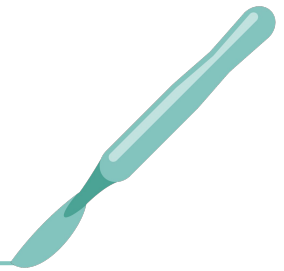


Abdominal wall, Umbilicus and Hernia



Objectives

- The student is expected to describe and explain the different types, surgical anatomy, predisposing factors, clinical features and the complications of the following)
 - Groin hernias (**inguinal** and **femoral**)
 - Other hernias (**umbilical**, paraumbilical, epigastric, divarication, incisional, obturator, Spigelian, perineal and lumbar)
 - Abdominal wall (hematoma, tumours)
 - Umbilicus (fistulae, granuloma, adenoma, omphalitis, secondary deposits, endometrioma, and discoloration)

Colour Index

- Main Text
- Males slides
- Females slides
- Doctor notes
- Textbook
- Important
- ★ Golden notes
- Extra



Tutorial titles

- 01 **Abdominal wall disorders**
 - Hematoma
 - Tumors
- 02 **Groin Hernias**
 - Inguinal (Direct, Indirect)
 - Femoral
- 03 **Other Hernias**
 - Umbilical, paraumbilical, epigastric, divarication, incisional, obturator, Spigelian, perineal and lumber
- 04 **Umbilicus**
 - Fistulae, granuloma, adenoma, omphalitis, secondary deposits, endometrioma, and discoloration

1- Rectus Muscle Disorders

> Rectus sheath Hematoma

Extra Picture



- a painful swelling within the rectus sheath Due to ruptured artery.
- This condition is rare, but may represent an unusual presentation of acute abdominal pain in **the elderly patient**
- Anticoagulant is a major risk factor, History may be accompanied with Excessive physical exertion
- US can be used to confirm the diagnosis

Acute

(in elderly after violent cough, especially in those on steroids)

A-Rupture of inferior epigastric artery:

- presents with tender mass in right or left iliac fossa and with overlying bruise

B- rupture of superior epigastric artery:

- presents with upper abdominal tenderness and a bruise below the costal margin

Norman browse

- presents as non tender upper abdominal mass
- The swelling will be firm to hard, and without a definite edge because it is deep seated.

Chronic

> Desmoid Tumor

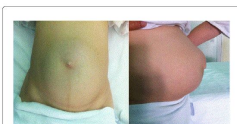


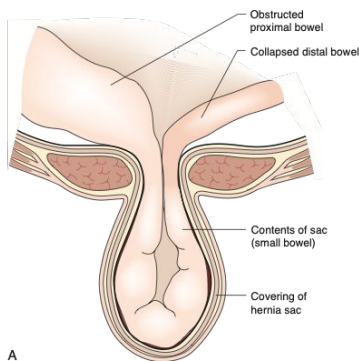
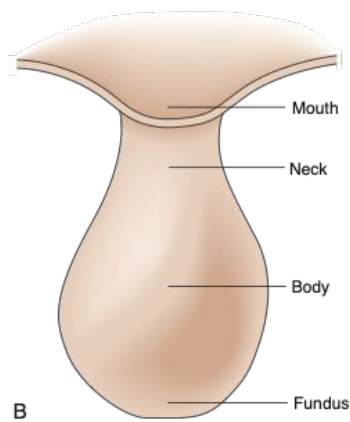
Figure 1: Abdominal mass at physical examination.

- Rare benign tumor. Can progress to be malignant fibrosarcoma
- Thought to arise from fibrous intramuscular septa in the lower rectus abdominis muscle.
- it does not change in size when the abdominal muscles are contracted.
- Associated with Gardner's syndrome.
- Most common in women of child-bearing age

Hernias (In general)

- **Hernia** Derived from Latin word for rupture
- An abnormal protrusion of an organ or tissue through a defect in its surrounding walls
- Hernias can be considered as a disease of collagen metabolism. Collagen I/III ratio is important.
- In summary: weak areas are caused by stretching or surgical incisions in association with a defect in collagen metabolism

Reference Pictures



Hernia Parts

- Hernia **neck** Located at the innermost musculoaponeurotic layer whereas the hernia **sac** is lined by peritoneum and protrudes from the neck
- No consistent relationship between the area of a hernia defect and the size of a hernia sac
 - In physical examination, we don't care how large the "sac" is. We must palpate the hernia and push it centrally to estimate its "defect" size.

Hernia Contents

- A hernia may contain any intra abdominal structure, but most commonly contains omentum and/or small bowel.
- A hernia is an abnormal protrusion of a cavity's contents through a weakness in the wall of the cavity, **but takes with it all the linings of the cavity** "To form its wall"

Terminology

Reducible Hernia

- Irreducible Hernia

Strangulation

- Contents of the hernia can be returned to their normal location

Incarceration

- Irreducible hernia with compromised blood supply "Gangrene"
- Usually due to occluded Vein then complicate to artery

Hernias (In general)



Etiology (Unified theory)

Not part of the objectives

- Traditionally thought of a weakness of the transversalis fascia
- Evolving evidence points to multifactorial evidence
- **(I doubt you will be asked about these theories, but at least understand it)**

Anatomy:

- 20% of males will have a patent processus vaginalis in adulthood (But <50% will develop a hernia)
- Weakness of the posterior Inguinal wall is due to the degeneration of the fibers, muscles, and aponeuroses of the transversus abdominis and internal oblique/
- Collagen framework of the transversalis fasciae appears to be modified in patients with direct hernias

Biochemistry:

- Smooth muscle activity within the tunica vaginalis must undergo atrophy and apoptosis for it to seal; this system is dependent on sympathetic nervous system and androgens
- Chemical mediators which interfere with fibrinogenesis contribute to hernia formation

01

03

Smoking:

- smoking likely globally affects collagen formation/degradation/modification

Collagen:

- Type III collagen is not a sufficient barrier and may dispose a patient herniation, **as opposed to Type I**
- Decrease in Type I or increase in Type III collagen has been linked to herniation

02

04

Enzymatic Pathology

- Increase levels of elastase and metalloproteinases, and decreases levels of metalloproteinase inhibitors are associated with hernia formation

Proteases

- Cellular Mediators
- Collagen quality is affected by the protease-anti-protease balance
- Imbalance of proteases and antiproteases may contribute to collagen synthesis

05

06

Genetics

- Connective tissue disorders, Hypermotility, Congenital hip dislocation, are all associated with hernia formation

Summary

- "Hernia disease" is multifactorial in etiology
 - Final common pathway seems to be the collagen matrix
 - Many details and the exact pathway remain unclear
 - Investigation are ongoing

07

06



Risk groups

- Intraabdominal high pressures from **constipation**, prostatic symptoms, excessive coughing & lifting.
 - However, it has been shown that hernia is no more common in Olympic weightlifter than in general population, suggesting that high pressure is not a major factor causing hernia
 - Many patients will first notice 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**.
 - A recent Swedish report has shown that inguinal hernia is less common in obese patient with hernia risk being negatively related to BMI contrary to widespread belief

Groin Hernias

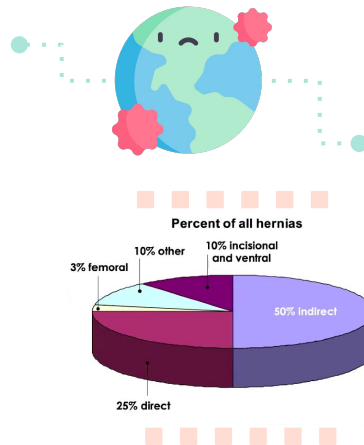


Backgrounds

- **Groin hernias are divided into (Inguinal & Femoral)**
- **“These are important facts you need to remember” you have to consider which type is more common in each gender**
- (Femoral commonly occur in females, Inguinal commonly occur in males “Indirect in children”. Don’t get confused when asked about this part)
 - You can use these gender and age groups as tips if asked to determine the type of hernia in the MCQ
- Indirect inguinal is the most common in both males and females
- Direct hernias are very uncommon in women
- Indirect inguinal and femoral hernias are more common on the right side
 - Attributed to a delay in atrophy of the processus vaginalis following the normal slower descent of the right testis to the scrotum during fetal growth; tamponading effect of the sigmoid colon on the left femoral canal

