

Original article

## Preoperative upper gastrointestinal endoscopy in obese patients undergoing bariatric surgery: is it necessary?

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Received May 9, 2007; revised October 29, 2007; accepted December 18, 2007

### Abstract

**Background:** Obesity has been shown to be an important risk factor for several gastrointestinal diseases. However, the indication for preoperative upper gastrointestinal endoscopy (UGE) for all patients before bariatric surgery is controversial. The aim of the present study was to evaluate the spectrum of gastrointestinal diseases detected during preoperative UGE in patients undergoing bariatric surgery and the relevance of this procedure.

**Methods:** A series of severely obese patients, who had undergone UGE before Roux-en-Y gastric bypass from October 2004 to May 2005 were consecutively enrolled in this study. The demographic and clinical data and endoscopic diagnoses were evaluated. Gastric biopsies were performed in elective patients according to the endoscopic findings.

**Results:** The study included 162 patients, 69.8% of whom were women. The mean age was  $36.7 \pm 10.8$  years. Abnormal findings were observed in 77.2% of patients. Esophagitis was present in 38.9%, gastritis in 51.2% (erosive gastritis in 49.3% and nonerosive gastritis in 50.7%), gastric ulcers in 1.9%, hiatal hernia, in 8.6%, gastric polyp in .6%, and duodenitis in 6.8% of patients. No patient had esophageal or gastric varices. *Helicobacter pylori* infection was investigated in 96 patients and was detected in 37.5%. Gastric biopsies were performed in 36 patients, with chronic inflammation found in 72.2%, inflammatory activity in 30.6%, and intestinal metaplasia in 11.1%. Glandular atrophy was not found in any patient.

**Conclusion:** The results of our study have shown that the spectrum of gastrointestinal diseases observed in severely obese patients who underwent bariatric surgery is broad. Although this issue remains highly controversial, these findings suggest that systematic preoperative UGE and *H. pylori* testing should be performed in all patients scheduled to undergo bariatric surgery. (Surg Obes Relat Dis 2008;4:144–151.) © 2008 American Society for Metabolic and Bariatric Surgery. All rights reserved.

**Keywords:** Bariatric surgery; Obesity; Endoscopy; Esophagitis; Gastritis

Obesity, defined as a body mass index  $>30$  kg/m<sup>2</sup>, is a public health issue and is estimated to affect 1.7 billion individuals worldwide [1]. It is associated with a 50–100% increased risk of dying from all causes and from

other co-morbidities, including diabetes mellitus, coronary heart disease, obstructive sleep apnea syndrome, stroke, gallbladder disease, liver disease, and cancer [2,3]. Bariatric surgery has been considered an effective treatment for severe, medically complicated, and refractory obesity. It is currently the only treatment proved to improve morbid obesity and its co-morbidities, reducing the risk of premature mortality and improving patients' quality of the life [4,5].

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Gastrointestinal diseases are associated with an elevated body mass index (BMI), and endoscopy has been used to investigate these diseases. However, in a substantial number of patients, endoscopy will reveal no detectable abnormalities, incidental findings, or changes of uncertain significance [6]. Thus, the reasonable indications for an endoscopic procedure should include symptomatic patients or risk groups. Obesity, for example, has been shown to be an important risk factor for gastroesophageal reflux disease, erosive esophagitis, hiatal hernia, and *Helicobacter pylori* infection [7–9].

All these conditions can be clinically relevant and can have a significant affect on patients undergoing bariatric surgery. However, the true prevalence of gastrointestinal diseases in these patients is unknown, and the indication for upper gastrointestinal endoscopy (UGE) before surgical treatment of obesity is controversial. The objective of the present study was to evaluate the spectrum of gastrointestinal diseases found at routine UGE before bariatric surgery and to assess the relevance of this procedure in these obese patients.

