



PIPADOR REVISION

MRCOG Part 1 Revision Notes

The Bladder

ANATOMY • LECTURE 13

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG Part 1 Revision Notes

Lecture 13: The Bladder

Anatomy • Visual revision edition

COLOUR CODE USED THROUGHOUT THESE NOTES

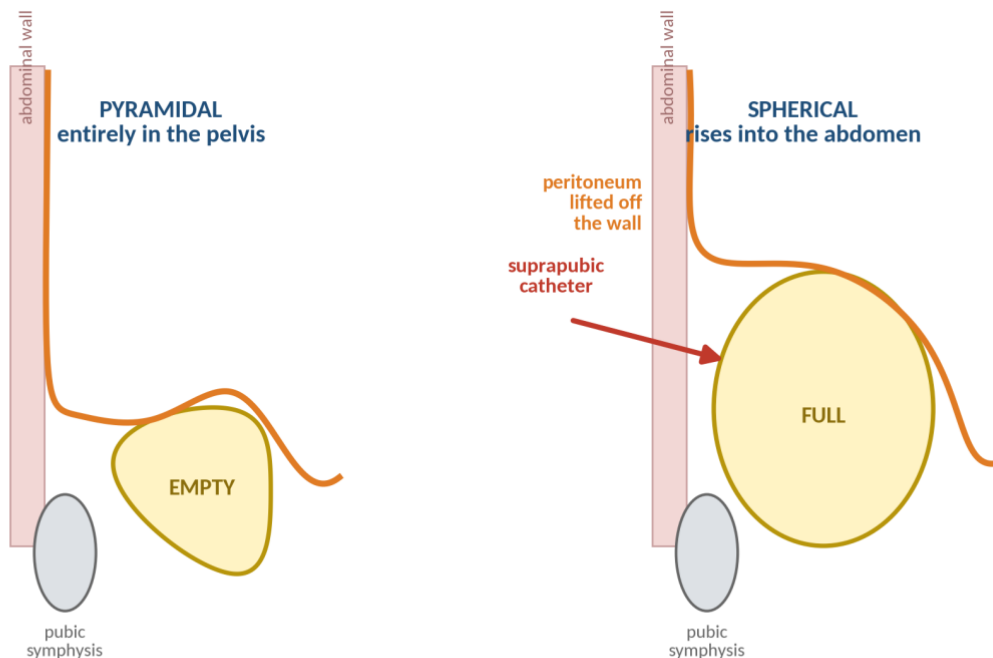
BLADDER	TRIGONE	SYMPATHETIC	PARASYMPATHETIC	PUDENDAL	PERITONEUM
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LEARNING OBJECTIVES — tick off as you go

- ☐ Describe bladder shape, position and surfaces.
- ☐ Identify the trigone and ureteric orifices.
- ☐ Describe the bladder wall layers (detrusor).
- ☐ Identify blood supply, lymphatics and innervation.
- ☐ Apply the micturition reflex to bladder anatomy.
- ☐ Recognise the embryological origin (urachus, allantois).
- ☐ Apply to incontinence, fistulae and surgical injury.

1 Overview, Shape and Capacity

IN ONE LINE: A hollow, distensible muscular bag for **STORAGE** and **VOIDING** — its shape and position change with filling.



Orange = peritoneum. A full bladder peels the peritoneum upwards, so a suprapubic catheter stays extraperitoneal.

Figure 1. Empty vs full — and why a suprapubic catheter misses the peritoneum.

150–300 mL first urge to void	400–600 mL functional capacity	up to ~800 mL
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cystometric capacity (more in chronic retention)

In children the bladder sits higher — partly abdominal — because the pelvis is small.

