

Management of Gallbladder Disease

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What are we going to discuss?

- Cholelithiasis and Choledocholithiasis
 - Acute disease
 - Chronic Disease
- Acalculus Gallbladder Diseases

What are we not going to discuss?

- Malignant pancreatico-biliary diseases
- Choledochocal cysts
- Biliary *Ascaris*, *Cryptosporidium*, and Flukes
- Benign biliary strictures and atresias
- Chronic pancreatitis

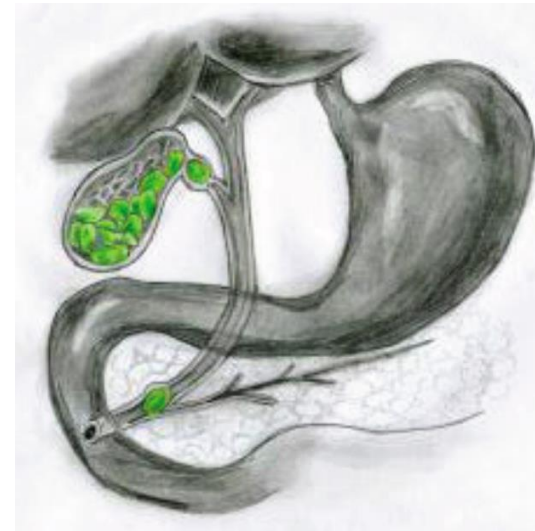
Gallbladder Disease

- Spectrum of disease involving the biliary tree, usually related to gallstones
- Approximately 10 – 15% general population
 - Increases with age, gender
 - Higher in Arizona, Pima Indian group particularly at risk
 - Most (50%) asymptomatic
 - Annually, 1 – 4% develop complication
- Most costly digestive disease in US
 - 1 million hospitalizations, 700,000 operative procedures
 - Annual cost: \$5 billion



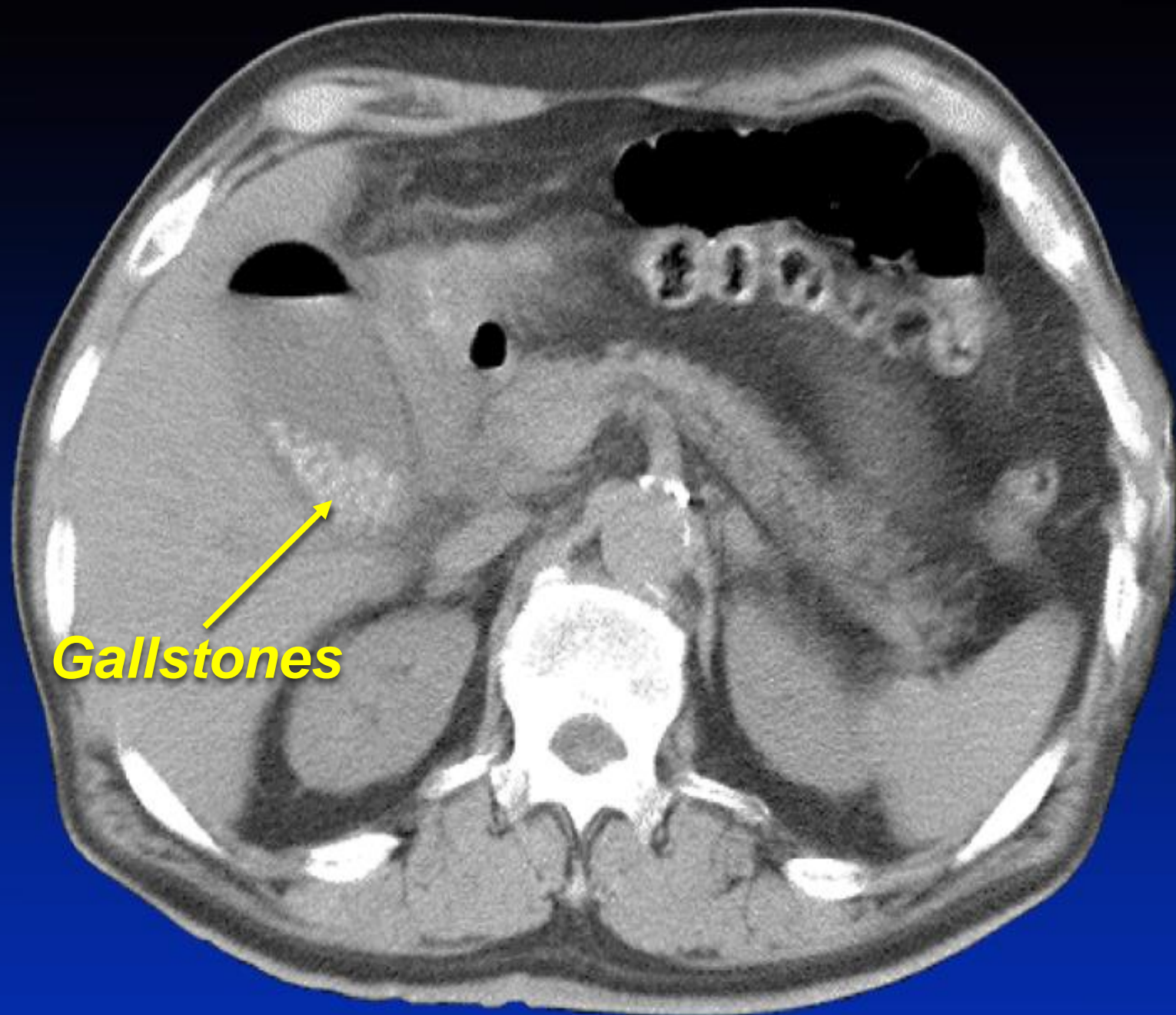
Gallbladder Disease - Spectrum

- Asymptomatic cholelithiasis
- Biliary colic/chronic cholecystitis
- Biliary dyskinesia
- Acute cholecystitis
 - Gangrenous cholecystitis
- Acalculous cholecystitis
- Asymptomatic choledocholithiasis
- Choledocholithiasis obstructive jaundice
 - Cholangitis
- Gallstone pancreatitis



Case Presentation

- 41 yo female with no past medical history presents to the ED following MVC resulting in left femur fracture and no other injuries.
- She is afebrile, HR 110, BP 140/70, RR 18
- Abdominal CT scan demonstrates no acute injuries but...

