

Three-Year Outcomes of Laparoscopic Sleeve Gastrectomy at King Khalid General Hospital, Hafar Al-Batin

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ABSTRACT

Background: Laparoscopic sleeve gastrectomy (LSG) is one of the most frequently performed bariatric procedures worldwide, with proven efficacy in weight loss and comorbidity resolution. However, long-term outcome data from specialized centers in Saudi Arabia are limited. **Objectives:** To evaluate the three-year outcomes of LSG performed at a specialized bariatric center, focusing on weight loss, comorbidity resolution, and postoperative complications. **Methods:** A retrospective cohort study was conducted including 50 patients who underwent LSG between January 2020 and December 2021 at King Khalid General Hospital, Hafar Al-Batin, Saudi Arabia. Data included demographics, body mass index (BMI), comorbidities, and complications. Patients were followed for 3 years. Descriptive statistics were used. **Results:** Of the 50 patients (15 males, 35 females; mean age 36 ± 9 years), mean BMI decreased from 42 ± 5.1 kg/m² to 30 ± 3.8 kg/m² at 3 years (%EWL: 71%). Comorbidities included type 2 diabetes mellitus (14%), hypertension (26%), hypertriglyceridemia (22%), and osteoarthritis knee pain (2%). Complete resolution was observed in all affected patients. Complications occurred in 20%, including staple line leaks (10%), all in cases performed by a visiting surgeon, conversion to Roux-en-Y gastric bypass (6%), post-stent bleeding (2%), and vitamin B12 deficiency-related complications (2%). **Conclusion:** LSG at a specialized bariatric center produced sustained weight loss and resolved all recorded comorbidities at three years. The higher complication rate in cases performed by the visiting surgeon points to the importance of consistent surgical expertise.

Keywords: Laparoscopic sleeve gastrectomy, bariatric surgery, obesity, comorbidity resolution, long-term outcomes, Saudi Arabia.

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INTRODUCTION

Obesity affects more than 35% of adults in Saudi Arabia and is associated with chronic conditions including type 2 diabetes mellitus, hypertension, and dyslipidaemia [7]. Globally, the prevalence of obesity has nearly tripled since 1975, with more than 650 million adults meeting WHO criteria for obesity by 2016 [6]. The condition

drives cardiovascular disease, obstructive sleep apnea, non-alcoholic fatty liver disease, and several malignancies, and places a growing burden on healthcare systems worldwide.

Bariatric surgery is the most durable treatment for severe obesity when lifestyle modification and pharmacotherapy have not achieved sufficient weight reduction. Current

guidelines recommend it for patients with a BMI of 40 kg/m² or above, or 35 kg/m² or above in the presence of obesity-related comorbidities [3]. Of the available procedures, LSG has grown rapidly in adoption: according to the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO), it accounted for approximately 46% of all bariatric operations performed worldwide by 2018, making it the most commonly performed bariatric procedure globally [8]. Its technical advantages include the absence of intestinal anastomosis, a lower operative risk compared to Roux-en-Y gastric bypass (RYGB) in high-BMI patients, and a shorter operative time.

The mechanism of weight loss following LSG combines gastric volume restriction with a substantial reduction in circulating ghrelin, a hunger-promoting hormone produced primarily in the resected gastric fundus, leading to appetite suppression and improved insulin sensitivity partly independent of weight loss [9]. Randomized trials including the SM-BOSS and SLEEVE-PASS studies confirmed that LSG produces weight loss and metabolic outcomes broadly comparable to RYGB over three to five years, though RYGB may retain a modest advantage in long-term type 2 diabetes remission [9].

Short-term LSG outcomes are well-reported in the literature, but long-term follow-up data from specialized Saudi centres are limited. This study reports three-year

outcomes of LSG at King Khalid General Hospital, with a focus on weight loss, comorbidity resolution, and complications.

METHODS

This retrospective cohort study included 50 consecutive patients who underwent LSG between January 2020 and December 2021. Data collected included demographic variables, preoperative BMI, comorbidities, and postoperative complications. All patients were followed for 3 years with scheduled clinic visits at 6 months, 1 year, 2 years, and 3 years postoperatively.

Surgical Technique:

A standard LSG technique was used, involving resection of the greater curvature of the stomach over a 36–40 Fr bougie. Staple line reinforcement was performed in all cases.

Statistical Analysis:

Descriptive statistics were applied. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as frequencies and percentages.

