Bariatric Surgery Needs a Seat at the Children's Table: Bridging the Perception and Reality of the Role of Bariatric Surgery in the Treatment of Obesity in Adolescents

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ABSTRACT

The long-term morbidity of obesity in adolescents is well recognized nationally and represents a major health concern for the population of the near future. Traditional medical management of obesity focuses on addressing behavioral modification, dietary and exercise programs, and, to a lesser degree, pharmaceuticals. Although these strategies are relatively effective, they suffer from the lack of sustained benefit, a high relapse rate, and, in case of pharmacotherapy, potentially dangerous adverse effects. Bariatric surgery in adolescents has often been characterized as a risky intervention with unknown long-term benefits. However, recent data establish that a sustained, clinically meaningful effect on weight loss, as well as a reduction in chronic morbidities related to obesity, can be achieved. The role of bariatric surgery as an accepted adjunctive strategy in the treatment of obesity in adolescents is becoming more recognized; however, a number of barriers exist that prevent the timely evaluation of adolescents with obesity for potential surgical intervention. We examine these barriers in light of recent advancements to help better define the role of bariatric surgery in the treatment of obesity in adolescent population. (*Clin Ther*. 2018;40:1648–1654)

Key words: adolescent, pediatric, obesity, bariatric surgery, weight loss surgery, sleeve gastrectomy.

INTRODUCTION

The public health and personal burden of obesity in the adolescent population is no longer a subject of debate and has been the focus of extensive investigation. The role of surgery in the treatment of obesity in adolescents has received a lot of attention but has yet to be universally accepted. Discussion on the safety profile and long-term utility of surgical intervention at such a young age creates some uncertainty on the part of the referring practitioners. However, with the obesity epidemic in full force and strong opinions on either side, it is worth revisiting the role of adolescent bariatric surgery in the light of recent evidence.

The overall prevalence of childhood obesity, defined as a body mass index (BMI) >95th percentile for age and sex, is near 18% nationally.[1,2] The prevalence has increased in the last 30 years but, despite preventive efforts, has not decreased in the past decade in industrialized countries. Alarmingly, extreme obesity (BMI >99.5%) has continued to grow and is now up to 6% nationally.[1,2] Improved understanding of the physiologic processes underlying obesity has led to its recognition as a disease rather than an exclusively psychological or social problem. Behavioral, diet modification, and exercise-based programs have sprung up throughout the nation, backed by literature that supports their effectiveness. These programs are meant to create a stigma-free environment for the initial steps toward weight loss. A stepwise approach, recommended by the American Academy of Pediatrics, involves screening by the primary care practitioner and transition to a multidisciplinary and specialty weight loss team.[3,4] The team approach provides structure and tools to develop skills for self-monitoring and self-control.[4–6] However, despite evidence of proven individual effectiveness, the Achilles' heel of behavioral intervention is its dependence on compliance. High attrition rates in such programs are well documented, indicating their decreased efficacy on a broad population scale.[7–9] Pharmaceutical solutions for weight loss

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in adults have a long and tumultuous history; thus, their application in the adolescent population has been cautious and has met with mixed success. Currently, a small number of pharmaceutical weight loss agents are approved for use in adolescents. The effective use of approved agents, such as orlistat and metformin, is further hampered by their relatively modest effect and often debilitating adverse effects.[10–13] Newer agents designed to target gastrointestinal hormones, gut microbiome, and epigenetic modification have a high potential risk of gastrointestinal, neurologic, cognitive, and other systemic adverse effects.[4,14–16] Additional studies will be necessary to better understand the utility of these medications in the treatment of obesity in adolescents.

The evolving application of bariatric surgery in adults has begun to extend into the pediatric population, adding another potential dimension to the treatment algorithm. However, given its irreversible and invasive nature, a number of concerns pertaining to effectiveness, tolerability, and ethics arise whenever pediatric bariatric surgery is considered. These concerns are well justified and should be thoughtfully addressed using evidence-based data whenever possible. However, although the adult experience has several decades of published results, adolescent bariatric surgery is only now beginning to generate meaningful long-term outcome data.