Inguinal Hernias

- **25M:1F For groin hernias**
- Prevalence of hernias increases with age, as does likelihood of **strangulation**
- Strangulation occurs in 1% to 3% of groin hernias
- 75% of all abdominal wall hernias occur in inguinal region
 - 2/3 are indirect, 1/3 direct



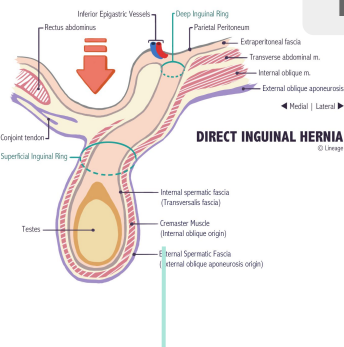
Femoral Hernias

- 5% of all hernias are femoral
- Other hernias represent 20%
- F:M is 10:1 for femoral hernias
- 10% of F and 50% of M who have a femoral hernias either have or will develop an inguinal hernia
- Femoral hernias have the **highest rate** of strangulation (15% to 20%) of all hernias



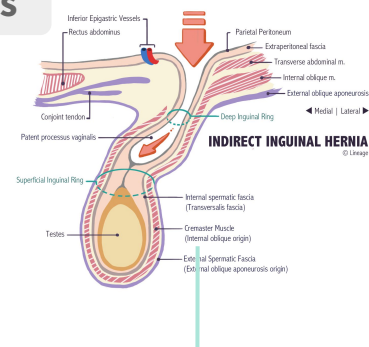
Inguinal Hernia

Extra Pictures



Direct Inguinal

- Herniated part pushes skin directly



Indirect

- Herniated part pushes Inguinal canal contents, which indirectly pushes the underlying skin

2- Groin hernias (Inguinal)



Surgical Anatomy

★ Reference Picture

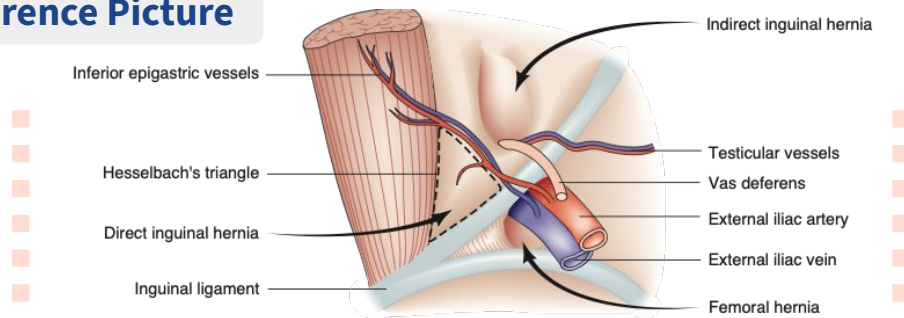


Fig. 11.3 Anatomy of the internal inguinal ring, showing sites of herniation from within.

Abdominal wall

- Formed of (from external to internal):
 - Skin
 - Soft tissue (Scarpa's fascia)
 - External oblique muscle
 - Internal Oblique Muscle
 - Transversus abdominis muscle
 - transversalis fascia

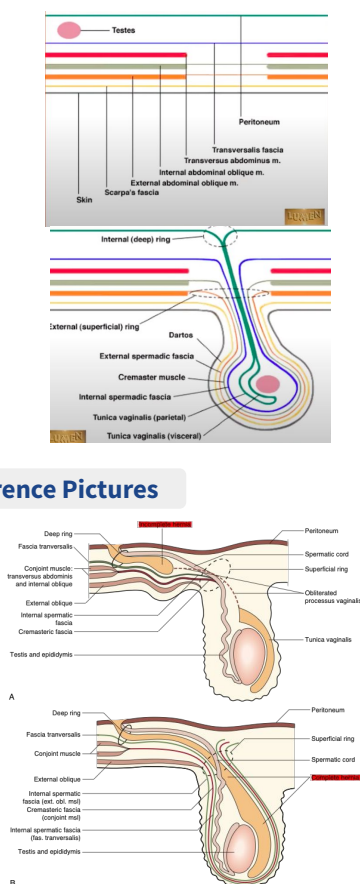
Inguinal Canal

- The canal that contains spermatic cord (males) or round ligament (Females) & Processus Vaginalis
- Have deep (Internal) & Superficial (External) rings
- Passes Above inguinal ligament, lateral to inferior epigastric arteries
- Will be discussed in details in next slide

Testicular descendant

- after descendant
 - Scarpa's gives dartos fascia
 - Transversus doesn't contribute
 - Internal oblique forms the cremaster muscle
 - External oblique forms the external spermatic fascia
 - (in females, the ovaries don't descend as the testicles in males, this is why inguinal hernias are more common in males)

Reference Pictures



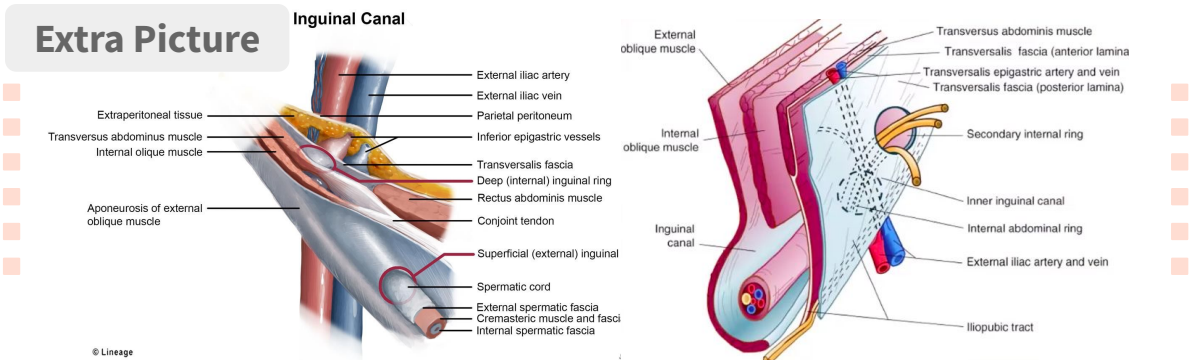
Sequence from Dr.Bisher slides



2- Groin hernias (Inguinal)



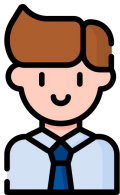
Surgical Anatomy



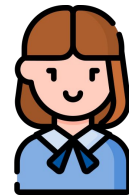
- 4 cm oblique passage, lies just above inguinal ligament
- Bounded by the deep and superficial inguinal rings, and the four walls
 - The internal (**deep**) **inguinal ring** is an opening in the transversalis fascia
 - Bounded medially by inferior **Inferior epigastric artery** **Important landmark to differentiate between direct and indirect hernia**
 - The inguinal canal ends at the external (**superficial**) **inguinal ring**, which is an opening in the aponeurosis of the external oblique muscle



Contents of Inguinal canal



Males:
Rule of three



Females:
Rule of two

- Three layers of fascia
 - **External** spermatic fascia,
 - **Middle** spermatic fascia (Cremasteric)
 - **Internal** spermatic fascia
- Three arteries
 - **Cremasteric** artery,
 - **Testicular** artery.
 - Artery of the **vas deferens**
- Three Nerves
 - **Ilioinguinal**,
 - Genital branch of **genitofemoral**,
 - **Sympathetic** fibers to vas and testes
- Three veins:
 - **Pampmiform** plexus ,
 - **External spermatic** vein,
 - **Deferential** vein
- Three other things

