A Critical Review on Risks versus Benefits of Bariatric Surgery

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ABSTRACT

Background: bariatric surgery refers to a series of weight loss procedures that an obese individual can have in order to reduce their food intake, therefore causing them to lose weight. Obese patients lose more weight with bariatric surgery than with medical weight-loss treatment. The laparoscopic Roux-en-Y gastric bypass procedure results in more short-term weight loss than laparoscopic adjustable gastric banding, but the latter has fewer postoperative complications and a lower mortality rate; long-term comparative data are currently lacking. The decision regarding which procedure to perform should be based on individual patient and surgeon factors.

Aim and Intervention of the study: to review the history of bariatric surgery in order to compare the different bariatric operations, to list the current indications for these procedures, to evaluate the outcomes, and to consider the risks.

Position: a critical review of controlled randomized studies has provided evidence that bariatric surgery produces durable weight loss exceeding 100 lb (46 kg), full and long-term remission of type 2 diabetes in over 80% with salutary effects on the other comorbidities as well with significant reductions in all-cause mortality.

Conclusion: bariatric surgery is the therapy of choice for patients with severe obesity.

Keywords: Obesity, Bariatric surgery, bypass, Diabetes.

INTRODUCTION

Bariatric surgery is currently the only modality that provides a significant, sustained weight loss for morbidly obese patients, with resultant improvement in obesity-related comorbidities. This article delineates the current types of bariatric surgery, their respective outcomes, and their impact on obesity-related medical comorbidities.

Bariatric Surgery as Treatment for Severe Obesity

The health implications of obesity include increased risk for coronary artery disease, hypertension, hyperlipidemia, type 2 diabetes mellitus, sleep apnea, stroke, arthritis of the weight-bearing joints, and increased prevalence of selected types of cancer. Obesity contributes to approximately 300,000 premature deaths each year as a result of health-related complications (1). The risk for developing these medical comorbidities is directly proportional to the degree of obesity (2). Additionally, the relative risk for death increases substantially with increasing BMI, particularly for individuals who have BMI of 35 kg/m2 or more (3). Thus, severe obesity is somewhat arbitrarily defined as a BMI of 35 kg/m2 or more, and morbid obesity is defined as a BMI of 40 kg/m2 or more with coexistence of significant comorbidity.

The prevalence of severe obesity seems to be increasing at an even higher rate than moderate degrees of obesity (4). Bariatric surgery, also known as weight-loss surgery or obesity surgery, is widely accepted as the only known effective treatment for severe obesity. This procedure was introduced in the 1950s and involves surgical manipulation of the gastrointestinal tract to induce long-term weight loss in severely obese individuals. Bariatric surgery has been shown to substantially improve or resolve many common obesity-related comorbid conditions, including type II diabetes, hypertension, sleep apnea, and dyslipidemia. A recent report with 10-year outcome data from the observational Swedish Obese Subjects (SOS) study showed marked benefits in patients treated surgically compared with matched control subjects treated medically, including recovery from diabetes, lipid abnormalities, sleep apnea, and quality of life (5). Several studies have also shown that bariatric surgery improves long-term survival (6).

Mechanisms for Diabetes Remission

Type 2 diabetes mellitus has long been and continues to be a significant source of morbidity...
and mortality and a substantial economic burden on worldwide health care (7). Development of type 2 diabetes is rooted in two fundamental pathophysiologic processes: decreased production of endogenous insulin and cellular insulin resistance. Bariatric surgery has been shown to resolve or substantially improve glucose control (8). Although no clear understanding exists of the mechanisms through which bariatric surgery facilitates remission of type 2 diabetes, numerous possible mechanisms for altering either insulin production or resistance have been proposed as potential explanations for improved or resolved diabetes after bariatric surgery. However, it is becoming increasingly clear that remission of diabetes is multifactorial (9).

In 2011, the International Diabetes Federation issued a position statement suggesting "Under some circumstances, people with a BMI 30–35 should be eligible for surgery (10)." When determining eligibility for bariatric surgery for extremely obese patients, psychiatric screening is critical; it is also critical for determining postoperative success. Patients with a body-mass index of 40 kg/m2 or greater have a 5-fold risk of depression, and half of bariatric surgery candidates are depressed (11).

