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Surgical Management of Morbid Obese Patients Roux-En-Y Gastric Bypass Versus Sleeve Gastrectomy

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Abstract

Background: Nowadays obesity considered as a disease. Obesity is complex and poorly understood and the causes of this disease likely include a combination of genetic and environmental factors, but it also includes behavioral, psychological, and other factors.

Aim of Study: Comparative study between the laparoscopic Roux-en-y gastric bypass and sleeve gastrectomy in management of morbid obesity.

Patients and Methods: Study included 20 morbidly obese patients, 10 patients subjected for laparoscopic sleeve gastrectomy and 10 patients for laparoscopic Roux-en-y gastric bypass.

Results: There was significant difference in % Weight Loss (WL) between the LSG and LRYGB at 12-month with greater % WL in the LRYGB group than the LSG group. However, there was no significant difference between LSG and LRYGB in WL at 6-month follow-up. Overall postoperative morbidity was higher after LRYGB group compared with LSG.

Concluion: LRYGB and LSG are effective procedures for treatment of morbid obesity. Both can be performed very safely in an experienced hand, but LSG is a simpler and safer procedure with no significant disadvantage compared to LRYGB.

Objective: Comparative study between the laparoscopic Roux-en-y gastric bypass and sleeve gastrectomy in management of morbid obesity.

Key Words: *Morbid obesity – Sleeve gastrectomy – Gastric bypass – Weight loss.*

Introduction

NOWADAYS obesity considered as a disease. Obesity is complex and poorly understood and the causes of this disease likely include a combination of genetic and environmental factors, but it also includes behavioral, psychological, and other factors [1].

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Obesity increases the risk of many health problems. These co-morbidities are most commonly shown as metabolic syndrome which is a combination of many medical disorders including: Type II diabetes mellitus, hypertension, IHD and hypercholesterolemia [2].

The prevalence of morbid obesity rapidly increasing worldwide, surgery has been recognized to be the only long term management for morbid obesity, although surgical therapy can be associated with complications [3].

There are various surgical procedures available for the treatment of morbid obesity. These include purely restrictive procedures such as the laparoscopic gastric band and sleeve gastrectomy, or purely malabsorptive procedures such as Biliopancreatic Diversion (BPD) and jejunoileal bypass. To reduce the complications associated with purely malabsorptive operations while still improving on the weight loss, a number of combined restrictive malabsorptive procedures have been developed, such as the Laparoscopic Roux-en-Y Gastric Bypass (LRYGB) [4].

Laparoscopic Sleeve Gastrectomy (LSG) is emerging as a promising therapy for the management of morbid obesity. This procedure has revealed to be effective and a potential competitor with these operations. In fact, LSG has the advantage to be minimally invasive than LRYGB and BPD, and not inferior in terms of weight loss, as demonstrated in some preliminary studies [5].

Laparoscopic Roux-en-Y gastric bypass is the "gold standard" bariatric surgical procedure in USA. It has both restrictive and malabsorptive properties due to the combination of a small gastric pouch and total bypass of the duodenum and the proximal jejunum [6].

Patients and Methods

This is a combined prospective retrospective study which conducted in Surgery Department, Al-Azhar University Hospitals in the period between January 2017 and May 2018. Study included 20 morbidly obese patients (BMI ›_40Kg/m^2 or ›_35 Kg/m^2 associated with other co-morbidities). Additionally, we subjected 10 patients for laparoscopic sleeve gastrectomy prospectively and 10 patients for laparoscopic Roux-en-y gastric bypass retrospectively.

Inclusion criteria: BMI >40kg/m^2 or BMI >35 kg/m^2 with co-morbidities, documented weight loss attempts for at least 6 months, good motivation for surgery, the age was restricted to patients from 18 to 59 years.

Exclusion criteria: Patients with ASA (American Society of Anesthesiologists) score 4 or higher, previous obesity surgery, previous gastric surgery, patients with hormonal disturbance, large abdominal ventral hernia, psychiatric illness.

Study strategy:

Ethical approval was taken from Al-Azhar University Ethical Committee and written consent was taken from every patient after explanation of all details of the operation, advantages, disadvantages, diet habits after surgery, realistic expectations and with the possibility of conversion to open surgery and all the possible intra-operative, early and late post-operative complications.