2 Surfaces and Relations

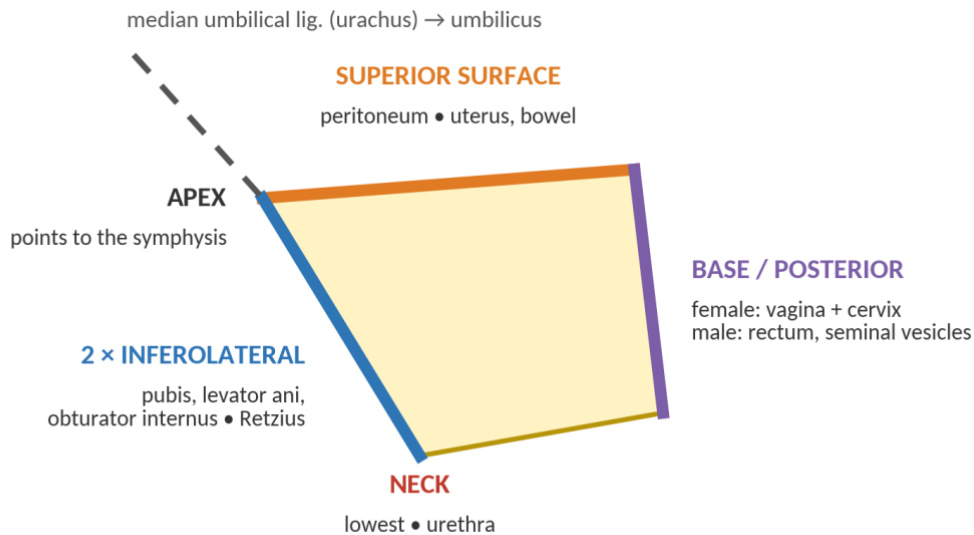


Figure 2. Four surfaces, an apex and a neck (empty bladder, side view).

MNEMONIC / MEMORY HOOK

Only the TOP wears peritoneum. Superior surface = peritonealised; inferolateral surfaces and base are not.

Surface	FEMALE	MALE
Superior	Peritoneum, body of uterus (vesicouterine pouch), bowel	Peritoneum, bowel, sigmoid
Inferolateral	Pubis, retropubic fat (Retzius), levator ani, obturator internus	Same
Base (posterior)	Upper vagina, cervix	Rectovesical pouch, rectum, seminal vesicles, vas ampullae
Apex	Median umbilical ligament → umbilicus	Same
Neck	Urogenital diaphragm; urethra; pubocervical fascia, pubovesical ligaments	Prostate

3 Internal Anatomy — the Trigone

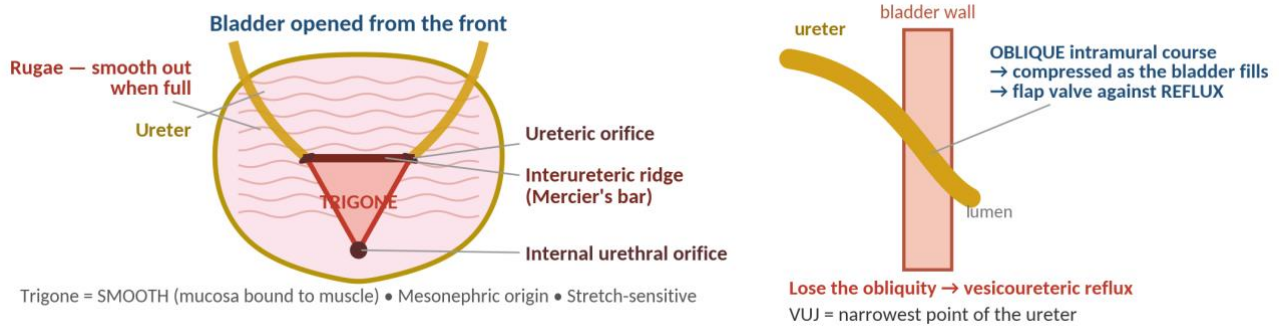


Figure 3. The trigone and the ureteric flap valve.

TRIGONE

- Smooth triangle on the base: 2 **ureteric orifices** (superolateral) + **internal urethral orifice** (inferior)
- **Interureteric ridge (Mercier's bar)** joins the ureteric orifices
- Mucosa bound to muscle — **no rugae**; mesonephric origin; stretch-sensitive
- Site of schistosomiasis-related pathology and squamous cell carcinoma

URETERIC ORIFICES + VUJ

- Slit-like; ureter runs **obliquely** through the wall → valve against reflux
- Lost obliquity → **vesicoureteric reflux**
- VUJ is one of three ureteric narrowings: **PUJ**, **pelvic brim**, **VUJ** (narrowest)

