



PIPADOR REVISION

MRCOG Part 1 Revision Notes

The Pelvic Nerves

ANATOMY • LECTURE 4

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG Part 1 Revision Notes

Lecture 4: The Pelvic Nerves

Anatomy • Visual revision edition

COLOUR CODE USED THROUGHOUT THESE NOTES

LUMBAR PLEXUS	SACRAL PLEXUS	PUDENDAL	SYMPATHETIC	PARASYMPATHETIC	PELVIC PLEXUS
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LEARNING OBJECTIVES — tick off as you go

- ☐ Identify branches of the lumbar plexus reaching the pelvis.
- ☐ Describe the sacral plexus and its branches, especially the pudendal nerve.
- ☐ Recognise autonomic nerves: sympathetic chain, hypogastric plexuses, pelvic splanchnic nerves.
- ☐ Apply nerve anatomy to pelvic surgery (avoid injury).
- ☐ Apply to clinical scenarios: pudendal nerve block, autonomic control of micturition and defecation.

1 Overview

IN ONE LINE: Somatic nerves (lumbar + sacral plexuses) serve walls, perineum and leg; autonomic nerves run the viscera.

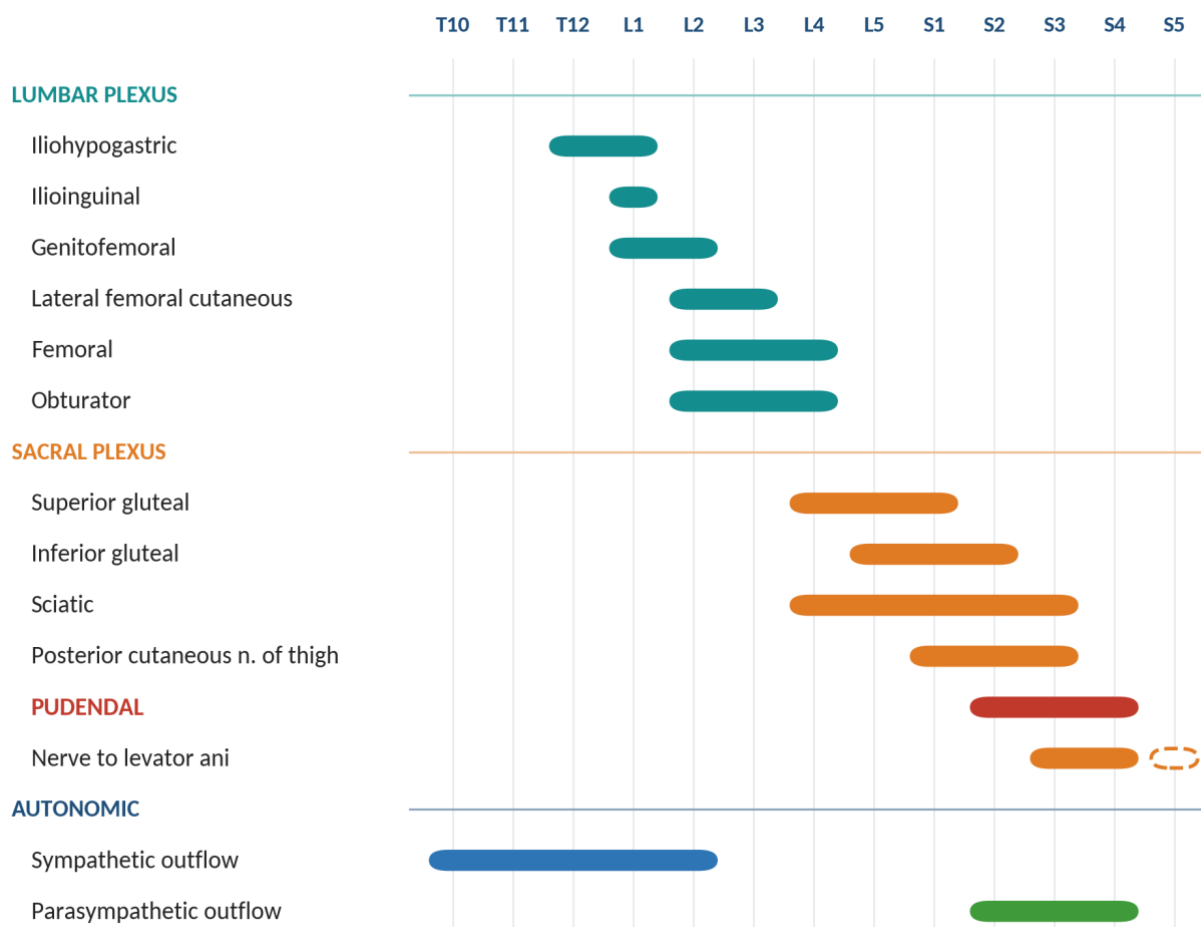


Figure 1. Every nerve in this lecture on one root chart. Dashed = sometimes.

2 Lumbar Plexus Branches Reaching the Pelvis

IN ONE LINE: Formed within psoas major from the anterior rami of L1–L4 (plus T12).

