

Perioperative Management of the Bariatric Patient

Marisha Burden, MD
Chief of Hospital Medicine
Denver Health Medical Center
Assistant Professor of Medicine
University of Colorado Denver
Rocky Mountain Hospitalist Symposium
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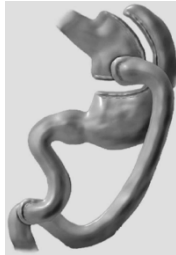
What is the next best step?

Mr. R is POD 1 s/p a Roux-en-Y gastric bypass surgery. He has type 2 diabetes with a hemoglobin A1c of 7.2. Pre-op meds: lantus once a day and lispro with meals.

- 1) Discontinue all insulin
- 2) Discontinue lispro, continue current dose of lantus
- 3) Discontinue lispro, decrease lantus dose by half,
- 4) Decrease lantus dose by half, decrease lispro dose by half

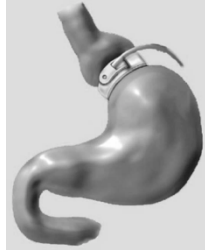
Roux-en-Y

- Most commonly performed operation
- Safest and most efficacious
- Combined restrictive and malabsorptive
- Commonly laparoscopic
- 2-4 hours



Laparoscopic Adjustable Gastric Banding

- Fastest rate of growth
- Restrictive
- Band placed around proximal aspect of stomach below GE junction
- Operative time: 1-2 hours



Smith et al. Surgical Approaches to the Treatment of Obesity. Bariatric Surgery. Endocrinol Metab Clin N Am 37 (2008) 943-964.

Roux-en-Y Gastric Bypass and DM2

Author	N	Pre-op Weight	Follow-up (y)	Weight loss	Pre- vs Post op Fasting Glucose	Pre- vs Post op HbA1c	Response
Pories	608	134 kg	10	54% EWL	213 vs 117	12.3 vs 6.6	R = 89% I = 7% U = 4%
Schauer	1160	50.4 BMI	4	60% EWL	180 vs 98	8.2 vs 5.6	R = 83% I = 17%
Torquati	117	49 BMI	1	69% EWL	N/A	7.7 vs 6.0	R = 74% I = 26%
Morinigo	34	49 BMI	1	32% IBW	155 vs 91	6.9 vs 4.6	R = 80% I = 20%

BMI, body mass index; EWL, excess weight loss; I, improved; IBW, ideal body weight; N/A, no applicable; R, remission; U, unchanged.

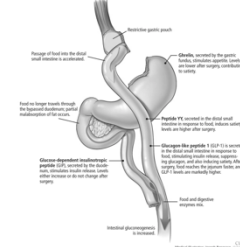
Table adapted from: Smith et al. Surgical Approaches to the Treatment of Obesity. Bariatric Surgery. Endocrinol Metab Clin N Am 37 (2008) 943-964.

Hypotheses on why bariatric surgery improves type 2 DM

- Weight loss increases insulin sensitivity
- Less lipotoxicity/inflammation
- Effect on gut hormones

How gut hormones may contribute to regression of diabetes after Roux-en-Y surgery

After Roux-en-Y surgery, the anatomy of the gastrointestinal tract is altered, and as a result of various changes, especially the gut, there are changes that contribute to the regression of type 2 diabetes. How does this happen?



KASHYAP S R et al. Cleveland Clinic Journal of Medicine 2010;77:468-476

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Post Operative Diabetes Management

- Diabetes managed with oral therapy
 - Discontinue all insulin secretagogues
 - Sulfonylureas
 - Meglitinides
 - Discontinue metformin several days before surgery
- Often patients on oral therapy alone will not need it at discharge

Post Operative Diabetes Management

- Diabetes managed with insulin
 - Highly variable for each patient
 - Degree of insulin resistance
 - Preoperative insulin doses
 - General rule: Basal insulin is decreased by 50% (or more)
 - Often further decreases are needed before discharge
 - Once patient eating, insulin with meals may be required

Hyperinsulinemic Hypoglycemia

- Increasingly recognized as a complication post gastric bypass
- Presents >1 year post surgery
- Typically occurs 2-3 hours after meals
- Inappropriately high C-peptide and insulin levels
- Usually amenable to dietary modification
- May need partial pancreatectomy

Summary

Mr. R is POD 1 s/p a Roux-en-Y gastric bypass surgery. He has type 2 diabetes with a hemoglobin A1c of 7.2. Pre-op meds: lantus once a day and lispro with meals. What is the next best step?

