Laparoscopic adjustable gastric banding in adolescent: safety and efficacy

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Abstract
Background: Obesity prevalence is rapidly increasing among children and adolescents worldwide. It is considered one of the most alarming public health issues facing the world today. The adult experience has demonstrated that surgery is the only effective means of achieving persistent weight loss in obese patients. However, little is known about bariatric surgery in children and adolescents. The aim of this study is to evaluate the safety and efficacy of laparoscopic adjustable gastric banding (LAGB) in this group of patients.

Methods: A retrospective review included all children and adolescents who underwent LAGB from January 2003 to December 2005.

Results: Fifty-one patients underwent LAGB. The mean age was 16.8 years (range, 9-19), and the mean body mass index was 49.9 kg/m² (range, 38-63). Mean excess weight loss was 42% at 6 months and 60% at 1 year follow-up. The most prevalent comorbidities were obstructive sleep apnea, limited physical activities, hypertension, and diabetes mellitus. Band adjustments were performed under fluoroscopic guidance in 5 patients and direct access as a clinic procedure in the remaining. One patient required port repositioning under fluoroscopic guidance. The mean follow-up was 16 months (range, 3-34). There was no mortality or significant postoperative complications.

Conclusion: The absence of significant nutritional deficiency, the continued adjustability, and potential reversibility of LAGB make it the safest, least invasive, and most effective bariatric surgery that can be offered to the young and adolescent population.

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Obesity prevalence is rapidly increasing among children and adolescents worldwide. It is considered one of the most alarming public health issues facing the world today [1-4]. Although believed in the past to be less frequently associated with increased morbidity than in adults, obesity in children is now recognized to be associated with insulin resistance, hypertension, hyperlipemia, hepatic steatosis, sleep apnea, and orthopedic complications [5-8]. The physical and social effects of severe obesity in young people are devastating [9]. The greatest concern and potential public health effects are that obesity during the pediatric age is a strong predictor of obesity in adulthood [10-13]. Studies show that 50% to 77% of children and adolescents who are obese carry their obesity into adulthood, thus increasing their risks of developing serious and often life-threatening conditions. The risk increases to 80% if one of the parents is also obese [10,14].
The adult experience has demonstrated that surgery is the only effective means of achieving persistent weight loss in obese patients. However, little is known about bariatric surgery in children and adolescents. The aim of this study is to evaluate the safety and efficacy of laparoscopic adjustable gastric banding (LAGB) in this group of patients.

1. Materials and methods

A retrospective review included all children and adolescents who underwent LAGB in our institution from January 2003 to December 2005. Our criteria to consider patients for surgery met adult criteria set by the National Institutes of Health for surgical correction of morbid obesity [15], which include body mass index (BMI) of 40 kg/m² with or without comorbidities or 35 kg/m² with comorbidities, supportive family environment, failure to obtain weight loss for at least 6 months with conservative medical treatment, and willingness and motivation by the patients and their families to undergo surgery and to follow postoperative instructions. All patients were assessed by a multidisciplinary team consisting of a pediatrician, a dietician, a health educator, and a surgeon. Preoperative laboratory screening includes a chemistry profile, a lipid profile, a complete blood count, fasting blood glucose, glucose tolerance tests, an insulin level, a urinalysis, and a thyroid function test. The preliminary evaluation may suggest the need for consultation by a cardiologist, a pulmonologist, or an endocrinologist. Echocardiogram and sleep studies or lung function tests were requested if clinically indicated. Patients along with their families were counseled in 3 consecutive weekly sessions regarding the surgical technique, the benefits, and the risks of the procedure in addition to their obligation toward postoperative guidelines and lifestyle changes.

A 10- or 11-cm Lap-Band (Bioenterics, USA) was placed laparoscopically to create a 15-mL proximal pouch using the pars flaccida technique in all patients. Postoperatively, patients were observed for 24 hours before discharge after a dietician visit. Those patients with sleep apnea were admitted to the intensive care unit for overnight observation. Preoperatively, subcutaneous heparin and intravenous cefuroxime were prescribed.

