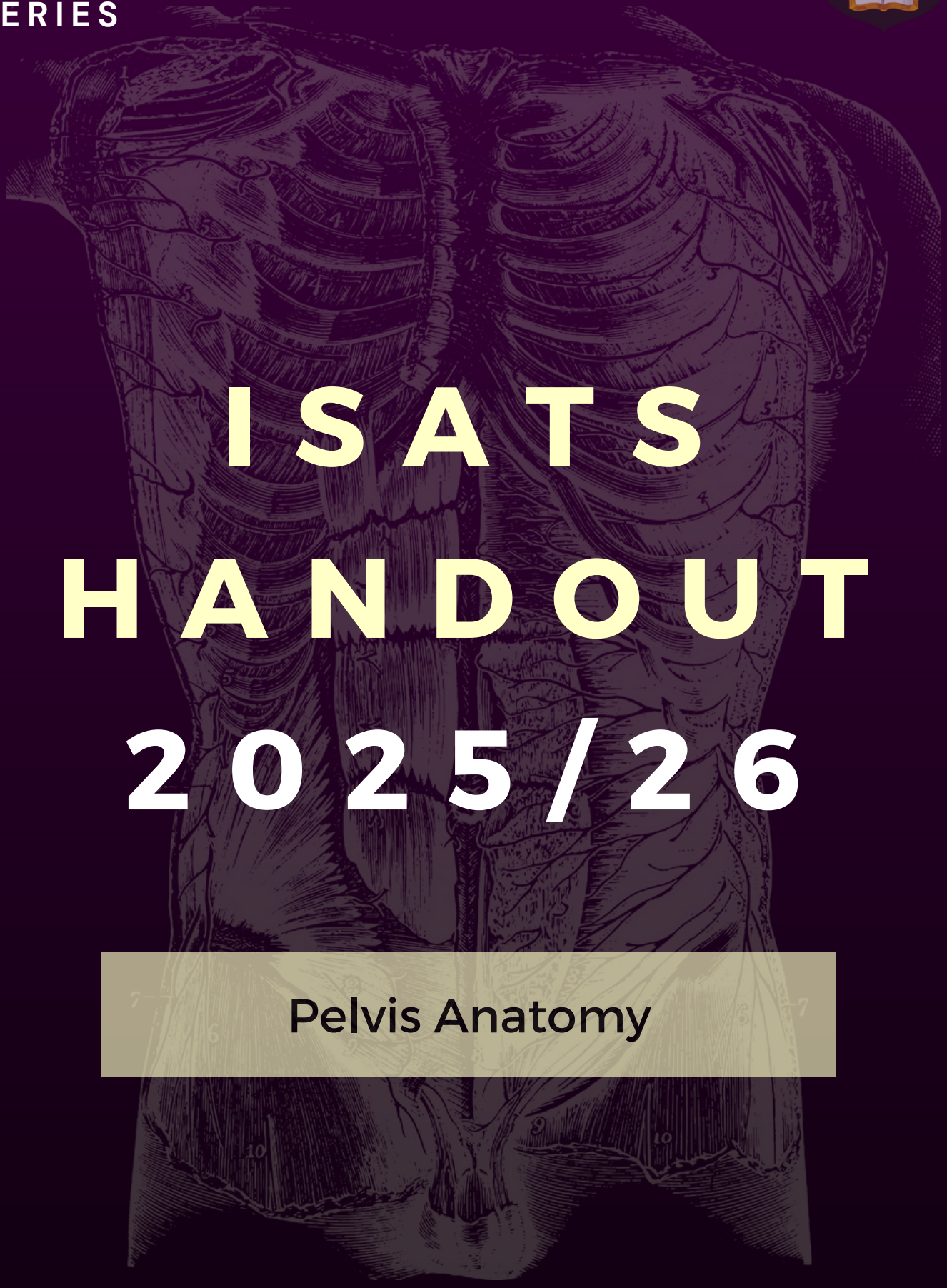
INTERNATIONAL SURGICAL ANATOMY TEACHING SERIES



