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Prevalence of gastroesophageal reflux disease in obese patients eligible for bariatric surgery

Abstract

Objective: To determine the prevalence and characteristics of gastroesophageal reflux disease (GERD) in obese patients at the Mário Covas State Hospital (Hospital Estadual Mário Covas) who are candidates to bariatric surgery through complementary examinations.

Methods: One hundred and fifty obese patients eligible for bariatric surgery were evaluated using three diagnostic methods for GERD (questionnaire, upper gastrointestinal endoscopy [UGE], and 24-hour esophageal pH monitoring [EPM]). Ambulatory esophageal manometry (AEM) complemented the anatomical-physiological study of GERD.

Results: The results of 24-hour EPM indicated that the prevalence of GERD in the study population was 42.7%. Similar prevalence rates (65% and 54.2%) were found in other studies.

The questionnaire results were not significantly correlated with the results of complementary examinations and body mass index. UGE results showed that the prevalence of hiatal hernia was low (13%). The prevalence of erosive reflux esophagitis (ERE) was significantly higher in the study population (38.0%) than in the general population (11.8–15.5%). No acid reflux-related complications were observed. The results of AEM showed that 60% of patients had esophageal motility changes. Transient lower esophageal sphincter (LES) relaxation was the most common motility disorder and was significantly associated with ERE (p=0.010) and distal gastroesophageal reflux (GER) (p=0.038). Body mass index was significantly correlated with distal GER (p=0.017) on EPM.

Conclusion: The prevalence of GERD was high in obese patients eligible for bariatric surgery. Erosive reflux esophagitis and Hypotonic LES were significantly associated with acid reflux. Typical reflux symptoms were not useful diagnostic indicators of GERD in this population.

Keywords: obesity, gastroesophageal reflux, bariatric surgery, bariatric endoscopy, esophageal motility

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Abbreviations: GER, gastroesophageal reflux; GERD, gastroesophageal reflux disease; UGE, upper gastrointestinal endoscopy; EPM, 24-hour esophageal pH monitoring; AEM, ambulatory esophageal manometry; ERE; erosive reflux esophagitis, LES, lower esophageal sphincter; HEMC, mário covas state hospital

Introduction

Obesity is a chronic nutritional disorder that is characterized by an excessive accumulation of body fat, which is influenced by lifestyle and socio-cultural factors, especially in emerging and first world countries. In these countries the prevalence of gastroesophageal reflux disease (GERD), as well as obesity, has progressively increased, as has been shown by some studies, with GERD rates up to 20%.[1]

The clinical presentation of GERD in obese patients is perhaps one of the most controversial issues, as its diagnosis is influenced by subjective, cultural, personal and psychological factors. Some authors propose that obesity itself is a risk factor for the development of GERD, but this relationship remains controversial with regard to the real impact of obesity on esophageal physiology and the consequences on GERD, including esophagitis, Barrett's esophagus (BE) and adenocarcinoma in obese.[2]

The changes caused by obesity in the physiology of the digestive system, such as increased intra-abdominal pressure, lead us to consider that this nutritional disorder favors the development GERD and that the vast majority of obese patients are carrier of this disorder. However, there are controversies among the authors regarding the real magnitude of this association, between obesity and GERD. This work proposes to evaluate the profile of GERD in morbidly obese patients through complementary exams and, thus, to identify variables and risk factors that may participate in the pathophysiological mechanisms of this disease in obese people, data that served as a basis for future research on this subject.

Materials and methods

Study design

This prospective, non-randomized, cross-sectional, single-center cohort study was carried out at the Digestive Endoscopy Service and Functional Assessment Service of the Esophagus of HEMC in 150 obese patients who were candidates for bariatric surgery at the Digestive Surgery Service of HEMC. All patients eligible for bariatric surgery had either a body mass index (BMI) ≥40kg/m² or BMI ≥35kg/m² associated with comorbidities. Other inclusion criteria were age 18 to 65years, the ability to understand and answer the questionnaire on GERD symptoms and quality of life (GERDS-QoL) (Annex A), and no contraindication to complementary examinations.

The exclusion criteria were patients who underwent anti-reflux surgery, anatomical changes in the esophagus and stomach, pregnant or lactating patients, disabling psychiatric illnesses, and subjects undergoing other clinical assessments.