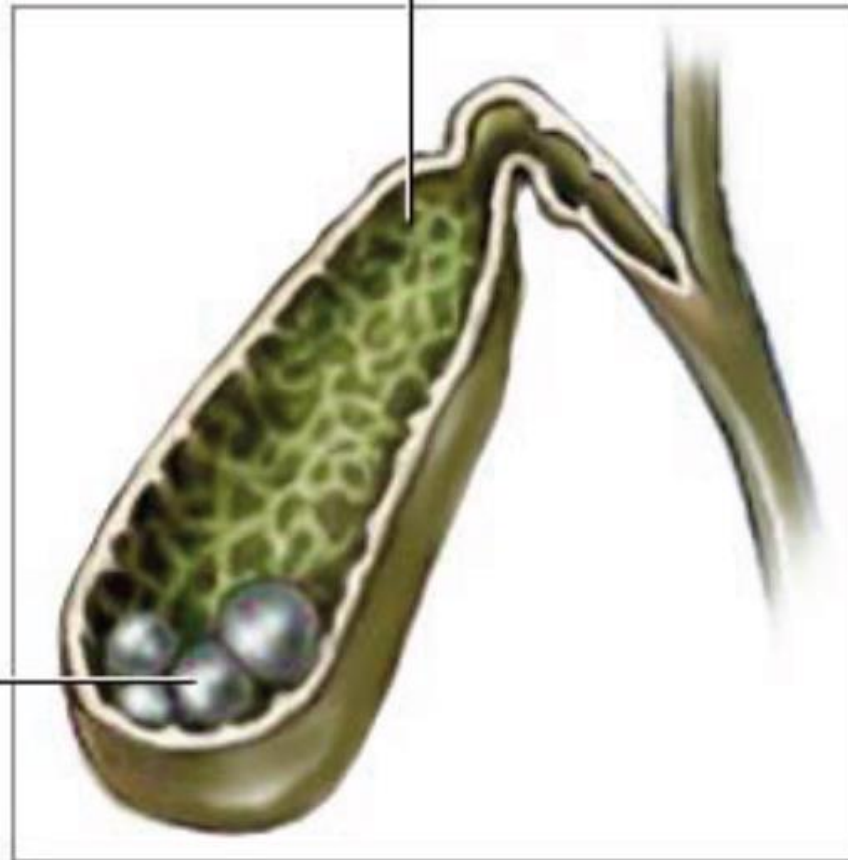


Gallstones

Asymptomatic Cholelithiasis

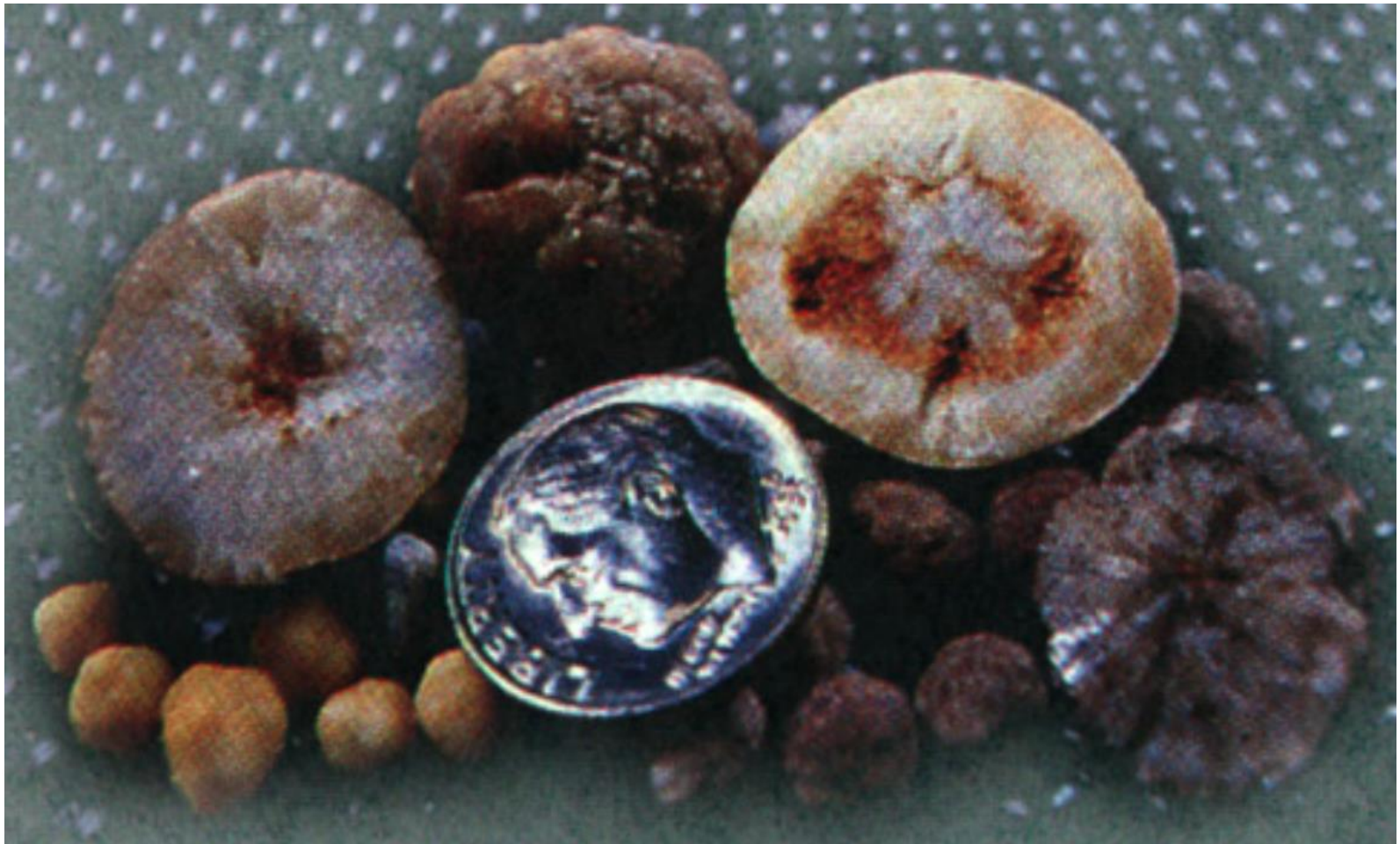


Gallbladder



Gallstones in
gallbladder

Cholelithiasis: Cholesterol and Pigmented Types



Risk Factors for Cholelithiasis

- Cholesterol: Supersaturation, typically too much cholesterol
- Pigmented: Hemolytic conditions or infections
- Age – increases between 30 – 50 years old
- Female gender
- Pregnancy/multiple children
- OCP's/Estrogen replacement
 - Estrogen increases biliary cholesterol secretion
 - Progesterone decreases bile acid secretion
- Family History – 2 fold increase, Pima Indians
- Obesity – 35% of gastric bypass patients have stones

5 F's: Fat, Forty, Female, Fertile, Family

Asymptomatic Cholelithiasis

- Her sister had gallstones and had her gallbladder removed. She wants to know if she should get her gallbladder removed
- Should she?

Natural History

- **Asymptomatic Stones**

- 5yrs 10% symptomatic (2%/yr)
- 10yrs 15% symptomatic
- 15yrs 18% symptomatic

***90% who become symptomatic initially have just biliary colic

Cholecystectomy not needed

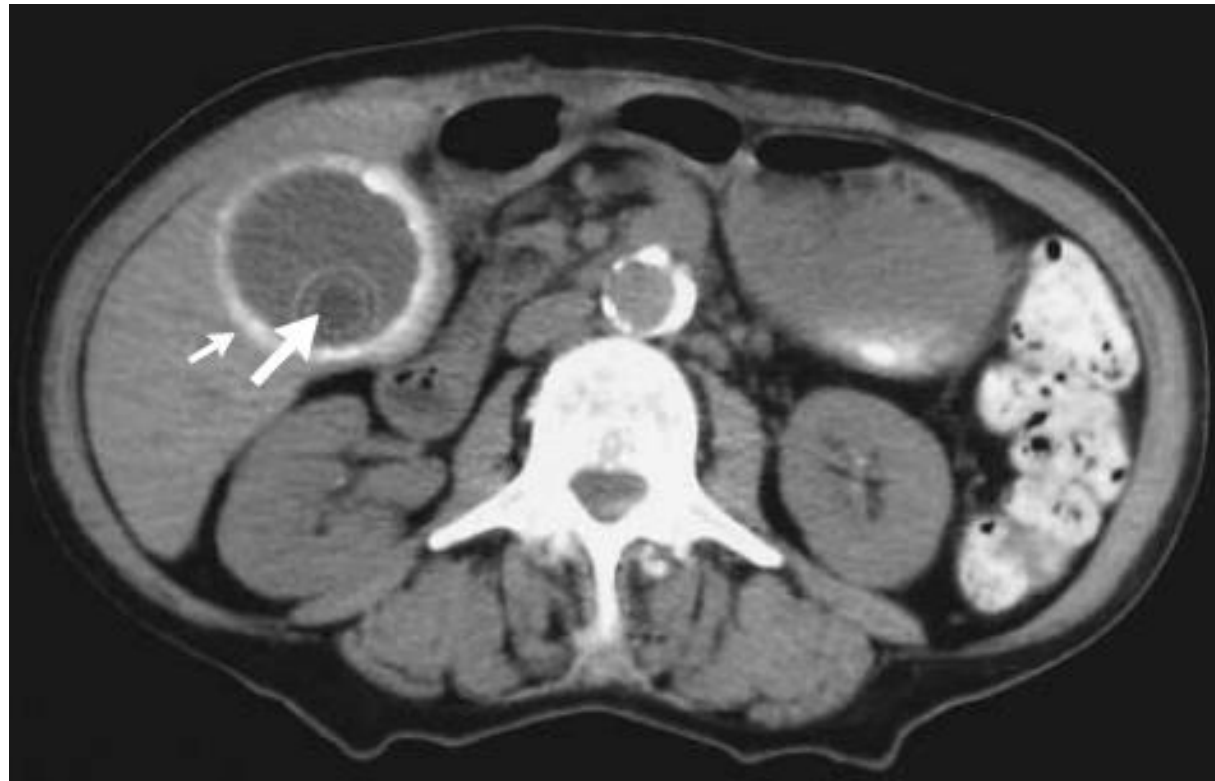
- **Symptomatic stones**

- 50% develop recurrent sx
- 1-2%/yr develop complications of gallstone disease

Cholecystectomy indicated

Surgery for Asymptomatic Cholelithiasis

- Gallbladder adenomas > 1 cm
- Porcelain gallbladder
- Pre-transplant
 - Bone marrow
 - Cardiac
 - Lung

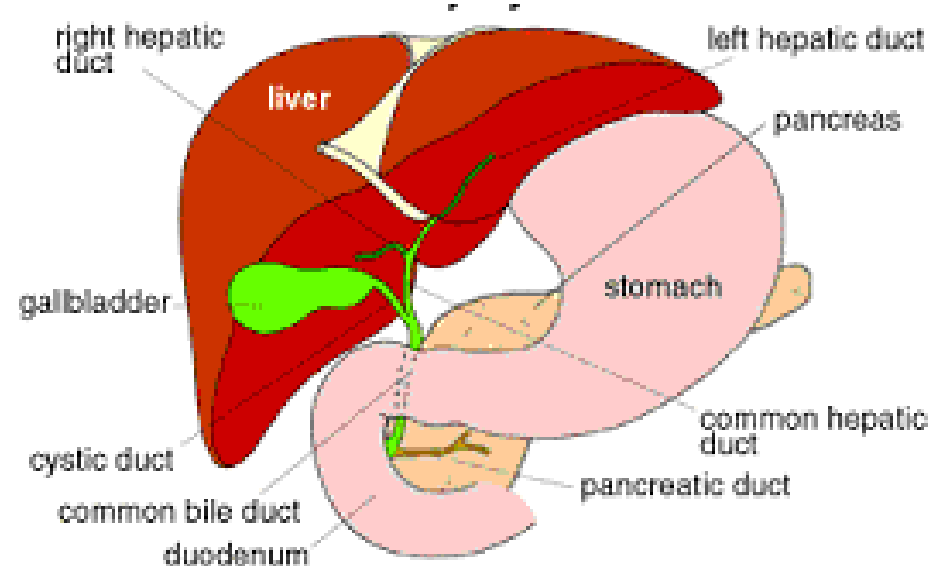


Case Presentation (continued)

