Endoscopic Retrograde Cholangiopancreatography: A Primer.

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Disclosures

- None
Objectives

▪ Familiarize primary providers with ERCP
▪ Review the indications for ERCP
▪ Identify potential issues related to success
▪ Understand the different techniques utilized
  ▪ Particular interest in why different stents are used
▪ Reducing the risk of post-ERCP pancreatitis
Indications

- Jaundiced patient with evidence of biliary obstruction
- The patient without jaundice whose data suggest pancreatic duct or biliary tract disease.
- Evaluation of signs or symptoms suggesting pancreatic malignancy when alternative investigations are equivocal or normal.
- Acute biliary pancreatitis with concomitant cholangitis or biliary obstruction.
- Pancreatitis of unknown etiology.
- Evaluation of patients with suspected type 1 or type 2 sphincter of Oddi dysfunction.
- Common bile duct stones
- Papillary stenosis
- Sump syndrome
- Post cholecystectomy bile leak
- Post cholecystectomy biliary injury
- Suspected choledochal cyst
- Ampullary carcinoma in patients who are not candidates for surgery
- Pancreatic pseudocyst drainage in appropriate cases.

TOP SUBURBAN HOSPITAL INDICATIONS

Adapted from National Institutes of Health State-of-the-Science Conference Statement, 2002 and ASGE guideline statement, 2012
Indications

▪ ERCP is generally **NOT** indicated initially:
  ▪ Evaluation of abdominal pain of obscure origin.
  ▪ Prior to laparoscopic cholecystectomy in the absence of signs of biliary obstruction.
  ▪ Evaluation of suspected gallbladder disease without evidence of bile duct disease.
  ▪ Pancreatic malignancy unless management will be altered.
  ▪ Dilated bile duct without underlying biochemical data to support obstruction

Adapted from National Institutes of Health State-of-the-Science Conference Statement, 2002 and ASGE guideline statement, 2012
Potential issues that affect success

- Patients with surgically altered anatomy
- Prior pancreatitis
- Duodenal strictures
- Head and neck issues
- Concurrent medications
  - Anticoagulants, antiplatelet agents, ect.
Surgically altered anatomy

- Roux-en-Y gastric bypass
  - Laparoscopic gastrostomy
  - Deep enteroscope
- Choledochojejunostomy
  - Deep enteroscope
- Billroth 2
  - ERCP, rarely colonoscope
- Whipple resection
  - Colonoscope, deep enteroscope
Techniques utilized for successful ERCP

- Cannulation
- Sphincterotomy
- Stone extraction
- Stents
Cannulation

- Accepted standard is a wire guided cannulation
  - Lower rate of complications including pancreatitis
Cannulation

Dual wire technique

This is associated with increased risk of pancreatitis

However, improved common bile duct cannulation rates in difficult ERCPs

Cannulation

- Needle Knife Sphincterotomy
  - Wire cannulation proves fruitless
  - A precut sphincterotomy can be performed
    - Associated with increased bile duct cannulation success\(^1\)
    - However, increased risk of pancreatitis\(^1\)
  - Conversely, early precut may decrease overall risk\(^2\)
    - Considered after 10 attempts or 10 min
    - Pancreatitis rate was lower 2.5% to 5.3%
    - Increased successful biliary cannulation

Sphincterotomy

- Two major methods
  - Application of a cutting current with sphincterotome in place
  - Papillary dilation
Sphincterotomy

- Sphincterotomy
  - Blended current or a pure cutting current are used to decrease risk of pancreatitis
  - Some data to support a pure cutting current is superior
  - Cut is applied in the 11 to 1 o'clock position
  - A 75 percent bowed sphincterotome or an inflated stone balloon should be able to move easily in and out of the orifice if an adequate sphincterotomy has been created.

Sphincterotomy

- Much more difficult in patients with peri-ampullary diverticulum

Sphincterotomy

- Papillary dilation
  - Balloon dilation of the ampulla to facilitate passage of stones from the bile duct
  - Proposed secondary to concern over long term outcomes of sphincterotomy
    - Data has shown bacterial colonization of the bile duct in patients 17 years after sphincterotomy
    - Data in regard to safety is lacking (possible higher rates of pancreatitis)
  - Therefore, not the standard
    - However this is used extensively in Asia
    - Useful adjunct for stone extraction and often combined with sphincterotomy
    - Useful in patients who are at risk of bleeding after sphincterotomy, patients in whom the local anatomy makes a sphincterotomy impossible or dangerous - periampullary diverticulum, altered surgical anatomy