- **Two main things**
 - **Fat pad**
 - **Round ligament**
- **Two vessels**
 - **Artery to round ligament**
 - **Vein of the round ligament**
- **Two nerves**
 - **Ilioinguinal**
 - **Genital branch of genitofemoral**

2- Groin hernias (Inguinal)



Clinical features of inguinal hernias: (Norman Browse)

- Progressive pain and discomfort **at the groin**
- If very painful and tender hernia -> **strangulation**
- **can be painless swelling** in the groin or scrotum
- colicky pain and bowel obstruction

	Indirect hernia	Direct hernia
Prevalence	<ul style="list-style-type: none"> • Most common hernia in all genders. • Most commonly occur in pediatrics 	<ul style="list-style-type: none"> • Most commonly occurs in males (Adults) • Rare in children
Predisposing factors	<ul style="list-style-type: none"> • Persistence of a patent processus vaginalis 	<ul style="list-style-type: none"> • weakness of the abdominal wall (hesselbach's triangle).
Site	<ul style="list-style-type: none"> • above inguinal ligament, and lateral to the inferior epigastric artery. • The defect (Neck) is not palpable, as it is behind the fibres of the external oblique muscle 	<ul style="list-style-type: none"> • above inguinal ligament, and medial to the inferior epigastric artery. • The defect (neck) may be felt in the abdominal wall above the pubic tubercle
Clinical Features	<ul style="list-style-type: none"> • Lump is Clearly visible when patient stands, or asked to cough, and reduces when lying down • Resolve spontaneously in children within 1st year of life 	<ul style="list-style-type: none"> • Lump is Clearly visible when patient stands, or asked to cough, and reduces when lying down • Bilateral hernia is usually direct
Signs	<ul style="list-style-type: none"> • Lump can present either at groin or scrotum • Reduces upwards, then laterally (to pass inguinal ligament) and backwards • Controlled after reduction by pressure at internal inguinal ring 	<ul style="list-style-type: none"> • Does not (hardly ever) go down into the scrotum • Reduces upwards and then straight backwards • Not Controlled after reduction
Complications	<ul style="list-style-type: none"> • Occasionally irreducible, rarely strangulated • testicular infarction is more common than bowel infarction. 	<ul style="list-style-type: none"> • rarely becomes irreducible, obstructs or strangulates.

2- Groin hernias (Inguinal)



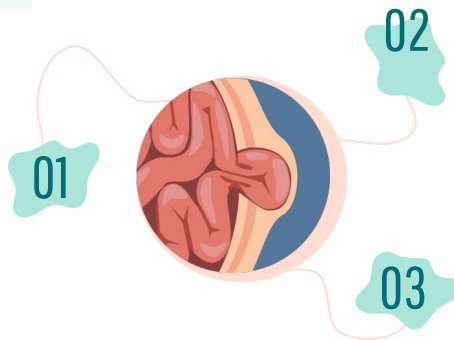
01

Indirect Inguinal Hernia

- The **most common** Hernia
- ★ **Predisposing factors are:** Persistence of a **patent processus vaginalis** which is the primary causative factor in **pediatric population**; in adults, the case is likely multifactorial
- An indirect inguinal hernia enters the internal (deep) inguinal ring and descends **within the coverings of the spermatic cord** so that it can pass into the scrotum, the so-called inguino-scrotal hernia.
- It enters the inguinal canal. So, it will protrude above inguinal ligament, and **lateral to the inferior epigastric artery**, this protrusion may remain in the inguinal region, or extend **by passing above the inguinal ligament** to the scrotum.

Clinical Features

- May remain asymptomatic with some dragging or discomfort in the groin during lifting or straining or at the end of the day
- Relieved by rest
- Develop over months to years.



- In adults it Develops over months to years
- **More common in children**, spontaneous resolution **during the first year of life**
 - once the child begins to walk it's resolution less likely.
- It is unusual for a patient to present with a lump without a pain

Reference Pictures

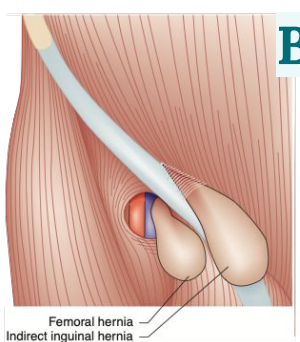
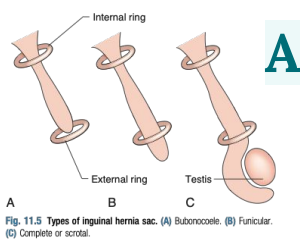


Fig. 11.7 Clinical photograph of bilateral inguinal hernia.

Signs of the hernia

- Figure (A), Picture (A) Bubonocoele:
 - Hernia forms a swelling in the inguinal region (Appearing as a bulge)
- Figure (A), Picture (C) Hernia extended into the scrotum
 - passes above and medial to the pubic tubercle (Landmark of inguinal ligament), in contrast to a femoral hernia, which bulges below and lateral to the tubercle (Figure B)
- Clearly visible when patient **stands**, or asked to **cough**, and reduces when **lying down**
- If you couldn't find a protrusion, look for asymmetry (Bilateral hernia is uncommon, and if present they wouldn't be symmetrical)
- If you also couldn't (Like in obese patients), try to palpate the cough impulse

2- Groin hernias (Inguinal)



02

Direct Inguinal Hernia

Predisposing factors

- Due to **weakness of the abdominal wall** (Hesselbach's triangle).
- precipitated by increases in intra-abdominal pressure
 - Other common causes of hernia
 - Weakness is usually bilateral

Association with indirect hernia

- The neck of the sac of a **direct** inguinal hernia **lies medial** to the inferior epigastric vessels, whereas that of an **indirect hernia lies lateral** to them.
- A combined indirect and direct hernia may occur on the same side (**pantaloon** (بنطالون) or **saddle-bag hernia**), with sacs straddling the inferior epigastric vessels.

Hesselbach's Triangle

Once Again ;)

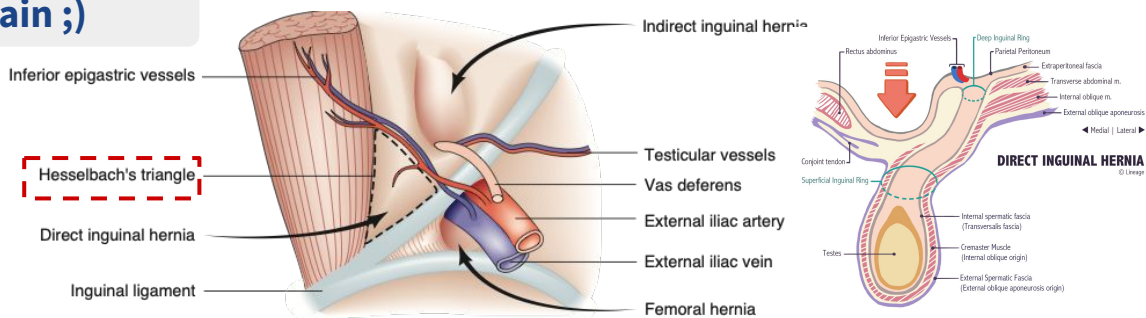


Fig. 11.3 Anatomy of the internal inguinal ring, showing sites of herniation from within.

- A direct hernia is a weakness of the inguinal **floor**.
- Pushes the **transversalis fascia** - which is void of muscle- to protrude.
- It lies between **Inferior epigastric vessels** (Superolateral), **Lateral border of rectus abdominis muscle** (Medial) and **inguinal ligament** (Inferolateral)
 - These boundaries mark the area known as **Hesselbach's triangle**.

Clinical Feature

01

- The hernia forms a bulge in the medial side of inguinal canal.
- **reduced by backward pressure**, and the edges of the defect may then be palpable.

