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Laparoscopic Sleeve Gastrectomy versus Greater Curve Plication in Management of Morbid Obese Patients with Hiatus Hernia

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ABSTRACT

Introduction and Aim: Laparoscopic sleeve gastrectomy (LSG) considered the gold standard for management of morbid obesity, but, it has serious complications. Laparoscopic greater curvature plication (LGCP) is a restrictive procedure to lower the complications of LSG with the advantage of being a reversible procedure. The current work was designed to compare between Laparoscopic sleeve gastrectomy and greater curve plication in management of morbid obese patients with hiatus hernia.

Methodology: This study included 40 morbidly obese patients with hiatal hernia, who underwent laparoscopic Nissen Fundoplication with Greater Curvature Plication (Group A) or Laparoscopic Crural Repair with Sleeve Gastrectomy (Group B).

Results: Vomiting was the most common postoperative complaint. Two out of 20 patients (10%) In cases of LGCP developed prolonged nausea, vomiting and sialorrhea for 5 and 7 days but subsided subsequently with antiemetics, proton pump inhibitors, and prokinetics. Intraoperative hemorrhage in two cases of LGCP, Two out of 20 patients (10%) In cases of LGCP developed prolonged nausea, vomiting and sialorrhea for 5 and 7 days but subsided subsequently with antiemetics, proton pump inhibitors, and prokinetics. Four patients of 20 patients (20%) In cases of LGCP developed weight regain and sleeve gastrectomy revision was obtained by performing re-laparoscopy.

Conclusion: LSG is a better procedure than LGCP as the most important disadvantage of Laparoscopic gastric plication are that it causes a high rate of recurrence and occurrence of early postoperative complaints.

Keywords: Greater Curvature Plication; Morbid Obesity; Laparoscopic Sleeve; Hiatus Hernia.

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INTRODUCTION

Obesity is an abnormal accumulation of body fat (usually 20% above the normal ideal body weight) to the extent that it may have an adverse effect on health [1].

It is a rapidly growing public health problem affecting an increasing number of countries worldwide because of its prevalence, costs, and health effects [2].

Obesity adversely affects nearly all physiological functions of the body and comprises a significant public health threat. It increases the risk for developing multiple disease conditions, such as diabetes mellitus [1].

Nonsurgical therapy leads to modest and transient weight loss at best, and surgery has been advocated as the only effective "large-scale" treatment for obesity [3].

Bariatric surgery today is considered as the most effective way of management for persistent weight loss and for relieving the associated comorbidities and to improve the quality of life [4].

Over the last decades, numerous prospective and longitudinal studies have demonstrated the benefits of bariatric surgery on weight loss, mortality, and other chronic diseases. Even though the mechanisms underlying many of these beneficial effects remain poorly understood, surgical management of obesity continues to increase given its unmatched efficacy [5].

Gastric restrictive procedures include laparoscopic adjustable gastric banding and sleeve gastrectomy. Laparoscopic sleeve gastrectomy (LSG), which is one of the most popular bariatric surgery worldwide, has two serious complications leakage and bleeding from staple line with variable incidence ranging from 1.2 and 3.6 % respectively and can lead to serious outcome [6].

In an attempt to reduce these serious complications, another gastric restrictive technique came into view, notably, gastric plication that was first used as weight reducing procedure through an open approach [2].

The idea of laparoscopic greater curvature plication (LGCP) is apparently similar to that of LSG, in formation small gastric tube by elimination of the greater curvature without gastrectomy [7].

Cost savings and affordability have also been promoted, as plication does not require the use of stapling devices, adjustable gastric bands, or prolonged hospitalization [2].

Reports regarding LGP are scarce worldwide and we have few data of LGP in Egyptian patients and surgeons still have debates regarding the ideal weight loss procedure [8].

THE AIM OF THE WORK

The aim of this work was to compare between laparoscopic sleeve gastrectomy versus greater curve plication in management of morbid obese patients with Hiatus hernia.