## Methods

A series of obese patients who underwent UGE before Roux-en-Y gastric bypass from October 2004 to May 2005 were consecutively enrolled in this study. Patients were included in this study if they were >18 years old, were scheduled to undergo bariatric surgery within the specified period, and were willing to undergo preoperative UGE and to participate in the study. All the obese patients had a BMI >40 kg/m<sup>2</sup> or >35 kg/m<sup>2</sup> with other co-morbidities (e.g., hypertension, diabetes, metabolic syndrome). The UGE study was a part of the preoperative evaluation of all patients and was performed by experienced endoscopists from different clinics. The patients underwent UGE under conscious sedation 1 month before surgery. The patients were interviewed during their hospital stay, and the clinical, demographic, and specific preoperative UGE data were collected and included age; gender; height; weight; waist circumference; history of hypertension, dyslipidemia, diabetes, cardiopathy, or sleep obstructive apnea; medications in use; laboratory data (hemoglobin, hematocrit, leukocytes, prothrombin time, alanine aminotransferase, aspartate aminotransferase, total bilirubin, albumin, total cholesterol, high-density lipoprotein cholesterol, triglycerides, fasting plasma glucose, and insulin); and endoscopic data (presence of hernia, gastric and esophageal varices, esophagitis, gastritis, duodenitis, esophageal and gastric ulcers, and polyps). Insulin resistance was calculated using the Homeostasis Model Assessment, with insulin resistance defined as a Homeostasis Model Assessment finding of  $\geq 3.0$ , as previously described [10,11]. The metabolic syndrome was defined according to the guidelines of the National Cholesterol Education Program [12].

Esophagitis was classified into grades of A–D according to the Los Angeles classification system [13], and gastritis was classified as erosive or nonerosive according to the severity of mucosal injury. The grading of gastritis and its classification according to localization were done in accordance with the Sydney criteria [14]. The presence of *Helicobacter pylori* was also recorded for all patients in whom it was tested. *H. pylori* infection was tested using the rapid urease test, histologic staining, or culture, and information on the testing results was obtained retrospectively. Almost 90% of *H. pylori* testing was performed using the rapid urease test (CLOtest, Delta West, Bentley, Western Australia). In the remaining cases, tests were performed using histologic staining, except for 1 case, in which *H. Pylori* culture was done. This information was obtained retrospectively, and no statistically significant difference was observed in this study sample regarding the positivity rate among these methods. Whenever *H. pylori* was detected, eradication therapy was prescribed, and surgery was delayed until the therapy was complete. The success of *H. pylori* eradication was not assessed. Gastric biopsies were performed in elective patients according to the macroscopic findings. The histologic variables included in the study were chronic inflammation, inflammatory activity, glandular atrophy, and intestinal metaplasia. This study was performed in accordance with a protocol approved by the internal review board of the Gonçalo Muniz Research Center.

The data were processed and analyzed using the Statistical Package for Social Sciences software program, version 9.0 (SPSS, Chicago, IL). The results are expressed as the mean  $\pm$  standard deviation in the case of continuous variables, and as absolute and relative frequencies for the categorical variables. The Kolmogorov-Smirnov test was used, and stratified distribution plots were examined to verify the normality of the distribution of the continuous variables. Abnormally distributed variables were evaluated using a nonparametric test of comparison such as the Mann-Whitney *U* test or the Kruskal-Wallis test. Normally distributed variables were evaluated using Student's *t* test and analysis of variance. Frequencies were compared using the chi-square test. All analyses were two-tailed, and the significance level was set at  $P < .05$ .

## Results

This study included 162 obese patients who had undergone bariatric surgery. The demographic and clinical characteristics of these patients are listed in Table 1. Abnormal findings were observed at endoscopy in 125 patients (77.2%). These findings correlated with more advanced age ( $P < .001$ ) but did not correlate with gender, BMI, waist circumference, or the presence of co-morbidities (hypertension, diabetes, or dyslipidemia). Esophagitis was found in 63 patients (38.9%), 34.9% of which were classified as

Table 1  
Demographic and clinical characteristics of 162 patients undergoing bariatric surgery

