ORIGINAL RESEARCH

Med J SDU / SDÜ Tıp Fak Derg ▸ 2025:32(3):192-197 ▸ doi: 10.17343/sdutfd.1647673

Laparoscopic Sleeve Gastrectomy versus Laparoscopic Roux-en-Y Gastric Bypass in Management of Morbid Obesity: Midterm Results in a Single Center

Oktay KARAKOSE[1], Servet KARAGUL[2], Serdar SENOL[3], Huseyin EKEN[4], Ahmet AKBAS[5]

[1] Division of Surgical Oncology, Samsun Training and Research Hospital, Samsun, Türkiye
[2] Division of Gastroenterological Surgery, Istanbul Atlas University, Faculty of Medicine, Istanbul, Türkiye
[3] Division of Gastroenterological Surgery, Samsun Training and Research Hospital, Samsun, Türkiye
[4] Private Clinic of General Surgery, Izmir, Türkiye
[5] Department of General Surgery, Faculty of Medicine, Karadeniz Technical University, Trabzon, Türkiye

Cite this article as: Karakose O, Karagul S, Senol S, Eken H, Akbas A. Laparoscopic Sleeve Gastrectomy versus Laparoscopic Roux-en-Y Gastric Bypass in Management of Morbid Obesity: Midterm Results in a Single Center. Med J SDU 2025;32(3):192-197.

Abstract

Objective

Laparoscopic sleeve gastrectomy (LSG) and laparoscopic Roux-en-Y gastric bypass (LRYGB) are widely used surgical procedures for morbid obesity. The objective of the study was to present the mid-term results of our first LSG and LRYGB cases.

Material and Method

We retrospectively reviewed LSG and LRYGB patients treated at Samsun Training and Research Hospital, Turkey, within the period from January 2016 to December 2020. The demographic data of patients, comprising age, gender, body mass index (BMI), obesity-related diseases, and medications, were registered. The percentage total weight loss (%TWL), percentage excess weight loss (%EWL), and postoperative BMI were evaluated, and the results of both groups were compared.

Results

The LSG and LRYGB groups comprised 19 and 43 patients, respectively. Of these, 50 were female and 12 were male. The average age in the LSG group was 30.89 ± 7.56 years, whereas in the LRYGB group it was 42.56 ± 12.18 years ($p < 0.05$). The mean %EWL was 72.35 ± 35.24 and 76.08 ± 22.84, and the mean %TWL was 30.46 ± 13.37 and 34.70 ± 11.31, respectively ($p > 0.05$). BMI was 31.84 ± 8.76 in the LSG group and 30.14 ± 5.05 in the LRYGB group ($p > 0.05$). B12 and Fe deficiency were observed in LRYGB cases, with a significant difference found between the groups. The mean follow-up was 50.47 ± 10.93 months in the LSG group and 52.21 ± 11.58 months in the LRYGB group ($p > 0.05$).

Conclusion

LSG and LRYGB are two bariatric surgical procedures that are safe and effective with adequate weight loss in the medium term. Monitoring for B12 and Fe deficiency is important in patients undergoing LRYGB.

Keywords: Morbid obesity, Roux-en-Y gastric bypass, sleeve gastrectomy

Correspondence: O.K. / oktaykarakose@gmail.com
Received: 27.02.2025 • Accepted: 30.06.2025
ORCID IDs of the Authors: O.K: 0000-0002-2429-3915; S.K: 0000-0003-1964-2516; S.S: 0000-0002-6084-2491; H.E: 0000-0001-6095-6002; A.A: 0000-0002-6333-4919

Introduction

Obesity is a serious global public health concern, with its significantly rising prevalence in recent years (1,2). Factors such as widespread consumption of ultra-processed foods, sedentary lifestyles, and behavioral changes have substantially contributed to its increased incidence, particularly in industrialized nations. Conservative approaches like dietary regulation and physical activity often fail to achieve meaningful and sustainable weight loss in patients with morbid obesity (3-8). Despite recent advances in medical treatments, long-term efficacy remains limited, making surgical interventions the most effective option for managing obesity (9,10). Among the surgical options, laparoscopic sleeve gastrectomy (LSG) and laparoscopic Roux-en-Y gastric bypass (LRYGB) are recognized as two of the most reliable procedures. LSG is currently the most widely performed technique due to its relative simplicity, while LRYGB, although more complex, remains a preferred choice in patients with gastroesophageal reflux or hiatal hernia (11-14). Initially, our clinic favored LRYGB for bariatric surgery, but over time, we began to perform more LSG procedures. This study was conducted to share the midterm results of our early experiences with both techniques.