Clinical evaluation to assess the degree of obesity, pre-operative detection of different obesity related co-morbidities like hypertension, DM, sleep apnea, skeletal problems, infertility, hernias, history of psychotherapy, etc. In addition, all patients were subjected to full laboratory investigations (as full blood count, blood sugar, liver function tests, kidney function tests, liver enzymes, hormonal assay and lipid profile). Also pulmonary evaluation: Including chest X-ray and pulmonary function tests. Cardiovascular assessment: ECG, venous duplex and echocardiography if needed.

Surgical techniques: Both procedures were performed under general anesthesia with the patient in the supine position and the surgeon standing between the legs of the patient. A pneumoperitoneum was then established to 15-mmHg pressure carbon dioxide using verus needle in the left hypochondrium for all cases maintaining a 15mmHg intra-abdominal pressure. After creation of pneumoperitoneum, a five port technique was used placing five ports in the upper abdomen in a "diamond-shaped" pattern. 10-mm camera port just to the left of the midline approximately two hand breadths below the xiphi-sternum, 10-mm port about 2cm below the xiphi-sternum in the midline (at the lower border of the liver), 12-mm port in the right midclavicular line, 10-12cm below the right costal margin (the right working port), 12-mm port in the left midclavicular line, 10-12cm below the left costal margin (the left working port), 5-mm assistant port in the left anterior axillary line, 12-14 finger breadths below the left costal margin.

Sleeve gastrectomy: A window is dissected at the junction of the greater curvature and the greater omentum, around 10cm from the pylorus. Division of the gastroepiploic, short gastric and posterior fundic vessels is done starting at 4cm proximal to the pyloric ring all the way till the angle of his using the harmonic scalpel. Once the dissection part is over, a 36Fr bougie is introduced orally by the anaesthesiologist through the oesophagus and inside the stomach. The surgeon then guides it along the lesser curvature and into the pyloric channel and duodenal bulb. Gastric transection begins 4 to 6cm proximal to the pylorus. A 60-mm, green or gold cartilage is placed across the antrum through the right midepigastric port and fired. The second stapler is placed approximately 1 to 2cm from the border of the lesser curvature in the direction of the gastroesophageal junction. Sequential firings of the stapler along the border of the bougie on the lesser curvature complete the gastric transection Fig. (1). After completing the transection, the entire staple line is inspected carefully to make sure that the staples are well formed especially at the antrum where the stomach is thickest Fig. (2). The transected part of the stomach is then removed through one of the 12mm port sites. After the transection has finished the hemostasis is checked then the bougie is removed followed by insertion of nasogastric tube into the stomach through which methylene blue is injected to confirm that no leak. A 22Fr Nelaton catheter is inserted at staple line then we removed all ports and camera at end. All fascial defects at ports 10, 12 and 15 were closed by vicryl 0 to prevent hernias. Then patient is recovered and transferred to ward or ICU for early post-operative care.

Laparoscopic Roux-en-Y gastric bypass: Creation of the proximal gastric pouch begins with dissection along the upper lesser curvature of the stomach with the ultrasonic scalpel. After the proximal posterior gastric wall has become visible, a pathway clear to the greater curvature side of the

proximal stomach should be visible. Peritoneal attachments of the greater curvature near the angle of his are divided, and the 60-mm endo-gastrointestinal assisted (GIA) stapler (3.5mm staples) is applied several times across the proximal stomach to create a small (30mL or less) proximal gastric pouch. The patient was returned to the supine position to create the jejunojejunostomy. The greater omentum and transverse colon were passed to the upper abdomen to expose the ligament of Treitz. To create the Roux limp, the jejunum was transected with Endo GIA II stapler, 45mm length and 3.5mm staples, at approximately 30cm from the ligament of Treitz, where a comfortable length of mesentery exists. A smaller staple size (2.5mm) was later substituted to reduce staple line bleeding at the transected bowel. The jejunal mesentery was then divided with two applications of the Endo GIA II stapler using the vascular load (45mm length, 2.0mm staples). The Roux limb was then measured 150cm distally, and a stapled side-to-side anastomosis was created with the proximal jejunal limb using one application of the Endo GIA stapler II (60mm length, 3.5mm staples). The enterotomy site was closed, and the mesentery of the jejunojejunostomy was sutured. Then end-to-side-gastrojejunostomy technique using an Endo GIA technique was used. The gastric pouch and Roux limb was irrigated with dilute methylene blue dye to detect leaks. A drain was placed posterior to the gastrojejunal anastomosis and brought out through a right subcostal port site.

