Academic International Journal of Medical Science
ISSN: 2984-7583
Aca. Intl. J. Med. Sci. 2024; 1(2) 24-34
Journal homepage: www.aipublishers.org/aijms

Laparoscopic Sleeve Gastrectomy: Suture or not Suture Staple Line.

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Article Info.
Article history:
Received 12 March 2024
Revised 9 April 2024
Published 31 May 2024
Keywords:
Laparoscopic sleeve gastrectomy (LSG), Staple line reinforcement (SLR), Over-sewing
How to cite:
Sabah Kareem Al hussaini, Marwa Issa Yaseen. Laparoscopic Sleeve Gastrectomy: Suture or not Suture Staple Line. *Aca. Intl. J. Med. Sci. 2024; 1(2) 31-4.*
DOI:
https://doi.org/10.59675/M217

Abstract:

Background The severity of postoperative complications is the main disadvantage of laparoscopic sleeve gastrectomy (LSG). Staple line reinforcement (SLR) is strongly advocated. Recently, oversewing has been proposed as a cost-effective and helpful method for reinforcing the staple line. **Aim of the study:** To evaluate the benefit of staple lines over sewing in decreasing postoperative complications and their severity.

Patients and methods: One hundred laparoscopic surgery group (LSG) patients were randomly assigned to either group (A) without staple line over sewing or (B) with staple line over sewing from January 2022 to January 2023 in a prospective study conducted at three hospitals (Alhussein Medical City, Alkafeel Private Hospital, and Zain Alabdin Private Hospital). We want to learn if laparoscopic sleeve gastrectomy patients benefited more from a staple line than a sewn one. **Results:** The most frequently reported complication was bleeding, which was reported in two patients in group A and one patient in group B, respectively; vomiting was reported more frequently in group B. The cross-tabulation between complications and comorbidities revealed no significant association between them. The hospital stay was the same in both groups except for patients with non-surgical complications, which need more hospital stay time. In regard to the severity of complications, we found that complicated cases in group A needed more hospital stays and more interventions to control the problem in comparison to those in group B.

Conclusion: Laparoscopic sleeve gastrectomy with staple line over sewing is a technique that may decrease early complications and the severity of complications. There was no significant difference between the two groups (with and without staple line over sewing) in regard to the relation between complications on one side and the comorbidity on the other.

1. Introduction

Over the past few decades, obesity has increased in prevalence among people worldwide. The World Health Organization (WHO) declared the rising obesity rates to be a global epidemic about 20 years ago. In 2016, it was estimated between 13% (650 million) and 39% (1.9 billion) of people globally were overweight or obese, with obesity prevalence reaching 50% in some areas [1-3]. Co-morbidities associated with obesity include cancer risk, orthopedic, adrenal, gastrointestinal, and cardiovascular conditions [4]. Moreover, obesity is a major contributor to reduced life quality, disability, and social disadvantages and has a strong correlation with several socioeconomic problems. (5) Over the past 20 years, bariatric surgery's significance in treating obesity, its comorbidities, and its problems has become well-established.

The techniques used in the field of bariatric surgery are still being updated, and efforts are ongoing to enhance patients' outcomes in terms of weight loss and comorbidity management.

Almost 90% of patients get better diabetes control following bariatric surgery through the reduction of both blood sugar levels and the dosage of medication necessary for glycemic management, a remission rate of 78% was attained [6, 7]. In recent study, there has been an increase in the implementation of sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB) as a result of their exceptional performance in managing type 2 diabetes mellitus (T2DM) and facilitating weight reduction [8]. According to a prospective meta-analysis conducted by Parikh et al., the average anticipated weight reduction (EWL) was 56.7% one year and 70.1% three years following laparoscopic sleeve gastrectomy (LSG). In [9] LSG, or sleeve laparoscopic gastrectomy, is a type of bariatric surgery. To reduce stomach capacity and decrease consumption, it entails excising about 80% of the stomach, including the fundus and most of the body. Moreover, there is less ghrelin in the blood. It is believed that the combination of lower ghrelin levels and less food intake makes this technique more successful [10].

The American Society for Metabolic and Bariatric Surgery designated laparoscopic self-glands (LSG) as a major surgical method for the treatment of morbid obesity in 2009 [11].

Along with these significant advantages, this procedure also maintains gastrointestinal continuity without the need for an anastomosis, prevents malabsorption, eliminates implanted, non-absorbable material, and may be convertible to other operations. In [12]

However, there are several difficulties with LSG. The least severe ones are stomach tube dilatation or stricture, inadequate weight loss, and gastroesophageal reflux disease [13–15]. Bleeding and leakage from the gastric staple line are the most dangerous and feared consequences [16–17]. Significant morbidity may result from these occurrences, including a protracted hospital stay for conservative care, stenting, the requirement for a total gastrectomy, or even death [17–18].