Techniques, tests, and examinations

Patients underwent the following complementary examinations before bariatric surgery: completion of the GERDS-QoL questionnaire (Table 1), UGE, AEM, and 24-hour esophageal pH monitoring. To improve data reliability, patients using anti-reflux drugs (proton pump inhibitors and H1 blockers) were instructed to discontinue treatment for 3weeks before answering the questionnaire and undergoing UGE, manometry, and 24-hour esophageal pH monitoring.

Instruments for data collection and operational definition of variables

The research protocol was approved by the Research Ethics Committee of the School of Medicine of the University of ABC (FMABC) under Protocol No. 34627614.4.0000.0082. Patients and parents or legal guardians were informed about the study protocols and signed informed consent.

Clinical data and anamnesis: Interviews in which the patient completed the GERDS-QoL questionnaire (Table A). The clinical criterion for diagnosing GERD was the identification of typical symptoms (heartburn and retrosternal burning) lasting 4 to 8weeks, with a minimum frequency of twice a week, according to the guidelines of the First Brazilian Consensus on Gastroesophageal Reflux Disease.[3] The degree of obesity was determined using the BMI classification adopted by the WHO by dividing body mass (Kg) by the square height (m^2).[4]

UGE: This examination was performed under conscious sedation, according to the protocol of the HEMC anesthesia team. The Los Angeles classification was used to indicate the degree of ERE.[5] HH was considered when the gastric esophageal transition (GET) was 2cm or more above the diaphragmatic hiatus.[6]

AEM: This examination was performed using a polygraph and an eight-channel silicone catheter (four radial and four longitudinal channels) in a perfusion system to identify the anatomical parameters necessary to guide the position of pH electrodes and assess esophageal motility changes. The physiological and pathological criteria of this examination were established by Nasi et al.[7] (Figure 1).

