MEDICAL EDUCATION RESOURCE

Preliminary Consideration of Boundaries and Contents of Pelvis

Introduction

- The **pelvis** is the **basin-shaped cavity** at the lower end of the trunk, lying between the abdomen above and perineum below.
- It serves as a **bony and muscular funnel** that transmits the weight of the upper body to the lower limbs and supports pelvic organs.
- The **bony pelvis** is formed by:
    - Two **hip bones** (ossa coxae),
    - **Sacrum**, and
    - **Coccyx**.
- The **pelvic cavity** is divided into two parts by the **pelvic brim (linea terminalis):**
    1. **Greater (false) pelvis** – above the pelvic brim; part of the abdominal cavity.
    2. **Lesser (true) pelvis** – below the brim; encloses the pelvic viscera.

Functions of the pelvis:

- Supports weight of trunk.
- Protects pelvic viscera (bladder, rectum, reproductive organs).

- Provides attachment for muscles of lower limb and perineum.
- Transmits forces from spine to lower limbs during locomotion.

Lesser Pelvis

- The **lesser pelvis** (true pelvis) forms the **pelvic cavity proper**.
- Bounded by:
  - **Anteriorly:** Pubic bones and symphysis pubis.
  - **Posteriorly:** Sacrum and coccyx.
  - **Laterally:** Pelvic parts of hip bones (ischium and ilium below the linea terminalis).
- **Cavity shape:** Funnel-shaped, narrower below.

Contents:

- **Pelvic viscera:** Urinary bladder, rectum, and reproductive organs (uterus, vagina, prostate, seminal vesicles).
- **Muscles:** Pelvic diaphragm (levator ani and coccygeus).
- **Vessels:** Internal iliac arteries and veins.
- **Nerves:** Sacral plexus, coccygeal plexus, and autonomic pelvic plexuses.
- **Lymphatics:** Internal and external iliac nodes.

Clinical note:
Pelvic fractures may endanger pelvic viscera and vessels because of the close relationship

between bone and soft tissues.

Muscles of the Pelvis (429)

The walls of the pelvis are partly **bony** and partly **muscular**.

Muscular components:

1. **Piriformis muscle:**
    - Origin: Anterior surface of sacrum.
    - Insertion: Greater trochanter of femur (passes through greater sciatic foramen).
    - Function: Lateral rotation and abduction of thigh.
    - Nerve supply: Branches from sacral plexus (S1, S2).
2. **Obturator internus:**
    - Origin: Internal surface of obturator membrane and surrounding bones.
    - Insertion: Greater trochanter (after passing through lesser sciatic foramen).
    - Function: Lateral rotation of thigh; forms lateral wall of pelvis.
    - Nerve supply: Nerve to obturator internus (L5, S1, S2).

Pelvic floor (diaphragm):

- Formed mainly by **levator ani** and **coccygeus muscles**.
- Supports pelvic viscera and maintains continence.

- Detailed structure discussed in next chapter.

Pelvic Inlet (Superior Aperture of Pelvis)

- The **pelvic inlet** marks the boundary between **greater and lesser pelvis**.
- It is an **oblique plane** directed downward and forward.

Boundaries:

- **Posteriorly:** Promontory of sacrum and alae of sacrum.
- **Laterally:** Arcuate line of ilium and pectineal line of pubis.
- **Anteriorly:** Upper margin of symphysis pubis.

Diameters of pelvic inlet:

1. **Anteroposterior (true conjugate):**
    - From sacral promontory to upper border of symphysis pubis.
    - About **11 cm**.
2. **Transverse diameter:**
    - Widest distance between arcuate lines of ilium.
    - About **13 cm**.
3. **Oblique diameter:**

- From sacroiliac joint on one side to iliopectineal eminence on opposite side.
- About **12 cm**.

Obstetric significance:

- The size and shape of the pelvic inlet determine **ease of childbirth**.
- **Narrow inlet** may cause obstructed labor.

Pelvic Outlet (Inferior Aperture of Pelvis)

- The **pelvic outlet** is the lower opening of the pelvis, closed in living state by the **pelvic diaphragm**.
- It is diamond-shaped.

Boundaries:

- **Anteriorly:** Inferior border of symphysis pubis.
- **Posteriorly:** Tip of coccyx.
- **Anterolaterally:** Ischiopubic rami.
- **Posterolaterally:** Sacrotuberous ligaments and ischial tuberosities.

