Abdomen.
Retroperitoneal space
Abdominal cavity

The space bounded by:

- Anterolateral abdominal wall
- Posterior abdominal wall
- Diaphragm
- Pelvic walls and pelvic floor.

Subdivided into:

- True abdominal cavity (from diaphragm to linea terminalis)
- Pelvic cavity (below linea terminalis).
Peritoneum is a continuous serous membrane, composed of two layers:

- **Parietal peritoneum**, lines abdominal and pelvic wall
- **Visceral peritoneum**, lines abdominal and pelvic organs.

**Peritoneal compartment** is part of the abdominal cavity enclosed within the parietal peritoneum. Contains organs covered with peritoneum and peritoneal structures.

Outside the parietal peritoneum is the extraperitoneal compartment of the abdominal cavity.
• **Mesenteries**
  – Double layer of peritoneum (2 serous membranes fused together)
  – Extend to the digestive organs from the body wall
• **Function:**
  – Hold organs in place
  – Sites of fat storage
  – Provide a route for vessels and nerves
• **Ventral mesenteries:**
  – Lesser omentum and Falciform ligament
• **Dorsal mesenteries:**
  – Greater omentum, Transverse mesocolon, Mesentery proper, and Sigmoid mesocolon
Peritoneum

- **Peritoneal**
  - Remains surrounded by peritoneal cavity
  - Liver, stomach, ileum and jejunum

- **Retroperitoneal**
  - Some organs lay behind/outside peritoneum
    - *Primarily retroperitoneal*
      - Organs NEVER within the cavity
      - Kidneys, bladder, ureter
    - *Secondarily retroperitoneal*
      - Migrate posterior to the peritoneum during embryogenesis to become retroperitoneal
      - Lack mesenteries
      - Duodenum, ascending and descending colon, rectum, pancreas
Posterior abdominal wall

- spleen
- adrenal (suprarenal) gland
- kidney
- renal vein and artery
- inferior vena cava
- abdominal aorta
- ureter
- urinary bladder
Posterior abdominal wall

Diaphragm

- *medial arcuate ligament*, tendinous arch across the psoas muscle
- *lateral arcuate ligament*, across the quadratus lumborum
- *median arcuate ligament*, around the aorta
- *right crus* (esophageal opening) and *left crus*
- *openings at T8, 10, 12*
- *phrenic nerve* motor & sensory
Posterior abdominal wall

- Quadratus lumborum
- Psoas major
- Psoas minor (frequently absent)
- Iliacus
Retroperitoneal structures

- inferior vena cava (IVC)
  - testicular (or ovarian)
- aorta
  - celiac trunk
  - superior mesenteric artery
  - inferior mesenteric artery
  - external iliac
  - internal iliac
  - testicular (or ovarian)
- lumbar sympathetic chain
- celiac ganglia
- kidney
  - ureter
- adrenal gland
Mnemonics

S uprarenal Glands (Adrenals)
A orta/IVC
D uodenum (except first part)
P ancreas (Tail is intraperitoneal)
U reters
C olon (Ascending and Descending only)
K idneys
E sophagus
R ectum
Kidneys: Gross Anatomy

- Lie retroperitoneally in superior lumbar region
- Extend from T11 (T12) to L3
- Laterally convex, medially concave
- Hilus
  - Blood vessels, ureters, and nerves enter and leave kidney
- Adrenal gland
  - On superior extremity
Projections
Kidney: Gross Anatomy

Lateral margin. Convex.

Medial margin. Concave at the hilum.

**Renal hilum.** Site of entry and exit of blood vessels & ureter.

**Renal sinus.** Cavity at the medial border for the renal hilum.

**Anterior surface.** Facies anterior. Curved.

**Posterior surface.** Facies posterior. Nearly flat.

**Upper pole.** Extremitas superior

**Lower pole.** Extremitas inferior
Kidney: Gross Anatomy

**Renal fascia.** Fibrous sheath that separates the adipose capsule from the perirenal fat.

*Pararenal fatty body.* Corpus adiposum pararenale. Fat pad between the posterior layer of the renal fascia and the transversal fascia.

**Adipose capsule.** Fatty capsule of the kidney, more prominent posteriorly and medially.

**Fibrous capsule.** Tough organ capsule fused with the surface of the kidney, but removable.
Contacts

1. Posteriorly – diaphragm, m. quadratus lumborum, psoas major
2. Upper pole – adrenal gland
3. Anteriorly
   a) Right kidney
      liver, 
      duodenum, 
      large intestine
   b) Left kidney
      stomach, 
      spleen, 
      large intestine 
      small intestine
Kidney: Gross Anatomy

- **Blood supply**
  - Renal artery and vein
  - $\frac{1}{4}$ heart’s systematic output reaches the kidney

- **Nerve supply**
  - Renal plexus
    - Sympathetic & parasympathetic fibers
Horshoe kidney
Ureters

• Begin at L2 as a continuation of renal pelvis
• Retroperitoneal
• Enters the bladder at an oblique angle
  – This prevents backflow into the ureters
• Three anatomical constrictions
  – At the exit from the renal pelvis
  – Over the iliac vessels
  – At the entrance of the urinary bladder
Adrenal glands

- Lie on the upper medial surface of the kidney
- Within renal fascia & adipose capsule
- Triangular shape
- Contacts
  - Right gland – liver
  - Left gland – stomach, pancreas, spleen
- Blood supply
  - A. suparenalis superior
  - A. suparenalis media
  - A. suparenalis inferior
Pancreas

- Exocrine & endocrine gland
- Secondarily retroperitoneal
- Location:
  - Curve of duodenum
  - Extends to spleen
Vessels

The aorta gives off paired and unpaired branches.

