Management of Gallbladder Diseases

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Content

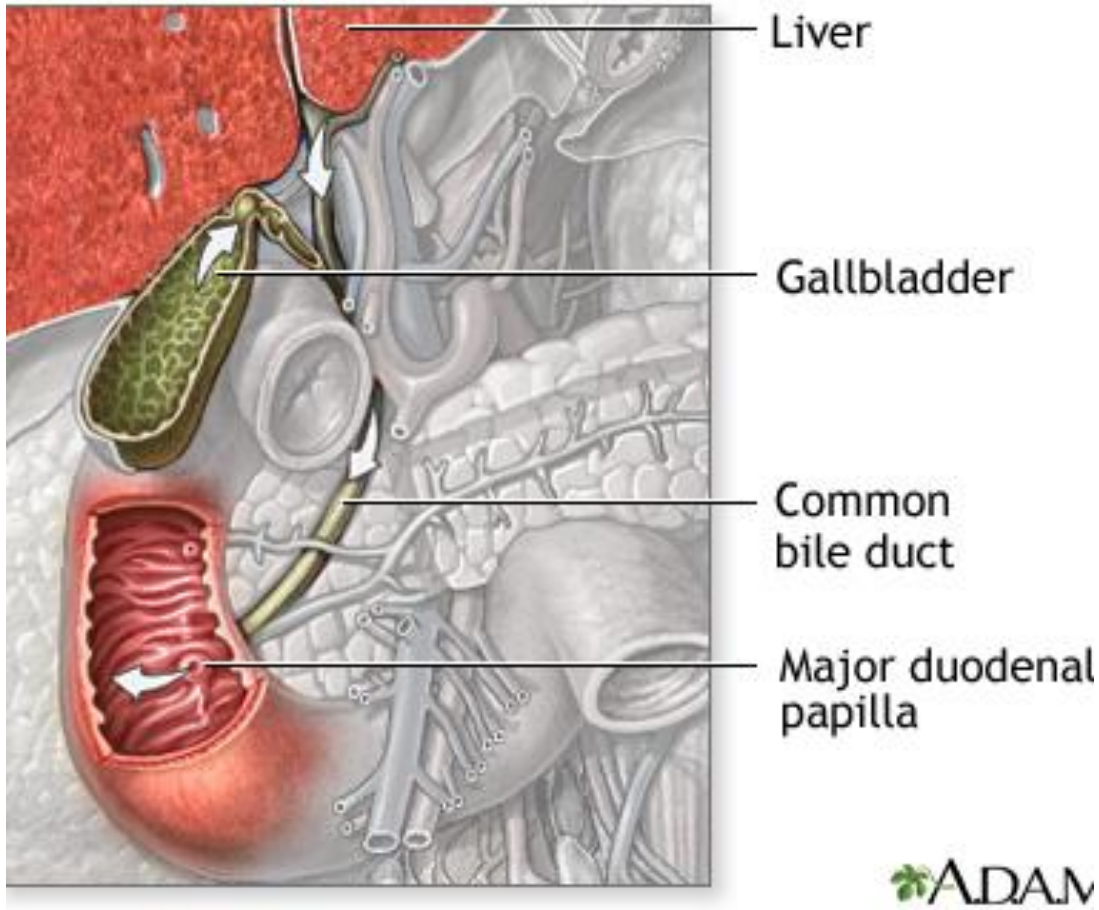
- Scope of gallbladder diseases
- Evaluation
  - H&P
  - Labs
  - Imaging
- Cholecystectomy vs cholecystostomy
- Cholangiogram, ERCP
- Cirrhosis and Pregnancy
- Cases

Gallbladder Disease

- Spectrum of disease involving the biliary tract, usually related to gallstones
- Most costly digestive disease in the US
  - 1 million hospitalizations, 700k operations, $5B/year
- Prevalence of gallstones: 10-15% of general population
  - Increases with age
  - Ethnicities- Pima Indian, Latinos
- 50% of stones remain asymptomatic
- Complication of stones is 1-4% per year

Gallbladder Diseases

- **Asymptomatic cholelithiasis***
- **Symptomatic cholelithiasis***
- **Biliary dyskinesia***
- **Acute cholecystitis***
- **Choledocholithiaisis (asymptomatic)***
- **Choledocholithiaisis (cholangitis)***
- **Gallstone pancreatitis***
- **Acalculous cholecystitis***
- Gallstone ileus
- Gallbladder polyp
- **Gallbladder cancer***
- Porcelain gallbladder
- **Cholangiocarcinoma***

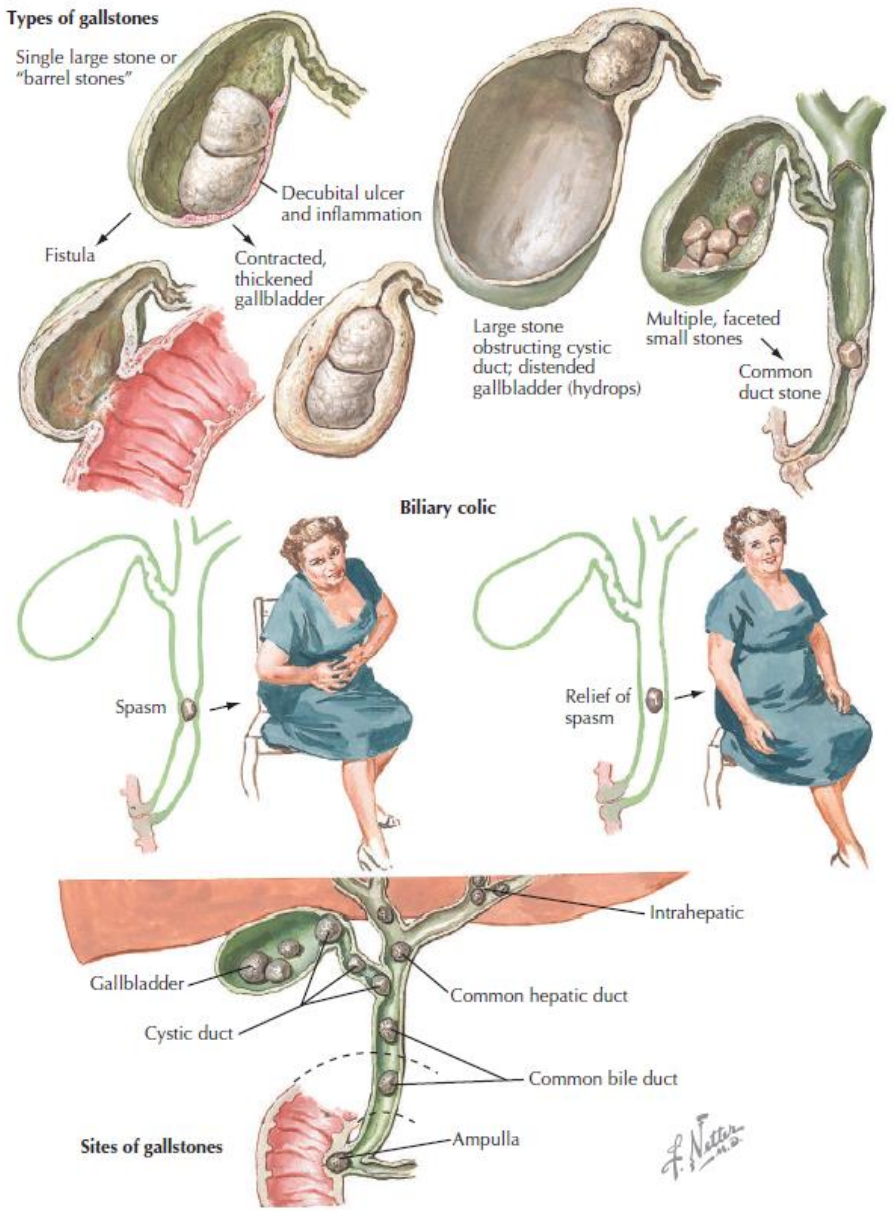


Risk factors for Cholelithiasis

- Cholesterol- supersaturation
- Pigmented- hemolytic conditions/infections
- Age- increases 30s-50s
- Female Gender
- Pregnancy/multiple children
- Hormonal therapy
  - Estrogen: increases biliary cholesterol secretion
  - Progesterone: Decreases bile acid secretion
- Family medical history
- Obesity/rapid weight loss

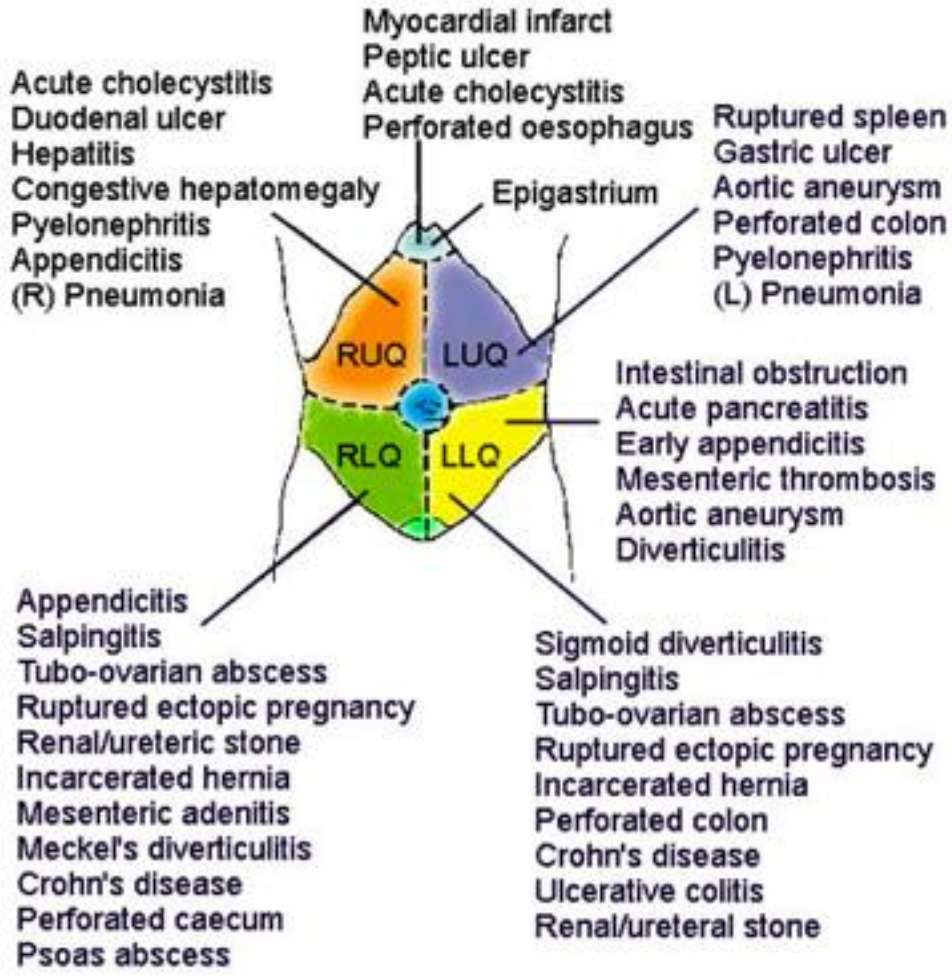
Presentation

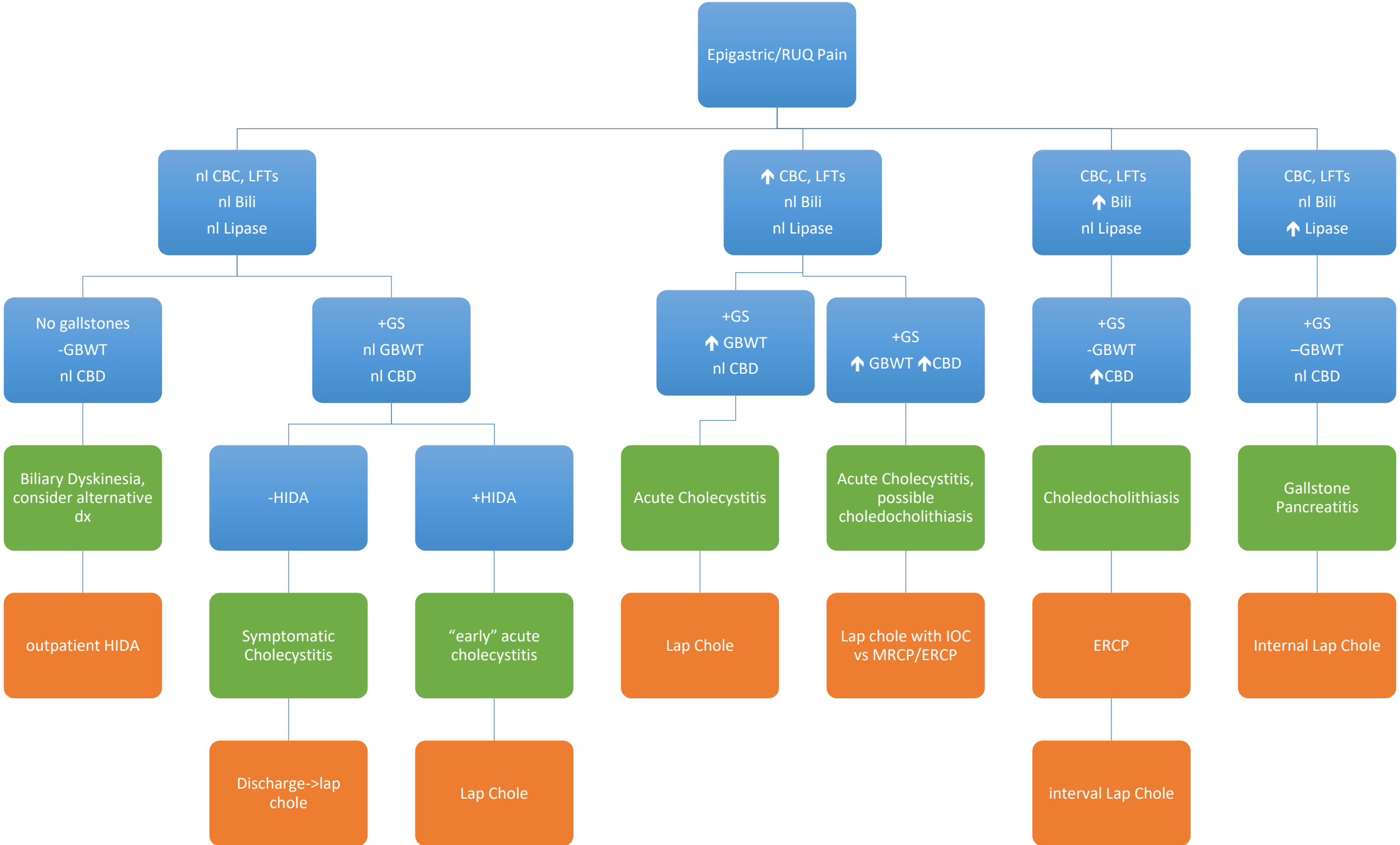
- Biliary Colic
  - Onset ~30 minutes after fatty meal, plateaus ~1hr, resolves ~6hr
  - Constant, intense, dull
  - Epigastrium, RUQ, substernal
  - Radiates to right shoulder blade
- Associated with nausea, vomiting.
- Atypical symptoms:
  - non-specific abdominal pain, distension, bloating, early satiety
  - nausea and vomiting without AP
  - Chest pain, epigastric/retrosternal burning



Differential

- GERD
- PUD
- Hepatitis
- Pancreatitis
- Nephrolithiasis
- RLL PNA
- Appendicitis
- MI




