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Evaluation of operative complications in obese patients who underwent laparoscopic sleeve gastrectomy: Single-center experience

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ABSTRACT

Introduction: The complications experienced during and after surgery in patients who underwent laparoscopic sleeve gastrectomy for obesity treatment in 1 clinic were analyzed.

Materials and Methods: The demographic and clinical data of all patients who underwent bariatric surgery with the diagnosis of obesity in the Kahramanmaras Sütçü İmam University Faculty of Medicine General Surgery Department between April 2008 and June 2016 were examined retrospectively by reviewing the hospital information system and patient files. Complications experienced during and after the operation were examined in 431 patients who underwent laparoscopic sleeve gastrectomy. The complications were divided into peroperative and postoperative types. Deaths within the first 30 days were considered operational mortality.

Results: Hemorrhage was detected in 13 patients and anastomosis leakage in 2 patients as a perioperative complication. In 51 patients, 1 or more complications developed postoperatively. In all, 20 patients experienced hemorrhage, 12 had anastomotic leakage, 12 had pneumonia, 10 had intra-abdominal abscess, 5 had a wound infection, 2 had a pulmonary embolism, and small bowel necrosis, portal vein thrombosis, myocardial infarction, and small bowel perforation was each seen in 1 patient. Postoperative mortality was observed in 6 patients (1.39%).

Conclusion: Laparoscopic sleeve gastrectomy is currently the most common, popular surgical procedure in the appropriate obese patient group in terms of results. Like any surgical procedure, however, it cannot be said that laparoscopic sleeve gastrectomy is completely free of the risk of complications.

Keywords: Complication; laparoscopic sleeve gastrectomy; obesity.

Introduction

Obesity is a serious health problem increasingly prevalent all over the world. It has been understood that in addition to physical activity limitations caused by the illness, it is involved in several etiologies of cancer, diabetes, hypertension, respiratory problems, hormonal changes and

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psychiatric disorders. For this reason, it is a collection of multisystem diseases that should be treated more seriously.[1] Therefore, multidisciplinary treatment is needed in the treatment of this disease in cooperation with dietician, psychologist, endocrinologist and surgeon. Unfortunately, past and current diet, physical activity, behavioral therapy, and the failure to achieve the desired outcome of treatment with pharmaceutical agents have brought bariatric surgery to the forefront.[2] Procedures for bariatric surgery were horizontal gastroplasty, vertical banded gastroplasty, roux-en-y gastric bypass, transected roux-en-y gastric bypass, laparoscopic adjustable gastric band, biliopancreatic diversion, biliopancreatic diversion with duodenal switch and laparoscopic sleeve gastrectomy procedures. Laparoscopic sleeve gastrectomy (LSG) has become an increasingly popular procedure worldwide.[1,3] LSG is the procedure most commonly applied in obesity treatment in the literature despite the fact that the rates vary between 37%–53.8.[4,5]

The LSG administered in the treatment of obesity disease, which is observed in 36% of the population, is being performed in many centers in every country in recent days.[1] With the increasing series of LSG, the diversity of complications has increased and the treatment of these complications is important.[6] In this study, we investigated the complication frequency, complications, how we treated these complications, and the mortality that no surgeon wanted, in 431 patients who had undergone LSG because of obesity.

Materials and Methods

This study was conducted in Kahramanmaras Sütçü İmam University Faculty of Medicine (KSUTF) General Surgery Department. Between April 2008 and June 2016, all patients who underwent bariatric surgery with the diagnosis of obesity in KSUTF General Surgery Department were examined retrospectively by reviewing the hospital information system and patient files. Laparoscopic sleeve gastrectomy (LSG) was performed on 431 of the total 468 consecutive bariatric surgery patients, laparoscopic roux-en-y gastric bypass (RNYGB) was performed on 19, laparoscopic adjustable gastric band was on 19, gastric plication on 3, Single anastomosis duodeno-ileal bypass with sleeve gastrectomy (SADI-S) on 2, and 1 patient biliopancreatic diversion with duodenal switch (BPD-DS) operation was performed. 431 patients who underwent LSG were included in the study. Thirty-seven patients undergoing other bariatric surgical procedures were removed from the study.

