Hernias

- Abdominal hernias are a protrusion of intraabdominal contents through a congenital or acquired defect in the abdominal wall
- Layers of the abdominal wall (from superficial to deep)
    - Skin and subcutaneous tissue
    - Superficial fascia
        - Superficial fatty layer (Camper fascia)
        - Deep membranous layer (Scarpa fascia)
    - External oblique muscle (most anterior muscle)
    - Internal oblique muscle
    - Transversus abdominis muscle
    - Deep fascia (transversalis fascia) : fuses with the fascia lata of the thigh (most posterior)
    - Preperitoneal adipose tissue
    - Parietal peritoneum

Inguinal Hernia

- Anatomy of the inguinal canal
    - Extends between the deep (internal) and superficial (external) ring
        - Deep ring
            - it is the entrance of the canal
            - located just above the midpoint of the inguinal ligament and lateral to the inferior epigastric vessels
            - It is an opening in the transversalis fascia
        - Superficial ring
            - it is the exit of the canal
            - located just superior to the pubic tubercle
            - It is an opening in the external oblique aponeurosis
    - Anterior wall (related to the external ring) : made up of external oblique aponeurosis (since it is the most anterior muscle) and reinforced by the internal oblique muscle laterally
    - Posterior wall (related to the internal ring) : made up of transversalis fascia laterally (since it is the most posterior part) and reinforced by the conjoint tendon medially
    - Roof (superior): internal oblique and transversus abdominis muscles
    - Floor (inferior): inguinal ligament (it is the thickened inferior portion of external oblique aponeurosis) and reinforced by the lacunar ligament medially
    - Hesselbach triangle borders
        - Medially : rectus abdominis muscle

        - Laterally : inferior epigastric vessels
        - Inferiorly : inguinal ligament
- Contents of inguinal canal : spermatic cord in males and round ligament in females plus ilioinguinal nerve
- Contents of the spermatic cord : testicular artery / artery to vas / pampiniform plexus / lymphatics / genital branch of genitofemoral nerve / sympathetic and parasympathetic nerves to the penis / vas deferens / cremasteric artery and vein
- Inguinal hernias are more common in males
- Mnemonic for relation to the inferior epigastric vessels : The DIRECT path leads through the MiDdle, the INDIRECT path goes beLow." (DIRECT hernias lie MeDial and INDIRECT hernias lie Lateral to the inferior epigastric vessels)
- Clinical features for both
    - Ill defined mass in the inguinal region
    - Increases in size when coughing or straining (cough impulse)
    - Decreases in size on lying supine
    - Inguinal pain (inguinodynia) or vague inguinal discomfort that increases with physical activity but can also be painless
    - Male patients physical exam : Invaginate the scrotal skin toward the superficial inguinal ring with the index or little finger
- Inguinodynia with no palpable groin mass is typically the only manifestation of an occult inguinal hernia (hernia not visible on physical exam)
- Complications
    - Incarcerated hernia : the hernia is irreducible but the skin overlying the hernia is normal
    - Obstructed hernia : symptoms of mechanical bowel obstruction : sudden onset of pain, nausea, vomiting, abdominal distention, constipation or obstipation
    - Strangulated hernia
        - Sudden, severe groin pain caused by constriction and ischemia (or necrosis) of hernial contents
        - Signs of sepsis or signs of shock
        - Features of bowel obstruction if the hernia contains intestinal loops
        - Skin overlying the hernia: is warm, erythematous, tender and may appear exfoliated or blistered
- Diagnosis is usually clinical but ultrasound can be used to visualize the hernial sac
- To differentiate between both types clinically : reduce the hernia and close the internal ring with your finger and ask the patient to cough : if it protrudes then it is direct hernia
- Reducing a hernia “en masse” : Reducing the hernia contents and hernia sac (happens due to chronicity and repeated reductions)
- The inguinal canal is situated downward and outward so to reduce the hernia we push inward and upward
- Treatment

    - Hernioplasty : hernia repair with mesh (gold standard) : can be laparoscopic or open (open is preferred in complicated hernias)
    - Herniorrhaphy (non mesh repair)
    - We arrange for elective hernia repair within 4-6 weeks
- Risk of strangulation is higher when the child is younger (most in premature)

Direct Inguinal Hernia

- Protrusion of abdominal or pelvic contents directly through the posterior wall of the inguinal canal
- Location
    - Herniates only through the external ring (deep ring not involved so it does not reach inside the spermatic cord but it can reach the scrotum)
    - Herniates within the Hesselbach triangle
    - It is located medial to the inferior epigastric blood vessels and lateral to the rectus abdominis
    - It is only surrounded by the external spermatic fascia
- It is mainly acquired due to weakening of the transversalis fascia due to
    - Conditions resulting in increased intraabdominal pressure like chronic constipation
    - Long term glucocorticoids use
- Mainly seen in adult old males

