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ORIGINAL ARTICLE

Comparative study of outcomes between Laparoscopic single anastomosis sleeve ileum bypass (SASI bypass) Versus Laparoscopic Sleeve Gastrectomy for Management of Type II Diabetes and Hypertension in Obese Patients

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Abstract

Background: ***The global and national epidemic of obesity has emerged. This chronic medical condition goes beyond mere cosmetics; it can result in heart disease, hypertension, diabetes, and other chronic disorders.***

Aim and objectives: ***To evaluate the effectiveness of a single perforation sleeve ileal bypass against a sleeve gastroplasty (S.G.) in managing hypertension and diabetes mellitus (D.M.).***

Patients and methods: ***This study compared the effects of laparoscopic (SASI) against laparoscopic S.G. on obese individuals with Type 2 diabetes mellitus (T2DM) and hypertension. It was conducted from February 2022 to February 2024 at the General Surgery Department of Al-Azhar University hospitals, involving 30 patients.***

Results: ***There was a statistically significant effect of SASI and S.G. on morbidly obese patients with T2DM, improved after a year on body weight and plasma glucose levels, with no statistically significant difference between the two groups for obesity or obesity-related comorbidities (hypertension and hyperlipidemia).***

Conclusion: ***When choosing a bariatric operation, the most crucial factors to consider are its safety and effectiveness in helping patients lose weight and reverse the metabolic effects of obesity.***

Keywords: Laparoscopic Sleeve Gastrectomy; sleeve ileum bypass; Diabetes; Laparoscopic single anastomosis

1. Introduction

The global and national epidemic of obesity has emerged. This chronic medical condition is not merely a matter of appearance; it can result in heart disease, hypertension, diabetes, and other long-term ailments. The focus of obesity treatment has shifted from dietary and lifestyle changes to surgical management to find the ideal solution to please the patient and improve his quality of life. This shift was brought about by these interventions' failure to achieve long-term weight loss and the lack of available pharmaceutical agents.[1]

A BMI (body mass index) of 30 kg/m2 or more is considered obese. When combined with an obesity-related illness, a BMI of more than 40 kg/m2 or more than 35 kg/m2 is referred to as morbid obesity. Patients who are obese and have a body mass index (BMI) of 40 kg/m2 or higher without any accompanying medical conditions, or who have a BMI of 35 kg/m2 or higher but have one or more obesity-related severe comorbidities, or who have a BMI of 30 to 34.9 kg/m2 and are diabetics or have metabolic syndrome, may consider surgery.[2]

(D.M.) is a dangerous chronic illness that has spread like an epidemic throughout the world and whose prevalence has been rising, particularly in the last 20 to 30 years. According to the 2019 International Diabetes Federation Report, 463 million individuals worldwide are estimated to have diabetes (both diagnosed and undiagnosed combined), and by 2045, this figure is expected to rise to 700 million.[3]

This study aims to conduct a comparative analysis of Sleeve Gastrectomy and Only Anastomosis Sleeve Ileal Bypass in terms of their impact on the management of Diabetes Mellitus and Hypertension.

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2. Patients and methods

This study was a prospective comparative analysis conducted on a cohort of 30 obese patients with a body mass index (BMI) of 30 kg/m2, who also had obesity-related comorbidities such as type 2 diabetes mellitus (T2DM). The objective was to assess the impact of sleeve gastrectomy (S.G.) compared to sleeve arthroplasty (SASI) on obese patients with type II diabetes mellitus and hypertension. The participants were randomly divided into two groups: one group consisted of 15 patients who underwent SASI, while the other group consisted of fifteen patients who underwent laparoscopic surgery (LSG). The study was conducted between February 2022 and February 2024.

The inclusion criteria: Patients who have had hypertension and Type II Diabetes Mellitus for at least six months, as well as those who have had a BMI of 35 to 65 kg/m2 for at least five years, fall into the 18- to 60-year-old age group. These patients can agree in an educated manner and are dedicated to following up.

Exclusion criteria: Age range: 18 to 60 years old; Type 1 D.M.; medically treatable obesity causes; prior gastric or bariatric surgical experience; individuals at high risk for anaesthesia based on the ASA classification; individuals suffering from a large ventral hernia in the abdomen, Currently nursing or pregnant, addiction to drugs or alcohol, Psychological instability in the past and patients suffering from gastritis and oesophageal reflux disease.

Preoperative workup:

Every patient who was part of this study underwent the following procedures: A thorough history that included personal history such as age, gender, and level of marriage; eating patterns; the length of obesity; and the history of prior weight-loss attempts, whether they were non-surgical or surgical.

Medical history for comorbidities: D.M.: kind, when it starts, how long it lasts, whether it is controlled with present drugs, whether switching from oral hypoglycemia to insulin should happen, and any family history. Hypertension, Respiratory and cardiac issues, Cerebrovascular stroke, dyslipidemia, prior DVT, and any additional comorbidity. Prior surgical experience, drug or alcohol use history, and family history of obesity.