Material and Method

This was a single-center retrospective study. Before the study, approval was obtained from the ethics committee (No: GOKAEK 2024/4/13). All the patients gave informed consent. The study retrospectively reviewed LSG and LRYGB procedures performed on patients with obesity during the period from January 1, 2016, to December 31, 2020. Patients who had a body mass index (BMI) of 40 kg/m2 or above, or a BMI of 35 kg/m2 and above, and obesity-related diseases were included in the study. The age range was 18–65 years. Every patient was evaluated by a team of specialists, and a surgical decision was made after the assessment. A pre-operative esophagogastroduodenoscopy was routinely carried out. Demographics and clinical characteristics were analyzed. All surgical procedures were performed under general anesthesia by the same surgical team. LSG was carried out using a standardized five-port technique and a 36-Fr bougie for calibration. LRYGB included the creation of a 30 mL gastric pouch and a 150 cm Roux limb with two anastomoses (gastrojejunostomy and jejunojejunostomy). Patients were monitored postoperatively via scheduled outpatient visits at 1, 3, 6, and 12 months, and annually thereafter. Laboratory tests and imaging studies were used for follow-up evaluations. The data of patients unable to visit the hospital were collected by telephone or social media. Patients who discontinued their clinical follow-up and could not be contacted to obtain data were also excluded from the study. Patients who underwent revision surgery or complications were also excluded from the study.

Statistical Analysis

Frequency analysis was used to describe nominal and ordinal parameters, whereas means and standard deviations were used to describe scaled values. The normalcy of scale parameters was verified using the Kolmogorov-Smirnov test. The independent-samples t test was employed for comparing regularly distributed values, whereas the Mann–Whitney U test was used for comparing non-normally distributed parameters.

Results

The number of patients was 19 in the LSG group, whereas it was 43 in the LRYGB group. Of these, 50 were female, while the remaining were male. The average age was 30.89 ± 7.56 and 42.56 ± 12.18 years in the LSG and LRYGB groups, respectively ($p < 0.05$). The BMI was 45.42 ± 5.91 in the LSG group and 46.57 ± 5.84 in the LRYGB group ($p > 0.05$). Diabetes mellitus was present in 1 and 17 patients in the LSG and LRYGB groups, respectively, and the difference was statistically significant. Comorbidities such as hypertension, asthma, sleep apnea, and dyspnea were not different between the groups (Table 1).

The mean percentage excess weight loss (%EWL) was 72.35 ± 35.24 and 76.08 ± 22.84, respectively, and the mean percentage total weight loss (%TWL) was 30.46 ± 13.37 and 34.70 ± 11.31, respectively, with no significant difference between the groups. BMI was 31.84 ± 8.76 and 30.14 ± 5.05 in the LSG and LRYGB groups, respectively ($p > 0.05$). B12 and Fe deficiency were observed in LRYGB cases, with a significant difference between the groups. The mean follow-up duration was 50.47 ± 10.93 and 52.21±11.58 months in the LSG and LRYGB groups ($p > 0.05$) (Table 2).

Discussion

This study demonstrates that both LSG and LRYGB are effective surgical interventions for the treatment of morbid obesity. Our findings reflect the evolution of clinical practice in our center, where LRYGB was initially preferred but LSG gradually became the dominant procedure. The higher number of LRYGB cases in this series reflects our earlier institutional

