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ORIGINAL CONTRIBUTIONS

Usefulness of Upper Gastrointestinal Symptoms as a Driver to Prescribe Gastroscopy in Obese Patients Candidate to Bariatric Surgery. A Prospective Study

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Abstract
Background Before bariatric surgery, the necessity of routine upper gastrointestinal endoscopy is controversial, and guidelines recommend endoscopy in symptomatic cases. However, impaired visceral sensation occurring in obese patients may be misleading. The purpose of the study is to evaluate prospectively the prevalence of gastrointestinal symptoms, endoscopic findings, and the relation between symptoms and endoscopic findings in obese patients before surgery.
Materials and Methods One hundred forty-two consecutive patients candidate to primary bariatric surgery filled out the validated Rome III symptomatic questionnaire and performed endoscopy.
Results With a median age of 41 years and BMI of 44 Kg/m^2, 83 % were females. Symptoms were referred by 43 % of patients: gastroesophageal reflux disease (GERD) (27.9 %) and dyspepsia (24.6 %), subdivided in postprandial distress (PDS) (66.7 %) and epigastric pain (33.3 %) syndromes. Of GERD patients, 19.7 % presented concomitantly PDS. Belching was present in 8.2 % and nausea and/or vomiting in 1.6 % of patients. At endoscopy, one or more lesions were present in 47.1 % of the patients: erosive esophagitis (5.6 %), hiatal hernia (23.2 %), gastroduodenal erosions (6.3 %), and peptic ulcers (3.5 %). At histology, 24 % of patients have *Helicobacter pylori* infection, and its prevalence in gastroduodenal erosions and ulcers was 22.2 and 60 %, respectively. Surprisingly, in patients with peptic lesions *H. pylori*-negative, no chronic use of NSAIDs was reported. Analyzing the coexistence of symptoms and lesions, these resulted equally distributed beyond the presence of symptoms, being present in 44.2 and 49.4 % of symptomatic and asymptomatic patients, respectively.
Conclusions The presence of symptoms cannot be considered as a valuable guide to indicate endoscopy since the majority of endoscopic lesions were asymptomatic and not *H. pylori*-related.

Keywords Pre-surgical endoscopy · Bariatric surgery · Obesity · Gastrointestinal disorders · GERD

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Introduction

The routine prescription of upper gastrointestinal (GI) endoscopy before bariatric surgery is controversial. Recommendations, with low level of evidence (grade D), of the American Association of Clinical Endocrinologist, the Obesity Society and the American Association of Metabolic and Bariatric Surgery indicate to perform endoscopy only in symptomatic cases [1]. The European guidelines [2] of the International Federation for the Surgery of Obesity and the European Association for the Study of Obesity only suggest to evaluate gastroesophageal reflux disease (GERD) patients, without clear indications about the necessity to perform an upper GI endoscopy. Most of the studies on symptomatic patients have been focused on GERD, with only few studies analyze upper GI symptoms in their complexity.

Usually, the surgeon's attitude depends on the National Health Care System, on the local surgical bariatric program, and on their working environment (private, public, academic). Nevertheless, gastroscopy is generally indicated only in case of symptomatic patients. In asymptomatic patients, routine endoscopy remains controversial.

The prevalence of upper GI endoscopic findings in obese patients candidate to bariatric surgery range between 10 and 89.7 % [3, 4], and the few studies that have analyzed the prevalence of endoscopic findings in symptomatic and asymptomatic patients separately reported in the latter a prevalence ranging from 46 up to 80 % [5, 6]. However, in obese patients, the absence of GI symptoms might be misleading [7, 8].

The evidence of pathological upper GI findings influences the choice of surgical procedure. Gastric banding is contraindicated in case of paraesophageal hernia [9, 10], and in GERD-related Barrett's esophagus, gastric bypass is recommended [11].

The aim of this study was to evaluate prospectively in an unselected population of morbid obese patients candidate to primary bariatric surgery the prevalence of upper GI symptoms, endoscopic findings, including *Helicobacter pylori* infection, in order to establish the relation between the complexity of symptoms and endoscopic findings.

Materials and Methods

Patients

One hundred forty-two consecutive morbid obese patients candidate to primary bariatric surgery, recruited from September 2013 to June 2014, were prospectively evaluated. Prior to surgery, each patient filled out a validated questionnaire for upper GI symptoms and was submitted to upper GI endoscopy.