Epigastric/RUQ Pain
nl CBC, LFTs
nl Bili
nl Lipase
↑ CBC, LFTs
nl Bili
nl Lipase
CBC, LFTs
↑ Bili
nl Lipase
CBC, LFTs
nl Bili
↑ Lipase
No gallstones
-GBWT
nl CBD
+GS
nl GBWT
nl CBD
+GS
↑ GBWT
nl CBD
+GS
↑ GBWT ↑CBD
+GS
-GBWT
↑CBD
+GS
–GBWT
nl CBD
Biliary Dyskinesia, consider alternative dx
-HIDA
+HIDA
Acute Cholecystitis
Acute Cholecystitis, possible choledocholithiasis
Choledocholithiasis
Gallstone Pancreatitis
outpatient HIDA
Symptomatic Cholecystitis
“early” acute cholecystitis
Lap Chole
Lap chole with IOC vs MRCP/ERCP
ERCP
Internal Lap Chole
Discharge->lap chole
Lap Chole
interval Lap Chole

Serologic Tests

- WBC
  - Systemic inflammation
- AST/ALT
  - Hepatocellular inflammation/damage
- Bili/AP
  - Cholestasis, biliary obstruction, impaired conjugation
- Lipase
  - Pancreatic Inflammation

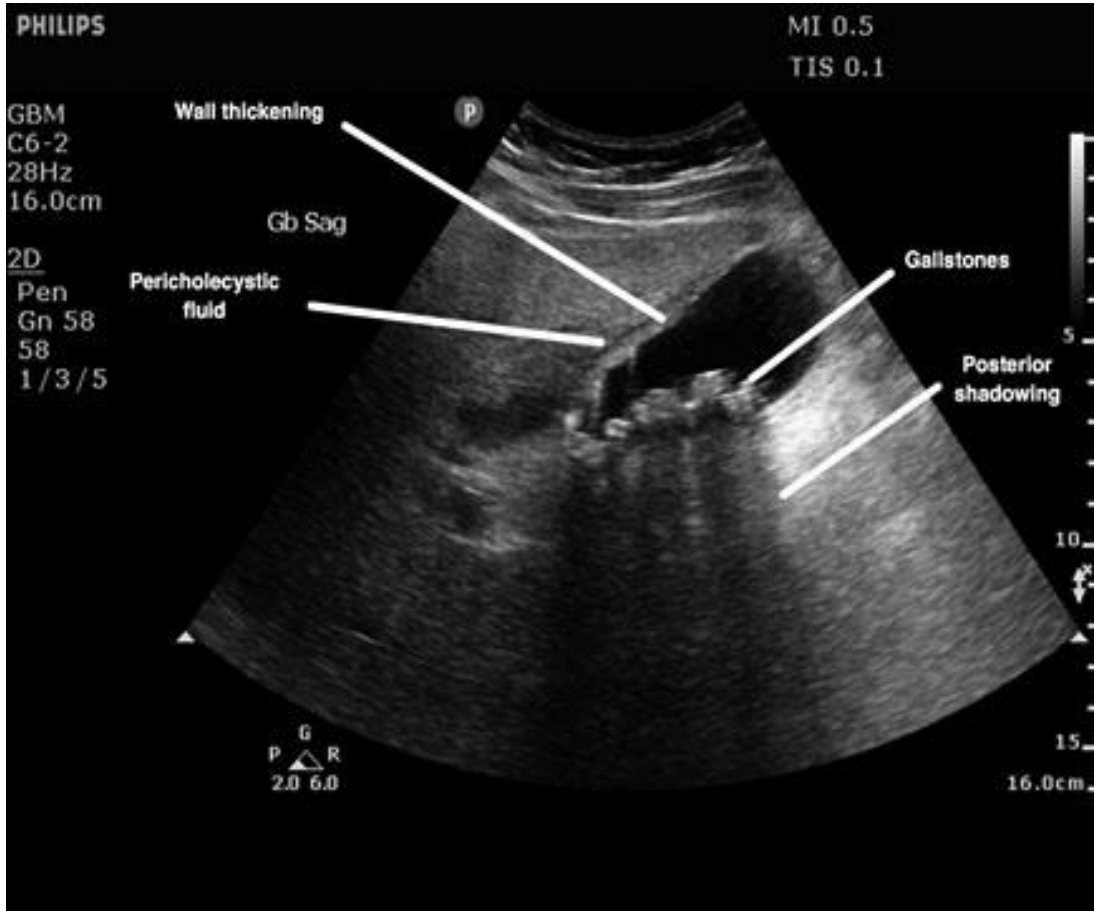
Biliary Imaging

- Imaging
  - Ultrasound
  - Scintigraphy (HIDA)
  - MRCP
  - Computed tomography

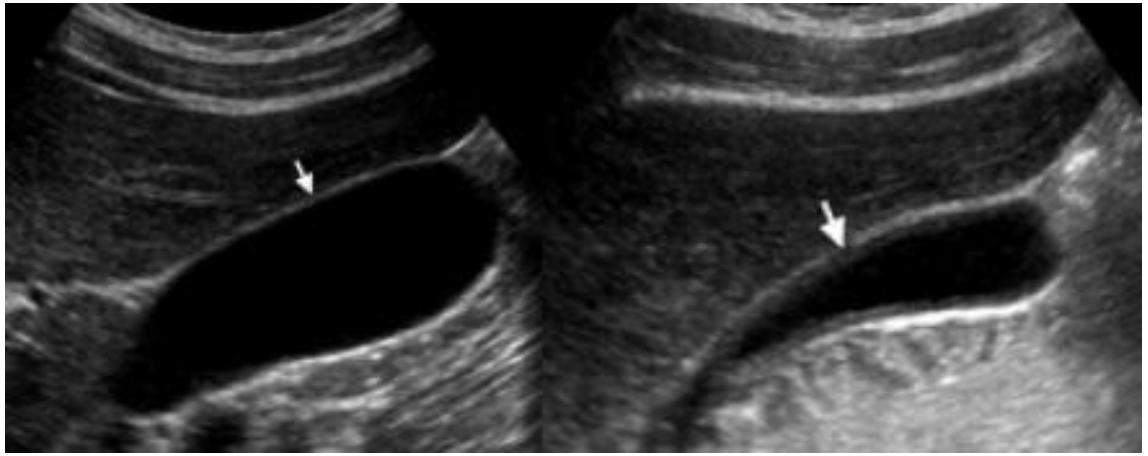
Kiewiet et al. A systematic review and meta-analysis of diagnostic performance of imaging in acute cholecystitis. Raiology 2012 Sep;264(3): 708-20.

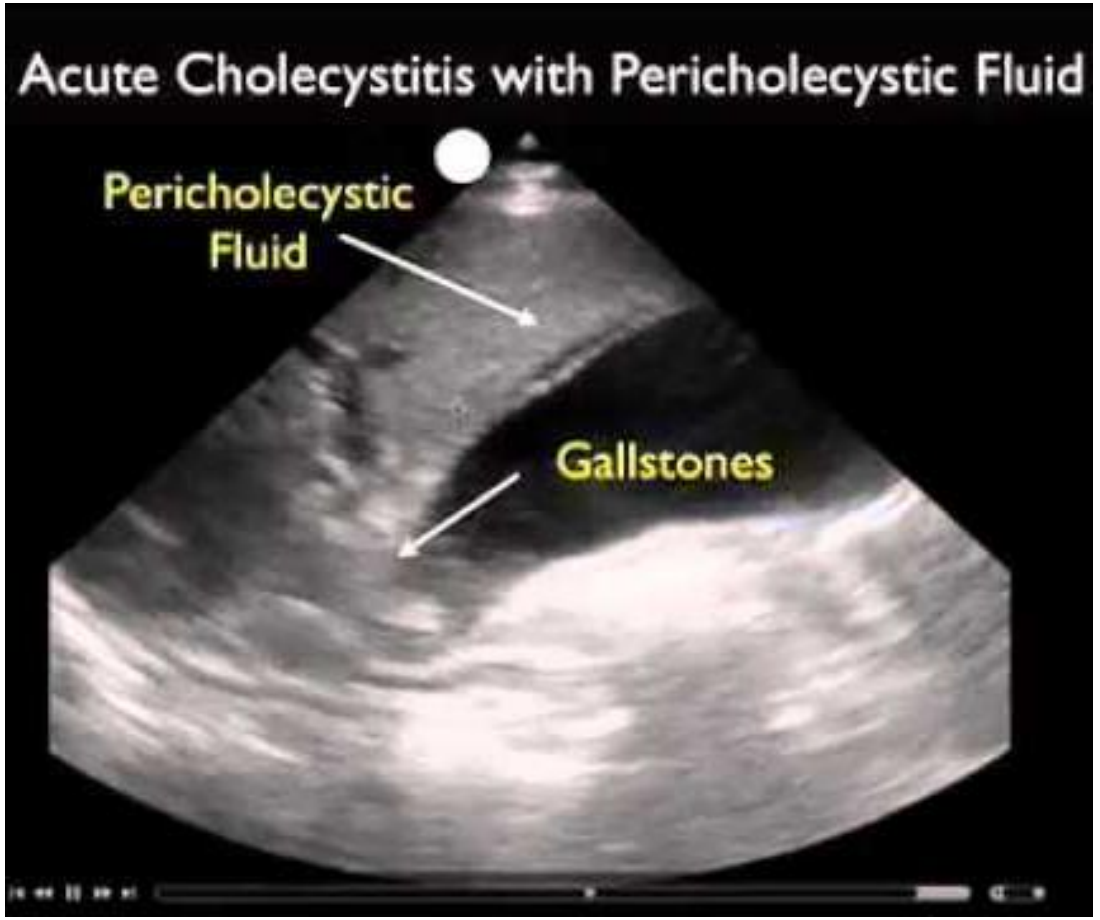
Ultrasound

- Cholelithiasis
- Gallbladder wall thickening >3 mm
- Pericholecystic fluid
- Sonographic Murphy's sign
- Also important: CBD size and presence of CBD stones

