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ORIGINAL ARTICLE

Incidence of Gastroesophageal Reflux Disease Postsleeve Surgery in Bariatric Patients

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Abstract

Background: **The laparoscopic Roux-en-Y gastric bypass is currently suggested as the operation of choice for cases with severe obesity and gastroesophageal reflux disease (GERD) since it has been correlated with acceptable GERD control in both short-term and long-term trials. This study aimed to quantify the rate of GERD among individuals who underwent laparoscopic sleeve gastrectomy.**

Patients and methods: **This was a prospective, randomized clinical research. This research done on 30 cases with class II obesity with comorbidities or class III obesity who were candidates for bariatric operation was accepted despite their GERD symptoms. The patients were selected from surgery clinics in Al-Azhar University Hospitals and Al-Salaam Governmental Hospital. The work was carried out from February 2021 to November 2021.**

Results: **We found that 16.7% of patients have never symptoms of GERD after laparoscopic sleeve they had erosive esophagitis grade A, 16.7% of patients who have mild symptoms of GERD after laparoscopic sleeve they had erosive esophagitis grade A, 66.7% of patients who have moderate symptoms of GERD after laparoscopic sleeve they had erosive esophagitis grade A.**

Conclusion: **Based on these findings, laparoscopic sleeve gastrectomy is increasingly being seen as a bariatric procedure for obese individuals who also suffer from GERD.**

Keywords: Bariatric, Gastroesophageal reflux disease, Postsleeve surgery

1. Introduction

For individuals with class III obesity or class II obesity with comorbidities, a bariatric operation is now the most successful treatment option.[1]

Both obesity and gastroesophageal reflux disease (GERD) are quite common and often occur together. It has been established that typical GERD symptoms are not always reliable for diagnosing GERD in obese patients or after bariatric surgery.[2]

The present diagnostic criteria for GERD are outlined by the Lyon consensus, which also emphasizes on objective metrics for GERD in clinical practice and research.[3]

Patients with significant obesity with GERD are presently advised to undergo laparoscopic Roux-en-Y gastric bypass due to its association with adequate GERD management in both short-term and long-term studies.

Contrarily, laparoscopic sleeve gastrectomy (LSG) has become the most common technique in the USA despite having a relationship to less favorable GERD results and a fluctuating frequency of de novo GERD.[4]

Although preliminary research suggests LSG can reduce GERD symptoms and the need for acid suppressors, further research is needed.

Even though LSG is not thought to increase GERD symptoms, objective measurements show that acid exposure is three times greater than before surgery.[5]

A significant frequency of long-term or de novo esophageal mucosal injuries, for example, esophagitis and Barrett's esophagus, has also been seen in a

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small number of researches after LSG,[6] requiring the usage of acid reducers after surgery.

This work aimed to evaluate the incidence of GERD post-LSG operation.

2. Patients and methods

This was a prospective, randomized clinical study. This research done on 30 cases with class II obesity with comorbidities or class III obesity who were candidates for bariatric surgery was accepted despite their GERD symptoms.

The patients were selected from the surgery clinics in Al-Azhar University Hospitals and Al-Salaam Governmental Hospital. The work was carried out from February 2021 to November 2021.

2.1. Ethical consideration

Approval of Ethical Committee from the Ethics Unit at Faculty of Medicine, Al-Azhar University, Cairo. Simplified information regarding the study's nature and purpose was provided to all patients. All patients gave their informed consent in writing.

2.2. Inclusion criteria

Cases that will fulfill the following criteria were included in this study: age between 18 and 50 years, BMI more than or equal to 40 or more than or equal to 35 kg/m^2 together with significant comorbidities and both sexes with morbid obesity candidate for sleeve gastrectomy.

2.3. Exclusion criteria

Age less than 18 or more than 50 years, patients had achalasia or prior gastroesophageal surgery, cases with redo-gastric sleeve, and cases with positive endoscopic results for gastritis, duodenitis, or peptic ulcer.

Cases were randomly allocated into one group (30 patients): group (LSG group with an incidence of GERD after operation): that will include 30 class III obesity or class II obesity with comorbidities patients attend for upper endoscope to show the incidence of GERD features at 6 months after LSG treatment therapy.

