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Clinical Correlation: Abdominal Wall Hernias



Source: Museu d'Arqueologia de Catalunya

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Hernia: The protrusion of tissue through a defect in fascial and/or muscular layer(s) that normally contain it.

- The *sine qua non* of a hernia is a **bulge**.
- *16th century illustration of femoral hernia*



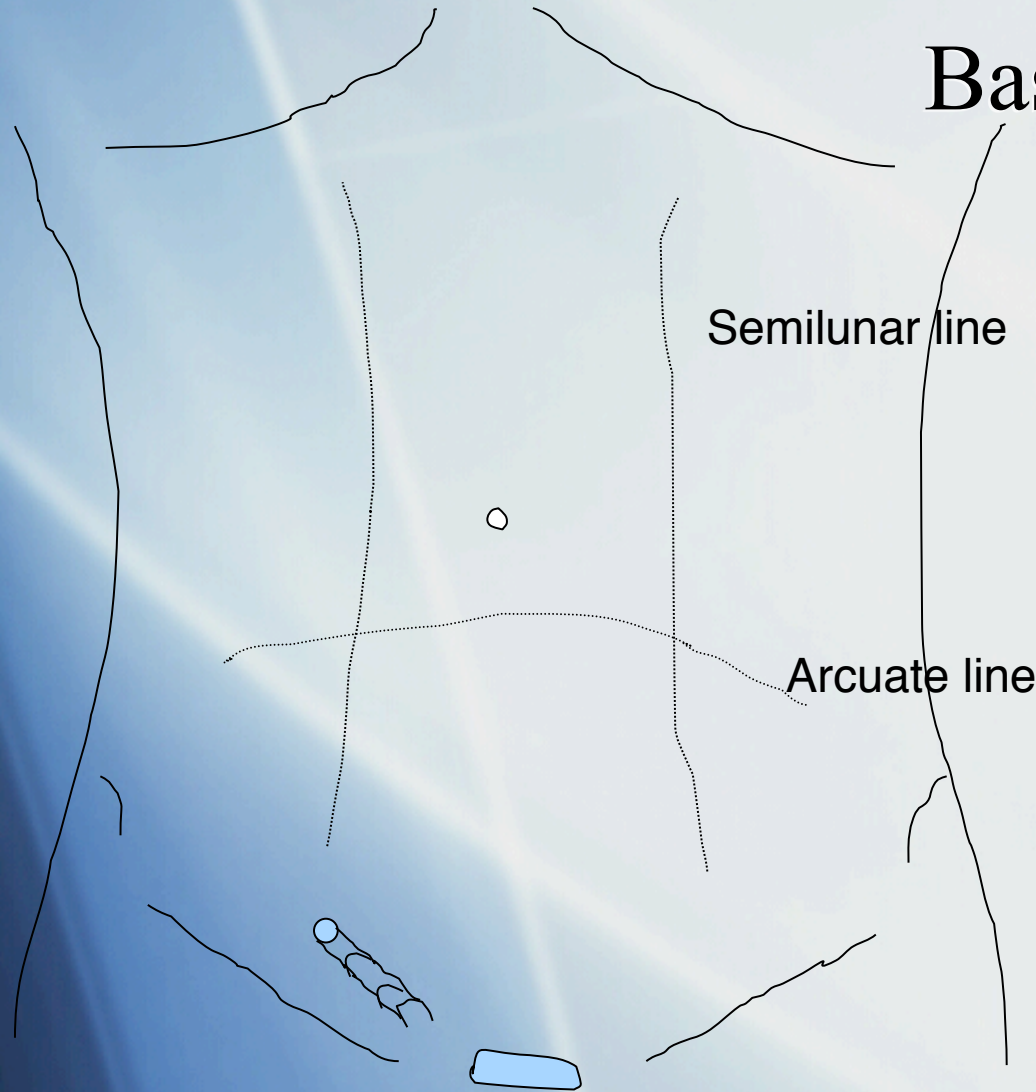
Source: Undetermined

Types of abdominal wall hernia	Location	Congenital	Acquired
Epigastric	Upper midline		*
Umbilical	Umbilicus	*	?
Inguinal/femoral	Groin	*	*
Incisional	Anywhere		*
Lumbar	Petit's Δ		*
Interparietal	Lateral hypogastric		*
Obturator	Obturator foramen		*
Spigelian	Arcuate x semilunar lines	?	?
Traumatic	Anywhere		*
Diastasis	Upper midline	Not a hernia	Not a hernia

Why Do Hernias Occur?

1. There is a congenital developmental defect
 - ⊙ Failure of fascial opening to close (e.g., umbilical)
 - ⊙ Failure of process to obliterate itself (e.g., processus vaginalis)
2. There is an acquired weakness
 - ⊙ Deterioration/thinning of fascia with age
 - ⊙ Loss of tissue (injury, infection, poor wound healing, etc.)

Basic Anatomy

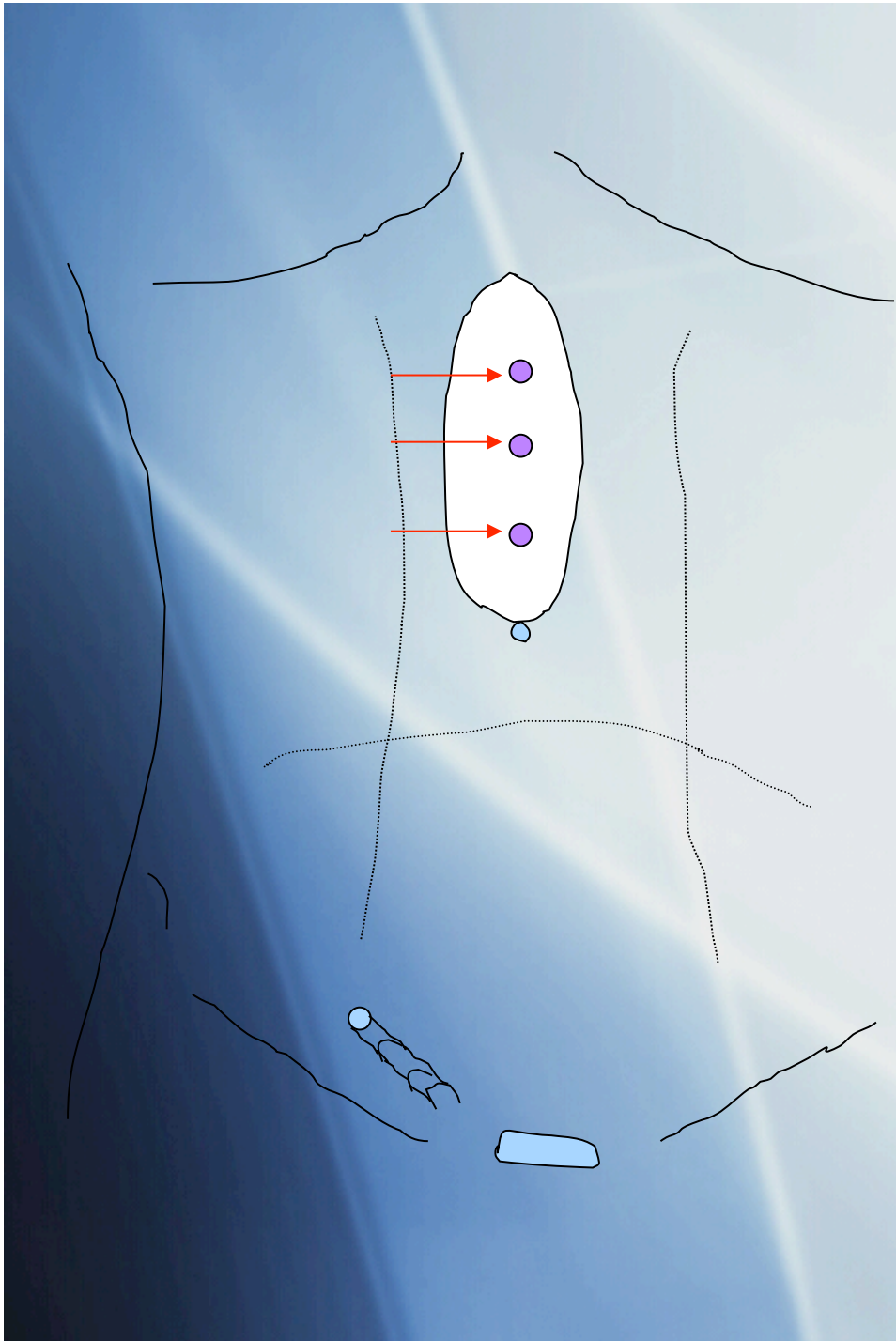


Semilunar line

Arcuate line

Epigastric hernia

- Very common
- In midline between umbilicus and xiphoid
- May be multiple
- Small fascial defect (<1 cm)
- Tongue of preperitoneal fat through interlacing fibers of linea alba
- Peritoneal sac present only if very large.

