Surgical Management of Metabolic Syndrome Related to Morbid Obesity

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KEYWORDS

• Morbid obesity • Metabolic surgery • Multimodal surgical pathway
• Surgical outcomes • Surgical risk • Bile acids • Gut microbiome

KEY POINTS

- Morbid obesity and metabolic syndrome are a global epidemic.
- The limited efficacy of intensive medical therapy is related to complex socioeconomic and biologic factors that cause most individuals to regain weight.
- Prerequisites for metabolic surgery include medical, nutrition, and behavioral assessments to ensure patients are medically optimized and mentally and emotionally prepared for the postoperative period.
- The understanding of the mechanisms of action of metabolic surgery has evolved from restriction and malabsorption to the complex interaction of neurologic and enteric hormones, changes in gut biochemical pathways, and the important role of the gut microbiome.

INTRODUCTION

The World Health Organization has invoked the term "globesity" to describe the worldwide epidemic of obesity. In 2014, nearly 2 billion individuals worldwide were overweight (body mass index [BMI], 25–30 kg/m^2). A total of 600 million individuals were obese (BMI >30 kg/m^2). The worldwise rise of obesity creates a paradox of malnutrition and obesity occurring side by side in the same country. With rising global sourcing of inexpensive processed foods (of poor nutritional value) it is difficult for many individuals to consume an affordable, balanced, and nutritious diet. Overconsumption of processed foods contributes to obesity and the metabolic syndrome.[1,2] Metabolic syndrome is defined as a combination of diabetes plus two of any of the following: morbid obesity (BMI >30 kg/m^2), hypertension, hypertriglyceridemia, or hypercholesterolemia.

Morbid obesity is historically resistant to treatment and may not be curable. The annual probability of a morbidly obese (BMI $\geq$40 kg/m^2) person obtaining a normal

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weight with medical therapy is 1 in 1290 for males and 1 in 677 for females.[3] The annual probability of achieving 5% weight reduction is one in eight for males and one in seven for females.[3] Most weight loss programs, therefore, currently recommend a 5% to 10% reduction in weight as a target goal.

Beyond the obvious health consequences, morbid obesity also has an enormous economic impact. In the United States, morbid obesity increases direct medical costs by 42%.[4] Annual health care expenditures to treat morbid obesity–related diseases approach nearly $150 billion per year.[4] Obesity also impacts national security. In one study, 27% of draft-eligible US adults age 17 to 24 were deemed unfit for military service because of weight-related restrictions.[5] In the US military health care system (one of largest health care systems in world, providing care to more than 9 million patients) roughly 70% of the beneficiaries are overweight or obese.[5]

Current treatment approaches in morbid obesity are multimodal in nature. Combination therapies include increases in moderate-intensity aerobic and resistance exercise; behavioral lifestyle changes to increase compliance with diet and activity recommendations; medical nutrition therapy (including diets with energy deficits >500 kcal per day); intensive medical therapy (pharmacologic treatment of cardiovascular comorbidities and possible prescription of weight loss medications); and (increasingly) metabolic surgical procedures, such as gastric bypass and vertical sleeve gastrectomy (VSG). Each of these therapies attempts to mitigate the metabolic consequences of obesity.[6] This article focuses on the preoperative evaluation and proper patient selection for metabolic surgery. The procedures are discussed relative to their anatomy, metabolic mechanism of action, and common adverse effects.

PRESURGERY MEDICAL EVALUATION

The preoperative evaluation and selection of metabolic surgery patients is best done by a multidisciplinary team. Standard components of the preoperative examination include a full medical assessment with risk stratification, nutritional counseling, and behavioral health evaluation and support. Most health care systems use a checklist or algorithmic approach to preoperative management based on a centers of excellence model with existing best practices.

The medical evaluation includes a complete history and physical focusing on obesity-related comorbidities, documenting weight, height, and BMI. The history should include prior attempts at self or medically directed weight loss. Laboratory evaluations should include a complete chemical profile including liver and kidney functions, fasting blood glucose, hemoglobin A_{1c}, and a lipid profile. Blood type, coagulation profile, and hemoglobin (Hb) levels are assessed. Micronutrient measurements include iron stores, vitamin B_{12}, folate, and vitamin D levels. Deficiencies should be corrected preoperatively.

Patients with a BMI greater than 35 kg/m^2 have a high incidence of obstructive sleep apnea (OSA). OSA is associated with major cardiopulmonary morbidity. Controversy exists as to the whether or not all bariatric patients should undergo polysomnography testing. OSA screening and confirmatory polysomnography should be performed preoperatively. The use of continuous positive airway pressure in the perioperative period may decrease cardiopulmonary morbidity. The American Society for Metabolic and Bariatric Surgery (ASMBS) and the Society for Gastrointestinal and Endoscopic Surgeons recommend that all patients diagnosed with moderate to severe OSA use continuous positive airway pressure preoperatively and in the immediate postoperative period.[7,8]