MEDICAL EDUCATION RESOURCE

Surface Marking of Abdomen and Pelvis

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Planes and Regions of the Abdomen

The abdomen is divided into **nine regions** by two horizontal and two vertical planes:

- **Horizontal planes:**
  - *Transpyloric plane* — passes through the lower border of the first lumbar vertebra and the tips of the ninth costal cartilages.
  - *Transtubercular plane* — passes through the tubercles of the iliac crests at the level of the fifth lumbar vertebra.
- **Vertical planes:**
  - *Right lateral plane* and *Left lateral plane* — drawn vertically from the midpoints of the clavicles down to the mid-inguinal points.

These planes divide the abdomen into nine regions: right and left hypochondriac, epigastric, right and left lumbar, umbilical, right and left iliac, and hypogastric (pubic) regions.

Surface Marking of Viscera

Spleen

- Lies along the **long axis of the 10th rib**.
- Its upper border corresponds to the **9th rib**, and the lower border to the **11th rib**.

- The medial end lies about **4–5 cm from the posterior midline**, and the lateral end reaches the **left midaxillary line**.

Stomach

- **Cardiac orifice:** Marked on the **7th costal cartilage**, about 2.5 cm left of the median plane.
- **Pyloric orifice:** On the **transpyloric plane**, approximately 1.2 cm right of the median plane.
- **Lesser curvature:** A J-shaped line joining the cardiac and pyloric orifices.
- **Fundus:** Lies beneath the **left 5th intercostal space**, corresponding to the left dome of the diaphragm.
- **Greater curvature:** Extends from the fundus to the pylorus, crossing between the **9th and 10th costal cartilages** and reaching down to the **L3 vertebral level**.

Duodenum

Located above the umbilicus and about 2.5 cm wide.

1. **First part:** 2.5 cm long, runs upward and to the right from the pylorus.
2. **Second part:** 7.5 cm long, descends vertically along the right lateral plane.
3. **Third part:** 10 cm long, crosses the midline horizontally just above the umbilicus at the subcostal plane.
4. **Fourth part:** 2.5 cm long, ascends to the duodenojejunal flexure, 1 cm below the transpyloric plane and 3 cm to the left of the median plane.

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Caecum

- Lies in the **right iliac fossa**, bounded by the inguinal ligament, right lateral plane, and intertubercular plane.
- It measures about **6 cm in length** and **7.5 cm in breadth**, directed downward and medially.
- The **ileocaecal orifice (valve)** lies at the junction of the right lateral and transtubercular planes.

Surface Marking of Abdominal Viscera (Continued)

Ileocaecal Orifice (Valve)

- Lies at the **junction of the right lateral and transtubercular planes**.
- Situated **about 2.5 cm above** the intertubercular plane and **5 cm medial** to the right anterior superior iliac spine.
- Represents the point where the **ileum opens into the caecum**.

Appendix

- The base of the appendix corresponds to **McBurney's point**, located **one-third of the distance** from the **right anterior superior iliac spine to the umbilicus**.
- The tip may lie in various positions — most commonly **retrocaecal**, but also pelvic, subcaecal, preileal, or postileal.

Ascending Colon

- Extends vertically in the **right lumbar region** from the **caecum to the right colic (hepatic) flexure**.
- Lies along the **right lateral plane**, beginning at the **level of the transtubercular plane** and ending just below the **transpyloric plane**.

Transverse Colon

- Extends across the upper abdomen from the **right colic (hepatic) flexure** to the **left colic (splenic) flexure**.
- Crosses the **umbilical and epigastric regions**, with its midpoint usually near the **umbilicus** or slightly above it.
- The **left colic flexure** is higher and more posterior than the right.

Descending Colon

- Lies along the **left lateral plane** in the **left lumbar region**, extending from the **left colic flexure** down to the **sigmoid colon**.
- It begins at the level of the **9th costal cartilage** and descends to the **iliac crest**.

Rectum and Anal Canal

- The **rectum** begins at the level of **S3 vertebra**, at the termination of the sigmoid colon.
- The **anal canal** begins at the **anorectal junction** and extends downward and backward to the **anus**, situated in the **midline, about 4 cm anterior to the tip of the coccyx**.

Liver

- The **upper border** of the liver follows a line from the **right 5th rib in the midaxillary line** to the **left 5th intercostal space** near the midclavicular line.
- The **lower border** runs from the **right 10th rib in the midaxillary line** to a point **just below the left costal margin** near the 9th costal cartilage.
- The **inferior border** crosses the **midline midway between the xiphoid process and the umbilicus**.

Gallbladder

- The **fundus** lies at the tip of the **right 9th costal cartilage**, where it meets the **lateral border of the rectus abdominis** muscle.
- The **body** extends upward, backward, and to the left, beneath the right lobe of the liver.
- The **neck** lies at the level of the **transpyloric plane**, close to the junction of the **right and left lobes** of the liver.

