Maria L. Collazo–Clavell, MD
Associate Professor of Medicine
Mayo Clinic School of Medicine
Collazoclavell.maria@mayo.edu
Medical Management of Bariatric Surgery Patients
Disclosures

- None
Learning Objectives

- Recognize the expected clinical course after bariatric surgery depending on the operation performed.
- Implement an appropriate surveillance strategy for the identification of nutritional deficiencies after bariatric surgery.
- Know the expected impact on weight related medical co-morbidities depending on operation performed.
Follow up after bariatric surgery

- Varies amongst bariatric surgery programs
  - Most rigorous first couple of years
  - More and more involving medical providers outside of the bariatric field

- Monitor:
  - Weight loss
  - Nutrition
  - Weight related co-morbidities
  - Complications
Bariatric Surgery at Mayo Clinic

- Post Operative Follow Up
  - 3 months
  - 6 months
  - 12 months
  - Annually
Patient Attrition to Follow Up

MBSAQIP Database
May 2008–April 2016  N= 2181
# Patient Experience

Table 1.

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>3-month post (%)</th>
<th>6-months post (%)</th>
<th>12-months post (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you happy you had bariatric surgery?</td>
<td>98.8</td>
<td>98.7</td>
<td>99.3</td>
</tr>
<tr>
<td>Have you been taking all the recommended vitamins/minerals every day?</td>
<td>78.7</td>
<td>81.0</td>
<td>76.0</td>
</tr>
<tr>
<td>Have you been following all the recommended nutrition guidelines every day?</td>
<td>82.0</td>
<td>81.5</td>
<td>81.7</td>
</tr>
<tr>
<td>Are you experiencing significant gastrointestinal (GI) symptoms (i.e., nausea, vomiting, diarrhea)?</td>
<td>20.2</td>
<td>14.2</td>
<td>13.7</td>
</tr>
</tbody>
</table>
## Patient Experience

Table 2.

<table>
<thead>
<tr>
<th>What has been most challenging since surgery? (free text entries)</th>
<th>3-month post (%)</th>
<th>6-months post (%)</th>
<th>12-months post (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition and hydration</td>
<td>56.3</td>
<td>42.5</td>
<td>44.3</td>
</tr>
<tr>
<td>Physical activity</td>
<td>14.4</td>
<td>24.1</td>
<td>24.6</td>
</tr>
<tr>
<td>GI symptoms</td>
<td>12.4</td>
<td>13</td>
<td>11.5</td>
</tr>
<tr>
<td>Lifestyle/psychosocial</td>
<td>9.1</td>
<td>13.9</td>
<td>16.4</td>
</tr>
<tr>
<td>Pain</td>
<td>3.9</td>
<td>2.8</td>
<td>0</td>
</tr>
<tr>
<td>Medications</td>
<td>2</td>
<td>1.9</td>
<td>0</td>
</tr>
<tr>
<td>Vitamins and minerals</td>
<td>1.3</td>
<td>0.9</td>
<td>1.6</td>
</tr>
<tr>
<td>Hair loss</td>
<td>0.7</td>
<td>0.9</td>
<td>1.6</td>
</tr>
</tbody>
</table>
Monitoring After Bariatric Surgery: Weight

Reported Weight Loss

- **Sleeve Gastrectomy**
  - 25% at 1 year

- **Roux-en-Y Gastric Bypass**
  - 30–35% at 1 year

- **Biliopancreatic Diversion and Duodenal Switch**
  - 40–50% at 2 years
Monitoring After Bariatric Surgery: Weight

- Dietary Adherence
  - Restriction
  - Dumping
  - Hunger/Cravings

- Regular Physical Activity
  - Activity Tracking tool
  - Formal exercise

- Behaviors
  - Stress
Monitoring After Bariatric Surgery: Weight

Monitoring After Bariatric Surgery: Nutrition

- Dietitian visits
  - Calories
  - Protein
  - Fluids
- Vitamin/Mineral Supplementation regimen
  - Vary amongst bariatric programs
  - Assess adherence
Supplementation Regimens vary
- MVI/Mineral 2 tablets daily
- Vitamin B12 1,000 mcg SQ monthly
- Calcium 1,000–2,000 mg/day
- Iron
- Vitamin D
Adherence to Empiric Vitamin/Mineral Supplementation and Related Nutrient Deficiencies in Patients after Roux–en–Y Gastric Bypass

Haleigh James, MDa, Paul Lorentz, RNb, Collazo–Clavell, ML, MD

- May 2010– April 2012
- 287/331 patients
  - 78% F
- Outcomes at 6, 12, 18–36 months
  - Medication reconciliation
  - Laboratory testing
Supplementation Use at 18–36 months:

- MVI/Mineral preparation > 90%
- Vitamin B12 > 90%
- Calcium > 75%
Adherence to Empiric Vitamin/Mineral Supplementation and Related Nutrient Deficiencies in Patients after Roux-en-Y Gastric Bypass

- **Vitamin D**
  - At 6 months: 39.7%
  - At 18–36 months: 65.8%

- **Iron**
  - At 6 months: 11.5%
    - M–10.2%  F–11.9%
  - At 18–36 months: 23.1%
    - M–19.6%  F–24%
Adherence to Empiric Vitamin/Mineral Supplementation and Related Nutrient Deficiencies in Patients after Roux–en–Y Gastric Bypass

