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A single center experience

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Murat Toksoy*, Ozan Akinci**, Sefa Ergun***, Elif Tuncay****, Kagan Zengin***

**Department of General Surgery, Afyon Bolvadin State Hospital, Afyon, Turkey*
***Department of General Surgery, Istanbul Kartal Dr Lutfi Kirdar City Hospital, Istanbul, Turkey*
****Department of General Surgery, Cerrahpasa Faculty of Medicine, Istanbul University-Cerrahpasa, Istanbul, Turkey*
*****Department of General Surgery, Bingol State Hospital, Bingol, Turkey*

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Aim: *The safety and effectiveness of MGB versus LSG remain unclear. In this study, we It has been shown by many clinical studies that laparoscopic sleeve gastrectomy (LSG) and mini-gastric bypass (MGB), two current methods in metabolic surgery, may be alternatives to Roux-en-Y gastric aimed to compare the postoperative outcomes of MGB and LSG procedures performed in bariatric surgery.*
Material Methods: *A total of 175 patients who underwent MGB and LSG surgery between 2016 and 2018 at a single metabolic surgery center were analyzed retrospectively. Two surgical procedures were compared in terms of the perioperative, early and late postoperative outcomes.*
Results: *There were 121 patients in the MGB group and 54 patients in the LSG group. No significant difference was found between the groups regarding the operating time, the conversion to open surgery and the early postoperative complications (p>0.05). The length of hospital stay was significantly shorter in the MGB group (p:0.001). The excess weight loss (EWL%) and total weight loss (TWL%) were significantly higher in the MGB group (90.3 vs. 79.2; and 36.4 vs 30.5, respectively). No significant difference was found between the two groups in terms of the remission rates of comorbidities. The symptoms of gastroesophageal reflux were observed in a significantly fewer number of the patients in the MGB group (6 patients 4.9% vs. 10 patients 18.5%).*
Conclusions: *Both LSG and MGB are effective, reliable, and useful methods in metabolic surgery. The MGB procedure is superior to the LSG in terms of the length of hospital stay, EWL%, TWL% and the postoperative gastroesophageal reflux symptoms.*

Key Words: Metabolic surgery, Mini gastric bypass, Postoperative outcomes, Sleeve gastrectomy

Introduction

Obesity is a common public health problem worldwide and is currently the most common preventable cause of death after smoking. Between 1980 and 2008, the global average body mass index (BMI) in women and men has increased by 0.4-0.5 kg/m^2 per decade [1]. That obesity and associated comorbidities reduce the average life expectancy and cause a serious economic burden has further increased the importance of metabolic surgery [2]. Although obesity has several treatment modalities such as diet, exercise, lifestyle change, and medications, surgical treatment is superior to other methods in terms of sustainable weight loss and improving accompanying metabolic diseases [3].
The patients with a BMI of ≥40 or a BMI of ≥35 with comorbidities such as type-2 diabetes mellitus (T2DM), hypertension (HT), or obstructive sleep apnea syndrome (OSAS) are candidates for metabolic surgery [4]. According to the mechanism of action, metabolic surgery methods

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Correspondence to: Ozan Akıncı, MD, Istanbul Kartal Dr Lutfi Kirdar City Hospital, Department of General Surgery, 34862 Cevizli, Kartal, Istanbul, Turkey (e-mail: ozanakinci1987@hotmail.com)

can be classified as restrictive (adjustable gastric banding, vertical banded gastroplasty, gastric plication, or sleeve gastrectomy), malabsorptive (duodenal-jejunal bypass or jejunoileal bypass), or mixed (Roux-en-Y gastric bypass (RYGB), mini gastric bypass (MGB), biliopancreatic diversion with or without duodenal switch). The choice of surgical method depends on the patient's diet, accompanying diseases, and the surgeon's preference and experience [4,5].