Pelvic outlet subdivisions:

- Divided by line joining ischial tuberosities into:
  - **Urogenital triangle (anterior)** – contains urogenital structures.

- **Anal triangle (posterior)** – contains anal canal and ischioanal fossae.

Clinical note:

- The outlet expands during childbirth due to backward movement of coccyx and stretching of perineal tissues.
- The **anteroposterior diameter** of the outlet is about **12.5 cm**.

Clinical Anatomy

- **Pelvic fractures:** Common after road traffic accidents; may injure bladder, urethra, or pelvic vessels.
- **Pelvic disproportion:** In obstetrics, mismatch between fetal head and maternal pelvis causes difficult labor; assessed using pelvic diameters.
- **Sacral promontory prominence:** Reduces pelvic inlet size; important in **cephalopelvic disproportion**.
- **Pelvic tumors or abscesses:** Can compress pelvic nerves, causing pain radiating to thigh or perineum.
- **Differences between male and female pelvis:**
  - **Female pelvis:** Broader, shallower, with wider subpubic angle and circular inlet – adapted for childbirth.
  - **Male pelvis:** Narrower, deeper, with heart-shaped inlet and smaller outlet.
- **Pelvic inclination:** Angle between plane of pelvic inlet and horizontal plane (~50–60° in erect posture).

    - Important in radiological and obstetric assessments.

- **Obstetric conjugate:** True anteroposterior diameter of inlet, measured indirectly per vaginam.

- **Diagonal conjugate:** From sacral promontory to lower border of symphysis pubis; used clinically to estimate pelvic adequacy for delivery.

Pelvic Floor

- The **pelvic floor** is a **muscular partition** that forms the **floor of the pelvic cavity** and the **roof of the perineum**.

- It provides support to the pelvic viscera and helps maintain the integrity of the lower abdominal structures.

- Composed mainly of the **pelvic diaphragm**, which includes:

    1. **Levator ani muscles** — pubococcygeus, puborectalis, and iliococcygeus.

    2. **Coccygeus (ischiococcygeus)** muscle.

Features:

- Stretches between the two lateral pelvic walls and attaches posteriorly to the coccyx.

- Perforated by the **urethra** (and **vagina** in females) and **anal canal**.

- Covered superiorly by **pelvic fascia** and inferiorly by **perineal fascia**.

Functions:

- Supports pelvic organs like bladder, rectum, and uterus.
- Maintains intra-abdominal pressure during coughing, sneezing, and childbirth.
- Provides sphincteric control around pelvic openings.
- Assists venous and lymphatic return from pelvic organs.

Clinical Anatomy

- **Pelvic floor weakness:** Seen commonly in multiparous women; leads to uterovaginal prolapse, cystocele, or rectocele.
- **Childbirth trauma:** Overstretching or tearing of the levator ani and perineal body causes pelvic organ descent.
- **Episiotomy:** Mediolateral incision made to prevent uncontrolled perineal tearing during childbirth.
- **Chronic strain:** From coughing, constipation, or obesity weakens the floor and predisposes to herniation of pelvic viscera.
- **Paralysis:** Pudendal nerve or sacral root injury (S2–S4) causes loss of sphincter control.
- **Pelvic floor exercises (Kegel's):** Strengthen levator ani to prevent prolapse and incontinence.

Pelvic Cavity

- The **pelvic cavity** lies within the **lesser pelvis**, between the pelvic inlet and outlet.
- It is funnel-shaped and narrow inferiorly.

Boundaries:

- **Anterior:** Posterior surface of pubic symphysis and bodies of pubic bones.
- **Posterior:** Sacrum and coccyx, covered by piriformis muscle.
- **Lateral:** Obturator internus muscle and fascia.
- **Floor:** Pelvic diaphragm (levator ani and coccygeus).

Orientation:

- The long axis of the cavity is directed downward and backward.
- The plane of the pelvic inlet is inclined at about 50–60° from the horizontal.

Contents of the Pelvic Cavity

- **Pelvic viscera:**
  - *In males:* Urinary bladder, terminal ureters, seminal vesicles, prostate, and rectum.
  - *In females:* Urinary bladder, urethra, uterus, vagina, and rectum.
- **Vessels:** Internal iliac arteries and veins with branches, superior rectal vessels, and gonadal vessels.
- **Nerves:** Sacral and coccygeal plexuses, hypogastric plexus, and pelvic splanchnic nerves.
- **Lymphatics:** Internal, external, and common iliac lymph nodes.
- **Muscles:** Piriformis, obturator internus, levator ani, and coccygeus.

