Managing Patients after Bariatric Surgery

Marc-Andre Cornier, M.D.
Professor of Medicine
Division of Endocrinology, Metabolism and Diabetes
University of Colorado School of Medicine
marc.cornier@ucdenver.edu

Disclosures

Nothing to disclose

Objectives

- Discuss the management of co-morbid conditions and medications after bariatric surgery
- Review the prevention and management of chronic complications of bariatric surgery
- Develop a plan for the management of weight regain after bariatric surgery
Audience Participation

• How should comorbid conditions be managed post-operatively?
  1. Diabetes medications should be discontinued as all patients have resolution of their diabetes after surgery.
  2. Diabetes medications should be held post-operatively and insulin needs assessed using frequent glucose monitoring.
  3. If oral medications are restarted, they should be restarted at a full dose, using an extended release formulation.
  4. All antihypertensives should be continued as blood pressure tends to not improve in short-term.

Audience Participation

• How should comorbid conditions be managed post-operatively?
  1. Diabetes medications should be discontinued as all patients have resolution of their diabetes after surgery.
  2. Diabetes medications should be held post-operatively and insulin needs assessed using frequent glucose monitoring.
  3. If oral medications are restarted, they should be restarted at a full dose, using an extended release formulation.
  4. All antihypertensives should be continued as blood pressure tends to not improve in short-term.

Audience Participation

• Which of the following is true regarding post-operative management and risk of micronutrient deficiencies:
  1. With current gastric bypass procedures the risk of micronutrient deficiencies is very low.
  2. Concern for thiamine deficiency and Beriberi should be high and thiamine should be urgently replaced.
  3. Concerns for metabolic bone disease are low since obesity is associated with increased bone density.
  4. Approximately a third of patients develop vitamin B12 deficiency and thus patients should all be replaced or monitored closely.
Audience Participation

- Which of the following is true regarding post-operative management and risk of micronutrient deficiencies:
  1. With current gastric bypass procedures the risk of micronutrient deficiencies is very low.
  2. Concern for thiamine deficiency and Beriberi should be high and thiamine should be urgently replaced.
  3. Concerns for metabolic bone disease are low since obesity is associated with increased bone density.
  4. Approximately a third of patients develop vitamin B12 deficiency and thus patients should all be replaced or monitored closely.

Weight Loss Therapy: Guide to Selecting Treatment

<table>
<thead>
<tr>
<th>BMI</th>
<th>&lt;25</th>
<th>25-26.9</th>
<th>27-29.9</th>
<th>30-35</th>
<th>35-40</th>
<th>&gt;40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet, Exercise</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Pharmacology</td>
<td></td>
<td>w/co-morbidities</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td></td>
<td>w/co-morbidities</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rationale for Bariatric Surgery

- Currently the most effective treatment for obesity with respect to amount and duration of weight loss.
- Dramatic improvement and/or resolution of existing medical co-morbidities.
- Improvement in mortality.
- Prevention of future co-morbidities.
- Improvement in quality of life.
- Cost effective.
Bariatric Surgery

Lap Band  Sleeve Gastrectomy  Gastric Bypass

Low                      Effectiveness               High

Risk

Weight Loss and Maintenance after Bariatric Surgery

Stampede Trial: 5-year Outcomes

N Engl J Med 2017;376:641-651
Case 1

- JW is a 56 year old woman with a history of type 2 diabetes, hypertension, sleep apnea, arthritis and severe obesity (BMI 45) who is scheduled for Gastric Bypass surgery.
- She is currently on metformin, glargine 45 units daily, aspart 12 units with meals, lisinopril 40 mg, amlodipine 10 mg, naproxen 400 mg 2x daily.
- She also uses CPAP for her OSA

How should her medications and co-morbidities be managed post-operatively?

Medication Adjustments

- Essential medications should be administered in “regular-release” rather than sustained-release formulations to offset the altered GI absorption after surgery.
- Tolerance can be improved by crushing the tablets or liquid formulations during the early postoperative days.

