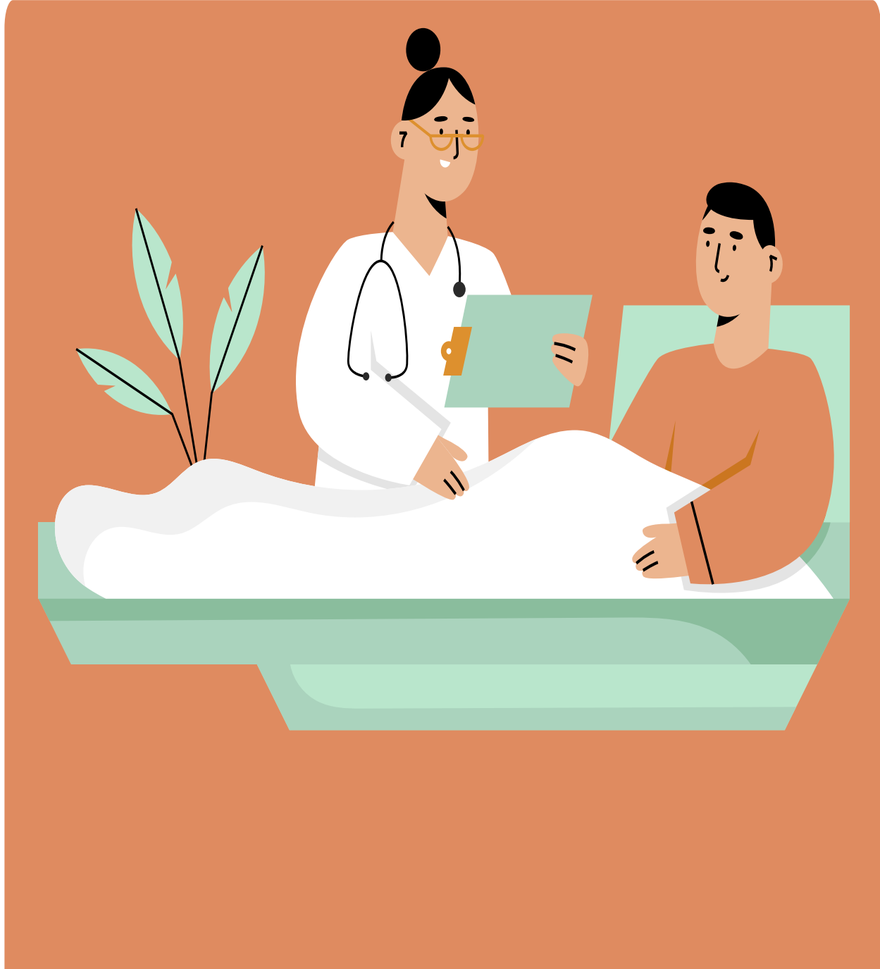
MED437
KING SAUD UNIVERSITY

SURGERY TEAM 437



Hernias DDX of Abdominal Masses and

Objectives:

1. Abdominal hernias
2. Inguinal hernias
3. Ventral hernias
4. Rare external hernias
5. Internal hernias
6. Complications of hernias
7. Management of complicated hernias.

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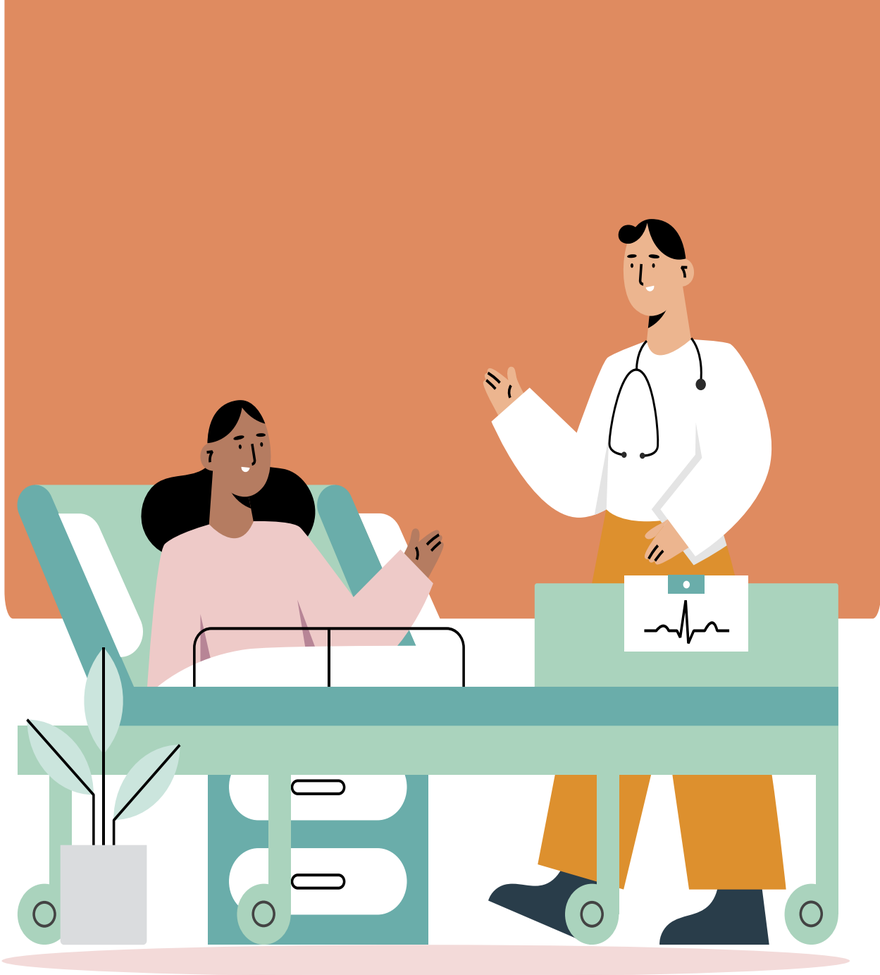
Color Index:

- Important
- Doctor's Notes
- Extra
- Davidson's

Editing File / Feedback

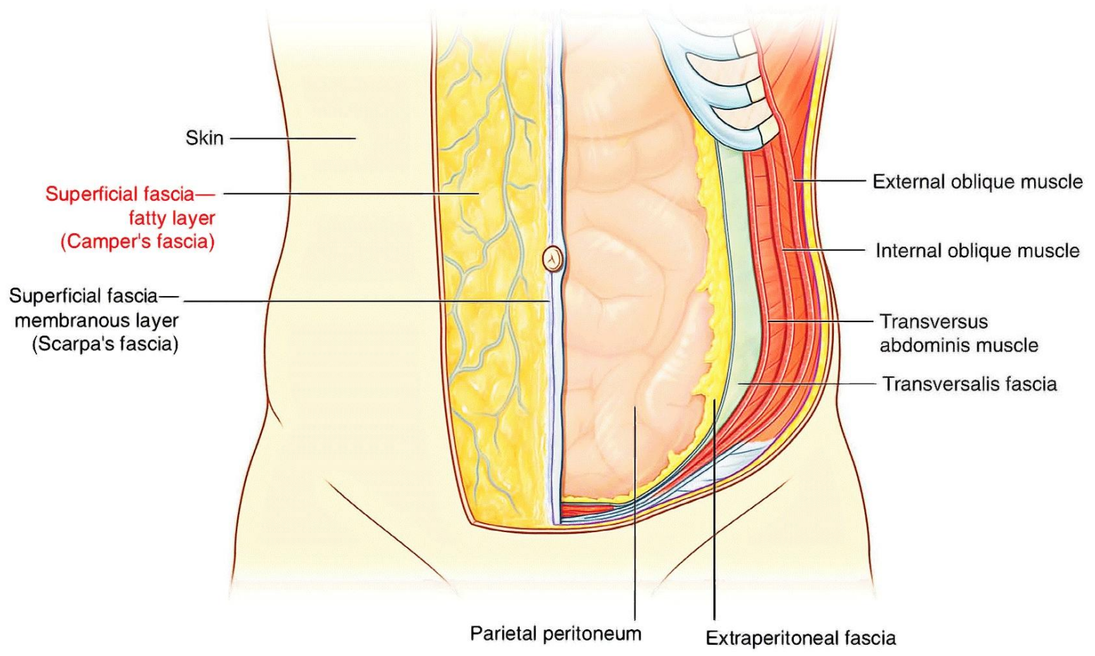


Surgical Anatomy

Abdominal Wall:

○ Anterior abdominal wall:

1. Skin: loosely attached to the underlying structures except at the umbilicus “situated in the linea alba”.
2. Subcutaneous tissue:
   - Camper’s fascia: Superficial and fatty,
   - Scarpa’s fascia: Deep and fibrous.
3. Rectus abdominis.
4. External oblique muscle: in the groin, its aponeurosis forms:
   - The inguinal ligament
   - The External spermatic fascia of the spermatic cord.
5. Internal oblique muscle: forms the lateral part of the inguinal ligament.
6. Transversus muscle: forms the rectus sheath and th
7. Transversus fascia: with the descent of the testicle, the transversalis fascia establishes continuity with the internal spermatic fascia of the spermatic cord.
8. Peritoneum.



Layers: Skin ⟶ Subcutaneous fat ⟶ Scarpa’s fascia ⟶ External oblique ⟶ Internal oblique ⟶ Transversus abdominis ⟶ Transversalis fascia ⟶ Preperitoneal fat ⟶ Peritoneum

- **Inguinal Canal:**
  - The inguinal canal is an oblique passage 3.75 cm in length, directed downwards and medially in the lower anterior abdominal wall, through which the spermatic cord passes to the testis in the male, or the round ligament in the female.
  - The openings of the canal are formed by the internal and external rings:
    - The **internal (deep)** inguinal ring is an opening in the transversalis fascia, which lies approximately 1.25 cm above the mid-inguinal point (midway between the pubic symphysis and the anterior superior iliac spine). The internal inguinal ring is bounded medially by the inferior epigastric artery.
    - The inguinal canal ends at the **external (superficial)** inguinal ring, which is an opening in the aponeurosis of the external oblique muscle just above and medial to the pubic symphysis.
    - At birth, the internal and external rings lie on top of each other, so that the inguinal canal is short and straight with growth, the two rings move apart so that the canal becomes longer and oblique.
  - **Contents:** Ilioinguinal nerve, spermatic cord in males & round ligament in females.
  - **Boundaries:**
    - Anterior: Aponeurosis of the external oblique muscle.
    - Inferior: (floor): The inguinal ligament, and lacunar ligament on the medial side.
    - Superior (roof): The arching fibers of the internal oblique and the transversus abdominis muscles.
    - Posterior: Transversalis fascia, reinforced medially by the conjoint tendon.
  - The processus vaginalis traversing the canal is normally obliterated at birth, but persistence in whole or in part presents an anatomical predisposition to an indirect inguinal hernia.
    - The testis and spermatic cord receive a covering from each of the layers as they pass through the abdominal wall:
      1. The internal spermatic fascia: is the innermost layer, derived from the transversalis fascia,
      2. The cremasteric muscle and fascia: is the middle layer from the internal oblique muscle.
      3. The external spermatic fascia: is the outer layer from the external oblique aponeurosis.
    - Within the inguinal canal, the spermatic cord is covered only by the cremasteric and internal spermatic fascia.

Surgical Anatomy

- **The spermatic cord:** vss deferens, artery of the vas, testicular artery, and cremasteric artery.
  - Consists of: pampiniform plexus of veins, ilioinguinal nerve, the genital branch of the genitofemoral nerve & lymphatics.
- **Hesselbach's triangle:** it is a space formed by the following boundaries:
  - Laterally: Inferior epigastric vessels (branches of external iliac vessels and are important
    landmarks for laparoscopic hernia repair. These vessels course medial to the internal inguinal ring and eventually lie beneath the rectus abdominis muscle immediately beneath the transversalis fascia).
  - Medially: Lateral border of rectus abdominis.
  - Inferiorly (base): Inguinal ligament.
  - Above (roof): conjoint ligament.

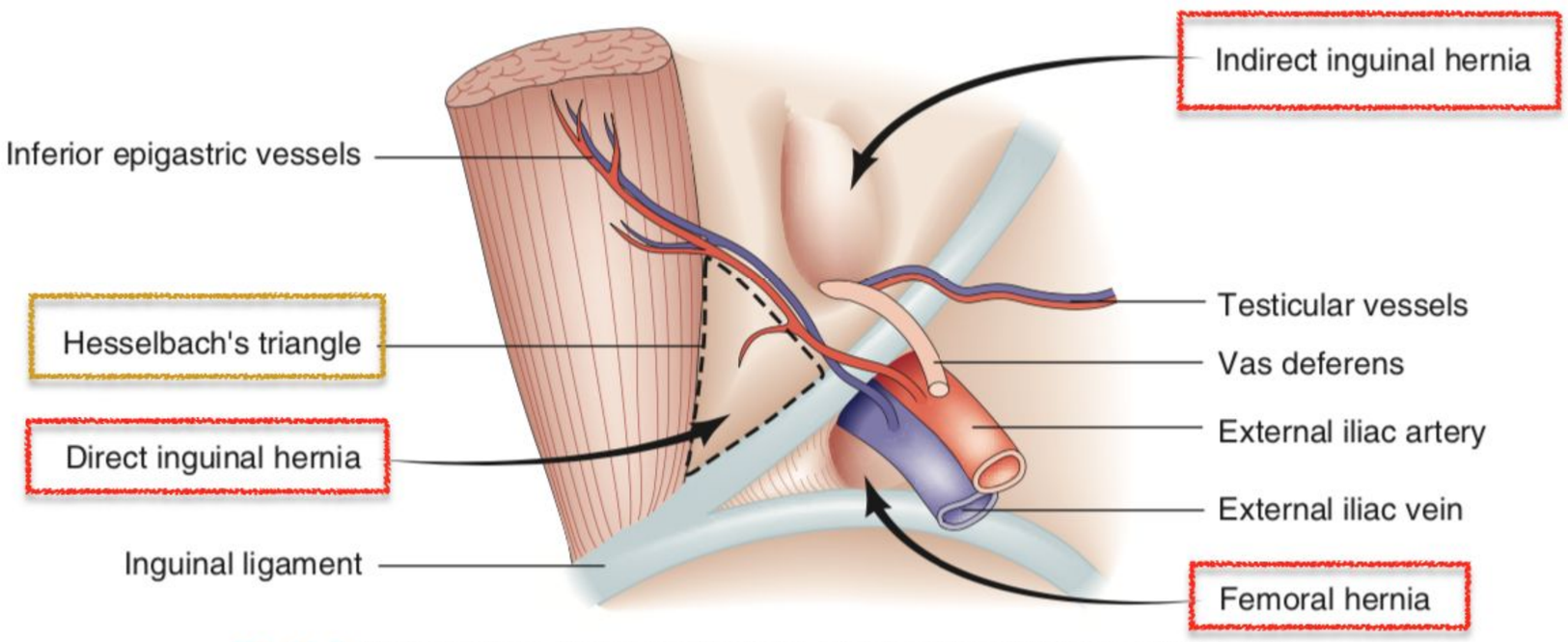


Fig. 11.3 Anatomy of the internal inguinal ring, showing sites of herniation from within.

