Management of Gallbladder Disease

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What are we going to discuss?

- Cholelithiasis and Choledocholithiasis
  - Acute disease
  - Chronic Disease
- Acalculcus Gallbladder Diseases
What are we not going to discuss?

- Malignant pancreatrico-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

NEJM 330: 403, 1994
J Am Col Surg 210: 668, 2010
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...
Asymptomatic Cholelithiasis
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
- Porcelin 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 (>1.0cm)
- 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 cholecystokininin injection
- Due to dysfunctional contraction of gallbladder
- Treatment: Laparoscopic cholecystectomy without intraoperative cholangiogram
- Sustained benefit: 70 -80% long term pain relief
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 (102.8°F), 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 >3mm
- Pericholecystic fluid
- Cholelithiasis
- Sonographic Murphy’s sign
- 90-96% sensitive
- CBD assessment
  - Size: < 10 mm
  - Choledocholithiasis
Key findings of acute cholecystitis include a thickened gallbladder wall and the presence of pericholecystic fluid.
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 with 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

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<tr>
<th></th>
<th>PD group</th>
<th>EC group</th>
<th>( P )</th>
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<tbody>
<tr>
<td>( N )</td>
<td>23</td>
<td>19</td>
<td></td>
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<tr>
<td>Overall complication rate</td>
<td>2(8.7%)</td>
<td>9(47%)</td>
<td>0.011</td>
</tr>
<tr>
<td>Minor complications(^a)</td>
<td>2(8.7%)</td>
<td>5(26%)</td>
<td>0.21</td>
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<tr>
<td>Major complications(^a,b)</td>
<td>0</td>
<td>4(21%)</td>
<td>0.03</td>
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<td>90-day mortality</td>
<td>3(13%)</td>
<td>3(16%)</td>
<td>1.0</td>
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<tr>
<td>Overall hospital stay in days</td>
<td>25(7–97)</td>
<td>23(5–65)</td>
<td>0.39</td>
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<tr>
<td>ICU stay in days</td>
<td>10.5(2–71)</td>
<td>3(2–31)</td>
<td>0.17</td>
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\(^a\) P value adjusted for age and gender
\(^b\) P value adjusted for comorbidities

World J Surg 35:826, 2011
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

- Cholangitis
- Pancreatitis
- Kidney stone
- Intestinal obstruction, ischemia or perforation
- Cholecystitis
- Peptic ulcer
- Ectopic pregnancy
Pancreatic Enzymes in Acute Pancreatitis

Hours after onset

Fold increase over normal

Lipase

Amylase
The image shows a CT scan of the abdomen highlighting gallstones, fluid, and the pancreas.
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??

Acute Pancreatitis
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

A. Mild Acute Pancreatitis

B. 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