Symptomatic Questionnaire Following Rome III Criteria

The questionnaire was organized into two parts [12]. The first part included general information such as age, sex, smoking habits, height and body weight, and ongoing therapy. The second part included 13 items, one for each of the following symptoms: heartburn, regurgitation, chest pain, dysphagia, odynophagia, globus, chronic cough and hoarseness, epigastric pain/burning, postprandial fullness, early satiation, nausea, vomiting, and belching. Their presence and frequency were recorded, and symptoms were considered present when occurring at least once a week. Severe GERD was defined when symptoms occur daily.

Symptoms were analyzed either separately or altogether to classify patients in defined syndromes, which can also overlap:

- GERD, with typical reflux symptoms defined by the presence of troublesome heartburn and/or regurgitation and atypical ones such as chest pain, dysphagia, odynophagia, globus, chronic cough, and hoarseness [13]
- Dyspepsia defined by the presence of symptoms thought to originate in the gastroduodenal region. This was further subdivided in PDS, in the presence of postprandial fullness and/or early satiation and epigastric pain syndrome (EPS) in the presence of pain or burning localized in the epigastrium [12].

When we analyze the coexistence of GI symptoms and endoscopic findings, the presence of nausea, vomiting, or belching, isolated or combined, was considered as presence of other symptoms.

Esophagogastroduodenoscopy

Endoscopies were carried out in outpatients setting at least 4 weeks before the scheduled surgery. Procedures were performed by the same endoscopist in order to avoid bias. The following findings were evaluated:

- Absence of endoscopic findings;
- *Hiatal hernia*: defined as the presence of at least 3 cm of separation from the caudally displaced esophagogastric junction and diaphragmatic impression;
- *Erosive esophagitis*: classified following the Los Angeles (LA) classification [14];
- *Barrett's esophagus*: defined as the replacement of the normal stratified squamous epithelium lining of the esophagus by simple columnar epithelium with goblet cells;
- *Gastroduodenal erosions and ulcers:* erosions defined as mucosal change covered with white necrotic substance of less than 5 mm and ulcer by a mucosal break of 5 mm or greater;

Table 1 Presence or absence of endoscopic findings in symptomatic and asymptomatic patients

Numbers of patients *n* (%)	Symptomatic patients *n*=61	Asymptomatic patients *n*=81	*p* value
Presence of endoscopic lesions	27 (44.2 %)	40 (49.4 %)	ns
Absence of endoscopic lesions	34 (55.7 %)	41 (50.6 %)	ns

ns not significant

- *Helicobacter pylori infection*: assessed by histological examination (Giemsa stain).

Statistical Analysis

Quantitative data are expressed as median (range). Fisher's exact tests was performed and a p value <0.05 was considered as statistically significant (MedCalc statistical software Version 14.12.0).

For the sample size calculation, on the basis of the available data, it has been assumed that 60–55 % of obese symptomatic [3, 4] and 50–45 % of obese asymptomatic patients [5, 6] have endoscopic findings. By the use of single proportion for sampling and considering a type I error a=0.05 and a type II error b=0.05, the number of patients to study was 141.

Results

Of the 142 consecutive obese patients candidate to bariatric surgery, 83 % (118/142) were female. Patients were predominantly in the fourth decade of life, with a median age of 41 years (range 17–60), and 23.9 % (34/142) were smokers. The median BMI was 44 kg/m^2 (range 35.7–58.7). Of the patients, 15.5 % (22/142) complained of hypertension under treatment, 2 % (3/142) of dyslipidemia, and 4.9 % (7/142) of diabetes treated with oral hypoglycemic drugs [15]. Of the patients, 4.9 % (7/142) were on non-steroidal anti-inflammatory drugs (NSAIDs) for cardiovascular prevention and 8 % (13/142) were on proton pump inhibitor (PPI) in chronic treatment at full doses.

