

Evaluation Of The Efficacy And Safety Of Using Chemical Sealing Agent In Reinforcement Of Stable Line In Laparoscopic Sleeve Gastrectomy

Hisham W. A. Hassan, Tarek Z. M. Morsy, Mohamed A. S. Ahmed *

Department of General Surgery, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt

Abstract

Background: Worldwide, the epidemic of morbid obesity is posing a serious threat to public health. Bariatric surgery is still the go-to option for many patients after they've tried and failed with more conservative treatments, including changing their eating habits, increasing their physical activity, and improving their overall lifestyle.

Aim: In order to determine whether the use of Glubran, a chemical sealing agent, to reinforce the stable line during laparoscopic sleeve gastrectomy (LSG) is safe and effective in preventing early complications such as leaks and bleeding.

Subjects and methods: From September 2024 to March 2025, 25 patients with BMIs more than 40 who had LSG at the General Surgery Department, Al-Hussien and Sayed Galal, Al-Azhar University Hospitals in Cairo, participated in this combined prospective and retrospective cohort study.

Results: At 3 months postoperative, Group-2 appears to have a higher prevalence of all symptoms compared to Group-1. In all examined symptoms (nausea, vomiting, fluid intolerance, heartburn, dyspepsia, dysphagia, regurgitation, and chest pain) at three months after surgery, a statistically significant p-value was found between the groups. In terms of nausea, heartburn, regurgitation, and chest discomfort, Group-2 seemed to have a larger prevalence of symptoms than Group-1 at six months after surgery. In terms of nausea, heartburn, regurgitation, and chest discomfort, Group-2 seemed to have a larger prevalence of symptoms than Group-1 at 12 months after surgery.

Conclusion: Both omentopexy with Glubran and gastrectomy (SG) are safe operations. The risk of problems like torsion, volvulus, and stomach tube blockage can be decreased using omentopexy. Additionally, it reduces the rate of leaks and hemorrhages and helps with postoperative nausea and vomiting.

Keywords: LSG; Chemical sealing; Reinforcement; Stable line

1. Introduction

The two types of bariatric procedures are malabsorptive, which limit the amount of nutrients absorbed (e.g., biliopancreatic diversion), restrictive, which limit the amount of food consumed (e.g., adjustable gastric banding and sleeve gastrectomy), or a combination of both (e.g., Roux-en-Y gastric bypass surgery).¹

Laparoscopic sleeve gastrectomy (LSG) is still one of the safest and best surgical procedures available today for treating morbid obesity.²

Significant anatomical and functional changes result from the removal of the gastric fundus, a sizable part of the body, and a portion of the antrum. These changes impact both gastric acid secretion and motility, particularly accommodation, which may cause gastrointestinal discomfort.³

The potential risk factors for complications after an LSG have received a lot of attention in the past ten years, with a focus on strategies to lessen suture-line leaks. Changing the bougie's size, its distance from the pylorus, and various staple-line reinforcing methods have all been part of these strategies.⁴

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* Corresponding author at: General Surgery, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt.

E-mail address: Mohamedawwad6351@yahoo.com (M. A. S. Ahmed).

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proving that Glubran spray works well when used in conjunction with an omentopexy. Often used in endoscopy and surgery, especially for the emergency treatment of patients with upper gastrointestinal bleeding, this modified glue creates an adhesive, hemostatic seal when nebulized and sprayed on tissues. It also serves as an antiseptic barrier against the most prevalent pathogenic agents.⁵

The purpose of this study was to assess the safety and effectiveness of reinforcing the stable line in LSG with a chemical sealing agent (Glubran) in order to prevent early complications like bleeding and leaks.

2. Patients and methods

Twenty-five patients with a BMI of more than 40 had LSG at the General Surgery Department, Al-Hussien and Sayed Galal, Al-Azhar University Hospitals in Cairo, between September 2024 and March 2025 as part of this combined prospective and retrospective cohort study.

Inclusion criteria:

Patients aged between 18 and 55 years, indicated for LSG, with the absence of active gastric disease, and a BMI of more than 35 with comorbidities or more than 40 without comorbidities.

Exclusion criteria:

Patients younger than 18-years, patients operated for other bariatric surgeries rather than LSG, patients with redo LSG, patient refusal to be included with in the study, and patients with any medical diseases affecting coagulation or healing.

Ethical considerations:

Every patient gave their written consent after being fully informed about the operation, its benefits and drawbacks, postoperative dietary guidelines, reasonable expectations, the possibility of switching to open surgery, and all potential intraoperative, early, and late postoperative complications. The Al-Azhar University ethical committee granted ethical approval.