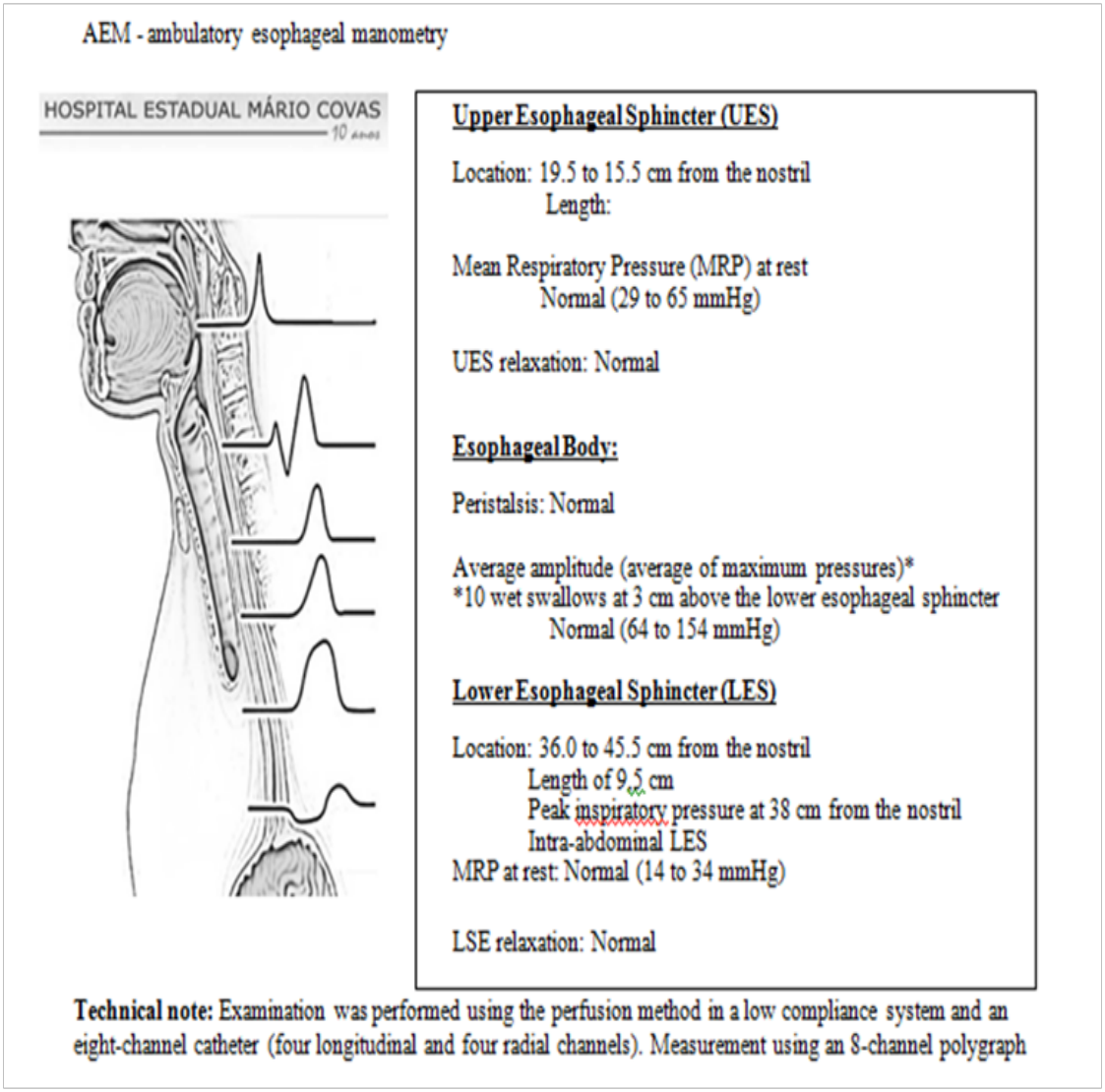

Figure 1 ambulatory esophageal manometry examination report

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EPM: Monitoring was performed using catheters with one or two antimony electrodes to detect pH changes in acid reflux, according to the variation in H^+ concentration in the distal esophagus. The physiological and pathological criteria used in this examination were established by DeMeester[8] (Figure 2).