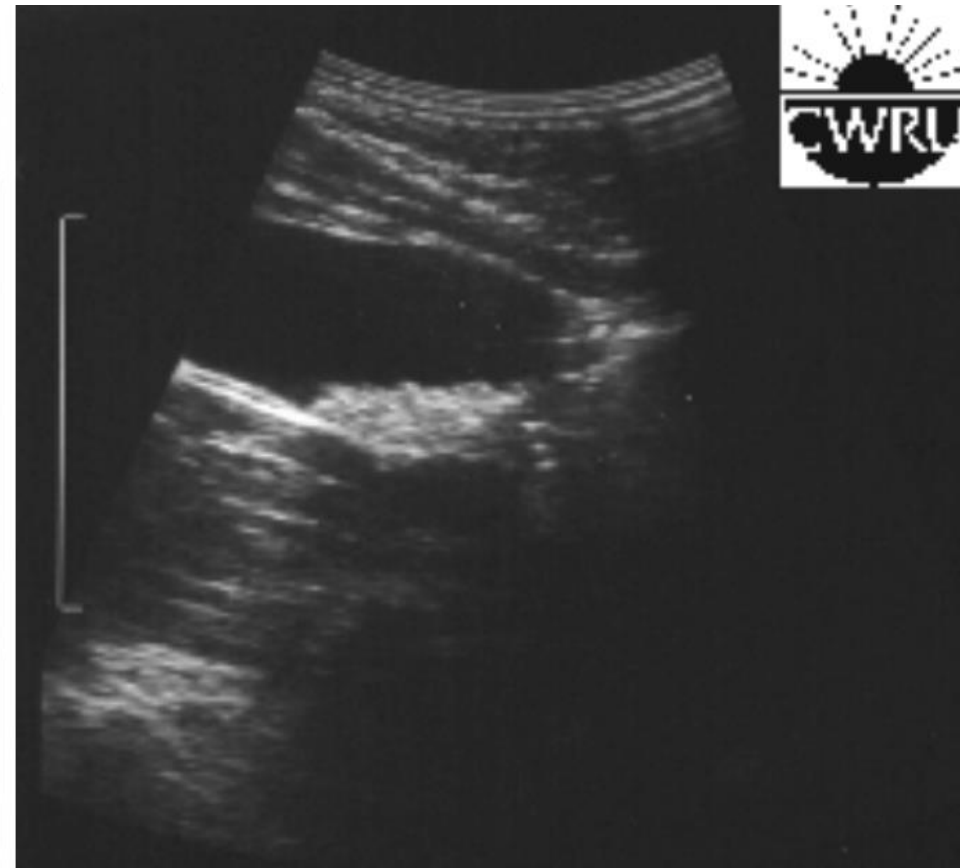
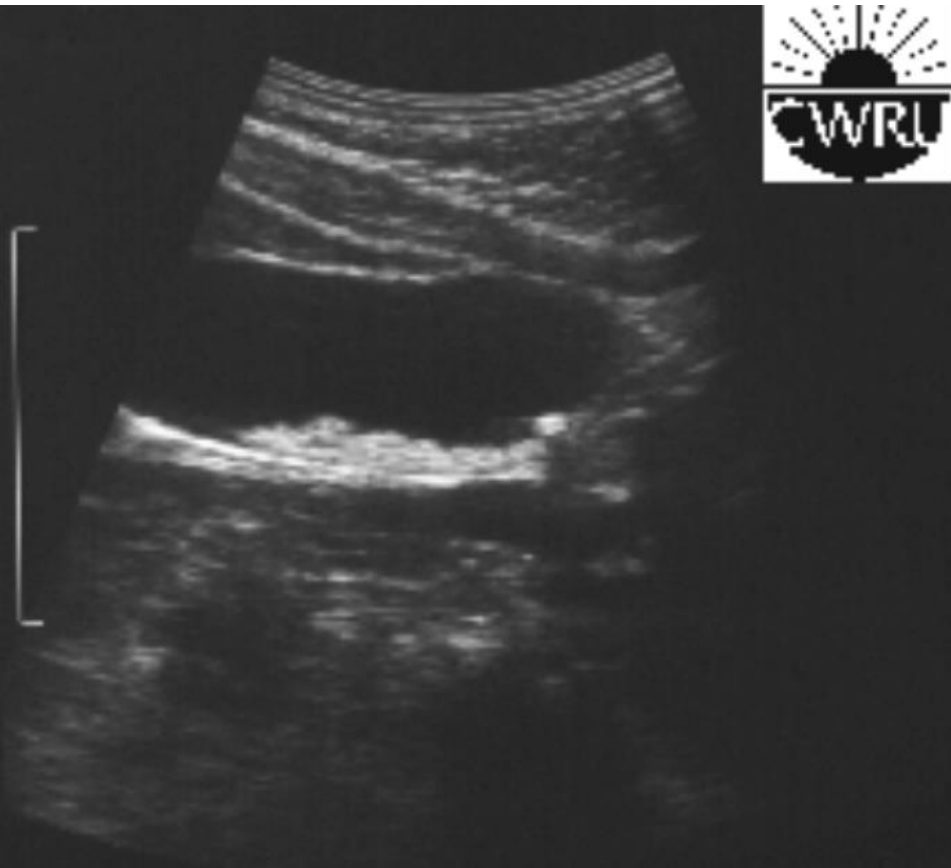
- One year following uneventful recovery from her MVC she develops:
 - Intermittent right upper quadrant/midepigastic abdominal pain
 - Radiates around right side to intrascapular area of back
 - Occurs 6-12 hours after eating, especially Kentucky Fried Chicken (Original Recipe)
 - Associated with nausea and anorexia
 - Antacids don't help but pain spontaneously resolves after several hours

Differential Diagnosis of Epigastric Pain

- Peptic Ulcer Disease
- Pancreatitis
- Biliary Colic
- Hepatitis
- Gastroenteritis
- Intestinal Obstruction
- Mesenteric Ischemia
- Myocardial Infarction



Cholelithiasis: Ultrasound Diagnosis





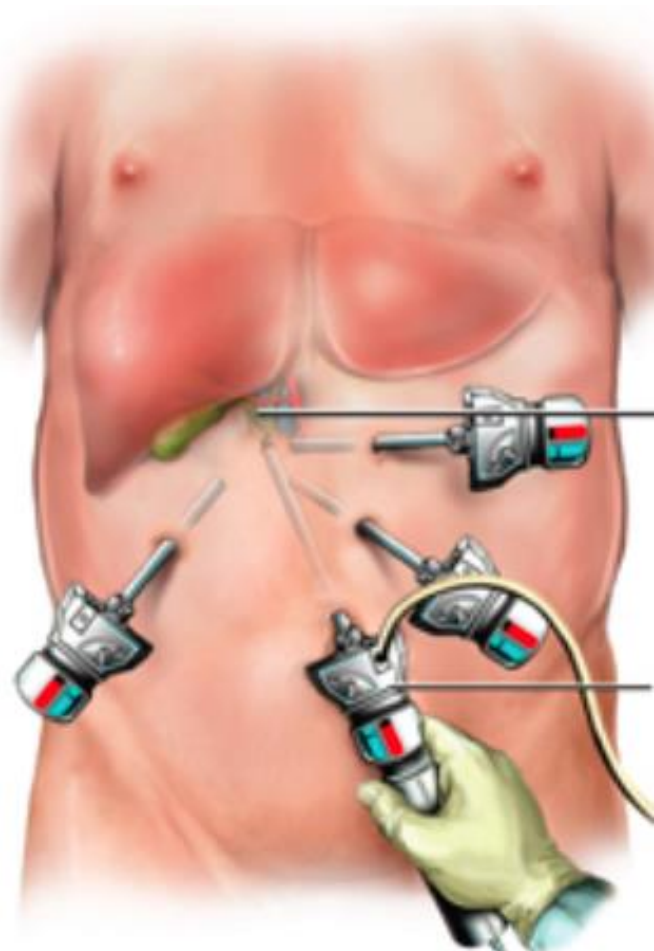
Symptomatic Cholelithiasis – Biliary Colic

- Clinical signs and symptoms
- Ultrasound or other radiographic confirmation
- No evidence of acute invasive infection or inflammation
- No evidence of jaundice, pancreatitis, or common bile duct stones or dilatation ($>1.0\text{cm}$)
- Treatment:
 - Avoid fatty foods
 - Elective cholecystectomy (laparoscopic) at convenience
 - Intraoperative cholangiogram: Hx of CBD involvement