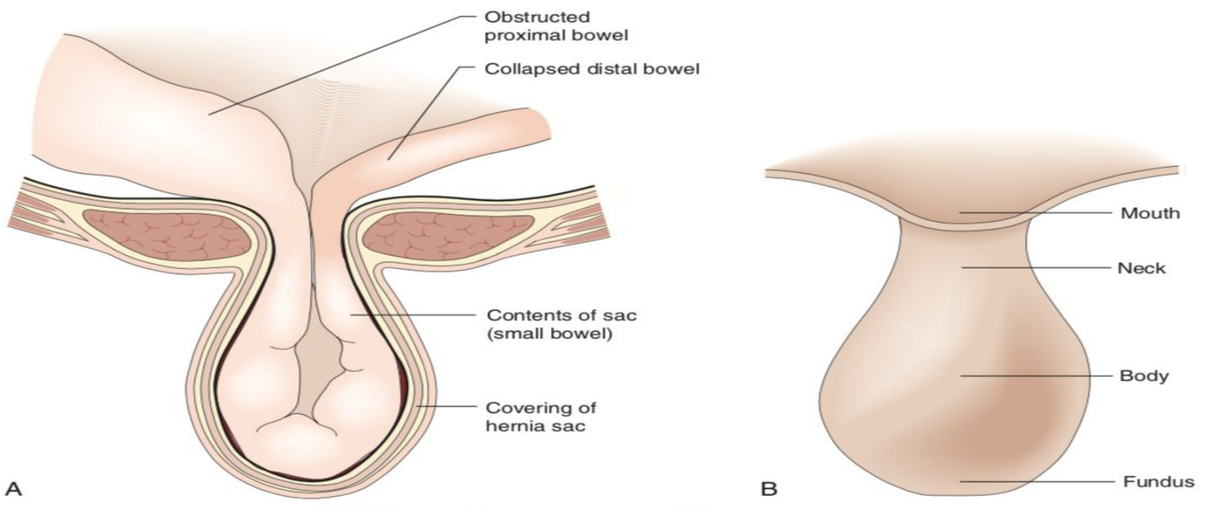
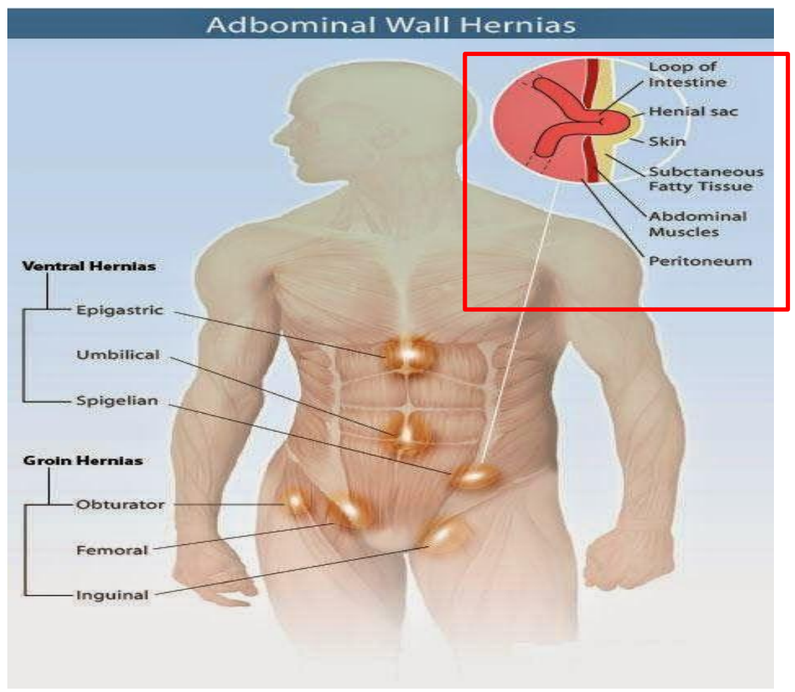


Fig. 11.2 **Hernia.** **(A)** Anatomical structure. **(B)** Parts of the hernial sac.

Abdominal Hernias

Definition:

★ An abnormal protrusion of a cavity contents (peritoneal sac) through a weakness in the wall of the cavity (musculoaponeurotic barrier)



Classifications:

★ Congenital or acquired (in pediatrics)
★ Location: (it it's gives you a hint about What is happened)
  ○ Ventral: Epigastric, umbilical, & spigelian
  ○ Groin: Obturator, femoral, & inguinal
★ Internal or external **(based on images)**
★ Complicated or uncomplicated (carcerated or Incarcerated or Strangulated)

Risk Factors:

★ Intraabdominal high pressures from staring at defecation or urination (constipation, prostatic enlargement, colon or rectal cancer, excessive coughing & lifting)
  ○ However, it has been shown that hernia is no more common in olympic weightlifters than the general population, suggesting that high pressure is not a major factor in causing a hernia. (this study does not has a supporting finding)
  ○ Many patients will first notice a hernia after excessive straining.
★ Pregnancy due to hormonally induced laxity of pelvic ligaments.
★ Elderly due to degenerative weakness of muscles and fibrous tissue.
★ Hernia is more common in smokers. (due to relaxation of muscle tissue and they will have chronic cough)
★ A recent Swedish report has shown that inguinal hernia is less common in obese patients with hernia risk being negatively related to body mass index (BMI) contrary to widespread belief.
★ GERD

Composition:

★ Sac: allows bowel and omentum to pass through the defect.
★ Content: (small or large bowel or other organs)
  ○ Any intra-abdominal structure, but most commonly omentum and/or small bowel.
  ○ A hernia may involve only part of the circumference of the bowel (Richter's hernia), a Meckel's diverticulum (Littre's hernia) or an incarcerated appendix (Amyand's hernia).
★ Neck: The constriction formed by the orifice in the abdominal wall through which the hernia passes. (when it's smaller the risk of complications are higher)
  - Reducible hernia when the intraperitoneal organs can move freely in and out of the hernia (ability to return the displaced organ or tissue hernia contents to their usual anatomic site)
    - It can come in OSCE you'll examine the patient and tell them to: 1- stand so hernia will come out 2-lay down it will back. So if you tested him and the patient has those 2 things, the diagnosis will be (reducible hernia)
    - But if the patient stand or lay down and it's there out didn't come back so here he has a chronic hernia and the diagnosis will be (irreducible hernia)
    - If you saw a case of hernia and there is scar (laparotomy scar) and maybe swelling so the diagnosis will be: 1-recurrent hernia or 2- incisional hernia (it can come in osce or pic in MCQ)

History:

★ Painless lump usually (reducible hernia)
  ○ Aching or heavy feeling, sharp, intermittent pains suggest pinching of tissue.
  ○ Severe pain should alert the surgeon to a high risk of strangulation.
★ Reduces spontaneously or needs to be helped. (make him stand or lay down)
★ Symptoms of bowel obstruction (not passing gas or bowel movement, red flag either incarcerated or strangulated, and its emergency surgery is needed)
★ Constipation, cough, lower urinary tract symptoms, or lifting heavy objects.
★ Primary hernia or a recurrent one.
★ Recurrent hernia is more difficult to treat and may require a different surgical approach.