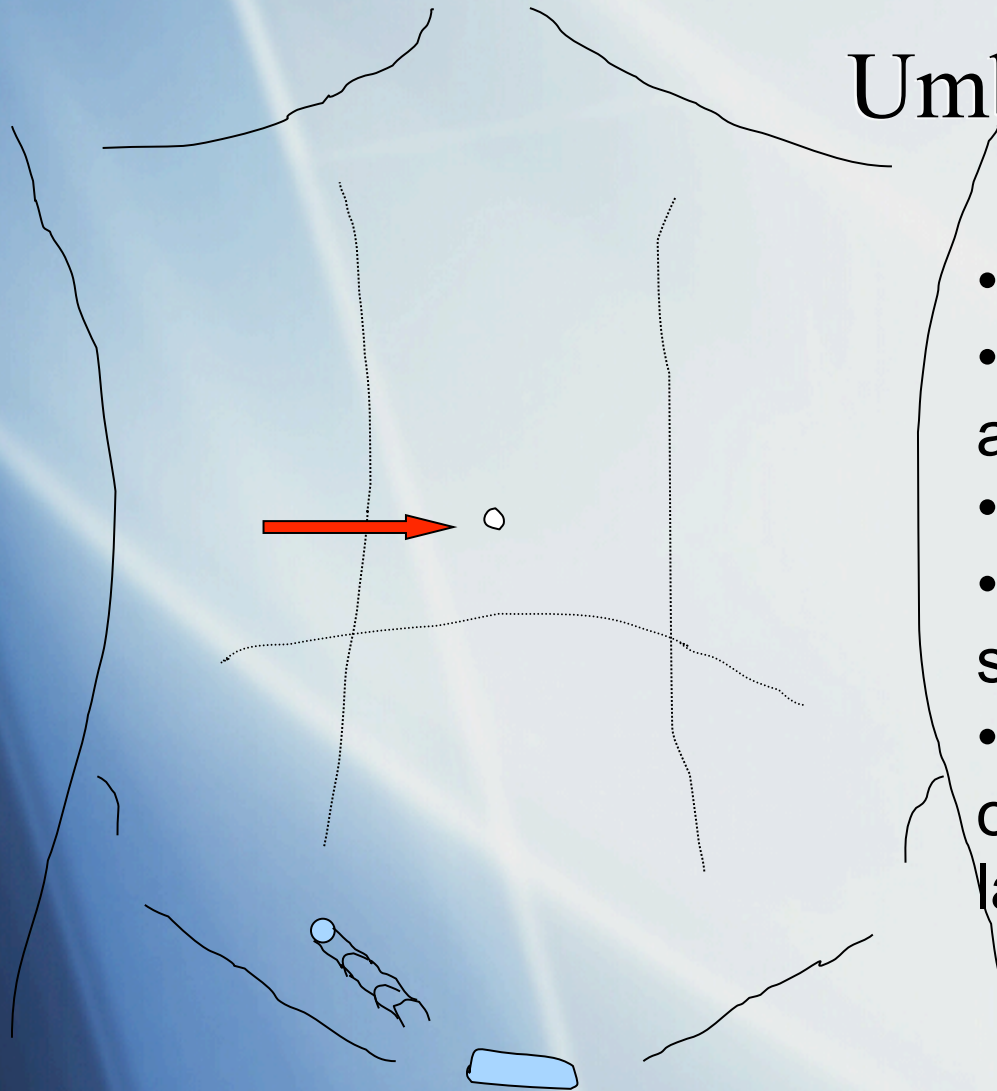




*4th - 5th century B.C.
Phoenician terracotta
figure with umbilical
hernia*

Source: Museu d'Arqueologia de Catalunya

Umbilical Hernia



- Common in infancy
- Reacquired during adulthood
- Peritoneal sac
- Small ones of no significance
- Large ones contain omentum, small or large bowel

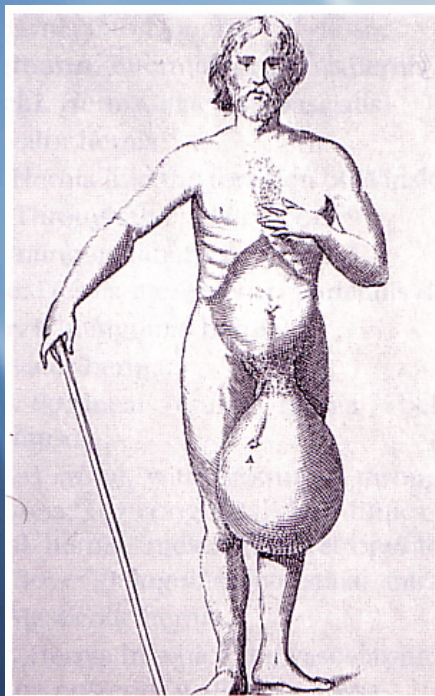
Typical Umbilical Hernia



Umbilical
&
Inguinal
&
Epigastric
Hernias



Scrotal hernia, 1682



Source: Undetermined

Hernia strap, 1758



Source: Undetermined

16th century hernia repair



Source: Undetermined

Inguinal hernia

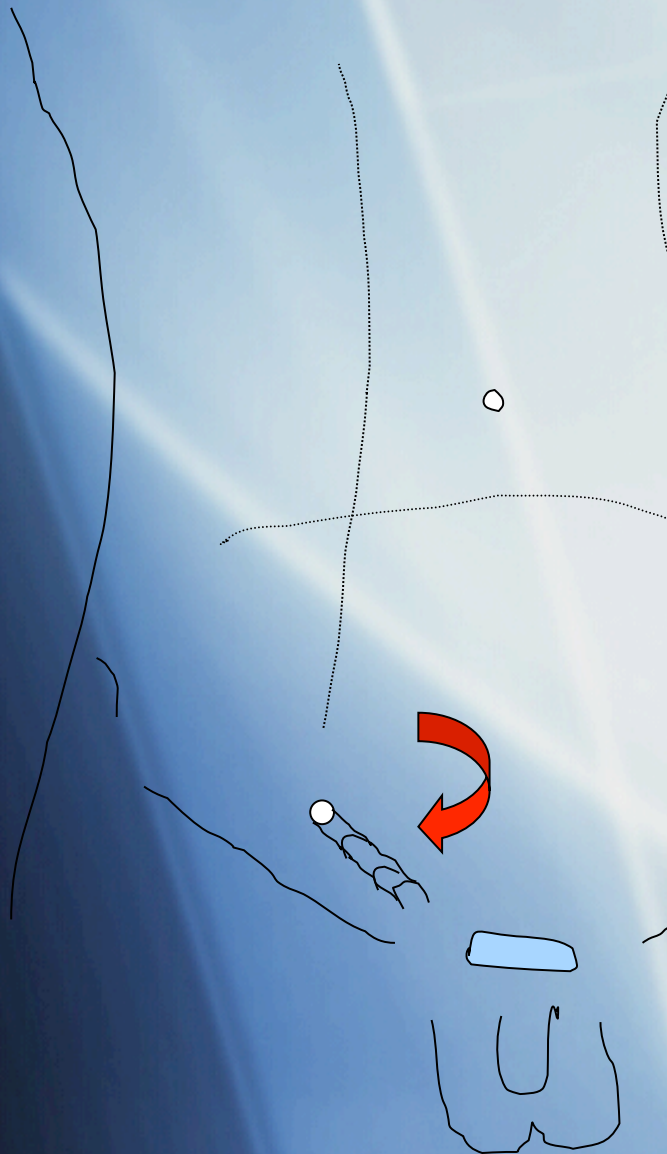
- Most common
- Most difficult to understand
- Congenital ~ indirect
- Acquired ~ direct or indirect

• **Indirect Hernia**

- has peritoneal sac
- lateral to epigastric vessels

• **Direct Hernia**

- usually no peritoneal sac
- through Hasselbach triangle, medial to epigastric vessels



Typical scrotal hernia



Giant scrotal hernia

- Note scaphoid abdomen



Anatomy, Nomenclature and Classification of Inguinal Hernia

The Inguinal Canal

- The anatomic space beneath the external oblique aponeurosis, between the internal and external inguinal rings.
- In men, it contains the cremaster muscle which covers the cord structures (vas deferens, testicular vessels, and associated connective tissues).
- In women, it contains the cremaster muscle, round ligament from the uterus, nerves and some connective tissues.
- Ilioinguinal & other nerves are found in or on cremaster and internal oblique muscles.