Table 1 Baseline characteristics of the patients

	LSG (n=19)	LRYGB (n=43)	p value
Gender, n (%)			
Female	17 (89.5)	33 (76.7)	0.209[a]
Male	2 (10.5)	10 (23.3)	
Age, mean ± SD	30.89±7.56	**42.56±12.18**	0.000[b]
BMI, mean ± SD	45.42±5.91	46.57±5.84	0.480[b]
Type 2 DM preop, n (%)	1 (5.3)	**17 (39.5)**	0.005[a]
Oral antidiabetic drug, n (%)	1 (5.3)	**17 (39.5)**	0.005[a]
İnsulin, n (%)	-	5 (11.6)	0.149[a]
HT preop, n (%)	2 (10.5)	12 (27.9)	0.117[a]
Asthma, n (%)	1 (5.3)	5 (11.6)	0.397[a]
Sleep apnea, n (%)	1 (5.3)	3 (7.0)	0.642[a]
Dispnea, n (%)	2 (10.5)	10 (23.3)	0.209[a]

a. Fisher's Exact Test, b. Independent Samples t-test, SD: Standard Deviation, LSG: Sleeve gastrectomy, LRYGB: Laparoscopic Roux-en-Y gastric bypass, BMI: Body mass index, DM: Diabetes mellitus, HT: Hypertension

Table 2 Postoperative outcomes of the groups

Mean ± SD	LSG (n=19)	LRYGB (n=43)	p value
%EWL	72.35±35.24	76.08±22.84	0.675[a]
%TWL	30.46±13.37	34.70±11.31	0.204[a]
BMI	31.84±8.76	30.14±5.05	0.825[b]
Type 2 DM postop, n (%)	-	3 (7.0)	0.326[c]
Oral antidiabetic drug, n (%)	-	3 (7.0)	0.326[c]
Insulin, n (%)	-	1 (2.3)	0.694[c]
HT postop, n (%)	1 (5.3)	4 (9.3)	0.511[c]
Asthma postop, n (%)	1 (5.3)	-	0.306[c]
B12 deficiency, n (%)	-	**10 (23.3)**	0.018[c]
D Vit deficiency, n (%)	-	5 (11.6)	0.149[c]
Fe deficiency, n (%)	-	**13 (30.2)**	0.004[c]
Dumping syndrome, n (%)	-	4 (9.3)	0.221[c]
Follow up month	50.47±10.93	52.21±11.58	0.713[b]

a. Independent Samples t-test, b. Mann Whitney U Test, c. Fisher's Exact Test, SD: Standard Deviation, LSG: Sleeve gastrectomy, LRYGB: Laparoscopic Roux-en-Y gastric bypass, EWL: Excess weight loss, TWL: Total weight loss, BMI: Body mass index, DM: Diabetes mellitus, HT: Hypertension; B12: Vitamin B12; D Vit: Vitamin D; Fe: Iron

preference, while the recent increase in LSG cases underscores its growing acceptance. Historically, LRYGB was considered the best option for obesity surgery, but new surgical options have emerged over time (15-18). LRYGB remains the first choice in the case of gastroesophageal reflux. Like other new

surgical techniques, LSG was initially not quickly adopted by surgeons. This was basically because LSG was technically a new and different method in gastrointestinal surgery. Despite modifications, LRYGB was adopted in gastric surgery for many years (19-21). Vast experience and knowledge exist regarding metabolic effects and complications of LRYGB procedures. Numerous procedures have been used for treating morbid obesity, of which some are now considered safer. Long-term results were also obtained in bariatric surgery (22-25).

The follow-up duration of our patients was 50.47 ± 10.93 months in the LSG group and 52.21 ± 11.58 months in the LRYGB group. The long-term clinical outcomes of weight loss surgery can be inconsistent with the long-term results. Therefore, the results of the medium and long-term follow-up studies can provide a more reliable assessment. The BMI of our patients was 31.84 ± 8.76 kg/m2 in the LSG group and 30.14 ± 5.05 kg/m2 in the LRYGB group, indicating that both surgeries provided successful weight loss.

A significant difference with regard to age was found between the groups. The mean age was 30.89 ± 7.56 years in patients with sleeve gastrectomy and 42.56 ± 12.18 years in the other. This likely reflects a tendency to avoid procedures that cause more extensive anatomical alterations in younger populations. Concerns over long-term nutritional deficiencies and the limited ability to evaluate the gastric remnant post-LRYGB may also contribute to this trend. Hence, long-term data are needed on the morbidities caused by the gastric remnant after LRYGB. An advantage of LSG is that the stomach can be evaluated using endoscopy throughout life, and developing minimally invasive endoscopic procedures is feasible. Additionally, younger patients undergoing LSG may be more adherent to postoperative dietary and activity recommendations, potentially influencing weight loss outcomes. While both procedures proved effective for weight reduction, LRYGB was more frequently selected for patients with obesity-related comorbidities, particularly type 2 diabetes. Although LSG also yields metabolic improvements, the malabsorptive component of LRYGB may offer superior outcomes in this subgroup (26,27).