2.4. Methods

Eligible cases were subjected to history taking and physical examination including age, sex, BMI, and the clinical grade of obesity was determined.

2.5. Operative technique

Patients are put in the supine split-leg posture and flipped over following receiving prophylactic antibiotics and general anesthesia. To prevent the case from falling off the operating table, a Trendelenburg posture should be used in conjunction with sufficient support for the extremities.

The gastroepiploic artery divides into several smaller branches just beyond the stomach wall. After moving farther cephalad, we divide the short gastric vessels to the fundus. Division of the posterior fundic vessels is also done.

The left crus of the diaphragm is then divided to release angle of His. Because of the potential for splenic or esophageal damage during dissection, extreme caution is required.

There are two ways to carry out LSG, both of which have been explained. Following the surgeon's access to the smaller sac, the stomach is stapled, and the sleeve gastrectomy is completed. The second method involves devascularizing the larger curvature of the stomach.

We favor the second method, which involves stapling following the larger curvature that has been completely devascularized. First, we use ultrasonic shears (SonoSurg; Olympus Corporation, Tokyo, Japan) to divide the larger omentum in the middle of its greater curvature. Volume 2 of the *Open Journal of Gastroenterology* in 2008 Researchers Trelles and Gagner.

Distal to the middle, the dissection of the greater curvature continues to about 2 cm proximal to the pylorus.

When the dissection of the greater curvature is finished, the posterior portion of the antrum is freed by lysing all adhesions in the smaller sac. It is also possible to devascularize the entire greater curvature by beginning 2 cm proximal or distal to the pylorus (based on antrum preservation) and working cephalad up to the fundus, or by beginning 2 cm proximal or distal to the pylorus and working cephalad up to the fundus, again based on antrum preservation. We like to preserve the antrum. Thus we use buttressing material and sequential firings of 60-mm/4.8-mm linear staplers about 5–6 cm proximal to the pylorus.

The usage of buttressing material enhances costs, but it also shortens the time spent doing the operation.

Since bioabsorbable glycolide copolymer reinforcements (Seamguard W.L. Gore & Associates Inc., Flagstaff, Arizona, USA) have been demonstrated to be secure and efficient in avoiding intraoperative bleeding, we use them. Nevertheless,

there is not enough data to show a reduced leakage rate (cohort too small).[7]

There is no universally accepted standard for the distance the stomach bifurcates from the pylorus. Encourage antrum resection by completing the greater curvature dissection distal to the pylorus. This will allow firing to begin 2 cm proximal to the pylorus with the linear stapler oriented toward the incisura angularis and close to a 32-Fr bougie that follows the lesser curvature or firing 3–4 cm proximal to the pylorus in BPD-DS.

Depending on the thickness of the stomach wall, a linear stapler with a 45-mm or 60-mm capacity that is loaded with a green (4.8-mm staple height) or blue (3.5-mm staple height) cartridge can be utilized for the first two firings, respectively. After this is done, a gastrectomy is often finished with blue linear staplers that are 60 mm in length. For the entire gastrectomy, Almogy *et al.*[8] recommend using linear staplers with a 75-mm staple length.

First, we place the stapler so that just 1.5 cm of the stomach's anterior serosa protrudes beyond the lesser curvature.

After the first 60-mm/4.8-mm linear stapler has been shot, a second one is lined with it and fired, allowing enough space for the stomach lumen to remain unblocked.

After the second shot is fired, the anesthesiologist inserts a bougie transorally and places it in the antrum under laparoscopic guidance.

While most surgical groups wait until the greater curvature dissection is complete before inserting the bougie into the stomach, doing so following the first two stapler firings provides a technical advantage by making it easier to align the bougie along the lesser curvature and continue with the sleeve gastrectomy.

All LSG performed as part of a BPD-DS utilizes a 60-Fr bougie, which enables the surgeon to produce a gastric pouch size of 150–200 ml, the optimal range for sustaining a healthy protein intake.

Choosing the antrum location for the stapler's initial firing. The sleeve gastrectomy volume, which is associated with the bougie size utilized as a guide for the stomach transection, has not yet been standardized.