Relations:

- In males, the rectum lies posterior to the bladder and prostate, separated by the **rectovesical pouch**.
- In females, the uterus and vagina lie between bladder (anteriorly) and rectum (posteriorly).

Structures Crossing the Pelvic Inlet (Pelvic Brim)

The following structures pass across the **pelvic brim** from the abdomen into the pelvis:

From posterior to anterior:

1. **Sacral promontory** — central landmark.
2. **Common iliac vessels** — bifurcate into external and internal iliac arteries and veins.
3. **Sympathetic trunk** — descends along the sacral ala.
4. **Ureter** — crosses the brim anterior to the bifurcation of the common iliac artery.
5. **Gonadal vessels** — descend anterior to the ureter.
6. **Lumbosacral trunk** — passes medially over the sacral ala to join the sacral plexus.
7. **Obturator nerve** — crosses the brim to reach the obturator canal.
8. **Iliolumbar vessels** — lie posterior to psoas major near the brim.
9. **Sigmoid colon (on the left side)** — crosses the brim to become the rectum.

Clinical importance:

- The **ureter** is at risk during pelvic surgeries where it crosses the **common iliac bifurcation**.
- **Obturator nerve compression** by enlarged pelvic lymph nodes may cause pain radiating to the medial thigh.
- Knowledge of these structures is essential in pelvic dissections and gynecological or urological operations.

Facts to Remember

- The **pelvis** is a basin-shaped structure located at the lower end of the trunk and acts as the connection between the vertebral column and the lower limbs.
- It is formed by **two hip bones**, the **sacrum**, and the **coccyx**, united anteriorly at the **pubic symphysis**.
- The **pelvic brim (linea terminalis)** divides the pelvis into the **greater (false)** pelvis above and the **lesser (true)** pelvis below.
- The **greater pelvis** forms part of the abdominal cavity, while the **lesser pelvis** contains the pelvic organs.
- The **pelvic inlet** is bounded by the sacral promontory, alae of sacrum, arcuate line, pectineal line, and upper margin of symphysis pubis.
- The **pelvic outlet** is bounded anteriorly by the lower margin of symphysis pubis, posteriorly by the tip of coccyx, and laterally by the ischiopubic rami and sacrotuberous ligaments.

- The **pelvic floor** is formed by the **pelvic diaphragm**, consisting of the **levator ani** and **coccygeus muscles**, and is reinforced by the **perineal body** and **perineal membrane**.

- The **levator ani** includes three parts — **pubococcygeus**, **puborectalis**, and **iliococcygeus** — which together support pelvic viscera and maintain continence.

- The **pelvic diaphragm** is perforated by the **urethra**, **vagina (in females)**, and **anal canal**.

- The **pelvic fascia** invests the walls of the pelvic cavity and ensheathes the viscera, providing mechanical support and fixation.

- The **pelvic cavity** contains viscera (bladder, rectum, reproductive organs), vessels (internal iliac branches), nerves (sacral and pelvic plexuses), and lymphatics.

- The **ureter**, **obturator nerve**, **common iliac vessels**, **gonadal vessels**, and **lumbosacral trunk** are key structures crossing the **pelvic brim**.

- The **obturator internus** forms the **lateral wall**, and the **piriformis** forms the **posterior wall** of the pelvic cavity.

- The **pelvic inclination** (angle between the pelvic inlet and horizontal plane) is about **50–60°** in the upright position.

- The **female pelvis** is broader, shallower, with a circular inlet and wider subpubic angle, suitable for childbirth.
  The **male pelvis** is deeper, narrower, with a heart-shaped inlet.

- The **obstetric conjugate** is the shortest anteroposterior diameter of the pelvic inlet and is clinically significant for determining the adequacy of the pelvis during childbirth.

- The **pelvic floor** acts as a **dynamic sphincteric platform**, maintaining continence and providing support during increased intra-abdominal pressure.

- Weakness of the pelvic floor due to repeated childbirth or aging results in **prolapse of pelvic organs**.

- The **ureter** crosses the **pelvic brim anterior to the bifurcation of the common iliac artery**, making this site important during surgical procedures in the pelvis.