Although RYGB operation is the most common contemporary metabolic surgery method worldwide and is accepted as the gold standard for obese T2DM patients, laparoscopic sleeve gastrectomy (LSG) has become prominent in recent years [5,6].

In addition to LSG as being a restrictive procedure, a neuroendocrine mechanism, which results in a decreased appetite due to a reduction in ghrelin secretion following the resection of the gastric fundus, contributes to weight loss in this procedure [7]. LSG has several advantages such as being a more easy technique, having a shorter learning curve, an acceptable stapler-line leakage, excess weight loss (EWL%), and positive postoperative results concerning the remission of comorbidities [8,9]. On the other hand, the disadvantages such as weight regain and gastroesophageal reflux are why surgeons hesitate to perform LSG [10,11].

Mini-gastric bypass (MGB) surgery, also known as single-anastomosis gastric bypass or omega gastric bypass, constitutes 7.6% of all metabolic surgery operations worldwide and has been used more commonly in recent years [6,12]. MGB is a safe and easy procedure, and the fact that it has a shorter operating time, has lower morbidity and mortality rates, and is equivalent or superior to RYGB in terms of T2DM remission and EWL% has made it a widely recognized technique [13,14]. Despite this trend, MGB has been reported to have postoperative disadvantages such as gastroesophageal bile reflux, marginal ulcer, and remnant gastric cancer [15].

A limited number of previous studies have compared the MGB and LSG methods in metabolic surgery. In this study, we aimed to compare the postoperative outcomes and the effectiveness of the MGB and the LSG methods in the patients operated due to obesity and the related metabolic diseases.

Material-Method

The data were retrospectively analyzed for 175 patients who underwent LSG or MGB by one specialized surgeon between September 2016 and September 2018 in the Department of General Surgery at Istanbul University, Cerrahpasa School of Medicine due to the diagnosis of morbid obesity. The study was approved by the local ethics committee (approval number: 22.05.19 / 78166) and was conducted following the principles outlined in the Declaration of Helsinki. Redo or revisional surgeries and the patients who were lost to follow-up or did not attend regular follow-up controls were excluded from the study. The patients were examined at postoperative 1st, 3rd, 6th, and 12th months.

Each patient was evaluated and followed for at least 6-12 months before surgery and the indication for bariatric surgery was endorsed by a multidisciplinary team. It was decided on the basis of clinical practice guidelines which surgical procedure should be applied to patients [16]. The patients were divided into two groups: LSG and MGB. Age, gender, preoperative BMI, preoperative HbA1c (%), comorbidities (T2DM, HT, OSAS, dyslipidemia), and American Society of Anesthesiologists (ASA) scores were recorded for both groups. The groups were compared in terms of the operating time, the length of hospital stay, the need for transfer to the postoperative intensive care unit (ICU), early postoperative complications (i.e., bleeding, leakage, or diabetic ketoacidosis), and the postoperative mortality rates. In addition, BMI, the rates of EWL%, total weight loss (TWL%), T2DM, HT, OSAS remission, and the rate of lipid profile change at the end of the first year were recorded.

curvature, 2-3 cm proximal to the pylorus. The omentum was separated from the stomach with a vascular sealing device in a line close to the stomach up to the His angle. The fat pad in the esophagogastric junction was dissected. The left hiatal crus was clearly exposed. The adhesions behind the In LSG surgeries, the patient was in the lithotomy position with both arms and legs open, and the surgeon was positioned between the legs. A total of five trocars were used. First, a 10-mm trocar was placed in the midline superior to the umbilicus. After the pneumoperitoneum was formed at 12 mmHg pressure, a 5-mm trocar was placed from the subxiphoid area for liver retraction. Two 12-mm trocars were placed in a half-moon configuration through the right and left pararectal line to be used by the surgeon, and the last 5-mm trocar was placed from the left anterior axillary line. The procedure was started by adjusting the patient in a anti-trendelenburg position. The dissection was started from the greater stomach were released as much as possible. A 36-French orogastric tube inserted by the anesthetist was placed in the stomach. Sleeve gastrectomy was completed with a transsection from 2-3 cm proximal of the pylorus to the His angle using a tube-guided endoscopic stapler (Endo-GIA, Covidien, USA). The specimen was taken out of the abdomen through the 12-mm trocar, and the operation was completed.