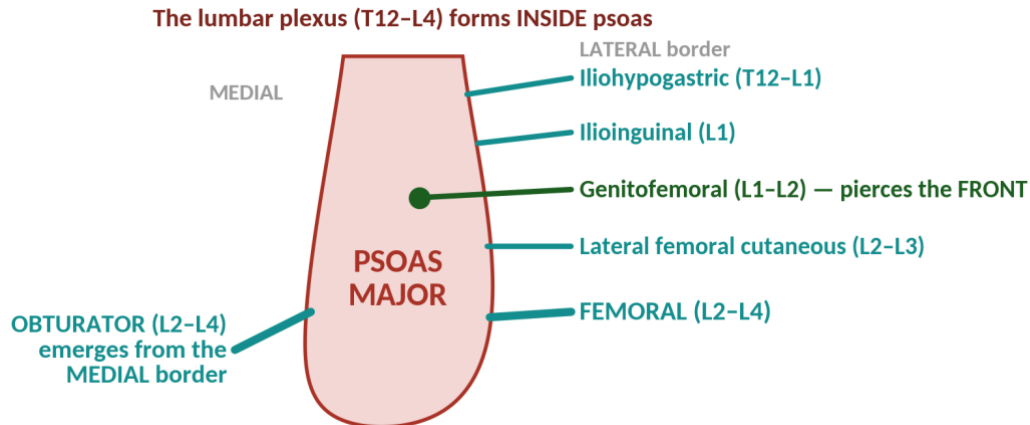


Figure 2. Where each branch leaves psoas.

MNEMONIC / MEMORY HOOK

'**I, I Get Lunch On Fridays**': Iliohypogastric • Ilioinguinal • **Genitofemoral** • Lateral femoral cutaneous • Obturator • Femoral

Nerve	Root	Distribution	Clinical relevance
Iliohypogastric	T12–L1	Lower abdominal wall (motor); skin over hypogastrium, lateral buttock	Injury at Pfannenstiel closure
Ilioinguinal	L1	Through inguinal canal; skin of medial thigh, mons pubis, labium majus	Hernia repair, Pfannenstiel; chronic groin pain
Genitofemoral	L1–L2	Genital branch (labium majus); femoral branch (upper anterior thigh)	Side-wall surgery, lymphadenectomy
Lateral femoral cutaneous	L2–L3	Skin of lateral thigh	Meralgia paraesthetica; prolonged lithotomy
Femoral	L2–L4	Iliacus, quadriceps; anterior thigh, medial leg (saphenous)	Retractor compression, lithotomy → weak knee extension, lost patellar reflex
Obturator	L2–L4	Thigh adductors; medial thigh skin	Side-wall surgery, lymphadenectomy → adductor weakness

Obturator vs femoral — side by side

	OBTURATOR (L2–L4)	FEMORAL (L2–L4)
Divisions	Anterior divisions of L2–L4	Posterior divisions of L2–L4
Leaves psoas	Medial border	Lateral border; between psoas and iliacus, deep to fascia iliaca