- Proper understanding of the **pelvic boundaries, cavity, and supporting structures** is essential for safe obstetric, gynecological, and urological interventions.

Clinicoanatomical Problem

Case 1:
A 27-year-old woman presents with a feeling of heaviness in the lower abdomen and difficulty controlling urination, particularly after her second childbirth.

Question:
Which structures are likely weakened, and what condition does this represent?

Explanation:

- The **levator ani muscles**, particularly the **pubococcygeus** and **puborectalis**, as well as the **perineal body**, are overstretched or torn during childbirth.

- This leads to **pelvic floor weakness**, resulting in **uterovaginal prolapse**, **cystocele**, or **stress urinary incontinence**.

- In severe cases, prolapse may involve descent of uterus or vaginal wall through the vaginal canal.

Clinical insight:
Pelvic floor exercises (Kegel's) strengthen the levator ani; in advanced cases, surgical repair (colporrhaphy) may be necessary.

Case 2:
A 45-year-old man develops deep-seated pelvic pain after a fall from a motorcycle. X-ray reveals a fracture of the pelvic ring near the pubic symphysis.

Question:
Which pelvic viscera are most likely at risk, and why?

Explanation:

- Fractures of the **anterior pelvic ring** may injure the **urinary bladder** and **urethra**, as these lie just posterior to the pubic bones.
- Blood and urine may extravasate into the **retropubic space (space of Retzius)** or spread into the **perineum** depending on the site of urethral tear.
- Injury at the **membranous urethra** (below prostate) is particularly common in such trauma.

Clinical management:
Immediate catheterization should be avoided until imaging confirms urethral integrity. Surgical repair may be required.

Case 3:
During a gynecological procedure for an ovarian mass, the surgeon encounters a tubular structure crossing the pelvic brim anterior to the bifurcation of the common iliac artery.

Question:
What is this structure, and why is it clinically important?

Explanation:

- The structure is the **ureter**, which crosses the **pelvic brim anterior to the bifurcation of the common iliac artery** (“water under the bridge”).
- It is vulnerable to injury or ligation during **pelvic or obstetric surgeries** (e.g., hysterectomy, oophorectomy).

- Ureteral injury may lead to **urine leakage, hydronephrosis, or fistula formation**.

Clinical pearl:
Surgeons must identify the ureter visually before ligating pelvic vessels to prevent iatrogenic damage.

Case 4:
A 55-year-old woman complains of pain radiating to the medial side of her thigh along with difficulty in adduction of the thigh. On pelvic examination, enlarged lymph nodes are noted near the obturator foramen.

Question:
Which nerve is involved, and what is the cause of these symptoms?

Explanation:

- The **obturator nerve**, which crosses the **pelvic brim and obturator canal**, is compressed by **enlarged pelvic lymph nodes or tumors**.
- This leads to **referred pain along the medial thigh** and **weakness of adductor muscles**.
- Common in cases of **pelvic carcinoma** or **metastatic lymphadenopathy**.

Clinical importance:
Obturator nerve involvement helps localize pelvic pathology and may necessitate surgical decompression or node dissection.

Case 5:
A 30-year-old primigravida in labor is unable to deliver despite strong uterine contractions. Pelvic examination suggests the fetal head is unable to enter the pelvic inlet.

Question:
What anatomical factors could explain this difficulty?

Explanation:

- The **pelvic inlet** may be **contracted or deformed**, often due to a **prominent sacral promontory** or **narrow transverse diameter**.

- This causes **cephalopelvic disproportion** — the mismatch between the size of the maternal pelvis and the fetal head.

- Common causes include rickets, osteomalacia, or congenital pelvic deformities.

Clinical management:
Cesarean section may be required if the pelvic dimensions are inadequate for vaginal delivery.

Case 6:
A 60-year-old woman complains of chronic constipation and a bulging mass through the posterior vaginal wall.

Question:
Which structure is affected, and what is the anatomical defect?

Explanation:

- The condition is **rectocele**, caused by **posterior vaginal wall weakness** and **defective levator ani support**.

- The **rectum** herniates into the vagina, producing the sensation of incomplete evacuation and pelvic fullness.

Clinical importance:
Repair involves strengthening the pelvic floor (posterior colporrhaphy) and restoring levator ani integrity.