02

- it is often difficult to distinguish between the direct and indirect hernias
- “deep ring occlusion test” may aid in differentiating, but it is unreliable test. Often the final differentiation made on the operating table.
- 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 (Direct hernias never extend to scrotum)

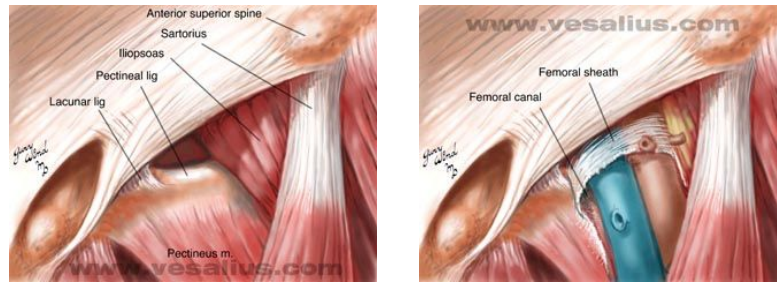
03

- The sac has a **wide neck**, so that the hernia **rarely** becomes irreducible, obstructs or strangulates.

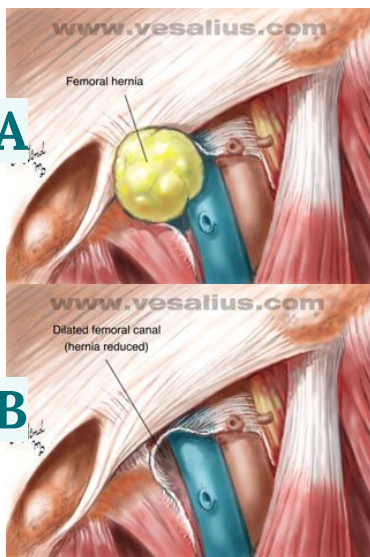
2- Groin hernias (Femoral)



Surgical Anatomy of femoral hernia



- What is in the femoral **sheath** ?
 - surrounds the femoral vessels forming the femoral sheath.
 - Femoral vein Medially, and Femoral artery laterally
 - Femoral nerve is outside the lateral sheath
- What is in the femoral **canal** ?
 - The small space medial to the vein within the femoral sheath is the femoral canal through which **lymphatics** pass **from the thigh into the abdomen**.



Femoral Hernia

- Picture (A): This is a bowel passing through the femoral canal forming femoral hernia.
- Picture (B): And this is when the hernia reduced “void of bowel”.
- As the hernia enlarges, it passes through the saphenous opening of the thigh and then turns upwards to lie in front of the inguinal ligament (**Forms J-shaped course**).

Femoral Canal Boundaries

- **Anterior:** Inguinal (Poupart’s) ligament
- **Posterior:** Pectineal (Cooper’s) Ligament
- **Lateral:** Femoral vein
- **Medial:** Edge of the lacunar (Gimbernat’s) ligament
 - In 10-20% of cases, the aberrant obturator artery passes adjacent to the lacunar ligament
- Want more details about these ligaments? [Click here](#)

Reference Picture

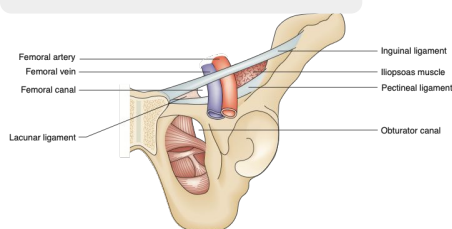
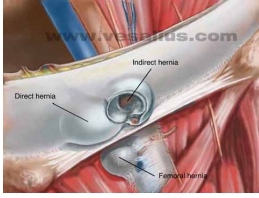


Fig. 11.12 Anatomy of the femoral ring.

2- Groin hernias (Femoral)



Surgical Anatomy of femoral hernia



- Look at the picture
 - What is the easiest way to locate pubic tubercle? (to locate inguinal ligament)
 - By tracing the tendon of adductor longus upward
 - What's the simplest anatomical difference between direct, indirect and femoral hernias?

Inguinal Ligament

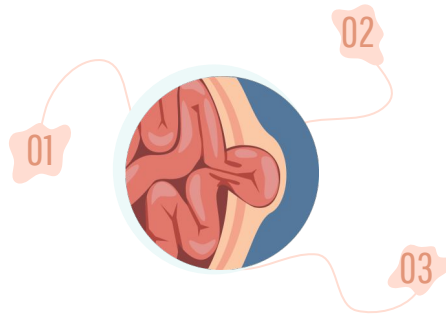
- Above: Inguinal hernia (Direct and indirect)
- Below: Femoral hernia

Another ?

- Another difference is the relation to Inferior epigastric vessels
 - Medial to the vessels = Direct
 - Lateral to the vessels = Indirect

Clinical Features of femoral hernia

- **Predisposing factors** are similar to the direct hernia
- Femoral hernias are often small (Because it has many coverings) and easy to miss on clinical examination,
- **They are prone to obstruction and strangulation** (Because it has a small neck)
 - ~40% presents this way



- Patient presents either by a lump in the upper medial thigh
- Or by exercise induced pain
- is frequently difficult or **impossible to reduce** because of its J-shaped course and the tight neck of the sac.
- There is cough impulse

Differentials (Extra):

- Inguinal lymph node (No cough impulse, irreducible)
- Saphenous varix: (positive cough impulse or 'saphenous thrill', which is prominent on standing but disappears on elevating the leg)
- Ectopic testis, psoas abscess, hydrocele of spermatic cord
 - Needle aspiration is not advisable for any such swelling (only after clearly defining diagnosis or after removal of the mass)



2- Groin hernias (Treatment)

Sportsman hernia

- **Groin injury leading to chronic groin pain** is often referred to as the sportsman's hernia
- Mostly, there is no clinical signs (No lumps), despite the pain symptoms.
- If you perform dynamic U/S (rest and straining), you may find "impalpable hernia" in some patients which causes the pain, and you will find nothing in others.
- Treatment is controversial, some can be treated as hernia, and other will be treated with NSAIDs.
- A deficiency of the posterior inguinal wall is the most common operative finding in patients with chronic groin pain.
- The differential diagnosis includes
 - musculotendinous injuries, urological pathology, or bone and joint disease.
- MRI is gold standard for diagnosis

Treatment of "uncomplicated" inguinal hernia

Management is **not part of our objectives**, but some doctors mentioned it.

01

- The identification of an inguinal hernia in any child is nearly always an indication to operate.
- **Strangulated surgery must undergo emergent surgery!**



02

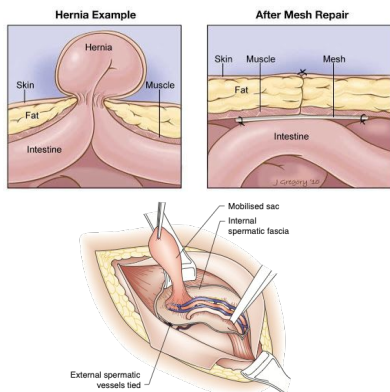
- Adults with a symptomatic inguinal hernia should be offered surgery.
 - **Children usually need observation only, depending on the type of hernia**
 - Elective surgery (Open or laparoscopic, Mesh network or without mesh)
- These are the **trusses**, they apply pressure to the hernia and reduce it backward, to keep the protruding tissue in place and relieve discomfort.
 - The upper picture is unilateral truss
 - The lower picture is bilateral truss
 - Trusses can be used to provide symptomatic relief of hernias
- Hernia control (partial or total symptom relief) has been reported in 31-70% of patients with trusses,
 - Trusses should be used only for low-risk, completely reducible groin inguinal, **not femoral hernias**
 - Trusses should be preserved and offered to those in whom the surgical option is contraindicated, like those who cannot tolerate anaesthesia (severe CVD or respiratory disease).

