Comparison between effectiveness of mini gastric bypass and sleeve gastrectomy in weight reduction in super obese patients

Mohamed S. Abouelela, Farouk A. Mourad, Hisham A. Reyad

Department of General Surgery, Faculty of Medicine, Assiut University, Assiut, Egypt

Correspondence to Mohamed Shaker Abouelela, MD, Department of General Surgery, Faculty of Medicine, Assiut University, 56665, Egypt. Mob: 01006904446; e-mail: shakersurg82@yahoo.com

Received: 28 November 2019
Accepted: 25 December 2019
Published: 27 April 2020

The Egyptian Journal of Surgery 2020, 39:338–343

Background
Morbid obesity is defined as BMI more than 40 kg/m^2, and those individuals with BMI more than 55 kg/m^2 are classified as super obese patients. Super obese patients have been associated with higher morbidity and mortality and increased surgical risk. The optimal surgical management of these patients is controversial. The current work was designed to compare laparoscopic mini gastric bypass (MGB) and sleeve gastrectomy (SG) in super obese patients.

Patients and methods
This study included 50 super obese patients who were randomly divided into two groups: group 1 included 25 patients treated by laparoscopic MGB, and group 2 included 25 patients treated by laparoscopic sleeve gastrectomy (LSG).

Results
The mean age of MGB group was 44.87±10.34 years, with a range between 34 and 58 years, whereas it was 45.11±9.09 years in case of SG group, with a range between 27 and 55 years. Most patients in both groups were females (60% in the case of MGB group and 68% in case of SG group). Mean percent of excess weight loss after 1 year was insignificantly higher in MGB group (79.76±5.78) in comparison with the SG group (76.11±5.22; P=0.06), whereas BMI after 1 year was insignificantly lower in MGB group (35.12±3.89) in comparison with the SG group (36.22±4.87; P=0.32).

Conclusion
Bariatric surgeries (LSG and MGB) are effective procedures for weight reduction, with insignificant differences between both, but the study suggests that MGB has a better and earlier effect than LSG.

Keywords:
laparoscopic mini gastric bypass, laparoscopic sleeve gastrectomy, super obese patients, type 2 diabetes mellitus

Egyptian J Surgery 39:338–343

1110-1121

Introduction

Obesity is considered the epidemic of the current century and is one of the major public health-related problems owing to genetic, social, or cultural factors [1]. According to the WHO global estimates, in 2014, 39% of adults were overweight and 13% were obese [2].

In the USA, the obesity epidemic has reached record numbers, with greater than 30% of the adult population being obese, and twice that number experiencing overweight or obesity. With these alarming percentages, the management of obesity has become a public health priority, and many options for weight loss are available for this population. Surgical intervention is the most reliable and popular way to treat morbidly obese patients struggling with conservative treatments such as diet and exercise [3].

Bariatric surgery is now considered the most effective way to manage obese and related complications, where Roux-en-Y gastric bypass and sleeve gastrectomy (SG) are the most popular forms [4].

Worldwide, SG is one of the most popular procedures (37%). It is considered as a technically less complex procedure with a short learning curve and effective weight reduction. High risk of weight regains and gastroesophageal reflux disease (GERD) are the main disadvantages of SG [5].

Mini gastric bypass (MGB), also known as single anastomosis gastric bypass or omega gastric bypass, is a new procedure introduced by Rutledge [6]. Owing to high safety margin and its simplicity in addition to its efficacy, MGB has rapidly become one of the most popular procedures in many centers. Gastric and esophageal bile reflux, marginal ulcer, poor follow-up, and remnant gastric cancer are its limitations [7,8].

Morbid obesity is defined with BMI more than 40 kg/m^2, and those individuals with BMI more than 55 kg/m^2 are classified as super obese patients [3]. Super obese patients have been associated with higher morbidity and mortality and increased surgical risk. The optimal surgical management of these patients is controversial. This work was designed to compare laparoscopic MGB and SG in super obese patients.