Post-operatively: Patients were discharged on the second post-operative day if they felt able to return home, after removal of the drain. Patients were followed-up at outpatient clinic. Visits were scheduled once a month for the first 3 post-operative months and every 3 months thereafter. The following data were recorded in each visit during the follow-up period; the patient weight, reflux symptoms and any complications that may occur as vomiting, diarrhea, dumping and intestinal obstruction.

Fig. (1): Freeing of greater curvature.

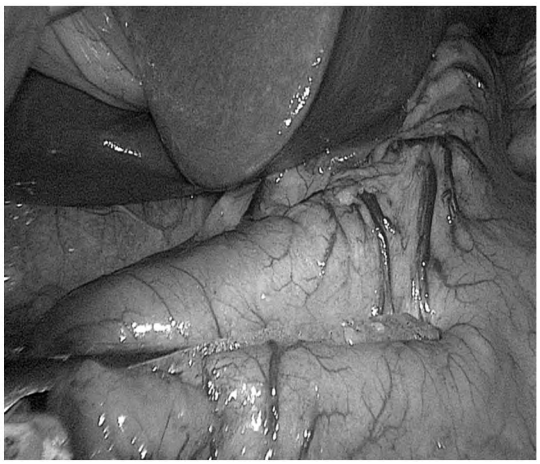

Fig. (2): First staple fire in sleeve gastrectomy.

Results

Throughout the study period, 20 patients were included; they were divided into 10 patients for LRYGB and 10 patients for LSG. There were 8 females in LRYGB group compared to 7 females in LSG group. Moreover, mean age was higher in LRYGB patients compared with LSG patients with no significant difference (45±12 vs. 44±11 years old). Furthermore, there were no significant differences in mean BMI (43±7 vs. 42±6kg/m^2). Anesthesia was measured using ASA score. Grade 3 had 11 patients (55%) with 6 patients in LRYGB and 5 patients in LSG group. Furthermore, grade 2 had 7 patients (35%) with 3 patients in LRYGB group and 4 patients in LSG group. As regard the co-morbidities, patients undergoing LRYGB had higher rates of diabetes but with no significant difference (40% vs. 30%). On the other hand, hypertension and COPD were higher in LSG compared to LRYGB surgery (60% vs. 50%), (10% vs. 0%). Furthermore, both groups had only one smoker patient (Table 1).

Compared with LSG operation, LRYGB operation was found to have significantly longer operative time (140±56 minutes vs. 98±50 minutes, p= 0.028) and anesthesia time (177±65 minutes vs. 143±52 minutes, p=0.046).

The majority of individual complication rates were similar between groups, but LRYGB group was associated with higher rates of wound infection (20% vs. 10%), bleeding requiring transfusion

(20% vs. 10%). Deep venous thrombosis was the only complication found to be higher after LSG operation (0% vs. 10%). Overall post-operative morbidity was higher after LRYGB group compared with LSG. Hospital length of stay was equivalent between groups (2 days). There was no significant difference found in 6-month mortality between groups (0% in both groups) (Table 2).

There were significant differences in % Weight Loss (WL) between the LSG and LRYGB at 12-month with greater % WL in the LRYGB group than the LSG group. However, there were no significant differences between LSG and LRYGB in WL at 6-month follow-up (Table 3).

Table (1): The patient's characteristics.

	LRYGB	LSG	*p*-value
Sex:			
Female	8 (80%)	7 (70%)	0.87
Male	2 (20%)	3 (30%)	
Age (years)	45±12	44±11	0.84
BMI (kg/m^2)	43±7	42±6	0.73
ASA score:			
Grade 2	3 (30%)	4 (40%)	0.71
Grade 3	6 (60%)	5 (50%)	
Diabetes	4 (40%)	3 (30%)	0.82
Hypertension	5 (50%)	6 (60%)	0.95
COPD	–	1 (10%)	–
Smoking	1 (10%)	1 (10%)	1

Table (2): Post-operative complications.

	LRYGB	LSG	*p*-value
Wound infection	2 (20%)	1 (10%)	0.78
Pneumonia	2 (20%)	1 (10%)	0.78
DVT		1 (10%)	
Bleeding requiring transfusion	2 (2%)	1 (10%)	0.78
Hospital stay	2±11	2±6	1
6-months mortality	0 (0%)	0 (0%)	1

Table (3): Weight loss (WL); LRYGB vs LSG.

	LRYGB	LSG	*p*-value
WL at 6 months %	28.2±10.1	32.8±12.9	0.42
WL at 12 months %	63.4±20.4	40.6±15.8	<0.001

Discussion

Bariatric surgery has been proven to be a viable option for the treatment of severe obesity in comparison to conservative methods, resulting in long-lasting weight loss, improved quality of life, and resolution of obesity related comorbidities and it decreases overall mortality as well as morbidity in morbidly obese patients **[7]**.

