SCHOOL OF PUBLIC HEALTH
UNIVERSITY of WASHINGTON

Nutritional Deficiencies status post Gastric Bypass Surgery and the Nutrition Care Process

Amanda Wood, MS Nutritional Sciences & Dietetics
Preceptor: Tiana Colovos, MS RD CD
UWMC, The Center for Bariatric Surgery

Background

Recent projections estimate 67% of Americans are obese or overweight. Obesity related comorbidities affect every system of the body. Common ones include hypertension, hyperlipidemia, obstructive sleep apnea, osteoarthritis, depression, diabetes mellitus, irritable bowel syndrome, and a variety of cancers. As a result, combined direct and indirect health care costs of obesity are estimated to be $117 billion per year.

Bariatric surgery is a possible curative treatment for both obesity and some related comorbidities. Studies show it leads to sustainable long-term weight loss and may even reverse diabetes and sleep apnea. Bariatric surgery is indicated for individuals with a BMI ≥ 40 or BMI ≥ 35 with serious obesity-related comorbidities. They must also have failed weight loss attempts in the past and currently possess the appropriate motivation and psychological stability to understand the risks and benefits of the procedure.

Complications of the Roux-en-Y gastric bypass (RYGB) surgery include a 1% mortality risk, 10% serious risk of stomal stenosis, incisional hernia, small bowel obstruction, marginal ulcer, infection, and anastomotic leak. Other risks include persistent nausea and vomiting, rapid weight loss, food aversions, and malabsorption. All of these risks create a greater propensity to develop micronutrient deficiencies status post bariatric surgery.

Assessment

__Mrs. FTT__: 44 year old female status post RYGB in March 2005 complicated by strictures with multiple dilations and subsequent revision in 2008. She presents at the UWMC Center for Bariatric Surgery to follow up on complications post gastric bypass revision. The patient arrives to clinic with her mother. She is nauseated and lying down on the exam table with a blanket and wearing dark sunglasses.

__PMH__: Morbid obesity, psychiatric disease including multiple suicide attempts, alcohol abuse, chronic lower back pain, right ear deafness, chronic nausea and vomiting, history of vitamin B12, vitamin D, vitamin C, zinc, and folate deficiency.

__Anthropometrics__:

Ht 67" Wt 165 lbs (Nadir 118 lbs prior to 2008 surgery) BMI 25

__GI Symptoms__: Decreased taste and smell. Chronic nausea. Vomiting 1-2 x/day; decreased after discontinuing recent antibiotics. Alternating constipation and diarrhea. Foamy, foul smelling stools

__Current Diet__: Tolerating soft foods; croissants, cottage cheese, egg salad, cream cheese. Bites and sips during the day; 4 cups of water per day

__Physical Symptoms__: Bilateral peripheral neuropathy from hips to toes. Edentulous from excessive vomiting; wears dentures. Hair loss, weak nails. Dizziness, confusion, poor memory. Bruises easily. Wheelchair dependent. Light sensitive. Edema from hips to knees.

Diagnoses

1. Protein calorie malnutrition RT persistent nausea and vomiting AEB food recall showing 400-500 calories per day x weeks.

2. Multiple micronutrient deficiencies RT inadequate oral intake AEB physical signs and symptoms of neuropathy and documented recent history of vitamin B12, zinc, vitamin D, folate, and vitamin C deficiencies.

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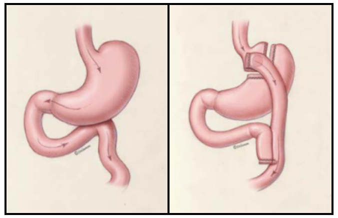

(Left) Normal stomach. (Right) Stomach after Roux-en-Y gastric bypass procedure.