ISATS HANDOUT 2025/26

Pelvis Anatomy

High Yield | Surgical Relevance | Approved for CPD points

PELVIC ANATOMY

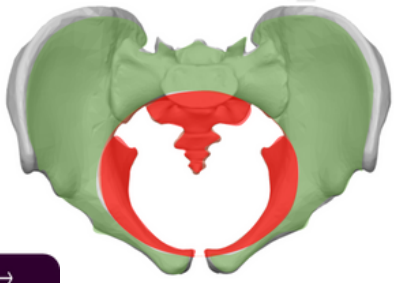
***Objectives**: Understand the bony anatomy of the pelvis, the muscles of the pelvic floor and the gross anatomy & neurovascular supply of the uterus, ovaries, fallopian tubes, cervix and vagina. Apply anatomical knowledge in context of common procedures within obstetrics and gynaecology.*

Greater Pelvis

- Superior (above pelvic brim)
- Part of abdominal cavity

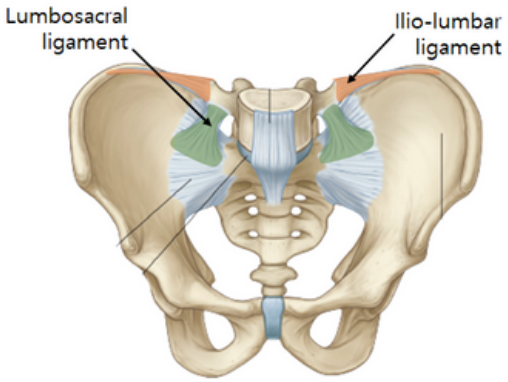
Lesser Pelvis

- Inferior (below pelvic brim)
- Encloses pelvic cavity and contains structures of urinary, GI, and reproductive system

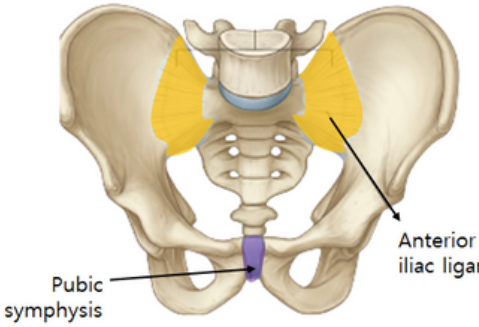


Pelvic Inlet → Rim encircled by bone | Pelvic Walls | Pelvic Outlet | Pelvic floor → Separates perineum + pelvic cavity

