Objectives

• Examine endoscopic treatment options for:
  – Marginal ulceration
  – Leaks – fistulas
  – GERD
  – Stenosis
  – Foreign body
  – GI bleeding
  – Choledocholithiasis
  – Dilated stoma & weight recidivism
Types of Bariatric Surgery

- VBG Restrictive
- LAGB Restrictive
- RYGB Restrictive
- SG Restrictive
- Maldigestive
- Behavioral
- Modification
- DS/BPD Restrictive
- Maldigestive

General Principles

- Direct communication with surgeon
- Operative note
- Roux limb length 50—150 cm
- Use of silastic bands at G-J anastomosis
- Antecolic vs retrocolic roux approach
- Endoscope choice
- Early postoperative and/or leak, consider contrast study
Signs and Symptoms Prompting Endoscopic Evaluation

- Nausea
- Vomiting
- Dysphagia
- Pain
- Reflux
- Diarrhea
- Anemia / Bleeding
- Weight Gain

Marginal Ulceration
Marginal Ulcers

- 1-6 mos after surgery, 95% by 12 mos
- Incidence: 1-36%
- Abd pain, nausea, bleeding, asymptomatic

67% healing with PPI
Adding sulcralfate of no benefit
22 pts: suture / staple removal
5 pts: surgical revision, one emergent

Marginal Ulcers: Risk Factors

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Univariate analysis</th>
<th>Multivariate analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds ratio [CI]</td>
<td>P value</td>
</tr>
<tr>
<td></td>
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<tr>
<td>Years from Surgery</td>
<td>0.8 [0.7-0.9]</td>
<td>&lt;0.01</td>
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<tr>
<td>Diabetes</td>
<td>2.5 [1.1-6]</td>
<td>0.03</td>
</tr>
<tr>
<td>Smoking</td>
<td>2.5 [1.5-5]</td>
<td>0.02</td>
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<tr>
<td>NSAID use</td>
<td>0.9 [0.4-2]</td>
<td>0.7</td>
</tr>
<tr>
<td>Inhaled steroid use</td>
<td>2.3 [1-5]</td>
<td>0.055</td>
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<tr>
<td>SSRI use</td>
<td>0.7 [0.4-1.2]</td>
<td>0.2</td>
</tr>
<tr>
<td>Gastric pouch length</td>
<td>1.2 [1.03-1.5]</td>
<td>0.02</td>
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</tbody>
</table>

No analysis of H. pylori
Marginal Ulcer

Suture  
Staple

Marginal Ulcer Therapy

• Endoscopic suturing

Leaks - Fistulas

Anastomotic Leak Management

Operative
- Laparoscopic vs. open repair
- Enteral access, drainage

Non-operative
- NPO / TPN
- IV Abx
- G-tube
- Drainage
- Endoscopic
Leaks

- 1-6% incidence; lap>open
- Leaks:
  - G-J anastomosis, > remnant stomach> J-J anastomosis
  - Tachycardia, fever, N/V, abd pain
  - Peritonitis, abscess, MOF, death
  - Can present with tachycardia only
  - #2 most common cause for mortality

Leaks

- Mortality rate: 6-14%
- **RYGB sites**: GJA (68%), pouch staple lines 10%, JJA (5%), multiple 10%
- **SG sites**: 90% in proximal stomach near GEJ
Fistulas - Leaks

- Can be difficult
- CT / water soluble contrast: limited sensitivity but high PPV
- Endoscopy
- Endoscopy with fluoroscopy
  - Injection of contrast
  - Injection of contrast / methylene blue into drain
  - “Bubble test”

Fistulas

- Fistula: (gastro-gastric)
- Chronic GG fistula: highest when pouch and excluded stomach are contiguous
- N/V epigastric pain
- Weight gain
- Contrast study vs endoscopy
Fistulas - Leaks