The demographic data of 431 patients of preoperative and 3 months, 6 months, 1 year and 2 years after the operation were reached through the hospital registry system, patient files, telephone conversations and communication via social media. Patient's hospital stay, pre-operative and follow-up BMI, comorbid disease and disease post-operative course, preoperative drug use, post-operative drug use, intraoperative and postoperative complications were recorded.

The reachable data was recorded. Preoperative and post-operative BMI was not comparable in patients with no postoperative BMI. The ideal BMI of the patients included in the study was calculated based on 25 kg/m^2. In addition, the percentage of excess weight loss (EWL = [(initial weight) - (postoperative weight)] / [(initial weight) - (ideal weight)] was calculated for each patient at 3, 6, 12 and 24 months.

Complications were divided into peroperative and postoperative. Deaths within the first 30 days were considered operational mortality.

Laparoscopic Sleeve Gastrectomy Procedure

All patients to be LSG were placed in the reverse trendelenburg position with the legs opened 30° angle on the operation table and fixed to the operation table. The surgeon performed the operation, which was positioned between the legs of the patient. 12 mm optical trocars were placed 3 cm above the umbilicus and 2 cm left of the median line. The insufflation was made from this trocar. The 2nd trocar of 5 mm was placed 2 cm below the xiphoids, and the 3rd trocar was placed in the midclavicular line parallel to the right side of the first trocar. The 5 mm 4th trocar was placed 2 cm below the costal margin in the left anterior axillary line. The 12 mm last trocar was placed in the left midclavicular line parallel to the first trocar. The stomach was released from the omentum and spleen using vascular sealing devices (ultracision, ligature, etc.), beginning from approximately 6 cm above the pylorus at side of the large curvature up to the HIS angle. A 32 F orogastric tube was placed in the stomach and the stomach was cut from the antrum to the HIS angle with 2 thick (green 4.1 mm), 4 or 5 blue (3.5 mm thick) stapler cartridges with the guide of orogastric tube. Metal clips were thrown into the bleeding spots on the stapler line. The resected stomach tissue was taken out through a 12 mm trocar drill. Following the withdrawal of the orogastric tube to the esophagogastric junction, methylene blue was administered and a leaky

test was performed and then one foley drain was placed in the left subdiaphragmatic space.

Patients were mobilized at postoperative 8th hour and enoxaparin 0.6 IU daily admninistered for prophylaxis of deep vein trombosis as long as they were hospitalized. The patients had no clinical problems and the postoperative fourth day fluid regime was started and the drains were withdrawn and discharged after 24 hours of follow-up after withdrawn of drains. In the presence of clinical suspicion, oral contrast (urography) tomography was used to check for leakage.

Statistical Analysis

Quantitative data were expressed as mean±standard deviation and median range (min.-max.) and qualitative data were expressed as n (%). Preoperative BMI and postoperative BMI were compared using Paired Samples T Test. P values <0.05 were considered statistically significant.

Results

Of the 431 patients who underwent LSG, 335 (77.7%) were female and 96 (22.3%) were male. The mean age of the patients was 36.68±10.4 years (range 16–64), 37.05±10.82 (range 16–64) years for women and 35.37±9.19 (range 20–62) years for men. The mean BMI of the female patients before the operation was calculated as 48.05±7.27 kg/m^2 (min-max 35.26–73.09 kg/m^2) and the mean of the male patients was 47.22±5.87 kg/m^2 (min-max 35.64–66.87 kg/m^2). Mean hospitalization time was 6.24±4.98 (4–62 days). 44 patients required intensive care follow-up. The mean duration in the intensive care unit for these patients was 3.29±3.70 (1–21 days). All followups of other patients were made at the service.

While 431 patients had preoperative information, postoperative information of 57 patients who did not regularly come to their follow-up or could not communicate with the phone and social media could not be reached. 374 patients had 3rd month, 357 patients had 6th month, 307 patients had first year, 171 patients had second year data. During this study, the most recent data of 374 patients were recorded. The changes in the preoperative and postoperative BMI were compared at the end of the follow-up periods.

