Obesity and Weight Management  39

Abstract

Weight-loss surgery is increasingly recognized as a safe and effective tool for the treatment of morbid obesity. In this article, we discuss recent results, surgical options, and selection criteria for adolescent bariatric surgery. In addition, we review practical suggestions for improving care of the morbidly obese adolescent in a tertiary care center.

Introduction

In morbidly obese adults who fail to lose adequate weight despite modification of diet, activity, and behavior, bariatric surgery has proven to be a powerful weight-loss tool. Early results in adolescents demonstrate similar outcomes. Perhaps more important than the surgical intervention are the selection criteria and preoperative preparation recommended to minimize complications and improve long-term outcomes. In this article, we review new findings, comment on new ideas, and discuss practical interventions to improve treatment.

New Findings

Weight-loss surgery has been proven to be safe and effective, and it increases life expectancy. Review of adolescent data from national databases and a meta-analysis reveal no in-patient deaths (30-day) and a low complication rate. Weight-loss surgery often results in dramatic reductions of excess body weight, improvements or resolutions of comorbidities (including diabetes, dyslipidemia, sleep apnea, and liver disease), and improvements in quality of life.

While concerns arise with respect to performing weight-loss surgery in reproductive-age females, there are no data to support adverse pregnancy or fetal outcomes. In fact, weight-loss surgery appears to reduce maternal complications rates and may improve neonatal outcomes. These results are not surprising given the association of maternal obesity with gestational diabetes, pre-eclampsia, large-for-gestational-age infants (macrosomia), and adverse perinatal outcomes.

New Ideas

Which weight-loss surgery is recommended for adolescents?

Almost all weight-loss surgery is now performed using minimally invasive laparoscopic techniques. While
gastric bypass remains the current gold standard for adolescents, the gastric band and sleeve gastrectomy are discussed as alternatives.

Gastric bypass involves the creation of a small gastric pouch and intestinal bypass. There are decades of experience with gastric bypass leading it to be considered the gold standard of weight-loss surgery in both adults and adolescents. The results in adolescents have been favorable with an average reduction of approximately 60% of excess weight, reduction in comorbidities, and improvement in quality of life.4–8 However, gastric bypass is associated with malabsorption and requires that patients take nutritional supplements postoperatively to avoid nutritional deficiencies.

Gastric banding involves the implantation of an adjustable band around the upper stomach that partially obstructs passage of food. While gastric banding is an attractive option for adolescents because it is adjustable and removable, it is currently not approved by the FDA in the United States for patients less than 18 years of age. While incidence of major complications may be lower than for other bariatric procedures, the reoperation rate for dysphagia, band migration, port displacement, and infection may be higher in younger patients.11 Some centers have abandoned gastric banding because of poor long-term results, the need for frequent adjustments, complications associated with implantation of a foreign body, and concerns with chronic esophageal obstruction. Of further concern is that many adolescent patients and their families are succumbing to market pressures and are seeking care at unaccredited outpatient surgery centers or traveling abroad to obtain gastric banding procedures for reduced prices with questionable follow-up and unknown long-term outcomes. Many experts recommend limiting the use of the band until the results of an FDA trial become available.

Sleeve gastrectomy involves removal of a large portion of the outer curvature of the stomach resulting in a tube-shaped stomach. The procedure is believed to decrease appetite by mechanical restriction and by reducing levels of ghrelin, an orexigenic hormone produced in the stomach. Sleeve gastrectomy, like gastric banding, avoids intestinal bypass and is therefore less likely to be associated with nutritional deficiencies and altered medication absorption than gastric bypass. Unlike the gastric band, no foreign body is implanted and there is no need for adjustments. The short- and mid-term results in adults appear to be equivalent or better than the gastric band with fewer obstructive symptoms and rehospitalizations.1,11 While there is growing interest in the sleeve gastrectomy and its potential role for the adolescent patient, long-term results are unknown, and therefore, prospective evaluation is recommended.

What BMI criteria should be utilized?

