Obesity, Bariatric Surgery, and Wound Healing

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Obesity rates are rising at an alarming rate and pose a major public health concern in the US and worldwide. The Centers for Disease Control and Prevention[1] estimate that 34% of the American population is obese, numbers that have trended upward dramatically since 1980. Even more alarming is the increase in childhood obesity. Obesity in children 2 through 19 years of age has steadily grown; currently, more than 17% of American children are obese.[2]

Obesity is defined by body mass index (BMI) ≥30, calculated by dividing weight in kilograms by height in meters squared. Morbid obesity is defined as having a BMI ≥40. Obesity is a refractory and multifactorial disease associated with many comorbid conditions that affect all organ systems (see Table 1). If comorbid conditions associated with obesity are taken into account, obesity contributes to an estimated 300,000 deaths per year.[3]

Conventional forms of obesity treatment include a combination of diet therapy, physical activity, pharmacotherapy, and behavior modification; the surgical approach (ie, bariatric surgery) is considered an effective long-term treatment.[4] Because bariatric surgery successfully resolves certain comorbid conditions such as diabetes, hypertension, and obstructive sleep apnea, bariatric surgery is recognized as a metabolic surgery.[5]

Table 1. Comorbid conditions associated with obesity

Type 2 diabetes mellitus (T2DM)
Obstructive sleep apnea
Hypercholesterolemia
Hypertension
Reflux disease
Cardiovascular disease
Gallbladder disease
Osteoarthritis
Cancer
Clinical depression

Adapted from the Obesity Action Coalition (OAC). Available at: www.obesityaction.org/aboutobesity/relatedconditions/como.php. Accessed April 21, 2011.

Nutritional Concerns With Bariatric Surgery

Bariatric surgical techniques have evolved since the first surgical procedure (the jejunoileal bypass [JI]) was performed in the mid-1950s. According to the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK),[6] the most common bariatric procedure performed in the US is the Roux-en-Y gastric bypass (RNYGBP), followed by the adjustable gastric band (AGB), vertical sleeve gastrectomy (VSG), and the biliopancreatic diversion with duodenal switch (BPD/DS). All bariatric procedures restrict stomach capacity, so the patient is unable to eat large portions of food, leading to weight loss because of reduced caloric intake. Some surgical procedures are also malabsorptive, so calorie and nutrient absorption is reduced, which also facilitates the weight loss process.

Thus, bariatric surgery poses challenges and opportunities for nutrition and healthcare professionals. The type of bariatric procedure has a bearing on the type of nutritional side effects or potential deficiencies that may develop. Currently, no single, standardized bariatric diet is available, and many recommendations are based on experiential data with limited evidence-based research. Most dietary recommendations for postbariatric surgical patients are supported by evidence for similar gastrointestinal surgeries or recommendations for very low-calorie diets (VLCD). However, the American Society for Metabolic and Bariatric Surgery (ASMBS)[7] recently published specific guidelines for the perioperative and postoperative care of the bariatric patient. In addition, the American Association of Clinical Endocrinologists, the Obesity Society, and the ASMBS have published a joint clinical practice guideline.[8]

Bariatric surgery is considered a safe procedure for the long-term resolution of obesity; however, nutrition deficiencies, dumping syndrome (ie, rapid gastric emptying, where undigested stomach contents are "dumped" too rapidly into the small intestine), and food intolerances have been reported, especially in patients who do not follow guidelines.[9] Potential nutritional side effects after bariatric surgery, which may be exacerbated by surgical type, are listed in Table 2.

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Table 2. Potential nutritional side effects of bariatric surgery

Vomiting
Dehydration
Electrolyte imbalance
Diarrhea or constipation
Vitamin and mineral deficiency
Protein deficiency
Protein-calorie malnutrition (PCM)
Osteoporosis
Iron-deficiency anemia
Pernicious anemia
Hair loss
Food intolerance
Adverse sensory stimulation
Dumping syndrome
Hypoglycemia

General nutrition recommendations for bariatric surgery focus on eating pattern, mechanics of eating and drinking, food tolerance, diet progression, adequate intake of fluids and macronutrients (especially high-quality protein), and daily adherence to vitamin and mineral intake recommendations. Table 3 lists general bariatric nutrition recommendations; however, healthcare providers should consider individual, patient-focused nutrition counseling based on the type of surgical procedure, presence of nutrition complication, socioeconomic and psychosocial factors, level of education, and patient readiness for the lifestyle changes associated with this surgery. Table 4 lists recommended vitamin and mineral intake based on surgical procedure.

In addition, it has been shown that patient outcomes in safety, weight loss, and dietary compliance are enhanced when a multidisciplinary team approach to care is implemented.[10]

Wound Healing in the Bariatric Surgical Patient

Most bariatric surgery is laparoscopic, but some patients may require "open" surgery or a laparotomy. These patients will have a larger incision that may take longer to heal. Infections can occur up to 3 weeks after surgery and patients must be educated on how to care for the surgical wounds and monitor for signs of infection or wound dehiscence. A recent study[11] that examined the information received by patients undergoing bariatric surgery found that study participants received very little information about incision care. Lack of information about incision care was associated with greater fear of having the surgery. A questionnaire included as part of the study revealed patients are most concerned about pain, complications, and activity — issues that could easily be addressed with proper education and instruction. The Midwest Bariatric Institute at Saint Margaret Mercy Hospital in Indiana[12] posts wound care instructions on its website as part of the educational process. This one-page document explains what to ex-

