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Original research

Is sleeve gastrectomy a therapeutic procedure for all obese patients?

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HIGHLIGHTS

- Laparoscopic sleeve gastrectomy (LSG) is a safe procedure with a limited morbidity risk.
- Potential benefit of the procedure in patients with preoperative BMI <50 kg/m2.
- Our results confirm LSG as one of the most attractive first stage surgical procedure for morbid obesity.

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ABSTRACT

Background: Laparoscopic sleeve gastrectomy (LSG) is a worldwide surgical procedure for morbid obesity. However patients selection is still anecdotal. The aim of this study is to analyse clinical and anthropometric parameters correlated with LSG and to check the validity of this procedure for different categories of obese patients.

Methods: Two-hundred one consecutive patients were submitted to LSG as a primary bariatric procedure between 2008 and 2014. One year follow-up was completed in 159 patients. Smaller groups of patients completed 2 and 3 years follow-up (78, 46 patients respectively). Median preoperative body mass index (BMI) was 45.4 kg/m2 (range: 34.8–73.8); 135 patients (80%) had one or more comorbidities. Potential correlations between age, gender, preoperative BMI, preoperative excess weight, early excess weight loss (EWL) and 1 and 3 year-EWL were investigated.

Results: All procedures were regularly completed with laparoscopic approach without conversion to laparotomy. Postoperative complications occurred in six patients (3.7%); no postoperative mortality was observed. Median one-year BMI and EWL were 32.8 kg/m2 and 55.34%, respectively. Three year-EWL was significantly influenced by age, and early EWL. A complete normalization of glycemic levels after the three-year follow-up was also observed in high percentage of diabetic patients. In patients with pre-operative BMI>50 kg/m2 we observed most failure cases in terms of EWL and the worst metabolic results.

Conclusions: Our experience indicates that LSG is a safe procedure with satisfactory three-year late weight loss in patients with preoperative BMI <50 kg/m2. Promising results, in terms of improvements of comorbidities, were also observed. These results make LSG one of the most attractive first stage surgical procedure for morbid obesity.

1. Introduction

Sleeve gastrectomy is a restrictive operation for morbid obesity introduced initially as the first step of a two-stage procedure, biliopancreatic diversion (BPD) with duodenal switch, in order to achieve an initial weight loss and reduce the morbidity risk of the

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definitive operation [1,2].

Afterwards, short-term follow-up results indicated that weight loss and improvements of comorbidities with sleeve gastrectomy alone were similar to those obtained with the definitive two-stage procedure [3,4].

As such, it has been proposed as a single operation, in consideration of the relative technical simplicity and the lower risk of postoperative complications and long-term sequelae compared with more invasive and derivative procedures as BPD, Roux-en-Y gastric bypass (RYGB) and mini gastric bypass (MGB). Nowadays, laparoscopic sleeve gastrectomy (LSG) is a widespread operation associated with a low incidence of postoperative morbidity and mortality [5–10].

However, even if meta-analysis and small randomized studies demonstrated encouraging results in terms of weight loss and resolution of comorbidities, even when compared with other procedures, definitive long-term follow-up data are lacking and late results still unclear [8,11–18].

Furthermore, several aspects are still debated, mainly regarding the patients selection and the management of stapled stomach resection.

In the present study, we report a six-year single-center experience with LSG; a detailed analysis of data in a subset of patient with one and three-year follow-up has been performed. The aim of this study is to investigate the potential correlations between anthropometric-preoperative variables and 1 and 3 year-EWL in order to demonstrate if LSG is a valid procedure for all types of morbid obese patients.