• Immediately after the aorta enters the abdomen gives rise to its first paired branch, the inferior phrenic artery.

The unpaired branches are:
• celiac trunk
  – splenic
  – left gastric
  – common hepatic
• superior mesenteric
• inferior mesenteric
• median sacral
Paired branches supply the organs and muscular wall of the abdomen:

- inferior phrenic
- middle suprarenal
- renal
  - inferior phrenic
- lumbar (4)
- common iliac (at L4)
  - external iliac
  - internal iliac
Vessels

The veins all drain into the inferior vena cava.
The major veins are:

- common iliac
- lumbar veins
- left renal vein
  - left testicular (ovarian) vein
  - suprarenal vein
- right renal vein
  - suprarenal vein
- hepatic veins
- inferior vena cava
Nerves

- sympathetic trunk
- hypogastric plexus
- T12 - subcostal
- L1
  - iliohypogastric
  - ilioinguinal
- genitofemoral - lies on the psoas major muscle
- lateral femoral cutaneous
- femoral - lateral to the psoas major
- obturator - medial to the psoas major
Nerves

The lumbosacral plexus formed by L1 – L5 spinal nerves (ventral rami)
• L1 - iliohypogastric & ilioinguinal nerves.
• L1, L2 - genitofemoral nerve
• L2, L3 - lateral femoral cutaneous nerve
• L2-L4 - femoral and obturator nerves
• L4, L5 - lumbosacral trunk, which joins sacral nerves to form the sacral plexus.
Pelvic Walls and Floor

- Posterior Pelvic Wall – formed by the sacrum and coccyx, adjacent parts of the ilia, and the S-I joints; piriformis muscle covers the area
Pelvic Floor

- Formed by the funnel shaped pelvic diaphragm – consists of the levator ani and coccygeus muscles and their fascia
- Stretches between the pubis anteriorly and the coccyx posteriorly and from one lateral pelvic wall to the other
Viscera

- Urinary organs in the pelvis
- Ureters – muscular (smooth) tubes running from kidneys to bladder 25 to 30 cm long
- Bladder – a hollow container surrounded by a strong smooth muscular wall
- Temporary reservoir for urine
- Apex, Body, Fundus, Neck, Uvula
2. Identify the normal position and anatomical relationships of the pelvic viscera.
1. In males

- From the abdominal wall covers the superior and part of the posterior surface of the urinary bladder and superior tips of the seminal vesicles.
- Rectovesicular pouch - the most inferior extent of the peritoneum in the male.
- Attaches to the anterior aspect of the rectum.
Peritoneum

2. In females
   - Forms vesicouterine pocket
   - Deeper rectouterine pouch

   the rectouterine pouch is the most inferior extent of the peritoneum.
Peritoneal reflections and their relationship to the pelvic contents.

- Most pelvic organs are subperitoneal.
Fascia of the pelvis

1. Visceral fascia:
covers organs, binds the pelvic viscera to each other and to the parietal fascia

2. Parietal fascia:
covers the pelvic surfaces of muscles and lines the pelvic cavity
   a. superior parietal fascia is thickened at the neck of the urinary bladder to form the pubovesicular ligament (female) and the puboprostatic ligament (male),
   b. anchors neck of urinary bladder to the pubis.
   c. pubovesicular ligament in females, attaches to the vagina as well.
Ligaments supporting pelvic organs

**Peritoneal ligaments**
- Fundus
- Bladder
- Round lig. of uterus
- Uterine tube
- Broad ligament
- Lig. Of the ovary
- Suspensory lig.
- Round ligament of the uterus
- Uterine art.
- Ovarian art.
- Uterine tube
- Mesosalpinx
- Lig. Of the ovary
- Uterine art.
- Ureter
- Uterine art.

**Pelvic visceral ligaments**
- Bladder
- Pubocervical lig.
- Transverse cervical lig.
- Cervix
- Sacrocervical lig.
- Rectum
- Sacrocervical lig.
- Pelvic diaphragm
- Pubocervical lig.
Spaces within the fascia

Retropubic space:
- fascial plane between bladder and pubic symphysis which allows for expansion of the bladder and access to the bladder and the prostate without entering the peritoneal cavity.
Rules:
1. All pelvic organs are supplied by branches of the internal iliac artery except the ovaries and the upper third of the rectum.
2. Venous drainage follows the arterial supply, including the portal tributary, the inferior mesenteric vein.
3. Portal caval anastomoses are found at the inferior rectal veins.
Lymphatic drainage of pelvis and perineum

**Rules:**

- Lymphatics drain toward lymph nodes along internal iliac veins, except for the ovary (para-aortic nodes), and superior portion of the rectum (inferior mesenteric nodes).
- Perineum drains to superficial inguinal nodes.
Nerve supply of Pelvic Organs