REVIEW

THE AMERICAN JOURNAL of MEDICINE®

# Management of the Metabolic/Bariatric Surgery Patient

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**ABSTRACT**

There is currently a global pandemic of obesity and obesity-engendered comorbidities; in particular, certain major chronic metabolic diseases (eg, type 2 diabetes) which markedly reduce life expectancy and quality of life. This review is predicated on the fact that management of the obese patient is a primary concern of all physicians and health care providers, and that metabolic/bariatric surgery is a highly successful therapeutic option for this disease.

 • *The American Journal of Medicine (2011) 124, 1099-1105*

**KEYWORDS:** Metabolic/bariatric surgery; Micronutrients; Nutrition; Obesity

Over the past 50 years, there have been numerous papers published stressing the ever-increasing global prevalence of overweight (body mass index [BMI] 25-29.5 kg/m$^2$), obesity (BMI 30-34.9 kg/m$^2$ or 30-39.9 kg/m$^2$), and morbid obesity (BMI >40 kg/m$^2$ or >35 kg/m$^2$ in the presence of significant obesity comorbidities).[1-3] In reality, there are few individuals with a BMI >35 kg/m$^2$ who do not have significant comorbidities related to obesity. The cited incidence rates increase annually. The most recent data from the Centers for Disease Control give population estimates of 68.0% for overweight, 33.8% for obesity, and 14.3% for morbid obesity, with 5.7% of the US population having a BMI ≥40 kg/m$^2$.[2] Nearly 75% of Americans have a BMI >25 kg/m$^2$, and 1 of 4 children are overweight or heavier.[4] The World Health Organization has estimated that there are more than 1.7 billion overweight adults and 22 million overweight children under the age of 5 years in the world.[5,6] For 2015, the World Health Organization predicts there will be 2.3 billion adults overweight; this is nearly twice the population of China.[7] More than 700 million of them will be obese or morbidly obese.[7]

The comorbidities of obesity affect nearly every organ system and can be classified as metabolic (eg, type 2 diabetes) and structural (eg, obstructive sleep apnea),[8,9] as well as several carcinomas (eg, breast).[10-12] These comorbidities per se, and the atherosclerotic diseases they engender, reduce life expectancy of obese, in particular morbidly obese, females by 7 years, and males by 9 years.[13]

The global epidemic of obesity has not been checked by the disciplines of behavior modification, dietary management, exercise, and drug management, alone or in combination. Surgery has, in contrast, been highly effective, with extremely low operative mortality and morbidity, in achieving long-term lowering of body weight and resolving, diminishing, and preventing obesity comorbidities.[1,14-16] There are about 300,000 operations for weight loss and management of obesity comorbidities performed annually.[17] It is incumbent, therefore, for all health care practitioners, medical as well as surgical, to have a working knowledge of bariatric, more precisely metabolic/bariatric, surgery.

The term "metabolic" comes from the Greek, pertaining to or involving transition or a changing of form (state). Metabolic surgery was defined in a book of that title, published in 1978, as "the operative manipulation of a normal organ or organ system to achieve a biological result for a potential health gain."[18] "Baros" also is from the Greek, meaning "weight." The term "bariatric" came into use in 1965, defining a branch of medicine dealing with causes,

**Funding:** None.

**Conflicts of Interest:** Authors of this manuscript have no disclosures concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

**Authorship:** All authors had access to the data and a role in writing the manuscript.

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0002-9343/$ -see front matter 
doi:10.1016/j.amjmed.2011.05.035

prevention, and treatment of obesity. The discipline of "bariatric surgery" was established by the founding of the American Society of Bariatric Surgery in 1983.