RESULTS

A total of 50 patients (15 males, 35 females) were included, with a mean age of 36 ± 9 years (range 20–55 years) (Table 1). Mean preoperative BMI was 42 ± 5.1 kg/m², which decreased to 30 ± 3.8 kg/m² at 3 years, corresponding to a mean %EWL of 71% (Table 1; Figure 1).

Table 1 Baseline demographic and anthropometric characteristics of the study cohort (n = 50). BMI = body mass index; SD = standard deviation; %EWL = percentage excess weight loss.

Characteristic	Value
Total patients, No.	50
Sex: Male / Female, No.	15 / 35
Age range (years)	20–55
Age, mean ± SD (years)	36 ± 9
Preoperative BMI, mean ± SD (kg/m ²)	42 ± 5.1
BMI at 3 years, mean ± SD (kg/m ²)	30 ± 3.8
Mean %EWL at 3 years	71%

Mean BMI Before and After Surgery

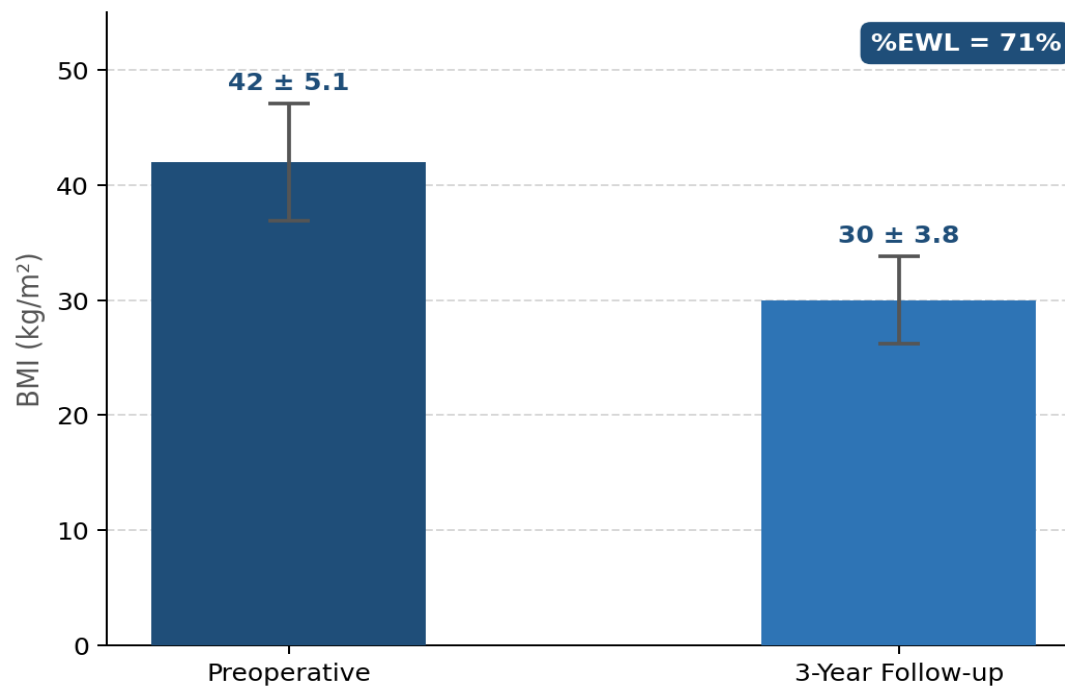


Figure 1 Mean BMI at baseline and 3-year follow-up. Error bars represent ± 1 standard deviation. %EWL = 71%.

This %EWL falls within the upper range of published three-year outcomes for LSG, which typically report %EWL between 55% and 72% in comparable patient populations [4, 5]. The female predominance in this cohort (70%) is consistent with national patterns of bariatric surgery uptake in Saudi Arabia [1]

Preoperative comorbidities included hypertension (26%), hypertriglyceridemia (22%), diabetes mellitus (14%), and osteoarthritis/knee pain (2%) (Table 2; Figure 2). Complete resolution of all comorbidities was observed in 100% of affected patients at 3-year follow-up (Table 2).

Diabetes remission, defined as cessation of antidiabetic medication without persistent hyperglycaemia, was achieved in all seven affected patients (100%). Published data report type 2 diabetes remission rates of 60-80% following LSG, making the complete remission observed here notable, though the small number of diabetic patients limits the strength of this finding [10]. Resolution of hypertension was similarly complete, with all 13 affected patients able to discontinue antihypertensive therapy by the three-year follow-up, consistent with the metabolic benefits of sustained weight loss documented in the STAMPEDE trial and related studies [10].

