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COMPARATIVE STUDY BETWEEN SINGLE ANASTOMOSIS SLEEVE JEJUNAL BYPASS, SLEEVE GASTRECTOMY AND ONE ANASTOMOSIS GASTRIC BYPASS

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ABSTRACT

Background: Obesity is a major public health issue that is connected with an increased risk of cardiovascular disease, diabetes, and cancer. Bariatric surgery, as opposed to non-surgical care, has been shown in studies to result in greater and more permanent weight reduction Recently, single anastomosis sleeve jejunal bypass (SASJ) has emerged as a novel procedure and is theorized to be associated with a lower incidence of malnutrition due to the presence of two pathways for food. **Aim of Study:** To assess intraoperative and postoperative outcomes of single anastomosis sleeve jejunal bypass, sleeve gastrectomy and one anastomosis gastric bypass. **Patients and methods:** This is a prospective cohort study that has been conducted in Baghdad Teaching Hospital and Private Nursing Hospital/ Medical city, Baghdad, during the period from the 1st of June 2021 to the 1st of January 2023. The study included 90 patients who underwent either OAGB, LSG, or SASJ. Patients were followed-up for one year to assess the following parameters: weight loss, quality of life, postoperative complications, and remission of hypertension, type II diabetes, obstructive sleep apnea. **Results:** No significant difference between the three study groups was detected regarding weight loss, quality of life, intraoperative blood loss, remission rates of type II diabetes, hypertension and obstructive sleep apnea. Postoperative complication rate was similar between the three groups, except for LSG which showed significantly higher incidence of gastroesophageal reflux disease. Patients who underwent OAGB had significant hypoalbuminemia. The intraoperative time of SASJ was significantly longer than OAGB and LSG. **Conclusion:** Based on the findings of the present study, SASJ is a safe procedure that is not associated with increased rate of nutritional complications. Regarding effectiveness, the weight loss and remission of obesity related comorbidities were similar to those of OAGB and LSG.

KEYWORD: Bariatric surgery, sleeve surgery, Single-anastomosis sleeve jejunal (SASJ) bypass, Mini gastric bypass.

INTRODUCTION

Obesity is defined as improper or excessive buildup of fat that poses a health danger. An obese person has a body mass index (BMI) of more than 30. Obesity is a major public health issue that is connected with an increased risk of cardiovascular disease, diabetes, and cancer. It has a negative impact on both the quality of life and the life expectancy.[1] Because of the rising incidence of obesity and its associated diseases, effective treatment and prevention are considered essential.[2] Bariatric surgery, as opposed to non-surgical care, has been shown in studies to result in greater and more permanent weight reduction.[3]

In individuals with a BMI of 35 kg/m2 or 30-35 kg/m2 with co-morbidities, bariatric surgery is the most effective therapy option that not only causes weight reduction but also improves comorbid conditions. On the other hand, similar to any other kind of surgical operation, there is a risk of experiencing numerous complications. Because the occurrence of nutritional deficiencies is a complication that might pose a risk to one's life, bariatric surgery has to be carefully considered before being performed.[4]

At the present time, bariatric surgery is seen to be the most successful therapy for morbid obesity. This kind of surgery may accomplish effective and persistent weight reduction, in addition to improving obesity-related

comorbidities and quality of life. Two of the most popular types of bariatric surgery performed all over the globe are the laparoscopic sleeve gastrectomy (LSG) and the one anastomosis gastric bypass (OAGB). Furthermore, single anastomosis sleeve jejunal bypass (SASJ) has arisen as a novel surgery that entails performing LSG with a loop gastrojejunostomy established 150-180 cm distal to the Treitz ligament.[5]

Surgical procedures have been recognized for more than a half-century to accomplish large and long-term weight reduction, but they have had significant influence on community health.[6]

Bariatric surgery, often known as weight loss surgery, is a kind of surgical procedure used to assist patients who are obese lose weight. The operation includes changing the digestive tract to control how many calories a person may intake and absorb, as well as suppressing hunger signals. Bariatric surgery is often performed after diet and exercise have failed or when a person's weight is causing major health concerns. The National Institutes of Health (NIH) state that the most effective long-term therapy for class III obesity is bariatric surgery.[7]

