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ORIGINAL ARTICLE

COMPARATIVE ANALYSIS OF ROUX-EN-Y GASTRIC BYPASS AND SLEEVE GASTRECTOMY IN TERMS OF SAFETY: A RETROSPECTIVE STUDY

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Introduction: The choice of an appropriate surgical procedure for the treatment of obesity is critical to achieving effective and safe outcomes. This study aimed to compare the safety of two popular procedures: Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (SG) in terms of operative time, length of hospitalization, reoperations, and complications according to the Clavien-Dindo scale (C-D).

Methods: A retrospective analysis of clinical data was conducted on patients who underwent bariatric surgery between September 2021 and April 2023 at our institution. Patients who underwent Roux-en-Y gastric bypass (RYGB) or sleeve gastrectomy (SG) were included in the analysis. Operative time, length of hospitalization, reoperations, and complications classified according to the C-D scale were assessed.

Results: The analysis included 94 patients, of whom 13 underwent RYGB and 81 underwent SG. The mean operative time was 157.46 minutes (SD 28.56) for RYGB and 83.48 minutes (SD 17.83) for SG. This difference was statistically significant ($p < 0.05$). Hospitalization length was 3.6 (SD 0.6) days for RYGB and 3.3 (SD 0.6) days for SG. No reoperations were required in the RYGB group, whereas 2.47% of SG patients required reoperation. In the RYGB group, 7.7% of patients had Class I complications according to the C-D scale. In the SG group, 4.9% had Class I and 2.5% had Class IIIB complications.

Conclusions: This retrospective study suggests that both Roux-en-Y gastric bypass and sleeve gastrectomy are safe surgical procedures for the treatment of obesity. Apart from the significantly longer operative time associated with Roux-en-Y gastric bypass, no statistically significant differences were observed between the procedures in terms of length of hospitalization, reoperations, and complications according to the C-D scale. Our results can contribute to informed decision-making regarding the choice of a surgical procedure for obesity treatment, with particular consideration of patient safety.

Keywords: bariatric surgery, roux-en-Y gastric bypass, sleeve gastrectomy, postoperative complications, surgical safety, retrospective study

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INTRODUCTION

Obesity is a global health issue of significant concern, affecting millions of individuals worldwide and contributing to a wide range of health problems [4–5,10–11]. As the prevalence of obesity continues to rise, the importance of effective and safe bariatric surgical procedures becomes increasingly evident. Bariatric surgery is a key intervention in the management of obesity, offering long-term weight loss and improvements in comorbidities such as type 2 diabetes and hypertension. However, the selection of the most suitable surgical procedure is pivotal to achieving successful and safe outcomes.

This study presents a comparative analysis of two widely performed bariatric procedures: sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB). The primary focus is on evaluating the safety and effectiveness of these procedures in terms of operative outcomes, postoperative complications, and baseline patient characteristics. Understanding the advantages and specific features of each procedure may assist clinicians in making informed decisions and ultimately improving the care and well-being of patients with obesity.

The Aim of the Study

The aim of this study was to compare the safety and efficacy of two commonly performed bariatric procedures, sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB), with a focus on operative outcomes, postoperative complications, and baseline patient characteristics.

METHODS

This retrospective comparative analysis included clinical data from patients who underwent either sleeve gastrectomy (SG) or Roux-en-Y gastric bypass (RYGB) at our institution between September 2021 and April 2023. The study included all eligible patients who met the specified inclusion criteria. These criteria comprised a maximum body mass index (BMI) of 35 kg/m² with comorbidities (diabetes, hyperinsulinemia, or hypertension) or a BMI of at least 40 kg/m². The study followed the standards proposed by Szeliga et al. [13].

Patients were categorized into two groups for analysis:

- **Sleeve Gastrectomy (SG):** This group consisted exclusively of patients who underwent primary sleeve gastrectomy as their initial bariatric procedure.
- **Roux-en-Y Gastric Bypass (RYGB):** This group included patients who underwent primary RYGB as well as those who received RYGB as a secondary intervention following a failed sleeve gastrectomy. RYGB was offered as a revision procedure for patients who experienced inadequate outcomes after sleeve gastrectomy or as a second-stage procedure for patients with a BMI greater than 50 kg/m².

