



LAPAROSCOPIC SLEEVE GASTRECTOMY IN MORBIDLY OBESE PATIENTS, OUR EXPERIENCE IN A REMOTE TERTIARY CARE HOSPITAL

General Surgery

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ABSTRACT

INTRODUCTION: Obesity is a medical condition in which excess body fat has accumulated to an extent that it may have an adverse effect on health of a person. Obesity is responsible for metabolic dysfunction involving lipid and glucose metabolism. Bariatric surgery remains the only effective treatment for inducing and maintaining satisfactory weight loss and in reducing weight related co morbidities for the morbidly obese patients.

AIM: To evaluate the efficacy of Laparoscopic Sleeve Gastrectomy (LSG) as a definitive procedure for morbidly obese patients.

MATERIAL AND METHODS: The present study was both retrospective and prospective in design and was conducted in the department of general and minimal access surgery, SKIMS, Srinagar. All patients fulfilling inclusion criteria like patients with BMI >40 kg/m² without associated medical co-morbidity, BMI >35kg/m² with an associated medical co-morbidity, failed dietary therapy, psychiatrically stable without alcohol dependence or illegal drug use & who had undergone bariatric gastrectomy with available techniques from September 2011 to April 2016 were included in the study. 15 morbidly obese patients underwent LSG. The operation was performed through two 12 mm and two 5 mm ports, using the Endo-GIA stapler to create a lesser curve gastric tube over a 36-Fr bougie. The data was analyzed using SPSS software (24) with p<0.001 as the significant value.

RESULTS: A total of 15 patients were included in the study. Age of the patients ranged from 23 to 61 years with a mean age of 44.13 years and SD 12.55 years. There were eleven females and four males, aged 44.13±12.55 yrs and mean pre-operative weight of 122.53±24.82 kg. Post operatively, mean weight at 3 months follow-up was 109.73±22.89 kg, at 6 month follow-up was 94.27±20.10 kg, and at 1 year was 78.80±17.53 kg. At the follow-up (7.5±4.4 months post operatively), the % EWL (Percentage Excess weight loss) was 35.7±10.1. Eight patients who received regular postoperative dietician counseling during follow-up did better than the patients who did not (% EWL 40.4±3.8 vs. 30.2±4.1, respectively). All patients reported significant loss of appetite. LSG had a significant effect on the state of hypertension, diabetes mellitus and dyslipidemia; though it had an insignificant effect on obstructive sleep apnoea. There was one staple line haemorrhage that led to haemodynamic instability, ultimately requiring surgical exploration with haemostasis.

CONCLUSION: Although the number of patients is relatively small, the data of this study indicate that laparoscopic sleeve gastrectomy is effective in weight reduction, and an increase in %EWL and %EBL, being an acceptable surgical option for morbidly obese patients. It improves the metabolism of insulin, glucose and lipids. The achieved body weight loss improves the patient's quality of life and improves or resolves co morbidities such as metabolic syndrome. A higher number of patients and longer follow-up period will be necessary to evaluate long-term efficacy.

KEYWORDS

Bariatric surgery, metabolic syndrome, obstructive sleep apnoea, Obesity.

INTRODUCTION

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health [1]. Obesity is responsible for metabolic dysfunction involving lipid and glucose. It is one of the leading preventable causes of death worldwide [2]. Currently more than 1 billion adults are overweight and at least 300 million of them are clinically obese. Obesity accounts for 26% of total health care costs in several developed countries. In the United States obesity is estimated to cause an excess 111,909 to 365,000 death per year, while 1 million (7.7%) of deaths in the European Union are attributed to excess weight [3]. The ICMR-INDIAB study is the first study from India to estimate the prevalence of obesity (generalized and abdominal) among urban and rural residents of states of India. According to this study, the highest prevalence of obesity was found in Chandigarh followed by Tamil Nadu, Maharashtra and Jharkhand. Among women aged 35-70 yr, the age-adjusted prevalence of obesity (BMI ≥25 kg/m²) in urban and rural areas was 45.6% and 22.5%, respectively [4].

Obesity is defined by body mass index (BMI) i.e. subject's mass in kilogram divided by the square of height in meter and further evaluated in terms of fat distribution via the waist-hip ratio and total cardiovascular risk factors [5]. BMI is closely related to both percentage body fat and total body fat [6]”Table/Figure1”.

