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Original Article

# The effectiveness of laparoscopic sleeve gastrectomy surgery applied to morbidly obese adolescents

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## Abstract

**Objective:** This study aimed to define the demographic features of adolescent patients who underwent bariatric surgery, laparoscopic sleeve gastrectomy (LSG), before the surgery and during the hospital stay period.

**Methods:** This is a descriptive retrospective study. It retrospectively screened 70 patients who underwent bariatric surgery, finding nine patients. Patients above 18 years old and those without a diagnosis of morbid obesity (those with a body mass index equal to or less than 40) were excluded from the study.

**Results:** Of the participants, 66.7% (n=6) were females and 33.3% (3) were males, and the mean age of all patients was 17.44±0.88 (ranging from 16 to 18). The body mass index for females was 43.47±3.01 kg/m2, while for males, it was 47.9±6.35 kg/m2 (p=0.178). The average duration of hospital stay was 4.33±0.58 days for males, 3.33±0.52 days for females, and 3.67±0.71 days for the whole group (p=0.033). No death was reported.

**Conclusion:** We believe that bariatric surgery is necessary for an adolescent age group whose morbid obesity persists after medical treatments both to decrease comorbidity burden and to prevent more serious problems that may develop later. We believe that this procedure, which we have reported as being applied safely in adolescent age groups, should be repeated in future trials, including multicenter prospective and long-term follow-up studies.

**Keywords:** Adolescent, bariatric surgery, obesity, sleeve gastrectomy.

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## INTRODUCTION

The prevalence of morbid obesity has increased in both developing and developed countries (1). Adolescent obesity is associated with various chronic diseases, including diabetes, sleep apnea, cardiovascular diseases, nonalcoholic steatohepatitis, polycystic ovary syndrome, and musculoskeletal diseases (2,3). In addition, the risk of morbidity and mortality associated with obesity is increasing over time. Individuals who develop obesity at an early period may be at a higher risk for obesity than individuals who develop it at a later period (4). Obesity in adolescence is significantly associated with obesity in adulthood (5).

The present study aimed to investigate the effects of bariatric surgery in adolescent patients on comorbid diseases and weight loss.

## MATERIALS AND METHODS

The Non-Interventional Research Ethics Committee of Üsküdar University approved the study (61351342-/2019-13). Seventy patients who underwent laparoscopic sleeve gastrectomy (LSG) between 2013 and 2016 were screened, and nine patients from the adolescent age group were included in the study. This retrospective study included a descriptive chart review. We investigated the preoperative demographic features, comorbidity factors, postsurgical hospital stay period, and early postoperative complications of pediatric patients who underwent LSG at different hospitals in Istanbul. We evaluated demographic features, comorbidity status, and the effect of the operation on weight loss. Patients who were above 18 years of age and who did not have a diagnosis of morbid obesity (body mass index equal to or less than 40) were excluded from the study. Preoperative body mass index (BMI), age, sex, and comorbidities of the patients were recorded. Later, weight loss and improvements in comorbid diseases were compared.

### *Statistical analysis*

IBM SPSS Statistics 22.0 (SPSS Inc., Chicago, IL, USA) programs were used. Normality testing for continuous variables was performed with Shapiro–Wilk and Lilliefors tests. Student's t test was used to compare age, body mass index, duration of hospitalization, age of onset of obesity, and cortisone suppression test results between females and males. Levene's test for the equality of variances with 95% confidence intervals were used for age, BMI, duration of hospitalization and age of onset. P value < 0.05 in all statistical tests were considered statistically significant.

## RESULTS

This study included nine patients, including 67% (n=6) females and 33% (n=3) males. The mean age of the patients was 17.44±0.88 years, and their mean body mass index (BMI) was 44.96±4.56 kg/m$^2$. For female patients, the mean age was 17.83±0.41 years, and the mean BMI was 43.47±3.01 kg/m$^2$. For male patients, the mean age was 16.67±1.16 years, and the mean BMI was 47.9±6.35 kg/m$^2$. The mean duration of hospitalization was longer among males (4.33±0.58) compared to females (3.33±0.52) (p=0.03). The results of Levene's test for the equality of variances with 95% confidence intervals were p=0.217 for age, p=0.178 for BMI, p=0.033 for duration of hospitalization and p=0.591 for age of onset. The t values were -1.7, 1.5, 2.7, 0.6, and -1.6, respectively.

All patients had previously tried diet and exercise as a means of weight loss. In addition, eight patients tried to lose weight through psychotherapy, but they were not successful. Preoperative evaluations revealed nonalcoholic hepatosteatosis in one patient and a loose lower esophageal sphincter in three patients. No other pathological sign was observed in other laboratory and imaging methods. There were comorbid diseases such as obstructive sleep apnea in 11.1% of the patients, hypertension in 22.22%, type II DM in 22.2%, and depression in 36.3%. Evaluation of improvements at postoperative 3$^{rd}$ month for comorbid diseases revealed improvements in all cases for obstructive sleep apnea syndrome, type II DM, and hypertension.

