii)
Two derivatives of the gubernaculum in women?	Ovarian ligament + round ligament
Where does the left ovarian vein drain?	Left renal vein
Lymph drainage of the ovary?	Para-aortic nodes
Nerve lying in the floor of the ovarian fossa?	Obturator nerve
Karyotype and gonads in Swyer syndrome?	46,XY, streak gonads (remove — gonadoblastoma)
Definition of POI?	Loss of ovarian function before 40
What is PMDS?	46,XY male with testes + persistent uterus/tubes (AMH/AMHR2 defect)

8 References

- Sadler TW. Langman's Medical Embryology. 14th ed. 2019.
- ESHRE / ASRM / CRE / IMS Guideline: Premature Ovarian Insufficiency. 2024.
- ESHRE Guideline: Female fertility preservation. 2020.
- Gravholt CH et al. Clinical practice guidelines for the care of girls and women with Turner syndrome. 2024.