Gallbladder Cancer Statistics

- Relatively uncommon cancer in the US
- Most common biliary tract malignancy
- Estimated about 6000 new cases each year
- About 1/3 of cases result in death
- Three times more common in women than men

Clinical Diagnoses of GB Carcinoma

Variety of clinical diagnoses:
- Malignancy found incidentally on imaging
- Malignancy found intra-operatively at cholecystectomy
- Malignancy found incidentally by histopathology after cholecystectomy for gallstones or cholecystitis (incidental GB CA seen in 1% - 3% of elective cholecystectomy for gallstones)

Clinical Diagnoses of GB Carcinoma

- Most patients present with advanced disease and are symptomatic
- Symptoms usually vague and indolent: abdominal pain, anorexia, jaundice, weight loss, palpable mass
- Anatomic factors promoting early local spread (thinness of muscular layer and continuity of connective tissue of GB wall with connective tissue of the liver)
- Ease of tumor invading the liver, biliary tree, lymphatic and vascular channels and peritoneal cavity

Risk Factors for GB Cancer

- Gallstones
  - Most common risk factor, present in 74%-92% of affected patients
  - Cause chronic inflammation leading to mucosa dysplasia and subsequent carcinoma
- Porcelain GB: 10-25% of patients have GB CA
- Female gender
- Older age
  - Average age at dx is 72
  - 75% of patients are older than 65
## Risk Factors for GB Cancer

- Gallbladder polyps (>1cm more likely to be cancerous)
- Pathologic and congenital anomalies
  - Choledochal cysts and cystic dilatation of the biliary trees
  - Low insertion of the cystic duct, anomalous junction of the pancreatico-biliary ducts (chronic biliary reflux of pancreatic secretions leading to mucosal metaplasia and subsequent carcinoma)
- PSC (5-10% of patients with PSC have GB CA)
- Ethnicity and geography
  - USA: highest among Mexican and Native Americans
  - Worldwide: more common in Asian, Eastern Europe, and South American countries

## Gallbladder CA Imaging

Three different imaging patterns corresponding to macroscopic examination

1. A soft tissue mass replacing the gallbladder and invading the liver (40%-65%)
2. Focal or diffuse gallbladder wall thickening as well as asymmetric wall thickening (20%-30%)
3. An intraluminal polypoid mass (15%-25%)

## Gallbladder Carcinoma: US Imaging

1. Carcinoma presenting as a soft tissue mass replacing the gallbladder
   - Non-visualization of the GB with presence of gallstones within the mass is most diagnostic
   - Heterogenous predominantly hypoechoic mass with irregular margins reflecting varying degrees of necrosis
   - Echogenic foci associated with shadowing related to gallstones, GB wall calcification or tumor calcification

## Gallbladder Carcinoma: US Imaging

- Direct extension to liver: tumor inseparable from liver
- Direct extension to biliary tree: bile duct obstruction
- Liver metastases
- Color and spectral Doppler helpful in differentiating tumor-factive sludge from mass lesion (although CT more sensitive and specific)
- DDx: Central liver malignancies (HCC, Cholangio CA, Mets) invading the gallbladder

## 87 yo patient with abdominal pain

Abdominal Ultrasound
Gallbladder Carcinoma: US Imaging

- Carcinoma presenting as an intraluminal polypoid mass
  - Intraluminal polypoid mass immobile with changes in position (differentiating from mobile tumoractive sludge but difficult to distinguish from non shaddowing, adherent stone or sludge)
  - Color flow Doppler helpful when vascularity is seen
  - Contrast enhanced MR or CT helpful to assess enhancement
  - Features of polypoid lesion associated with malignancy:
    - Size>10mm (prevalence of malignancy 37% to 88%)
    - Thickening or nodularity of GB wall
    - Evidence of hepatic invasion and/or lymphadenopathy

Gallbladder Polyps

- Common, prevalence up to 12%
- Most often incidental findings (abd US or post cholecystectomy), most are benign
- Classifications:
  - Benign: Neoplastic and non-neoplastic (cholesterol polyps most common 60-90%)
  - Malignant: Gallbladder carcinoma
- Symptoms: nonspecific and vague, often asymptomatic
  - Cholesterol polyps may detach and act clinically as gallstone or causing acaulous cholecystitis
- US: Unable to reliably distinguish between neoplastic and non-neoplastic polyp (high resolution US or EUS may improve differentiation)

Management of GB Polyps

- Primary goal: To prevent the development of GB carcinoma due to its poor prognosis, even though it is a rare disease

- Cholecystectomy is recommended:
  - Any symptomatic polyps
  - 6mm or greater with associated risk factors (PSC, Peutz-Jeghers syndrome, familial adenomatous polyposis, age>60, gallstones)
  - Polyps > 10mm
  - Fast-growing polyps
  - Sessile, wide-based or long pedicle polyps
  - Polyps in the neck or associated with abnormal GB wall on US
Management of GB Polyps

