POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

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Pediatric Metabolic and Bariatric Surgery: Evidence, Barriers, and Best Practices

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abstract

Severe obesity among youth is an "epidemic within an epidemic" and portends a shortened life expectancy for today's children compared with those of their parents' generation. Severe obesity has outpaced less severe forms of childhood obesity in prevalence, and it disproportionately affects adolescents. Emerging evidence has linked severe obesity to the development and progression of multiple comorbid states, including increased cardiometabolic risk resulting in end-organ damage in adulthood. Lifestyle modification treatment has achieved moderate short-term success among young children and those with less severe forms of obesity, but no studies to date demonstrate significant and durable weight loss among youth with severe obesity. Metabolic and bariatric surgery has emerged as an important treatment for adults with severe obesity and, more recently, has been shown to be a safe and effective strategy for groups of youth with severe obesity. However, current data suggest that youth with severe obesity may not have adequate access to metabolic and bariatric surgery, especially among underserved populations. This report outlines the current evidence regarding adolescent bariatric surgery, provides recommendations for practitioners and policy makers, and serves as a companion to an accompanying technical report, "Metabolic and Bariatric Surgery for Pediatric Patients With Severe Obesity," which provides details and supporting evidence.

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This policy statement uses the term "pediatric" in reference to a person under 18 years of age. The term "adolescent" may be defined differently in various studies and clinical settings on the basis of age or developmental stage. When making specific recommendations, this policy statement uses "adolescent" to refer to a person from age 13 years to age 18 years. "Severe" obesity (class 2 obesity or higher) is defined as having a BMI ≥35 or ≥120% of the 95th percentile for age and sex.[1] Recent data from the NHANES (2014–2016) report the prevalence of severe obesity in youth at

7.9% overall, 9.7% in 12- to 15-year-olds, and 14% in 16- to 19-year-olds. These numbers represent a near doubling since 1999 and equate to 4.5 million children in the United States affected by severe obesity.[2] These children are at high risk for developing chronic and progressive diseases, including hypertension, dyslipidemia, obstructive sleep apnea, polycystic ovarian syndrome, type 2 diabetes mellitus, fatty liver disease, bone and joint dysfunction, depression, social isolation, and poor quality of life.[3–7]

Roux-en-Y gastric bypass (RYGB) is often referred to as the gold standard for surgical management of severe obesity in adults[8,9] and adolescents[7] and is performed by using minimally invasive, laparoscopic surgical techniques. RYGB results in significant weight loss as a result of its effects on appetite, satiety, and regulation of energy balance.[9]

Vertical sleeve gastrectomy (VSG) leads to weight loss through similar effects on appetite, satiety, and regulation of energy balance and may reduce appetite through delayed gastric emptying and altered neurohormonal feedback mechanisms.[10] VSG is the most common bariatric procedure performed in adults and is becoming more common among adolescents.[11,12]

Laparoscopic adjustable gastric band (LAGB), a reversible procedure that accounted for approximately one-third of all bariatric operations in the United States a decade ago,[12] has experienced a significant decline in use among adults because of limited long-term effectiveness and higher-than-expected complication rates.[13,14] Disappointing outcomes in the context of few prospective studies in the pediatric population have resulted in a similar decline in use of LAGB among adolescents.[11] At present, LAGB is limited by the US Food and Drug Administration to people 18 years or older.

EVIDENCE

Data Quality

Evidence regarding the safety and efficacy of metabolic and bariatric surgery is outlined in detail in the accompanying technical report.[15] Data are derived from observational cohort studies, case-control series, retrospective case reports, and expert opinion. The relatively low prevalence of bariatric surgery in adolescents and the practical and ethical barriers to randomization are known limitations.