Two patient groups were formed: Group 1 (n=12) received LSG operations with glubran spray for omental fixation, while Group 2 (n=13) received LSG procedures without omental fixation.

Every patient underwent a complete history taking, a preoperative evaluation, and the detection of various morbid obesity complications, such as hypertension, diabetes mellitus, and sleep apnea. Routine laboratory tests were necessary for preoperative evaluation, and all patients received intravenous drips of a broad-spectrum antibiotic, a third-generation cephalosporin, with one dose administered before surgery and another two hours after.

Surgical techniques:

The patient was in a supine posture during both procedures, and the surgeon stood between the patient's legs while they were under general anesthesia. Then, using a Veress needle in the left hypochondrium, a pneumoperitoneum was created to maintain a 15 mmHg intra-abdominal pressure for carbon dioxide in all patients. Five ports were placed in the upper abdomen in a "diamond-shaped" arrangement using a five-port approach after the pneumoperitoneum was created.

A ten-millimeter camera port is located in the center of the body, approximately two palm widths below the xiphi-sternum. Another ten-millimeter port is located in the center of the body, approximately two palm widths below the xiphi-sternum, at the lower border of the liver. The right working port is twelve millimeters below the right costal margin, and the left working port is twelve millimeters below the left costal margin. The left anterior axillary line has a five-millimeter assistant port that is twelve to fourteen finger breadths below the left costal margin.

Sleeve gastrectomy:

A window is divided at the point where the greater curvature and larger omentum meet, around 10 cm from the pylorus. The gastroepiploic, short gastric, and posterior fundic arteries are split with a harmonic scalpel around 4 cm proximal to the pyloric ring and up to the angle of His. As a post-dissection procedure, the anesthesiologist will insert a 36 Fr bougie into the stomach via the oesophagus. The surgeon then uses the lesser curvature to guide the instrument into the duodenal bulb and pyloric canal. Gastric transection begins four to six centimeters from the pylorus.

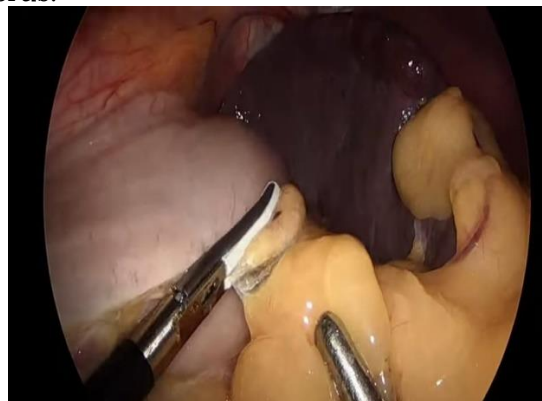


Figure 1. Devascularization of the stomach.

The right midepigastic port is used to insert and shoot a 60-mm piece of green or gold cartilage across the antrum. In the direction of the gastroesophageal junction, the second stapler is positioned 1-2 cm from the smaller curvature's edge. The stomach transection is finished by firing the stapler in succession along the bougie's edge on the smaller curvature.

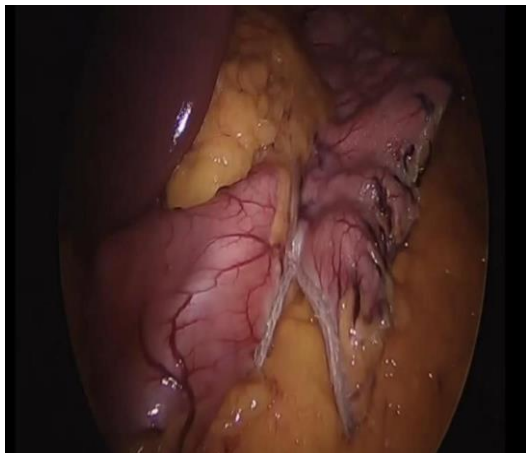


Figure 2. Gastrectomy by stapler 6 cm proximal to the pylorus.

The entire staple line is examined closely after the transaction is finished to ensure that the staples are properly created, particularly at the antrum, where the stomach is thickest. After that, one of the 12mm port sites is used to remove the transected portion of the stomach. Following the completion of the transaction, the hemostasis is examined, the bougie is withdrawn, and a nasogastric tube is inserted into the stomach to administer methylene blue to ensure there is no leak. After inserting a 22 Fr Nelaton catheter at the staple line, we withdrew the camera and all ports. In order to prevent hernias, Vicryl 0 was used to close all fascial flaws at ports 10, 12, and 15. After recovering, the patient is moved to the intensive care unit or surgical floor for prompt postoperative treatment.