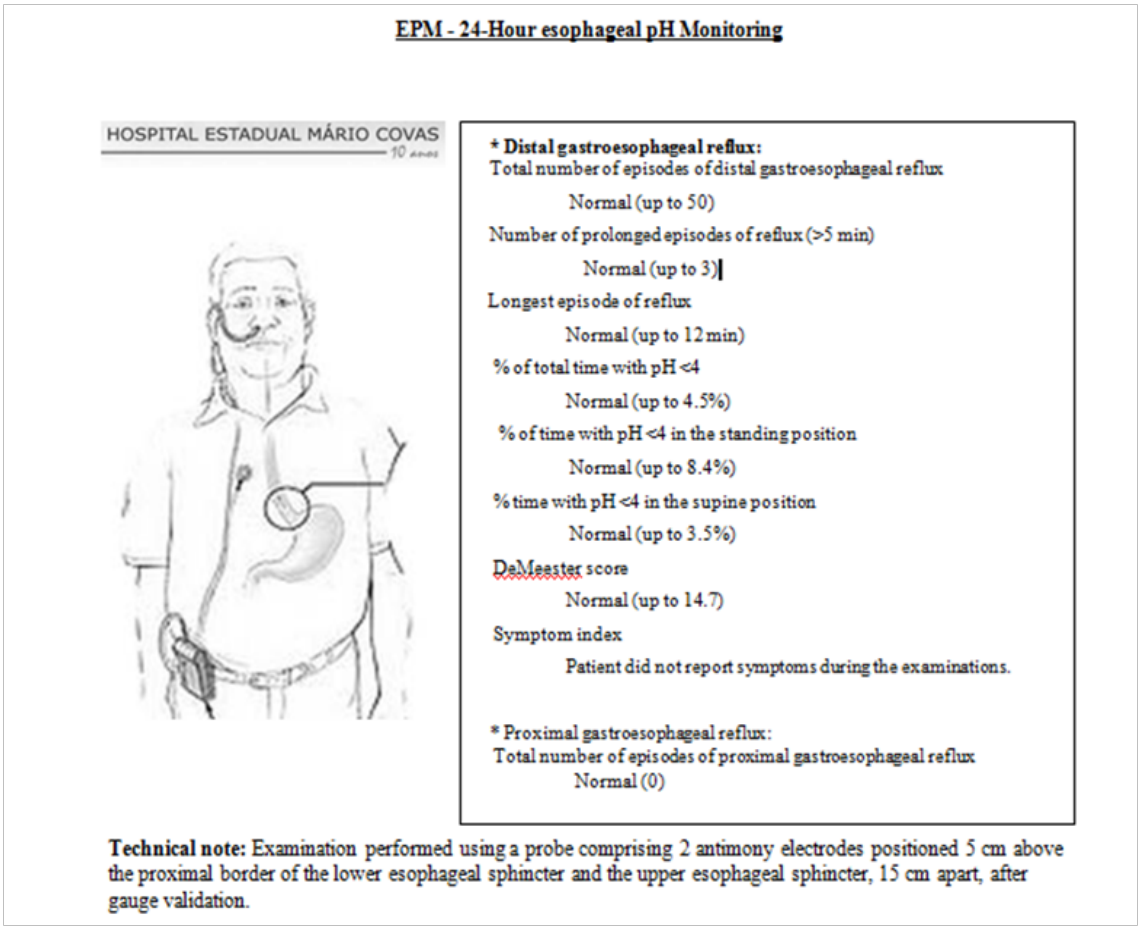

Figure 2 24-Hour esophageal ph monitoring examination reports

Statistical analyses

SPSS Statistics for Windows version 16 (SPSS Inc., Chicago, IL, USA) was used for all statistical analyses. The data were subjected to descriptive and inferential statistical analyses. For the descriptive statistical analyses, the means and the standard deviations were determined to measure dispersion, and the data were replicated absolutely and relatively. For the inferential statistical analyses, the chi-squared test was used to analyze the independence of the qualitative and quantitative variables, and the *p* values generated indicated the levels of independence between the variables analyzed. The level of significance used was 5% or p=0.05. The strengths of the linear associations between two variables were evaluated using the Pearson correlation coefficient.

Results

There was a predominance of female patients in the study population (N=131, 87%). The mean age of the sample was 37years (SD=9.18; SE=0.75). The average BMI was 43.5 (43–44) kg/m^2 (SD=6.75; SE=0.55). The majority of patients had a BMI ≥ 40kg/m^2 (N=106, 70.60%), and one third (44, 29.3%) had either a BMI <40kg/m^2 or a BMI >35kg/m^2 together with obesity-related comorbidities. GERDS-QoL results (Table A) indicated that 79 patients (52.7%) presented with GERD. The level of acceptance of symptoms was considered satisfactory because the majority of responses were "very satisfied" in the questionnaire, corresponding to 59% of the answers. Furthermore, 68% of the responses were classified as "very satisfied" and "satisfied." The analysis of UGE showed that 38% of patients (N=57) had ERE, confirming the diagnosis of GERD using this method. The number of cases of ERE classified as grades "A", "B", and "C" was 43 (75%), 11 (19%), and 3 (6%), respectively. There were no cases as grade "D" of ERE or suspected cases of Barrett´s Esophagus. There were a few cases of HH 20 (13.33%).

AEM showed that 91 patients (60.10%) had manometric changes, and lower esophageal sphincter (LES) hypotonia was the most common motility change (44.64%). The average duration of EPM was 22 hours per examination, and this method diagnosed distal physiological reflux (83,55%) and distal gastroesophageal reflux (GER) (64, 42.67%). There were a few cases of symptomatic GER (3,2%). The inferential

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analysis demonstrated that ERE was significantly associated with distal GER (p=0.023) on EPM and with LES hypotonia (p=0.010) on AEM. There was no significant relationship (p=0.741) between ERE and typical reflux symptoms. HH was not significantly related to questionnaire results (p=0.235) and with ERE (p=0.285) and distal GER (p=0.231) on EPM. Distal GER was significantly linked with ERE (p=0.023) and LES hypotonia (p=0.038) on EPM but not with questionnaire results (p=0.156).

There was a significant relationship of intrathoracic LES with LES hypotonia (p=0.031) and distal GER on EPM (p=0.023). Nonetheless, the relationship between intrathoracic LES and BMI >35kg/m^2 was weak (p=0.896).

