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What to expect in the first 3 months following a sleeve gastrectomy?

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ABSTRACT

Introduction: The purpose of this descriptive study was to analyze the clinical, laboratory, anthropometric, and histological results of patients who underwent laparoscopic sleeve gastrectomy (LSG) before and three months after the operation.

Materials and Methods: A total of 110 patients who were followed and underwent LSG between January 2021 and December 2021 were included in this study. Body mass index (BMI), waist and hip circumference, soft lean mass (SLM), percent body fat (PBF), and common laboratory parameters were evaluated before and three months after the LSG. Endoscopic biopsies and LSG specimens were examined by the pathology department.

Results: The mean age of the patients was 40.8±11.3 years, and 78.4% were female. There was no significant difference in age in terms of gender (p=0.789). The mean age was significantly lower in patients without comorbid diseases and chronic drug use (p<0.001). There was a significant decrease in BMI, PBF, SLM, glucose, HOMA-IR, HbA1c, total cholesterol, and triglyceride values in the third month (all p's <0.001). A significant correlation was observed between PBF% change and SLM% change values at post-op 3rd month (r=0.332, p=0.001). BMI% and PBF% change showed a stronger correlation than BMI% and SLM% change with (r=0.447, p<0.001) and (r=0.253, p=0.016), respectively. Histopathologic findings of LSG revealed gastrointestinal stromal tumor in 2 cases, neuroendocrine hyperplasia in 2 cases, and intestinal metaplasia in 13 cases, which were detected incidentally.

Conclusion: LSG is an effective treatment for obesity and associated comorbidities, with significant improvements observed in metabolic parameters, hypertension, and laboratory values. Careful monitoring and follow-up are essential to detect and treat potential histopathologic findings.

Keywords: Bariatric Surgery, Gastrectomy, Gastrointestinal Stromal Tumors, Obesity

Introduction

More than 1.9 billion adults worldwide are overweight, and 650 million of them are obese, making obesity a severe health problem. This condition increases the risk of numerous comorbidities, including hypertension, stroke, dyslipidemia, type 2 diabetes, osteoarthritis, asthma, cer-

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tain cancers, and a shorter lifespan.[1] Bariatric surgery is frequently recommended for morbidly obese patients with a BMI >40 kg/m² or a BMI >35–40 kg/m² with at least one comorbid condition when non-surgical therapies, including lifestyle changes and drugs, fail.[2]

However, psychiatric status and patient awareness are critical selection factors, given the significant impact of surgical consequences.[3] Bariatric surgery has shown remarkable effectiveness in achieving long-term weight loss and preventing obesity-related comorbidities, with low morbidity and mortality rates.[4] Roux-en-Y gastric bypass (LRYGB) (a malabsorptive/restrictive type) and laparoscopic sleeve gastrectomy (LSG) (mainly a restrictive type) are the two most frequently used bariatric surgical techniques.[2] These surgeries alter appetite and eating behavior by changing levels of gastrointestinal or exogenic hormones like ghrelin, neuropeptide Y, and peptide YY (PYY).[5] Peptide YY (PYY) is released postprandially from the distal gastrointestinal tract to inhibit the release of neuropeptide Y. Ghrelin injections in humans stimulate food intake, while PYY infusion induces satiety.[6] Both LRYGB and LSG increase postprandial PYY levels, but only LSG significantly suppresses postprandial ghrelin levels.[7]

LSG offers other benefits, such as short recovery periods, quick weight loss, and safety, making it the preferred surgery for obesity.[8] During an LSG, the greater curvature of the stomach is detached, and a gastric remnant is constructed.[9] Despite the removal of 80% of the stomach, active gastritis remains prevalent in the remaining region. Hormonal secretion continues from the antrum, and detection of activity in the remnant can impair weight loss, which may be explained by hormonal mechanisms.[10] Despite the lack of guidelines, histopathologic examination of bariatric surgery specimens provides an opportunity for surgeons to explore various gastric pathologies that may affect obese patients.[11]

In this study, we aimed to assess the clinical, biochemical, and anthropometric data, as well as the histopathological findings, in patients who underwent LSG before and three months after surgery.

