

The impact of routine omentopexy to staple line on the incidence of early postoperative complications after laparoscopic sleeve gastrectomy: is it worth?

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Background

In laparoscopic sleeve gastrectomy (LSG), the patients may experience serious postoperative complications such as hemorrhage or leakage. The aim of this study was to evaluate the benefit of routine omentopexy (RO) to staple line in decreasing postoperative hemorrhage and leakage.

Patients and methods

A retrospective cohort study analyzing prospectively collected data including 2000 LSG from March 2015 to December 2017. The patients were evenly divided into two groups: Group A of 1000 LSG with no omentopexy (NO) and group B of 1000 LSG with RO to staple line with full thickness stitches till the level of the incisura above.

Results

The mean age was 33.2 ± 15.7 and 30 ± 10.9 for group A (NO) and group B (RO), respectively. The mean BMI in group A is 45 ± 7 , while it is 46 ± 9 in group B. Staple line leakage occurred in 9 cases (0.9%) of group A, while none (0.0%) of the group B patients experienced evidence of leakage ($P=0.003$). In group A, 26 cases were diagnosed to have significant postoperative bleeding, compared with only eight (0.8%) patients of group B ($P=0.003$). Perigastric localized collection was found in three (0.3%) cases and only one case in the two groups ($P=0.625$). The operative time spent in group A was 55 ± 20 min, much lower than that in group B which was 85 ± 35 ($P=0.001$). The mean hospital stay was 30 ± 18 and 24 ± 12 in group A and Group B, respectively ($P=0.001$).

Conclusion

RO to staple line has shown to be effective in decreasing staple line bleeding and leakage and hospital stay, although it prolongs the operative time.

Keywords:

leakage, omentopexy, sleeve gastrectomy

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Introduction

Laparoscopic sleeve gastrectomy (LSG) has been increasingly performed as a primary and sole weight-loss operation for morbidly obese patients. It has grown in popularity and become the dominant bariatric procedure during recent years by maintaining gastrointestinal continuity and being a relatively easy procedure [1,12].

LSG is specifically associated with two significant complications: hemorrhage and leakage. The most dreaded complication after SG is a gastric leak, which most commonly occurs at the upper staple line near the gastroesophageal junction. This complication, if not identified and treated quickly and aggressively, may lead to severe abdominal sepsis, which might progress to either a chronic gastric fistula or to multiorgan failure and patient demise [2].

Various methods for staple line reinforcement (SLR) by oversewing the staple line or buttressing the staple line with various synthetic and biological materials

were suggested to reduce the incidence of leak and bleeding. Studies were conducted to assess its efficacy and showed potential benefit [3,13].

There is a lack of prospective data regarding the routine use of omentopexy as an integral step in LSV to prevent potential serious complications.

The purpose of this study was to evaluate the benefits of omentopexy to staple line in reducing postoperative hemorrhage and leakage rates.

Patients and methods

The following are the characteristics of the study depicted in the PICOS format:

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- (1) Participants: 2000 cases of LSG were done between March 2015 and December 2017 at the Bariatric Unit, Ain Shams University Hospital (El-Demerdash). The patients were followed up to 6 months postoperatively. Obese patients aged between 18 and 55 years with a BMI of more than 35 plus comorbidities or BMI more than 40 without comorbidities were included, while patients with uncontrolled hypertension, bleeding disorders or cirrhotic liver (Child B and C) were excluded.
- (2) Intervention (exposure): 1000 cases of Group B were performed with routine omentopexy (RO) (omental fixation to the staple line with full thickness stitches till the level of incisura) and then titanium clips of the lower part to control bleeders, if present.
- (3) Control: 1000 cases of group A were performed without omentopexy, but with clipping the suture line, if bleeder is present (NO=no omentopexy).
- (4) Outcomes:
 - (a) Primary outcome: leakage rate.
 - (b) Secondary outcome: postoperative bleeding, perigastric localized collection, and operative time.
- (5) Study design: a retrospective cohort study with retrospective analysis of prospectively collected data

An IRB approval was obtained from the Department of Surgery, Faculty of Medicine, Ain Shams University. Informed consent was obtained from all individuals participating in the study.

Surgical procedures

Preoperative preparation

Full labs includes complete blood count, coagulation profile, and blood biochemistry including hepatitis B virus surface antigen, hepatitis C antibody, HIV-Ab, thyroid stimulating hormone, and glycated hemoglobin. If the patient is diabetic, fasting blood glucose, fasting insulin level, and fasting C-peptide are added. Other testing includes PAUS, ECG, ECHO, and pulmonary function tests. oesophago-gastro-duodenoscopy (OGD) is routinely performed in reflux patients.