Polyps without signs of malignancy or risk factors
- Polyps < 6mm are not followed up
- Polyps 6-9 mm
  - 6 month follow up
  - If no changes in size, contour or vascularity, another follow up US in 12 months
  - If no changes, no further imaging studies *

87 yo female presenting with loss of appetite and dehydration
CT Abdomen and Pelvis
8mm enhancing GB nodule, recommend US

Gallbladder Carcinoma: US Imaging

Carcinoma presenting with focal or diffuse wall thickening
- Most diagnostic challenging of the three patterns
- Mimic appearance of the more common acute and chronic inflammatory conditions of the GB (acute and chronic cholecystitis, xanthogranulomatous cholecystitis, adenomyomatosis) and diffuse hepatic or systemic disease (hepatitis, renal, cardiac, etc.)

9.5 mm polypoid lesion with mildly focal thickened wall
Due to symptoms, cholecystectomy was performed
Path: Chronic cholecystitis. Invasive adeno carcinoma

Gallbladder Carcinoma: US Imaging

Carcinoma presenting with focal or diffuse wall thickening
- Correlation of the associated imaging findings with the clinical presentation may help determine the cause
- Characteristics suggesting malignancy:
  - Focal, asymmetric or irregular wall thickening
  - Wall thickening > 1cm (suggesting malignancy vs complicated cholecystitis)
  - MRI helpful in Dx of adenomyomatosis

59 yo female RUQ pain r/o acute cholecystitis
83 yo male presenting with weakness and confusion
Non contrast CT

Mild GB wall thickening and gallstones, suggesting cholecystitis
US recommended

HIDA scan: Negative for acute cholecystitis
MRI recommended
DUE TO SYMPTOMS, CHOLECYSTECTOMY WAS PERFORMED FOR CONCERNS OF ACUTE CHOLECYSTITIS

Primary Gallbladder Lymphoma

ADENOMYOMATOSIS
Epithelial proliferation, muscular hypertrophy and intramural diverticula (Rokitansky-Aschoff sinuses), segmentally or diffusely involving the GB

US finding:
Cholesterol crystals, seen as 'comet-tail' reverberation artifacts within a thickened GB wall
Air may produce a similar artifact as in emphysematous cholecystitis but patient usually ill in contrast to those with adenomyomatosis.

MRI: may help differentiate adenomyomatosis from GB CA by depicting Rokitansky-Aschoff sinuses

XANTHOGRANULOMATOUS CHOLECYSTITIS
An unusual variant of chronic cholecystitis, characterized by a lipid-laden inflammatory process comparable to xanthogranulomatous pyelonephritis.

Imaging findings:
- Marked GB wall thickening, often containing hypoechoic intramural nodules at sonography and hypodensities at CT, representing abscesses or foci of xanthogranulomatous inflammation

Without associated features suggesting GB CA as liver, bile duct invasions, nodal metastases, distinction between these two entities often impossible preoperatively

Cases to ponder

82 yo female presented with RUQ pain for 1 week

US: contracted gallbladder with stones and wall thickening equivocal Murphy's sign but diffuse abdominal pain concerning for acute cholecystitis
Non-contrast CT: Gallstones, inflammation, hypodense area in the liver? Focal fat vs abscess from focal perforation vs liver lesion

Path: Invasive adenocarcinoma of the GB (unsuspected)

66 yo female presenting with abdominal pain
US: Cholelithiasis without sonographic findings to suggest acute cholecystitis
Liver mass concerning for mets. Rec CT or MR

Path: Invasive adenocarcinoma of the GB (unsuspected)

Patient is scheduled for elective cholecystectomy in 2 weeks
But represented to ER in 1 week with severe abdominal pain.
Surgery done same day for suspected acute cholecystitis

Path: Adeno carcinoma of GB
Post surgery MRI obtained

MRI: confirm hepatic mass
US guided BX of liver lesion
Path: Metastatic adeno carcinoma from GB CA

61 yo male who fell 4 weeks ago
complaining of back pain
US abdomen ordered

US: 2.5 cm heterogeneous mass within the GB with focal areas of shallowing and thickened wall, concerning for GB carcinoma
Gallbladder Carcinoma

- Uncommon but aggressive disease with poor prognosis
- Better understanding of clinico-pathologic characteristics and risk factors of GB carcinoma are necessary for early detection and establishing appropriate treatment strategies for curative treatment and long term survival
- Primary goal in management of GB polyps is to prevent development of GB carcinoma

Gallbladder Carcinoma Imaging

- Ultrasound often the initial study for patient suspected of gallbladder disease
- CT and MR imaging helpful and complimentary
  - Adjunct to an inconclusive abdominal US
  - Differentiating adherent sludge/polyp/mass in equivocal cases
  - Contracted gallbladder with stones and acute symptoms
  - Staging of GB carcinoma

THE END
THANK YOU