- Micronutrient deficiencies
  - Albumin
    - At 12 months (205) 1.5%
    - At 18–36 months (137) 2.9%
  - Vitamin B12
    - At 12 months (193) 0.0%
    - At 18–36 months (107) 3.7%
Adherence to Empiric Vitamin/Mineral Supplementation and Related Nutrient Deficiencies in Patients after Roux-en-Y Gastric Bypass

- **Anemias**
  (M/F)
  - At 12 months (232) 9.5% (19.6/6.6)
  - At 18–36 months (183) 16.4% (34.3/12.2)

- **Iron deficiency**
  - At 12 months (197) 7.1% (7.3/7.1)
  - At 18–36 months (148) 8.8% (17.2/6.7)
Adherence to Empiric Vitamin/Mineral Supplementation and Related Nutrient Deficiencies in Patients after Roux–en–Y Gastric Bypass

- **Vitamin D (< 25 ng/mL)**
  - At 12 months (201) 15.4%
  - At 18–36 months (148) 16.2%

- **Vitamins A and E**
  - At 12 months (162)
    - Vitamin E 0.0%
    - Vitamin A 4.9%
Adherence to Empiric Vitamin/Mineral Supplementation and Related Nutrient Deficiencies in Patients after Roux-en-Y Gastric Bypass

- Patients do very well with their MVI/Mineral and parenteral Vitamin B12 supplementation
  - Good protection against B complex and folate deficiencies
- Iron deficiency remains common
  - Mindful of adequate screening/supplementation in men
Vitamin D

- Common
- Prevalence rises
- Modification to our current supplementation regimen
  - Goal 25OH Vitamin D > 30 ng/mL
  - Vitamin D3 5,000 IU daily
Monitoring After Bariatric Surgery: Nutrition

- Supplementation Recommended varies
  - MVI/Mineral 2 tablets daily
  - Vitamin B12 1,000 mcg SQ monthly
  - Calcium 1,000–2,000 mg/day
  - Vitamin D 2,000–5,000 IU/day
  - Iron
    - Monitor CBC/Ferritin
Bariatric Surgery: Weight related Medical–Co–Morbidities

<table>
<thead>
<tr>
<th>Remission Rates (%)</th>
<th>RCT (%)</th>
<th>Observational (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM 2</td>
<td>92</td>
<td>86</td>
</tr>
<tr>
<td>HTN</td>
<td>75</td>
<td>74</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>75</td>
<td>68</td>
</tr>
<tr>
<td>OSA</td>
<td>96</td>
<td>89</td>
</tr>
</tbody>
</table>

JAMA Surg.2014; 149(3);275–287
Remission of Type 2 DM

- Duration of DM2
  - < 5 years

- Age
  - < 50 years

- BMI
  - > 35 kg/m²

- Metabolic Severity of DM 2
  - Insulin therapy, HgbA1c at time of operation

- Operation performed
  - BPD > RYGB > SG
  - BMI > 40 kg/m²: 9/10; 7/10; 5–6/10
Recurrence of DM 2

- Older Age
- Insulin therapy before surgery
- Weight regain
Bariatric surgery and diabetes: Implications of type 1 versus insulin–requiring type 2

Spyridoula Maraka, Yogish C. Kudva, Todd A. Kellogg, Maria L. Collazo–Clavell, Manpreet S. Mundi

- DM–1 (10) vs. IRDM2 (118)
- Similar weight loss at 2 years
  - 39.5 kg vs. 40.3 kg
- A1c improvements
  - DM2 7.8% vs. DM 1 6.8%
  - DM1 Preop 8.2% vs. 7.8%
- Medications
  - Less reduction in glucose, lipid and blood pressure lowering meds
Bariatric surgery and diabetes: Implications of type 1 versus insulin–requiring type 2

- Similar weight loss
- Health benefits
- Not necessarily improvement in glycemic control
Monitoring After Bariatric Surgery: Complications

- **Mortality**
  - < 30 days: 0.08–0.22%
  - > 30 days: 0.3%

- **Complication Rates**
  - 10–17%
  - RYGB > SG

- **Reoperations**
  - 5–7%
  - Gastric Banding > SG > RYGB

JAMA Surg. 2014; 149(3); 275–287.
Monitoring After Bariatric Surgery: Complications

- Behavioral
  - Risk for ETOH Abuse after RYGB
  - Recommendation for Abstinence

- Calcium Oxalate Stone Disease
  - Fluid intake
  - Calcium supplementation

- Bone loss/Fractures
  - Avoid nutritional contributors (Calcium/Vitamin D)

- Gastrointestinal
  - Anastomotic ulcerations/stricture
    - Nausea/Vomiting
  - Small Intestine Bacterial Overgrowth
    - Abdominal bloating and diarrhea
Follow up after bariatric surgery is important
  ◦ Increasingly completed outside of bariatric programs

Patients face continued and varied struggles throughout their journey
  ◦ Identifying them is key

Goals are to assess:
  ◦ Weight management
  ◦ Nutrition
  ◦ Weight related co-morbidities
  ◦ Complications
Questions & Discussion
Selected References

Selected References