OBJECTIVES

- Emphasize the clinical importance and prevalence of internal hernias
- Review the types of internal hernias
- Describe the clinical and imaging features of these hernias
INTERNAL HERNIAS

- Protrusion of the gut through the peritoneum, mesentery, or omentum into a compartment in the abdominal cavity
- The hernia orifice is usually a preexisting foramen, recess, and fossa but can be caused by surgery, ischemia, and trauma
INTERNAL HERNIAS

- Congenital defects are anomalies of intestinal rotation and mesenteric attachments
- Autopsy incidence 0.2 - 0.9%
WHY INTERNAL HERNIASE ARE IMPORTANT

- IH should be a major default diagnosis in patients with SBO, especially with closed loop or strangulating features
- Contributor to tsunami of requests for outpatient abdominal CT scans for abdominal discomfort and pain
- Source of chronic and intermittent bowel obstruction
CAUSES OF SMALL BOWEL OBSTRUCTION

- ADHESIONS 49%
- HERNIAS 30%
- NEOPLASMS 15%
- OTHER 6%
HERNIAS AS CAUSE OF BOWEL OBSTRUCTION

- INTERNAL HERNIAS 33%
- EXTERNAL HERNIAS 66%
HERNIAS AS CAUSE OF STANGULATION

- INTERNAL HERNIAS 40%
- EXTERNAL HERNIAS 60%
INTERNAL HERNIAS

- Preoperative diagnosis can be difficult: S+S range from high grade bowel obstruction to mild digestive complaints
- If reducible they are often silent
- IH are the most common cause of strangulating obstruction
During the past decade the incidence of IH has increased due to more frequent bariatric surgery and liver transplantation.

RYGB is associated with an increased incidence of transmesenteric, transmesocolic and retroanastomotic internal hernias.
TYPES OF INTERNAL HERNIAS

- Broad ligament
- Fossa of Douglas
- Perirectal fossa

Radiographics 25: 997-1015, 2005
TYPES OF INTERNAL HERNIAS

- Left paraduodenal
- Right paraduodenal
- Pericecal
- Foramen of Winslow
- Transomental
- Intersigmoid
- Transmesenteric
- Retroanastomotic

Radiographics 25: 997-1015, 2005
INTERNAL HERNIAS

- Paraduodenal 53%
- Pericecal 13%
- Foramen of Winslow 8%
- Transmesenteric 8%
- Intersigmoid 6%
- Supravesical-pelvic 6%
- Transomental 1-4%
PARADUODENAL HERNIAS

- Paraduodenal fossae originate as congenital peritoneal anomalies due to failure of mesenteric fusion with the parietal peritoneum and an associated abnormal rotation as the SB is imprisoned beneath the developing colon.
INTERNAL HERNIAS: AIDS IN PREOPERATIVE DIAGNOSIS

- Engorged, stretched, and displaced mesenteric vascular pedicle and convergence of vessels at the hernia orifice
- Saclike mass or cluster of dilated SB loops at an abnormal anatomic location in the setting of SBO
- Knowledge of the normal anatomy of the peritoneal cavity and characteristic anatomic location
- Superior duodenal fossa
- Inferior duodenal fossa (Treitz)
- Paraduodenal fossa (Landzert)
- Intermesocolic (Broesike)
- Mesentericoparietal (Waldeyer)
PARADUODENAL FOSSAE

- Paraduodenal fossa (Landzert) found in 2% of autopsies - induces left PDH
- Mesentericoparietal (Waldeyer) found in 1% of autopsies - induces right PDH
PERICECAL HERNIA

- 4 pericecal recesses can be involved with hernias: retrocecal, paracolic, superior ileocecal, inferior ileocecal
- 13% of all internal hernias

AJR 186: 703-717, 2006
PERICECAL HERNIA

- Ileal loops occupy the right paracolic gutter
- Clustering of fluid filled SB lateral to the cecum and posterior to the ascending colon
- Tethering at the aperture of the peritoneal recess and dilation of SB with a transition zone
- Patients may present with acute abdomen
- Chronic incarceration may be difficult to differentiate from IBD, appendiceal disorders and other causes of SBO
The intersigmoid fossa lies behind the apex of the V-shaped parietal attachment of the sigmoid mesocolon. This pocket is found in 65% of autopsies. Accounts of 6% of all internal hernias. Three types: intersigmoid; transmeso-sigmoid; intermesosigmoid.
SIGMOID MESOCOLON