Data Sources

The Teen-Longitudinal Assessment of Bariatric Surgery (Teen-LABS) study is the largest ongoing observational cohort study of youth undergoing metabolic and bariatric surgery to date. There were 242 patients (12–28 years of age) enrolled at 5 US centers (2007–2011) undergoing RYGB (n = 161), VSG (n = 67), or LAGB (n = 14).[16] Participants had a mean age of 17 years, were mostly female (75%) and white (72%), and had a mean preoperative BMI of 53 and 4 major comorbid conditions. Although the study is still ongoing, recent publications have reported outcomes at 3 years, consisting of 99% (n = 225) of participants who have undergone RYGB or VSG.[16,17] Other data sources include the Follow-up of Adolescent Bariatric Surgery at 5 Plus Years[18] (FABS-5+) study (2001–2007), the Adolescent Morbid Obesity Surgery Study[19,20] (AMOS) (2006–2009), and the Bariatric Outcomes Longitudinal Database[21] (2004–2010). Several smaller cohort studies provide additional data.[22–24] The companion technical report further details the strengths and limitations of these studies.

Outcomes on Weight Loss and Comorbidity Resolution

Until recently, weight-loss studies have reported weight loss in different ways, making comparison between interventions challenging. In the Teen-LABS cohort, RYGB and VSG groups experienced a mean weight reduction of 27% and resolution of comorbidities at 3 years, including type 2 diabetes mellitus (95%), hypertension (74%), and dyslipidemia (66%), with an accompanying reduction overall in the prevalence of multiple concurrent cardiovascular disease risk factors (ie, 3 or more).[17] Surgical treatment is more effective than medical therapy among adolescents with severe obesity for treatment of type 2 diabetes mellitus,[25] and weight-related quality of life has also been shown to improve significantly.[16] The FABS-5+ study represents the longest-term follow-up data in adolescents to date (5–12 years; mean of 8 years) with 78% subject retention (n = 58 of 74). After RYGB, adolescents demonstrated a 29% reduction in BMI and significant improvements in elevated blood pressure, dyslipidemia, and type 2 diabetes mellitus at 8 years.[18] Results from the AMOS cohort of adolescents undergoing RYGB demonstrated a mean weight loss of 36.8 kg at 5 years. By contrast, adolescents enrolled in lifestyle modification demonstrated a mean increase in BMI of 3.3.[19,20] A 2017 meta-analysis of 24 studies reviewed outcomes for 1928 adolescent patients who received LAGB, VSG, and RYGB. In this analysis, the mean absolute BMI decrease at 6 months was 5.4% in patients who underwent LAGB, 11.5% in patients who underwent VSG, and 18% in patients who underwent RYGB. At 36 months, significant weight loss was maintained with a mean BMI reduction of 10.3% in patients who underwent LAGB, 13% in patients who underwent VSG, and 15% in patients who underwent RYGB.[26,27] More recently, an analysis of electronic health record data compared the effectiveness of bariatric procedures among pediatric patients and demonstrated a similar BMI reduction among patients who received VSG or RYGB, and a lower BMI reduction in patients who received LAGB.[28]

Complications

Surgical complications are infrequent, with the majority being defined as minor (15%) and occurring in the early postoperative period (eg, postoperative nausea and dehydration).[11,16,27] Major perioperative complications (30 days) were reported in 8% of Teen-LABS participants. In addition, 2.7% required reoperation before hospital discharge, which was similar to adults.[29] Micronutrient deficiencies are common after both RYGB (iron 66%, vitamin B_{12} 8%, and folate 6%) and VSG (iron 32% and folate 10%).[16] Vitamin D deficiency is common preoperatively among teenagers with obesity and does not change significantly after surgery.[16] Folate deficiency is a concern for females of childbearing age.[16] Long-term implications of nutrient deficiency are unknown because most longitudinal studies of pediatric metabolic and bariatric surgery do not manage patients through subsequent pregnancy to assess for related complications.[27] Among adolescents who are more severely affected by anxiety or depression at baseline, limited data suggest that they may have a higher risk for postoperative anxiety and depression.[30] Although no perioperative deaths were reported in the Teen-LABS, AMOS, or FABS-5+ cohorts, 3 deaths (0.3%) occurred—at 9 months (related to infectious colitis),[18] 3.3 years (related to hypoglycemic complications in an individual with type 1 diabetes),[16] and 6 years (unrelated), respectively, collectively representing a recently reported 0.3% mortality rate.[27]

