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Assessment of Suture Line Reinforcement via Omentopexy in Laparoscopic Sleeve Gastrectomy

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ORIGINAL ARTICLE

Assessment of Suture Line Reinforcement Via Omentopexy in Laparoscopic Sleeve Gastrectomy

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Abstract

Background: **Initially, the Laparoscopic Sleeve Gastrectomy (LSG) was considered a viable independent bariatric surgery, rather than solely serving as the initial phase of a two-stage laparoscopic Roux-en-Y gastric bypass. In 1988, Hess was the first surgeon to execute a sleeve gastrectomy (SG), which was at the time a component of another malabsorptive treatment known as the biliopancreatic diversion with duodenal switch. The encouraging results of SG in terms of weight reduction and resolution of comorbidities as a first stage, paired with a low rate of complications, has encouraged the global emergence and monumentally rapid dissemination of SG as a standalone operation. These results may be found in the previous sentence.**

Method: **This study aimed to evaluate additional surgical procedure by using omentopexy as augmentation to the suture line of laparoscopic sleeve gastrostomy. This is combined prospective and retrospective Cohort study included 100 morbid obese patients with BMI >40 operated for LSG. All patients were subjected to routine laboratory investigations, ECG, chest X-ray, and radiological studies (plain X-ray or CT volumetery). Patients were divided into two equal groups: Group 1: underwent LSG procedures with omental fixation with full-thickness stitches. Group 2: underwent LSG procedures without omental fixation.**

Result: **Sleeve gastrectomy and omentopexy are safe procedures. The omentopexy has a role in reducing complications such as the probability of torsion, volvulus, and obstruction of the gastric tube it also improve postoperative nausea and vomiting with notable decrease in the rate of leak and hemorrhage. The omentopexy has no any additional cost on the patient with no significant increase on the time of surgery. Preoperative and postoperative data showed a reduction in mean BMI in both groups.**

Conclusion: **Further clinical studies are needed with multicenter cooperation to validate our findings. Large sample size studies are required.**

Omentopexy is a crucial component of laparoscopic sleeve gastrectomy and should be regarded as a standard procedure. Additional studies are needed for study the effect of age, sex, and comorbidities on the results.

Keywords: Laparoscopic, Sleeve gastrectomy, Suture line

1. Introduction

The incidence of morbid obesity is quickly growing, which makes it a significant public health problem that affects people all over the world. Some individuals are able to reduce their excess body weight by the use of lifestyle-altering measures, exercise programs, and diet regimens; nonetheless, bariatric surgery continues to be the treatment of choice for many patients who have not been successful with the use of conservative approaches. The use of bariatric surgeries has been shown to be highly effective in terms of both weight loss and the amelioration of comorbid conditions.[1] Bariatric surgeries can either be restrictive, which means they reduce the quantity of food that can be consumed (for example, adjustable gastric banding and sleeve gastrectomy), malabsorptive, which

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means they limit the amount of nutrients that can be absorbed (for example, biliopancreatic diversion), or a mix of the two (for example, Roux-en-Y Gastric bypass surgery).[2] In the battle against morbid obesity, laparoscopic sleeve gastrectomy has shown to be one of the safest and most successful current surgical procedures.[3]

Excision of the gastric fundus and a portion of the antrum causes notable anatomical and functional changes that impact gastric acid secretion and motility, specifically accommodation, resulting in gastrointestinal symptoms.[4]

Metabolic-bariatric surgery is highly effective for treating morbid obesity, but it carries a risk of perioperative complications. The IFSO reports a lower incidence of postoperative complications for LSG (2.12%) compared to LRYGB (3.02%). The mortality rate of LSG ranges from 0.18% to 0.27% and is influenced by factors such as age, Sex, comorbidities, and the center's references where the procedure is conducted.[5]

This study aimed to evaluate additional surgical procedure by using omentopexy as augmentation to the suture line of laparoscopic sleeve gastrostomy.

