Laparoscopic Sleeve Gastrectomy In Morbid Obesity: Early Results Of 240 Patients

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Summary:

Background: Laparoscopic sleeve gastrectomy is becoming one of the most common procedures performed for the treatment of morbidly obese patients in the last few years until now.

Objectives: This type of surgery needs to be evaluated regarding the various techniques used and the possible post-operative complications with the exact methods of treating them.

Patients and methods: A retrospective study was conducted on 240 consecutive morbidly obese patients over a period of 3 years (Feb 2011- Mar 2013) in the Saint Raphael Centre of morbid obesity with an average patient body mass index of 45 (35 - 61). They all underwent LSG, and the decreased weight resulting from surgery was analyzed regarding early and late complications. In 40 of the 240 patients, the gastric band was removed 4 weeks prior to the sleeve operation.

Results: Intraoperative difficulties (difficult endotracheal intubation in 7 patients, difficult ports insertion in 6 patients, opening of the staple line in one patient and a bleeding from short gastric vessels in 2 patients). Only 5 patients developed primary haemorrhages (within the first 24 hours post operatively) from the staple line three of them were treated conservatively and the other 2 patients were returned to the theater, no anastomotic leakage or stricture, and no mortality. During a median follow up of 10.6 months (range of 1-3 months), the excess BMI lost reached 52+-23%, and the BMI decreased from 45 +-5 to 33 +- 5 kg/m2. Patient satisfaction scores (1-4) at least one year after surgery was 3.5 +- 0.7.

Conclusion: The early results achieved by following the above outlined surgical steps in 240 consecutive patients who underwent LSG indicates show that this type of morbid obesity surgery is an effective, safe and worthwhile choice for morbidly obese patients as a first treatment option, although long-term results are still pending.

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Introduction:

The world is experiencing an accelerated growth in the practice of bariatric surgery to address the global epidemic of morbid obesity(1,2,3). This bariatric explosion is due to the poor results obtained with non-surgical treatments, increasing evidence of significant and durable weight loss with surgery, as well as to a wide diffusion via the media and, consequently, an increased patient demand. This exponential growth is also related to the expansion of laparoscopy in the treatment of morbid obesity. The physiologic and clinical benefits of the laparoscopic bariatric surgery over the open approach [4, 5] have encouraged more primary care physicians to refer morbidly obese patients for surgical treatment, and have motivated more patients to pursue this approach.The sleeve gastroectomy (SG), also called the greater curvature, vertical, parietal, as well as longitudinal gastrectomy, is a new tool in the armamenture of all bariatric surgeons. In 1988, Hess and Hess (USA) [6] first added the sleeve gatrectomy, and simultaneously the duodenal switch (DS), as a modification to the biliary pancreatic diversion (BPD) to improve clinical outcomes. However, in 1993 Marceau (Canada) [7] published the first report on BPD-DS. Of all the standard restrictive operations, the Magenstrasse and Mill (M & M) procedure most closely resembles the SG. The M & M procedure, first described in Leeds (England) in 1995 [8], is performed using a similar technique to that used for vertical banded gastroplasty (VBG). Major benefits of the M & M procedure include the preservation of the gastric emptying [9], avoidance of foreign materials, and reduced gastrointestinal symptoms such as diarrhea, dumping and vomiting [10]. SG is essentially a completion of the Magenstrasse distally by completely separating the greater curvature of the stomach from the lesser curvature and the antrum. Michel Gagner at Mount Sinai Hospital in New York, USA [11, 12] first performed a laparoscopic SG (LSG) as the restrictive part of a BPD-DS in 1999. However, the initial reports on BPD-DS showed an increased morbidity and mortality in male and super obese patients [13, 14]. To reduce complications and mortality, Gagner and co-workers proposed a LSG as the first step of a two-stage laparoscopic BPD-DS in 2000, and later, as the first step of a two-stage laparoscopic roux-en-Y gastric bypass (LRYGB) in 2003 [15]. Since then, the use of the SG has spread worldwide [16,17,18] due to its major potential benefits, including its technical simplicity and significant weight-loss outcomes with low rates of complications and mortality. In view of the above, we undertook a retrospective study of the patients undergoing an LSG, aiming to evaluate most specifically the post-operative morbidity associated with the procedure, as well as the effect of an LSG on body weight and patient

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satisfaction, and whether to regard this operation as a first choice in the management of morbid obesity.

Patients and methods:

This retrospective study included 240 patients undergoing a laparoscopic sleeve gastrectomy during a 3-year period from February 2011 to March 2013. They comprised 198 females and 44 males, with a mean age of 38±12 years, a mean weight of 120±20 kg, and a mean BMI of 45±5 kg/ m2 (Table 1).In 40 of the 240 patients, the gastric band was removed 4 weeks prior to the sleeve operation. The preoperative investigations included: blood tests (random blood sugar, renal and liver function tests and a complete blood count), chest x-ray, ECG, abdominal ultrasound, and endocrinological nutritional evaluation. All patients were kept on a low carbohydrate diet for 4 weeks prior to surgery in order to decrease steatosis. All patients received a one-dose prophylactic intravenous antibiotic (cefitriaxone 1g) and a low molecular weight heparin SC (Innohep 3500 IU) immediately before surgery.A laparoscopic sleeve gastrectomy was performed on all patients by the same surgeon and, as mentioned previously, it consisted of the following steps:The greater curvature was deranged from its vascular supply by dividing it starting 6-7 cm from the pylorus and continuing towards the angle of the His by the use of a Harmonic Scalpel (Ethicon Endo Surgery U.S.A). On reaching the spleen, the short gastric vessels were carefully detached ascending in the cephalad direction until the left crus of the diaphragm was reached.The sleeve gastrectomy started at the antrum with the use of an Endo GIA staplerTM with a 4.1mm thickness (green) followed by successive 5-6 firings of 3.8mm loads (blue), including the body and the fundus up to the angle of the His. This was done while a calibrating 36 Fr calibrating tube was closely applied to the lesser curvature of the stomach to achieve a good sleeved stomach without any possible stenosis. The staple line was then reinforced by burying it using continuous non-absorbable seroserosal suturing starting at the angle of the His and ending at least at the mid-part of the stomach. Then the calibrating tube was withdrawn and a bubble test was performed to check for any possible leaks.