Patients and methods

The study was conducted prospectively after approval from the Ethical Committee of Faculty of Medicine in the period between 2016 and 2018 at the Department of General Surgery in Assiut University Hospitals. From our database, we identified 50 patients who underwent either a MGB procedure (MGB-group, 25 patients) or SG (SG-group, 25 patients). Patients with redo operations, patients with age above 60 years or less than 18 years, and patients with endocrinal or psychological disorders were excluded from the study.

Both groups were compared for age, sex, preoperative weight/BMI, and comorbidities (i.e. hypertension, coronary heart disease, sleep apnea, type 2 diabetes and dyslipidemia), as well as operative time and duration of stay. Informed consent was obtained from each patient.

Preoperative assessment

Patients were assessed by the bariatric surgery team to determine eligibility. Cardiologists, pulmonologists, and endocrinologists were involved if patients presented with any pertinent risk factors. The type of bariatric procedure was determined by the patient's BMI, presurgical comorbidities, past surgical history, and patient preferences with guidance from the surgeon.

The following investigations were done: complete blood picture, internal randomized ratio, kidney functions test, serum electrolytes as calcium, sodium and potassium, chest radiography, and abdominal ultrasonography. Other investigations may be needed, such as pulmonary function tests and upper endoscopy.

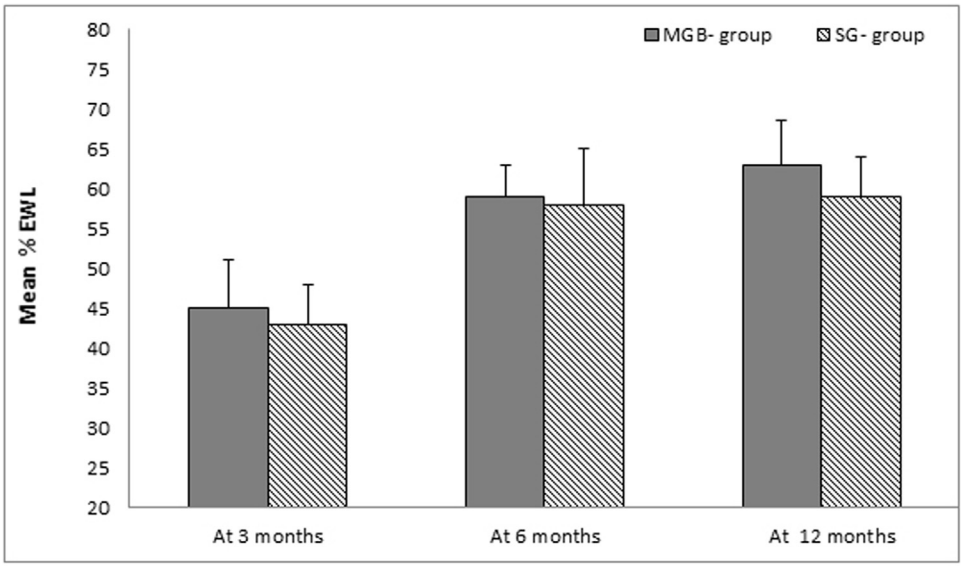
Surgery

Both procedures (either SG or MGB) were performed laparoscopically under general anesthesia. For SG, the gastric greater curve was mobilized at 6 cm proximal to the pylorus till the angle of His, with importance according to the total exposure of the left crural pillar. Gastric resection was done using generally five to seven vertical 60 mm staple cartridges over a 36-French bougie.

For MGB, creation of the gastric tube was done from the angle of the lesser curvature to the left crural pillar using generally four to five vertical 60 mm staple cartridges over a 36-French bougie 160–200 cm downstream the angle of Treitz; an antecolic gastrojejunostomy is performed using a posterior 45 mm linear stapler (Figs 1, 2).