2. Patients and methods

The study obtained ethical approval from the Al-Azhar University ethical committee and written consent from each patient after providing a comprehensive explanation of the operation, including its benefits, drawbacks, dietary requirements after surgery, realistic expectations, and the possibility of conversion to open surgery. Additionally, all potential intra-operative, early, and late postoperative complications were disclosed. Patients were divided into two groups: Group 1 ($n = 50$): underwent LSG procedures with omental fixation with full-thickness stitches. Group 2 ($n = 50$): underwent LSG procedures without omental fixation. All patients were subjected to Peroperative Management, Full history taking including family and Personal history (Name, age, sex, surgical history and patient's comorbidities).

The mean age for Group 1 was 39.05 years with a standard deviation of 5.41, and for Group 2, the mean age was 39.32 years with a standard deviation of 5.79. Group 1 and Group 2 both have a similar Sex distribution, with females comprising the majority at 60% and 62%, respectively, while males make up 40% and 38% in each group.

Routine laboratory investigations required for preoperative assessment in the form of the following investigations: Complete blood Count, Fasting blood Glucose level, Blood urea level and serum creatinine level (renal functions), SGPT and SGOT level (liver functions), PT, PTT and INR (coagulation profile), lipid profile and necessary imaging, ECG and chest X-ray when required. Radiological studies: Plain X-ray or CT volumetry can be used for stomach imaging. All patients were administered a broad-spectrum antibiotic, specifically a 3rd generation cephalosporin, via intravenous drip. This was done once before the surgery and again 2 h after the surgery. Following transection, a thorough inspection of the staple line is conducted to ensure proper formation of staples, particularly at the antrum level where the stomach is at its thickest part.

Postoperative care refers to the medical attention and treatment provided to a patient after a surgical procedure. Pain management was achieved through the administration of IV Acetaminophen, NSADs, and opioids as needed. Postoperative Gastrointestinal upset in the form of nausea and vomiting were evaluated on the first day based on frequency and managed with a single intravenous dose of 4 mg ondansetron. Patients received regular follow-up visits at 3, 6, and 12-month intervals after discharge for clinical examination and nutritional support in the outpatient clinic of general surgery.

Preoperative use of low molecular weight heparins for venous thromboembolism prevention is a significant risk factor for heightened postoperative bleeding.[6] Postoperative symptoms such as nausea, vomiting, fluid intolerance, heart burn, dyspepsia, dysphagia, regurgitation, and chest pain were evaluated in patients at 3, 6, and 12 months after surgery. Postoperative nausea and vomiting were evaluated through patient self-reporting of the frequency of attacks within the previous 24 h during follow-up visits.

3. Result

According to BMI, Group 1 has a mean BMI of 46.03 kg/m^2 with a standard deviation of 4.54, while

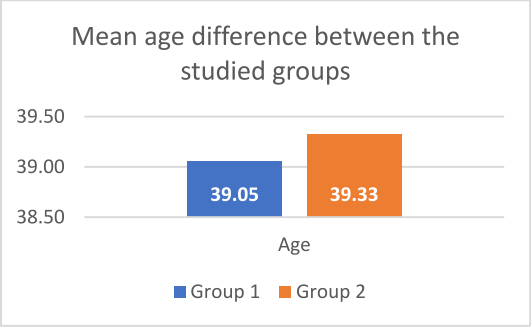

Fig. 1. Mean age differences among 2 studied groups.

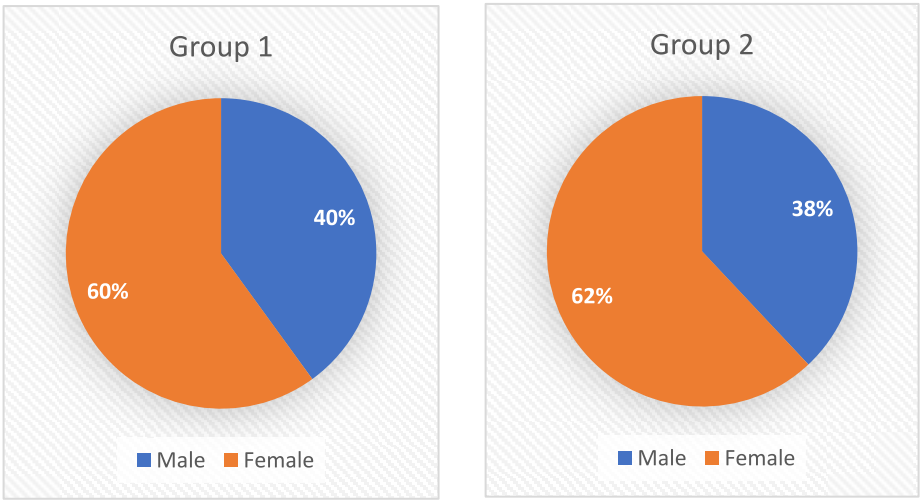

Fig. 2. Sex frequencies in the studied groups.