Pelvic Joints

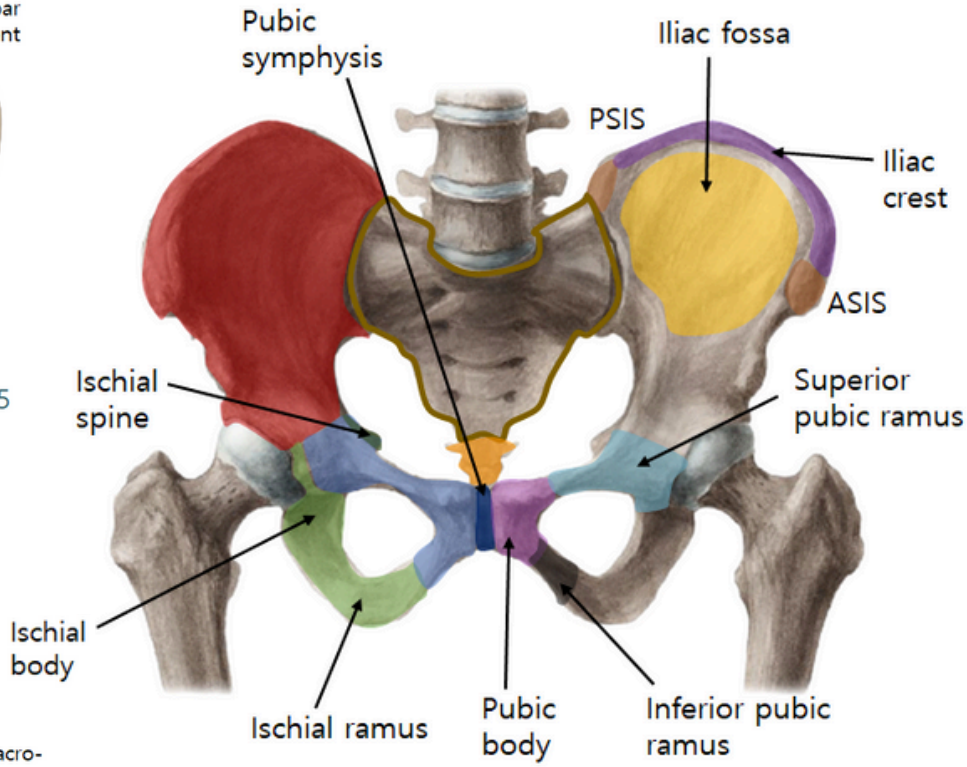


- Lumbosacral joint – sacrum with L5
  - Lumbosacral ligaments
  - Ilio-lumbar ligaments



- Sacro-iliac joints – sacrum with pelvic bones
  - Anterior & posterior sacro-iliac ligament
  - Interosseous sacro-iliac ligament
- Pubic symphysis – anteriorly in midline

Bony Anatomy of the Pelvis



Male
- Pelvic inlet: heart-shaped
- Angle formed by pubic arch: 50-60 degrees
- Ischial spine - project medially into pelvic cavity

Female
- Pelvic inlet: circular
- Angle formed by pubic arch: 80-85 degrees
- Ischial spine - less prominent projection

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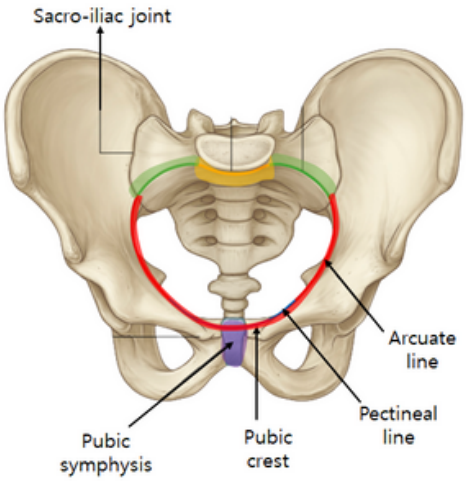
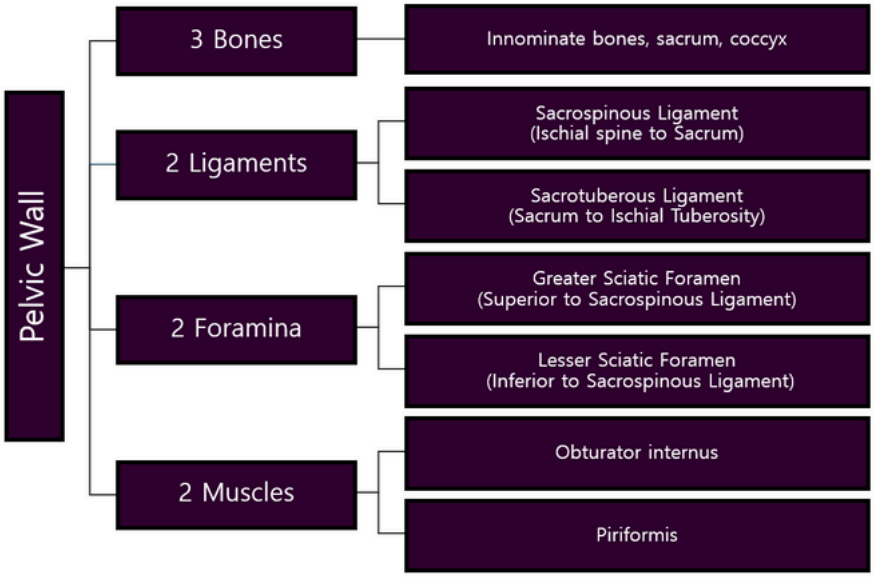
Lesser (False Pelvis)

