CLINICAL TECHNIQUE

Concomitant Obesity and GERD: Is Laparoscopic Sleeve Gastrectomy Still Considered the Best Option? A Clinical and Endoscopic Evaluation

Ehab M Oraby[1], Ola A Harb[2], Mokhtar A Bahbah[3]

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Abstract

Background: Obesity is a real worldwide problem. About one billion people are suffering from obesity all over the world. Two-thirds of the communities are adults, then the remaining one-third are children and adolescents. Obese patients especially those with central obesity are showing an incidence of 20–50% for preexisting gastroesophageal reflux disease (GERD).

Objectives: This article is trying to define the relationship between these items in obese patients in our community through clinical and endoscopic evaluation.

Patients and methods: This prospective study involved 61 patients who were scheduled for bariatric procedures. All patients were invited to answer a GERD questionnaire and to do upper GI endoscopy twice: once preoperative and second time 1 year postoperatively. Patients were divided into three groups regarding preexisting GERD and operative procedure.

Results: Group A patients showed significant worsening of GERD scores, endoscopic esophagitis grade, and proton pump inhibitor dependency (PPI). Group B patients showed significant improvement in GERD scores without improvement in esophagitis grade. Group C patients showed multifactorial significant improvement.

Conclusion: Laparoscopic sleeve gastrectomy (LSG) operation seems to be truly a refluxogenic procedure, while Roux-En-Y gastric bypass (RYGB) should be considered as better alternatives to avoid postoperative worsening of GERD and degree of esophagitis. These results need confirmation by studies with a bigger number of patients.

Keywords: Body mass index, Gastroesophageal reflux disease, Obesity, Sleeve gastrectomy.

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Introduction

Obesity is a real worldwide problem. About one billion people are suffering from obesity all over the world. Two-thirds of this community are adults, and the remaining one-third are children and adolescents.[1–3]

Over the last years, a growing discussion was running around obesity as a disease. Approaching this disease with a surgical intervention was found to have a solid and reliable outcome.[4] Previously, more complicated interventions such as RYGB were planned for obesity control, while LSG was considered as only a preliminary step before a definitive procedure. Later, LSG was found to be an effective standalone simple procedure, and no need to add a further complex step.[5]

Obese patients especially those with central obesity, are showing an incidence of 20–50% of preexisting GERD.[1,2,5,6] This high association was attributed to high intra-abdominal pressure that may increase intragastric pressure, delayed gastric emptying, weak lower esophageal sphincter pressure, more frequent lower esophageal relaxations, and associated hiatus hernia (HH).[1] The presentation and endoscopic findings of GERD vary from a silent condition (10–25%), erosive esophagitis (4–34%), Barrette's esophagus (15%), and even esophageal adenocarcinoma in 0.5%.[3] In the same context, a preexisting HH in morbidly obese patients was found to reach 37–50%.[7]

On the other hand, LSG was found to be a Refluxogenic procedure. This finding was explained by the high pressure in the gastric tube, crural dissection, disturbed angle of His, and de novo HH due to migration of gastric tube toward chest cavity.[1,3] Many papers reported variable degrees of de novo GERD and de novo HH after LSG. Patients after LSG developed de novo GERD in 11–70%, de novo HH in 16–73%, and persistence of preexisting GERD in about 75–100% of cases.[1,2,6,8–10]

Evaluation of GERD is accomplished through many parameters such as clinical symptoms, pH monitoring, esophageal manometry, contrast-imaging studies, and upper GI endoscopy.[2]

The relationship between obesity, GERD, and bariatric operations was studied in many papers, but still, there is a strong debate with wide variations in its results that can be demonstrated in having no consensus around many items in this topic. This paper is trying to define the relationship between these items in obese patients in our community through clinical and endoscopic evaluation.

[1,3]Department of General Surgery, Benha University, Benha, Egypt

[2]Department of Pathology, Zagazig University, Cairo, Egypt

Corresponding Author: Ola A Harb, Department of Pathology, Zagazig University, Cairo, Egypt, Phone: +012234789123, e-mail: olaharb2015@gmail.com