Operative technique

All operations were performed by a single surgeon: Dr Karim Sabry. We used a five-port technique which includes a 5 mm sub-xiphoid trocar (for Nathanson liver retractor), 15 mm left hypochondrial (left working port), 12 mm right hypochondrial (right working port), 10 mm supraumbilical for the cameraman and 5 mm left anterior axillary line subcostal for the assistant. After ports insertion, we

proceed for devascularization of the greater curvature of the stomach followed by mobilization of the upper part of the stomach till the left crus is clarified up, and the mobilization up to the pyloric ring below. Then we insert a 36 Fr. Bougie, followed by stapling.

First use one green reload 60–4.8 mm (Covidien). Then, if needed, we may use another green reload and continue stapling using blue reloads of 60–3.5 mm till the end.

Group A: no omentopexy

No omental fixation. However, if bleeding is present, we apply titanium clips to the staple line.

Group B: routine omentopexy

We perform omental fixation by full thickness stitches using PDS2-0 (Figs 1, 2 and 3), till the incisura (to avoid stricture). If bleeding is present from the lower part of the staple line, we apply clips (Fig. 4).

Before finalizing, we elevate the mean blood pressure to greater than 90 mmHg as a test for hemostasis.

We perform a methylene blue test to make sure of the sealed staple line with no intraoperative leakage.

Finally, we insert an intra-abdominal drain in all cases.

Postoperative

Mobilization after 2 h with oral sips after 6 h.

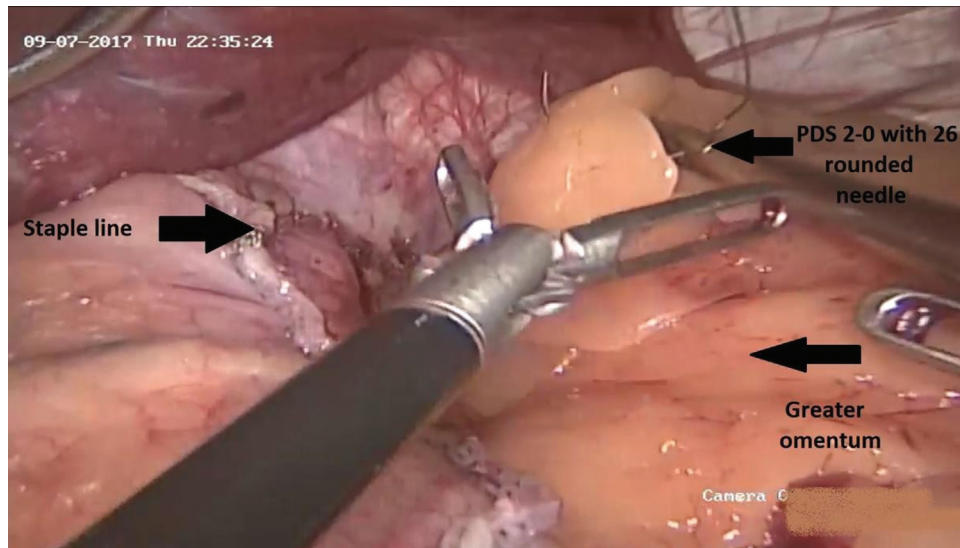
During the hospital stay period, we follow-up the patient by vital data and the drain.

Within 12 h postoperatively, we discharge the patient after removal of the drain on fluids for 10 days. Within 10 days postoperatively, a routine abdominal computed tomography scan with gastrografin meal is asked to be available at the time of the first visit. Removal of stitches is done and diet is changed into well-chewed smashed food with avoidance of spices and fries for the next 20 days.