Meanwhile, an increasing recognition of the long-term effects of obesity in children in conjunction with the limited clinical efficacy of programs that involve only nonsurgical therapies are indicators of the insufficiency of such programs and the high rates of recidivism.[17–23] From this experience, the concept of bariatric surgery as an adjunctive therapy to improve overall treatment efficacy has evolved.[2,4,24] Generations of obese teenagers are growing to adulthood with, what appear to be, largely intractable significant health problems, such as type 2 diabetes and cardiovascular disease, as well as reduced life expectancy.[25,26] This emphasizes the need to use surgical intervention earlier in life.

General perceptions regarding pediatric bariatric surgery are evolving. In a 2007 survey, 48% of pediatricians and family practitioners, regardless of their specialty, board certification, sex, or years since medical school, indicated that they would never refer an obese adolescent for bariatric surgery. The minimum acceptable age for referral was considered to be approximately 18 years old, with a great variability of the perceived minimum BMI and BMI percentiles. Not surprisingly, most primary care physicians surveyed endorsed a weight loss program, but the expected duration to achieve a desired effect ranged from 6 months to 2 years.[27] More recently, Vanguri et al[28] reexamined the issue of practice and perception regarding bariatric surgery in adolescents. The authors found a more encouraging trend, with only 15% of practitioners claiming that they would not refer patients of any age to bariatric surgery but only 9% responding that they ever did so in practice. Alarmingly, despite the recommendations in the expert literature, including those from the American Academy of Pediatrics, that weight loss surgery should be a part of a stepwise approach to obesity in adolescents, 27% of respondents were initially unaware of that option for their patients.[28] However, the authors further note that practitioners with fewer years of experience in practice are more likely to consider bariatric surgery a part of the antiobesity armamentarium, suggesting a potential shift in opinion and greater exposure to the concept of bariatric surgery during training.

DISCUSSION

Reluctance to subject teenagers to surgery with potential life-long alterations in anatomy and lifestyle is understandable in the case of a chronic condition, such as obesity. Indeed, some practitioners feel that without a cataclysmic event to precipitate the need for surgery, such as ruptured appendix or intestinal volvulus, medical solutions may appear more acceptable. However, as previously mentioned, data suggest that early-onset obesity-related morbidity becomes more intractable and sustained after the teenage years. For instance, type 2 diabetes appears to be more resistant to current medical therapies when it is diagnosed in adolescents. These patients progress more rapidly to insulin therapy by comparison to obese adults.[29] Furthermore, the efficacy of bariatric surgery appears to be reduced when initiated later in life, as reflected by a reduction in weight loss and beneficial effect on diabetes in this circumstance.[30–32] Thus, failing to consider bariatric surgery in adolescent years as an adjunctive option in concert with continued best medical therapy may constitute denial of an effective and indicated treatment. Although this trend is not expected to change rapidly, it is worth reexamining and addressing the reservations

that the practitioners have about bariatric surgery. We chose to focus on the most common areas of concern among pediatric practitioners: surgical complications, lack of long-term data, and difficulty navigating the ethics of life-altering surgery in a minor.[27,28,33,34]