In MGB surgeries, the patient was in the lithotomy position with both arms and legs open, and the surgeon was positioned between the legs. A total of five trocars were used, and the trocars were placed in a configuration similar to that in the LSG. The omentum minus was opened using the vascular sealing device at the level of incisura angularis as close to the stomach as possible in order to protect the nervus vagus; and the posterior wall of the stomach was accessed. The adhesions, if present on the

posterior part of the stomach, were released. Then, before proceeding to the stapler stage, the fat pad at the esophagogastric junction level was dissected to fully evaluate the left crus line at which the trans-section would end. A 36-French orogastric tube was placed by the anesthetist. Endoscopic linear staples (Endo-GIA, Covidien, USA) were placed from the lesser curvature initially in the horizontal plane. Then, the orogastric tube was advanced up to the stapler line, and a long and narrow gastric pouch was formed with vertical staples under the guidance of the orogastric tube afterwards. The following biliopancreatic limb lengths were measured, depending on the patient's BMI: BMI <50 kg/m^2 = 200 cm, BMI between 50-60 kg/m^2 = 250 cm, and BMI >60 kg/m^2 = 300 cm [17].

The main reason for this preference for measuring biliopancreatic limb length is the effects of biliopancreatic limb length on severe protein-calorie malnutrition, which requires revisional surgery after MGB [18]. Antecolic end-to-side gastroenterostomy anastomosis was performed with the help of staples. The anterior defect was closed manually with a 3/0 absorbable monofilament suture (Maxon, Covidien, USA) by using the double-continuous technique. At the end of the operation, the anastomosis was checked by administering methylene blue through the orogastric tube. In both LSG and MGB surgeries, leakage was routinely checked on the third postoperative day with the ingestion of methylene blue. Oral fluid intake was started in patients without anastomosis or stapler line leakage.

The patients without a complication were discharged on the third postoperative day. The patients' follow-up was done after one, three, and six months, and then once a year.

For the patients diagnosed with T2DM, the complete remission was defined as having plasma glucose level <126 mg/dL or HbA1c<6.5% of at least 1-year duration in the absence of insulin or glucose-lowering agent administration [13]. For the patients diagnosed with HT, the remission was defined as being normotensive without medication, and no remission was defined as being hypertensive or using medication for HT. For the patients diagnosed with OSAS, the remission was defined as not requiring a continuous positive airway pressure (CPAP), no remission was defined as a continued need for CPAP. The TWL was calculated with the following formula: TWL (%) = 100 x [weight loss / weight at baseline]. The EWL was calculated with the following formula: EWL (%) = 100 x [weight loss / baseline excess weight]. The ideal weight was identified using the standard Devine formula. The ideal body weight for men equaled 50 kg plus 2.3 kg/1 inches>5 ft. The ideal body weight for women equaled 45.5 kg plus 2.3 kg/1 inches>5 ft [19].

Statistical Analyses

Descriptive statistics were presented with mean and standard deviation or median and minimum-maximum values for continuous data and with frequency and percentage for categorical data. The normal distribution of continuous variables was evaluated with Kolmogorov-Smirnov and Shapiro-Wilk tests. The comparisons between the two groups were made with independent-samples *t*-test for the parametric data or with the Mann-Whitney U test for non-parametric data. The Wilcoxon test was used for the comparisons for non-parametric variables in the dependent groups. Chi-square test was used for the comparison of qualitative data. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed with SPSS version 20 (IBM Inc., Chicago, USA).

