

Repair of hiatal hernia during in-sleeve gastrectomy: impact on the prevalence of gastroesophageal reflux.

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Summary:

Objective: To assess the impact of hiatal hernia repair during morbid obesity vertical gastrectomy on the prevalence of gastroesophageal reflux disease (GERD).

Material and methods: Comparative, cross-sectional study, which included patients submitted to surgery for morbid obesity, patients with hiatal hernia, who underwent vertical gastrectomy, between August 2008 and August 2013. They were divided into two groups. Group A: Hernia was repaired during surgery and Group B: It was not repaired. The prevalence of GERD was determined through a validated survey. The data of the preoperative variables were obtained from the prospectively kept electronic database of the bariatric surgery program of the Hospital, and the postoperative during the evaluation. Environment: Academic and university hospital, Caracas, Venezuela.

Results: 40 patients were included in the analysis, 20 for each group. The prevalence of GERD was 5% in group A and 95% in group B ($p = 0.001$).

Conclusions: In patients undergoing vertical gastrectomy due to morbid obesity, formal repair of the esophageal hiatus should be considered when a hiatal hernia is diagnosed.

Keywords:

- Hiatal hernia
- Cruroplasty
- Gastric sleeve
- Obesity
- Reflux

Introduction

Bariatric surgery has demonstrated its effectiveness in the treatment of morbid obesity and its associated diseases, with a low rate of complications and mortality (1). This, combined with the increase in the prevalence of obesity and the failure of medical treatment, has led to a sustained increase in demand for these operations (2). Among these procedures, vertical gastrectomy or gastric sleeve has gained popularity among surgeons, due to its lower technical complexity and good results (3). However, there are conflicting results regarding the gastroesophageal reflux (GERD) after the sleeve. Several studies suggest an increase in the severity of reflux symptoms and "de novo" or a new appearance after surgery, among other reasons, due to a decrease in gastric emptying, an increase in intragastric pressure, a decrease in residual stomach distensibility and a weakening of the lower esophageal sphincter (IAS) (4,5).

On the other side, the hiatal hernia (HH) is closely related to the presence of GERD. 60% of patients with HH diagnosed by endoscopy have symptoms of gastroesophageal reflux and a higher risk of erosive esophagitis (6). These patients have a significant delay in esophageal emptiness, so the exposure of the mucosa to the acid is prolonged (7). Given the known consequences of GERD (Esophagitis, Barrett and cancer), it is important to develop and optimize techniques that decrease the chance of a resulting reflux after surgery.

Concomitant repair of the HH is a safe option, which may have some impact on the symptoms of reflux (8). However, most of the related studies are level III or IV, with small samples, without a standardized definition of

gastroesophageal reflux (non-validated and informal scales), variable criteria for HH and different repair techniques (9). Despite this, the results in general, show the improvement of reflux after the sleeve when the HH is repaired. However, without a control group it is not clear if the gastric sleeve or the repair is responsible for this improvement. The primary objective of this study is to evaluate the impact of hiatal hernia repair during morbid obesity vertical gastrectomy on the prevalence of GERD.

Materials and methods

This is a cross-sectional and comparative study, which included patients surgically operated for morbid obesity who underwent laparoscopic gastric sleeve and hiatal hernia repair, at the General Hospital del Este "Dr. Domingo Luciani", Caracas, Venezuela, between August 2008 and August 2013. The control group was made up of patients undergoing gastric sleeve during the same period, carriers of hiatal hernia, whose hernia was not repaired. This group was selected in a 1: 1 ratio, matching it with the study group, according to age, sex and initial body mass index (BMI).

Review cases or conversions were excluded. All patients who are subject to bariatric surgery in the center are selected based on the criteria established by the American Bariatric Surgery Association and other related institutions (10). Before surgery, patients are evaluated by a multidisciplinary team consisting of nutritionists, psychologists, psychiatrists, internists, endocrinologists and gastroenterologists (Routine Gastroscopy).

Contraindications used by the team to perform gastric sleeve include patients with GERD, esophagitis, Barrett's

esophagus, or BMI ≥ 50 kg / mt2. The criterion used for the diagnosis of hiatal hernia had a distance greater than 2 cm between the Z line and diaphragmatic depression. None of the patients included had esophagitis on preoperative endoscopy. The baseline demographic variables included were: age, sex, comorbidities, preoperative and current BMI, difference in BMI, percentage of excess weight lost and operating time.