Table 2 Preoperative comorbidities and their resolution status at 3-year follow-up. All comorbidities resolved completely (100% resolution rate).

Comorbidity	No	%	Resolution
Hypertension	13	26%	Complete
Hypertriglyceridemia	11	22%	Complete
Diabetes Mellitus	7	14%	Complete
Osteoarthritis / Knee Pain	1	2%	Complete
Overall resolution rate	—	—	100%

Distribution of Preoperative Comorbidities

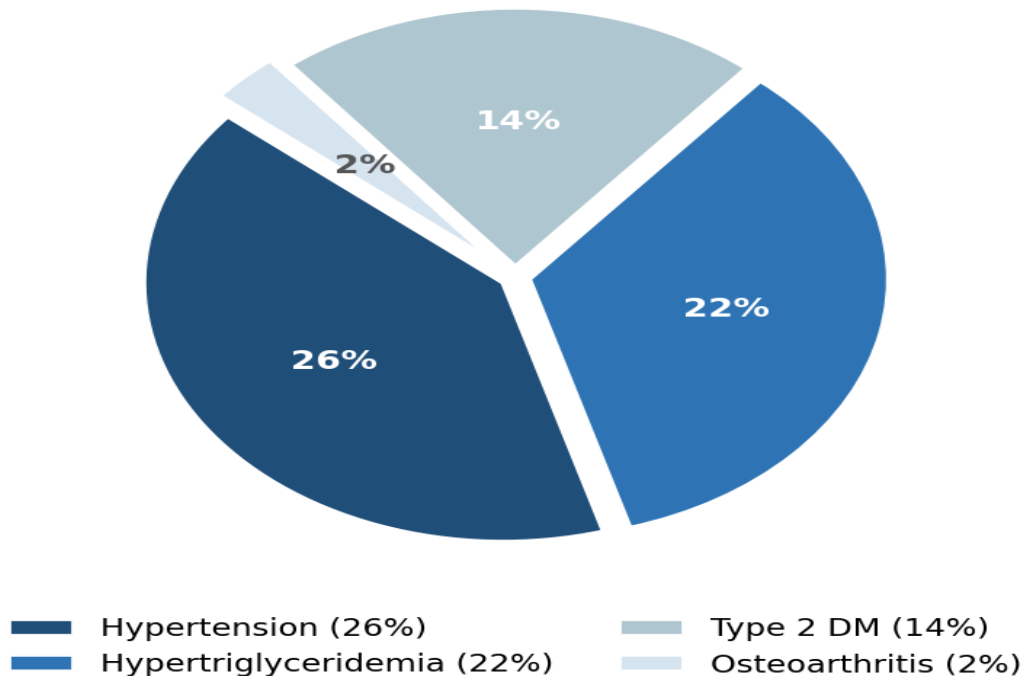


Figure 2 Distribution of preoperative comorbidities among the study cohort (n = 50). Complete resolution was achieved in all affected patients at 3-year follow-up.

Overall complications occurred in 20% of patients (Table 3; Figure 3). These comprised staple line leaks in 10% of cases (all attributable to the visiting surgeon), conversion to Roux-en-Y gastric bypass in 6%, post-stent bleeding in 2%, and vitamin B12 deficiency-related complications in 2% (Table 3). All five staple line leaks were managed initially with endoscopic luminal stenting; one patient developed post-stent bleeding as a secondary complication, and three were ultimately converted to

RYGB after conservative management failed. The vitamin B12 deficiency case resolved with supplementation. No deaths occurred. In high-volume centers, staple line leak rates following LSG are generally reported below 2% [11], placing the 10% rate observed in visiting-surgeon cases substantially above the accepted benchmark and underscoring the relationship between operator experience and complication risk.

Table 3 Postoperative complications recorded during the 3-year follow-up period. RYGB = Roux-en-Y gastric bypass.

