Common surgical alterations

Intact pancreaticobiliary anatomy
- Gastric surgery
  - Partial gastrectomy
    - Billroth I
    - Billroth II
  - Roux-en-Y gastrectomy
  - Roux-en-Y gastric bypass
- Esophagectomy
  - Gastric pull-up
- Others
  - PEG, PEJ

Altered pancreaticobiliary anatomy
- Choledochoduodenostomy
- Hepaticojejunostomy
- Whipple procedure
Non-surgical alterations

- Duodenal obstruction
  - Tumor
  - Prior endoscopic intervention
- Alteration in biliary or pancreatic anatomy

Preparation

- Review and discuss surgical alteration
  - Type of surgery performed
  - Length of limbs
    - Roux-en-Y
    - Billroth II
  - Type of reconstruction
    - Hepaticojejunostomy
- Review relevant studies
  - UGI
  - MRCP
  - Endoscopy/ERCP
Alternatives to ERCP

- Is it really necessary?
  - Diagnostic
    - History – is it really biliary or pancreatic type pain?
    - MRCP
    - Spiral CT
    - EUS
  - Therapeutic
    - PTC
    - Surgery

EUS Guided Cholangiogram

- Abnormal anatomy
  - Dilated duct
  - Abnormal liver tests
Billroth I anatomy

Billroth I / choledochoduodenostomy

- Normal orientation
- Usually successful
  - Gastroscope
  - Conventional methods/accessories
- One opening usually in distal bulb leading to proximal biliary tree
- Distal biliary access usually closed
- Distal common duct access via papilla
Billroth II

Size of gastrojejunostomy

Oralis totalis (Polya) isoperistaltic

Oralis partialis (Hoffmeister)

Billroth II

Angulation of the afferent limb

- Decreases with
  - Antiperistaltic reconstruction
  - Scarring
  - Surgical technique
- Risk of perforation
Length of afferent limb in BII

- **Antecolic reconstruction**
  - Usually longer afferent limb

- **Retrocolic reconstruction**

Identification of afferent limb in BII

- More acute, difficult to intubate, at 12 o’clock
- Along greater curve for isoperistaltic and non dependent for antiperistaltic reconstruction
- More bile
- Endoscope in right upper quadrant on Fluoroscopy
- Not efferent limb
- Duodenal stump reached
- Papilla found
Choice of endoscopes in BII

Duodenscope
- Difficult to reach ampulla
- Easier to cannulate and treat
- Perforation risk

Choice of endoscopes in BII

Forward viewing scope
- Easier to reach ampulla
- Difficult cannulation
  - Cap
- 7Fr stent only
- ? Perforation risk
  - Non variable torque
  - Risky with adult colonoscope
Roux-en-Y
Gastrectomy and gastric bypass

- Ulcer or cancer surgery
  - Usually reachable with colonoscope
  - Most accessories available
  - Usually successful
Jejunojejunal anastomosis

**Side to side**
- More common
- Angulation of afferent loop
- Perforation of blind loop

**End to side**

Roux en Y

- Gastric bypass
  - Consider other approach
    - ~50% successful at best
  - Enteroscope
  - Very limited options
    - Not for complex therapy

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Table 1: Comparison of different approaches for ERCP in patients with Roux-en Y anatomy

<table>
<thead>
<tr>
<th>Approach</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Best Application</th>
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</thead>
</table>
| Duodenoscope (through anatomic route) | Minimally invasive  
Sides viewing facilitates cannulation of native papilla  
Complete instrument availability (Can do high complexity interventions) | Often unsuccessful in long Roux Limb                    | Native papilla  
Short Roux Limb                                           |
| Colonoscope/Enteroscope   | Minimally invasive                                    | Forward viewing (difficult native cannulation)  
Often unsuccessful in long roux limb                      | Prior Sphincterotomy or BE/PE anastomosis  
Short Roux Limb  
Low complexity interventions                               |
| Single/Double Balloon or Spiral Enteroscope | Minimally invasive  
High success rates for reaching ampulla | Forward viewing (difficult native cannulation)  
Limited availability of instruments                       | Prior Sphincterotomy  
BE/PE anastomosis  
Long Roux Limb  
Low complexity interventions                           |
Laparoscopic Assisted ERCP

More Invasive

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Advantages</th>
<th>Disadvantages</th>
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</thead>
<tbody>
<tr>
<td>ERCP through gastrostomy</td>
<td>- Side viewing facilitates cannulation of native papilla</td>
<td>- More invasive than endoscopic approaches</td>
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<tr>
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<td>- Allows for repeat procedures</td>
<td>- RYGB with native papilla</td>
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<tr>
<td></td>
<td>- Complete instrument availability</td>
<td>- When repeat procedures are anticipated</td>
</tr>
<tr>
<td>Laparoscopic assisted ERCP</td>
<td>- Side viewing facilitates cannulation of native papilla</td>
<td>- More invasive than endoscopic approaches</td>
</tr>
<tr>
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<td>- Complete instrument availability</td>
<td>- RYGB with native papilla</td>
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<td>- Laparoscopy can diagnose/treat internal hernias</td>
<td>- When internal hernia is in the differential diagnosis</td>
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<tr>
<td>Interventional Radiology</td>
<td>- Less invasive than surgical approaches</td>
<td>- Morbidity (pain, external drains)</td>
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<tr>
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<td>- No access to pancreas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- RYGB patients with acute cholangitis</td>
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<tr>
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<td>- Poor surgical candidates</td>
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</tbody>
</table>
EUS Guided ERCP after Roux-en Y Gastric Bypass
Variations in Choledochojunostomy

Percutaneous choledochoscopy for inaccessible stones

- Percutaneous biliary access
- Dilate serially over weeks
- 20Fr peel away sheath for access
- Replace percutaneous tube after therapy
Percutaneous choledochoscopic EHL

- Failed intrahepatic views
  - Stricture
- Left lateral position
  - Pressure
  - Overtube usually not helpful
- Colon/enteroscope
  - Enteroscope accessories
- Air contrast study
- Balloon occlusion study
Post Whipple

- Classic
  - Similar to antiperistaltic BII
    - 40-60cm afferent limb along lesser curvature
  - End to side biliary anastomosis on antimesenteric border
- Pylorus sparing
  - End to side duodenojejunal anastomosis
  - 40-60cm afferent limb on the right side

Bilateral Hilar Metal Stents
Duodenal Obstruction

- Tumor
- Prior therapy
  - Balloon dilation
  - EUS guided approaches
    - Rendezvous retrograde
    - Antegrade
    - Biliary enteric anastomosis

Stent Revision for Cholangitis after Biliary and Duodenal Metal Stents
Antegrade Stenting

- Technically easier
  - Echoendoscope
  - No dilation for Zilver 635
- Risk of bile leak
- Safer than biliary enteric anastomosis

Choledochoduodenostomy
Final Tips

- Review the Operative Note for type of operation and length of limbs
- Tattoo the afferent limb to save time
- Use a short cap when using forward viewing
- Complete a detail report with accurate measurements, description of technique
- Employ local expertise – surgical and IR colleagues

Thank you