Genetic studies of families and populations have generated useful

information on genes and mutations associated with obesity, body fat distribution, and other relevant phenotypes [7]. Morbid obesity defined as BMI of 40 or more or 35 and experiencing obesity related health problems like high blood pressure or diabetes, is also associated with cardiac, liver, intestinal, pulmonary, endocrine, and reproductive dysfunctioning. Complications are either directly caused by obesity or indirectly related through mechanisms sharing a common cause such as a poor diet or a sedentary lifestyle.

Non operative management with diet, exercise, behaviour modifications, and medications rarely achieves adequate sustainable weight loss in morbidly obese patients [8]. Surgery is the only proven long term effective treatment for morbid obesity. However, surgical treatment of high risk patients remains a challenge even in highly specialized centres [9]. Bariatric surgery remains the only effective treatment for inducing and maintaining satisfactory weight loss and reducing weight related co morbidities for the morbidly obese patients [10]. There are four types of operations that are commonly offered: AGB (Adjustable gastric band), Roux-en-Y gastric bypass (RYGB), biliopancreatic diversion with a duodenal switch (BPD-DS), and Laparoscopic sleeve gastrectomy (LSG). Each surgery has its own benefits and risks.

This study was carried out to study the reduction in weight, complications and effect of LSG over co morbidities associated with obesity.

MATERIAL AND METHODS

The present study was both retrospective and prospective in design and was conducted in the department of General and minimal access Surgery, SKIMS, Srinagar. All patients fulfilling the inclusion criteria & who had undergone Bariatric gastrectomy with available techniques from September 2011 to April 2016 were included in the study. Total 15 patients were retrospectively and prospectively evaluated.

INCLUSION CRITERIA:-

Patients with BMI >40 kg/m² without associated medical co-morbidity, patients with BMI >35kg/m² with an associated medical co-morbidity, failed dietary therapy, psychiatrically stable patients without alcohol dependence or illegal drug use fulfilling other criteria, patients willing for the surgery and having knowledge about the procedure and patients with medical problems not precluding probable survival from surgery.

Total 15 morbidly obese patients underwent LSG. All the patients who presented to general surgery outdoor and those referred from endocrinology department were taken for the study. Patients fulfilling the inclusion criteria were included in the study and those not fulfilling the criteria were excluded. The operation was performed using the Endo-GIA stapler to create a lesser curve gastric tube over a 36-Fr bougie. With the patient intubated in supine position, pneumoperitoneum is established through the umbilicus using the open (Hassan) technique. A 12 mm trocar is introduced through umbilicus as camera port and two 12 mm trocars are placed on the right and left clavicular line as working ports. One 5 mm trocar is placed on the left anterior axillary line. One 5 mm epigastria port is used for liver retraction. After the identification of the gastric antrum (measurement of the distal 7 cm from the pylorus on the greater curvature), harmonic scalpel is utilized to dissect greater omentum from the greater curvature of stomach. Dissection is continued up to gastro esophageal junction. After greater curvature is freed from the omentum, 45 mm - 3.5 mm linear stapler is fired at the point of the initial dissection on the greater curvature, creating a vertical cut on the gastric wall. Then a 36-Fr bougie is inserted and sequential firings of the endo Gastro-Intestinal-Anastomosis (GIA) with 60 mm - 3.5 mm linear staplers were applied over it, up to the esophagogastric junction. The excised portion of stomach is then extracted through the umbilicus. Usually drains were not needed. A nasogastric tube was left in place in the remnant gastric tube and intermittent suction was applied to it.

Prior to the introduction of bariatric surgery, non operative management with diet, exercise, behavior modifications, and medications was the mainstay treatment but rarely achieves adequate sustainable weight loss [8]. Most of our patients were being evaluated in the department of endocrinology for their metabolic syndrome and were referred to our department for bariatric surgery after fulfilling inclusion criteria. Our patients were mainly concerned for their metabolic disorders and were being treated medically. So convincing them that by operating on their stomach to improve their metabolic disorders was a real challenge for the operating surgeon. Second most important issue was the financial issue because most of our patients were from lower middle class family.

Ethical clearance: This study was cleared by the ethical committee of SKIMS.