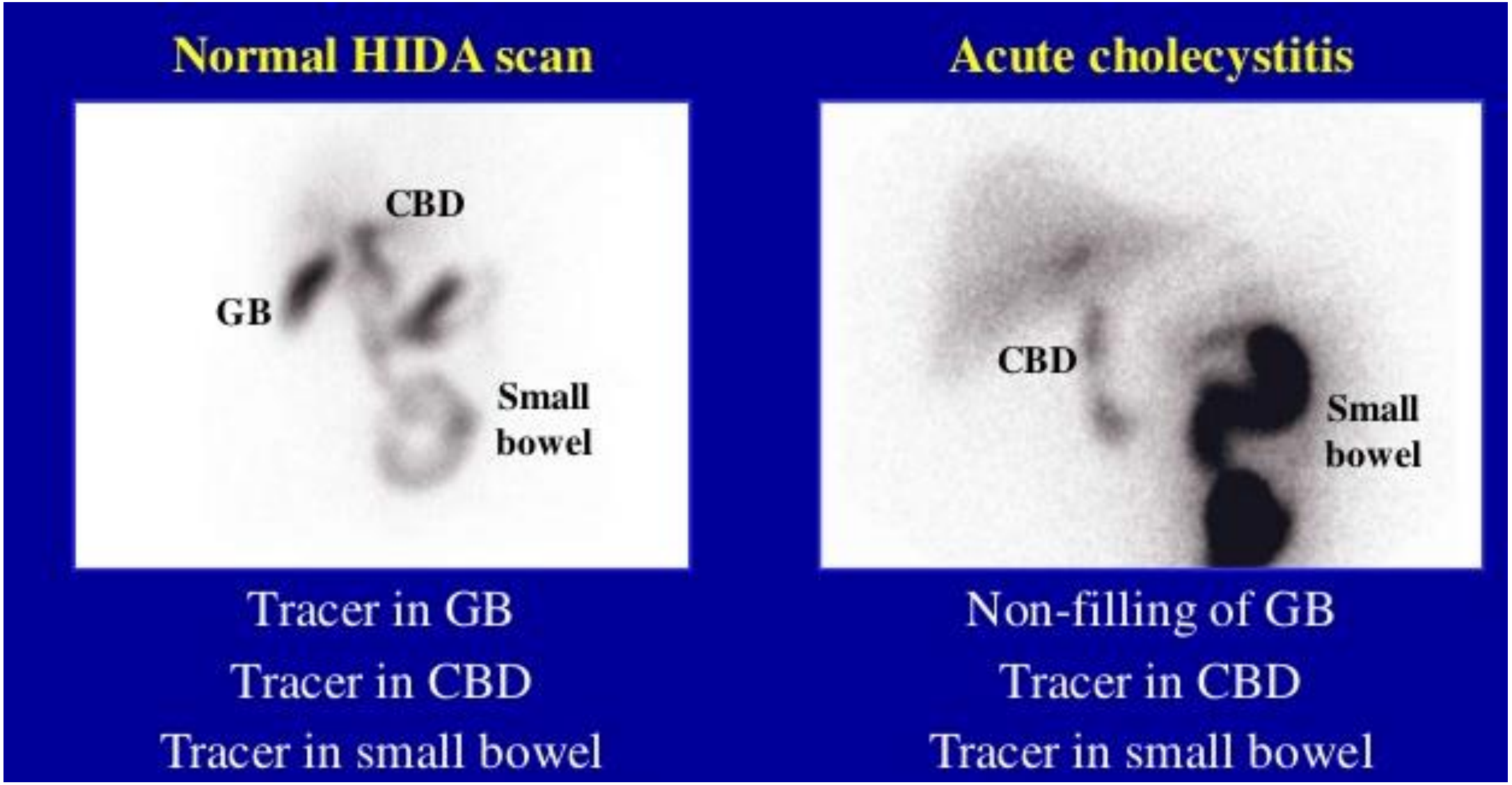


Ultrasound

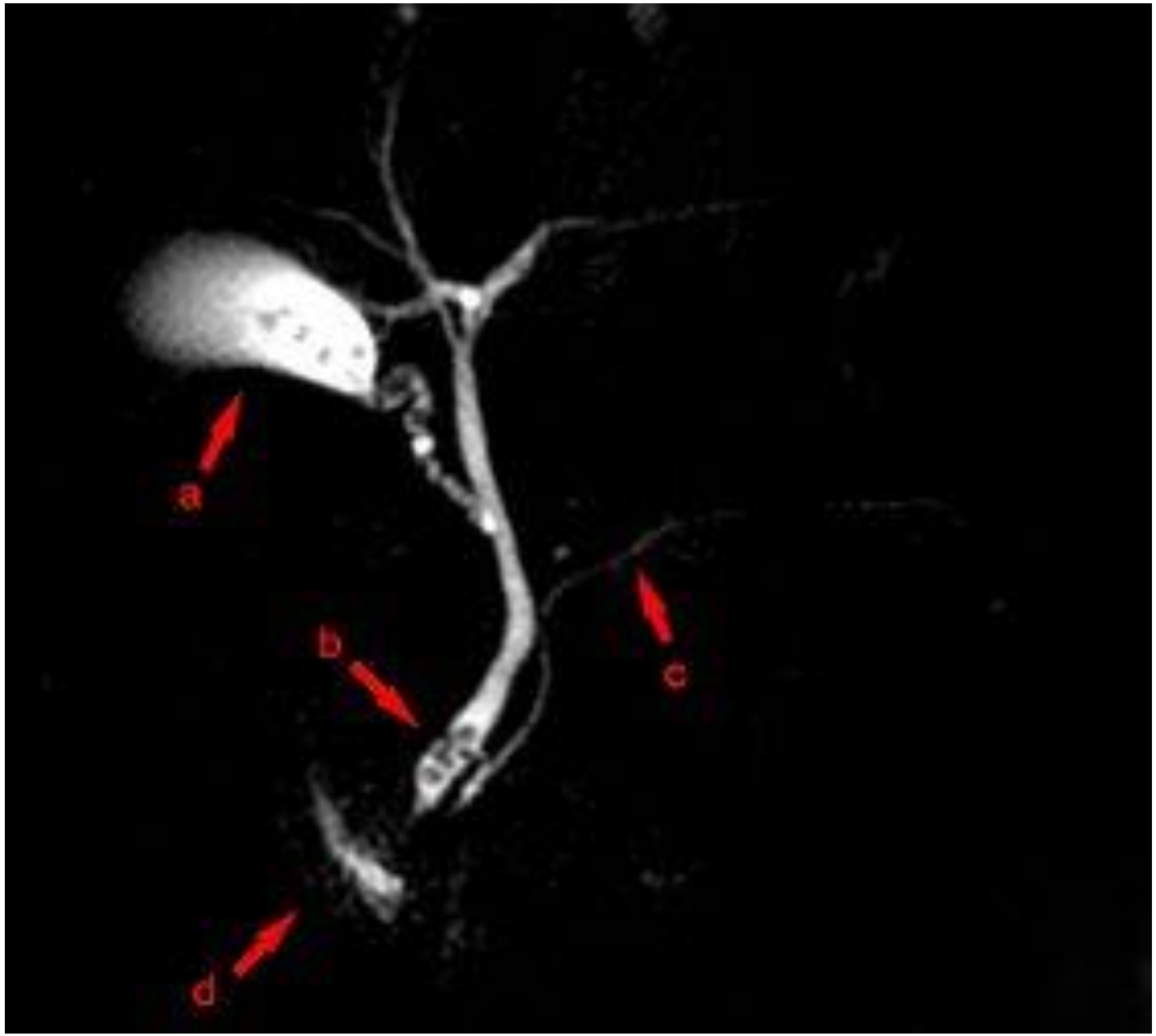



Acute Cholecystitis with Pericholecystic Fluid
Pericholecystic Fluid
Gallstones

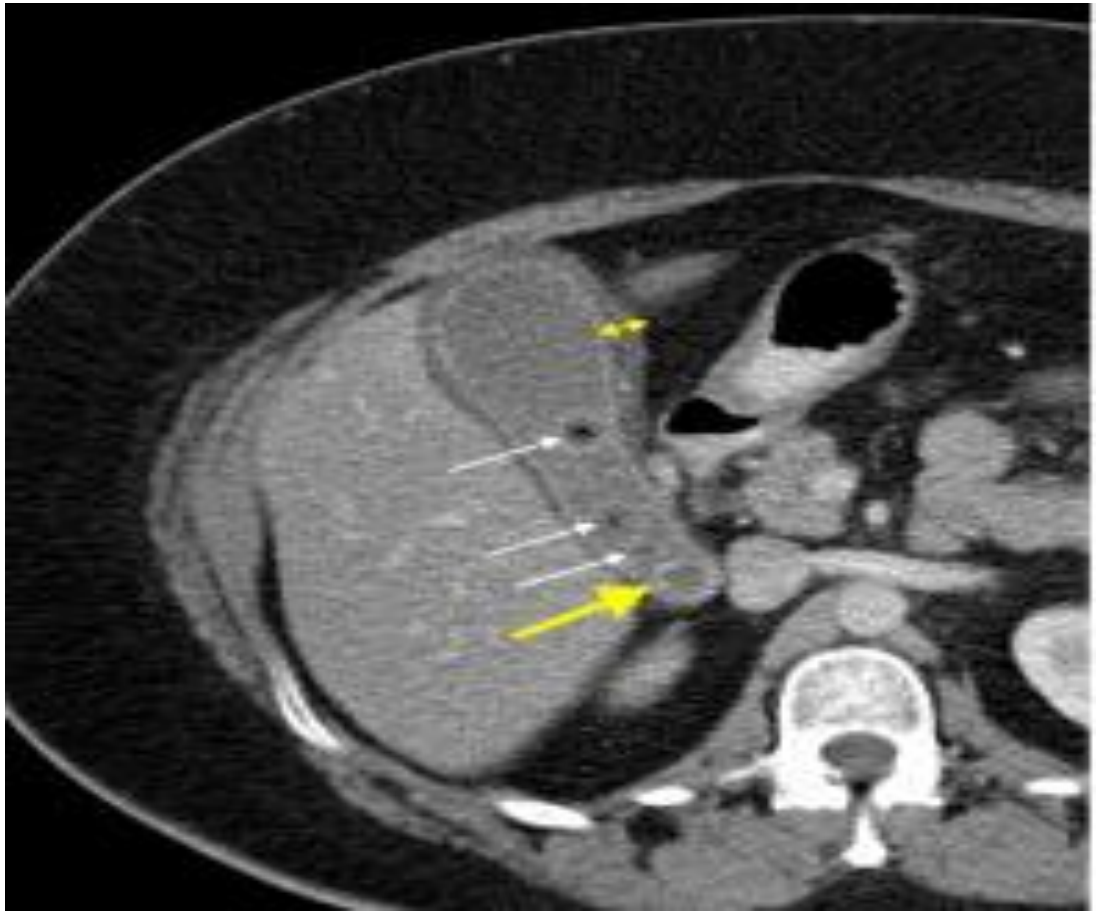
Hepatobiliary Iminodiacetic Acid scan



MRCP



CT

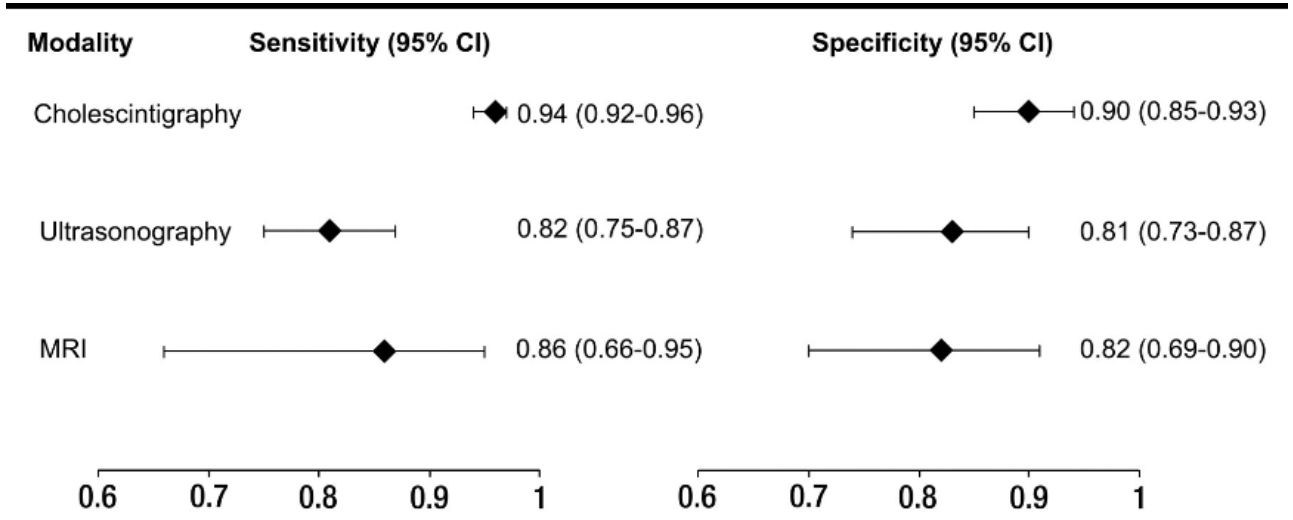


DIFFERENTIAL FOR GBWT

- Acute cholecystitis
- Post prandial physiological state
- **HEPATIC CIRRHOSIS**
- Hepatitis
- **CONGESTIVE HEART FAILURE**
- Fitz-Hugh-Curtis syndrome
- Hypoalbuminemia
- Acute pancreatitis
- Perforated duodenal ulcer
- Gallbladder cancer
- Adenomyomatosis of the gallbladder
    - Radiopaedia.org

Diagnostic Accuracy in Acute Cholecystitis

- HIDA
  - Sensitivity 96% and specificity 90%
- US
  - Sensitivity 82% and specificity 81%
- MR
  - Diagnostic accuracy is comparable to US
- CT
  - Evidence of diagnostic accuracy of CT for suspected cholecystitis is scarce.



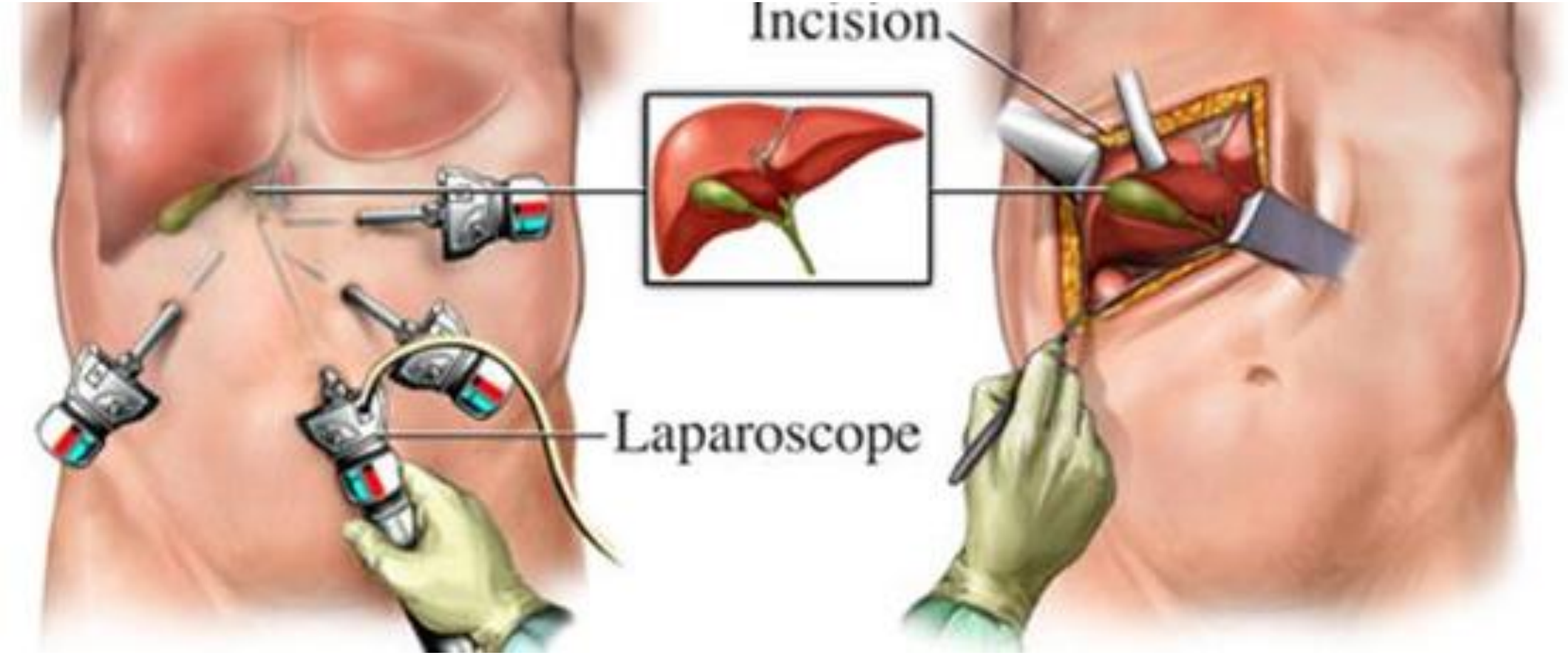
Kiewiet et al. A systematic review and meta-analysis of diagnostic performance of imaging in acute cholecystitis. Raiology 2012 Sep;264(3): 708-20.

Procedures

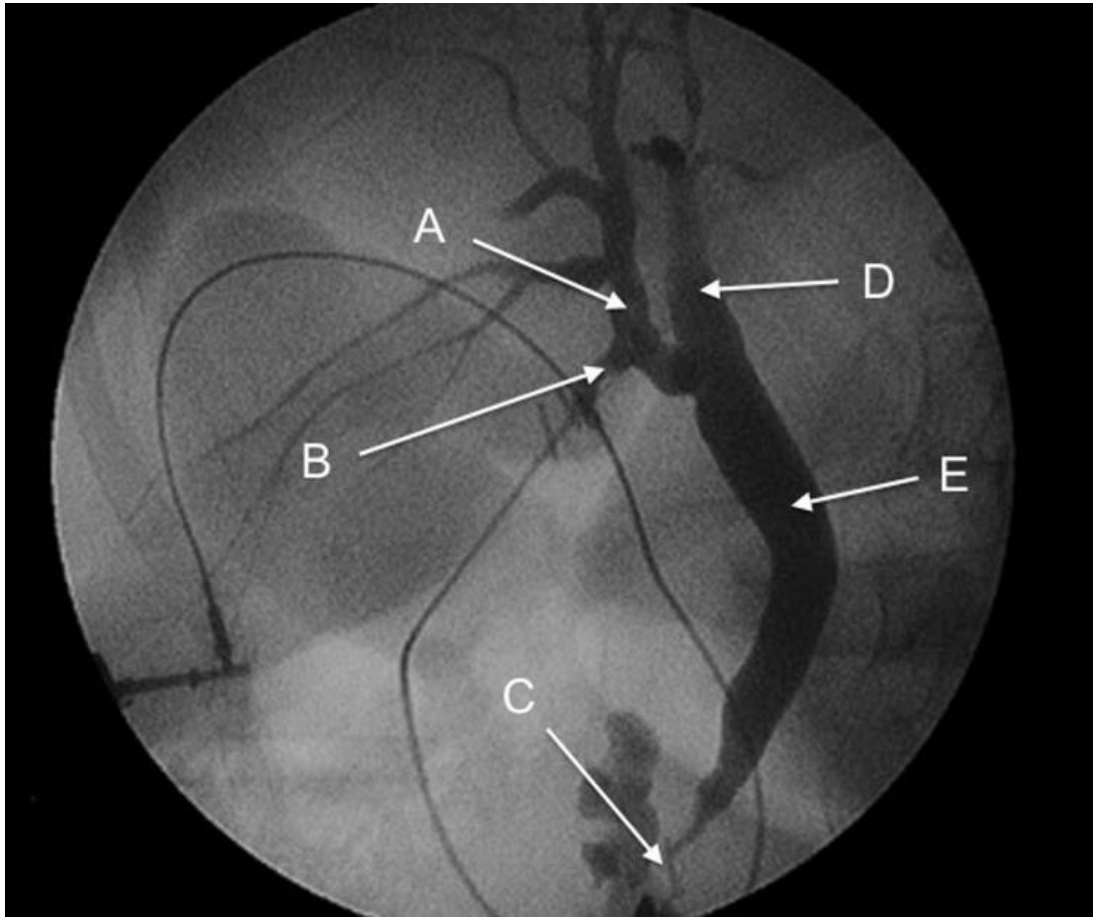
- Treatment of Blocked Cystic Duct
  - Cholecystectomy
  - Percutaneous cholecystostomy
- Treatment of Blocked CBD
  - Intraoperative cholangiogram
  - Endoscopic Retrograde Cholangiopancreatography
  - Percutaneous transhepatic cholangiography