All patients were discharged home on a liquid diet that was advanced to solid food during the ensuing 4- to 6-week period. The first follow-up visit was 2 weeks after discharge. The first Lap-Band adjustment was performed at least 6 weeks postoperatively, when the patient had ceased losing weight. All adjustments, except in 5 patients, were done in the clinic without fluoroscopic guidance. The patients were given water to drink using straws while adjusting to assess the adequacy of the adjustment. Adjustments were performed as often as necessary based on patient weight loss and symptoms. The injected volume during the first adjustment was 1 to 2 mL. Any further adjustment was performed as required based on weight loss with maximum of 0.5 mL normal saline each time.

2. Results

Fifty-one patients underwent LAGB (27 females and 24 males). Mean age was 16.8 years (range, 9-19), and mean preoperative BMI was 49.9 kg/m² (range, 38-63). The most prevalent comorbidities were metabolic syndromes (obesity, dyslipidemia, hypertension, insulin resistance) in 15 patients, obstructive sleep apnea in 10 patients, significant limitation in daily physical activities in 37 patients, arthropathies in 7 patients, hypertension in 6 patients, and type 2 diabetes mellitus in 7 patients. The average operative time was 70 minutes (range, 40-110). All patients were fully ambulating the night of surgery and were discharged the next day. Mean excess weight loss (EWL) was 42% (range, 15-63) at 6 months, 60% (range, 27-80) at 1 year, and 67% (range, 26-100) with more than 18 months of follow-up. Band adjustments were performed under fluoroscopic guidance in 5 patients and direct access as a clinic procedure in the remaining. One patient required port repositioning under fluoroscopic guidance, and one patient required readmission and rehydration because of an overly tight adjustment. Nine patients complained of repeated attacks of vomiting especially when eating fast or eating foods that are supposed to be avoided during the early postoperative period. The mean follow-up was 16 months (range, 3-34). There was no mortality or other postoperative complications. Late complications of band erosion, pouch prolapse, pouch dilatation, or significant port problems were not seen. Patients with diabetes and hypertension were cured of their disease, and other comorbidities improved or resolved with discontinuation of their therapy. All the adolescents reported an improvement in overall well-being and were happier with their achievement.

3. Discussion

One of the most alarming developments in pediatrics in the past 2 decades has been the emergence of a new chronic disease: obesity in childhood and adolescence. The prevalence of obesity and excessive weight among children and adolescents has tripled since the 1960s [2,16-18]. Twenty to thirty percent of all children aged 2 to 19 are overweight [17]. Obesity is associated with significant health problems in the pediatric age group and is an important early risk factor for adult morbidity and mortality [7-11]. A dose-response relationship between BMI during young adulthood and the risk of death has been demonstrated, with extreme obesity resulting in a reduction of 20, 13, 5, and 8 years of life expectancy for black men, white men, white women, and black women, respectively [19]. Importantly, the loss of 5% to 10% of body weight results in a significant improvement in risk and comorbidity [20].
The medical community is struggling to develop effective strategies for the treatment of this epidemic. Effective treatment is essential to aid both weight reduction and to reduce the impact of comorbid health and psychosocial problems. It has been shown that the conservative treatment of obesity is ineffective and associated with high attrition rates. Indeed, up to 90% of people will return to their original weight within 2 years of stopping treatment [21,22]. Resorting to surgery to change the metabolism of a growing child is a profoundly new concept, but adolescents with morbid obesity who have life-threatening comorbidities may warrant such radical therapy.

When considering weight loss surgery in adolescents, the indications, the type of procedure, and the age at which it can be performed are controversial. The indications for bariatric surgery in adults were derived by a National Institutes of Health consensus panel in 1991 [15]. In general, adults with a BMI of 40 with or without comorbidities and a BMI of 35 with comorbidities are considered candidates for bariatric surgery. This panel specifically avoided making a recommendation for the treatment of patients younger than 18 years. A task force convened by the American Pediatric Surgical Association addressed this issue. The indications for surgery described by this task force are much more conservative than those for adults [23]. Evidence suggests that early surgical intervention in extreme obesity provides the best chance to reverse comorbidities [24-26]. Indeed, it is necessary to be more aggressive in the treatment of adolescent obesity by using established adult criteria. However, we should look for the ideal procedure. The LAGB may be the ideal operation for the adolescent population precisely because the gastric banding is easily and completely reversible as well as providing great flexibility in a population that has dynamic changes in their physical and dietary needs.