Preoperative BMI of patients with an average BMI of 47.7 decreased to 39.3 at the end of the third month, 35.1 at the end of the 6th month, 31.9 at the end of the 12th month, and 31.6 at the end of the 24th month. A statistically significant difference was found between the preoperative BMI and postoperative 3rd ($p<0.001$), 6th ($p<0.001$), 12th ($p<0.001$) and 24th ($p<0.010$) BMI values ($p<0.05$) (Table 1).

The percentage of postoperative EWL was calculated as 38.7% in 374 patients at 3rd month, 58.3% in 357 patients at 6th month, 72.8% in 307 patients at 12th month and 74.5% in 171 patients 24th month. EWL was found to be 72.6% in the calculation based on the latest pounds according to the mean follow-up period of 374 patients.

When we analyzed the distribution of comorbid disease-related medical treatment, 374 patients were able to reach follow-up, 26 patients had asthma (7%), 77 patients had HT (20.6%), 81 patients had type 2 DM (21.7%), 7 patients had OSAS (1.87%) and 13 patients had HL (3.5%).

Table 1. Comparison of preoperative and postoperative body mass index

	n	Body mass index	p*
		Mean±SD	
Preoperative body mass index	374	47.7±6.6	0.001
Postoperative body mass index 3rd month	374	39.3±6.3	
Preoperative body mass index	357	47.8±6.6	0.001
Postoperative body mass index 6th month	357	35.1±5.9	
Preoperative body mass index	307	47.7±6.7	0.001
Postoperative body mass index 12th month	307	31.9±5.8	
Preoperative body mass index	171	48.0±7.2	0.010
Postoperative body mass index 24th month	171	31.6±6.6	

*Paired Samples T Test. SD: Standard deviation.

Table 2. Effect of sleeve gastrectomy on comorbid diseases

	Reduced		Continued		Discontinued	
	n	%	n	%	n	%
Antiasthmatic drugs	5	19.2	5	19.2	16	61.6
Antihypertensive drugs	4	5.2	10	12.9	63	81.9
Antidiabetic treatment	5	6.2	2	2.5	74	91.3
Bilevel CPAP usage	0	0	0	0	7	100
Antilipidemic therapies	0	0	0	0	13	100

Sixteen (61.6%) of 26 patients with asthma in the preoperative period discontinued their antiasthmatic drugs in the postoperative period, 5 (19.2%) reduced the frequency of use of these drugs and 5 (19.2%) continued to use the drug. Of the 77 patients with hypertension, 63 (81.9%) left the antihypertensive drug, 4 (5.2%) lowered the drug dose and 10 (12.9%) patients continued with the same antihypertensive drug. Of the 81 patients with diabetes, 74 (91.3%) left antidiabetic treatment, 5 (6.2%) patients left insulin and continued oral antidiabetic treatment and 2 (2.5%) patients continued the same antidiabetic treatment. All 7 patients with OSAS discontinued BPAP treatment and 13 patients with hyperlipidemia left all antilipidemic therapies (Table 2).

427 of 431 patients were completed laparoscopically, while 4 patients were completed by open surgery. Laparoscopic gastric bypass was performed as revision surgery because of reweighting of 7 of 431 patients.

Complications

Hemorrhage developed as a perioperative complication in 13 patients. When we evaluated our perioperative complications, in 1 patient at the stapler stage we noticed that we had cut the stomach transversally due to sliding of orogastric bugie, then we converted to open surgery and terminated the operation succesfully. In another patient, leaks were detected in the test made with methylene blue and the stapler line was sutured. In this patient's postoperative follow-up, there was no problem and the patient was discharged with cure. In addition, minimal hemorrhage in 4 patients and significant hemorrhage in 5 patients were managed with vessel sealing devices. In another 4 patients, haemostasis was achieved by suturing the stapler line (Table 3).