Characteristic	Value
Female gender	113 (69.8)
Age (yr)	36.7 ± 10.8
BMI (kg/m <sup>2</sup> )	44.1 ± 6.0
Waist circumference (cm)	121.2 ± 15.3
Hypertension	76 (46.9)
Diabetes	22 (13.6)
Dyslipidemia	120 (74.1)
Proton pump inhibitor use	10 (6.2)
Alcohol use	72 (44.7)
Hemoglobin (g/dL)	13.7 ± 1.4
Hematocrit (%)	41.0 ± 4.9
Platelets (×10 <sup>5</sup> /mm <sup>3</sup> )	2.8 ± 0.6
Prothrombin time (%)	0.97 ± 0.07
Elevated transaminases	48 (29.6)
Total bilirubin (mg/dL)	0.6 ± 0.2
Albumin (mg/dL)	4.0 ± 0.4
Total cholesterol (mg/dL)	206.9 ± 40.9
High-density lipoprotein cholesterol (mg/dL)	46.0 ± 10.6
Triglycerides (mg/dL)	166.7 ± 100.9
Fasting plasma glucose level (mg/dL)	102.1 ± 36.7
Insulin resistance	92 (56.8)
Metabolic syndrome	81 (50.0)

BMI = body mass index.

Data presented as mean ± standard deviation or numbers of patients, with percentages in parentheses.

grade A, 25.4% as grade B, and only 4.8% as grade C. No patient had grade D esophagitis in this study sample. Data on the presence of esophagitis was missing in 22 patients (34.9%). Esophagitis was more frequent in men (53.1%) than in women (33.0%;  $P = .017$ ) and was not associated with age, BMI, or waist circumference. However, this association disappeared after controlling for BMI (<40 versus >40 kg/m<sup>2</sup>). Moreover, the increase observed in BMI for patients with grade A esophagitis to those with grade C was not statistically significant (Fig. 1). All patients with grade C disease had a BMI >40 kg/m<sup>2</sup>.

No patient had esophageal or gastric varices. Gastric ulcers were present in 3 patients (1.9%), and these patients underwent treatment before surgery. Hiatal hernias were found in 14 patients (8.6%), 11 (78.6%) of whom had esophagitis. Gastric polyp and duodenitis were found in 1 (0.6%) and 11 (6.8%) patients, respectively. Gastritis was associated with duodenitis in 9 patients (81.8%). The hiatal hernias were small in all 14 patients, and the gastric polyp was localized on the distal part of the stomach; hence no changes were made in the surgical treatment of these patients.

Gastritis was found in 83 patients (51.2%; erosive gastritis in 49.3% and nonerosive gastritis in 50.7%). The most common site affected in the stomach was the antrum (90.3%). Pangastritis and fundus gastritis were present in 8.3% and 1.4% of patients, respectively. Of the 64 patients for the grade was determined, low-grade, moderate, and

high-grade gastritis was found in 68.8%, 23.4%, and 7.8% of patients, respectively. Only 1 patient reported the regular use of aspirin, and this patient had erosive, moderate gastritis. Of the 10 patients using proton pump inhibitors, 4 (40%) had no gastritis.

*H. pylori* infection was tested in 96 individuals and was positive in 37.5%. Only 1 of the 3 patients with gastric ulcers was tested for *H. pylori* infection, and this patient tested positive. Of the patients with *H. pylori* infection, 21 (58.3%) had gastritis; however, a similar prevalence was found in *H. pylori*-negative patients (50.0%). Gastric biopsies were performed in 36 patients, and chronic inflammation was found in 26 (72.2%), inflammatory activity in 11 (30.6%), and intestinal metaplasia in 4 (11.1%). Glandular atrophy was not found in any of the patients in this study. The histologic findings are given in Table 2, stratified by the presence of *H. pylori* infection. Of the 31 patients with *H. pylori* infection who underwent a histologic assessment, 16 (51.6%) had gastritis. No association was found between *H. pylori* infection and age, gender, dyslipidemia, insulin resistance, BMI, diabetes, fasting plasma glucose, metabolic syndrome, or gastritis grade.

