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Retrieval of the gastric specimen following laparoscopic sleeve gastrectomy. Experience on 275 cases

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ABSTRACT

Severe obesity leads to a high incidence of complications and a decrease in life expectancy, especially among younger adults. Laparoscopic sleeve gastrectomy (LSG) first intended as the first step of biliopancreatic diversion with duodenal switch is gaining a per-se procedure role because of its effectiveness on weight loss and comorbidity resolution. Different techniques have been described for specimen extraction in LSG. In this article we report the technique adopted in 275 LSGs performed in our department.

In the first 120 LSGs performed from 2007, the specimen was extracted through a mini laparotomy. In the following 155 cases the technique has been simplified: the grasped specimen has been withdrawn through the 15 mm trocar site.

We registered in the fist group six cases of wound infection (5%), ten cases of hematoma (8.3%) and four cases of port site hernia (3.3%). In the second group only one case of hematoma (0.6%, $p = 0.01$) but no cases of wound infection ($p = 0.01$) or port site hernia, ($p = 0.03$) although we registered a specimen perforation during retrieval in 16 patients, were reported.

The technique described in the 155 cases of the control group has shown to be more effective than the technique we used in the case group, allowing significantly lower operative time (112.9 ± 1.0 vs 74.9 ± 9.1 $p < 0.001$) and complications, and providing unchanged costs.

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1. Introduction

Severe obesity is one of the major problems in Western Countries and is associated with several comorbidities and disabling diseases (cardiovascular disease, metabolic syndrome, type 2 diabetes, fertility, certain tumor types and increased mortality) [1–4].

Obesity is notoriously difficult to manage. Diet, behavioral therapy, exercise, and pharmacological intervention have been traditionally used but generally yield modest results, and weight regain is common. In cases of failed medical therapy, bariatric surgery should be considered the treatment of choice for severe obesity [5].

The surgical treatment of obesity is a rapidly growing area of surgical practice, reflecting the ability of bariatric surgery to achieve major and durable weight loss, as well as the evolution of safer, less invasive procedure [2].

Laparoscopic sleeve gastrectomy (LSG) was introduced as a first step procedure to minimize surgical risk for super-super-obese or high-risk patients, followed by either laparoscopic biliopancreatic diversion with duodenal switch (BPD-DS) or laparoscopic Roux-en-Y gastric bypass (LRYGBP). Afterward it was noticed that the sleeve gastrectomy alone caused good weight loss before the second part was performed. So the encouraging results obtained in some series, have led many authors to avoid a second surgical intervention,

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especially if the excess weight loss percentage (EWL%) of operated patients reached and maintained satisfactory levels [6–8].

In the attempt to standardize the procedure, several technical aspects have been discussed through the years by experts [9–12].

The gastric specimen extraction is a minor technical issue, nevertheless it may represent, at the end of the procedure, especially during the learning curve, a challenging and time-consuming passage. An increased incidence of postoperative wound infections if the specimen opens, and an additional risk of hernia formation if the trocar site is enlarged to allow specimen extraction have been in fact reported [13]. Different techniques for the extraction of the excised stomach have been described [13]. Aim of this retrospective case control study, is to compare two techniques for specimen extraction we used in 275 LSGs performed in our unit.

2. Patients and methods

Starting from 2007, up to March 2015, 275 obese patients underwent LSG at the Advanced Biomedical Sciences Department – General Surgery – "Federico II" University of Naples, Italy.

All our patients routinely receive a preoperative esophago-gastro-duodenoscopy (EGDS) and a preoperative Helicobacter Pylori screening. Perioperative antiplatelet drugs administration is managed according to validated criteria [6,14]. All the patients are administered a pulmonary thromboembolism (PE) prophylaxis according to the Italian Society for Metabolic and Bariatric Surgery (SICOB) guidelines [6,15]. One dose of 2 g ceftriaxone is administered intravenously 10–15 min before the operation for infection prophylaxis.

According to previous reports [6,16], the vascular preparation of the gastric greater curvature starts at 5–6 cm from the pylorus and proceeds with the section of gastro-splenic ligament upward until the angle of His, using a 5 mm radiofrequency device (Ligasure™, Covidien®, Mansfield, MA, USA). Then, a gastric sleeve is tailored using a 60 mm linear stapler (Echelon flex 60®, Ethicon Endo Surgery, Johnson & Johnson©, Somerville, NJ, USA) following the edge of a 38 F calibrating oro-gastric tube. A total of five to seven cartridges are used. Between the closure of the stapler and its firing, a 20 s interval has been observed in any case [17]. Although debated, no oversewing of the staple line is performed to prevent bleeding or staple line leaks [6,7,16]. A methylene blue test with 80–100 mL of saline solution is routinely performed to evaluate possible leaks. Finally a fibrin glue sealant is sprayed along the suture line [18]. In all patients a naso-gastric tube and a drainage tube are left in place.

As for the first 120 cases, operated from 2007 to 2012, the method for specimen extraction is practiced through a mini laparotomy. This technique consists in an enlargement of the skin incision from 1.5 cm to about 3 cm and ulterior port-site fascial enlargement. The use of retractors is essential for the extraction of the gastrectomy specimen trough the skin breach.