Statistics:

Data was analyzed using SPSS software (24) with p<0.001 as significant value. statistical tests.

RESULTS

A total of 15 patients were included on the basis of inclusion criteria. Age of the patients ranged from 23 to 61 years with a mean age of 44.13 years and SD 12.55 years (Table 2). Out of 15 patients, there were 4 males and 11 females patients (p-value=0.071).

Pre-operatively patients were weighed. Weight of patients ranged from 91-180 kg with mean weight of 122.53±24.82 kg. (Fig-1/Table 1)

Pre-operatively, hypertension was present in 11 (out of 15) patients (73.33%), diabetes mellitus in 7 patients (46.67%), dyslipidemia in 6 patients (40%), Obstructive sleep apnea in 5 patients (33.33%)(Fig-2/Table 2). Post-operatively, effect on associated co morbidities was also studied and it was found that among 7 diabetics, 5 patients did not require any anti-diabetic treatment postoperatively, 1 patient remained

on pre-operative treatment and 1 was shifted from injectable to oral treatment (p=0.002), 5 patients had obstructive sleep apnea (OSA) pre-operatively, out of whom 1 patient improved and the rest 4 continued to have OSA (p=0.690). (Fig 2/Table 2)

Pre-operatively weight of patients ranged from 91-180 kg with mean weight of 122.53±24.82 kg. Post operatively mean weight at 3 month follow-up was 109.73±22.89 kg, at 6 month follow-up was 94.27±20.10 kg, and at 1 year was 78.80±17.53 kg with a significant mean weight loss of 35.69% over a period of 1 year (p-value=<0.001). (Fig-3/Table 3)

Mean pre-operative BMI was 47.75kg/m² with a standard deviation of 8.78 kg/m² and range 37.5kg/m² to 66.4kg/m². Mean post-operative BMI at 1 year was 30.60±5.65kg/m². Pre and post-operative results were compared (p<0.05) and is shown in scatter diagram. (Fig 4/table 4)

Minor complications in the form of wound infection, basal atelectasis, thrombophlebitis etc were reported in 6 patients (40%). Major complication in the form of gastric leak with hemorrhage that ultimately required revision surgery was noted in 1 patient (6.67%).

DISCUSSION

LSG originally proved to be a beneficial procedure for interval weight loss as the first stage of a two-staged bypass procedure [11]. More recently, LSG is showing promise as a primary bariatric procedure for appropriate candidates [12, 13, and 14].

The mean age of patients in our study was 44.13 years ± 12.55, with 11(73%) females and 4(27%) males. In a study of 529 cases by Drake Eric Bellanger et al [15], the mean age of patients was 43.43±10.63 years with 81.5% females and 18.5% males. The mean preoperative weight and BMI of our patients was 122.53±24.82 kg and 47.75kg/m² ±8.78 kg/m², respectively. Drake Eric Bellanger et al [15] report similar values of 124.7±29.0 kg and 44.26±8.54 kg/m² respectively. In a systematic review by Brethauer et al. [16], weight loss ranged from 33% to 85% of excess weight in patients having LSG. Wiener et al. [17] have demonstrated the durability of LSG at 5 years. There is continued disagreement as to whether LSG represents a strictly restrictive procedure versus combination restrictive/hormonal procedure [18]. Studies have shown the effects of LSG on ghrelin levels and hunger [19], as well as additional metabolic hormones [20].

