Diseases of the Biliary tract

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Diseases of the Biliary tract

- Normal Biliary Physiology
- Cholelithiasis
- Choledocholithiasis
- Cholangitis
- Biliary malignancy
Normal Biliary Physiology

- Liver produces 500-1500 ml of bile/day
- Concentrate bile and conduct it in well-timed aliquots to the intestine
- Bile acids participate in normal fat digestion
- CCK normally released after food ingestion
- GB contracts and sphincter of Oddie relaxes which allows delivery of water soluble moieties
- Bile acids are detergents that have both fat and water soluble moieties
Cholelithiasis
Cholelithiasis

- Gallstone
- Cause disease in US in 20-35% of patients by age 75
- Two types:
  - cholesterol (75%)
  - Pigment (25%) contains calcium bilirubinate and other calcium salts
Cholesterol Stones

- Gallbladder
- Key to stone formation
- Area of bile stasis which leads to crystal growth
- Provides mucus to act as a nidus for initiating cholesterol crystal
- Mexican Americans and Puma Indians has high prevalence and bile acid secretions is believed to be the common denominator
Pigment Stones

- Pathophysiology less well understood
- Increase production of bilirubin conjugates (hemolytic states)
- Increase Calcium and Carbonate
- Cirrhosis
Predisposing Factors

- Factors that increase biliary cholesterol saturation:
  - Estrogen
  - Multiparty
  - Obesity
  - Rapid weight loss
  - Terminal ileal disease
  - Oral contraceptives
Predisposing Factors

- Factors that increase bile stasis:
  - Bile duct strictures
  - Fasting
  - Choledochal cysts
  - Pregnancy- GB hypomotility
  - Parenteral hyperalimentation
Clinical Manifestations

- Most are asymptomatic
- Cystic duct obstruction, distended GB with biliary pain or superimposed inflammation and acute cholecystitis
- Common bile duct obstruction: pain, jaundice, cholangitis, pancreatitis and rarely cirrhosis
Asymptomatic Gallstones

- 60-80% patients with gallstones in US
- Over 20-year period; 18% develop biliary pain and 3% require cholecystectomy
- Prophylactic cholecystectomy
  1. Calcified (porcelain) GB
  2. Sick cell anemia
Acute Cholecystitis

- Acute RUQ Pain and tenderness secondary to cystic duct obstruction and inflammation
- Acalculous cholecystitis (5%):
  - Triad- prolonged fasting, immobility and hemodynamic instability.
- Critically ill patients: Burns, trauma, sepsis, TPN
Acute Cholecystitis

- RUQ and epigastric pain, increased in severity and does not spontaneously resolve
- Murphy’s sign: increased subhepatic tenderness and inspiratory arrest during deep breath
- Tender enlarged GB in 1/3 of cases
- Mild jaundice in 20%
Diagnosis

- **RUQ US**: Sensitivity and specificity of >95%
- **HIDA scan**: in cholecystitis shows the liver by the isotope, but the gallbladder is not seen, 97% sensitive, 90% specific
Complications

- Onset of fever, leukocytosis, increasing abdominal pain, persistent severe symptoms:
- Emphysematous cholecystitis
- Empyema of GB
- Gangrene
- Perforation
- Mirizzi’s syndrome: Profound jaundice in which extrinsic CBD compression occurs from impacted stone in GB neck
Emphysematous Cholecystitis
Management of Acute Cholecystitis

- Patient may improve over 1-7 days
- NG suction for vomiting and abd distension
- IV fluids, antibiotics and analgesics
- Cholecystectomy: within 24-48 h
- Emergency if advanced or complicated disease
- Cholecystotomy: for high risk patients
Chronic Cholecystitis

- Gallstone
- Biliary pain
- Mild histologic inflammation with fibrosis
- Pain occurs during transient obstruction of cystic duct by gallstones
- Attacks occurs at variable intervals (days-years)
- Nonspecific symptoms: dyspepsia, fatty food intolerance, bloating and belching with heartburn
Treatment

- Laparoscopic cholecystectomy: may need Pre-op ERCP only in concomitant choledocholithiasis
- Open Cholecystectomy: Mortality rate < 0.5%
- Might be required during procedure for adhesions or obesity
Choledocholithiasis

- 15% of patients with gallstones have CBD stones
- CBD stones usually originate from GB
- Less commonly stones form de novo in the biliary tree
- Ascaris leads to CBD stones in Asia
- Oriental cholangiopathy secondary to Clonorchis sinensis
Symptoms