Complications and Mortality

Unfortunately, any surgery is expected to have a measurable rate of complications and even mortality. The literature on adult patients documents a significant improvement in the safety profile of bariatric surgery. Overall, <6 deaths after bariatric surgery in adolescents have been reported in the literature, with none being a direct complication of the procedure itself.[35–37] Major complications, such as anastomotic or staple line dehiscence in Roux-en-Y gastric bypass (2%–5%) and laparoscopic sleeve gastrectomy (0%–20%), remain a concern but have to be weighed against the risks of avoiding surgery. Nevertheless, most patients do not experience any complications and derive benefits from surgery. The Teen-Longitudinal Assessment of Bariatric Surgery study reports a 30-day complication rate of 8% and a 3-year reoperation rate of 13%.[32,35,38] Importantly, these studies address the outcomes of Roux-en-Y gastric bypass, whereas sleeve gastrectomy data are only beginning to emerge. Despite recent evidence of the need for postoperative vitamin supplementation, sleeve gastrectomy is commonly considered to be primarily a restrictive procedure and may be particularly useful in adolescents.[39–41] McGuire at al[42] recently reported an experience with 59 adolescents with median BMIs >50 kg/m^2 undergoing sleeve gastrectomies. The authors document no intraoperative complications and one case of postoperative pancreatitis.[42] Alqahtani et al[43] published data on 108 patients aged 5 to 21 years undergoing sleeve gastrectomy. They report no major complications and a 4.3% rate of minor complications, including reflux and wound infections.[43] More recently, the data from accredited bariatric centers report the 30-day risk of complications to be <2%. Uneventful recovery was noted in in 93% of adolescents and was >2 times more likely after a sleeve gastrectomy then Roux-en-Y gastric bypass after adjusting for risk factors.[44] This finding is especially relevant because of a notable shift in adult and adolescent bariatric surgery away from Roux-en-Y gastric bypass toward sleeve gastrectomy.

As noted above, the morbidity of refractory obesity is substantial, even in the teenage years. Literature on lifestyle modification and pharmaceutical interventions has identified adverse reactions in 3% to 44% of the patients.[45,46] These interventions have resulted in additional hospital admissions and progression of psychiatric defects. Poorly controlled obesity in adolescents carries substantial morbidity and long-term health implications.[25,47] In fact, earlier intervention is preferable because the increase in cardiovascular risk appears to be attenuated in those who can achieve successful weight loss before reaching adulthood.[48] Thus, the benefit of earlier bariatric surgery, especially in the case of sleeve gastrectomy, may outweigh the risk of potential perioperative morbidity.

Long-term Effects

The durability of the effect of intervention in obese adolescents is a critical concern. In fact, the lack of a sustained effect is one of the primary weaknesses in the lifestyle modification strategy.[7,14] The paucity of long-term data has been an important barrier to evaluating the role of bariatric surgery in adolescents. However, with methodic and thoughtful efforts, meaningful experience is beginning to emerge. The long-awaited longitudinal results of the Follow-up of Adolescent Bariatric Surgery at 5 Plus Years study have recently been published and elucidated the therapeutic effect in adolescents 5 to 12 years after the Roux-en-Y gastric bypass. The authors report a significant and sustained reduction in BMI (16.9 kg/m^2), incidence of hypertension, and diabetes. These findings corroborate and strengthen the shorter follow-up reports of similar findings.[35,45,49] Importantly, it was observed that most study participants remained obese despite significant weight loss. The authors attributed this to the so-called floor effect of bariatric surgery, which occurred because of the excessively high initial BMIs (mean, 58.5 kg/m^2). This finding is significant because it further supports an idea that an earlier intervention will likely have a greater beneficial effect on weight and relevant metabolic factors. It can be surmised that the intervention at lower thresholds for surgery may be even more effective. This notion has been previously proposed: Michalsky et al[49] examined the changes in cardiovascular disease risk factors, such as dyslipidemia and elevated blood pressure, after a 3-year follow-up from bariatric surgery. Their findings revealed a decreased ability to normalize cardiovascular risk factors in adolescent patients who received bariatric surgery at higher BMIs. Such findings further reinforce the

practice of consideration of bariatric surgery in adolescents with BMIs >40 and >35 kg/m^2 with certain comorbidities, such as type 2 diabetes and obstructive sleep apnea. Sleeve gastrectomy, which is gaining popularity and clinical experience, may be even more suited for adolescents by providing the needed effect to younger patients without exposing patients to significant metabolic risks associated with Roux-en-Y gastric bypass. Recently, Khidir et al[30] found in a 5-year follow-up study that, compared with adults, adolescents undergoing sleeve gastrectomy were able to achieve higher weight loss and sustained remission of diabetes. The publication of these long-term findings, together with what we learned from the adult literature, should help assuage any concerns about the sustained effect of bariatric surgery in adolescents.

