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Original research

Esophagogastric junction morphology assessment by high resolution manometry in obese patients candidate to bariatric surgery

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ABSTRACT

Introduction: Obesity is a strong independent risk factor of gastroesophageal reflux disease (GERD) symptoms and hiatal hernia development. Pure restrictive bariatric surgery should not be indicated in case of hiatal hernia and GERD. However it is unclear what is the real incidence of disruption of esophagogastric junction (EGJ) in patients candidate to bariatric surgery. Actually, high resolution manometry (HRM) can provide accurate information about EGJ morphology. Aim of this study was to describe the EGJ morphology determined by HRM in obese patients candidate to bariatric surgery and to verify if different EGJ morphologies are associated to GERD-related symptoms presence.

Methods: All patients underwent a standardized questionnaire for symptom presence and severity, upper endoscopy, high resolution manometry (HRM). EGJ was classified as: Type I, no separation between the lower esophageal sphincter (LES) and crural diaphragm (CD); Type II, minimal separation (>1 and < 2 cm); Type III, >2 cm separation.

Results: One hundred thirty-eight obese (BMI>35) subjects were studied. Ninety-eight obese patients referred at least one GERD-related symptom, whereas 40 subjects were symptom-free. According to HRM features, EGJ Type I morphology was documented in 51 (36.9%) patients, Type II in 48 (34.8%) and Type III in 39 (28.3%). EGJ Type III subjects were more frequently associated to Symptoms than EGJ Type I (38/39, 97.4%, vs. 21/59, 41.1% $p < 0.001$).

Conclusions: Obese subjects candidate to bariatric surgery have a high risk of disruption of EGJ morphology. In particular, obese patients with hiatal hernia often refer pre-operative presence of GERD

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symptoms. Testing obese patients with HRM before undergoing bariatric surgery, especially for restrictive procedures, can be useful for assessing presence of hiatal hernia.

1. Introduction

Esophagogastric junction (EGJ), an anatomic-functional zone constituted by the lower esophageal sphincter (LES) and crural diaphragm (CD), is the main defense against gastro-esophageal reflux [1]. EGJ competence depends on the integrity and interaction between these two elements. Actually, high-resolution manometry (HRM) allows to accurately evaluate CD and LES contractions and their anatomical relationship. According to HRM-based Chicago classification, we can even distinguish three subtypes of EGJ based on the separation between CD and LES and reflux of gastric content into the esophagus, with the consequent potential development of gastroesophageal reflux disease (GERD) has been otherwise associated to EGJ dysfunction and or disruption demonstrated at HRM [2,3].

In this context, obesity has been shown a strong risk factor for severe symptomatic GERD and hiatal hernia often complicated with either ulcerated esophagitis and/or Barrett's esophagus [4–6].

Indeed, there is a strong, positive association between obesity and GERD in clinical studies. Obese patients have increased numbers of reflux events and esophageal acid exposure on pH studies [7] and an increased risk of erosive esophagitis on endoscopy [8]. Pure restrictive bariatric surgery should not be indicated in case of hiatal hernia and GERD, due to a possible rise in reflux events. However it is unclear what is the real incidence of disruption of esophagogastric junction (EGJ) in patients candidate to bariatric surgery.

The aim of the current study was to describe the EGJ morphology determined by HRM in consecutive obese patients candidate to bariatric surgery; secondary endpoint was to verify if incidence of EGJ morphology patterns distinctive for hiatal hernia is associated to GERD-related symptoms.

2. Methods

2.1. Subjects

In this prospective study, 138 obese adult (18 years or older) patients were included. We prospectively enrolled all consecutive obese patients (BMI>35) who underwent complete preoperative assessment for bariatric surgery at Academic Hospital of Naples between 2012 and 2014. The local Institutional Review Board approved the study protocol, and informed consent was obtained from each subject. The study was conducted according to the Helsinki declaration.

The exclusion criteria were: a history of thoracic, esophageal, or gastric surgery; primary or secondary severe esophageal motility disorders; the use of non-steroidal anti-inflammatory drugs (NSAIDs) and aspirin; pregnancy; the presence of peptic stricture or duodenal or gastric ulcer on upper endoscopy; and the inability to pass through the esophago-gastric junction. All subjects who agreed to participate in our study underwent upper endoscopy and HRM. The patients were asked to discontinue any medication that would influence esophageal motor function 5–7 prior to motility testing, whereas patients treated with antisecretory drugs were asked to discontinue acid-suppressive therapy at least 30 days before the upper endoscopy in order to assess erosive esophagitis incidence. During the washout period, the patients were allowed to use an antacid or alginate, on as needed basis, for the relief of heartburn [9].

2.2. Clinical evaluation

At first visit, demographics (with recording of height and weight), current medications, tobacco use, and alcohol consumption, clinical history, and previous instrumental investigation were reviewed and recorded. Anthropometric measurements were obtained in all patients (weight, height, body mass index [BMI], body composition determined by conventional quadripolar body impedance analyzer BIA, TANITA). A structured questionnaire on gastroesophageal reflux symptoms was administered. Patients were classified as Symptom+ (if presenting GERD symptoms lasting more than 6 months and occurring at least three times per week) or Symptom-. Symptoms were evaluated using a validated questionnaire incorporating a Likert visual analog scale (0–3, where 0 = absent, 1 = mild, 2 = moderate, and 3 = severe and frequent) for GERD-related symptoms (e.g. heartburn, regurgitation) [10].

2.3. Upper endoscopy

Endoscopy was performed according to International guidelines by an experienced team of gastroenterologists at our Institution. Any visible lesions including esophagitis, gastritis, anastomotic inflammation, ulcers, or strictures were recorded. The EGJ was defined as the level at which the tubular esophagus joined the proximal margin of gastric folds. The squamocolumnar junction was defined as the point where the normal squamous epithelium joined the pink mucosa of the columnar-lined esophagus. Esophagitis was staged according to the Los Angeles classification, Barrett's esophagus was defined as a detectable upward displacement of the squamocolumnar junction at endoscopy, confirmed by intestinal metaplasia at histology [11–13].

2.4. High-resolution manometry

Each patient underwent manometrical esophageal function testing using HRiM with a 32- channel probe (Sandhill-HRiM catheter InSight; Sandhill Scientific Inc., Highlands Ranch, CO, USA). Data acquisition, display and analysis were performed using dedicated software (Sandhill Bioview, Sandhill Sci.), after a proper thermal compensation. The patients underwent transnasal placement of the manometric assembly and the catheter was positioned to record from the hypopharynx to the stomach. Studies were done in a supine position and the manometric assembly was positioned with at least 5 intragastric sensors to optimize EGJ and intragastric recording. The catheter was then taped to the nose. The manometric protocol included at least ten 5-mL swallows (0.3% saline) and a 5-min period to assess basal sphincter pressure as previously described [14–16] LES was localized and its pressure and relaxations (using the integrated relaxation pressure over 4 s, IRP) evaluated; proximal and distal borders were marked according to pressure difference related to intraesophageal and intragastric pressure marks. CD was marked as the axial level characterized by