4 Wall Layers

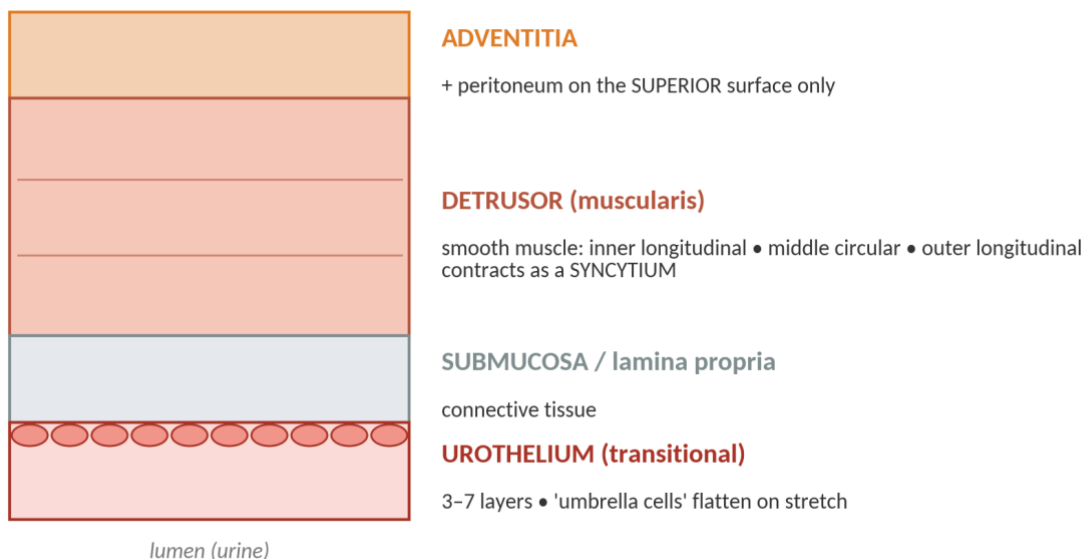


Figure 4. Four layers, lumen upwards.

- Elsewhere the mucosa forms **rugae** when empty; they flatten when full.
- Trigonal muscle is continuous with ureteric muscle and distinct from the detrusor.

5 Blood Supply and Lymphatics

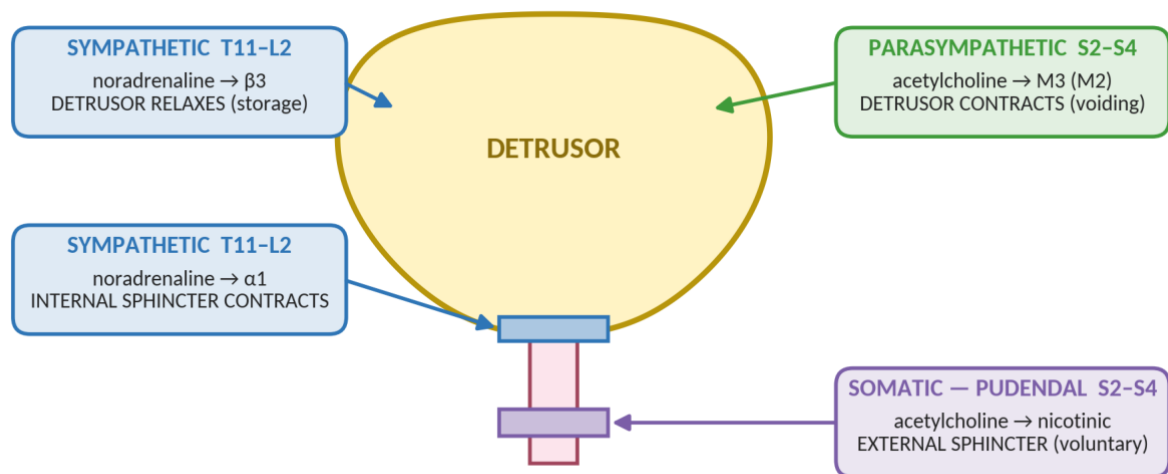
ARTERIES (internal iliac, anterior division)

- **Superior vesical** — from the patent umbilical a.; upper bladder
- **Inferior vesical** (male) — base, prostate, seminal vesicle
- Female: **vaginal a.** (its homologue) supplies the base
- Small branches: obturator, inferior gluteal, uterine

VEINS + LYMPH

- Vesical venous plexus → internal iliac v. (male: joins prostatic plexus)
- Links with **Batson's vertebral plexus** → spinal metastases
- Lymph: mainly **external iliac**; some internal iliac, obturator, common iliac
- Neck/trigone → internal iliac