Full clinical examination, such as Comprehensive assessment, Vital signs consisting of temperature, respiration rate, blood pressure, and pulse; examination of the abdomen for scars from prior surgeries, hernias, organomegaly, and tenderness in the right hypochondrium; calculation of BMI by measuring weight in grams and height in meters; and consultation with a doctor to ensure appropriate blood sugar control (both before and after surgery).

Investigations:

Laboratory investigations, including Full blood count, tests for kidney and liver functions, coagulation profile, blood sugar levels (during and after a meal), Glycosylated A1c haemoglobin, thyroid function testing, Lipid profile, and amount of serum cortisol.

Imaging studies: Chest X-ray and Abdominopelvic ultrasonography. Other investigations for special situations: ECG and Echocardiography.

Patient preparation: All patients should sign the informed consent form. Control of any coexisting medical disease. A prophylactic Low molecular weight heparin 12 hours prior to surgery is to be continued postoperatively (if there was no intra-abdominal bleeding regarding tube drain) until full ambulation and proper fluid intake. A prophylactic antibiotic with induction of anaesthesia (third-generation cephalosporin). A prophylactic elastic stocking.

Postoperative care:

They were monitored closely for vital signs (ICU admission if necessary). Promote early mobilization. As a preventative strategy against postoperative pulmonary embolism, anticoagulant medication (elastic stocking and subcutaneous low molecular weight heparin) should be used (assuming there was no intra-abdominal bleeding regarding tube drain). Intermittent doses of intravenous broad-spectrum antibiotics combined with drip intravenous analgesics give more reliable pain relief. PPI to prevent ulcers from stress. A clear fluid diet was initiated as soon as the patient had an open bowel. A drain was removed after allowing oral fluid intake; no bleeding or leaking was found. Release upon complete mobility and appropriate oral hydration.

The following guidelines should be followed while following a five-stage diet plan under a nutritionist's supervision: In the first stage, the patient began receiving oral fluids in the form of warm, clear fluids or diet drinks like pineapple and apple juice in the first week, followed by two weeks of skim milk and creamy free soup. The second phase began two weeks after surgery and consisted of drinking protein-rich liquids like milk and yoghurt. The third stage began one month after surgery as a smashing diet consisting of fried eggs and cooked veggies. The fourth step was a low-calorie soft diet consisting of eggs, salmon, lentils, beans, fruits, and vegetables initiated one month after surgery in the third postoperative month. The fifth stage began with frequent, small, low-fat, low-sugar meals in the fourth month following surgery.

Follow-up:

The follow-up phase was conducted as an outpatient program, consisting of weekly visits for a month following hospital discharge, followed by follow-up at one, three, six, and twelve months. In

the interim between previously scheduled follow-up visits, patients will be assessed at any time if they develop problems in the outpatient clinic.

Outcomes assessment:

Weight loss: Weight-loss % and BMI at 3, 6, and 12 months.

General health condition: Reduction of complications associated with the primary procedure (e.g., dysphagia, reflux, vomiting).

Any postoperative complications: both during planned and unplanned visits.

Metabolic effect: Seven and twelve months' worth of calcium, vitamin D, and vitamin B. LDL, HDL, triglycerides, and cholesterol comprise the lipid profile (6 and 12 months). (1), 3, 6, and 12 months of hypertension and diabetes mellitus, if any.

Statistical analysis and data interpretation:

IBM SPSS Corp. was used to examine the data provided to the computer. Published in 2013. Version 28.0 of IBM SPSS Statistics for Windows. N.Y. / Armonk: IBM Corp. Numbers and percentages were used to describe the qualitative data. The mean and standard deviation were used to characterize the data after utilizing the Kolmogrov-Smirnov test to confirm that the quantitative data were normally distributed. The acquired results were deemed significant at the (0.05) level. The Chi-Square test is used when comparing two or more groups for categorical data. ANOVA with Repeated Measures was utilized to compare two independent groups using the Student t-test and between two or more study periods using the Paired t-test and Post Hoc test. Tukey test for comparisons between pairs.

3. Results

Table 1. Demographic characteristics of the studied groups.

		SASI (N=15)	SLEEVE (N=15)	P-VALUE
AGE (YEARS)	Mean ± SD	36 ± 9	35 ± 9	0.763
SEX				
MALES	N (%)	4 (26.7)	5 (33.3)	1.0
FEMALES	N (%)	11 (73.3)	10 (66.7)	

The studied groups were comparable regarding age and sex, with no significant differences between the studied groups (P = 0.763 and 1.0, respectively).

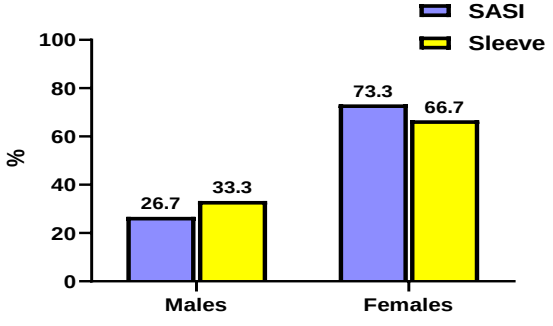

Figure 1. Gender distribution in the studied groups.

