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ORIGINAL ARTICLE

Comparative study between laparoscopic Sleeve Gastrectomy vs Sasi Operation as a Treatment for Morbidly Obese Patients with Type 2DM

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Abstract

Background: ***Obesity is identified by a BMI of more than thirty kg/m2, whereas severe obesity is identified as a body mass index exceeding Forty kg/m2. Up to one-third of those seeking bariatric surgery are diagnosed with Type 2 DM, indicating a significant correlation between obesity and T2DM.***

Aim: ***To compare laparoscopic sleeve gastrectomy to SASI (single anastomosis sleeve ileal bypass) operation as a treatment for Morbidly Obese cases with type 2 diabetes.***

Patients and Methods: ***This prospective interventional study included sixty individuals who were selected from attendees of outpatient General Surgery clinics of Al Azhar University Hospitals. Samples were collected by the systematic random method from February 2023 to December 2023.***

Results: ***Most of the cases reported dose reduction of anti-DM medications post-operative in 86.7% of subjects had laparoscopic sleeve gastrectomy, while medication has not been changed in 13.3%. At the same time, 93.3% of subjects who had Sas operation reported dose reduction of anti-DM medications, and medication had not been changed in 6.7%. There was no significant variation among both groups concerning age, sex, BMI, baseline anti-DM treatment, fasting blood glucose (FBG) regarding pre-operative value at three three-month follow and at six three-month follow-ups, weight loss, and complication rate (bleeding, stenosis, and biliary gastritis).***

Conclusion: ***Laparoscopic sleeve gastrectomy was as effective as Sasoperation as a treatment for Morbidly Obese cases with Type 2 DM, as the two groups had similar results in our study.***

Keywords: laparoscopic sleeve gastrectomy; Sasi operation; Obesity; Type 2 Diabetes Mellitus (T2DM)

1. Introduction

Addressing obesity is a multifaceted health issue. Obesity is caused by a combination of causes and contributing variables, encompassing individual aspects such as behavior and genetics. Behaviors encompass several factors, such as dietary patterns, physical exercise, sedentary lifestyle, pharmaceutical usage, and other forms of exposure. The environment around food and physical exercise, education and skill and vels, and the marketing and promotion of food also influence our civilization. [1]

Individuals with a BMI above 40, which is classified as super obese, provide a specific challenge to the healthcare system due to their higher likelihood of having complicated health conditions and increased risks related to surgery. There is a continuous connection between a higher BMI and a reduced likelihood of achieving significant weight reduction, in addition to a greater likelihood of health problems and death following bariatric surgery.[2]

Diabetes mellitus is a chronic illness that has become widespread on a global scale, and its occurrence is still on the rise. In 2000, the global prevalence of diabetes across all age categories was determined to be 2.8 percent, which is projected to increase to 4.4 percent by 2030. By the year 2000, the global population of individuals aged 35 to 64 years with diabetes was estimated to be around 171 million. However, it is projected that by 2030, this number will increase significantly to reach nearly 366 million. The correlation between obesity and T2DM is widely recognized, and it has been observed that around one-third of patients seeking bariatric surgery had a pre-existing diagnosis of diabetes. [3]

The majority of diabetic individuals are unable to achieve adequate glucose control with medical therapy for an extended period due to a restrictive mechanism that results in the simultaneous resolution of T2DM. [4]

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The objective of the research was to compare laparoscopic sleeve gastrectomy to SASI (single anastomosis sleeve ileal bypass) operation as a treatment for Morbidly Obese cases with type 2 DM.

2. Patients and methods

This prospective interventional research involved 60 participants who were selected from the attendees of outpatient General Surgery clinics of Al Azhar University Hospitals. Samples were collected by the systematic random method from February 2023 to December 2023.

Inclusion criteria: Individuals between the ages of eighteen and sixty who are obese, with a BMI between thirty and sixty, and who have type 2 DM should have been diagnosed within the past five years, regardless of their degree of control or the type of diabetic drugs they are utilizing.

Exclusion criteria: Individuals with a BMI below 30, individuals diagnosed with T1DM, individuals who were not suitable for general anesthesia, and those with any contraindications for laparoscopic surgery.