All patients followed a multidisciplinary pathway to qualify for bariatric surgery. This involved comprehensive care, including dietary and psychological evaluations. Standard diagnostic evaluations, such as upper gastrointestinal endoscopy, were also carried out.

Patients received individualized recommendations regarding the choice of bariatric procedure based on clinical evaluation and personal preferences. The final decision took into account clinical findings, patient preferences, and factors such as BMI. SG was recommended for patients with a BMI below 35 kg/m² or above 50 kg/m², particularly for younger individuals. RYGB was recommended for patients with type 2 diabetes, complaints of heartburn (gastroesophageal reflux), or evidence of significant esophagitis (Los Angeles grade B, C, or D). Prior to surgery, all patients underwent H. pylori eradication as part of their preoperative preparation.

Patients were admitted to the hospital one day before the surgery. On the day of surgery, all patients remained in the postoperative unit for the entire day.

SG was performed using previously described techniques [8–9]. The RYGB procedure was carried out using linear staplers, with a 30 mm stapler for the gastro-jejunostomy and a 60 mm stapler for the jejuno-jejunostomy. The alimentary limb was standardized at 100 cm, and the biliopancreatic limb at 150 cm. In all cases, the mesenteric defect and Petersen's space were carefully closed. The decision to create a longer biliopancreatic limb was based on studies suggesting improved weight-loss outcomes with this approach [1].

All procedures were performed by a highly experienced surgeon with a record exceeding 200 LSG procedures and 50 RYGB surgeries.

Patients were discharged on the first postoperative day if predefined objective criteria were met, including absence of fever, effective pain control, tolerance of oral intake, ambulatory mobility, and residence within one hour of travel from the hospital.

All patients were prescribed proton pump inhibitors for two months and ursodeoxycholic acid for six months. Low-molecular-weight heparin was recommended for thromboprophylaxis, although alternative agents, such as rivaroxaban, have been suggested by some authors [14].

The primary outcomes of this study were related to the comparative safety of SG and RYGB. The primary endpoints were key parameters such as operative time, length of hospitalization, reoperations, and complications assessed according to the Clavien-Dindo classification [10].

Data Analysis

Data analysis was performed using SAS Studio statistical software (SAS Institute Inc., Cary, NC, USA). Descriptive statistics, including means, standard deviations, and percentages, were calculated to summarize demographic and operative variables. Categorical variables between the two groups under consideration were compared using the Chi-squared test or Fisher's exact test, as appropriate. Continuous variables were analyzed using the Wilcoxon signed-rank test. Statistical significance was defined as $p < 0.05$.

Ethical Considerations

This retrospective analysis was conducted in accordance with ethical principles and applicable guidelines. Stringent measures were implemented to ensure patient confidentiality and data protection throughout the study. The requirement for informed consent was waived due to the retrospective nature of the analysis.

RESULTS

Baseline Characteristics

The mean age of patients in the SG group was 39.0 years, with a standard deviation of 9.5. In the RYGB group, the mean age was 37.8 years, with a standard deviation of 4.7. These results indicate that patients in the SG group were slightly older on average than those in the RYGB group; however, the difference was not statistically significant.

Patients in the SG group had a mean body weight of 119.1 kg, with a standard deviation of 21.7. In the RYGB group, the mean body weight was 106.6 kg, with a standard deviation of 13.1. The difference in body weight between the two groups was statistically significant ($p < 0.05$), indicating that, on average, patients in the SG group had a significantly higher body weight than those in the RYGB group. The mean height of patients in the SG group was 168.5 cm, with a standard deviation of 8.2. In the RYGB group, the mean height was 169.5 cm, with a standard deviation of 9.4. These findings indicate that patients in the RYGB group were slightly taller on average than those in the SG group.

The mean BMI in the SG group was 41.7 kg/m², with a standard deviation of 5.4. In the RYGB group, the mean BMI was 37.1 kg/m², with a standard deviation of 3.5. The difference was statistically significant ($p < 0.05$), demonstrating that patients in the SG group had a significantly higher BMI and greater obesity severity.

In the SG group, approximately 82.7% of patients were female, while in the RYGB group 84.6% were female. Both groups were therefore predominantly female, with a slightly higher proportion in the RYGB group; however, this difference did not reach statistical significance.

