

A Comparative Study between Laparoscopic Sleeve Gastrectomy and Laparoscopic Gastric Bypass in Management of Morbid Obesity

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How to cite this paper: Mawla, W.A., Elgohary, M.N. and Elekiabi, O.A. (2020) A Comparative Study between Laparoscopic Sleeve Gastrectomy and Laparoscopic Gastric Bypass in Management of Morbid Obesity. *Surgical Science*, 11, 61-68.
<https://doi.org/10.4236/ss.2020.114008>

Received: March 19, 2020

Accepted: April 7, 2020

Published: April 10, 2020

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Abstract

There are several surgical techniques for management of obesity, the most commonly used management strategies were; laparoscopic gastric bypass and laparoscopic sleeve gastrectomy, both techniques have advantages and drawbacks. But there are few published studies which clarified such issue and compare between both management strategies. We aimed in the present study to compare laparoscopic sleeve gastrectomy and laparoscopic gastric bypass as management surgical strategies of morbid obesity regarding technical success, degree of weight loss, degree of weight loss maintenance, postoperative and long term morbidities and degree of presence or absence of nutritional deficiencies. **Patients and Methods:** This is a prospective study which included a cohort of 100 patients with morbid obesity 50 of them underwent Laparoscopic gastric bypass and performed 50 underwent *Laparoscopic sleeve gastrectomy* with a five-year follow-up. **Results:** We showed that weight loss was higher in the laparoscopic sleeve gastrectomy group initially ($p = 0.002$), then after 2 years total weight loss was higher in the laparoscopic assisted gastric bypass group ($p = 0.004$). Diabetes, dyslipidemia and hypertension resolution was more common after laparoscopic assisted gastric bypass than after laparoscopic assisted sleeve gastrectomy. Occurrence of nutritional deficiencies was less commonly happened after laparoscopic assisted gastric bypass than after laparoscopic assisted sleeve gastrectomy. **Conclusions:** We showed a similar rate of weight reduction and resolution of nutritional deficits initially in both between laparoscopic assisted sleeve gastrectomy and laparoscopic gastric bypass maintenance of weight reduction was found more in laparoscopic assisted sleeve gastrectomy but rates of nutritional deficits were higher in such procedure.

Keywords

Morbid Obesity, Laparoscopic Sleeve Gastrectomy,
Laparoscopic Gastric Bypass

1. Introduction

Obesity has been continually considered a public health problem in most developing and developed countries. Marked obesity is leading to plethora of complications which could negatively affect almost all body organs which leads to marked morbidity reducing life expectancy of obese persons [1] [2]. Surgical management sometimes considered the only method of solving the problem of morbid obesity, decreasing patients' weight, controlling most complications, improving quality of life and increasing life expectancy of patients [3]. There are several surgical techniques for management of obesity, the most commonly used management strategies were; laparoscopic gastric bypass and laparoscopic sleeve gastrectomy, both techniques have advantages and drawbacks [4]. Laparoscopic sleeve gastrectomy was been reported to be safe and easily performed but has the disadvantage of nutritional deficiencies which occur to patients following such approach which need a long period of patients follow up to detect and manage health problems resulting from nutritional deficiencies [5] [6] [7] [8]. Previous studies showed that laparoscopic gastric bypass could be safely performed with fewer complications and fewer drawbacks in addition to similar degree of weight loss to laparoscopic sleeve gastrectomy [9]. But there are few published studies which clarified such issue and compare between both management strategies, and even published reports included a small number of patients and lack a long period of patients' follow-up [10]. We aimed in the present study to compare between laparoscopic sleeve gastrectomy and laparoscopic gastric bypass as management surgical strategies of morbid obesity regarding technical success, degree of weight loss, degree of weight loss maintenance, postoperative and long term morbidities and degree of presence or absence of nutritional deficiencies.

2. Patients and Methods

This is a retrospective study which included a cohort of 100 patients with morbid obesity that underwent laparoscopic sleeve gastrectomy and laparoscopic gastric bypass after approval by the local ethical committee of Faculty of Medicine, Zagazig University Hospitals. Patients were randomly chosen from operated patients in General Surgery Department and Pediatric Surgery Department, Faculty of Medicine, Zagazig University Hospitals in the period from October 2014 to October 2019. We explained both techniques with their risks, advantages, disadvantages and follow-up duration to patients and choosing any of the techniques was on patients demand. Cases underwent upper gastrointestinal endoscopy in Department of Internal Medicine, Faculty of Medicine, Zagazig University.

Inclusion criteria:

Patients with severe obesity who accepted to be included in the study.