Clinical Presentation

Of the patients, 57 % (81/142) were asymptomatic and 43 % (61/142) presented one or more upper GI symptoms. Among symptomatic patients, 27.9 % (17/61) presented GERD, 29.4 % (5/17) with typical, and 70.5 % (12/17) with typical and atypical symptoms while 18 % (11/61) presented atypical GERD symptoms. Of the GERD patients, 25 % (7/28) referred severe symptoms. Dyspepsia was referred by 24.6 % (15/61) of symptomatic patients: 66.7 % (10/15) with postprandial distress and 33.3 % (5/15) with epigastric pain syndrome. Of the patients, 19.7 % (12/61) presented overlap between GERD and dyspepsia, 8.2 % (5/61) belching, and only one patient referred nausea and vomiting.

Endoscopic Findings

Of the patients, 47.1 % (67/142) showed one or more endoscopic mucosal lesions. Of the patients, 23.2 % (33/142) presented hiatal hernia ≥3 cm, 5.6 % (8/142) erosive esophagitis (6 cases of class LA A and 2 LA B), 6.3 % (9/142) gastroduodenal erosions, and 3.5 % (5/142) active peptic ulcer. No patients showed Barrett's esophagus or cancer. At histology, 24 % (34/142) of patients had *H. pylori* infection, whose prevalence in gastroduodenal erosions and ulcers was 22.2 % (2/9) and 60 % (3/5), respectively. Interestingly, in patients with peptic lesions without *H. pylori* infection, no chronic use of NSAIDs was reported. Patients with peptic lesions have been treated for 8 weeks with full dose of PPI, and *H. pylori*-positive patients underwent to eradication treatment. A new endoscopy or ^{13}C-urea breath test was undertaken before surgery.

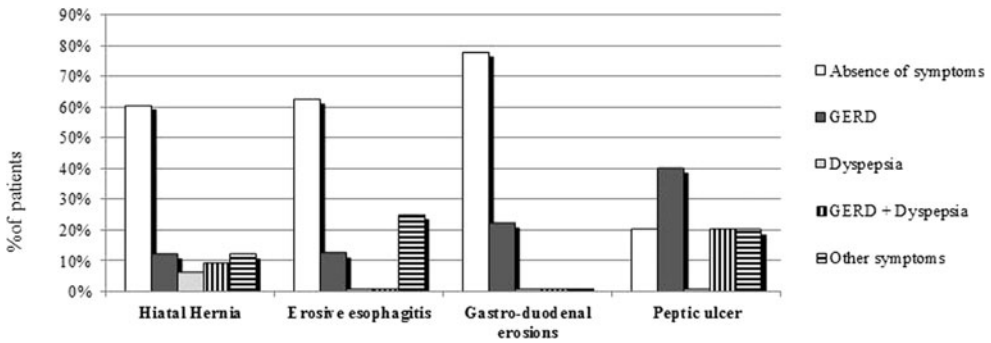

Fig. 1 Clinical presentation for each endoscopic finding. *White columns* absence of symptoms. *Dark gray columns* gastroesophageal reflux disease (GERD). *Light gray columns* dyspepsia. *Columns with vertical pattern* gastroesophageal reflux disease (GERD) and dyspepsia. *Columns with horizontal pattern* other symptoms

Endoscopic findings were not related to the presence of symptoms, being their prevalence similar in symptomatic and asymptomatic patients (Table 1). Considering patients with endoscopic findings, 59.7 % (40/67) of them were asymptomatic while 40.3 % (27/67) complained one or more GI symptoms such as: 13.4 % (9/67) GERD, 10.4 % (7/67) of dyspepsia, 5.9 % (4/67) of dyspepsia and GERD concomitantly, 7.4 % (5/67) of atypical GERD symptoms, and 2.9 % (2/67) of belching.

The main clinical presentation of endoscopic findings resulted to be GERD, alone or combined to dyspepsia (Fig. 1), while dyspepsia alone was rarely suggestive of endoscopic findings. GERD represented the main clinical presentation also of gastric lesions. Peptic ulcer resulted the only findings with a low rate of asymptomatic patients. It is of note that the two erosive esophagitis of class LA B founded were in both cases asymptomatic.

Conclusion

The present prospective study highlights that clinical presentation is not suggestive for the presence of endoscopic findings in obese patients candidate to bariatric surgery, supporting the necessity of routine upper GI endoscopy, independently from the presence or absence of symptoms.