According to reports, the rate of major bleeding from the staple line that necessitates a blood transfusion or reoperation ranges from 1.1% to 8.7% [11].

Stapler-line leaks are the most hazardous and potentially fatal consequence; a mean frequency of 2.7% was reported from 24 studies including 1749 patients [19]. Usually, leaks happen directly below the

gastroesophageal junction, possibly as a result of the stomach's vertical tabularization, which raises internal pressure [20].

If this consequence is not detected and treated promptly, it may result in severe abdominal sepsis. From there, the patient may die from multiorgan failure or develop a persistent gastric fistula [22–21].

RYGB surgery is typically thought to be more intrusive than sleeve gastrectomy [23]. One of its most difficult side effects is still the possibility of bleeding and staple line leakage. A retrospective assessment of 4888 patients found that the mean risk was 2.6% and the leak rate was 7% [24].

There is currently no agreement on the most effective way for lowering the danger of leaking, despite the fact that numerous research have evaluated different approaches to making the staple line secure [25].

Staple-line reinforcement (SLR) has been proposed as a method to reduce the occurrence of both bleeding and leak after LSG. SLR can be by several different methods: over sewing the staple-line, buttressing it

2. Patients and methods:

2.1 Study design and setting:

Alhussein Medical City, Al-Kafeel Private Hospital, and Zain Alabdeen Private Hospital participated in a cohort study from January 2022 to January 2023. data analysis, with 100 LSG split into two groups: group (B) with staple and line over stitching; group (A) does not have a staple.
The advantage of staple lines versus sewing in laparoscopic sleeve gastrectomy is what we are investigating.2.2 patients: Three hospitals handled 100 LSG cases. The patients were split into two groups and monitored for six months following surgery**:** **Group A**: 30 cases were performed without staple line over sewing, males were 15 and females were 15 cases, mean age was (32.9+-6.64), the mean BMI*&. (45.2+-5.77), as shown in. table _1.
Diabetes mellitus was one case, and Hypertension two cases.
Group B: 70 cases were performed with staple line over.
sewing (suturing anterior and posterior to the staple line.
(plication) with PDS (2-0) stitch's till 4 cm from pylorus The males were 24 and females were 46 cases, the mean age was (range 33.26+-9.13), the mean BMI (range 44.16+-6.49) Diabetic mellitus was one case, Hypertension was 3 cases.

2.3 Inclusion criteria:

Morbidly obese individuals with BMI >40 kg/m2 or BMI >35 kg/ m2 with one or more comorbidities.

2.4 procedure:

2.4.1 pre-operative preparation:

A complete history, clinical examination, and laboratory blood tests (total blood picture, liver function, viral hepatitis markers, kidney function, random blood sugar, glycosylated hemoglobin, thyroid profile, and coagulation profile), were performed on every patient whose BMI was greater than or equal to 35 kg/m2.
Each individual was evaluated for cardiac function using an ECG and echocardiogram, as well as pelvic and abdominal ultrasonography, chest radiography, and pulmonary function testing.

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2.4.2 The surgical technique:

All patients received 1 g of ceftriaxone, a third-generation cephalosporin, at the time of anesthesia induction and 4000 IU of enoxaparin 12 hours before to the surgery, which was performed under general anesthesia. The assistant was on the left side, the camera operator was to the right of the patient, and the surgeon was positioned between the patient's legs while they were in a supine position. The four-port access method was applied. A supraumbilical incision made 10 cm from the xiphoid process allowed for the insufflation of the peritoneal cavity, which was carried out up to 14–15 mmHg with the use of a camera scope and 12 mm visiport. 10. This port was then used for stapling and dissection. A 30-degree angled laparoscope was utilized for the general laparoscopic procedure after inserting the 10 mm camera port. Two 5 mm working ports were placed in the same transverse plane above the camera port, one in the left midclavicular line and the other 2 cm to the left.. The liver's left lobe was retracted and the entire stomach was visible once the ports were set up. Next, utilizing cutting-edge bipolar technology to divide the gastroepiploic vessels (5mm ligasure; Covidien type), the process was initiated. began 4 centimeters away from the pylorus. To guarantee full mobility of the gastric fundus, dissection proceeded in the direction of the gastric fundus with the division of short gastric arteries until full visibility of the left crus of the diaphragm was attained. Figure 2.1 At this point, extra caution was exercised due to the spleen's close vicinity, and dissection was used to separate the stomach's posterior wall from the surrounding tissue.

Following the insertion of a 36-F calibration tube (bogie) and cannulating the pylorus up to the first segment of the duodenum, the gastric sleeve is created.