PATIENTS AND METHODS

Forty morbidly obese patients with hiatal hernia and\or GERD underwent Laparoscopic Nissen Fundoplication with Greater Curvature Plication (Group A; 20 patients) or Laparoscopic Crural Repair with Sleeve Gastrectomy (Group B; 20 patients).

All patients underwent a preoperative work-up including history and physical examination, routine laboratory investigations, ECG, chest radiography, pulmonary function tests, abdominal ultra-sonography, upper gastrointestinal (GIT) endoscopy, barium swallow (if indicated) and psychiatric evaluation.

Prophylactic antibiotic and anticoagulant injection were taken routinely preoperative. An informed consent was given by all patients. All patients were evaluated thoroughly including a detailed history with relevant investigations and other specific tests, Clinical assessment including history and examination.

Methods

1) All patients submitted for psychological assessment and full medical and surgical history taking
2) Assessment of dietary habits of patients and previous trials of weight reduction.
3) All patients signed the consent as this study approved by Ethical and Medical Committee in our faculty.
4) Laboratory investigations (pre-operative) A complete liver function tests, renal function tests and the usual screening blood tests were performed.
5) Endocrinal evaluation were done, including thyroid function and serum cortisol level.
6) We used Garrows grading of obesity based on the BMI which is weight in kg/height in m^2: normal 20-24.5, overweight 25, obese 25-35, morbidly obese >35 and super-obese >50kg/m^2.[9]
7) To evaluate associated co-morbidity and treatment medications used (DM, hypertension, co-arthritis and obstructive sleep apnea syndrome).

Surgical Procedure

Under general anaesthesia, all patients were positioned in reverse Trendelenburg position, tilted up 30°. The camera man stands to the patient's right side, the assistant to the left side.

The surgeon stands between the legs to operate in the French position. After induction of the pneumoperitoneum, five ports (one 10 mm optical port above the umbilicus, two 12 mm ports in the midclavicular line in both sides above the level of the umbilicus, one 5 mm port below the xiphisternum for liver retraction, and one 5 mm port in the left anterior axillary line) were placed.

Sleeve gastrectomy

It was performed using a linear stapler with two sequential green load firings for the antrum, followed by three or four sequential blue cartridges for the remaining gastric body and fundus. The stapler was applied alongside a 36-Fr calibrating bougie strictly positioned against the lesser curve; the final appearance of stomach like a tube. Intraoperative methylene blue dye test was routinely performed. One drain was placed, extraction of excised part of stomach and finally port sites closed with sutures.

Greater curvature plication:

After crural repair and devascularization of greater curvature of stomach as before, the esophagus retracted anteriorly, visualization of the fundus from behind the right side of the esophagus. The left hand grasps the fundus and pulls it around to the right side. The fundus should come around easily and stay in place without tension. The esophagus should essentially be invaginated into the fundus with the fundoplication facing the patient's right side.

A "shoe shine" maneuver can be performed to ensure that the proper portion of the fundus was brought around. The fundoplication is secured by placing three 2-0 non-absorbable sutures in simple fashion to create a 2-cm loose floppy Nissen. Gastric plication was created by plicating the greater curvature; applying a first row of seromuscular, non-absorbable 0 interrupted sutures, so that it was far away from gastric acid.

The distance between the sutures varied between 1.0 and 1.5 cm. This was reinforced by a second row of non-absorbable running 0 sutures, to strengthen the plication and prevent herniation between the sutures. Plication was started at the top of gastric fundal wrap and carried down to 4cm from the pylorus [10]. Invagination of three sections of gastric wall, by taking four bites, two posterior and two anterior to the greater curvature. The final shape of stomach was like a sleeve gastrectomy, but slightly larger. One drain was placed, and finally port sites closed with sutures.