Closure

Suturing

Vacuum-assisted Sponges

Stents
SEMS
SEPS

Fistula Plugs

Mechanical Closure
Clips
OTSC

Sealants
Fibrin
Cyanoacrylate

Stents for Bariatric Surgery Leaks

Pooled proportion of successful leak closure: 87.8% (95% CI, 79.4%-94.2%),
Pooled proportion of successful endoscopic stent removal: 91.6% (95% CI, 84.2%-96.8%)
Stent migration: 16.9% (95% CI, 9.3%-26.3%)

Puli et al Gastrointest Endosc 2012;76:287-93.
Leaks categorized based on time from initial operation
- Acute: <7 days
- Early: 1-6 weeks
- Late: 6-12 weeks
- Chronic: >12 weeks

Stents appropriate for acute, early, and late

Stents for Bariatric Surgery Leaks
- Document sealing
- Establish enteral nutrition if possible
- Evaluate q2-4 wks OR with New / Recurrent sx’s
- Complications
  - Migration
  - Tissue ingrowth (change 2-4 wks or use SEPS indwell)
  - Collapse
  - Bleeding, Pain
Stent Placement
(18 mm x 123 mm partially covered)

Post-operative acute abdominal series
Post-operative acute abdominal series

UGI series (Stent in place)
Endoscopic Closure of Postoperative Gastrointestinal Leakage and Fistulas with OTSC

- 9 upper, 5 lower leaks
- 100% technical success
- 5 months therapy
- 79% overall closure rate
  - Includes chronic leaks

Endoscopic Repair of Gastrogastric Fistula After RYGB

- 95 pts
- Clip or Suture
- Mean f/u: \(395 \pm 49\)d
- 95% initial closure
- 59 (65%) with reopening at \(177 \pm 202\)d

Hybrid ESD for Fistula


GERD
GERD

• Consider endoscopy refractory cases
• G-J anastomotic stenosis
• G-G fistula
• “Tight” band with VBD
• Motility disorders

Endoscopic Management of Stenosis
Stenosis

- Unique to operation
- Most common in RYGB
  - 3-22%
- Occurs in sleeve gastrectomy as well
- Approach needs to be tailored to operation

Stenosis

- N/V, dysphagia, GERD
- Normal G-J anastomosis: 10-12 mm
- Open RYGB: 3-9%
- Lap RYGB: 5-12%
Anatomic Considerations

- Operative notes
  - Linear, circular stapler
    - 21 or 25 mm
- Upper endoscopy
- Upper GI
- CT
  - To evaluate extra-luminal milieu

Stenosis

- The most common sites of postoperative stenosis:
  - Gastric band
  - Gastrojejunal anastomosis (most common; 4-19% incidence)
    - Circular staplers have a significantly higher rate than hand-sewn or linear staplers.
  - Site of passage through mesocolon
  - Jejunoojejunal anastomosis
  - Adhesions
Stenosis

- Endoscopy preferable to contrast studies
- **Beware retrocolic tunneled roux limb**
  
  G-J anastomosis nl, jejunum beyond will be dilated until the point where it traverses the mesentery where the stricture will be seen. High perforation risk

Classification of Strictures

- **Chronicity**
  - Less than 90 days
  - 90 days to 12 months
  - Greater than 12 months
Classification of Strictures

- **Chronicity**
  - Less than 90 days
  - 90 days to 12 months
  - Greater than 12 months

- **Etiology**
  - Acute complications with late manifestation
    - Leak, sub-clinical
    - Technical
  - Chronic process
    - Marginal ulceration - Smoking, NSAIDs
    - Foreign body, carcinoma
Endoscopy for Stricture Management

- Dilation with balloons
- Bougie dilators for chronic, long-segment

Stenosis

- Staged TTS balloon dilation to 15 mm
- 2-4 sessions
  - Start 4 wks post op and repeat q2-3 wks
- 66-93% successful
- Suture / staple removal to optimize
- 15 mm target
  - Decreased rate of restenosis
  - Not associated with increased weight gain
  - Alternative therapy: needle knife incision
  - Steroid injection s/p TTS balloon dilation