Groin Hernias

Very very important

- ★ Groin hernias account for 75% of all abdominal wall hernias(most common)
- ★ The most common types of groin hernia are indirect inguinal (60%) direct inguinal (25%) and femoral (15%).
- ★ Premature infants is 30 times that seen at term.
- ★ In early life, an indirect inguinal hernia is by far the most common.
- ★ Femoral hernias are relatively more common in females, but an indirect inguinal hernia is still the most common type of groin hernia in women(so the indirect inguinal hernia is the most common in both genders)
- ★ An inguinal hernia, which passes into the scrotum, passes above and medial to the pubic tubercle, in contrast to a femoral hernia, which bulges below and lateral to the tubercle

1. Direct Inguinal Hernia:

- It happens in hesselbach's triangle in adult

A great video!

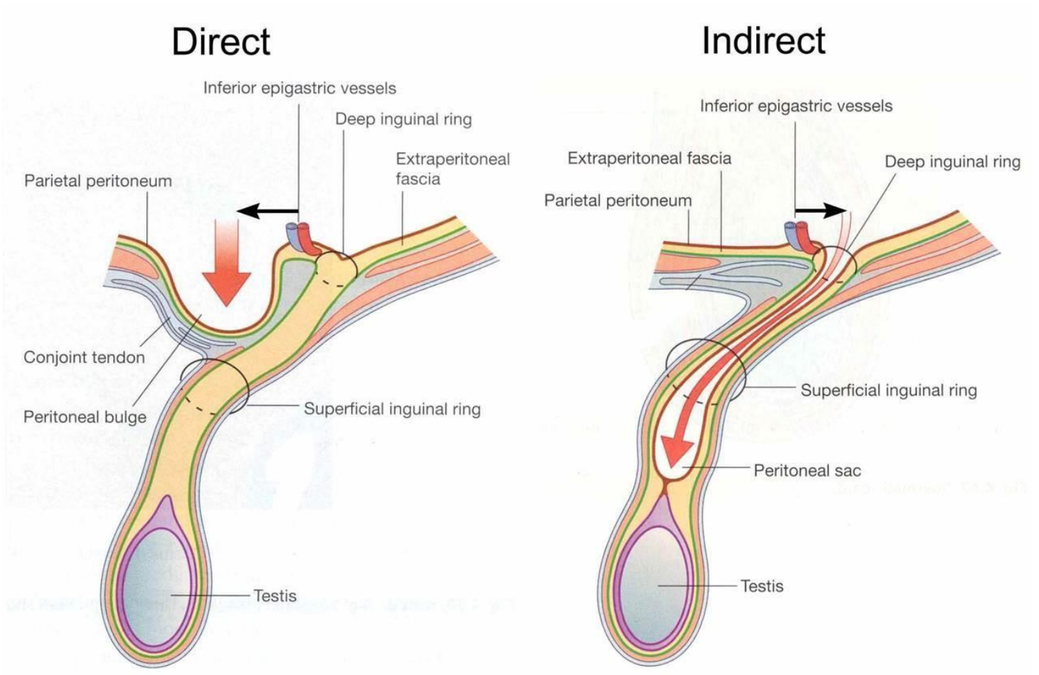
YouTube

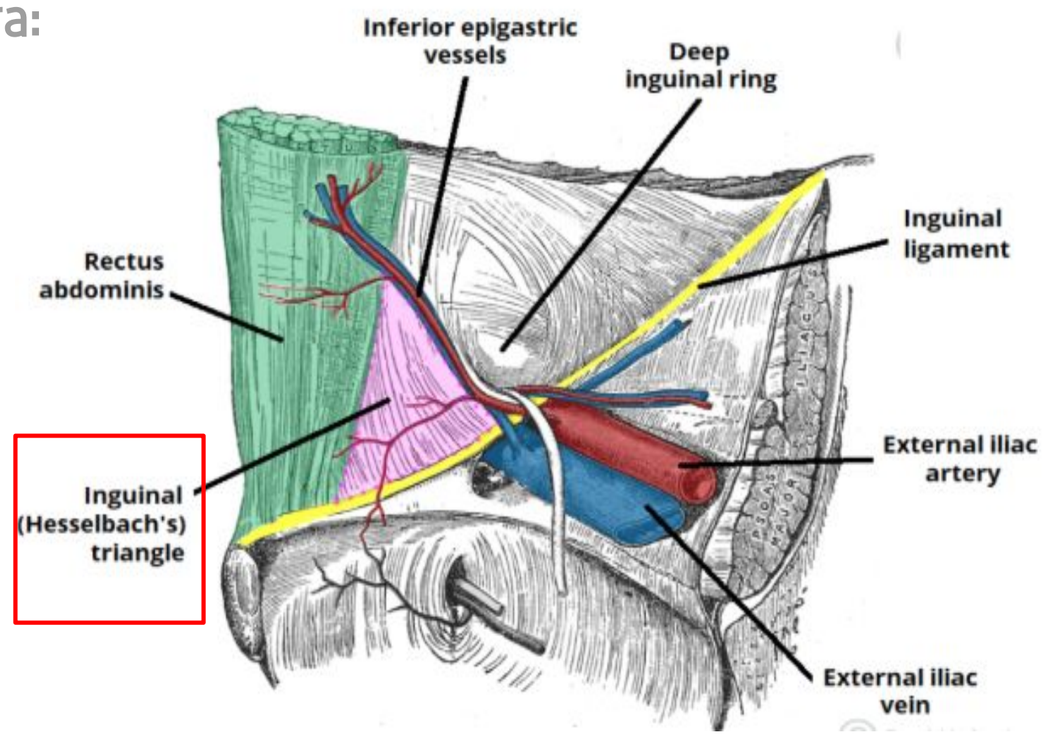
- ★ Due to weakness of the abdominal wall.
- ★ Occur after middle age
- ★ The hernia protrudes through the transversalis fascia in the posterior wall of the inguinal canal.
- ★ The defect is bounded medially by the lateral border of rectus muscle, below by the inguinal ligament, and laterally by the inferior epigastric vessels.
  - ○ These boundaries mark the area known as Hesselbach's triangle. (itrepresents an area of potential weakness in the abdominal wall, through which herniation can occur)
- ★ The hernia occasionally bulges through the external (superficial) inguinal ring, but the transversalis fascia cannot stretch sufficiently to allow it to descend down into the scrotum.
- ★ The sac has a wide neck, so that the hernia seldom becomes irreducible, obbstructs or strangulates(remember wide neck don't worry, but if it's small neck you worry)
- ★ The neck of the sac of a direct inguinal hernia lies medial to the inferior epigastric vessels
- ★ A combined indirect and direct hernia may occur on the same side (pantaloon or saddle-bag hernia), with sacs straddling the inferior epigastric vessels.