	OBTURATOR (L2–L4)	FEMORAL (L2–L4)
Route	Crosses brim behind common iliac vessels; along lateral wall; exits via obturator canal	Exits under inguinal ligament, lateral to femoral artery
Supplies	Adductors; medial thigh skin	Iliacus, quadriceps, pectineus, sartorius; anterior thigh, saphenous
Injured by	Side-wall dissection: lymphadenectomy, radical hysterectomy, deep endometriosis	Deep self-retaining retractor on psoas; hip hyperflexion/abduction in lithotomy
Deficit	Adductor weakness, medial thigh numbness	Weak knee extension, lost patellar reflex

3 Sacral Plexus

IN ONE LINE: Anterior rami of L4–S4, lying on piriformis on the posterior pelvic wall.

Nerve	Root	Distribution	Course
Sciatic	L4–S3	Hamstrings, leg, foot	Greater sciatic foramen, below piriformis
Pudendal	S2–S4	Perineum (motor + sensory)	GSF → round ischial spine → LSF → Alcock's canal
Superior gluteal	L4–S1	Gluteus medius, minimus, TFL	Above piriformis
Inferior gluteal	L5–S2	Gluteus maximus	Below piriformis
Posterior cutaneous n. of thigh	S1–S3	Skin of posterior thigh, perineum	Below piriformis
Nerve to piriformis	S1–S2	Piriformis	Anterior to piriformis
N. to obturator internus + gemellus sup.	L5–S2	Those muscles	GSF → round ischial spine → LSF
N. to quadratus femoris + gemellus inf.	L4–S1	Those muscles	Anterior to sciatic
Nerve to levator ani / coccygeus	S3–S4 (S5)	From the pelvic surface	Direct branches

3.2 The pudendal nerve (S2–S4) — main nerve of the perineum

THE PUDENDAL ROUTE MAP

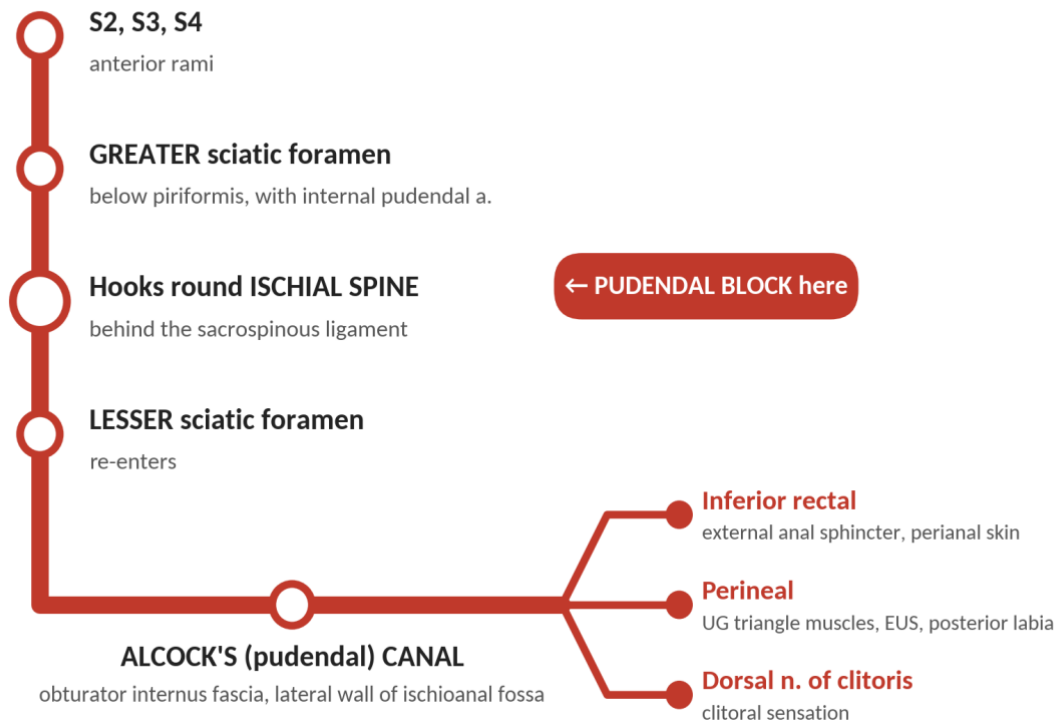


Figure 3. Follow the red line: out, round the spine, back in, along the canal, then three branches.