By submitting an updated review about sleeve gastric bypass surgery. The Updated Review of Sleeve Gastrectomy in the *Open Gastroenterology Journal*, Volume 2, 2008. The Updated Review of Sleeve Gastrectomy in the *Open Gastroenterology Journal*, Volume 2, 2008. The Updated Review of Sleeve Gastrectomy in the *Open Gastroenterology Journal*, Volume 2, 2008. When we have a reserve that is 45% bigger, our likelihood of suffering from protein insufficiency and other deficiencies is reduced. Once the sleeve gastrectomy is finished, the anesthesiologist will take out the bougie. We use interrupted figure-of-eight/of 3-0 Maxon sutures at the intersections of the staple lines and the most distal end of the staple line, as this is where we expect most leaks to occur. Over-sewing the staple line with an absorbable running suture (silk, Vicryl, PDS, or Maxon) with or without inversion of the staple line is commonly recommended by surgeons who do not utilize buttressing materials to stop bleeding and leaks.

After stopping any bleeding or leaking, the excised stomach is removed through the umbilicus and placed in a large plastic impermeable bag (Tyco Healthcare, Norwalk, Conn.) to avoid contaminating the surgical incision.

It can also be collected through the widened 15-mm port on the case's left side, but this method stretches the abdominal wall's muscle layer, which might lead to more discomfort after surgery.

Finally, we used a methylene blue test to check for leaks in the staple line and gauge stomach capacity. This is done via an orogastric tube while the proximal duodenum is clamped with long intestinal forceps.

If holes are found, they are patched by stitching over them. Neither cholecystectomy nor draining of the liver is performed routinely at our institution.

2.6. Postoperative follow-up

The ICU is reserved for patients with severe underlying cardiovascular illness, male sex, BMI more than 60 kg/m, diabetes, obstructive sleep apnea, and intraoperative complications.[9]

In the early postoperative phase, we reestablish CPAP or BiPAP therapy in obstructive sleep apnea patients in the recovery room and maintain it during daytime and nighttime sleep.

Despite the lack of established recommendations, the vast majority of surgeons employ some sort of DVT prevention, even when treating obese patients.

When there is clinical suspicion of leakage, we do an upper gastrointestinal contrast scan.

The typical postoperative hospital discharge date is the second day. Different hospitals have different protocols for postoperative nutrition and monitoring.

Proton pump inhibitors are reserved for individuals who experience dysphagia or reflux symptoms; they are not used routinely.

Gallstone prevention in patients with an intact gallbladder is achieved by administering Ursodiol 600 mg daily (Actigall, Ciba-Geigy, Summit, New Jersey, USA) for 6 months, during the time of maximal weight loss for gallstone prophylaxis.

2.7. Statistical analysis

The statistical software for social sciences, version 23.0 (produced by SPSS Inc. Chicago, Illinois, USA), was used to analyze recorded data. The mean, SD, and ranges were the presentation formats for the quantitative data.

The following evaluations and procedures were carried out: when comparing two sets of data presumed to be connected, a paired sample t test of significance was carried out. To analyze the relationship between proportions and qualitative factors, a χ^2 significance test was carried out. It was decided that a margin of error of 5% would be acceptable, and the confidence interval was set at 95%. Therefore, the P value was declared significant since the following occurred: P value: a P value of 0.05 was deemed significant, a P value of 0.001 was considered extremely significant, and a P value of more than 0.05 was regarded to be inconsequential.

3. Results

Figures 1–4, Tables 1–3.

4. Discussion

There is a lack of consistency in the findings of studies that have attempted to examine the association between gastrectomy and reflux.

Both perspectives are supported by physiopathological evidence. Obesity, a rise in intragastric pressure, and the resulting elevation in the esophageal-gastric pressure gradient all lend credence to the idea that reflux may be more prevalent in these individuals.