03

- Controlling inguinal hernias by the use of a **truss (non-surgical option)** is unfavorable, as this is uncomfortable and causes **pressure-induced weakening of the abdominal wall muscles & testicular atrophy.**

2- Groin hernias (Treatment)

Surgical repair of uncomplicated hernia



- The first step in the open approach is to open the inguinal canal, free the hernial sac from the spermatic cord, reduce its contents, if any (like bowel or omentum), and excise it after **transfixing** and ligating its neck.
 - If the posterior wall is weak, then you need to add a mesh network to strengthen it (this is common in children and elderly)
 - In adults and adolescents, suture repair “without a mesh” is preferred, as the mesh may cause fibrosis and infertility

Reference Picture

- Repair Types (No need to know the details of these procedures and how they are done. But at least have an idea about the different names)

- Iliopubic Tract
- Bassini
- Shouldice
- Cooper Ligament (McVay)
- **Lichtenstein (most common)**
- Plug and Patch
- Preperitoneal
- Laparoscopic

Reference Pictures

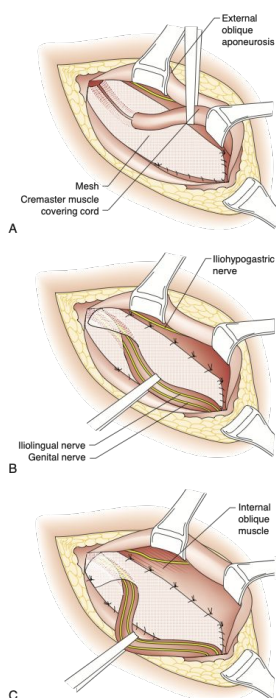


Fig. 11.10 Lichtenstein open mesh repair, right-sided hernia. (A) The lower border of the mesh is secured in place with a continuous suture to the inguinal ligament. (B) Interrupted sutures are placed between the upper edge of the mesh and the underlying aponeurosis. (C) A suture is placed laterally to close the two tails around the internal ring.

Lichtenstein Repair

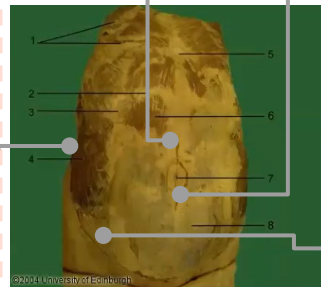
- (A) The lower border of the mesh is secured in place with a continuous suture to the inguinal ligament.
- (B) Interrupted sutures are placed between the upper edge of the mesh and the underlying aponeurosis.
- (C) A suture is placed laterally to close the two tails around the internal ring.
- Lichtenstein repair used only for inguinal hernias
- benefit of **laparoscopic surgery** is that the mesh is larger than that used at open surgery, and covers the direct, indirect and femoral hernial orifices. (**Preferred in bilateral or recurrent hernia**)
- McVay (Cooper ligament) repair: This is the only anterior tissue repair approach that treats all three groin hernias (Indirect, Direct, and femoral)

3- Other Hernias (Ventral Hernias)



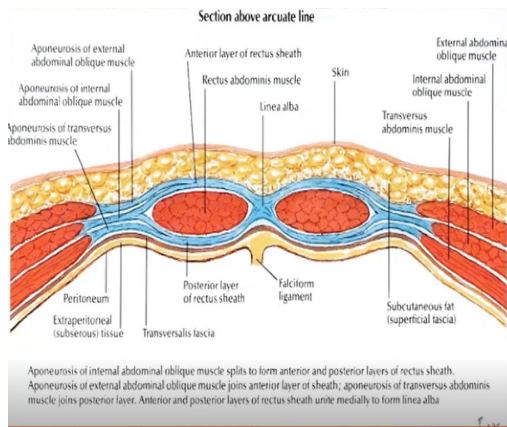
Surgical anatomy of Anterior abdominal wall

- Single **Anterior** muscle:
 - Rectus abdominis
- **Linea Alba** separates left RA from right RA



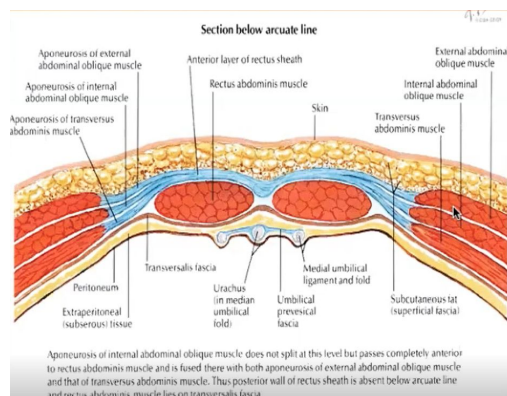
- 3 **Lateral** muscles
 - External oblique
 - Internal oblique
 - Transversus Abdominis

- In the middle of the abdomen we have the umbilicus
 - Arcuate line: 3-6cm below the umbilicus
- Linea semilunar lies between anterior muscle and lateral muscles



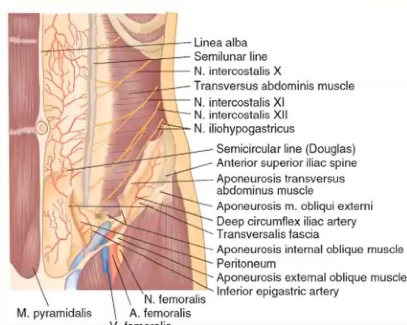
Above arcuate line

- Posterior rectus sheath:
 - present above, **absent below arcuate line. (most important fact)**
- Anterior rectus sheath:
 - Formed by **External oblique aponeurosis** always
- **Internal Oblique muscle** aponeurosis contributes to **both** the anterior and posterior rectus sheaths
- **Transversus abdominis** aponeurosis passes posterior to the rectus muscle to form the **posterior rectus sheath**.



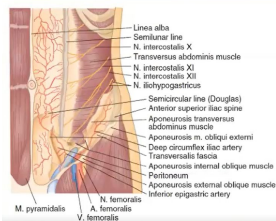
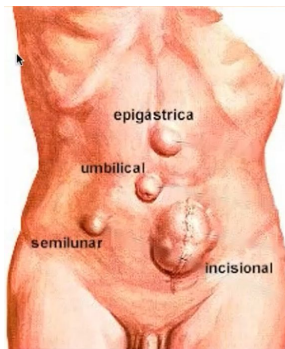
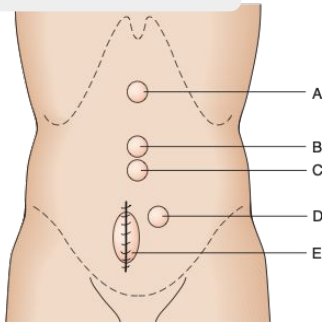
Below arcuate line

- Internal oblique and transversus abdominis aponeurosis:
 - anterior to the rectus muscle.
- Rectus abdominis muscles are nearly fused with the transversalis fascia.
- This distinction is important in the laparoscopic approach to inguinal hernia repair.



3- Other Hernias (Ventral Hernias)

Reference Picture



What are ventral hernias ?

- Ventral hernias occur through areas of weakness in the anterior abdominal wall
- A) through the linea alba (**epigastric** hernia)
- B&C) Through the umbilicus (**umbilical** "B" and **paraumbilical** "C" hernia)
- D) Through the lateral border of the rectus sheath (**Spigelian** hernia)
- E) Through the scar tissue of surgical incisions (**incisional** hernia)
 - scars from laparoscopic surgery, are called **port-site hernia**.

Innervation and blood supply of anterior abdomen

- You are supposed to remember these from your anatomy lecture

Epigastric hernia



Predisposing Factors

- Common in thin individuals
- Especially in children and associated with divarication of Rectus abdominis
- Common in individuals with a single aponeurotic



Clinical Features

- It is a hernia of linea alba, above umbilicus and below xiphoid process
- Patient complain of a local discomfort at that site Especially during ingestion
- Rarely visible on inspection, but is palpable as a firm midline lump.



Complications

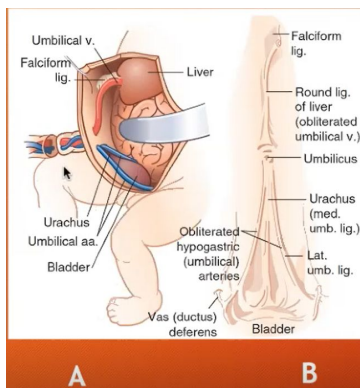
- The herniation may consist of extraperitoneal fat or may be a protrusion of peritoneum containing omentum.

