Original Article

Comparison of leakage rate after sleeve gastrectomy compared with gastric bypass

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Abstract

Background: Gastric bypass and sleeve gastrectomy are two common types of bariatric surgery. Anastomotic leak is one of the common and fatal complications of these surgeries. The current study compared the leakage rate after sleeve gastrectomy and gastric bypass.

Materials and Methods: This cross-sectional study was performed on patients who underwent bariatric surgery in Mortaz and Mojibinia Hospitals (Yazd-Iran) from 2016 to 2020. Age, sex, body mass index (BMI) before surgery, underlying disorders, surgery types (sleeve gastrectomy or gastric bypass), amount of weight loss, leakage, duration time between the end of the surgery, and occurrence of leakage were recorded. The patients were followed up for three months. The patients were observed for the presence of the leakage for two weeks after the operation.

Results: A total of 713 patients were enrolled in the study; 427 underwent sleeve gastrectomy (59.89%), and 286 underwent gastric bypass surgery (40.11%). Of these patients, 43.3% were male. The age of performing the surgery significantly differed between the groups (P-value: 0.031). The gastric bypass group lost more weight than the sleeve gastrectomy group (P-value <0.001). The leakage rate was higher in patients operated on by gastric bypass than those operated on by sleeve gastrectomy (P-value = 0.032). Leakage time significantly differed between the groups (P-value = 0.043).

Conclusion: Bypass gastrectomy has a higher leakage rate than sleeve gastrectomy, but it has a higher effect on weight loss.

Keywords: Anastomotic leak, Gastrectomy, Gastric bypass, Bariatric surgery

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Introduction

Severe obesity is a disease that has several adverse effects on life. Bariatric surgery can successfully help with weight loss in patients who have not been able to lose weight. Patients are often advised to lose weight initially with non-surgical methods, but failure of non-surgical treatment for persistent weight loss is common among people with severe obesity[1-3]. Severe intervention in lifestyle can cause weight loss of an average of about 10% in 1 year and maintain weight

loss of 5.3% over 8 years[4].

Medication may cause short-term and long-term weight loss. Specific criteria set by the National Institutes of Health have shown that bariatric surgery is appropriate for all patients with a BMI > 40 kg / m2 and those with a BMI of 35-40 with comorbidities. There are also specific requirements for bariatric surgery intervention in people who are less obese, such as those with a BMI of 30-35 with type 2 diabetes[5, 6]. Bariatric surgery includes adjustable gastric banding, sleeve gastrectomy, Roux-en-Y gastric bypass, and bilio-pancreatic diversion[7]. bariatric surgery has become popular due to its effects on obesity. Laparoscopic sleeve gastrectomy (LSG) has become the most common bariatric surgery[8, 9]. Roux-en-Y gastric bypass was developed in response to the unacceptable complications that followed bowel bypass. A method that led to reduced absorption, reduced food intake, and significant weight loss with related benefits[10].

The complication of staple-line leaks has been the most concerning problem since its early introduction, with reported rates of about 2.4 percent ranging from 1.1 to 4.7 percent[11-16]. Various studies aimed to discover criteria for reducing the risk of leaks over the last ten years, including bougie size, distance from the pylorus, surgeon skill, and staple line reinforcement[17-20].

Anastomotic leakage is the most frightening complication of surgical procedures because it increases mortality by 15% and disease burden by 61%. Patients undergoing bariatric surgery with a BMI of more than 50 kg/m2 are more prone to leakage. Leakage should be suspected in any patient with bariatric surgery in case of persistent tachycardia (> 120 beats per minute), shortness of breath, fever, and abdominal pain. The average time for leakage symptoms is approximately 3 days after surgery[11, 21-24]. In this study, we aimed to compare the prevalence of leakage rates between sleeve gastrectomy and gastric bypass in patients who underwent bariatric surgery.

Methods

In this cross-sectional study, we aimed to compare the prevalence of leakage rate between sleeve gastrectomy and gastric bypass. We assessed patients who underwent bariatric surgery from April 2016 to April 2020. All patients referred to Mortaz and Mojibinia Hospitals (Yazd-Iran) were enrolled in the study.

The inclusion criteria were performing sleeve gastrectomy or gastric bypass for weight loss. The exclusion criteria were gastric band bariatric surgery, patients refusing referral for follow-ups, and not having consent to participate in the study. After considering inclusion and exclusion criteria, 713 patients were entered into the study.