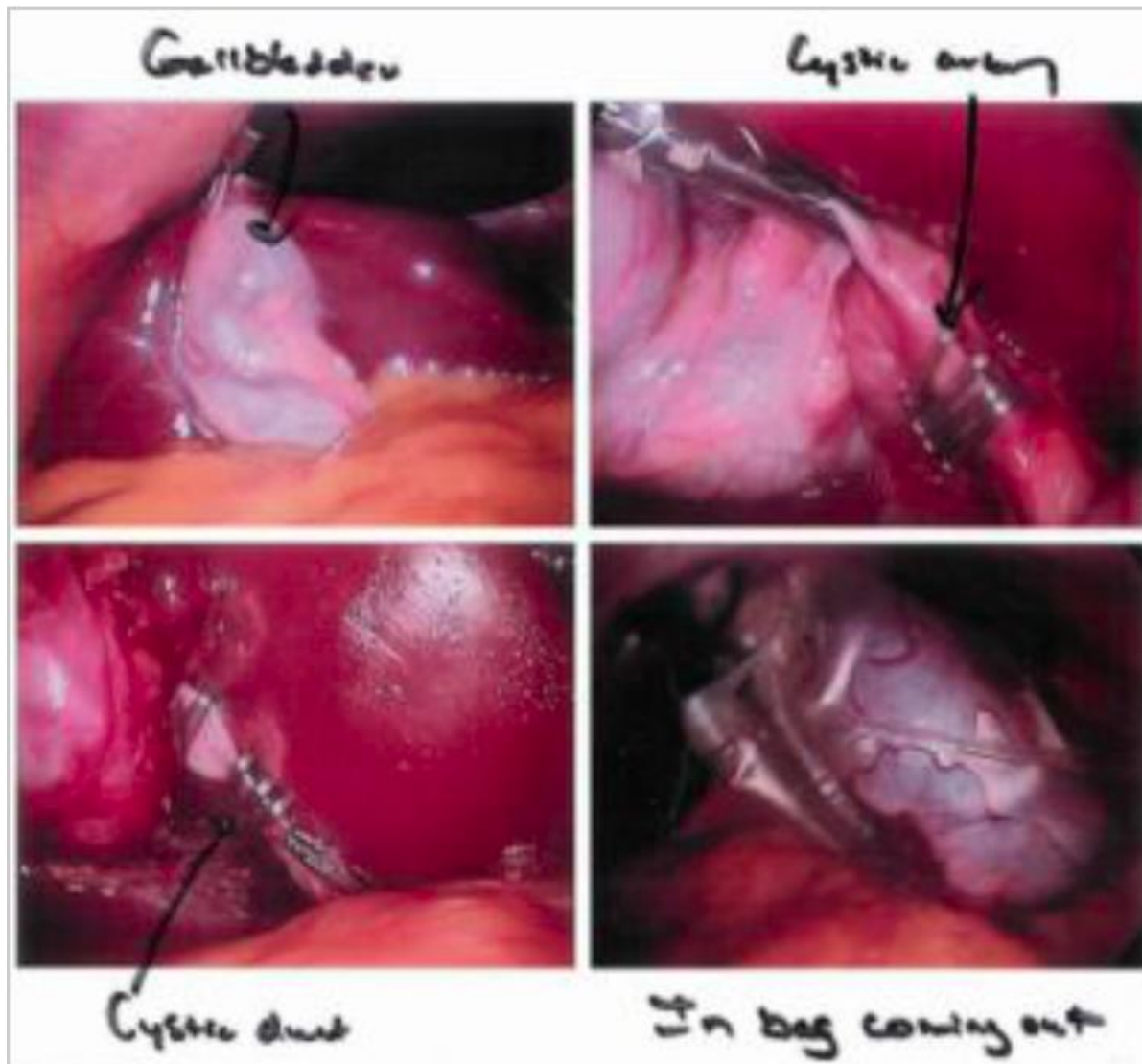
Biliary Dyskinesia

- Classic biliary colic symptoms
- Absence of cholelithiasis
- Low (<30%) gallbladder ejection fraction on HIDA scan
- Symptoms recreated with cholecystokinin injection
- Due to dysfunctional contraction of gallbladder
- Treatment: Laparoscopic cholecystectomy without intraoperative cholangiogram
- Sustained benefit: 70 -80% long term pain relief

