

Incidence of Gastroesophageal Reflux after Laparoscopic Sleeve Gastrectomy

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ABSTRACT:

BACKGROUND:

The effect of laparoscopic sleeve gastrectomy (SG) on the development of gastroesophageal reflux disease (GERD) has remained controversial. Despite the positive effect of sleeve gastrectomy (SG) on weight loss and improvement in obesity and its morbidities, there is concern about the development of gastro esophageal reflux after this bariatric operation. There have been limited studies on this aspect and most of the published studies are retrospective. Therefore, we conducted a prospective study to assess this problem.

OBJECTIVE:

The aim of study is to assess the incidence of GERD post LSG.

PATIENTS AND METHODS:

We studied the incidence of GERD in patients who underwent LSG for the treatment of their morbid obesity at Al Imamain Al Kadhmain Teaching hospital. A prospective review of 48 patients undergoing LSG for morbid obesity from the 1st of October 2016 to the 1st of October 2018 was performed. Patients were evaluated using the Spanish version of the Carlsson-Dent questionnaire. Evaluation was done at 1, 6 months and 1 year postoperatively. Postoperative gastric anatomy was checked by Gastrografin studies that were routinely performed in all patients on the third postoperative day. These studies were evaluated prospectively. Changes of each one of the reflux symptoms were assessed in relation to the radiological pattern of the gastric sleeve.

RESULTS:

We had two groups of patients. Both of them underwent LSG by the same surgical team and in the same technique; the only difference between them was the point of start of devascularization and cutting of the stomach. Group 1 included 27 patients in whom the start of devascularization and cutting of the stomach was at 4 cm from the pylorus. Group 2 included 21 patients in whom devascularization and cutting of the stomach was at 6 cm from the pylorus of stomach. GERD occurred in 9 patients in Group 1 which represent (33.33 %). While 1 patient from Group 2 had GERD postoperatively and they represent (4.76%).

CONCLUSION:

LSG might increase the occurrence of GERD despite the satisfactory weight loss. The incidence of GERD can be reduced by changing the surgical technique. Additional studies including esophageal manometry and 24-hours pH testing are needed to obtain better evaluation on the effect of LSG on gastroesophageal reflux disease.

KEYWORDS: Reflux, esophagitis, sleeve, gastrectomy

INTRODUCTION:

Obesity is a global public health concern that has implications on both individuals and societies; Obesity is associated with gastroesophageal reflux disease (GERD);

although weight loss has been proven to decrease/resolve GERD symptoms [1-3]. Symptoms of reflux may also be found in many patients following bariatric procedures, especially vertical banded gastroplasty and laparoscopic adjustable gastric banding [4].

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In contrast, Roux-en-Y gastric bypass is considered as an antireflux procedure [5]. Recently, popularity of laparoscopic sleeve gastrectomy (LSG) has increased and it may be considered as a primary operation for the treatment of morbid obesity [6-8]. The procedure involves removal of the greater curvature of the stomach from the antrum to the angle of His and so, a long tubular gastric sleeve is created [9]. These anatomical changes may be expected to have a great effect on upper gastrointestinal motility, and therefore, they might induce gastroesophageal reflux. Indeed, there is evidence that LSG may increase the incidence of reflux in the first year postoperatively [10-16] and then the improvement in symptoms develops over time [10,15].

LSG is a restrictive operation but it is not associated with the complications of having a foreign object present in the body or the necessity to undergo continuous monitoring for band fills. This LSG procedure also potentially avoids some of the complications associated with LRYGB such as malnutrition, dumping syndrome, and marginal ulceration. Additionally, recent data have suggested that the removal of the gastric fundus will cause a decrease in ghrelin [17]. This change in ghrelin levels combined with the increased gastric emptying and the restrictive component of LSG might be considered the contributing factors to the weight loss seen in these patients [18].

Although LRYGB has been shown to alleviate gastroesophageal reflux [4], LSG has had a wide range of results from improvement of GERD after LSG to increased prevalence in newly diagnosed episodes of GERD in patients after LSG [19,20]. The anatomy and shape of stomach post LSG has been described in upper gastrointestinal gastrografin swallow studies (UGI), routinely performed between the first and fourth postoperative day to exclude early complications and permit gradual liquid intake [21-24]. In fact, various anatomical patterns of the gastric sleeve that reflect variations or limitations of the surgical technique have been identified [23].