Materials and Methods

The study was approved by the Ethics Committee of Kartal Dr. Lutfi Kırdar City Hospital (Decision number: 514/194/32, Date: 27.01.2021). One hundred and ten patients (24 females, 86 males), aged 22–66 years, with a BMI >35–67 kg/m², who were followed at the obesity outpatient clinic between October 2016 and December 2020 and underwent LSG between January 2021 and December 2021, were included.

A multidisciplinary team at the obesity center of Kartal Dr. Lutfi Kırdar City Hospital evaluated the patients. The patients' psychosomatic and endocrine profiles were reviewed to identify contraindications before surgery. Patients were followed for at least six months before surgery to track changes in their lifestyles, such as eating behaviors and physical activity. A psychiatrist evaluated patients with eating disorders, and a physiotherapist informed them about the physical exercises required after surgery. Subsequently, these patients were evaluated by a multidisciplinary committee consisting of a bariatric surgery team and endocrinologists, and those suitable for LSG were selected. The surgery was performed by the same surgical team using the classical LSG technique. Terminal malignancies, severe psychiatric disorders, bipolar disorder, psychosis, and post-traumatic stress disorder were contraindications for surgery. Anthropometric measurements (weight, BMI, waist circumference, hip circumference, soft lean mass (SLM), and percent body fat (PBF)) were analyzed using a Tanita MC-580 body composition analyzer (TANITA MC-580, Japan) preoperatively, as well as within the first and third months after the LSG. BMI (body weight/height² (kg/m²)) was calculated, and patients were classified as overweight (BMI = 25.0–29.9 kg/m²), obese (BMI = 30–40 kg/m²), and morbidly obese (BMI > 40 kg/m²).[9]

Upper gastrointestinal endoscopy (UGIE) was performed preoperatively on all patients, and biopsies were taken from the corpus and antrum, even without significant macroscopic lesions. Endoscopic and sleeve gastrectomy biopsy specimens were assessed with routine immunohistochemical and histopathologic methods. The endoscopic biopsies and the LSG specimens were examined microscopically with hematoxylin and eosin (H&E) staining, enhanced with Giemsa stain for Helicobacter pylori (HP) infection, and Periodic Acid-Schiff Alcian Blue (PAS-AB) stain for intestinal metaplasia.[12]

Statistical Analysis

Statistical analysis was carried out using the SPSS program (Statistical Package for Social Science, version 11.7; Chicago, IL). The Kolmogorov-Smirnov test was performed to determine the distribution of the parameters. Descriptive statistics were expressed as mean±standard deviation (SD) and median (2.5–97.5%) as required. The comparison of the variables was done with the Wilcoxon test. Correlations were determined by Spearman correlation analysis, and p <0.05 was accepted as statistically significant.

Results

The study included 110 patients, and patient characteristics are shown in Table 1. The mean±SD age of the patients was 40.8±11.3 years, with a range of 22–66 years, and 78.4% were female. Age differences between males and females were not statistically significant (p=0.789). Patients without comorbid diseases and chronic drug use had a significantly lower mean age (p<0.001). The median duration of diabetes was five years, and 33 patients were receiving oral anti-diabetic (OAD) therapy, whereas 36.2% of the cases were diabetic, and 26.1% were taking insulin. After the procedure, 11.9% of diabetics continued their OAD medication. Table 2 shows the median (2.5–97.5 percentile) values for the anthropometric and clinical laboratory parameters before and three months after LSG. There was a significant decrease in BMI, PBF, SLM, glucose, HOMA-IR, HbA1c, total cholesterol, and triglyceride values at the 3rd month. Pre-op and post-op 3rd-month BMI levels are given in Figure 1. Pearson analysis showed a significant correlation between PBF% change and SLM% change values (r=0.332, p=0.001). BMI% and PBF% change showed a better correlation than BMI% and SLM% change, with (r=0.447, p<0.001) and (r=0.253, p=0.016), respectively. Gastrointestinal stromal tumors were observed in 2 cases, neuroendocrine hyperplasia in 2 cases, and intestinal metaplasia in 13 cases, all detected incidentally during the histopathologic examination. The diameters of the gastrointestinal stromal tumors were 3 mm, and micronodular linear-type neuroendocrine hyperplasia was detected.