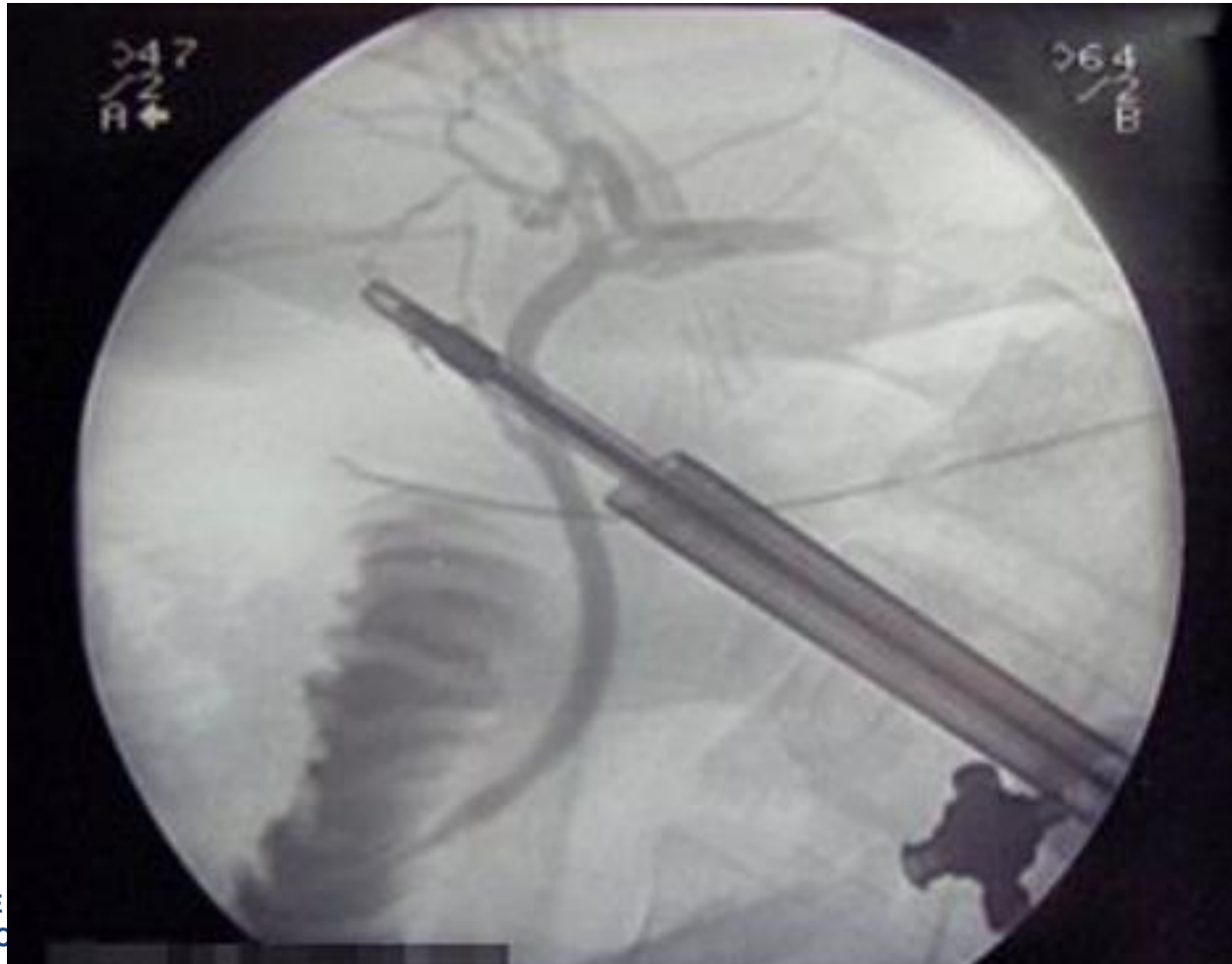
Laparoscopic Cholecystectomy



Laparoscopic cholecystectomy



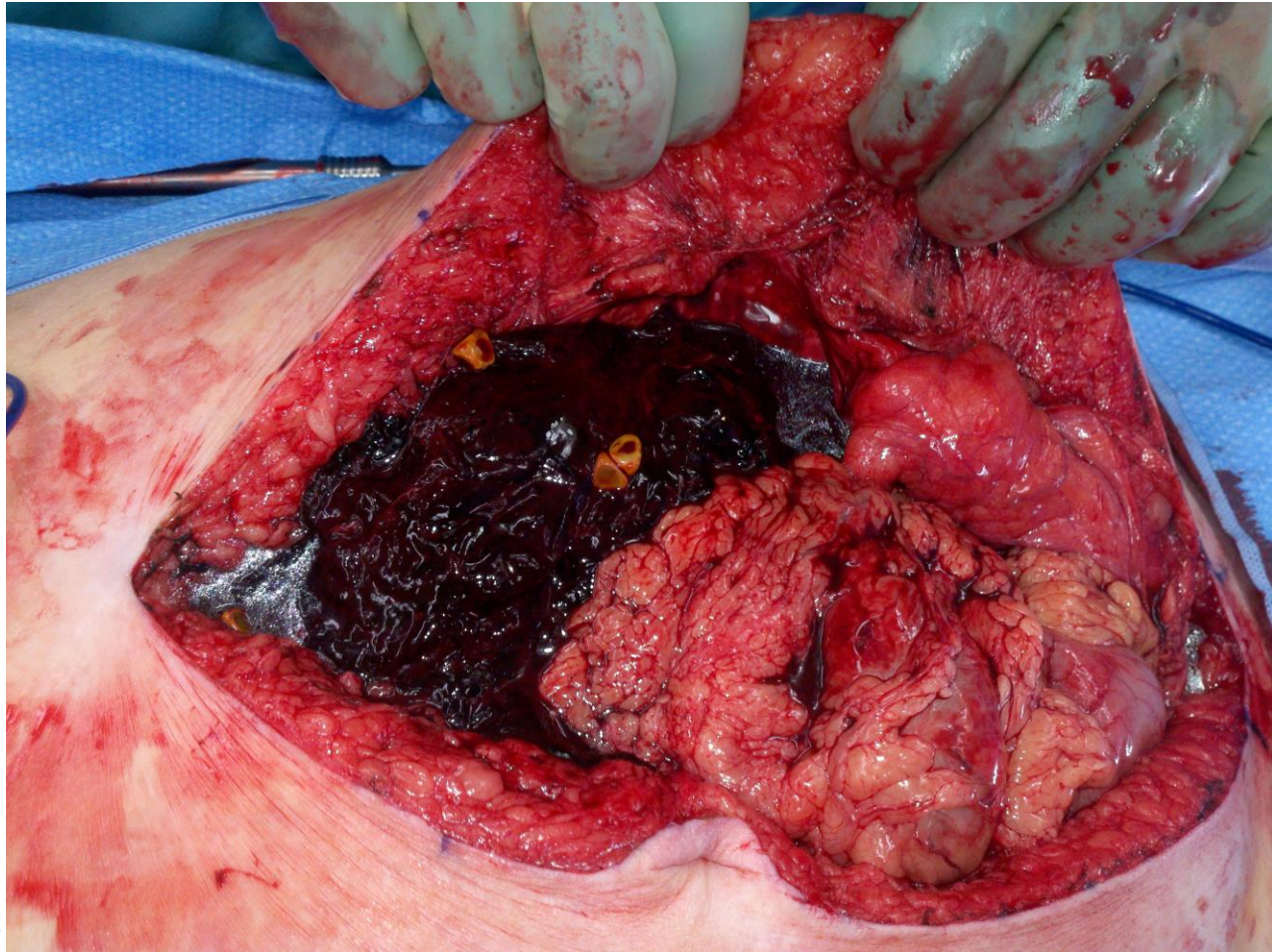
Intraoperative Cholangiogram



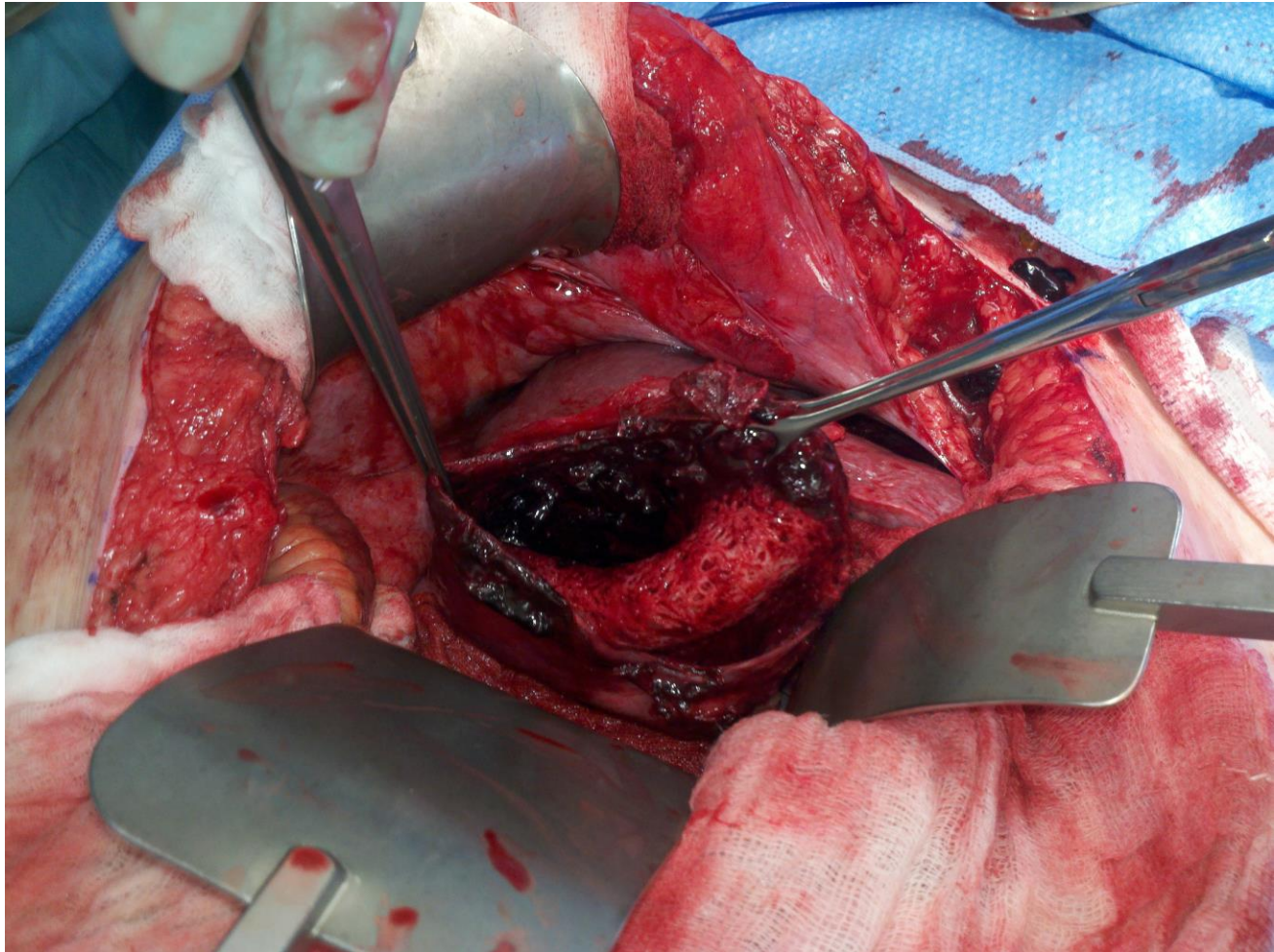
Conversion from Laparoscopy to Open

- Decision surgeon specific
 - Safety is the most important consideration
- Factors affecting:
 - Multiple previous operations
 - Extent of pericholecystic inflammation
 - Anatomic variant concerns
 - Bleeding
 - Concern for or recognized CBD injury

Conversion to Open Cholecystectomy



Conversion to Open Cholecystectomy



Conversion to Open Cholecystectomy



Case Presentation (continued)

- Patient scheduled to undergo elective laparoscopic cholecystectomy in 4 weeks
- One week before surgery presents to ED with 2 days of marked constant RUQ pain associated with fever (102.8F), vomiting, anorexia and (+) Murphy's sign
- WBC 16.2; HCT 48%; Platelet Count 330
- Chem 7 normal ALT 35 AST 26 Alk Phos 150
Bilirubin 1.8 Amylase 30 Lipase 46
- Ultrasound consistent with acute cholecystitis

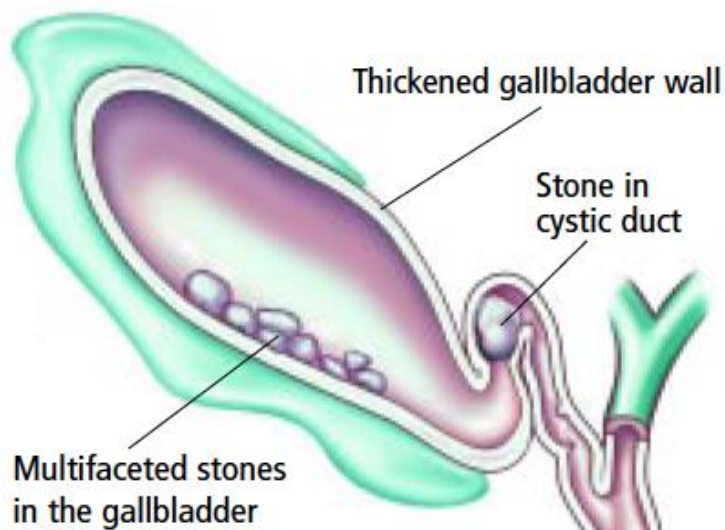
Cholecystitis: Acute or Chronic Inflammation



Acute Cholecystitis: Ultrasound Findings

- Gallbladder wall thickening $>3\text{mm}$
- Pericholecystic fluid
- Cholelithiasis
- Sonographic Murphy's sign
- 90-96% sensitive
- CBD assessment
 - Size: $< 10\text{ mm}$
 - Choledocholithiasis





Key findings of acute cholecystitis include a thickened gallbladder wall and the presence of pericholecystic fluid

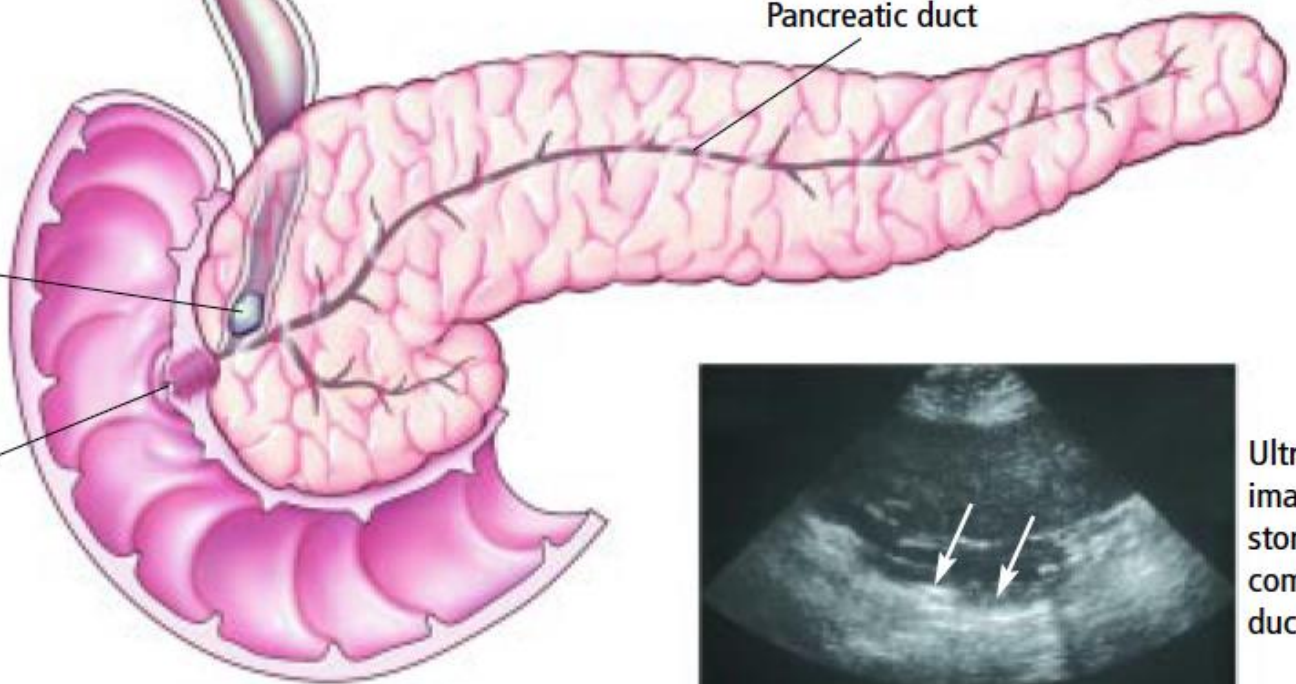


Common bile duct

Pancreatic duct

Distal common bile duct stone

Ampulla



Acute Cholecystitis

- Acute inflammation of gallbladder related to stone occluding cystic duct
- Frequently infected (gram negatives and anaerobes)
- Assess pain, PO intake, systemic inflammation
- Admit for IV antibiotics, hydration
- Consider cholecystectomy during admission
 - Duration of acute symptoms important determinant
 - < 5 days preferable due to decreased fibrous inflammation