Sphincterotomy
Stone Extraction

- Common bile duct stones occur in 15-20% of patients with cholelithiasis\(^1\)
- First step is a proper sphincterotomy
- Balloons and baskets are most common devices
- Mechanical lithotripsy for larger/harder stones
- Electrohydraulic lithotripsy (EHL) – Can be performed with choledochoscopy

Stone Extraction

- Balloon

- Basket
Stents

- Two major types – Plastic and Metal
- Plastic stents
  - Easier to place
  - Much shorter lifespan (60 days), higher rates of cholangitis
  - Allows for easier secondary evaluations such as EUS
  - Ideal for indeterminate strictures and stone disease
  - Generally removed at approximately 6 weeks
Stents

- Metal stents
  - Both covered (removable) and uncovered (permanent) variants
  - Much larger in diameter and as such, greatly improved patency rate (270 days)\(^1\)
  - Lower rates of cholangitis
  - Therefore, if surgery for resectable malignancy is delayed (i.e. neoadjuvant therapy), metal stent is preferred\(^2\)
    - Covered metal stents provide better patency at cost of higher migration rate, risk of cholecystitis\(^3\)
    - Expect for anatomical considerations, covered stent is preferred in resectable disease undergoing neoadjuvant therapy\(^4\)
    - They do not interfere with surgery
  - Covered metal stents can be used in recalcitrant stone disease, improved outcomes

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3. Aadam AA et al. GIE 2012
4. Kubota K et al. Dig Endosc 2014;26:77-86
Stents
Post ERCP Pancreatitis

- Elevated amylase/lipase levels noted in 75% of post ERCP patients
- Acute clinical pancreatitis ranges 3-5%¹
- Severe pancreatitis rate of 0.32%²
- Remains a common cause of ERCP malpractice claims³
- Mechanism is not clearly understood
  - Felt related to hydrostatic pressure exerted by contrast injection and instrumentation⁴

References:
Post ERCP Pancreatitis

- Separated into three categories
  - **Mild:** Amylase 3 times normal at 24 hours post ERCP, 2-3 days in the hospital
  - **Moderate:** Hospitalized for 4-10 days
  - **Severe:** Hospitalized for more than 10 days, hemorrhagic, pancreatitis, pseudocyst formation

- Managed with bowel rest and IV fluids
  - Lactated ringers is preferred
    - Decreased CRP as well as incidence of SIRS at 24 hours compared to normal saline
    - Often 3 liters are administered post procedure with 3-5 additional liters over the first 12 hours
    - Dependent upon renal/cardiovascular status of the patient

Post ERCP Pancreatitis

- Prophylactic therapy
  - Aggressive LR fluid resuscitation
  - Pancreatic duct stenting
    - Prophylactic pancreatic stent placement is recommended to prevent post ERCP pancreatitis (Recommendation grade A)
  - Rectal administered NSAIDs
    - Routine rectal administration of 100mg of diclofenac or indomethacin, immediately before or after ERCP, is a grade A recommendation

Post ERCP Pancreatitis

- Pancreatic duct stenting
  - Preserves pancreatic duct drainage (bypassing papillary edema)
  - Marked reduction in severe/necrotizing pancreatitis
  - Patient’s must be followed for stent migration
    - AXR in 1 week
    - Endoscopy for removal if persists - 10%
  - Dangerous if failed placement
  - Should only be performed by high volume endoscopists

1. Freeman ML, Guda NM; Gastrointest Endosc. 2004;59(7):845.
Post ERCP Pancreatitis

- Rectal administered NSAIDs
  - Studies have proven safety\(^1\)
  - Meta-analysis of multiple studies have shown a relative risk reduction for PEP of 0.47 with a number needed to treat of 13\(^2\)
  - More recently, Chinese study revealed a 50% reduction with PRE-procedure use in ALL patients\(^3\)
  - Mechanism thought to be related to blockade of phospholipase A2 and COX in the pathway of pancreatitis
  - Recommended dose – 100 mg of Indomethacin delivered rectally either immediately before or after ERCP

TAKE TWO RECTALLY, CALL ME IN THE MORNING!

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\(^1\) Patai\(Á\), Solymosi N, Patai AV. Medicine (Baltimore). 2014;93(26):e159.
\(^3\) Luo H et al. Lancet 2016 Apr 28; [e-pub]. ([http://dx/doi.org/10.1016/S0140-6736(16)30310-5](http://dx/doi.org/10.1016/S0140-6736(16)30310-5))
Successful ERCP depends on a successful team!