2. Indirect Inguinal Hernia:

- ★ An indirect inguinal hernia enters the internal (deep) inguinal ring and descends within the coverings of the spermatic cord so that it can pass on down into the scrotum, the so called inguino-scrotal hernia.
- ★ Occur in earlylife
- ★ The neck of the sac of a indirect inguinal hernia lies lateral to the inferior epigastric vessels

Extra:





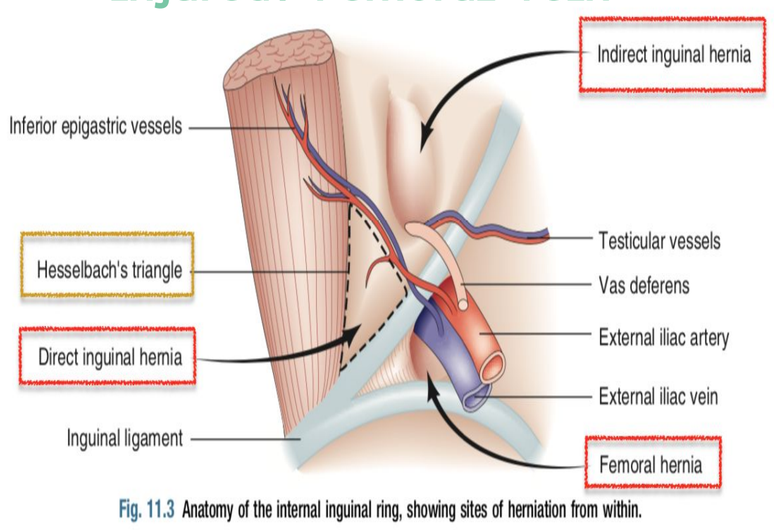
Groin Hernia

3. Femoral Hernia:

- Always have very narrow neck and go to emergency

★ A hernia projects through the femoral ring and passes down the femoral canal.
★ The ring is bounded by:
  ○ Laterally by the femoral vein
  ○ Anteriorly by the inguinal ligament
  ○ Medially by the lacunar ligament
  ○ Posteriorly by the superior ramus of the pubis □□(pec□tineal □□or Cooper's ligament)
★ The hernia forms a bulge in the upper inner aspect of the thigh.
★ Groin pain related to exercise is also a common presentation.
★ It can sometimes be difficult to differentiate between an inguinal and a femoral hernia
  ○ The inguinal hernia passes above and medial to the pubic tubercle inguinal legend
  ○ The femoral hernia passes below and lateral to it.
  ○ Tracing the tendon of adductor longus upwards to its insertion to the pubic tubercle is the way to differentiate
★ A femoral hernia is frequently difficult or impossible to reduce because of its J-shaped course and the tight neck of the sac make it higher risk for obstruction or strangulation.
★ As well as needing to be differentiated from inguinal hernia, it can be confused with:(not all inguinal swelling is hernia)
  ○ Inguinal lymph node (no cough impulse, irreducible),
  ○ Sa[henous varix (positive cough impulses or saphenous thrill whic is prominent on standing but disappears on elevating the leg)
  ○ Ectopic testis
  ○ Psoas abscess
  ○ Hydrocele of the spermatic cord or a lipoma.(you differentiated by history or scenario)

- Q: in OR there is lots of bleeding in femoral hernia surgery what is the vessel injured? Femoral vein



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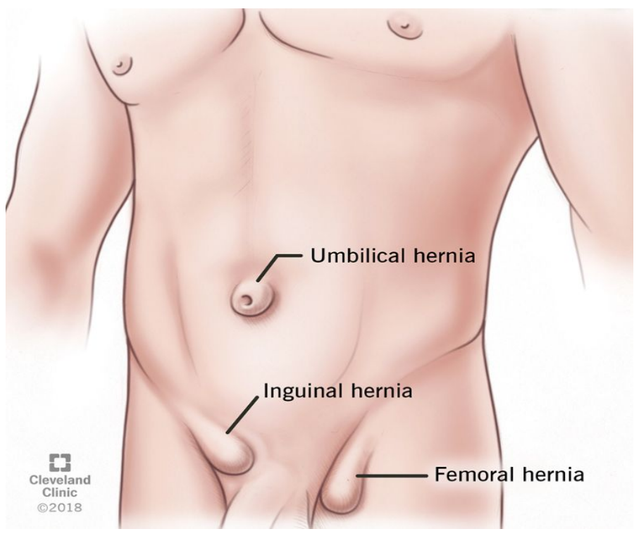
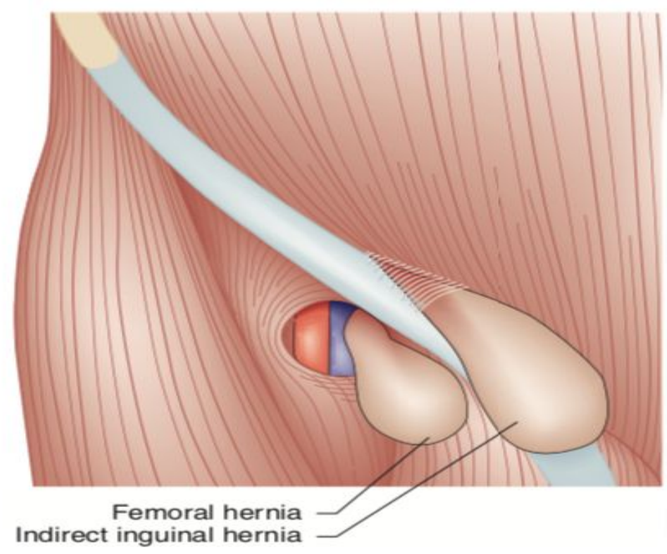




4. Sportsman's Hernia:

- Pain due to excessive exercise no hernia

★ Groin injury leading to chronic groin pain is often referred to as the sportsman's hernia.
★ The definition, investigation and treatment of this condition remain controversial.
★ The differential diagnosis includes musculotendinous injuries, osteitis pubis, nerve entrapment, urological pathology or bone and joint disease.
★ In many cases, clinical signs are lacking, despite the patient'ssymptoms.
★ Diagnosis: MRI
★ Tx: NSAIDS or surgery

Ventral Hernias

★ Occur through areas of weakness in the anterior abdominal wall
- The linea alba (epigastric hernia)
- The umbilicus (umbilical and paraumbilical hernia)
- The lateral border of the rectus sheath (Spigelian hernia)
- The scar tissue of surgical incisions (incisional hernia).
  - Such incisions include scars from laparoscopic surgery, the so-called port-site hernia.