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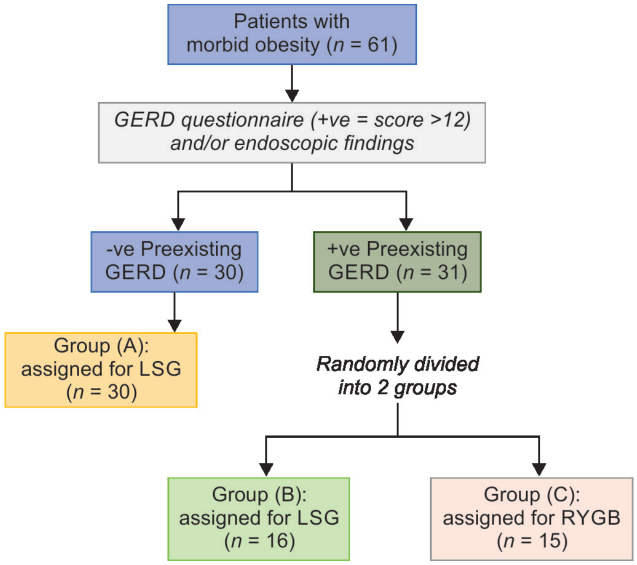
Flowchart 1: Study flowchart



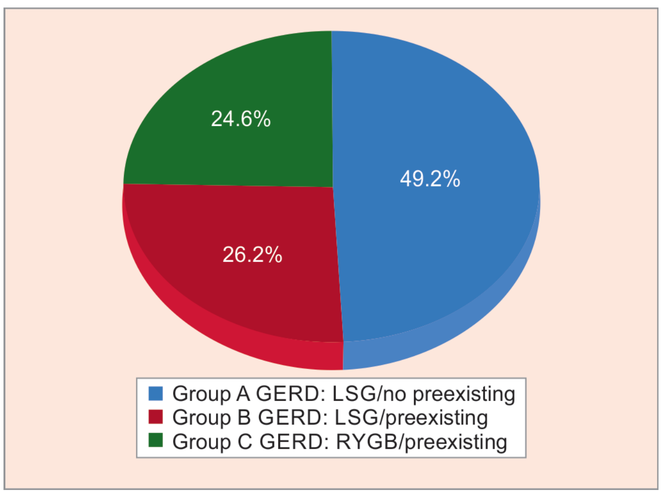


Fig. 1: Pie chart for groups

Patients and Methods

This prospective study was conducted at the Department of Surgery, Benha University Hospitals, after approval from the local Ethical Committee and after fully informed written consent signed by the patients.

This study involved patients who were scheduled for bariatric procedures from November 2017 to May 2020. All patients were invited to answer a GERD questionnaire and to do upper GI endoscopy twice: once preoperative and second time 1 year postoperatively. Sixty-one patients fulfilled these steps. Demographic data, BMI, GERD-Health Related Quality of Life (GERD-HRQL) questionnaire,[11] PPI dependency, and upper GI endoscopy findings were collected and analyzed.

After the preoperative questionnaire and intraoperative upper GI endoscopy, patients were divided into two categories. The first category included patients with no preexisting GERD (group A), and the other category included those with positive preexisting GERD. The second category was further subdivided randomly into two groups: groups B and C (Flowchart 1 and Fig. 1).

Table 1: Overall preoperative data (n = 61)

Age (years)	*Mean ± SD*	*36.6 ± 7.6*	*Remarks*
Gender			
Males	*n* (%)	11 (18.0)	
Females	*n* (%)	50 (82.0)	
Preoperative BMI	Mean ± SD	43.9 ± 3.6	
GERD score preop (?/30)	Mean ± SD	14.26 ± 6.7	Score ≤12 = negative
Endoscopic esophagitis			
No esophagitis	*n* (%)	30 (49.2)	No preexisting GERD in 49.2%
Grade A	*n* (%)	3 (4.9)	Preexisting GERD is 50.8% of cases
Grade B	*n* (%)	12 (19.7)	
Grade C	*n* (%)	9 (14.8)	
Grade D	*n* (%)	7 (11.5)	
Erosive esophagitis	*n* (%)	0	
PPI intake preop			
No PPI intake	*n* (%)	33 (54.1)	
Occasional intake	*n* (%)	16 (26.2)	
Daily intake	*n* (%)	12 (19.7)	

Proton pump inhibitor dependencies were defined to have regular PPI intake 5 times per week for more than 3 months.[8]

Data analyses were carried out in six subsequent steps:

(i) An overall analysis of whole-sample preoperative data.
(ii) Differential analysis of preoperative data for the three groups.
(iii) Individual analysis of each group comparing preoperative and postoperative data.
(iv) Comparing group B vs group A as they are sharing the same technique (LSG) for patients with preexisting GERD and those without preexisting GERD, respectively.
(v) Comparing group B and C patients. All of them were suffering from preexisting GERD, receiving different operations (LSG and RYGB, respectively).
(vi) Estimating the correlation between GERD score and endoscopic esophagitis in different groups.

