

Original Article

# Complications of Laparoscopic Sleeve Gastrectomy by Using Four Ports: A Descriptive Study

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## ABSTRACT

**Background:** Obesity is a global health issue, with laparoscopic sleeve gastrectomy (LSG) emerging as a key surgical intervention. The use of a four-port approach in LSG is prevalent, yet it necessitates an evaluation of its safety and the scope of postoperative complications.

**Objective:** This study aims to evaluate the complications associated with the use of four ports in laparoscopic sleeve gastrectomy.

**Methods:** Conducted at Mumtaz Surgimed Hospital in Vehari, Punjab, this descriptive study involved thirty patients undergoing LSG with a four-port approach from May 1st to October 30th, 2023. The study assessed postoperative complications, with patients' BMI, comorbidities, and demographic data also considered.

**Results:** Participants had a mean age of  $48.53 \pm 5.91$  years, with females comprising 63.3% and males 36.7%. Postoperative complications included gastroesophageal reflux disease (GERD) in 5 patients (16.7%), dyspepsia in 4 (13.3%), pulmonary issues in 2 (6.7%), bleeding in 3 (10%), and gastric stenosis in 1 (3.3%). There was a notable reduction in BMI from  $47.69 \pm 4.24$  kg/m<sup>2</sup> to  $40.03 \pm 3.31$  kg/m<sup>2</sup>.

**Conclusion:** The four-port laparoscopic sleeve gastrectomy is a relatively safe surgical option for obesity treatment, with a low incidence of postoperative complications.

**Keywords:** Bariatric Surgery, Complications, Laparoscopic Sleeve Gastrectomy, Obesity, Postoperative Care, Surgical Outcomes, Weight Loss.

## INTRODUCTION

Laparoscopic Sleeve Gastrectomy (LSG) has been established as an effective and widely accepted surgical method for tackling obesity and related metabolic disorders (1). This minimally invasive procedure involves the removal of a significant portion of the stomach, creating a tubular structure that limits food intake capacity (2). While LSG is generally considered safe and efficient for weight loss, the implementation of four ports during the surgery introduces specific challenges that warrant detailed examination (3).

In standard LSG, the surgeon inserts trocars or ports at four different locations on the abdominal wall, which serve as entry points for inserting specialized instruments and a camera. These tools are essential for visualizing and manipulating internal organs during the operation. Despite the popularity of the four-port approach, it is not without its difficulties and complexities (4, 5).

One of the primary concerns with using four ports in LSG is an increased risk of postoperative discomfort (6). The additional incisions can intensify pain during the recovery period. Managing this pain effectively is crucial, requiring a balance between providing sufficient relief and minimizing potential side effects or complications (7, 8).

Furthermore, the use of four ports may raise the risk of infection (9). Each port site is a potential entry point for bacteria, increasing the chances of surgical site infections. To mitigate this risk, stringent aseptic techniques and proper wound care are essential. Surgeons must be vigilant in preventing and promptly addressing any signs of infection to ensure optimal patient outcomes (10).

Besides the risks of anesthesia and a higher propensity for deep venous thrombosis, surgeons must also be aware of various complications when operating on obese patients. Despite technological advancements and the success of the weight loss procedure, complications remain a concern (11, 12).

LSG with four ports remains a prevalent and effective technique for managing obesity. However, it is crucial for healthcare professionals to understand the potential risks associated with this method. Ensuring the success and safety of LSG procedures necessitates careful management of postoperative pain, reducing infection risks, avoiding abdominal wall complications, and addressing longer operation times. Ongoing research and advancements in bariatric surgery are likely to provide valuable insights for refining the process and reducing complications.

The objective of this study is to systematically analyze the complications associated with the use of four ports in LSG, emphasizing the need for continuous improvement in surgical techniques to enhance patient outcomes and minimize risks.

## MATERIAL AND METHODS

The study was executed at Mumtaz Surgimed Hospital in Vehari, Punjab, between 1st May and 30th October 2023, subsequent to receiving ethical approval. Selection of participants was stringent, focusing on multiple factors such as Body Mass Index (BMI) assessments, dietary habits, existing co-morbidities, prior weight loss attempts, and the onset of symptoms. Exclusion criteria encompassed individuals above 55 years, those with a BMI exceeding 40, existing cardiac conditions, and concurrent gastroesophageal reflux disease (GERD) with radiologically confirmed hiatal hernia. Candidates were required to consult with a nutritionist and provide evidence of significant weight loss, exceeding 10 kg at any point. The dietitian recommended lifestyle modifications where applicable. On the day preceding the surgery, measurements were made to ascertain the amount of excess body weight and establish a target weight loss.