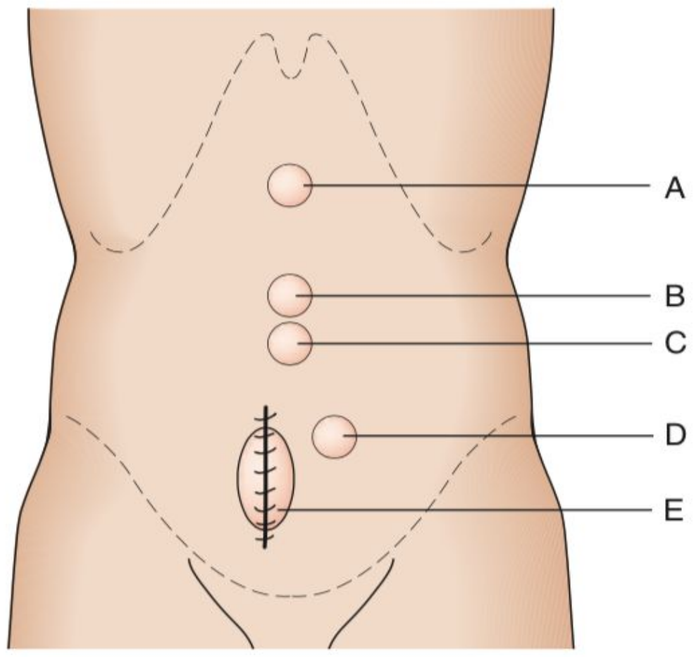


Fig. 11.13 Types of ventral hernia. (A) Epigastric: through the linea alba. **(B)** Umbilical: through an umbilical scar. **(C)** Para-umbilical: above or below the umbilicus. **(D)** Spigelian: lateral edge of rectus muscle. **(E)** Incisional: anywhere.

1. Umbilical Hernia:

★ True umbilical hernia occur in infants more commonly.
★ The small sac protrudes through the umbilicus, particularly as the child cries, but is easily reduced.
★ Over 95% of these hernias close spontaneously in the first 3 years of life(so baby less than 3y don't need surgery)
★ Persistence after the third birthday is an indication for elective repair.
★ Surgery involves excision of the hernial sac and closure of the defect in the fascia of the abdominal wall.

A. Para-Umbilical Hernia (PUH)

- This hernia is caused by gradual weakening of the tissues around the umbilicus.
- It most often affects obese multiparous women, and passes through the attenuated linea alba just above or below the umbilicus.
- The hernia gradually enlarges, the covering tissues become stretched and thin.
- The hernia orifice is at the side of the sac bulges out beside [illegible] crescent-shaped slit

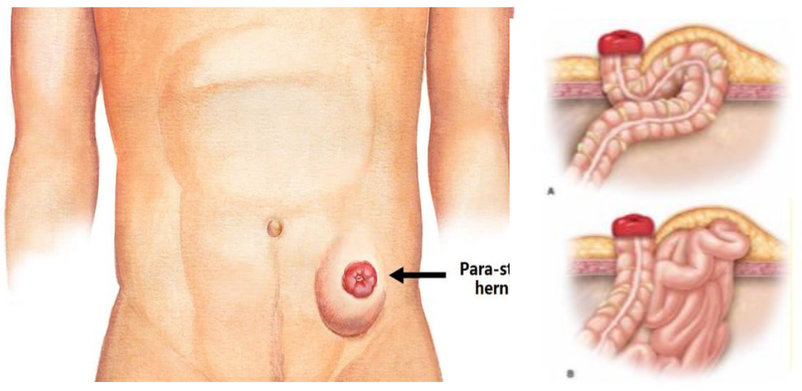
Crescent-shaped umbilicus

2. Incisional Hernia:

★ Occur after 5% of all abdominal operations.
★ Over half of incisional hernias occur in the first 5 years after the original surgery.
★ Midline vertical incisions are most often affected, and poor surgical technique, wound infection, obesity and chest infection are important predisposing factors.(that is why if you did a surgery mid line and your patient has cough or Bph you have to treat it before you discharge)
★ The diffuse bulge in the wound is best seen when the patient coughs or raises the head and shoulders from a pillow, thereby contracting the abdominal muscles.

3. Parastomal Hernia:

★ A type of incisional hernia that allows protrusion of abdominal contents through the abdominal wall defect created during ostomy formation.
★ These occur after the formation of an abdominal wall stoma.
★ The majority of patients with a stoma will develop a parastomal hernia with time.



4. Sliding Hernia:

★ Part of the wall of the sac is formed by a viscus.
- Right cecum
- Left sigmoid or bladder

Ventral Hernias

5. Spigelian Hernia: IMP

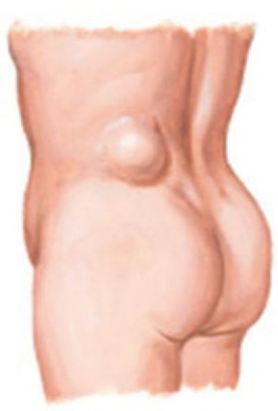
★ Through the linea semilunaris at the outer border of the rectus abdominal muscle

6. Lumbar Hernia (petit's): IMP

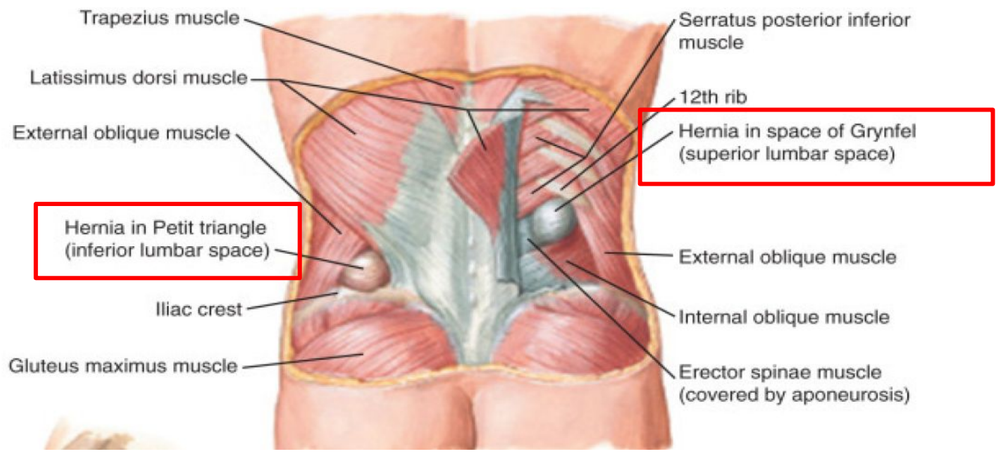
★ Forms a diffuse bulge above the iliac crest between the posterior border of the external oblique and latissimus dorsi muscle

★ It has 2 types according to the anatomical location:

- Superior lumbar hernia **(Grynfeltt-Lesshaft hernia)** occurs through the superior lumbar triangle. more common than inferior lumbar hernias.
- Inferior lumbar hernia **(Petit hernia)** occurs through the inferior lumbar triangle.