## Discussion

In this study, the presence of different gastrointestinal diseases was evaluated in morbidly obese patients scheduled to undergo bariatric surgery. Our results have shown that UGE is indicated in such patients before surgery. The rate of gastrointestinal findings detected by UGE in these severely obese patients was high (77.2%). These results were expected, because obesity is a known risk factor for

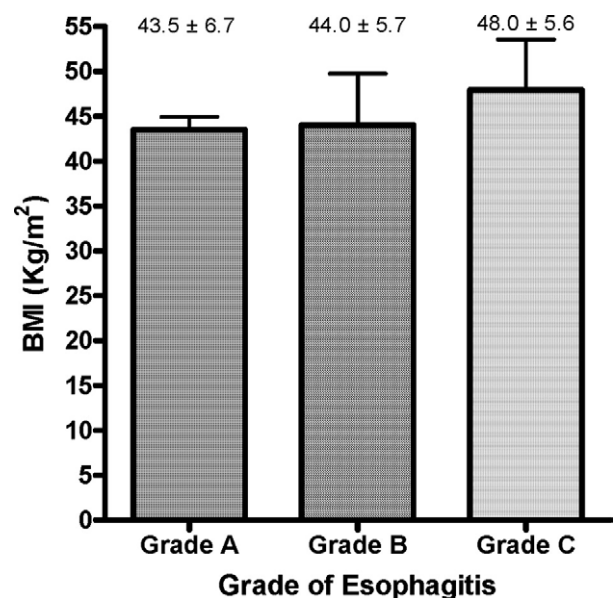


Fig. 1. BMI stratified by grade of esophagitis according to Los Angeles criteria.

Table 2  
Histologic findings by *Helicobacter pylori* infection profile in 31 patients

Variable	<i>H. pylori</i> status (%)			P value
	Positive (n = 14)	Negative (n = 17)	Total (%)	
Chronic inflammation	92.9	58.8	74.2	0.045
Inflammatory activity	57.1	11.8	32.3	0.018
Glandular atrophy	0	0	0	—
Intestinal metaplasia	7.1	11.8	9.7	NS

NS = not significant.

gastrointestinal diseases. Our results are in agreement with the findings of Madan et al. [15], who reported that gastrointestinal abnormalities were found at preoperative endoscopy in 91% of the obese sample of patients in their series who underwent laparoscopic gastric bypass. However, lower rates (10–33.9%) have been found in other studies [16,17]. Moreover, in the present study we found that the abnormal findings correlated with age, which could be indirectly explained by the more prolonged exposure to obesity as a risk factor for gastrointestinal pathologic features.

Esophagitis was the most frequent finding in our patients, with a prevalence in our study of 38.9%, in agreement with the data reported by Verset et al. [18], who observed a frequency of 31% of esophagitis in their sample. Lower prevalence rates have been reported in other studies [17,19,20]. As previously described, many factors can explain the association of esophagitis and other reflux disease complications with obesity, such as increased intra-abdominal pressure [21], impaired gastric and esophageal emptying times [22], decreased lower esophageal sphincter pressure, and an increased frequency of transient sphincter relaxation [23]. However, manometric studies have reported inconsistent results, indicating both decreased and normal lower esophageal sphincter pressure in obese patients [23,24].

The rates of esophagitis are high in obese patients compared with thin individuals or those of normal weight. In a retrospective case-control study of 1389 patients, Wilson et al. [8] reported a prevalence of esophagitis of 12% in thin individuals (BMI <20 kg/m<sup>2</sup>), 13.4% in individuals of normal weight (BMI 20–25 kg/m<sup>2</sup>), 19.9% in mildly obese patients (BMI 25–30 kg/m<sup>2</sup>), and 22% in obese individuals (BMI >30 kg/m<sup>2</sup>). In a multivariate analysis, El-Serag et al. [7] also demonstrated that overweight and obesity are associated with a 2.59–4.19-fold increased risk of erosive esophagitis compared with normal-BMI participants. Although obesity satisfies several criteria for a causal association with esophagitis, the case-control and cross-sectional design of these studies has made it difficult to affirm the temporal association between these factors.