Summary Insight:
Pelvic anatomy has vital clinical implications — from childbirth and urinary continence to surgical safety.
Understanding the **pelvic floor**, **pelvic inlet**, and **structures crossing the brim** is essential for managing **obstetric, urologic, and gynecologic** conditions effectively.

Frequently Asked Questions

Q1. What is the difference between the greater and lesser pelvis?
A.

- The **greater (false) pelvis** lies above the pelvic brim and forms part of the abdominal cavity, supporting the intestines.
- The **lesser (true) pelvis** lies below the brim and encloses the pelvic viscera such as bladder, rectum, and reproductive organs.

Q2. What structures form the bony pelvis?
A. Two hip bones, the sacrum, and the coccyx together form the **bony pelvis**.

Q3. What is the pelvic brim (linea terminalis)?
A. It is the oblique ridge that separates the greater and lesser pelvis, formed by the **sacral promontory**, **ala of sacrum**, **arcuate line of ilium**, **pectineal line**, and **upper margin of pubic symphysis**.

Q4. What is the difference between the pelvic inlet and pelvic outlet?
A.

- **Pelvic inlet:** Upper aperture of the lesser pelvis bounded by the pelvic brim.
- **Pelvic outlet:** Lower aperture bounded by the coccyx, ischial tuberosities, and pubic arch.

Q5. What is the pelvic floor made up of?
A. The **pelvic diaphragm**, formed by the **levator ani** (pubococcygeus, puborectalis, iliococcygeus) and **coccygeus muscles**, along with their covering fasciae.

Q6. What are the functions of the pelvic floor?
A.

- Supports the pelvic viscera.
- Maintains continence by acting as a sphincter.
- Resists intra-abdominal pressure during straining.
- Assists in childbirth and prevents prolapse.

Q7. Which muscles form the lateral walls of the pelvis?
A. Obturator internus muscles covered by obturator fascia form the lateral walls.

Q8. Which muscles form the posterior wall of the pelvis?
A. The **piriformis** muscles along with the **sacrum and coccyx**.

Q9. What is the function of the levator ani?
A.

- Supports pelvic organs.
- Maintains urinary and fecal continence.
- Contracts reflexly during coughing and straining to prevent prolapse.

Q10. What is the clinical importance of the perineal body?
A. It is a central fibromuscular node that anchors perineal and pelvic muscles. Damage during childbirth leads to prolapse of uterus or vagina.

Q11. What are the main differences between the male and female pelvis?
A.

- **Female pelvis:** Wide, shallow, circular inlet, large subpubic angle, adapted for childbirth.
- **Male pelvis:** Narrow, deep, heart-shaped inlet, small subpubic angle.

Q12. What is the true conjugate diameter, and why is it important?
A.

- The **true (obstetric) conjugate** is the distance from the sacral promontory to the upper border of symphysis pubis (~11 cm).
- It is critical for determining the adequacy of the pelvis for vaginal delivery.

Q13. What is the diagonal conjugate?
A.

- Distance from sacral promontory to lower border of symphysis pubis.
- Measured clinically per vaginam to estimate the true conjugate.
- Normally about **13 cm**.

Q14. What are the main structures passing through the pelvic brim?
A. Ureter, common iliac vessels, gonadal vessels, lumbosacral trunk, sympathetic chain, and obturator nerve.

Q15. Why is the ureter said to cross “under the bridge”?
A. Because it passes **beneath the uterine artery** in females and **beneath the vas deferens** in males — a key relation remembered as “**water under the bridge**.”

Q16. What is the role of the perineal membrane?
A.

- Provides attachment for perineal muscles.
- Forms the roof of the superficial and floor of the deep perineal pouches.
- Supports urogenital organs.

Q17. What is the importance of the obturator nerve in pelvic anatomy?
A. It supplies adductor muscles of the thigh and may be compressed by pelvic tumors or lymph nodes, causing pain along the medial thigh.

Q18. What are the main differences in the pelvic cavity of males and females?
A.

- **Male:** Smaller cavity, deeper pelvis, narrow subpubic angle.
- **Female:** Wider cavity, shallower pelvis, larger subpubic angle.

Q19. Which viscera occupy the pelvic cavity in both sexes?
A. The **urinary bladder**, **ureters**, and **rectum**. The reproductive organs differ between sexes.