GERD symptoms can be distinguished into typical symptoms, such as heartburn, regurgitation, and dysphagia, and atypical,

such as chronic cough, laryngitis, hoarseness, or asthma these are the atypical respiratory symptoms that need to be mentioned because the link between GERD and pulmonary diseases has been increasingly recognized [25].

PATIENTS AND METHODS:

Inclusion criteria:

The study included patients undergoing LSG at Al Imamain Al Kadhmain Teaching hospital from 1st of October 2016 - 1st of October 2018.

All patients admitted for laparoscopic sleeve gastrectomy were operated on by the same surgical team, they met the following criteria of bariatric surgery for international federation for the surgery of obesity (IFSO) :

Body mass index (BMI) > 40 Kg/m², or BMI 35-39_Kg/m² with co morbidities, within the age limit of 18-55 years, and failed conservative treatment for more than 2 years.

Exclusion criteria:

We excluded from our study the patients who were (A) Heavy sweet eaters (B) Smokers (C) Patients with suspected gastroesophageal reflux disease GERD as suggested by their symptoms preoperatively and (D) patients with diabetes.

Maneuver:

All patients were evaluated with a comprehensive blood count, metabolic panel, liver function testing, echocardiography, before any surgical intervention. We divided the patients into two groups of populations, both of them underwent the same operation with the same technique but they differed in the site of the start of devascularization of the greater curvature of stomach which is also the site of start of stapling and cutting of stomach, in one of these groups we started the devascularization at 4 cm from the pylorus (the distance was measured by measuring the distance between the two jaws of the grasper which is 2 cm, they represent (Group 1). In the second group, we started devascularization at 6 cm from the pylorus, they represent (Group 2). All patients underwent a postoperative upper gastrointestinal (UGI) study and have regularly scheduled postoperative follow-up visits. All of them were interviewed regarding their reflux symptoms using the Spanish version of the Carlsson-Dent questionnaire 1, 6 months and 1 year after their surgical procedure.

GASTROESOPHAGEAL REFLUX SLEEVE GASTRECTOMY

This questionnaire includes 7 multiple choice questions and its cut-off point for a positive result is ≥ 4 . This questionnaire qualitatively evaluates symptoms associated with GERD and their triggering factors such as diet, posture, and medications used (Figure 1). Under an institutional review board-approved protocol, a prospective chart review was performed of all LSG patients during this period. The charts were reviewed for patient demographics, medication use, body mass index, postoperative upper gastrointestinal radiographic findings, and percentage of excess weight loss. All patients received prophylactic dose of intravenous antibiotics and subcutaneous unfractionated heparin and had bilateral sequential compression devices placed preoperatively.

<i>Carlsson-Dent Questionnaire</i>
<p>1- Which of the following sentences best describes your complaint? Mark an option.</p> <ul style="list-style-type: none"> • +5 Burning sensation or burning pain that starts in the pit of your stomach or your chest and goes up in to your throat (heartburn). • 0 Nausea or vomiting. • +2 Pain in the middle of your chest when you eat. • 0 None of the above.
<p>2- Which of the following sentences best describes the time at which you have the complaint? Mark an option</p> <ul style="list-style-type: none"> • -2 At any time and there is no relation to eating (neither improves nor worsens with meals). • +3 Within the first 2 hours after eating. • 0 Always
<p>3- What happens to your complaint in the following situations? Does it get better? Gets worse? Or nothing happens? Read each sentence carefully and circle what happens to your main complaint.</p> <ul style="list-style-type: none"> • You eat a lot or more than you are accustomed to +1 -1 0. • You eat fatty foods +1 -1 0. • You eat spicy or very seasoned food +1 -1 0.
<p>4- What happens to your main complaint when you take antacids? Mark an option.</p> <ul style="list-style-type: none"> • 0 Nothing. • +3 Complete relief within the first 15 minutes after having taking them. • 0 Complete relief 15 minutes after having taking them. • 0 I don't take antacids.
<p>5- What happens to your main complaint when you bend over or lie down? Mark an option.</p> <ul style="list-style-type: none"> • 0 Nothing. • +1 It gets worse or the activity worsens it. • -1 It gets better. • 0 I don't know.
<p>6- Which of the following options describes the effect that carrying heavy things, straining, or doing anything strenuous has on your main complaint?</p> <ul style="list-style-type: none"> • 0 No effect. • +1 It gets worse or the activity worsens it. • -1 It gets better. • 0 I don't know or I don't do strenuous things.
<p>7- If you regurgitate (the food in your stomach returns to your throat). What happens to your complaint?</p> <ul style="list-style-type: none"> • 0 Nothing. • +1 It gets worse or the regurgitation worsens it. • -1 It gets better. • 0 I don't know or I don't regurgitate.