In 51 patients one or more complications developed postoperatively. 20 patients had hemorrhage, 12 had anastomotic leakage, 12 had pneumonia, 10 had intraabdominal abscess, 5 had wound infection, 2 had pulmonary embolism and minor bowel necrosis, portal vein thrombosis, myocardial infarction and small bowel perforation each in one case (Table 4). When we examined our postoperative complications, in 51 (11.8%) patients different complications have developed.

A total of 12 (2.78%) patients developed anastomosis leakage. Only 2 patients who had leakage were relaparoscopically sutured. On clinical follow-up, oral contrast-enhanced tomography confirmed the absence of leakage and the regimen was initiated and the patients discharged uneventful. In one patient relapsaroscopy was

Table 3. Perioperative complications

	n	%
Hemorrhage (controlled by coagulation)	5	1.2
Hemorrhage (controlled by suture)	4	0.9
Leakage	2	0.4
Minimal hemorrhage	4	0.9

Table 4. Postoperative complications

	n	%
Wound Infection	5	1.2
Hemorrhage	20	4.6
Leakage	12	2.78
Pulmonary embolism	2	0.46
Intra-abdominal abscess	10	2.3
Pneumonia	12	2.78
Small bowel necrosis	1	0.2
Portal vein thrombosis	1	0.2
Myocardial infarction	1	0.2
Small bowel perforation	1	0.2

performed due to unexplained tachycardia and suspicion of anastomosis leakage, but it was evaluated as negative laparoscopy, no leakage was seen, and the patient was discharged after clinical follow-up uneventful.

Five patients had intraabdominal abcess together with anastomosis leakage. Three of these patients underwent percutaneous drainage and followed as controlled fistulas and treated with antibiotics and discharged uneventful. 1 patient could not be controlled with relapsaroscopy and percutaneous drainage and bariatric stent was applied. The other patient was sutured in open surgery and the regimen was initiated when the anastomotic leakage was judged to be no longer by applying control x-rays on the clinical follow-up and discharged with healing.

Of the 3 patients who developed pneumonia with leakage, 2 were treated with bariatric stent implantation and antibiotherapy. 1 died due to pulmonary sepsis. In one patient who underwent relaparoscopy due to hemorrhage in the early postoperative period then leak was detected and treated with bariatric stent.

Intrabadominal abscess and pneumonia developed in one patient with leakage. This patient was treated with a combination of percutaneous drainage, nasogastric catheter feeding up to duodenum and antibiotherapy. 3 patients who developed only intraabdominal abscess were treated with percutaneous drainage and antibiotherapy and discharged uneventful. Only 6 patients developed pneumonia and were treated with antibiotics and discharged. Hemorrhage and pneumonia developed in 1 patient. He was treated with blood transfusion and antibiotics. Only hemorrhage developed in 17 patients. Two of these patients underwent relaparoscopy to achieve hemostasis. Other patients were clinically resolved with blood transfusion. Small bowel necrosis developed in one patient. This patient underwent a small bowel resection and was discharged with cure. Small bowel perforation in one patient was detected on the first postoperative day and repaired with open operation. The wound infection of this patient was treated with antibiotherapy and dressing. Four patients had wound infection. All were treated with dressing and antibiotics.

Pulmonary embolism developed in 2 patients. One patient was treated and discharged by medical treatment and the other patient lost his life.

Postoperative mortality was seen in 6 patients (1.39%). 1 patient died due to myocardial infarction and 1 patient died due to hypertensive cerebrovascular disease, 1 patient died due to pulmonary embolism and 3 patients died due to sepsis.

Table 5. Mortality reasons

	n	%
Myocardial infarction	1	0.23
Pulmonary embolism	1	0.23
Hypertensive serebro vascular disease	1	0.23
Sepsis	3	0.69

The first of 3 patients with sepsis was a 20-year-old woman with post-leak pneumonia-related pulmonary sepsis, the second was a 38-year-old female with aspiration pneumonia sepsis according to the information from the anesthesiologist at the external center, and the last patient was a 38-year-old male patient with abdominal sepsis although no leak was detected (Table 5).