Indirect Inguinal Hernia

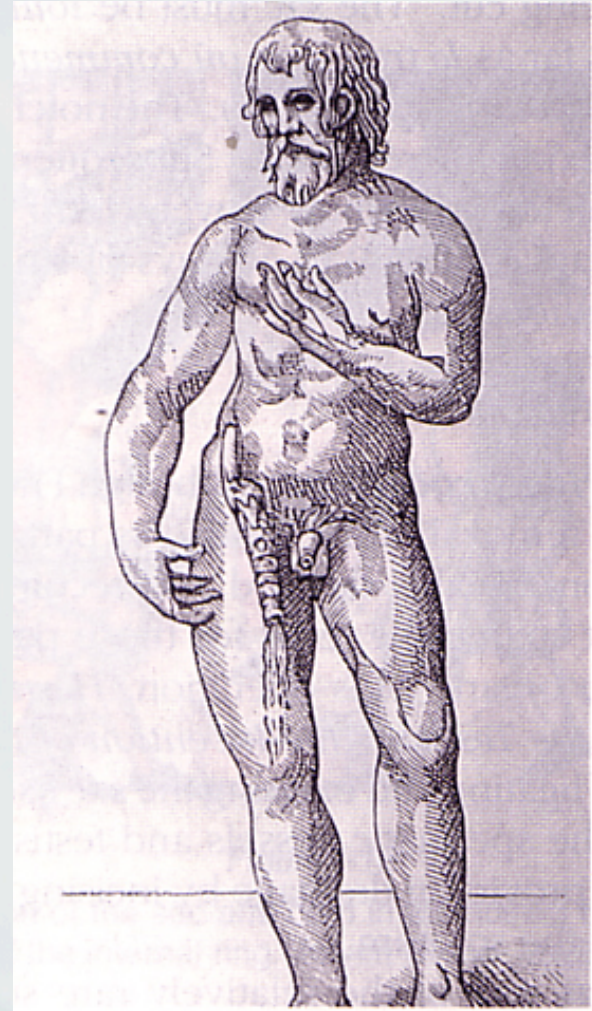
- Consists of peritoneal sac coming through internal ring, antero-medial to the spermatic cord (or round ligament) and into which omentum or bowel can enter.
- Usually congenital, but may be acquired.
- The majority of hernias in patients under age 25 are congenital and indirect.
- Male/female ratio is about 9:1.
- Internal ring may be normal or dilated.
- Higher risk of incarceration/strangulation if internal ring is small and hernia is large and extends into scrotum.
- [Anatomists assert that indirect hernias emerge lateral to the epigastric vessels. This is anatomically accurate but for practical purposes a pretty useless definition.]

Direct Inguinal Hernia

- Bulges into inguinal canal as a result of weakness or attenuation of the posterior floor of the inguinal canal
- Can develop anywhere in inguinal floor from internal ring to pubic bone, and involve some or all of floor.
- Contains primarily retroperitoneal fat. However, a true peritoneal sac containing bowel is sometimes present.
- Usually low (but not zero) risk for incarceration or strangulation.
- Infrequent in women, who usually have indirect hernia.
- It does occur medial to the epigastric vessels.
- Large direct hernias can extend into the scrotum.

Sliding Hernia

- Hernia consisting of retroperitoneal fat and/or large bowel (cecum on the right, sigmoid on the left) that 'slide' through an enlarged internal ring, rather than into and out of an existing peritoneal sac.
- Always comes through internal ring lateral to the cord, rather than antero-medial.



Source: Undetermined



Hernia surgery
Circa 1300

In p[ro]p[ri]o p[ar]te[n]s colligetur i[n] b[an]co. r[ati]o
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Source: Undetermined

~1600



Source: Undetermined

~1497



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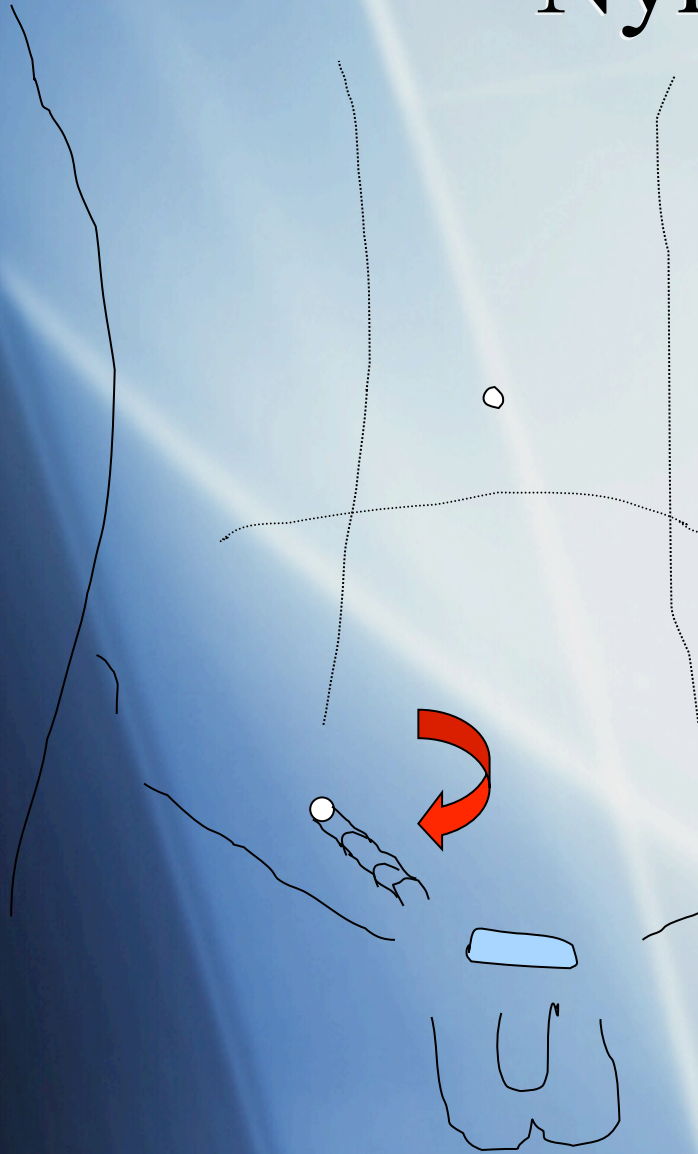
17th
century



Source: Undetermined

Nyhus Classification

- Type 1: indirect; congenital, normal internal ring
- Type 2: indirect; dilated internal ring, normal inguinal floor (transversalis fascia)
- Type 3: weak inguinal floor
 - 3a ~ direct hernia
 - 3b ~ indirect or sliding (acquired)
 - 3c ~ femoral
- Type 4: Recurrent



Etiology of Inguinal Hernia

- Congenital
 - All hernias in infants and children are indirect
 - They occur as a result of the failure of obliteration of the *processus vaginalis*.
 - Sac is adherent to the vas deferens
 - [Incomplete obliteration of *processus* may also lead to hydrocele.]

Etiology (2)

- Acquired Hernia ~ Direct or Indirect (Nyhus type 3)
 - Over age 25 the most common cause of inguinal hernia is attenuation or degeneration and fatty transformation of the aponeurotic tissues of the inguinal floor.
 - This can lead either to
 - **direct** weakness and bulging of the inguinal floor,
 - **indirect** hernia through a weak internal ring
 - or a combination of the two.
 - This is **not** work or activity related.