Endoscopy for Stricture Management

• Response rates up to 90% for early strictures

• Etiologies?
  – NSAIDS
  – H pylori
  – Foreign body (suture)

• Not without complications
  – Recurrence

Ukleja et al, Surg Endosc 2008
Bezoars

- First month postoperatively onward
- N/V, dysphagia
- VBG, RYGB
- Bezoar disruption and treatment of G-J anastomotic stenosis

Foreign Body

- Sutures, staples, bands
- Pain, ulceration, bezoar, obstruction
- Variety of endoscopic devices can be used to remove sutures and staples
- Bands: VBG vs LAGB
  - Surgery may be needed
  - LAGB: endoscopic removal if buckle visible: transection then removal of device.

SEPS for VBG and LAGB
GI Bleeding / Anemia

- Acute bleeding in early postoperative period, think staple line
- Iron deficiency in 30-50% of RYGB pts
  - Multifactorial
  - Endoscopic / imaging evaluation
  - Low volume colonoscopy preps
  - Retrograde exam of distal stomach / duodenum (pediatric colonoscope, enteroscope). Success much lower (25%) if roux limb >100 cm.


Choledocholithiasis

- Postoperative incidence of cholelithiasis: 27-71%
- Postoperative incidence of choledocholithiasis: unknown
- Assessment: ultrasound, MRCP
- Approach to bile duct
  - Deep enteroscopy platforms (>70% success rate) If Roux limb >100 cm, much lower success
  - Laparoscopically assisted
  - Percutaneous (IR or EUS-assisted)
  - Deep enteroscopy-assisted PEG
  - Lumen opposing metallic stents; risk of GGF?
Weight Gain

- Dilated pouch
- Dilated G-J anastomosis

Endoscopic Revision

- Advantages:
  - Avoids re-operative surgical intervention
  - Low morbidity
- Disadvantages:
  - Efficacy
  - Long-term durability
### Risk Factors for Weight Gain After RYGB

- GJ stoma diameter (mm)
- Time from RYGB (yr)
- Marginal ulcer presence


<table>
<thead>
<tr>
<th>GJ stoma diameter (mm)</th>
<th>Percent weight regain</th>
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<tbody>
<tr>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>20</td>
<td>52</td>
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<tr>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>40</td>
<td>68</td>
</tr>
<tr>
<td>50</td>
<td>87</td>
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</tbody>
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### Endoscopic Suturing for Transoral Outlet Reduction (TORe) Increases Weight Loss After Roux-en-Y Gastric Bypass Surgery

- Multicenter RCT with sham controls
- Weight gain or inadequate weight loss after RYGB
- GJ diameter >2 cm
- The primary end point: weight loss at 6 months measured as a percentage of baseline weight.
- 77 pts enrolled

Thompson CC et al., Gastroenterology 2013;145:129-137
Weight loss or stabilization achieved in 96% subjects receiving TORe vs. 78% of controls (p = .019)

Thompson CC et al., Gastroenterology 2013;145:129-137
Modified TORe

- APC ablation of anastomotic margin
- Purse string suture
- Dilation balloon placed through second endoscope channel and inflated to 8 mm
- Purse string cinched around balloon


Sclerotherapy

- 2-center study 231 consecutive pts, 575 sclerotherapy procedures

Abu Dayyeh et al., Gastrointest Endosc 2012;76:275-82.
Predictors of response
1. Amount of weight gain
2. # sclerotherapy sessions

Abu Dayyeh et al., Gastrointest Endosc 2012;76:275-82.

Modified ESD before G-J Revision

Summary

• Many complications of bariatric surgery can be managed endoscopically
• Know the post surgical anatomy
• Each bariatric surgical procedure has its own footprint of complications
• Team approach