Age, sex, body mass index (BMI) before surgery, underlying disorders, surgery types (sleeve gastrectomy or classic gastric bypass), amount of weight loss, leakage, and duration time between the end of surgery and occurrence of leakage were recorded. The patients were followed up for three months. The patients were observed for leakage for two weeks. If the patients had tachycardia, shortness of breath, fever, and abdominal pain in these two weeks, they were evaluated for leakage.

Ethical Considerations: This study has received ethical clearance from the Research Ethics Committees of the Islamic Azad University-Yazd Branch, with an assigned ethics code (IR.IAU.YAZD.REC.1403.034).

Statistical analysis: Frequency and percentage were used to describe qualitative data and mean, standard deviation, median, and amplitude were used for quantitative data. Chi-square and Fisher tests were used to compare the variables between the two treatment groups. Analyses were performed by SPSS 25.0 statistical software, and a P-value less than 0.05 was considered statistically significant.

Results

In this study, the rate of anastomotic leak after sleeve gastrectomy was compared with gastric bypass surgery, and 713 patients were included in the study, of which 427 patients underwent sleeve gastrectomy, and 286 patients underwent gastric bypass surgery. We evaluated basic data, and its results are seen in Table 1. Most of the patients were younger than 30 years, and the age of performing the surgery was significantly different between the two groups (P-value: 0.031).

We evaluated the frequency of underlying disease of patients between the two groups, and it was found that there was no statistically significant difference between

Table 1. Patients demographic data.

		Surgery		P-value*
		Sleeve, N=427 (%)	Bypass, N=286 (%)	
Sex	Man	179 (41.9)	130 (45.5)	0.3
	Woman	248 (58.1)	156 (54.5)	
Age	<30	229 (53.6)	155 (54.2)	0.03
	30-40	173 (40.5)	107 (37.4)	
	40-50	19 (4.4)	24 (8.4)	
	>50	6 (1.4)	0 (0.0)	
BMI before surgery	>40	405 (94.8)	275 (96.2)	0.4
	35-40	22 (5.2)	11 (3.8)	

*Based on the Fisher Exact test and Chi-square

Table 2. Weight loss in two groups.

		Surgery		P-value*
		Sleeve N=427 (%)	Bypass N=286 (%)	
Weight loss	0-10	356 (83.4%)	32 (11.2%)	0<0.001
	10-20	62 (14.5%)	195 (68.2%)	
	20-30	9 (2.1%)	59 (20.6%)	

*Based on the Chi-square test

the two groups about underlying disease (P-value=0.23).

In Table 2, we assessed weight loss in both groups over three months. Patients who underwent gastric bypass surgery had more weight loss than patients who underwent sleeve gastrectomy. This difference was statistically significant (P-value <0.001).

Table 3 compares the leak rate after sleeve gastrectomy to gastric bypass surgery in the patients.

Table 3. Evaluation of leakage rate after sleeve surgery compared to gastric bypass surgery in patients undergoing surgery.

		Surgery		
		Sleeve N=427 (%)	Bypass N=286 (%)	P-Value
Leak	No	424 (99.3)	278 (97.2)	0.03
	Yes	3 (0.7)	8 (2.8)	
Time to leak	No	424 (99.3)	278 (97.2)	0.04
	First week	1 (0.2)	6 (2.1)	
	Second week	2 (0.5)	2 (0.7)	

Patients operated on by sleeve gastrectomy had a significantly lower postoperative leakage rate (P-value = 0.032). There was also a statistically significant difference in leakage time between the two groups (P-value = 0.043). None of the patients who experienced anastomotic leak had underlying diseases.

Discussion

Globally, an estimated 1.48 billion adults are overweight, with 502 million of them categorized as obese. Bariatric surgery has grown in popularity over time to become the world's most common weight loss procedure. It helps people lose weight and improves or even eliminates comorbidities like type 2 diabetes. It also has a low morbidity and death rate[25-27].

In the United States, laparoscopic sleeve gastrectomy is more prevalent than gastric bypass because of better outcomes such as decreased mortality and total morbidity, equivalent weight loss, and remission of health comorbidities at 5 years[28, 29]. Based on the present study's result, the short-term outcome of gastric bypass was remarkable. The current study observed that gastric bypass had higher weight loss than sleeve gastrectomy during three months. This amount is different from the reports of studies that mentioned above. Our study evaluated the weight loss rate between the two surgery types during three months, but those studies evaluated this rate during five years[30, 31].