In the following 155 cases, control group, operated from 2013 to 2015, the technique used has been simplified and does not require any special device [19,20]. The muscle wall at the 15-mm trocar site, which is left in place, is slightly enlarged, as to the size of two fingertips, to allow easier specimen extraction. The resected stomach is grasped at the caudal tip by a laparoscopic grasper through the 15-mm trocar and the grasper, together with the trocar and the tip of the specimen, is extracted while maintaining the proper orientation for easy extraction. The stomach is removed entirely from the abdomen using Kocher clamps, pulling up alternately the greater curvature and the staple line with gentle traction, taking care not to open the specimen. Emptying the stomach before resection with the oro-gastric bougie allows easier retrieval and avoids rupturing of the staple line, with gastric contents soiling through the abdominal wall layers or into the abdominal cavity. Finally, great care is taken to close the trocar site with a Vicryl 0 cross stitch (polyglycolic acid), using a Bercy needle.

A retrospective statistical evaluation to investigate eventual differences between the two techniques has been performed using the SPSS 17 system (SPSS Inc., Chicago, IL, USA). Operative time, wound infection, onset of hematoma and trocar site hernia were analyzed. Continuous data were expressed as the means ± SD, and categorical variables were expressed as the % changes. To compare continuous variables, an independent and/or paired sample t-test was performed, and correlation was assessed using the Pearson's linear correlation coefficients (r). The chi-square test was used to analyze categorical data. When the minimum expected value was <5, the Fisher's exact test was used. All of the results are presented as 2-tailed values with statistical significance defined as p values < 0.05.

3. Results

A total of 275 subjects who underwent sleeve gastrectomy for obesity were enclosed in this study. No significant differences were observed at baseline between the first 120 patients and the next 155 patients in terms of sex, age, preoperative BMI or comorbidities ($p = ns$). In the fist group, case group, there were six cases of wound infection (5%), ten cases of hematoma (8.3%) and four cases of port site hernia (3.3%) while in the second group (control group) there was one case of hematoma (0.6%) ($p = 0.001$) but no cases of wound infection ($p = 0.001$) or port site hernia ($p = 0.03$) using this technique, although we registered a specimen perforation during retrieval in 16 patients (10.3%).

Mean operative time was 112.9 ± 1.0 min in the first 120 cases in which the mini laparotomy was performed and 74.9 ± 9.1 min in the following 155 cases with the new technique ($p < 0.001$).

4. Discussion

Obesity is a pandemic health problem in both developed and developing countries and the costs of care continue to grow in parallel with the prevalence of the disease. This morbid condition leads to a high incidence of complications and a decrease in life expectancy, especially among younger adults [21,22]. In fact it is associated with development of comorbid conditions such as hypertension, diabetes mellitus, sleep apnea, congestive heart failure and certain tumor [23]. Moreover, obese women of reproductive age are a specific group at risk for obesity-related reproductive and obstetric complications [24]. So, while the obesity epidemic continues to increase worldwide, surgery remains the only proven treatment modality [25].

LSG is usually considered a restrictive procedure even though some other advantages have been observed when compared to other interventions. They are the hormonal effect produced by the ghrelin and the glucagon-like peptide 1 (GLP-1) decrease, the accelerated gastric emptying, the absence of implanted material, the persistence of normal gastrointestinal continuity, the preservation of gastric antrum in order to allow sufficient production of intrinsic factor, the avoidance of malabsorption, and finally the opportunity to convert LSG into both a LRYGBP or a BPD-DS [8,10,11].

The analysis of our experience with LSG indicates that this is an effective and safe procedure for the treatment of morbid obesity [6,26].

Although representing a minor technical problem, the extraction of the excised stomach, especially during the learning curve, may be challenging and time consuming, determining up to 20–30 min of extra operative time. And especially, prolonged operative time has shown to be an independent factor of both

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prolonged hospital stay and higher perioperative complications rate in bariatric patients [27]. The learning curve plays a key role in the reduction in operative time; nevertheless, the simplified specimen extraction saves about 10–15 min [13]. In this light different techniques for the extraction of the gastrectomy specimen have been suggested through years. Some authors use an endobag inserted through a 15-mm trocar [28–30], others enlarge the trocar site [9,31,32]. The morcellation of the specimen before its extraction has also been proposed [33].

Recently, Alley et al. [34] reported a new technique for extracting the gastrectomy specimen after LSG, which they used in 13 consecutive patients. They report "a low-technology technique for orienting the gastric specimen for easy extraction without port site enlargement": place a long 2-0 silk suture to the caudal (distal) "tip" of the specimen before placing it in a retrieval bag, inserted through the 15-mm trocar. In one case, port-site fascial enlargement was required (7.7%); none of the patients experienced wound infection. Conversely, the technique we used in the control group does not require stitches, loop, or bag; it needs just the time to grasp the specimen and pull it out. Although an endoloop, a tip-stitch, or an endobag can be useful for the extraction of the specimen, the technique described by us seems to be simpler, saving time, and being cost effective.

In conclusion, our study presents two major limitations. First, it is a retrospective study in which the lack of some data may represent a bias as in every retrospective study. Following, it has to be considered the influence of the learning curve in the operative time of the patients operated in the case group.

Probably the "ideal" technique to extract the excised stomach is yet to come. Nevertheless, according to the results of our study, the approach we used in the 155 cases of the control group has shown to be more effective than the technique we used in the case group, allowing significantly lower operative time and complications, and providing unchanged costs.

Ethical approval

Ethical approval was requested and obtained from the "Azienda Universitaria Federico II" ethical committee.

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Author contribution

Paola Maietta: Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data; also participated substantially in the drafting and editing of the manuscript.

Marco Milone: Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data.

Guido Coretti: Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data.

Giuseppe Galloro: Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data.

Giovanni Conzo: Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data.

Giovanni Docimo: Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data.

Roberto Ruggiero: Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data.

Mario Musella: Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data; also participated substantially in the drafting and editing of the manuscript.

Conflicts of interest

All Authors have no conflict of interests.

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