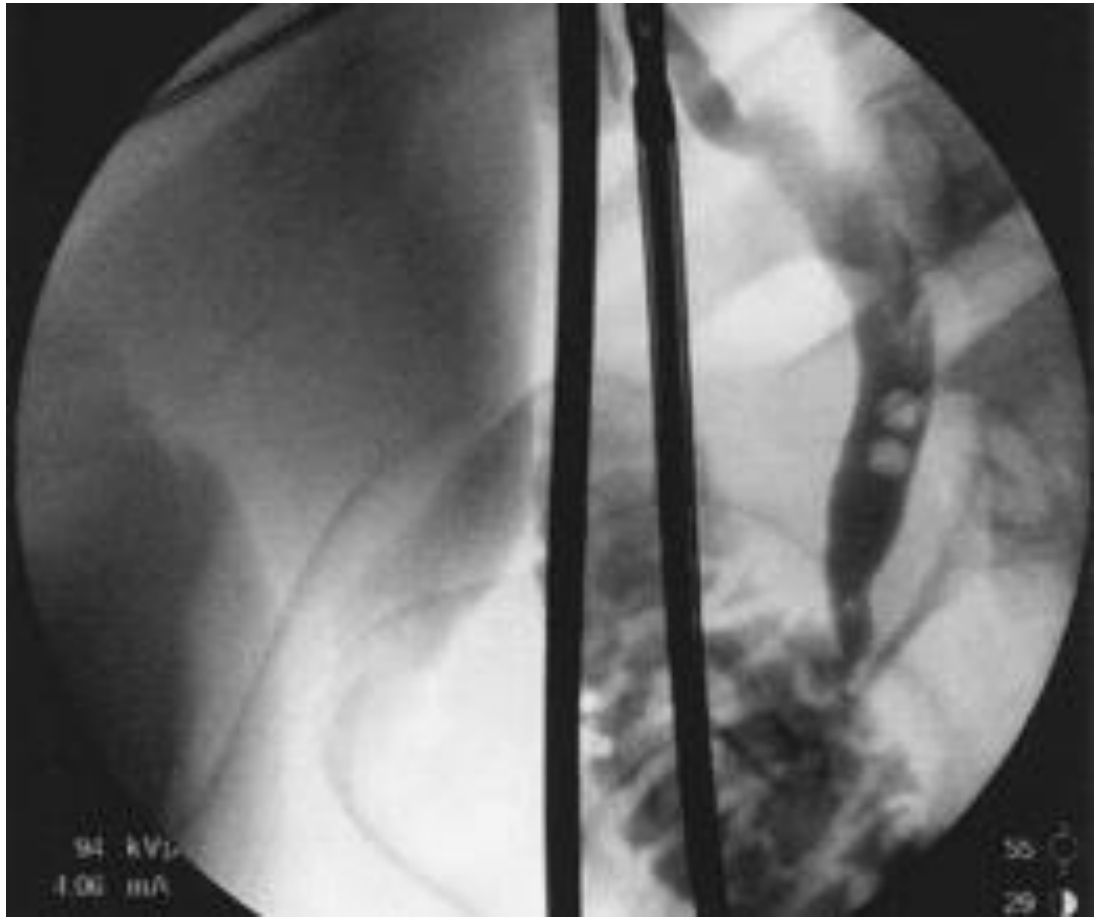
- DO NOT FORGET ANTIBIOTICS
- Treat the sepsis, decompress the system, prevent recurrence.

Cholecystectomy



Intra-operative Cholangiography





Post-op Course

- Depends on severity of initial indication
- Laparoscopic vs open cholecystectomy
- Normal Post-op Course
  - Decline in acute pain and return of bowel function 1-3 days
    - Shoulder pain
  - Return to usual activities and energy in 1-2 weeks
- CAUTION: fevers, worsening AP inability to tolerate PO, new or persistent jaundice suggest possible complications

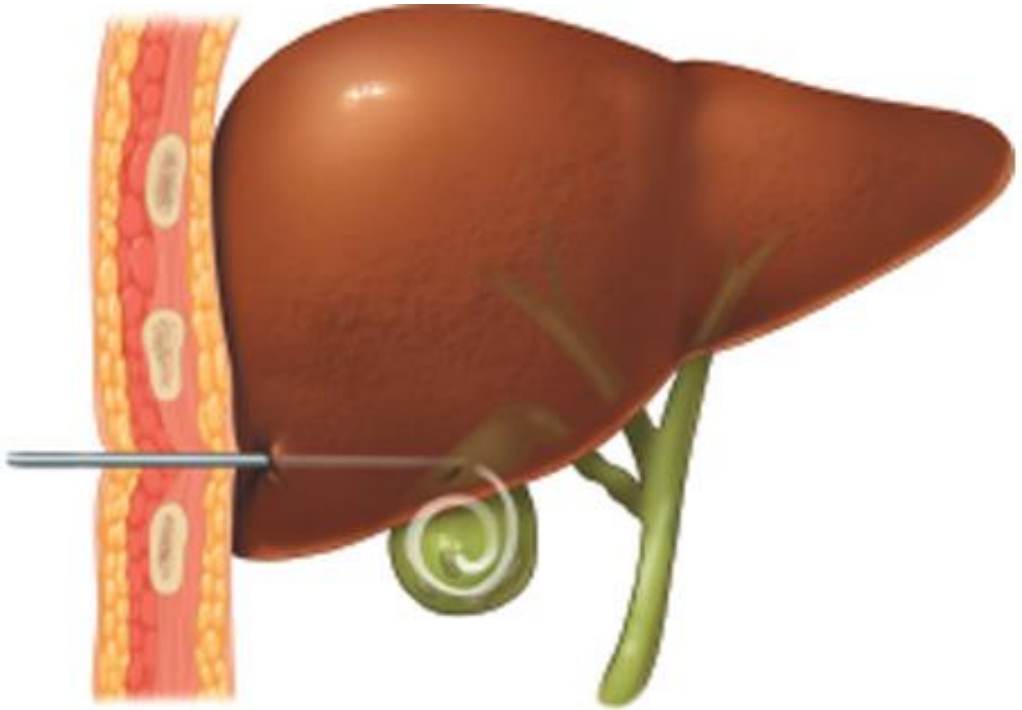
Post-op Complications

- Bleeding, infection, bile leak, CBD injury, retained stone

- Relevant Testing
  - CBC, CMP, lipase
  - US, HIDA, MRCP

Percutaneous Drainage

B



Source: Brunicardi FC, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, Pollock RE: *Schwartz's Principles of Surgery, 9th Edition:* http://www.accessmedicine.com

Early Cholecystectomy vs Percutaneous Drainage

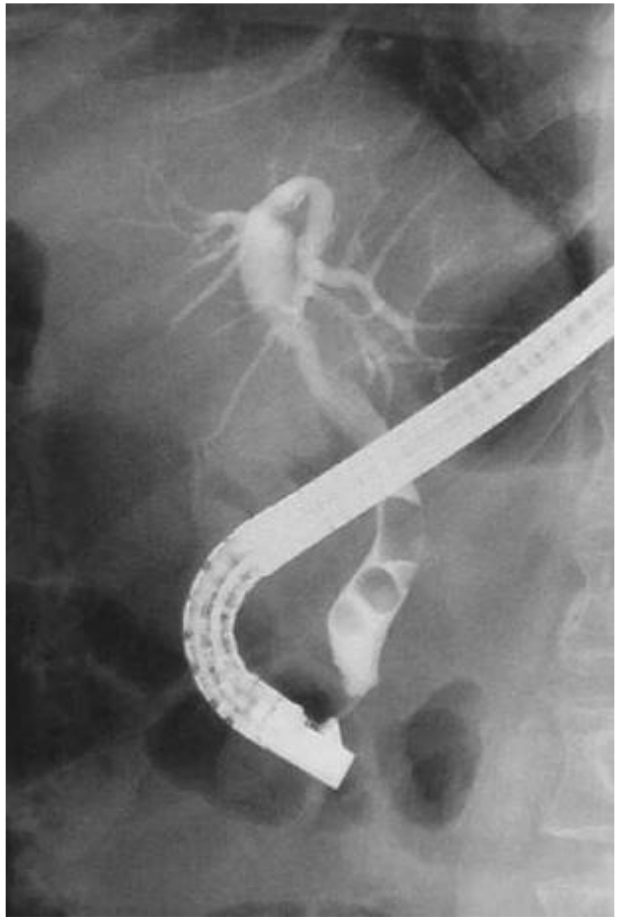
Table 3 Complication rates, mortality, and length of hospital stay

	PD group	EC group	*P*
N	23	19	
Overall complication rate	2(8.7%)	9(47%)	0.011
Minor complications[a]	2(8.7%)	5(26%)	0.21
Major complications[a,b]	0	4(21%)	0.03
90-day mortality	3(13%)	3(16%)	1.0
Overall hospital stay in days	25(7–97)	23(5–65)	0.39
ICU stay in days	10.5(2–71)	3(2–31)	0.17

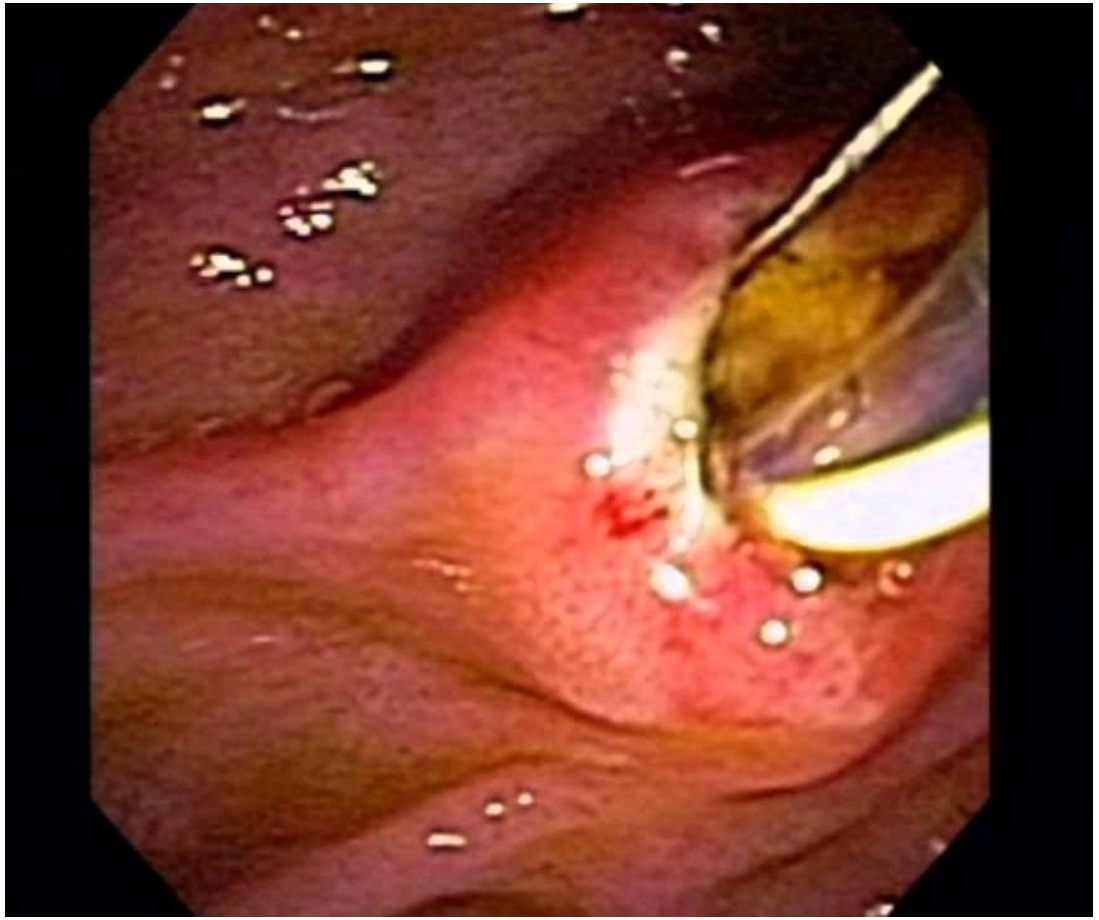
World J Surg 35:826, 2011

ERCP

- Cannulation of ampulla
- Sphincterotomy
- Removal of stones
- +/- biliary stent
- If unsuccessful
  - surgical decompression
    - Lap CBD exploration
    - Open CBDE
  - Percutaneous transhepatic cholangiography