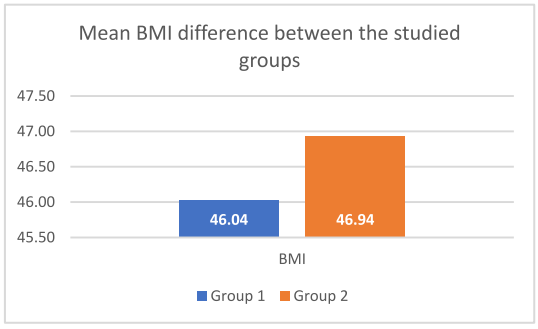

Fig. 3. Mean BMI differences in the studied groups.

Group 2 has a slightly higher mean BMI of 46.93 kg/m^2 with a standard deviation of 4.82 (Figs. 1–3) (Table 1).

According to preoperative comorbidities in the studied groups, diabetes militates represented 18% in Group 1 and 16% in Group 2. Similarly, for hypertension, the proportion of individuals with hypertension was 22% in Group 1 and 20% in Group 2. For GERD, the proportion of individuals with GERD was 8% in Group 1 and 4% in Group 2. For sleep apnea, the proportion of individuals with sleep apnea was 20% in Group 1 and 32% in Group 2 (Fig. 4).

The mean operative time in Group 1 was 58.88 min with a standard deviation of 5.35, while the mean operative time in Group 2 was 53.46 min with a standard deviation of 4.53. The test statistic for the difference in means is 4.802, and the corresponding P value is < 0.001, indicating that the difference in operative time between the two groups is statistically significant. Group 2 had a significantly shorter operative time compared to Group 1. For hospital stay, the mean hospital stay in Group 1 was 1.08 days with a standard deviation of 0.12, while the mean hospital stay in Group 2 was 1.19 days with a standard deviation of 0.31 as in Table 2 (Figs. 5 and 6).

According to postoperative complications, postoperative complications seemed to be higher in Group 2 than Group 1. A statistically significant P value detected when comparing postoperative complications in both studied groups according to leakage, twist and readmission (P value = 0.041, 0.012 and 0.003, respectively), Table 3 (Fig. 7).

Table 4.

Patients were assessed 3 months, 6 months and 12 months postoperative for postoperative symptoms. At 3 months postoperative, Group 2 appears to have

Table 1. Preoperative comorbidities among 2 studied groups.

	Group 1 $n = 50$	Group 2 $n = 50$	Test	P
Diabetes	9 (18%)	8 (16%)	0.071	0.790
Hypertension	11 (22%)	10 (20%)	0.06	0.806
GERD	4 (8%)	2 (4%)	0.709	0.400
Sleep apnea	10 (20%)	16 (32%)	1.871	0.171

Test = Chi-Square.

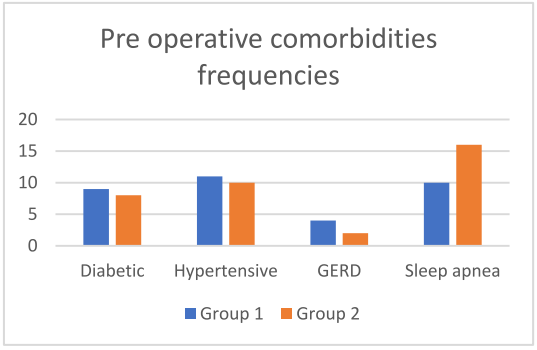

Fig. 4. Preoperative comorbidities in the studied groups.

Table 2. Operative details among 2 studied groups.