Acute Cholecystitis: Operate or not

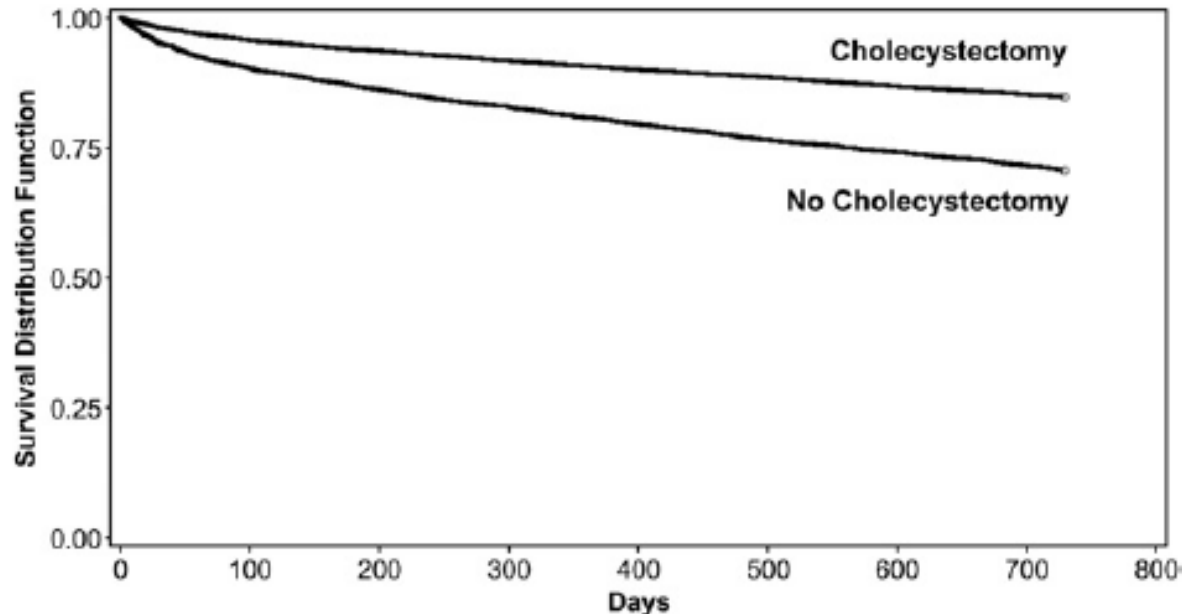


Figure 4. Kaplan-Meier unadjusted 2-year survival in patients who do and do not undergo cholecystectomy during initial hospitalization for acute cholecystitis. The 30-day, 1-year, and 2-year cumulative death rates were 2.0%, 9.0%, and 15.2%, respectively, in the cholecystectomy group and 5.0%, 19.4%, and 29.3%, respectively, in the no cholecystectomy group ($p < 0.0001$).

Acute Cholecystectomy: Timing of Surgery

- Typically within 5 days of symptoms onset, preferably within 72 hours
- Acute inflammation progresses to fibrotic changes
- Higher rate of conversion to open and bile duct injury if delayed
- High risk patients should be considered for cholecystostomy tube placement
 - ICU patients with other severe co-morbidities (LVAD, ECMO)
 - Advanced liver disease (Child's A:10%, B: 25%, C: 50%)

Cholecystostomy vs Cholecystectomy

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

	PD group	EC group	<i>P</i>
<i>N</i>	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

Acute Acalculous Cholecystitis

- Acute cholecystitis without cholelithiasis, probably ischemic etiology
- Disease of acutely ill patients, typically in ICU
- TPN is a risk factor
- Diagnosis made by ultrasound and/or HIDA scan
- Treatment depends on overall condition:
 - Severely ill – Percutaneous cholecystotomy tube
 - Mild to moderate - Cholecystectomy

Case Presentation (continued)

- Day after admission labs: TB 4.8, Alk Phos 500, amylase 95, lipase 60, WBC 22
- Pain unchanged
- Fever 102.5, appears jaundiced, decreased mental status, BP 90/40
- Intra- and extrahepatic bile duct dilated, CBD 14 mm

Acute Cholangitis

- Obstructive jaundice due to choledocholithiasis, malignancy, or stricture.
 - Jaundice with dark urine (urobilinogen) is surgical
 - Jaundice with clear urine (urobilin) is medical
- Sepsis related to infected proximal bile in occluded duct, can cause septic shock
- Cholecystitis increases bilirubin to <2.0
- Cholangitis increases bilirubin to >2.0
- Treatment: Antibiotics, hydration, and bile duct decompression

Acute Cholangitis

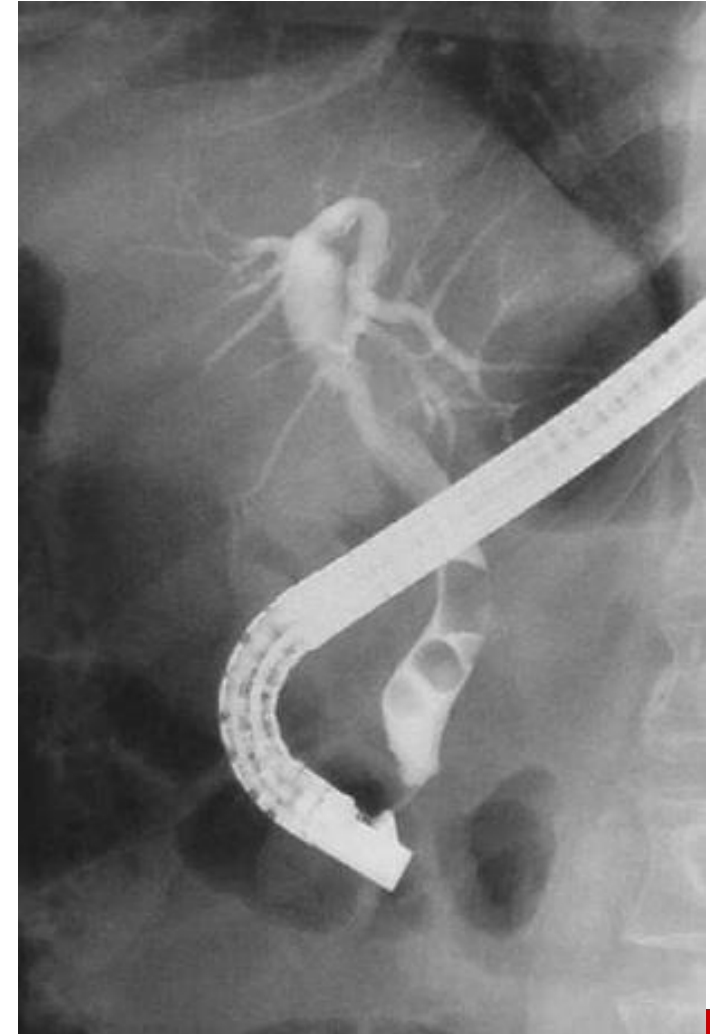
- Charcot's Triad
 - Jaundice
 - RUQ pain
 - Fever, chills
- Reynold's Pentad
 - Jaundice
 - RUQ pain
 - Fever, chills
 - Mental Status changes
 - Hypotension

Choledocholithiasis Risk Factors

- Jaundice > 2.0
 - > 4.0 should undergo pre-operative ERCP
- Alkaline phosphatase $>$ normal
- Common bile duct > 8 mm (age dependent)
- U/S or CT evidence of CBD stone
- Pancreatitis or history of pancreatitis

Endoscopic Retrograde Cholangiopancreatography

- ERCP
- Cannulation of ampulla
- Diagnostic and therapeutic
- Determines etiology of obstruction
- Removal of bile duct stones, placement of biliary stent
- Unsuccessful (rare): PTC or surgical decompression



Common Bile Duct Drains

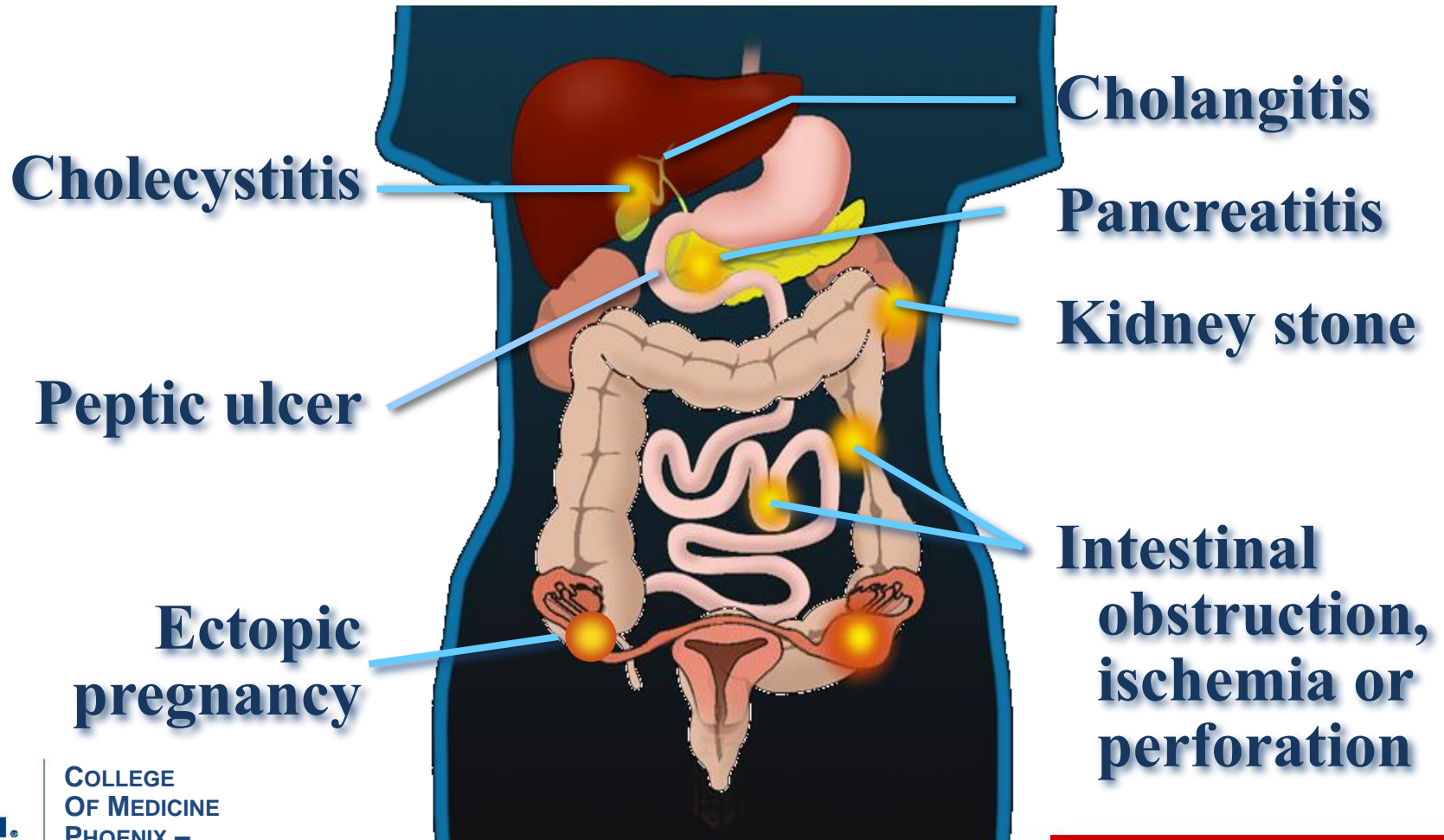
- Endoscopically placed biliary stent
- Percutaneous transhepatic biliary drain
- Surgically placed bile duct drains
 - T-tube
 - Transhepatic or enteric biliary drain



