



A Comparative Analysis of the Short-Term Efficacy of Sleeve Gastrectomy and Roux-en-Y Gastric Bypass

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Abstract

Background: Given the growing global burden of obesity and the increasing number of bariatric procedures performed annually, it is crucial to compare the outcomes of different surgical techniques to guide clinical decision-making. This study aimed to evaluate the effectiveness of Roux-en-Y Gastric Bypass (RYGB) vs. Sleeve Gastrectomy (SG) in terms of weight loss and postoperative complications.

Methods: A cross-study was conducted involving patients aged 18 years and older, with a Body Mass Index (BMI) of 40 kg/m^2 or higher, or a BMI between 35 and 40 kg/m^2 accompanied by obesity-related comorbidities. The participants underwent either SG or RYGB based on the medical assessments. The study analyzed the demographic data, surgical duration, length of hospital stays, and weight loss outcomes.

Results: Eighty patients were included in the study, with 40 patients in each group, and there were no significant differences in their baseline characteristics. One year after surgery, SG resulted in a significantly greater reduction in BMI and Total Weight Loss percentage (TWL%) compared to RYGB, with a p-value of 0.021 for both measures. Additionally, SG had a shorter operative time, with a p-value of 0.004. The length of hospital stays and rates of anastomotic leaks were similar between the two groups.

Conclusion: SG demonstrated superior short-term weight loss compared to RYGB, with greater BMI reduction and TWL. Both procedures had similar safety profiles.

Keywords: Metabolic and bariatric surgery, Morbid obesity, Sleeve gastrectomy, Roux-en-Y gastric bypass, Weight loss

Introduction

Obesity has become a major global health concern, with its prevalence steadily rising in both developed and developing countries. According to recent estimates, over 650 million adults worldwide suffer from obesity, defined as a Body Mass Index (BMI) over 30, while approximately 15% of the global population is classified as severely obese with a BMI exceeding 40 (1,2). Despite the availability of lifestyle interventions and pharmacological therapeutic strategies,

Metabolic and Bariatric Surgery (MBS) remains the most effective option for achieving significant and sustained weight loss in severe obesity. Roux-en-Y Gastric Bypass (RYGB) and Sleeve Gastrectomy (SG), are the most commonly performed MBS. SG is a less complex procedure than RYGB, that has shown promising short-term efficacy in treating morbid obesity and type 2 diabetes (3). Additionally, it is technically simpler, and associated with fewer early postoperative complications such as dumping syndrome and internal hernias (4).

MBS not only facilitates substantial weight loss but also leads to significant improvements in obesity-related comorbidities such as type 2 diabetes, hypertension, and obstructive sleep apnea (5). Studies have demonstrated that metabolic and hormonal changes following surgery contribute to improved glycemic control and a reduced risk of cardiovascular disease. However, despite these benefits, concerns remain regarding postoperative complications and long-term adverse effects. Nutritional deficiencies, gastrointestinal symptoms, and the potential need for revision surgeries highlight the importance of careful patient selection and thorough long-term follow-up (6,7).

Regarding the growing global burden of obesity and the increasing number of bariatric procedures performed annually, it is crucial to compare the outcomes of different surgical techniques to guide clinical decision-making. This study aimed to evaluate the effectiveness of RYGB vs. SG in terms of weight loss and postoperative complications. By analyzing these factors, the aim was to provide valuable insights that can help optimize treatment strategies for individuals suffering from severe obesity.

Materials and Methods

Study subjects and design

This study was designed as a cross-sectional study. Data were obtained through a review of patient records at Aria Hospital in Mashhad, Iran, in 2023. The patients aged 18 or older with a BMI ≥ 40 kg/m² or a BMI between 35 and 40 kg/m² accompanied by at least one obesity-related comorbidity (such as diabetes, sleep apnea, severe reflux, hyperlipidemia, or hypertension) were included in the study. The patients had undergone either RYGB or SG as a primary MBS. The selection of the surgical method was based on a comprehensive assessment of each patient's medical history, paraclinical evaluations, and endoscopic findings. Data collected included demographic characteristics, BMI, pre-existing comorbidities, surgical duration, length of hospital stay, and weight loss outcomes one year postoperatively. Follow-up information was obtained through direct patient contact and review of hospital records. Informed consent was obtained from all the participants before enrollment in the study.

Surgical technique

Roux-en-Y Gastric Bypass (RYGB) Sleeve Gastrectomy (SG): RYGB was conducted using a standardized method. A small gastric pouch was formed, and the alimentary and biliopancreatic limbs were measured according to established surgical guidelines. The patients were monitored closely after surgery for complications and to assess weight loss outcomes.

Sleeve Gastrectomy (SG)

SG was conducted using a standardized technique to create a gastric sleeve along a bougie guide. The procedure included reinforcement of the staple line to minimize the complications.