The traditional physiologic mechanisms of action postulated for metabolic/bariatric operations; namely, malabsorptive (biliopancreatic diversion, duodenal switch), malabsorptive/restrictive (gastric bypass), primarily restrictive (adjustable gastric band, vertical banded gastroplasty, and sleeve gastrectomy) and other (electrical stimulation of the stomach or vagus nerves) may be incomplete. Recently, proposed mechanisms of action for metabolic/bariatric surgery involve neural/hormonal/cerebral mechanisms. We know that 80% of the vagal fibers are afferent;[19] that there is an intrinsic myoneural network connecting the stomach, intestine, and pancreas;[20] that there are foregut and hindgut hormones that influence satiety, pancreatic function, and peripheral insulin resistance and sensitivity;[21-23] and that fat cells elaborate energy conservation hormones, influence insulin resistance, and produce inflammatory cytokines.[24,25] We know that there are multiple hypothalamic nuclei and areas dedicated to appetite, hunger, and satiety and that certain neurons increase appetite and metabolism, whereas others do the reverse.[26,27]

**CLINICAL SIGNIFICANCE**

- Obesity comorbidities are metabolic (eg, type 2 diabetes), structural (eg, obstructive sleep apnea), and neoplastic (eg, breast carcinoma).
- Metabolic/bariatric surgery is highly effective with low mortality and morbidity.
- Standard procedures are adjustable gastric banding, gastric bypass, biliopancreatic diversion/duodenal switch, and sleeve gastrectomy.
- Postoperative care includes supervision of medications and micro- and macronutrients, and anticipation of complications.

## THE PREOPERATIVE METABOLIC/BARIATRIC SURGERY PATIENT

### Patient Selection

Common-usage patient selection criteria are a BMI $\geq$40 kg/m$^2$ or $\geq$35 kg/m$^2$ in the presence of significant comorbidities. The 1991 National Institutes of Health guidelines credited for these boundaries are otherwise irrelevant to the times because they make no allowance for laparoscopic metabolic/bariatric surgery and would limit the metabolic/bariatric operative procedures to Roux-en-Y gastric bypass and vertical banded gastroplasty, a rarely performed operation today.[28] The 2004 American Society for Metabolic and Bariatric Surgery guidelines have never been given credence.[29] Today, there is an active effort to lower the minimal BMI to 30 kg/m$^2$, or even lower, in certain patients, for example, patients with type 2 diabetes.[30-32]

Outside of the BMI, there are few hard and fast selection criteria: adolescent metabolic/bariatric surgery is becoming more prevalent,[33-35] elderly age has not posed a limitation,[36-38] and most comorbid conditions are causes for surgery rather than contraindications.[28,29,39] Psychiatric status and the cognizant ability to understand the surgical consequences are important selection factors but have been overly emphasized, primarily by payers to limit surgical access.[40,41] Finally, preoperative dietary history also is often used as a selection criteria by payers to limit access.[42]

### Procedure Selection

There have been efforts made to establish an operative selection algorithm;[43-45] none have been adequately tested or accepted in general practice. Some surgeons believe one operation fits all, regardless of the circumstances; other surgeons continuously modify their operative approach, making standardization difficult. As a rule, today, the more demanding the procedure, usually the better are weight loss and control of comorbidities.[1,39]

## THE PERIOPERATIVE METABOLIC/BARIATRIC SURGERY PATIENT

### Patient Preparation

Perioperative optimization of the metabolic/bariatric surgical patient is an opportunity to reduce complications. Patient education about dietary expectations is paramount. Preoperative weight loss has been shown to improve excess weight loss postoperatively and to reduce both operating time and hospital stay,[46-48] as well as reducing the size of the liver, mesenteric fat deposits, and abdominal wall depth, thereby improving exposure and patient safety.[49,50] Preoperative weight loss also may promote patient compliance.[51] The majority of patients have sleep apnea but may not have been tested.[52,53] There appears to be an increased likelihood of renal stone formation in patients following gastric bypass operation;[54-56] dietary steps to reduce stone formation are indicated.

Evaluation of the gastrointestinal tract preoperatively should be carried out for those patients with a known history of ulcer disease or other gastrointestinal symptoms. Screening for *Helicobacter pylori* is controversial.[57,58] We broadly screen patients with an upper gastrointestinal study who are undergoing planned banding to test for hiatal hernias and gross motility disturbances. This too is controversial.[59-61]

The majority of patients presenting for metabolic/bariatric surgery are deficient in vitamin D,[62-64] many young women are iron deficient,[65-67] and up to one third of patients present with deficiencies of vitamin A.[65,68] These abnormalities should be corrected preoperatively.