Complication	n (%)	Notes
Overall complications	10 (20%)	—
Staple line leak	5 (10%)	All by visiting surgeon
Conversion to Roux-en-Y gastric bypass	3 (6%)	—
Post-stent bleeding	1 (2%)	—
Vitamin B12 deficiency-related	1 (2%)	—

Postoperative Complication Profile

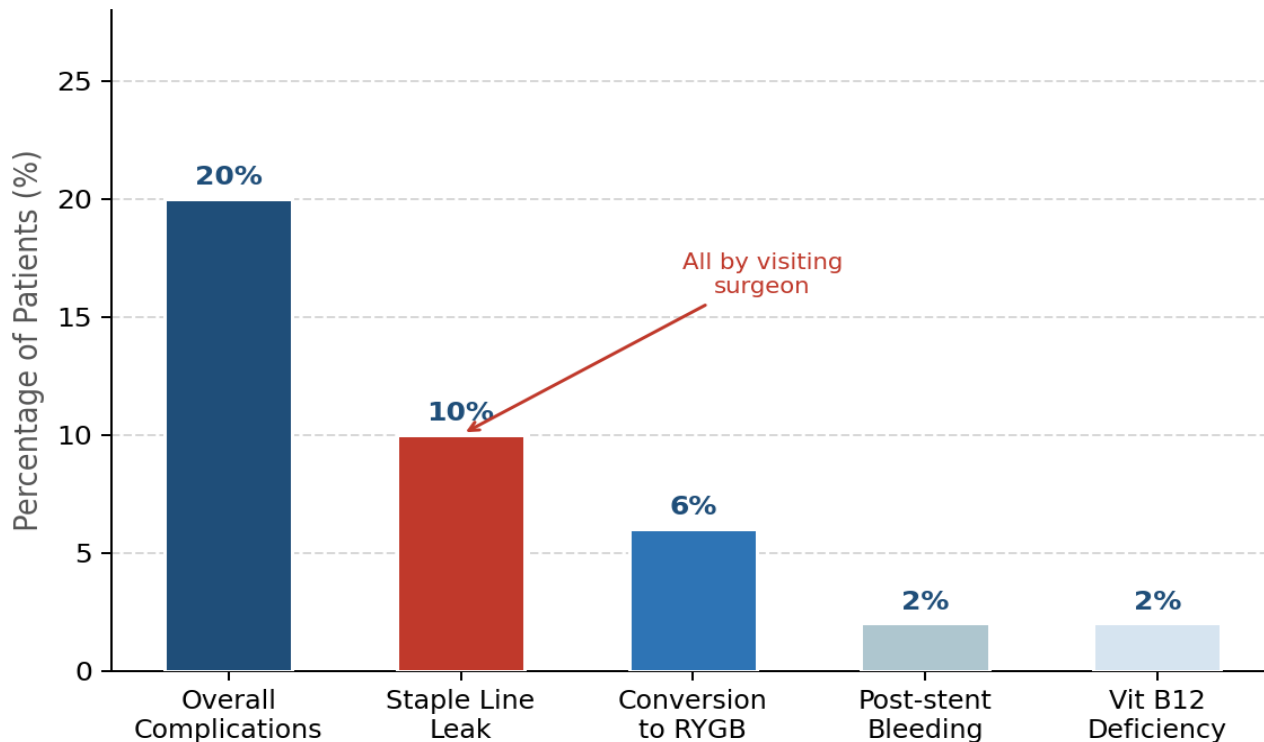


Figure 3 Postoperative complication profile (n = 50). All staple line leaks occurred exclusively in cases performed by a visiting surgeon. RYGB = Roux-en-Y gastric bypass.

Complications:

- Staple line leaks: 5 (10%) – all by visiting surgeon
- Conversion to Roux-en-Y gastric bypass: 3 (6%)
- Post-stent bleeding: 1 (2%)
- Vitamin B12 deficiency complication: 1 (2%)

DISCUSSION

LSG at this centre produced a mean %EWL of 71% and complete remission of all recorded comorbidities at three years. These results are consistent with regional data, including Almutairi et al. (2021), who reported similar weight loss and comorbidity resolution rates in Saudi patients.

The 10% staple line leak rate in cases performed by the visiting surgeon was substantially higher than the <2% rate reported by high-volume centers, pointing to the role of surgical experience in outcomes. There were no deaths, and nutritional deficiency rates were low, consistent with standardized postoperative protocols.

The mean %EWL of 71% falls within the 60-75% range reported in long-term European and North American studies.

LIMITATIONS:

This study is limited by its retrospective design, single-center setting, and small sample size. The absence of a control group and partial reliance on medical records for follow-up data may also introduce bias.

CONCLUSION

LSG at this center produced substantial long-term weight loss and resolved all recorded comorbidities. The higher complication rate in cases performed by the visiting surgeon suggests that outcomes depend on the operating surgeon's bariatric experience.

ETHICAL APPROVAL & DECLARATIONS

Ethical approval for this study was obtained from the King Khalid General Hospital Research Ethics Committee (Approval No: 2023/14). The authors declare no conflicts of interest. No external funding was received.

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