Hiatal hernia, which is frequent in obese patients, might have a facilitating role in promoting gastroesophageal reflux

disease and its complications. In our series, 78.6% of patients with a hiatal hernia had esophagitis. After controlling for the presence of a hiatal hernia, Wilson et al. [8] found that the association between obesity and esophagitis had decreased but remained statistically significant. These investigators suggested that this association is substantially, but not completely, mediated through an increased prevalence of hiatal hernia.

The present study failed to find any association between esophagitis and gender, age, BMI, or waist circumference. Several studies have reported controversial findings with respect to the association between gender and esophagitis. Some have found an increased risk of gastroesophageal reflux in obese women [16], with the suggestion that humoral factors also be considered as a mechanism relating obesity to reflux. Others have reported that the obesity-related risk of reflux disease was not modified by gender [7]. However, El-Serag and Johanson [25] found that male gender was an independent risk factor for severe esophagitis. With regard to age, it would appear that a greater prevalence of obesity in individuals in older age groups supports the putative role of age as a risk factor for gastroesophageal reflux; however, this could also be related to a longer period of exposure to other risk factors [26]. Nonetheless, our population was younger compared with the populations of these studies. Moreover, even studies performed in older individuals have failed to show any association between esophagitis and age [7]. With respect to BMI and waist circumference, although these variables have been reported to be important risk factors for esophagitis, their influence in promoting esophageal disorders was less evident among only obese individuals compared with obese versus non-obese patients [16].

However, does this rate of esophageal lesions justify the use of preoperative UGE? Although obesity has been shown to be a risk factor for almost all these disorders and although correlation between symptoms and endoscopic findings is lacking [27], this does not constitute a serious problem because Roux-en-Y gastric bypass is an excellent antireflux operation comparable to surgery for more severe esophageal lesions such as Barrett's esophagus, as demonstrated by Csendes et al. [28]. Therefore, the frequency of esophageal lesions is not a strong enough argument to recommend preoperative UGE for morbidly obese patients.

A high prevalence of gastritis was found in the present study compared with that in other studies. In obese individuals, this rate has varied from 17% to 30% [18–20]. Papavramidis et al. [19] also reported that 80% of their patients with gastritis had moderate gastritis, an incidence greater than that found in our study. However, when the histologic evaluation was considered, the prevalence of gastritis in our study was similar to that reported by Papavramidis et al. [19], both around 70%. Therefore, a discrepancy was found between the histologic and endoscopic findings. Histologic examination detected chronic inflammation in 72.2% of the



studied patients; however, in the 36 patients in whom the histologic evaluation was performed, only 19 (52.8%) had any grade of inflammation at endoscopy, a similar frequency to that found for the entire sample of patients. These results can be explained by the difference in the diagnostic capacity of these methods.

*H. pylori* is recognized as the main etiologic agent of gastritis in humans, and its prevalence was 37.5% in our series [29,30]. Our results are in accordance with those of previous population-based studies in developed countries [31] and with studies performed in morbidly obese individuals [32]. This can be explained by the socioeconomic profile of our patients (data not shown), because most had a greater family income than the populations in most studies performed in developing countries. A clear association exists between socioeconomic status and *H. pylori* infection [29,31]. In the present study, we found no association between *H. pylori* infection and other previously described risk factors. Most studies have shown a tendency for the prevalence to increase with age; however, the infection rates remain constant after 20 years of age [29]. These results are consistent with the hypothesis that the infection occurs during childhood in developing countries and the risk of becoming infected during adulthood is low and constant. Because the *H. pylori* status was not tested in all individuals, a slight difference in the revealed prevalence might have occurred. No difference was observed in age, co-morbidities, BMI, waist circumference, and the presence of gastritis or gastric ulcers between patients with *H. pylori* status determined and those without their *H. pylori* status determined (data not shown). Therefore, we believe that, if it exists, this difference would not be great the prevalence found should be similar to the real prevalence. However, this is purely speculative and is a limitation of our study.

