Abdominal Wall Hernias: Classic and Unusual

Arash Bedayat, MD; Hemang Kotecha, DO; Matthew L. Hoimes, MD; Byron Y. Chen, MD; Hao S. Lo, MD; Adib R. Karam, MD
Objectives

• Review the radiologic anatomy and imaging findings of abdominal wall hernias

• Discuss the etiologies, imaging pitfalls, and complications of selected hernias
Abdominal Wall Hernias

• Definition: protrusion of an intra-abdominal structure through an abdominal wall defect
• Classified by etiology and location
• Males are 8 times more likely to develop a hernia and 20 times more likely to need repair when compared to females
• Usually asymptomatic unless large or incarcerated
• Contrast-enhanced CT scan with multiplanar reconstructions (MPR) is the imaging modality of choice for diagnosis and surgical planning
Risk Factors

- History of prior abdominal wall hernia or prior abdominal surgery
- Abdominal trauma
- Age
- Male gender
- Caucasian race
- Chronic cough or constipation
- Smoking
- Family history of abdominal hernia
# Abdominal Wall Hernias

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Inguinal Hernia

Indirect
- Most common hernia in males and females
- Herniates through the internal inguinal ring, lateral to the inferior epigastric artery
- Right > left
- Mostly congenital

Direct
- Males > Females
- Herniates medial to the inferior epigastric vessels through Hesselbach's triangle
- Results from weakness in the floor of the inguinal canal and abdominal wall
Inguinal Hernia

Bilateral inguinal hernias with the hernia sacs dissecting cranially between the lateral abdominal wall musculature (white arrows). Both hernias contain non-obstructed bowel loops.
Inguinal Hernia

Large bilateral intra-scrotal inguinal hernias with the hernia sacs containing large bowel. Note the presence of fecal impaction at the rectum (R) causing large bowel obstruction and contributing to development of bilateral inguinal hernias.
Inguinal Hernia: Scrotal Cystocele

• Trapped urinary bladder within the inguinal canal
• Seen in 1-3% of inguinal hernias
• Mostly asymptomatic, however may present with dysuria, frequency, urgency, nocturia or hematuria
• Best detected in erect or prone positions
• Risk factors:
  – Chronic bladder distension
  – Bladder atonia
  – Pericystitis
  – Fat protrusion
  – Pelvic masses
Right scrotal cystocele with herniation of the urinary bladder dome (B) into the right inguinal canal (arrows). Note the apparent thickening of the herniated portion of the urinary bladder wall due to stretching of the intra-pelvic portion and relative decompression of the herniated portion (pitfall). Bladder wall thickening resolved following adequate bladder distension.
Inguinal Hernia: Amyand’s Hernia

- Trapped appendix within the inguinal canal
- Incidence ranges from 0.19% to 1.7% of all inguinal hernia cases
- Right > Left
- Male > Female
- More common in children
- Increased chance of strangulation and vulnerability to trauma
Inguinal Hernia: Amyand’s Hernia

Normal appendix extending into a small fat-containing right inguinal hernia (arrows). Patients with acute appendicitis may present with acute scrotal pain (pitfall).
Femoral Hernia

• Most commonly in older females
• Diagnosis generally made clinically, with imaging reserved for uncertain cases, when there is difficulty distinguishing between femoral and inguinal hernia
• Imaging features:
  – Medial to the common femoral artery and vein
  – Lateral to the pubic tubercle
  – Compression of the femoral vein
• The narrow neck of the femoral canal opening leads to higher risk of incarceration compared to inguinal hernia
• Treatment: surgical closure of the femoral sheath defect
Incarcerated right femoral hernia containing thickened, inflamed terminal ileum. The hernia sac also contains normal appendix (arrow). The hernia sac is located medial to the femoral vessels. Note also the narrow neck.
Normal appendix extending into a right femoral hernia (arrows). When incarcerated, this is known as De Garengeot's hernia.
Ventral Hernia

- Hernia through the anterior or anterolateral abdominal wall
- Midline defects include umbilical, epigastric, and hypogastric hernias
- Lateral ventral hernias are usually Spigelian
(a) and (b): Large ventral hernia containing omentum and the inferior tip of segment 3 of the liver (L).

