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## Original research

## Bariatric surgery in elderly patients. A comparison between gastric banding and sleeve gastrectomy with five years of follow up



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## ABSTRACT

**Introduction:** The prevalence of obesity is rising progressively, even among elderly patients. Many studies investigated about safety and efficacy of bariatric surgery among aged obese patients. The objective of this review is to assess the benefits relative to risks of weight loss that may be obtained by performing two common bariatric procedures in obese elderly patient. **Materials and methods:** We retrospectively evaluated 10 morbid obese patients older than 60 years reaching 5 years of follow up who respectively underwent Laparoscopic Sleeve Gastrectomy (LSG) or Laparoscopic Adjustable Gastric Banding (LAGB). Eventual changes in comorbidities, weight loss, EWL% were investigated. **Results:** Although LSG patients required a longer postoperative hospital stay than LAGB patients ( $p < 0.001$ ), both procedures have shown to be safe and equally effective for weight loss achievement in elderly patients. Whereas all patients showed comorbidities resolution, no significant difference in weight loss between LAGB group and LSG group was found at 1 year (EWL%  $p = 0.87$ ; BMI  $p = 0.32$ ), 3 years (EWL%  $p = 0.62$ ; BMI  $p = 0.79$ ) and 5 years (EWL%  $p = 0.52$ ; BMI  $p = 0.46$ ) of follow up. **Conclusions:** Bariatric surgery is safe and effective to reach obesity related comorbidities resolution among elderly obese patients. Both LAGB and LSG determine a weight loss lesser than observed in a standard bariatric population. In this study LSG is significantly less cost effective than LAGB. Larger studies with longer follow up are however needed to evaluate the real impact of bariatric surgery on weight loss, resolution of comorbidities and improvement of quality of life in elderly obese patients.

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## 1. Introduction

Obesity is defined as an unhealthy excess of body fat, which increases the risk of medical illness and premature mortality [1]. The epidemic explosion of morbid obesity problem has led an increasing interest in the possibility of use of bariatric surgery. In

the U.S.A. 35% of subjects over 60 years old suffer from obesity including further increase in morbid obesity [1,2].

In Italy, according to national data between 1991 and 2010, the prevalence of obesity among the elderly has increased from 7.5% to 16% [3]. Obesity causes serious medical complications, which lead to considerable morbidity, impaired quality of life, and premature death. Furthermore the prevalence of many of the medical complications associated with obesity such as diabetes and hypertension increases with age [4,5].

The Italian Society for Bariatric and Metabolic Surgery (SICOB), recommends bariatric surgery in obese elderly patients, in any case younger than 70 years old, emphasizing the need for greater attention to the assessment of cost–benefit ratio. In fact, patients over sixty years are supposed to have more postoperative complications, a slight decrease of expected weight loss and a lower compliance to the dietary regimen than younger patients.

In this study we report one single centre experience in bariatric procedures with patients aged over 60 years who underwent

*List of abbreviations:* LSG, laparoscopic sleeve gastrectomy; LAGB, laparoscopic adjustable gastric banding; EWL%, excess weight loss rate; BMI, body mass index; T2DM, type 2 diabetes mellitus; PE, pulmonary embolism; DVT, deep venous thrombosis; QOL, quality of life; HbA1c, glycosylated haemoglobin; FPG, fasting plasma glucose; LOS, postoperative hospital length of stay.

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Laparoscopic Sleeve Gastrectomy (LSG) or Laparoscopic Adjustable Gastric Banding (LAGB) with five years of follow up.

## 2. Patients and methods

Starting from 2005, 520 morbid obese patients have been operated on in our centre [6]. A total of 10 elderly patients aged >60 years old who underwent bariatric surgery in this period at our institution, and reaching at least five years of follow up, was retrospectively examined in this study. Patients were grouped as follows:

Group A, 6 patients who underwent LAGB and Group B, 4 patients who underwent LSG, see Table 1 for preoperative details.

We interviewed and examined all the patients at our institution to obtain accurate pre- and postoperative medical profiles. Group A (6 LAGB patients) had a mean age of 65.8 years, a mean preoperative Body Mass Index (BMI) of 45.4 and presented hypercholesterolaemia in two cases. Group B (4 LSG patients) had a mean age of 66.2 years, a mean preoperative BMI of 48.2, and comorbidities such as Type 2 Diabetes Mellitus (T2DM) (3 cases), hypertension (3 cases), and hypercholesterolaemia (2 cases).

All LAGB and LSG were performed by laparoscopy. In particular LAGB procedures were performed using the pars flaccida approach [6] while LSG was performed following a previously described technique [7,8]. According to SICOB guidelines for prevention of pulmonary embolism (PE) and deep venous thrombosis (DVT), all patients were administered continuous, intravenous, low-dose heparin infusion and intraoperative pneumatic leg compression for prophylaxis.