Biter et al. compared LSG and LRYGB. They reported that LSG and LRYGB led to clinically similar BMI loss for people with grade 2 and 3 obesity. However, LRYGB showed significantly higher weight loss. They also stated that LRYGB was more advantageous in terms of secondary outcomes such as dyslipidemia and gastroesophageal reflux disease; they found no significant effect on major complications (28). Similarly, Kachornvitaya et al. obtained comparable outcomes concerning weight loss and resolution of comorbidities at 5 years in the LSG and LRYGB groups. The results showed that LSG and LRYGB are reliable and successful bariatric procedures. Long-term complications were observed at a higher rate in LSG than in LRYGB. A complication differentiating LSG from LRYGB was gastroesophageal reflux disease (29). A recent review of randomized clinical trials compared the efficacy of LRYGB with that of LSG in the treatment of type 2 diabetes mellitus (T2DM) (30). LSG was shown to have greater efficacy in the remission of T2DM, hypertension, and dyslipidemia, and in terms of weight loss compared with LRYGB. Further, LSG showed a lower severity of complications than LRYGB. Moreover, LRYGB was more effective than LSG in reducing BMI as well as cholesterol, low-density lipoprotein, and triglyceride levels.

A fully established and accepted algorithm for the management of obesity has not yet been reported. Various techniques have shown varying degrees of effectiveness concerning both weight loss and the management of obesity-related comorbidities. LSG is efficacious and a preferred technique because it causes minimal anatomical changes to the digestive system. One of the reasons for this preference is that LSG has been standardized after gaining extensive experience and expertise in managing its complications. The learning curve for LRYGB is longer than that for LSG, and hence it requires more time to gain experience. However, LRYGB is still a highly reliable modality for treating obesity. Although various techniques have been used for treating obesity in the past, some procedures were abandoned over time due to insufficient weight loss or malabsorptive complications.

The main limitation of this study was its retrospective nature, which may inherently introduce bias. Moreover, the lack of randomized group allocation could have led to selection bias and affected the comparability of the outcomes. Based on our experience, LRYGB was initially recommended for patients who wanted to undergo bariatric surgery. This recommendation was made not only for those seeking weight loss but also for those with obesity-related diseases. In contrast, LSG is offered by surgeons as an option to young patients. The statistical difference in the age of the patients substantiated this. Another limitation of the study was that nutritional parameters were not recorded. The changes in nutritional characteristics and vitamin-mineral balance could not be monitored regularly due to the low compliance of bariatric patients with follow-up.

Conclusion

LSG and LRYGB are safe and effective bariatric surgical procedures. Both resulted in acceptable midterm weight loss in this study. In LRYGB, patients should be closely monitored for B12 and Fe deficiency. Further studies comparing the two techniques in a randomized manner using standardized groups are still needed.

Conflict of Interest Statement
The authors have no conflicts of interest to declare.

Ethical Approval
Approval was obtained from the Samsun Training and Research Hospital Ethics Committee (No: GOKAEK 2024/4/13). The study was conducted in accordance with the principles set forth in the Declaration of Helsinki.

Funding
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Availability of Data and Materials
Data and materials may be used.Data sharing not applicable.

Artificial Intelligence Statement
No artificial intelligence tools were used.

Authors Contributions
OK: Conceptualization; Formal analysis; Investigation; Methodology; Validation; Visualization; Writing-original draft.

SK: Conceptualization; Investigation; Methodology; Resources; Writing- review & editing.

SS: Investigation; Methodology; Validation; Data curation; Data curation; Formal analysis; Writing-original draft.

HE: Formal analysis; Investigation; Visualization; Writing-original draft.

AA: Methodology; Visualization; Writing- review & editing.

