Laparoscopic Sleeve Gastrectomy for Morbid Obesity: Technique and Preliminary Results

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Abstract: Background Laparoscopic sleeve gastrectomy (LSG) was originally used as a bridge to definitive surgery in high risk patients. Recently it has been considered as a stand- alone procedure due to its effectiveness on weight loss and co-morbidities resolution. **Aim**: To evaluate the outcome of LSG as a single therapy in the treatment of morbid obesity. **Methods**: Forty patients with morbid obesity and or obesity related co-morbidities were included in this study. Their body mass index (BMI) ranged from 35k/m^2 to 45kg/m^2 was managed from June 2009 to January 2012 at Al-Zahraa University Hospital. Preoperative demographic data, operative procedure, immediate and long-term follow-up results of LSG are analyzed according to a prospective database. **Results**: SG was performed laparoscopically in 39 cases (97.5%) with 2.5% conversion rate "in one case". The mean operative time was 105±25min. There was an acceptable excess weight loss 46.7% at 12 months and 58.8% at 18 months. Early postoperative complications revealed one case (2.5%) developed gastric outlet stenosis who died after re-operation(mortality rate); however, no leakage from stapler line, dumping syndrome, marginal ulcer, or nutritional problems were observed during postoperative follow-up. All of the main co-morbidities improved after this procedure. **Conclusion**: According to short – term follow-up LSG is a safe and effective treatment for morbid obesity. Also LSG is effective for co-morbidities resolution. Longer follow-up is needed to confirm the effectiveness of LSG as a single therapy in the treatment of morbid obesity.
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Key words: Bariatric surgery; metabolic surgery; obesity, weight loss.

1. Introduction

Obesity is a major cause of premature death, and its prevalence is increasing worldwide[(1)]. Obesity is a major risk factor for the development of insulin resistance type 2 diabetes mellitus (T2 DM)[(2)]. Cardiovascular mortality is 50% greater in obese persons and 90-% greater in severely obese persons. Because of the dramatically increased morbidity and mortality risk associated with extreme obesity, such patients who do not achieve a significant weight reduction with therapeutic life style changes or pharmacotherapy; so they may benefit from surgical intervention[(3)].

Bariatric surgery is considered as the only effective treatment with long-term sustained results for morbid obesity[(4)]. Sleeve gastrectomy (SG) was first described in 1988 by Hess and Marceau as a restrictive component of the biliopancreatic diversion with duodenal switch (BPD-DS) procedure. In 1999[(5,6)], 10 years after the introduction of minimally invasive surgery, LSG was performed as a fist step procedure in high-risk patients, to be followed by a second-step Roux-en-Y gastric bypass (LRYGBP)[(7)] or laparoscopic BPD-DS[(8)].

The original idea conceived by Gagner et al (2003)[(7)]; was to allow super- morbidly obese patients to lose weight and decrease their operative risk by allowing some co- morbid conditions to go into remission. Since SG proved to be effective, in short-term, in achieving considerable weight loss, it has been proposed by some to be used as a stand-alone bariatric procedure. Thus, SG has been indicated as a definitive treatment in patients with body mass index (BMI) >40kg/m^2 or BMI >35kg/m^2 when associated with co-morbidities[(4)].

2. Materials and Methods

Between June 2009 to January 2012, 40 obese patients were submitted to LSG in the department of General Surgery at Al Zahraa University Hospital.

Data were collected prospectively and included: age, gender, BMI and co-morbid conditions at the time of Hospital admission. They were 24 cases (60%) had a BMI from 40 to 45kg/m^2, while 16 cases (40%) had BMI from 35 to 40kg/m^2 with co-morbidities related to obesity e.g. diabetes, hypertension, and hyperlipidemia. No other co-morbidities were recorded in this study e.g alveolar hypoventilation, sleep apnea, Degenerative joint disease; cholelithiasis; dysfunctional uterine bleeding, infertility and urinary stress incontinence in females. All these patients had made reasonable attempts at weight management with diet, exercise and behavior modification. Patients excluded from this study include an extremely high operative risk, active substance abuse, major psychological or endocrinological conditions, and patients that cannot comprehend the nature of the surgical intervention and compliance with the life long diet, exercise and behavior modification. Preoperative evaluation including age, sex, BMI, clinical evaluation mainly blood pressure, chest and heart examination. Laboratory investigations mainly

complete blood picture, plasma glucose levels, serum total cholesterol (Tc), triglyceride (TG), high-density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) concentrations were determined as a baseline levels. Postoperatively patients were followed up in terms of weight loss, mortality, short and long term complications. They were also followed for co-morbidity improvement.