A shorter duration of hospitalization for females was statistically significant. No significant difference was found according to age, body mass index, or age of onset of obesity (Table 1).

**Table 1.** General descriptive features for continuous variables in adolescent patients who underwent obesity surgery according to sex

| | Male (n=3) | Female (n=6) | p value | t value | Confidence interval |
|---|---|---|---|---|---|
| **Age** (year) | 16.67±1.16 | 17.83±0.41 | 0.217 | -1.7 | (-3.82, 1.49) |
| **BMI** (kg/m$^2$) | 47.9±6.35 | 43.47±3.01 | 0.178 | 1.5 | (-2.6, 11.6) |
| **Mean duration of hospitalization** (day) | 4.33±0.58 | 3.33±0.52 | **0.033** | 2.7 | (0.106, 1.89) |
| **Age of onset for obesity** (year) | 8±1.0 | 7.5±0.71 | 0.591 | 0.6 | (-2.15, 3.15) |
| **Cortisone suppression test** (µg/dl) | 0.25±0.21 | 0.57±0.24 | 0.154 | -1.6 | (-0.79, 0.157) |

***Abbreviation:*** BMI: Body mass index

## DISCUSSION

Although international epidemiological studies suggest that the prevalence of pediatric obesity in developed countries is not increasing, the prevalence of severe obesity, which represents 2.5-6% of children at 2-19 years of age, is on the rise (6-9). The role of the hypothalamus in the regulation of body weight has an important role in the pathophysiology of adolescent obesity. Therefore, it is not surprising that most of the monogenic and syndromic forms of severe obesity are associated with hypothalamic dysfunction (10-12). In our study, the ratio of patients who had a first-degree relative with obesity was 33.3%. However, these conditions are rare. The most common one, a homozygous mutation at melanocortin 4 (MC4R), is assumed to explain 5% of early-onset obesity (13-15). Clinically, children with such mutations present with a linear growth pattern and rapid weight gain starting during the early childhood period (11). Current approaches to obese adolescents include behavioral and dietary changes performed by a multidisciplinary team. In our study, 88.8% of the patients were admitted to the psychiatric ward, and all of them received dietary advice. Although such interventions may yield short-term benefits, data for long-term benefits are lacking (16). Among the patients who had undergone bariatric surgery in our clinic, one patient (11.1%) had obstructive sleep apnea, two patients (22.2%) had hypertension, two patients (22.2%) had type II diabetes, and three patients (36.3%) had depression. These patients had tried various treatment methods for years. Bariatric surgery is a term used to explain procedures that involve modifications in the gastrointestinal system to induce weight loss. These procedures decrease gastric volume and absorption capacity of the intestines (17). In the last 20 years, bariatric surgery has become an important treatment choice for obese adults, and its use for adolescents has increased (18). National trends in the USA show that procedures for adolescents increased five times between 1997 and 2003 (18). Bariatric surgery for adolescents varies based on the operation center, country, and health infrastructure (19,20). Laparoscopic Roux-en-Y gastric bypass (RYGB) is the most commonly used method and is frequently used during the adolescent period. Laparoscopic adjustable gastric band (LAGB) and sleeve gastrectomy are considered in this age group. We performed sleeve gastrectomy for all patients in our clinic. Laparoscopic gastric application is another emerging surgical technique that has not been investigated in detail in pediatric patients (21). Although there is not a consensus on the optimal surgical technique, randomized studies that compare different surgical techniques are scarce (22). Bariatric surgery may be an effective weight loss strategy for patients with severe and permanent obesity who cannot achieve weight loss with nonsurgical methods and may lead to improvements in comorbidities (17). However, bariatric surgery is associated with a significant morbidity risk and surgical complications, with reported mortality including bowel obstruction, ulcerations, gall bladder stones, scar tissue development, complications related to the band, and additional surgery (17,23). During the postoperative period, only one of our patients had hyperemesis.

The mortality rate in bariatric surgery is reported to be between 0.1% and 0.2% (17). Although no mortality occurred in our sample that included nine patients, we believe that the most important cause for this is the small sample size of our study.

Complication rates are higher in patients who have more severe obesity and a higher frequency of comorbidities (17). Additionally, the success of the study depends on the experience of the operator, the operation volume of the center, patient-related factors, the presence of intensive care conditions, and the condition of the patient's respiratory system (18). After bariatric surgery, lifelong follow-up is required for the patients.

***Limitations:***

Our study has some limitations, including its retrospective nature and the relatively small number of patients employed. There is a need for prospective case–controlled studies on this topic.

## CONCLUSION

Bariatric surgery is indicated in the morbidly obese adolescent patient population who do not benefit from medical treatment methods.

**Conflict of interest:** The authors declares that there is no conflict of interest.
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**Peer-review:** Externally peer-reviewed.
**Ethical approval:** The study was conducted in accordance with the conditions recommended by the Helsinki Declaration. It was approved by the Üsküdar University clinical research ethics committee (61351342-/2019-13).
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