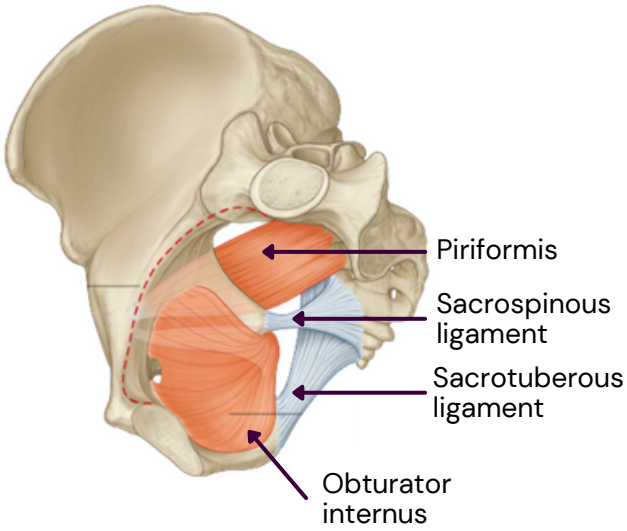
Pelvic Inlet

- Posteriorly - vertebral body of S1 (**sacral promontory**) + alae (**wings**) of sacrum
- Laterally - rim of ilium and superior pubic ramus (**linea terminalis**)
- Anteriorly - **pubic symphysis**



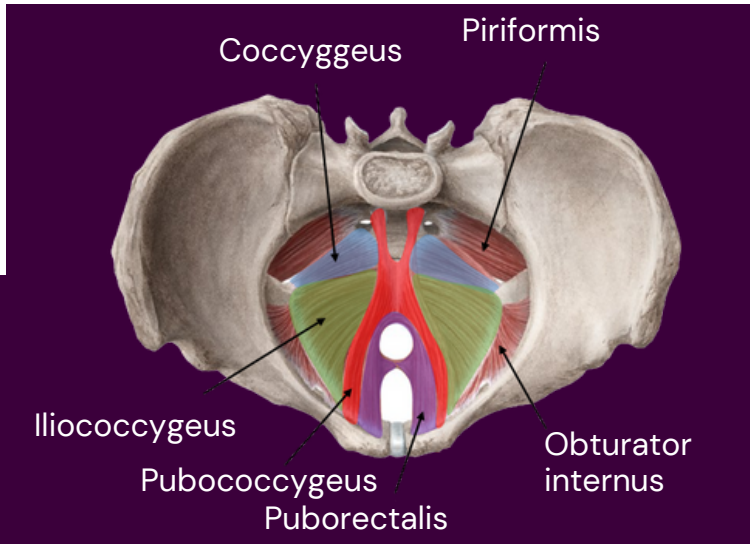
Pelvic Walls





Pelvic Floor

- Pelvic floor: divides pelvic cavity + perineum
- Consists of: pelvic diaphragm + perineal membrane + deep perineal pouch
- Vagina and urethra penetrate pelvic floor to pass into perineum



Pelvic Floor Muscles

- Form pelvic floor, support pelvic viscera, reinforce sphincters
- 2 Muscles
  - Coccygeus
  - Levator ani muscles