- **Biliary colic**

- **Charcot’s triad:**
  1. RUQ Pain for hours
  2. Chills and fever
  3. Jaundice
  4. Hypotension
  5. Altered level of consciousness
Complications of Cholangitis

- Sepsis
- Renal failure
- Liver abscess
- Mortality 4-10%
Primary CBD Stones

- Caused by bile stasis and chronic bactibilia
- Up to 90% of patients with brown pigment stones have (+) bile culture results
- Usually brown pigment stones have high content of cholesterol than black pigment stones
- Biliary stasis:
  1. Sphincter of Oddie dysfunction
  2. Benign biliary stricture
  3. Sclerosing cholangitis
  4. Cystic dilatation of the bile duct
Diagnosis

- Laboratory: High bilirubin commonly more than 3 mg/dl (60% of patients)
- Elevated Alk Phosph and GGT
- Positive blood culture
- MRCP
- EUS
EUS
Treatment of Choledocholithiasis

- ERCP and sphincterotomy with stone removal
- ERCP before cholecystectomy
  1. Gallstones with jaundice bili above 3.5 mg/dl
  2. Stones seen by US, CT or MRCP
  3. Dilated CBD
  4. EUS/ERCP to prevent unnecessary complications
Neoplasms in the biliary tract
Gallbladder cancer

- 2.5/100,000
- Most common biliary tract cancer (54%)
- 95% adenocarcinoma
- Native Americans
- Male: Female = 1:3
- 5-year survival rate is 5%
Risk Factors of GB Cancers

- Cholelithiasis: large and symptomatic
- Chronic infection of GB: Salmonella Typhi
- Genetic factors
- GB polyps > 1 cm
- Porcelain GB (25%)
- Congenital biliary cysts
- Anomalous pancreaticobiliary ductal junction
**GB Cancer**

- **Location:** Fundus (60%), body, (30%), neck (10%)
- **Diagnosis** normally made incidentally at surgery
- **Direct invasion** of liver, extrahepatic biliary ducts, duodenum and colon
- **Intraperitoneal seeding**
Cholangiocarcinoma

- 3% of all cancer death in the US
- It arise from extrahepatic or intrahepatic biliary ducts
- The etiology remains undetermined
- Most common: Klatskin tumor, perihilar, followed by distal CBD and less common in intrahepatic ducts
Symptoms

- Progressive painless jaundice
- Pruritus
- Weight loss
- Abdominal pain
Courvoisier’s sign

- If CCC located distal to the cystic duct takeoff, the patient may have palpable gallbladder.
Laboratory

- Elevated total bilirubin 5-30 mg/dl
- Elevated Alk and GGY
- Elevated CA 19-9
Imaging

- US and CT scan: GB mass and dilated biliary ducts
- MRI and MRCP: vascular invasions and visualization of biliary tree
- Endoscopic ultrasound: most helpful for staging and vascular invasion
Treatment of Biliary Neoplasms

- Curative Surgery: may be attempted in young in tumor is localized
- Choledochoduodenostomy if unrespectable
- Cure in less than 10%
- Palliative treatment with chemotherapy and biliary stenting
ERCP: A Historical Timeline

1968

1974

1980

1989
Urgent Indications

- Cholangitis
  1- Choledocholithiasis (85%)
  2- Biliary Strictures
  3- Malignant Obstruction
  4- Biliary instrumentation
- Severe biliary pancreatitis
Dye is injected through a catheter into the pancreatic or biliary ducts.
Gallbladder, Pancreas and their ducts
Severe Biliary Pancreatitis

- ERCP in severe pancreatitis reduces morbidity and may be mortality
- Evidence of benefits is strongest among patients with cholangitis
Common Indications

- Obstructive jaundice
- Pancreatitis
  - Idiopathic recurrent
  - Chronic
- Post-operative pancreatobiliary
  - Stones
  - Strictures
  - Fistulas
Guidelines for the Use of ERCP I

- Validated by prospective controlled trials
  - Palliation of malignant biliary obstruction- metallic stent have longer patency
Guidelines for the Use of ERCP II

- Validated by observational studies
- First line therapy for post-operative leaks and stricture
- Evaluation and treatment for recurrent and chronic pancreatitis
Guidelines for the Use of ERCP III

- Symptomatic pancreatic pseudocyst in patients with history of pancreatitis.
- Can be performed safely in both children and pregnant adults.
- Treatment of pancreatic duct fistulas via the placement of stents.
Guidelines for the Use of ERCP IV

- Validated by observational studies
- Should not be undertaken for evaluation of pancreaticobiliary pain without objective imaging studies.
- Routine pre-laparoscopic cholecystectomy ERCP should be performed

- Validated by expert opinion
- ERCP is primarily a therapeutic procedure
ERCP Complication

- One of the most technically demanding procedure performed by an endoscopist
- Manipulating the papilla can deliver a fatal complication
- The only endoscopic procedure regularly performed that can injure our patients
ERCP complications

- Diagnostic ERC - overall complication rates of 5% to 6% and a mortality rates of 0.07% to 0.1%*
- ES complication rate 7%-10%, mortality rate 0.2%-2.2%.