Indications

Published adult indications for bariatric surgery,[31] longitudinal data in adolescents, and the American Society for Metabolic and Bariatric Surgery best practice recommendations[32] all contribute to 16 existing sets of recommendations for bariatric surgery in pediatric patients.[33] Key considerations include BMI, comorbid health conditions, and quality of life. As metabolic and bariatric surgery have become more widespread, outcomes have supported indications for bariatric surgery that more closely mirror adult recommendations.[24,33] Best practice guidelines (Table 1), as developed in 2018 by the American Society for Metabolic and Bariatric Surgery, recommend that bariatric surgery be considered for youth with BMI ≥35 with concurrent severe comorbid disease or for those with BMI ≥40 kg/m^2 (where comorbid disease is commonly encountered but not mandatory).[32,34] Generally accepted contraindications include a medically correctable cause of obesity, untreated or poorly controlled substance abuse, concurrent or planned pregnancy, current eating disorder, or inability to adhere to postoperative recommendations and mandatory lifestyle changes. Gaps in recommendations include a thorough discussion of patient and/or family goals and expectations; procedural preferences; detailed recommendations for perioperative care, particularly in females of childbearing age; and defined expectations and optimal timing for transition of long-term care to adult medical and/or surgical obesity care providers.[33] The presence of a disability is a relevant factor but is not an automatic contraindication, and each case warrants additional consideration.[35]

Eligibility

Determination of eligibility for bariatric surgery involves a thoughtful, shared decision-making process between the patient, parent(s) or guardian(s), and medical and surgical providers. In addition to BMI and comorbidity status, criteria include physiologic, psychological, and developmental maturity; the ability to understand risks and benefits and adhere to lifestyle modifications; decision-making capacity; and robust family and social supports leading up to and after surgery. Current longitudinal studies evaluating safety and efficacy endpoints do not apply specific age limits for the timing of surgery; thus, there is no evidence to support the application of age-based eligibility limits.[11,20]

BARRIERS

Access

Although nearly 4.5 million US adolescents have severe obesity, current estimates suggest that only a small faction undergo metabolic and bariatric surgery.[12,17,18,20,36,37] Recent estimates show a tripling of procedural prevalence in the early 2000s (0.8–2.3 per 100 000 between 2000 and 2003) with current estimates of between 1000 and 1600 cases each year.[1,38,39] Although limitations to access are

TABLE 1 Indications and Contraindications for Adolescent Metabolic and Bariatric Surgery

Wt Criteria	Comorbid Conditions
Class 2 obesity, BMI ≥35, or 120% of the 95th percentile for age and sex, whichever is lower	Clinically significant disease, including obstructive sleep apnea (AHI >5), T2DM, IIH, NASH, Blount disease, SCFE, GERD, and hypertension
Class 3 obesity, BMI ≥40, or 140% of the 95th percentile for age and sex, whichever is lower	Not required but commonly present

AHI, Apnea-Hypopnea Index; GERD, gastroesophageal reflux disease; IIH, idiopathic intracranial hypertension; NASH, non-alcoholic steatohepatitis; SCFE, slipped capital femoral epiphysis; T2DM, type 2 diabetes mellitus.

multifactorial, race and socioeconomic status have emerged as striking disparities in insurance authorization for metabolic and bariatric surgery.[40] A recent review from the Teen-LABS research consortium reports that less than half (47%) of qualifying surgical candidates received insurance coverage after an initial request for authorization. Age under 18 years was cited as the most common reason for coverage denial. In contrast, 85% of adults who met surgical criteria obtained initial insurance coverage authorization. Eleven percent of adolescents never obtained authorization despite multiple appeals.[40] Children and adolescents from racial minority groups are more likely to experience severe obesity[1,41] and related comorbid health conditions.[5] Recent data show that outcomes after adolescent bariatric surgery do not differ by race or ethnicity[21]; however, adolescents of minority groups are less likely to undergo a bariatric surgery.[42] This disparity appears most related to socioeconomic status as opposed to racial or ethnic status.[43–46] This disparity may be explained in part by inconsistent eligibility criteria for related coverage among various government-sponsored insurance programs even in the instance of medical necessity. Medical necessity is defined as "health care interventions that are evidence-based, evidence-informed, or based on consensus advisory opinion…to promote optimal growth and development in a child and to…diagnose, treat, ameliorate or palliate the effects of physical conditions."[47]