2. Material and methods

2.1. Patients and preoperative work-up

Between January 2008 and August 2014, 201 consecutive patients were submitted to LSG as a primary bariatric procedure at the Unit of Obesity Surgery, Policlinico “Le Scotte”, University of Siena, Italy. The selection of patients eligible for this operation was performed following the guidelines of the Italian Society of Obesity Surgery (SICOB) [19]. 52 patients were lost to first-year follow-up and therefore excluded from the study. The one-year analysis was performed in 159 patients (51 male, 108 females, median age: 46 years, range: 22–66). A smaller group of patients was used to carry out three -year analysis. Generally, body mass index (BMI) > 40 kg/m^2, BMI> 35 kg/m^2 associated with one or more comorbidities and good cognitive compliance were the main factors taken into consideration. A preoperative multidisciplinary evaluation of a team involving surgeon, anaesthesiologist, endocrinologist, gastroenterologist, dietician and psychiatrist was performed. Informed consent was obtained from all patients included in the present study. Preoperative work-up included standard blood exams, chest X-rays, pulmonary function tests, electrocardiogram, echocardiography, liver ultrasound and upper digestive endoscopy. Antibiotic and thromboembolic prophylaxis were administered to all patients. Main patients' characteristics and associated comorbidities of the present series are reported in Table 1.

Classification of comorbidities was performed according to the SICOB criteria [19].

2.2. Follow-up program

Before discharge a gastrografin swallow was performed in all patients in order to check suture line. After discharge, a personalized diet and postoperative follow-up schedule has been provided to all patients. Follow-up program included clinical evaluation, blood exams and additional instrumental examinations at 1, 3, 6, 12 months in the first year, then every six months for the following year, then every twelve months. All check-up visits were performed at the outpatient clinic of our Department. About blood exams, we carried out complete blood count, hepatic and renal function, fasting blood sugar, iron metabolism and prealbumin every outpatient follow-up control; cholesterol and triglycerides levels every six months for two years and then every year. Follow-up data were prospectively recorded on previously built database. For the present study, follow-up end-date was May 31st, 2015.

Table 1
Main characteristics of 159 patients at the time of surgery (* = median).

N° of patients	159
Sex (male:female)	51:108
Age (years)*	46
Height (m)*	164
Weight (kg)*	121.1
BMI (Kg/m^2)*	45.4
Postoperative complications	6 (3.7%)
- Bleeding	3 (1.9%)
- Stenosis	1 (0.6%)
- Leak	1 (0.6%)
- Abscess	1 (0.6%)
Reoperation	2 (1.2%)
Mortality	0 (0%)
Comorbidities	139 (87.4%)
- One or more	40 (25.2%)
- Hypertension	44 (27.7%)
- Diabetes mellitus	37 (23.3%)
- Obstructive sleep apnea	

2.3. Statistical analysis

A preliminary data exploration was performed. For numerical variables, such as operation time, age, body weight, BMI, % excess weight (EW), % excess weight loss (EWL), total cholesterol, HDL, LDL, triglycerides and fasting plasma glucose the normality of distribution was assessed by Q-Q plot and when the observed value was similar to expected value by means of the Kolmogorov-Smirnov test. When resulting as not normally distributed, they were expressed as median, interquartile range (IQR, i.e. the range between 25th and 75th percentile), and range, and were compared by means of non-parametric test (Mann-Whitney).

Graphical analysis of changes in BMI, %EW, %EWL, total cholesterol, HDL, LDL, triglycerides and fasting plasma glucose levels was conducted building box-plots, in which the median, IQR, non-outlier range, and also moderate and extreme outliers (i.e. values exceeding 2 times and 3 times the IQR) are represented. This graphical analysis has the advantage to show all values near the range (potential expression of unfavourable results), which may be not represented in simple report of mean, median and range of values [20].

Statistical analysis of time-dependent changes was performed using the Wilcoxon signed-rank test. Analysis of variance or Mann-Whitney test were used to compare different data among three or two groups, respectively. The potential correlations between continuous variables were conducted using linear regression analysis and Loess correlation curve. For statistical analysis, SPSS statistical package (version 17.0) (SPSS™, Chicago, Illinois, USA) was used.

3. Results

3.1. Surgical data and postoperative morbidity

All procedures were regularly completed with laparoscopic