Research Article

Laparoscopic sleeve gastrectomy versus laparoscopic mini-gastric bypass in obesity

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Abstract

Background: Laparoscopic mini-gastric bypass (MGBP) is gaining popularity among the bariatric procedures today, and laparoscopic sleeve gastrectomy (SG) as a single-stage procedure for the treatment of morbid obesity is becoming increasingly popular. **Patients and methods:** Between October 2014 and July 2018, 100 obese patients were randomized, operated upon, and followed up for 24 months in Al Minia University Hospital. A total of 50 patients underwent SG, and 50 patients underwent MGBP. The mean BMI of all patients was 47.8 ± 5.5 kg/m2, their mean age was 30 ± 8.3 years, and 80% of them were female. Patients were followed up at 1, 3, 6, 9, 12, 15, 18, 21 and 24 months. **Results:** Age, sex, BMI, and comorbidities were equal. The mean operative time for SG was 86.9 ± 51.6 min and that for MGBP was 108.4 ± 41.8 min; the percentage of 1-year excess weight loss was similar (76.2 ± 4.49% for SG and 80.3 ± 8.3% for MGBP). The comorbidities were significantly improved after both procedures, except for type 2 diabetes mellitus, which showed a higher resolution rate after MGBP. **Conclusion:** Laparoscopic SG regarding excess weight loss is comparable to laparoscopic MGBP in short-term follow-up (2 year) with less metabolic effect. Further long-term studies are needed.

Keywords: comorbidities, diabetes mellitus, mini-gastric bypass,

Introduction

Obesity is a major health burden worldwide, and although it was considered a disease of the western world, it seems to have expanded to the developing world[1]. Significant obstructive sleep apnea (OSA) is present in 40% of obese persons and venous thromboembolism in 12%[2]. More than 70% of patients with sleep apnea present with obesity[3]. Conservative measures, such as dieting and physical exercise, have proven inadequate[4]. Depending on the type of operation, gastrointestinal surgery is also very effective in the resolution of diabetes[5]. Traditionally, the primary mechanisms through which bariatric surgery achieves its outcomes are believed to be the mechanical restriction of food intake, reduction in the absorption of ingested foods, or a combination of both [6]. Furthermore, little is known regarding the effect of the various surgical procedures on glycemic control and T2DM remission[7]. SG was first described in 1999 as part of the biliopancreatic diversion duodenal switch procedure. Subsequently, LSG has been performed as a standalone procedure [8]. Although these procedures have proven to be good therapeutic options for some patients such as gastric leaks,which pose a particularly difficult challenge when they occur near the angle of His, potentially generating severe clinical conditions that require reoperation, and may even cause death [9]. Mini-gastric bypass (MGBP), first reported by Rutledge, was proposed as a simple and effective treatment of morbid obesity. MGBP is a modification of the Mason's loop gastric bypass, with weight loss results similar to laparoscopic Roux-en-Y gastric bypass (LRYGB) [10], which was the most favored bariatric procedure in America. [11]. However, controversies about the relative safety of this procedure remain, mainly the incidence of marginal ulcer and reflux esophagitis [12].

Patients and methods

It was done from October 2015 to July 2018. All patients were evaluated preoperatively (full examination, obesity and its comorbidities).

Patients were chosen and divided randomly into two groups in accordance to their admission to the study: the first group underwent LSG, whereas the second group underwent laparoscopic MGBP. All patients were evaluated regarding operative time, postoperative recovery, complications, resolution of comorbidities, and percent excess weight loss (%EWL). Results were recorded intraoperatively, early postoperatively, and at 1‑month, 3‑month, 6‑month, 9 month, 12 month, 15 month, 18 month, 21 month, and 24 month intervals. Written informed consent was obtained from all the patients to be included in this study.

Statistical analysis

Data were collected in tables and then analyzed with respect to χ^2 and *P* value. Data were fed to the computer and analyzed using IBM SPSS software package version 20.0 (IBM Corp., Armonk, New York, USA). *P* values less than 0.05 were considered significant.

Results

MGB. Overall, three patients with T2DM had complete and three had partial resolution in SG, whereas nine patients had complete and two partial resolution in MGB; three patients had complete and two partial resolution regarding hypertension in SG and five complete and three partial resolution in MGB; dyslipidemia remission was seen in four patients and improved in two patients in SG and seven patients had remission and one improved in MGB. There was resolution of osteoarthritis, OSA, and polycystic ovary in all patients in both groups. Bleeding was seen in three cases in SG, where two of them were managed conservatively and one needed exploration, and only one case in MGB, which was managed conservative. Wound infection was recorded in one case in SG and in two cases in MGB. Postoperative nausea and vomiting was seen in five cases in SG and in two cases in MGB; all were managed with antiemetics. Moreover, four cases had port site hernia in SG and two in MGB. Symptomatic cholelithiasis was obvious in both groups; in SG, eleven patients were managed conservative and three patients needed surgery, whereas in MGB, six patients were managed conservatively and one needed surgery.

Table (1): Comparison between the two groups according to operative time and postoperative recovery (days)

Operative time and postoperative recovery (days)	Sleeve gastrostomy (*n*=25)	Mini‑gastric bypass (*n*=25)	*t*	*P*
Operative time (min)				
Minimum‑maximum	39.0‑95.0	55.0‑93.0	1.479	0.146
Mean±SD	68.0±12.56	73.0±11.32		
Begin oral liquids (days)				
Minimum‑maximum	0.5‑2.6	0.5‑2.5	1.111	0.272
Mean±SD	1.23±0.59	1.0±0.85		
Duration of analgesic (days)				
Minimum‑maximum	3.0‑10.0	3.0‑9.0	0.602	0.550
Mean±SD	5.67±2.53	5.27±2.15		
Hospital stay (days)				
Minimum‑maximum	2.0‑6.0	3.0‑7.0	3.777*	<0.001*
Mean±SD	2.27±0.46	3.0±0.85		
Return to daily activities (days)				
Minimum‑maximum	4.0‑12.0	5.0‑9.0	3.500*	<0.001*
Mean±SD	4.07±1.44	5.87±2.13		
Return to work (days)				
Minimum‑maximum	10.0‑16.0	11.0‑18.0	0.852	0.398
Mean±SD	11.53±1.68	13.07±8.88		

P, *P* value for comparing between the two groups. *$P \leq 0.05$, statistically significant.