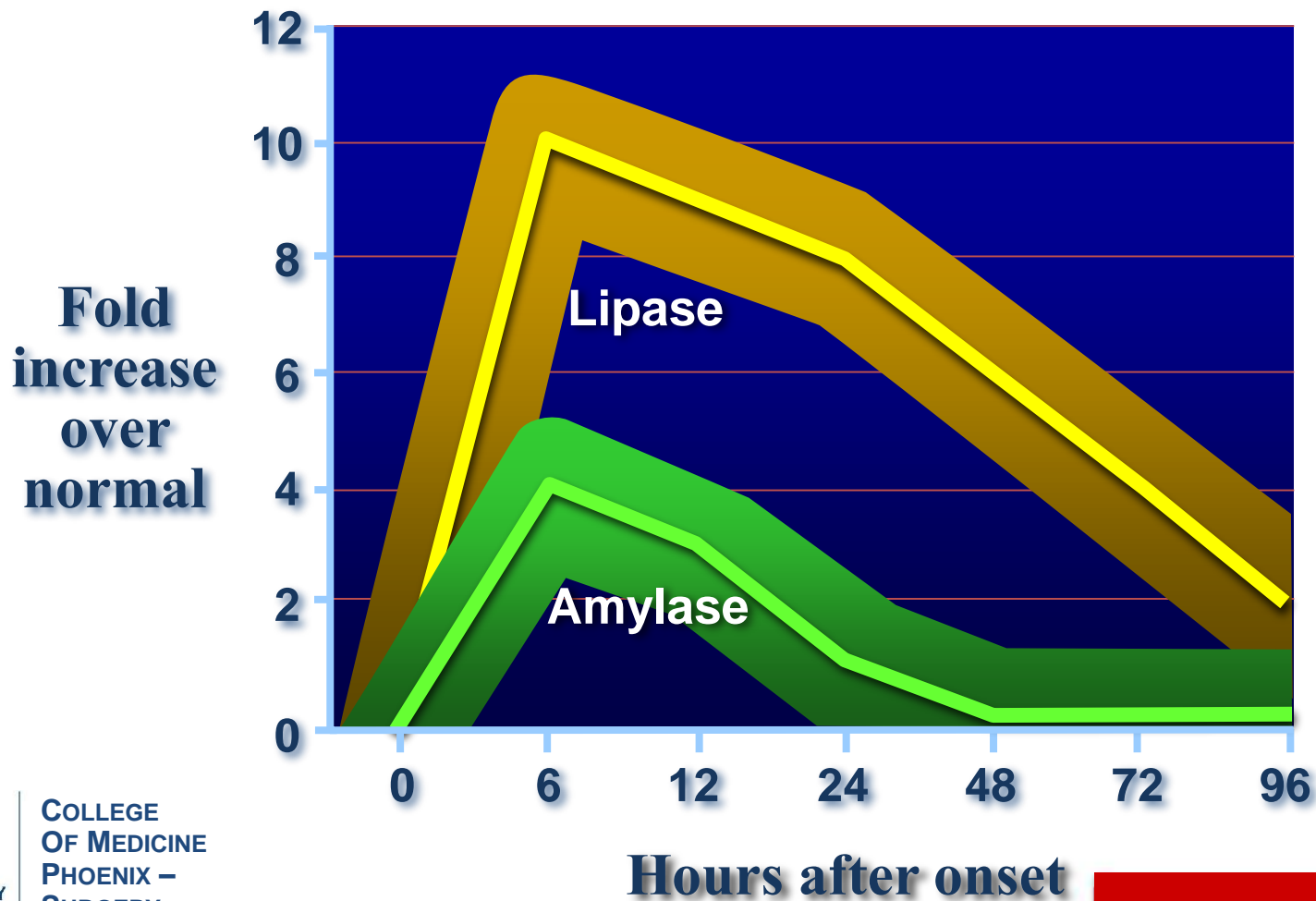
Case Presentation (continued)

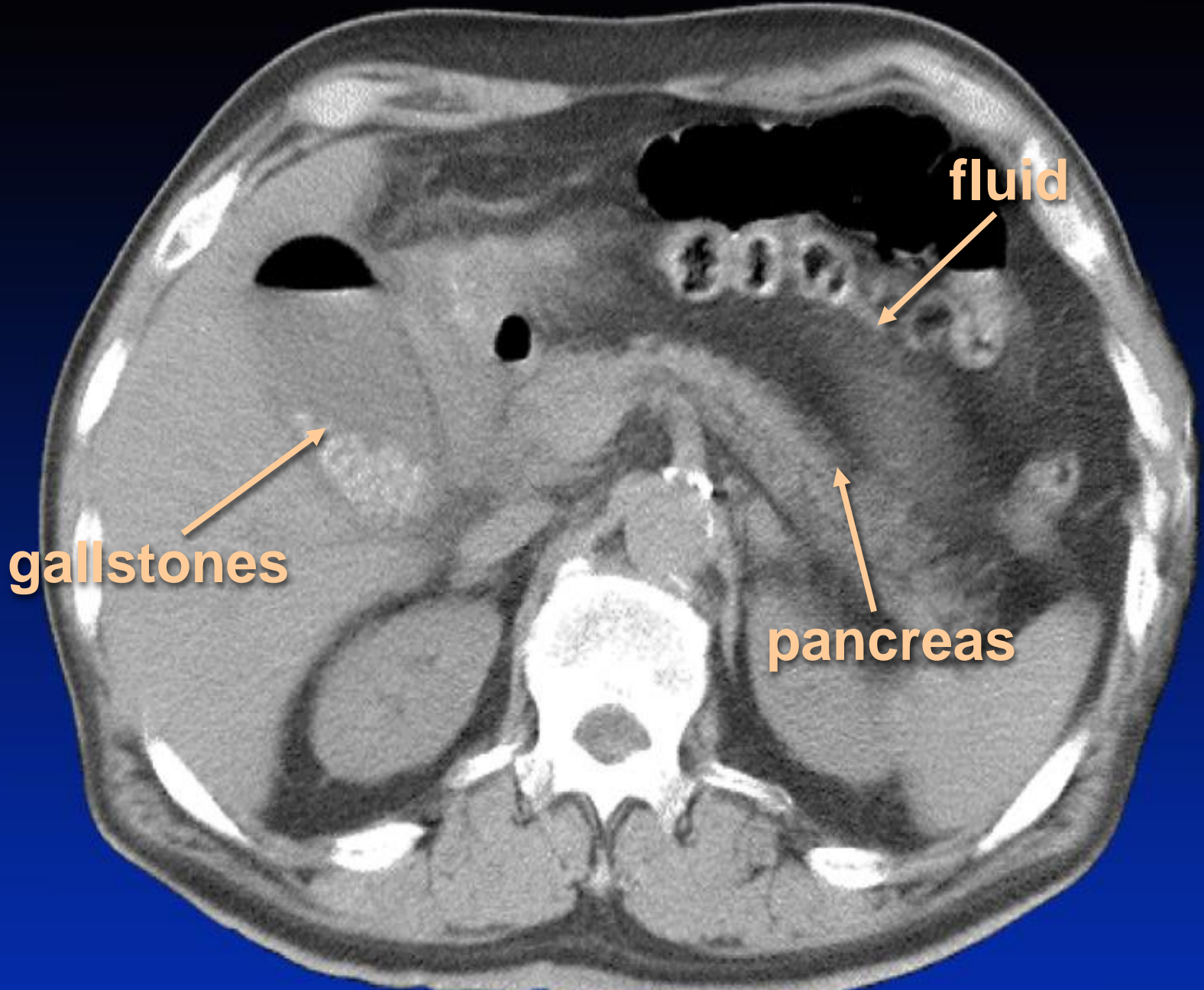
- ERCP performed with extraction of impacted CBD stone at level of ampulla
- Following day: TB 2.8, amylase 3000, lipase 4500
- Pain worse, WBC 24, febrile

Abdominal Pain and Increased Serum Amylase



Pancreatic Enzymes in Acute Pancreatitis





fluid

gallstones

pancreas



Cross-sectional Anatomy



Gastroduodenal a.

