The problem

Obesity Trends* Among U.S. Adults: BFRSS, 2010
(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4” person)
Obesity Trends* Among U.S. Adults
BRFSS, 1990, 2000, 2010
(*BMI ≥30, or about 30 lbs. overweight for 5’4” person)

1990

2000

2010

The problem

- Obesity is now more prevalent worldwide than malnutrition from hunger
- 1.6 billion adults are overweight
  - ≥ 400 million adults are obese
- By 2015, 2.3 billion adults will be overweight
  - > 700 million adults will be obese.

http://www.cdc.gov/obesity/data/trends.html
The solution

- Lifestyle modification
  - Diet
  - Exercise
- Medication
- Surgery
- Minimally invasive options

Why surgery?
Why surgery?

- 203 women
  - randomized to control group vs home exercise
- Results
  - Some weight reduction in first 6 months, but no difference noted at 1 year


Understanding bariatric surgical anatomy

- Restrictive procedures
- Malabsorptive procedures
- Combination restrictive and malabsorptive procedures

Restrictive Procedures

- Gastric pouch
- Mesh or silastic ring/band
- Adjustable Lap band
- Subcutaneous port

Illustration: John E. Pandolfino, MD
Malabsorptive Procedures

Illustrations: John E. Pandolfino, MD

Roux-en-Y Gastric Bypass: restrictive and malabsorptive

Illustration: John E. Pandolfino, MD
Upsides of bariatric surgery

- Safe and effective
  - Rapid weight loss
  - Improved comorbidities
  - Durable results


Upsides of bariatric surgery

- The only durably effective therapy for severe obesity is currently surgery
- Significantly reduces the risk of mortality associated with obesity

Illustrations: John Pandolfino, MD
The downsides of bariatric surgery: gastrointestinal complications

- Complications common to all bariatric surgery
  - Gallstone disease
  - Peptic ulcer disease (PUD)
  - Gastroesophageal reflux disease (GERD)
- Complications occurring more commonly after gastric banding
  - GERD
  - Food impaction
  - Band displacement
  - Band erosion
- Complications occurring more commonly in Roux-en-Y gastric bypass (RYGB), gastric resection, and biliopancreatic diversion (BPD)
  - Anastomotic complications
  - Suture-line and staple-line complications

Clinical case: Initial Presentation

- 41 year-old female
- Hypertension, Diabetes, DJD, OSA
- BMI 41 kg/m²
- Underwent uncomplicated RYGB 5 months ago
- Did well postoperatively and transitioned to “regular” diet after 2 months
- Taking MVI, Ca²⁺, B₁₂
- Has lost 50 lbs
- Developed progressive N, V and abdominal pain 6 weeks ago
Clinical case: Initial Presentation

- Upper GI X-ray 3 weeks ago showed “possible 3mm ulcer distal to gastrojejunal anastomotic line”
- Treated with omeprazole 20 mg BID PO with minimal relief
- Always nauseated, afraid to eat because it leads to pain and vomiting
- Currently only eating 2-3 times a day, less than 3 oz at a time, minimal protein
- Tolerating PO liquids
- Admitted to hospital with dehydration

Clinical case: diagnostic workup

- What would you do first?
  - Repeat UGI Xray
  - EGD
  - CT abdomen
  - Surgical exploration
  - Other
Diagnostic Considerations

- Obstructive symptoms (pain, N, V) are the most common presenting symptoms after RYGB
- Abnormalities vary from none (dietary indiscretion) to more serious (ulcer, stricture most common)
- UGI may miss post-anastomotic disease (poor filling beyond)-ulcers invariably post-anastomotic
- In the absence of peritoneal signs, EGD more likely to be useful than CT (leaks, closed-loop obstruction, GOO)
- Exploration is almost never necessary

What to recommend now?
What to recommend now?

- Increase PPI dose (add sucralfate?)
- Test for *H. pylori*
- TPN
- No smoking
- No NSAIDs
- All of the above

Complications of Roux-en-Y Gastric Bypass (RYGB)
Postoperative Complications

Perioperative mortality of bariatric surgery is less than 1% but morbidity can be substantial:

Early (within 30 days)
- Mortality 1%
- Anastomotic Leak 1.5%
- Pulmonary Embolism 2%
- Acute Gastric Distention rare
- Pneumonia 1.9%
- Wound Infection 6%

Late
- Stomal Stricture 3 – 20%
- Stomal Ulceration 3 – 20%
  - Marginal ulcer (J)
  - Stomal ulcer (GP)
- Staple line disruption 1%
- Internal Hernia rare
- Incisional Hernia 15%
- Fistula rare

Anastomotic Complications: where do they occur?