Surgical procedure: Under general anesthesia, the patient was placed in the supine position. Five ports were used as in Fig. (1). The supra-umbilical port is for laparoscope, two 12-mm ports were being placed one on the right and one on the left 10cm caudal from costal margin at midclavicular line, one 5mm port in the right sub-costal for the retraction of the liver, and 10-mm port in the left sub-costal margin. The division of the vascular supply of the gastric greater curvature starts at 6-8cm from the pylorus and proceeds upwards until the angle of His and is performed with (ultra sonic dissector)Harmonic Scalpel Fig. (2). The LSG was created using a linear stapler (Eendo GIA), with two sequential 4.8/60mm green load firings from the antrum, followed by two or three sequential 3.5/60-mm blue loads for the remaining gastric body and fundus or Echelon (Ethicon Endo-surgery; Johnson and Johnson) with gold cartridge. The stapler is applied alongside a 36Fr calibrating bougie, Fig. (3). The resected stomach was grasped at the antral tip by a laparoscopic grasper and retrieved through one of the port site Fig. (4). Any bleeding site was clipped. Drain was routinely placed, and the nasogastric tube was removed on the first postoperative day. Upper gastrointestinal contrast (Gastrografin) study was performed on the second postoperative day Fig. (5). Oral intake started from the second postoperative day. Patients were discharged on the third postoperative day. All patients were submitted to a routine, postoperative, oral multivitamin supplementation for life, while H_2 blocker for 6 months.

Mean operative time, hospital stay, and early postoperative complications were recorded. Short -term follow-up from 6 months to24 months (long term is more than 5 years) (average 12months) was recorded in the form of weight, BMI, blood pressure, blood glucose, TG, TC, HDL-C, LDL-C were measured at each visit at the third, sixth, ninth and twelfth postoperative months in the outpatient clinic in the first year, and followed with a visit every half year in the second year.

3. Results

Forty patients were included in this study, 5 men (12.5%) and 35 women (87.5%) while mean age was 30±11 years. The preoperative characteristics of the patients were listed in Table 1.

The operation was performed laparoscopically in 39 patients (97.5%), with conversion rate in one (2.5%) case due to massive hepatomegaly. The mean operative time 105±25min (range, 80-130). Mean postoperative hospital stay was 5 days (range 4-7 days). No operative mortality. Early postoperative complications revealed stenosis at the gastric outlet Fig. (6), in the fourth week in one patient (2.5%) requiring re-operation. Roux-en-Y gastro-jejunostomy was done, leakage from the site of anastomosis in the same patient with intra-abdominal collection, finally the patient died. On the other hand, we did not report other complications as bleeding, leakage, marginal ulcer, dumping syndrome, or wound-related complications, such as infection or herniation.

Table (1): Preoperative characteristic of patients.

Obese patients	40
Men/women	5/35
Age (years)	30±11
Body mass index (kg/m^2)	40±5
Hypertension (%) 5 patients	12.5%
Diabetes mellitus (%) 6 patients	15%
Hyperlipidemia (%) 5 patients	12.5%

Long-term complications registered were three cases (7.5%) of nausea and vomiting that required readmission. An upper endoscopy was performed, with no abnormality identified. However, their symptoms improved with oral dompridone suggesting a gastric dismotility.

Table (2): Anthropometric and metabolic modifications in LSG

	Before SG	3 months	6 months	9 months	12 months	18 months
Weight/kg	121±18	104±6	93±7	87±6	81±5	72±6
BMI (kg/m^2)	40±5	38±5	36±5	34.2±5	32.1±4	28.2±3
EBWL (%)	-	19.6	29.4	37.8	46.7	58.8
Glucose fasting (mg/dL)	170±40	140±20	130±20	110±12	107±11	101±13
SBP (mmHg)	150±20	140±15	135±10	130±10	135±5	133±5
DBP (mmHg)	102±10	90±10	86±8	82±5	80±5	80±5
TC (mg/dL) (0-200)	216±33	187±21	142±16	125±13	112±11	109±13
LDL-C (mg/dL) (0-160)	181±29	158±17	137±13	122±11	113±13	112±14
HDL-C (mg/dL) (35-55)	68±19	49±11	44±10	39±4	38±3	38±3
TG (mg/dL) (50-200)	226±32	199±22	182±13	171±11	162±13	140±12

SBP, (systolic blood pressure); DBP, (diastolic blood pressure); EBWL %, (excess body weight loss).