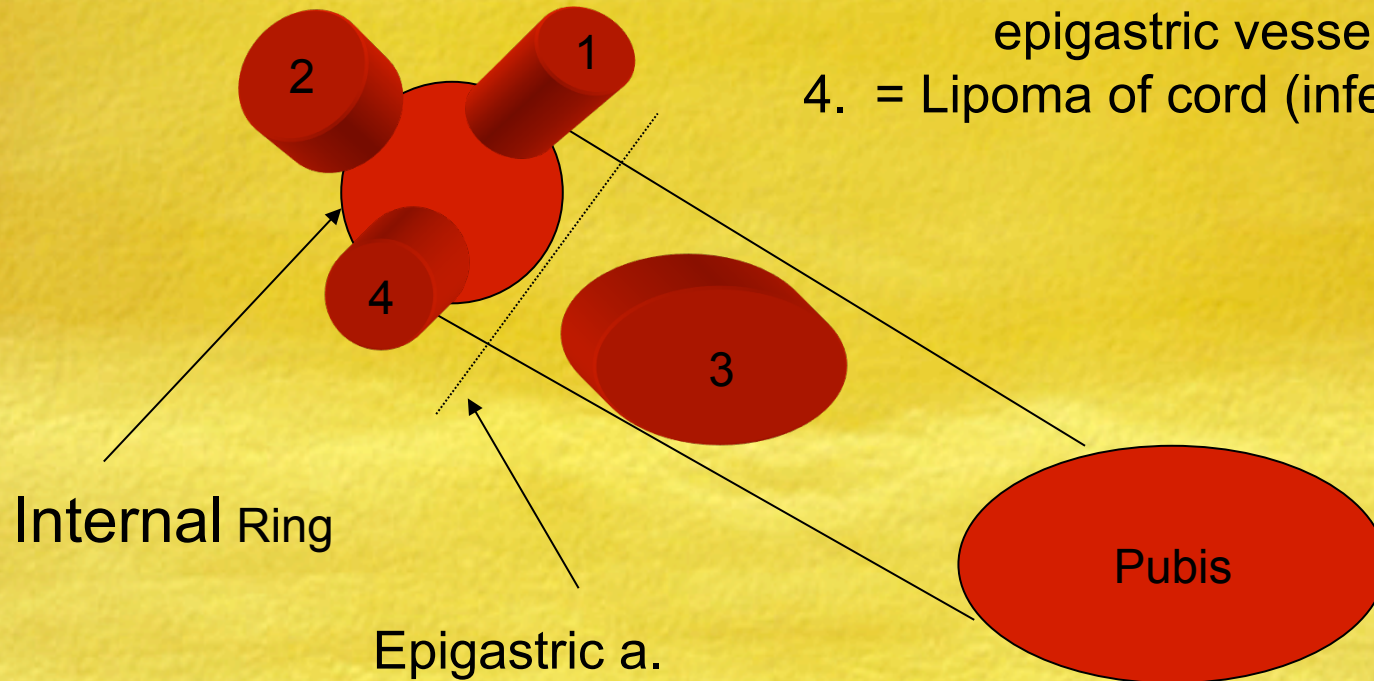
Relationship to “lifting” at work or other activity

- Lifting and straining make patients aware that they have a bulge.
- Lifting and straining do not usually cause the attenuation or degeneration of the inguinal floor, which is the underlying etiology of the hernia.
- Normal lifting does not cause recurrence.
- (Straining is not a good idea, whether you have a hernia or not.)

Important Things to Know

- Most adult indirect hernias are acquired.
- Indirect hernias have a peritoneal sac, hence can contain bowel (incarcerate, strangulate).
- Direct hernias contain preperitoneal fat, BUT large direct hernias can:
 - Have a peritoneal sac
 - Descend into the scrotum
 - Incarcerate, strangulate just like an indirect

1. = Indirect (anteromedial to cord)
2. = Sliding (lateral to cord)
3. = Direct (medial to cord and epigastric vessels)
4. = Lipoma of cord (inferolateral)



Important Things to Know (2)

- Incarcerated/strangulated hernia occurs far less frequently than most persons imagine.
- Lipomas ('fatty tumors') are common in the inguinal canal
 - ⊙ Arise lateral/inferior to the cord, inside cremaster
 - ⊙ Can be hard to differentiate from true hernia
- Clinical exam is not accurate in determining whether a hernia is direct or indirect.

Giant Scrotal Hernia (1/2 of small bowel + right colon)



Incarcerated Inguinal Hernia with Bowel Obstruction



More typical inguinal hernia



Watchful Waiting Study

- 720 men with minimally symptomatic hernias
- Randomized to watchful waiting or repair
- Followed 2-5 years
- Delaying surgical repair until symptoms increase is acceptable & safe
- Acute hernia incarcerations occur rarely

Femoral Hernia



Source: Undetermined

- Develops in femoral canal, medial to femoral vein, below the inguinal ligament
- Occurs mainly in slender women, young or old
- Often has peritoneal sac
- Frequently presents with incarceration or strangulation
- Can cause bowel obstruction

Incarcerated Femoral Hernia causing obstruction



Incarcerated Femoral Hernia



Incisional Hernia

- Can occur ANYWHERE an incision has been made, no matter how small.



Incisional Hernia

- Can develop in the original incision site because of dehiscence or failure of wound healing, or
- Can develop at the sites where sutures are passed through the tissue during closure (Swiss cheese-type hernia), or
- Both

Incarcerated incisional hernia



- Cannot be reduced.
- Tender
- What do you think is in it?
- How do you deduce this?

Causes of Incisional Hernia

- Technical failure or fascial dehiscence:
 - Sutures rip through, are placed improperly, or break
 - Weak tissue (“ppp”), tension, infection
 - Occurs within days or weeks after operation
- **FAILURE OF WOUND HEALING**
 - Most common cause
 - Seen 6-12 months after operation

Incisional Hernia

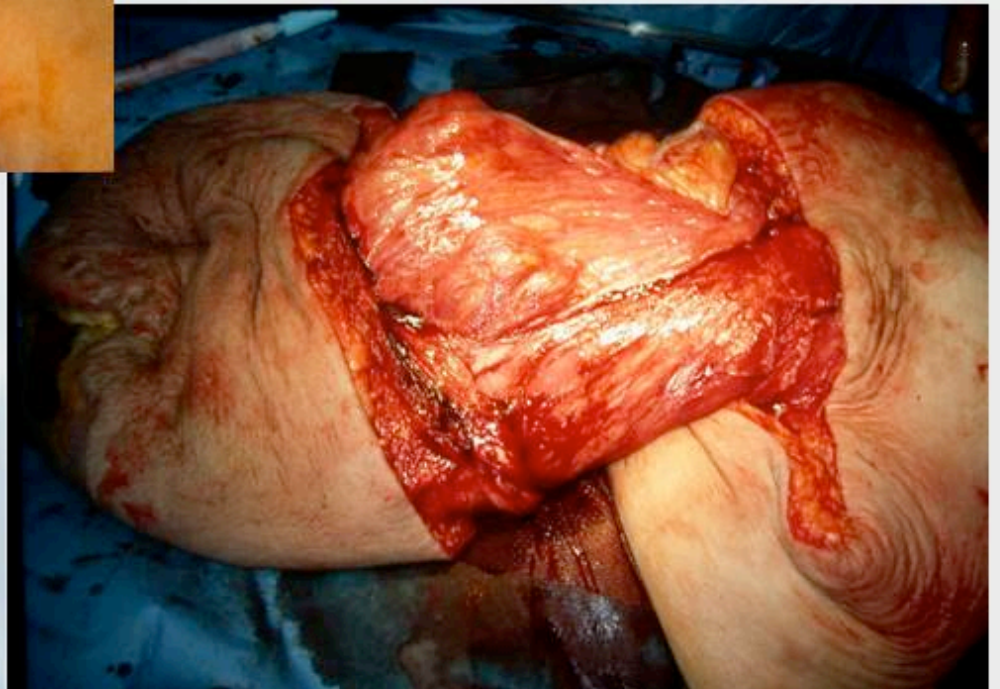
- Pressure on skin can cause ulceration



Incisional Hernia with Evisceration

- Note ulceration and spontaneous evisceration
- Cover with moist dressing.
- Take to operating room emergently for repair.