A standard HP eradication protocol, consisting of clarithromycin, amoxicillin + clavulanic acid, and a proton pump inhibitor, was administered for one week to the 50 patients with confirmed HP infection based on biopsy results. Histopathological findings of the patients are given in Table 3.

Table 1. Patient demographics

Patients	n	%
Age (mean±SD) (years)	40.8±11.3	
Gender (Female/Male)	91/25	78.4/21.6
Diabetes Mellitus	42	36.2
Hypertension	31	26.7
Hyperlipidemia	10	8.6
Hypothyroidism	9	7.8
Depression	3	2.6
Gastritis	2	1.7

Table 2. Median (2.5-97.5) percentile values for the anthropometric and laboratory parameters before and 3rd month after the LSG

	Before LSG	After LSG	p
	Median (2.5-97.5 Percentile)		
BMI (kg/m^2)	46.7 (37.4-60.3)	38.9 (28.5-50.1)	*<0.001
PBF (%)	44.0 (29.8-49.3)	41.1 (23.2-49.3)	*<0.001
SLM (%)	62.9 (50.9-93.5)	55.5 (44.8-79.3)	*<0.001
Glucose (mg/dL)	109 (79-337)	95 (72-153)	*<0.001
HOMA-IR	5.2 (2.4-25)	2.2 (1.0-4.68)	*<0.001
HbA1c (%)	5.8 (5.6-6.4)	5.4 (5.2-5.8)	*< 0.001
Total Cholesterol (mg/dL)	208 (135-285)	197 (119-266)	*0.044
LDL Cholesterol (mg/dL)	124 (75-206)	127 (67-194)	0.631
Triglyceride (mg/dL)	136 (55-353)	108 (53-242)	*0.001
HDL Cholesterol (mg/dL)	43 (30-48)	43 (32-71)	0.982
Hemoglobin (g/L)	12.7 (9.0-16.0)	12.8 (10.2-16.5)	0.618

*p<0.05 statistically significant.

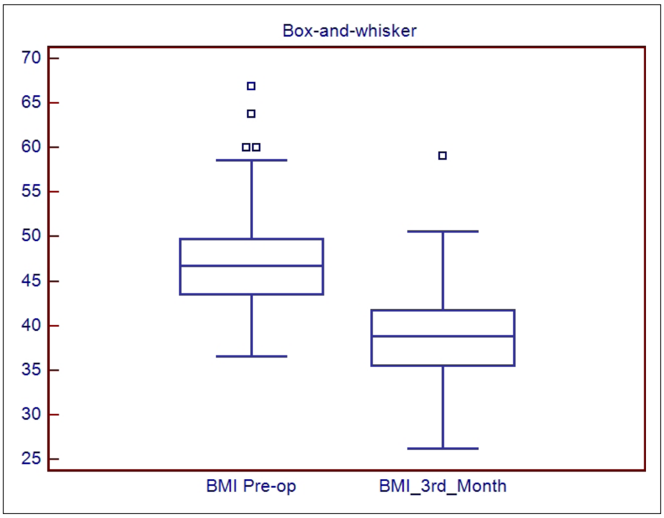

Figure 1. Pre-op and post-op 3rd-month BMI levels.

Table 3. Histopathological findings of the patients

Histopathological findings	n (%)
Chronic gasritis	99 (90)
Helicobacter Pylori	50 (45.4)
Intestinal metaplasia	13 (11.8)
Lymphoid aggregate	30 (27.2)
Gastrointestinal stromal tumor	2 (1.8)
Neuroendocrine cell hyperplasia	2 (1.8)
No specific pathology	10 (9)

Discussion

Diabetes and hypertension were the most prevalent comorbid diseases in our patients, while individuals without comorbid disorders and drug use were younger. In the third month following surgery, we observed a significant decrease in BMI, PBF, SLM, glucose, HOMA-IR, HbA1c, total cholesterol, and triglyceride levels.