Statistical Methods

Data management and statistical analysis were done using SPSS version 25 (IBM, Armonk, New York, United States). Quantitative data were assessed for normality using the Shapiro–Wilk test and direct data-visualization methods. According to normality testing, numerical data were summarized as means and standard deviations or medians and ranges. Categorical data were summarized as numbers and percentages. Quantitative data were compared between study groups using one-way ANOVA. Categorical data were compared using the Chi-square or Fisher's test, if appropriate. Post hoc analyses were done using Bonferroni's method. All statistical tests were two-sided. P values less than 0.05 were considered significant.

Results

In this study, (Table 1) 61 patients were involved, 11 males (18%) and 50 females (82%). No significant differences were noted between

Table 2: Differential preoperative data

		Groups			
		Group A (n = 30)	*Group B (n = 16)*	*Group C (n = 15)*	*p-value*
Gender					
Female	Count (%)	24 (48.0)	14 (28.0)	12 (24)	0.80
Male	Count (%)	6 (54.5)	2 (18.2)	3 (27.3)	
Age in years	Mean (SD)	35.3 (8.7)	36.6 (8.1)	39.2 (3.8)	0.28
BMI (preoperative)	Mean (SD)	44.0 (3.6)	43.5 (2.6)	44.2 (4.6)	0.85
GERD score preop	Mean (SD)	8.13 (2.6)	19.4 (3.3)	21.1 (2.8)	0.00
Preop PPI intake					
No PPI	Count (%)	30 (100)	3 (18.8)	0	
Occasional PPI	Count (%)	0	6 (37.5)	10 (66.7)	
Daily PPI	Count (%)	0	7 (43.8)	5 (33.3)	

Pearson Chi-square tests for gender, and one-way ANOVA test for age, BMI, GERD score, and esophagitis

Table 3: Group B preop–postop difference ($n = 16$)

	Preop data	*Postop data*	*Postop–preop difference*	*p-value*
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*(<0.05)*
BMI	43.5 (2.6)	32.0 (2.1)	–11.5 (1.5)	0.00
GERD score	19.4 (3.3)	16.4 (5.2)	–2.9 (4.2)	0.01
Endoscopic esophagitis	1.6 (1.4)	2.0 (1.4)	+0.4 (1.7)	0.40
PPI intake	1.1 (0.9)	0.9 (0.9)	–0.1 (1.1)	0.65

Table 4: Group C postop–preop difference

	Preop data	*Postop data*	*Postop–preop difference*	*p-value*
	Mean (SD)	*Mean (SD)*	*Mean (SD)*	*(<0.05)*
BMI	44.2 (4.6)	31.8 (3.1)	–12.4 (2.5)	0.00
GERD score	21.1 (2.8)	12.3 (1.9)	–8.7 (2.2)	0.00
Endoscopic esophagitis	3.1 (1.1)	0.8 (0.8)	–2.3 (1.1)	0.00
PPI intake	1.5 (0.5)	0.4 (0.5)	–1.1 (0.6)	0.00

the study groups (Table 2) regarding age (p = 0.178), gender (p = 0.746), and preoperative BMI (0.85). The three groups do not differ significantly from each other at the 0.05 level. On the other hand, no statistically significant difference between groups B and C regarding GERD score and endoscopic esophagitis (0.13 and 0.39, respectively) (Table 2).

Patients in a group A show a significant difference between preoperative and postoperative data, significant decrease in BMI (–11.8 ± 3.1), significant increase in GERD scores (+4.7 ± 4.8), significant increase in endoscopic esophagitis (+0.8 ± 0.8), and PPI intake (+0.3 ± 0.6). These results significantly imply that LSG is a refluxogenic operation.

Patients in group B (Table 3) show a significant decrease in BMI (–11.5 ± 1.5), significant decrease in GERD scores (–2.9 ± 4.2), statistically non-significant increase in endoscopic esophagitis (p value = 0.40), and statistically non-significant decrease in PPI intake (p value= 0.65). Patients with preexisting GERD who received LSG showed a little bit significant improvement in GERD score and also statistically non-significant worsening of endoscopic esophagitis.

Patients in group C (Table 4) show a significant decrease in BMI (–12.4 ± 2.5), statistically significant improvement in GERD scores (–8.7 ± 2.2), statistically significant improvement in endoscopic esophagitis (–2.3 ± 1.1), and statistically significant decrease in PPI intake (–1.1 ± 0.6).