MNEMONIC / MEMORY HOOK

'**Out, round, back in**': out through the GREATER foramen, round the ISCHIAL SPINE, back in through the LESSER foramen.

'**S2, 3, 4 keeps the perineum off the floor**' — pudendal roots.

PUDENDAL BLOCK

- At the **ischial spine**, transvaginally
- Needle through sacrospinous ligament just medial to spine
- **10 mL** local anaesthetic each side
- Perineal + lower vaginal anaesthesia — **not** uterine pain

PUDENDAL INJURY / NEURALGIA

- Childbirth (esp. instrumental), perineal surgery
- **Sacrospinous fixation**: suture too lateral — keep ~2 cm medial to spine
- Neuralgia: perineal pain **worse sitting**, relieved standing
- Nantes criteria; blocks, pulsed RF, decompression

4 Coccygeal Plexus

- Small plexus from **S4, S5** and the coccygeal nerves.
- Supplies coccygeus and levator ani; **anococcygeal nerves** give skin sensation around the coccyx.

5 Autonomic Nervous System in the Pelvis

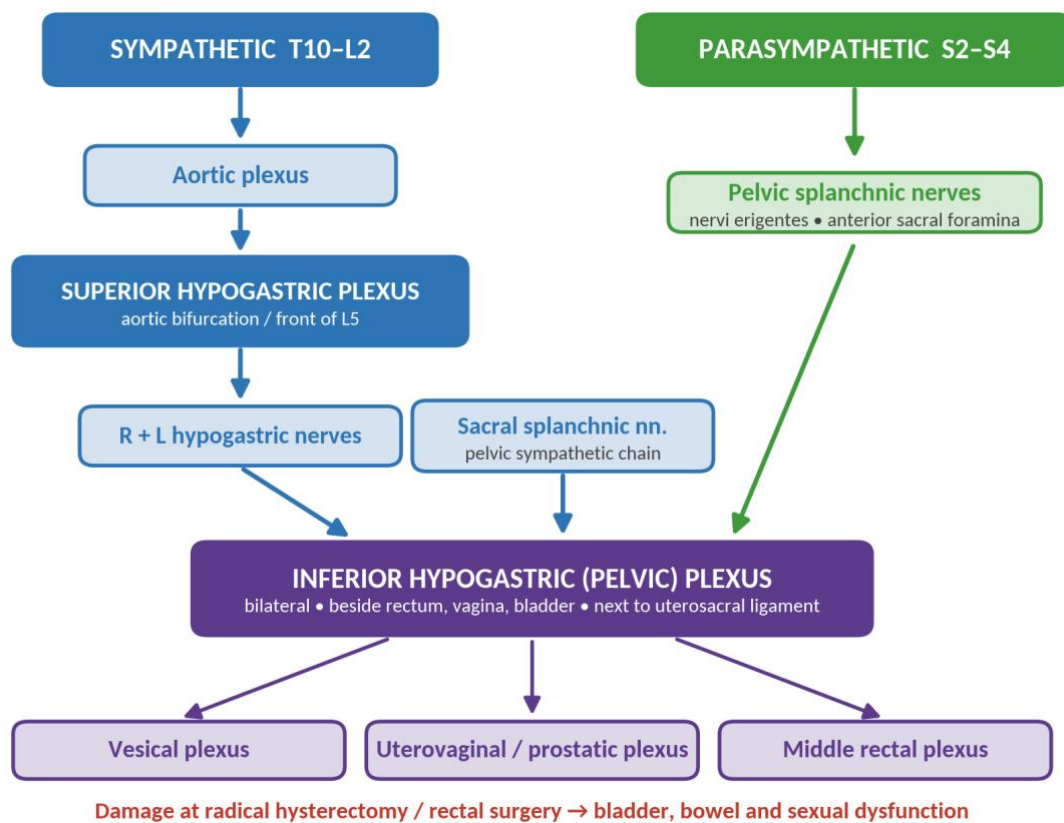


Figure 4. Sympathetic (blue) and parasympathetic (green) streams converge on the inferior hypogastric plexus.

