ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2015) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Effects of omega-loop bypass on esophagogastric junction function

Salvatore Tolone, M.D. Ph.D.[a,*], Stefano Cristiano, M.D.[b], Edoardo Savarino, M.D., Ph.D.[c], Francesco Saverio Lucido, M.D.[b], Domenico Ivan Fico, M.D.[b], Ludovico Docimo, M.D.[a]

[a]*Division of General and Bariatric Surgery, Department of Surgery, Second University of Naples, Naples, Italy*
[b]*General and Bariatric Surgery Unit, Camilliani Hospital, Casoria, Italy*
[c]*Gastroenterology Unit, Department of Surgery, Oncology and Gastroenterology, University of Padua, Padua, Italy*

Received January 27, 2015; accepted March 22, 2015

Abstract

Background: At present, no objective data are available on the effect of omega-loop gastric bypass (OGB) on gastroesophageal junction and reflux.

Objectives: To evaluate the possible effects of OGB on esophageal motor function and a possible increase in gastroesophageal reflux.

Setting: University Hospital, Italy; Public Hospital, Italy.

Methods: Patients underwent clinical assessment for reflux symptoms, and endoscopy plus high-resolution impedance manometry (HRiM) and 24-hour pH-impedance monitoring (MII-pH) before and 1 year after OGB. A group of obese patients who underwent sleeve gastrectomy (SG) were included as the control population.

Results: Fifteen OGB patients were included in the study. After surgery, none of the patients reported de novo heartburn or regurgitation. At endoscopic follow-up 1 year after surgery, esophagitis was absent in all patients and no biliary gastritis or presence of bile was recorded. Manometric features and patterns did not vary significantly after surgery, whereas intragastric pressures (IGP) and gastro-esophageal pressure gradient (GEPG) statistically diminished (from a median of 15 to 9.5, $P < .01$, and from 10.3 to 6.4, $P < .01$, respectively) after OGB. In contrast, SG induced a significant elevation in both parameters (from a median of 14.8 to 18.8, $P < .01$, and from 10.1 to 13.1, $P < .01$, respectively). A dramatic decrease in the number of reflux events (from a median of 41 to 7; $P < .01$) was observed after OGB, whereas in patients who underwent SG a significant increase in esophageal acid exposure and number of reflux episodes (from a median of 33 to 53; $P < .01$) was noted.

Conclusions: In contrast to SG, OGB did not compromise the gastroesophageal junction function and did not increase gastroesophageal reflux, which was explained by the lack of increased IGP and in GEPG as assessed by HRiM. (Surg Obes Relat Dis 2015;▮:00–00.)

Keywords: Omega-loop gastric bypass; One-anastomosis gastric bypass; GERD; Reflux; High-resolution manometry; MII-pH; Impedance; Obesity; Bariatric surgery

Obesity is a growing epidemiologic problem in the Western countries, leading to important diseases and complications. Thus, several bariatric operations for morbid obesity have been developed to reduce excess weight. In particular, gastric banding, gastric bypass surgery, and sleeve gastrectomy are the most commonly used at the moment.

More recently, omega-loop gastric bypass (OGB, also known as mini-gastric bypass or one-anastomosis gastric bypass), a modification of Mason's loop gastric bypass, consisting primarily of a long linear lesser-curvature gastric tube with a terminolateral gastroenterostomy 180–200 cm

*Correspondence: Salvatore Tolone, M.D., Ph.D., Division of General and Bariatric Surgery, Department of Surgery, Second University of Naples, Via Pansini 17, 80131, Naples, Italy.
E-mail: salvatore.tolone@unina2.it

http://dx.doi.org/10.1016/j.soard.2015.03.011
1550-7289/

distal to the ligament of Treitz, was introduced [1]. Thousands of these procedures have now been performed globally and it is considered a well-tolerated and effective option for morbid obese patients [2].

Despite positive effect in terms of weight loss and improvement of obesity-related co-morbidities, there are concerns about the reported complication rate and the length of follow-up, with the recommendation to establish a registry of complications and revision procedures [3–5]. In particular, symptomatic biliary reflux gastritis and esophagitis requiring revision surgery have been reported [3]. Concerns have also been expressed about the risk of gastric/esophageal cancer with this procedure because of chronic biliary reflux [6]. However, no data are available on the effect of this type of procedure on gastroesophageal reflux.

Therefore, to verify if OGB can increase chronic gastroesophageal reflux, we designed a study that combined high-resolution manometric measurements with 24-hour pH-impedance monitoring before and after this bariatric intervention. The primary objective was to assess the effect of OGB on gastroesophageal reflux and reflux symptoms. Other objectives included the assessment of the effect of OGB on esophagogastric junction (EGJ) function parameters such as lower esophageal sphincter (LES) pressure and on esophageal peristalsis.

Materials and methods

Study design and patient selection

In this prospective study, 15 obese adult ($\geq$18 yr) patients were included. All patients underwent OGB in the Camilliani hospital in Casoria, Italy. Before and 1 year after the surgical procedure, presence of reflux-related symptoms and dysphagia were evaluated using validated questionnaires, and upper endoscopy, combined high-resolution impedance manometry (HRiM), and combined 24-hour pH-impedance monitoring (multichannel intraluminal impedance pH monitoring [MII-pH]) of the esophagus were performed.

The local Institutional Review Board approved the study protocol, and informed consent was obtained from each participant. The study was conducted according to the Helsinki Declaration.

Bariatric surgery was indicated according to international guidelines [7]. Exclusion criteria from the study were as follows: symptoms and/or diagnosis of gastroesophageal reflux disease (GERD) during the preoperative evaluation protocol; previous upper gastrointestinal surgery; paraesophageal (type 2), mixed (type 3), or sliding hiatal hernias $\geq$3 cm; presence of esophagitis; and Barrett's metaplasia.

Patients without preoperative endoscopic evaluation or with the absence of MII-pH or HRiM data were excluded from the study. Patients lost to follow-up and those who declined consent were excluded from the study as well.

Clinical evaluation

Anthropometric measurements were obtained in all patients (weight, height, body mass index [BMI], body composition determined by conventional quadripolar body impedance analyzer [BIA], TANITA). The patients were evaluated for symptoms using a validated questionnaire incorporating a Likert visual analogue scale (0–3, where 0 = absent, 1 = mild, 2 = moderate, and 3 = severe) for GERD-related symptoms (e.g., heartburn, regurgitation, and chest pain) and dyspeptic symptoms (e.g., epigastric pain, nausea, and abdominal pain) [8].

Endoscopy

High-magnification upper gastrointestinal endoscopy before and 1 year after surgery was performed according to international guidelines. Any visible lesions, including esophagitis, gastritis, anastomotic inflammation, ulcers, or strictures, were recorded. Esophagitis was staged according to the Los Angeles classification [9], whereas gastritis was graded according to the Sidney system [10]. Biopsies were performed only in the presence of macroscopic evidence of inflammation.

Evaluation of esophageal function

Patients had to observe fasting since the night before and had to be off medication (any kind of proton pump inhibitors [PPI], or drugs affecting the normal gastrointestinal motility) for at least 14 days. At the end of the recording period, HRiM and MII-pH tracings were reviewed manually by a single expert investigator (ST) blinded for the conditions of the patients to ensure accurate detection and classification of EGJ, motility patterns, and reflux episodes.

HRiM

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 Scientific), 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