ABDOMINAL WALL HERNIAS

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LEARNING OBJECTIVES

1- Understand the surgical anatomy of inguinal canal and femoral canal
2- Understand the pathogenesis of different types of hernias
3- Know the complications of hernial swellings
4- Know the steps of clinical examination of a hernial swelling
5- How to prepare your patient for surgery (hernial repair)
6- Know the steps of surgery for all types of hernias
The inguinal canal is (4cm) that extends in a downward and medial direction, just above and parallel to the lower half of the inguinal ligament.

It begins at the deep (internal) inguinal ring at the midinguinal point and continues for approximately 4 cm, ending at the superficial inguinal ring, superior and medial to the pubic tubercle.
SURGICAL ANATOMY OF THE INGUINAL HERNIA

• **The external inguinal ring**
  • A triangular opening in the aponeurosis of the external oblique
  • 1.25 cm medial and superior to the pubic tubercle.

• **The internal inguinal ring**
  • U-shaped opening in the transversals fascia
  • 1.25 cm above the midpoint of the inguinal ligament (Poupart’s ligament).
SURGICAL ANATOMY OF THE INGUINAL HERNIA

• **In the male**: 
  
  - Transmits the spermatic cord, the ilio-inguinal nerve, and the genital branch of the genito-femoral nerve.

• **In the female**: 
  
  - Round ligament replaces the spermatic cord.
Boundaries of the inguinal canal

- **Anteriorly:**
  - External oblique ap. & the conjoined tendon laterally.

- **Posteriorly:**
  - Inferior epigastric A; *fascia transversalis* & conjoined tendon medially.

- **Superiorly:**
  - Conjoined tendon of muscles (internal oblique and transversus abdomens).

- **Inferiorly:**
  - Inguinal ligament
Inguinal canal opened
Coverings of the spermatic cord:

- *Indirect hernia (sac anterolateral to the cord)*
  1. Extra peritoneal fat
  2. *Int. sperm. Fascia*
  3. *Cremastric m. & fascia*
  4. *Ext. sperm. fascia*
  5. Scarbs fascia
  6. Subcut. Fat
  7. Skin
Coverings of the spermatic cord:

- **Direct ing hernia (sac posterior to the cord)**
- 1- Extraperit. Fat
- 2- *Fascia transversalis*
- 3- *Cremastric m. & fascia*
- 4- *Ext. sperm. fascia*
- 5- Scarb’s fascia
- 6- Subcut. Fat
- 7- Skin
Surgical Anatomy of Inguinal Canal

- External oblique muscle
- Anterior superior iliac spine
- Aponeurosis of external oblique
- Inguinal ligament
- Superficial inguinal ring
- Spermatic cord
- Femoral artery and vein

Anatomy of Hasselbach’s triangle
Surgical anatomy of femoral canal

- The femoral canal occupies the most medial compartment of the femoral sheath.
- It extends from the femoral ring above to the saphenous opening below.
- It is 1.25 cm long and 1.25 cm wide at its base.
- The femoral canal contains fat, lymphatic vessels, and the lymph node of Clocquet.
Surgical anatomy of femoral canal

Femoral canal:

- **Above;** it is closed by the **septum crurale**, and **below** by the **cribriform fascia**.

The femoral ring is bounded (3 ligaments & vein)

- **Anteriorly** by the **inguinal ligament**;
- **Posteriorly** by **Cooper’s (iliopectineal) ligament**;
- **Medially** by the concave knife-like edge of **lacunar ligament**.
- **Laterally** by a thin septum separating it from **the femoral vein**.
Anatomy of Femoral Canal

Anatomy of the femoral canal
Figure 13.6  The boundaries of the left femoral canal.
Relation of groin hernias to inguinal ligament
Definition of Hernia

- Hernia is the protrusion of a viscus or part of a viscus through an abdominal wall opening.
- It may be congenital or acquired.
- The commonest types:
  - Inguinal (73%),
  - Femoral (17%)
  - Umbilical varieties (8.5 %).
- 1.5 per cent for the rarer forms.
- Incisional hernia occurs as a complication of partially disrupted abdominal wall incision. It is a common variety of external acquired hernia.
Figure 13.1 The sites of herniae. (A) Common. (B) Rare.
GENERAL FEATURES

• 1 - They occur at a weak spot (natural anatomical opening or acquired defect).

• 2 - They reduce on lying down or by direct pressure.