	Group 1 $n = 50$	Group 2 $n = 50$	Test	P
Operative Time (minutes)	58.88 ± 5.35	53.46 ± 4.53	4.802	<0.001[a]
Hospital stay (Days)	1.08 ± 0.12	1.19 ± 0.31	0.550	0.582

Test = Mann-Whitney.
[a] = P-value <0.05.

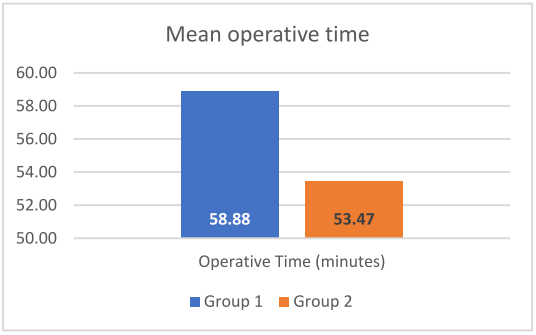

Fig. 5. Operative time difference in the studied groups.

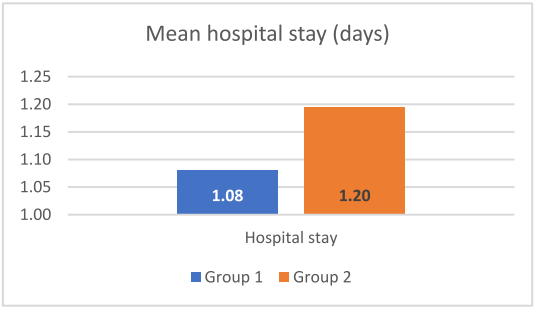

Fig. 6. Mean hospital stay difference in the studied groups.

Table 3. Postoperative compilations among 2 studied groups.

	Group 1 $n = 50$	Group 2 $n = 50$	Test	P
Leakage	0 (0%)	4 (8%)	4.167	0.041[a]
Bleeding	1 (2%)	6 (12%)	3.840	0.05
Twist	0 (0%)	6 (12%)	6.383	0.012[a]
Readmission	1 (2%)	12 (24%)	8.842	0.003[a]

Test = Chi-Square.
[a] = P-value <0.05.

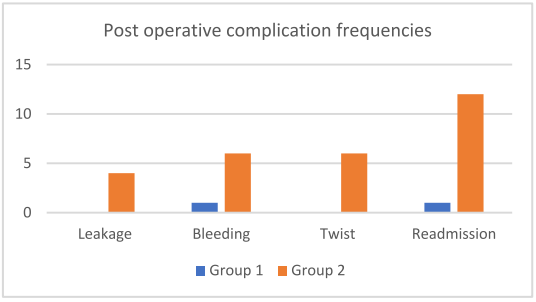

Fig. 7. Postoperative complications frequencies.

Table 4. 3 months postoperative symptoms differences in both groups.

3rd month symptoms	Group 1 $n = 50$	Group 2 $n = 50$	Test	P
Nausea	4 (8%)	18 (36%)	6.261	0.001[a]
Vomiting	2 (4%)	8 (16%)	6.254	0.046[a]
Fluid intolerance	1 (2%)	14 (28%)	5.454	<0.002[a]
Heart burn	3 (6%)	16 (32%)	10.981	0.001[a]
Dyspepsia	2 (4%)	8 (16%)	6.254	0.046[a]
Dysphagia	2 (4%)	6 (12%)	7.521	0.02[a]
Regurgitation	3 (6%)	16 (32%)	10.981	0.001[a]
Chest pain	1 (2%)	12 (24%)	7.231	0.002[a]

Test = Chi-Square.
[a] = P-value <0.05.

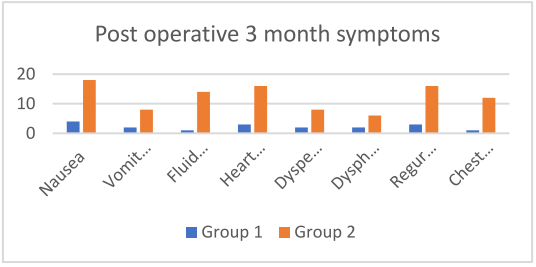

Fig. 8. 3 months postoperative symptoms differences in both groups.

