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Original article

The effect of residual gastric antrum size on the outcome of laparoscopic sleeve gastrectomy: a prospective randomized trial

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Abstract

Background: Laparoscopic sleeve gastrectomy (LSG) is gaining popularity worldwide as a definitive bariatric procedure. However, there are still some controversial issues associated with the technique, one of which is the size of the residual antrum. Objectives: The aim of this prospective randomized trial is to study the effect of the size of the residual gastric antrum on the outcome of LSG. Settings: University-affiliated hospital.

Methods: Between November 2009 and August 2013, 113 morbidly obese patients submitted for LSG were randomized into 2 groups, namely antral preserving-LSG (AP-LSG) and antral resecting-LSG (AR-LSG), depending on the distance from the pylorus at which gastric division begins. In the AP-LSG group, the distance was 6 cm from the pylorus and included 58 patients, whereas the distance was 2 cm in the AR-LSG group and included 55 patients. The follow-up period was at least 12 months. Baseline and 6 and 12 month outcomes were analyzed including assessments of the percent excess weight lost (% EWL), reduction in BMI, morbidity, mortality, reoperations, quality of life, and co-morbidities.

Results: Both groups were comparable regarding age, gender, body mass index (BMI), and co-morbidities. There was one 30-day mortality, and there was no significant difference in the complication rate or early reoperations between the 2 groups. Weight loss was significant in both groups at 6 and 12 months. At 12 months, weight loss was greater in the AR-LSG than in the AP-LSG group, but with was no significant difference between the 2 groups at 12 months (%EWL was 64.2% in the AP-LSG group and 67.6% in the AR-LSG group; $p > .05$). The resolution/improvement of co-morbidities, quality of life outcome and the overall prevalence of co-morbidities were similar.

Conclusions: LSG with or without antral preservation produces significant weight loss after surgery. The 2 procedures are equally effective regarding %EWL, morbidity, quality of life, and amelioration of co-morbidities. (Surg Obes Relat Dis 2015;11:997–1003.)

Keywords: Bariatric surgery; Morbid obesity; Residual antrum; Sleeve gastrectomy

The problem of obesity has reached epidemic proportions not only in Western countries but worldwide as well [1,2]. Bariatric surgery, meanwhile, has emerged as the only effective and durable treatment of morbid obesity. Bariatric surgery consistently induces durable weight loss and reliably causes the improvement or remission of co-morbid diseases such as diabetes mellitus and hypertension [3–10]. Laparoscopic sleeve gastrectomy (LSG), first described as the initial stage of a 2-stage biliopancreatic diversion-duodenal switch (BPD-DS), is emerging as a popular operation for the treatment of morbid obesity, with acceptable morbidity and long-term weight loss compared with the laparoscopic Roux-en-Y gastric bypass (LRYGB)

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and adjustable gastric band (AGB) [11–13]. The advantages of this procedure include the lack of an intestinal bypass, thus avoiding gastrointestinal anastomoses, metabolic derangements, and internal hernias, shorter operating times, and no implantation of a foreign body [14]. LSG has a favorable complication profile, making it an especially attractive procedure for higher-risk patients [14–16]. The technique has been adopted by a large number of surgeons, influenced heavily by the misconception that it is a simple and easy operation. In recent years, the number of procedures performed has risen exponentially, reaching 18,098 cases in 2008, which is a figure that has undoubtedly been exceeded in the years since [13].

However, the many points of controversy regarding the procedure create a range of possibilities without consensus: the size of the bougie used as a calibrator, the distance from the pylorus to the first line of section, the section shape at the gastroesophageal junction, the necessity and options available for reinforcing the staple line, and the routine use of intraoperative seal testing. All of these issues are constantly debated among the most experienced authors [17–21].

The aim of this prospective randomized trial is to address one of these controversial issues, which is the effect of the size of the residual gastric antrum on the outcome of LSG for morbidly obese patients regarding weight loss, complications and the resolution of co-morbidities.

Methods

Between November 2010 and August 2013, 113 morbidly obese patients who matched the inclusion criteria were submitted for LSG at the Gastroenterology Surgical Center at Mansoura University and enrolled in the trial. This prospective randomized study was carried out after the approval of the Institutional Research and Ethical Committee and was conducted according to the principles of the Declaration of Helsinki. The study was registered at the clinical trials registry of the National Institutes of Health (ClinicalTrials.gov ID. NCT01846637). Written informed consents were signed by all participating patients after explaining the advantages and complications of the surgical procedure. The change in lifestyle and the need for life-long follow-up of surgical procedures were emphasized.

In our weight management program, patients were accepted for surgery if they satisfied the guidelines of the Society of American Gastroenterological Surgeons [16] [body mass index (BMI) $\geq$40 kg/m^2 or BMI $\geq$35 kg/m^2 with at least one co-morbidity associated with obesity (type 2 diabetes, hypertension, dyslipidemia, obstructive sleep apnea), age between 18 and 60 years, and failure of conservative treatment over 2 years]. Exclusion criteria included (1) BMI $>$60 kg/m^2, (2) poorly controlled significant medical or psychiatric disorders, (3) active alcohol or substance abuse, (4) active duodenal/gastric ulcer disease, (5) difficult to treat gastroesophageal reflux disease (GERD) with a large hiatal hernia, (6) previous major gastrointestinal surgery, and (7) diagnosed or suspected malignancy.

Only the data of patients who had completed their 3-, 6-, and 12-month follow-up visits at the time of the study were further analyzed. Data collected included demographic characteristics, operative time, length of stay, postoperative complications, and weight loss.

Randomization

Patients were randomized into 2 groups depending on the distance from the pylorus at which the gastric division begins. In group A (antral preserving-LSG [AP-LSG]), the distance was 6 cm, and in group B (antral resecting LSG [AR-LSG]), the distance was 2 cm. Eligible patients were randomized into one of 2 groups using sealed opaque envelopes containing computer-generated random numbers. Envelopes were drawn and opened at the time of anesthesia induction in the operating room by a nurse not otherwise engaged in the study. Using this strategy, a total of 115 patients were eligible and randomized. Two patients were excluded because of a huge and heavy left liver lobe in one patient (he did not receive surgery), and one patient had a preoperative intragastric balloon 4 weeks before LSG. A total of 113 patients were ultimately included in the study.

All of the patients had a thorough preoperative evaluation by an internal disease specialist, a dietician, and a surgeon. Standard preoperative and metabolic blood investigations were carried out on all patients in addition to upper gastrointestinal endoscopy and abdominal ultrasound examination. A psychiatric evaluation was obtained if considered necessary. Peptic ulcer disease and *Helicobacter pylori* infection were treated before surgery if diagnosed during the initial assessment. Cholecystectomy was performed at the time of bariatric surgery only if gallstones were detected by abdominal ultrasound. All patients were given a low-calorie, high-protein diet for at least 2 weeks before surgery. An anesthetic review was arranged before surgery. Each patient was admitted the night before surgery, and subcutaneous low-molecular-weight heparin and elastic stockings were used for deep vein thrombosis prophylaxis. Chemoprophylaxis was administered with 1.5 g of cefuroxime upon induction of anesthesia.

Surgical technique

All patients were operated on using standardized operation techniques. In all patients, we used a 38-Fr bougie along the lesser curvature for calibration of the gastric tube. A Harmonic Scalpel™ (Ethicon Endo-Surgery, Cincinnati, OH) was used for freeing the greater gastric curvature, and all stapling was performed using an Echelon 60 Compact