Exclusion criteria:

Patients refusing to be included in the study;

Patients with insufficient weight loss;

Patients with rapid weight gain after the prosthesis.

Two senior bariatric surgeons with a large experience in bariatric surgery performed surgeries for the included patients.

We have recorded data of the patient as; body mass index (BMI), body weight, nutritional status, and comorbid conditions. We have evaluated and compared between patients in both performed surgical groups regarding postoperative results by recording degree of weight loss, remission of comorbid conditions as type 2 diabetes which was diagnosed when fasting blood glucose level less than 126 mg/dl and level of HbA1c less than 6.5%, after stopping all diabetes medications. Hypertension resolution was defined as normal blood pressure (systolic < 140 mm Hg and diastolic < 80 mm Hg), without the use of antihypertensive medications. We considered the level less than 130 mg/dL for low-density lipoprotein, more than 35 mg/dL for high-density lipoprotein, less than 150 mg/dL for triglycerides, in addition to cessation of all lipid-lowering drugs as parameters for dyslipidemia resolution.

Operative details made for all included patients in both groups

We have performed operations for all patients laparoscopically, where we have gained an access to the abdomen using Veress needle, we have placed a 10 mm port to use it as an optical port and we have placed another 2 ports of 12 mm in the mid-clavicular line in line with the placed optical port. We have placed 2 ports with size about 5 mm in the mid clavicular line in the subcostal area on both sides. To retract the liver we have used the Nathanson retractor.

Laparoscopic gastric bypass technique

After liver retraction as previously detailed; we have made a vertical gastric pouch of about 6 - 7 cm in length and 20 - 30 cc in volume by using 38 Fr.

We have made a roux-en-y with a biliopancreatic limb of about 80 cm and an alimentary limb of about 120 cm for all procedures and performed a gastrojejunostomy of about 2 cm - 2.5 cm using a linear cutter stapler. We have closed the gastro-enterotomy using endo Stitch of Covidien. We have tackled any intra-operative bleeding using clips. We have closed Petersen's space and mesenteric defects with non-absorbable sutures.

Laparoscopic sleeve gastrectomy technique

After liver retraction as previously detailed; we started the procedure by omental dissection from the greater curvature upwards to fat pad of Belsey's and downwards till the pylorus using a harmonic scalpel. Then using a 38 Fr. bougie *in situ*, we have used an Ethicon stapler which has a green reload to begin stapling of about 5 cm from the pylorus. We made a distance of about 2.5 cm away from the lesser curvature. We have continued stapling upwards with the stapler main-

tained a width of 2.5 cm from the gastroesophageal junction. We have created a sleeve of about 90 - 120 cc. We have tackled any intra-operative bleeding using clips. We have not performed any leak tests. We have applied pneumatic compression devices for all operated patients and we have given them post-operative enoxaparin 0.4 ml 12 h as prophylactic therapy for thromboembolism.

Statistical analysis

We have collected data and statistically analyzed them by using Statistical Package for Social Science program. We have used Chi-square test for categorical variables to compare between differences of both groups. We reported the continuous variables as means and standard deviation. All performed tests were 2-sided and the p values of <0.05 was considered statistically significant.

3. Results

Patient data and pre-operative details

We included 100 patients with morbid obesity 50 of them underwent *Laparoscopic gastric bypass* and performed 50 underwent Laparoscopic sleeve gastrectomy with a five-year follow up.

Patient data we detailed in **Table 1**. We found that patients underwent laparoscopic assisted sleeve gastrectomy patients were slightly younger than patients in the other group (p = 0.009). There were no statistically significant differences between both groups regarding gender. Weight, height, BMI, comorbid conditions (DM and hypertension), levels of LDL, HDL, cholesterol or triglycerides.

Table 1. Pre-operative details of patients with severe obesity who were included in the study and followed for five years.

| Variables | Surgical techniques | | p |
|----------------------|-----------------------------|---------------------------------|-------|
| | laparoscopic gastric bypass | laparoscopic sleeve gastrectomy | |
| | N = 50 (%) | N = 50 (%) | |
| Age | 28.40 ± 15.57 | 30.21 ± 16.78 | 0.009 |
| Gender: | | | |
| Female | 30(60) | 30 (60) | 1 |
| Male | 20 (40) | 20 (40) | |
| Height | 1.65 ± 0.10 | 1.64 ± 0.10 | 0.08 |
| BMI | 45.25 ± 6.04 | 45.39 ± 8.44 | 1 |
| Weight | 123.07 ± 16.12 | 120.71 ± 23.52 | 0.09 |
| D. M | 29 (30.5%) | 21 (21.4%) | 0.7 |
| Hypertention | 46 (48.4%) | 47 (47.9%) | 0.8 |
| LDL | 140.31 ± 29.0 | 139.67 ± 28.35 | 0.7 |
| HDL | 44.11 ± 11.79 | 41.94 ± 8.89 | 0.8 |
| Triglycerides | 152.14 ± 52.55 | 147.66 ± 48.82 | 0.3 |
| Cholesterol | 190.56 ± 30.17 | 189.77 ± 29.49 | 0.5 |