Bariatric surgery refers to a variety of surgical procedures, including gastric bypass, adjustable gastric banding, sleeve gastrectomy, and duodenal switch, and includes both open and laparoscopic procedures (12). Some studies indicate that bariatric surgery may be effective on short and medium term weight loss which, is associated with a reduction of comorbidities, such as diabetes. Furthermore, it is generally believed that several types of bariatric surgery are cost-effective. This poses a moral imperative to provide surgery to a vulnerable group of patients in need of help. However, high quality evidence on safety, efficacy, effectiveness, efficiency, and cost savings for children and adolescents is lacking. Exposing young people to potentially harmful treatment with uncertain outcomes is morally problematic. Hence, it is difficult to assess the risk/benefit ratio and there is a moral imperative to provide high quality evidence (13).

History of current bariatric operations and the laparoscopic revolution

Variations on a Theme

Bariatric operations have traditionally been divided into three groups:

1. Restrictive, i.e., procedures that produce weight loss solely by limiting intake (gastric banding, GS).
2. Malabsorptive, i.e., operations that induce weight loss totally by interference with digestion and absorption (intestinal bypass); and
3. Mixed, i.e., procedures that limit intake and produce malabsorption (gastric bypass, duodenal switch). Despite this apparently clear classification, the mechanisms of action remain unclear. For example, whereas the GS is considered a restrictive procedure, limiting intake due to the low volume of the tube, the longitudinal gastrectomy also discards the source of ghrelin production.

Figure 1 provides a diagrammatic overview of the various operations previously or currently in use. The list is only partial. Multiple variations of each of the operations have been performed and discarded over the last 50 year with variations in the size of the gastric pouches, length of limbs, type and size of anastomoses, with or without vagotomy, the addition of constricting rings, and even wrapping the entire stomach in fabric.

Indications and Contraindications to Bariatric Surgery

The original indications and contraindications to bariatric surgery were established in 1991 by the NIH Consensus Conference on the Surgery for Obesity. In 2004, the American Society for Bariatric Surgery [ASBS, recently renamed as the American Society for Metabolic and Bariatric Surgery (ASMBS)] updated that statement with a follow-up Consensus Conference (14), that reached the following conclusions:

1. Bariatric surgery is the most effective therapy available for morbid obesity and can result in improvement or complete resolution of obesity comorbidities.
2. Types of operative procedures for morbid obesity have increased since 1991 and are continuously evolving. There are currently four types of procedures that can be used to achieve sustained weight loss: gastric bypass (standard, long-limb, and very long-limb Roux), alone or in combination with vertical banded gastroplasty; laparoscopic adjustable gastric banding; vertical banded gastroplasty; and biliopancreatic diversion and duodenal switch.
3. Both open and laparoscopic bariatric operations are effective therapies for morbid obesity and represent complementary state-of-the-art procedures.
4. Bariatric surgery candidates should have attempted to lose weight by nonoperative means, including self-directed dieting, nutritional counseling, and commercial and hospital-based weight loss programs, but should not be required to have completed formal nonoperative obesity therapy as a precondition for the operation.

5. The bariatric surgery patient is best evaluated and subsequently cared for by a multidisciplinary team.

6. Bariatric surgery candidates should have a comprehensive medical evaluation before the operation; evaluation by subspecialists (e.g., cardiologists, psychiatrists, and psychologists) is not routinely needed but should be available if indicated.

7. Bariatric surgery, performed only by experienced centers, should be considered in morbidly obese adolescents.

8. Extending bariatric surgery to patients with class I obesity (BMI, 30–34.9 kg/m²), who have a comorbid condition that can be cured or markedly improved by substantial and sustained weight loss, may be warranted and requires additional data and long-term risk and benefit analyses.

9. Bariatric surgery can be cost effective before the fourth year of follow-up.

10. Bariatric surgery offers rich opportunities for both basic and translational patient-oriented research to provide a better understanding of the factors involved in the regulation of food intake, pathophysiology of obesity, metabolic and clinical effects of sustained weight loss, and best treatment options for obese persons.