LSG as a definitive bariatric procedure was quite successful for body weight reduction in our series. Following the operation, a statistically significant mean weight loss of 35.69% over a period of 1 year was observed. Other authors have disclosed analogous results. In one of the first studies on the efficacy of LSG by Gagner et al [21], 20 patients who underwent LSG were compared with 57 patients who had undergone Intra-gastric Balloon. The study showed that at six months patients undergoing LSG showed a faster and greater weight loss than those using an intra-gastric balloon. Moreover, LSG was found to be a safe procedure, with reproducible results, in contrast to the intra-gastric balloon which was tolerated by 93% of the patients. In a study from Mogno P et al [22] which included ten patients, the average %EWL and BMI reduction at one year were 51% and 23%, respectively. It was concluded that LSG can be safely integrated into a bariatric surgical program with good results in terms of weight loss and quality of life. In a study conducted by Cottam D et al [23] involving 126 patients with a preoperative mean BMI value of 65.3±0.8, the mean %EWL after LSG at one year was 46. One distant mortality was encountered, and the incidence of major complications reached 13%. Rosenthal RJ et al [24] reported 30 patients with a mean preoperative BMI value of 41.4. Mean weight loss in this study at three and six months postoperatively was 22.7 kg and 30.5 kg and mean % EWL 40.7 and 52.8, respectively. These figures along with ours compare favorably with those reported for adjustable Gastric Banding [25,26,27] and even for Roux-en-Y Gastric Bypass [28,29], series thus far reported. In a recent prospective randomized trial of LSG vs. gastric banding (GB) (25), the median %EWL at one year was 41.4 after GB and 57.7 after LSG (P-value=0.001) and at three years 48 after GB and 66 after LSG (P value=0.003). Moreover, weight loss and loss of feeling of hunger after one year and three years were better after LSG than GB. In our patients, weight loss was found to be steady in all patients throughout the follow-up.

Improvement of the co-morbid conditions was significant. Type 2

diabetes mellitus (T2DM) was diagnosed in 7 patients before surgery that improved in 5 patients (71.43%). Arterial hypertension improved in 9 (81.81%) of the initial 11 patients at 1 year after LSG surgery; dyslipidemia in 6 (100%) out of 6 hyperlipidemic patients. Also at 1 year post-surgery, symptoms of OSA improved in 1(20%) of 5 OSA (Obstructive sleep apnea) patients. In a study by Hady Razak Hady et al [30], statistically significant reduction in postoperative BMI, plasma levels of glucose and insulin as well as the homeostatic model assessment insulin resistance (HOMA IR) score was noted in comparison to the preoperative values. The ghrelin levels decreased. Lipid profile, AST and ALT levels varied depending on the particular time points.

The co-existence of obesity with insulin resistance has been studied extensively and is well documented. Silecchia et al. [31] documented resolution of non-insulin-dependent DM (NIDDM) in 69.2% and 76.9% of patients, 12 and 18 months after LSG, and improvement of NIDDM in 15.4% and 15.4% in patients with super morbid obesity respectively.

Technically, this operation appears to be less demanding than the Roux-en-Y gastric bypass. However, certain specific operative points must be emphasized.

An issue involves the bougie that is used to create the gastric tube. We have found it difficult to stabilize it across the lesser curve, indicating that care should be taken regarding possible accidental grasping by the GIA stapler.

Onset and duration of prophylactic anticoagulation constitutes another challenging issue. Since the operation involves the creation of a lengthy suture line that is especially prone to hemorrhage, sound clinical judgment should be exercised. We rely on intra-operative pneumatic compression stockings devices and early mobilization of the patient. Low-molecular weight heparin is started on the 1st postoperative day when the patient is haemodynamically stable and blood haemoglobin shows no serious decrease. We had no pulmonary embolism episodes but the hemorrhagic event and the hematomas arouse some skepticism as to the anticoagulation scheme.

The incidence of staple line dehiscence after LSG ranges from 0% to 5.5% [32, 33, 34, 35, and 36] and with overall complication rates ranging from 0% to 24% [16]. Lalor et al. [34] have advocated oversewing the staple line to minimize staple line dehiscence while others routinely use only buttress material or both [17]. Additionally, some studies have advocated avoiding the incorporation of the area of the gastro-esophageal junction into the staple line [33, 34]. Our results of 6.67% leak rate compares favorably with the literature. We firmly believe there are two main tenets to adopt in order to minimize leaks. First, and of utmost importance, is to avoid creating a physiologic stricture at the incisura angularis and second, avoid stapling too close to the esophagus in the area of the cardia. While doing LSG, we have observed that compression of stapled gastric tissue with the stapled device reduces bleeding from the staple line, hence decreases the need of reinforcement of staple line with suture and saves time. Leaks after LSG can result in significant morbidity. There is also a tendency for leaks after LSG to occur in a latent fashion and appears to be associated with an increase pressure in the sleeved stomach and/or improper staple formation.

Drake Eric Bellanger et al (49) in a study on 529 cases report a total complication rate of 3.2% and a 1.7% 30-day readmission rate. No leaks occurred in any of the 529 patients, and one death (0.19%) was observed. The most common complications were nausea and vomiting with dehydration and venous thrombosis.