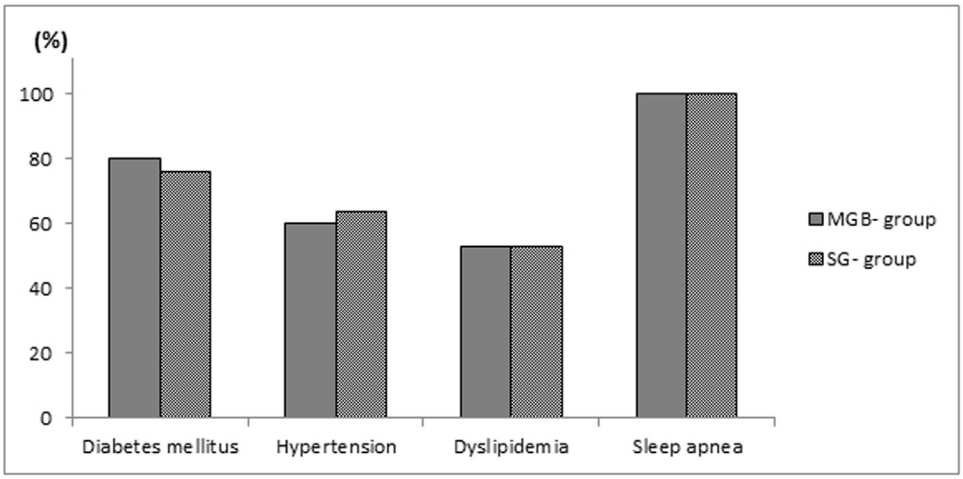
For both procedures, methylene blue through a nasogastric tube was used to confirm the absence

Figure 1



Percentage of excess weight loss in both studied groups.

Figure 2



Remission rate of comorbidities in the current study.

Table 1 Baseline data of the studied patients

Variables	MGB group (*n*=25)	SG group (*n*=25)	*P* value
Age (years)	44.87±10.34	45.11±9.09	0.87
Range	34–58	27–55	
Sex			0.44
Male	10 (40)	8 (32)	
Female	15 (60)	17 (68)	
Smoking	5 (20)	6 (24)	0.23
BMI (kg/m^2)	65.12±5.89	67.12±3.95	0.67
Range	58–73.23	59.45–72.46	
Comorbidities			
Diabetes mellitus	12 (48)	14 (56)	0.65
Hypertension	17 (68)	15 (60)	0.90
Dyslipidemia	17 (68)	15 (60)	0.90
Coronary heart disease	5 (20)	6 (24)	0.11
Sleep apnea	18 (72)	16 (64)	0.45

Data are expressed as mean (SD) and frequency (percentage). MGB, mini gastric bypass; SG, sleeve gastrectomy. *P* value was significant if <0.05.

of a leak. Postoperatively, patients were allowed to drink if no complications were observed. Patients' evaluation for early postoperative complications was done for bleeding, early leak, or persistent nausea and vomiting.

Follow-up program

Patients were evaluated every 2 weeks at the first month, monthly for 6 months, and then every 6 months.

Statistical analysis

Data were analyzed using IBM SPSS version 20.0 (SPSS Inc., Chicago, Illinois, USA). Numerical data were expressed as mean±SD or median and range as appropriate. Qualitative data were expressed as frequency and percentage and were compared by χ^2-test, where quantitative data were expressed as mean ±SD and compared with Student's *t*-test. The level of confidence was kept at 95%, and hence, *P* value was significant if less than 0.05.

Results

Table 1 shows that both groups had insignificant differences regarding baseline data. Most patients in both groups were females (60% in the case of MGB group and 68% in the case of SG group). Mean BMI in MGB group was 65.12±5.89 kg/m^2 with a range between 58 and 73.23 kg/m^2, whereas in the case of SG group, the mean BMI was 67.12±3.95 kg/m^2 with a range between 59.45 and 72.46 kg/m^2. The most frequent comorbidities in both groups were sleep apnea followed by hypertension and dyslipidemia. Other data are summarized in Table 1.

