

Original Research Article

The comparison of effects of Roux-n-y gastric bypass and sleeve gastrectomy on excess weight loss in morbidly obese patients

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ABSTRACT

Background: Obesity an important health problem which has become a worldwide epidemic that effects both developed countries and developing countries. Bariatric surgery is the most efficient cure for morbid obesity. Authors retrospectively reviewed the results of different techniques in bariatric surgery to assess the efficiency of initial operations.

Methods: The medical files and operation notes and the one-year follow-up of patients were reviewed. The outcomes of sleeve gastrectomy (SG) and gastric roux-n-y bypass (RYGBP) operations were reviewed and their effects on excess weight loss were investigated.

Results: Overall, there were 97 patients included in the study, the majority of which were female (87/97, or 90%). The mean age of the SG group was 42.01 ± 8.48 years versus 36 ± 8.32 years in the RYGBP group, with $p=0.007$. Excess weight loss percentages were 51.7% and 57% for sleeve gastrectomy and RYGBP, respectively, $p=0.491$. Both operations are effective in reducing comorbidities.

Conclusions: In the RYGBP procedure there is more excess weight loss than the results of SG procedure but the difference is not statistically significant. In both procedures, the initial results on weight loss and reduction of comorbidities are comparable. Because SG is less traumatic and relatively easier to perform, it can be the preferred operation for morbid obesity.

Keywords: Excess weight loss, Morbid obesity, Roux and Y Gastric bypass, Sleeve gastrectomy

INTRODUCTION

Obesity is one of the major health problems in both developed and developing countries. Rates of obesity have almost tripled since 1975. According to the World Health Organization (WHO), more than 1.9 billion adults worldwide are overweight and 650 million are obese.¹ In 1998, the Turkey obesity prevalence study (TURDEP I) reported the prevalence of obesity as 22.3%.² Twelve years later in the Turkey obesity prevalence study II (TURDEP II), the obesity rate was found to have risen to 32%, which is a remarkable and alarming increase.³

Obese individuals have an increased risk of morbidity and mortality from type 2 diabetes mellitus (DM), hypertension, coronary artery disease, cancer (especially colon, prostate, and breast cancer), sleep apnea, thromboembolic events, degenerative joint disease, and dermatological disorders.⁴ Treatment for obesity is very difficult and requires a multidisciplinary approach. Medical treatment has limited and short-term success; once morbidly obese, patients are around 3% likely to maintain a body mass index (BMI) below 35 on a diet.⁵ Currently, surgery is the most effective treatment for morbid obesity.⁶ After bariatric surgery, the relationship

between weight loss and the reduction of obesity-related comorbidities has been well established.⁷ Roux-en-Y gastric bypass (RYGBP) is the most common bariatric surgery, and its long-term effects are well known to significantly reduce obesity-related long term comorbidities and provide significant and permanent weight loss.^{8,9} RYGBP is a form of surgery that restricts food intake and reduces absorption.¹⁰ Laparoscopic sleeve gastrectomies (LSG) have been increasingly used in the last few years, as sleeve gastrectomy (SG) causes less traumatic and relatively a straightforward operation that takes shorter time to perform.¹¹

Authors hypothesized that, since SG is less traumatic and relatively easier to perform, SG can become the preferred bariatric surgery if the resulting weight loss is comparable to RYGBP. Authors evaluated the RYGBP and LSG cases between 2011 and 2014 to investigate the results of initial bariatric operations. The primary outcomes were early weight loss. Secondary outcomes were the resolution of comorbidities and comparison of initial results with the literature.