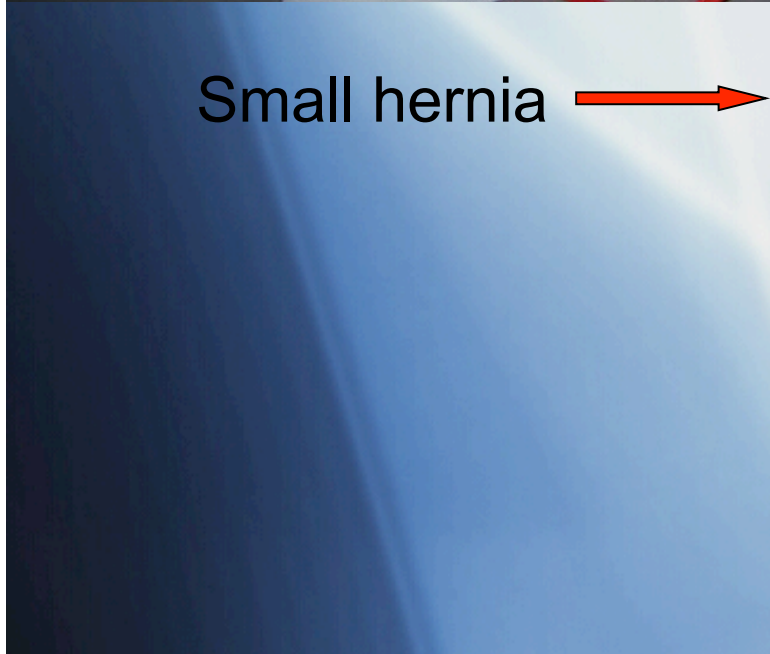


Incisional hernia with 'peau d'orange' (lymphedema)