The stapling procedure involved linear cutting green reload 60–4.1 mm and then using blue of 60–3.6 mm (Covidien type), which began 4 cm from the pylorus and ended at an angle of 1 cm away from the gastroesophageal junction. The bogie was used as a guide to ensure that the staple line did not stray. Figure 1.2 In group A, the staple line was not oversealed, and a titanium clip was used if a bleeding site was found. SLR was performed in group B by oversealing with continuous PDS 2/0 suture material, removing only the gastric sleeve's serosal layer (fig. 1.3).

Last, a tube drain 18 F was periodically supplied intra-abdominal from the left subcostal assistant port and put close to the gastric sleeve, secured with silk 1. Finding stapler line leaks was the goal.. Through a 12-mm opening, the transected stomach was extracted. The peritoneum was then allowed to deflate before the ports were withdrawn. Local anesthetics were injected into the port locations, and non-absorbable matrass sutures were used to close the skin, along with sterile dressings.

2.4.3- Following surgery:

management All patients received antithrombotic low-molecular-weight heparin for ten days following surgery; they were also instructed to mobilize as soon as possible and to continue taking antibiotics, IV hydration, PPI, and painkillers. In addition, patients were told to begin sipping water on the first post-operative day. Investigations such as standard post-operative gastrografin leak testing were not. After a leak test on day two, she was sent home with painkillers, antibiotics, and PPI for a month. The length of the procedure, the length of the postoperative hospital stay, any complications (such as bleeding and

leaks), and the requirement for blood transfusions were assessed for each patient. If patients experienced any of the following symptoms, they were advised to go back to the emergency room: fever, tachypnea, abrupt, unexplained stomach pain, or persistent vomiting.

2.5. Statistical analysis:

SPSS version 23.0 was used for data entry, tabulation, and processing.The statistical significance of categorical variable associations was tested using Chi-square test (with Fisher's Exact Test modification as applicable). The independent samples T-test was used to determine statistical significance of two numerical variables. P-values below 0.05 were significant throughout the investigation.

3. Results:

There were 100 patients enrolled in this study, 30 patients in group A (without suture line over sewing) and 70 patients in group B (With suture line over sewing) regarding age and gender of 2 groups there's no significant association as shown in (Table-1). There were no statistically significant differences in weight, height, or BMI between the two study groups, as shown in (Table-2). Regarding chronic disease No significant correlations existed between study groups and chronic diseases. shows in (Table 3) that three patients in group A (two with hypertension and one with diabetes) and four in group B (Three with hypertension and one with diabetes) had chronic illnesses shows (Table 4) that there were no statistically significant associations between study groups and vomiting or bleeding.

Four (13.3%) patients in group A vomited, compared to 12 (17.4%) in group B. Two (6.7%) patients in group A had bleeding, compared to one (1.4%) in group B. None of the 100 patients had leak Before authoring this study, no patients died. There was no statistically significant association between chronic illnesses and bleeding, as none of the patients who had bleeding were hypertensive or diabetics, as seen in Table-5. There was a statistically significant difference in operative time between group A and group B by a mean of 5.14 minutes being longer in group B. The drained fluid in group A was 44.17±9.7 cc, which was significantly higher by 23.58 cc in comparison to 20.59± 7.78 cc in group B, as shown in Table-6. In regard to the bleeding occurred in two cases of group* A was huge amount that needed blood transfusion and reoperation to control it (was from stapler line) while in one case of group B was less amount and on reoperation no obvious source of bleeding only collection seen and only suction done. From that we found that the severity of complications more in group A than in group B, may interpreted to over sewing stapler line decrease bleeding complications.

Table-1: Distribution of study groups according to basic characteristics.

Variables		Group A	Group B	Total	P-value
		No. (%)	No. (%)	No. (%)	
Age groups	20-29	10(33.3)	23(32.9)	33(33)	0.923
	30-39	15(50)	33(47.1)	48(48)	
	≥40	5(16.7)	14(20)	19(19)	
Gender	Male	15(50)	24(34.3)	39(39)	0.140
	Female	15(50)	46(65.7)	61(61)	

Table-2: Distribution of anthropometric measures according to study groups.

Variables	Group A	Group B	Mean difference	P-value
	Mean± SD	Mean± SD		
Weight (kg)	119.27±16.2 7	116.46±17.8 2	2.810	0.460
Height (CM)	162.5±6.12	162.49±6.57	0.014	0.992
BMI (kg/ m2)	45.21±5.77	44.16±6.49	1.054	0.444

Table-3: Distribution of study groups according to comorbidities.

Variables		Group A	Group B	Total	P-value
		No. (%)	No. (%)	No. (%)	
Chronic illness	**No**	27(90)	66(94.3)	93(93)	0.511
	HTN	2(6.7)	3(4.3)	5(5)	
	DM	1(3.3)	1(1.4)	2(2)	

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Table-4: Distribution of study groups according to complications.