Table (2): Comparison between the two groups according to percent excess weight loss

Percent excess weight loss	Sleeve gastrostomy (*n*=25)	Mini-gastric bypass (*n*=25)	*t*	*P*
1 month				
Minimum-maximum	23.9644.5	12.5-28.6	6.460*	<0.001*
Mean±SD	32.05±5.96	22.13±4.84		
3 months				
Minimum-maximum	33.5-66.7	24.0-48.8	6.845*	<0.001*
Mean±SD	54.05±8.2	39.75±6.47		
6 months				
Minimum-maximum	51.5-80.5	32.8-70.8	2.073	0.054
Mean±SD	67.6±6.45	63.32±8.06		
12 months				
Minimum-maximum	66.7-87.0	45.6-87.8	2.070	0.054
Mean±SD	76.22±4.49	80.31±8.8		

P, *P* value for comparing between the two groups. *$P \leq 0.05$, statistically significant.

Discussion

A systematic analysis with pooled data from 19 prospective studies adjusted for age, study, physical activity, alcohol consumption, education, and marital status, over 160 000 deaths, showed that overall for men and women combined, for every five unit increase in BMI, a 31% increase in risk of death was observed [13-14].

There is strong published evidence that bariatric surgery is the only effective means to sustain long-term weight loss, and this weight loss is also associated with the resolution of obesity-related comorbid conditions, which increase the risk of mortality associated with obesity [15]. In our study, there were 19(38%) patients with T2DM 8 in SG and 11 in MGB, 14(28%) patients with hypertension six in SG and eight in MGB, and 14(28%) patients with dyslipidemia, with six in SG and eight in MGB.

Plamper et al.,[16] described in their study comparing SG with MGBP that both groups were comparable for age, preoperative weight, and BMI as well as the distribution of the associated comorbidities.

In our study, there were 19(38%) patients with T2DM, eight in SG and 11 in MGB; 14(28%) patients with hypertension, six in SG and eight in MGB; 14(28%) patients with dyslipidemia, six in SG and eight in MGB; seven (28%) patients with OSA, three in SG and four in MGB; 13(52%) patients with osteoarthritis, seven in SG and six in MGB; three (12%) patients with PCO, one in SG and two in MGB.

Weight loss is reported in many different ways. Sczepaniak et al., evaluated the weight loss has been reported as absolute weight loss, percentage of total weight loss, %EWL, percentage of excess BMI loss, and percentage of patients with successful weight loss [17].

Boza et al.,[18] have reported excellent results of 1000 consecutive LSG procedures with a mean EWL of 84.5% at 3-year follow-up and with minimal weight regain after the first postoperative year. In our study, mean % EWL was 32.05% at 1 month, 45.05% at 3 months, 67.6% at 6 months, and 76.22% at 12 months in SG and was 22.13% at 1 month, 39.75% at 3 months, 63.32% at 6 months, and 80.31% at 12 months in MGB.

Laparoscopic MGBP in morbidly obese patients with T2DM has been proved to be effective in prospective randomized controlled trials[19], and in extensive reports in the literature[20], Lee et al.,[21] have suggested that the efficacy of T2DM remission was similar regardless of BMI, and they recommend that more free use of gastric bypass should be considered in Asian patients with T2DM. We

found three patients with T2DM had complete and three had partial resolution in SG whereas nine had complete and two had partial resolution in MGB; three patients had complete and two had partial resolution in hypertension in SG, whereas five had complete and three had partial resolution in MGB; dyslipidemia remission was seen in four patients and improvement in two patients in SG and seven patients with remission and one with improvement in MGB; and resolution of osteoarthritis, OSA, and polycystic ovary in all patients in both groups.

The primary risk factor for T2DM is obesity, and 90% of all patients with type 2 diabetes are either overweight or obese [22]. Gill et al.,[23] found that SG results in T2DM resolution ranging from 80% to 96% in morbidly obese subjects. Laparoscopic MGBP in morbidly obese patients with T2DM has been shown to be effective[23]. Schauer et al.,[24] recently demonstrated the superiority of the RYGB over a SG for the morbidly obese patients with remission of T2DM at 3 years.

Obesity is associated with an increased risk of GERD, with up to 50% of morbidly obese patients suffering from this condition. Prachand and Alverdy also concluded that the incidence of GERD seems to be more frequent after LSG [25]. There is no doubt that 0.5–1.0% of the patients develop malnutrition requiring surgical correction – reversal or shortening of biliopancreatic limb, or conversion to sleeve – after MGB [26].

In the entire literature, there is only one reported case of Petersen's hernia after MGB [27].No internal hernia was recorded in our study, and only four cases developed symptomatic acid reflux in SG and seven cases developed symptomatic (bile) reflux in MGB. It is believed that MGB results in less dumping and reactive hypoglycemia compared with RYGB. Carbajo et al., [28] did not see any dumping syndrome in their study.

Conclusion

LSG regarding EWL is comparable to laparoscopic MGBP in short‐term follow‐up (1 year) with less metabolic effect. Further long‐term studies are needed.

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