Q20. What is the clinical importance of the pelvic diaphragm?
A. It supports pelvic organs, prevents prolapse, and maintains urinary and fecal continence; injury or paralysis leads to pelvic floor dysfunction.

Q21. What is the plane of pelvic inclination?
A. The angle between the plane of pelvic inlet and the horizontal plane, usually about **50–60°** in the erect posture.

Q22. Why is the pelvic outlet important in obstetrics?
A. Its size and elasticity determine the ease of childbirth; coccyx moves backward during labor to increase its anteroposterior diameter.

Q23. Which vessels supply the pelvic organs?
A. Branches of the **internal iliac artery** and **superior rectal artery** (from inferior mesenteric artery).

Q24. What is the main nerve supply to the perineum and pelvic floor?
A. The **pudendal nerve (S2–S4)**, which supplies motor and sensory fibers to perineal muscles, genitalia, and sphincters.

Q25. What happens if the pelvic floor is weakened?
A. It may lead to **pelvic organ prolapse**, **urinary incontinence**, or **rectal descent** due to loss of support and sphincteric control.

Q26. What are the boundaries of the pelvic outlet?
A.

- **Anterior:** Inferior border of symphysis pubis.
- **Posterior:** Tip of coccyx.
- **Lateral:** Ischiopubic rami and sacrotuberous ligaments.

Q27. Which muscles pass through the greater sciatic foramen?
A. The **piriformis** muscle and **pudendal nerve** with internal pudendal vessels.

Q28. What is the role of the lumbosacral trunk?
A. It joins the sacral plexus and helps form nerves supplying the lower limb (e.g., sciatic nerve).

Q29. What are the common causes of pelvic floor damage?
A. Childbirth trauma, chronic coughing, obesity, constipation, aging, or neuropathy affecting pudendal or sacral nerves.

Q30. Why is knowledge of pelvic anatomy essential in surgery?
A. To avoid iatrogenic injury to vital structures like **ureter**, **internal iliac vessels**, and

pudendal nerve during obstetric, gynecologic, or urologic operations.

Multiple Choice Questions

1. The bony pelvis is formed by:
A. Two hip bones and sacrum
B. Two hip bones, sacrum, and coccyx
C. Two hip bones only
D. Sacrum and coccyx only
? Answer: B. Two hip bones, sacrum, and coccyx

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2. The line that divides the greater and lesser pelvis is called:
A. Arcuate line
B. Pelvic outlet
C. Pelvic brim (linea terminalis)
D. Obturator line
? Answer: C. Pelvic brim (linea terminalis)

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3. The greater pelvis is also known as:
A. False pelvis
B. True pelvis
C. Pelvic cavity
D. Pelvic diaphragm
? Answer: A. False pelvis

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4. The lesser pelvis is also known as:
A. False pelvis
B. True pelvis
C. Pelvic girdle
D. Pelvic outlet
? Answer: B. True pelvis

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5. The pelvic inlet is bounded posteriorly by:

A. Coccyx

B. Sacral promontory

C. Sacrotuberous ligament

D. Ischial tuberosity

? Answer: B. Sacral promontory

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6. The pelvic outlet is bounded anteriorly by:

A. Pubic symphysis

B. Sacral promontory

C. Ischial spine

D. Ischial tuberosity

? Answer: A. Pubic symphysis

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7. The main muscle forming the pelvic floor is:

A. Obturator internus

B. Piriformis

C. Levator ani

D. Psoas major

? Answer: C. Levator ani

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8. The levator ani is composed of all the following parts **except:**

A. Puborectalis

B. Iliococcygeus

C. Pubococcygeus

D. Ischiococcygeus

? Answer: D. Ischiococcygeus

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9. The pelvic diaphragm is pierced by all the following structures **except:**

A. Urethra

B. Vagina (in females)

C. Rectum

D. Ureter

? Answer: D. Ureter

10. The angle between the plane of the pelvic inlet and the horizontal is known as:

A. Pelvic inclination

B. Pelvic conjugate

C. Pelvic obliquity

D. Pelvic rotation

? Answer: A. Pelvic inclination

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11. The main nerve supply to the pelvic floor is derived from:

A. Sciatic nerve

B. Pudendal nerve

C. Femoral nerve

D. Obturator nerve

? Answer: B. Pudendal nerve

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12. The obturator internus muscle forms which wall of the pelvis?

