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Evaluating the Efficacy of Laparoscopic Mini-gastric Bypass Operation in Reducing Weight among Obese Patients

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Abstract

Background: **Obesity is known to be an increasing health concern recently in both developed and developing countries. Its medical importance peaked after been recognized globally as a disease of its own in addition to being a major predisposing factor for chronic diseases. Obesity is now increasing in prevalence in adults, adolescents, and children, and is now considered to be a global epidemic. Surgical treatment for obesity in the form of bariatric and metabolic operations has revolutionized our approach in treating obesity and prevent/treat its complications. Laparoscopic mini-gastric bypass operation emerged recently among bariatric operations and proved itself as an efficient and safe operation.** ***Aim:*** **To evaluate the ability of laparoscopic mini-gastric bypass in reducing weight among obese patients.** ***Subjects and Methods:*** **A sample of 40 individuals with a body mass index (BMI) greater than 35 kg/m^2 was randomly selected from the obesity clinic, Suez Canal University teaching hospital, city of Ismailia, Egypt. The patients underwent laparoscopic mini-gastric bypass operation and were offered a follow up for a period of 12 months.** ***Results:*** **The mean BMI of the patients declined from 49.2 kg/m2 preoperatively to 34.2 kg/m2 at the end of the follow up. This was associated with a dramatic increase in the mean percent excess body weight loss (%EWL) from 20% early postoperatively to 71% at the end of follow-up (p <0.05). There was no mortality among the patients and the complications were minimal and self-limiting.** ***Conclusions:*** **Laparoscopic mini-gastric bypass had proved itself to be a safe and effective operation in reducing weight.**

Keywords: Bariatric, Metabolic, obesity

Introduction

Chronic diseases -as the predominant causes of death worldwide- are well established, and obesity -being one of the factors strongly contributive to chronic diseases- has being consistently threatening the global health and raising worldwide medical concern(1). During the past decades it has been reported an increasing prevalence of obesity (Body Mass Index ≥30 kg/m^2) worldwide. In 2005, the World Health Organization (WHO) stated that 1.6 billion people were overweight and 400

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million were obese. In the year 2014, this figure jumped to 1.9 billion people to be overweight and 600 million were obese and 42 million children under 5 years of age were obese, 39% of adults aged 18 years and over were overweight and 13% among the same age group were obese[2]. Domestically speaking; in 1996, Egypt had the highest average Body Mass Index (BMI) in the world at 26.3 kg/m^2 and it is ranked the 7th most overweight country in the world[3]. Obesity leads to multiple comorbidities including hypertension, hyperlipidemia, and hyperglycemia, whereas weight loss is associated with reduced metabolic and cardiovascular risks[4]. Bariatric surgery has long been introduced for weight control in conservative treatment failed individuals and was widely accepted in the past decades[5]. Up to date, several bariatric surgeries exist. Laparoscopic adjustable gastric banding (LAGB), laparoscopic sleeve gastrectomy (LSG), and laparoscopic Roux-en-Y gastric bypass (LRYGB) are the three most commonly used bariatric surgeries and LRYGB is proved to be accompanied with more rapid and more substantial weight loss than "restrictive" procedure (LAGB-LSG) with less risk of failure or complication, thus, it is generally considered as the "gold standard" procedure[6]. Laparoscopic mini gastric bypass (LMGB) is the simplified procedure of LRYGB[7]. Upon its appearance, LMGB showed many advantages, such as; one less anastomosis, shorter operative time, lower risk of anastomotic leakage and internal herniation, shorter learning curve, and the ease of reversibility[8]. The efficacy of LMGB was confirmed regarding weight reduction that reached 65-80% (percentages of excess weight loss)[9].

Patients and Methods

This study is based on a Quasi-Experimental design (pre-test post-test analysis). There was a non-random assignment of patients who fulfilled the inclusion criteria of the study. All patients were consented according to institutional consent form. Pre-test (Baseline) data were gathered, the intervention (Laparoscopic Mini-Gastric Bypass) was applied to the patients and, finally, the outcome (post-test data) of the intervention was examined and compared to the baseline data. A sample of 40 patients was randomly selected among those attending the obesity clinic in the Suez Canal University teaching hospital and was prepared to perform laparoscopic mini-gastric bypass operation. All selected cases were subjected to the following inclusion criteria: Age between 20 to 60 years old, BMI above 35 kg/m^2, Both genders. The selected patients were examined preoperatively to collect the baseline data including Demographic data, body measurements and BMI. Also, the gastrointestinal quality of life index (GIQL index) was applied to the patients preoperatively. All patients performed laparoscopic mini-gastric bypass operation by the same surgical team and with the same operative set. The patients were observed over a follow up period of 12 months were their BMI and percent excess weight loss (%EWL) were measured every 3 months. The GIQL index was applied to all patients at the end of the follow up period.