BMI >35kg/m^2 and GERD diagnostic methods were strongly associated (p=0.017) with distal GER on EPM. However, ERE was not related to questionnaire results (p=0.829 and 0.763, respectively). Similarly, LES hypotonia was not significantly correlated with HH on EPM (p=0.638 and 0.773, respectively). The EPM results for distal GER parameters indicated that BMI >35kg/m^2 was significantly connected with the most prolonged episodes of acid reflux (p=0.002), percentage of total time with pH >4 (p=0.020), and percentage of time with pH <4 in the supine position (p=0.047).

Discussion

The EPM results demonstrated that the prevalence of GERD in obese patients eligible for bariatric surgery at HEMC was high (42.6%). Other studies showed that the prevalence of GERD using this diagnostic method was high in obese patients before bariatric surgery 65%,[9] 54.2%.[10] The meta-analyzes that assessed the association between BMI and GERD observed that the progressive increase in BMI[11] and central adiposity has a positive association between and erosive esophagitis, EB and esophageal adenocarcinoma.[12] No studies were found that refer to a negative association between GERD and overweight or obesity, which used the gold standard test (24-hour esophageal pH-metry) or with a meta-analysis design. Studies that deny this association are based on the analysis of the symptoms or results of EDA.[13–15]

Clinical data - typical reflux symptoms in obese patients

The sensitivity and specificity of clinical assessment was 59.4% and 52.3%, respectively, demonstrating a lower performance of this criterion in the obese population relative to the general population (sensitivity of 65% and specificity of 75%).[16] Results similar to ours were obtained by other authors (29.3% and 68,3%).[9,10] The prevalence of typical symptoms was high in our sample. Nonetheless, questionnaire results did not agree with the results of complementary examinations. More than half of the patients (52.7%) reported typical symptoms of GERD in the anamnesis, but few patients were diagnosed with GERD using other methods (12.0% in UGE, 17.9% in EPM, and 14.5% in both examinations). However, reflux symptoms did not impair the quality of life, there was little dependence on medications for symptom control, and the level of acceptance of the disease was high (acceptance rate of 68%). The occurrence of typical symptoms of GERD is highly variable in obese patients given that some studies found a positive correlation between symptoms and BMI,[17,18] whereas other studies found no such association.[12,19,20]

GERD is a complex condition diagnosed with methods that use independent variables, leading to variability in the results, especially for typical symptoms, because this diagnosis involves personal, cultural, subjective, and psychological factors. However, the clinical characteristics of GERD and its connection with esophageal acid exposure were consistent with the results of studies conducted in other countries.

Data on complementary examination for diagnosing GERD in obese patients

UGE

The UGE results showed that the prevalence of HH was low (13%), and all cases were classified as type 1 (sliding hernia). There was a weak correlation (p=0.773) between BMI >35kg/m^2 and HH, and between the other study variables and HH. The reported prevalence of HH in obese patients by UGE was low (8–17%). These results are consistent with our study. [12,13,21,22] The prevalence of ERE in the study population was significantly higher (38.0%) than that of the general population (11.8–15.5%),[23,24] and the prevalence of ERE in symptomatic patients (54.0%) and asymptomatic patients (46.0%) was significantly higher than that in the general population (24.5% and 36.8%, respectively).[25]

The sensitivity of UGE (48.4%) was similar to that reported in the literature for the general population; however, the specificity was lower in our study (69.8%).[26] A study conducted in Brazil analyzed 717 endoscopic procedures in preoperative bariatric surgery patients and found a positive correlation between higher BMI (grade II, 35.0–39.9 kg/m^2) and ERE (p=0.03). The prevalence of ERE in this same study was 18.7%, which was higher than that in the general population but lower than that in our sample (38.0%).[21] Similar to other studies,[5,21,27] our results showed a significant relationship (p=0.011) between BMI >35kg/m^2 and ERE. Furthermore, there was a significant correlation between ERE and the DeMeester score (p=0.028), and between ERE and transient LES relaxation (p=0.010), and the variables were strongly and positively correlated and varied simultaneously.

The questionnaire results were not linked with the presence of ERE (p=0.741), which agrees with other studies[9,15,17,20] in which, despite the presence of esophageal acid exposure, obese patients had lower esophageal sensitivity; for this reason, GERD should be analyzed in obese patients using other diagnostic methods.