References

1. Hemmingsson E, Ekblom Ö, Kallings LV, et al. Prevalence and time trends of overweight, obesity, and severe obesity in 447,925 Swedish adults, 1995–2017. Scand J Public Health 2021;49(4):377–83. doi:10.1177/1403494820914802
2. Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of obesity and severe obesity among adults: United States, 2017–2018. NCHS Data Brief 2020;(360):1–8.
3. Askari M, Heshmati J, Shahinfar H, Shirani F, Sharbafi MH, Amini M, et al. Ultra-processed food and the risk of overweight and obesity: A systematic review and meta-analysis of observational studies. Int J Obes (Lond) 2020;44(10):2080–91. doi:10.1038/s41366-020-0609-7
4. Juul F, MartinezSteele E, Parekh N, Monteiro CA, Chang VW. Ultra-processed food consumption and excess weight among US adults. Br J Nutr 2018;120(1):90–100. doi:10.1017/S0007114517002022
5. Silveira EA, Mendonça CR, Delpino FM, et al. Sedentary behavior, physical inactivity, abdominal obesity, and obesity in adults and older adults: A systematic review and meta-analysis. Clin Nutr ESPEN 2022;50:63–73. doi: 0.1016/j.clnesp.2022.05.005
6. Day K, Alfonzo M, Chen Y, et al. Overweight, obesity, and inactivity, and urban design in rapidly growing Chinese cities. Health Place 2013;21:29–38. doi: 0.1016/j.healthplace.2013.01.007
7. Vitiello A, Angrisani L, Santonicola A, Panico G, De Sena G. Bariatric surgery versus lifestyle intervention in Class I obesity: 7–10year results of a retrospective study. World J Surg 2019;43(3):758–62. doi:10.1007/s00268-018-4845-1
8. Hofsø D, Nordstrand N, Johnson LK, et al. Obesityrelated cardiovascular risk factors after weight loss: A clinical trial comparing gastric bypass surgery and intensive lifestyle intervention. Eur J Endocrinol 2010;163(5):735–45. doi:10.1530/EJE-10-0055
9. Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: A systematic review and meta-analysis. JAMA 2004;292(14):1724–37. doi:10.1001/jama.292.14.1724
10. Edholm D, Svensson F, Näslund I, et al. Long-term results 11 years after primary gastric bypass in 384 patients. Surg Obes Relat Dis 2013;9(5):708–13. doi: 0.1016/j.soard.2013.06.009
11. Smith CD, Herkes SB, Behrns KE, et al. Gastric acid secretion and vitamin B12 absorption after vertical Roux-en-Y gastric bypass for morbid obesity. Ann Surg 1993;218(1):91–6. doi:10.1097/00000658-199307000-00014
12. Sargsyan N, Das B, Robb H, et al. Outcomes of oneanastomosis gastric bypass conversion to Roux-en-Y gastric bypass for severe obesity: A systematic review and meta-analysis. Obes Surg 2024;34(3):976–84. doi:10.1007/s11695-023-06954-2
13. Carandina S, Soprani A, Sista F, et al. Conversion of oneanastomosis gastric bypass (OAGB) to Roux-en-Y gastric bypass (RYGB) for gastroesophageal reflux disease (GERD): Who is more at risk? A multicenter study. Surg Endosc 2024;38(3):1163–69. doi:10.1007/s00464-023-10937-8
14. Dayan D, Kanani F, Bendayan A, et al. The effect of revisional one anastomosis gastric bypass after sleeve gastrectomy on gastroesophageal reflux disease, compared with revisional Roux-en-Y gastric bypass: Symptoms and quality of life outcomes. Obes Surg 2023;33(7):2125–31. doi:10.1007/s11695-022-06335-5
15. Delko T, Kraljević M, Lazaridis II, et al. Laparoscopic Roux-Y-gastric bypass versus laparoscopic oneanastomosis gastric bypass for obesity: Clinical & metabolic results of a prospective randomized controlled trial. Surg Endosc 2024;38(7):3875–86. doi:10.1007/s00464-023-11117-2
16. Salte OBK, Olbers T, Risstad H, et al. Ten-year outcomes following Roux-en-Y gastric bypass vs duodenal switch for high body mass index: A randomized clinical trial. JAMA Netw Open 2024;7(6):e2414340. doi:10.1001/jamanetworkopen.2024.14340
17. Jain M, Tantia O, Goyal G, et al. LSG vs OAGB: 7-year follow-up data of a randomised control trial and comparative outcome based on BAROS score. Obes Surg 2024;34(4):1295–305. doi:10.1007/s11695-024-06123-5
18. Chalmers KA, Cousins SE, Blazeby JM. ByBandSleeve Trial Management Group. Randomized controlled trials comparing gastric bypass, gastric band, and sleeve gastrectomy: A syste-