Sample Size: These findings are based on research that Emile and his colleagues conducted. In order to determine the appropriate size of the sample, Epi Info STATCALC was applied, taking into consideration the following assumptions: A two-sided confidence level of ninety-five percent with a power of eighty percent is obtained. The odds ratio was determined to be 1.115, with a margin of error of five percent. The greatest number of samples that could be collected from the Epi-Info output was 53 in the end. In order to account for any incidences of individuals dropping out during the follow-up period, the sample size was raised to sixty subjects. [5]

Patients were subdivided into two groups: Group A: 30 obese diabetic individuals who underwent laparoscopic sleeve gastrectomy. Group B: 30 obese diabetic individuals who undergo Sasi operation.

Method:

All patients were subjected to Complete history taking (Personal history, Any Complaint and its duration, Past Medical history, Past Surgical history, and family history), Physical examinations, General examination (Vital signs (Pallor, Jaundice, Cystosis, and lymph node enlargement), and Body Mass Index (BMI)), and a physical examination.

The physical examination of Obese Patients with Type 2 DM included Skin, Cardiovascular, Respiratory, Abdominal, Neurological, Musculoskeletal, Eye, and Foot examinations.

Skinfold Thickness Measurement to estimate body fat percentage. Investigational Studies (Routine laboratory investigations: Renal, function test, Complete blood picture (CBC), Liver Test Profile, Glycated Hemoglobin (HbA1c), Lipid Profile, C-peptide, Thyroid Function, ECG, Echo, Duplex Venous and Respiratory Function.

Procedures

Group A underwent laparoscopic sleeve gastrectomy

A twelve-millimeter optical trocar was inserted in the midline supraumbilical position to enable direct visualization of the subject for the camera. Following that, two trocars measuring five millimeters were used, one of which was positioned in the upper left quadrant and the other in the upper right quadrant. A ten-millimeter-diameter trocar was introduced into the body via the left side. The epigastrium was where the Nathanson liver retractor was positioned. A harmonic scalpel (Harmonic Ace, Ethicon Endosurgery) was employed to separate every short gastric artery. The larger curvature of the stomach was dissected in the direction of the left pillar of the crus. Calibration of the gastric sleeve was performed using a thirty-six Fr bougie. The stomach was then vertically separated using four to five linear staplers (Echelon 60, Ethicon Endosurgery). Approximately four to six centimeters above the pylorus, on the greater curvature, parallel to the lesser curvature, and extending toward the angle of His, this process commenced. The selection process involved the utilization of cartridges of distinct hues, specifically green (4.1 millimeters), gold (3.8 millimeters), and blue (3.5 millimeters), in accordance with the thickness of the stomach wall. In order to reinforce the staple line, continuous sutures constructed from an absorbable material were utilized. A plastic container was utilized to preserve the obtained specimen. A multi-lumen receptacle was positioned in close proximity to the staple line.

Group B underwent a Sasi operation.

The SASI bypass was initiated by conducting a regular LSG. A vessel-sealing device was used to devascularize the larger curvature of the stomach. Subsequently, a linear cutting stapler was employed to surgically divide the stomach utilizing a thirty-six to thirty-eight (Fr) orogastric tube as a reference point, beginning at a distance of 3–6 centimeters from the pylorus and extending up to the cardio esophageal junction. Following the formation of the gastric pouch, the duodenojejunal junction was located, and the length of the small bowel was determined. Once the ileocecal junction was identified, a segment of the bowel measuring 250-300 cm was measured in the proximal direction. The chosen loop was then moved across to the antrum without separating it from its mesentery. An anastomosis was made by stapling the anterior wall of the gastric antrum, located six (cm) from the pylorus to the chosen ileal loop in a side-to-side, iso-peristaltic manner. The

anastomosis was intentionally designed to have a diameter that varied from 2.5 to 3 cm. Continuous running sutures were utilized to close the anterior wall of the gastroenterostomy. We employed the MINORS to evaluate the methodological rigor and potential bias of the investigations. Any disagreements about the interpretation of the results were settled through a consensus meeting and mutual agreement. A score of 20 or higher indicates a low risk of bias for comparison research.

Patients were followed up at one month, third month, and six months.

Ethical Consideration: The research protocol was approved by the Local Ethics Committee; informed consent was taken from every individual. The data acquired from individuals are confidential, and the study ensured that participants' identities were not disclosed in any report or publication related to this study. Prior to the inclusion of participants in this study, they were provided with an explanation of the study's objectives, methodology, and the evaluation of potential risks and benefits.