Statistical Analysis

Data were analyzed using SPSS software, the mean, median and mode were used for descriptive analysis; t-Test was used for comparing means of continuous data. Chi square was used to test difference of categorical data. P-value of <0.05 was considered significant.

Results

The mean age of the cases under study patients ranged from 20 to 60 years old with

a mean age of 39.5 years old. Most of the cases were females (65%), also the majority had a university degree (77.5%) with 20% having a high school diploma and 2.5% had basic education (table 1). No mortality among the cases was observed.

Table 1: Frequency Distribution of the Studied Cases' Demographic Data (N=40)

Variable		Frequency	Percentage
Age (years)	Mean ± SD Range	39.5 ± 8.6 20 – 60	
Gender	Male	14	35%
	Female	26	65%
Education	University	31	77.5%
	High school	8	20%
	Basic	1	2.5%
	Illiterate	0	0

The mean operative time was 92 min. (range: 72-113 min.). Most of the cases (30%) showed minimal intraoperative blood loss (<50ml) also the majority (72.5%) showed the least perioperative hemoglobin difference (a decrease by <1 gm/dl). Most of the cases (77.5%) did not suffer from intraoperative injury to a vital structure except for a 17.5% liver injury (mild capsular tear/self-limiting bleeding) and 5% short gastric artery bleeding (controlled with harmonic scalpel). None of the cases required conversion to open surgery (table 2). Most cases suffered from mild postoperative pain as witnessed by a NRS pain score between 1-3 among the majority of the cases (42.5%) and absence of pain among 30% of the cases, this is further confirmed by the requirement of only postoperative paracetamol in 47.5% of the cases (Figure 1).

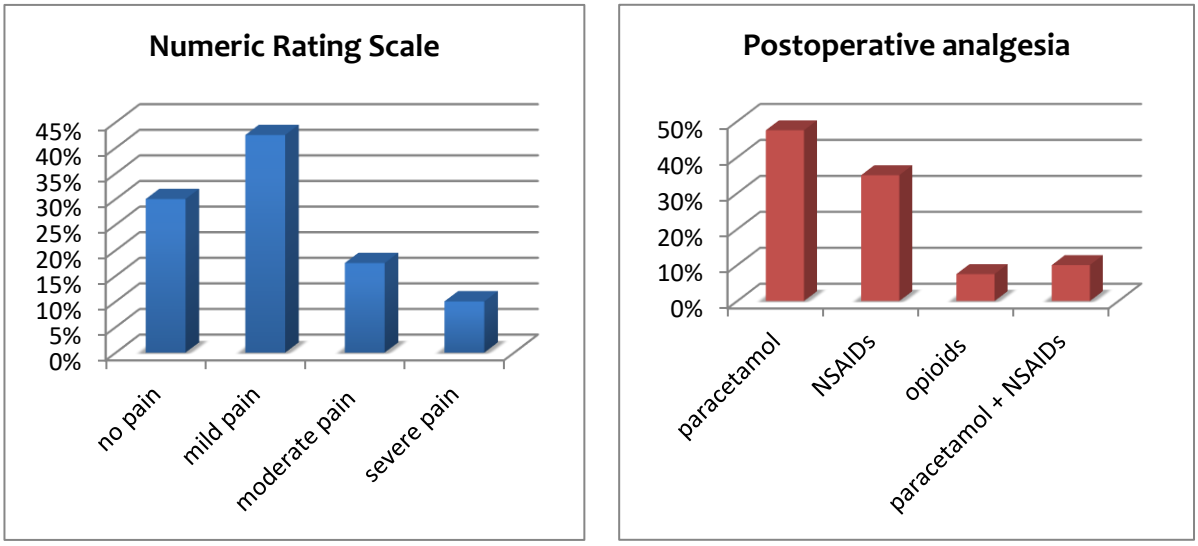

Figure 1: postoperative pain according to Numeric Rating Scale (NRS) for pain assessment and the use of analgesia (N = 40) (X^2 = 0.896, *p* value > 0.05)

Regarding the perioperative changes in the cases` GIQLI mean score, the mean total score beside the physical, social and emotional scores were all elevated