Statistical analysis methods

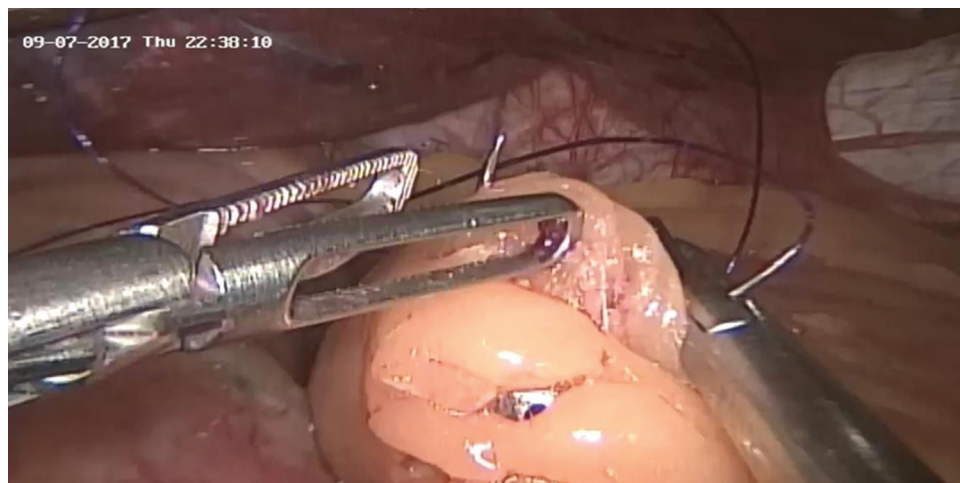
Continuous variables are expressed as mean and SD. Categorical variables are expressed as frequencies and percentages. Student's *t*-test was used to assess the statistical significance of the difference between two study group means. χ^2 -test and Fisher's exact test was used to examine the relationship between categorical variables. A significance level of *P* less than 0.05 was used in all tests. All statistical procedures were carried out using SPSS version 15 for Windows (SPSS Inc., Chicago, Illinois, USA).

Fig. 1



Stitching the greater omentum to the staple line beginning at the highest point of the staple line.

Fig. 2



PDS2-0, 26 rounded needle stitching the greater omentum.

Results

The mean age was 33.2 ± 15.7 and 30 ± 10.9 for group A (NO) and group B (RO), respectively (Table 1). Male sex represents 633 (63.3%) cases and 559 (55.9%) cases, while the female sex was only 367 (36.7%) patients and 441 (44.1%) patients of group A (NO) and group B (RO), respectively (Table 2).

The mean BMI in group A was 45 ± 7 ranging between 38 and 52, while it was 46 ± 9 ranging between 37 and 55 in group B (Table 3).

Among the two groups ischemic heart disease (ISHD) constitutes, respectively, 1.5% (15 cases) and 2.2% (22 cases) ($P=0.245$). Sixty-seven (6.7%) patients of group

A (NO) and 50 patients ($P=0.105$) of group B (RO) had hypertension. Diabetes mellitus was found in only 32 (3.2%) cases of group A (NO), compared with 43 (4.3%) cases of group B (RO) ($P=0.195$) (Table 4).

Staple line leakage occurred in nine (0.9%) cases of group A (NO), while none (0.0%) in group B (RO) experienced evidence of leakage during the follow-up period ($P=0.003$). Patients with leakage were managed by introduction of intragastric stent and feeding jejunostomy. Twenty-six cases of group A (NO) were diagnosed to have significant postoperative bleeding, compared with only eight (0.8%) patients of group B (RO) ($P=0.003$). Fifteen (1.5%) cases needed to go back to the theater and required relaparoscopy with full thickness stitches omental

Table 1 Demographic characteristics of the study population

	Groups (mean±SD)		P	Significance
	Group A: no omentopexy	Group B: routine omentopexy		
Age	33.2±15.7	30.0±10.9	0.001	HS
Sex [n (%)]				
Male	633 (63.3)	559 (55.9)	0.009	HS
Female	367 (36.7)	441 (44.1)		

HS, highly significant.

Table 2 Comparison between groups A and B as regards BMI

	BMI		P	Significance
	Mean±SD	Range		
Group A	45±7	38–52	0.005	HS
Group B	46±9	37–55		

HS, highly significant.

Table 3 Comparison between groups A and B as regards comorbidities

	Groups [n (%)]		P	Significance
	Group A	Group B		
ISHD				
Yes	15 (1.5)	22 (2.2)	0.245*	NS
No	985 (98.5)	978 (97.8)		
HTN				
Yes	67 (6.7)	50 (5.0)	0.105*	NS
No	933 (93.3)	950 (95.0)		
DM				
Yes	32 (3.2)	43 (4.3)	0.195*	NS
No	968 (96.8)	957 (95.7)		

DM, diabetes mellitus; HTN, hypertension; ISHD, ischemic heart disease.