SYMPATHETIC (T10–L2)	PARASYMPATHETIC (S2–S4)
- Pelvic sympathetic chain lies medial to anterior sacral foramina Sacral splanchnic nerves → inferior hypogastric plexus - Bladder neck and internal sphincter contract; detrusor relaxes (storage) - Vasoconstriction; uterus variable (contracts in pregnancy) Ejaculation (males)	Pelvic splanchnic nerves (nervi erigentes) leave the anterior sacral foramina - Join the inferior hypogastric plexus Detrusor contracts (micturition) Rectum contracts (defecation) - Vasodilation of erectile tissue — erection

MNEMONIC / MEMORY HOOK

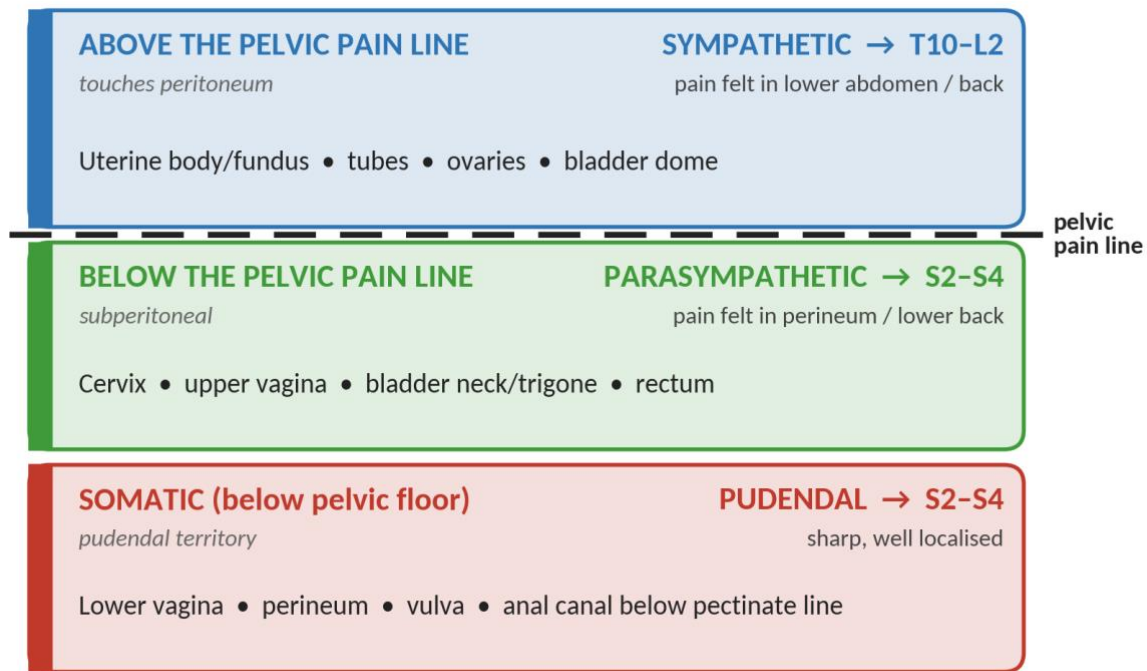
'Point and Shoot': Parasympathetic = Point (erection) • Sympathetic = Shoot (emission/ejaculation)

Superior vs inferior hypogastric plexus

	SUPERIOR HYPOGASTRIC	INFERIOR HYPOGASTRIC (PELVIC)
Where	Aortic bifurcation, front of L5 ; continuation of aortic plexus	Bilateral , lateral to rectum, vagina, bladder; next to the uterosacral ligament
Fibres	Mostly sympathetic (T10–L2)	Mixed: hypogastric nn. (symp) + pelvic splanchnic (parasymp) + sacral splanchnic (symp)