Results

There were 121 patients (42 male and 79 female) in the MGB group and 54 patients (22 male and 32 female) in the LSG group. The distribution of gender and ASA scores was similar in these groups (Table I). The mean age in the MGB group was significantly higher than that in the LSG group (p = 0.01). There was no significant difference in preoperative weight and BMI between the groups (p>0.05). The number of patients with T2DM and the average HbA1c level was significantly higher in the MGB group (p < 0.001), but there was no difference between the groups in terms of the number of patients with HT or OSAS (Table I). In addition, the average time since the initial diagnosis of T2DM for these patients was significantly longer in the MGB group

Table I - *Demographic characteristics and baseline health status of the patients.*

	MGB n=121 (%)	LSG n=54 (%)	p
Age, years, mean±SD	43.9±12.1	40.5±10.8	0.010*
Gender, M/F	42/79	22/32	0.444**
Weight, kg, mean±SD	116.9±16.1	119.4±15.0	0.293***
BMI, kg/m2, mean±SD	42.2±4.5	43.1±3.9	0.368***
HbA1c, %, mean±SD	8,07±1,84	7,06±1,63	<0.001***
Comorbidities, n (%)			
Type-2 diabetes mellitus	108 (89.3)	39 (72.2)	<0.001**
Hypertension	68 (56.2)	33 (61.1)	0.387**
OSAS	15 (12.3)	11 (20.3)	0.690**
ASA scores, n (%)			
ASA 1	18 (14.8)	10 (18.5)	
ASA 2	76 (62.8)	29 (53.7)	0.158**
ASA 3	27 (22.3)	15 (27.7)	

ASA: American Society of Anesthesiologists, BMI: body mass index, HbA1c: glycated hemoglobin, MGB: laparoscopic mini-gastric bypass, LSG: laparoscopic sleeve gastrectomy, OSAS: obstructive sleep apnea syndrome, SD: standard deviation
*Independent-samples t-test,
**Chi-square test
***Mann-Whitney U test

(8.56 years) than that in the LSG group (5.28 years) (p = 0.004).

No significant difference was found between the groups in terms of operating time, conversion to open surgery, postoperative ICU need, time to start oral intake, and postoperative complications (Table II). In the MGB group, 12 patients developed complications: 6 had postoperative bleeding (4.9%), 5 had anastomosis leakage (4.1%), 1 had diabetic ketoacidosis (0.8%). In the LSG group, 7 patients developed complications: 2 had postoperative bleeding (3.7%), 3 had staple line leakage (5.5%), 1 had diabetic ketoacidosis (1.8%), 1 had pleural effusion requiring intervention (1.8%). Of those who had postoperative bleeding, 1 patients in the MGB group and 1 patients in the LSG group needed reoperation. Of those who had leakage, 1 patient in the MGB group and 2 patients in the LSG group required endoscopic stenting; others were treated conservatively. The length of hospital stay was significantly shorter in the MGB group (p = 0.001). No deaths occurred within the first 30 days after the operations.

At the end of the first year after the operations, the mean BMI of the MGB group was significantly lower than that of the LSG group (p < 0.001). The mean TWL% was significantly higher in the LSG group (36.4% ± 9 vs. 30.5% ± 9, p = 0.003) while the mean EWL% was significantly higher in the MGB group (90.3% ± 13 vs. 79.2% ± 16, p < 0.001) (Table III). In the patients with T2DM, complete remission was observed in 94 patients (87%) in the MGB group and 32 patients (82%) in the LSG group (p = 0.382). In the patients with HT, complete remission was observed in 40 (58.8%) patients in the MGB group and 18 (54.5%) in the LSG group, with no significant difference between the groups (p = 0.552). In the patients with OSAS, complete remission was observed in 14 (93%) patients in the MGB group and 11 (100%) patients in the LSG group, with no significant difference between the groups (p = 0.382).