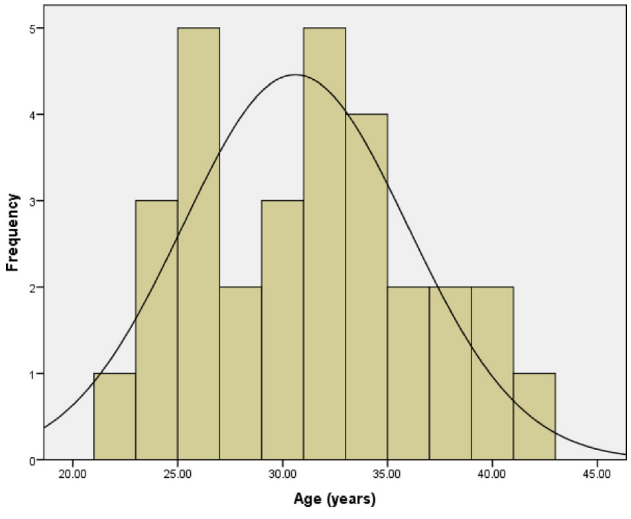

Fig. 1. Cases age.

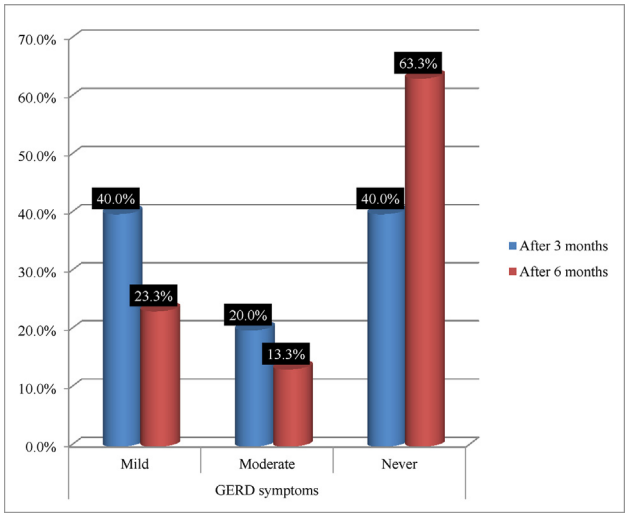

Fig. 2. GERD symptoms degree at 3 and 6 months. GERD, gastroesophageal reflux disease.

Upper GI endoscopy 6 months	Total (N=30)
Grade A erosive gastritis [n (%)]	6 (20.0)
Normal [n (%)]	24 (80.0)

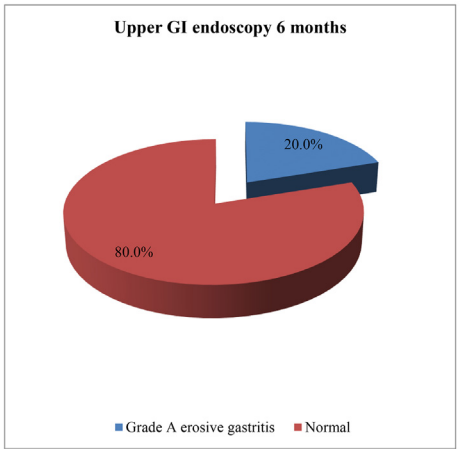

Fig. 3. Percent of erosive gastritis at 6 moths by upper GI endoscopy. GI, gastrointestinal.

Hiatal hernias, which are also more frequent in overweight persons, may develop in tandem with these. Sleeve gastrectomy and subsequent weight loss help reduce reflux symptoms in this setting.

The occurrence of reflux may also be diminished by other effects, such as a decrease in acid production and an acceleration of stomach emptying.

However, greater reflux following surgery can be attributed to several factors involving reduced gastric compliance, elevated intragastric pressure, reduced LES resting pressure, a persistent hiatus hernia, and a stenotic gastric angle 1, 4, 5, 26, 30, and 41.