These baseline characteristics, with statistically significant differences in body weight and BMI, provide important insight into the demographic and clinical profiles of patients in the SG and RYGB groups and form the basis for further analysis and interpretation of study outcomes (Table 1).

Surgical Outcomes

The mean operative time for SG was 83.5 minutes, with a standard deviation of 17.8. In the RYGB group, it was 157.5 minutes, accompanied by a standard deviation of 28.6. This difference was statistically significant ($p < 0.05$), indicating that RYGB required a substantially longer operative time than SG.

Tab. 1. Baseline characteristics.

Variable	SG N=81		RYGB N=13	
	Mean	SD	Mean	SD
Age [years]	39.0	9.5	37.8	4.7
Body weight [kg] *	119.1	21.7	106.6	13.1
Height [cm]	168.5	8.2	169.5	9.4
BMI [kg/m2]*	41.7	5.4	37.1	3.5
Female [%]	82.7%		84.6%	

SG - Sleeve Gastrectomy; RYGB - Roux-en-Y Gastric Bypass; SD - standard deviation; BMI – body mass index; * - p<0.05

Patients who underwent SG had a mean length of hospitalization of 3.3 days, with a standard deviation of 0.6. In the RYGB group, the mean length of hospitalization was 3.6 days, with a standard deviation of 0.7. This represents a slight difference between the groups, with RYGB patients experiencing a marginally longer hospital stay.

Reoperations were necessary in 2.47% of patients in the SG group, and all were attributable to postoperative bleeding. It is noteworthy that none of the RYGB patients required further surgical intervention. These results demonstrate a notably lower rate of reoperations in the RYGB group, with no such procedures reported in this group (Table 2).

Postoperative complications were classified according to the Clavien-Dindo system. The classification includes various classes, with different levels of severity. In both the SG and RYGB groups, the majority of patients were classified as Class 0, indicating no postoperative complications. Patients in both groups were also classified as Class I and Class II. In the SG group, 4.9% of patients were classified as Class I, and 2.5% as Class IIIB. In the RYGB group, 7.7% of patients were classified as Class I. These findings illustrate the incidence and severity of postoperative complications in both groups based on the Clavien-Dindo classification (Table 3).

These surgical outcomes, particularly the statistically significant difference in operative time, highlight important aspects of the safety and efficiency of the two bariatric procedures.

DISCUSSION

This study compared the safety and efficacy of two commonly performed bariatric procedures, sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB). The analysis included a comprehensive examination of baseline characteristics, operative outcomes, and postoperative complications to provide insight into patient profiles and the effectiveness of these surgical interventions.

A comparison of the baseline characteristics of patients in both the SG and RYGB groups revealed statistically significant differences in body weight and body mass index (BMI) between the two groups. Patients undergoing SG exhibited significantly higher body weight and BMI than those who underwent RYGB.

Operative outcomes differed significantly between the procedures. Operative time was significantly longer for RYGB than for SG, which is consistent with findings reported by Dworak et al. [2], who conducted an investigation into the learning curve for RYGB, reporting an average of approximately 150 minutes for surgeons performing 61 to 90 RYGB procedures. The increased duration of RYGB procedures can be attributed to their inherent complexity, involving both restrictive and malabsorptive elements. Conversely, SG is primarily a restrictive procedure and does not require anastomosis.

Length of hospitalization differed only slightly between the two groups, with RYGB patients experiencing a marginally longer hospital stay. However, this difference was not statistically significant,

Tab. 2. Surgical outcomes.

Variable	SG N=81		RYGB N=13	
	Mean	SD	Mean	SD
Operative time [min]*	83.5	17.8	157.5	28.6
Length of Hospitalization [days]	3.3	0.6	3.6	0.7
Reoperations [%]	2.47%		0%	

SG - Sleeve Gastrectomy; RYGB - Roux-en-Y Gastric Bypass; * p<0.05

Tab. 3. Clavien-Dindo classification.*

Class [%]		SG N=81	RYGB N=13
Clavien-Dindo	Class 0	92.6%	92.3%
	Class I	4.9%	7.7%
	Class II	0.0%	0.0%
	Class IIIA	0.0%	0.0%
	Class IIIB	2.5%	0.0%
	Class IV	0.0%	0.0%
	Class V	0.0%	0.0%

SG - Sleeve Gastrectomy; RYGB - Roux-en-Y Gastric Bypass; * - p<0.05

and both procedures were associated with relatively short hospitalizations. These findings demonstrate the efficiency and safety of both procedures with regard to hospital resource utilization.