Provider Concerns

National survey data suggest that providers are reluctant to refer pediatric patients with obesity for bariatric surgery. Concerns include a lack of knowledge about the biology of obesity, surgical procedures, risks, and follow-up; a lack of awareness of surgery as an option[48]; concern for altered growth or development; and provider weight bias manifested as a belief that weight is a personal responsibility rather than a medical problem.[49,50] Existing evidence suggests that bariatric surgery does not lead to growth impairment, and among older adolescents, several studies have demonstrated that linear growth continues after surgery.[18,20,21] Recent data from a single site outside the United States routinely performing RYGB and VSG for patients with a mean age of 11.5 years have shown no adverse impact on linear growth when compared with age-matched peers receiving medical management for obesity,[51,52] although more evidence is needed to confirm this finding.

Lifestyle Counseling

Many providers prefer a "watchful waiting" approach, or long-term lifestyle management.[50] However, current evidence suggests that pediatric patients with severe obesity are unlikely to achieve a clinically significant and sustained weight reduction in lifestyle-based weight management programs[53] and that watchful waiting may lead to higher BMI and more comorbid conditions.[54–58] This concern is illustrated in a recent comparison of adolescents initially participating in a comprehensive lifestyle program before surgery (ie, delayed surgical treatment group) that showed higher starting BMI at the time of surgery when compared with adolescents who did not participate in the lifestyle program (ie, nondelayed surgical treatment group).[20] In addition, comparative data examining postoperative outcomes along the severely obese BMI spectrum (low, middle, and high) suggest that adolescents within a lower BMI range (BMI <55) at the time of bariatric surgery have a higher probability of achieving nonobese status when compared with individuals with a higher starting BMI (BMI ≥ 55).[59]

Cost-effectiveness

Bariatric surgery is more costly in the short-term than other treatment options, although this varies by the number and type of comorbidities.[60] However, long-term bariatric surgery cost-effectiveness data related to the pediatric population are limited but include several studies that suggest that surgery may become cost-effective around 5 years postoperation.[60–62] Despite economic assertions related to the use of bariatric surgery in the pediatric population, ongoing efforts to prevent obesity at the population level, including robust public health strategies, should continue to be improved and widely disseminated.[61]

BEST PRACTICES

Multidisciplinary Care

The evidence for safe and efficacious metabolic and bariatric surgery in pediatric patients is based on comprehensive care in multidisciplinary clinics involving pediatric experts on obesity, adolescent medicine, mental health, nutrition, and exercise science in addition to surgeons. The multidisciplinary care model maximizes pediatric and adolescent-specific health care resources designed to deliver optimal care.[60] These comprehensive programs follow a set of principles or best practices for pediatric metabolic and bariatric surgery. The American Society for Metabolic and Bariatric Surgery,[61] the American Heart Association,[7] and several other medical society- and institution-issued guidelines support the multidisciplinary model.[61] Although national accreditation for adolescent metabolic and bariatric surgery is recent (2014), the Metabolic and Bariatric Surgery Association Quality Improvement Program provides a resource for primary care providers to locate high-quality comprehensive adult bariatric programs with additional accreditation and pediatric-specific programs.

Adolescent-Oriented Care

Although, as described, no data exist to define an age limitation for weight-loss surgery in youth, the majority of those who undergo surgery are adolescents. The unique developmental, physiologic, and emotional needs of adolescents with respect to selection of appropriate patients for surgery, the optimal timing of surgery, and long-term follow-up are distinct from those same needs in adults. In particular, adolescent girls are more likely than adolescent boys to undergo bariatric surgery.[16,20,21,27] Some studies have noted increased pregnancy rates in adolescents after metabolic and bariatric surgery[62] and a higher risk of small-for-gestational-age births among mothers who have previously had metabolic and bariatric surgery.[63] As with other aspects of adolescent health, the provider should appropriately engage the adolescent in the decision-making process out of respect for his or her developing autonomy and ensure that the teenager has appropriate expectations for surgical outcomes. Consultation with an ethics professional may be warranted in challenging situations.