• 3 - They have an expansile impulse on cough.
Aetiology and pathogenesis

• 1-Congenital types:
  - Unobliterated processus vaginalis: congenital inguinal H.
  - Cong weakness of umb. stump: congenital umbilical H.
  - Defect in skin formation of the abdomen: Exomphalus minor or major
  - Congenital diaphragmatic. Hernia
  - Hernia of the canal of Nuck
Congenital Inguinal Hernia
Clinical presentations of unobliterated processus vaginalis:

- A - Normal anatomy
- B - Scrotal hydrocele
- C - Communicating hydrocele
- D - Encysted hydrocele
- E - Congenital ing hernia
- F - Inguinoscrotal hernia
Congenital Umbilical hernia
2-Acquired types:
- Weak anatomical point ➔ Ing. H. & Femoral H
- Weakness after trauma ➔ Incisional H. & Direct H

Predisposing factors: Ask for (History taking)
1- Increased intra-abd. Pressure: lifting heavy objects, organomegally, pregnancy, chronic constipation, ascitis

2- Chronic cough & straining due to smoking or chronic obstructive pulmonary diseases

3- Straining on micturation: senile prostate, cancer prostate, stricture urethra

4- Congenital weakness of mesenchymal tissues: patients with Kyphosis or flat foot
Composition of a hernia

- The sac is a diverticulum of peritoneum consisting of neck, body and fundus.
- The neck is usually well defined, but
- In most of direct inguinal hernias and in many Incisional hernias: There is No actual neck.
- The body of the sac: in long-standing cases; the wall of the sac is thick.
- Coverings are derived from the layers of the abdominal wall through which the sac passes.
Contents of the sac

- By palpation of the swelling
- Omentum = omentocele = doughy sensation
- Intestine = enterocele = soft
- Fluid as a part of ascitis, or as blood-stained fluid in case of strangulation = positive fluctuation
Special types of hernias:

- A portion of the circumference of bowel = Richter’s hernia
- A Meckel’s diverticulum = Littre's hernia
- A portion of the bladder, or a diverticulum of the bladder = sliding hernia
- The caecum on right side, sigmoid colon on left side = sliding hernia
- Ovary with or without the corresponding Fallopian tube; may be part of the contents
Special types of hernias:

• The direct hernia may have both a lateral and a medial component to inferior epigastric artery = saddle-bag or pantaloon hernia

• Mydl’s hernia: A double loop of intestine in the sac & intermediate loop in the sac
Richter’s hernia
Sliding hernia

Hernia sac reflecting onto cecum
Complications

1- Irreducible H
2- Obstructed H
3- Strangulated H
4- Inflamed H.
Irreducible hernia

- The contents cannot be returned to the abdomen
- Caused by adhesions between the sac and its contents or from overcrowding within the sac.
- Irreducibility without other symptoms is diagnostic of an omentocele.
- Note: Any degree of irreducibility predisposes to strangulation.
Obstructed hernia

- Obstructed from *without*(narrow neck) or from *within*(overcrowding of contents)
- There is no interference to the blood supply of the bowel.
- **No clear distinction** can be made between obstruction and strangulation in hernias.
- *So the safe course is to assume that hernial obstruction is an urgent condition and to treat accordingly.*
Strangulated hernia

- A hernia becomes strangulated when the **blood supply** of its contents is **seriously impaired**.
- **In order of frequency, the constricting agent is:**
  - 1. *The neck of the sac.*
  - 2. *The internal or external rings.*
  - 3. *Adhesions within the sac.*
Strangulated hernia (cont.)

- Gangrene may occur as early as 5 or 6 hours after the onset of the first symptoms of strangulation.
- A femoral hernia is the most likely to strangulate.
- At first only the venous return is impeded.
- The wall of the intestine becomes congested and bright red, and serous fluid is poured out into the sac.
- As the congestion increases, the intestine becomes purple in color and the fluid becomes serosanguineous.
Strangulated hernia (cont.)

- The strangulated loop becomes **distended**, (often to twice its normal diameter.)
- **Venous congestion** increases, and **the arterial supply** becomes impaired.
- The shining serosa becomes **dull and covered by a fibrinous, covered with sticky exudates.** The walls of the intestine have **lost their tone; and are very friable. Gangrene appears first at the neck and spreads proximally.**
- If the strangulation is unrelieved, **perforation and Peritonitis** spreads from the sac to the peritoneal cavity.
Clinical features of strangulation

- Sudden **paroxysmal pain**, located mainly at the umbilicus.
- **Vomiting** is forcible and repeated.
- **On examination,**
- **The hernia is:**
- **Tense, tender, and irreducible and there is no expansile impulse on coughing.**
Inflamed hernia

Inflammation can occur from:

- Acute appendicitis, Meckel's diverticulitis or salpingitis.