While original recommendations required a minimum BMI greater than 40 with comorbidities or BMI greater than 50, several groups have advocated utilization of the adult NIH guidelines (BMI > 35 with major comorbidities or BMI > 40) for adolescents.5 The original more stringent criteria were intended to be cautionary and conservative given the potential for long-term complications. However, there are several arguments not to delay surgery in otherwise qualified patients. For example, delaying surgery can delay improvements in quality of life during the formative adolescent years. Furthermore, comorbidities such as nonalcoholic fatty liver disease appear to respond better when in the early stages of disease.7 Beta islet-cell burnout from years of chronic hyperglycemia and insulin resistance can impact the chances of full remission of diabetes following bariatric surgery.12

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**Table 1. Current Recommended Guidelines for Adolescent Bariatric Surgery (Adapted from Pratt5)**

**INDICATIONS:**

- BMI ≥ 35 with serious comorbidities (Type 2 diabetes mellitus, moderate or severe obstructive sleep apnea, pseudotumor cerebri, and severe steatohepatitis).
- BMI ≥ 40 with other comorbidities (hypertension, insulin resistance, glucose intolerance, impaired quality of life or activities of daily living, dyslipidemia, sleep apnea).

**REQUIREMENTS:**

- Tanner Stage IV/V and Skeletal maturity (if a malabsorptive procedure will be performed).
- Lifestyle changes (demonstrated commitment to diet and physical activity changes).
- Psychosocial maturity and support (evidence of mature decision-making; informed assent; evidence of appropriate social support; psychiatric clearance; demonstrated compliance with office visits to suggest commitment to post-operative follow up).
Practical Suggestions to Improve Treatment

Morbidly obese adolescents pose unique challenges with respect to medical and psychosocial care. They exist at the transition between childhood and adulthood. Often they receive care from pediatricians while manifesting chronic diseases seen in adults. Intervention often requires involvement of the family with the associated struggles required for behavior modification at home. In order to improve treatment of morbidly obese adolescent candidates for bariatric surgery, we recommend: (1) a dedicated multidisciplinary team, (2) institutional support, and (3) a close collaboration with an experienced adult bariatric team.

Addressing morbid obesity requires an experienced multidisciplinary team including a physician, dietitian, mental health specialist, and coordinator. In addition, a physical therapist and subspecialists (surgery, pulmonary, infectious disease, cardiology, gastroenterology, radiology, psychiatry, etc.) should be available for consultation. Surgeons performing weight-loss surgery should be formally trained or have an appropriate skill-set as well as the mentorship of an experienced bariatric surgeon. The multidisciplinary team should be equipped to evaluate for comorbidities frequently associated with obesity that may have been unrecognized prior to referral. Medical work up should also include an evaluation for depression and other psychological problems which should be addressed prior to consideration for surgery. A minimum 6-month behavior-based intervention is recommended prior to consideration for surgery. In most instances, the intervention should be motivational, incorporate the family, and address the home environment.

Interventions can be expensive and are often not reimbursed. Financial support can be initially obtained through grants and departmental funding. Ultimately, insurance companies and healthcare systems must be approached and their support obtained in order for these programs to remain fiscally viable.

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It is also important to secure institutional support in the form of personnel, resources, and equipment. Many freestanding children’s clinics and hospitals do not have examining tables, patient beds/toilets, operating tables and equipment, and radiology equipment (e.g., computed tomography [CT] scans) that can accommodate large patients in excess of 300 pounds. Therefore, there must be a commitment from the institution to purchase or fortify existing equipment or collaborate with other institutions to provide these resources.

Along these lines, a close collaboration with an experienced adult bariatric team is extremely helpful. An adult bariatric program can provide training, experience, and well-established pathways to improve clinical outcomes. Collaboration with adult bariatric program can also facilitate transition of adolescent patients to adult support groups and medical care. Furthermore, adult bariatric programs can provide assistance with lifelong management of nutritional deficiencies and long-term surgical complications.

Concluding Thoughts

One of the major challenges to the success of adolescent bariatric surgery will be the funding and availability of multidisciplinary programs to promote the diet, activity, and behavior changes that are critical to achieving and maintaining a healthy weight, avoiding postoperative nutritional deficiencies, and securing life-long follow-up. Centers committed to the care of morbidly obese adolescents are encouraged to conduct prospective analysis of their outcomes and long-term follow up. Along these lines, we await results from the National Institutes of Health–Teen-Longitudinal Assessment of Bariatric Surgery Outcomes (Teen-LABS; www.cincinnatichildrens.org/teen-labs), FDA trial of gastric band in adolescents, and other studies.

Author Disclosure Statement

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which includes a tertiary-care multidisciplinary clinic that offers bariatric surgery.

References