Leakage is the most critical and life-threatening consequence after bariatric surgery, as well as the leading cause of death. There are different leak rate reports, which vary between 1% and 3%[32]. The cause of leakage following LSG is unknown. Blood supply disruption, particularly near the crura, stapler device failure, poor technique, and postoperative gastroparesis (with an intact pylorus creating increased intragastric stress) have all been related[33]. Abdominal pain, tachycardia, nausea and vomiting, abdominal distention, and fever are all possible symptoms[34]. The staple line's reinforcement does not diminish the chance of leakage[32]. Leakage is difficult to treat: early leaks are usually treated surgically, while delayed leaks are treated conservatively with intravenous antibiotics, drainage, and stenting[35].

A meta-analysis of 148 studies on 40,653 sleeve gastrectomy found that the total leak rate among these individuals was 1.5 percent[8]. The current study found

that the leakage rate was 0.7% in 427 sleeve gastrectomies. This rate is half of Gagner et al.'s study. Maybe this difference comes from the volume of the understudy population. Varban et al. found that leakage rates in sleeve gastrostomy have decreased during the past 5 years from 1.18% to 0.36%[20]. Our results about leakage rate were in the mean of rats mentioned in the Varban et al. study, but the results showed different results from those of the Gagner et al. Also, the surgeon's skill and experience in sleeve gastrectomy are important. Varban et al. emphasized that a surgeon's skill and technique are power points in the better outcome of sleevegastrectomy[20]. Future studies should evaluate the short- and long-term leakage rate after sleeve gastrectomy based on the surgeon's skill and technique. Birkmeyer et al. mentioned a strong positive relationship between a surgeon's skill and surgery outcome in bariatric surgeries[36].

In a study by Alizadeh et al., it was mentioned that the leak rate in sleeve gastrectomy is lower than in gastric bypass surgery, similar to the current study. Alizadeh et al. found that the overall leakage rate was 0.7% in sleeve gastrectomy and gastric bypass surgery. In the present study, it was observed that the overall leakage rate was 3.5%. This difference between the rate of leaks in the two studies may be coming from different understudied populations. Our study was conducted on 713 patients, while the Alizadeh et al. conducted 133,478 patients. This difference may show that the leakage rate decreases with an increasing understudied population[37].

In a study by Thereaux et al. that was performed on patients with a BMI more than 50 kg/m² to evaluate and compare the results of sleeve gastrectomy and gastric bypass, it was found that there was no statistically significant difference between sleeve gastrectomy and gastric bypass groups about gender and BMI. At one year, gastric bypass made more weight loss than sleeve gastrectomy. In the present study, similar results were observed during three months. In Thereaux et al.'s study, it was mentioned that bariatric surgeries are helpful for diabetes mellitus improvement[38]. The current study found that underlying disorders had similar prevalence between the two groups, and there was no significant difference between the two groups in terms of underlying disorders. Also, none of our patients with underlying disease experienced an anastomotic leak. We did not assess the correlation of BMI with leakage rate in the current study because we aimed to compare the leakage rate between the two types of bariatric surgery, which was one of our study's limitations. It is recommended that future studies evaluate the correlation between BMI levels and the leakage rate after bariatric surgery.

Some other studies, such as Schauer et al.'s study[39] and Perathoner et al. study[40], demonstrated that bariatric surgery positively affects diabetes improvement. In the Perathoner et al. study, 93 patients were studied. Preoperative BMI was 44.1 ± 6.9 kg/m^2, and postoperative BMI was 33.4 ± 6.8 kg/m^2 one year after sleeve gastrectomy. The current study showed that sleeve gastrectomy remarkably affected weight loss. Also, Perathoner et al. said a leak occurred in about 3% of patients, and more than 50% of patients had experienced resolution of diabetes and hyperlipidemia. As we said above, in the current study, we did not assess the effect of bariatric surgeries on underlying diseases. However, in the current study, only 0.7% of our patients experienced a leak after sleeve gastrectomy. This rate shows the skill of the surgeons in our hospitals[40]. Schauer et al. mentioned that bariatric surgeries had positive effects on the resolution of diabetes, and they also mentioned that gastric bypass had a greater effect on weight loss than sleeve gastrectomy, like our result[39].

Conclusion

Sleeve gastrectomy and gastric bypass are two methods of bariatric surgery that have remarkable effects on weight loss. Although gastric bypass has a better effect on weight loss, sleeve gastrectomy has a lower leakage rate after surgery. Choosing these two methods seems related to the surgeon's and patient's preferences.

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None.

Conflict of interest

The authors further declare that they have no conflict of interest.

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