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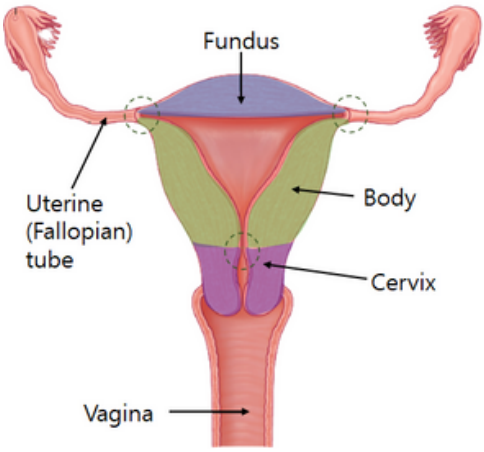
Female Reproductive System

Uterus

- Thick-walled muscular organ located between bladder and rectum
- Usually:
  - **Anteverted** (rotated anteriorly)
  - **Anteflexed** (flexed anteriorly)

Fundus	Rounded superior end (Above origin of uterine tubes)
Body	Contains narrow cavity (Site of embryo implantation)
Cervix	Joins with vagina



Ligaments

Broad ligament (Double layer of peritoneum & encloses fallopian tube/ovaries)

- Mesometrium: largest part from lateral pelvic walls to uterus
- Mesosalpinx: superior part and suspends fallopian tube
- Mesovarium: posterior part which attaches to ovary

Uterosacral ligament

- Extends from cervix to sacrum

Ligament ovary

- Attaches from inferior pole of ovary to uterus

Round ligament of uterus

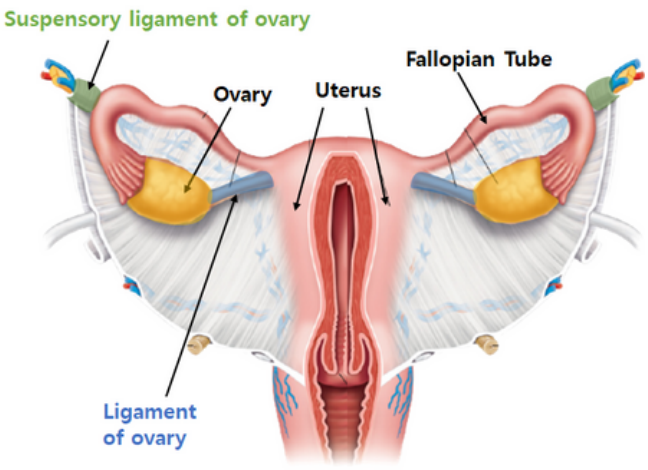
- Extends from uterus → inguinal canal → labium majus

Cardinal ligament

- Base of broad ligament
- Contains uterine artery and vein

Ovaries

- Function: site of egg production (oogenesis)
- **Structure**
  - 2 almon-shaped
  - Suspended by **mesovarium**
- **Ligaments**
  - **Ligament of ovary:** ovary to fundus of uterus
  - **Suspensory ligament of ovary:** contains ovarian vessels, nerves & lymphatics ("*suspend the end*")



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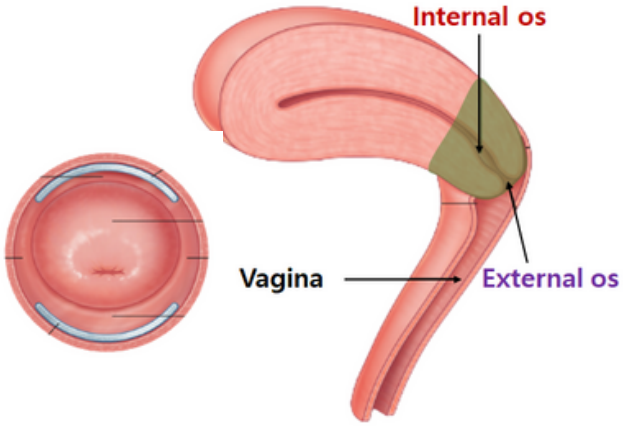
Fallopian Tube