Common
bile duct

Gall
bladder

Duodenum

R. renal v.

Inf. vena cava

S. mesenteric v.

Aorta

S. mesenteric a.

Pancreas

Stomach

Splenic
flexure

L. adrenal

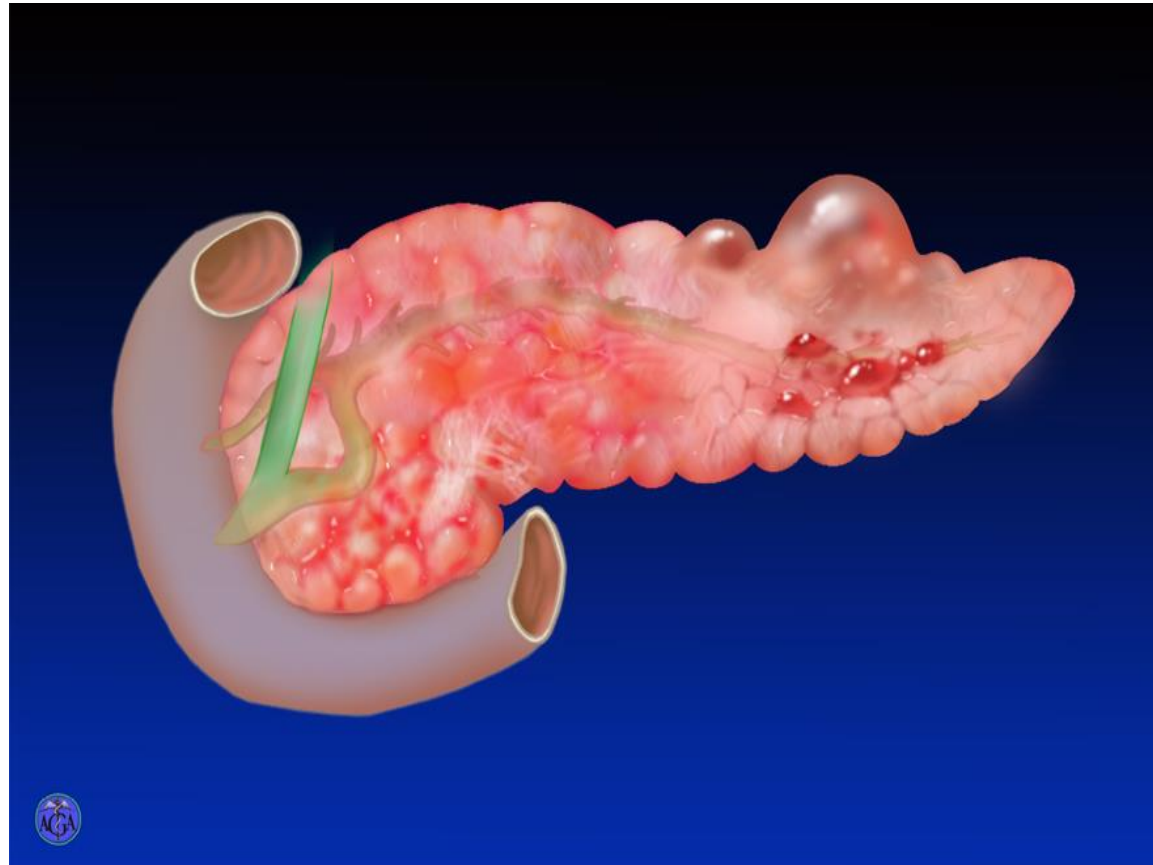
Spleen



Case Presentation (continued): Our Patient

- History: She denied alcohol use, she was not taking any medicines, no history of recent trauma
- Known choledocholithiasis, recent ERCP
- Labs: Normal calcium and triglycerides
 - * elevated liver enzymes and bilirubin

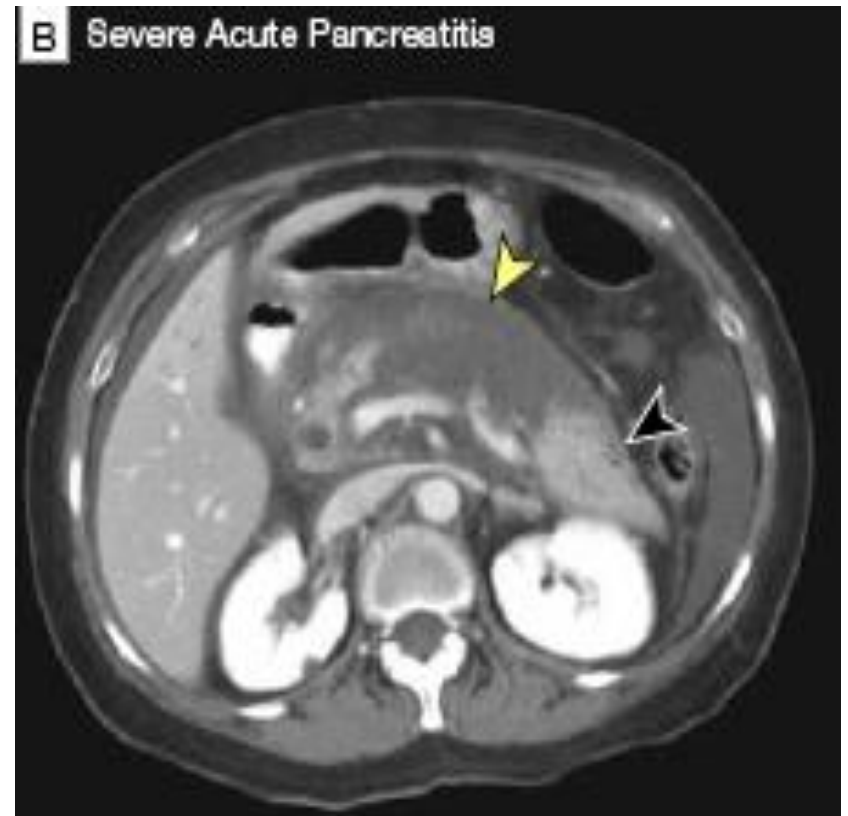
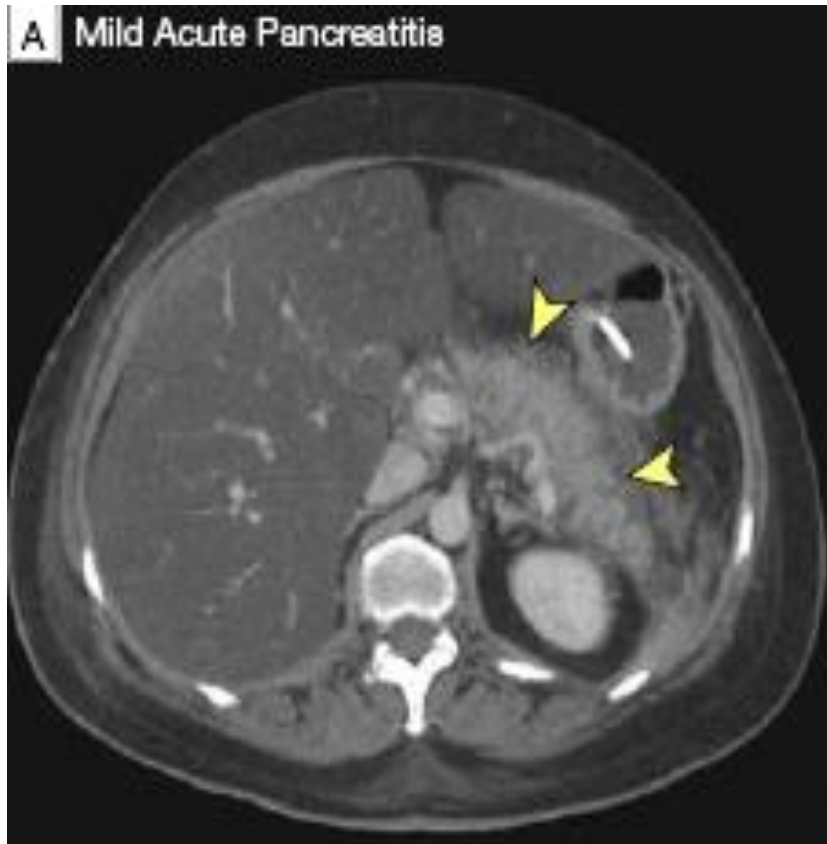
Diagnosis??



Severity of Acute Pancreatitis

- Signs and symptoms of pancreatitis range from mild pain to a severe life threatening illness
- Pancreatic edema=mild pancreatitis
- Pancreatic necrosis=severe pancreatitis
- Cholecystectomy indicated during hospitalization
 - 33-50% recurrence if wait 4-6 weeks
- Early cholecystectomy indicated when mild inflammation

Mild vs Severe Acute Pancreatitis



Post-Operative Expectations

- Pre-operative indication
 - Biliary colic
 - Biliary dyskinesia
- Systemic manifestations
 - Acute cholecystitis
 - Mild gallstone pancreatitis
 - Cholangitis
- Co-morbidities
 - Severe pancreatitis
 - Organ dysfunctions

Post-Operative Expectations: Elective

- Outpatient surgery
- Minimal pain, anorexia
- Return to usual activities within 7-14 days
- Fevers, worsening abdominal pain, inability to tolerate PO, or JAUNDICE = potential problem
 - Requires further workup, don't blame other causes
 - Early involvement of surgical service
 - Labs: CBC, amylase/lipase, liver function tests
 - CT or U/S to evaluate for free fluid and CBD size

Post-Operative Jaundice

- Maybe related to pre-operative disease but should immediately be decreasing post-operative if duct cleared
- Related to bile leak (cystic duct usually), stricture, or obstruction (stone or clip)
- Risk factors
 - Laparoscopic > open (0.1-0.6% vs 0.01-0.05%)
 - Acute cholecystitis vs biliary colic
 - Age
 - Pre-operative CBD stones

Post-Operative Jaundice

- Needs further workup
 - Small CBD with fluid: HIDA, MRCP, or ERCP to evaluate for leak
 - Dilated CBD: MRCP or ERCP to evaluate for obstruction
- ERCP for management of leak or obstruction
 - Cystic duct leak: ERCP stent +/- percutaneous subhepatic drain
 - CBD stricture: ERCP stent, re-evaluate subsequently for surgery
 - CBD obstruction: ERCP +/-stent, most likely surgery

Summary

- Gallbladder disease has wide spectrum of presentation, most are asymptomatic
- Laparoscopic cholecystectomy is preferred management
- Conversion to open more related to degree of inflammation and safety than skill
- Cholecystostomy has role in selected critically ill or major co-morbidity patients
- Post-operative deviation from expected, especially fever, pain or jaundice requires additional workup