Nevertheless, LSG has been associated with several important advantages in terms of pylorus preservation (avoidance of dumping syndrome) and preservation of intestinal continuity (no intestinal bypass and malabsorption).

LIMITATIONS

The main weaknesses of our study include a small sample size and limited duration of follow-up.

CONCLUSIONS

The LSG procedure causes noticeable weight loss with BMI reduction and an increase in %EWL and %EBL. It improves the metabolism of

insulin, glucose and lipids. The achieved body weight loss improves the patient's quality of life and improves and/or resolves co morbidities such as metabolic syndrome. In our opinion one should consider the LSG procedure to be the first line of treatment in super morbid obesity, as it is relatively easy to perform with a low burden of peri-operative morbidity.

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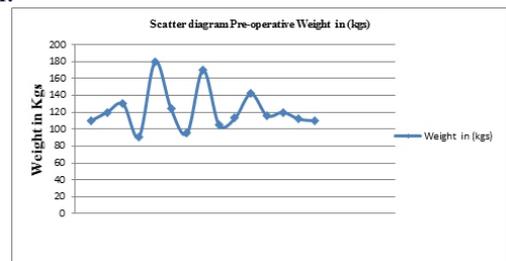
TABLE : 1

| BMI(kg/m ²) | Classification |
|-------------------------|---------------------------|
| <18.5 | Underweight |
| 18.5-24.9 | Normal weight |
| 25-29.9 | Overweight |
| 30-34.9 | Class I Obesity (obese) |
| 35-39.9 | Class II Obesity(severe) |
| 40-44.9 | Class III Obesity(morbid) |
| 45-49.9 | Super obese |
| 50 &> | Super super obese |

Table 2: Demographic profile of patients.

| Age groups(in years) | No. of patients | Percentage |
|----------------------|-----------------|--------------|
| 20-40 | 6 | 40.0% |
| 40-60 | 8 | 53.33% |
| >60 | 1 | 6.67% |
| Total | 15 | 100.0 |

Fig 1.



Note: X axis depicts the number of patients.

Fig 3.

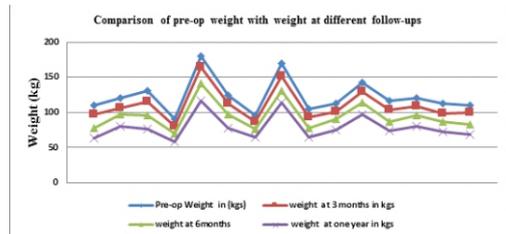
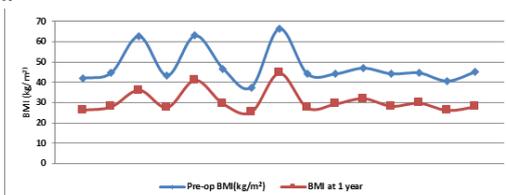


Table 3. Showing the pattern of weight reduction on follow-up

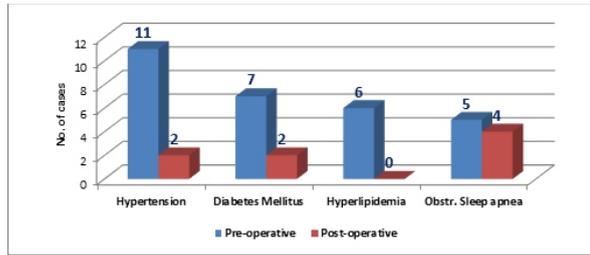
| | Mean weight at follow-up (kg) | %age reduction in weight from pre-op value | Paired t-test (t-stat) | t-critical | p-value |
|----------------|-------------------------------|--|------------------------|------------|---------|
| 3 month | 109.73±22.89 | 10.45% | 20.434 | 2.144 | <0.001 |
| 6 month | 94.27±20.10 | 23.10% | 17.678 | 2.144 | <0.001 |
| 1 year | 78.80±17.53 | 35.69% | 19.624 | 2.144 | <0.001 |

Fig 4.



Note: X axis depicts the number of patients.

Fig 2. Graphical representation of impact of LSG over the associated co morbidities.



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