Discussion

Obesity is still a serious health problem that is common worldwide and the prevalence has increased over the years. The medical, social, and psychological problems that obesity has caused have led to the search for solutions for obesity sufferers and health professionals who are interested in obesity. As a result of this quest, historically, bariatric surgery has taken place in the treatment of obesity. Several methods have been tried in bariatric surgery, some of them have been abandoned, and some of them have been applied nowadays. The seriousness and the frequency of the complications caused by the method have been the most important factor in abandoning or practicing the method. According to ASMBS data, LSG has become the most frequently applied bariatric surgical procedure in the US in 2014 with 51.7%. This rate increased by 53.8% in 2015.[4] However, LSG is not an innocent operation without any complications. LSG is a serious procedure with its own specific peroperative and postoperative serious complications and patients who have been exposed to this procedure should be followed with the same seriousness. Some of the complications that arise are related to the procedure being performed and do not vary with the surgeon, while others vary with the skill and experience of the surgeon performing it.

As a result of our retrospective study, we examined the demographic and clinical data of 431 consecutive LSG patients who had BMI averages of 48.05±7.27 kg/m^2 in women

and 47.22±5.87 kg/m^2 in men. We investigated the changes in BMI during periodic follow-ups of patients, postoperative recovery of comorbid diseases present in preoperative condition, complications during and after operation, reasons of mortality. This retrospective study has been hampered by the limitations of data access resulting from the inadequacy of the registry in our hospital. At the end of this study, we could not reach the target point in patient documentation. We believe that this study offers useful ideas about what to do in the treatment of obesity that is open to new procedures and how to resolve the complications after LSG, even if the data obtained are limited.

As a result of this eight-year LSG experience, we found that the mean BMI of patients with an average BMI of 47.86±6.98 kg/m^2 was reduced by 31.6±6.66 kg/m^2 after 2 years. Already in the studies done in the literature before us, the average decline in BMI in 1-5 year follow-ups of patients is 28.5–47.3.[7–9] In this respect, the BMI changes of the patients in our study are in paralel with other studies in the literature. EWL change in obese patients is one of the best indicators of the effectiveness of the surgical procedure performed.[6] The EWL changes of our study patients were 74.5% at the end of the second year and are consistent with other studies in the literature.[7,10,11] This shows that we achieved the weight loss that we aimed with our LSG procedure, and that we have done the operation successfully.

Many studies have shown that the risk of postoperative complications and mortality development due to comorbid diseases in obese patients is higher than ideal overweight patients. That is, although obesity is not an independent risk factor for any surgical intervention, the presence of a comorbid disease increases this risk at varying rates of disease severity.[12,13] In addition to weight loss of patients after bariatric surgery, partial recovery of comorbid diseases has also been shown in many studies.[14–16] In our study, 173 patients had complete improvement in comorbid diseases and 14 patients had a decrease in the need for medical medication. Despite these benefits, we can not say that, like every surgical procedure, different obesity surgery procedures and LSG, which is the most popular among them, are completely innocent. Peroperative complications developed in our patients include hemorrhage controlled by coagulation, hemorrhage controlled by suture, minimal hemorrhage and leakage, postoperative complications such as wound infection, haemorrhage, leakage, pulmonary embolism, intraabdominal abscess, pneumonia, small intestinal necrosis, portal vein thrombosis, myocardial infarction, small bowel perforation.

Conclusion

The rate of 3.4% peroperative, 11.8% postoperative complication and 1.39% postoperative mortality rate in our patients are serious. Instead, we believe that new pharmacological and surgical interventions with fewer complications and mortality should be found to treat obesity. Nevertheless, we can say that LSG is a populer surgical procedure, which is the most frequently applied in the appropriate obese patient group. However, like any surgical procedure, we can not say that LSG is a completely innocent procedure.

Disclosures

Ethichs Committee Approval: The study was approved by Kahramanmaras University Medical Faculty Scientific Researches Ethics Committee (with the decision no. 06 of 19.10.2015).

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Conflict of Interest: None declared.

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