Anthropometric and metabolic data of the patients in this study are reported in table (2). The effect of the operation on co-morbid diseases such as diabetes,

hypertension, and hyperlipidemia revealed improvement and discontinuation of treatment in 5 diabetic cases (83%) and improvement in one case (17%). Cases of hypertension achieved cure in 4 cases (80%), while in one case (20%) the dose of treatment was reduced. All cases of hyperlipidemia were improved completely.

4. Discussion

SG is gaining popularity worldwide. The reason for this "sleeve explosion" (i) is due to less of difficulty in operation; (ii) efficacy in terms of weight loss with low rate of morbidity and mortality; (iii) no nutrients malabsorption; (iv) no "blind" stomach; (v) no dumping syndrome; (vi) feasibility of postoperative endoscopic cholangiography; (vii) absence foreign bodies; (viii) standard second stage (BPD-DS or GBP) in case of failure[1]. Patients experience excellent weight loss after SG alone, and multiple recent reports have documented SG as single therapy in the treatment of morbid obesity[9,10].

LSG is conceptually totally different because its efficacy is based not only on creating restriction, but also on inducing anorexia through the elimination of the ghrelin-producing portion of cells located in the removed gastric fundus[11]. The disadvantages of LSG include the risk of stapling complications, such as leaks, bleeding, stenosis, and the irreversibility of the procedure. In addition, lacking larger series and long-term results to support this procedure when used as a final step[12].

Rosenthal (2011)[13] reported that; the mean patient age was 42 years, with 26% male and 73% female. The mean BMI of the patients was 44±4.7kg/m^2. The mean bougie size was 37F±5.92F. The average length of hospital stay 2.5±0.93 days. The conversion rate was 1.05±1.85%. On average, patients experienced a 1.06% leak rate and 0.35% stricture rate.

Daskalakis and Weiner (2009)[4]; reported that the LSG is not a 'simple' procedure. Although low, a mortality of approximately 1% has been reported, which in a high volume center for LSG was increased to 3.2% for the group of high risk patients.

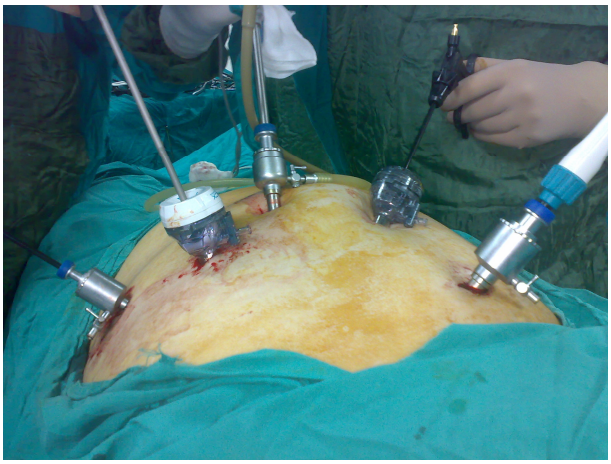

Fig. (1): Position of trocar placement.

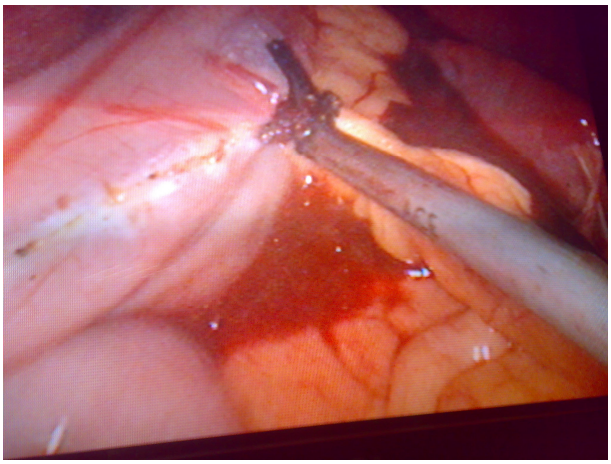

Fig.(2): The division of the vascular supply.

Fig. (3): Echelon Stapler

Fig. (4): Extraction of the resected stomach

Fig. (5): Upper gastrointestinal contrast study.

Fig. (6): Stenosis at the gastric outlet.