- CONTAINS THE SIGMOID AND HEMORRHOIDAL VESSELS OF THE IMA AND IMV
- CONTINUOUS WITH THE BARE AREA OF COLON AND RECTUM, AND BROAD LIGAMENT
- CONFINES THE SPREAD OF DIVERTICULITIS
- PATHWAY OF DISEASE SPREAD BETWEEN SIGMOID AND OVARY
TRANSOMENTAL HERNIA

- Accounts for 1% - 4% of all internal hernias
- Type I - through the free edge of the GO
- Type II - through the GCL into the lesser sac
TRANSOMENTAL HERNIA

- Type I - most common, through a slit like opening (2-10 cm in diameter) at the periphery of the free edge of the GO
- SB, cecum, and sigmoid may be involved
- Clinical and radiologic features are almost identical to transmesenteric hernias
TRANSMESEMENTRIC HERNIA

- In adults most mesenteric defects are the result of surgery, trauma, or inflammation.
- SBO develops in most cases due to the absence of a limiting hernia sac.
- Cannot differentiate closed loop SBO caused by transmesenteric hernia vs prolapse of intestine under adhesive bands.
FORAMEN OF WINSLOW HERNIA

- 8% of all internal hernias
- SB most frequently involved (60%-70%)
- TI, cecum, ascending colon (25-30%)
- GB, transverse colon, and omental hernias are rare
- Risk factors: enlarged foramen, excessively mobile gut due to a long mesentery, persistence of the ascending mesocolon, ascending mesocolon that is not fused to the parietal peritoneum
FORAMEN OF WINSLOW
HERNIA: CT FINDINGS

- Mesentery interposed between IVC and main portal vein
- Air-filled collection in the less sac with beak directed towards the epiploic foramen
- Absence of the ascending colon in the right paracolic gutter
- ≥ 2 bowel loops in the high subhepatic spaces
SUPRAVESICAL HERNIA

- Supravesical fossa is located between the remnants of the medial and left-right umbilical ligaments.
- Sac may remain above the pelvis forming an external supravesical hernia or pass caudally and form an internal supravesical hernia.
BROAD LIGAMENT HERNIA

- 4% - 5% of all internal hernias
- SB is the herniated gut in > 90%
- > 85% in parous women
- Congenital and acquired
- Acquired defects due to surgical trauma, pregnancy and birth trauma, perforations following vaginal manipulation, PID
BROAD LIGAMENT HERNIA
CLASSIFICATION

- Type 1 = defect caudal to round ligament
- Type 2 = defect above round ligament
- Type 3 = defect between the round and broad ligament through the mesoligamentum teres
BROAD LIGAMENT HERNIA

CT FINDINGS

- Cluster of dilated SB with A-F levels in the pelvic cavity
- Distended bowel loops compress the rectosigmoid dorsolaterally and the uterus ventrally
TRANSMESENTERIC OR RETROANASTOMOMOTIC INTERNAL HERNIAS FOLLOWING LIVER TRANSPLANTATION

- SBO 100%
- Medial duodenojejunal junction 100%
- Central displacement of colon 100%
- Engorged mesenteric vessels 100%
- Crowding mesenteric vessels 100%
- Cluster of SB loops 88%
TRANSMESENTERIC OR RETROANASTOMOTIC INTERNAL HERNIAS FOLLOWING LIVER TRANSPLANTATION

- Central displacement of colon 88%
- Lack of overlying omental fat 88%
- Depressed duodenojejunum 75%
- Ascites 50%
- Whirl sign 50%
- Mural SB thickening 50%
- Saclike mass 25%

Blacher Radiology 218:384-388, 2001
INTERNAL HERNIAS
ASSOCIATED WITH RYGB

• Transmesocolic
• Small bowel mesentery
• Petersen type
INTERNAL HERNIAS ASSOCIATED WITH GASTRIC BYPASS: CT FINDINGS

- Swirled mesentery
- Mushroom
- Hurricane eye
- SBO
- Clustered loops
- SB behind SMA
- R sided anastomosis

Lockhart AJR 188: 745-750, 2007
THINK INTERNAL HERNIA

- GASTRIC BYPASS PATIENT
- OBSTRUCTION WITH NO EXTERNAL HERNIA OR HISTORY OF SURGERY
- CLOSED LOOP OR STRANGULATION
BE VERY SUSPICIOUS

- Gut in abnormal location
- Swirled mesentery
- Sac-like collection of gut