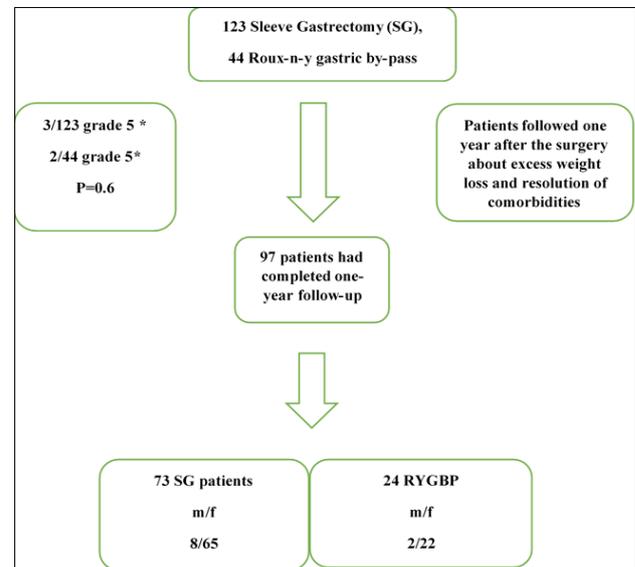
METHODS

The files of patients who underwent surgery for the treatment of obesity were reviewed in a retrospective cohort study. Patients with a BMI over 40 kg/m² were regarded as (morbidly or severely obese and patients with a BMI >50 kg/m² as super obese.¹² Surgery was performed according to the National heart lung and blood institute (NHLBI) criteria.¹³ Between March 2010 and March 2013, 73 morbidly obese patients who underwent LGS and 24 patients who underwent RYGBP were included in the study (Figure 1). The patients were interviewed before the surgery and the expectations of the physician and the patient were taken into consideration to reach a final decision for the surgical technique to be used. All patients were previously under dietary control. Breathing exercises and thromboembolism prophylaxis were started before surgery. All operations were performed by the same experienced surgeons. The study protocol was approved by the ethics committee with the number of (no: 863/2014). The study was conducted in accordance with the principles of the Declaration of Helsinki, as revised in 2000, in the general surgery department of Ankara Numune Training and Research Hospital.

Excess weight loss (EWL) percentage was measured according to the Metropolitan height and weight tables.¹⁴ Excess weight was found by subtracting the ideal weight value from the patient's current weight. The weight that the patient lost at the end of one year was divided by the patient's excess weight in kilograms, multiplied by 100, and expressed as a percentage.

Each patient was called for a follow-up visit every month for the first three months, every three months for the next 12 months, and every six months until the ideal weight

was reached. Weight loss was recorded, and BMI was measured at each visit. The percentage of reduction in excess weight and postoperative weight loss were recorded.



*Grade of the complication according to the Clavien-Dindo Classification system for complications in surgery.

Figure 1: Patients flow chart.

For hypertension, obstructive sleep apnea syndrome (OSAS), and asthma, the following definitions were used: remission was defined as a lack of symptoms and discontinuation of treatment, improvement was defined as a reduction in treatment, and unchanged as no difference from baseline. The remission of T2DM was defined according to the American Diabetes Association criteria for complete remission with fasting glucose (100 mg/dL) and at least one year without active pharmacological therapy or ongoing procedures.¹⁵ Improvement was defined as a reduction in treatment and resolution in the symptoms and complaints.

Availability of data and materials

All data and materials kept up in center where operations were performed.

Informed consent

After explaining the interventions, risks, and benefits as a policy of the health system in the country, informed consent was obtained from the relatives of each patient before the procedures.

Statistical analysis

All data were expressed as mean±standard deviation. The EWL between the LSG and RYGBP groups at the end of the 12th month was compared using the Mann-Whitney U-test. Statistical significance was defined as a p value of

≤ 0.05 . Improvement in comorbidities was expressed as percentages. Fisher's exact test was used to compare the percentages of improvement of comorbidities. SOFA Statistics (Source forge), PSPP (Source forge), and SPSS 22 (IBM SPSS statistics for Windows. Armonk, NY: IBM Corp) were used for statistical analyses.

RESULTS

Overall, 97 patients were included in the study, the majority of which were women (87/97, or 90%). The mean age of the SG group was 42.01 ± 8.48 years versus 36 ± 8.32 years in the RYGBP group, ($p=0.007$, Table 1).

In this study, there were improvements in the diabetes and hypertension. In the SG group of 73 patients, there were 24 (32.8%) patients with the diagnosis of concomitant diabetes mellitus (DM), 10 (13.6%) patients with hypertension, and 6 (8.2%) patients with asthma and 6 (8.2%) patients with other pulmonary complaints. Type 2 diabetes was eliminated in 14 (66%) of 24 patients, and the need for insulin was reduced in 4 (24%) patients.

Nine (90%) of the 10 hypertensive patients recovered. Two (100%) patients with obstructive sleep apnea improved.

Table 1: The patients' characteristics.