(improved) in the postoperative assessment (12 mos. after the operation) (78.8 to 100–12.7 to 20.3–7.1 to 15.8–4.2 to 14.2 respectively), while the only parameter to show a postoperative decrease (worsen) is the Gastrointestinal parameter (54.8-49.9). The perioperative change in the mean scores was not statistically significant (p> 0.05) (Figure 2). The mean BMI before operation was 49.4 Kg/m^2, the mean BMI was reduced to 45 Kg/m^2 3 mos. after surgery, then to 42 Kg/m^2 6 mos. postoperative, 39.4 Kg/m^2 9 mos. postoperative and finally in the last assessment at 12 mos. postoperatively the mean BMI reached 34.2 Kg/m^2. The perioperative change in the mean BMI was statistically significant (p< 0.05) (Fig. 3). Regarding the patients` mean percent excess body weight loss. The mean percentage was 20% at 3 month postoperative follow up, it increased to 41% at 6 mos. follow up, then 54% at 9 mos. follow up and finally reached 71% at the end of follow up (12 mos.). The postoperative change in the mean %EWL was statistically significant (p< 0.05) (Fig. 4).

Table 2: Frequency Distribution of the Studied Cases According to the Operative Data (N=40)

Variable		Frequency	Percentage
Operative duration (min)	Mean ± SD Range	91.9 ± 10.1 72 – 113	
Intraoperative Blood loss (ml)	< 50 ml	12	30%
	50 – 100 ml	8	20%
	100 – 150 ml	8	20%
	150 – 200 ml	7	17.5%
	200 – 250 ml	5	12.5%
Perioperative Hb difference (gm/dl)	< 1 gm/dl	29	72.5%
	1 – 2 gm/dl	10	25%
	2 – 3 gm/dl	1	2.5%
Intraoperative injury	No injury	31	77.5%
	Liver	7	17.5%
	Short gastric artery	2	5%
Laparotomy		0	0%
Mortality		0	0%

Discussion

Obesity has been officially recognized as a disease by the American Medical Association, thus altering our prospective for obesity as becoming not only a predisposing and contributing factor for several chronic disorders, but also a medical illness by itself that requires treatment even without being associated with another chronic disease. Laparoscopic mini gastric bypass (LMGB) was introduced as a simple (one anastomosis) operation combining both restrictive and malabsorptive functions thus suitable for obese patients especially those with metabolic derangements and high BMI. The core of the present study was based upon the above information, aiming evaluating the outcome of laparoscopic mini gastric bypass on morbidly obese patients. After performing statistical analysis for the collected data; the

mean operative time was 91.9 minutes, intraoperative blood loss was minimal in the majority of the patients (50% of the patients showed blood loss less than 100 ml and 72.5% showed less than 1 gm/dl decrease in postoperative hemoglobin). There was no intraoperative conversion to laparotomy or mortality. Regarding complications; 10% of the cases suffered from early persistent vomiting, after excluding gastrointestinal obstruction all of them were controlled with medications, 1 case (2.5%) suffered from early leakage from the gastric pouch and was treated on the next day to the operation laparoscopically with suturing.

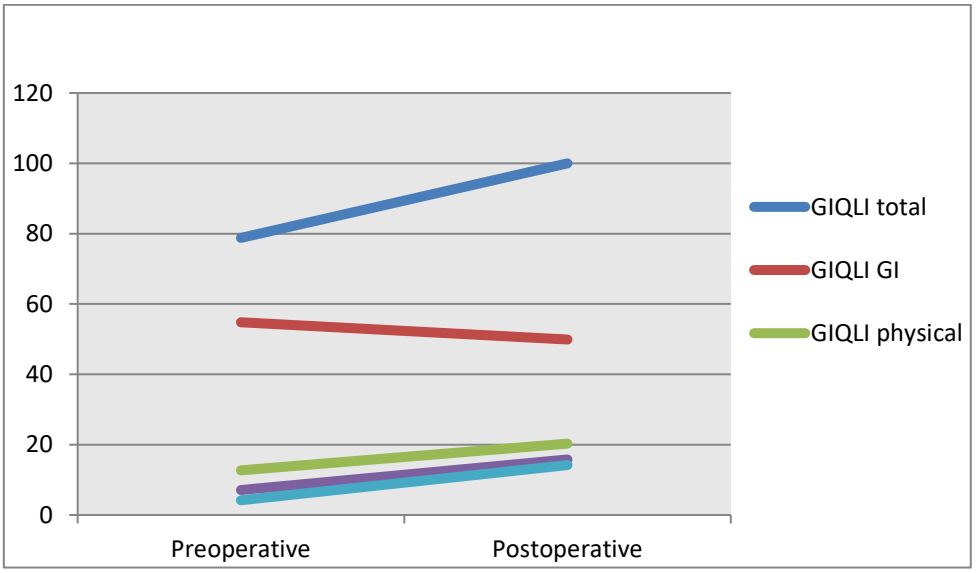

Figure 2: perioperative change in the cases` score in the Gastrointestinal Quality of Life Index (GIQLI) (N = 40)

As for the late complications (after discharge), 27.5% of the cases suffered from iron deficiency anemia (treated with oral iron supplementation), 12.5% suffered from mild hypoprotenemia (treated with diet support), 22.5% suffered from significant hair fall (treated with adjusting the type and dose of the multivitamin supplementation) and 37.5% suffered from GIT upset in the form of heart burn, flatulence and diarrhea and were treated conservatively.