Since LAGB was first performed in 1993 by Belachew et al [27], 130,000 procedures have been performed worldwide [28]. It is one of the most commonly performed operations for the treatment of morbid obesity outside of the United States. Roux-en-Y gastric bypass, however, is still the most frequently performed bariatric operation in the United States [29]. Several studies have demonstrated that morbidly obese patients can achieve superior weight loss using LAGB [30,31].

Several authors have reviewed their experience using varied open bariatric surgical techniques in adolescent obesity with varied results [32-37]. Recently, surgical experiences with severely obese adolescents treated via laparoscopic approaches have been reported in the international literature [38-44].

Stanford et al performed laparoscopic gastric bypass on 4 obese children and achieved an EWL of 87% at 18 months. Dolan et al [41] published their initial experience with LAGB in 17 morbidly obese adolescents. At a median follow-up of 25 months, the EWL was 60%. A slipped band and a leaking port after 2 years of follow-up were reported. Similarly, Abu-Abeid et al [38] reported on LAGB in 11 children with a reduction of the mean preoperative BMI from 46 to 32 after a mean follow-up of 23 months and no complications. Fielding and Duncombe [43] present their experience with 41 adolescents who underwent the LAGB procedure. They maintained a mean EWL of 70% at 5 years, and the 2 patients with diabetes were cured. Angrisani et al [44] (the Italian Collaborative Study Group for Lap-Band) reported on 58 patients less than 19 years of age undergoing LAGB. The overall postoperative complication rate was 10.3%. Band slippage was observed in 1 patient, gastric pouch dilatation in 2, and intragastric migration in 3 patients. The band was removed in 2 patients for psychologic intolerance, and 1 patient was converted 2 years later to open gastric bypass. The overall band removal rate was 10.3%. Conversion was necessary in 1 patient with gastric perforation, and delayed biliopancreatic diversion was performed in 2 patients.

The current report of LAGB in adolescents is one of the largest in the literature. It showed a comparable EWL with previous reports [38-43]; however, the complication rate and the necessity to convert to open or other bariatric procedures were not seen in our series. The recent modification [45] in LAGB technique, which we applied in all cases, might have contributed to these different results. These modifications include the pars flaccida technique, a very small (15 mL) initial pouch with a proper anterior fixation of the band avoiding fixing the stomach to the crura of the diaphragm and leaving the band empty at surgery with the first adjustment 6 weeks later. This study also demonstrated that we can minimize the radiation exposure by avoiding fluoroscopic guidance during adjustment without jeopardizing the port or the stoma.

One of the most important advantages of LAGB in adolescents is the absence of significant nutritional deficiencies that are seen commonly with gastric bypass. None of our patients received routine nutritional supplements, and none were found to have any clinical or biochemical evidence of malnutrition. Similar results have been reported in other studies [38,41,43,44].

Another common concern in performing bariatric surgery in adolescents is related to compliance with postoperative dietary protocols. All patients in our group were compliant with the follow-up program. This could have been because of our flexible follow-up schedule. All patients have open access to the clinic and direct contact with the treating physician through his personal contact numbers. In addition, all patients who do not come to their appointment are contacted and rescheduled. In each visit, we reinforce, to the patients and their families, the importance of adhering to the postoperative instructions, including diet and exercise, regardless of the weight loss during the previous weeks.

In conclusion, LAGB provides an effective surgical solution for morbidly obese children and adolescents and avoids the risk of metabolic problems associated with bypass procedures. The LAGB procedure is unique in
leaving completely intact the physiologic and anatomic function of the digestive system. Furthermore, the gastric band may be easily manipulated or reversed as necessary.

References