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) software application. They were presented as numerical values and percentages for qualitative factors and as the mean plus SD for quantitative variables. Significance level: A p-value above 0.05 indicates results that are not significant. A P value below 0.05 indicates significant results.

3. Results

Table 1. Comparison of participating subjects Characteristics

	LAPAROSCOPIC SLEEVE GASTRECTOMY		SAS OPERATION		INDEPENDENT STUDENT T TEST / CHI SQUARE TEST	
	N=30		N=30			
	Mean	SD	Mean	SD	t	P-value
AGE (YEAR)	44.23	7.51	44.97	7.15	0.387	0.7
SEX	N	%	N	%	X2	P-value
MALE	16	53.30%	14	46.70%	0.267	0.606
FEMALE	14	46.70%	16	53.30%		
INITIAL TREATMENT	N	%	N	%	X2	P-value
ORAL HYPOGLYCEMIC	10	33.30%	6	20.00%	1.377	0.502
INSULIN	13	43.30%	16	53.30%		
BOTH	7	23.30%	8	26.70%		

There was no significant variation among both groups concerning age, sex & baseline anti-DM treatment as demonstrated in table 1.

Table 2. comparison of fasting and post-prandial blood glucose of participating subjects

	LAPAROSCOPIC SLEEVE GASTRECTOMY		SAS OPERATION		INDEPENDENT STUDENT T TEST / CHI SQUARE TEST	
	N=30		N=30			
	Mean	SD	Mean	SD	t	P-value
BASELINE	156.17	9.37	157.23	10.45	0.416	0.679
3 MONTH FOLLOW UP	121.57	28.43	118.43	21.24	0.484	0.63
6 MONTH FOLLOW UP	92.97	7.31	92.63	7.19	0.178	0.859

There were no significant distinctions in FBG among both groups as regard pre-operative value (10.24±0.80 vs 157.23±10.45), at 3 months follow up (121.57±28.43 vs 118.43 ±21.24) and at 6 months follow up (92.97±7.31vs 92.63 ±7.19).

Table 3. comparison of BMI of participating subjects

	LAPAROSCOPIC SLEEVE GASTRECTOMY		SAS OPERATION		INDEPENDENT STUDENT T TEST / CHI SQUARE TEST	
	N=30		N=30			
	Mean	SD	Mean	SD	t	P-value
BASELINE	46.19	3.77	45.82	4.59	0.338	0.736
3 MONTH FOLLOW UP	33.81	2.84	33.27	2.20	0.836	0.407
6 MONTH FOLLOW UP	30.40	3.28	29.74	2.48	0.876	0.384

There were no significant variations in BMI among both groups as regard pre-operative value (46.19±3.77 vs 45.82±4.59), at 3 months follow up (33.81±2.84 vs 33.27±2.20) and at 6 months follow up (30.40±3.28 vs 29.74±2.48).

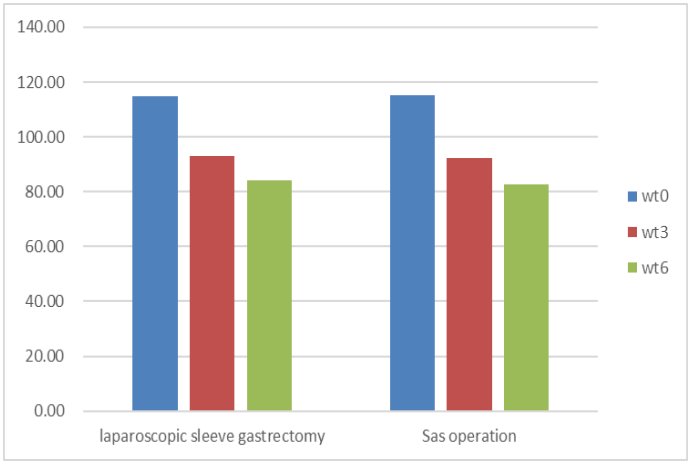

Figure 1. body weight in participating subjects

Table 4. comparison of outcome of participating subjects

	LAPAROSCOPIC SLEEVE GASTRECTOMY		SAS OPERATION		INDEPENDENT STUDENT T TEST / CHI SQUARE TEST	
	N=30		N=30			
	Mean	SD	Mean	SD	t	P-value
WEIGHT LOSS	30.69	8.36	32.34	6.88	0.835	0.407
SATISFACTION	N	%	N	%	X2	P-value
UNSATISFIED	4	13.30%	2	6.70%	1.037	0.595
GOOD	14	46.70%	13	43.30%		
EXCELLENT	12	40.00%	15	50.00%		

There was no significant disparity in weight loss amongst both groups (30.69±8.36 vs 32.34±6.88). Most of subjects showed good (46.7% vs 43.3%) and excellent (40% vs 50%) satisfaction of operation results.