Lumbar Hernia



7. Obturator Hernia: IMP

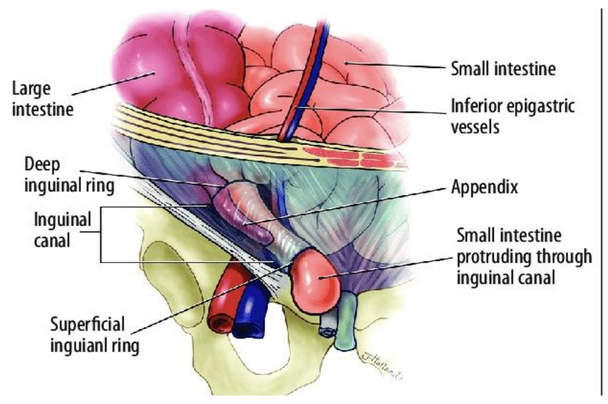
★ A rare hernia that is more common in women and passes through the obturator canal

★ Patients may present with knee pain owing to pressure on the obturator nerve (Howship-Rommber sign) (the sign is inner thigh pain on intertan rotation of the hip

Other Rare Hernias

1. Amyand's Hernia:

★ Hernia sac containing ruptured appendix

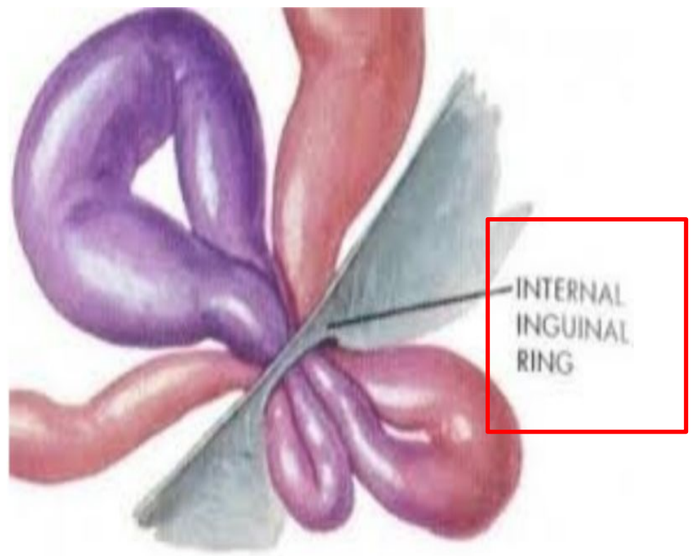


2. Maydl's Hernia (Hernia-in-W):

★ Hernia sac contains two loops of bowel with another loop of bowel being intra-abdominal

- Loop of bowel in the form of W lies in the hernial sac and the centre portion of the W loop may become strangulated, either alone or in combination with bowel in the hernial sac
- More often seen in men and predominantly on the right side

★ Postural or manual reduction of the hernia is **contraindicated** as it may result in non-viable bowel being missed.



3. Littre's Hernia

4. Petersen's Hernia

5. Petit's Hernia

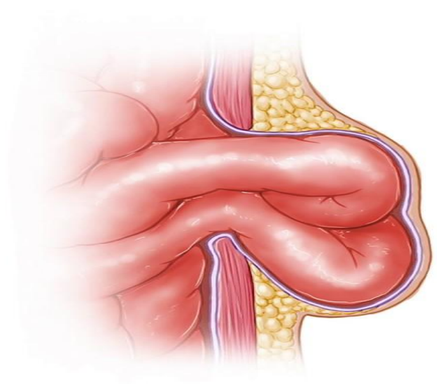
6. Grynfeltt's Hernia

7. Richter's Hernia

Hernia Complications

1. Irreducible Hernia (incarcerated):

- ★ In which the contents cannot be manipulated back into the abdominal cavity.
- ★ Fixed within the hernia sac and may cause intestinal obstruction
- ★ Secondary to adhesions, the content get swollen (edematous) from the inflammation or the defect (neck) is small. (remember always small neck higher risk of complications
  - Negative cough impulse
  - Painless or discomfort
  - No Tenderness
  - No skin changes

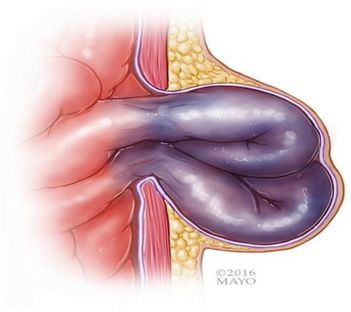


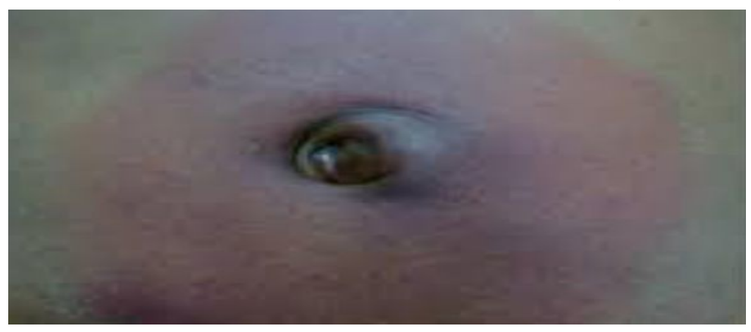
2. Obstructed Hernia:

- ★ Narrow neck acts as a constriction ring
- ★ If the hernia contains bowel then it may become obstructed partially or totally
- ★ Patient will have symptoms & signs of bowel obstruction
  - No cough impulse
  - Painful
  - Tender
  - No skin Changes

3. Strangulated Hernia (Ischemic):

- ★ Incarcerated hernia with resulting ischemia
- ★ Compromise the blood supply of the contents.
- ★ The low-pressure venous drainage is occluded first and then the artery
  - No cough impulse
  - Very painful
  - Severely tender
  - SKIN CHANGES

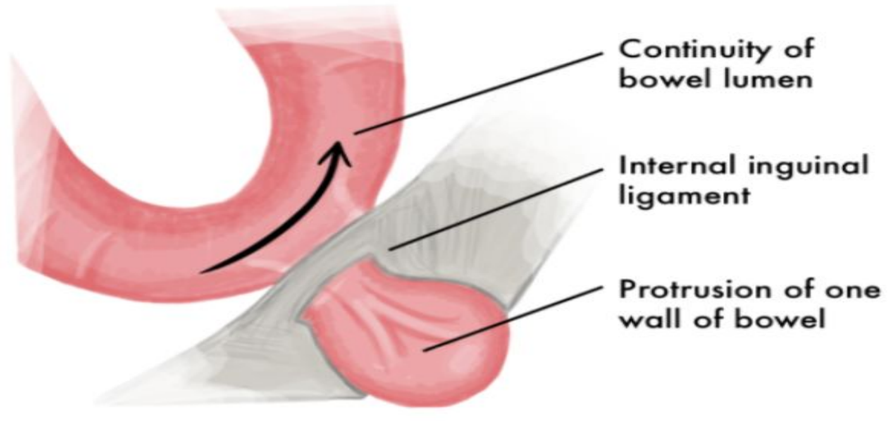




- This pic is important and may come in exam , it's strangulated umbilical hernia due skin color change , the management by emergency surgery, if they ask about comment you should say there is a severe tenderness

4. Richter's Hernia:

- ★ Incarcerated or strangulated hernia involving only one part of the(small)bowel wall.
- ★ It may be small and difficult or even impossible to detect clinically.
- ★ Bowel obstruction may not be present but the bowel wall may still become necrotic and perforate with life-threatening consequences.
  - So it is a form of strangulated hernia
- ★ Femoral hernia may present in this way often with diagnostic delay and high risk to the patient. (because it's neck is small)
- ★ Strangulation is the main risk factor for death in such cases



Surgical Recall:

Why should hernias be repaired? To avoid complications of incarceration/ strangulation, bowel necrosis, SBO, pain.

