Early complications and outcome of sleeve gastrectomy

FARAG A ELGALI ALSHRIF, FATHI A ABDULLAH OTMAN

Department of General Surgery, Tobruk Medical Center, Libya

Corresponding author: FARAG A ELGALI ALSHRIF

Email: dr.faraj@surgeon.ly

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Abstract:

Background: Very short-term outcomes are reported in reports on very high-risk morbidly obese patients undergoing laparoscopic sleeve gastrectomy (LSG). Nevertheless, the short- and mid-term outcomes remain unclear.

Aim: To evaluate our experience and outcomes with LSG as an independent bariatric operation.

Methods: This study was conducted at Department of General Surgery, Tobruk Medical Center, Libya during the period from 1/2022 to 6/2022 on patients with a BMI >40 kg/m^2 without comorbidities or with a BMI >35 kg/m^2 with at least one obesity related comorbidity qualify for bariatric surgery, which includes LSG. All patients underwent a preoperative medical evaluation, a detailed psychological assessment, relevant laboratory/radiologic testing, and esophagogastroduodenoscopy. Patients were followed up for 12 months.

Results: The mean excess body weight loss was 22.5%, 33.5%, 41.2%, 49.7% and 61.3% at 1, 3, 6, 9, 12 months postoperatively, respectively. No deaths occurred in our cases. 2% conversion rate were occurred. A return to the operating room was needed in only two patients (4%). Major complications, specifically staple line leak, bleeding, and gastric sleeve stricture, were not seen in our cases.

Conclusion: Satisfactory weight loss outcomes and low complication rates were observed after LSG. In our experience LSG is technically simple, safe, and effective to serve as a definitive procedure for morbid obesity.

Keywords: Sleeve Gastrectomy, LSG, Outcomes, Complications.

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Introduction:

Laparoscopic sleeve gastrectomy (LSG) was initially proposed as a staged approach to biliopancreatic diversion (BPD) with duodenal switch (DS) in high-risk, high-body mass index (BMI) (> 60 kg/m2) obese individuals **(1).** In higher-risk patients, several surgeons found a manageable complication rate and a notable reduction in weight after LSG. **(2).**

A novel, effective, and safe approach to treating obesity that has a greater patient survival rate is sleeve gastrectomy. This procedure involves the removal of a sizable portion of the stomach, which controls hunger **(3).** The only weight loss strategy that has been shown to work is metabolic surgery. However, because elderly patients (those over 60) are seen as high-risk patients, many surgeons are reluctant to recommend acceptable surgical operations to them. Furthermore, there is a dread of potential problems **(4).**

In contrast, sleeve gastrectomy experienced a sharp rise, accounting for almost 50% of primary bariatric procedures in just 2016. Prior meta-analyses comparing RYGB and SG were carried out, however they either did not undertake age-stratified analysis or only included patients under 65 **(5, 6).**

Studies have indicated that individuals over 60 years of age had longer hospital stays following open surgical procedures, and they also have higher incidence of complications and death when compared to younger age groups. Studies conducted on older patients have shown that laparoscopic surgery for obesity is feasible. The majority of this research concentrated on laparoscopic adjustable gastric banding and gastric bypass surgery. Furthermore, research on the relatively new SG technique is currently scarce **(7).**

Based on current estimates, the most frequent operation globally for bariatric procedures is sleeve gastrectomy (SG), accounting for 46% of all procedures. Roux-en-Y gastric bypass (RYGB) follows closely behind with 40% of all procedures **(8).** Furthermore, for those whose obesity was not severe enough to require a complex bariatric treatment, LSG was recommended as a technique. In the end, LSG was carried out on a few patients with unique circumstances where standard bariatric procedures would be too drastic **(9).**

Methods:

This study was conducted at Department of General Surgery, Tobruk Medical Center, Libya during the period from 1/2022 to 6/2022. The National Institutes of Health's 1991 bariatric surgery recommendations served as the foundation for the standard inclusion criteria in this study. Bariatric surgery, including LSG, is appropriate for patients with a BMI >40 kg/m2 without comorbidities or a BMI >35 kg/m2 with at least one obesity-

related comorbidity. Each patient received an esophagogastroduodenoscopy, a thorough psychological evaluation, pertinent laboratory and radiologic testing, and a thorough preoperative medical evaluation. Based on a clinical suspicion of obstructive sleep apnea, most patients underwent sleep apnea testing. Patients underwent a 12-month follow-up period.