Table 5. complications in participating subjects

COMPLICATIONS	LAPAROSCOPIC SLEEVE GASTRECTOMY		SAS OPERATION		INDEPENDENT STUDENT T TEST / CHI SQUARE TEST	
	N=30		N=30			
	N	%	N	%	X2	P-value
BLEEDING	2	6.70%	1	3.30%	83.30%	0.659
STENOSIS	1	3.30%	0	0%		
BILIARY GASTRITIS	1	3.30%	0	0%		

There were no significant distinctions in complication rate among both groups as regard bleeding (6.7% vs 3.3%), stenosis (3.3% vs 0%) and biliraty gastritis (3.3% vs 0%).

Table 6. Effect on anti DM treatment in the studied population

COMPLICATIONS	LAPAROSCOPIC SLEEVE GASTRECTOMY		SAS OPERATION		INDEPENDENT STUDENT T TEST / CHI SQUARE TEST	
	N=30		N=30			
	N	%	N	%	X2	P-value
REDUCED DOSES	26	86.70%	28	93.30%	0.741	0.389
UNCHANGED	4	13.30%	2	6.70%		

Most of cases reported dose reduction of anti DM medications post-operative in 86.7% of subjects had laparoscopic sleeve gastrectomy while medication have not been changed in 13.3%. While 93.3% of subjects who had Sas operation reported dose reduction of anti DM medications and medication have not been changed in 6.7%. Difference between groups was statistically insignificant.

4. Discussion

The risk of comorbidities that involve diabetes mellitus, hypertension, different cancers, cardiovascular disease, obstructive sleep apnea, and dyslipidemia, in addition to overall mortality, also increases when BMI rises among individuals. [6, 7]

Diabetes mellitus has become one of the most pressing and frequent issues in recent decades, coinciding with the rising obesity crisis, and is now the seventh leading cause of death in the United States in addition to worldwide, with 5.2 million deaths worldwide attributed to diabetes, a mortality rate of 82.4 per 100,000. [8]

Bariatric surgery, also known as metabolic surgery, is a procedure that alters the upper gastrointestinal tract (GIT) to address obesity and its related conditions, with a focus on metabolic regulation. [9, 10]

The main results of this research were as follows:

In the present study, we revealed that there was no significant variation among both groups concerning age, sex, and baseline anti-DM treatment.

In accordance with our study, Madyan et al. aimed to describe the technical steps and assess

the short-term outcomes of SASI bypass in patients with super-morbid obesity. They found that in SASI Bypass (n = 20), the Mean age (y) was 35.4 ± 8, and Male/female was 3/17. In Sleeve Gastrectomy (n = 20), the Mean age (y) was 35 ± 7.1, and the Male/female was 1/19. There was no significant distinction regarding age and sex between the SASI Bypass group and the Sleeve Gastrectomy group. [2]

In our results, there were no significant variances in FBG amongst both groups as regards pre-operative value (10.24±0.80 vs. 157.23±10.45) at three-month follow-up (121.57±28.43 vs. 118.43±21.24) and at six-month follow-up.

(92.97±7.31vs 92.63 ±7.19). There were no significant variations in PPG among both groups as regards pre-operative value (238.97±10.92 vs. 239.93±10.88) at three three-month follow (182.17±11.91vs 181.73±10.3) and at six months follow-up up (155.13±28.69 vs. 150.07±21.48).