Managing Diabetes

- Pre-operative therapy is held/stopped
- Insulin used immediately post-operatively
- Assess insulin needs in the hospital
- Home glucose monitoring to adjust further - glucose declines rapidly
- If need therapy can consider:
  - Insulin is safest at least in the short-term
  - Metformin can be restarted but do not use extended release and use lower doses
  - Watch for gastric emptying issues with GLP-1 receptor analogs
Managing Other Co-Morbidities and Medications

• Hypertension (immediately after surgery):
  – Stop diuretics, reduce other medications
  – Monitor and adjust as needed

• Arthritis:
  – Stop non-steroidal anti-inflammatories 10 days pre-op
  – Avoid for 6-12 months

• Obstructive Sleep Apnea:
  – CPAP mask and pressure may need adjustment

• “Other” Conditions:
  – Monitor and adjust as needed

Case 2

• SL is a 35 year old woman who underwent gastric bypass surgery for severe obesity 4 months ago. She is losing weight at a good rate and feels good overall. She complains of some numbness in her feet.
• Her diabetes is now controlled without medications. She is currently taking a prenatal vitamin, levothyroxine, a proton pump inhibitor, and an antidepressant.

Should we be worried about micronutrient deficiencies?

Micronutrient Deficiencies

• Primarily an issue with gastric bypass
  – can get thiamine deficiency with other procedures
• Predictable based on the bypassed segments
• Preventable with appropriate monitoring and supplementation
• Think: B12, Folate, Iron, Calcium, Vitamin D, and Thiamine
Thiamine

- Without supplementation, can become acutely deficient in the post-operative period especially if a lot of vomiting.
- Symptoms: Double vision, ataxia, nystagmus, facial weakness, polyneuropathy, confusion, Wernicke’s encephalopathy
- Beriberi
  - Dry: symmetric peripheral polyneuropathy
  - Wet: high output congestive heart failure
- Rx: Thiamine 100 mg IV or IM daily x 7-14 days, then 10 mg/d orally till recovery

Iron

- Goal is to pick up early with monitoring
- Most sensitive test is ferritin
- To prevent: all patients, especially women, should be on multi-vitamin (MVI)
  - Prenatal MVI has increased iron and folate
- If deficiency develops try oral replacement
- 20-30% may need parenteral iron replacement

Vitamin B12

- About a third of patients will become B12 deficient if not treated
- Global replacement vs close monitoring
- Prevention: Recommended daily intake is about 1 mcg/d
  - Oral crystalline B12: 500-1000 mcg/day
  - Sublingual: 500 mcg/day
  - Nasal spray: 500-1000 mcg/week
  - IM: 1000 mcg/month
- Remember that metformin can lead to low B12 levels too
Calcium and Bone Health

- Post-operatively
  - Calcium Citrate 1200-1500 mg/d
- May reduce Calcium supplement if person is tolerating and consuming a lot of calcium in their diet
- Consider DEXA scan at 1-2 years post-op and every 2 years after

Vitamin D

- Vitamin D deficiency is very common
  - Present pre-operatively in 30-40%
    - Obesity
    - Dark skinned individuals
- Try to replete pre-operatively if deficient
- Recommend 800 units daily to prevent deficiency post-operatively
- May need higher doses post-operatively if truly deficient

Nutrient Screening Time Points

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Pre-op</th>
<th>3 mo.</th>
<th>6 mo.</th>
<th>Annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin B1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>X</td>
<td>PTV930</td>
<td>TTV930</td>
<td>EPOCOS</td>
</tr>
<tr>
<td>Ferate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td></td>
<td></td>
<td></td>
<td>6-2.5 pm</td>
</tr>
<tr>
<td>DEXA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Case 2

- SL comes in 3 months later complaining of not feeling well especially after she eats.
- She gets sweaty, light-headed, feels her heart racing, and fatigued.
- Eating sometimes makes her feel better but this concerns her as she wants to lose more weight.

Should we be worried about hypoglycemia?

Post-Bariatric Surgery Hypoglycemia

- Rare, but true incidence is unclear
  - Most studies suggest 0.1-0.2%
  - Up to 10-15% in one US study?
- Is it “real” hypoglycemia?
  - Rule out “Dumping Syndrome”
- Generally seen only after gastric bypass surgery
- Usually presents as post-prandial hypoglycemia
  2-4 years after surgery

“Noninsulinoma Pancreatogenous Hypoglycemia Syndrome”

- Exact mechanisms are not clear:
  - Increase in incretin hormones (GLP-1)
  - Enhanced beta cell sensitivity
  - Failure to reduce islet cell mass
  - Increased insulin sensitivity
  - Hypersecretion of insulin
  - Abnormal counter-regulatory response to hypoglycemia
Hypoglycemia: Work Up

• First, confirm whether true hypoglycemia
  − Mixed Meal Tolerance Test
  − Monitor with glucometer or consider CGM along with food diary
• If true hypoglycemia and no response to diet then work up further:
  − Measure glucose, insulin, proinsulin, C-peptide, beta-hydroxybutyrate and sulfonylurea/meglitinide screening during an episode of hypoglycemia
  − Overnight or 72-hour fast
  − Localization Studies: CT/MRI, PET, selective arterial calcium stimulation test with venous sampling