Table 5. 6 months postoperative symptoms differences in both groups.

6th month symptoms	Group 1 $n = 50$	Group 2 $n = 50$	Test	P
Nausea	3 (6%)	4 (8%)	0.154	0.695
Vomiting	1 (2%)	1 (2%)	0.000	1.000
Fluid intolerance	1 (2%)	1 (2%)	0.000	1.000
Heart burn	4 (8%)	6 (12%)	0.447	0.504
Dyspepsia	3 (6%)	3 (6%)	0.000	1.000
Dysphagia	3 (6%)	3 (6%)	0.000	1.000
Regurgitation	3 (6%)	6 (12%)	1.118	0.290*
Chest pain	1 (2%)	4 (8%)	2.022	0.155*

Test = Chi-Square.
* = P value < 0.05.

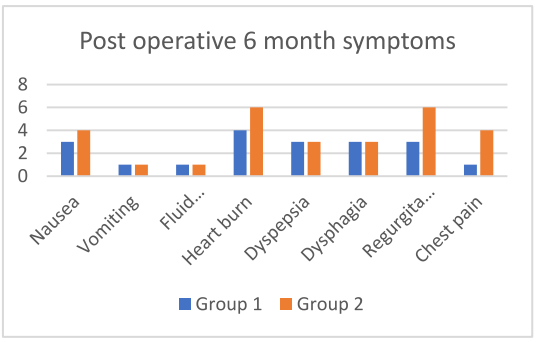

Fig. 9. 6 months postoperative symptoms differences in both groups.

Table 6. 12 months postoperative symptoms differences in both groups.

12th month symptoms	Group 1 $n = 50$	Group 2 $n = 50$	Test	P
Nausea	2 (4%)	3 (6%)	0.212	0.645
Vomiting	0 (0%)	0 (0%)	0.000	1.000
Fluid intolerance	0 (0%)	0 (0%)	0.000	1.000
Heart burn	3 (6%)	5 (10%)	0.549	0.459
Dyspepsia	2 (4%)	2 (4%)	0.000	1.000
Dysphagia	2 (4%)	2 (4%)	0.000	1.000
Regurgitation	2 (4%)	5 (10%)	1.425	0.233
Chest pain	0 (0%)	3 (6%)	4.252	0.039[a]

Test = Chi-Square.
[a] = P-value <0.05.

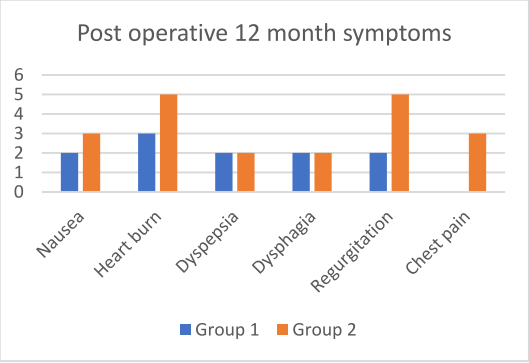

Fig. 10. 12 months postoperative symptoms differences in both groups.

a higher prevalence of all symptoms compared to Group 1. Statistically significant P value detected between the studied groups in all studied symptoms (nausea, vomiting, fluid intolerance, heart burn, dyspepsia, dysphagia, regurgitation, chest pain) at 3 months post operation (Fig. 8).

At 6 months postoperative Table 5, Group 2 appears to have a higher prevalence of symptoms compared to Group 1 according to nausea, heart burn, regurgitation and chest pain (Fig. 9).

At 12 months postoperative Table 6, Group 2 appears to have a higher prevalence of symptoms compared to Group 1 according to nausea, heart burn, regurgitation and chest pain. A statistically significant P value (0.039) detected between the two studied groups in chest pain (Fig. 10).

As mentioned in Table 7, Comparison between the two groups according to preoperative and postoperative data showed reduction in mean BMI in both groups with no statistically significant difference. Mean BMI in group 1 was 46.03 kg/m^2 preoperative compared to 32.2 kg/m^2 postoperative. Mean BMI in group 2 was 46.93 kg/m^2 preoperative compared to 33.5 kg/m^2 postoperative. Frequencies of diabetes, hypertension, GERD, and sleep apnea were lower in both groups postoperative than preoperative (Figs. 11 and 12).