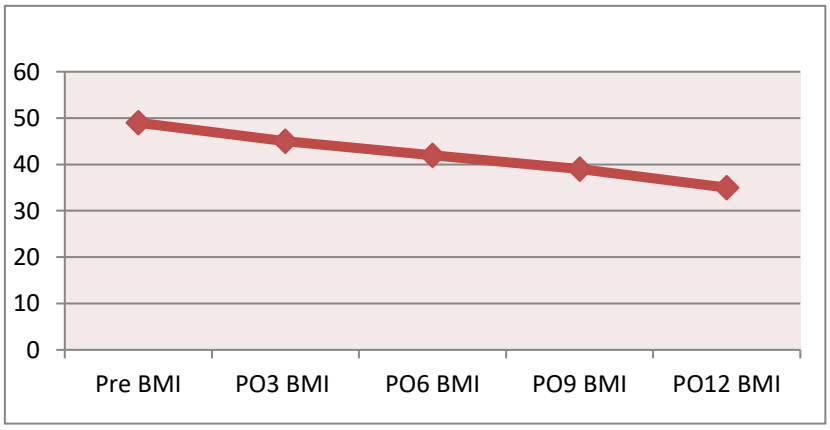

Figure 3: perioperative change in the cases` Body Mass Index (BMI) (N = 40)
$X^2 = 0.016$, $p < 0.05$

Rutledge & Walsh (2005)[10] reported in his 6-years follow up study on 2410 LMGB patients a mean operative time of 37.5 minutes, 1.08% anastomosis leaks, 0.17% conversion to laparotomy and 4.9% iron deficiency anemia, with 0.08% mortality. intraoperative blood loss ranged between 25-50 ml. While Noun et al., (2012)[11]. examined 1000 LMGB patients and reported a mean 89 min operative time, anastomotic leak in 0.5% of the cases, with neither conversion nor mortality. Lee et al., (2012)[12] compared LMGB to Roux-en-Y patients over a follow up period of 10 years. Among the LMGB patients, the mean operative time was 100 minutes, anastomotic leak was detected in 1.3% of the cases, mortality rate was 0.17% of the cases and laparotomy was required in 0.1% of the cases. The mean intraoperative blood loss was 34 ml.

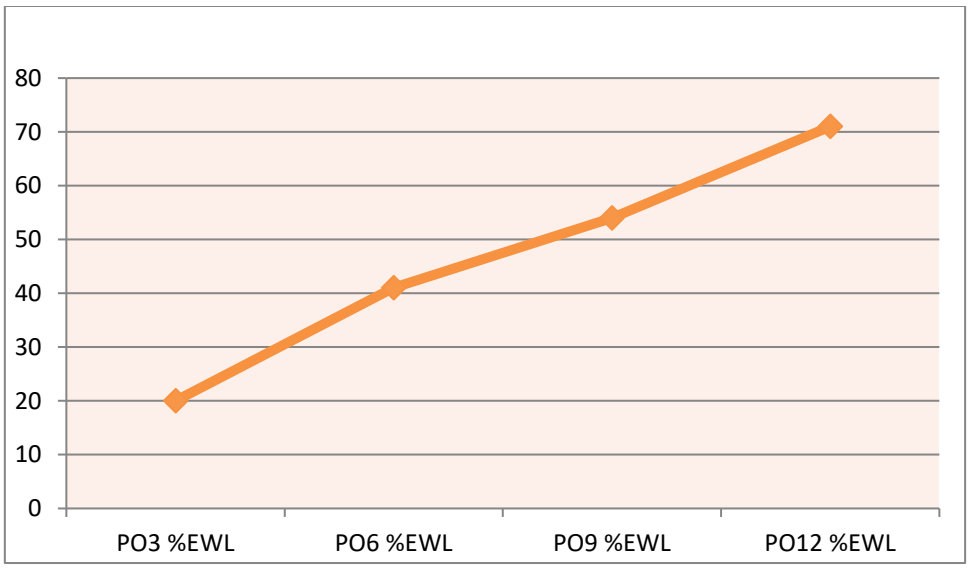

Figure 4: Postoperative Change in the Cases` Percent Excess Weight Loss (N = 40)
$X^2 = 0.041$, $p < 0.05$