	SUPERIOR HYPOGASTRIC	INFERIOR HYPOGASTRIC (PELVIC)
Output	Divides into right and left hypogastric nerves	Vesical, uterovaginal/prostatic and middle rectal plexuses
Clinical	Presacral neurectomy for midline pain (rarely done now)	Damage at radical hysterectomy / rectal surgery → bladder, bowel, sexual dysfunction; nerve-sparing techniques

6 Sensory Innervation and the Pelvic Pain Line



Ovaries and tubes: sympathetic T10–T11, along the gonadal vessels. Pelvic pain line for the gut = mid-sigmoid.

Figure 5. Where you are relative to the peritoneum decides which pathway carries the pain.

Organ	Sensory pathway
Uterine body and fundus	Sympathetic (T10–L1) via hypogastric plexus — referred to lower abdomen / back
Ovaries / fallopian tubes	Sympathetic (T10–T11) via gonadal vessels — referred to ipsilateral flank / abdomen
Bladder dome	Sympathetic (T11–L2)
Cervix	Parasympathetic (S2–S4) — referred to perineum, lower back
Upper vagina	Parasympathetic (S2–S4)
Bladder neck / trigone	Parasympathetic (S2–S4)
Rectum	Parasympathetic (S2–S4) — gut pain line is at mid-sigmoid
Lower vagina	Pudendal (S2–S4) — somatic
Anal canal below pectinate line	Pudendal — somatic, pain-sensitive
Perineum / external genitalia	Pudendal (mainly)

EXAM HOOK

Above the pelvic pain line (touching peritoneum) → pain travels with **sympathetic** fibres. **Below** it (subperitoneal) → with **parasympathetic** fibres to S2–S4. **Perineum** → somatic **pudendal**.

7 Sexual Function, Micturition and Defecation

SEXUAL FUNCTION

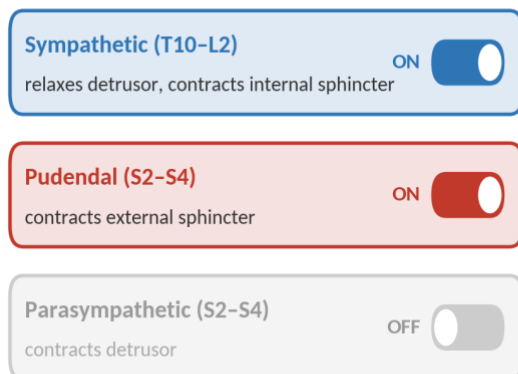
- **Erection ('Point')**: parasympathetic S2–S4 via pelvic splanchnic and cavernous nerves — vasodilation
- **Emission/ejaculation ('Shoot')**: sympathetic T10–L2; pudendal for forceful ejaculation
- Orgasm: spinal reflex, pudendal + autonomic
- Autonomic plexus damage → sexual dysfunction

DEFECATION

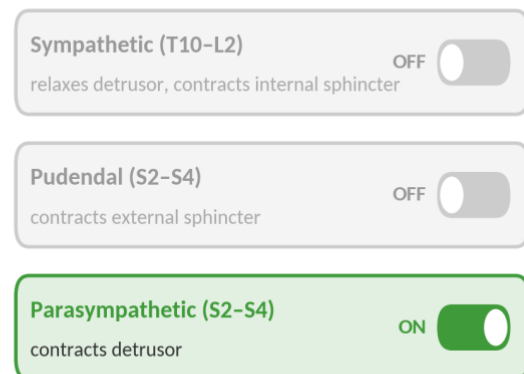
- Parasympathetic S2–S4 → rectal contraction
- **Internal** anal sphincter: smooth, involuntary, sympathetic tone
- **External** anal sphincter: skeletal, voluntary, pudendal
- **Puborectalis**: voluntary control of anorectal angle

Micturition — who is switched on?

STORAGE



VOIDING



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

Figure 6. Storage vs voiding.