A. Anterior wall

B. Lateral wall

C. Posterior wall

D. Inferior wall

? Answer: B. Lateral wall

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13. The piriformis muscle forms which wall of the pelvis?

A. Posterior wall

B. Anterior wall

C. Lateral wall

D. Superior wall

? Answer: A. Posterior wall

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14. The pelvic cavity in females contains all of the following **except:**

A. Uterus

B. Urinary bladder

C. Seminal vesicles

D. Rectum

? **Answer:** C. Seminal

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15. The uterovesical pouch lies between:

A. Uterus and rectum

B. Bladder and uterus

C. Uterus and vagina

D. Rectum and vagina

? Answer: B. Bladder and uterus

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16. The rectovesical pouch in males is located between:

A. Bladder and rectum

B. Bladder and prostate

C. Urethra and rectum

D. Prostate and seminal vesicles

? Answer: A. Bladder and rectum

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17. The true conjugate diameter of the pelvis extends from:

A. Sacral promontory to lower border of symphysis pubis

B. Sacral promontory to upper border of symphysis pubis

C. Coccyx to pubic symphysis

D. Ischial spine to ischial spine

? Answer: B. Sacral promontory to upper border of symphysis pubis

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18. The diagonal conjugate is measured from:

A. Sacral promontory to upper border of symphysis pubis

B. Sacral promontory to lower border of symphysis pubis

C. Coccyx to pubic symphysis

D. Tip of coccyx to ischial spine

? Answer: B. Sacral promontory to lower border of symphysis pubis

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19. The ureter crosses the pelvic brim anterior to the:

A. External iliac artery

B. Common iliac bifurcation

C. Internal iliac vein

D. Inferior epigastric artery

? Answer: B. Common iliac bifurcation

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20. The obturator nerve passes through the:

A. Greater sciatic foramen

B. Lesser sciatic foramen

C. Obturator canal

D. Pelvic outlet

? Answer: C. Obturator canal

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21. The pelvic diaphragm is formed by:

A. Levator ani and coccygeus

B. Levator ani and piriformis

C. Coccygeus and obturator internus

D. Obturator internus and piriformis

? Answer: A. Levator ani and coccygeus

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22. The lumbosacral trunk contributes fibers to:

A. Lumbar plexus

B. Sacral plexus

C. Coccygeal plexus

D. Hypogastric plexus

? Answer: B. Sacral plexus

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23. The female pelvis differs from the male pelvis in having:

A. Narrow subpubic angle

B. Heart-shaped inlet

C. Wider subpubic angle

D. Longer sacrum

? Answer: C. Wider subpubic angle

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24. The main arterial supply to the pelvic organs is by:

A. External iliac artery

B. Internal pudendal artery

C. Internal iliac artery

D. Median sacral artery

? Answer: C. Internal iliac artery

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25. The pelvic outlet is increased during childbirth by:

A. Forward movement of coccyx

B. Backward movement of coccyx

C. Relaxation of psoas major

D. Contraction of obturator internus

? Answer: B. Backward movement of coccyx

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26. The weakest part of the pelvic floor, prone to tearing during childbirth, is:

A. Coccygeus

B. Levator ani

C. Perineal body

D. Obturator internus

? Answer: C. Perineal body

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27. The pelvic fascia is derived from:

A. Endopelvic connective tissue

B. Peritoneum

C. Abdominal wall fascia

D. Psoas fascia

? Answer: A. Endopelvic connective tissue

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28. The muscle that forms a sling around the rectum is:

A. Pubococcygeus

B. Puborectalis

C. Iliococcygeus

D. Coccygeus

? Answer: B. Puborectalis

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29. Which structure is at risk during ligation of the uterine artery?

A. Ureter

B. Obturator nerve
C. Internal iliac vein
D. Lumbosacral trunk
? Answer: A. Ureter

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30. The pelvic cavity in the erect posture is directed:
A. Upward and forward
B. Downward and backward
C. Horizontally
D. Straight downward
? Answer: B. Downward and backward

Viva Voce

Q1. What are the two main divisions of the pelvis?
A. The pelvis is divided into the **greater (false)** and **lesser (true)** pelvis by the **pelvic brim (linea terminalis)**.

Q2. What bones form the pelvis?
A. Two hip bones, the **sacrum**, and the **coccyx** form the pelvis.

Q3. What is the shape of the pelvic inlet?
A. The **pelvic inlet** is **oval in females** and **heart-shaped in males**.