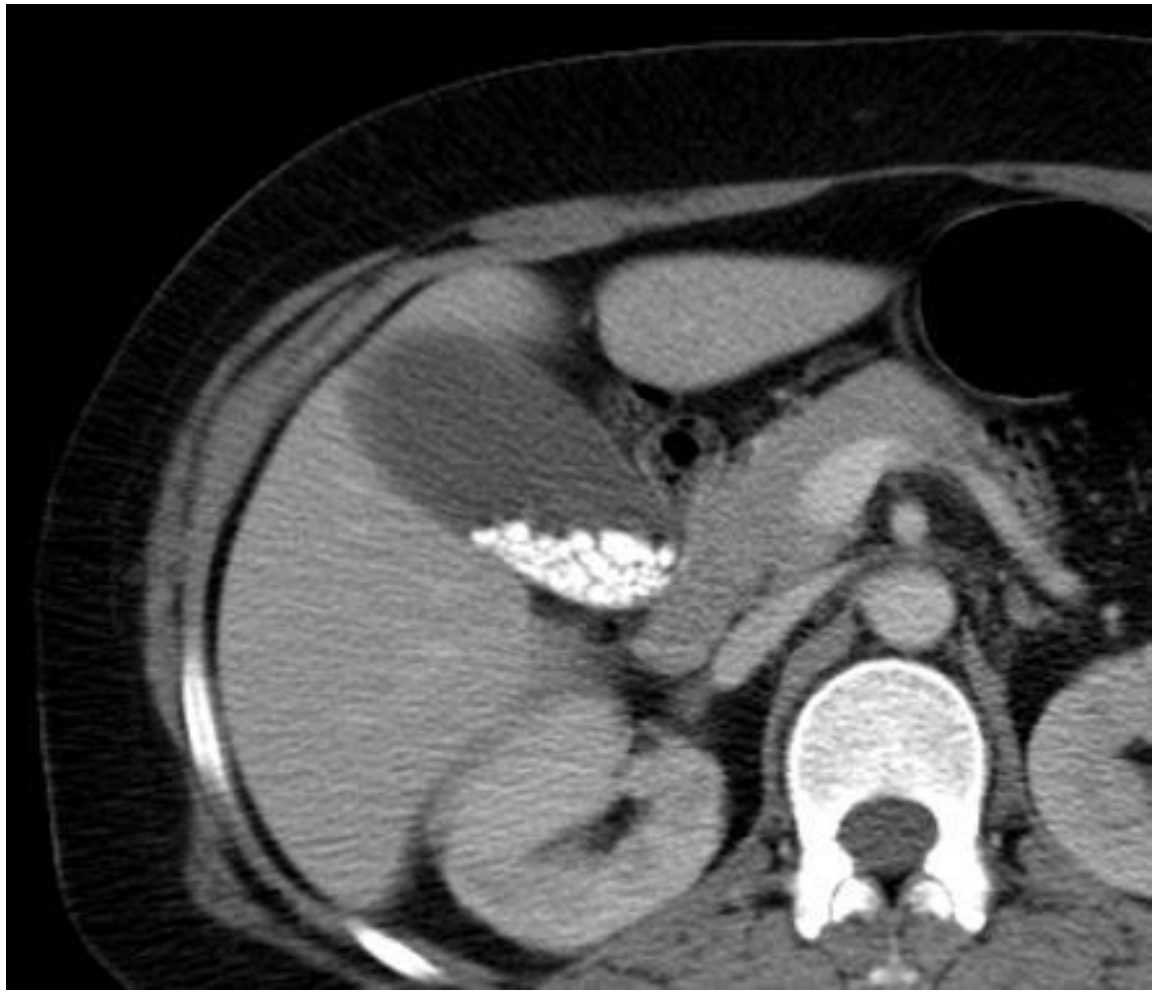


Endoscopic Sphincterotomy and Stone Retrieval



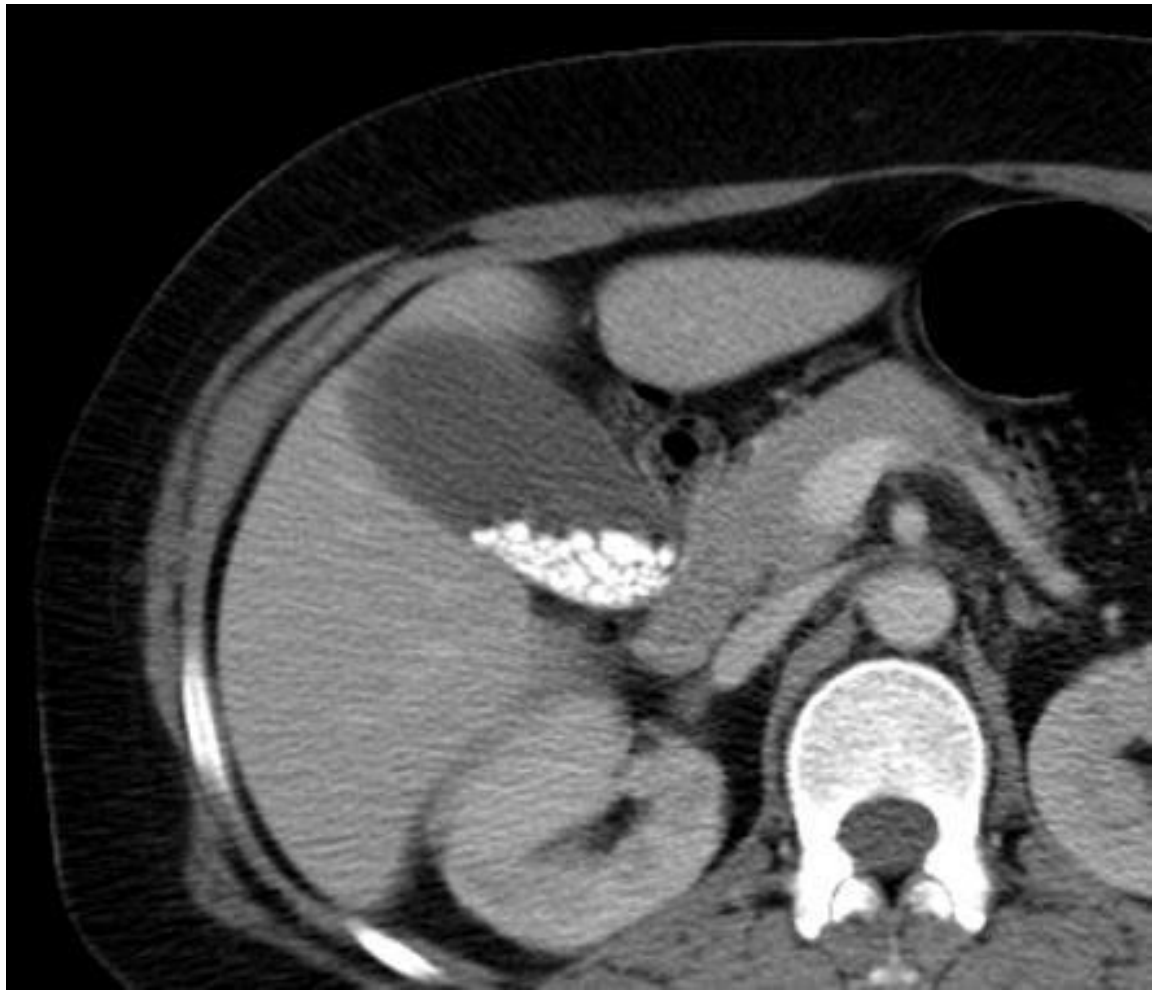
Case 1

- 41F presents to the ED after minor MVC.
- AF, HR 90, BP 140/70, RR 18, 98% on 2L NC
- CBC, INR WNL
- CT A/P negative for acute injuries, however..



Next you…

- A. Obtain more history
- B. CBC, CMP, lipase
- C. Ultrasound
- D. MRCP
- E. Consult surgeon



Does she need her GB removed?

What are the chances that she will have problems from the gallstones?

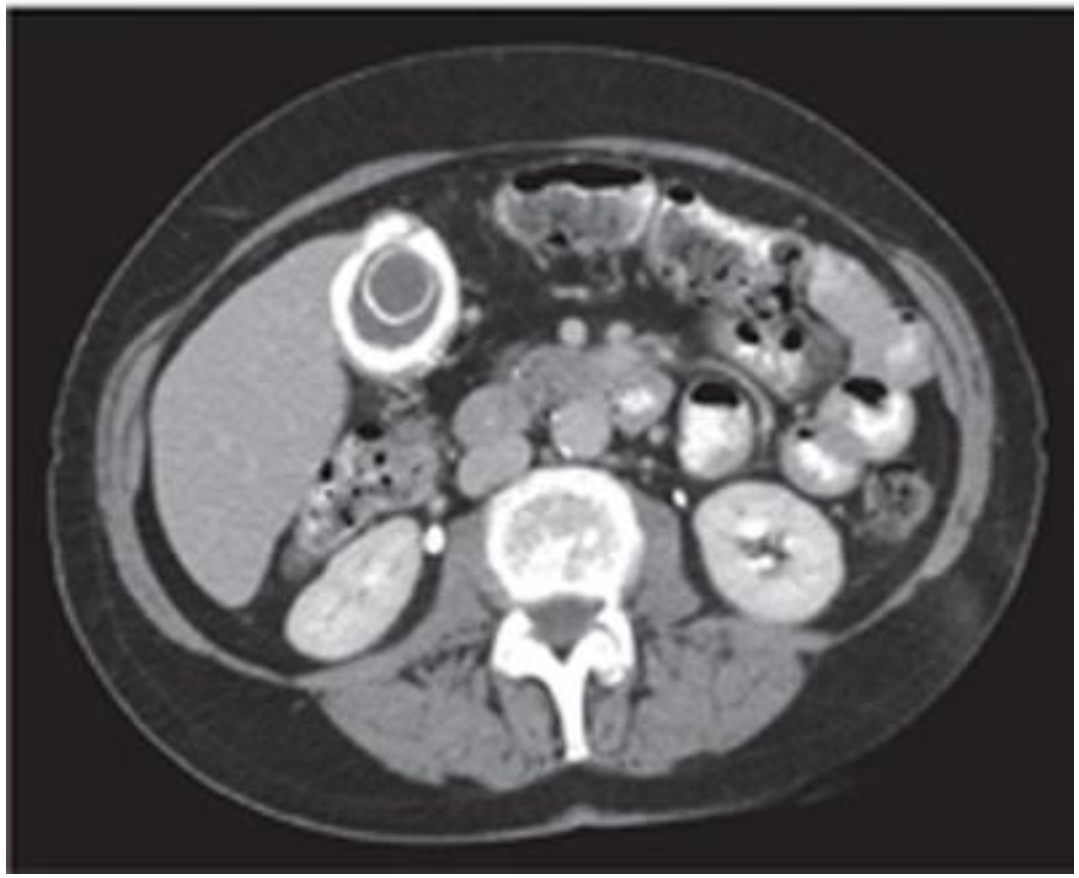
Asymptomatic Cholelithiasis

- Asymptomatic Stones
  - 1-4% complication rate/year
  - 5 years- 10 % symptomatic
  - 10 years- 15% symptomatic
  - 15 years- 18% symptomatic

- Symptomatic Stones
  - 90% initially present with symptomatic cholelithiasis
  - 50% develop recurrent symptoms
  - 1-2% develop complications of gallstone disease per year

Indications for Cholecystectomy- Asymptomatic

- GB adenoma >1 cm
- Porcelain gallbladder



Case Presentation 2

- A young 40 year old woman presents to the ED for epigastric pain after eating a fatty meal.
- Radiates to right flank/scapula.
- Associated with nausea and vomiting
- Does not feel like her usual acid reflux, did not improve with antacid.

Differential Diagnosis of Epigastric Pain

- Biliary etiology
- Gastroenteritis
- Peptic ulcer disease
- Pancreatitis
- Hepatitis
- Small bowel obstruction
- Myocardial infarction

- As you are waiting for CBC, CMP, and lipase results you would order…

A. US
B. CT
C. MRCP
D. Call surgeon

Case 2: Recheck Patient

- WBC, LFTs normal
- Pain COMPLETELY resolves
- US completed

What's the diagnosis?
Does she need her GB removed?
If so, when?

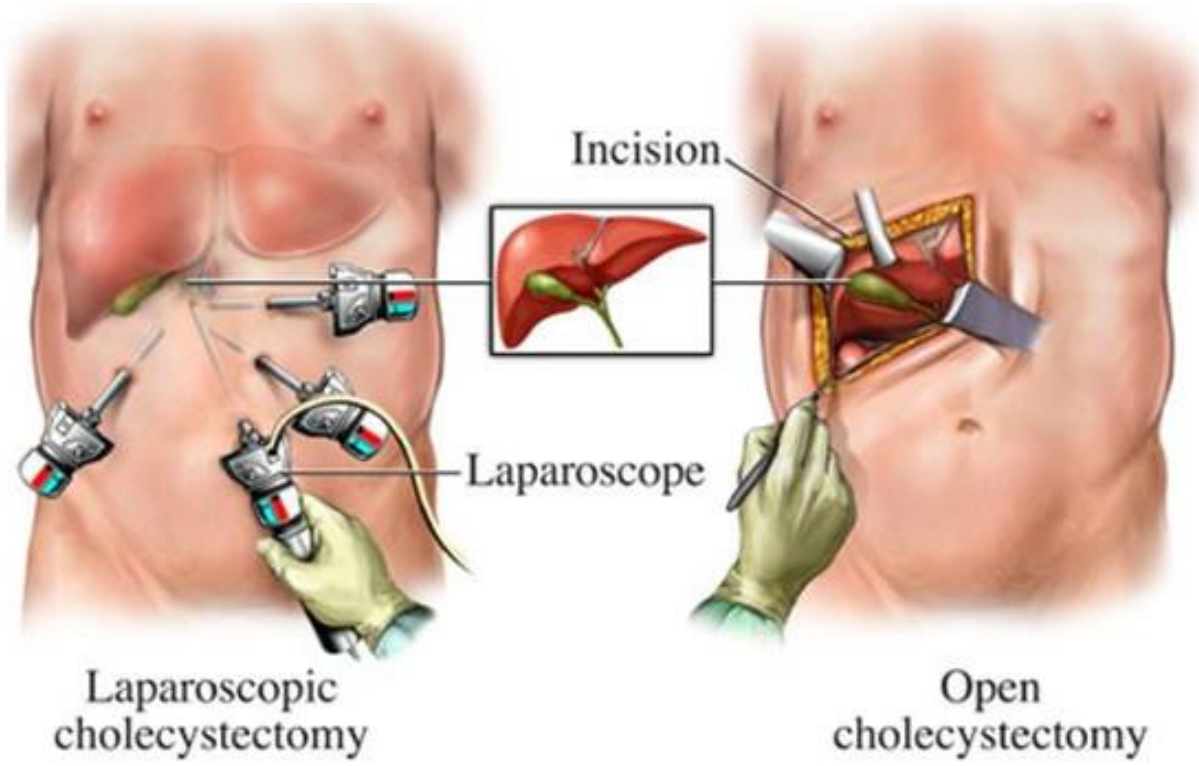
Diagnostic Criteria for Symptomatic Cholelithiasis

- Clinical signs and symptoms
- Radiographic confirmation of stones
- No evidence of inflammation/infection
- No evidence of jaundice, pancreatitis, CBD stones or dilatation.

CAVEAT: If it doesn't completely resolve in ED or at home between episodes, WBC or LFTs are elevated, or there are signs of gallbladder inflammation consider (early) acute cholecystitis.

Symptomatic Cholelithiasis

- No antibiotics
- Low fat diet until…
- Elective cholecystectomy



Patient 2.2

- Same scenario.
- US shows GS, no GBTW, normal CBD.
- Pain has not resolved

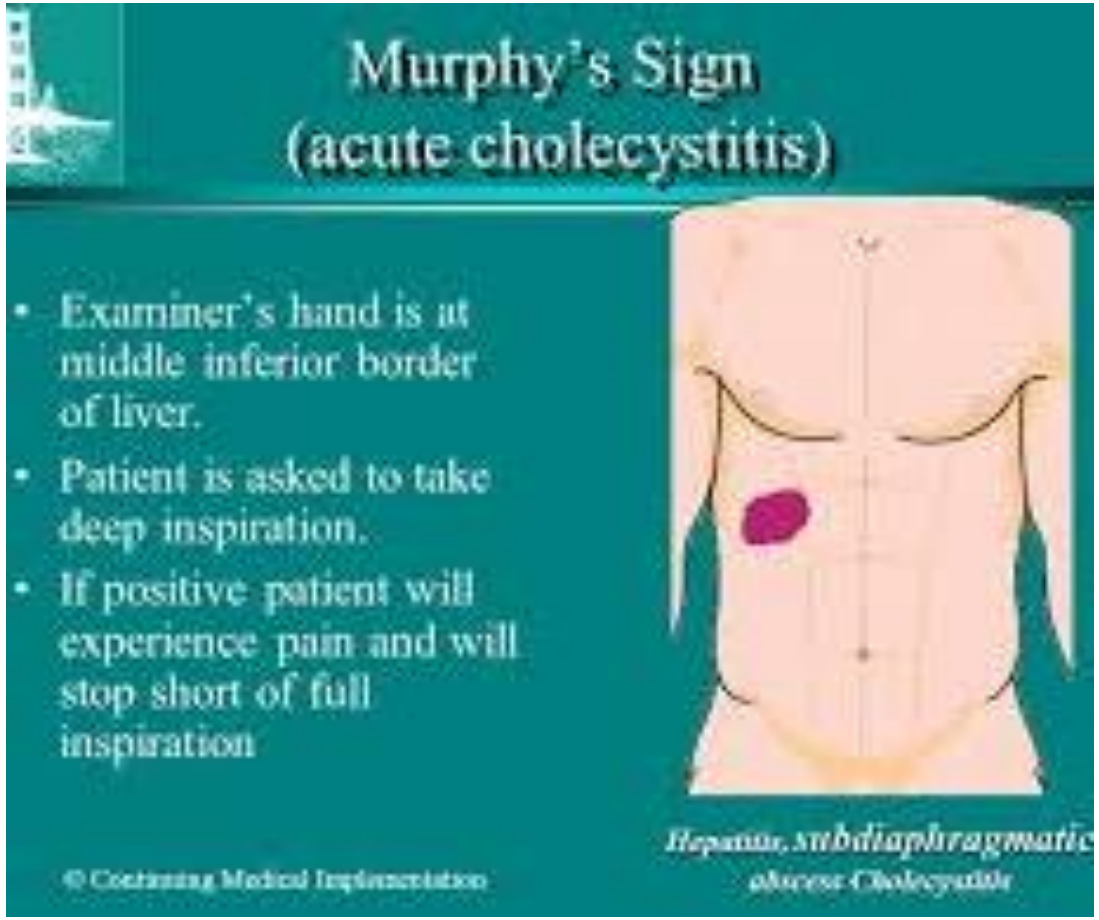
What do you do?

a. Home with meds
b. Call surgeon
c. Repeat US
d. HIDA scan
e. CT

Patient 3

Patient was seen in ED 2 weeks ago. Diagnosed with symptomatic cholelithiasis, saw surgeon, lap chole scheduled next week.