Comparing group A vs group B (Table 5), both groups are matching in preoperative BMI, age, and gender. Both groups were exposed to the same operation LSG. Group A showed no preexisting GERD. Group B showed preexisting GERD. Decrease in BMI has no significant changes between both groups. So, preexisting GERD had no effect on weight loss in this study. GERD score difference showed a significantly wider gap. GERD score worsened in group A (+4.7 ± 4.8) while showed little improvement in group B (–2.9 ± 4.2). On the other hand, endoscopic esophagitis showed worsening in both groups with a narrower gap but still significant. Worsening in group A is more. Proton pump inhibitor intake also showed significant differences: worsening in group A while little improvement in group B.

Comparing between groups B and C (Table 6), both groups were matching in preoperative BMI, age, gender, and preexisting GERD. Each group was exposed to a different operation (LSG vs RYGB). Group C showed more loss in BMI but was still statistically non-significant. Both groups showed improvement in GERD score.

Table 5: Comparing group A vs group B*

	Postop–preop difference		*Postop–preop difference comparison*	*Sign.*
	Group A	*Group B*		
	Mean (SD)	*Mean (SD)*	*Mean (SE**)*	*(<0.05)*
BMI	−11.8 (3.1)	−11.5 (1.5)	0.3 (0.8)	1.00
GERD score	+4.7 (4.8)	−2.9 (4.2)	7.7 (1.3)	0.00
Endoscopic esophagitis	+0.8 (0.8)	+0.4 (1.7)	1.3 (0.37)	0.02
PPI intake	+0.3 (0.6)	−0.1 (1.1)	0.6 (0.2)	0.03

*One-way ANOVA and Post hoc test, Bonferroni method
**Standard error

Table 6: Comparing group B vs group C*

	Postop–preop difference		*Postop–preop difference comparison*	*Sign.*
	Group B	*Group C*		
	Mean (SD)	*Mean (SD)*	*Mean (SE**)*	*(<0.05)*
BMI	−11.5 (1.5)	−12.4 (2.5)	0.9 (0.9)	1.00
GERD score	−2.9 (4.2)	−8.7 (2.2)	5.8 (1.5)	0.001
Endoscopic esophagitis	+0.4 (1.7)	−2.3 (1.1)	1.5 (0.4)	0.002
PPI intake	−0.1 (1.1)	−1.1 (0.6)	0.6 (0.3)	0.06

*One-way ANOVA and Post hoc test, Bonferroni method
**Standard error

Table 7: Pearson correlation

	GERD score	*Esophagitis*	*PPI*
	Correlation (sign.)	*Correlation (sign.)*	*Correlation (sign.)*
Preop data (Groups B + C, +ve preexisting GERD, *n* = 31)			
GERD score	1.00 (–)	0.46 (0.01)	0.62 (0.00)
Esophagitis			0.28 (0.12)
Postoperative data (Groups A + B + C, *n* = 61):			
GERD score	1.00 (–)	0.48 (0.00)	0.60 (0.00)
Esophagitis			0.53 (0.00)

This improvement was more in group C (−8.7 ± 2.2). On the other hand, endoscopic esophagitis in group B showed little deterioration in endoscopic esophagitis. While group C showed improvement in endoscopic esophagitis with a statistically significant difference between the two groups. Proton pump inhibitor intake showed statistically non-significant differences (*p*-value = 0.06). Overall findings were little improvement in group B and a better improvement in group C.

Table 7 shows the significant positive intermediate correlation between GERD score and endoscopic esophagitis pre- and postoperatively (Pearson correlation 0.46 and 0.48, respectively).

The preoperative correlation between PPI and GERD score is stronger than that between PPI and endoscopic esophagitis (significant 0.62, non-significant 0.28). This reflects that PPI intake is related more to patients' symptoms. A weak correlation between PPI dependency and endoscopic esophagitis can be explained by the presence of asymptomatic cases. On the other hand, these two correlations become mostly equal of intermediate strength in postoperative data (significant 0.60, significant 0.53).

Distribution of endoscopic esophagitis among groups (Table 8): Group A patients with 100% had no preexisting esophagitis and 56.7% developed de novo esophagitis. Group B patients with 100% preexisting esophagitis, their response to LSG varied widely from the cure of esophagitis in 12.5% of patients to erosive esophagitis in 6.3%. Group C patients showed 40% clearance of esophagitis, other cases were included within low-grade esophagitis (only at grades A and B).

Discussion

Obesity is no more just a cosmetic problem. Obesity is a metabolic disease that responds well to surgical control. This area of research is rapidly growing with rapidly cumulating data that can act as a guide toward proper management.