Q4. What is the shape of the pelvic outlet?
A. The **pelvic outlet** is **diamond-shaped**.

Q5. Name the muscles forming the pelvic diaphragm.
A. Levator ani (pubococcygeus, puborectalis, iliococcygeus) and **coccygeus (ischiococcygeus)**.

Q6. What is the function of the pelvic diaphragm?
A. It supports the pelvic viscera, maintains continence, and assists in increasing intra-

abdominal pressure during defecation and parturition.

Q7. What is the levator ani?
A. It is a broad, thin muscle forming the main part of the pelvic diaphragm and consisting of **pubococcygeus**, **puborectalis**, and **iliococcygeus**.

Q8. What is the nerve supply of the pelvic diaphragm?
A. Branches from the **pudendal nerve (S2–S4)** and direct branches from the **sacral plexus**.

Q9. What is the action of puborectalis muscle?
A. It forms a sling around the rectum and maintains the **anorectal angle**, thereby helping in **fecal continence**.

Q10. Which muscle forms the posterior wall of the pelvis?
A. The **piriformis** muscle.

Q11. Which muscle forms the lateral wall of the pelvis?
A. The **obturator internus** muscle.

Q12. What are the openings in the pelvic diaphragm?
A.

- **In males:** Urethra and anal canal.
- **In females:** Urethra, vagina, and anal canal.

Q13. What is the perineal body?
A. A **fibromuscular node** between the vagina and anal canal (in females) or between bulb of penis and anal canal (in males), giving attachment to several perineal and pelvic muscles.

Q14. What is the importance of the perineal body?
A. It maintains the integrity of the pelvic floor; damage leads to **prolapse of pelvic viscera**.

Q15. Which structures pass through the pelvic brim?
A. Ureter, common iliac vessels, gonadal vessels, lumbosacral trunk, sympathetic chain, and obturator nerve.

Q16. What is the angle of pelvic inclination?
A. About **50–60°** between the plane of the pelvic inlet and the horizontal plane in erect posture.

Q17. What is the obstetric conjugate?
A. The **true anteroposterior diameter** of the pelvic inlet, from the **sacral promontory to the upper border of symphysis pubis**.

Q18. What is the diagonal conjugate?
A. Distance between the **sacral promontory and the lower border of symphysis pubis**, measured clinically to estimate pelvic adequacy for delivery.

Q19. What is the difference between male and female pelvis?
A.

- **Female pelvis:** Wider, shallower, with circular inlet and wider subpubic angle.
- **Male pelvis:** Narrower, deeper, with heart-shaped inlet and smaller subpubic angle.

Q20. What is the clinical importance of the ureter's relation at the pelvic brim?
A. The **ureter crosses anterior to the bifurcation of the common iliac artery**; it is liable to injury during pelvic surgeries such as hysterectomy.

Q21. Which structures form the pelvic floor?
A. Levator ani, **coccygeus**, **perineal body**, and **perineal membrane**.

Q22. What is the importance of levator ani in continence?
A. It supports the rectum and bladder neck and maintains closure of the urogenital and anal openings during rest.

Q23. What are the boundaries of the pelvic outlet?
A.

- **Anterior:** Inferior border of symphysis pubis.
- **Posterior:** Tip of coccyx.
- **Lateral:** Ischiopubic rami and sacrotuberous ligaments.

Q24. What are the contents of the pelvic cavity?
A.

- **In males:** Bladder, prostate, seminal vesicles, rectum.
- **In females:** Bladder, uterus, vagina, rectum.

Q25. Which nerve supplies the perineum?
A. The **pudendal nerve (S2–S4)**.

Q26. What happens if the pelvic diaphragm is paralyzed?
A. Leads to **urinary and fecal incontinence** and **pelvic organ prolapse**.

Q27. Why is the coccyx important in childbirth?
A. It moves **backward** to increase the **anteroposterior diameter of the pelvic outlet**.

Q28. What is the most common site of pelvic floor tear during delivery?
A. The **perineal body** and **pubococcygeus** muscle.

Q29. Which artery supplies the pelvic organs?
A. Branches of the **internal iliac artery**.

Q30. Why is the pelvic floor described as a dynamic structure?
A. Because it contracts and relaxes during various physiological activities — defecation,

micturition, and childbirth — while constantly supporting pelvic organs.