In terms of the lipid profiles of the two groups, a significant increase in HDL (p < 0.001) and a significant decrease in total cholesterol and triglyceride (p = 0.038 and p < 0.001, respectively) were found in the MGB group at the end of the first year. In the LSG group, a significant increase in HDL (p < 0.001) and a significant decrease in triglyceride (p = 0.008) were observed (Table V). No significant difference was found between the two groups in terms of the difference between preoperative and postoperative first-year lipid levels (p > 0.05) (Table IV).

In terms of late complications of these surgeries, 6 patients (4.9%) in the MGB group and 10 patients (18.5%) in the LSG group had symptoms of gastroesophageal reflux disease (GERD) (p = 0.008). One

Table II - *Perioperative characteristics of the patients.*

	MGB n=121 (%)	LSG n=54 (%)	p
Operating time, mins, mean±SD	53.2±22.8	55.4±21.9	0.158*
Conversion to open, n (%)	1 (0.8)	1 (1.8)	0.555**
Postoperative ICU need, n (%)	5 (4.1)	4 (7.4)	0.107**
Time to start oral intake, days, mean±SD	3.05±0.58	3.075±0.74	0.888*
Postoperative complications, n (%)	12 (9.9)	7 (12.9)	0.309**
Leakage	5 (4.1)	3 (5.5)	0.677*
Bleeding	6 (4.9)	2 (3.7)	0.713*
Length of hospital stay, days, mean±SD	3.73±1.19	4.05±1.20	0.001*

ICU: intensive-care unit, MGB: laparoscopic mini-gastric bypass, LSG: laparoscopic sleeve gastrectomy, SD: standard deviation
*Mann-Whitney U test
**Chi-square test

Table III - *Patients' body-weight status, resolution, and improvement of coexisting conditions at one year after the procedure.*

	MGB (n=121)	LSG (n=54)	p
BMI, kg/m^2, mean±SD	25.39±3.74	29.75±4.67	<0.001*
TWL, %, mean±SD	36.4±9	30.5±9	0.003*
EWL, %, mean±SD	90.3±13	79.2±16	<0.001*
Diabetes mellitus, n (%)	94 (87%)	32 (82%)	0.382**
Hypertension, n (%)	40 (58.8%)	18 (54.5%)	0.552**
OSAS, n (%)	14 (93%)	11 (100%)	0.382**

BMI: body mass index, EWL: excess weight loss, MGB: laparoscopic mini-gastric bypass, LSG: laparoscopic sleeve gastrectomy, OSAS: obstructive sleep apnea syndrome, SD: standard deviation, TWL: total weight loss
*Mann-Whitney U test
**Chi-square test

TABLE IV - *Comparison of changes in the lipid profile of the patients at one year after the procedure.*

Endpoint	Baseline	Year 1	p (baseline to year 1)*	p (between groups)**
HDL, mg/dL				
MGB, mean±SD	44.92±12.86	86.14±20.73	<0.001	0.487
LSG, mean±SD	47.2±14.32	83.40±20.56	<0.001	
LDL, mg/dL				
MGB, mean±SD	125.81±36.17	116.91±21.06	0.259	0.670
LSG, mean±SD	139.3±29.67	135.31±37.03	0.158	
Total cholesterol, mg/dL				
MGB, mean±SD	194.49±44.55	173.71±34.02	0.038	0.690
LSG, mean±SD	204.78±32.91	200.54±43.60	0.463	
Triglyceride, mg/dL				
MGB, mean±SD	219.90±170.32	117.4±54.26	<0.001	0.109
LSG, mean±SD	151.44±56.49	103.13±32.55	0.008	

HDL: high-density lipoprotein, LDL: low-density lipoprotein, MGB: laparoscopic mini-gastric bypass, LSG: laparoscopic sleeve gastrectomy, SD: standard deviation
*Wilcoxon test
**Mann-Whitney U test

patient in the MGB group had marginal ulcers. None of the patients developed anastomosis stricture or internal herniation and effective surgical methods [20]. The average operation times have been reported to be 52-147 and 44-112 minutes for MGB and LSG, respectively [21-23]. Meta-analyses have shown that there was no significant difference between the two procedures in terms of operation time [2].