What is more dangerous: a small or large hernia defect?
Small defect is more dangerous because a tight defect is more likely to strangulate if incarcerated.

Types of hernias:

- **Sliding hernia:** Hernia sac partially formed by the wall of a viscus (i.e., bladder/cecum)
- **Littre's hernia:** Hernia involving a Meckel's diverticulum (Think alphabetically: Littre's Meckel's = LM)
- **Spigelian hernia:** Hernia through the linea semilunaris (or spigelian fascia); also known as spontaneous lateral ventral hernia (Think: Spigelian = Semilunaris)
- **Internal hernia:** Hernia into or involving intra-abdominal structure
- **Petersen's hernia**: Seen after bariatric gastric bypass– internal herniation of small bowel through the mesenteric defect from the Roux limb
- **Obturator hernia:** Hernia through obturator canal (females > males)
- **Pantaloon hernia:** Hernia sac exists as both a direct and indirect hernia straddling the inferior epigastric vessels and protruding through the floor of the canal as well as the internal ring (two sacs separated by the inferior epigastric vessels [the pant crotch] like pair of pantaloon pants)
- **Incisional hernia:** Hernia through an incisional site; most common cause is a wound infection
- **Ventral hernia:** Incisional hernia in the ventral abdominal wall
- **Parastomal hernia**: Hernia adjacent to an ostomy (e.g., colostomy)
- **Richter's hernia:** Incarcerated or strangulated hernia involving only one sidewall of the bowel, which can spontaneously reduce, resulting in gangrenous bowel and perforation within the abdomen without signs of obstruction
- **Epigastric hernia:** Hernia through the linea alba above the umbilicus
- **Umbilical hernia:** Hernia through the umbilical ring, in adults associated with ascites, pregnancy, and obesity
- **Femoral hernia:** Hernia under inguinal ligament medial to femoral vessels
- **Indirect inguinal:** Inguinal hernia lateral to Hesselbach's triangle
- **Direct inguinal:** Inguinal hernia within Hesselbach's triangle
- **Hiatal hernia:** Hernia through esophageal hiatus

What is the differential diagnosis for a mass in a healed C-section incision? Hernia, ENDOMETRIOMA

Surgical Recall:

GROIN HERNIAS

1. **Direct inguinal hernia**
   a. **What is it?** Hernia within the floor of hesselbach's triangle, the hernia sac does not travers the internal ring (think: directly through the abdominal wall)
   b. **What is the cause?** Acquired defect from mechanical breakdowns over the years
   c. **What nerve runs with the spermatic cord in the inguinal canal?** ilioinguinal nerve
2. **Indirect inguinal hernia**
   a. **What is it?** Hernia through the internal ring of the inguinal canal, traveling down towards the external ring; it may enter the scrotum upon exiting the external ring (i.e., if complete) ; think of hernia sac traveling indirectly through the abdominal wall from the internal ring to the external ring
   b. **What is the cause?** Patent processus vaginalis (congenital)
   c. **What is the incidence?** 5% of all men; most common hernia in both men and women
   d. **How is an inguinal hernia diagnosed?** Relies mainly on history and physical exam with index finger invaginated into the external ring and palpation of hernia; examine the patient standing up if diagnosis is not obvious. (Note: if swelling occurs below the inguinal ligament, it is possibly a femoral hernia)
   e. **What is the risk of strangulation?** Higher with indirect than direct inguinal hernia, but highest in femoral hernias
   f. **What is the treatment?** Emergent herniorrhaphy is indicated if strangulation is suspected or acute incarceration is present; otherwise, elective herniorrhaphy is indicated to prevent the chance of incarceration/ strangulation

Inguinal Hernia Repairs Define the following procedures:

- **Bassini:** Sutures approximate reflection of inguinal ligament (Poupart's) to the transversus abdominis aponeurosis/ conjoint tendon
- **McVay:** Cooper's ligament sutured to transversus abdominis aponeurosis/conjoint tendon
- **Lichtenstein:** "Tension-free repair" using mesh
- Plug and patch: Placing a plug of mesh in hernia defect and then overlaying a patch of mesh over inguinal floor (requires few if any sutures in mesh!)
- **High ligation:** Ligation and transection of indirect hernia sac without repair of inguinal floor (used only in children)
- **TAPP procedure:** TransAbdominal PrePeritoneal inguinal hernia repair
- **TEPA procedure:** Totally ExtraPeritoneal Approach

What are the indications for laparoscopic inguinal hernia repair?

1. Bilateral inguinal hernias 2. Recurring hernia 3. Need to resume full activity as soon as possible

FEMORAL HERNIA:

What is it? Hernia traveling beneath the inguinal ligament down the femoral canal medial to the femoral vessels (Think: FM radio, or Femoral hernia = Medial)

What are the boundaries of the femoral canal?

1. Cooper's ligament posteriorly 2. Inguinal ligament anteriorly 3. Femoral vein laterally 4. Lacunar ligament medially

What factors are associated with femoral hernias? women, pregnancy, and exertion

What percentage of all hernias are femoral? 5%

What percentage of patients with a femoral hernia are female? 85%!

What are the complications? Approximately 1/3 incarcerate (due to narrow, unforgiving neck)

What is the most common hernia in women? Indirect inguinal hernia.

What is the repair of a femoral hernia? McVay (Cooper's ligament repair), mesh plug repair

Quiz

1. **What is the most common organ in an inguinal hernia sac in me?**
   a. Large intestine
   b. Small instestine
   c. Appendix
   d. Stomach

2. **What is the most common organ in an inguinal hernia sac in women?**
   a. Fallopian tube
   b. Uterus
   c. Ovaries
   d. A & C

3. **Which of the following is the border of Hesselbach's triangle?**
   a. Round Ligament
   b. Medial border of the rectus
   c. Epigastric Vessle
   d. Conjoint tendon

4. **A 28 year old man with groin mass, vomiting, air-fluid levels on abdominal x-ray. What is the most likely diagnosis?**
   a. Femoral hernia
   b. Strangulated inguinal hernia
   c. Obturator hernia
   d. Incarcinated inguinal hernia

5. **A 46 year old male came to the ER with severe abdominal pain and mass, while examining the patient you noticed and appendicectomy scar. What is the most likely diagnosis?**
   a. Paraumbilical hernia
   b. Inguinal hernia
   c. Incisional hernia
   d. Spigelian hernia

6. **29 year old women came to the ER complaing of groin pain when she excersise with a mass below the inguinal ligmant, what is the most likely diagnosis?**
   a. Femoral hernia
   b. Obturator hernia
   c. Lumbar hernia
   d. Sliding hernia

1. B
2. D
3. C
4. D
5. B
6. A