The hernia is **tender** but **not tense**, and the overlying skin becomes **red and edematous**.
**Indirect (oblique) inguinal hernia**

- Commonest type: 65%
- Occur in males and females.
- Cong. Or Acquired (through inguinal lig.)
- In cong. Types: 55% on right side (late descent of rt. Testis).
- In 15 –20 %: bilateral (congenital H is 40% bilateral).
- The swelling is felt above and Medial to pubic tubercle.
- Descends to the scrotum.
- Reduces up, back, & laterally.
- Int. ring test +ve
- The defect can not be palpated (deep to ext. obl.)
Inguinoscrotal hernia
Direct inguinal hernia

• 10-15% of ing. Hernias.
• > 50% bilateral.
• Always acquired (through Hasselbach’s triangle).
• Never occur in females.
• Very rarely descend into the scrotum.
• Reduces up & back.
• Int. ring test –ve
• The swelling is felt above and laterals to pubic tubercle.
Passway of direct hernia

- Rectus muscle
- Inguinal ligament
- Iliac artery
- Iliac vein
- Inferior epigastric artery
- Hesselbach triangle
Direct hernia

A left direct inguinal hernia. A small bulge coming straight out through the transversalis fascia and external inguinal ring. There is an early bulge on the right.
If it is an inguinal hernia, is it direct or indirect hernia?

This can be done by 3 methods:

1- Relation to pubic tubercle:
   - Inguinal hernia lies above and medial to pubic tubercle (indirect H), above and lateral to pubic tubercle (direct H).

2- Direction of reduction:
   - Indirect hernia reduces upward, backward and laterally
   - Direct hernia reduces directly backward

3- Internal ring test:
   - Indirect hernia has a positive test: the swelling does not appear except after relieving the pressure on the internal inguinal ring.
Differential diagnosis of Groin hernia:

In the male

1. Femoral hernia
2. Infantile hydrocele
3. Encysted hydrocele of the cord
4. Lipoma of the cord
5. Ectopic testis
6. Inguinal lymphadenopathy
7. Femoral aneurysm
8. Psoas abscess

In the female

- Hydrocele of the canal of Nuck
- Femoral hernia.
Treatment of inguinal hernia

- **Operation is the treatment of choice.**
- **1- Inguinal herniotomy** = Excision of the hernial sac
- It is the basic operation for hernia in infants, adolescents who have good inguinal musculature.
2- Herniorrhaphy:
• Consists of:

(1) **Narrowing** of the stretched internal inguinal ring and

(2) **Herniorrhaphy** = **Repair of the transversalis fascia**
**Herniorrhaphy is done by many methods:**

1- **Darning of fascia transversalis:**
   - With prolene sutures and narrowing of the internal ring (Lytle method).

2- **Bassini's repair:**
   - The conjoint tendon is sutured to iliopubic tract (Deep part of inguinal lig).

3- **McVay's Repair:**
   - The conjoint tendon is sutured medially to Cooper's ligament (Cooper's Repair) and laterally to iliopubic tract.

4- **Shouldice Repair:**
   - The fascia transversalis is opened and sutured in 4 layers to the conjoint tendon above and the deep layer of inguinal lig below. **Rarely done nowadays.**
Bassini Repair
Conjoint tendon into the iliopubic tract
3- Hernioplasty by synthetic mesh:

Lichtenstein Tension Free Repair:

- Synthetic mesh is applied to the posterior wall of inguinal canal
Hernioplasty by **synthetic mesh**:
Femoral hernia

- It is the most liable to be strangulated because of the neck of the sac is narrow and the rigidity of the femoral ring.
Femoral hernia

- The female to male ratio is about 2:1.
- The right side is affected twice as much as the left.
- In 20% of cases the condition is bilateral.
- **Incidence of Bilaterality for different types:**
  - Indirect ing. H: 15-20%
  - Congenital H: 40%
  - Direct ing. H: 50%
  - Femoral H: 20%
Femoral hernia

- A hernia passing down through the femoral canal descends vertically downward as far as the saphenous opening then it turns upwards.
- A fully distended femoral hernia assumes the shape of a Retort, and its bulbous extremity (fundus) may be above the inguinal ligament.
Femoral hernia

- Below and lateral to the pubic tubercle
Differential diagnosis of femoral hernia

• 1- An inguinal hernia.
• 2- A saphena varix.
• 3- An enlarged femoral lymph node
• 4- Lipoma.
• 5- A femoral aneurysm.
• 7- A distended psoas bursa.
Special types of femoral hernia:

1- **Hydrocele** of a femoral hernial sac

2- **Laugier's** femoral hernia (through a gap in Lacunar lig.)