Parameters	Sleeve gastrectomy	Roux-en-y gastric bypass	p value
n	73	24	
Male/female	8/65	2/22	
Age (years)	42.01 ± 8.48	36 ± 8.32	$p=0.007^*$
Average weight (kg)	130 ± 22.30	$118.13 \text{ kg} \pm 16.40$	$p=0.017^*$
Ideal weight (kg)	59.30 ± 6.60	62.63 ± 2.84	$p=0.943$
Body/mass index	48.20 ± 6.97	44.01 ± 5.54	$p=0.007^*$
Excess weight loss (%)	51.7%	57%	$p=0.491$

*significant.

Table 2: The concomitant comorbidities and resolution rates in the SG and RYGBP group.

	Morbidity	DM type 2	HT	ASTIM	Pulmonary complaints
SG group	Preoperative	24	24	6	6
	Postoperative remission or improvement	20 (83%)	20 (83%)	Improvement	Improvement
RYGBP	Preoperative	5	6	Null	Null
	Postoperative remission or improvement	4 (80%)	6 (100%)		

SG: sleeve gastrectomy, RYGBP: Roux-n-y gastric by-pass, HT: hypertension,

In the 24 patients who underwent RYGBP, five (21%) patients had type 2 diabetes and six (25%) patients had hypertension. In the postoperative examinations, the blood pressure values of all six (100%) patients returned to normal, and four (80%) patients stopped using diabetes medication. There were no significant differences between the two groups in terms of the rate of concomitant diseases (Table 2).

Table 3: Complications according to the Clavien-Dindo grading system.

Grade	SG	RYGBP	p value
Grade 1	7 (9.5%)	2 (8.3%)	0.85406
Grade 2	5 (6.8%)	2 (8.3%)	0.686982

SG: sleeve gastrectomy, RYGBP: Roux-n-y gastric by-pass.

Considering the included 73 patients who had completed 1-year follow-up, in the SG group, there were 5 (6.8%) patients had prolonged hospitalization (Grade 2) due to leakage and hemorrhage. Seven (9.5%) patients had prolonged hospitalization due to wound infection (Grade 1).

Table 4: The postoperative resolution rate of comorbidities (partial or total combined).

Concomitant disease	SG group	RYGBP	p value
Type 2 DM (n, %)	20 (83%)	4 (80%)	>0.05
HT (n, %)	20 (83%)	6 (200%)	>0.05
Asthma	6	Null	
Pulmonary complaints	6	Null	

SG: sleeve gastrectomy, RYGBP: Roux-n-y gastric by-pass.

Of the 24 included patients who underwent RYGBP, 2 (8.3%) were treated medically due to leakage (Grade 2) and 2 (8.3%) had prolonged hospitalizations due to wound infection (Grade 2) (Table 3).

DISCUSSION

In case-control and retrospective studies, RYGBP was shown to be more effective than SG in weight loss, reduction of comorbidities, and diabetes remission.

However, in some randomized studies, it was reported that SG had similar results to RYGBP. LSG is a straightforward procedure that can usually be achieved laparoscopically, even in the case of an extremely obese patient. In addition, there is no digestive anastomosis, no mesenteric defects with the risk of internal hernia, no foreign material as in the case of gastric banding, and no dumping syndrome. The risk of peptic ulcers is low, and the gastrointestinal tract is suitable for gastroscopic evaluation.¹⁶

Several studies have compared RYGBP and SG. In a double-blind study, Karamanakos et al, found no difference in weight loss between the two groups at 12 months (60.5±10.7% versus 69.7±14.6%, p=0.05), although both results were slightly higher than ours.¹⁷ In terms of comorbidities, both procedures showed a significant decrease in glucose and triglyceride levels. A visual analog scale was used to measure appetite, and a significant decrease in appetite was detected in both groups.

In a randomized multicenter study, Peterli et al, performed a clinical trial assessing the effectiveness and safety of these two operative techniques.¹⁸ By the end of the first year, the EWL for the two procedures was as follows: 72.3±22% for LSG and 76.6±21% for LRYGB; p=0.2. Comorbidities and quality of life were significantly improved after both procedures, although LSG was associated with a shorter operative time and a trend toward fewer complications than LRYGB. In accordance with this study, they reported slightly better weight loss with RYGB, but both procedures were almost similar in weight loss and improvement of comorbidities one year after surgery.