Other inclusion criteria include the patient’s ability to understand the surgery and the consequences of the treatment, to comply with long-term follow-up, to agree to maintain vitamin and mineral supplementation, and to report problems promptly to specialists familiar with the complications of bariatric surgery. Contraindications include uncontrolled emotional disorders and drug or alcohol abuse. A relative contraindication observed by many surgeons is a lack of support or strong disagreement with the surgery by the family.

The choice of the individual procedure is not yet based on sound data, but many surgeons choose to favor gastric bypass or the duodenal switch over adjustable gastric banding in patients with diabetes. The rapidly growing databases of the NIH project, Longitudinal Assessment of Bariatric Surgery (LABS) and the Surgical Review Corporation (SRC), the independent, nonprofit organization that manages the ASMBS Centers of Excellence program, should soon facilitate these decisions.

**Risks of Bariatric Surgery**

Bariatric surgery is remarkably safe, especially given the large size of the patients as well as the frequency and seriousness of the comorbidities. Comparison with mortality rates reported from other common operations brings these very low rates into focus. The review of mortality by Dimick et al. (16) after common operations in U.S. hospitals revealed the following data: aortic aneurysm, 3.9%; coronary artery bypass graft, 3.5%, esophagectomy, 9%; and pancreatectomy, 8.3%. Only hip replacement with its mortality of 0.3% was as safe as bariatric surgery.

There is still no proven explanation for the significant mortality rates after discharge—in fact, more patients die after discharge than during hospitalization. Pulmonary emboli and arrhythmias are suspected but not yet proven. This is an important issue because these deaths may be preventable with the appropriate medication.

Although the mortality rates are low, probably due to the standardization of bariatric surgical care, the complications after bariatric surgery can be deadly and must be treated promptly by surgeons familiar with these problems. The complications fall into two groups: acute and long-term. The acute complications, which occur in 5–10% of the patients depending on the procedure, patient risk, age, and condition, mirror those after other abdominal operations, i.e., hemorrhage, obstruction, anastomotic leaks, infection, arrhythmias, and pulmonary emboli. Due to the patients’ weight, rhabdomyolysis is also seen occasionally, especially after prolonged operations.

Long-term complications may be baffling to those unfamiliar with bariatric surgery: neuropathies due to nutritional deficiencies, internal hernias, anastomotic stenoses, and emotional disorders. Although the nutritional deficits can be avoided with daily chewable multivitamin and mineral supplements and with
calcium and iron for menstruating women, compliance with this recommendation is not universal. Unfortunately, we have seen full-blown cases of beri-beri, pellagra, kwashiorkor and severe neuropathies in patients who were treated for a variety of rare illnesses before the dietary deficiencies were recognized.

Another complication is hypoglycemia (17) a condition that may appear as long as 14 years after the surgery with plasma glucose levels as low as 30 mg%. Although some recommend surgical intervention for this syndrome, all of the 47 patients in our series recovered within 1 year after conservative approaches, of which the most effective was the immediate availability of hard candy when the patients felt an “aura” of an oncoming attack.

The treatment of complications, both acute and long-term, requires someone familiar with the uncommon and baffling syndromes seen in the postbariatric surgical patient. Because some of these adverse outcomes require very prompt action, measured in hours, early consultation with a bariatric surgeon or a physician knowledgeable in this area is essential.

Surgical Approaches to the Treatment of Obesity 1025 Although the specific mechanisms involved in the remission of these edical conditions remain to be fully elucidated, it has become clear that bariatric surgery has established a significant and firm role in the treatment of medical comorbidities that result directly from obesity. However, until commercial insurance carriers provide improved coverage for bariatric surgery, patient access to these treatments will remain limited.

RECOMMENDATIONS

Overall and after weighting the risks vs. benefits of the bariatric Surgery, it is recommended for the qualified range of patients.

The benefits are greater than the risks for most patients especially those undergoing laparoscopic Roux-en-Y gastric bypass or laparoscopic adjustable gastric banding; thus, these have become our procedures of choice (19). The NIH, as well as the American College of Surgeons (ACS) and the American Society for Metabolic and Bariatric Surgery (ASMBS) also recommend that surgery be performed by a board certified surgeon with specialized experience/training in bariatric and metabolic surgery, and at a center that has a multidisciplinary team of experts for follow-up care. This may include a nutritionist, an exercise physiologist or specialist, and a mental health professional. In addition, some insurance companies require that the surgery be performed at a facility that meets the ASMBS-approved quality standards (MBSAQIP). Facilities which meet high standards or quality, like those outlined in MBSAQIP, are preferable choices for patients (19).