Table 2 shows that SG group had significantly lower operative time in comparison with MGB group (82.89

Table 2 Operative time, hospital stay, and postoperative complications

Variables	MGB group (*n*=25)	SG group (*n*=25)	*P* value
Operative time (min)	82.89±22.89	69.11±15.89	0.03
Hospital stay (days)	1.56±0.50	1.87±0.50	0.76
Complications			0.06
Hemorrhage	1 (4)	2 (8)	
Incarcerated incisional hernia	1 (4)	0	
Total	2 (8)	2 (8)	

Data are expressed as mean (SD) and frequency (percentage). MGB, mini gastric bypass; SG, sleeve gastrectomy. *P* value was significant if <0.05.

Table 3 Percentage excess weight loss in both groups

Variables	MGB group (*n*=25)	SG group (*n*=25)	*P* value
%EWL after			
3 months	45.63±6.26	43.64±5.02	0.06
6 months	59.11±3.87	58.11±7.87	0.45
12 months	79.76±5.78	76.11±5.22	0.06
BMI after (kg/m^2)			
3 months	43.12±2.33	44.76±6.78	0.09
6 months	39.88±5.78	39.05±2.98	0.11
12 months	35.12±3.89	36.22±4.87	0.32

Data are expressed as mean (SD). %EWL, percent of excess weight loss; MGB, mini gastric bypass; SG, sleeve gastrectomy. *P* value was significant if <0.05.

Table 4 Remission rate of comorbidities in the both groups

Variables	MGB group (*n*=25)	SG group (*n*=25)	*P* value
Diabetes mellitus	20 (80)	19 (76)	0.07
Hypertension	15 (60)	16 (64)	0.90
Dyslipidemia	13 (52)	13 (52)	0.63
Sleep apnea	25 (100)	25 (100)	0.63

Data are expressed as frequency (percentage). MGB, mini gastric bypass; SG, sleeve gastrectomy. *P* value was significant if < 0.05.

±22.89 vs 60.11±15.89 min, respectively; *P*=0.03), whereas hospital stay was insignificantly higher in SG group (1.56±0.50 vs 1.87±0.50 days; *P*=0.76). Only two patients in each group had postoperative complications. Two patients of SG groups developed hemorrhage, which was controlled, whereas hemorrhage and incarcerated incisional hernia occurred in one patient each from the MGB group.

Table 3 shows that mean percent of excess weight loss (% EWL) after 1 year was insignificantly higher in MGB-group (79.76±5.78) in comparison with the SG group (76.11±5.22; *P*=0.06), whereas BMI after 1 year was insignificantly lower in MGB-group (35.12±3.89) in comparison with the SG group (36.22±4.87; *P*=0.32).

Table 4 shows the remission rate of different comorbidities in this study. Remission of diabetes mellitus, hypertension, dyslipidemia, and sleep apnea occurred in 20 (80%), 15 (60%), 13 (52%), and 25 (100%) patients, respectively, in case of MGB group and occurred in 19 (76%), 16 (64%), 13 (52%), and 25 (100%) patients, respectively, in case of SG group.

Discussion

Obesity is a complicated state that arises as a result of genetic, cultural, social, and dietary factors. In the USA, the obesity epidemic has reached record numbers, with greater than 30% of the adult population being obese, and twice that number experiencing overweight [1].

With these obvious percentages, treatment of obesity has become a public health priority, and many procedures are available for weight loss. The most reliable and popular way to treat morbidly obese patients is surgical intervention, if the patients have been shown to be struggling with conservative treatments such as diet and exercise [9].

Among the population of morbidly obese adult patients (BMI >40 kg/m^2), super obese (BMI ≥55 kg/m^2) patients present particular challenges for bariatric surgeons, and more common technical difficulties related to the size of super obese patients are that surgical navigation is more complex [3].

Moreover, the thicker layers of the abdominal wall and intra-abdominal fat, longer distance between the xiphoid and the esophagus, and massive hepatomegaly are some of the surgical hindrances associated with this patient population. Surgical treatment of super obese patients has also been associated with higher surgical morbidity and mortality and increased surgical risk [10].