Post-operative weight loss and body mass index outcomes

We showed that weight loss was higher in the laparoscopic sleeve gastrectomy group initially ($p = 0.002$), then after 2 years total weight loss was higher in the laparoscopic assisted gastric bypass group ($p = 0.004$).

In laparoscopic assisted sleeve gastrectomy patients started to gain weight while in laparoscopic assisted gastric bypass patients continued to lose weight for 3 years after operation. After 5 years both surgical procedures were found to be effective in decreasing weight but laparoscopic assisted sleeve gastrectomy procedure cause a higher rate of weight regain more than laparoscopic assisted gastric bypass.

Comorbid conditions

Diabetes, dyslipidemia and hypertension resolution was more common after laparoscopic assisted gastric bypass than after laparoscopic assisted sleeve gastrectomy.

Nutritional deficiencies

Occurrence of nutritional deficiencies was more commonly happened after laparoscopic assisted gastric bypass than after laparoscopic assisted sleeve gastrectomy.

4. Discussion

The present study assessed long-term consequences as; loss of weight, remission of comorbid conditions and improvement nutritional deficiencies in patients with morbid obesity who have performed laparoscopic assisted sleeve gastrectomy and gastric bypass. We have revealed that both procedures have led to marked reduction of weight in the 1st year, the degree of reduction of weight and BMI is more in patients underwent laparoscopic assisted sleeve gastrectomy more than the other operated group two years after surgery. In laparoscopic assisted sleeve gastrectomy patients started to gain weight while in laparoscopic assisted gastric bypass patients continued to lose weight for 3 years after operation. After 5 years both surgical procedures were found to be effective in decreasing weight but laparoscopic assisted sleeve gastrectomy procedure cause a higher rate of weight regain more than laparoscopic assisted gastric bypass similar results were found by Bhandari *et al.*, [4] and Himpens, [11]. So our results and results of previous studies showed that although short term induction of weight loss was nearly similar for both procedures but the long term weight loss is more in laparoscopic assisted gastric bypass. So follow-up of patients after performing such bariatric procedure is needed. In the current study we showed the resolution of type 2 diabetes which has occurred in both procedures and it was more in laparoscopic assisted gastric bypass similar results were found by Bhandari *et al.*, [4], R.V. Cohen, *et al.*, [12]. Many previous reports showed that remission of type 2 diabetes is higher in laparoscopic assisted gastric bypass than more than laparoscopic assisted sleeve gastrectomy [13] [14] [15] [16]. We showed that resolution of nutritional deficiencies as anemia and hypoalbuminaemia were found less in laparoscopic assisted sleeve gastrectomy. More over calcium vitamin B12 deficiency were found less commonly after laparoscopic gastric bypass these results were

similar to Bhandari *et al.*, [4] and Gehrler, *et al.*, [17]. Those results were explained by that post-operative gastric emptying is the cause of such nutritional deficiencies [18] [19]. Additionally, in laparoscopic assisted sleeve gastrectomy removing the fundus and greater curvature of the stomach lead to reduction of gastric acid and intrinsic factor secretions that negatively affects nutrients absorption as folate, iron and vitamin B12 [2]. In the studied cohort we found a higher degree of nutritional deficiencies which was a strong prediction of post-operative deficiencies which is consistent with other studies [20] [21] [22]. Our results were in line with former reports which compare between comparing results between laparoscopic assisted sleeve gastrectomy and laparoscopic gastric bypass [23] [24] [25].

5. Conclusion and Recommendations

We showed a similar rate of weight reduction and resolution of nutritional deficits initially in both laparoscopic assisted sleeve gastrectomy and laparoscopic gastric bypass but over a long time of follow-up differences in effectiveness between both procedures appears. Although maintenance of weight reduction was found more in laparoscopic gastric bypass but rates of nutritional deficits were higher in such procedure. The advantage of our study is its prospective nature with long-term follow-up of patients but further studies are needed to assess long-term impact of both laparoscopically assisted surgical procedure on other long-term comorbidities as gastroesophageal reflux and assessing quality of life.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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