Table 7. Compare preoperative data with 12 months postoperative data in the studied groups.

	Time	Group 1 $n = 50$	Group 2 $n = 50$	Test	P
BMI, M ± SD	Preoperative	46.03 ± 4.54	46.93 ± 4.82	Z = 0.860	0.346
	Postoperative	32.2 ± 3.9	33.5 ± 4.2	Z = 0.874	0.473
Diabetes, n(%)	Preoperative	9 (18%)	8 (16%)	0.071	0.790
	Postoperative	2 (4%)	3 (6%)	0.212	0.645
Hypertension, n(%)	Preoperative	11 (22%)	10 (20%)	0.06	0.806
	Postoperative	5 (10%)	6 (12%)	0.102	0.749
GERD, n(%)	Preoperative	14 (28%)	15 (30%)	0.709	0.400
	Postoperative	2 (4%)	5 (10%)	0.892	0.183
Sleep apnea, n(%)	Preoperative	10 (20%)	16 (32%)	1.871	0.171
	Postoperative	4 (8%)	8 (16%)	1.421	0.233

Z = Mann-Whitney.
Test = Chi-Square.

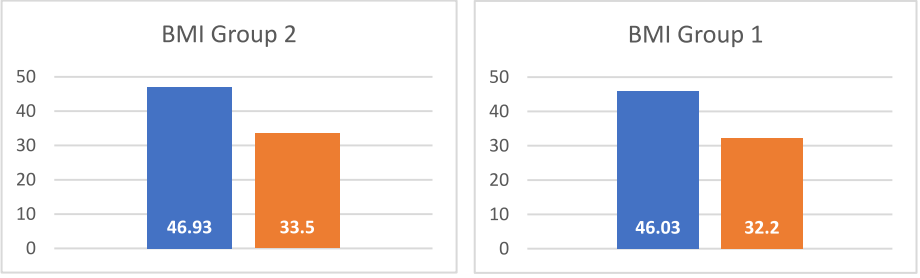

Fig. 11. BMI difference preoperative and postoperative in both groups.

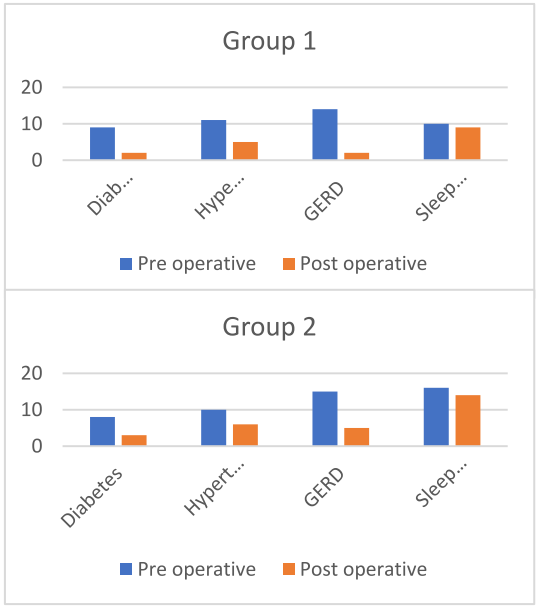

Fig. 12. Preoperative and postoperative data difference in both groups.

4. Discussion

Initially, the LSG was considered a viable independent bariatric surgery, rather than solely serving as the initial phase of a two-stage laparoscopic Roux-en-Y gastric bypass. Hess introduced sleeve gastrectomy (SG) in 1988 as a part of the malabsorptive procedure, biliopancreatic diversion with duodenal switch. The favorable outcomes of SG, including weight loss and comorbidity resolution in the initial stage, along with a low incidence of complications, have stimulated the worldwide adoption and rapid proliferation of SG as a primary surgical intervention.[7] LSG is less complex and has a lower learning curve compared to alternative bariatric procedures. However, the surgery is not without its risks, including an increased risk of problems, such as bleeding (5%), leakage (1–3.9%), stenosis (2–5%), sleeve twisting, and worsening of symptoms associated with gastroesophageal reflux disease (GERD).[8] Several techniques were proposed for treating or reinforcing the staple line, such as staple line suturing, buttressing or omentopexy (OP) (158). In line with the findings of our research, 119 patients went through the LSG procedure. Patients were divided into two groups at random: Group A ($n = 60$) had an LSG procedure followed by a modified omentopexy, whereas Group B ($n = 59$) had an LSG procedure but no omentopexy was performed. They reported that the mean BMI for group A was 45.5 kg per square meter, whereas group B had a mean that was slightly higher at 46.32 kg per square meter.[9]