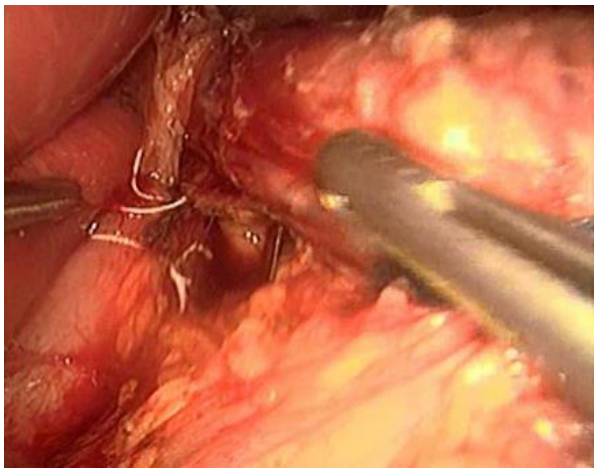

Figure (1): Crural repair

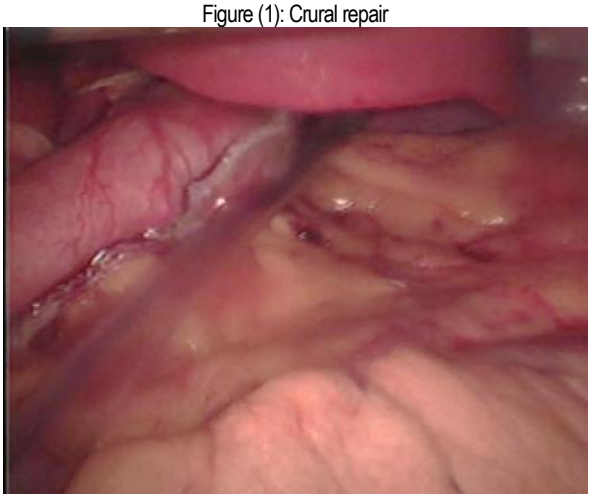

Figure (2): The final appearance of stomach after sleeve gastrectomy

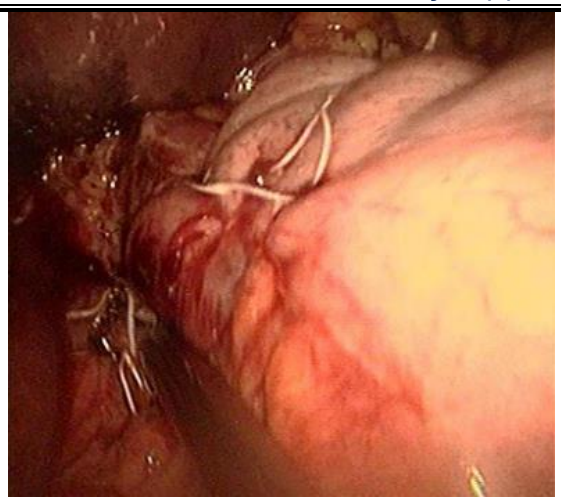

Figure (3): The final appearance of crural repair with Nissen Fundoplication

Statistical analysis:

The Statistical data included were expressed as mean, standard deviation (SD) and the student *t*- test was used to elucidate the differences between the treated groups and control group. The obtained data were analyzed by using statistical package for social science (SPSS) software (V.15), produced by SPSS Inc., Chicago, USA. *P* value lower than or equal to 0.05 was considered significant from the statistical point of view.

RESULTS

Forty patients underwent bariatric procedure from February 2017 to August 2018 at our Surgery Department, Al-Azhar University Hospital Damietta. Group included 20 patients who underwent LGCP, Group 2 included 20 patients who underwent LSG. The age of patient ranged between 18 to 58 years, and there was no significant differences between groups.

The patient's age ranged between 18 to 58 years, and 35.0% were males. There was no significant difference between groups A and B regarding patient's age, body mass index and gender (Table 1).