Measures

Data were collected using a custom-designed checklist, specifically created for this study. The checklist included demographic details such as age, sex, and BMI, along with clinical parameters including pre-existing comorbidities, weight loss one-year post-surgery, surgical duration, and hospital length of stay. Postoperative follow-up was conducted

through direct patient contact and review of hospital records.

Statistical analysis

Data normality was assessed using the Kolmogorov-Smirnov test with the Lilliefors correction. If data were normally distributed, parametric tests such as the Student's t-test and ANOVA were used for analysis. If normality was not confirmed, non-parametric tests, including the Mann-Whitney U test and the Kruskal-Wallis test were applied. The categorical variables were analyzed using the chi-square test, and Fisher's exact test was used when more than 20% of expected cell counts were below five. All the statistical analyses were conducted using SPSS 22 (IBM Corp., Armonk, NY, USA), with a significance level set at $p < 0.05$.

Ethical approval

This study received approval from the Ethics Committee of the Islamic Azad University of Mashhad Medical Sciences unit, under the ethics code IR.IAU.MSHD.REC.1401.156. All the patients' data was

kept confidential, and no additional financial burden was imposed on the patients or their families.

Results

A total of 40 patients were enrolled in the SG group and 40 patients in the RYGB group. The mean age of the participants was 36.36 ± 10.59 years in the SG group and 38.45 ± 9.99 years in the RYGB group, with no significant difference between the two groups ($p = 0.311$). There were no differences in gender distribution between the groups ($p = 0.152$). In both groups, 85% of the patients had at least one comorbidity, and this was not significantly different ($p = 1.0$). Furthermore, no significant differences were found in the prevalence of specific comorbidities such as hypothyroidism, hyperlipidemia, hypertension, diabetes, polycystic ovary syndrome, osteoarthritis, sleep apnea, back pain, previous cholecystectomy, or GERD (all $p > 0.05$). The demographic and clinical information of the patients is presented in table 1. The comparison of weight loss after one year indicated that patients who underwent SG experienced

Table 1. Clinical and demographic data

Variable	SG (n=40)	RYGB (n=40)	p-value
Mean age (years) Mean $\pm$ SD	36.36 $\pm$ 10.59	38.45 $\pm$ 9.99	0.311 ^t
Gender (females%)	60%	75%	0.152 ^c
Prevalence of comorbidities (%)	85%	85%	1.0 ^c
Comorbidities	%(n)	%(n)	-
Hypothyroidism	30% (3)	30% (7)	0.176 ^c
Hyperlipidemia	40% (9)	59% (13)	0.317 ^c
Hypertension	65% (31)	52% (34)	0.390 ^c
Diabetes	48% (33)	51% (35)	0.531 ^c
Polycystic ovary syndrome	48% (37)	39% (15)	0.615 ^c
Osteoarthritis	47% (23)	52% (25)	0.648 ^c
Sleep apnea	52% (37)	47% (21)	0.176 ^c
Back pain	43% (24)	44% (19)	0.262 ^c
Previous cholecystectomy	35% (5)	35% (6)	0.499 ^c
GERD	51% (36)	48% (34)	0.615 ^c

For quantitative variables Mean $\pm$ SD and for qualitative data the Count (%) is reported.

t: Student test, C: Chi-Square test, RYGB: Roux-en-Y Gastric Bypass, SG: Sleeve Gastrectomy.

Table 2. Comparison of weight loss, BMI change, surgery duration, hospital stay, and anastomotic leaks between SG and RYGB Groups

Variable	SG (n=40) Mean±SD	RYGB (n=40) Mean±SD	p-value
Mean weight loss (kg)	44.67±13.11	37.95±12.44	0.021 ^t
Mean BMI change (kg/m ²)	15.89±3.38	14.71±4.01	0.021 ^t
Total weight loss (TWL) (%)	35.56±5.94	35.25±7.24	0.021 ^t
Mean surgery duration (min)	142.63±35.11	167.62±38.20	0.004 ^t
Mean length of hospital stay (days)	2.32±0.53	2.30±0.60	0.697 ^t
Rate of anastomotic leaks (%)	2.5%	2.5%	1.0 ^c

t: Student test, C: Chi-Square test, RYGB: Roux-en-Y Gastric Bypass, SG: Sleeve Gastrectomy.

significantly greater weight loss compared to those who underwent RYGB ($p=0.021$). Additionally, the change in BMI and total weight loss percentage were significantly higher in the SG group ($p=0.021$ for both). The mean duration of surgery was significantly shorter in the SG group ($p=0.004$). However, there was no significant difference in the length of hospital stay between the two groups ($p=0.697$), and the rate of anastomotic leaks was identical in both groups ($p=1.0$). Table 2 shows the clinical information in detail.

