Common Disorders in ERCP and EUS

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Objectives

• Describe the anatomy and physiology of the pancreobiliary system
• Describe the pathophysiology of the pancreobiliary system as it relates to imaging during ERCP/EUS
ERCP/EUS

- Endoscopic Retrograde Cholangio Pancreatography
  - a procedure consisting of a combination of retrograde cholangiography and transhepatic cholangiography. The endoscope is advanced into the duodenum, the biliary tract is cannulated, and contrast medium is injected in order to demonstrate all portions of the biliary tree
- Endoscopic Ultrasound (EUS) is a modality which combines a high frequency transducer with an endoscope to visualize beyond the wall of the GI tract

Anatomy
Biliary Imaging

Pancreatic Duct
Physiology

• The biliary system function is to collect, concentrate and store bile, and release it into the duodenum when needed for digestion

Pancreas

Exocrine Function

- Acinar cell secrete 500 – 1000 mL of pancreatic juice daily
  - Water, Bicarbonate, Enzymes, Potassium, Sodium, Chloride and Calcium

Enzymes

- Amylase, Lipase, Protease

Pancreatic secretion is controlled by hormones

- Cholecystokinin (CCK) and Secretin

Common Disorders Seen in ERCP/EUS

• Chronic Pancreatitis
  • Celiac Plexus Blocks
• Pancreatic Cancer
  • Celiac Plexus Neurolysis
• Biliary Obstruction
  • Cholidocholithiasis
  • Primary Sclerosing Cholangitis
Chronic Pancreatitis

Sex:
- Males are affected more commonly than females (6.7 vs 3.2 per 100,000 population).
- Sex differences with respect to etiology also exist. Alcohol-induced illness is more prevalent in males, idiopathic and hyperlipidemic-induced pancreatitis is more prevalent in females, and equal sex ratios are observed in chronic pancreatitis associated with hereditary pancreatitis.

Age:
- The mean age at diagnosis is 46 years.
- In idiopathic chronic pancreatitis, age distribution has been reported, designated as early-onset form (median age 19.2 y) and late-onset form (median age 56.2 y).

Chronic Pancreatitis

Causes:
- Excessive alcohol consumption is the most common cause, accounting for about 60% of all cases.
- Several inherited disorders also are considered metabolic in origin, accounting for about 1% of cases
- Cystic fibrosis
- Hyperlipidemia (usually type I and type V) also may cause chronic pancreatitis
- Hypercalcemia due to hyperparathyroidism
- Nutritional, or tropical, chronic pancreatitis is rare in the United States, but it is an important cause of disease in other parts of the world.
- Medications are an infrequent, or possibly under recognized, cause of chronic pancreatitis
EUS Imaging of Chronic Pancreatitis
Pancreatic Duct Dilation

Pancreatic Duct Stone
EUS-Guided Pseudocyst Drainage

ADVANTAGES:
EUS provides highly detailed information re the interface between PC and GI wall (distance, presence of blood vessels)
Can locate ideal access route
Provides information re the PC contents and structure (density, type of material, septations)

LIMITATIONS:
Limited optics
Need larger working channels
Cost of dedicated accessories

Celiac plexus block

- Used for pain management of chronic pancreatitis
- CPB uses steroid to block nerve receptors in the celiac plexus

Chronic Pancreatitis:
- pain score reduction in 50% of pt’s and sustained for 24 weeks.
EUS-Guided Celiac Block

TECHNIQUE:
- Hydrate with 500-1000 mL NS IV pre-procedure
- Conscious sedation & monitor: EKG, BP, O₂ Sat & CO₂ level
- Left Lateral Decubitus position
- Locate Aorta through posterior gastric wall
- Trace Aorta to the Celiac Trunk
- Under EUS guidance, place needle, primed with NS, immediately adjacent and anterior to the lateral aspect of the Aorta @ level of the Celiac trunk.

EUS-Guided Block (con’t)

- Clear needle by injecting 2 mL of NS, perform aspiration test
- Inject 10 mL of 0.25% preservative free bupivacaine. Repeat aspiration test
- Inject 40 mg of triamcinolone (Kenalog)
- Look for echo-dense cloud
- Repeat process in opposite side of the Aorta
EUS-Guided Celiac Block

POST-PROCEDURE:
Transient upper abd/back pain (burning)
Frequent VS and monitor for orthostatic changes prior discharge
Recovery time approx 2 hrs

COMPLICATIONS:

EUS APPROACH
– Minor: Transient Diarrhea and Hypotension (9% and 20% respectively)
– Major: Para-aortic abscess

EUS-Guided Celiac Block

Study Results
• 55% of patients responded at 8wks
• 26% pain relief at 12 wks
• 10% pain relief at 24 wks
• 3 patients pain relief between 35-48 wks
  (Gress, 2001)
Carcinoma

- 90% of all pancreatic tumors are solid malignant adenocarcinoma arising from the ductal epithelium
- 5th leading cause of cancer death in U.S.
- Estimated 37,170 deaths in 2007 (NCI)
- Few early symptoms
- Dismal survival rates!
- Higher incidence in men / blacks
- Higher incidence in industrialized nations
- 80% of all cases diagnosed between ages 60-80

Tumors

- Islet Cell
  - Gastrinoma
  - Insulinoma
  - Glucagonoma
  - Somatostatinoma
  - VIPoma

- Intrapapillary Mucinous Neoplasm (IPMN)
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EUS

Indications
• Evaluation
• Staging
• Sampling
• Treatment
  • Injection Therapy
Fine Needle Aspiration (FNA)