3- Other Hernias (Ventral Hernias)

Umbilical & Paraumbilical hernias



Picture (A), in the fetus



- In the fetus, the umbilical vein radiates **superiorly** and
- the **two umbilical arteries** and **urachus** inferiorly radiate from the umbilicus

Picture (B), After birth

- **Umbilical vein** obliterated superiorly to become the round ligament of the liver.
- **Urachus** Obliterated to form **Median** umbilical ligaments inferiorly
- **Umbilical Arteries** obliterated to form **Lateral** umbilical ligament (called also the medial umbilical ligaments.)



Umbilical Hernia



Paraumbilical hernia

- Called also (**Infantile** umbilical hernia)

Predisposing Factors

- **Age group:** Occur in infants
- Protrude **through** Umbilical ring
- it is **caused** by a weakness in the adhesion between the scarred remnants of the umbilical cord and umbilical ring

Clinical Features

- These small hernias occur in the superior margin of the umbilical ring
- Easily **reducible** and become prominent **when the infant cries**
- Most of these hernias resolve within the first 24 months of life (Strangulation is rare)
- **Over 95% of these hernias close spontaneously in the first 3 years..** Persistence after the 3rd birthday is an indication for elective repair.



- Called Also (**Acquired** umbilical Hernia)

Predisposing Factors

- **Age group:** occur in Adults
 - (Obese Multiparous women, Ascites)
- Protrusion is part of linea alba (Just above or below the Umbilicus)
 - Above is more common
- Caused by gradual weakening of tissues around the umbilicus
 - This weakening can be caused by excessive stretching.

Clinical Features

- **Do not spontaneously resolve** but gradually increase in size
- The dense fibrous ring at the neck of this hernia makes strangulation of herniated intestine or omentum an important **complication**



- Both these hernias are **covered by skin**, while omphalocele is not.
- Omphalocele is a type of congenital hernia in which the contents of the abdomen are herniated through the umbilicus and covered only with peritoneum.

3- Other Hernias (Ventral Hernias)

Incisional Hernias



Predisposing Factors

1. Poor surgical technique.
 2. wound infection
 3. Obesity
- Especially Elderly, diabetic patients, Immunocompromised patients or patients on steroids (All have poor healing)



Fig. 11.15 A midline incisional hernia.



Complications

- Strangulation is rare, but surgical repair is usually advised.

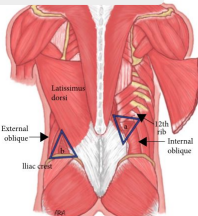
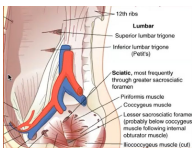


Clinical Features

- Hernia through an incision site
- >50% of incisional hernias occur in **the first 5 years** after the original surgery.
- **Midline vertical incisions** are most often affected.
- The Bulge is better seen when patient contract his abdomen muscles **“Coughing or raising from the bed”**

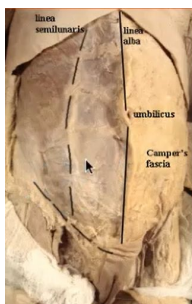
Lumbar Hernia (Rare)

Extra Picture

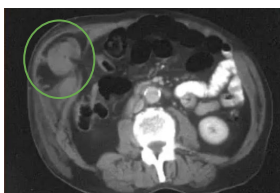


- **Grynfeltt's**: through superior lumbar triangle:
 - 12th rib, paraspinous muscles, and internal oblique.
 - More common
- **Petit's**: through inferior lumbar triangle
 - iliac crest, latissimus dorsi muscle, and external oblique
- Both may occur primary due to increased intra-abdominal pressure, or secondary complication to spinal surgery

Spigelian (Semilunar) Hernia (Rare)



This is the hernia



- Hernia through the Linea semilunaris between rectus abdominis and lateral abd. Wall muscles
- **This area is** Lack of posterior rectus fascia -> inherent weakness.
- Nearly all occur **at** or below the arcuate line
 - **The conjunction of arcuate line and linea semilunaris is the weakest area.**
- often interparietal - hernia sac dissects posterior to the external oblique aponeurosis. (at the outer border of the rectus abdominis muscle)
- Treatment is surgical, as the hernia is **liable to strangulate**

3- Other Hernias (Ventral Hernias)

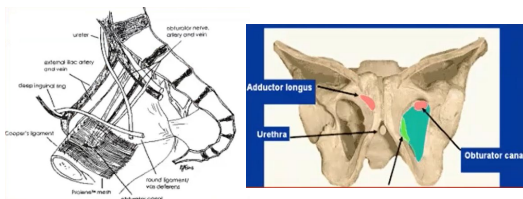
Divarication Hernias

- An **acquired** condition in which the rectus muscles are separated by an abnormal distance (>2cm) along their length, but with no fascial defect
 - Progressive thinning of the linea alba
- It is most commonly found in middle-aged and older men **with central obesity**, or in women who have carried a large fetus or twins to term
- It can also occur in infants, but mostly improve spontaneously

- Called also (**Rectus diastasis**)
- It is considered as Rectus muscle disease, it is **not true hernia**
- Divarication is best observed with the patient lying supine. If asked to raise the head and legs together, the recti are fully tensed and the abdominal pressure rises, producing a visible swelling of that weak area.

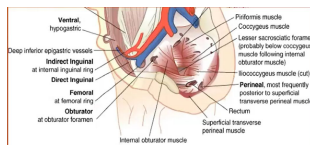
- It is an important risk factor for developing ventral hernias
- It is not true hernia, no risk of strangulation.

Obturator Hernia (Rare)



- Through the obturator canal
- Patients may present with knee pain owing to pressure on the obturator nerve; however, the diagnosis is frequently made only when the hernia has strangulated and is discovered at laparotomy.

Perineal & Sciatic Hernia



- hernia sac protrudes through the pelvic diaphragm
- Rare but mostly in older, multiparous women. (or iatrogenic in those who underwent rectal surgery)
- Sciatic Hernia:** through greater sciatic foramen

Special Hernias

Littre's hernia

- hernia content include Meckel's diverticulum

Petersen hernia

- Seen after bariatric gastric bypass

Petit's, Gyrnfeltt's & Pantaloon hernias

- Peter's & Gyrnfeltt's had Mentioned Earlier in Lumbar hernia
- Pantaloon: had mentioned in Inguinal hernias

Richter hernia



- Incarcerated/strangulated hernia involving **one sidewall of the bowel only** (bowel wall only)



Amyand's hernia

- Hernia sac containing a ruptured appendix

Sliding hernia

- It is a sort of **chronic** groin hernias in which the protruded organ is "fused" with the sac wall

Maydl's Hernia

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



Hernia Complications



Irreducibility / Incarceration

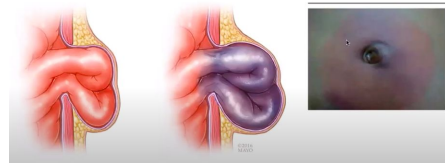
- when the intraperitoneal organs can move freely in and out of the hernia
- An irreducible hernia is one in which the contents cannot be manipulated back into the abdominal cavity.
- This may be due to narrowing of the neck of the sac by fibrosis, distension of the contained bowel, or adhesions to the walls of the sac.
- Irreducible hernia isn't an indication for emergent surgical intervention