The diagnosis of GERD was established using the Manterola scale (11). It is a four-item questionnaire, which combines three typical symptoms with an atypical one. The patient is considered to have GERD if the result of the scale is equal to or greater than three points. It has a sensitivity of 97% and a specificity of 87% for diagnosis of GERD. The patients were contacted and evaluated in consultation or via telephone. This study was approved by the Ethics Committee of the Institution, and all the procedures were performed according to the standards of the Institution and the Helsinki Declaration of 1964.

All patients included in the study gave informed consent. Surgical technique: All cases were performed by laparoscopy using 5 ports. The patient is placed in a supine position with the surgeon standing to the right of the table. The protocol for prevention of venous thrombosis includes the use of intermittent pneumatic compression stockings (Intermittent pneumatic compression is a therapeutic technique used in medical devices that include an air pump and inflatable auxiliary sleeves) during surgery and enoxaparin in the postoperative period, with the first dose at 8-12 hours after the closure of the skin. Foley probes, nasogastric probes, or routine drains are not used. Patients are motivated to start walking early and begin diet with clear liquids 6-8 hours after the operation. The pneumoperitoneum is insufflated through a Veress needle placed on the left subcostal edge. The first trocar (a surgical instrument with a three-sided cutting point enclosed in a tube, used for withdrawing fluid from a body cavity) is optical, and the rest is placed under laparoscopic vision. The greater curvature is released until the left pillar of the diaphragm is exposed, sealing and sectioning all vessels with Ligasure® or Harmonic scalpel®. The stomach is sectioned with an Echelon 60® linear self-sharpener, following a 36 french spark plug as a calibrator. The section starts at 4 or 5 cm from the pylorus. Two green charges and golden or blue charges are then used. The entire line of staples is reinforced with a continuous absorbable suture (Polyglactin 910).

In the technique used by the authors to repair the hernia, the hiatus is approached from right to left. The lesser omentum is opened, the right abutment is dissected, the phrenoesophageal ligament is sectioned, and the esophagus is circumferentially released until achieving 2 cm of the intra abdominal esophagus. The hiatus closure is performed with one or two posterior points with silk 0. No mesh was used in any patient.

Statistical Treatment: In the case of nominal data and in mean and standard deviation for continuous data the results were expressed in frequency and proportions. The normal distribution of continuous data was checked with the Shapiro Wilk test. The difference between the groups, in the case of quantitative variables, was analyzed with the t-test for independent samples, and for the proportions with Pearson's Chi square. $P < 0.05$ was considered

statistically significant. The SPSS 24 software was used for analysis.

Results

Out of a total of 225 laparoscopic gastric sleeves due to morbid obesity, 40 cases that met the inclusion criteria were included for the analysis. At the time of the survey, the patients had between 2 and 3 years of having been submitted to surgery. Twenty patients had a repaired hernia and were included in group A, and 20 were selected for group B according to the described pairing. The characteristics of the sample are presented in Table 1, which highlights the fact that there was no significant difference in any of the evaluated variables, thus, demonstrating the homogeneity of the groups. The results regarding the prevalence of GERD are presented in Table 2. Reflux was significantly more frequent in cases where the hiatal hernia was not repaired, 95% vs. 5% ($p = 0.001$). There was no mortality or major complications in this series.

Variables	With repair	Without repair	p
N	20	20	-
Age (years) *	38 ± 10	38 ± 11	0.897
Sex			
Masculine	2 (10,0%)	4 (20,0%)	0.376
Femenine	18 (90,0%)	16 (80,0%)	
HTA	4 (20,0%)	2 (10,0%)	0.658
Hypothyroidism	2 (10,0%)	0 (0,0%)	0.68
Dyslipidemia	0 (0,0%)	1 (5,0%)	1.000
Asthma	0 (0,0%)	2 (10,0%)	0.468
Hyperinsulinemia	2 (10,0%)	2 (10,0%)	1.000
Initial BMI (*)	36.3 ± 4,1	37,8 ± 2,9	0.168
PEPP (*)	91.2 ± 13,7	82,8 ± 18,4	0.110
Current BMI (*)	23.0 ± 9	26.3 ± 9,5	0.144
Time of evolution	3.34 ± 1,07	2.84 ± 0,97	0.132

*Average + DS

Table 1. Distribution of patients according to baseline indicators and groups.