Surgical Technique: A Veress needle was used to create pneumoperitoneum in the left upper quadrant. The liver's left lobe was raised using a Nathanson liver retractor. The conventional five-trocar method was applied. An ultrasonic dissector was used to mobilize the stomach's greater curvature. It was positioned 4 cm from the pylorus to the angle of His. A 36-F bougie was fashioned for the sleeve. From the dissection point toward the incisura angularis, a green load 60-mm Echelon linear stapler was applied. Next, several applications of blue load 60-mm staplers were applied superiorly alongside the smaller curvature. The surgeon utilized staple line reinforcement, also known as Seamguard buttressing or oversewing, at his or her discretion. An intranasogastric injection of 60 mL of methylene blue was used to conduct a leak test. An Endocatch bag was used to remove the surgically excised stomach.

Statistical analysis: Data were analyzed using Statistical Program for Social Science (SPSS) version 23 and MedCalc version 15.4. Quantitative data were expressed as mean ± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

Result:

Table (1): Demographic data of the studied group

Variables	**Laparoscopic inguinal hernia repair (N=60)**
Age	54 (25–75)
Gender **Male** **Female**	 15 (30%) 35 (70%)
Preoperative BMI (kg/m2)	47.3 (36.9– 66.8)
Comorbidities	
Preoperative diabetes mellitus	20 (40%)
Preoperative hypertension	32 (64%)
Preoperative hyperlipidemia	19 (38%)
Preoperative sleep apnea	17 (34%)
Reflux disease	5 (10%)

The study included 50 consecutive patients in total. The study cohort was primarily female (70%), had a mean age of 54 years, and a mean BMI of 47.3 kg/m2. Of the prevalent comorbidities associated with obesity, 64% of patients had hypertension, followed by diabetes mellitus (40%) and hyperlipidemia (38%). Patient demographic characteristics were shown in Table 1.

Table (2): One month outcome and complications of the studied group

Variables	**Laparoscopic inguinal hernia repair (N=60)**
Operative time (min)	115.6 (66–209)
Conversion to open (n)	1 (2%)
Complications (n)	
Staple line leak	0 (0%)
Abscess	1 (2%)
Hemorrhage	1 (2%)
Dehydration	2 (4%)
Gastric sleeve stricture	0 (0%)
Return to operating rooma	2 (4%)
Length of stay (days)	2.7 (1.5–4.3)

Patients spent 115.6 hours in operation on average. The 2% conversion rate is due to extensive intra-abdominal adhesions from prior laparotomies, most often open cholecystectomy and open hernia repair. Two patients (4%) required a return visit to the operating room: one for surgical management of bleeding at the port-site, and the other for clinical indications of a staple line leak (tachycardia, epigastric stomach pain, and oliguria). The gastric sleeve of the later patient was discovered to be intact, and there were no fluid collections or intra-abdominal spills that may have indicated a staple line leak or unintentional bowel damage. Following the laparoscopic exploration, the symptoms went away, indicating that they were probably caused by insufficient pain management and/or mild postoperative dehydration. Five of the patients in our initial cases experienced resistance to oral intake in the first few days following surgery, which was probably caused by gastric sleeve edema. For a duration of 24 to 48 hours, they needed IV fluid administration; after that the symptoms subsided gradually. We did not see any serious issues in our instances, including bleeding, strictures in the stomach sleeve, or staple line leaks. The average stay in the hospital was 2.7 days. (Table 2).

Table (3): Weight Loss Outcome after Laparoscopic Sleeve Gastrectomy

Variables	**Laparoscopic inguinal hernia repair (N=60)**
1 month	22.5%
3 months	33.5%
6 months	41.2%
9 months	49.7%
12 months	61.3%

At1,3,6,9, and 12 months after surgery, the mean excess body weight decrease was 22.5%,33.5%,41.2%,49.7%, and 61.3%, respectively (Table 3). At 12 months, follow-up information was available for every patient. In our cases, there were no fatalities.

All diabetic patients had better control over their hyperglycemia at one year following the vertical sleeve gastrectomy (either total remission or less severe illness, as shown by fewer oral antidiabetic drugs and/or insulin requirements) at twelve months following surgery. About 50% of patients showed significant improvements in their hypertension and hyperlipidemia.

Discussion:

Laparoscopic sleeve gastrectomy (LSG) was initially proposed as a staged approach to biliopancreatic diversion (BPD) with duodenal switch (DS) in high-risk, high-body mass index (BMI) obese patients **(10).**

Although there have been more LSG procedures conducted globally in recent years, the precise and intermediate outcomes are still unknown **(11)**

We demonstrated that there were 50 consecutive patients in the trial overall. The study cohort's mean age was 54 years, its mean BMI was 47.3 kg/m2, and its majority was female (70%). Among the common comorbidities linked to obesity, hypertension was present in 64% of patients, followed by diabetes mellitus (40%) and hyperlipidemia (38%).