- Spinal injury, autonomic neuropathy and multiple sclerosis all cause bladder dysfunction.

8 Clinical Correlations

8.1 Nerve injury in surgery

	Deep retractor	Prolonged lithotomy	Pfannenstiel too lateral	Side-wall surgery	Sacrospinous fixation	Radical hysterectomy
Femoral	●	●	•	•	•	•
Lat. fem. cutaneous	•	●	•	•	•	•
Common peroneal	•	●	•	•	•	•
Ilioinguinal / iliohypogastric	•	•	●	•	•	•
Obturator	•	•	•	●	•	•
Genitofemoral	•	•	•	●	•	•
Pudendal	•	•	•	•	●	•
Inferior hypogastric plexus	•	•	•	•	•	●

Femoral → weak knee extension, lost patellar reflex • Common peroneal → foot drop • Obturator → adductor weakness

Figure 7. Which surgical situation threatens which nerve.

CAUDA EQUINA SYNDROME

- Compression of L2–S5 roots below the conus (L1–L2)
- Central disc, tumour, trauma
- **Saddle anaesthesia**, retention/incontinence, faecal incontinence, leg weakness, lax anal tone
- **Surgical emergency**

SACRAL NEUROMODULATION

- Implanted electrode at the **S3** root
- Refractory overactive bladder
- Urinary retention (**Fowler's syndrome**)
- Faecal incontinence

9 MRCOG Exam Pearls — Last-Minute Page

Numbers to know

T12–L4 Lumbar plexus	L4–S4 Sacral plexus	S2–S4 Pudendal nerve	L2–L4 Femoral + obturator
T10–L2 Sympathetic outflow	S3 Sacral neuromodulation	10 mL LA per side, pudendal block	~2 cm SSF suture medial to spine

HIGH-YIELD CHECKLIST

- ☐ Lumbar plexus (T12–L4): iliohypogastric, ilioinguinal, genitofemoral, LFCN, femoral, obturator.
- ☐ Obturator (L2–L4): medial to psoas, exits via obturator canal; adductors.
- ☐ Femoral (L2–L4): under inguinal ligament lateral to artery; retractor and lithotomy injury.
- ☐ Sacral plexus (L4–S4): sciatic, pudendal, gluteal nerves, posterior femoral cutaneous, nerve to levator ani.
- ☐ Pudendal (S2–S4): GSF below piriformis → round ischial spine/sacrospinous → LSF → Alcock's canal.
- ☐ Pudendal branches: inferior rectal, perineal, dorsal nerve of clitoris.
- ☐ Pudendal block at ischial spine through sacrospinous ligament.
- ☐ Levator ani: dual supply — direct S3–S4 + perineal branch of pudendal.
- ☐ Sympathetic T10–L2 via hypogastric plexuses; parasympathetic S2–S4 via pelvic splanchnics.
- ☐ Inferior hypogastric plexus beside the uterosacral ligament — at risk in radical hysterectomy.
- ☐ Pelvic pain line: above → sympathetic; below → parasympathetic S2–S4; perineum → pudendal.
- ☐ 'Point and Shoot'. Cauda equina = surgical emergency.

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

Question	Answer
Which lumbar plexus branch emerges from the medial border of psoas?	Obturator
Which pierces the anterior surface of psoas?	Genitofemoral
Deep retractor on psoas — which nerve, and what deficit?	Femoral — weak knee extension, lost patellar reflex
Foot drop after prolonged lithotomy?	Common peroneal nerve
Pudendal nerve roots?	S2–S4
Where do you inject for a pudendal block?	Just medial to the ischial spine, through the sacrospinous ligament
Three terminal branches of the pudendal nerve?	Inferior rectal, perineal, dorsal nerve of clitoris
Pain from the uterine body travels with which fibres?	Sympathetic (T10–L1)
Pain from the cervix travels with which fibres?	Parasympathetic (S2–S4)
Which system produces erection?	Parasympathetic ('Point')
Which root is used for sacral neuromodulation?	S3

10 References

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