Objectives

- Adenomyomatosis
- Acute cholecystitis
- Chronic cholecystitis
- Xanthogranulomatous cholecystitis
- Complicated cholecystitis: gangrenous, hemorrhagic, emphysematous.
- Gallbladder perforation.
- Gallbladder carcinoma
- Gallstone ileus

Adenomyomatosis (AMT)

- One of the 2 hyperplastic cholecystoses
- Proliferation of mucosal epithelium with invagination into hypertrophied muscular layer.
- Aka intramural diverticulosis
- Intramural diverticula = Rokitansky-Aschoff sinuses.
- AMT is common, up to 8% of cholecystectomy (CCK) specimens

AMT 3 Forms

2. Segmental/annular. Circumferential stricture divides the gallbladder (GB) into 2 compartments. Usually mid GB.
3. Diffuse.

AMT US Findings

- Diffuse or segmental wall thickening (WT).
- Fundal form with focal wall thickening or polypoid nodule/mass.
- Anechoic intramural diverticula +/- echogenic foci.
- Small stones in diverticula with reverberation of US waves between cholesterol crystals, causes comet-tail artifact.
- Often with co-existent gallstones.
- Most common: small # of comet-tails.
**AMT Diff Dx**

- Annular form or fundal form vs. GB carcinoma (GBC). No comet-tails in GBC. Diffuse form vs. acute or chronic cholecystitis. No comet-tails in cholecystitis.
- Diffuse form vs. acute or chronic cholecystitis. No comet-tails in cholecystitis.
- AMT vs. emphysematous cholecystitis. Both can display comet-tails. Clinical setting.

**AMT Imaging considerations**

- CT with nonspecific focal or diffuse wall WT. CT rarely able to resolve intramural diverticula. Do US for comet-tails.
- Equivocal US with focal WT, no convincing comet tails. Do MR, not CT. MR can resolve intramural diverticula as high T2 foci. “string of pearls”

**AMT and GBC**

- 1992, Ootani et al, Japan, reported increased incidence of GBC in segmental AMT (6.4%) compared to other forms of AMT and compared to pts without AMT (3.1%). P<0.025.
- 3197 consecutive CCK’s.
- In all 12 pts with AMT and GBC in this series, all had segmental AMT, and in all 12 the carcinoma was in the fundal subcompartment.
- Conclusion, pts with segmental AMT should be closely followed.

**Acute Acalculous Cholecystitis (AAC)**

- Seen in already sick patients who get worse. Often in the ICU.
- Suspect in a sick patient with fever, ^WBC, without obvious source.
- More fulminant, higher mortality (up to 65%) than acute calculous cholecystitis.
- Predisposing factors: bile stasis, systemic infection, GB ischemia, cystic duct obstruction.

**AAC Imaging findings**

- WT, sludge, distension: not specific in ICU pts.
- Murphy’s sign not reliable in ICU pts.
- Majority of ICU pts have abnormal GB on US.
- CT or MR can better display pericholecystic and hepatic inflammatory change vs. US.
- Cholescintigraphy helpful if the GB is visualized.
- If no other source of sepsis, and GB abnormal, consider diagnostic/therapeutic percutaneous cholecystostomy.

**Chronic Cholecystitis**

- Intermittent cystic duct obstruction and chronic inflammation.
- Results in thickened, fibrotic GB wall.
- Small GB, despite fasting
- Gallstones 95%.
- US: echogenic band surrounding the mucosa.
- MR: diffuse low T2 WT due to fibrosis.
- Decreased GB ejection fraction.
Xanthogranulomatous cholecystitis

- Rare type of chronic cholecystitis
- Chronic infection, stones, extrav of bile into wall, chronic inflammatory response with histiocytes.
- Intramural XG nodules and fibrosis.
- GB adherent to other structures, fistulæ.
- Infiltrating inflammatory mass
- Resembles GBC on imaging. Bx for dx.