- Muscular tubes extending from superior end of body of uterus to ovary
- Enclosed in upper margin of broad ligament (**mesosalpinx)**
- Course - pass superiorly and laterally to ovaries

Fimbriae – Finger – like ciliated projections (facilitate collection of eggs) → Infundibulum – trumpet – shaped ends & curve over ovary → Ampulla – expansion of fallopian tub → Isthmus – Joins with uterus body

Cervix

- Short, broad cylinder at inferior part of uterus
- **Function:** passage of sperm & maintain sterility of female reproductive tract
- Cervix is connected to the vagina distally
- **Connections**:
  - Internal os - central cervix opens **above** into uterine cavity
  - External os - central cervix opens **below** into vaginal cavity



Arterial Supply

- Internal iliac artery - supply pelvic viscera
  - Arises from common iliac at IV disc of L5/S1
  - Located medial to external iliac vein

- Bladder → **Superior vesical a.**
- Uterus/Cervix → **Uterine a.**
- Vagina → **Vaginal a.**
- Perineum → **Internal pudendal a.**
- Ovaries → **Ovarian a.**

Note: Ovarian (gonadal) artery from abdominal aorta to supply the ovaries and fallopian tubes

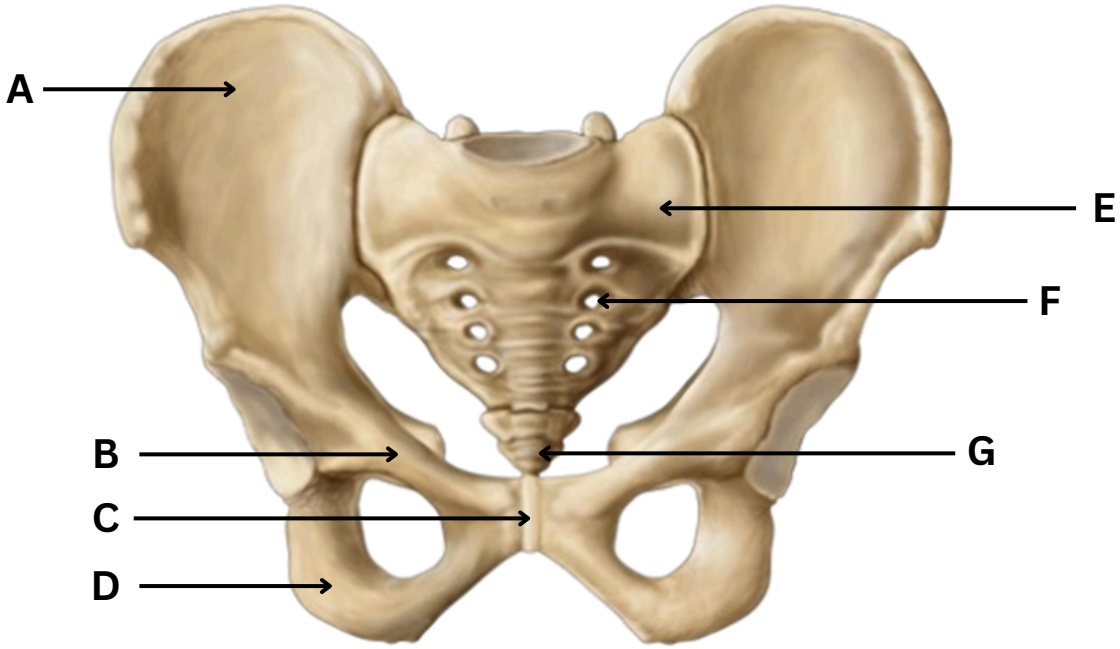
Innervation

- Mixed autonomic innervation enter through inferior hypogastric plexus
- **Parasympathetic:**
  - Pelvic splanchnic nerves – S2-S4 - penetrate pelvic floor to innervate erectile tissue in females and males (vasodilation)
- **Sympathetic:**
  - Fibres supply blood vessels, accessory reproductive glands, cause contraction of internal anal and urethral sphincter
- **Pudendal nerve (SOMATIC INNERVATION)**
  - Leaves pelvic cavity via greater sciatic foramen to enter gluteal region
  - Then around ischial spine and enters lesser sciatic foramen to enter perineum
  - Sensory: supplies skin of perineum/ external genitalia.
  - Motor: skeletal muscle of perineum.