After one year, patients who have bariatric surgery have a reduction of weight equal to 25–35 percent of their body weight (typically at least 15 kg), and this loss is maintained at 15–25 percent after 20 years. Another advantage is that the majority of obesity-related ailments, if not all of them, show signs of improvement when weight is reduced. The life quality becomes better. The bariatric patient requires a multidisciplinary team that consists of a bariatric surgeon, a bariatric physician, a dietitian, a specialist nurse, an anesthesiologist, and a radiologist.[8]

Factors including as surgeons' expectations, surgical technique problems, and clinical results have prompted doctors to design less complicated and creative ways to bariatric surgery.[9] There are a few distinct ways to go about this operation, including the purely restrictive, purely malabsorptive and mixed methods. The advantages of these approaches are not without complications, and they often need for continuous monitoring.[10]

For instance, in absorption-reducing procedures, micronutrient malabsorption from the initial sections of the small intestine guarantees a lifetime of supplement prescription.[11]

Sleeve gastrectomy

Excision of approximately 80 percent of the stomach is required for the sleeve gastrectomy procedure. This is accomplished through the use of multiple firings of a linear stapler/cutter, which separates a narrow tube or sleeve of the lesser curve of the stomach from the greater curve aspect of the stomach. The antrum is kept intact so that the emptying of the stomach may be maintained. The method cannot be altered in any way, nor can it be reversed. The treatment is performed using a laparoscopic technique and takes between 30 and 90 minutes to complete. Some patients are treated on an outpatient basis, however the majority of patients remain in the hospital for between one and two days.[6]

In sleeve gastrectomy, a staple line leak at the angle of His usually presents any time after discharge up to 30 days, and patients can also deteriorate rapidly with sepsis. Urgent CT scanning and re-laparoscopy are indicated, with source control by drainage the major goal.[8]

Single-anastomosis sleeve jejunal (SASJ) bypass

A form of bariatric procedure known as the single-anastomosis sleeve jejunal (SASJ) bypass has been in use since 2004. When compared to other bariatric techniques, this procedure has the benefit of presenting the architecture of the stomach and intestines in a manner that is more comparable to normal anatomy. In addition, the main studies demonstrated a satisfactory reduction in excess weight as well as a recovery from the comorbid condition. Because of the presence of an ulcer at the location of the anastomosis, the surgical procedure had to be altered in 2006 so that the bypassed stomach could be removed in its entirety.[10] Additionally, indicating the resemblance to the original gastrointestinal architecture supports sufficient micronutrient resorption, and as a result, less long-term supplement needs were employed. This is because there were fewer micronutrient deficiencies. Additionally, early meal exposure to the ileum with this approach, in conjunction with enhanced production of GLP-1 and peptide YY, leads to higher beta cell stimulation for insulin secretion, decreased glucagon response, and a shorter period of time for the stomach to empty.[12]

One anastomosis gastric bypass (Mini Gastric Bypass)

A bariatric surgery known as the laparoscopic one-anastomosis gastric bypass (OAGB) combines the concepts of restriction and malabsorption. This is accomplished by establishing a long and narrow gastric pouch and bypassing part of the small intestine (duodenum and part of the jejunum). At the moment, it is the third most frequent bariatric treatment done anywhere in the world; each year, more than 19,000 surgeries (4.8 percent) are carried out. The terms "Mini Gastric Bypass" and "Omega Loop Gastric Bypass" are interchangeable when referring to OAGB".[13]

AIM OF STUDY

This study aims to evaluate the difference between each of single anastomosis sleeve jejunal bypass, sleeve gastrectomy and one anastomosis gastric bypass regarding the following.

1. Intraoperative characteristics: represented by intraoperative blood loss and operative time.

2. Postoperative outcomes: Represented by percentages of total weight loss and estimated weight loss.
3. Postoperative complications.

PATIENTS AND METHODS

This is a prospective cohort study that has been conducted in Baghdad Teaching Hospital and Private Nursing Hospital/ Medical city, Baghdad. The data was collected from the 1st of June 2021 to the 1st of January 2023.

Participants were adults (28-62 years old) who met the bariatric surgery eligibility criteria and had OAGB, LSG, or SASJ bypass during the research period.

Exclusion criteria

- Patients who did not complete the follow-up period.
- Patients who were non-compliant to the nutritional supplementation regimen after the surgery.
- Patients with mental disabilities.
- Patients with ASA III or more.