The patients were kept in the hospital for 3 days. On the first day they were kept on IV fluids and nil by mouth. From day 2-14 they were on clear fluids, followed by a soft diet for up to six weeks post-operation, after which the patients were kept on a protein-enriched, low-calorie solid diet with long-term oral multivitamin supplements.

Table (1) Patient demographic characteristics and their post-operative weight and BMI alterations (values expressed as mean +/- SD).

	Patient (n=240)	Median follow up of 10.6 months
Age (years)	38.1 +/- 11.8	
Male/female	44/196	
Weight (Kg)	120.2 +/- 20.3	95.1 +/- 18.4
BMI (Kg/M2)	44.7 +/- 5.3	33.9 +/- 5.5
% EBMIL		52 +/- 23.9

BMI (Body Mass Index), % EBMIL (percentage of Excess Body Mass Index Loss).

Results:

The mean operation time was 90 min (range 65–115 min). Intraoperative difficulties were encountered in 16 patients: in one, the opening of the staple line due to a defective cartridge was immediately sutured manually; in two, bleeding of the short gastric vessels at the hiatus was successfully treated with a Harmonic Scalpel™, seven patients had difficult endotracheal intubation and six patients had difficult ports insertion. Conversions to open procedures did not happen. Five patients developed primary heamorrhage(within the first 24 hours post operatively) 3 of them were treated conservatively and the other 2 were returned to the theater a bleeding point from stapler line was identified and treated by clips, no anastomotic leakage, no stenosis, and no mortality.The mean hospital stay was 2.5±1.5 days. All patients have remained under regular follow ups. During the median follow-up period of 10.6 months (range 2 to 31 months), the BMI significantly ($p<0.001$) decreased from 45±5 to 35± 5 kg/m2, and the percentage of excess BMI lost reached 52± 24% (Table 1). Clinically, all patients did well. There were no complaints of vomiting in the follow-up period and early satiety has usually been their only symptom. Out of the 240 patients, only 10 have expressed some degree of dissatisfaction with the results.

Discussion:

LSG is becoming a widely-used surgery whether a primary, staged, or revisional operation [14]. In fact, in the past 3 years, there have appeared in the literature an increasing number of reports on its use as a single-stage operation for morbid obesity. However, the incidence of complications is still a continuing concern [4,5,15]. By reviewing the results obtained in our study of 240 obese patients undergoing LSG our zero mortality rates is the same compares with rates ranging from 0% to 3.3% in the literature[16,17], no leak is the same comparing with other studies occurring with frequency of 0% to 8% according to Braghetto et al[16,17], it is apparent that an assessment of the various elements involved in the surgical procedure would be warranted and skilled surgical maneuvers are very important in preventing complications.

The following are the four elements felt to be of most importance in reducing complications and post-operative morbidity when performing LSG:

1. Detachment of the greater momentum from the greater curvature of the stomach using a harmonic scalpel device and an application of the linear stapler-cutter device beginning at 6–7 cm from the pylorus so that part of the antrum (the pump mechanism) remains. This is done to avoid delayed gastric emptying or gastric atony that could necessitate total gastrectomy, as occurred in the case described by Baltasar et al. [18], who reportedly started the division of the antrum only 2 cm proximal to the pylorus. The important role of the antrum in the mechanism of gastric emptying is in agreement with the report by Weiner et al. [19].
2. Protection of the staple line by placing continuous inverting Lembert sutures close to the staple line. To protect the gastric suture line from such bleeding and leaks, other surgeons have used various materials, e.g., Peristrips® (Synovis Surgical Innovation, St. Paul. MN, USA) [20,21] and Seamguard® [22], with mixed results.
3. Insertion of a 36 Fr calibrating tube into the stomach to guide our resection. Continuous suturing close to the staple line over a 36 Fr bougie will not lead to post-operative stricture despite the decrease in sleeve volume, whereas use of a 32-Fr bougie is likely to do so.
4. Firing of the stapler parallel to the calibrating tube in order to prevent segmental dilatation of the sleeve and to make the sleeve as CVS as possible, ensuring the complete removal of the fundus, which has the greatest potential for later dilatation.LSG includes removing 80 - 90 % of the stomach, leaving behind only a sleeve of the stomach, thus restricting the amount of food that can be taken, and elevating the intragastric pressure [23]. Total resection of the fundus is of great importance to avoid the creation of a new reservoir by possible dilatation of this relatively thin gastric area. The diameter of the gastric sleeve is also important to avoid or delay subsequent dilation where a wide sleeve will dilate earlier than a tighter one.
The main mechanism of weight reduction after sleeve gastrectomy surgery is the restriction of food intake resulting from the low distensibility of the sleeve and the consequent immediate high intraluminal pressure [23]. Other factors that play a role are the hormonal changes following the operation [24,25] and their possible effect on gastric motility [26]. The behavioral changes of the individual patient taking place before and after the operation may also be of significance in reaching a long-term successful outcome [27].

Conclusion:

The early results documented for this series of 240 obese patients who underwent an LSG without any serious complications (bleeding, leakage or mortality), but with significant weight loss are certainly promising.

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