Method using curvilinear array echoendoscope to obtain tissue of tumors, cysts, and lymph nodes
Can detect & stage tumors of esophagus, stomach, duodenum, ampulla, pancreas, rectum & mediastinal staging of lung cancer

EUS-Guided Celiac Plexus Neurolysis (CPN)

Pancreatic Cancer:
• pain score reduction in 78% of pt’s at 2 weeks and sustained for 24 weeks.
EUS-Guided CPN

TECHNIQUE:
- Hydrate with 500-1000 mL NS IV pre-procedure
- Conscious sedation & monitor: EKG, BP, O2 Sat, and CO2 level
- Left Lateral Decubitus position
- Locate Aorta through posterior gastric wall
- Trace Aorta to the Celiac Trunk
- Under EUS guidance, place needle, primed with NS, immediately adjacent and anterior to the lateral aspect of the Aorta @ level of the Celiac trunk.

EUS-Guided CPN (con’t)

- Clear needle by injecting 2 mL of NS then perform aspiration test
- Inject 10 mL of 0.25% preservative free bupivacaine
- Repeat aspiration test
- Inject 10 mL of dehydrated 98% absolute alcohol
- Look for echo-dense cloud
- Repeat process in opposite side of the Aorta
EUS-Guided CPN

POST-PROCEDURE:
Transient upper abd/back pain (burning)
Frequent VS and monitor for orthostatic changes prior discharge.
Recovery time approx 2 hrs.

COMPLICATIONS:

EUS APPROACH
- Minor: Transient Diarrhea and Hypotension (9% and 20% respectively)
- Major: Para-aortic abscess

ALL CPN (Meta-analysis)
- Minor: 38%-44% diarrhea and hypotension respectively
- Major: 1% Paresthesias, paraplegia, pneumothorax, prolonged gastroparesis or diarrhea

Choledocholithiasis

• Gallstones in the common bile or hepatic duct
Risk Factors for Pigmented Stones

• Increasing age
• Chronic hemolysis – sickle cell disease
• Alcoholism or alcoholic cirrhosis
• Biliary infection – usually *E. coli*
• TPN
• Vagotony
• Periampullary diverticula
• Gallbladder stasis

Signs and Symptoms

• Pain 3-6 hours after the heaviest meal of the day
• Nausea or vomiting
• Increased eructation (Burp)
• Dyspepsia
Treatment

- ERCP
  - Sphincterotomy
  - Stone Removal

Stone Management

- ERCP
  - Cannulation to confirm presence of stones
- Sphincterotomy
  - Permit access to duct with accessory devices
  - Permit release of stone
- Biliary duct dilation to increase access to duct
  - Smaller sphincterotomy to preserve papillary function
  - Reduce complications
- Stone extraction
Stone Extraction

- Stones of 10 mm in diameter or less will occasionally be released spontaneously with sphincterotomy
- Methods of extraction
  - Balloon
  - Basket
  - Lithotripsy

Balloon Extraction

- Balloon extraction of biliary stones is more popular in the United States
- Inflation of balloon to desired size to pull stone through the duct
Balloon Extraction

- Method is relatively simple and has several advantages
  - Less risk of impaction
  - Flexibility in balloon sizes
  - Ability to perform occlusion cholangiogram

Basket Extraction

- Use of a wire basket to trap the stone within and extract
- Some baskets offer ability to convert to lithotripsy
- More common in practices outside the U.S.
Basket Extraction

• Completion of procedure
  • Insure basket is free of debris
  • “Basket Impaction”

Mechanical Lithotripsy

• Usually necessary for stones larger than 15 mm
• Employed to break up or crush stones into smaller fragments
Lithotripsy

- May be utilized in 2 fashions:
  - Through the scope method
  - After endoscope has been removed

PSC

- 50 – 75% of patients with PSC have ulcerative colitis
- Also associated with Crohn’s Disease
- Men are affected twice as much as women
- 2/3 of patients are younger than 45
- 10 – 15% of patients with PSC develop Cholangiocarcinoma
PSC Clinical Manifestations

- Progressive fatigue
- Jaundice
- Pruritus
- Abdominal pain
- Elevated serum alkaline phosphatase

PSC Treatment

ERCP
- Dilation
- Stenting
- Surveillance

- Liver Transplant
Access

• Entering the duct
• Create a path through the stricture
  • Guidewire
  • Cannula
• May be the most protracted portion of the procedure

Diagnosis

• Duodenoscope
  • Cytology Brush
  • Biopsy Forceps

• Endoscopic Ultrasound
  • Fine Needle Aspiration
Tissue Sampling

Stricture Dilation

• Goal is to expand the lumen of the duct
• Methods
  • Balloon Dilation
  • Dilating Catheters
  • Placement of Stents
Dilation

Gradual Dilation
Balloon Dilation

Stenting
Stenting

PLASTIC STENTING

• Variety of sizes
  • Length
  • Diameter

• Styles
  • Straight
  • Doudenal Bend
  • Center Bend
  • Pig Tail
Multiple Placement

METAL STENTING

Malignant etiologies
- PERMANENT IMPLANT
METAL STENTING

Uncovered
- Stainless steel mesh
- Compressed onto a sheath
- No occlusion of collateral ducts
- Tumor in growth

Covered
- Reduce tissue in growth
- Liable to migrate
- Block collateral ducts

Foreshortening
Foreshortening

- Stents are compressed to pass through the endoscope
- Woven or stainless steel stents may “foreshorten” up to 40% when they assume their final shape in the duct

Metal Stent Deployment
References

- http://www.emedicine.com/mst/topic3034.htm