A number of studies have compared the results of LRYGB, which is still the gold standard for many bariatric teams and LSG. Regarding previous data, it became evident that LSG is a bariatric procedure that demonstrates initial promising results in terms of WL, feasibility, and safety **[8]**.

In our study, the mean operative time was 140 ± 56 minutes for LRYGB group, significantly (*p*-value=0.046) longer than the LSG group (98 ±50) and this correlates with all other studies comparing this two operations. The longer operative time for the RYGBP was due to the second jejuno-jejunal anastomosis and closure of the mesenteric defect between the small bowel mesentry and the transverse mesocolon.

Also in our study; both procedures were found to be effective at promoting patients weight loss during the observation period with minimal post-operative complications.

In terms of percentage of WL, the LSG group achieved a slightly higher % WL (32.8 ± 12.9) than the LRYGB group (28.2 ± 10.1) at 6 months post-operatively (*p*-value=0.42). By the end of the first year, (%WL) is lower in sleeve gastrectomy group (40.6± 12.8) compared to the LRYGB group (63.4± 20.4) (*p*-value <0.001).

Initial literature investigating LSG was restricted to small, single-center studies with limited follow-up of long-term excess body weight loss and co-morbidity remission. However, increasingly, more large-scale studies have documented long-term weight loss **[9-11]**.

Multiple studies have also reported long-term weight loss outcomes at 5 years, with percent excess body weight loss ranging from 53% to 69% **[12-14]**.

As regard complications; we found LSG had decreased rates of wound infection, bleeding compared with LRYGB. There was no mortality, leak or intestinal obstruction in both groups. The decreased rate of bleeding after LSG is likely due to less overall length of staple lines compared with LRYGB as well as the absence of two stapled anastomoses.

These findings are consistent with those of Carlin and colleagues, who performed a matched cohort study of 2949, noted a 30-day post- operative complication rate of 6.3% after LSG, 10% after LRYGB and laparoscopic adjustable gastric banding 2.4% **[15]**.

Conclusion:

LRYGB and LSG are effective procedures for treatment of morbid obesity. Both can be performed very safely in an experienced hand, but LSG is a simpler and safer procedure with no significant disadvantage compared to LRYGB.

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المناجزة الجراحية للمرضى الذين يعانون من السمنة المفرطة عن طريق إجراء مقارنة بين المرضى الذين يخضعون لعملية تحويل مسار المعدة والذين يخضعون لعملية تدبيس المعدة

تعتبر السمنة المفرطة من المشاكل الصحية الكبرى التى يعانى منها حوالى ١.٧ بليون شخص حول العالم، ويفوق معدل الوفيات للأشخاص الذين يعانون من السمنة المفرطة ١١ ضعف بالمقارنة للأشخاص الذين لا يعانون من السمنة.

تعتبر جراحات السمنة هى الإجراء التداخلى الوحيد الذى يضمن إنقاص الوزن على المدى البعيد. وتعد عملية تكميم المعدة من العمليات الموجودة حديثل لعلاج السمنة المفرطة، حيث أنها تقلل حجم المعدة إلى أقل من ٢٥٪ من حجمها الأصلى. وهناك أيضا عملية تحويل مسار المعدة وهى عملية أكثر تعقيدا، وهى العملية الأشهر فى الولايات المتحدة الأمريكية. ويمكن إجراء كلا العمليتين بالمنظار الجراحى.

هناك العديد من المضاعفات التى قد تصاحب عمليات السمنة المفرطة، على سبيل المثال التسريب، النزيف الحاد، قرحة عند مكان التوصيل، حدوث نقص فى العناصر الغذائية، حدوث جلطات الأوردة، إلتهابات مكان الجروح.

لذلك أجريت هذه الدراسة على ٢٠ مريضا يعانون من السمنة المفرطة، تم إجراء عملية تحويل مسار المعدة لعشرة منهم، وعملية تكميم المعدة للعشرة الآخرون.

وأثبتت الدراسة أن كلا العمليتين يؤدى إلى إنقاص الوزن بشكل جيد لكن عملية تحويل مسار المعدة كانت أكثر تأثيرا من عملية تكميم المعدة. على الجانب الآخر كان معدل المضاعفات أكثر وضوحا بعد عملية تحويل المسار.