Table 3. General bariatric nutrition requirements

Mechanics of eating and drinking
Eat slowly; take 30 minutes to eat a meal
Chew food until a pureed consistency
Take small sips of fluids; avoid gulping
Do not eat and drink together; wait at least 30 minutes to drink before and after eating
Keep food or drink covered if experiencing smell aversion
Do not chew gum
Do not use straws

Eating pattern
Do not skip meals; eat at least three meals per day
Avoid grazing and mindless eating

Daily general nutrition recommendations
Diet progression: clear liquid, full liquid, pureed, soft, mechanical, regular with some modifications
Begin with a chewable or liquid vitamin and then progress to swallowable tablet
Consume 60–80 g of protein per day (approximately 1.0 –1.5 g/kg ideal body weight)
Consume 64–72 oz of fluid
Avoid or limit natural sugars
Avoid carbonation
Avoid or limit caffeine
Avoid or limit spicy foods

Adapted from ASMBS Allied Health Nutritional Guidelines for the Surgical Weight Loss Patient.
Available at: www.asmbs.org/Newsite07/resources/bgs_final.pdf.

Table 4. Recommended vitamin and mineral intake[a]

Vitamin/Minerals	Restrictive[b]	Restrictive/ malabsorptive[c]
High potency multivitamin	100% DRV	200% DRV
B_{12} (sublingual, nasal, or injection),	500–1,000 µg	500–1,000 µg
Calcium citrate	1,500–2000	1,500–2,400[d]
Elemental iron	18–27 mg	18–27 mg
B-complex with thiamin	50–100 mg	50–100 mg
C	500 mg	500 mg
Biotin	3,000 mcg	3,00 mcg
Zinc	15 mg	15 mg
Oral modular protein	As recommended	

DRV = daily recommended value; IU = international units; BDP/DS = biliopancreatic diversion with duodenal switch
[a] Begin with a chewable or liquid vitamin and then progress to swallowable tablet
[b] Adjustable gastric band may not require vitamin B12
[c] For BPD/DS add 10,000 IU vitamin A; 2000 IU vitamin D; 300 ug vitamin K
[d] 2,400 mg of calcium citrate is recommended for BPD/DS

Adapted from ASMBS Allied Health Nutritional Guidelines for the Surgical Weight Loss Patient. Available at: www.asmbs.org/Newsite07/resources/bgs_final.pdf.

pect and how to change the wound dressings, shower with the incision, and monitor for any complications.

According to Virji and Murr,[13] risk of wound infections and incisional hernias are seen less in laparoscopic surgical procedures than in conventional surgeries. McGlinch et al[14] have found that wound infection is seen in <3% of the population with laparoscopic bariatric surgery; however, in open bariatric surgery, as high as 20% of patients may present with wound infection with symptoms of pain, fever, erythema, and purulence around the surgical site. Obese patients carry higher risk of skin wound infections because of the presence of large subcutaneous spaces with poor blood supply. A large percentage of patients undergoing bariatric surgery also present with several comorbid conditions such as diabetes mellitus, which increases risk of poor wound healing. Wound infections may present several weeks postsurgery and may lead to weakened surgical incision sites. Wound infections pose a challenge and are associated with increased morbidity because of prolonged healing time and increased risk of incisional hernias.

In addition to nursing and medical management of wounds, which includes drainage and broad-spectrum antibiotic therapy, increased protein and calories, 15 mg of zinc, 3000 mcg biotin, and 250 to 500 mg of vitamin C may be recommended (see Table 4). For malabsorptive bariatric procedures, oral intake of modular proteins that contain all indispensable amino acids may be recommended. A protein intake of 1.5 to 2.0 g/kg of body weight may be appropriate to reduce the risk of hypoalbuminemia.

Chronic wounds. Some bariatric surgical patients may have chronic wounds such as nonhealing pressure ulcers. This may be a result of the greater adiposity, making it difficult to reposition, and multiple skin folds. Although evidence is scant with regard to bariatric surgical patients with chronic wounds, the most important macronutrient for both populations is protein. Protein is the sole macronutrient to provide nitrogen, which is essential to life. The patient with reduced stomach capacity should be instructed to consume the protein component of the meal first.

Because of compromised absorption of macro- and micronutrients, patients who have undergone gastric bypass or BPD/BS present the extra challenge of balancing weight loss with calorie and protein intake appropriate to facilitate chronic wound healing. The addition of L-arginine and L-glutamine may be useful in the wound healing process, although empirical evidence of efficacy and dosage of these products used in the bariatric population is limited. Medical nutrition therapy of bariatric patients with acute or chronic wounds requires individual detailed assessment of oral intake and tolerance. Correcting malnutrition by administering appropriate calories and the addition of nutraceuticals, modular proteins, separate amino acids, and extra vitamins and minerals are best recommended after careful assessment of lab work and interdisciplinary collaboration with the medical and nursing team.

Practice Points

Healthcare professionals should understand that bariatric patients have an altered anatomy that mandates specific nutrition requirements. Nutrition assessment should include collecting anthropometric and biochemical data along with a full assessment of dietary intake, eating patterns, adherence to diet regimen, current challenges, and any wounds that may be present before or after surgery. The patient's physical activity progress and psychosocial support system also should be monitored. Bariatric patients should understand the surgery provides only a tool to help facilitate weight loss. The nutrition professional can assist the patient with dietary and lifestyle changes for life-long healthy success of obesity remission. n

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