- Pouch
  - Stomal ulcer
- Anastomosis
  - Marginal ulcer
  - Anastomotic stricture
- Remnant stomach
  - PUD
- Duodenum
  - PUD
- Roux anastomosis
  - Bleeding
  - Stricture
  - Ulceration
Anastomotic Ulcer

- Occur in 3-20% of patients after RYGB
- Usual presentation is epigastric pain, but nausea and/or vomiting may accompany pain or be the sole presenting symptom(s)
- Ulcers on jejunal side (marginal ulcers) require careful endoscopic examination to detect

Above: Wash well!  Below: Look beyond!
Anastomotic Ulcer Treatment

- Treatment is medical
  - Acid suppression with PPI will heal nearly all
  - Sucralfate
  - Eradicate H. pylori
    - Schirmer, et al., 2002: marginal ulcers with + without preop HP screening
      - +screen 2.4%
      - -screen 6.8%
      - P<0.05
- Rare cases require reoperation

Case 2: Initial Presentation

- 37 year-old woman
- Morbidly obese since teen years
  - HTN
  - DM 2
  - GERD
- Underwent RYGB 7 weeks ago
- Lost 35 lbs in 6 weeks
- Never tolerated solids well, now not tolerating liquids either
- Epigastric pain & vomiting 2 weeks
What is your differential diagnosis?

Case 2: Diagnostic workup?

- UGI Xray
- EGD
- CT abdomen
- Surgical consultation
- Ultrasound
- Bloodwork
- Other
Case 2: Endoscopic findings

- What is your diagnosis?
- What are your treatment options?
- What is the treatment of choice?

Anastomotic Stricture

- Occur in 10% of RYGB patients
- Usual presentation is vomiting or early satiety with or without nausea, but abdominal pain may also present
- Stoma diameter usually greater than 1cm when created
- Stricture arbitrarily defined as inability to pass standard diagnostic gastroscope across anastomosis without resistance
- May be early or late complication
Anastomotic Stricture Treatment

Treat Endoscopically

- Gastrograffin swallow
- Endoscopic view of stomal stenosis with ulceration
- Dilation with a through-the-scope balloon dilator


Anastomotic Stricture

- Endoscopic balloon dilation
  - Short through-the-scope dilation balloon, with or without guidewire
  - Balloon diameter approximating anastomotic diameter at original operation
  - More than one session may be required
Leaks, fistulas, suture-line and staple-line disruptions

- Can occur at suture line or at anastomosis
- Most common fistula post-Roux-en-Y gastric bypass is between gastric pouch and gastric remnant

Leaks, fistulas, suture-line and staple-line disruptions

1. Fistula to excluded stomach
2. Left: pouch-remnant gastro-gastric fistula.
3. Right: staple-line disruption revealing surgical drain and suture on serosal side of gastric pouch

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Leaks, fistulas, suture-line and staple-line disruptions

Leaks and Fistulas
Leaks and Fistulas

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Leaks and Fistulas

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Leaks and Fistulas

Fistula closed
Anastomosis widely patent
Removing Foreign Material

Removing retained staples: why bother?

Removing retained sutures: why bother?
Removing Foreign Material

Removing retained sutures: why bother?

- Ulcers
- Strictures

1 2
3 4

Removing Foreign Material

Removing retained sutures: more than meets the eye

- YES!
- NO!
Removing Foreign Material
Removing retained sutures: what to do

Removing Foreign Material
Removing retained sutures: double-channel scope approach
Gastrointestinal Bleeding

- Anastomotic bleeding
  - Pouch-enteric anastomosis
  - Jejuno-jejunal anastomosis
- Peptic ulcer disease
  - Gastric pouch
  - Gastric remnant
  - Duodenum
- Approach to afferent Roux limb or jejuno-jejunal anastomosis requires deep-enteroscopy, laparoscopically-assisted endoscopy, or surgery

Complications of Laparoscopic Adjustable Gastric Banding (LAGB)
Laparoscopic Adjustable Gastric Band

Endoscopic Management of Post-Gastric Banding Complications

- Symptoms similar to RYGB patients: GERD symptoms, nausea, vomiting, pain, dysphagia
- Endoscopist’s role much more diagnostic, much less therapeutic
- Endoscopically identifiable etiologies include
  - GERD-related stigmata
  - Band overinflation
  - Peptic ulcer disease
  - Band slippage or gastric prolapse
Gastric Banding Complications

- Food impaction / pouch outlet obstruction
- Band displacement / slippage
- Band erosion
- Gastric pouch dilatation
- Esophageal dilatation
Gastric Banding Complications

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Gastric Banding Complications