In addition, the higher BMI at the time of surgery has been linked with higher incidence of major surgical complications for certain bariatric procedures, as well as longer length of hospitalization, increasing rates of 30-day re-admission, and rising treatment costs. Initial surgical management options for these patients include the well-established and widely accepted MGB surgery

as well as SG, a procedure that has gained recent popularity owing to its simplicity and favorable complication profile [11].

This work was performed to compare between laparoscopic MGB and SG in super obese patients. In our study, we found an insignificantly better weight loss with MGB 1 year after the operation. Furthermore, perioperative results regarding morbidity and mortality operation time and hospital stay also clearly insignificantly favor MGB over SG in super obese patients.

These findings were in accordance with review studies demonstrating MGB as a safe and efficient procedure. Several centers have shown sustainable mid-term and long-term results regarding weight loss and improvement of comorbidities [12].

There are also comparative studies reporting that MGB had better EWL and resolution of metabolic syndrome after a mean follow-up of 5.6 years. A matched-pairs study from France also showed better weight loss following MGB 1 year after the operation. So far, only one randomized trial has been conducted demonstrating better perioperative outcomes for MGB and early postoperative results [13].

Kular *et al*. [14] found that EWL to be superior in MGB over SG after 5 years. Their results regarding both early and late complications confirm our findings favoring MGB and point out a higher revision rate for SG owing to weight loss problems and GERD.

Inconsistent with Eisenberg *et al*. [9], the mean percent EWL in patients receiving SG was insignificant in both groups. Moreover, they reported that %EWL for the 12-month time point is similar to the %EWL reported in other studies. At a 6-month follow-up, the SG group experienced a 31.8%EWL and the MGB group had a 29.2%EWL, with no significant differences between groups. At 12 months, both the SG group and the RYGB group continued to experience a reduction in their %EWL.

Moreover, there were no significant differences in complications between groups. Overall, results from our study revealed that both procedures are effective single-standing measures for short-term obesity management (<36 months) in super obese patients, where the frequency of postoperative complications in our work was similar in both groups (8%).

Although several reports suggest that rates of perioperative morbidity and mortality might be higher in older patients, the improvement in intraoperative surgical management and the optimization of perioperative care have led to excellent results in bariatric elderly patients. Even if older patients have more preoperative and postoperative comorbidities and lose less weight than younger patients, weight loss and improvement in comorbidities are clinically significant [15].

Often the complication rate is in fact low and related to underlying diseases and not to the operative technique or procedure itself. 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 [1].

Willkomm *et al*. [16] found an apparently higher operative risk profile in those over age 65 years with higher rates of sleep apnea, diabetes, and hypertension. However, the operative outcomes were similar in the two groups in terms of operative time, and 30-day readmission rates. The authors concluded that patients older than 65 years had excellent outcomes compared with younger patients, suggesting that older age is not a risk factor for complications or death with bariatric surgery.

This work showed a remission rate of different comorbidities. Silecchia *et al*. [17] comparing two groups of patients who underwent LAGB demonstrated no significant differences in terms of postoperative morbidity and comorbidity resolution between patients younger and older than 55 years.

Most recently, Magouliotis *et al*. [18] performed a simple meta-analysis of MGB vs SG, wherein 10 English studies were included, and most results reported better outcomes with MGB (1-year EWL %, remission rate of type 2 diabetes mellitus, remission rate of hypertension, bleed rate, anemia rate, GERD rate, hospital stay, operation time, and revision rate).

Conclusion

After prospectively comparing the two procedures for a year, almost both procedures have the near the same effect on loss of weight and resolving or better control on co-morbidities such as diabetes mellitus and hypertension, but %EWL was insignificantly higher in case of MGB.