- Presents with two days of RUQ, fever, nausea, vomiting, murphy's sign
- WBC 16
- Bili/ALT/AST/AP 1.8/35/26/150
- Lipase 46
- US consistent with acute cholecystitis

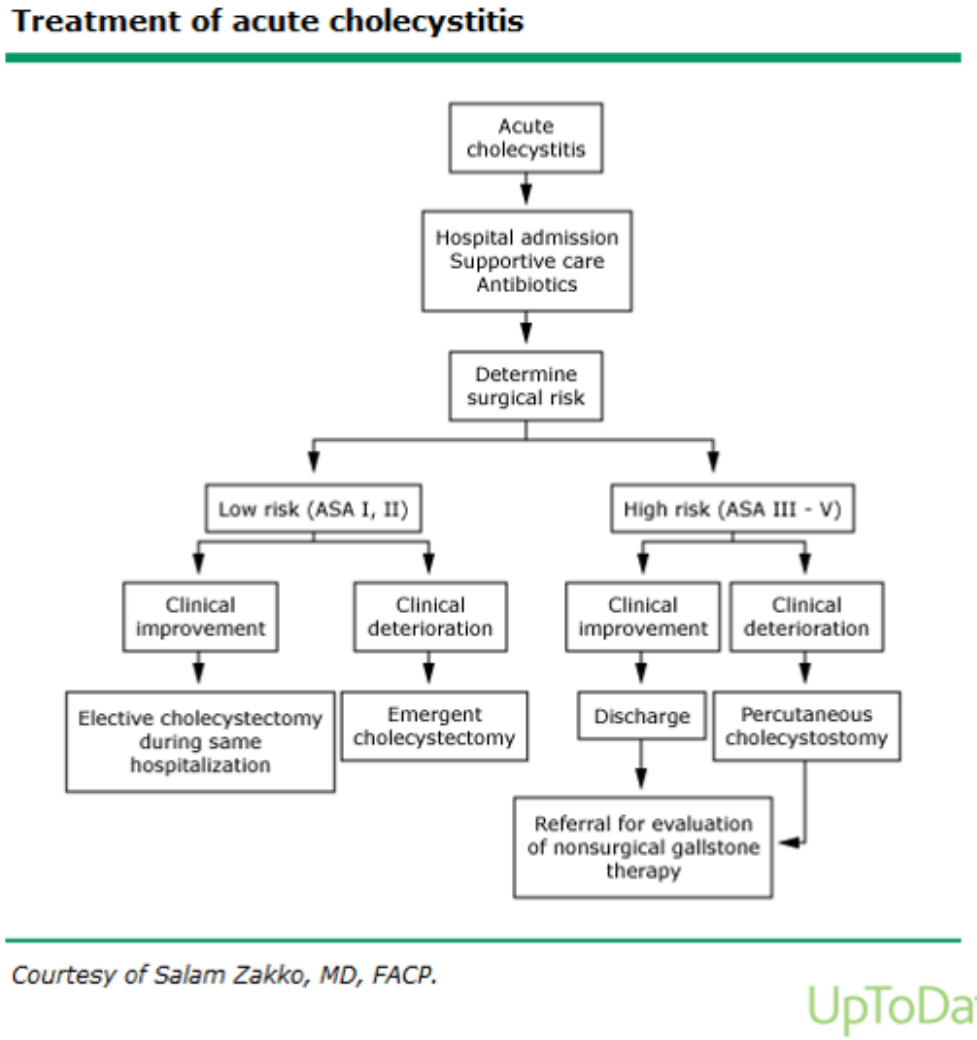



10-07-2009-0005
74/F
Abdomen
#127
/ 8.0cm MI 1.0
C3-7ED /
Res TIs 0.1
[2D] G49 / 92dB
FA2 / P100
HAR
M
GB STAND


4b

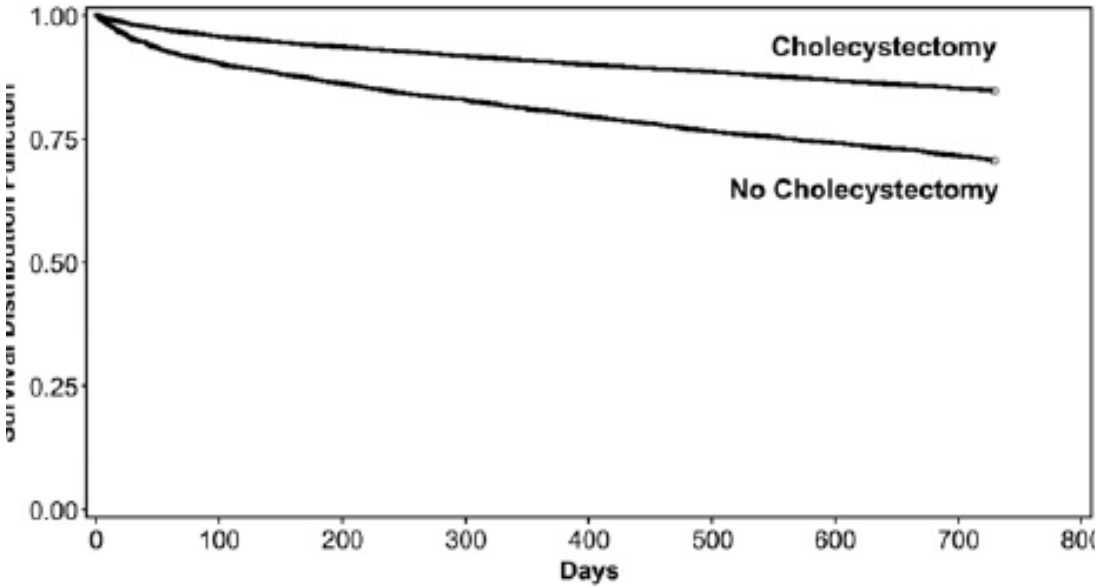
Management

- Frequently infected by gram negatives and anaerobes
- NPO, IVF resuscitation, IV Abx
- Call surgeon
  - Cholecystectomy vs cholecystostomy



Timing of Surgery

- Preferably within 72h
  - Acute inflammation progresses to fibrotic changes
  - Higher rate of conversion to open cholecystectomy and biliary duct injury
- High risk patients should be considered for cholecystostomy tube placement
  - ICU with severe comorbidities
  - Cirrhosis
  - >72 hours of symptoms

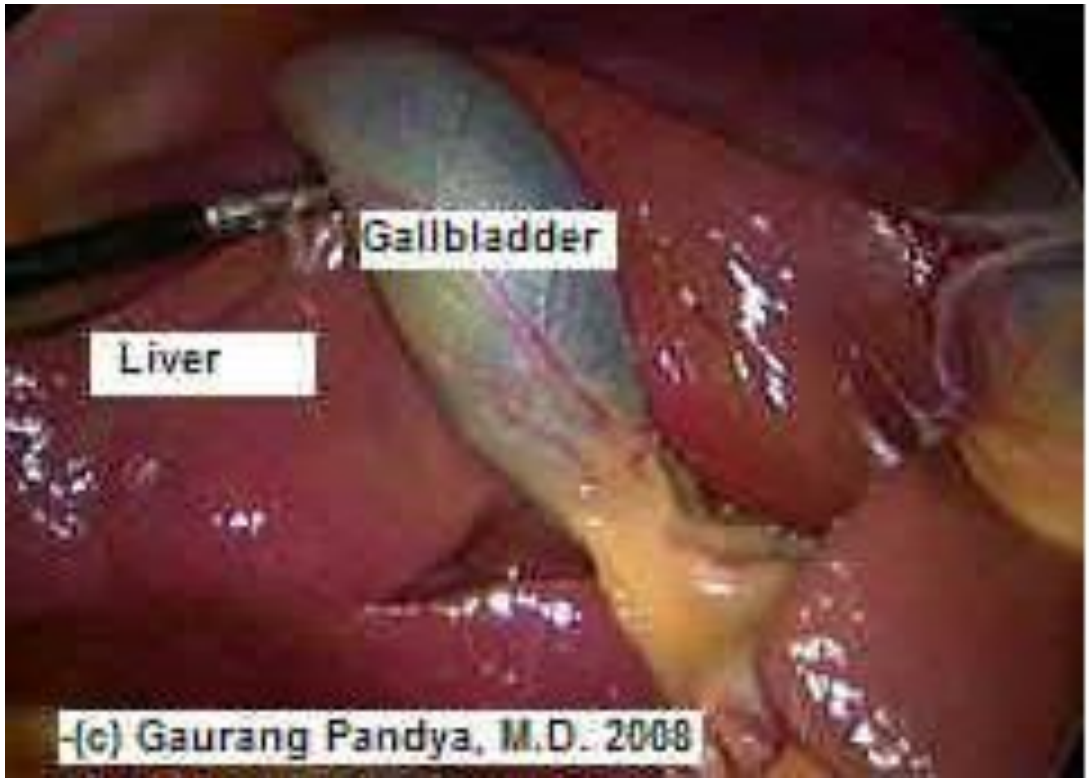


igure 4. Kaplan-Meier unadjusted 2-year survival in patients wh
lo and do not undergo cholecystectomy during initial hospitalizatio
or acute cholecystitis. The 30-day, 1-year, and 2-year cumulativ
leath rates were 2.0%, 9.0%, and 15.2%, respectively, in the cho
ecystectomy group and 5.0%, 19.4%, and 29.3%, respectively, i
he no cholecystectomy group ($p < 0.0001$).

Am CollSurg210:668, 2010

Laparoscopic Cholecystectomy

Normal gallbladder

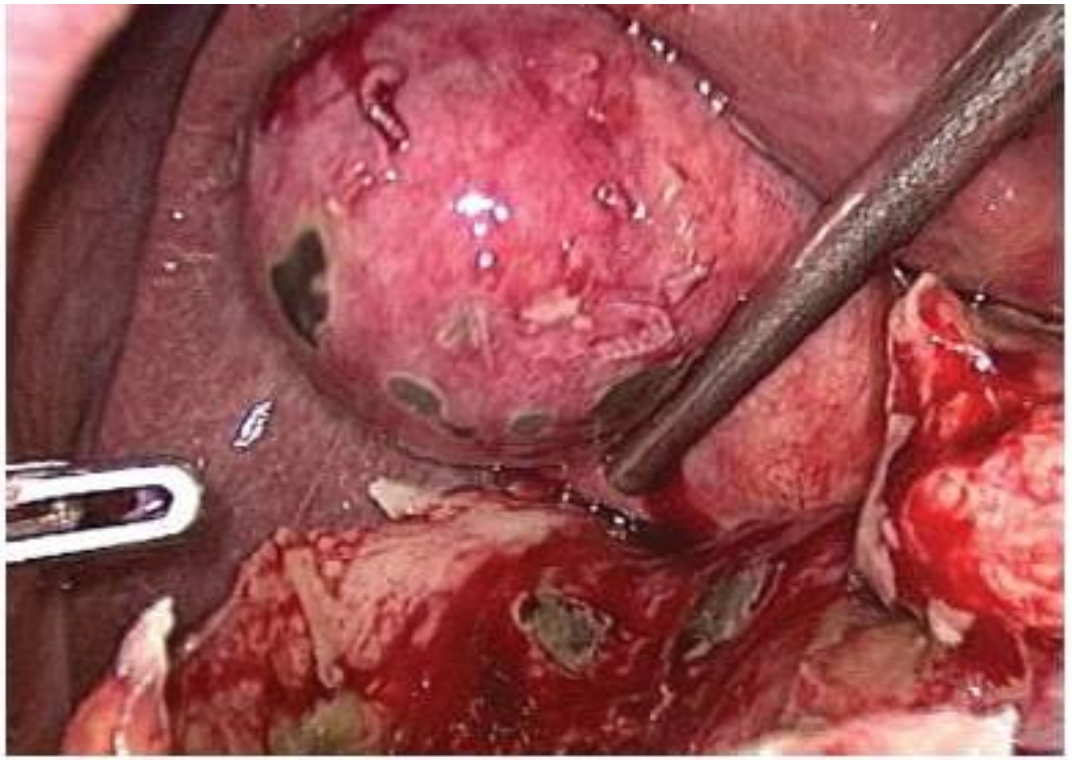


Simple acute cholecystitis

Laparoscopic Cholecystectomy

Phlegmonous acute cholecystitis

Gangrenous acute cholecystitis



Surgery tomorrow, however, at 2am

- Tmax 102.5, BP 90/40, HR 130, confusion
- WBC 22
- Bili: 4.8<-1.8
- Lipase 60
- US IH and EH bile duct dilatation, CBD 9 mm

Diagnosis?
Treatment priorities?