The association between gender and *H. pylori* infection is controversial. Most studies performed in developing countries have reported no gender difference in the risk of infection [29]. In relation to metabolic risk factors, Perdicizzi et al. [9] reported that obesity and diabetes can be associated with *H. pylori* colonization owing to the reduced gastric motility and chemical changes in the gastric mucosa observed with these pathologic features. Sung et al. [30] also showed an association between *H. pylori* and cardiovascular risk factors, especially the lipid profile; however, the findings have been inconclusive, and, because of our small sample size, we were unable to exclude the possibility of this association.

Duodenitis was present in 6.8% of our patients. Similar findings have also been reported in obese patients by Zeni et al. [20] (6%) and Papavramidis et al. [19] (10%). Duodenitis can develop in association with gastritis, and in the present study, an association of these two disorders was found in 81.8% of patients with duodenitis. In these patients, *H. pylori* testing was performed in only 5 patients, 1 of whom tested positive; another patient had a duodenal

ulcer (data not shown). This could indicate that, in addition to infectious causes, ulcers or no casual agent can be found in patients with duodenitis [19]. Three patients had gastric ulcers, a rate similar to that reported in other studies of obese individuals [20]. Although only 1 patient had a gastric polyp, this finding is important. Unlike colon polyps, gastric polyps are rare, occurring in <1% of individuals [33]; however, a greater prevalence (5%) has been reported by Zeni et al. [20]. Most tumors are detected incidentally during gastroscopy, and because adenomatous polyps can represent a premalignant lesion, polypectomy is recommended. This procedure was performed in our patient, but no alteration was made to the surgical approach in view of the distal localization of the polyp. This patient was lost to follow-up, and no information is available with respect to the histologic type of this tumor.

Because of the spectrum of gastrointestinal lesions found in severely obese patients, many investigators have discussed the role of UGE for these patients. Csendes et al. [34] and Sharaf et al. [27] have recommended UGE with biopsy sampling and assessment of *H. pylori* status in all candidates for bariatric surgery because of the high diagnostic yield and relative low cost of this procedure compared with the high cost of operative and postoperative complications from digestive lesions. Gastrointestinal diseases, including tumors, ulcers, and large hiatal hernias, can affect the medical and surgical treatment of these patients. Other investigators have stated that the frequency of severe gastrointestinal diseases such as gastric polyps is low and that a less-invasive strategy, using *H. pylori* status and prophylactic proton pump inhibitors, can reduce costs and the subsequent investigation of false-positive results, because this management strategy would permit the treatment of the most significant lesions while avoiding invasive routine endoscopy [35]. This is, however, a dangerous strategy. A contradictory argument is that the gastric and duodenal mucosa might not be within the reach of the endoscope, and subsequently revealed cases of gastric cancer have been reported in published studies [36]. This issue could result in serious ethical dilemmas for the surgical team if no previous gastric investigation has been conducted. Moreover, Verset et al. [18] studied 159 obese patients who underwent UGE before and after vertical banded gastroplasty and reported finding important gastrointestinal lesions at both examinations; therefore, preoperative endoscopy can help define any postoperative lesions found.

## Conclusion

The results of the present study suggest that the spectrum of gastrointestinal diseases in severely obese patients undergoing bariatric surgery is broad, and significant lesions have been observed. Although their prevalence was relatively low, gastric ulcers need to be treated before gastric bypass, because they increase the risk of bleeding or per-

foration. Also, gastric polyps or large hiatal hernias can change the surgical approach. Despite the controversy with this issue, eradication therapy should be performed for all patients with *H. pylori* infection before they undergo Roux-en-Y gastric bypass, because this infection can play an important role in the pathogenesis of some postoperative mucosa lesions. Although no definite answers can be given and additional studies are needed, we recommend systematic preoperative UGE and *H. pylori* testing for all patients scheduled to undergo bariatric surgery. This strategy could also be relevant for the management of postoperative lesions.

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