A structured follow-up that included periodical visits was provided for all patients. Controls were scheduled every three months during the first postoperative year and every six months thereafter. During visits surgeons performed all necessary adjustments on gastric banding, while nutritional counselling was provided as well.

Quality of life (QOL) was assessed by bariatric psychologist by using three factors: physical function, work, and emotional function/depression. These questionnaires were administered to all patients 2 weeks before surgery and at the last date of follow-up after surgery.

Both the diagnosis and resolution of T2DM were defined according to the American Diabetes Association (ADA) guidelines [9]. Glycosylated haemoglobin (HbA1c), fasting plasma glucose (FPG), and need for medications to control blood sugar, were investigated.

Resolution of hypertension was defined as the discontinuation of antihypertensive medications as determined by the patient physician.

Resolution of hypercholesterolaemia was defined as the discontinuation of lipid lowering agents as determined by the patient physician.

Results for both groups were evaluated at one, three and five years following surgery, by comparing BMI, expressed as kg/m<sup>2</sup>,

**Table 2**  
Results at 1, 3 and 5 years follow-up.

Pz	BMI 1 y	Weight 1 y	EWL% 1 y	BMI 3 y	Weight 3 y	EWL% 3 y	BMI 5 y	Weight 5 y	EWL% 5 y
1	44.4	115 kg	10%	38.6	100 kg	23.1%	36.6	95 kg	26.9%
2	34.6	82 kg	13.7%	26.6	63 kg	33.7%	27	64 kg	32.6%
3	38.6	100 kg	18%	34.7	90 kg	26.2%	28.5	74 kg	39.3%
4	37.2	100 kg	9.1%	28.3	76 kg	30.9%	27.3	75 kg	31.8%
5	40	101 kg	15.8%	35.6	90 kg	25%	28.5	72 kg	40%
6	38.2	121 kg	13.6%	26.8	85 kg	39.3%	25.6	81 kg	42.1%
7	46.3	100 kg	11.5%	42.6	92 kg	18.6%	—	—	—
8	37.4	91 kg	17.3%	33.3	81 kg	26.4%	32.1	78 kg	29.1%
9	42.9	114 kg	15.5%	35.8	95 kg	29.6%	30.1	80 kg	40.7%
10	40.3	107 kg	16.4%	36.9	98 kg	23.4%	29.4	78 kg	39.1%

EWL% and comorbidities resolution, with the aim to determine which procedure between LAGB and LSG could be more effective and safe in elderly patients. Statistical analysis was performed with SPSS version 14.0 (SPSS<sup>®</sup>, Chicago, IL, USA) and significance was assigned for *p* values <0.05. The Student-*t* test to compare BMI and EWL% results from both group was used.

## 3. Results

No surgical conversion from laparoscopic to open surgery was needed. There were no deaths, perioperative or postoperative complications. The postoperative hospital length of stay (LOS) was 2.1 ± 0.4 days for LAGB and 7 ± 1 days for LSG (*p* < 0.001). Nine patients (90%) reached five years of follow up.

In group A (LAGB) we found a mean EWL of 14.2% at 1 year and a mean BMI of 39; mean EWL was of 33.5% at 3 years with a mean BMI of 33.5; at 5 years the mean EWL was 34.6% with a mean BMI of 28.7. One patient was lost at follow up four years following surgery.

In group B (LSG) we found an average EWL of 13.9% at 1 year with a mean BMI of 41.4; EWL was of 28.8% at 3 years, with a mean BMI of 34.5. At 5 years the mean EWL was 37.2% with a mean BMI of 30.4 (Table 2).

Our analysis demonstrate that no significant difference in weight loss between LAGB group and LSG group was found at 1 year (EWL% *p* = 0.87; BMI *p* = 0.32), 3 years (EWL% *p* = 0.62; BMI *p* = 0.79) and 5 years (EWL% *p* = 0.52; BMI *p* = 0.46) of follow up.

Also comorbidities resolution and QOL were evaluated at five years of follow-up. In both groups complete resolution of all comorbidities (100%) considered in this study was found.

Quality-of-life measurements improved almost equally after both procedures with better although not significant results reached by patients who underwent LSG.

## 4. Discussion

Bariatric surgery is currently indicated for patients with morbid obesity and most guidelines suggest to include patients with a BMI

**Table 1**  
Preoperative parameters.

Patients	Age	Preop. BMI	Preop weight	Hypertension	Diabetes	HyperChol	Intervention
1	66	50	130 kg	No	Yes	Yes	LSG
2	65	40	95 kg	No	No	Yes	LAGB
3	67	47	122 kg	No	No	No	LAGB
4	65	41	110 kg	No	No	No	LAGB
5	68	47.6	120 kg	No	No	No	LAGB
6	66	44	140 kg	Yes	Yes	No	LSG
7	65	52	113 kg	No	No	Yes	LAGB
8	65	45	110 kg	No	No	No	LAGB
9	66	51	135 kg	Yes	No	Yes	LSG
10	67	48	128 kg	Yes	Yes	No	LSG

>40 kg/m<sup>2</sup> or a BMI >35 kg/m<sup>2</sup> with comorbidities such as cardiorespiratory disease, T2DM, sleep apnoea, and severe osteoarthritis, which are expected to improve by surgically induced weight loss [5].