In the group in the omentopexy with Glubran:

As an additional step, we covered all of the rime sutures with a layer of synthetic sealant and selected an omentum flap to cover it. Using an omentum flap, we meticulously prevented any stress on the resected stomach or gastric rotation.

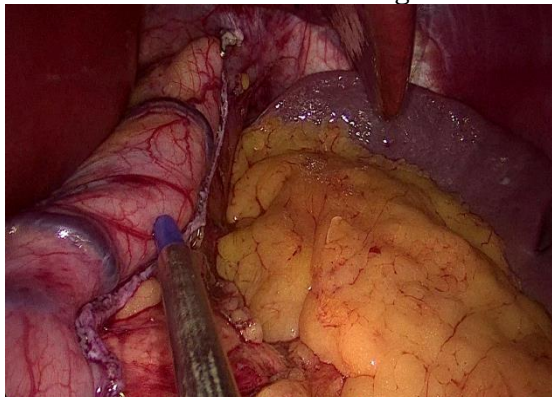


Figure 3. Omentopexy with glubran spray.

Follow up:

Following discharge, all patients had routine follow-up appointments at 3-, 6-, and 12-month intervals for postoperative clinical evaluation and nutritional support in the general surgery outpatient clinic. Patients' postoperative symptoms, such as nausea, vomiting, fluid

intolerance, heartburn, dyspepsia, dysphagia, regurgitation, and chest discomfort, were evaluated three, six, and twelve months after surgery. At follow-up appointments, postoperative nausea and vomiting were evaluated by asking the patient how many episodes they had in the previous day.

Statistical analysis:

Data was updated, tagged, and tabulated using IBM Corp.'s Statistical program for Social Science (2017. IBM SPSS Statistics for Windows 25.0 (Armonk, NY: IBM Corp.). Each parameter's data was presented and analyzed accordingly. Data distribution normality was tested with the Shapiro-Wilk test. Average and SD for numerical data. Non-numerical data frequency and proportion. A non-parametric variable difference between study groups was tested for statistical significance using the Mann-Whitney Test (U-test). The Chi-Square test assessed the relationship between two qualitative variables. Determine the connection between two quantitative variables. P-value <0.05 at 95% confidence interval indicates significance.

3. Results

Table 1. Demographic data in the studied groups.

	GROUP-1 N=12	GROUP-2 N=13	TEST	P
AGE (YEARS), M±SD	39.05±5.41	39.32±5.79	Z=0.176	0.860
GENDER, N(%)				
MALE	20(40%)	19(38%)	X ² =0.42	0.838
FEMALE	30(60%)	31(62%)		
BMI(KG/M ²), M±SD	46.03±4.54	46.93±4.82	Z=0.860	0.346

Z=Mann-Whitney test, X²=Chi-Square

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 gender distribution, with females comprising the majority at 60% and 62%, respectively, while males make up 40% and 38% in each group. According to BMI, Group-1 has a mean BMI of 46.03kg/m² with a standard deviation of 4.54, while Group-2 has a slightly higher mean BMI of 46.93kg/m² with a standard deviation of 4.82,(table 1).

Table 2. Three-months post-operative symptoms differences in both groups.

3 RD MONTH SYMPTOMS	GROUP-1 N=12	GROUP-2 N=13	TEST	P
NAUSEA	4(8%)	18(36%)	6.261	0.001*
VOMITING	2(4%)	8(16%)	6.254	0.046*
FLUID INTOLERANCE	1(2%)	14(28%)	5.454	<0.002*
HEART BURN	3(6%)	16(32%)	10.981	0.001*
DYSPEPSIA	2(4%)	8(16%)	6.254	0.046*
DYSPHAGIA	2(4%)	6(12%)	7.521	0.02*
REGURGITATION	3(6%)	16(32%)	10.981	0.001*
CHEST PAIN	1(2%)	12(24%)	7.231	0.002*

Test= Chi-Square, * =p-value <0.05

Patients were assessed 3months, 6months and 12months post-operative for post-operative symptoms. At 3months post-operative, Group-2 appears to have a higher prevalence of all symptoms compared to Group-1. At three months after surgery, there was a statistically significant p-value found between the groups for all

symptoms, including nausea, vomiting, fluid intolerance, heartburn, dyspepsia, dysphagia, regurgitation, and chest discomfort,(table 2; figure 5).