Obstruction

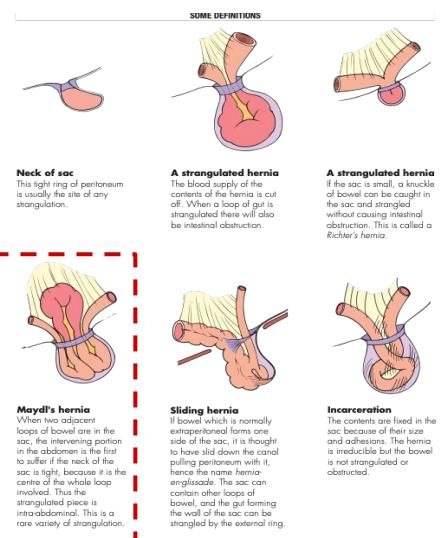
- Obstruction of the intestinal lumen (Precede the strangulation)
- There is no Ischemia
- Colicky abdominal pain, vomiting, constipation and distension signal the **need for urgent operation** before strangulation supervenes.
- Obstruction is an indication of emergent surgery

Strangulation

- Occur after obstruction
- The vessels supplying the bowel within a hernia may be compressed by the neck of the sac or by the constricting ring through which the hernia passes.
- The contents initially become swollen as a result of **venous congestion (Veins occlude first)** & Exudation
- The arterial supply is subsequently compromised and **gangrene** follows
- The skin overlying the hernia is red, warm to touch and tender, **cough impulse is lost**, and there may be increasing evidence of circulatory collapse and sepsis.
- **In Richter's hernia, there may be strangulation w/o obstruction signs (Make it harder to diagnosis clinically, this non-diagnosed strangulation increases the mortality risk in these patients)**
- In **Maydl's hernia** (Hernia-in-W shape) Postural or manual reduction of the hernia is **contraindicated** as it may result in non-viable bowel being missed (**Look at the picture below**)

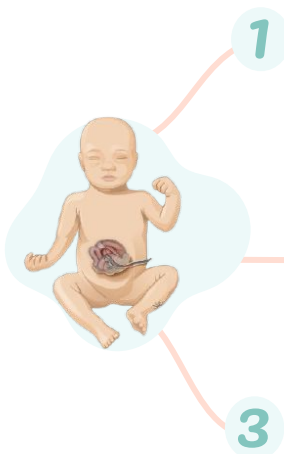


- What is the main clinical feature to differentiate between Obstructed and strangulation hernia ?
 - The color of the lump (strangulated hernia will be darkened, reddish or bluish. Pain may present in both.
- Complete and incomplete hernia (occur in indirect hernia)
 - Complete extend to scrotum while incomplete remain in the inguinal canal
- If the lump **isn't** associated with cough impulse, you have to think of other differentials depending of the site of that hernia (Lymph nodes, mass, etc)



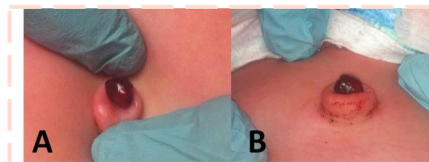
- The **commonest** abnormality of the umbilicus is an umbilical hernia, described earlier.
- The **important congenital abnormalities** of the umbilicus are exomphalos and fistula, and the common acquired conditions (apart from herniae) are inflammation and invasion by tumour.

Exomphalos (Omphalocele)



- The intestines protrude through a central defect of all layers of the abdominal wall.
- Void of skin (this is the difference from Umbilical hernia)
- Their only covering is a thin, transparent membrane formed from the remnant of the coverings of the yolk sac
- If this membrane ruptures, death from peritonitis may follow.
- Present at birth
- Represents an intrauterine **failure of the intestines to return to the abdomen**
 - combined with a failure of the two sides of the laterally developing abdominal wall to unite to cover the embryonic defect

Umbilical Granuloma



- It is a mass that occur in the umbilical ring, as result of inflammation, Granuloma and excessive granulation tissue
- The baby presents with an inflated umbilicus overlaid by a bright-red, moist, friable, sometimes hemispherical mass of **bleeding** granulation tissue
- (You need to send a specimen for pathology to confirm it is a granulation tissue).
- Not present at birth. It occur gradually after the umbilical cord has been tied
- Usually regress spontaneously in the first month, if not the possibility of a patent vitello-intestinal duct or an umbilical adenoma should be considered.

Umbilical Fistula

- Four structures pass through the umbilicus during fetal growth: the umbilical vein, the umbilical arteries, **the vitello-intestinal duct and the urachus**. If either of the last two tubes fails to close properly, there will be an intestinal or a urinary fistula.

Norman's Pictures

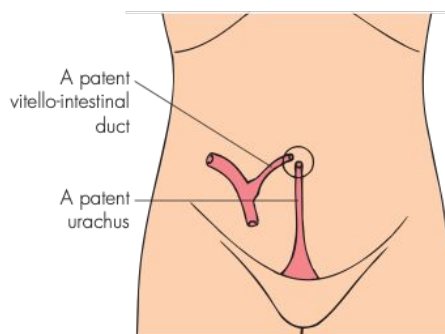
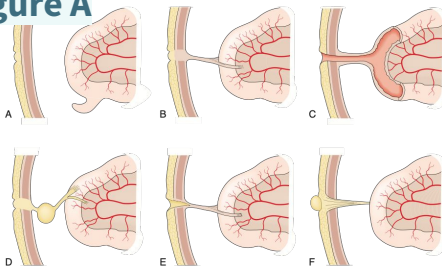


Figure A

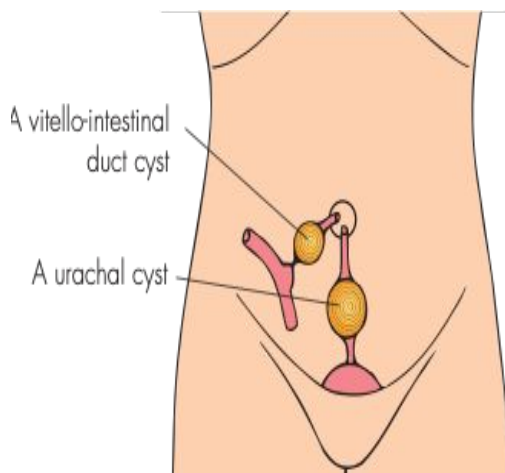


Patent Vitello-intestinal tract

- The vitello-intestinal duct runs in intrauterine life from the apex of the midgut loop to the yolk sac. It is normally obliterated **long** before birth
- If not, it may persist as meckel's diverticulum, or rarely develop into another complication (Figure A)
 - (A) A Meckel's diverticulum.
 - (B) A fibrous cord to the ileum.
 - (C) An umbilical intestinal fistula.
 - (D) An enterocystoma.
 - (E) An umbilical sinus
 - (F) An enteroteratoma.
- Can Present either as **a complicated Intestinal fistula in which food leak from the umbilicus**, or resembles umbilical granuloma

Patent Urachus

- A patent urachus can become a track through which urine can leak through umbilicus
- Rare in children, more common in adults with chronic retention
- The patient complains of a watery discharge from the umbilicus. (this discharge usually caused by umbilical infection, bladder fistula in which urine leak through the umbilicus is a complication)



Duct cyst

- Both these tracts may partially close, leaving a patent segment that becomes a cyst.
- **Vitello intestinal tract leaves a small mobile cyst**
- **Urachus tract cyst is immobile and large situated below the umbilicus**

> Umbilical Adenoma

- The mother complains that the baby has a lump (Raspberry like) at the umbilicus and a mucous discharge.
- Pathology specimen for confirmation
- An umbilical adenoma is a patch of intestinal epithelium left behind when the vitello-intestinal duct closes.

> Omphalitis



- Infection of the umbilicus (Dermatitis)
- **Common in adults**
- Risk factors include poor hygiene and sunken umbilicus caused by obesity
- The commonest cause of umbilical discharge. although, you need to exclude other causes.
- True omphalitis is infection of the stump of the umbilical cord **following inadequate postnatal care and cleanliness.**

The causes of a discharge from the umbilicus

- The patient complains of umbilical discharge, pain and soreness.
- On examination, the skin within and around the umbilicus is red and tender, and exuding a seropurulent discharge with a characteristic foul smell.