3- **Narath’s** femoral hernia (with cong. Hip dislocation: the hernia lies behind the femoral vessels)

4- **Cloquet’s** hernia (the sac lies behind the pectineus m.)
If it is a groin hernia, is it inguinal or femoral hernia?

- This can be done by 2 methods:

1- Relation to the inguinal ligament:
   - Inguinal hernia above the inguinal ligament while femoral hernia lies below the inguinal ligament

2- Relation to the pubic tubercle:
   - Inguinal hernia lies above and medial to pubic tubercle (indirect H), above and lateral to pubic tubercle (direct H), while femoral hernia lies below and lateral to the pubic tubercle.

3- Reducibility:
   - Inguinal hernia can be reduced completely
   - Femoral hernia cannot be reduced completely
Treatment of femoral hernia.

• Urgent operation.

1- The low operation (Lockwood), rarely done.

• The sac is dissected out below the inguinal ligament via a groin-crease incision.

• The canal is closed by suturing the inguinal ligament to the Cooper’s lig using nonabsorbable sutures.
2- The Mc Evedy operation:

- **A vertical incision** is made over the femoral canal and continued upwards above the inguinal ligament.
- The **neck of the sac** is then freed from above the inguinal lig. with pushing the fundus from below and is **transfixed**.
- The Cooper’s ligament and the conjoined tendon (**C to C**) or the Poupart’s lig to Cooper’s lig (**P to C**) are sutured with non-absorbable sutures.
3-Lotheissen’s operation:

- The inguinal canal is opened **as for inguinal hernia.**
- The Transversalis fascia is **incised** to the medial side of the inf. epigastric vessels.
- The peritoneum is now in view and the sac is withdrawn from the femoral canal
- **You can incise the lacunar lig. to withdraw the sac**
- The nonabsorbable sutures are then passed through the **Cooper’s lig. to the conjoined tendon (C to C).**
Congenital umbilical hernia

1- Congenital umbilical hernia of infants and children.

- This is a hernia through a weak umbilical scar.
- Males to females is 2:1.
- The hernia is often symptomless
- Increase in the size of the hernia on crying causes pain, which makes the infant cry the more.
- Most of congenital umbilical hernias close in the first year of life
Congenital umbilical hernia
Treatment

- **Conservative treatment** for small defects is successful in 93% of cases.
- In cases where conservative treatment fails at the age of 5 years or a larger defect, operation is required → **Herniorrhaphy (closure of the defect with non-absorbable sutures) and preserve the umbilicus.**
Exomphalus minor & major = Omphalocele

- Once in 6000 births
- It is due to failure of all or part of the midgut to return to the coelom (abdominal cavity) during early fetal life.

- **The sac consists of three layers:**
  - An outer layer of amniotic membrane.
  - A middle of Wharton’s jelly.
  - An inner of peritoneum.
Two varieties of Exomphalus:

- **1-Exomphalos minor.**
  - The sac is relatively small less than 5 cm and to its summit is attached the umbilical cord.
  - So, loops of small intestine or a Meckel’s diverticulum can be included in the ligature applied to the base of an umbilical cord containing this protrusion.
2- Exomphalalus major.

- The swelling is more than 5 cm and the umbilical cord is attached to the inferior aspect of the swelling.

- It contains small and large intestine & nearly always a portion of the liver.
Treatment

- *Exomphalus minor:*
- The contents are reduced into the abdomen.
- The sac (Wharton's jelly and amniotic membrane) is excised.
- The skin and muscles on both sides are approximated and sutured in the midline.
Treatment

- **Exomphalus major:**
  - *Operation within the first few hours of life is the only hope and usually incompatible with life*
  
  - If the sac is intact, apply a *synthetic mesh* to close the defect.
  