- 1) Patients with dramatic reduction in po intake immediately postoperatively
- 2) Multiple factors that account for improved glycemic control
- 3) Once patient eating, may need to add back short acting insulin with meals
- 4) Patients will need close monitoring of their diabetes

What is the next best step?

Mrs. S is a 54 yo female with history of remote gun shot wound. She undergoes a Roux-en-Y gastric bypass with lysis of adhesions. On POD 4, she has increased abdominal pain, chest pain and SOB. HR 120, 89% on 6L, RR 22, AF. On exam patient visibly tachypneic, soft abdomen with positive bowel sounds, wound clean, dry, and intact. Labs: HCO3 of 18, AG 15, lactate 5.3, Cr 1.7, wbc ct 2.4, hct 36, plts 350,000.

- 1) CT PE study
- 2) Antibiotics for post op wound infection
- 3) Take patient to OR emergently
- 4) Upper endoscopy to eval for gastric leak

Gastric leaks

- High morbidity and mortality - most common surgery related cause of mortality
- Occurs .5-5% of the time
 - Most likely place = gastrojejunal anastomosis (can also occur in gastric remnant, gastric pouch)
 - Frequency depends on type of surgery
- Usually occur within a week but can occur as late as one month post op

Luber et al. Care of the Bariatric Surgery Patient in the Emergency Department. The Journal of Emergency Medicine. 34, No 1, 13-20; 2008
Elison, S and Elison S. Bariatric Surgery: A review of the Available Procedures and Complications for the Emergency Physician. The Journal of Emergency Medicine. 34, No 1, 21-32; 2008.
Yurcin, S and De Maria, Eric. Management of Leak in the Bariatric Gastric Bypass Patient: Reoperative, Drain and Feed Distally. J Gastrointest Surgery (2009) 13: 1564-1566.

Gastric Leaks

- Signs
 - Tachycardia (>120)
 - Tachypnea
 - Hypoxia
 - Hypotension
 - Oliguria
 - Fever
 - Elevated wbc ct
- Evaluation
 - Upper GI series
 - May not visualize all leaks (only detects 22% of leaks)
 - Repeat laparoscopy

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Early Post Op Medical Complications

- PE
 - Second most common cause of death after bariatric surgery
 - Incidence of 2%
 - Mortality of 20-30%
 - Post op leaks or peritonitis may masquerade as a pulmonary complication
- Infection
 - <5% with laparoscopic procedure
- Rhabdomyolysis
 - Risk factors
 - BMI >60
 - Long duration of operation

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Adverse Outcomes within 30 Days after Surgery

Table 2: Adverse Outcomes within 30 Days after Surgery, According to Surgical Procedure.

Outcome	Total (N=4610) ^a	Laparoscopic Adjustable Gastric Banding (N=1158)	Laparoscopic Roux-en-Y Gastric Bypass (N=2975)	Open Roux-en-Y Gastric Bypass (N=417)	P Value ^b
Death	15 (0.3)	0	6 (0.2)	9 (2.1)	<0.001
Deep-vein thrombosis or venous thromboembolism	20 (0.4)	3 (0.3)	12 (0.4)	5 (1.1)	0.05
Tracheal re-intubation	20 (0.4)	2 (0.2)	12 (0.4)	6 (1.4)	0.004
Endoscopy	31 (1.1)	1 (0.1)	43 (1.3)	5 (1.1)	<0.001
Operation					
Tracheostomy	11 (0.2)	0	6 (0.2)	5 (1.1)	0.001
Placement of percutaneous drain	16 (0.3)	0	13 (0.4)	3 (0.7)	0.48
Abdominal operation	118 (2.6)	9 (0.8)	94 (3.2)	15 (3.6)	<0.001
Failure to be discharged by day 30	17 (0.4)	0	13 (0.4)	4 (0.9)	0.02
Composite end point ^c	189 (4.1)	12 (1.0)	143 (4.8)	34 (7.9)	<0.0001