* Cotton, GIE 94; Davis, AJG 97
** Freeman, NEJM 96; Sherman, Gastro 91; Lambert, BJS 91
Spectrum of ERCP Complications

- Pancreatitis: 5-6%. Severe pancreatitis in 0.4-0.6 % of cases.
- Bleeding: 2%. Severe in 0.5%.
- Perforation: 0.5-2.1%
- Others: Infection, vascular trauma, pneumothorax, impacted basket.
NIH State-of-the-Science Conference Statement: ERCP for diagnosis and therapy, 2002

- Avoidance of unnecessary ERCP is the best way to reduce the number of complications.
- With newer diagnostic imaging technologies emerging, ERCP is evolving into a predominantly therapeutic procedure.

Who and How?
Alternative Investigation

- CT scan
- MRCP
- Endoscopic Ultrasound
(Helical) CT

Advantage
- Non-invasive
- Readily available
- Operator independent
- More accurate than US

Disadvantage
- Contrast required
- Not in jaundice patient
- Radiation exposure
- Moderately expensive
## (Helical) CT

<table>
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<th>N</th>
<th>Sen</th>
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<th>Accuracy</th>
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<td>IHD</td>
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<td>73%</td>
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<td>CBD</td>
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<td>71%</td>
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**MRCP**

**Advantage**
- Non-invasive
- No contrast or radiation
- In all kinds of patients
- Operator independent
- Very sensitive and accurate

**Disadvantage**
- Not readily available
- Expensive
- Not in patient with claustrophobia and metal implant
MRCP

- Meta-analysis

- Medline search (1/97-3/03), English or French, bibliographies, and experts.

- 67 studies were included (4711 patients).

- Overall pooled sensitivity (95%) and specificity (97%).

- The procedure was less sensitive for stones (92%) and malignant conditions (88%) than for the presence (99%) and level (96%) of biliary obstruction.

Romagnuolo J, Ann Intern Med 2003
EUS

Advantage

- Highly sensitive and accurate
- Bedside examination possible
- In patients with metallic implant
- High success rate
- Proceed to ERCP at the same session

Disadvantage

- Not readily available
- Operator dependent
- Semi-invasive
- Expensive
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<th>Study</th>
<th>N</th>
<th>EUS vs.</th>
<th>Sen</th>
<th>Spec</th>
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<td>Surgery/ERCP</td>
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<td>97%</td>
<td>USG/CT (Sen): 80/83%</td>
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<td>97%</td>
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<td>13/22 stones &lt;1cm, 14 nondilated bile duct</td>
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<td>88%</td>
<td>98%</td>
<td>93%</td>
<td>Retrospective study</td>
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<td>ERCP+ES</td>
<td>93%</td>
<td>98%</td>
<td>99%</td>
<td>89%</td>
<td>95%</td>
<td>78/119(66%) CBD stones found 8 (10%) cases only diagnosed after ES</td>
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<tr>
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<td>MRCP/Surgery/ERCP</td>
<td>100%</td>
<td>95%</td>
<td>91%</td>
<td>100%</td>
<td>97%</td>
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EUS before ERCP

- N = 485 patients (mean age 66.2 years, range 20-94 years)
- Suspected to have choledocholithiasis based on clinical, biochemical, and US or CT imaging
- All had EUS before ERCP
- +ve EUS → ERCP + ES or surgery
- -ve EUS → observe

Buscarini E, GI Endosc 2003
EUS before ERCP

- EUS diagnosed choledocholithiasis in 239 (51.6%) and the absence of stones in 220 patients.
- In 4 patients (0.8%), EUS was incomplete.
- Sensitivity 98%, specificity 99%, PPV 99%, NPV 98%, accuracy 97%
- In 214 (46%) patients, more invasive investigations of the bile duct were avoided.
- Cost for patients: EUS-based strategy $374.50 significantly less than the theoretical mean cost of $443.80 (p < 0.001) for patients undergoing ERCP

Buscarini E, GI Endosc 2003
Can’t get in?

ERCP is most dangerous for people who need it least.