In our study, the mean operative time in Group 1 was 58.88 min with a standard deviation of 5.35, while the mean operative time in Group 2 was 53.46 min with a standard deviation of 4.53. The test statistic for the difference in means is 4.802, and the corresponding P value is < 0.001, indicating that the difference in operative time between the two groups is statistically significant. Group 2 had a significantly shorter operative time compared to Group 1. For hospital stay, the mean hospital stay in Group 1 was 1.08 days with a standard deviation of 0.12, while the mean hospital stay in Group 2 was 1.19 days with a standard deviation of 0.31.

This study retrospectively analyzed data from 200 laparoscopic sleeve gastrectomy (LSG) procedures, which were divided into two groups. Group A did not use omental fixation but utilized titanium clips to control bleeding points along the suture line. Group B used omental fixation with full-thickness stitches above and below the incisura, and also used titanium clips to control bleeding points if present. The study found that omental fixation using full-thickness stitches is effective in reducing bleeding and leakage along the staple line during laparoscopic sleeve gastrectomy, despite slightly increasing the duration of the operation.[10]

This study prospectively assessed early complications following laparoscopic sleeve gastrectomy during the designated follow-up period. Ninety-six cases were included in Group A, which received omentopexy with Glubran®2. The study included a control group of 90 consecutive patients, and found that the follow-up data indicated a significant reduction in overall complication rate in the case group.[10]

Our study aimed to investigate the efficacy of omentopexy in reducing GERD incidence following LSG. This retrospective cohort study compared 201 patients (145 females) in two groups: Group A ($n = 100$) underwent LSG with omentopexy, and Group B ($n = 101$) underwent LSG without omentopexy. It was observed that mean BMI had statistically significant difference between two studied groups. BMI decreased more in Group A after One year of surgery.[11]

In a controlled study conducted at a single bariatric center, the long-term outcomes and clinical relevance of LSG and laparoscopic greater curvature plication (LGCP) were compared. BMI is the cornerstone for evaluating our results. The study found that both groups experienced a significant reduction in BMI during the first year. The LSG group showed a significant decrease in BMI, with an estimated reduction of −9.22 kg/m and a

95% confidence interval ranging from −10.04 to −8.41 kg/m).[12]

LSG was initially employed as a component of a two-stage approach for individuals with a heightened risk of undergoing gastric bypass surgery. The Gastric Sleeve is currently utilized as a primary restrictive weight loss procedure. This surgical procedure involves longitudinal removal of 70–85% of the stomach, resulting in a sleeve-shaped stomach with a volume of 70–100 cc (equivalent to 1/4–1/2 cup or 2–4 oz).[13]

The LSG is considered an option for the elderly patients due to its low risk of complications and significant improvements in weight loss and comorbidities.[14]

4.1. Conclusion

Sleeve gastrectomy and omentopexy are safe procedures. The omentopexy has role in reducing complications such as the probability of torsion, volvulus, and obstruction of gastric tube it also improve postoperative nausea and vomiting with notable decrease in the rate of leak and hemorrhage. The omentopexy has no any additional cost on the patient with no significant increase on time of surgery. Preoperative and postoperative data showed reduction in mean BMI in both groups.

Further clinical studies are needed with multicenter cooperation to validate our findings. Large sample size studies are required. Omentopexy is a crucial component of laparoscopic sleeve gastrectomy and should be regarded as a standard procedure. Additional studies are needed for study the effect of age, sex, and comorbidities on the results.

Funding

None.

Conflicts of interest

None.

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