REFLUX	With hiatus closure		Without hiatus closure	
	N	%	N	%
YES	1	5	19	95
NO	19	95	1	5

Table 2. Comparison of the incidence of reflux according to groups

Discussion

The results of this study support the recommendation to repair the hiatal hernia, during the realization of a gastric sleeve. The majority of patients in whom the hernia was left intact developed GERD. By leaving the hiatal hernia intact, the mistake of incompletely reseating the fundus can be made, and two phenomena can explain the development of GERD as a consequence of this. First, a larger surface area of remaining gastric mucosa increases acid production due to a greater number of parietal cells. Second, the remaining stomach acquires the shape of an hourglass, which determines that the food remains longer in the proximal stomach, reducing gastric transit and favoring reflux. On the other hand, the presence of a hiatal hernia may favor the esophagogastric junction migrating to the thorax. Baumann et al (12) followed 27 patients with gastric sleeve, using multislice computed tomography,

finding that the migration of the line of staples to the thorax is related to the presence of gastroesophageal reflux. Most studies similar to this one show an improvement in GERD when the hernia is repaired (9), with the exception of two

The randomized controlled study conducted by Snyder et al (13) showed no difference between repairing or not the HH. However, there was a follow-up for a year, unlike our series, where there was a follow-up for more than two years. As it has been shown in other studies (14,15), the prevalence of GERD increases with the passing of time. Santonicola et al (16) showed the results of repairing the HH during gastric sleeve in 78 patients. The incidence of preoperative reflux was 38.4%, and after 15 months of follow-up, it was 30.8% ($p = 0.3$).

In fact, 22.9% of patients developed GERD de novo, despite repairing the HH. This reflects that the mechanisms that condition the development or improvement of reflux after a gastric sleeve are not yet clear. Another aspect that we must highlight is the instrument that is used to determine or characterize GERD. According to the systematic review conducted by Bolier et al (17), there are approximately 65 validated questionnaires for the evaluation of GERD. Out of these, 14 are applicable to measure the response to treatment, and four are applicable for diagnosis. This is one of the reasons for the variability of results between studies: most, use the questionnaires that are not applicable for diagnosis or use informal scales that are not validated.

In this study the Manterola questionnaire was used, because it was written in Spanish, in a Latin American country (Chile) unlike the other 3 scales, which were written in English and subsequently translated and validated into Spanish. This author used as a reference to establish the diagnosis of reflux ph metry. In addition, it has the highest sensitivity and specificity between the scales (97% and 87%) (11). The patients included in this study had mild or no symptoms of gastroesophageal reflux. This detail is important, and coincides with Lyon et al (14), who reported that not repairing the hernia in patients with a few preoperative symptoms, favors the increase in the frequency and severity of GERD. This supports the fact that if an HH is discovered during a gastric sleeve, it should be repaired whether the patient had symptoms of reflux or not.

The safety of repairing the HH during gastrectomy was studied by Dakour et al (8). 4687 sleeves were compared with the HH repair versus 28000 single sleeves, recorded in the database of the National Surgical Quality Improvement Program, and there were no differences in complications and mortality. In fact, there were no adverse or unexpected events related to dissection of the esophagus and closure of the hiatus. With gastric sleeve, there are changes that favor the resolution of these symptoms. The surface of the gastric mucosa is drastically reduced, and with it the amount of acid-producing parietal cells; gastric emptying increases, and, with weight reduction, intra-abdominal pressure decreases. All these factors explain why patients improve symptoms even without closing the hiatus.

Conclusions

The repair of the HH during a gastric sleeve due to morbid obesity decreases the prevalence of GERD. If diagnosed, its formal repair should be considered.

Limitations of the study

We recognize the type of sampling as a limitation of this study, because the decision to repair the HH, was at the discretion of the surgeon. However, the results were compared with a homogeneous control group, carrier of HH. On the other hand, we have no objective report of symptoms before surgery. Therefore, the study was focused on the prevalence of GERD and not on evolution. Likewise, the reflux with ph metry was not confirmed, however, the Manterola test we used, has high sensitivity and specificity for the diagnosis of GERD (11).

Conflict of interests

The authors declare that there is no conflict of interests.

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