Convenient sampling has been opted for this study as the population involved were those who underwent one of the 3 mentioned bariatric surgeries. Among 98 cases, 90 patients were selected, while 8 patients were excluded due to reasons mentioned in the exclusion criteria.

Verbal and written consent has been obtained from all participants before data collection.

An official letter of approval has been obtained from the scientific committee of the scientific council of General Surgery – Arab Board for Medical Specializations.

Patients basic sociodemographic and clinical data were recorded (age, gender, BMI, diabetes, hypertension, and obstructive sleep apnea). Moreover, Patients quality of life were assessed using the 2-part Quality of Life for Obesity Surgery (QOLOS) questionnaire.[14] During surgery, the following perioperative parameters were recorded.

- Operative time (measured in minutes).
- Intraoperative blood loss: It was estimated using the standard absorptive gauze measuring 10X10 cm. The patient was considered to have lost 100ml when the gauze was totally soaked.

After surgery, the patients were followed at 3, 6, and 12 months for the following parameters.

1. %TWL (total weight loss) = [(preoperative weight-weight on follow-up)/preoperative weight] × 100.
2. %EWL (estimated weight loss) = [(preoperative weight- weight on follow-up)/ (preoperative weight − ideal weight)] × 100.
3. Patients quality of life: was assessed using the QOLOS I and II questionnaire was also continuously evaluated during the follow-up period.
4. Resolution of hypertension: Defined as achieving blood pressure of <140/90 mmHg with reduction of antihypertensive treatment.
5. Resolution of diabetes: Defined as an HbA1C level < 6.0% or FBS < 110 mg/dL or without using oral antihyperglycemic drugs.
6. Resolution of obstructive sleep apnea: Defined as a STOPBANG score < 2 after operation.
7. Postoperative and nutritional complications.

Data entry was done using Microsoft Excel 2019. Data was recorded into different quantitative and qualitative variables for the purpose of analysis.

Analysis was done using statistical package for social sciences (SPSS version 26).

Data was summarized using measures of frequency (mean), dispersion (standard deviation), tables and graphs. A two-tailed p value of less than or equal to 0.05 was assigned as a criterion for declaring statistical significance.

RESULTS

A total number of 90 patients were included in the study sample (One anastomosis gastric bypass: 30, Sleeve gastrectomy: 30, and single anastomosis sleeve jejunal bypass: 30).

The age distribution of the studied sample ranged from 28-62 years. No significant difference regarding age was detected between the three study groups.

Table 1: Basic sociodemographic and clinical characteristics of the studied sample.

Patient characteristics		Group			P value
		OAGB	LSG	SASJ	
Age	<40 years	11	9	8	0.778
		36.7%	30.0%	26.7%	
	≥40 years	19	21	22	
		63.3%	70.0%	73.3%	
	Mean ± SD	42.6 ± 9.8	43.2 ± 10.3	44.3 ± 7.2	
Gender	Male	8	12	7	0.438
		26.7%	40.0%	23.3%	
	Female	22	18	23	
		73.3%	60.0%	76.7%	
BMI (Mean ± SD)		53.4 ± 6.4	55.8 ± 7.3	53.5 ± 7.3	0.253

Diabetes Mellitus	Yes	23	25	21	0.525
		76.7%	83.3%	70.0%	
	No	7	5	9	
		23.3%	16.7%	30.0%	
Hypertension	Yes	20	24	23	0.565
		66.7%	80.0%	76.7%	
	No	10	6	7	
		33.3%	20.0%	23.3%	
Obstructive sleep apnea	Yes	13	15	12	0.804
		43.3%	50.0%	40.0%	
	No	17	15	18	
		56.7%	50.0%	60.0%	
Quality of life for obesity surgery score (Maximum = 180)(Mean ± SD)		76.2 ± 6.3	78.3 ± 9.3	73.3 ± 4.7	0.583

Regarding operative time, the SASJ group had significantly longer operative time than OAGB and LSJ groups (P value <0.001). As for blood loss, no significant difference was detected between the three study groups; as shown in table 2.

Table 2: Perioperative parameters of the studied sample.