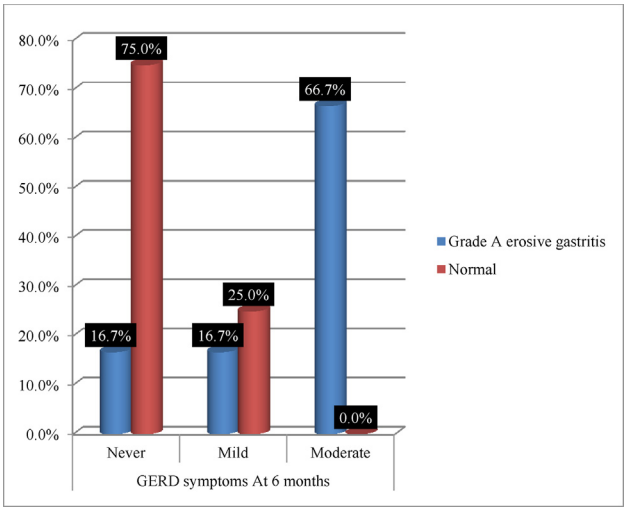

Fig. 4. Correlation between GERD symptoms and erosive gastritis incidence at 6 months. GERD, gastroesophageal reflux disease.

Table 1. Demographic data.

Grade obesity	Total ($N = 30$)
Class 3 Morbid [*n* (%)]	30 (100.0)
Anthropometric measurements	Total ($N = 30$)
Height (cm)	
Range	153–170
Mean ± SD	161.00 ± 4.04
Weight (kg)	
Range	104–126
Mean ± SD	113.60 ± 5.14
BMI (kg/m^2)	
Range	41.11–47
Mean ± SD	43.93 ± 1.28
Complicate post of operative	Total ($N = 30$) [*n* (%)]
No-complications	23 (76.7)
Complications	7 (23.3)
Leakage	3 (10.0)
Hemorrhage	2 (6.7)
Infection	2 (6.7)
Management ($N = 7$) [*n* (%)]	
Conserve, antibiotics, and dressing	2 (28.6)
Conserve, anticoagulants	2 (28.6)
Reoperation and gastric staple	3 (42.9)

A study by Csendes *et al.*[10] revealed a significant reduction in resting LES pressure in 85% of cases examined in a postsleeve gastrectomy series.

The current research was conducted to assess the incidence of GERD postlaparoscopic sleeve gastrectomy surgery. The study was done on 30 cases as one group with class III obesity or class II obesity with comorbidities who managed by laparoscopic sleeve gastrectomy attended for upper gastrointestinal endoscopy after 6 months of operations to assess GERD. The group matched regarding age (mean ± SD = 30.60 ± 5.37), sex, weight loss ($P < 0.001$). GERD symptoms 3 and 6 months with *P* value less than 0.001, GERD signs at 6 months upper gastrointestinal endoscopy ($P < 0.001$).

This current research found that complication occurs in the first 2 weeks from surgery, and about 23% of patients following sleeve gastrectomy are divided to gastric leakage which represent 10% and managed by reoperation, and gastric staple application, stricture about 6.7% and managed by npo, i.v. fluids and endoscopic dilatation and wound infection about 6.7% and managed by antibiotics, and dressing. This results have a narrow difference with other studies like The Cleveland Clinic Florida found in 2011 that contrasted to the adjustable gastric band and the gastric bypass, the complication and reoperation rates for gastric sleeve surgery were much lower. Over 2400 individuals who had gastric sleeves performed were analyzed in this research. Complications recorded in first 2 weeks was gastric leakage and, represented 2.5% which is smaller than the current study ratio 10%, infection 12%, which is higher than the current study ratio of 6.7%. Stricture 3.5%, which is smaller than the current study ratio of 6.7%.

Regarding weight reduction after sleeve where weight pre-LSG is of mean value 113.60 ± 5.14 and after LSG by 6 months is of the mean value of 72.03 ± 6.57 with weight loss of mean is 41.57 ± 3.00 with paired sample *t* test of 41.57 ± 3.00 and consistent of *P* value less than 0.001, which is highly significant weight loss after the operation, the current study results of weight loss was in agreement with Fischer *et al.*[11] study where in 6 months after the surgery EWL average of 45–55% of body excess weight.

Fischer *et al.*[11] sought to analyze expected weight loss EWL in patients who underwent gastric sleeve surgery.

They carried out a systematic literature inquiry on procedures conducted from January 2003 to

Table 2. Weight reduction correlation before and after sleeve gastrectomy.