Financial support and sponsorship
Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Orlando G, Gervasi R, Luppino IM, Vitale M, Amato B, Silecchia G, *et al.* The role of a multidisciplinary approach in the choice of the best surgery approach in a super-super-obesity case. Int J Surg 2014; 12: S103–S106.

2 Carbajo MA, Jiménez JM, Luque-de-León E, Cao M-J, López M, García S, *et al.* Evaluation of weight loss indicators and laparoscopic one-anastomosis gastric bypass outcomes. Sci Rep 2018; 8:1961.

3 Zerrweck C, Sepúlveda EM, Maydón HG, Campos F, Spaventa AG, Pratti V, *et al.* Laparoscopic gastric bypass vs. sleeve gastrectomy in the super obese patient: early outcomes of an observational study. Obes Surg 2014; 24:712–717.

4 Maggard MA, Shugarman LR, Suttorp M, Maglione M, Sugerman HJ, Livingston EH, *et al.* Meta-analysis: surgical treatment of obesity. Ann Int Med 2005; 142:547–559.

5 Jammu GS, Sharma R. A 7-year clinical audit of 1107 cases comparing sleeve gastrectomy, Roux-En-Y gastric bypass, and mini-gastric bypass, to determine an effective and safe bariatric and metabolic procedure. Obes Surg 2016; 26:926–932.

6 Rutledge R. The mini-gastric bypass: experience with the first 1,274 cases. Obes Surgery 2001; 11:276–280.

7 Musella M, Apers J, Rheinwalt K, Ribeiro R, Manno E, Greco F, *et al.* Efficacy of bariatric surgery in type 2 diabetes mellitus remission: the role of mini gastric bypass/one anastomosis gastric bypass and sleeve gastrectomy at 1 year of follow-up. A European survey. Obes Surg 2016; 26:933–940.

8 Mahawar KK, Carr WR, Balupuri S, Small PK. Controversy surrounding 'mini' gastric bypass. Obes Surg 2014; 24:324–333.

9 Eisenberg D, Bellatorre A, Bellatorre N. Sleeve gastrectomy as a stand-alone bariatric operation for severe, morbid, and super obesity. J Soc Laparoendoscop Surg 2013; 17:63.

10 Schwartz A, Etchechoury L, Collet D. Outcome after laparoscopic gastric bypass for super-super obese patients. J Visceral Surg 2013; 150:145–149.

11 Regan J, Inabnet W, Gagner M, Pomp A. Early experience with two-stage laparoscopic Roux-en-Y gastric bypass as an alternative in the super-super obese patient. Obes Surg 2003;13:861–864.

12 Peraglie C. Laparoscopic mini-gastric bypass in patients age 60 and older. Surg Endosc 2016; 30:38–43.

13 Lee W-J., Pok E-H., Almulaifi A, Tsou JJ, Ser K-H., Lee Y-C. Medium-term results of laparoscopic sleeve gastrectomy: a matched comparison with gastric bypass. Obes Surg 2015; 25:1431–1438.

14 Kular K, Manchanda N, Rutledge R. Analysis of the five-year outcomes of sleeve gastrectomy and mini gastric bypass: a report from the Indian subcontinent. Obes Surg 2014; 24:1724–1728.

15 Sugerman HJ. Effects of increased intra-abdominal pressure in severe obesity. Surg Clin 2001; 81:1063–1075.

16 Willkomm CM, Fisher TL, Barnes GS, Kennedy CI, Kuhn JA. Surgical weight loss >65 years old: is it worth the risk? Surg Obes Related Dis 2010; 6:491–496.

17 Silecchia G, Greco F, Bacci V, Boru C, Pecchia A, Casella G, *et al.* Results after laparoscopic adjustable gastric banding in patients over 55 years of age. Obes Surg 2005; 15:351–356.

18 Magouliotis DE, Tasiopoulou VS, Svokos AA, Svokos KA, Sioka E, Zacharoulis D. One-anastomosis gastric bypass versus sleeve gastrectomy for morbid obesity: a systematic review and meta-analysis. Obes Surg 2017; 27:2479–2487.