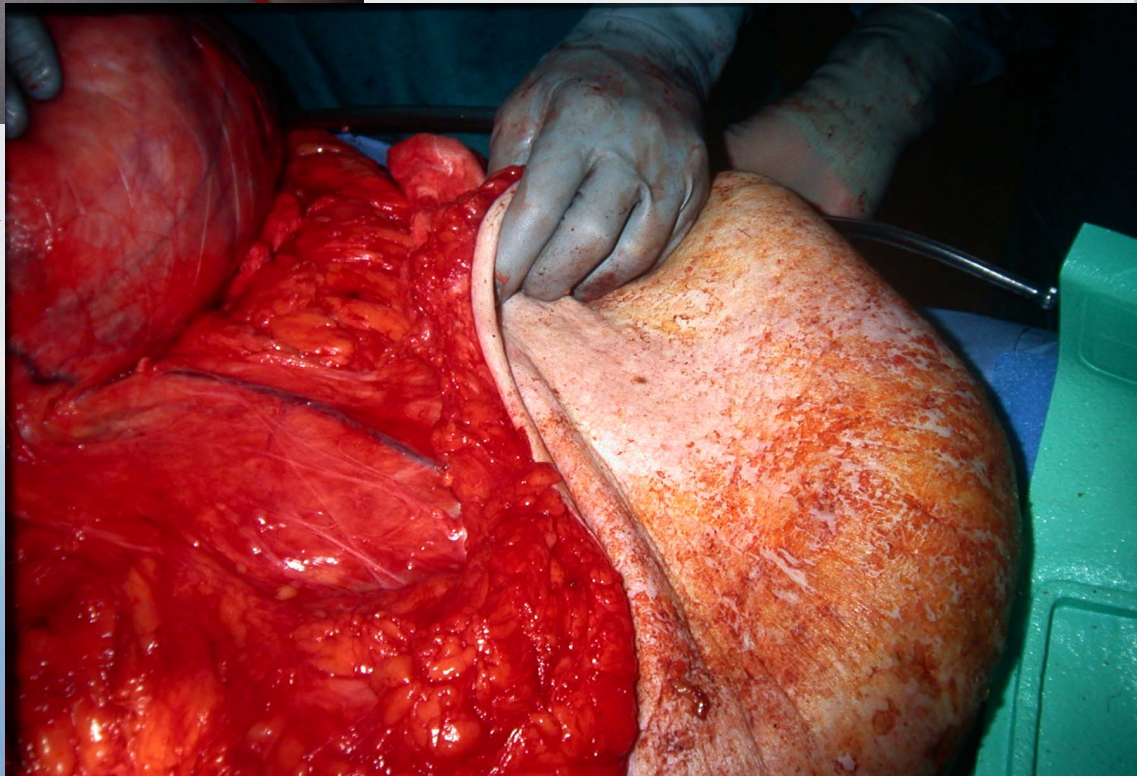


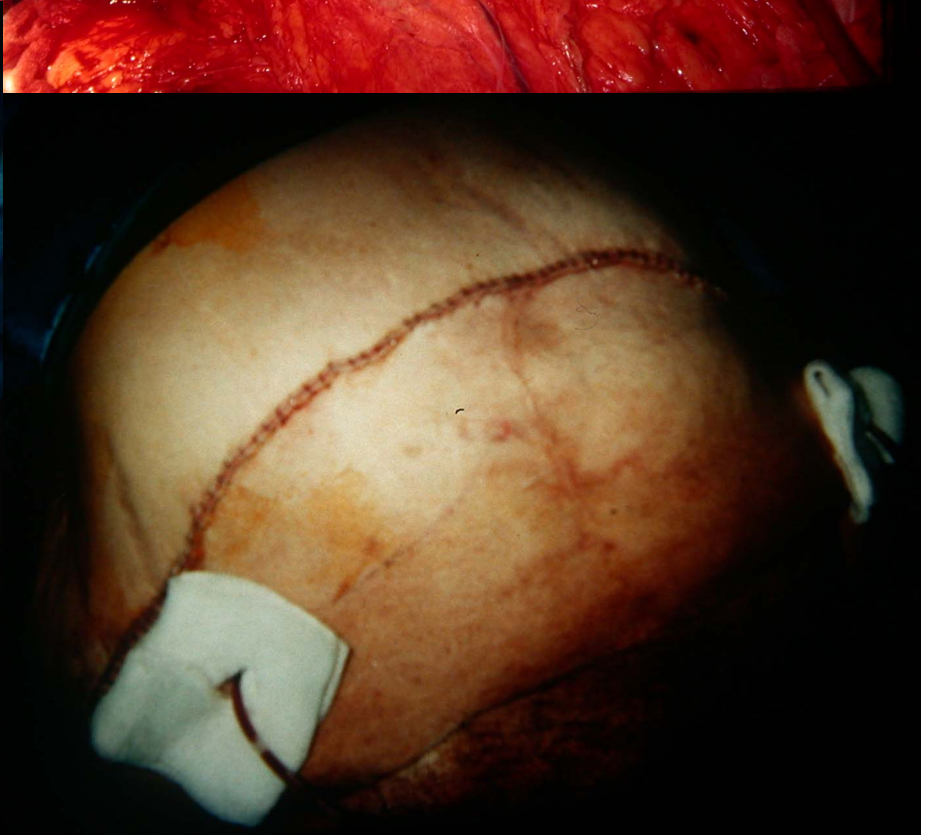
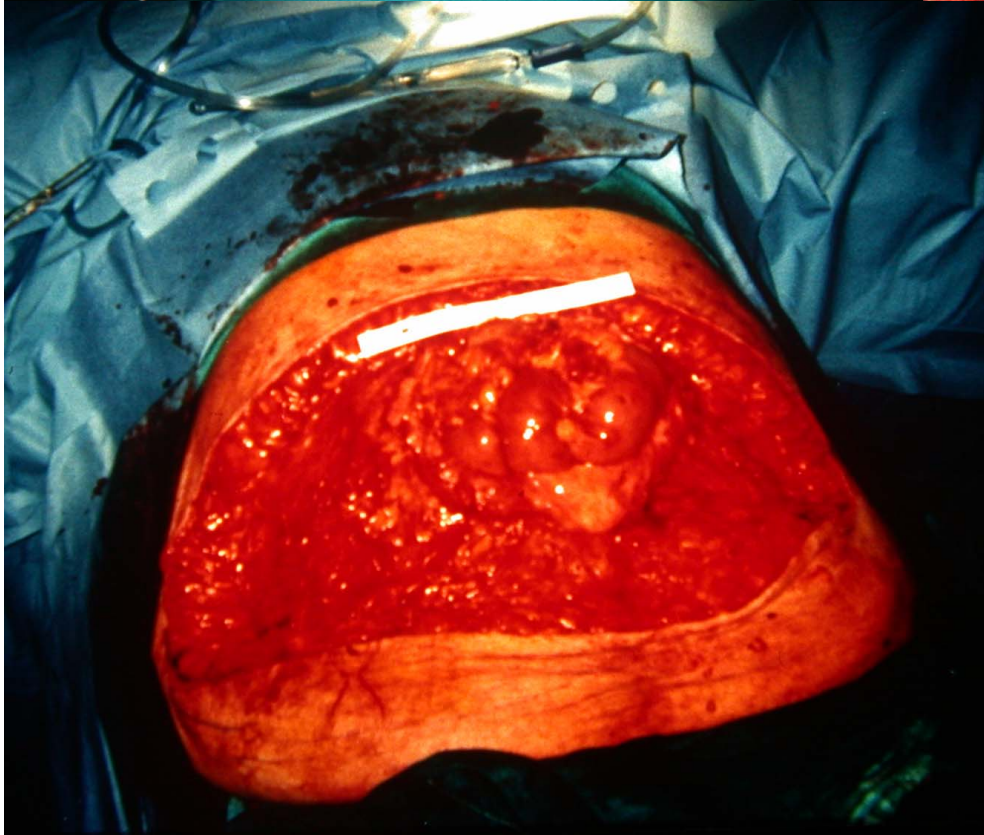
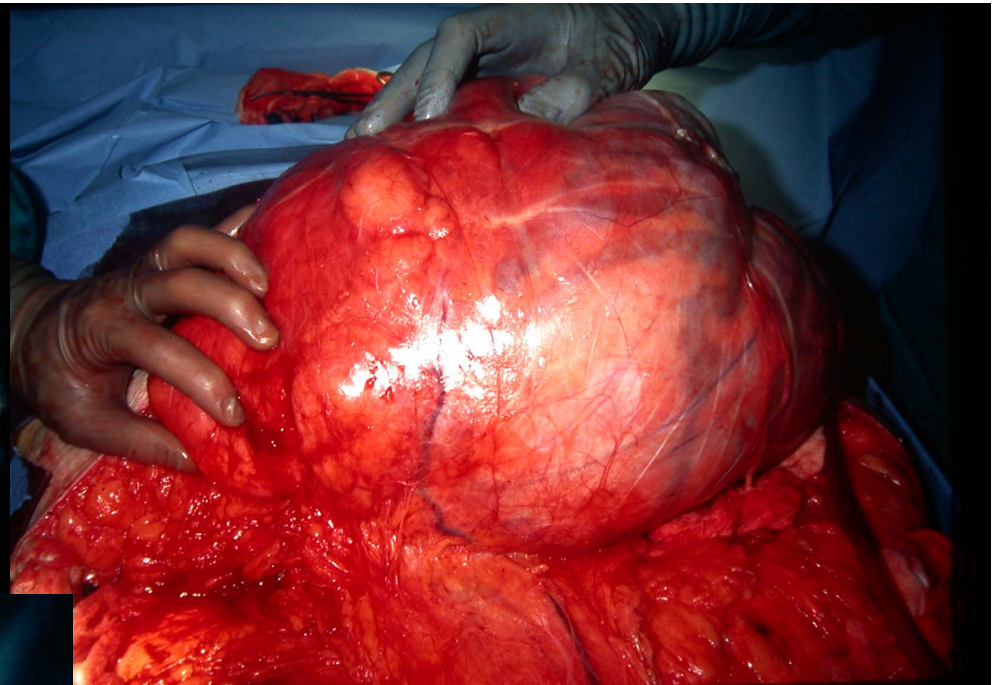


Large panniculus



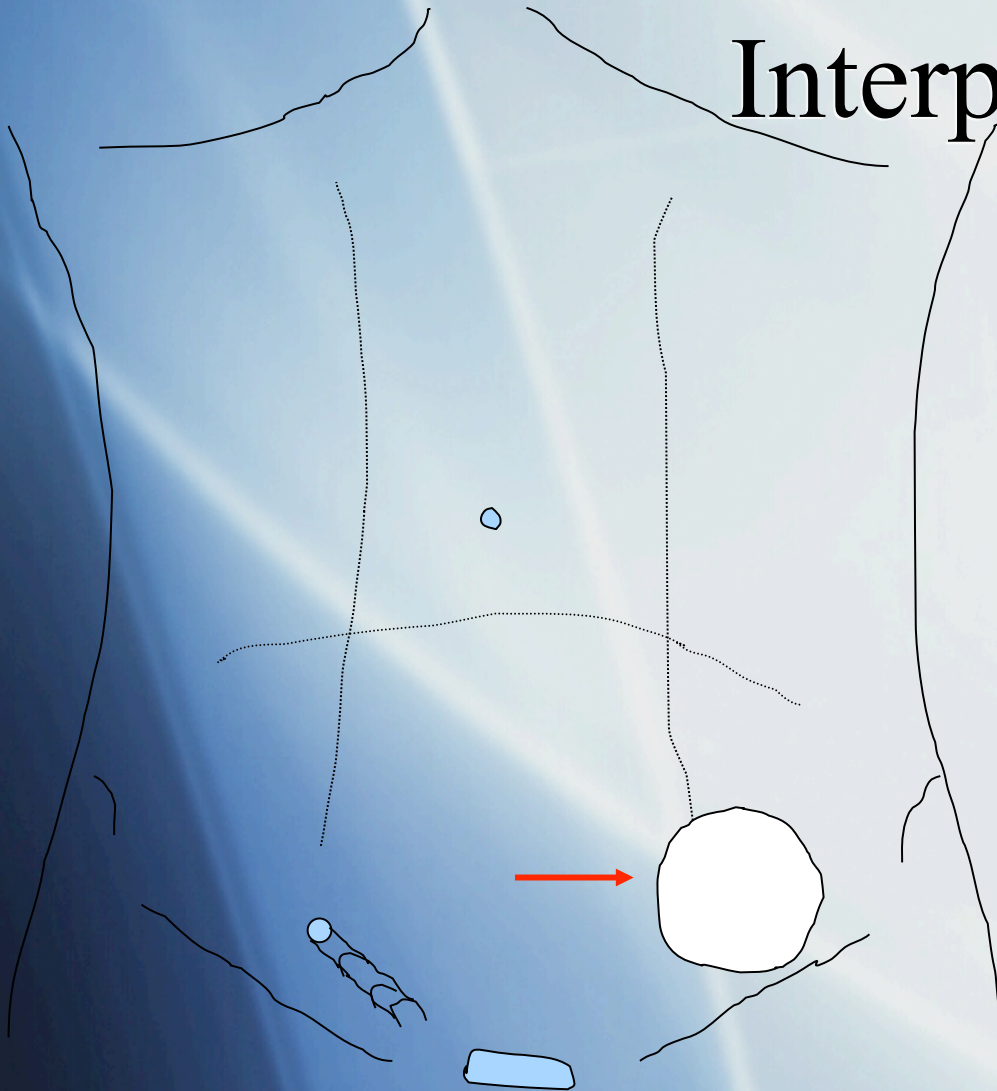
Small hernia





Interparietal hernia

- Very rare
- Between the layers of the abdominal wall
- Lateral to inguinal canal