Inconsistent with our results, Abouzeid et al. revealed that the mean pre-operative FBG level in twenty individuals with obesity and diabetes who had laparoscopic sleeve gastrectomy with loop bipartition (single anastomosis sleeve ileal bypass) was 165.75 ± 26.44 mg/dl, with a range of 123 to 210. The level significantly decreased to 110.45 ± 8.71 mg/dl (range 100 - 130) three months after the operation, with only three patients having levels above 110 mg/dl. Six months after the operation, the values had improved to 93.85 ± 8.98 mg/dl (which varied from 81 to 109). [11]

Also, Mahdy et al. found that FBS mg/dl at preoperative was 169.2 ± 74.2, at three months postoperative, was 109.5 ± 11.8, and at six months postoperative, was 101 ± 9.8. These results indicated significant improvement in FBS (P= 0.001).

In the present study, we revealed that there were no significant distinctions in BMI among both groups as regards pre-operative value (46.19±3.77vs 45.82±4.59) at three months follow up (33.81±2.84 vs33.27±2.20) and at six months follow up (30.40±3.28 vs29.74±2.48). [12]

Emile et al. aimed to examine the latest findings about weight loss, comorbidity improvement, as well as complication outcomes of SASI procedures. They reported that the median baseline weight was 121.6 (range, 117.38–172) kg, and the median preoperative body mass index was 45.6 (range, 43.2–58.3) kg/m2. [5]

Moreover, Mihmanli et al. revealed that in 88 cases with type 2DM who underwent LSG, the Preoperative body mass index of the eighty-eight cases was 48.65 ± 7.71 kg/m2, body mass index in the sixth month was 30 ± 3.28 kg/m2 & body mass index at the 12thmonth was 26 ± 2.53 kg/m2. [13]

In our findings, there was no significant variation in weight loss amongst both groups (30.69±8.36 vs 32.34±6.88). Most of the subjects showed good (46.7% vs 43.3%) and excellent (40% vs 50%) satisfaction with operation results.

Consistent with our results, Mahdy et al. utilized the Percentage of Excess Weight Loss as a parameter to judge weight loss; they considered his results excellent, with EWL being 75 percent at six months. [12]

As demonstrated in our study, there were no statistically significant differences in complication rate among both groups as regards bleeding (6.7% vs. 3.3%), stenosis (3.3% vs. 0%), and biliary gastritis (3.3% vs. 0%).

In supporting our results, Zayed et al., with group I receiving laparoscopic SG and group II receiving laparoscopic SASI. They revealed that concerning complications, there was no discernible variation between the two groups. In group I, there was Bleeding in 1 (5%), Stenosis in 1 (5%), and Biliary gastritis in 1 (5%), while in group II, there was Bleeding in 2 (10%), Stenosis 0 and Biliary gastritis in 1 (5%). [14]

As well, Abouzeid et al. reported that among twenty obese and diabetic cases who underwent laparoscopic sleeve gastrectomy with loop bipartition (single anastomosis sleeve ileal bypass), four individuals experienced distinct occurrences, accounting for barely twenty percent of the total patient population. These episodes were related to peri-operative challenges and complications. The complications seen were chest infection, bleeding during surgery, bleeding after surgery, and challenges encountered during the sleeve-ileal anastomosis procedure. [11]

In the current study, we found that most cases reported dose reduction of anti-DM medications post-operatively. 86.7% of subjects had laparoscopic sleeve gastrectomy, while medication was not changed in 13.3%. 93.3% of subjects who had Sas operation reported dose reduction of anti-DM medications, and medication was not changed in 6.7%. The difference between groups was statistically insignificant.

In line with our results, Madyan et al. found that in the SASI Bypass (n = 20) group, there was improvement in diabetes mellitus, n/N (%) in 5/5 (100) and in the Sleeve Gastrectomy (n = 20) group, there was improvement in diabetes mellitus 1/1 (100). There was no significant variance regarding improvement in diabetes mellitus between the SASI Bypass group and Sleeve Gastrectomy (P= 0.99). [2]

Similarly, Mahdy et al. observed that diabetes was completely resolved during the first month following surgery, with the exception of five individuals who had resolution after three months and needed a progressive reduction in

insulin and hypoglycemic medications.[12]

4. Conclusion

This study, we compared laparoscopic sleeve gastrectomy and Sas operation in treating morbidly obese individuals with T2DM. As a result, study concluded that laparoscopic sleeve gastrectomy was an equal treatment option to Sas operation for morbidly obese individuals with T2DM, as the outcomes of the two groups were comparable in our research.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

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All authors have a substantial contribution to the article

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