In this study; the mean patient age was 30 years, which is younger than the previous study; because most of cases are female (87.5%) with delayed age of marriage due to obesity. The mean BMI of the patients in this study was 40±5kg/m^2. The mean bougie size was 36F. The average length of hospital stay 5 days. The conversion rate was 2.5%; and mortality rate was 2.5%; which is relatively not differ from the previous study. Initial success in bariatric surgery is defined as over 50% excess weight loss "EWL"[(14)]. *Cottam et al. (2006)*[(15)] reported that an EWL of 33-51% with LSG at 12 months when utilized as a step approach. Abu-Jaish and *Rosenthal (2010)*[(11)]; reported that the mean EWL is 49% and 56% at 6 and 12 months, respectively. In this study EBWL 46.7% at 12 months and 58.8% at 18 months. The average percentage EWL is dependant on size of bougie used, and reinforcement of the stapler lines, to decrease the size of the remaining portion of the stomach. In this study the size of bougie 36F, and no inforcement of stapler lines to avoid stenosis later on.

Moon Han et al. (2005)[(16)]; showed that SG without the second-stage operation was associated with an EWL of 71% and with a 100% resolution rate of T2 DM at 6 months after surgery.

Kazunori et al. (2009)[(17)]; reported that the resolution of DM in 92.9% of cases and improvement in 7.1% of cases. The resolution rate of hyperlipidemia showed 100% after 3 months. The resolution of hypertension was in 85.7% and improvement in 14.3%. In this study; all of the main co-morbidities improved after this procedure, hyperlipidemia 100%, hypertension 80%; and T2 DM in 83% after 1 year follow-up.

References

1. Basso N, Casella G, Rizzello M. Laparoscopic sleeve gastrectomy as first stage or definitive intent in 300 consecutive cases. Surg Endosco. 2011;25:444-9.
2. Mario Rizzello, Francesca Abbatini; Giovanni Casella. Early post-operative insulin-resistance changes after sleeve gastrectomy. Obes Surg, 2010;20:50-5.
3. Dennis G, Sorenson T. Metabolic and bariatric surgery for obesity:A review Medicine Special Issue. 2011:57-62.
4. Daskalakis M, Weiner R. Sleeve gastrectomy as a single-stage bariatric operation: indications and limitations. Obesity Facts. 2009;2:8-10.
5. Marceau P. Hould FS. simard S. Biliopancreatic diversion with duodenal switch. World J surgery. 1998;22:947-54.
6. Hess DS, Hess DW. Biliopancreatic diversion with a duodenal switch. Obes Surg. 1998;8:267-82.
7. Gagner M, Regan JP, Inabnet WB. Early experience with two-stage laparoscopic Roux-en-Y gastric bypass as an alternative in the super-super obese patient. Obes Surg. 2003 Dec;13(6):861-864.
8. Silecchia G, Boru C, Pecchia A. Effectiveness of laparoscopic sleeve gastrectomy (first stage of biliopancreatic diversion with duodenal switch) on co-morbidities in super-obese high-risk patients. Obes Surg. 2006;16:1138-44.
9. Felberbauer FX, Langer F, Shakeri-Manesch S. Laparoscopic sleeve gastrectomy as an isolated bariatric

procedure: intermediate-term results from a large series in three Austrian centers. Obes Surg. 2008;18:814-18.
10. Nocca D, Krawczykowsky D, Bomans B, Noel P. A prospective multicenter study of 163 sleeve gastrectomies: results at 1 and 2 years. Obes Surg. 2008;18:560-5.
11. Abu-Jaish W, Rosenthal RJ. Sleeve gastrectomy: a new surgical approach for morbid obesity. Expert Rev Gastroenterol Hepatol. 2010;4:101-19.
12. Tucker ON, Szomstein S, Rosenthal RJ. Indications for sleeve gastrectomy as a primary procedure for weight loss in the morbidly obese. J Gastrointest Surg. 2008;12:662-7.
13. Rosenthal RJ. International sleeve gastrectomy expert panel consensus statement: best practice guidelines based on experience of >12.000 cases. Surgery for Obesity and related Disease. 2011;27:1-12.
14. Gumbs AA, Modlin IM, Ballantyne GH. Changes in insulin resistance following bariatric surgery: role of caloric restriction and weight loss. Obes Surg. 2005;15:462-73.
15. Cottam D, Qureshi FG, Mattar SG. Laparoscopic sleeve gastrectomy as an initial weight-loss procedure for high-risk patients with morbid obesity. Surg. Endosc. 2006;20:859-63.
16. Moon Han S, Kim WW, Oh JH. Results of laparoscopic sleeve gastrectomy (LSG) at 1 year in morbidly obese Korean patients. Obes Surg. 2005;15:1469-75.
17. Kazunori K, Tagaya N, Kanehira E. Laparoscopic sleeve gastrectomy with duodenojejunal bypass: technique and preliminary results. Obes Surg. 2009;19:1341-5.

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