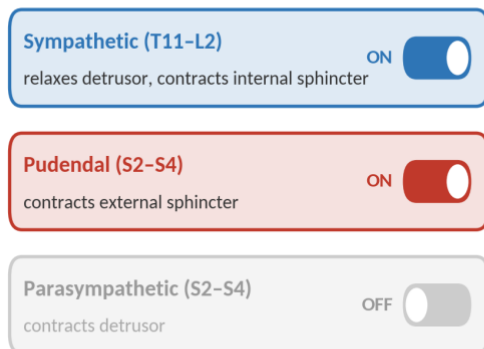
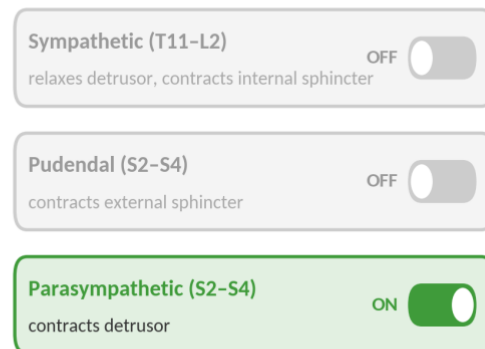
6 Innervation and the Micturition Reflex



DRUGS: antimuscarinics (oxybutynin, solifenacin) block M3 • mirabegron = β_3 agonist • botulinum toxin A into the detrusor

Figure 5. Which nerve, which transmitter, which receptor — and which drug.

Supply	Roots / route	Action
Sympathetic	T11–L2 → superior hypogastric plexus → hypogastric nerves → pelvic plexus	Storage: β_3 → detrusor relaxes; α_1 → internal sphincter contracts
Parasympathetic	S2–S4 → pelvic splanchnic nerves → pelvic plexus	Voiding: M3 (M2) → detrusor contracts; internal sphincter relaxes
Somatic	S2–S4 → pudendal (perineal branch)	External urethral sphincter — voluntary
Afferent	Stretch receptors → S2–S4; ascend to cortex	Fullness sensation; reflex arc

STORAGE**VOIDING**

Co-ordinated by the pontine micturition centre, with cortical override

Figure 6. Storage vs voiding (from Lecture 4).

MNEMONIC / MEMORY HOOK

Sympathetic = Storage (both start with S). Parasympathetic = Pee.

Pontine micturition centre co-ordinates; frontal cortex gives voluntary control. Cord injury → spastic or atonic bladder by level.

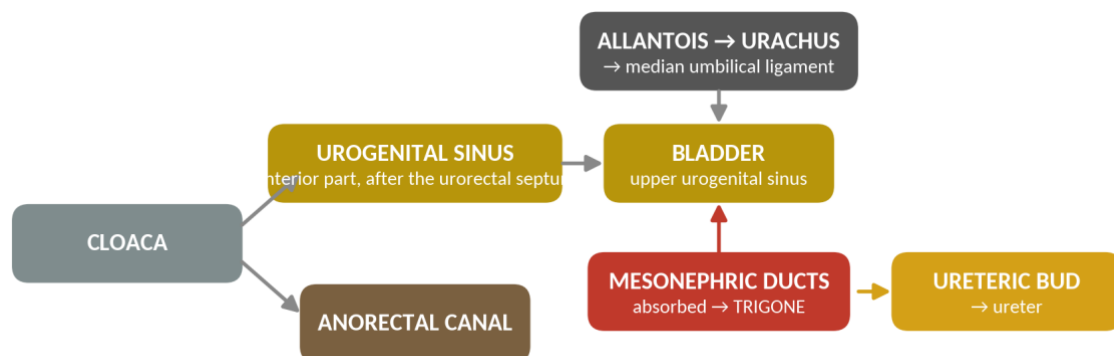
7 Embryology

Figure 7. Where each part of the bladder comes from.

- **Urachal anomalies:** patent urachus (urine at the umbilicus), sinus, cyst, diverticulum; rare urachal adenocarcinoma.

