

Early Laparoscopic Sleeve Gastrectomy Outcomes in Terms of Weight Loss

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ABSTRACT

Objective: To investigate the outcomes of laparoscopic sleeve gastrectomy (LSG) in terms of weight loss.

Study Design: Descriptive cohort study.

Place and Duration of Study: Department of Surgery, Shifa International Hospital, Islamabad, from January 2009 to January 2015.

Methodology: A total of 100 consecutive patients were included in the study through retrospective chart review. A 5-port technique was utilized with the gastric sleeve being created using endostapler. Postoperatively, patients gradually progressed from clear liquid diet and oral rehydration salts to nutritional supplements over three days. By two weeks postoperatively, patients had progressed to a solid diet. SPSS was used for data entry and analysis. Body mass index (BMI) and weight in kg were determined.

Results: From 100 patients, 17 were lost to follow-up less than a week into the postoperative period. Of the remaining, average age of the patients was 34.7 ± 11.3 years at the time of surgery. The majority of patients were females (72%). Mean preoperative and postoperative BMI was 45.3 ± 10.4 kg/m² and 35.0 ± 10 kg/m², respectively. Of the 83 patients, 62 were followed-up for longer than 1 month (average 419 days). For patients in this category, mean reduction in BMI was 10.3 ± 6.5 kg/m² with average weight loss of 34.3 ± 18.2 kg. There were no mortalities associated with LSG.

Conclusion: Laparoscopic sleeve gastrectomy is a safe and effective intervention in young Pakistani females with encouraging outcomes at a mean follow-up of over one year.

Key Words: Laparoscopic sleeve gastrectomy. Pakistan. Obesity. Females. Body mass index (BMI).

INTRODUCTION

Obesity is progressively becoming a major global healthcare problem.¹⁻³ This phenomenon can be attributed to heterogeneous urbanization with first world chronic diseases, featuring prominently in the major urban centers of developing countries. The same is true for Pakistan where a triple burden of disease exists encompassing infectious diseases, chronic diseases and trauma.⁴ Obesity presents a unique healthcare challenge. Almost all members of any given population are at risk of developing obesity. Furthermore, it has a profound impact on multiple aspects of human wellbeing including health, psychosocial state, and the associated economic burden of having a chronic disease that leads to multiple health problems. This pervasive impact highlights the need for a definitive solution. In terms of a solution to the problem of obesity, surgical interventions have proven to be more effective and durable than non-operative approaches internationally.⁵⁻⁷ One such procedure garnering interest is the LSG.⁸⁻¹⁰

Compared to other bariatric procedures like laparoscopic gastric bypass, LSG has been demonstrated to have a number of advantages including an easier

learning curve, lesser alteration of natural anatomy and the potential for follow-up bariatric procedures, if postoperative weight loss is not satisfactory. However, the efficacy of the procedure in inducing weight loss has not been investigated in the Pakistani population. Unlike most surgical procedures, the outcomes of bariatric procedures like LSG are highly dependent on cultural patterns like diet and lifestyle. This makes it essential to validate the efficacy of the procedure in the Pakistani population.

Keeping this in mind, the aim of this study was to analyze the early outcomes of LSG in terms of weight loss and treatment of obesity-related co-morbidities when done by a single surgeon at an academic tertiary care hospital in Pakistan.

METHODOLOGY

Institutional Review Board approval was obtained prior to commencement of the study. The data was retrospectively reviewed for 100 consecutive patients, who received a LSG from January 2009 to January 2015. This included 4 patients with concomitant laparoscopic band removal. All surgeries were performed by the same surgeon. All patients received a preoperative assessment by a multidisciplinary team including surgeons, anesthetists and nutritionists. Preoperative weight was taken on the day of surgery and then at regular follow-ups. All consenting patients were included regardless of gender, weight or outcomes.