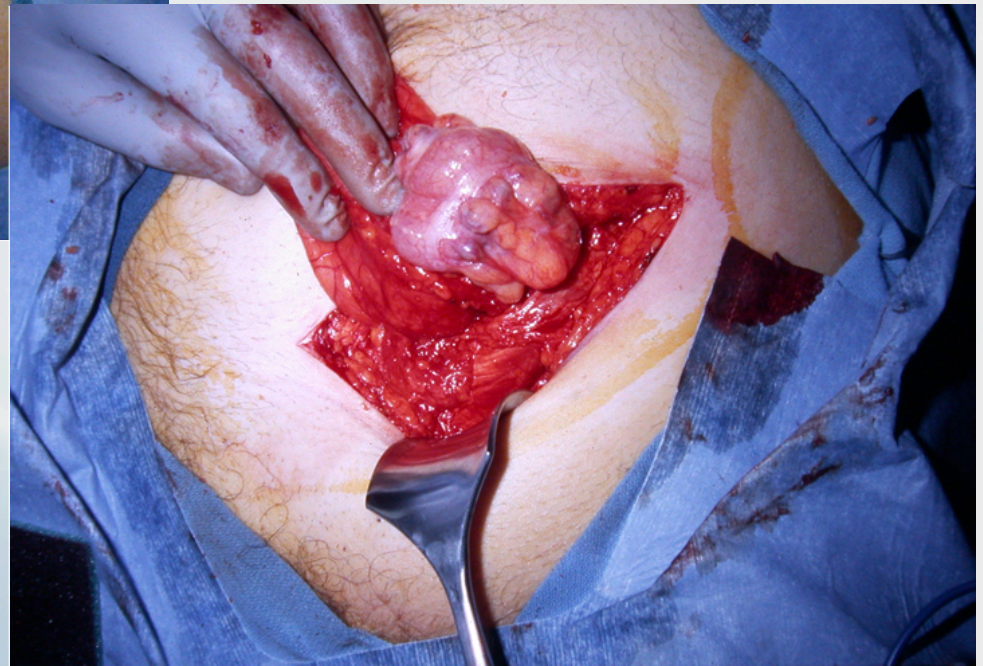
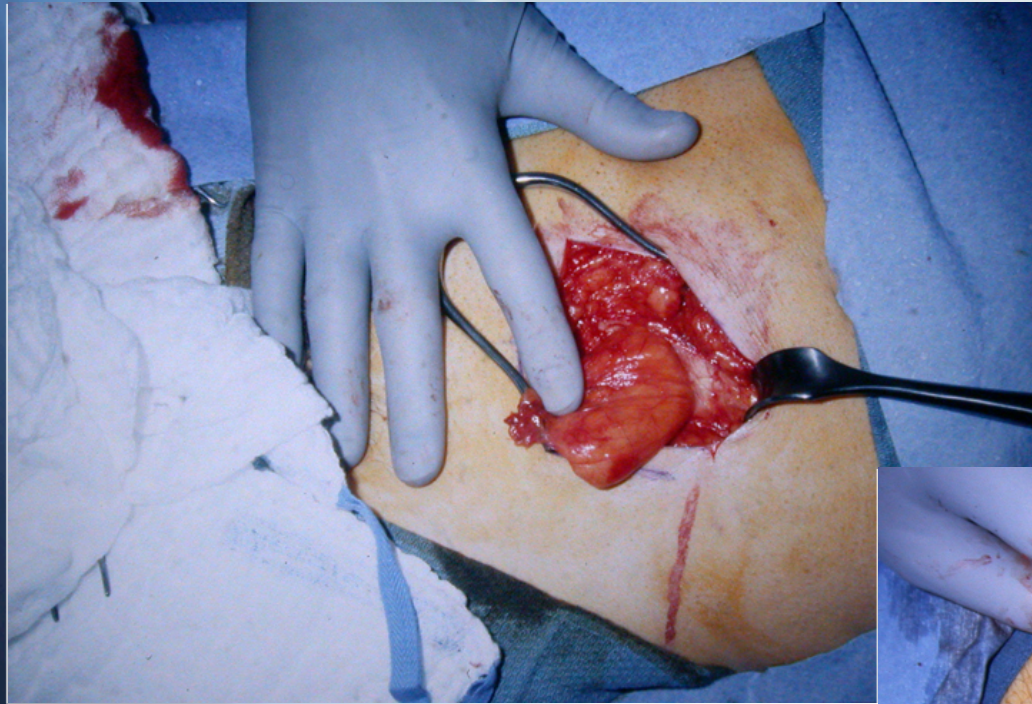


Interparietal hernia

- Beneath external aponeurosis, coming through internal oblique muscle.



Left lower quadrant
abdominal wall hernia
outside inguinal canal
containing sigmoid
colon



Obturator Hernia

- Very rare
- Seen in elderly, emaciated patients
- Develops in obturator fossa
- Not visible or palpable on outside
- Can strangulate, cause bowel obstruction



Bowel obstruction from incarcerated obturator hernia



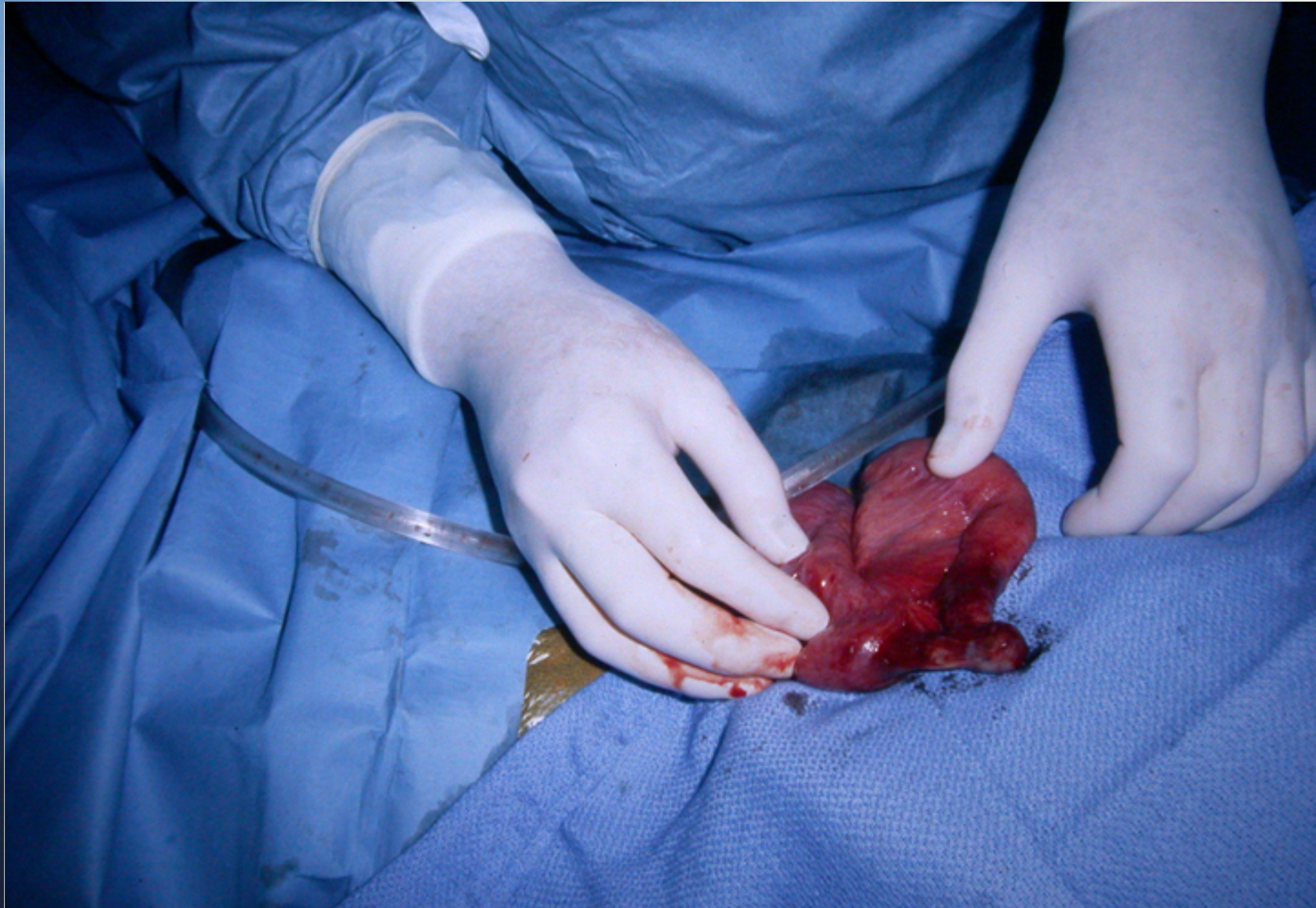
Obturator Hernia Causing Small Bowel Obstruction