All participants underwent comprehensive preoperative assessments including a complete blood count, renal and liver function tests, coagulation and virus profiles, fasting blood glucose levels, and a chest X-ray. Additional tests were at the discretion of the attending surgeon. Pre-surgery protocols involved instructions for exclusive consumption of clear fluids and administration of enoxaparin for thromboprophylaxis, which continued until the seventh postoperative day.

The surgical procedures were conducted with the patients in a supine position, employing a four-port technique. This involved liver retraction as necessary. The harmonic vessel-sealing device facilitated the release of the greater curvature until the left crus was visible. A specific point 7 centimeters from the pylorus on the antral side was marked for the initiation of the procedure. Endoscopic stapling devices, varying in thickness from 4.1 mm to 3.5 mm, were utilized from the antral end to the angle of His. A 36Fr bougie was used to guide the placement of staple points. Post-stapling, a submersion or dye test was conducted, followed by an over-running suture. The resected stomach segment was extracted through the 15 mm umbilical port, which was subsequently repaired before the recovery phase. Postoperative complications such as hemorrhage, gastric stenosis, GERD, pulmonary issues, and dyspepsia were monitored.

Data analysis was performed using SPSS version 20, applying a paired samples T-test to compare pre- and postoperative BMI values. The threshold for statistical significance was set at a P value of 0.05 or lower.

## RESULTS

In this study, thirty patients underwent laparoscopic sleeve gastrectomy using a four-port approach. The mean age of the participants was  $48.53 \pm 5.91$  years. Of these, 19 (63.3%) were female and 11 (36.7%) were male. The patients presented with comorbidities, including diabetes in 10 (33.3%), hypertension in 13 (43.3%), and depression in 14 (46.7%).

Regarding the surgical outcomes, there was a significant reduction in the mean Body Mass Index (BMI), decreasing from  $47.69 \pm 4.24$  kg/m<sup>2</sup> to  $40.03 \pm 3.31$  kg/m<sup>2</sup> ( $P = 0.0001$ ).

Analysis of postoperative complications revealed the following: Gastroesophageal Reflux Disease (GERD) occurred in 5 (16.7%) patients, pulmonary issues in 2 (6.7%) patients, dyspepsia in 4 (13.3%) patients, gastric stenosis in 1 (3.3%) patient, and bleeding in 3 (10%) patients.

Figure 1: Gender distribution

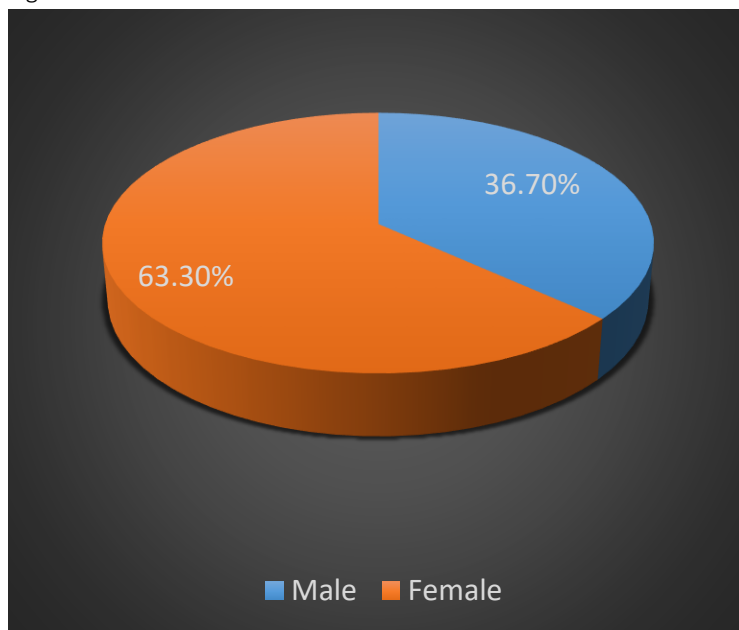


Table 1 Preoperative and postoperative BMI (Paired samples T test was applied)

Preoperative and postoperative BMI	Mean	N	Std. Deviation	P value
Preoperative BMI (Kg/m <sup>2</sup> )	47.6977	30	4.24821	0.0001
Postoperative BMI (Kg/m <sup>2</sup> )	40.0387	30	3.31799	