While age limitations between 18 and 50 stated by the NIH Consensus Conferences in 1991 were widened over time to age 60 [5,10,11], Dorman et al. [12] showed that patients age 65 or older undergoing bariatric surgery in the USA increased from the year 2005–2009. In this report, endorsed by the American College of Surgeons National Surgical Quality Improvement Program, the outcomes of 48,378 adults with a BMI greater than or equal to 35 kg/m<sup>2</sup> who underwent bariatric surgery between 2005 and 2009 were evaluated. During this time, the number of patients aged 65 and older seeking bariatric surgery increased from 1.5% to 4.8%.

To date, SICOB [13], in a recent position statement, extends bariatric surgery indications to elderly patients aged below 70.

Although several reports suggest that rates of perioperative morbidity and mortality might be higher in older patients [14], the improvement in intraoperative surgical management and the optimization of perioperative care, have led to excellent results in bariatric elderly patients. If older patients have more pre- and post-operative comorbidities and lose less weight than younger patients, conversely weight loss and improvement in comorbidities are clinically significant [15,16]. Often the complication rate is in fact low and related to underlying diseases and not to the operative technique or procedure itself [17].

Furthermore, following bariatric surgery elderly patients lose a significant amount of weight and this loss is associated with an improvement in obesity-related comorbidities and an overall reduction in medication requirements [16].

Willkomm et al. [18] found an apparently higher operative risk profile in those over age 65 ( $n = 100$ ) than in younger patients ( $n = 1374$ ), with higher rates of sleep apnoea, diabetes, and hypertension. However, the operative outcomes were similar in the two groups in terms of operative time, LOS, and 30-day readmission rates. The authors concluded that patients over age 65 had excellent outcomes compared with younger patients, suggesting that older age is not a risk factor for complications or death with bariatric surgery. In his study Silecchia et al. [19] comparing two groups of patients who underwent LAGB, demonstrated no significant differences in terms of postoperative morbidity and comorbidity resolution between patients younger or older than 55 years, while Quebbemann et al. [20] evaluated short term result on elderly patients after laparoscopic gastric bypass and LAGB, concluding that bariatric surgery can be performed with acceptable safety, excellent weight loss, resolution of comorbidities, and significant improvement in quality of life in patients older than 65 years. Again Taylor et al. [21] evaluated 40 patients with a mean age of 65.8 years (range 60–72) and preoperative mean BMI of 42.2 (range 33–54) who underwent LAGB from February 2000 to September 2005. Mean EWL at 2 years was 54% with a comorbidity improvement reported in 80% of patients.

Finally Soto et al. [22] and van Rutte et al. [23] report laparoscopic sleeve gastrectomy to be an effective and safe procedure for morbidly obese patients aged 60 and older. It can be performed with similar results comparing elderly group to younger patients.

Our results although similar in terms of perioperative safety, and comorbidities resolution, seem to be less encouraging, especially evaluating five years of follow up, in terms of weight loss. In group A (LAGB) in fact a mean EWL of 14.2% at 1 year, of 33.5% at 3 years and of 34.6% at five years was found, whereas similar results were present in Group B (LSG) patients, with an EWL of 13.9%, 28.8% and 37.2% at 1, 3 and 5 years respectively. Furthermore those findings appear poorer than results previously reported, in a standard bariatric population, by our group [6].

LSG, in our study, seems to be however less cost-effective than LAGB. If we in fact consider the similar results offered by both LAGB and LSG in terms of weight loss and comorbidity resolution, conversely we have to compare them with the significant longer hospital LOS requested for LSG. In this light we may conclude that probably LAGB should be preferred in elderly bariatric patients. Furthermore LSG has a safety profile lower than LAGB [24], and might expose these patients to complications difficult to be managed [25]. Although presenting 5 years of follow up, this study has the major limitation of evaluating a sample group too small to define any significant difference between elderly patients who underwent LAGB or LSG.

Nevertheless, according to our data, we may conclude that LAGB and LSG are two valid bariatric options in terms of perioperative safety and comorbidity resolution, despite an unsatisfactory weight loss in the long term in comparison with a standard bariatric population. They are able to induce a documented improvement in quality of life for morbidly obese geriatric patients. Larger studies with longer follow up are however needed.

### Ethical approval

This has been considered a clinical retrospective study. No ethical approval was requested. Italian laws in terms of patients privacy were fully respected.

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### Author contribution

**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.

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

**Paola Maietta:** Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data.

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

**Anna Pisapia:** Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data.

**Dario Gaudio:** Participated substantially in conception, design, and execution of the study and in the analysis and interpretation of data.

**Francesco Milone:** 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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