Figure 1: Carlsson-Dent questionnaire, Spanish version.
Source: Moreno-Eloa et al. ⁽²⁶⁾

RESULTS:

The medical records of 56 patients beginning in October 2016 through October 2018 who had undergone LSG for treatment of their morbid obesity at Al Imamain Al Kadhimain Teaching hospital were reviewed. Of those, 8 patients did not attempt our follow up schedules and they were excluded from our study. The remaining 48 patients were reviewed. Group 1 consisted of 13 males (48.14%), and 14 females (51.85%). Group 2 consisted of 9 males (42.85%), and 12 females (57.14%).

The mean age and BMI of patients in group 1 was (36.2±10.01) and (43.01±3.40) respectively, for group 2 the mean age and BMI was (37.5 ± 3.87) and (41.68 ± 3.87) respectively.

Generally, there were No statistical significance between group (1) and (2) regarding (Age, gender and BMI).

The incidence of hypertension in group 1 and group 2 was 9 (33.33%) and 4 (19.04%) respectively, the incidence of orthopedic impairment in group 1 and group 2 was 3 (11.11%) and 1 (4.76%) respectively, and the incidence of dyslipidemia in group 1 and group 2 was 5 (18.51%) and 7 (33.33%) respectively.

Two distinct patterns of the gastric sleeve were identified at UGI in these series: (a) the tubular, and (b) the inferior pouch pattern.

The tubular pattern was observed in patients whom the start of devascularization at 4 cm from the pylorus, whereas; the inferior pouch pattern was seen in patients whom the start of devascularization started at 6 cm from the pylorus.

In Group 1, at 6 months, we found that 16 patients had their CDQ less than 4 so they were considered free of GERD, while 11 patients had their CDQ more than 4 and they were considered that they had GERD.

In Group 2, 19 patients had their CDQ less than 4 and they were considered free of GERD, while 2 of them had GERD (their CDQ more than 4) as seen in table 1

At 1 year, In Group 1, 18 patients were considered to be free of GERD (their CDQ was less than 4), while only 9 of them were considered to have GERD (their CDQ was more than 4).

In Group 2, 20 patients had a score of less than 4 and they were considered as GERD free, while 1 patient had a score more than 4, so 1 patient from group 2 had GERD at 1 year. (Table 2)

Table 1: Comparison of the incidence of GERD in both groups at 6 months

Pattern of sleeve	Number of patients	percentage	Patients free of GERD at 6 months	Evidence of GERD at 6 months	P value
Group 1 (Tubular pattern)	27	56.25%	16 (59.25%)	11 (40.74%)	0.015*
Group 2 (Inferior pouch pattern)	21	43.75%	19 (90.47%)	2 (9.52%)	
Total	48	100 %	35 (72.91%)	13 (27.08%)	

Table 2: Comparison of the incidence of GERD in both groups at 1 year

Pattern of sleeve	Number of patients	percentage	Patients free of GERD at 1 year	Evidence of GERD at 1 year	P value
Group 1 (Tubular pattern)	27	56.25%	18 (66.66%)	9 (33.33 %)	0.015*
Group 2 (Inferior pouch pattern)	21	43.75%	20 (95.23%)	1 (4.76%)	
Total	48	100 %	38 (79.16%)	10 (20.83%)	

* P value is calculated by the use of Chi square test and the significance value was set at ≤ 0.05

DISCUSSION:

LSG is a relatively new bariatric procedure, most of the recent studies have focused on the complications such as staple line leak, and mortality, also they focus on the technical aspect of the procedure as it relates to weight loss, although many of the outcomes after LSG have been studied, little has been focused on the effects of LSG on GERD ⁽²⁷⁾.