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The patient was positioned on Allen stirrups and sequential compression devices were applied along with appropriate preoperative antibiotics. A 5-port access technique was used. Pneumoperitoneum was achieved through a supraumbilical incision 10 cm from the xiphoid process followed by insufflation to 15 mmHg using a Veress needle technique. Next, a 10 mm camera port was placed and general laparoscopy was carried out using a 30° angled laparoscope. This was followed by two 12 mm working ports placed in the same transverse plane above the camera port; one 2 cm to the right of the midline and the other in the left midclavicular line. Both of these ports were used for dissection and stapling. A smaller 5 mm port was placed along the left subcostal margin lateral to the 12 mm port for retraction of the omentum and fundus of the stomach. Finally, a 10 mm infra-xiphoid epigastric port was placed for retraction of the left lobe of the liver. Following establishment of the ports, the left lobe of the liver was retracted and the whole stomach was visualized. Once the pylorus was identified, a window was created between the greater curvature of the stomach and the greater omentum to obtain access to the lesser sac. Using this window, the entire greater curvature was devascularized starting 5 cm proximal to the pylorus and moving up to the esophagogastric junction using a harmonic scalpel. Particular care was taken at this stage due to the proximity of the spleen. In addition, the posterior wall of the stomach was also released from the underlying tissues with a combination of sharp and blunt dissection. With completion of the preparatory dissection, progress was made to the actual stapling stage. A 36 French bougie was inserted under laryngoscopic guidance down to the antrum of the stomach. A linear cutting endostapler was then used to staple and divide the stomach serially starting 5 cm from the pylorus and progressing up to the esophagogastric junction using the bougie as a guide to prevent deviation of the staple line. This step was further reinforced by oversewing the staple line with Vicryl 2/0 using an intracorporeal technique followed by a methylene blue leak test through a nasogastric tube used to replace the bougie. The transected gastric component was extracted through the left flank 12 mm port and sent for histopathological analysis. The final stage of the procedure was to secure hemostasis and place an 18 French drain along the staple line and to secure the drain with silk 1. The ports were then extracted after reducing the pneumoperitoneum, local anesthetic was infiltrated along the port lines, and the skin was closed using surgical staples followed by application of sterile dressing.

Following the surgery, patients were started on sips of water on postoperative day one. On postoperative day two, they were progressed to oral rehydration salts (ORS). From postoperative day three, they were started

on a customized blenderized diet designed by the team nutritionist until eventual progression to solids. Gastrograffin leak test was not part of the routine investigations. Postoperative weight loss was assessed on routine follow-up in the clinic.

Data was analyzed using SPSS version 22.0 (Armonk, NY). The primary outcome measure was postoperative weight loss. The secondary outcome measure was mortality rate to assess safety of the procedure. Descriptive statistics in terms of mean ± standard deviation were calculated for continuous variables while frequencies and percentages were calculated for categorical variables.

RESULTS

The first 100 patients to undergo LGS at our institution were included in the study with one of these patients undergoing the procedure twice (101 procedures). Of these, the majority were females (n=72) with 28 recipients being male. Of the 101 procedures, 5 patients were still in the first postoperative week and hence excluded from the analysis. The average age at the time of procedure was 34.7 ±11.3 years (range 12 - 62 years). Average weight at presentation was 128 ±14 kg (range = 87 - 214 kg). Of the remaining 96 patients, 14 were lost to follow-up. Sixteen patients belonged to the superobese category (BMI > 50). Mean preoperative