(c) and (d): Ventral hernia containing a portion of the stomach (S) without evidence of obstruction. Duodenum (D) is outside of the hernia sac.
Large midline ventral hernia containing non-obstructed small and large bowel. Small ventral hernias can be missed on CT scan obtained in the prone position, or without Valsalva maneuver during the scan (pitfall).
Midline ventral hernia through the linea alba containing a dilated/recanalized umbilical vein (arrows) in a patient with liver cirrhosis and portal hypertension. Note the presence of splenomegaly (S) and nodular surface of the liver (L). This particular hernia, if overlooked, can represent a major risk in the setting of a percutaneous procedure or surgical/laparoscopic port creation (pitfall).
Spigelian Hernia

• Rare type of abdominal wall hernia, making up to 2% of all ventral hernias
• The hernia orifice occurs at the junction of the semilunar and semicircular (or arcuate) lines
• The diagnosis is made most commonly with CT scan, which can aid in defining the surgical anatomy
The semilunar line demarcates the lateral border of the rectus abdominis muscle (white cursors). Below the semicircular or arcuate line, only a thin layer of transversalis fascia is posterior to the rectus abdominis muscles (white arrows). The hernia orifice occurs at the junction of the semilunar line and the semicircular or arcuate line.
Right Spigelian hernia containing peritoneal fat. Note the position of the hernia sac (long arrows), lateral to the rectus muscle (short arrow), and below the semicircular line.
### Umbilical hernia

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<th>Pediatric</th>
<th>Adult</th>
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<td>• Congenital</td>
<td>• Acquired</td>
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<tr>
<td>• Cause: Failure of closure of umbilical ring</td>
<td>• Cause: Increased intra-abdominal pressure</td>
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<td>• Risk factors: Prematurity, low birth weight, African American</td>
<td>• Risk factors: Obesity, pregnancy, ascities, African American</td>
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<tr>
<td>• Most resolve spontaneously (if&lt;1.5 cm)</td>
<td>• F&gt;M</td>
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<td>• Treatment: surgery if persists after age 4 years</td>
<td>• Incarceration more common in males</td>
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<td>• Treatment: surgical repair</td>
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Ascites and fluid filled loops of small bowel protrude into an umbilical hernia. Multiple dilated loops of intra-abdominal small bowel with air fluid levels indicate small bowel obstruction.
Lumbar Hernia

- Occurs posteriorly, through a defect bound by the 12\textsuperscript{th} rib superiorly, iliac crest inferiorly, erector spinae muscle medially, and the external oblique muscle laterally. Can be further divided into the superior (Grynflett-Lesshaft) and inferior (petit) lumbar triangles.
- Usually posttraumatic or postsurgical, and commonly in men between age 50-70.
- May contain bowel loops, retroperitoneal fat, kidneys, or other viscera.
- Diagnosis made most commonly by CT scan.
Large right lumbar hernia following right nephrectomy. The hernia sac contains small and large bowel, as well as the tip of the right lobe of the liver (L).
Parastomal Hernia

- Protrusion through an abdominal wall defect in the vicinity of a stoma
- Incidence reported in up to 50% of enterostomies with lower rates found in loop enterostomies
- Most patients do not have symptoms severe enough to warrant repair
- Diagnosis usually made clinically with imaging reserved for equivocal cases
Parastomal hernia following the construction of an ileostomy. White arrow indicates the stoma with multiple herniated small bowel loops adjacent in the hernia sac.
Perineal Hernia

- Very uncommon
- Mostly in elderly patients
- Cause: weakness of the pelvic floor in the urogenital diaphragm, levator ani or coccygeal muscles
- Risk factors: pregnancy, obesity, ascites, prior surgery
- Usually in close proximity to the anus, gluteal region, or labia major
- Classified as anterior or posterior with respect to the transverse perineal muscles
Perineal hernia through the right pelvic floor (arrows) in three different patients. The hernia sac contains fat in (a), ascites in (b), and rectum in (c).
Subcostal and Subxiphoid Hernias

(a) and (b): Right subcostal hernia following liver transplantation (cursors). The hernia sac contains colon and the tip of the right lobe of the liver.

(c) and (d): Subxiphoid hernia containing a portion of the left lobe of the liver. The arrow is pointing at the xiphoid process.
Richter Hernia

• Herniation of the anti-mesenteric wall of a bowel loop that does not include the entire wall circumference

• Most commonly occurs in the femoral canal, but can be a feature of any abdominal wall hernia
Richter hernia of transverse colon (arrows) seen incidentally in a female with right flank pain and obstructive uropathy.
Conclusion

• Abdominal wall hernias are common findings on CT scan of the abdomen and pelvis
• Identification of a hernia and its potential complications is critical to patient care
• Review of available prior cross-sectional imaging can aid in avoiding hernia-related complications during procedures


Suzuki S, Furui S, Okinaga K et al. Differentiation of femoral versus inguinal hernia: CT findings. AJR. 2007;189:W78-83.