Measurements	Weight (kg)		Paired sample *t* test		
	Range	Mean ± SD	Weight loss	*t* test	*P* value
Preintervention	104–126	113.60 ± 5.14	41.57 ± 3.00	75.837	<0.001**
After 6 months	58–89	72.03 ± 6.57			

***P* value less than 0.001 is highly significant.

Table 3. Upper gastrointestinal endoscopy features at 6 months after laparoscopic sleeve gastrectomy treatment therapy.

	Upper GI endoscopy 6 months [*n* (%)]		Total [*n* (%)]	χ^2 test	
	Grade A erosive gastritis	Normal		χ^2	*P* value
GERD symptoms at 6 months					
Never	1 (16.7)	18 (75.0)	19 (63.3)	18.722	<0.001**
Mild	1 (16.7)	6 (25.0)	7 (23.3)		
Moderate	4 (66.7)	0	4 (13.3)		
Total	6 (100.0)	24 (100.0)	30 (100.0)		

GERD, gastroesophageal reflux disease.
**Utilizing χ^2 test displaying *P* value less than 0.001 is highly significant.

December 2010 and came up with 123 papers that covered 12,129 patients.

These researchers found that the maximum EWL occurred 24 and 36 months after surgery, with a mean EWL of 64.3 and 66%, respectively. At 12 months, the mean EWL in cases who underwent sleeve gastrectomy was 56.1%.

Regarding symptoms of GERD in first 3-month postoperation, 60% of patients had symptoms of GERD, and at 6-month postoperation, 36.6% had symptoms of GERD. This result is smaller than the Pilone study, which showed that 48.0% of patients had GERD symptoms after 12 months also, regarding the symptoms of GERD in this current study, at 3-month postoperation, GERD symptoms score is significant height about (60% of patients), however at 6 months the score converged and decreased about (36.6% of patients) with highly significant *P* value of less than 0.001. Our research supports reducing in the frequency of GERD symptoms after sleeve gastrectomy over time.

Melissas *et al.*[12] revealed a reduction in GERD afterward SG at its terminal follow-up 24-month analysis is 16.7%, while its 6-month analysis revealed a 21.7% elevation in prevalence. Melissas *et al.*[12] stated a 5% reduction in GERD.

Regarding postoperation diagnosis of GERD by upper gastrointestinal endoscopy after 6 months we found that 20% of patients had grade an erosive esophagitis. This percentage is relatively small compared to other reports, some reports demonstrated that grade an erosive esophagitis incidence could increase up to 35% following gastric sleeve procedure like the Gibson SC study.

Gibson SC: his study conducted on 500 cases single surgeon Australian practice, morbidly obese, found 35% developed GERD by upper gastrointestinal endoscopy at 6 months. Gibson SC, Le Page PA, Taylor CJ. LSG: a review of 500 cases in single surgeon Australian practice.

Regarding symptoms correlation with upper gastrointestinal endoscopy at 6 months many studies have shown that there was some difference between the results of GERD symptoms and signs seen by upper gastrointestinal endoscopy flooring LSG as this current study, the symptoms correlation with upper gastrointestinal endoscopy at 6 months: found that 16.7% of patients who never have symptoms of GERD after LSG they had erosive esophagitis grade A, 16.7% of patients who have mild symptoms of GERD after LSG they had erosive esophagitis grade A, 66.7% of patients who have moderate symptoms of GERD after LSG they had erosive esophagitis grade A, all moderate symptoms has grade A erosive esophagitis of 66.7%, patients with mild symptoms (16.7%) had grade A erosive esophagitis while 25% had not, patients with never symptoms (16.7%) had grade A erosive esophagitis while 75% had not the variation in this results between the symptoms of GERD and erosive esophagitis is in agreement with Rajesh Domakunti, Yeshwant R. Lamture study.

Regurgitation symptoms were shown to be statistically significant ($P = 0.02$) since 37 out of 71 patients with regurgitation symptoms had erosive lesions, but no other significant associate was discovered because of the cases' equal distribution in NERD and ERD.

The endoscopic results were also associated with the duration, frequency, and severity.

4.1. Conclusion

Based on these findings, LSG is increasingly being seen as a bariatric procedure for obese individuals who also suffer from GERD.

Funding

The study is self-funded, no grants or external funders.

Ethics

Its was approved by faculty.

Conflicts of interest

There are no conflicts of interest.

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