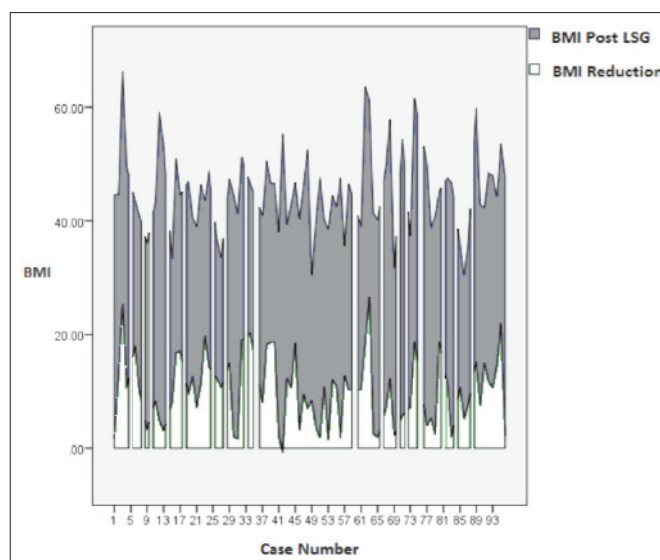


Figure 1: Stacked graph showing BMI after LSG with the associated weight loss for each case.

Table I: Means by gender.

	Male	Female
Age (years)	33.3 ± 9.2	36.2 ± 12.1
Follow-up period (days)	275 ± 281	334 ± 376.3
Presenting BMI (kg/m ²)	47.5 ± 9.1	44.3 ± 10.9
BMI last follow-up (kg/m ²)	36.9 ± 7.9	34.1 ± 10.9
Weight loss (kg)	34.3 ± 19.7	25.3 ± 17.1
BMI reduction (kg/m ²)	11.3 ± 6.8	9.7 ± 6.4

BMI and BMI at last follow-up were $45.3 \pm 10.4 \text{ kg/m}^2$ and $35.0 \pm 10 \text{ kg/m}^2$, respectively. Hence, the overall mean BMI reduction was $10.3 \pm 6.5 \text{ kg/m}^2$ (Figure 1).

Figure 1 depicts post-LSG BMI for each individual case along with the associated BMI reduction. Overall, the average weight loss was $27.9 \pm 18.2 \text{ kg}$. In the superobese category, mean reduction in BMI was $13.5 \pm 8.4 \text{ kg/m}^2$, whereas in the remaining patients mean BMI reduction was $9.4 \pm 5.5 \text{ kg/m}^2$. Average follow-up period was 327 ± 348 days. The patients were further divided in to group A and B with less than one month and more than one month follow-up, respectively. Of the 82 cases followed, 21 fit into category A. Of these 21, the average follow-up was 12 ± 4 days. During this period, average BMI reduced from $44.4 \pm 7.2 \text{ kg/m}^2$ to $41.5 \pm 7.6 \text{ kg/m}^2$, representing a mean BMI reduction of $2.9 \pm 2.7 \text{ kg/m}^2$ for patients still within the postoperative period of 30 days. Sixty-two patients fit into category B, for which average follow-up was 419 ± 345 days. Mean weight loss was $34.3 \pm 16 \text{ kg}$ which was a reduction in average BMI from $45.6 \pm 11.5 \text{ kg/m}^2$ to $33.0 \pm 10.3 \text{ kg/m}^2$, representing a mean BMI reduction of $12.6 \pm 5.6 \text{ kg/m}^2$. Table 1 summarizes gender specific data.

DISCUSSION

With a global rise in obesity, bariatric surgery has evolved some promising interventions to tackle this chronic phenomenon.¹¹ These surgeries are not merely cosmetic interventions as there is a demonstrated reduction in obesity related comorbidities with the associated weight loss.¹² They offer the most effective intervention for obesity even in people who have not sufficiently benefited from non-operative methods.⁷ Non-operative interventions like diet, behaviour modification and increased calorie expenditure through exercise and medications¹³ are usually the first line for combating obesity. However, in many cases they fail to produce durable weight loss.¹⁴

Laparoscopic gastric bypass remains the gold standard,¹⁵ but LSG is a convincing new approach with several advantages, some of which are unique. Originally designed as a restrictive first stage surgery to further operative intervention, studies have shown that there is more to LSG than a mere restrictive phenomenon and that it has the potential of becoming a definitive intervention on its own.⁹ Follow-up studies also suggest an unclear pathway involving the hormone Ghrelin.