It is well agreed that LRYGB improves GERD symptoms; however, a systematic review by Chiu et al. ^[19] has shown no evidence that LSG improved GERD. The second International Consensus Summit for Sleeve Gastrectomy survey found that 6.5% (range 0–83%) of the patients who had undergone LSG had postoperative GERD ^[8]. Braghetto et al. ^[16] found that GERD occurred in 46 patients out of 167 (27.5%) and their symptoms ranged from mild heartburn to regurgitation and vomiting and a radiological evidence of stricture that required endoscopic dilatation. In addition, Keidar et al. ^[28] found that 8 patients out of 212 patients who did LSG had GERD postoperatively and they required treatment, these patients had narrowing of the midstomach and dilated proximal part of stomach post operatively. In our study, we also found that the incidence of GERD was (27.08%) at 6 months and (20.83%) at 1 year postoperatively, and the GERD was more significant in Group 1 who represent the tubular pattern. It has been thought that the decrease in gastric emptying and compliance could be the cause for early postoperative GERD symptoms ^[10]. The changes in the angle of His is also thought to cause increased GERD symptoms ^[29]. Data published on the effect of LSG on reflux symptoms are controversial. Most studies have reported that there is an increase in the incidence of reflux symptoms during the first year post sleeve gastrectomy ^[10–16] and then there will be a gradual decrease in these symptoms afterwards up to the third postoperative year ^[10, 15]. This had been mainly related to anatomical changes at the gastroesophageal junction that have been considered to impair the antireflux mechanism of the cardia ^[13, 28, 30].

In fact, a recent study ^[31] demonstrated that the manometric analysis revealed an important decrease in LES pressure following LSG,

and this could be attributed to the partial resection of these fibers. The lack of gastric compliance together with severely restricted gastric capacity with an intact pylorus, and impaired gastric emptying have been suggested to predispose patients to reflux in the first postoperative period ^[10, 32].

On the other hand, few authors believe that sleeve gastrectomy (SG) has a beneficial effect on reflux. The acceleration of gastric emptying after LSG has been postulated to help with resolution of GERD symptoms ^[33]. Santoro ^[34] also postulated that LSG could help to treat GERD and this could be explained by reduction of acid production by excision of the fundus and this will reduce the tension on the gastric wall below the cardia according to Laplace's law. In addition, by improvement of weight loss and return to a normal body mass index, many believe that this accounts for resolution of GERD symptoms ^[30]. Moon Han et al. ^[35] reported a decrease in the incidence of reflux symptoms and esophagitis after SG in 70% of cases; this may be partly explained by that the reduction of weight post sleeve gastrectomy can be associated with a reduction of intra abdominal pressure. Melissas et al. ⁽¹⁸⁾ had shown that 5 patients out of 14 had GERD symptoms at 6 months and that all of them except one had complete remission of their symptoms at 2 years postoperatively. Melissas et al. ⁽²⁴⁾ also found that the percentage of gastric emptying increased from 49.2% preoperatively to 75.4% after sleeve gastrectomy. Braghetto et al. ^[36] have shown that there is an accelerated gastric emptying at scintigraphy obtained 3 months postoperatively in 75% of patients and that this may improve reflux symptoms. Nocca et al. ^[37] noted a low rate (11.8%) of symptoms of GERD when they preserved the antrum by starting the dissection at 10 cm from the pylorus. In our study, the incidence of GERD was significant during the 1st year postoperatively, GERD was more evident in Group 1 which represents the tubular pattern and this finding was present 6 months postoperatively and also at 1 year postoperatively, but there was a gradual reduction in the incidence of GERD.

Impairment of the antireflux mechanism of the cardia after sleeve gastrectomy may lead to increased regurgitation of intragastric contents. The parameter that seemed to affect postoperative symptoms was the shape of the sleeve. The finding that the incidence of GERD is higher in the tubular pattern rather than the inferior pouch patterns during the first postoperative year needs further evaluation. It is probably associated with the increase in the intragastric pressure after sleeve gastrectomy because of loss of the fundus and body of the stomach and the impairment in the receptive relaxation mechanism. It seems that the presence of a pouch may increase the ability of the stomach to distend and accommodate food, so that less gastric content is "available" for reflux. This may lead to reduction in regurgitant volume in patients with pouches as compared to tubular gastric sleeves and, therefore, less severe regurgitation and vomiting. The gradual reduction of the incidence of GERD could be related to the improvement of the BMI and the rapid gastric emptying following surgery.

CONCLUSION:

The difference in the incidence of GERD post sleeve gastrectomy between the two groups was statistically significant, GERD occurred more in Group 1 (which represents the patients in whom cutting and stapling of the stomach started at 4 cm from the pylorus) than Group 2 (which represents the patients in whom cutting and stapling of the stomach started at 6 cm from the pylorus). Therefore, changing the technique of surgery by making the start point of cutting and stapling of stomach at 6 cm from the pylorus of stomach may be necessary to decrease the incidence of GERD post sleeve gastrectomy.

RECOMMENDATIONS:

We recommend that the devascularization of the greater curvature of the stomach should start at 6 cm from the pylorus. The incidence of GERD post sleeve gastrectomy will need further evaluation by endoscopy, manometry and 24 hours PH monitoring.

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