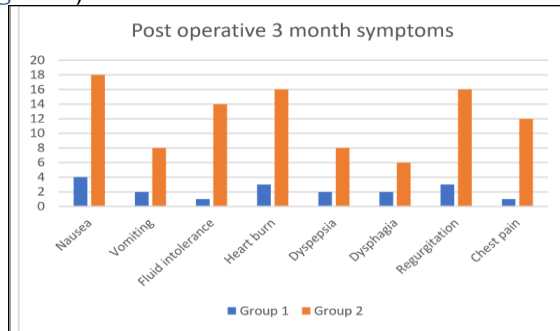


Figure 5. Three-months post-operative symptoms differences in both groups.

Table 3. Six-months post-operative symptoms differences in both groups.

6 TH MONTH SYMPTOMS	GROUP-1 N=12	GROUP-2 N=13	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

At 6months post-operative, Group-2 appears to have a higher prevalence of symptoms compared to Group-1 according to nausea, heart burn, regurgitation and chest pain,(table 3; figure 6).

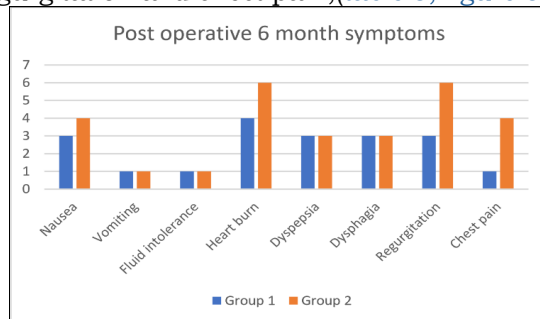


Figure 6. Six-months post-operative symptoms differences in both groups.

Table 4. Twelve-months post-operative symptoms differences in both groups

12 TH MONTH SYMPTOMS	GROUP-1 N=12	GROUP-2 N=13	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*

Test=Chi-Square, *=p-value <0.05.

At 12months post-operative, 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, (table 4; figure 7).

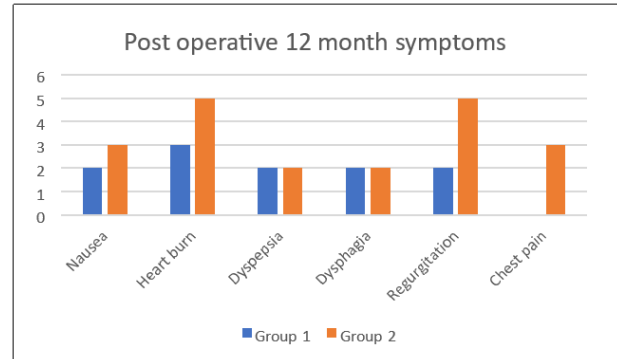


Figure 7. Twelve-months postoperative symptoms differences in both groups.

Table 5. Compare pre-operative data with 12 months post-operative data in the studied groups.

	TIME	GROUP-1 N=12	GROUP-2 N=13	TEST	P
BMI, M±SD	Pre operative	46.03±4.54	46.93±4.82	Z=0.860	0.346
	Post operative	32.2±3.9	33.5±4.2	Z=0.874	0.473
DIABETES, N(%)	Pre operative	9(18%)	8(16%)	0.071	0.790
	Post operative	2(4%)	3(6%)	0.212	0.645
HYPERTENSION, N(%)	Pre operative	11(22%)	10(20%)	0.06	0.806
	Post operative	5(10%)	6(12%)	0.102	0.749
GERD, N(%)	Pre operative	14(28%)	15(30%)	0.709	0.400
	Post operative	2(4%)	5(10%)	0.892	0.183
SLEEP APNEA, N(%)	Pre operative	10(20%)	16(32%)	1.871	0.171
	Post operative	4(8%)	8(16%)	1.421	0.233

Z=Mann-Whitnry, Test=Chi-Square

When comparing the two groups' pre- and post-operative data, which showed a drop in mean body mass index (BMI), there was no statistically significant difference. Group 1 had a mean body mass index (BMI) of 46.03 kg/m² before surgery and 32.2 kg/m² after. Group 2 had a mean body mass index (BMI) of 46.93 kg/m² before surgery and 33.5 kg/m² after. Before and after surgery, both groups had lower rates of diabetes, hypertension, GERD, and sleep apnea, (table 5).