Sucandy et al. (12) revealed that the trial included a total of one hundred consecutive subjects. The study population, with a mean age of 45 years and a mean BMI of 48.2 kg/m, was predominately female. One of the main comorbidities linked to obesity was found in 55% of patients to be hypertension, which was followed by diabetes mellitus (33%) and hyperlipidemia (36%). One year after the vertical sleeve gastrectomy, the highest resolution was seen with diabetes mellitus (72%), followed by hypertension (55.5%) and hyperlipidemia (50%) as well. All diabetic patients had improved hyperglycemia control at 18 months after surgery (either complete remission or less

severe illness, as demonstrated by reduced oral antidiabetic medication and/or insulin demands). In 36.1% of patients, significant improvements were observed in hypertension, and in 19.6% of patients, in hyperlipidemia.

Sánchez-Santos et al. (13) revealed that all operations were carried out laparoscopically; the patients had a mean BMI of 48.1 ±10.0 kg/m2 (range 28–82) and a mean age of 44.1 ± 11.8 years (range 10-72). Women made up 76% of the patients, while men made up 24%.

According to **Hajer et al. (14),** 1772 patients were older than 60 years (8.2%) and 91.8% of the patients were younger than 60. The percentage of female patients was greater. Of the patients under 60 years old, the average BMI was 51.7 ± 9.5 kg/m. A BMI of 49.2 ± 8.1 kg/m2 was the average .

The most common concurrent condition was hypertension, it was followed by sleep apnea and type 2 diabetes. The average age was 38.0 ± 11.8 years, and the average body mass index was 44.6 ± 5.7 kg/m2, according to **Khalaj et al. (15) .**

We demonstrated that the mean operative time was 115.6 hours. Extensive intra-abdominal adhesions from previous laparotomies, most frequently open cholecystectomy and open hernia repair, are the cause of the 2% conversion rate. A follow-up visit to the operating room was necessary for two patients (4%): one for surgical care of bleeding at the port-site, and the other for clinical signs (tachycardia, epigastric stomach pain, and oliguria) suggesting a staple line leak. The gastric sleeve of the later patient was discovered to be intact, and there were no fluid collections or intra-abdominal spills that may have indicated a staple line leak or unintentional bowel damage. Following the laparoscopic exploration, the symptoms went away, indicating that they were probably caused by insufficient pain management and/or mild postoperative dehydration. Five of the patients in our initial cases experienced resistance to oral intake in the first few days following surgery, which was probably caused by gastric sleeve edema. For a duration of 24 to 48 hours, they needed IV fluid administration; after that, the symptoms subsided gradually on their own. We did not see any serious issues in our instances, including bleeding, strictures in the stomach sleeve, or staple line leaks. The average stay in the hospital was for 2.7 days.

Sánchez-Santos et al. (13) revealed a 5.2% risk of surgical complications. Significant adverse effects included stricture resulting from the running suture, which was removed during a second operation, gastrointestinal bleeding in 0.4% of cases, abdominal bleeding in 0.7% of cases, and pulmonary embolism in 0.2% of instances, as well as liver failure in one case and subphrenic abscess in another. Stapler leakage occurred in 2% of cases. Minor sequelae included one case of bradycardia, one case of urinary sepsis, one case of wound infection, and two occurrences of hematuria. Eleven patients had gastric leaks found. It was identified following an upper gastrointestinal examination in the majority of instances; in one instance, it was identified following oral administration of methylene blue. In patients who underwent LSG as a follow-up

There was only one leakage (2.9%), which was fixed in 21 days after the patient had to have another surgery for debridement. This occurred after a lap-band failure. In two instances, a coated self-expanding wall stent was utilized; in two patients, a gastro-jejunostomy was carried out; an upper stomach resleeve was necessary in one patient; two patients underwent reoperation for debridement; and the remaining patients were kept on no peroxide, intravenous antibiotics, and parenteral nutrition exclusively. Four cases (0.7%) of biliary reflux were recorded in relation to the late complications; three of them underwent a laparoscopic gastric bypass during their reoperation, and the other patient was kept on medical therapy.

Sucandy et al. (12) revealed that the last 15 patients had an improvement in the mean operating duration from 2 hours to 1.5 hours. Large intra-abdominal adhesions from previous laparotomies, most frequently open cholecystectomy and open hernia repair, are the cause of the 2% conversion rate. Two patients required a trip back to the operating room: one for surgical management of bleeding at the port-site, and the other for tachycardia, epigastric stomach pain, and oliguria—clinical indicators of a staple line leak. The latter patient did not exhibit any intra-abdominal spillage or fluid accumulation, which could be signs of an inadvertent bowel damage or a staple line leak. Following the laparoscopic exploration, the symptoms went away, indicating that they were probably caused by inadequate pain control and/or mild dehydration following surgery. When our series first began, three patients experienced resistance to oral intake in the first few days following surgery, which was probably caused by gastric sleeve edema. For a duration of 24 to 48 hours, they needed IV fluid administration; after that, the symptoms subsided gradually on their own. In our study, we did not see any serious problems, such as hemorrhage, gastric sleeve stricture, intra-abdominal space infection, or staple line leak. Three days was the average length of hospital stay. Due to an acute attack of cholecystitis, one patient stayed for nine days, while another patient had to stay for twelve days due to difficulties with their prosthetic heart valve.