Values and Preferences

Eligibility for metabolic and bariatric surgery should be determined through a thoughtful process that considers the values of the patient and family and preference for the type of bariatric surgical procedure. These decisions may only occur after a thorough review of the effect of obesity on the adolescent's physical and emotional health and an understanding of the risks, benefits, and long-term implications of each procedure type. The relationship among the physician, patient, family, and surgical team is paramount to success. Preparing an adolescent patient for metabolic and bariatric surgery begins with a realistic discussion of these values and preferences, available treatment options, likely anticipated outcomes for weight loss, improvement in comorbid conditions, and a realistic understanding about the lifetime need for healthy lifestyle changes. Effective communication strategies, such as the teach-back method, should be used to ensure clear understanding of risks and benefits. It is important to establish the expectation for long-term psychological follow-up with patients and families early in the process.

PRACTICE-LEVEL RECOMMENDATIONS

The AAP recommends that pediatricians do the following.

1. Recognize that severe obesity (BMI ≥35 or ≥120% of the 95th percentile for age and sex, whichever is lower) places the adolescent at higher risk for liver disease, type 2 diabetes mellitus, dyslipidemias, sleep apnea, orthopedic complications, and mental health conditions even when compared with milder degrees of obesity.
2. Seek high-quality multidisciplinary centers that are experienced in assessing risks and benefits of various treatments for youth with severe obesity, including bariatric surgery, and provide referrals to where such programs are available.
3. Understand the efficacy, risks, benefits, and long-term health implications of the common metabolic and bariatric surgery procedures so that pediatricians can effectively help in family medical decision-making concerning surgical options to manage severe obesity.
4. Identify pediatric patients with severe obesity who meet criteria for surgery (Table 1), and provide timely referrals to comprehensive, multidisciplinary, pediatric-focused metabolic and bariatric surgery programs.
5. Coordinate pre- and postoperative care with the patient, family, and multidisciplinary, anesthesia, and surgical teams.
6. Monitor patients postoperatively for micronutrient deficiencies and consider providing iron, folate, and vitamin B_{12} supplementation as needed.
7. Monitor patients postoperatively for risk-taking behavior and mental health problems.

SYSTEM-LEVEL RECOMMENDATIONS

The AAP recommends that pediatricians do the following.

1. Advocate for increased access for pediatric patients of all racial, ethnic, and socioeconomic backgrounds to multidisciplinary programs that provide high-quality pediatric metabolic and bariatric surgery.

The AAP recommends that government, health, and academic medical centers do the following.

1. Use best practice guidelines outlined in this policy statement to support safe and effective multidisciplinary, pediatric-focused metabolic and bariatric surgery programs. This guidance is considered best practice because it is based on consensus expert opinion after reviewing numerous practices in various settings.
2. Consider best practice guidelines, including avoidance of unsubstantiated lower age limits, in the context of potential health care benefits and individualized patient-centered care.
3. Increase the number of and access to multidisciplinary, pediatric-focused metabolic and bariatric surgery centers, ensuring equal access to adolescents who meet criteria regardless of income, race, or ethnicity.

The AAP recommends that public and private insurers do the following.

1. Provide payment for multidisciplinary preoperative care to ensure appropriate selection of surgical candidates and for multidisciplinary postoperative care and required medications and supplements to improve surgical outcomes.
2. Provide payment for bariatric surgery from evaluation through follow-up and ongoing care for pediatric patients who meet standard criteria as set forth here.
3. Reduce barriers to pediatric metabolic and bariatric surgery (including inadequate payment, limited access, unsubstantiated exclusion criteria, and bureaucratic delays in approval requiring unnecessary and often numerous appeals) for patients who meet careful selection criteria.

CONTRAINDICATIONS

The following are contraindications:

- a medically correctable cause of obesity;
- an ongoing substance abuse problem (within the preceding 1 year);
- a medical, psychiatric, psychosocial, or cognitive condition that prevents adherence to postoperative dietary and medication regimens; and
- current or planned pregnancy within 12 to 18 months of the procedure.

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ABBREVIATIONS

AMOS: Adolescent Morbid Obesity Surgery Study
FABS-5+: Follow-up of Adolescent Bariatric Surgery at 5 Plus Years
LAGB: laparoscopic adjustable gastricband
RYGB: Roux-en-Y gastric bypass
Teen-LABS: Teen-Longitudinal Assessment of Bariatric Surgery
VSG: vertical sleeve gastrectomy

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