Reoperations were infrequent in both groups, with a notable difference in the rate. SG patients experienced a low rate of reoperations, while no reoperations were required in the RYGB group.

The classification of postoperative complications according to the Clavien-Dindo system demonstrated that the majority of patients in both groups experienced no or low-severity complications. Notably, patients in both groups were classified as Class I, indicating minor complications that were effectively managed.

In the SG group, a small percentage of patients were classified as Class I and Class IIIB, reflecting a slightly higher incidence of moderate complications. In the RYGB group, Class I complications were reported at a higher rate, possibly due to the greater complexity of the RYGB procedure. All reoperations in the SG group were due to postoperative bleeding. It is worth noting that no cases of leaks or mortality were observed.

In our practice, 2D imaging was used during laparoscopic surgery, although a study by Wang et al. recommended the use of 3D imaging. Their study, which compared 2D and 3D imaging in terms of technical performance and operative time during laparoscopic surgery, concluded that a 3D laparoscopic system can significantly reduce operative time and errors and increase surgeon comfort during laparoscopic gastric bypass surgery [15]. Despite these findings, we found 2D imaging to be sufficient for our procedures and maintained confidence in its utility.

The results of this comparative analysis offer valuable insights for clinical practice. SG appears to be a viable option for patients with more severe obesity, as indicated by the higher baseline BMI in this group. RYGB was associated with longer operative times, while the study demonstrated a favorable safety profile, which may be due to the careful patient selection for this procedure.

To date, the longest randomized controlled trial comparing sleeve gastrectomy (LSG) and Roux-en-Y gastric bypass (LRYGB) is the 10-year follow-up analysis of the SLEEVEPASS trial. In this study, both procedures demonstrated significant and sustained long-term weight loss. Although LRYGB resulted in slightly greater weight loss compared to LSG at 10 years, this difference did not meet the predefined criteria for clinical significance [12]. Importantly, the study found that both procedures had similar cumulative incidences of Barrett's esophagus (BE), which were significantly lower than in previous reports [12,14–16]. However, LSG patients experienced higher rates of endoscopic esophagitis, gastroesophageal reflux disease (GERD) symptoms, and proton pump inhibitor (PPI) use compared to LRYGB patients. These findings highlight the importance of preoperative GERD assessment and patient selection in the choice of bariatric surgery procedure. Furthermore, the study showed no statistically significant differences in the remission of type 2 diabetes, dyslipidemia, or obstructive sleep apnea between the two procedures, although LRYGB resulted in superior hypertension remission. The study suggests that both LSG and LRYGB have their advantages and considerations, and that the choice between them should be tailored to individual patient characteristics and needs.

It is essential to acknowledge the limitations of this retrospective analysis, including potential selection bias and variations in patient characteristics. The relatively small sample size, especially in the RYGB group, may limit the generalizability of the findings. Moreover, long-term follow-up data were not included in this study.

CONCLUSION

In conclusion, this study provides insights into the safety and efficacy of SG and RYGB in bariatric surgery. Both procedures offer benefits, and the choice between them should be based on individual patient characteristics and preferences. Further research with larger sample sizes and longer-term follow-up is warranted to provide a more comprehensive understanding of the comparative outcomes of these bariatric procedures.

AUTHORS' DECLARATION

Study Design: Przemysław Sroczyński. **Data Collection:** Grzegorz Dobkowski, Krzysztof Jędras, Przemysław Sroczyński. **Statistical analysis:** Michał R. Janik. **Data Interpretation:** Michał R. Janik. **Manuscript Preparation:** Michał R. Janik, Przemysław Sroczyński. **Literature Search:** Przemysław Sroczyński, Grzegorz Dobkowski, Krzysztof Jędras, Michał R. Janik. The Authors declare that there is no conflict of interest.

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