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**Gastric Banding Complications**

- Band erosion

**Video courtesy**
Prof. Raul Monserrat,
Caracas, Venezuela

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**Sleeve Gastrectomy Complications**
Sleeve Gastrectomy Complications

ACG 2013

John A. Martin, MD

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Sleeve Gastrectomy Complications
Endoscopic Management of Other Bariatric Surgical Complications

- Bile duct stone management
  - Post-gastric banding
  - Post-RYGB
    - Laparoscopically-assisted ERC
    - PTC
    - Via deep enteroscopy (Roux ≤ 150 cm)

Schreiner, et al. Gastrointest Endosc 2012;75:748-56.)
Endoscopic Management of Other Post-Bariatric Surgery Complications

- Bile duct stone management
- Endoscopic removal of eroded / lumenalized band (VBG)
- Endoscopic removal of endoluminal balloons
- Perforation → clip and co-manage with surgical colleague?

Endoscopy Post-Bariatric Surgery

Symptomatic indications for EGD

- Threshold is lower than in non-bariatric patients
- Vomiting +/- nausea
- Abdominal pain (usually epigastric)
- Weight gain / decelerated weight loss
- GI bleeding
  - Hematemesis
  - Melena
- Bloating (possibly)
- Vague abdominal discomfort (possibly)
- Jaundice (possibly)
What if endoscopy doesn’t provide an answer?

Post-endoscopic Workup of Post-Bariatric Surgery Complications

- Symptoms including GERD nausea, vomiting, pain, bloating
  - Consider CT first if pain is main symptom
  - Consider SBFT or CT enterography if nausea or bloating are pre-eminent
  - Consider US if symptoms are pancreatico-biliary in character, especially if GB in situ; MRCP if LFT’s are elevated as well
  - Role of capsule endoscopy undetermined in this population: case-by-case basis for bleeding or pain; role for Agile patency capsule?
**Abdominal pain**

- Upper abdominal pain
  - Heartburn alone?
    - Yes: Treat empirically with acid suppression (PPI)
    - No: Epigastric
      - Right upper abdomen
        - Check liver enzymes, ultrasound to exclude biliary source
      - Upper GI endoscopy to exclude GERD, PUD, anastomotic ulcer or stricture
  - No: Abdominal CT scan

**Nausea and vomiting**

- Nausea or vomiting
  - Nausea alone?
    - Yes: Consider GERD, PUD, anastomotic ulcer
    - No: Vomiting
      - EGD to exclude anastomotic stricture, food impaction or bezoar, PUD, or GERD
      - EGD normal
        - EGD or empiric treatment
        - Abdominal CT scan and consider systemic or CNS etiology
  - Abdominal CT scan
  - Normal
What do I need to get started?

Necessities (it doesn’t take a lot to get started)
- Diagnostic endoscope
- Standard biopsy forceps
- Hydrostatic dilation balloons
  - Diameter: 8 – 16 mm
  - Length: 4 – 6 cm (“pyloric” or “colonic”)
    - Non wire-guided (when scope visualizes jejunal lumen)
    - Wire-guided (when scope can’t visualize jejunal lumen)
  - Guidewire
- Endoscopic suture scissors
  - Reusable
  - “surgical scissors”, NOT “endoscopic loop cutter”
- Small rat-tooth forceps

Bariatric endoscopist’s toolbox

YES!

NO!
Bariatric endoscopist’s toolbox

- Necessities (though you’ll reach for them infrequently)
  - Hemostatic clips
    - Small
    - Large
  - Small rat-tooth forceps
  - Large rat-tooth forceps
  - Snares
  - Foreign body retrieval net
  - Stone extraction basket
  - Retrieval forcep (tripod, quadripod, etc.)
  - Overtube

- Luxuries or occasional-use instrumentation
  - Dual-channel therapeutic endoscope
  - Pediatric or transnasal-diameter endoscope
  - Fluoroscopy
  - Propofol / MAC anesthesia
  - Pseudocyst drainage needle-catheter (19 or 21 ga)
  - APC unit (with multiple probes)
  - Cytology brush
  - Deep enteroscope (for Roux-en-Y issues)
    - Balloon-overtube type
    - Rotational-type
Conclusion

- **In bariatric patients, scope sooner rather than later**
- Change is opportunity
  - New operations create new anatomy with new complications
  - Minimally invasive surgery interfaces seamlessly with interventional endoscopy
  - Both create opportunities for high-impact endoscopy
- Novel technology & concepts are spawning new endoscopic techniques to manage bariatric surgical complications definitively
- A comprehensive interdisciplinary treatment plan constitutes the foundation for every successful endoscopic treatment of a bariatric complication