Table 2 Postoperative complications

Postoperative complications		N	%
GERD	Yes	5	16.7%
	No	25	83.3%
Pulmonary complications	Yes	2	6.7%
	No	28	93.3%
Dyspepsia	Yes	4	13.3%
	No	26	86.7%
Gastric stenosis	Yes	1	3.3%
	No	29	96.7%
Bleeding	Yes	3	10.0%
	No	27	90.0%

## DISCUSSION

Obesity, a significant global health challenge, is characterized by the progressive accumulation of body weight leading to the deterioration of bodily organs and systems (13). A critical aspect of this condition is abdominal fat accumulation, a primary factor contributing to metabolic syndrome. This syndrome encompasses conditions such as hypertension, abnormal lipid levels, and insulin resistance, heightening the risk of heart attacks, strokes, and type 2 diabetes, thereby elevating cardiovascular issues and mortality rates compared to the general population (14).

Addressing obesity necessitates a balance between caloric intake and expenditure, along with the management of associated medical conditions. Conventional strategies, including increased physical activity, dietary modifications, and medication, often fall short in achieving desired weight loss, leading to the consideration of bariatric surgery as an effective alternative (15). Among the various bariatric procedures, laparoscopic sleeve gastrectomy (LSG), Roux-en-Y gastric bypass (LRYGB), and laparoscopic adjustable gastric banding (LAGB) are predominant. The International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO)

registry indicates that LSG accounts for 46.0% of the 394,431 bariatric surgeries performed in 51 countries, recognized for its effectiveness in substantial and enduring weight reduction and the amelioration of obesity-related comorbidities (16).

Introduced in 1990 as an alternative to distal stomach resection with duodenal switch, sleeve gastrectomy's popularity surged with the advent of laparoscopic techniques in 1999. LSG, which involves removing a significant portion of the stomach's larger curve, reducing stomach capacity by approximately 80%, has become prominent in obesity treatment and medical research. This reduction in stomach size not only limits food intake but also decreases ghrelin production, known as the "hunger hormone," thereby reducing hunger and food consumption (17).

Current study, involving 30 patients undergoing LSG, showed a mean age of  $48.53 \pm 5.91$  years, with a predominance of female participants. Notably, comorbidities such as diabetes, hypertension, and depression were prevalent. The study observed a significant reduction in BMI from  $47.69 \pm 4.24$  kg/m<sup>2</sup> to  $40.03 \pm 3.31$  kg/m<sup>2</sup> postoperatively, aligning with findings from a similar study in Pakistan (18).

Regarding postoperative complications, GERD was the most common, observed in 5 (16.7%) patients. Other complications included dyspepsia (4 patients, 13.3%), bleeding (3 patients, 10%), pulmonary issues (2 patients, 6.7%), and gastric stenosis in one patient (3.3%). Comparatively, the referenced Pakistani study (18) reported similar rates of GERD, pulmonary complications, dyspepsia, and bleeding, but no incidence of gastric stenosis, while another study (19) reported a 4% incidence of gastric stenosis, which is in line with current findings.

The strength of current study lies in its detailed examination of postoperative complications, providing valuable insights into the risks associated with LSG. However, limitations include the small sample size and the study's confinement to a single center, which may affect the generalizability of the findings. Moreover, the study's reliance on postoperative BMI as a primary outcome measure does not fully encompass the multidimensional impact of LSG on patients' overall health and quality of life.

While LSG is a potent tool for weight reduction and the management of obesity-related comorbidities, a comprehensive understanding of its associated risks and complications is imperative. Continuous research and improvements in surgical techniques are essential for enhancing patient outcomes and safety in bariatric surgery.

## CONCLUSION

In conclusion, current study demonstrates that laparoscopic sleeve gastrectomy utilizing a four-port approach is a relatively safe procedure, characterized by a low incidence of postoperative complications such as gastroesophageal reflux disease (GERD), pulmonary issues, bleeding, dyspepsia, and gastric stenosis. However, considering the limitations imposed by the small sample size of current study, we advocate for the conduct of multicenter studies involving larger patient cohorts. Such expanded research would allow for a more comprehensive and insightful examination of the outcomes and complications associated with this procedure, thereby contributing to a deeper understanding and enhancement of its safety and efficacy in the field of bariatric surgery.

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