Perioperative parameters	Group			P value
	OAGB	LSG	SASJ	
Operative time (minutes)	113.5 ± 31.5	76.4 ± 13.6	117.7 ± 25.7	<0.001
Blood loss (ml)	130.5 ± 35.2	136.3 ± 33.6	127.3 ± 35.4	0.635

The mean 3, 6, and 12 months %TWL and %EWL of the OAGB, LSG, and SASJ groups are illustrated in table 3. No significant difference was found between the three study groups. All study groups showed significant improvement in QOLOS 1 and 2 scores with no significant difference between the three study groups.

Table 3: Weight loss and quality of life outcomes.

Variable		Group			P value
		OAGB	LSG	SASJ	
%TWL	3 months	34.5 ± 7.3	32.6 ± 5.4	33.8 ± 8.7	0.632
	6 months	43.6 ± 11.3	40.5 ± 8.7	44.7 ± 10.0	0.362
	1 year	67.9 ± 15.6	65.7 ± 16.5	67.6 ± 13.6	0.355
%EWL	3 months	45.0 ± 5.7	44.8 ± 4.8	46.6 ± 6.3	0.805
	6 months	55.8 ± 7.7	52.6 ± 9.4	53.9 ± 7.5	0.587
	1 year	76.6 ± 11.7	75.5 ± 10.4	77.8 ± 8.4	0.623
QOLOS 1 (Maximum score = 180)	6 months	113.4 ± 8.6	110.6 ± 11.5	115.7 ± 12.5	0.200
	12 months	125.1 ± 20.6	127.0 ± 23.3	125.9 ± 17.0	0.623
QOLOS 2 (Maximum score = 100)	6 months	80.6 ± 8.4	78.5 ± 12.3	82.3 ± 11.0	0.729
	12 months	84.4 ± 6.4	83.6 ± 8.6	84.0 ± 12.0	0.836

The remission rates of hypertension, diabetes, and obstructive sleep apnea showed no significant difference between the three study groups; as illustrated in table 4.

Table 4: Improvement of obesity related comorbidities.

Variable		Group			P value
		OAGB	LSG	SASJ	
Hypertension	After 3 months	14	18	17	0.644
		46.7%	60.0%	56.7%	
	After 5 months	9	12	11	0.791
		30.0%	40.0%	36.7%	
	After 1 year	4	5	4	1.000
		13.3%	16.7%	13.3%	
Diabetes	After 1 month	7	10	9	0.770

		23.3%	33.3%	30.0%	
	After 6 months	2	1	0	0.770
		6.7%	3.3%	0.0%	
	After one year	0	0	0	------
		0.0%	0.0%	0.0%	
Obstructive sleep apnea	After one month	8	9	7	0.954
		26.7%	30.0%	23.3%	
	After 3 months	2	3	1	0.868
		6.7%	10.0%	3.3%	
	After 6 months	0	0	0	------
		0.0%	0.0%	0.0%	

Postoperative complications are illustrated in table 5. The incidence of GERD was significantly more common in the LSG group (P<0.001). Hypoalbuminemia was significantly more common in the OAGB group (P = 0.032). Regarding other complications, no significant difference in complication rate was detected between the three groups.

Table 5: Postoperative complications regarding the three studied groups.

Variable	Group			P value
	OAGB	LSG	SASJ	
Pulmonary embolism	1	0	0	1.000
	3.3%	0.0%	0.0%	
Wound infection	0	1	2	0.770
	0.0%	3.3%	6.7%	
GERD	0	8	0	**<0.001**
	0.0%	26.7%	0.0%	
Hair loss	12	14	15	0.805
	40.0%	46.7%	50.0%	
Dumping	0	0	2	0.326
	0.0%	0.0%	6.7%	
Peripheral neuropathy	0	1	2	0.770
	0.0%	3.3%	6.7%	
Hypoalbuminemia	4	0	0	**0.032**
	13.3%	0.0%	0.0%	
Hypocalcemia	7	2	6	0.199
	23.3%	6.7%	20.0%	
Vitamin D deficiency	4	1	4	0.380
	13.3%	3.3%	13.3%	
Bleeding	1	0	0	1.000
	3.3%	0.0%	0.0%	
Anastomotic leak	0	0	1	1.000
	0.0%	0.0%	3.3%	
Anemia	5	1	1	0.206
	16.7%	3.3%	3.3%	

DISCUSSION

Results from three bariatric surgeries with distinct modes of action were compared in this research. SG works by decreasing hunger and ghrelin levels by a process of mechanical constriction of the stomach.[15]