Discussion

Although the popularity of LSG in metabolic surgery has been growing, MGB is another procedure that has attracted the attention of surgeons in recent years as well. Meta-analyses indicate that both MGB and LSG are well-tolerated, useful [20]. However, Plamper et al. found significantly shorter operating times in MGB compared to LSG [17]. In our study, the operation times were 53.2 min for MGB and 55.4 min for LSG, respectively, with no significant difference between them.

Leakage and bleeding are the most common early complications of bariatric surgery due to long staple lines and gastrointestinal anastomosis. In the literature the bleeding rates of LSG and MGB were 6% and 28%, while leakage rates were reported as 5% and 5.8% respectively [24-26]. Wang et al. reported no difference between the two procedures in terms of overall early complications but the leakage rate was significantly lower in the MGB procedure [2]. In contrast, another meta-analysis showed no difference between the two techniques in terms of the postoperative complications in the early period [20]. In our study the bleeding rate in both groups was lower than reported in the literature, while the leakage rate was similar to other studies.

Parmar et al. reported an average length of hospital stay of 2 days for the MGB procedure while Guo et al. reported it to be 7.1 days [27,28]. Plamper et al. reported that the length of hospital stay was significantly shorter for the patients undergoing MGB than those undergoing LSG [17]. Similarly, a meta-analysis study has found MGB to be superior to LSG in terms of the length of hospital stay [2]. Likewise, our study also found a significantly shorter hospital stay in the MGB group ($p = 0.001$).

While some authors have reported that MGB is more effective than LSG in terms of weight loss in the long term [22,29], others have found the outcomes of these procedures to be similar in one year follow-ups [23,30]. One-year EWL% has been reported to vary between 38.2% and 66.2% in the MGB procedure and between 34.3% and 80.9% in the LSG procedure [17,23,31,32]. In a meta-analysis by Quan et al., it was concluded that there was no difference between MGB and LSG in terms of EWL% [33]. In contrast, Wang et al. reported that one-year EWL% was higher in the MGB group [2]. In our study, EWL% was found to be significantly higher in the MGB group than that in the LSG group.

The most common comorbidities associated with morbid obesity are T2DM, HT, OSAS, dyslipidemia, and osteoarthritis [28,29]. Weight loss is directly related to the remission of T2DM and dyslipidemia. Several studies have shown that the rates of remission for T2DM, HT, OSAS, and dyslipidemia were 86%, 75%, 93%, and 62% after MGB and 65%, 60%, 76%, and 54% after LSG, respectively; and that the MGB procedure was superior to LSG in terms of the remission of comorbidities [2,23,33]. The most likely reason for the superiority of MBG is that it leads to fat malabsorption as well as its having partial restrictive effects. In contrast, Kansou et al. found no significant difference between MGB and LSG regarding the remission rates of comorbidities oth-

er than osteoarthritis [31]. Our study found that the remission rates for T2DM, HT, and OSAS were similar in both groups ($p > 0.05$). In addition, although there was a significant increase in HDL and a significant decrease in triglyceride in both groups in the first postoperative year, we did not find a significant difference between the two procedures in terms of the remission of dyslipidemia ($p > 0.05$).

Gastroesophageal reflux disease (GERD) is one of the severe problems encountered after bariatric surgery in the long term. While some of the studies focusing on the relationship between LSG and reflux have reported that the disruption of His angle and the dissection of the gastrophrenic ligament increase the incidence of GERD, others have indicated that the reflux decreases with the decrease in the abdominal pressure due to weight loss. Although there is no consensus on the relationship between LSG and reflux, the rate of reflux has been shown to be higher in LSG than in MGB [34]. For this reason, some authors argue that LSG should not be preferred as the primary choice of operation in the patients with preoperative hiatal hernia or lower esophageal sphincter dysfunction [29,35]. Some studies have shown that GERD-related symptoms were below 1% in MGB [14,36]. Several studies reported that MGB is superior to LSG regarding GERD incidence, similar to our study [20,23].