Indirect Inguinal Hernia

- protrusion of abdominal or pelvic contents into the inguinal canal through the deep inguinal ring
- Location
    - Herniates through external and internal ring (reaching the scrotum through the spermatic cord)
    - It is lateral (outside) of the Hesselbach triangle
    - It is located lateral to the inferior epigastric blood vessels
    - It is surrounded by the external spermatic fascia, cremasteric muscle fibers and internal spermatic fascia (layers of the spermatic cord)
- It is more common than the direct hernia
- Most commonly congenital due to incomplete obliteration of the processus vaginalis during fetal development but can also be acquired due to weakening of the deep inguinal ring
- Associated with a communicating hydrocele

Femoral Hernia

- The femoral sheath is the funnel-shaped fascial space that extends inferior to the inguinal

ligament into the femoral triangle

- The femoral sheath is made up of (from lateral to medial) femoral branch of genitofemoral nerve, the femoral artery, femoral vein and the femoral canal all separated by septa
- Boundaries of the femoral canal : SLIP
    - Lateral : medial Septa of the femoral sheath (or femoral vein)
    - Medial : lacunar ligament
    - Anterior : inguinal ligament
    - Posterior : pubic ramus and pectineal ligament
    - The entrance of the canal is the femoral ring
- Contents of the femoral canal : lymphatic vessels and the lacunar lymph node
- A femoral hernia is an uncommon type of inguinal hernia in which intra-abdominal contents (intraperitoneal fat, mesentery, bowels) herniate into the femoral canal through the femoral ring
- A femoral hernia will push through the canal to the saphenous opening (in the fascia lata)
- Femoral hernias are more common in females, but not the most common type of hernia in females (it's inguinal)
- Risk factors
    - Advancing age
    - Obesity
    - Chronic constipation
    - Chronic cough (like due to COPD)
    - Straining during micturition (due to prostatic hypertrophy)
    - Multiparity
    - Previous abdominal surgeries especially those involving the inguinal region
- Femoral hernias are almost always acquired
- Clinical presentation : a globular subcutaneous swelling in the groin
    - Localization
        - inferior to the inguinal ligament
        - lateral to the pubic tubercle
        - medial to the femoral vein
    - Swelling enlarges with coughing (palpable cough impulse) or a Valsalva maneuver
    - Non specific dragging pain
- Diagnosis is clinical but ultrasound can be used in inconclusive cases
- Treatment : early elective surgical repair with mesh hernioplasty (tension-free repair)
- Complications
    - Incarceration : irreducible femoral hernia
    - Strangulation : ischemic necrosis of contents within the hernia sac as blood flow is compromised due to incarceration
        - Features of mechanical bowel obstruction
        - Possibly fever, leukocytosis, and hemodynamic instability

        - Features of paralytic ileus supervene once bowel perforation or peritonitis develop
        - Reduction of a strangulated hernia should not be attempted because generalized peritonitis would occur following reduction of strangulated bowel loops!
- Femoral hernias are the most likely type of hernias to be complicated
- Saphena Varix
    - A dilatation of the great saphenous vein at the saphenofemoral junction in the groin
    - It displays a cough impulse thus easily mistaken for a femoral hernia
    - Check for other varicose veins in the lower limb
- Other differential diagnoses
    - Inguinal hernia
    - Femoral pseudohernia
    - Lipoma
    - Lymph node enlargement
    - Femoral artery aneurysm
    - AV malformation
    - Psoas abscess

Umbilical Hernia

- Umbilical hernias are defined as midline hernias at the level of the umbilicus
- Types
    - Direct : umbilical orifice
    - Indirect (paraumbilical hernia) : adjacent to the umbilical orifice
- Etiology : Reopening of the previously closed umbilical ring or surrounding tissue due to increased intraabdominal pressure
- Clinical features
    - Direct hernia : mass that protrudes symmetrically through the umbilicus
    - Indirect hernia : mass that protrudes adjacent to the umbilical orifice pushing the umbilicus into a crescent shape
    - Fascial defect is often small
- Congenital form is always direct and usually resolves on its own without intervention
- Treatment : Surgical repair usually with mesh

Incisional Hernia

- Herniation of intraabdominal contents through an abdominal wall defect due to previous abdominal surgery

- Risk factors
  - Laparotomy especially via midline incision
  - Postoperative wound infection
  - Patient factors : smoking history, diabetes mellitus, obesity, immunosuppression, malnourishment, older age, conditions like COPD
  - Emergency abdominal surgery
  - Pregnancy
- Clinical features
  - Mass or protrusion at the site of the incisional scar that increases with coughing or straining
  - Edges of the hernial defect are palpable upon reduction of the hernia
  - Patients may be asymptomatic or present with nonspecific symptoms such as postprandial fullness
- Treatment
  - Elective surgical repair usually with mesh
  - Conservative management may be considered in patients at high risk for perioperative morbidity like patients with COPD
- Parastomal hernia : a type of incisional hernia in which intraabdominal contents protrude through the abdominal wall defect created during stoma placement (like colostomy)