8 Clinical Correlations**8.1 Types of incontinence**

Type	Mechanism	Clue / first steps
Stress	Urethral sphincter incompetence; weak pelvic floor	Leaks on cough/exertion — pelvic floor muscle training
Urge (OAB)	Detrusor overactivity	Urgency, frequency, nocturia — bladder training first
Mixed	Both	Treat the predominant symptom first

Type	Mechanism	Clue / first steps
Overflow	Chronic retention (neurogenic, obstruction)	Palpable bladder, high residual — catheterise
Continuous	Fistula	Constant leakage — examine, dye test, cystoscopy

8.2 – 8.9 More clinical links

OVERACTIVE BLADDER

- Bladder training + pelvic floor exercises
- **Antimuscarinics** (oxybutynin, solifenacin) or **β3 agonist** (mirabegron)
- Refractory: **botulinum toxin A**, sacral neuromodulation, augmentation cystoplasty

VESICOVAGINAL FISTULA

- Low-resource settings: **obstructed labour** (pressure necrosis)
- High-resource: **hysterectomy**, radiotherapy, malignancy
- Continuous leakage; dye test, cystoscopy, imaging
- Repair — vaginal or abdominal

BLADDER INJURY AT SURGERY

- Hysterectomy (prior CS, endometriosis, fibroids, adhesions); repeat CS
- Repair in **two layers**; catheter ~10–14 days
- Cystoscopy after complex pelvic surgery

RETENTION

- Acute: painful — postpartum, post-op, neurogenic, obstructive
- Chronic: painless, palpable, overflow
- **Retroverted gravid uterus at 12–14 weeks**
- Catheterise

UTI + PREGNANCY

- Short female urethra; **E. coli** commonest
- Nitrofurantoin, trimethoprim, cefalexin
- Pregnancy: progesterone → stasis → more UTIs; pressure → frequency

BLADDER CANCER

- **Urothelial (transitional) carcinoma** commonest — smoking, aromatic amines
- Squamous — chronic schistosomiasis
- **Painless haematuria** = warning sign

EXAM HOOK

Investigations: suprapubic palpation • anterior-wall assessment on VE • urinalysis • USS post-void residual • **urodynamics** • cystoscopy • CT/MRI.

9 MRCOG Exam Pearls — Last-Minute Page

Numbers to know

400–600 mL functional capacity	150–300 mL first urge	T11–L2 Sympathetic (storage)	S2–S4 Parasympathetic + pudendal
β3 / α1 Storage receptors	M3 Voiding receptor	3 Ureteric narrowings	10–14 d Catheter after repair

HIGH-YIELD CHECKLIST

- ☐ Pyramidal when empty, spherical when full; capacity ~400–600 mL.
- ☐ Full bladder rises above the symphysis — suprapubic catheter stays extraperitoneal.
- ☐ Four surfaces: superior (peritonealised), two inferolateral, base.
- ☐ Apex → umbilicus via the median umbilical ligament (urachus).
- ☐ Trigone: ureteric orifices + internal urethral orifice; smooth; mesonephric origin.
- ☐ Oblique intramural ureter prevents reflux; VUJ is the narrowest point.
- ☐ Detrusor: 3 smooth muscle layers; syncytial contraction.
- ☐ Internal sphincter: smooth, autonomic. External sphincter: striated, pudendal.
- ☐ Sympathetic T11–L2 = storage (β_3 , α_1). Parasympathetic S2–S4 = voiding (M3).
- ☐ Superior + inferior vesical arteries (internal iliac); lymph mainly external iliac.
- ☐ VVF: obstructed labour (low-resource); hysterectomy / radiotherapy (high-resource).
- ☐ OAB drugs: antimuscarinics (M3) and β_3 agonists.

Quick-fire self-test — cover the right-hand column

Question	Answer
Which bladder surface is covered by peritoneum?	Superior
What connects the apex to the umbilicus?	Median umbilical ligament (urachus)
Three corners of the trigone?	Two ureteric orifices + internal urethral orifice
Why is the trigone smooth?	Mucosa firmly bound to muscle (mesonephric origin)
What prevents vesicoureteric reflux?	Oblique intramural course of the ureter
Receptor for detrusor relaxation?	β_3 (sympathetic)
Receptor for detrusor contraction?	M3 (parasympathetic)
Nerve to the external urethral sphincter?	Pudendal (S2–S4)
Main lymph drainage of the bladder?	External iliac nodes
Commonest cause of VVF worldwide?	Obstructed labour
Mechanism of mirabegron?	β_3 agonist

10 References

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- Moore KL et al. Clinically Oriented Anatomy. 8th ed. 2017.
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- Sadler TW. Langman's Medical Embryology. 14th ed. 2019.