Site of obstruction deep
in pelvis

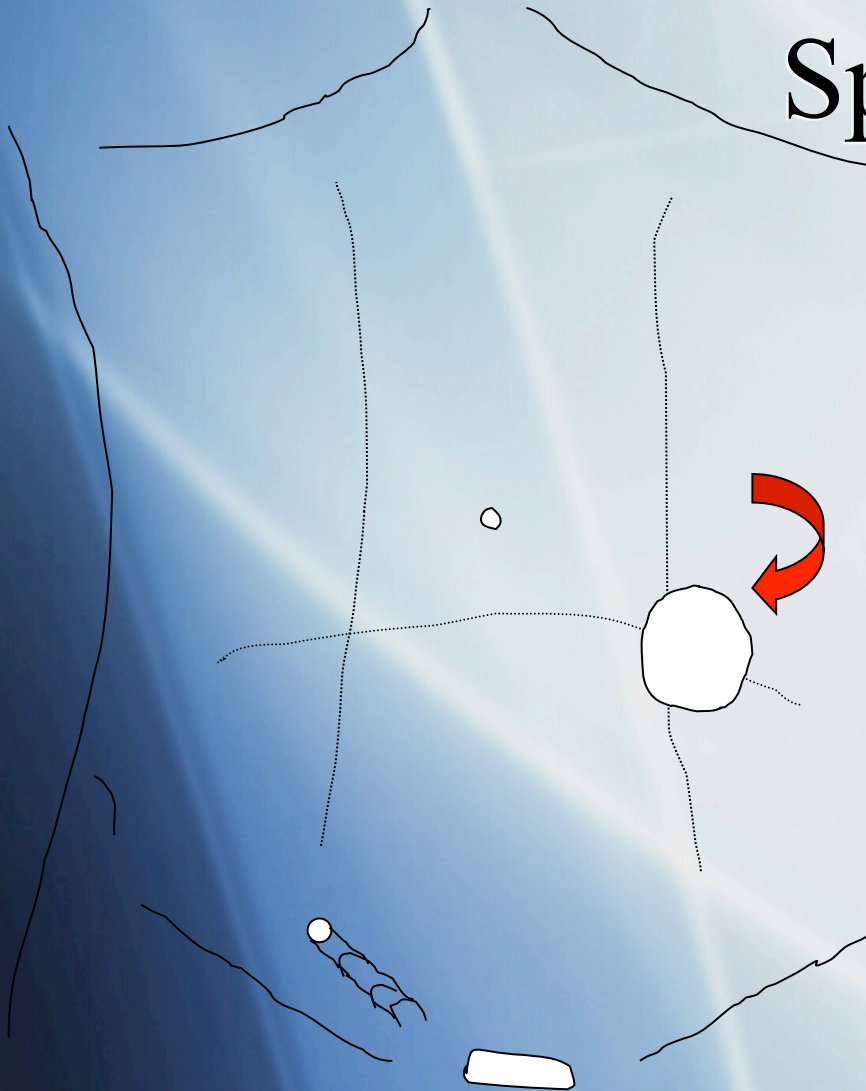


Infarcted small bowel from obturator hernia



Spigelian Hernia

- Very rare, difficult to diagnose.
- Develops at or near intersection of arcuate and semilunar lines, just lateral to rectus muscle.
- Has peritoneal sac; can cause of bowel obstruction



Spigelian
Hernia
Laparoscopic
view



Hydrocele

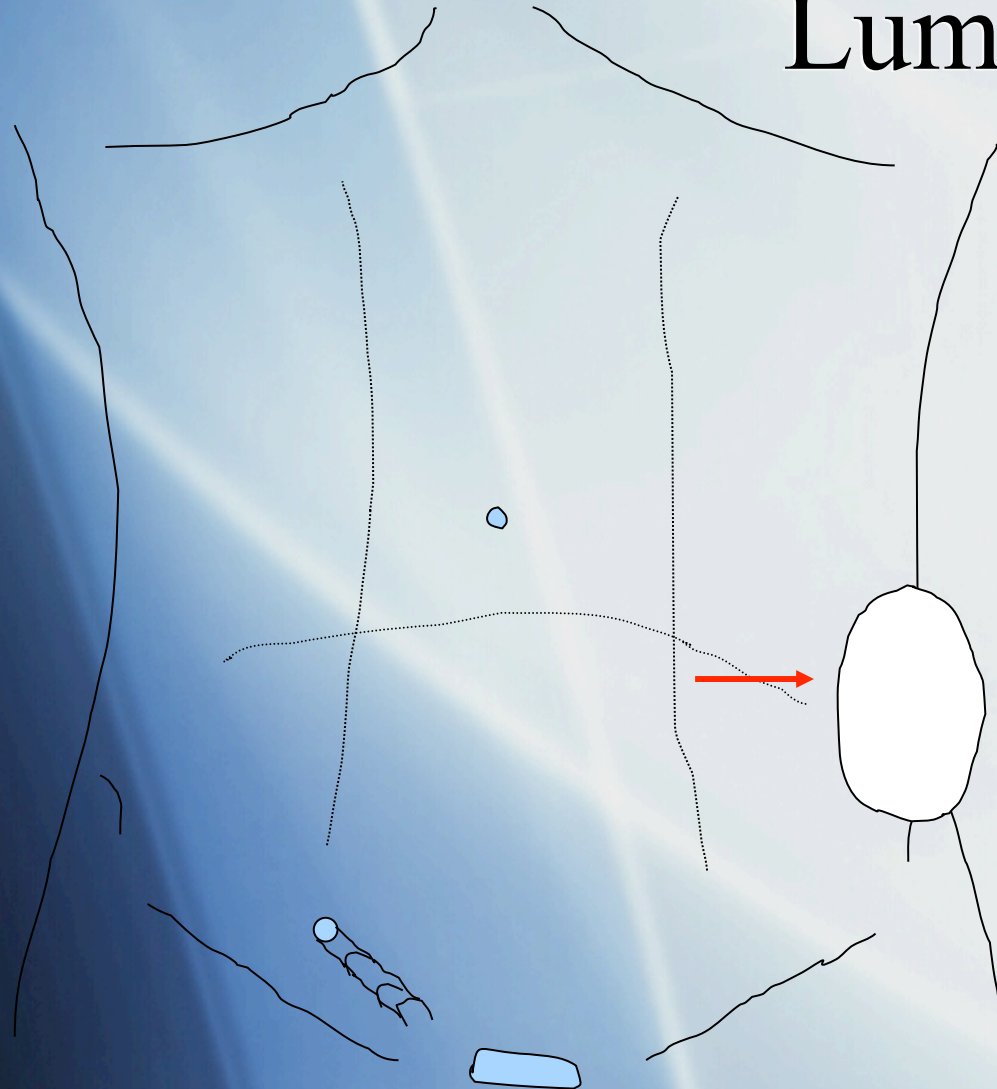
- Fluid collection in scrotum.
- Contained in peritoneal sac that may or may not communicate with peritoneal cavity via *processus vaginalis*.
- ‘Communicating’ hydrocele if peritoneal communication is present.
- Differentiated from true hernia by finding of normal (i.e., no bulge in) inguinal canal.



Giant
hydrocele,
asymptomatic



Lumbar Hernia



- Develops at Petit's Triangle
- Between abdominal and back muscles
- Fascia in this region is thin

Diastasis recti

- Not a hernia!
- Seen when there is wide separation of rectus muscle in epigastrium
- Seen only when lying supine and raising one's head.
- Not seen when one is standing.



Rare but interesting hernias:

- Richter: incarceration of a portion of the wall of the small bowel in a hernia.
- Littre: hernia containing a Meckel's diverticulum.
- Mayer-Rokitansky-Kuster-Hauser syndrome: ovary and fallopian tube in inguinal canal, associate with incomplete genital development (absent uterus, etc).
- Amyand (1736): acute appendicitis in incarcerated inguinal hernia
- Unnamed: hernias containing normal appendix or ovary.