Surface Marking of Abdominal Vessels and Retroperitoneal Organs

Bile Duct

- Represented by a **7.5 cm line** that is **vertical in the upper half** and **inclines to the right** in the lower half.
- It extends from a point **5 cm above the transpyloric plane** and **2 cm to the right of the median plane**, down to the **medial border of the second part of the duodenum**

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Pancreas

- The **head** lies within the concavity of the **duodenum**.
- The **neck** passes upward and to the left **behind the pylorus**, at the **transpyloric plane**.
- The **body** runs **upward and to the left for 10 cm**, occupying the upper two-thirds of the space between the **transpyloric and subcostal planes**.

Kidney

- Each kidney measures **11 × 5 cm**.
- On the **back**, it lies within *Morrison's parallelogram*, between the **11th thoracic spine** and the **3rd lumbar spine**.
- On the **front**, the **hilum** lies **5 cm from the median plane**, slightly **below the transpyloric plane** on the right and **above it** on the left.
- The **upper pole** is midway between the **xiphisternum** and **transpyloric plane**, about **4–5 cm from the midline**.
- The **lower pole** lies **6–7 cm from the midline**, at the **umbilical plane on the right** and **subcostal plane on the left**

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Ureter

- On the **front**, it is marked by a line from the **tip of the 9th costal cartilage** to the **pubic tubercle**, running slightly **medially downward**.

- The **upper 5 cm** of this line represents the **renal pelvis**.

- On the **back**, it extends **vertically from the posterior superior iliac spine** to the **second lumbar spine**, at the level of the **renal hilum**

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Surface Marking of Major Abdominal Vessels

Abdominal Aorta

- Represented by **two parallel lines 2 cm apart**, beginning **2.5 cm above the transpyloric plane** in the **median plane**, and ending **1.2 cm below and to the left of the umbilicus** (at the level of **L4 vertebra**)

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Common Iliac Artery

- Occupies the **upper one-third** of a line drawn from the **lower end of the abdominal aorta** to the **midinguinal point** (midway between the anterior superior iliac spine and the pubic symphysis)

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External Iliac Artery

- Occupies the **lower two-thirds** of the same line from the **aortic bifurcation to the midinguinal point**, where it continues as the **femoral artery** after passing beneath the **inguinal ligament**

Surface Marking of Major Abdominal Vessels and Miscellaneous Structures

Coeliac Trunk and Its Branches

- The **coeliac trunk** is marked as a **point 1 cm below** the origin of the abdominal aorta (just below the transpyloric plane).
- **Left gastric artery:** A line drawn upward and to the left from the coeliac trunk toward the **cardiac end of the stomach**.
- **Splenic artery:** A broad line extending **leftward and slightly upward for about 10 cm** from the coeliac trunk, following the course of the **upper border of the pancreas**.
- **Common hepatic artery:** A line drawn **rightward and slightly downward for about 2.5 cm**, then turning **upward for 3 cm** as the **proper hepatic artery**, which ascends toward the liver hilum.

Superior Mesenteric Artery

- Represented by a **curved line convex to the left**, extending from the **abdominal aorta just above the transpyloric plane** to the **intersection of the transtubercular and right lateral planes**.
- It passes **behind the pancreas and the splenic vein**, then descends in front of the **third part of the duodenum** to supply the **midgut**.

Inferior Mesenteric Artery

- Marked by a **curved line slightly convex to the left**, starting **4 cm below the transpyloric plane** on the abdominal aorta.

- The line extends **downward to a point 4 cm below the umbilicus** and the same distance **to the left of the median plane**, representing its course toward the **left iliac fossa**.

Inferior Vena Cava

- Indicated by **two vertical parallel lines 2.5 cm apart**, slightly **to the right of the median plane**.

- Extends from the **sternal end of the right 6th costal cartilage** downward to **just below the transtubercular plane**, corresponding to its origin at **L5 vertebra**.

Portal Vein

- Represented by a **broad line 8 cm long**, beginning at a point on the **transpyloric plane** about **1.2 cm to the right of the median plane**.

- It ascends **upward and to the right**, behind the neck of the **pancreas**, where it is formed by the **union of the splenic and superior mesenteric veins**.

Miscellaneous Surface Markings

Inguinal Canal

- Represented by **two parallel lines 1 cm apart and 3.7 cm long**, located **above the medial half of the inguinal ligament**.

- Extends from the **deep inguinal ring** (1 cm above the midinguinal point) to the **superficial inguinal ring**, which lies **above and lateral to the pubic crest**.

- The deep ring is marked as a **vertical oval**, while the superficial ring appears as a **triangular opening** just above the **pubic crest**.

Root of Mesentery

- A **10 cm oblique line** extending from the **left side of the second lumbar vertebra** (2.5 cm left of the midline) downward and to the right, ending at the **right sacroiliac joint**.

- This line represents the attachment of the **mesentery of the small intestine** to the posterior abdominal wall, crossing over the **third part of the duodenum**, **aorta**, **inferior vena cava**, and **right ureter**.