Acute Cholangitis

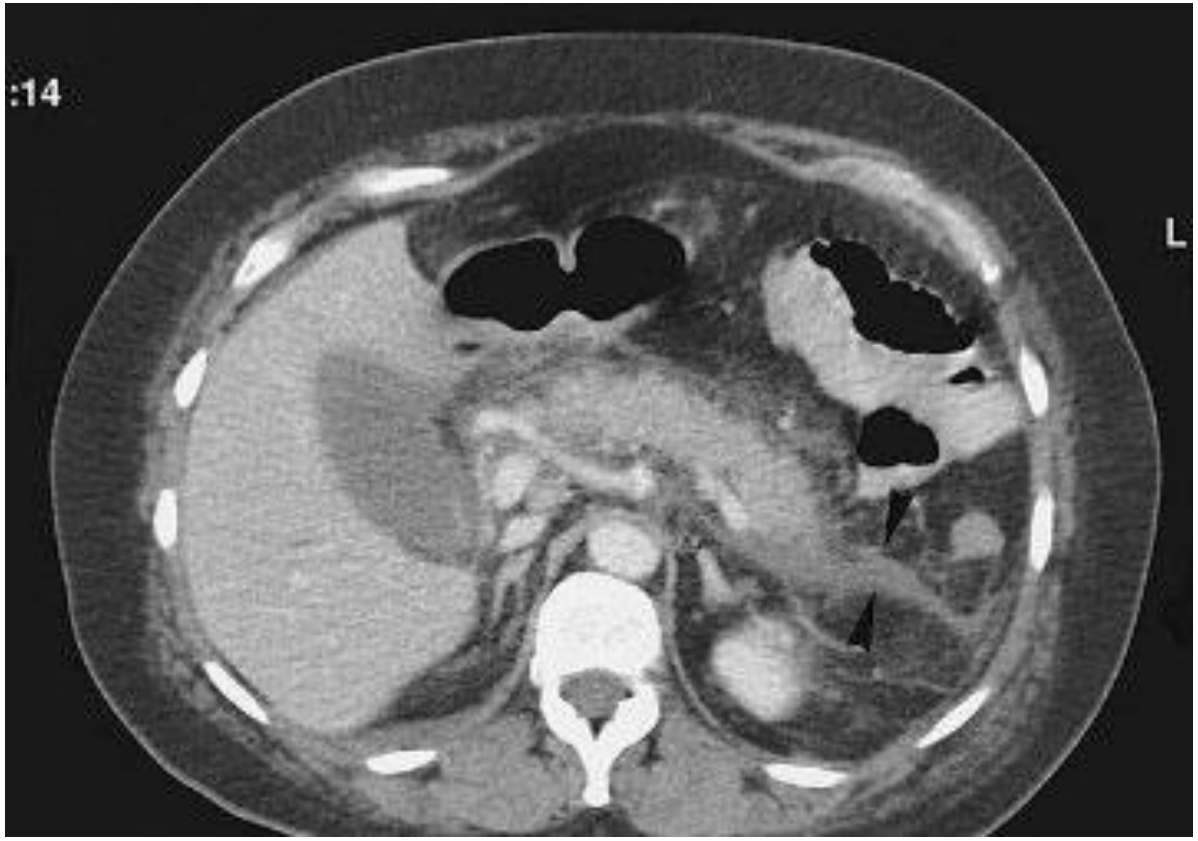
- Sepsis related to infected, obstructed biliary duct occlusion
- Usually
  - Bili in cholecystitis <2
  - Bili in cholangitis >4
- Treatment
  - Abx, fluid resuscitation and bile duct decompression

Choledocholithiasis Risk Factors

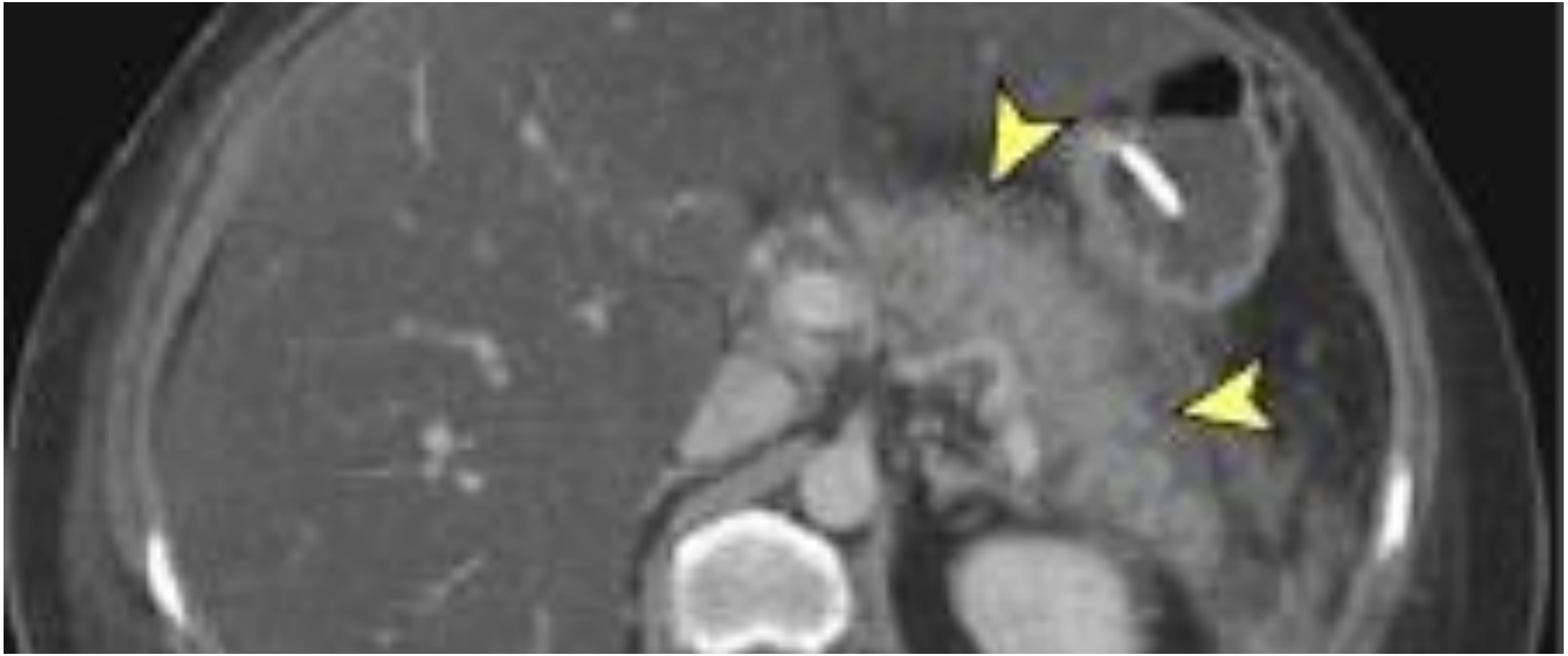
- Jaundice
  - Bili >2
- AP >normal
- CBD >8 mm
- Pancreatitis
- Confirmed by US, CT, MRCP evidence of CBD stone

Next Case

- 40 year old woman with history of asymptomatic cholelithiasis presents with one day of severe epigastric pain, n/v.
  - Elevated WBC and LFTs, Bili 1.2
  - Lipase 4500
  - CT A/P

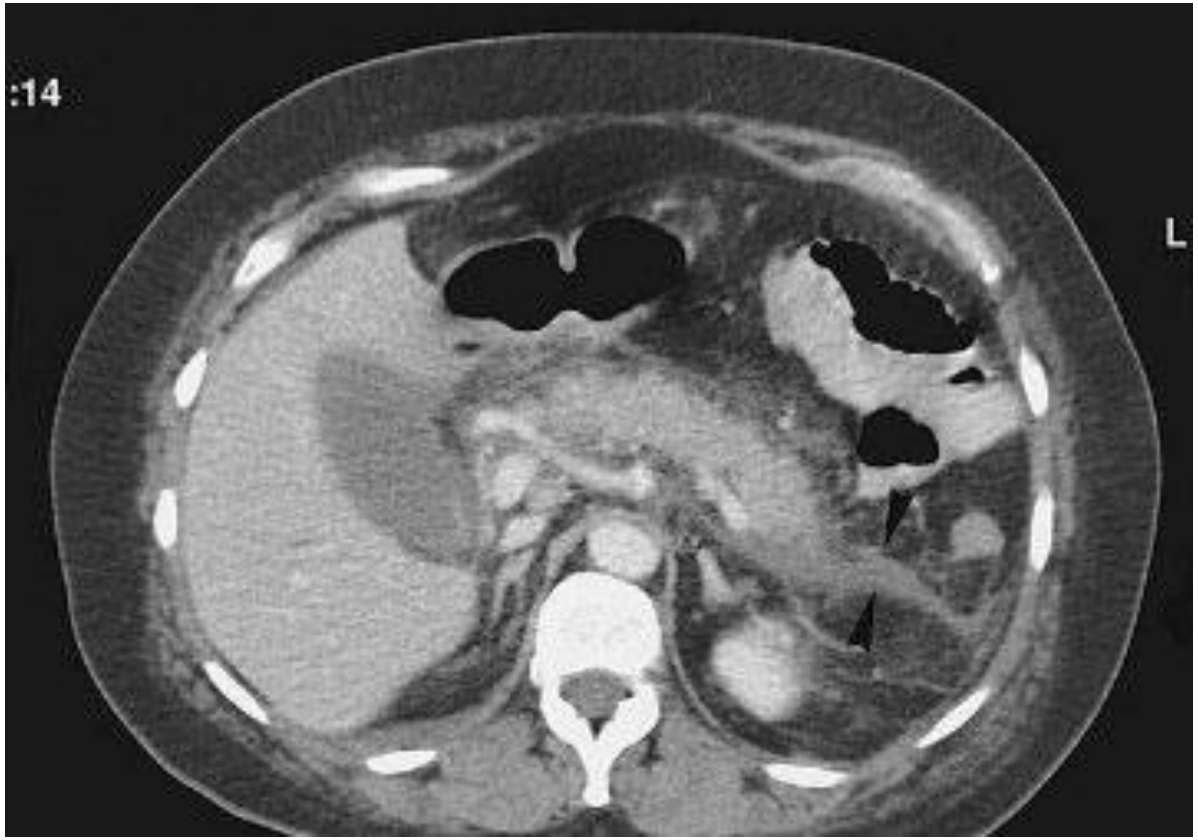


Gallstone Pancreatitis



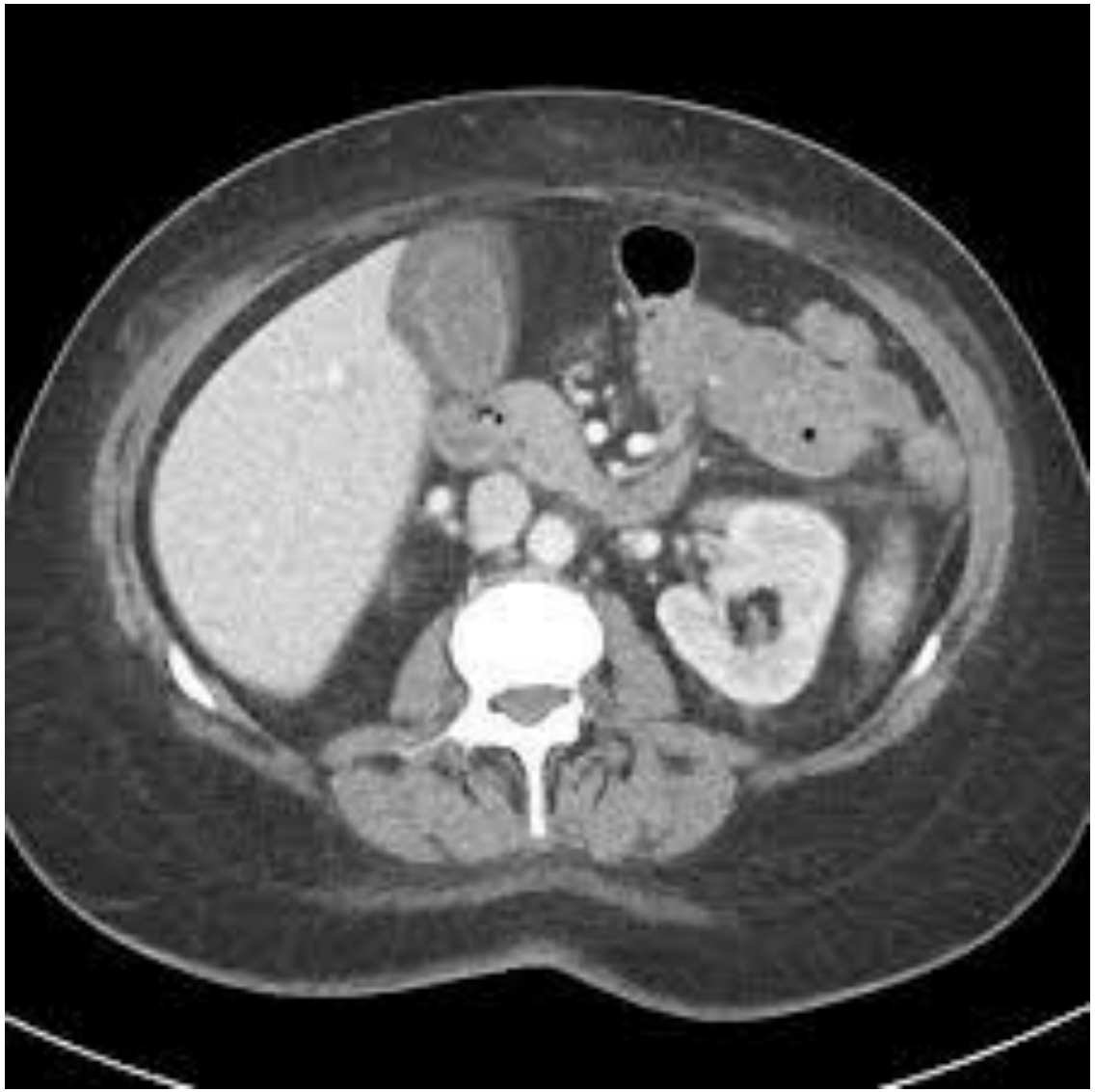
Case Presentation

- When do you operate?
  - Once tenderness has resolved
  - Before discharge
  - Usually in a couple days
- 33-50% recurrence within 4-6 weeks without surgery



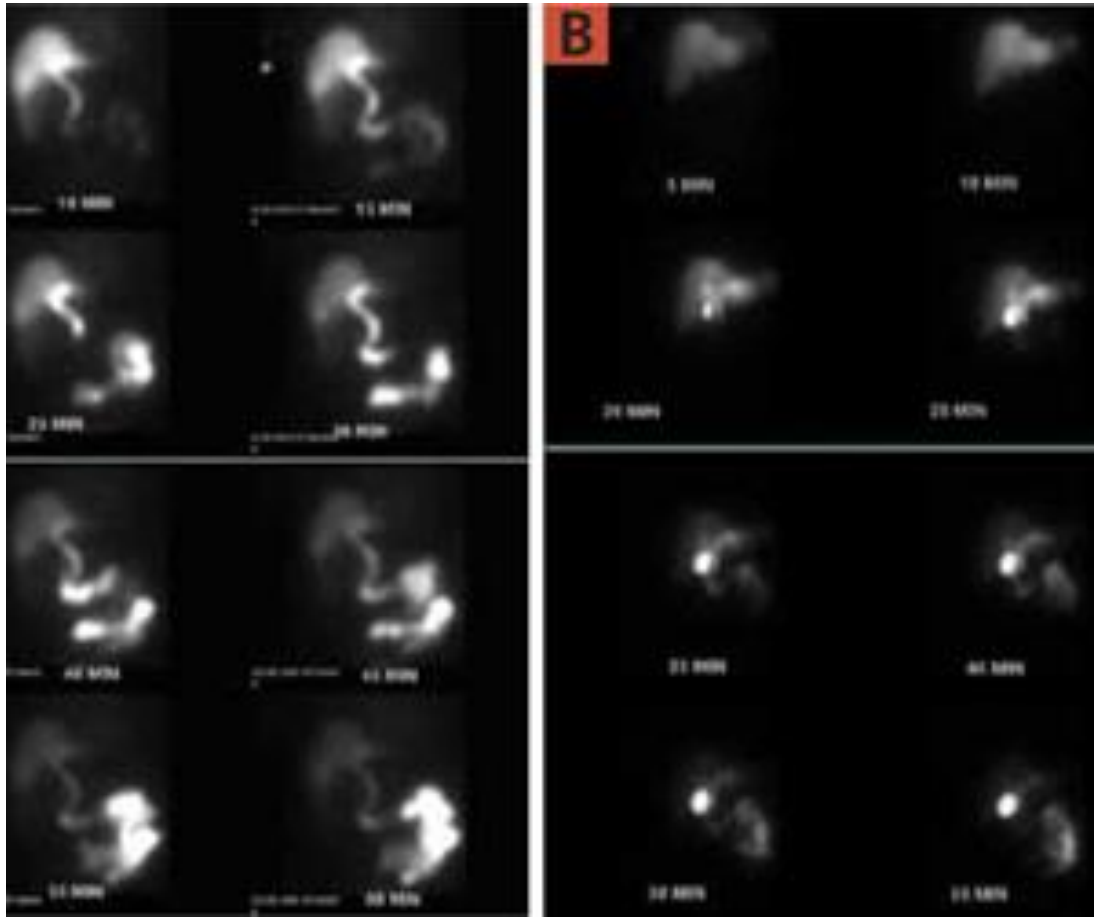
ICU Patient

- Intubated, on pressors, rising WBC->CT
- US on admission shows no gallstones.



