ABDOMINAL WALL & RECTUS SHEATH
Learning Objectives

- Describe the anatomy, innervation and functions of the muscles of the anterior, lateral and posterior abdominal walls.

- Discuss their functional relations and their roles in posture, ventilation and voiding of abdominal/pelvic/thoracic contents.
Deltoid muscle
Sternocleidomastoid muscle
Sternal head
Clavicular head
Trapezius muscle
Pectoralis major muscle
Serratus anterior muscle
Deltoid muscle
Tendinous intersection
External oblique muscle
Linea alba
Semitruncal line
Umbilicus
Iliac crest
Anterior superior iliac spine
Superficial circumflex iliac vein
Superficial epigastric veins
Pubic symphysis
Rectus abdominis muscle
Inguinal ligament
Pubic tubercle
Abdominal Quadrants

- Formed by two intersecting lines:
  - Intersect at umbilicus.

- Quadrants:
  - Upper left.
  - Upper right.
  - Lower left.
  - Lower right.
Abdominal Quadrants
Blood Supply

- Skin near the midline is supplied by branches of the superior epigastric artery (br. of int. thoracic artery) and the inferior epigastric artery (br. of external iliac artery)

- Skin of the flanks is supplied by branches from the intercostal, lumbar, and deep circumflex arteries
Superficial Fascia

- Fatty layer or fascia of camper is continuous with the superficial fat over the rest of the body and may be extremely thick in obese patients.

- The membranous layer or Scarpa’s fascia is thin and fades out laterally and above.

- Becomes continuous with the superficial fascia of the back and the thorax.
Superficial Fascia

- Inferiorly the membranous layer passes onto the front of the thigh, where it fuses with the deep fascia

- In the midline inferiorly forms a tubular sheath for the penis or clitoris

- Below in the perineum, enters the wall of the scrotum or labia majora

- From there it passes to be attached on each side to the margins of pubic arch, here it is called Colle’s fascia
Layers of Anterior Abdominal Wall

- Skin
- Superficial fascia-fatty layer (Camper's fascia)
- Superficial fascia-membranous layer (Scarpa's fascia)
- External oblique muscle
- Internal oblique muscle
- Transversus abdominis muscle
- Transversalis fascia
- Parietal peritoneum
- Extraperitoneal fascia

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Superficial Fascia

- Posteriorly it fuses with the perineal body and the margin of the perineal membrane.

- The fatty layer is represented as a smooth muscle in the scrotum, the dartos muscle.

- The membranous layer persists as a separate layer.
Deep Fascia

- Deep fascia in the anterior abdominal wall is merely a thin layer of connective tissue covering the muscles.

- It lies immediately deep to the membranous layer of the superficial fascia.
Muscles

- Consists of Three broad thin sheets that are aponeurotic in front
- From exterior to interior they are:
  - External oblique, internal oblique, and transverse
  - A wide vertical muscle, the rectus abdominis
- They lie on either side of the midline anteriorly
Muscles

- As the aponeurosis of three sheets pass forward, they enclose the rectus abdominis to form the rectus sheath

- The cremaster muscle which is derived from the lower fibers of internal oblique, passes inferiorly as a covering of the spermatic cord and enters scrotum
External Oblique Muscle

- Is a broad, thin, muscular sheet
- Origin: Lower 8 ribs
- Insertion: Xiphoid process, linea alba, pubic tubercle, iliac crest
- Nerve Supply: Lower 6 thoracic nerves, iliohypogastric & ilioinguinal nerves
- Action: Supports abdominal contents, assist in forced expiration, micturition, defecation, parturition, vomiting
External Oblique Muscle

- A triangular shaped defect in the external oblique aponeurosis lies immediately above and medial to the pubic tubercle, known as superficial inguinal ring.

- Between the anterosuperior iliac spine and the pubic tubercle, the lower border of the aponeurosis is folded backward on itself, forming the inguinal ligament.
Internal Oblique Muscle

- **Origin**: Lumbar fascia, iliac crest, lateral two-thirds of inguinal ligament
- **Insertion**: Lower three ribs and costal cartilages, xiphoid process, linea alba, symphysis pubis
- **Nerve Supply**: Lower six thoracic nerves, iliohypogastric & ilioinguinal nerves
- **Action**: Supports abdominal contents, assist in forced expiration, micturition, defecation, parturition, vomiting
Transversus Abdominis

- **Origin:** Lower six costal cartilages, lumbar fascia, iliac crest, lateral third of inguinal ligament

- **Insertion:** Xiphoid process, linea alba, symphysis pubis

- **Nerve Supply:** Lower six thoracic nerves, iliohypogastric & ilioinguinal nerves

- **Action:** Compresses abdominal contents
Rectus Abdominis

- **Origin**: Symphysis pubis and pubic crest
- **Insertion**: 5th, 6th and 7th costal cartilages and xiphoid process
- **Nerve Supply**: Lower six thoracic nerves
- **Action**: Compresses abdominal contents, flexes vertebral column, accessory muscle of expiration
Lymph Drainage

- Lymph drainage of the skin of the anterior abdominal wall above the umbilicus is upward to the anterior axillary (pectoral group of nodes)

- Below the level of umbilicus drains downward and laterally to the superficial inguinal nodes

- Swelling in the groin is may be due to enlarged superficial inguinal node
Venous Drainage

- Venous blood is collected into a network of veins that radiate from the umbilicus.
- The network is drained above into the axillary vein via the lateral thoracic vein.
- Below into the femoral vein via the superficial epigastric and the great saphenous veins.
- Few small veins, the paraumbilical veins form a clinically important portal-system venous anastomosis.
The superficial veins around the umbilicus and the paraumbilical veins connecting them to the portal vein may become grossly distended in case of portal vein obstruction.

The distended subcutaneous veins radiate out from the umbilicus, producing in severe cases the clinical picture called Caput Medusae.
caput Medusae
Nerves

- Nerves of the anterior abdominal wall supply the skin, muscles and the parietal peritoneum

- They are derived from the anterior rami of lower six thoracic and the first lumbar nerves

- Inflammation of parietal peritoneum causes pain in the overlying skin and also a reflex increase in tone of the abdominal musculature in the same area
Rectus Sheath

- Is a long fibrous sheath
- Encloses the rectus abdominis and pyramidalis muscle (if present)
- Contains the anterior rami of lower six thoracic nerves and the superior and inferior epigastric vessels and lymph vessels
- Formed mainly by aponeurosis of three lateral abdominal muscles
Rectus Sheath

For description it is considered at three levels:

- Above the costal margin the anterior wall is formed by the aponeurosis of the external oblique and posterior wall is formed by the thoracic wall

- That is the 5th, 6th and 7th costal cartilages and the intercostal spaces
Rectus Sheath

- Between the costal margin and the level of the anterosuperior iliac spine, the aponeurosis of the internal oblique splits to enclose the rectus muscle.

- The external oblique aponeurosis is directed in front of the muscle.

- Transversus aponeurosis is directed behind the muscle.
Rectus Sheath

- Between the level of the anterosuperior iliac spine and the pubis, the aponeurosis of all three muscles form the anterior wall.

- The posterior wall is absent.

- The rectus muscle lies in contact with the fascia transversalis.
Rectus Sheath

- The posterior wall of the rectus sheath is not attached to the rectus abdominis muscle.

- The anterior wall is firmly attached to it by the muscle’s tendinous intersections.
Linea Alba

- The rectus sheath is separated from its fellow on the opposite side by a fibrous band called the linea alba
- Extends from the xiphoid process to the symphysis pubis
Next Lecture