The learning curve for the MGB operation was calculated to be approximately 30 cases, which was found to be less than that for RYGB (>75 cases) [37]. The operating time and the length of hospital stay can be related to the operating surgeons' experience. Considering that all the surgeries in our study have been performed by two bariatric surgeons who completed their training, it is possible to say that the MGB procedure is as easy as the LSG procedure and that gastrointestinal anastomosis does not extend the hospitalization period.

Reporting the 2-year follow-up data for their LSG procedures, Disse et al. observed an enlargement of the remaining stomach pouch in 50% of the patients [38]. Braghetto et al. reported that 15.7% of patients had subsequent weight gain at 5-year follow-ups [10]. Alternative additional procedures such as gastric bypass can be applied to the patients who gain excessive weight [10,30]. The management of the inaccessible gastric remnant of the MGB procedure in terms of early and late complications poses a significant problem. It is a disadvantage that hemorrhages in the gastric remnant in the early period are not accessible in an endoscopic intervention and go clinically unnoticed and that a large volume of gastric remnant cannot be monitored for malignancy in the long-term [39]. The patients in our study did not develop any complications related to the gastric remnant.

Conclusions

Our study indicated that both LSG and MGB are effective, reliable, and useful methods in metabolic surgery. The MGB procedure is superior to LSG, with the additional benefits of a shorter length of hospital stay, a higher EWL%, TWL %, and a lower rate of GERD symptoms. There is a need for clinical studies with longer-term follow-ups involving more patients.

Riassunto

Obiettivo: È stato evidenziato da numerosi studi clinici che la gastrectomia laparoscopica verticale (LSG - laparoscopic sleeve gastrectomy) e il mini bypass gastrico (MBG), due attuali metodi della chirurgia metabolica, possono essere alternative al bypass gastrico Roux-en-Y. La sicurezza ed efficacia del mini bypass gastrico rispetto alla gastrectomia laparoscopica verticale rimangono incerte. In questo studio, abbiamo comparato gli esiti post-operatori delle procedure di MGB e LSG effettuate in chirurgia bariatrica.

Materiali e Metodi: È stato preso in esame a posteriori un totale di 175 pazienti sottoposti a intervento chirurgico di MGB e LSG tra il 2016 e il 2018 presso un centro di chirurgia metabolica. Le due tecniche chirurgiche sono state messe a confronto in relazione agli esiti perioperatori e post-operatori nel breve e nel lungo periodo.

Risultati: 121 pazienti rientrano nel gruppo MGB e 54 nel gruppo LSG. Non si sono riscontrate differenze significative tra i due gruppi in merito a tempi operatori, conversione a chirurgia invasiva e complicanze post-operatorie nel breve periodo ($p>0.05$) La durata della degenza ospedaliera è stata significativamente più breve nel gruppo MGB ($p:0.001$). La perdita di peso in eccesso (EWL%) e la perdita totale di peso (TWL%) sono risultate essere significativamente più alte nel gruppo MGB (rispettivamente 90.3 vs. 79.2 e 36.4 vs 30.5) Non è stata riscontrata differenza significativa tra i due gruppi in termini di tasso di remissione delle comorbilità. I sintomi di reflusso gastroesofageo si sono manifestati in misura significativamente minore nei pazienti del gruppo MGB (6 pazienti 4.9% vs. 10 pazienti 18.5%).

Conclusione: Sia LSG che MGB sono tecniche efficaci, affidabili e utili nella chirurgia metabolica. La procedura di MGB è migliore rispetto alla procedura LSG in termini di durata della degenza ospedaliera, percentuale di EWL, percentuale di TWL e sintomi di reflusso gastroesofageo.

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