Current guidelines indicate to perform upper GI endoscopy only if symptoms are considered "clinically significant" [1]. Some authors did not support the use of routine endoscopy, since the endoscopic findings altered the timing or the technique of surgery only in few patients [3, 16]. However, the present study shows that 87.5 % of erosive esophagitis would have been missed. This condition is recognized as a lesion that critically influences the type of surgery. According to the recent International Sleeve Gastrectomy Expert Panel Consensus Statement, the findings of severe esophagitis or Barrett's esophagus represent a contraindication to perform sleeve gastrectomy [17]. In these cases, Roux-en-Y gastric bypass is considered the best option to obtain substantial weight loss, resolution of esophageal mucosal lesions, and GERD symptoms [18].

Besides also 60.6 % of hiatal hernia, the most frequent findings [19, 20, 4] would have been missed, since asymptomatic. The prevalence of endoscopic findings in our population is in accordance with those previously reported. The prevalence of erosive esophagitis resulted to range between 2.5 and 38.9 % [3, 21] while that of gastroduodenal erosions between 13.7 and 49.3 % [21–23]. The prevalence of gastric peptic ulcer as well was similar to that reported [22, 24]. Finally, several studies have reported that during obesity, there is an augmented prevalence of Barrett's esophagus and esophageal cancers [25], but no pre-cancerous or cancerous lesions have been found. Smoke did not appear to influence the prevalence of lesion in asymptomatic patients since only 16 % of them were smokers.

The presence of asymptomatic endoscopic lesions could be ascribed to the impaired visceral sensation occurring in obese patients [7, 8]. This aspect has already been highlighted for motility GI disorders. Koppman et al. reported abnormal manometric findings in 41 % of the morbid obese patients with only one patient reporting non-cardiac chest pain [7]. The impaired visceral sensation occurring in obese patients is likely to be ascribed to a dysfunction of the autonomic nervous system. The absence of symptoms in the present study was not related to the use of PPI that were taken by 8 % of the patients.

The analysis of GI symptoms in obese patients has generally been restricted to GERD [26], with few studies that have performed a systematic evaluation of GI symptoms in their complexity. In the present study, by means of the Roma III symptomatic questionnaire, it results that GERD and dyspepsia are the most prevalent syndromes, similarly to what previously reported [27, 28].

Considering GERD-related symptoms as the only ones relevant in the pre-surgical analysis appears limited. By the side, dyspepsia resulted to be part of a functional disorder in most of the cases, being rarely associated to relevant endoscopic lesions.

Among patients with gastroduodenal erosion and/or peptic ulcer, only one third presented *H. pylori* infection and none reported NSAIDs consumption; for this reason, the detection of infection in our population is not suggestive for the presence of peptic lesions. The physiopathology of these lesions remains to be elucidated, even if, it is possible to assume a role of systemic inflammation. Obesity is a state of low chronic inflammation, with an increased production and secretion of inflammatory mediators, which might play a role in arising of these lesions [29]. Also concerning *H. pylori* infection, the guidelines [1] did not provide clear indication about screening and management, recommending the screening in patients that belong to high-prevalence areas. In Europe, the preoperative prevalence range from 8.7 % in a German to 84.2 % in a Poland cohort [30], with our series showing a value of 24 %.

The limitation of this study was the lack of cost-effectiveness analysis of the routine prescription of upper GI endoscopy and concomitant biopsies in obese patients candidate to bariatric surgery. However, the results of this preoperative workup have influenced the decision-making process in our population. Further prospective studies, aimed to evaluate this aspect, are needed to better support this approach. The evidence of hiatal hernia plus severe esophagitis have been considered a contraindication for laparoscopic sleeve gastrectomy, in both symptomatic and asymptomatic patients, and a Roux-en-Y gastric bypass was offered as effective options to those patients.

The results of the present prospective study suggest to perform routinely upper GI endoscopy before bariatric surgery,

beyond the presence of GI symptoms. This approach is very helpful to inform properly the patients to discuss with them the type of surgery, the need of concomitant surgical procedure (i.e., hiatal hernia repair), and of preoperative medical treatment (*H. pylori* eradication, peptic mucosal lesions).

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Conflict of Interest The authors declare that they have no competing interests.

Statement of Informed Consent Informed consent was obtained from all individual participants included in the study.

Statement of Human and Animal Rights All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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