Hypoglycemia: Management

• Educate on Hypoglycemia Safety and treatment
• Diet:
  − Start with nutritional manipulations including lower carbohydrate diet and small more frequent meals
  − Dietitian referral
• Medical therapy:
  − Acarbose, Diazoxide, Calcium Channel Blockers, Octreotide
• Surgical:
  − G-Tube and parenteral nutrition to proximal duodenum
  − RYGB reversal or conversion to Sleeve Gastrectomy
  − Pancreatectomy (not generally recommended)

Case 3

MR is a 54 year old man who underwent gastric bypass surgery for severe obesity 18 months ago. Overall he is doing well, but he is very disappointed in his weight loss. He initially lost about 25-30% of his initial body weight but has regained some and is now only about 15% below his initial weight.
• While his glycemic control is improved he is still on some basal and bolus insulin and metformin.
• His blood pressure is also better controlled but still on two medications.
• His triglycerides are significantly improved to the normal range. He is still taking a statin and fibrate.

Is weight regain common?
How should it be treated?
Weight Regain After Gastric Bypass
*Obesity Surgery* 18:648-651, 2008

- Prospective study of 782 gastric bypass patients from one institution
- Weight nadir occurred at an average of 18 months
- 50% of patients experienced some regain
- Average regain was about 8%
- Regain and surgical failure were higher in the “super obesity”

Weight Regain After Sleeve Gastrectomy
*JAMA Surgery* 2015

- Retrospective study of 443 laparoscopic sleeve gastrectomy patients from one institution
- Weight loss at 1 year was 31.9%
- Some weight regain by year 3 and 5, so weight loss was 29.8% and 26.4%, respectively
- Average regain was about 7%
- Complete remission of diabetes went from 51% to 20% between 1 and 5 years
Weight Regain – What Can We Do?

• Point out the positives
• Work on lifestyle modification
  – Exercise is likely best tool to help mitigate weight regain
• Consider changing current medications to more “weight friendly” options
• Consider anti-obesity pharmacotherapy
• Consider endoscopic or surgical options

Utility of Weight Loss Medications after Bariatric Surgery for Weight Regain or Inadequate Weight Loss

• Retrospective study of 319 patients post RYGB or VSG who were placed on weight loss medication for inadequate loss or regain
• 54% lost ≥5% of total weight with medications after surgery
• Mean additional weight loss was -7.6%
• Meds used at plateau resulted in similar weight loss to those who used meds after weight regain (6.9% vs 7.7%)

Efficacy of Adjuvant Weight Loss Medication after Bariatric Surgery

• Retrospective study of 209 patients post bariatric surgery.
• Medications:
  – Phentermine
  – Phentermine/Topiramate
  – Lorcaserin
  – Naltrexone/Bupropion


Liraglutide in the Management of Patients with Weight Regain after Bariatric Surgery

[Graph showing percent weight loss over time for Liraglutide (LG) and AGB (AGB) compared to GBP (GBP)]


Phentermine/Topiramate in the Management of Patients with Weight Regain after Bariatric Surgery

[Graph showing percent weight loss over time for Phentermine/Topiramate (Phen/Top) compared to Phen (Phen) and Top (Top)]


Case 5

- BD is a 32 year old woman who underwent gastric bypass surgery 6 months ago. She has done very well and has lost over 25% of her body weight already and feels good overall.
- Her menstrual periods have been more regular the last couple of months. She is interested in starting a family. She has had trouble conceiving in the past.

What can you tell her about fertility after surgery and recommend to her?
Pregnancy

- Fertility increases following weight loss.
- Avoid getting pregnant for the first year after surgery primarily from a fetal nutrition perspective.
- Birth control pills may be less effective because of poor absorption.
- Pregnancies need to be monitored, but outcomes appear good.
- Lap band: May need adjustment if pregnant.
- Vitamins, micronutrients critical!!!


“Other” Issues

- Depression
  - Many expect things to get better post-op
  - Pre-existing depression can be exacerbated by stress of surgery (increase in suicides in some series)
  - Ask about mood post-op

- Addictions
  - Too much weight loss too fast
    - Look for signs of volume depletion
    - Immune dysfunction - increased risk for infection

- Excess skin:
  - Common sites: breasts, abdomen, arms and thighs
  - Would not treat until 2 years post operatively

Thank You for Your Attention!