Lim et al, studied the two procedures in a military institution and reported that the EWL for LRYGB versus LSG was 72% versus 64.7% at 1 year (p=0.002).¹⁹ This study results again revealed a slightly better outcome with RYGB procedure, but the difference was not found to be different between the two procedures.

Wolnerhanssen et al, conducted a prospective, randomized study that compared the one-year follow-up results of LRYGB and LSG concerning weight loss, metabolic control, and fasting adipokine levels.²⁰ They found no significant difference in weight reduction, even though, weight loss was slightly greater with RYGB: 34.5±2.70% after LRYGB and 27.9±2.60% after LSG.

Postoperative comorbidities

In this study, the changes in diabetes and hypertension were evaluated in terms of improvement in comorbidities. This study results show that both SG and GBP were effective in the treatment of obese patients with T2DM 12 months after surgery. T2DM remission (partial or total) occurred in 80% of the RYGBP and 75% of the SG diabetic patient groups. This ratio is given as 80% for

RYGBP and 70-80% for SG in the literature.²¹ These figures are consistent with this finding. It is generally accepted that hypertension decreases by 60% after both SG and RYGBP. This rate was 90% for SG and 100% for RYGBP in this study. These higher rates are not uncommon in bariatric surgery.²² With regards to the resolution of co-morbidities there was no difference between the two groups, p>0.05 (Table 4).

In a randomized prospective multicenter study, Peterli et al, compared LSG with RYGBP for the resolution of comorbidities.²³ They found that there were no significant differences in the improvement of comorbidities, weight loss, quality of life, and complications in the post-surgical period. Hypertension resolved with both procedures (65.2% LSG versus 71.2% LRYGB), while Type 2 DM resolved 60% in the LSG group versus 77% in the LRYGB group.

Kehagias et al, reported that SG and LRYGB are equally safe and effective in the amelioration of comorbidities, while SG is associated with fewer postoperative metabolic deficiencies without the need for dietary supplementation.²⁴ Furthermore, LSG is equally as effective as LRYGB at the three-year follow-up on weight reduction.

In a large study of 558 patients, 200 underwent LSG and 358 underwent LRYGB. After one year, 86.2% of the LSG patients had one or more comorbidities in remission compared to 83.1% of the LRYGB patients (p=0.688). Similar comorbidity remission rates were observed after LSG and LRYGB for sleep apnea (91.2% versus 82.8%; p=0.338), hyperlipidemia (63% versus 55.8%; p=0.633), hypertension (38.8% versus 52.9%; p=0.062), diabetes (58.6% versus 65.5%, p=0.638), and musculoskeletal disease (66.7% versus 79.4%; p=0.472).²⁵ Lee et al, found RYGBP to be more effective in improving diabetes.²⁶ However, Kehagias, Woelnerhanssen, and Peterli found that the two procedures did not differ.^{20,24,27}

This study average excess weight loss rate after SG was 51.7%. This rate is consistent with Himpens, Bohjalian, and D'Hondt's excess weight loss rates after SG of 53%, 55%, and 56%, respectively. Sarela et al.²⁸⁻³¹ achieved a rate of 69%, which is higher than the results of these studies and may be an exception.

The excess weight loss rate after RYGBP was 57.4% in this study. The percentage of EWL varies between procedures. The highest rate is of EWL is 70-80% with the biliopancreatic diversion operation. The average EWL is around 60-70% after RYGBP and 50-60% after SG. The value determined in this study is very close to the accepted rate of 60%.²¹

Limitations of this study were the two groups compared in this study were not homogeneous. The SG group was older and weighed more than the RYGBP group. This may reflect bias in patient selection. At some point, SG

may have become the procedure of choice for older, more obese patients with greater surgical risk. This study is important to shed light on the changing trends in bariatric surgery. These procedures have become more common and widely applied. However, these findings represent the initial figures of authors practice and may be a good referral point for a start-up in a teaching hospital environment. It is always to the interest of surgeons reviewing the results of an early series.

CONCLUSION

Although there was less excess weight loss after SG than after RYGBP, there were no statistically significant differences between groups. In both the SG and RYGBP groups, comorbidities improved with weight loss. According to the surgeon's experience and preference, SG is a candidate procedure for primary bariatric surgery. It has the advantage of being used as the first leg of a planned operation when there is insufficient weight loss or in high-risk patients. SG is a method that provides an EWL similar to RYGBP.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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