4. Discussion

A higher risk of death and morbidity from both communicable and noncommunicable diseases is associated with being overweight. Obesity has been a more widespread health concern in recent decades, according to research.⁶

One can be considered obese if their waist circumference, skinfold thickness, bioimpedance, or BMI (weight in kilograms divided by the square of height in meters) is all high enough. When it comes to long-term management, bariatric procedures are your only choice.⁷

Before it became known as the first stage of a two-stage laparoscopic Roux-en-Y gastric bypass, LSG was considered a viable bariatric surgery in its own right. The biliopancreatic diversion with duodenal switch, a malabsorptive operation initially performed by Hess in 1988, included SG.

Due to its minimal complication rate, encouraging weight loss and comorbidity resolution as a first stage, and promising overall results, SG has emerged and spread tremendously quickly around the world as a stand-alone surgery.⁸

In the current study, according to BMI, Group-1 has a mean BMI of 46.03 kg/m² with a standard deviation of 4.54, while Group-2 has a slightly higher mean BMI of 46.93 kg/m² with a standard deviation of 4.82.

In agreement with the results of the current study, Elghandour et al.,⁹ comprised 119 people who had LSG. Group-A (n=60) patients had LSGs followed by modified omentopexies, while Group-B (n=59) patients had LSGs but no omentopexies. Patients were randomly assigned to these two groups. The average body mass index (BMI) for Group A was 45.5 kg/m², while it was marginally higher for Group B at 46.32 kg/m².

Zarzycki et al.,¹⁰ Meta-analysis of studies comparing LSG with and without omentopexy found no statistically significant differences in body mass index (BMI).

According to preoperative comorbidities in the studied groups, diabetes mellitus 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.

In their study, Elghandour et al.⁹ identified 10 DM patients (16.6%) in group A and nine patients (15.2%) in group B who had hypertension. In group A, 15 patients (or 25%), and in group B, 14 patients (or 23.7%), preoperative GERD 4 patients (6.6%) in group A and three patients (5%), both of whom had sleep apnea. Twelve patients in group A and twenty-two in group B, or 23.3% and 37.2%, respectively.

In the present study, patients were assessed 3months, 6months, and 12 months postoperatively for postoperative symptoms. At 3months postoperative, Group-2 appears to have a higher prevalence of all symptoms compared to Group-1. Three months after surgery, a statistically significant p-value was found between the groups for all symptoms. These included nausea, vomiting, fluid intolerance, heartburn, dyspepsia, dysphagia, regurgitation, and chest discomfort. Symptoms such as nausea, heartburn, regurgitation, and chest pain seem to be more common in Group-2 than in Group-1 at 6 months postoperative. In terms of nausea, heartburn, regurgitation, and chest pain

after 12 months postoperatively, Group 2 seems to have a greater prevalence than Group 1. A statistically significant p-value (0.039) in chest pain was detected between the two studied groups.

In consistent with our results, the results of Chen et al.,¹¹ Omentopexy patients had far lower incidence of nausea (P=0.01), vomiting (P=0.03), and reflux (P=0.002), according to the meta-analysis.

Also, Saber et al.,¹² looked forward to seeing if any problems arose during the follow-up period following LSG.

In line with the results of this study, Nosrati et al.,¹³ investigated the possibility that omentopexy may lessen the occurrence of GERD following LSG. This retrospective cohort study examined 201 patients, 145 of whom were female.

Ibrahim et al.,¹⁴ conducted a matched CC controlled single-bariatric center study comparing the long-term results and clinical significance of laparoscopic greater curvature plication (LGCP) with laparoscopic smaller incision (LSG). Results showed that both groups' body mass indexes dropped significantly within the first year. The LSG group was found to have an estimated reduction in body mass index of 9.22 kg/m; the 95% confidence interval for this estimate is - 10.04 to -8.41 kg/m.

Limitations: The study's retrospective approach, which could introduce analytic bias, limited sample sizes, and lack of comparison with other staple line reinforcing methods are some of its drawbacks.

4. Conclusion

Glubran omentopexy and SG are both safe procedures. In addition to lowering the risk of torsion, volvulus, and gastric tube blockage, omentopexy helps alleviate postoperative nausea and vomiting and significantly reduces the incidence of leaks and hemorrhages. There is no noticeable increase in operation time or extra expense for the patient when Glubran is used for omentopexy. The average body mass index (BMI) decreased in both groups after surgery compared to before.

Disclosure

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All authors have a substantial contribution to the article

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Conflicts of interest

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