matic review examining validity and applicability to wider clinical practice. Obes Rev 2024;25(5):e13718. doi:10.1111/obr.13718
19. Nishizaki D, Ganeko R, Hoshino N, et al. Roux-en-Y versus Billrothl reconstruction after distal gastrectomy for gastric cancer. Cochrane Database Syst Rev 2021;9(9):CD012998. doi:10.1002/14651858.CD012998.pub2
20. Cai Z, Zhou Y, Wang C, et al. Optimal reconstruction methods after distal gastrectomy for gastric cancer: A systematic review and network meta-analysis. Medicine (Baltimore) 2018;97(20):e10823. doi:10.1097/MD.00000000000010823
21. Hong J, Wang SY, Hao HK. A comparative study of doubletract reconstruction and Roux-en-Y after gastrectomy for gastric cancer. Surg Laparosc Endosc Percutan Tech 2019;29(2):82–9. doi:10.1097/SLE.0000000000000619
22. Raza MM, NjideakaKevin T, Polo J, et al. Long-term outcomes of bariatric surgery: A systematic review. Cureus 2023;15(5):e39638. doi:10.7759/cureus 39638
23. O'Brien PE, Hindle A, Brennan L, et al. Long-term outcomes after bariatric surgery: A systematic review and meta-analysis of weight loss at 10 or more years for all bariatric procedures and a singlecentre review of 20-year outcomes after adjustable gastric banding. Obes Surg 2019;29(1):3–14. doi:10.1007/s11695-018-3525-y
24. Raaijmakers LC, Pouwels S, Thomassen SE, et al. Quality of life and bariatric surgery: A systematic review of short and long-term results and comparison with community norms. Eur J Clin Nutr 2017;71(4):441–9. doi:10.1038/ejcn.2016.259
25. Bastos ELS, Salgado W Jr, Dantas ACB, et al. Medium and long-term weight loss after revisional bariatric surgery: A systematic review and meta-analysis. Obes Surg 2024;34(5):1917–28. doi:10.1007/s11695-024-05941-8
26. Singh B, Saikaustubh Y, Singla V, et al. Oneanastomosis gastric bypass (OAGB) vs Roux-en-Y gastric bypass (RYGB) for remission of T2DM in patients with morbid obesity: A randomized controlled trial. Obes Surg 2023;33(4):1218–27. doi:10.1007/s11695-022-06421-3
27. Level L, Rojas A, Piñango S, Luque R, FernándezCalle P, Mira J, et al. One anastomosis gastric bypass vs RouxenY gastric bypass: A 5year followup prospective randomized trial. Langenbecks Arch Surg 2021;406(1):171–9. doi:10.1007/s00423-020-02026-4
28. Biter LU, 't Hart JW, Noordman BJ, et al. Longterm effect of sleeve gastrectomy vs RouxenY gastric bypass in people living with severe obesity: A phase III multicentre randomised controlled trial (SleeveBypass). Lancet Reg Health Eur 2024;38:100836. doi:10.1016/j.lanepe.2024.100836
29. Kachornvitaya P, Sornphiphatphong S, Chaivanijchaya K, et al. Comparison of longterm outcomes after laparoscopic sleeve gastrectomy and laparoscopic RouxenY gastric bypass for morbid obesity. Asian J Surg 2024;28:S10159584(24)012697.
30. 30. Aguirre Talledo J, CaballeroAlvarado J, De la Cruz Davila M, et al. RouxenY gastric bypass vs vertical sleeve gastrectomy in the remission of type 2 diabetes mellitus: A systematic review and metaanalysis. Pol Przegl Chir 2024;96(3):69–82.