Musella et al., (2014)[13] studied 974 LMGB patients in Italy and reported a mean operative time in 115 minutes, leakage in 1.03% of the patients, anemia in 5.3% of the patients, laparotomy in 1.2% and mortality in 0.2% of the patients. Kular et al., (2014)[14] studied 1054 LMGB patients for a 6-years follow up period, this study reported a mean operative time of 52 minutes, leakage in 0.2% of the cases, anemia in 7.6% and mortality in 0.18% of the patients. 1.4% of the patients suffered from hypoproteinemia. None of the patients required conversion to laparotomy. Abd-Elmonem et al., (2018)[15] reported a mean operative time of 130 minutes, a mean intraoperative bleeding of 50 ml and conversion to laparotomy in 1.6% of the patients. The present study assessed the effect of LMGB on weight loss among the patients; regarding changes in BMI, The mean BMI before operation was 49.4 Kg/m^2, the mean BMI was reduced to 45 Kg/m^2 3 months after surgery, then to 42 Kg/m^2 6 months postoperative, 39.4 Kg/m^2 9 months postoperative and finally in the last assessment at 12 months postoperatively the mean BMI reached 34.2 Kg/m^2. The perioperative change in the mean BMI was statistically significant. On calculating postoperative percent excess body weight loss; The mean percentage was 20% at 3 month postoperative follow up, it increased to 41% at 6 month follow up, then 54% at 9 month

follow up and finally reached 71% at the end of follow up (12 month). The postoperative change in the mean %EWL was statistically significant. Wang et al., (2005)[16] reported –on a 423 LMGB patients– a decrease in the mean BMI among his cases from 44.2 kg/m^2 preoperatively to 29.2 kg/m^2 1 year postoperative with a mean percent excess weight loss of 69.3%. Also, Chakhtoura et al., (2008)[17] reported a similar BMI decline from 40.9 kg/m^2 to 31.9 kg/m^2 with a mean %EWL of 63% through a 1 year follow up study on 100 LMGB patients. Piazza et al., (2011)[18] examined 197 LMGB patients for 1 year postoperatively and noticed a decline in the mean BMI from 52.9 to 39.4 kg/m^2 with a mean %EWL of 65%. Noun et al., (2012)[11] examined 923 LMGB patients and found a decline in the mean BMI from 42.5 to 28.3 kg/m^2 after 1 year of follow up with a mean %EWL of 69.9%. Musella et al., (2014) examined 974 LMGB patients and reported a decrease in the mean BMI from 48 kg/m^2 preoperatively to 31.8 kg/m^2 one year postoperative with a mean %EWL of 70%[19]. Coskun et al., (2016)[20] studied 26 obese patients with T2DM performing LMGB and followed the patients from the preoperative period to 3, 6 and 12 months postoperatively. The mean BMI changed from 45, 33.7, 26.9 to 22.4 kg/m^2 respectively. The postoperative mean %EWL was 42.2 % at 3 months, 58.6 % at 6 months and 75.1% at 12 months postoperatively. The present study compared the patients` scores in the gastrointestinal quality of life index perioperatively; the mean total score among with the physical, social and emotional scores were all elevated (improved) in the postoperative assessment (12 months after the operation) (78.8 to 100 – 12.7 to 20.3 – 7.1 to 15.8 – 4.2 to 14.2 respectively), while the only parameter to show a postoperative decrease (worsen) is the Gastrointestinal parameter (54.8 to 49.9). The perioperative change in the mean scores was not statistically significant. Wang et al., (2005) studied 423 patients underwent LMGB, they compared their perioperative GIQLI scores. The mean total score increased from 109 to 116, the mean physical, social and emotional scores increased from 17.5, 14.5 and 12.7 to 22.2, 18.3 and 16.1 respectively. While the mean gastrointestinal parameter declined from 36.5 to 34.6[16]. Lee et al., (2005) reported similar results when comparing Roux-en-Y patients to LMGB ones. Among the LMGB patients, the mean total score increased from 104.6 to 113.9, the mean physical, social and emotional scores increased from 16.2, 13.4 and 11.8 to 21.3, 17.9 and 15.8 respectively. While the mean gastrointestinal parameter declined from 63.2 to 58.9[21].

Conclusion

Comparing the results of the present study with previous literature showed a consensus regarding the positive effect of LMGB on body weight reduction, aided to the confirmed safety and feasibility of this procedure.

Conflicts of interest: None declared

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