Table 4 Early postoperative complications among the two groups

	Groups [n (%)]		P	Significance
	Group A	Group B		
Leakage				
Yes	9 (0.9)	0 (0.0)	0.003	HS
No	991 (99.1)	1000 (100.0)		
Bleeding				
Yes	26 (2.6)	8 (0.8)	0.003	HS
No	974 (97.4)	992 (99.2)		
Perigastric localized collection				
Yes	3 (0.3)	1 (0.1)	0.625	NS
No	997 (99.7)	999 (99.9)		

HS, highly significance.

fixation, whereas 11 (1.1%) patients did not need surgical intervention and were managed conservatively with blood transfusion and hemostatics. Perigastric localized collection was found in three (0.3%) cases and only one (0.625) case in the two groups, respectively. These patients were managed by pigtail catheter insertion for evacuation along with antibiotics administration (Table 5).

Table 5 Comparison between groups A and B as regards operative time

	Operative time (min)		P	Significance
	Mean±SD	Range		
Group A	55±20	35–75	0.001	HS
Group B	85±35	50–120		

HS, highly significance.

Table 6 Comparison between groups A and B regarding hospital stay

	Hospital stay		P	Significance
	Mean±SD	Range (h)		
Group A	30±18	12–48	0.001	HS
Group B	24±12	12–36		

HS, highly significance.

The operative time spent in group A (NO) was 55 ±20 min, much lower than that in group B (RO) which was 85±35 ($P=0.001$) (Table 6).

The mean hospital stay in group A was 30±18 ranging between 12 and 48 h, while in group B it was only 24 ±12 ranging between 12 and 36 h, which achieved a high statistical significance ($P=0.001$).

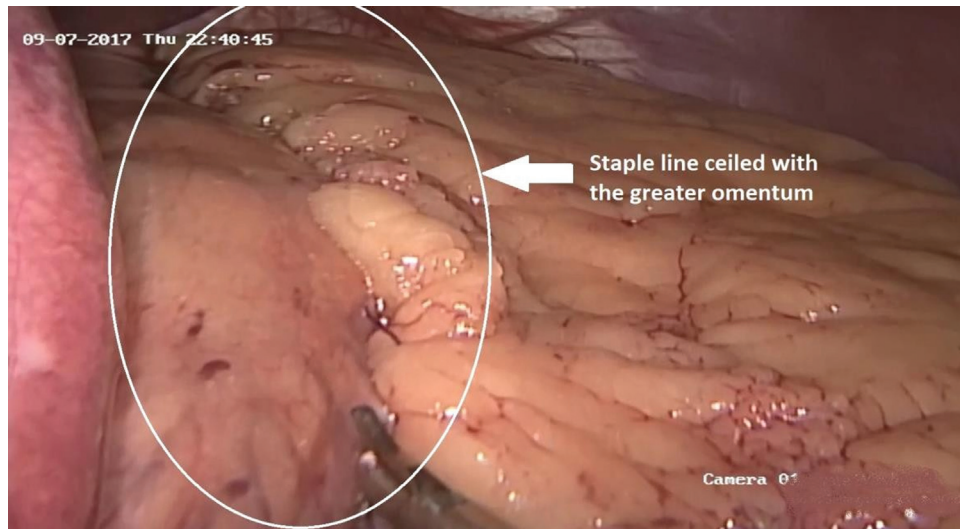
Discussion

LSG has been developed over the last 10 years to become more safe and efficient. Many techniques have been discovered to minimize postoperative complications such as bleeding and leakage, which are encountered for the most of postoperative complications [14,15,18].

Our study explains the technique of omentopexy to the staple line with full thickness stitches and its effect on the postoperative path of the patients. Bleeding and leakage are of most serious complications post-LSG; staple line bleeding incidence ranges from 0 to 4.4% [4–6].