In cases of LGCP, The mean operative time was 75 minutes (50-155 minutes) while, The operative time for all cases of sleeve gastrectomy ranged between 106 to 316 minutes, the mean was 143 minutes (2.55 ± 0.45 h). The mean duration of hospital stay In cases of LGCP was 60 hours (1-4 days) In cases of LGCP while, mean duration of hospital stay for all cases of sleeve gastrectomy was 78 hours (1-4 days). We encountered intraoperative hemorrhage in two cases of LGCP (from short gastric vessels and minor liver injury, respectively). Both were properly controlled, and neither required intra- or postoperative blood transfusion. There was no significant difference in both groups as regards the mean length of the hospital stay. No mortality was reported during follow up, there were no conservations to open surgery (Table 2).

The major complications in the studied group. No wound infections, gastrointestinal leaks, or intra-abdominal infections were seen. Vomiting was the most common postoperative

complaint. Two out of 20 patients (10%) In cases of LGCP developed prolonged nausea, vomiting and sialorrhea for 5 and 7 days but subsided subsequently with antiemetics, proton pump inhibitors, and prokinetics. Four patients (20.0%) in LGCP developed weight regain and sleeve gastrectomy revision was obtained by performing re-laparoscopy, compared to none in the other group, with significant difference (Table 3).

At the end of follow up period, sleeve gastrectomy (group B) had better results than LGCP regarding percentages of weight loss and BMI change (Table 4).

Table (1): Demographic data of the studied groups

Variables		Group A (n=20)	Group B (n=20)	Test	P
Age (years)	Mean ± SD	36.7 ± 10.32	37.65± 9.34	0.24	0.612
	Min. Max.	18 - 58	20-54		
BMI (kg/m²)	Mean ± SD	45.6±4.60	43.4±8.49	0.414	0.471
Sex (n,%)	Male	6(30.0%)	8(40.0%)	0.32	0.504
	Female	14(70.0%)	12(60.0%)		

Table (2): Outcome among studied groups

Variables	Group A (n=20)	Group B (n=20)	Test	P
Operative time (hour)	2.55±0.45	1.50±.0.75	0.315	>0.05
Hospital stay duration (days)	3.25±3.07	2.5±2.3	0.755	>0.05
Intraoperative hemorrhage	2 (10.0%)	0 (0.0%)	2.10	0.24
Motility	0 (0.0%)	0 (0.0%)	-	-

Table (3): Post-operative complications in the studied groups

Complications	Group A (n=20)	Group B (n=20)	Test	p
Vomiting	2 (10.0%)	3 (15.0%)	**0.22**	**0.63**
Reflux symptoms	5 (25.0%)	8 (40.0%)	**1.02**	**0.31**
Wound infections	0 (0.0%)	0 (0.0%)	**-**	**-**
Gastrointestinal leaks	0 (0.0%)	0 (0.0%)	**-**	**-**
Weight regain	4 (20.0%)	0 (0.0%)	**4.44**	**0.035***

Table (4): Comparison between groups regarding weight and BMI change

		Group A (n=20)	Group B (n=20)	p
Weight (kg)	Before surgery	135.4 ±6.4	133.76 ± 8.3	0.66
	After surgery (last visit)	106. 45 ± 3.6	91. 65 ± 4.2	0.003*
	Weight reduction	28.95± 2.8	42.11± 4.1	0.0012*
	Percentage of change	21.4%	31.5%	<0.001*
BMI (kg/m²)	Before surgery	45.6±4.60	43.4±8.49	0.67
	After surgery (last visit)	32.7±2.86	28.3±1.64	0.006*
	Weight reduction	14.9±1.84	25.1±6.85	0.004*
	Percentage of change	32.7%	57.8%	<0.001*

DISCUSSION

The worldwide prevalence of obesity has been increasing day after day [11]. Morbid obesity is a rapidly growing health problem all over the world. It threatens the life of different peoples and different age groups [4].

Conservative methods such as diet, physical exercise and drug therapy have been proven to be insufficient [12]. Many different methods that can provide significant and long-term weight loss have been developed in the last decade [13]. Bariatric surgery has recently become one of the most common treatment modality in maintaining long-term weight reduction and improving obesity-related conditions. Hence bariatric surgery is a cost-effective treatment modality [14].