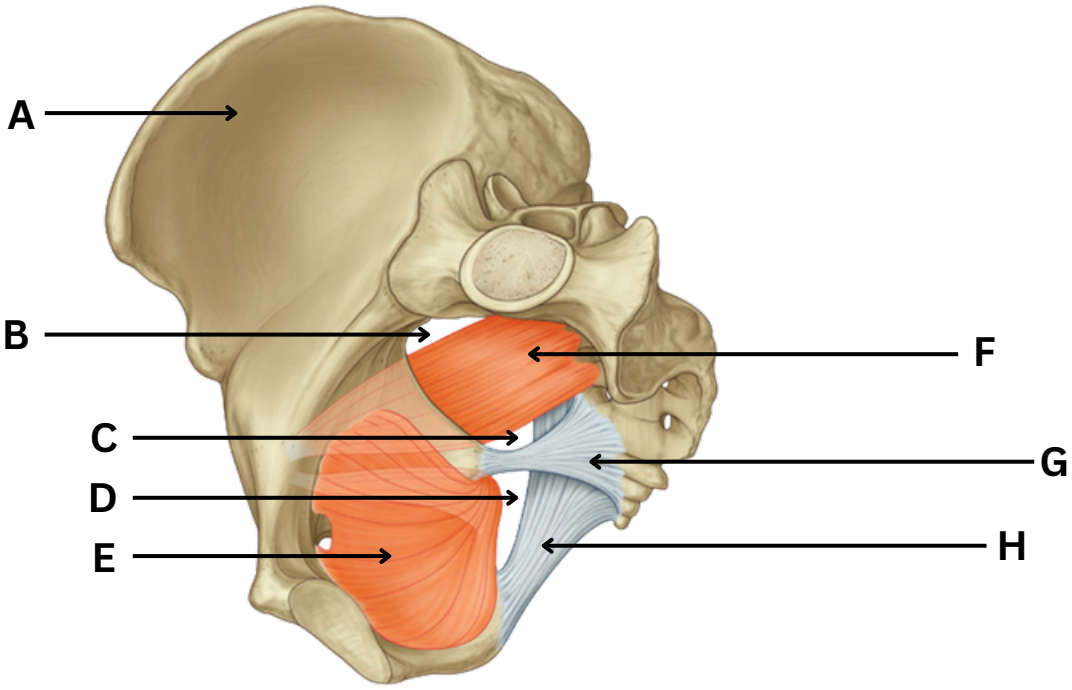
PELVIC ANATOMY

Test yourself

1) Label the structures of the bony pelvis:



2) Label the structures of the pelvic wall:



PELVIC ANATOMY

Test yourself

MCQ 1

A woman with suspected pelvic inflammatory disease undergoes transvaginal ultrasound. Fluid is noted posterior to the uterus. This fluid is most likely accumulating between which two structures?

A. Bladder and uterus
B. Cervix and bladder
C. Rectum and uterus
D. Rectum and vagina
E. Uterus and sigmoid colon

MCQ 2

A woman undergoes perineal examination following childbirth. Which structure divides the perineum into anterior and posterior triangles?

A. Anococcygeal ligament
B. Intertuberous line
C. Ischial spine
D. Pubic arch
E. Sacrotuberous ligament

MCQ 3

Following an episiotomy, a woman reports reduced sensation in the posterior perineum but no anal sphincter dysfunction. Which nerve is most likely affected?