Hajer et al. (14) revealed that patients under 60 had an overall rate of 4.9% general postoperative problems, whereas those over 60 had an overall rate of 7.8%. The most frequent problems were pulmonary, renal, and cardiac in nature. In the group, The mean duration of hospitalization was 6.9.

According to **Khalaj et al. (15),** hospital stays lasted 2.5 days on average. In the SG group, two late mortalities were recorded. 2.4% of patients went back to get surgery. According to **Poelemeijer et al. (16),** 2.5 days was the average length of stay. The readmission rate (n = 485) after SG was 3.4%. Wu et al. (2019) reported that the average length of hospital stay for the SG group ranged from 1.5 to 5.7 days. In the SG group, the mean operating time varied between 108.4 and 172.7 minutes.

Şen et al. (17) shown that 143 successive SGs were carried out in patients with class 1 obesity between 2012 and 2020 without conversion, leak, death, or venous incident. We lost two to follow-up. Two bleedings and one colon perforation (2.1% risk for acute life-threatening events) happened in 141 individuals. During a 25.9-month follow-up

period on average, 4 occurrences of de novo symptomatic cholelithiasis and 1 case of functional stenosis required reoperation after becoming clinically apparent in separate patients. As a result, at two years, a 5.6% rate of significant problems was found.

We demonstrated that every diabetic patient was able to better regulate their blood sugar levels at one year following the vertical sleeve gastrectomy (complete remission or less severe condition, as demonstrated by reduced need for insulin and/or oral antidiabetic medicine) one year after surgery. Significant improvements in hypertension and hyperlipidemia were seen in about 50% of individuals.

Sucandy et al. (12) found that at 1, 3, 6, 9, 12, and 18 months postoperatively, there were 62.8%, 50.94%, 32.3%, 44.06%, and 18.03% excess body weight losses on average. Our study's findings are supported by these outcomes. At six months, 51% of patients, 35% at one year, and 65% at 1.5 years, follow-up data were available. In this series, there were no fatalities.

Sánchez-Santos et al. (13) indicated a follow-up period of 16.5±10.6 months on average (range: 1–73). Just 33 patients reached the 36-month follow-up, out of the 281 patients who had a 12-month follow-up and the 120 patients who had a 24-month follow-up. First-time BMI mean was 46.97±9.8. Most patients showed a significant drop in BMI during follow-up. 37.9±8.1 at three months, 34.03±7.3 at six months, 31.8±7.2 at twelve months, 30.38±7.8 at twenty-four months, and 31.3±6.2 at thirty-six months was the mean BMI. The average BMI was 34.03±7.3 at six months, 31.8±7.2 at twelve months, 30.38±7.8 at twenty-four months, and 31.3±6.2 at thirty-six months. The average percentage of loss from overweight (%EWL) was 40.67±13.9 at three months, 55.13±14.9 at six months, 63.83±19.1 at twelve months, 68.5± 35.2 at twenty-four months, and 67.12±23.6 at thirty-six months. After three months, the average percentage of excess BMI reduction (%EBL) was 38.8±22., 55.6±8.0 at six months, 68.1±28.9 at twelve months, 72.4±31.1 at twenty-four months, and 72.1±21.8 at thirty-six months. At the 12-month follow-up, 81.7% of patients had lost more than 50% of their EB; at the 24-month and 36-month mark, 86% and 85.7% of patients, respectively, had lost more than 50% of their EB. % Patients with lower beginning BMI, particularly those whose initial BMI was less than 40 kg/m, had higher EBL. If a patient (15%) gained back the weight they had lost over the first three years of follow-up, it was considered a failure in weight loss.

Şen et al. (17) demonstrated that the weight loss advantage was both immediate and long-lasting ($p<0.001$). At one year, 100% of patients had achieved remission from T2D, whereas 98.1% had achieved remission from insulin resistance.

Conclusions: Following LSG, satisfactory results and low complication rates were noted. According to our research, LSG can be used as a definitive bariatric operation and is both safe and successful. LSG is a safe, low-risk surgical procedure with tolerable, not high, rates of perioperative morbidity and death.

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