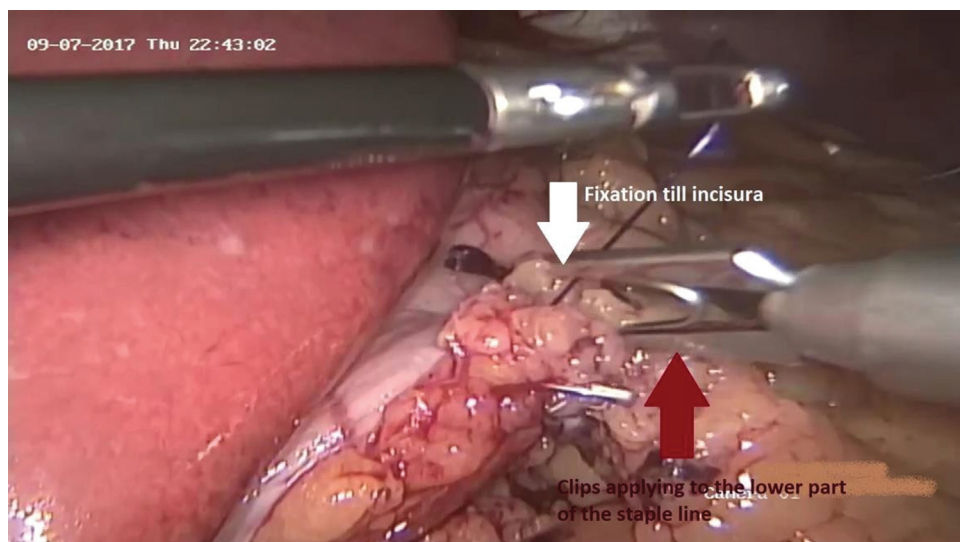
In our study, RO in LSG proved to show remarkable efficiency in reducing postoperative leakage and bleeding rates in comparison with LSV NO. This decreases patient's morbidity and mortality,

Fig. 3



Fixation of the greater omentum to the staple line.

Fig. 4



Fixation took place till the incisura, completing the lower part of the staple line with clips.

possibility of blood transfusion, and surgeon stress related to complicated patients. This could be explained by the tremendous intrinsic physiological capacity of the omentum to heal leakage sites and seal oozing surfaces. However, our technique failed to be statistically significant in minimizing the perigastric localized collection.

Despite the apparent effectiveness of RO in limiting early postoperative complications, it lengthens the operative time. Nevertheless, we attribute this added time to the relatively new technique. Thus, we believe that the extra time needed for RO could be decreased by improving the learning curve. On the other hand, our new technique demonstrated significantly lower hospital

stay in comparison with the NO group, which will help reduce both medical and financial burden.

Gibson *et al.* [7] have evolved their SLR technique, as they first sutured the omentum to the proximal 10 cm of staple line. Then, the partially mobilized fat pad or omentum was used to cover the angle of His by suturing to the left crus. In the latter part of the series, they have buttressed the most proximal staple firing with Seam Guard and they found one proximal staple line leak (0.2%) versus 0 and three postoperative bleeding (0.6%) versus 8 (0.8%) [7].

Moy *et al.* [8] used an endo-GIA stapler armed with a bioabsorbable buttress material (Seam guard). They

believed that the use of the buttressing material in the suture line decreases bleeding and leakage. The operative time average was 134 min out of 135 LSG operated in the period of 2003–2006. They found three leakage cases compared with 0 cases in our study [8].

Chang *et al.* [9] used omentopexy to prevent sleeve axial distortion and maintain the axis of the whole tube. The author suggested that gastric stenosis may predispose for gastric leak, as it increases the intragastric pressure with a relatively thinner gastric wall at the fundus. This contributes to the aim of our study as it stresses the role of omentopexy in preventing leakage [9].

There are some common complications after LSG such as bleeding, leakage, and stricture. In most cases, these complications can be managed conservatively with no need of revisional surgery, although there may be a need for surgical intervention in some serious cases so as to stop a serious bleeding or to close persistent leakage site after stent insertion without closure. Our technique, as previously mentioned, seems to reduce these complications avoiding the burden of revisional surgical intervention in a complicated patient [10,11]. A variety of other options intended to help preventing gastrointestinal leaks after LSG have been described. These include the use of SLR (absorbable, remodelable, and permanent types), biological sealants peri-strips dry (a bovine pericardium with collagen matrix), and oversewing (continuous, interrupted, full thickness, and Lember techniques) of the staple line [16,17]. However, we think that our discussed technique is more suitable as it is a natural, simple, and cost-effective technique, although it seems initially to be time wasting.

Limitations of the study

Despite the large sample size, it is still a single-institution study. Further multicentric studies are needed to be performed to confirm our results and achieve more potent scientific evidence. Second, this study was a retrospective study lacking randomization. We encourage other authors to conduct RCT for the same research point to achieve a higher level of scientific evidence.

Conclusion

RO to staple line proves to be an effective merging technique in reducing the incidence rates of post-LSG leakage and bleeding, and in minimizing hospital stay. Although it apparently consumes more operative time,

the learning curve can be enhanced in the future to minimize the time taken to perform this vital technique.

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Nil.

Conflict of interest

There are no conflicts of interest.

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