EPM

The results of EPM showed that the prevalence of GERD was high (42.7%), and acid reflux occurred predominantly at night in the supine position (18.0%). In addition, there were a few cases of mixed GER (4.6%) and symptomatic GER (2.0%).

There was a weak relationship between typical symptoms in the anamnesis and abnormal results on EPM because the percentage of patients with symptomatic and asymptomatic GERD on EPM was similar (60% and 40%, respectively), and the correlation between questionnaire results and the diagnosis of distal GER on EPM was weak (p=0.156). There was a significant association between distal GER on EPM and the most relevant outcomes of GERD, including ERE on UGE (p=0.023) and LES hypotonia on AEM (p=0.038). It is important to note that the only diagnostic method positively correlated with the degree of obesity was EPM. There was a significant correlation between BMI >35kg/m^2 and three parameters for distal GER: the most prolonged episode of acid reflux (p=0.002), the percentage of total time with pH <4 (p=0.020), and the percentage of time with pH <4 in the supine position (p=0.047).

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The mean DeMeester score in patients diagnosed with GERD on EPM was 17.4, with a standard deviation of 25.4, demonstrating that most of these patients had acid exposure above the limit considered normal in the general population (14.7), but acid exposure was not very high. Similarly, episodes of up to 12min are considered normal, and the average duration was 12:46±16:26 min, indicating that most abnormal values were not distant from the upper limit.

Changes related to our findings were pointed out by other authors through 24-hour esophageal pH monitoring[11,12,19] and esophageal impedance-pH monitoring.[18,28]

AEM

More than 50% of the patients had esophageal motility changes on AEM (N=91, 60%), and the segment most commonly affected was the LES (N=72, 48%). The main disorder in the esophageal body was reduced contractility (N=23, 15.3%) and hypotonia in both sphincters, and this change was more frequent in the LES (N=67, 44.6%). These same alterations were observed with similar frequencies by two Spanish studies that had evaluated this type of patients.[9,10]

LES hypotonia was significantly associated with the occurrence of ERE (p=0.010) and distal GER (p=0.038) but not with the DeMeester score (p=0.082). BMI >35kg/m^2 was not significantly correlated with transient LES hypotonia (p=638). The importance of the LES hypotonia presence for the diagnosis of ERE was demonstrated by the positive correlation (21.0%) between these two diagnoses in Pearson correlation analysis. Anggiansah et al. evaluated the effects of obesity on esophageal function in 406 patients by anamnesis, AEM, and EPM. There was a positive association between distal reflux with obesity (R=0.284, p≤0.001), peristalsis of the distal esophageal body (R=0.207; p≤0.001), LES hypotonia and short abdominal length of the LES (R=0.343; p≤0.001).[17]

Tolone et al.[29] examined the morphology of the esophagogastric junction in 138 obese patients before bariatric surgery using high-resolution esophageal manometry and observed that 63% of patients presented morphological changes, including the separation of the LES from the diaphragmatic crura. The patients with a higher BMI (28.3%) had a higher degree of separation of the LES (>cm) and a higher score in the GERDS-QoL (p=0.001) compared with patients without impairment of this junction.[29]

More than half of the patients in our study (N=80, 53.3%) had intrathoracic LES, and this condition was significantly correlated with the diagnosis of LES hypotonia (p=0.031) and distal GER (p=0.023). The presence of intrathoracic LES increased the likelihood of LES hypotonia and distal GER by 17.7% and 18.6%, respectively, which is consistent with the literature. Notwithstanding, the association between intrathoracic LES and BMI > 35kg/m^2 was not significant (p=0.697), and this result contradicts previous findings.

Conclusion

The prevalence of GERD in patients eligible for bariatric surgery at HEMC was high on EPM, which is the gold standard examination. UGE corroborated this result because a little more than one third of the patients were diagnosed with ERE. AEM showed that LES hypotonia was the most common esophageal motility disfunction and was strongly associated with GERD.

Typical reflux symptoms did not significantly impair the quality of life of obese patients and were poor indicators of esophageal inflammatory and motility changes in this population, indicating the need to investigate GERD in candidates for bariatric surgery using complementary examinations.

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Conflicts of interest

The authors declare that there were no conflicts of interest in conducting this work.

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