A. Femoral nerve
B. Ilioinguinal nerve
C. Obturator nerve
D. Pudendal nerve
E. Sciatic nerve

MCQ 4

A 25-year-old woman comes in with vomiting and abdominal pain. On examination, she is tender on palpation at all lower quadrants of the abdomen. Her temperature is 38°C. On ultrasound, there is fluid in the rectouterine pouch. What anatomical structure would a needle be passed via to extract this fluid?

A. Anterior fornix of the vagina
B. Bladder
C. Posterior fornix of the vagina
D. Round ligament
E. Urethra

MCQ 5

Which pelvic wall muscle lies immediately medial to the greater sciatic foramen, where the sciatic nerve exits?

A. Coccygeus
B. Levator ani
C. Obturator internus
D. Piriformis
E. Psoas major

MCQ 6

During a mediolateral episiotomy, which fibre is incised to allow foetal passage?

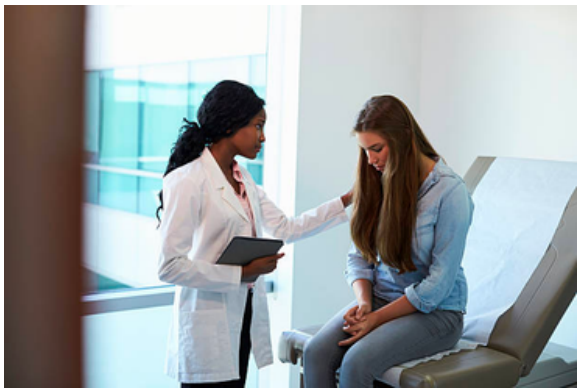
A. Bulbospongiosus
B. Coccygeus
C. External urethral sphincter
D. Levator ani
E. Superficial transverse perineal

PELVIC ANATOMY

Test yourself

OSCE Station - Case Based Discussion

A 29-year-old woman (G2P0), presents to the Emergency Department with a 1-day history of worsening left-sided lower abdominal pain and light vaginal spotting. She is hasn't menstruated for 7 weeks and reports dizziness. Her past medical history includes pelvic inflammatory disease treated 3 years ago. On examination, she is tachycardic with left adnexal tenderness. A pregnancy test is positive, and transvaginal ultrasound shows an empty uterus with a left adnexal mass and free fluid in the pelvis.



Q1. What is the most likely diagnosis?

Q2. Which anatomical site is most commonly affected in this condition?

Q3. Explain why free fluid may be seen in the pouch of Douglas in this condition.

Q4. List three risk factors for developing this condition.

Q5. What does the medical management of this condition involve?

Q6. List two potential complications of this condition if left untreated.

Answers:
Labelling: 1) A: Ilium, B: Pubis, C: Pubic Symphysis, D: Ischium, E: Sacrum, F: Sacral Foramina, G: Coccyx
2) A: Ilium, B: Suprapiriformis recess, C: Infrapiriformis recess, D: Lesser Sciatic Foramen, E: Obturator Internus, F: Piriformis, G: Sacrospinous ligament, H: Sacrotuberous ligament
MCQs: 1) C, **2)** B, **3)** D, **4)** C, **5)** C, **6)** A
OSCEs:
1) Ectopic pregnancy
2) Ampulla of the fallopian tube.
3) Rupture of an ectopic pregnancy causes intraperitoneal bleeding, which accumulates in the pouch of Douglas.
4) Previous ectopic pregnancy, endometriosis, pelvic inflammatory disease (PID), intrauterine device (IUD), previous tubal surgery.
5) Medical management involves administering methotrexate, which inhibits trophoblastic cell proliferation and allows resolution of the ectopic pregnancy. It is only suitable for haemodynamically stable patients who are willing to comply with follow-up. Follow-up involves serial β-hCG monitoring until levels are undetectable, with safety-netting to seek urgent care if worsening pain, dizziness, or bleeding develops due to risk of rupture.
6) Tubal rupture with life-threatening haemorrhage, infertility due to tubal damage.