  - If the sac is ruptured, try to reduce the contents into the abdomen.
  
  - Close the defects with *undermined skin* (Skin flaps) on both sides.
Paraumbilical hernia

• In adults; the hernia does not occur through the umbilical scar.
• It is a protrusion through the linea alba just above or just below the umbilicus.
• Paraumbilical hernias can become very large & partly irreducible.
- Women to men: 5 : 1
- **Dragging pain** & gastrointestinal symptoms are common
- There are transient attacks of intestinal **colic** due to **subacute intestinal obstruction**.
Paraumbilical hernia of adults
Treatment

- **Surgery** is indicated after good preoperative preparation
- Through a **transverse abdominal incision** over the maximum convexity of the swelling.
- The sac is **opened at its neck** to avoid injury of the contents.
- Deal with the contents as usual.
- Excise the sac (Herniotomy), and close the peritoneum
- Close the abdominal muscle in layers
- Apply **synthetic mesh (Hernioplasty)**
- Close the skin.
A = Mesh can be applied directly *extra peritoneal*
B = Mesh can envelop = *sandwich the muscles*
C = Mesh can be applied *superficial to the muscles*

Apply mesh in different ways
Epigastric hernia

- A midline epigastric swelling between the xiphoid process and the umbilicus due to herniation of extraperitoneal fat only = fatty hernia of the linea alba

- If the protrusion enlarges, it drags a pouch of peritoneum after it, and so becomes a true epigastric hernia.
Clinical features

- *Symptomless*
- *Painful* due to dragging of the gastric omentum or the fatty contents become partially strangulation.
- *The pain is* related to meals.
- **Surgical Repair** for symptomatic cases
- **Repair** consists of excision of the incarcerated preperitoneal tissue and simple closure of the fascial defect.
- Uncommonly, these defects can be sizable and contain omentum or other intra-abdominal viscera and may require **mesh repairs**.
Rare external hernias

1- Spigelian hernia is a variety of inter-parietal (inter-muscular) hernia occurring commonly at the level of the arcuate line.

- Operation is imperative because of intestinal obstruction.
2- Lumber Hernias

- Primary lumbar hernias gain exit through the **inferior lumbar triangle of Petit** or the **superior lumbar triangle of Grynfeltt**
- Lump in the flank is the main presentation
- Associated with a dull aching pain
- Incarceration or strangulation is rare (10%)
- Inferior hernia is small and occurs in young athletic women
- Repair the only treatment by mobilization of nearby fascia and closure of the defect by fascia to fascia closure
- In large defects, mesh is applied
Lumber Hernias

A

- Latissimus dorsi muscle
- External abdominal oblique muscle
- Lumbodorsal aponeurosis
- Internal abdominal oblique muscle
- Inferior lumbar (Petit) triangle
- Iliac crest
- Gluteus medius muscle

B

- Latissimus dorsi muscle
- External abdominal oblique muscle
- 12th rib
- Posterior lumbocostal ligament
- Internal abdominal oblique muscle
- Iliac crest
- Gluteus medius muscle
3- Obturator hernia

- The hernia, which passes through the Obturator canal
- It rarely causes a definite swelling in femoral triangle in elderly women, but may present with acute intestinal obstruction.
- The swelling is liable to be overlooked because it is covered by the pectineus but can be felt on rectal examination.
If the lower limb is flexed, abducted, and rotated outwards, the hernia becomes more apparent.

If the knee is extended, abducted, and internally rotated, pain is felt along the medial aspect of the thigh (Howship–Romberg sign).

The mortality rate is 13-40% making these hernias as the most lethal of all abdominal hernias.
On vaginal or rectal examination, the hernia can be felt as a tender swelling in the region of the Obturator foremen, and is detected by CT.

**Treatment**

Perform lower laparotomy

The constricting agent is the Obturator fossa

This fossa can be stretched to allow reduction

The contents of the sac are reduced.

The broad ligament is stitched over the opening to prevent recurrence, mesh is used when the defect cannot be closed appropriately.
4- *Gluteal hernia* passes through the greater sciatic foramen, either above or below the piriformis.

5- *Sciatic hernia* passes through the lesser sciatic foramen.
Anatomical passways of Gluteal & Sciatic hernias
• Their diagnosis is made after incarceration or strangulation

• Repair is done through an abdominal approach, the contents are reduced and the defect is closed with a fascial flap from the fascia of piriformis muscle.
Thank you