Upper body and visceral fat are strongly associated with comorbid diseases such as insulin resistance and metabolic syndrome.[13] According to Piché et al.,[14] individuals who are overweight and have excess visceral adipose tissue are at a higher risk. Additionally, overweight patients are more likely to suffer from type II diabetes, chronic back pain, malignancies, and cardiovascular and gallbladder diseases.[15] Waist circumference (WC), hip circumference (HC), and waist-to-hip ratio (WHR) are predictors of central or visceral obesity and are considered independent risk factors for cardiovascular diseases.[13] In the current study, the patients' WC and HC dropped by 13.3% and 12.1%, respectively. After the operation, the incidence of comorbidities and chronic drug use significantly decreased. Our findings are consistent with previous studies that have reported the benefits of bariatric surgery in improving metabolic parameters and comorbidities such as hypertension and diabetes.[4] Bariatric surgery has been found to significantly improve hypertension and diabetes, with recovery rates of 61.7% and 78%, respectively.[4] Sjöström et al.[16] reported a more than three-fold decrease in the risk of developing diabetes in the surgery group compared to those treated with nonsurgical procedures.

Our study observed a decrease of 6.6% in SLM and 13.4% in PBF in the third month after LSG, with a significant correlation between the percentage changes in SLM and PBF. Studies have shown that optimal weight loss after bariatric surgery should come from PBF without a decrease in lean mass and bone mineral content, referring to SLM.[17] Schneider et al.[18] reported a greater decrease in SLM following LSG compared to LRYGB. Belfiore et al.[19] highlighted the importance of preserving SLM and maintaining it at least at a physiological level, with the final goal of achieving SLM and PBF levels similar to those of individuals with normal weight.[20] Additionally, Vaurs et al.[21] reported that metabolic parameters improved significantly three months after surgery, with patients experiencing the least muscle loss showing better glycemic improvement. Schauer et al.[22] compared intensive medical treatment with LSG in 150 diabetic obese adults and found that LSG achieved a greater improvement in HbA1c (<6%) than the medical treatment group.

Dyslipidemia is a significant risk factor for atherosclerosis and coronary artery disease, and it is a leading cause of excessive mortality in obese patients.[23] Salman et al.[24] reported significant improvement in carotid intima-media thickness and dyslipidemia after surgery in their study, while Buchwald et al.[4]'s meta-analysis showed that surgical procedures significantly improved hypercholesterolemia and hypertriglyceridemia at the 2-year follow-up. Also, Sirbu et al.[25] reported a significant improvement in both HOMA-IR and dyslipidemia six months after LSG. In our study, metabolic parameters, including HOMA-IR, HbA1c, total cholesterol, and triglyceride values, decreased significantly in the third month after surgery.

Our institution performs routine histopathologic evaluations before and after LSG, and our study found that chronic gastritis was the most common finding, observed in 99% of patients. The higher prevalence of chronic gastritis might be due to dietary habits and the more frequent presence of HP in the population (50%). Chronic gastritis could lead to premalignant lesions such as atrophic gastritis and intestinal metaplasia, which could eventually result in gastric adenocarcinoma.[26] Our study also reported 2 gastrointestinal stromal tumors, 2 neuroendocrine cell hyperplasias, and 13 cases of intestinal metaplasia, all of which require careful follow-up and treatment.

One limitation of our study is that the majority of our study group was women, limiting the evaluation of gender effects. Future studies with larger patient populations, including different comorbidities and longer follow-up periods, are necessary to evaluate the long-term effects of LSG.

Conclusion

In conclusion, our study shows that LSG is an effective treatment for obesity and associated comorbidities, with significant improvements observed in metabolic parameters, hypertension, and laboratory values. Careful monitoring and follow-up are essential to detect and treat potential histopathologic findings.

Disclosures

Ethics Committee Approval: The study was approved by the Ethics Committee of Kartal Dr. Lutfi Kırdar City Hospital (Decision number: 514/194/32, Date: 27.01.2021).

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Conflict of Interest: None declared.

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