Qualifications for bariatric surgery

1. BMI ≥ 40, or more than 100 pounds overweight.
2. BMI ≥35 and at least two obesity-related co-morbidities such as type II diabetes (T2DM), hypertension, sleep apnea and other respiratory disorders, non-alcoholic fatty liver disease, osteoarthritis, lipid abnormalities, gastrointestinal disorders, or heart disease.
3. Inability to achieve a healthy weight loss sustained for a period of time with prior weight loss efforts (19).

CONCLUSION

Bariatric surgery continues to be the most sustainable form of weight loss available to morbidly obese patients. In addition, bariatric surgery has established an acceptable safety profile with respect to morbidity and mortality. With the number of elective bariatric cases growing in recent years, it is unsurprising that results have improved and better data are emerging regarding improvement of obesity-related comorbid conditions. Additionally, ample evidence suggests that bariatric surgery may increase longevity, particularly through reducing cardiovascular deaths.

REFERENCES

Table 1: SRC data from 272 ASMBS Centers of Excellence with 495 surgeons reporting outcomes in more than 110,000

<table>
<thead>
<tr>
<th></th>
<th>n</th>
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<tbody>
<tr>
<td>Hospital mortality</td>
<td>76</td>
<td>0.14</td>
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<tr>
<td>Operative mortality at 30 d (76 + 89 = 165)</td>
<td>165</td>
<td>0.29</td>
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<tr>
<td>Operative mortality at 90 d (76 + 89 + 31 = 196)</td>
<td>196</td>
<td>0.35</td>
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<tr>
<td>Readmissions</td>
<td>1956</td>
<td>4.75</td>
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<tr>
<td>Reoperations</td>
<td>887</td>
<td>2.15</td>
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Table 2: Data from a bariatric surgical community practice (Dr. Robin P. Blackstone, FACS, Scottsdale Arizona, 2007)

<table>
<thead>
<tr>
<th></th>
<th>Gastric bypass (n = 1104)</th>
<th>Adjustable gastric band (n = 84)</th>
<th>Revision (n = 37)</th>
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<tr>
<td></td>
<td>Pre-op status</td>
<td>Post-op resolution</td>
<td>Pre-op status</td>
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<td>Type 2 diabetes</td>
<td>24.80%</td>
<td>80.50%</td>
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<td>Hypertension</td>
<td>51.30%</td>
<td>63.30%</td>
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<td>Sleep apnea</td>
<td>45.10%</td>
<td>68.90%</td>
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<td>GERD</td>
<td>57.90%</td>
<td>87.60%</td>
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<td>Venous insufficiency</td>
<td>54.10%</td>
<td>71.00%</td>
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<td>Infertility</td>
<td>4.70%</td>
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<td>Asthma</td>
<td>26.10%</td>
<td>66.00%</td>
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<tr>
<td>Stress incontinence</td>
<td>55.00%</td>
<td>84.00%</td>
<td>33.3</td>
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<tr>
<td>Depression</td>
<td>18.90%</td>
<td>31.40%</td>
<td>32.1</td>
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<td>DJD</td>
<td>95.90%</td>
<td>67.10%</td>
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<tr>
<td>Hyperlipidemia</td>
<td>47.80%</td>
<td>61.40%</td>
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<td>Average medications</td>
<td>4.4</td>
<td>1.3</td>
<td>3.6</td>
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<table>
<thead>
<tr>
<th>Operations Performed Rarely Today</th>
<th>Currently Accepted Operations</th>
<th>Investigational Operations</th>
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<tr>
<td>Intestinal Bypass</td>
<td>Gastric Bypass</td>
<td>Gastric Sleeve</td>
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<td>Vertical Banded Gastroplasty</td>
<td>Adjustable Gastric Band</td>
<td>Duodeno-jejunal Bypass</td>
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<td>Minigastric loop bypass</td>
<td>Biliopancreatic Bypass with Duodenal Switch</td>
<td>Ileal Transposition</td>
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**Figure 1:** Overview of bariatric and metabolic surgical operations.