^a The total includes 166 procedures, including 117 sleeve gastrectomies, 47 biliopancreatic diversions with or without a duodenal switch, 1 vertical banded gastroplasty, and 1 open adjustable gastric banding.
^b P values are for the comparison between treatment groups. Values were calculated with the use of the chi-square test.
^c This end point is a composite of death, deep-vein thrombosis or venous thromboembolism, reintervention with the use of a percutaneous, endoscopic, or operative technique, or failure to be discharged from the hospital within 30 days after surgery.

Post Op Bleeding

- Incidence: 3.1%
 - 22% stop spontaneously
 - 55% need transfusion
 - 22% require operative intervention
- Active bleeding usually presents within 6 hours
 - Any bright red blood orally, rectally, or abdominally requires prompt surgical or endoscopic intervention
- Early UGIB - most often from the gastrojejunal anastomosis, gastric remnant, or jejunojejunal anastomosis
- Endoscopy helpful in only diagnosing gastric pouch bleeding

Elison, S and Elison S. Bariatric Surgery: A review of the Available Procedures and Complications for the Emergency Physician. The Journal of Emergency Medicine. 34, No 1, 21-32, 2008.
Karmali et al. Bariatric surgery: A primer. Can Fam Physician 2010; 56: 873-9.

Stomal stenosis

- Common complication of RYGBP
- 1.6-20% of open surgeries
- Usually presents in the first 6 mo after surgery
- Symptoms
 - Postprandial epigastric pain
 - Vomiting of undigested solids
 - May progress to vomiting of liquids
- Diagnosis
 - UGI series
 - Endoscopy (can also be therapeutic)
- May need operative revision

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Acute Gastrointestinal Obstruction

- 1-5%
- Bloating, hiccups, nausea, vomiting, abdominal pain
- X-rays: reveal massive distention with air fluid level in gastric pouch
- Other etiologies
 - Internal hernias (3%)
 - Adhesions
 - Intussusception of Y limb - rare

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Stomal ulcers

- Also called marginal ulcers (.5-4%)
- Less common than stenosis
- Usually present within 2-4 months of surgery
- Etiology
 - Local ischemia
 - Staple line dehiscence
 - Increased gastric acid production
 - NSAIDS
 - Tension on the pouch
- Symptoms
 - Epigastric pain or retrosternal pain
 - Dyspepsia
 - Nausea/vomiting
 - Upper GI bleed
- Diagnosis
 - Upper endoscopy
- Treatment
 - PPI or sucralfate

Ellison, S and Ellison S. Bariatric Surgery: A review of the Available Procedures and Complications for the Emergency Physician. The Journal of Emergency Medicine. 34, No 1, 21-32, 2008.

Complications specific to LAGB

- Gastric slippage
 - Most common complication
 - Portion of the stomach becomes prolapsed relative to band
 - Enlarged gastric pouch is reservoir for food and gastric secretions
- Present with epigastric pain, dysphagia, food intolerance, vomiting and reflux
- X-ray with large gastric air bubble with air fluid level above the band

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Complications specific to LAGB

- Gastric stoma obstruction
 - Occurs if band too tight
- Esophageal and gastric pouch dilatation
 - Occurs if band too tight
 - Diet non-compliance
 - If not fixed can result in permanent damage (esophageal dysmotility)
- Band erosion
 - Usually chronic process
 - Often fibrous capsule will form
 - May present in a more benign way
 - Infection at access port site
- Gastric injury and necrosis
 - Acute complication within 24-48 hours
 - Necrosis can be late