Symptoms	Potential Deficiency
Visual Impairment	Vitamin A, copper, vitamin E, thiamine
Gait Disturbances	Vitamin E, B1, B12, copper, niacin
Neuropathy	Copper, vitamin E, thiamine, vitamin B6
Skin Disorder/Dermatitis	Niacin, vitamin A, zinc, vitamin B2, vitamin B6
Glossitis/Cheilitis/ Stomatitis	Vitamin C, zinc, vitamin B2, vitamin B6

Interventions

__Out-Patient__

1.1,000 mcg vitamin B12 and 100 mg Thiamine injected intramuscularly
2.Hospital admission for failure to thrive r/t RYGB 2005, now w/ peripheral neuropathy, memory impairments, steatorrhea, persistent nausea with emesis, and concern for multiple micronutrient deficiencies
3.Check nutrition labs for deficiencies: Thiamine, vitamin B12, copper, vitamin E, pantothenic acid, niacin, vitamin C, vitamin A, vitamin D, zinc, selenium, and CRP
4.Initiate normal saline fluids checking electrolytes including magnesium and phosphorous regularly and correcting per pharmD
5.Initiate IV micronutrients via a banana bag and a semi elemental TF or TPN. Initiate slowly per risk of refeeding syndrome

__*Day 1 – In-Patient*__

1.Check nutrition labs: Thiamine, B12, copper, vitamin E, pantothenic acid, niacin, vitamin C, vitamin A, vitamin D, zinc, selenium, CRP
2.Start IV micronutrient repletion per lab values and pharmD recs
3.If pt unable to meet >75% of needs in 1-2 days recommend:

- **Start TF**: Peptamen 1.5 @ 20 cc/hr and titrate up to goal of 55 cc/hr. Provides 1800 kcal, 81 g protein, 924 ml FW
- **If unable to tolerate enteral nutrition, recommend TPN**: [1L] 500 ml D50 + 500 ml AA10 + 250 ml Lipids 20%. Provides 1,500 kcal, 50 g protein, 33% fat, CHO load 2.8 mg/kg/min.

4.Start bowel regimen docusate & senna. Miralax & benefiber as needed

Interventions Continued

__*Day 2 – In-Patient*__

1.Encourage oral intake as tolerated. Small frequent meals and snacks with protein. Glucerna or Ensure 3x/day as tolerated
2.Start calorie counts. If unable to meet >50% of needs within 1-2 days, recommend nutrition support.
3.Supplement micronutrients as indicated by nutrition labs
4.Continue scheduled bowel regimen

__*Day 7 – In-Patient*__

1.Patient continues to have poor oral intake, meeting <50% of needs x 6 days. **Recommend starting TF:** Peptamen 1.5 @ 20 cc/her and titrate up to goal of 55 cc/hr x 12 hr nocturnal feeding. Provides 900 kcal, 40 g protein, 475 ml FW.
2.Encourage oral intake small frequent meals, snacks w/protein. Ensure 3x/day
3.Supplement micronutrients as indicated by nutrition labs
4.Continue bowel regimen

Monitoring/Evaluating

__*Day 1 – In-Patient*__

1.Upper GI: normal gastric pouch, no stricture, dilation or leakage
2.Endoscopy: normal esophagus, 4 cm gastric pouch, no ulcer or obstruction or stricture, normal jejunum
3.CT abdomen & pelvis: normal transit into jejunal limb & small bowel, no dilation or obstruction. Significant fecal loading present.

Date	Laboratory	Value	Date	Laboratory	Value
Day 1	Hb	11.1 g/dL L	Day 6	Zinc	60 mcg/dL WNL
	HCT	35% L		Vitamin A	284 mcg/L L
	MCV	104 fL H		Vitamin C	0.42 mg/dL L
	Vitamin B12	> 1500 pg/mL H		Carotene	49 mcg/dL L
	Vitamin C	0.30 mg/dL L		CRP	2.0 mg/L WNL
	Vitamin D	16.4 ng/mL L		Pre-Albumin	16.6mg/dL L
	Zinc	56 mcg/dL L			

__*Day 2 – In-Patient*__

1.Oral intake < 800 kcal/day. Persistent nausea and vomiting
2.Low pre-albumin with normal CRP indicative of protein calorie malnutrition.
3.Constipation. Good urine output. No skin breakdown.

__*Day 3-7 – In-Patient*__

Calorie counts: pt meeting 35% of needs. Almost all carbs very little protein. Per RN pt experiencing nausea & distended abdomen. Unopened Ensure at bedside

Outcome

Mrs. FTT never received nutrition support. Nutrition labs were low, but remained stable throughout her 8-day admission. On Day 4, social work was contacted by Mrs. FTT's defense lawyer and informed she was due in court at a sentencing trial for a conviction of third degree assault. Ms. FTT was discharged in time for her court hearing. Current location unknown.