Discussion

MBS offers numerous benefits, including significant weight loss and the resolution of T2DM and other obesity-related comorbidities. While weight loss is linked to short-term improvements in metabolic and cardiovascular conditions, the long-term sustainability of these benefits remains uncertain (8,9). Sjöström *et al* (10) found that MBS is a more effective treatment for severe obesity than conventional therapies, leading to sustained weight loss, improved lifestyle, and reduced baseline risk factor, except for hypercholesterolemia. Additionally, the rates of diabetes, hypertriglyceridemia, low High-Density Lipoprotein (HDL) cholesterol, hypertension, and hyperuricemia remission were higher in the surgery group compared to the control group at both 2 and 10 years. However, hypercholesterolemia recovery rates showed no significant difference. The incidence of diabetes, hypertriglyceridemia, and

hyperuricemia was also lower in the surgery group, whereas no disparities were observed in hypertension and hypercholesterolemia rates between the groups. The most frequently performed MBS are RYGB and SG. However, there are many inconsistent results regarding their effectiveness in achieving mid and long-term weight loss. Therefore, this study aimed to evaluate RYGB and SG in terms of weight loss outcomes. This study compared the efficacy of SG and RYBP in BMI and Total Weight Loss percentage (TWL%) reduction. One-year post-surgery, SG resulted in significantly greater BMI reduction and TWL percentage than RYGB. While SG had a shorter operative time, hospital stay and anastomotic leak rates were similar between the groups. These findings suggest SG may provide superior short-term weight loss outcomes compared to RYGB.

A significant number of studies have evaluated the long-term effectiveness of RYGB and SG in reducing BMI and resolving comorbidities at least five years after surgery. The findings indicate that SG is more effective than RYGB in reducing BMI and TWL within a one-year follow-up period. Supporting the results, Aridi *et al* (11) also reported a higher EWL % in the SG group compared to the RYGB group both one year and five years after surgery.

In contrast, Peterli *et al* (12) conducted a Randomized Controlled Trial (RCT) involving 217 patients, with a five-year follow-up to compare the outcomes between SG and RYGB in terms of weight loss, resolution of comorbidities, quality of life, and adverse events.

They found no significant difference in BMI reduction at five years (61.1% for SG vs. 68.3% for RYGB; absolute difference: -7.18%; 95% confidence interval: -14.30% to -0.06%; $p=0.22$). However, they noted that gastric reflux improved more frequently after RYGB than after SG, whereas reflux symptoms tended to worsen more often following SG. The reoperation rates were reported as 15.8% for SG and 22.1% for RYGB. Additionally, Salminen *et al* (13) conducted a multicenter RCT with 240 patients and a five-year follow-up, which revealed that while RYGB showed a greater tendency for weight loss, the difference was not statistically significant.

Similarly, in a systematic review and meta-analysis, Lee *et al* (14) reported that RYGB resulted in greater BMI reduction at one and three years, but evidence beyond five years was insufficient. RYGB also demonstrated higher dyslipidemia resolution at one and five years, though no differences were noted between RYGB and SG regarding remission of T2DM, hypertension, or insulin resistance. However, RYGB had a higher complication and reoperation rate. In another study, Wang *et al* (15) compared RYGB and SG in super and super-super obesity, showing greater EWL at 12 months with RYGB, though no significant difference at 24 months. Diabetes and dyslipidemia resolution were superior with RYGB, but hypertension outcomes were similar. Lee *et al* (14) also analyzed six studies comparing single-anastomosis duodenoileal bypass (SADI), Biliopancreatic Diversion with Duodenal Switch (BPD-DS), and RYGB as revisional surgeries for SG, concluding that all three are effective, with BPD-DS yielding the best weight loss for higher BMI patients. This study has several limitations. First, the sample size was relatively small, which may limit the generalizability of the findings. Second, the follow-up

period was only one year, preventing the assessment of long-term weight loss outcomes and metabolic benefits. Third, while baseline characteristics were similar between groups, unmeasured confounding factors could have influenced the results. Fourth, the study did not account for variations in patient adherence to dietary and lifestyle recommendations, which could impact weight loss outcomes. Lastly, the lack of data on long-term complications and quality of life limits a comprehensive comparison of the two procedures. Future studies with larger cohorts and extended follow-up are required to validate these findings.

Conclusion

The findings indicate that SG led to a significantly greater reduction in BMI and TWL compared to RYGB. Both procedures, however, demonstrated similar safety profiles, including comparable hospital stay durations and anastomotic leak rates. Additionally, SG offered the advantage of a shorter operative time.

Ethical approval

The present study has a code of ethics with an ID number (IR.IAU.MSHD.REC.1401.156).

Consent to participate

Written informed consent was obtained from all the participants included in the study.

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None.

Conflict of Interest

There are no conflicts of interest.

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