- Congenital
 - Intestinal fistula
 - Patent urachus
 - Umbilical adenoma
- Acquired
 - Umbilical granuloma
 - Dermatitis (intertrigo)
 - Ompholith (umbilical concretion)
 - Fistula (intestinal)
 - Secondary carcinoma
 - Endometriosis

> Secondary deposits

01 Ompholith (Umbilical stones)

- A stone form from accumulation of sebum with broken hair (or clothes fluff) and remain as a lump.
- **Risk factor is poor hygiene** “especially in those with deep and narrow umbilicus i.e obese”
- Patient present with pain, or as umbilical infection.

Sister Joseph's nodules 02

- These are A firm or hard nodule bulging into the umbilicus, underneath the skin or eroding through it, present in malignant cancer
- Primary malignant tumors are rare. Nearly all umbilical malignant tumors are metastatic through lymphatics from intra-abdominal cancer
- patient who is losing weight and looks unwell must attract your suspicion

Endometrioma

- If in a female patient, the umbilicus enlarges, becomes painful and discharges blood during menstruation, it may contain a patch of ectopic endometrial tissue.

Discoloration of the umbilicus

01

Blue Tinge

- around the umbilicus, caused by dilated, tortuous, sometimes visible veins, is called a caput medusae

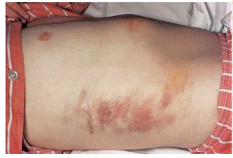


(Cullen's sign)

02

Yellow-blue bruising

- Due to digested subcutaneous tissues following an attack of severe acute pancreatitis (E.g. past history of gallstones)
- occur after few days of the acute attack.
- around the umbilicus (**Cullen's sign**) = tracked by falciform ligament to the umbilicus
- and in the flank (**Grey Turner's sign**) = tracked by retroperitoneal space



(Grey Turner's sign)

03

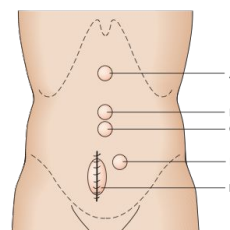
Bruising

- can also be associated with intra-abdominal bleeding, particularly when it is extraperitoneal.
- Causes include ruptured ectopic pregnancy and accidental peri-uterine bleeding in pregnancy.



imp: examples of cases from the Dr

- you have 55 y.o male came with groin swelling that he had since the last year, on and off. What's your best diagnostic tool?
 - Most hernias are diagnosed clinically, You need to check reducibility and cough impulse to check the complications.
 - If the diagnosis was hard (As in sportsman's hernia, pain w/o a visible mass) you can use MRI or CT
- pt came with nausea, vomiting and abdominal distension, what's the Dx? "they may add picture"
 - Depending on the picture :) but generally abdominal distension is caused by intestinal **obstruction**, if the hernia was red or blue colored then it is **strangulation**
- they may show picture with A B C label of bowel ischemia and ask you how you are gonna treat it? which type of hernia caused this?
 - I suppose the picture will come like this



Summary

Recall

Q1: Why should hernias be repaired?

Answer: To avoid complications of incarceration/strangulation, bowel necrosis, SBO, pain

Q2: What is more dangerous: a small or large hernia defect?

Answer: Small defect is more dangerous because a tight defect is more likely to strangulate if incarcerated

Q3: What are the boundaries of Hesselbach's triangle?

Answer: 1. Inferior epigastric vessels 2. Inguinal ligament (Poupart's) 3. Lateral border of the rectus sheath Floor consists of internal oblique and the transversus abdominis muscle

Q4: What is the differential diagnosis for a mass in a healed C-section incision?

Answer: Hernia, ENDOMETRIOMA

Q5: Direct Inguinal Hernia

-**What is it?** Hernia within the floor of Hesselbach's triangle, that is, the hernia sac does not traverse the internal ring (Think: directly through the abdominal wall)

-**What is the cause?** Acquired defect from mechanical breakdown over the years

-**What is the incidence?** ≈1% of all men; frequency increases with advanced age

-**What nerve runs with the spermatic cord in the inguinal canal?** Ilioinguinal nerve

-**What happens if you cut the ilioinguinal nerve?** Numbness of inner thigh or lateral scrotum; usually goes away in 6 months

Q6: Indirect Inguinal hernia

What is it? Hernia through the internal ring of the inguinal canal, traveling down toward the external ring; it may enter the scrotum upon exiting the external ring (i.e., if complete); think of the hernia sac traveling indirectly through the abdominal wall from the internal ring to the external ring

What is the cause? Patent processus vaginalis (i.e., congenital)

What is the incidence? ≈5% of all men; most common hernia in both men and women

What is the risk of strangulation? Higher with indirect than direct inguinal hernia, but highest in femoral hernias

Q7: What is the hernia sac made of?

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. Femoral vein laterally 4. Lacunar ligament medially

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

Q8: Femoral hernia

Answer: Small defect is more dangerous because a tight defect is more likely to strangulate if incarcerated

Q9: What are the boundaries of Hesselbach's triangle?

Answer: 1. Inferior epigastric vessels 2. Inguinal ligament (Poupart's) 3. Lateral border of the rectus sheath Floor consists of internal oblique and the transversus abdominis muscle

Q10: Define the following terms:

Cullen's sign Bluish discoloration of the periumbilical area from retroperitoneal hemorrhage tracking around to the anterior abdominal wall through fascial planes

Grey Turner's sign Ecchymosis or discoloration of the flank in patients with retroperitoneal hemorrhage from dissecting blood from the retroperitoneum (Think: Grey TURNer = TURN side to side = flank [side] hematoma)

Q11: Omphalocele

What is it? Defect of abdominal wall at umbilical ring; sac covers extruded viscera

How is it diagnosed prenatally? May be seen on fetal U/S after 13 weeks' gestation, with elevated maternal AF

How is the diagnosis made? Prenatal U/S

What are the possible complications? Malrotation of the gut, anomalies

Of what "pentalogy" (Associated abnormalities) is omphalocele a part? Pentalogy of Cantrell

What is the pentalogy of Cantrell? "D COPS": Diaphragmatic defect (hernia) Cardiac abnormality Omphalocele Pericardium malformation/absence Sternal cleft

Quiz

MCQ

Q1: which of the following is a common type of hernia that occurs in children

- A) incisional hernia
- B) direct hernia
- C) femoral hernia
- D) indirect hernia

Q2: which of the following is most liable to strangulation?

- A) incisional hernia
- B) direct hernia
- C) femoral hernia
- D) indirect hernia

Q3: what are the boundaries of Hesselbach's triangle?

- A) inferior epigastric artery, lateral border of rectus abdominis, inguinal ligament
- B) inferior epigastric artery, medial border of rectus abdominis, inguinal ligament
- C) superior epigastric artery, lateral border of rectus abdominis, inguinal ligament
- D) superior epigastric artery, medial border of rectus abdominis, inguinal ligament

Q4: what is the sign shown in the picture?

- A) Cullen's
- B) Grey Turner's
- C) sister Joseph
- D) castell



Q5: Patient came with apparent mass when he stands and it disappears with lying down, what is the diagnosis?

- A) femoral hernia
- B) inguinal hernia
- C) communicable hydrocele
- D) non communicable hydrocele

Q6: A 58-year-old man presents with a bulge in his right groin associated with mild discomfort. On examination the bulge is easily reducible and does not descend into the scrotum. Which of the following changes is most concerning for possible strangulation requiring emergent repair of the hernia?

- A) increase in the size of the hernia
- B) descent of the hernia to the scrotum
- C) appearance of a new hernia in the left groin
- D) worsening pain over the hernia during walking
- E) inability to reduce the hernia

Answers

[Click here for explanation](#)

Q1	D	Q4	A
Q2	C	Q5	B
Q3	A	Q6	E

Extra Questions

Good Luck!



Team leaders:

Nouf Alshammari

Naif Alsulais

Haneen Somily

Mohammed alshoieer

This lecture was done by:

- Mohammed Alshoieer
- Hashem Bassam



Note taker



Reviewer

[Feedback](#)