Learning Objective

- Describe ERCP as a procedure utilized to diagnose and treat biliary and pancreatic disorders: stones, strictures & need for stenting.

Outline

- Review anatomy and physiology of the pancreatobiliary system.
- Discuss specific “tools and techniques” for management of biliary and pancreatic stones and strictures.
- Discuss management of biliary and pancreatic duct strictures via stent therapy.
- Conclude with updates on prevention of complications: Post ERCP pancreatitis (PEP).
Introduction

- Since its initial description over 40 years ago, ERCP has evolved from a diagnostic to a therapeutic procedure.
- "Diagnostic" ERCP has been supplanted by less invasive procedures:

CT Scan  MRCP  EUS

Anatomy & Physiology

- Sphincter of Oddi:
  - Allows for release of bile and pancreatic juices.
- Pancreas (Exocrine):
  - Digestive Enzymes.
- Bile:
  - Emulsifies fats.
  - Facilitates absorption of fat-soluble vitamins.
  - Provides route of excretion of bilirubin and cholesterol.

Taking a Radiographic Look

- Endoscopic Retrograde Cholangiopancreatography (ERCP):
  - Combination of endoscopy and X-ray.
  - Utilized to visualize the pancreatobiliary system and perform endoscopic interventions:
    - Sphincterotomy
    - Stone Removal
    - Dilation
    - Stent placement
Stones

Bile Duct Stones (Choledocholithiasis)

- Most common cause of biliary obstruction.
- Clinical presentation: biliary colic, obstructive jaundice, cholangitis and possibly pancreatitis.
- Severe biliary pancreatitis: early intervention with ERCP, sphincterotomy and stone removal (and subsequent drainage) greatly reduces morbidity and mortality.

Pancreatic Duct Stones

- Pancreatic duct stones: sequela of chronic pancreatitis.
- Goal of ERCP: decompress main pancreatic duct by removing obstructing stones.
- Challenges of ERCP: ductal anatomy, ductal stricturing, calcified stones.
- Extracorporeal Shock Wave Lithotripsy (ESWL): may be necessary to fragment stones prior to endoscopic removal.
Stone Removal Devices/Techniques

Balloon Retrieval:
- Typically the first line device for uncomplicated stones.
- Multiple Stones: start distal and work up the duct.
- Pancreatic duct stones: calcification frequently causes balloon rupture.

Basket Retrieval:
- Baskets can capture stones for removal: medium to larger size stones.
- May be advantageous over balloons in extremely dilated ducts.
- Work distal to proximal!
- Pancreatic Duct: anatomically challenging!

Large Ducts: What to Do?
- Mechanical Advantage of extraction baskets:
  - Forces associated with pulling the basket are aligned with the axis of the stone.
  - With balloons, the stone is located lateral to the pull force.

Stone Removal: Devices / Techniques

Mechanical Lithotripsy:
- Reserved for large stones or cases feared of basket entrapment.
- Pancreas: anatomically challenging.
Pancreatobiliary Strictures

- Negotiating the Stricture
  - Bridging the "GAP"
  - Guidewires
  - Accessories
  - Position

- Do not fill what you cannot drain:
  - Use a minimal amount of contrast.
  - Consider wire-guided techniques.

Biliary Strictures

- Establish Diagnosis:
  - Benign Conditions:
    - Post operative: OLTX
    - Trauma
    - Autoimmune
    - Inflammatory
  - Malignant Conditions:
    - Pancreatic cancer (tumor compression)
    - Cholangiocarcinoma
    - Lymphoma
    - Metastatic disease

Biliary Hilar Strictures

- "Klatskin’s Tumor"
- Challenge to treat and manage
  - ?One side vs. two sided stent placement
  - ?Contrast free stent placement
  - MRCP first to target lobe for stenting

Bismuth Classification
Establish Diagnosis:
Benign Conditions:
- Chronic Pancreatitis
Malignant Conditions:
- Pancreatic cancer

Pancreatic duct sphincterotomy should precede dilation and subsequent stent insertion.
Dilation alone (w/o stenting): ineffective.
Challenge: guidewire manipulation.

Dilating Techniques
- Screw catheters:
  - Refractory strictures
  - Obstructing pancreatic and/or biliary stones
**STENTS**

**Plastic Biliary Stents**
- **Advantages:**
  - Multiple shapes
  - Multiple sizes
  - Inexpensive
  - Easy to insert
- **Disadvantages**
  - Stent occlusion (2-5 months)
  - Bacterial biofilm and associated biliary sludge material
  - Cost-effective??

**Biliary (& Pancreatic?) Metal Stents**
- **Covered Metal:**
  - Increasing use for benign conditions refractory to plastic stent therapy.
  - Prolonged radial force may prolong the maintenance of bile duct patency.
  - Randomized trials underway: biliary and pancreatic.
- **Uncovered Metal:**
  - Inoperable malignant conditions.

**Metal Stents: A Closer Look**
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Pancreatic Duct Stents

Complications of ERCP

- Best way to avoid complications = avoid unnecessary ERCP!

Endoscopy Related

- Bleeding:
  - Recognition of use and appropriate adjustment of antithrombotic therapies
  - Detect and correct coagulopathy
  - Careful sphincterotomy

- Infection:
  - Antibiotic prophylaxis for known or suspected biliary obstruction

- Perforation: Early recognition and expeditious management
  - Periampullary
  - Duodenal
  - Device induced

Post-ERCP Pancreatitis

- Definition: New onset characteristic pain with associated lab abnormalities (elevation > 3x normal) within 24hrs of ERCP.

- Severity of Complication:

Post ERCP Pancreatitis (PEP)

- Technique related risk factors:
  - Papillary trauma-difficult cannulation.
  - Consider guidewire assisted cannulation.
  - Repeated pancreatic duct injections.
  - Consider placing guidewire into pancreatic duct
  - Consider pancreatic duct stenting to facilitate biliary cannulation.
  - Balloon dilation of an intact biliary sphincter prior to biliary stone extraction.
  - Perform sphincterotomy, unless contraindicated (coagulopathy).

- Prophylactic PD Stent Placement:
  - Tried and true!
  - Standard of care in high risk patients.

Maranki, J., Yeaton, P., Current Gastroenterology Reports, 2013 (15)352

Pharmacologic Agents

- Pancreatitis:
  - Aggressive* hydration with lactated ringers.
  - Key points:
    - Hydration is a mainstay of treatment for acute pancreatitis, independent of etiology.
    - Lactate can stimulate an anti-inflammatory immune response.
    - LR less likely than saline to induce metabolic acidosis.

*Aggressive = 3mL/kg/hr during, 20 mL/kg bolus after and 3mL/kg/hr x 8hr after

Buxbaum, et al., Clinical Gastroenterology and Hepatology, 2014, 12(2).

- NSAIDS
  - Rectal administration of indomethacin immediately following ERCP (100 mgm).
  - Convenient, safe, inexpensive and effective.


- Stay tuned….can indomethacin alone replace PD stenting??

Pre-procedure assessment:
- Cardiopulmonary, renal, liver
Summary and Conclusions

- ERCP is one of the most commonly performed endoscopic procedure for the evaluation and treatment of various conditions of the biliary and pancreatic ductal systems.
- ERCP remains one of the most complex and higher risk procedures performed in endoscopy.
- Careful patient selection and thorough informed consent processes should be in place to ensure proper medical decision-making and physician-patient communication.
- Communication amongst all members of the ERCP team is paramount to the success of the procedure.

References


References


Thank You!

malickj@upmc.edu