Complicated types of Acute cholecystitis

- Gangrenous
- Hemorrhagic
- Emphysematous
- Gallbladder perforation

Gangrenous cholecystitis

- Severe form of acute cholecystitis
- Progressive distension…. ischemic necrosis of wall.
- US findings:
  - striated, edematous, irregular WT.
  - foci of marked GB wall thinning
  - sloughed membranes due to desquamated mucosa.
  - intramural abscess or hemorrhage
  - pericholecystic(pc) fluid/abscess

Hemorrhagic Cholecystitis

- Usually seen with gallstones and gangrenous cholecystitis
- Mural necrosis with hemorrhage into GB lumen.
- Rare cause of hematemesis or melena or hemoperitoneum.
- US: echogenic thrombus in GB lumen, other signs of cholecystitis
- CT: layering blood products/hematocrit
- MR: blood products

Emphysematous cholecystitis

- Cystic artery compromise, gangrene, gas-producing organisms in anaerobic environment. C. welchii, E. coli.
- Diabetes(50%), male(71%). Mortality 15%.
- Gas in GB lumen…wall…perforation with gas in pericholecystic tissue.
- Perforation…abscess…pneumoperitoneum
- US: comet-tails, echogenic wall with echogenic dirty shadowing.
- CT: to confirm, better define pc findings

Emphysematous itis diff dx

- Contracted GB with stones(WES). 2 echogenic bands with clean shadowing
- Porcelain GB. 1 echogenic band with clean shadowing.
Gallbladder perforation

- About 10% incidence in acute cholecystitis
- Increases mortality to about 24%.
- Usually due to ischemia, gangrene, mural necrosis.
- Fundus most frequent site of perforation.
- Types: subacute with abscess, most common free into peritoneal cavity (GB collapsed) chronic with cholecystenteric fistula
- US: irregular wall, wall defect, pelvic fluid/abscess
- CT to better define.

Gallbladder carcinoma (GBC)

- Most common biliary malignancy, > cholangioma.
- RUQ pain, jaundice, wt loss, or incidental at CCK.
- Risk factors: gallstones porcelain GB GB adenoma anomalous pancreaticobiliary duct jet carcinogenic chemicals
- 90% adenocarcinoma
- 60% start in fundus, 30% in body

GBC Imaging

- Most common: complex mass obscuring or replacing GB, necrosis, adjacent fluid, stones, liver invasion, biliary obstruction.
- Polypoid mass in GB lumen. Broad-based, nonmobile, no shadowing. Stones. Diff dx: sludge, thrombus, large polyps. This type usually well diff.
- Focal or diffuse WT. Least common. Difficult dx.
- Early WT is subtle, WT nonspecific, chronic cholecystitis often present in GBC, focal WT obscured by stones or porcelain GB.

GBC patterns of spread

- Direct invasion: liver, hepatoduodenal ligament, colon, duodenum.
- Nodes: first cystic and pericholedochal, then nodes near head of pancreas, celiac, SMA, periaortic.
- Hematogenous to liver.
- Intraductal.
- Intraperitoneal.
- Most pts unresectable at presentation.

GBC diff dx

- Complicated cholecystitis with pelvic fluid/abscess
- XG cholecystitis
- AMT
- Polypoid mass: large benign polyp, carcinoid, metastasis
- Large mass replacing GB: HCC, cholangioma, large metastasis.

GB Histologic layers

- Mucosa
- Lamina propria
- Muscular layer (mucosae vs propria)
- Perimuscular connective tissue layer: continuous with connective tissue layer in liver
- Serosa: limited, none at attachment to liver.
- NO SUBMUCOSA.
Metastasis to GB

- Focal WT, polypoid mass, large mass
- Usually no stones
- Melanoma, breast, HCC

Gallstone ileus

- Mechanical bowel obstruction by migrated gallstone. Most commonly ileum. If duodenum or pylorus, “Bouveret’s syndrome”.
- Cholecystoenteric fistula. Most commonly duodenum. Patients usually present with symptoms of bowel obstruction, GB disease is not suspected.
- US: pneumobilia, GB can be contracted, dilated bowel.

References