The minimally invasive nature of LSG makes it less painful for the patient than traditional laparotomy and may also make it feel psychologically more accessible. In comparison LGB, LSG has a shorter operative time which is better suited to high risk patients. LSG can even be performed on patients taking NSAIDs or having intestinal diseases like Crohn's disease.¹⁶ The pylorus

preserving nature of the surgery avoids dumping while endoscopic access to the rest of upper gastrointestinal tract remains intact, which is particularly important for populations at high risk of gastric cancer and choledocholithiasis. No significant foreign body is introduced into the body like the gastric banding¹⁷ and there is no major problem in absorbing essential nutrients like in patients undergoing LGB. All these factors contribute to the rapidly increasing number of LSG performed in the United States. However, two limitations must be kept in mind. First, the procedure is irreversible and secondly, there is still a dearth of long-term results establishing it as a definitive durable intervention. However, studies suggest that results are better if the volume of stomach resected is above 500 cm^3 .¹¹

There are multiple reasons of interest for investigating the outcomes of LSG in the Pakistani population.⁴ Firstly, bariatric surgery warrants ethnicity specific investigation as postoperative lifestyle habits, including local diet and exercise habits, have a strong influence on outcomes. Secondly, several studies show that Pakistanis and South Asians are more severely hit by the comorbidities associated with obesity. As such, the BMI cutoff for obesity in South Asians is lower,¹⁸ and they have also been proven to have smaller caliber coronary vessels compared to global averages. This makes bariatric interventions like LSG all that much more important in Pakistanis. To the authors' knowledge, this is the first study investigating the outcomes of LSG in the Pakistani population.

This study shows promising results with no mortalities. Arguably, weight loss in category A can be attributed to post-surgical catabolic shift. However, in category B, at an average follow-up of greater than a year, average BMI reduction was an encouraging 10.3 kg/m^2 – enough to shift a patient down to 2 categories on the WHO obesity classification chart. These results are comparable to a number of LSG outcomes reported in the literature. A study conducted in Palestine reported a decrease in BMI from $47.23 \pm 7.89 \text{ kg/m}^2$ to $36.74 \pm 7.74 \text{ kg/m}^2$ ($p < 0.001$) post-operatively.⁸ Another study conducted in France showed a decrease in BMI from 48.8 to 39.8 kg/m^2 at 6 months ($p < 0.001$).¹⁰

It must be kept in mind that an association between outcomes and bougie size has been demonstrated in the literature and the present results reflect the use of a size 36 Fr bougie.¹⁹ Two cases were of particular interest in this study. The first was a patient from the superobese category, whose weight increased by 2 kg post-LSG. This female was bed-bound preoperatively due to arthritis, secondary to obesity. Surgery was done with the hope of reducing weight to help her mobilize, however, this intention never materialized. The patient remained bed-bound postoperatively and increased her

diet under the impression that the surgery would compensate for increased calorie intake, despite counselling. Postoperative sedentary lifestyle has been proven to strongly influence outcomes.²⁰

The second case was a male who underwent the procedure twice. A reduction of 7 kg after the first procedure was considered inadequate. The patient underwent a repeat LSG 4 years after the first surgery. This time, he lost 40 kg within 6 months of the surgery. As mentioned above, it was hypothesized that the likely cause was inadequate volume of stomach resection in the first procedure. Four patients had a concomitant removal of gastric band without any associated complications. This procedure has been reported and studied in the literature as a viable approach.¹⁷ Mortality in this cohort was 0% with only one serious complication of leak, which was settled with surgery, repair and placement of drains.

This study has all the limitations associated with a retrospective cohort study. In addition, while weight loss at the latest follow-up was recorded, the data would be more useful if interval weight loss for each individual participant was also recorded. However, considering this is the first available data of its kind in the Pakistani population, the results are still valuable in setting a benchmark and guiding further investigations.

CONCLUSION

With significant average postoperative weight loss of $10.3 \pm 6.5 \text{ kg/m}^2$ and 0% mortality, LSG is a relatively safe and effective intervention in the Pakistani population for the goal of weight loss and its associated benefits with results comparable to those reported internationally.

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