Ethical Concern About the Adolescents' Ability to Consent to a Life-altering Procedure

The specific ethical concerns surrounding bariatric surgery in adolescents require careful consideration. Caniano[50] outlined several important issues facing adolescents, their families, and their health care practitioners with regard to their role in the decision-making process. Her discussion helps navigate specific challenges of this procedure in a young patient.[50] The issues of informed consent and assent may be particularly sensitive in adolescent population, especially in cases of discordant points of view between patients and their parents.[51] Indeed, neither intellectual nor emotional maturity is binary and exists across a range of issues.[52,53] Although there is no gold standard to measure maturity with complete objectivity, attempts to design and validate instruments to assist in this endeavor have been made. Treatment decision-making capacity assessment using the MacArthur Competence Assessment Tool for Treatment (MacCAT-T) in children and adolescents has been recently assessed. Application of MacCAT-T, which incorporates understanding, appreciating, reasoning, and expressing a choice individually, revealed that nearly 50% of the 11- to 18-year-olds scored in the higher range of reasoning. In fact, all patients had at least some degree of capacity to understand and retain diagnostic and treatment information.[54] Alderson[52] further noted that "children's competence and autonomy mainly develop through direct social personal experience and not through age and physical growth. Some of the youngest children can be among the most informed and confident." Specific experiences with chronic illness appear to increase the understanding of the disease and potentially enable minors to exhibit competence in medical decision making.[52] An argument can be made that earlier exposure to the prospect of bariatric surgery in the future may be beneficial. If presented as an option in a context of a chronic condition, such as obesity, the understanding of long-term effects and potential risks and benefits of the operation may be better examined. Doyle et al[55] explored how adolescents make decisions regarding bariatric surgery and found that indirect experiences through social exposure increased familiarity with the operation and made it less alien to them. These experiences assisted with alleviating the feeling of uncertainty and attributed more meaning to specific outcomes.[55] Weight loss programs that routinely use social and psychiatric evaluation in addition to weight loss specialists can help address the developmental variability and identify the patients who are fit to undergo surgery. Similarly, earlier surgical consultation would help them and their families understand and make personally and medically acceptable decisions about surgery. Thus, ethically appropriate treatment of adolescents struggling with obesity should not shield them from difficult decisions but instead provide adequate time, social exposure, and ample opportunity for open dialogue.

CONCLUSION

Increased awareness of obesity in adolescents and its long-term effects has led to its incorporation in national and government-driven health care targets, such as *Healthy People 2020* and American Academy of Pediatrics Treatment Recommendations.[3,56] Recognizing specific treatment challenges in adolescents with obesity has resulted in the development of guidelines incorporating a wide variety of prevention and treatment strategies. Bariatric surgery is specifically included as an adjunct when nonoperative strategies in severe cases have failed. In recent years, the emerging long-term data on its effectiveness, rapid transition to less morbid sleeve gastrectomy, and the increasing appreciation of the significant health burden of obesity in adolescents are making bariatric surgery an ever more useful option in the treatment of obesity in adolescents.

However, the success of surgery heavily depends on the physical, emotional, and psychological fitness of

patients. These factors enable them to comply with the lifestyle modifications and restrictions necessary for sustained healthy weight loss. Indeed, early consideration of bariatric surgery as an important adjunct to the best medical and lifestyle therapy in the weight loss process allows the patients, families, and practitioners the time and opportunity to become familiar with the idea of a surgical intervention. With an increasing understanding that earlier surgical care may provide an improved long-term clinical outcome, it makes sense to incorporate the conversation about bariatric surgery into even the initial stages of the weight loss process.

Future research and long-term follow-up will undoubtedly bring about a more complete understanding of the effects of bariatric surgery in the adolescent population. However, on the basis of the available evidence and severity of the problem, the time to act is now. Early conversation about bariatric surgery with adolescents struggling with obesity will create a healthy environment for careful and thoughtful patient selection and remove the emotional barriers that cloud sound medical judgment.

CONFLICTS OF INTEREST

The authors have indicated that they have no conflicts of interest regarding the content of this article.

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