Variables		Group A	Group B	Total	P-value
		No. (%)	No. (%)	No. (%)	
Vomiting	**No**	26(86.7)	57(82.6)	83(83.8)	0.770
	Yes	4(13.3)	12(17.4)	16(16.2)	
Bleeding	**No**	28(93.3)	69(98.6)	97(97)	0.213
	Yes	2(6.7)	1(1.4)	3(3)	
leakage	**No**	30(100)	70(100)	100(100)	-
	Yes	-	-	-	

Table-5: Distribution of chronic illness according to bleeding.

Variables		No Bleeding	Bleeding	Total	P-value
		No. (%)	No. (%)	No. (%)	
Chronic illness	**No**	90(92.8)	3(100)	93(93)	0.770
	HT N	5(5.2)	0(0)	5(5)	
	DM	2(2.1)	0(0)	2(2)	

Table-6: Distribution of study groups according to operative time and amount of drained fluid.

Variables	Group A	Group B	Mean difference	P-value
Operative time in minutes	57.5± 5.69	63.01± 11.70	↑5.514	0.002
Drained fluid in cc	44.17± 9.7	20.59±7. 78	↓23.58	0.010

4. Discussion:

One of the most popular bariatric procedures, sleeve gastrectomy has long been effective at maintaining weight and controlling comorbidities like diabetes [26]. Also There is no need to insert a laparoscopic gastric band. It requires no gastrointestinal anastomosis and does not affect gastrointestinal continuity, making it a simpler surgery. Thus, it has become the most common bariatric operation worldwide in the previous decade [27].

Stapling device technology has advanced, but staple line complications still matter, with bleeding and leakage ranging from 1 to 5% and more than 3% of patients requiring reoperation [28]. Staple line leaking

can result from mechanical or instrumentation issues, typically occurring within 48 hours, or from gastric sleeve ischemia from extensive dissection, occurring 5-7 days post-surgery [29].

This study compared the reinforcement of the staple line with PDS 2.0 in LSG to leaving it as is (no reinforcement) and found that it reduced postoperative problems (leakage, bleeding, frequent vomiting, and death) and severity. To achieve these goals, a prospective comparison of LSG outcomes in 30 patients without staple line over sewing and 70 with staple line over sewing was done. Patients in group A had a mean body weight of 119.27±16.27 kg, which was 2.810 kg higher than group B (116.46±17.82 kg). Group A had a mean height of 162.5±6.12 CM, while group B had a mean BMI of 45.21±5.77 kg/m2, which was only 1.054 kg/m2 higher than group B (44.16±6.49 kg/m2). There were no statistically significant differences in weight, height, or BMI between groups.

The most common leak site was the proximal stomach, which has the lowest pressure resistance [30-31]. However, the fundus had the biggest diameter in the resected stomach, therefore it distended under increased intraluminal pressure, per Laplace law. This study demonstrated no statistically significant difference in staple line leak across groups. This study does not support gastric leak efficacy conclusions.

In Knapps et al.'s largest comprehensive evaluation [32], 4881 patients who had LSG with and without SLR had leakage rates of 3.2 and 3.9%, respectively, showing no statistical difference. In another prospective randomized trial, Dapri et al. found differences in intraoperative blood loss parameters across non-reinforced, suture-reinforced, and stapler-load buttressing arms, but not leak rate following staple-line reinforcement [33]. A different prospective trial by Regular et al. indicated that over-sewing with no reinforcement and sutures increased leak risk [34-35].

This investigation was done on resected gastrostomy specimens and does not reflect stomach pressure in real life. In ischemia, either suturing or leaving the staple line unstitched increases leak risk. In group A, two instances (6.7) exhibited bleeding, compared to one case (1.4) in group B, which may be due to over sewing stapler line. Group A had more severe bleeding, requiring reoperation to reduce bleeding by removing the staple line (P. value (0.2)). Group B had less bleeding. We discovered that group A had higher issues than group B, possibly due to overseeing stapler line to reduce bleeding. In a comparable study, Knapps et al. found 2.6 and 1.7% hemorrhage.

Further analysis was performed to assess the possible relationship between comorbidities (HT,DM) from one side and bleeding complications on the other side. These analyses revealed no significant association between incidence of complications bleeding p. value 0.7 and these variables, indicating that staple line is more beneficial than sewing and is unaffected by comorbidities. However, no previous studies have examined this association.

Conclusion and advice:

Conclusion: 1-Oversewing the staple line during LSG is a cost-effective and simple way to reduce postoperative bleeding and reoperation.

Recommendations:

1.multiple centers study.
2.Expanded study.
3.prolong follow up 4-5 years

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