This study was designed to evaluate the effect of LSG on patients with no preexisting GERD and those with positive preexisting GERD. A further step is to compare the effect of two bariatric procedures (LSG and RYGB) on patients with preexisting GERD, finally trying to find a correlation between patient symptoms and endoscopic findings. In other words, are preoperative and postoperative endoscopy considered routine steps with bariatric procedures?

Overall evaluation of the current sample (Table 1) found GERD incidence to be 50.8%. Most of them are in grade B and C

Table 8: Endoscopic esophagitis between groups

			Groups					
			A		B		C	
			Preop	Postop	Preop	Postop	Preop	Postop
			(N = 30)	(N = 30)	(N = 16)	(N = 16)	(N = 15)	(N = 15)
Endoscopic esophagitis	No	n (%)	30 (100)	13 (43.3)	0	2 (12.5%)	0	6 (40%)
	Grade A		0	11 (36.7)	2 (12.5)	4 (25.0)	1 (6.7)	6 (40.0)
	Grade B		0	5 (16.7)	8 (50.0)	5 (31.3)	4 (26.7)	3 (20.0)
	Grade C		0	1 (3.3)	2 (12.5)	3 (18.8)	7 (46.7)	0
	Grade D		0	0	4 (25.0)	1 (6.3)	3 (20.0)	0
	Erosive		0	0	0	1 (6.3)	0	0
Total			30	30	16	16	15	15

Table 9: Group A preop–postop difference

	Preop. data	Postop. data	Postop–preop difference	p value
	Mean (SD)	Mean (SD)	Mean (SD)	(<0.05)
BMI	44.0 (3.6)	32.2 (2.7)	−11.8 (3.1)	0.00
GERD score	8.1 (2.6)	12.9 (4.2)	+4.7 (4.8)	0.00
Endoscopic esophagitis	0.0	0.8 (0.8)	+0.8 (0.8)	0.00
PPI intake	0.0	0.3 (0.6)	+0.3 (0.6)	0.01

esophagitis. Intake of PPI medications was occasionally in 26.2% and daily in 19.7%. These results are matching with other reports.[1,2,5,6]

Group A patients showed significant worsening of GERD scores (+4.7 ± 4.8) and endoscopic esophagitis after LSG (postoperative de novo GERD) (Table 9).

The above results are matching with what was reported by Jorge et al.,[8] Halim,[1] and Ramon et al.[3] that patients after LSG have factors that enhance de novo GERD such as lost angle of His, crural dissection, disturbed sling fibers, the excised pad of fat, increased intragastric pressure, delayed gastric emptying, weak LES, and possible migration of gastric tube toward the negatively pressured thoracic cavity.

On the other hand, some patients after LSG with preexisting GERD (group B, Table 3) may show some benefits in GERD improvement. Those patients with preexisting GERD received LSG. The significant improvement in GERD scores is synchronous with statistically non-significant worsening of endoscopic esophagitis. One case in this group (6.3%) showed erosive esophagitis (Tables 3 and 8). Although it is still statistically non-significant but can be considered clinically significant, samples with a bigger number can be more beneficial in declaring the statistical significance. The above data in group B can be explained by decreased intra-abdominal pressure after weight loss, improved gastric emptying in some cases, and decreased ability of acid production.[3]

Group C patients (preexisting GERD patients received RYGB, Table 4), those patients showed improvement in GERD scores (−8.7 ± 2.2). Also, there was a significant improvement in esophagitis grade (−2.3 ± 1.1) and PPI intake (−1.1 ± 0.6).

These results agree with that reported by Zaina et al.[7] that RYGB is a feasible option used more frequently to treat bariatric cases with concomitant GERD.

A comparison between patients in groups A and B (Table 5) revealed that there was no effect of preexisting GERD on the weight loss after LSG.

Another comparison between patients in groups B and C (Table 6) revealed more improvement in GERD scores, PPI intake, and endoscopic esophagitis for group C patients, the above results declared that RYGB is more effective in multifactorial control against GERD persistence.

In this study, Table 7, we found a positive weak to an intermediate correlation between GERD score and endoscopic esophagitis. That may be interpreted as clinical symptoms alone cannot be considered enough for GERD evaluation especially with patients giving symptoms of preexisting GERD.

Conclusion

Treating obesity in patients with concomitant GERD should be taken carefully. Laparoscopic sleeve gastrectomy operation seems to be truly a refluxogenic procedure, while RYGB should be considered as better alternatives to avoid postoperative worsening of GERD and degree of esophagitis. Upper GI endoscopy should be considered as a routine preoperative and postoperative-assessment tool, especially for cases with clinically suspected GERD. Further studies with a bigger number of cases are recommended to stabilize this concept.

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