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Summary

Mrs. S is a 54 yo female with history of remote gun shot wound. She undergoes a Roux-en-Y gastric bypass with lysis of adhesions. On POD 4, she has increased abdominal pain, chest pain and SOB. HR 120, 89% on 6L, RR 22, AF. On exam patient visibly tachypneic, soft abdomen with positive bowel sounds, wound clean, dry, and intact. Labs: HCO₃ of 18, AG 15, lactate 5.3, Cr 1.7, wbc ct 2.4, hct stable, plts stable.

- Gastric leaks most common surgical cause of mortality
- PE most common medical cause of mortality
- Prompt diagnosis of serious medical/surgical issues can be difficult in this population

What is the next best step?

Ms. R is a 32 year old female status post Roux-en-Y gastric bypass surgery 3 months ago. She has had persistent nausea and vomiting since her surgery.

- 1) Get a stat abdominal x-ray
- 2) Nutrition consult
- 3) Needs EGD
- 4) CT of abdomen and pelvis
- 5) Patient needs to return to OR for further evaluation

Nausea and Vomiting

- Usually improves with dietary education
- Other items to consider
 - Strictures
 - Obstructions
 - Over inflated LAGB
 - Pregnancy
 - Small bowel obstruction
- Screen for thiamine deficiency

Dumping Syndrome

- Occurs when food enters the small intestine bypassing the stomach
- Immediately post op and for up to 2-18 mo after surgery
- Symptoms
 - Occur within 30 minutes of eating
 - Nausea, vomiting, stomach pain or cramping, diarrhea, fullness or bloating, increased heart rate
 - Late symptoms: 1-3 hours after eating
 - Changes in the amount of insulin and sugar in the blood
 - "Reactive hypoglycemia"
 - Flushing, sweating, need to lie down, feel weak or dizzy, feel nervous or shaky, drop in BP

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Nutritional Complications

- Laparoscopic adjustable gastric banding < vertical sleeve gastrectomy < biliopancreatic diversion
- Iron deficiency
 - Iron absorbed in duodenum
- Megaloblastic anemia secondary to folate deficiency
- B12 deficiency
 - Felt to be secondary to failure of food-bound vitamin B12 to be cleaved in upper gastric pouch
- Secondary hyperparathyroidism

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What is the next best step?

Ms. R is a 32 year old female status post Roux-en-Y gastric bypass surgery 3 months ago. She has had persistent nausea and vomiting since her surgery.

- Frequently nausea/vomiting can be due to dietary indiscretion
- Other etiologies of nausea and vomiting must be considered as well
- Fertility also increases after surgery – remember to check a pregnancy test if indicated

Outcomes Data

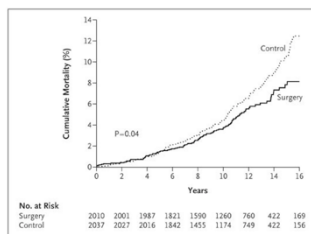
Effects of Bariatric Surgery on Obesity-related Co-morbidities

Comorbidity	Preoperative Incidence (%)	Remission > 2yrs postoperatively
T2DM, IFG, IGT	34	85
HTN	26	66
Hypertrig, low HDL	40	85
Sleep apnea	22 (men) 1 (in women)	40
OHS	12	76

Adapted from AACE/TOS/ASMBS Guidelines, 2009

Effects of Bariatric Surgery on Mortality

- SOS study
 - 2010 - bariatric surgery, 2037 conventional treatment
 - Average follow up of 10.9 years
 - 6.3% in matched control group died, 5% in surgery group died
 - Representing 29% adjusted (all-cause) mortality reduction associated with surgery



Sjostrom, Lars et al. Effects of Bariatric Surgery on Mortality in Swedish Obese Subjects. NEJM. 2007; 357: 741-52.