Laparoscopic sleeve gastrectomy (LSG) is a procedure used initially as the first stage of a definitive bariatric treatment known as the duodenal switch [15].

As a primary bariatric procedure, medium-term results have been shown to be adequate (>60% excess weight loss (EWL)), with improvements in comorbidities such as type 2 diabetes mellitus, hypertension, and obstructive sleep apnea in more than 65% of cases [16].

These promising results are associated with some complications, however, such as esophagitis, stenosis, fistulas, and gastric leaks near the angle of His. These leaks and fistulas are reported in nearly 1% of cases [17].

Laparoscopic gastric plication is a relatively new

restrictive method born as a result of search for a safe, effective (>50% EWL), less invasive, reversible, repeatable, and economical method, with the thought that the ideal procedure for morbid obesity surgery has yet to be found. It was introduced first by Tretbar in 1976, and then by Wilkinson in 1981 [18, 19].

Laparoscopic gastric plication is essentially an old but also a contemporary approach. Promising early-period results have been reported. When compared to other restrictive methods, excess weight loss at an acceptable level could be obtained at the early stage [12].

We conducted this study is to compare between laparoscopic sleeve gastrectomy versus greater curve plication in management of morbid obese patients with Hiatus hernia. Few complications were reported with LSG with good results regarding weight loss.

These results are in agreement with the third International summit on the status of LSG **by Deitel *et al*.** [20] and with **Hammadieh *et al*.** [21] who found that LGP is an effective and safe bariatric operation for reducing weight and improving obesity-related comorbidities in the long term, even in times of crisis. Patients achieved an excess weight loss of 65% over a follow-up period of three years. Comorbidities showed improvement in more than 50% of cases. The rate of serious complications was very low, and we did not encounter any case of leak, intraabdominal infection, or mortality.

We encountered intraoperative hemorrhage in two cases of LGCP (from short gastric vessels and minor liver injury, respectively). Both were properly controlled, and neither required intra- or postoperative blood transfusion.

In agreement with **Talebpour and Amoli** [22] who reported one case of a gastric leak associated with a more aggressive version of LGCP, which the authors attributed to excessive vomiting in the early postoperative period.

In agreement with significant weight loss in LGCP in the current work, two separate papers, reported efficacy in gastric plication procedures, as measured by changes in the weight progression [23, 24]. Also, **Brethauer *et al*.** [23] reported increased weight loss in patients receiving LGCP.

LGCP gained more popularity during the last 3 years. The BMI change after LGCP was 14.9 kg/m^2 compared to 25.1 kg/m^2 in LSG after one year. Thus, the result was significantly better with sleeve gastrectomy. Similarly, **Abouzeid and Taha** [25] aimed to explore the efficacy of the LGCPl the change in BMI after LGCP was 10.35 kg/m^2 (45.4% EWL) compared with LSG, which was 14.45 kg/ m^2 (66.4% EWL) after 1 year.

In our study, four patients (20%) in LGCP developed weight regain but none was reported in sleeve gastrectomy. The inadequate weight loss and failed patients could be explained by increased stomach capacity after 6 to 9 months postoperatively detected by upper gastrointestinal endoscopy or dye study and partially due to insufficient lowering of ghrelin hormone in those patients [25, 26].

In the present study, the mean hospital stay duration was 60 hours in LGCP, compared to 78 hours in LSG. **Abouzeid, and Taha** [25] reported that, the duration was 3.3±1.6 days (3-5 days) and patients started oral feeding on the second day.

Conclusion:

LSG is a better procedure than LGCP. LGCP had a high rate of early postoperative complaints such as nausea and vomiting. Its restrictive effect remains insufficient, and it has some specific complications such as partial fold herniation and blockage.

Conflict of interest

Authors declare that, there was no conflicts of interest.

Financial disclosure: none to be disclosed

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