In the same way as the traditional RYGB uses the principle of restriction plus diversion, the OAGB does the same, but with a single anastomosis rather than two.[13]

Regarding SASJ, it entails LSG with a loop gastrojejunostomy made between the sleeve and jejunum 150-180 cm distal to the ligament of Treitz.[16]

In the current study, there were no significant difference between the three study groups regarding age, gender, BMI, hypertension, Diabetes, obstructive sleep apnea, and their QOLOS I score; which excludes their role as confounding factors that may affect the intraoperative and postoperative outcomes and ensures a fair comparison between both study groups.

The present study has shown that SASJ group had significantly higher intraoperative time than OAGB and LSG. This finding is in concordance with Elrefai et al. (OAGB: 104.0 ± 9.6 min, LSG: 81.0 ± 11.1 min, SASJ: 106.7 ± 22.8 min).[5] Arslan et al. reported a mean of 192.8 min.[17]

This prolonged operative time of SASJ could be attributed to its relative novelty and complexity as it comprises creation of a gastric sleeve, counting 150-180 cm of the jejunum and performing a GJ anastomosis afterwards.

The current study has shown that after 6 and 12 months, SASJ achieved 53.9% and 75.8% EWL and 39.4 and 56.85% TWL, without a significant difference from OAGB and LSG. This is in concordance with Elrefai et al. who reported 6 and 12 months EWL of 53.47 and 77.61% and TWL of 39.4 and 56.85%.[5] Sewefy et al. reported one year EWL and TWL 85% and 51.2%; respectively.[16]

The study by Sayadishahraki et al. reported no significant difference between different bariatric procedures regarding 6 month %EWL, as the readings were readings were: 54.54, 52.48, and 50.70% in the SASJ, OAGB, and LSG groups respectively.[10]

Regarding improvement in obesity related comorbidities, All patients of the SASJ group (as well as the OAGB and LSG groups) showed remission of all patients with diabetes withing one year. This is in concordance to other studies; such as those by Elrefai et al. and Sayadishahraki et al.[5,10] Rezaie et al. also reported a remission rate of 100%.[18] Moreover, Arslan et al. observed a significant decrease in HbA1c values from 9.5 to 6.5% 3 months after the patients underwent SASJ.[17]

The early delivery of undigested food to the ileum after vertical gastrectomy is accompanied by an increase in the release of incretin hormones, most notably GLP-1. Increased beta cell secretion activity and early satiety are both effects of this hormone.[19]

Full resolution of obstructive sleep apnea was also observed after six months in all 3 groups of the present study. Similar results were reported by Elrefai et al.[5]

Regarding postoperative complications, GERD was only found in the LSG group (26.7%). While it was not observed in any patient of the OAGB and SASJ groups. This finding might be explained by the fact that the intragastric pressure is decreased when an anastomosis is created between the distal gastric sleeve and the jejunum, making GERD less likely to occur.

As for postoperative complications indicative of nutritional status (hair loss, neuropathy, hypocalcemia, and vitamin D deficiency); they were not significantly different among the three groups. The study by Rezaie et al. reported that patients who underwent SASJ did not exhibit serious bariatric metabolic surgery consequences or lack of important indicators for nutrition condition.[18]

The present study has shown significantly higher rates of postoperative hypoalbuminemia and in the OAGB group, despite all the patients received high protein diet supplements postoperatively. Moreover, anemia was more common in the OAGB group (although not statistically significant). This can be attributed to the one pathway surgical design of the OAGB, which leads to reduced iron absorption.

The present study showed comparable quality of life outcomes between the three study groups. It is noteworthy to mention that quality of life, eating disorder behaviors, food intolerance, and the disappearance of co-morbidities are all important factors in determining whether or not a bariatric intervention has been successful. Since the present study has found similar results amongst the three surgeries, it stands to reason that our patients also experienced similar improvements in their quality of life.

CONCLUSION

Based on the findings of the present study, SASJ is a safe procedure that is not associated with increased rate of nutritional complications. Regarding effectiveness, the weight loss and remission of obesity related comorbidities were similar to those of OAGB and LSG.

Recommendations

Further studies are recommended to consider the following.

- Larger sample size.
- Multicenter study.
- Longer study duration.

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