Acalculous Cholecystitis

- Acute cholecystitis without cholelithiasis
- Probably ischemic in etiology
- Disease of ICU patients
- TPN is risk factor
- Diagnosis made by US and or HIDA
- Treatment depends on overall condition
  - Mild to moderate illness- cholecystectomy
  - Severely ill- Perc chole

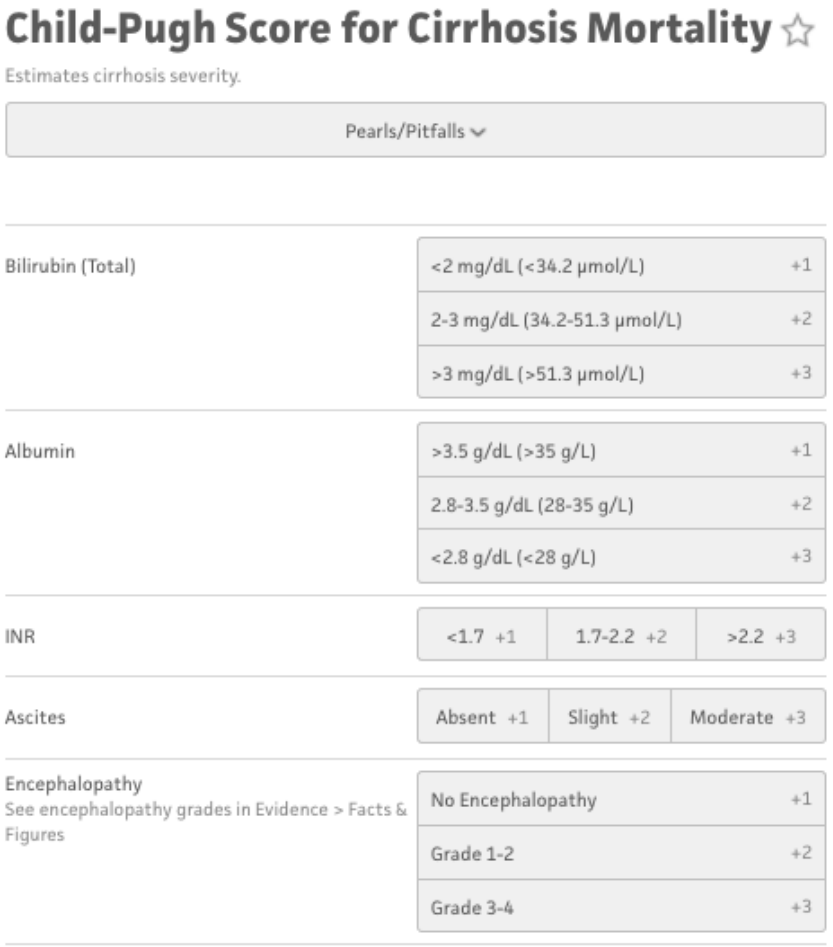


Patient with cirrhosis is diagnosed with acute cholecystitis

- What factors will determine how he is managed?

Cirrhosis

- The Child Pugh Score
  - No prospective validation
  - Used to assess severity of cirrhosis and to predict their risks of perioperative morbidity and mortality for both elective and emergency surgery.
    - CTP A mortality 10%
    - CTP B mortality 30%
    - CTP C mortality 75%
- Abx +/- perc chole



Child-Pugh Score for Cirrhosis Mortality ☆

Estimates cirrhosis severity.

Pearls/Pitfalls

Bilirubin (Total)	<2 mg/dL (<34.2 µmol/L)	+1	
	2-3 mg/dL (34.2-51.3 µmol/L)	+2	
	>3 mg/dL (>51.3 µmol/L)	+3	
Albumin	>3.5 g/dL (>35 g/L)	+1	
	2.8-3.5 g/dL (28-35 g/L)	+2	
	<2.8 g/dL (<28 g/L)	+3	
INR	<1.7 +1	1.7-2.2 +2	>2.2 +3
Ascites	Absent +1	Slight +2	Moderate +3
Encephalopathy See encephalopathy grades in Evidence > Facts & Figures	No Encephalopathy	+1	
	Grade 1-2	+2	
	Grade 3-4	+3	

Your wife's sister is 16 weeks and was diagnosed with acute cholecystitis last night.

- When do you do surgery?
  - Now
  - After 24 weeks
  - After delivery

- Open or laparoscopic?

Gallbladder Disease in Pregnancy

- **Guideline 15: Laparoscopic cholecystectomy is the treatment of choice in the pregnant patient with gallbladder disease, regardless of trimester (Moderate; Strong).**

Pregnancy

Present in	Recurrence of Symptoms During Pregnancy
First trimester	92%
Second trimester	64%
Third trimester	44%

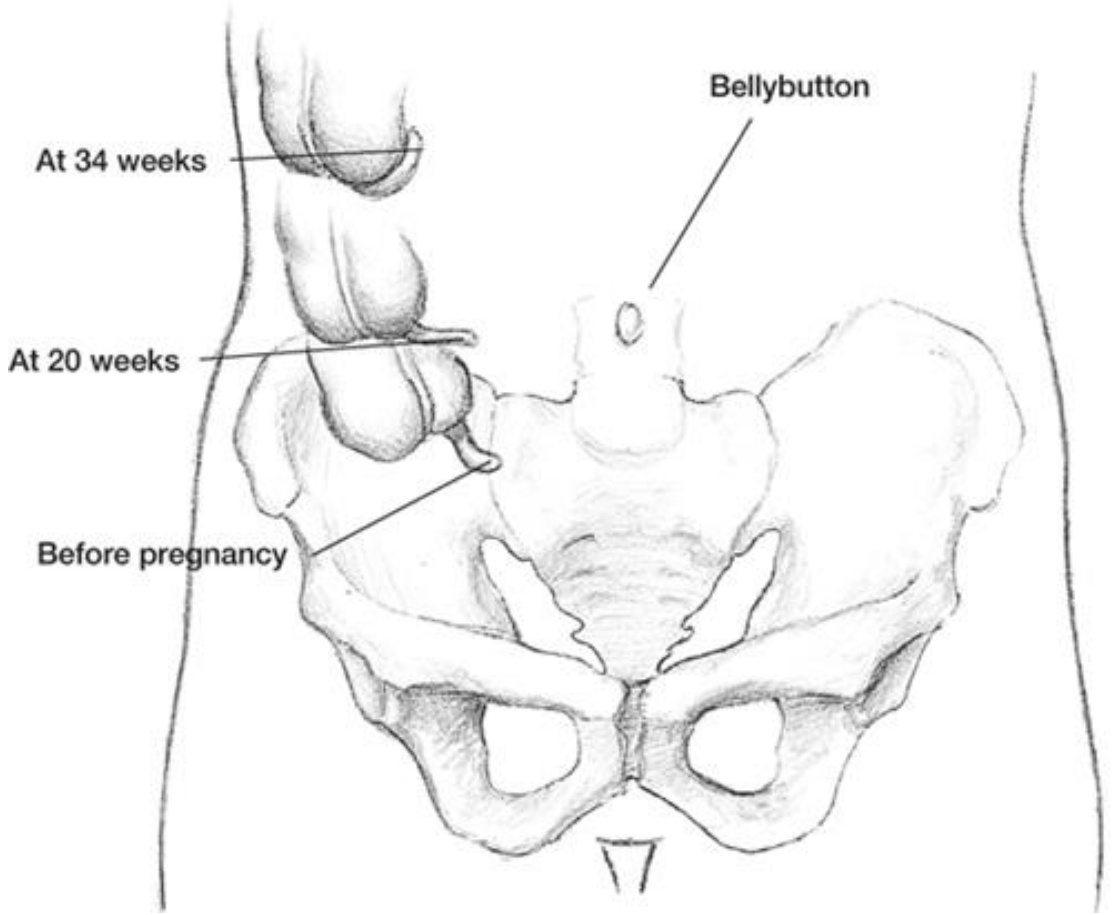
Delays in surgical management lead to increased rates of hospitalization, spontaneous abortions, preterm labor, and preterm delivery compared to those undergoing surgical cholecystectomy.

Overall, 50% of patients experience recurrence of symptoms. 23% develop acute cholecystitis or gallstone pancreatitis.
Pancreatitis results in fetal loss in 10-60% of pregnant patients.

Pregnant women with RUQ

- Pregnant women with RUQ.
- Elevated WBC
- Normal LFTs
- GB normal on US

- Consent for CT A/P



Gallbladder Cancer Staging

Gallbladder Cancer-TNM staging

Primary tumor (T)				
TX		Primary tumor cannot be assessed		
T0		No evidence of primary tumor		
Tis		Carcinoma in situ		
T1		Tumor invades lamina propria or muscular layer		
	T1a	Tumor invades lamina propria		
	T1b	Tumor invades muscular layer		
T2		Tumor invades perimuscular connective tissue; no extension beyond serosa or into liver		
T3		Tumor perforates the serosa (visceral peritoneum) and/or directly invades the liver and/or one other adjacent organ or structure, such as the stomach, duodenum, colon, pancreas, omentum, or extrahepatic bile ducts		
T4		Tumor invades main portal vein or hepatic artery or invades two or more extrahepatic organs or structures		
Regional lymph nodes (N)				
NX		Regional lymph nodes cannot be assessed		
N0		No regional lymph node metastasis		
N1		Metastases to nodes along the cystic duct, common bile duct, hepatic artery, and/or portal vein		
N2		Metastases to periaortic, pericaval, superior mesentery artery and/or celiac artery lymph nodes		
Distant metastasis (M)				
M0		No distant metastasis		
M1		Distant metastasis		
Stage grouping				
Stage 0		Tis	N0	M0
Stage I		T1	N0	M0
Stage II		T2	N0	M0
Stage IIIA		T3	N0	M0
Stage IIIB		T1–3	N1	M0
Stage IVA		T4	N0–1	M0
Stage IVB		Any T	N2	M0
		Any T	Any N	M1

Edge SB, et al. AJCC cancer staging handbook: from the AJCC cancer staging manual. 7th ed. New York: 2010

Table 4

Surgical Management of Gallbladder Carcinoma

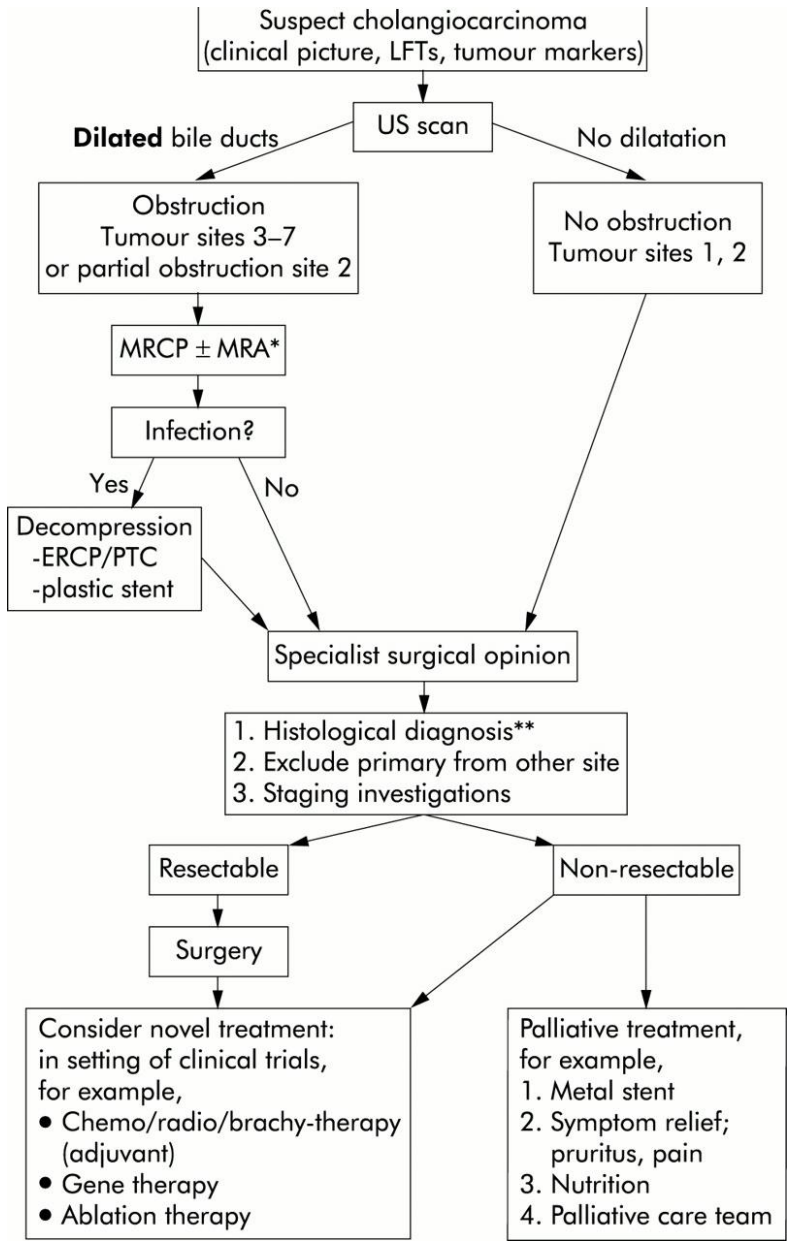
T/N	Procedure	5-yr Survival	Remarks/References
T1	Simple cholecystectomy	85%–100%	Recommended[54-57]
T2	Simple cholecystectomy	19%–40%	Not recommended[67-77]
T2	Radical cholecystectomy	61%–100%	Recommended[70-73]
T3	Radical cholecystectomy	15%–63%	Recommended[70-73]
T4	Radical cholecystectomy	7%–25%	In selected patients[65-68]
N1	Regional lymphadenectomy	45%–60%	Recommended[65,71]
N2	Radical cholecystectomy plus hepatopancreaticoduodenectomy		Very selected patients[72,76]

T/N = tumor/node status

Cholangiocarcinoma

Primary tumor (T)	
Tx	Cannot be assessed
T0	No evidence of primary tumor
Tis	Carcinoma *in situ*
T1	Tumor confined to the bile duct with extension up to the muscle layer or fibrous tissue
T2a	Tumor invades beyond the wall of the bile duct to the surrounding adipose tissue
T2b	Tumor invades adjacent hepatic parenchyma
T3	Tumor invades unilateral branches of the portal vein or hepatic artery
T4	Tumor invades main portal vein or its branches bilaterally, or the common hepatic artery, or the second-order biliary radicles bilaterally, or unilateral second order biliary radicles with contralateral portal vein or hepatic artery involvement
Regional lymph nodes (N)	
Nx	Cannot be assessed
N0	No regional lymph node metastases
N1	Regional lymph node metastases to nodes along the cystic duct, common bile duct, hepatic artery, and portal vein
N2	Metastases to periaortic, pericaval, superior mesenteric artery, and/or celiac artery nodes
Distant metastasis (M)	
Mx	Cannot be assessed
M1	Distant metastases present

AJCC: American Joint Commission for Cancer



Closing Comments

- Gallbladder disease has a wide spectrum of presentations
- Asymptomatic stones are observed, may become symptomatic
- Symptomatic gallbladder conditions usually benefit from cholecystectomy
- Laparoscopic cholecystectomy is preferred to open cholecystectomy
- Cholecystostomy has role in critically ill and high-risk operative candidates
- Deviations from expected post-op course are concerning for post-op complication. Maintain high level of suspicion, especially if fever, worsening pain, or jaundice