Table 2. Baseline characteristics of the studied groups.

		SASI (N=15)	SLEEVE (N=15)	P-VALUE
BODY MASS INDEX	Mean ± SD	45.1±4.8	46.6±5.8	0.451
WEIGHT (KG)	Mean ± SD	127±11	129±13	0.690
FASTING BLOOD SUGAR	Mean ± SD	164±43	157±36	0.666
POST PRANDIAL BLOOD SUGAR	Mean ± SD	234±10	233±10	0.856
HBA1C	Mean ± SD	9.2±0.9	9.2±0.9	0.904
TOTAL CHOLESTEROL	Mean ± SD	211.4±19.6	211.4±19.6	1.0
TRIGLYCERIDES	Mean ± SD	145±24	145±24	1.0
LDL	Mean ± SD	145.1±15.8	145.1±15.8	1.0
HDL	Mean ± SD	42.4±5.1	42.4±5.1	1.0
UNCONTROLLED HYPERTENSION	N (%)	10 (66.7)	9 (60)	0.705
DIABETES TREATMENT				
ORAL	N (%)	9 (60)	10 (66.7)	0.705
INSULIN	N (%)	6 (40)	5 (33.3)	

LDL: Low-density lipoprotein; HDL: High-density lipoprotein.

No significant differences were observed between the two studied groups, SASI and Sleeve, in terms of all general characteristics, including body mass index (BMI) (P = 0.451), weight (P = 0.690), fasting blood sugar (P = 0.666), post-prandial blood sugar (P = 0.856), HbA1c (P = 0.904), total cholesterol (P = 1.0), triglycerides (P = 1.0), LDL (P = 1.0), HDL (P = 1.0), uncontrolled hypertension (P = 0.705), and the distribution of diabetes treatment, both oral or insulin (P = 0.705).

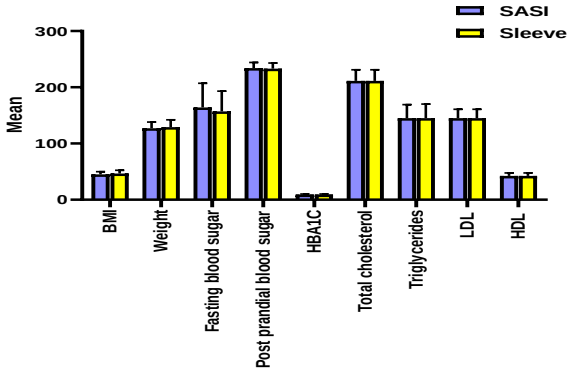

Figure 2. Baseline characteristics of the studied groups.

Table 3. Operative findings in the studied groups.

		SASI (N=15)	SLEEVE (N=15)	P-VALUE
OPERATIVE TIME (MIN)	Mean ± SD	117±11	81±7	<0.001*
HOSPITAL STAYS (DAYS)	Median (range)	2 (2-4)	2 (2-3)	0.081

* Significant P-value.

Significant variations were noted for a few preoperative and postoperative characteristics between the Sleeve and SASI groups. The length of the operation was significantly longer in the SASI group, with a mean of 117 ± 11 minutes compared to 81 ± 7 minutes in the Sleeve group (P < 0.001). However, hospital stay was similar in both groups, with a median of 2 days (range 2-4) for SASI and 2 days (range 2-3) for Sleeve (P = 0.081).

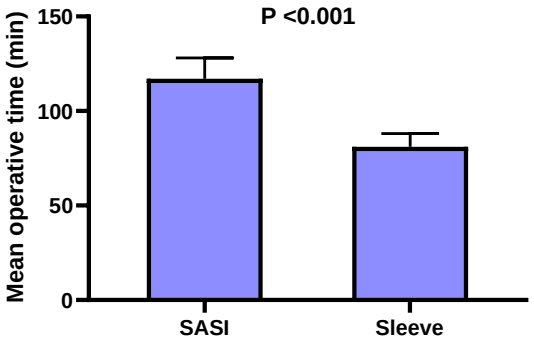

Figure 3. Operative time in the studied groups.

Table 4. Postoperative complications in the studied groups.

		SASI (N=15)	SLEEVE (N=15)	P-VALUE
BLEEDING	n (%)	0 (0)	0 (0)	-
LEAKAGE	n (%)	0 (0)	0 (0)	-
STENOSIS	n (%)	1 (6.7)	1 (6.7)	1.0
GERD	n (%)	0 (0)	2 (13.3)	0.483
VOMITING & DEHYDRATION	n (%)	1 (6.7)	1 (6.7)	1.0

GERD: Gastroesophageal reflux disease.

There were no reported cases of bleeding or leakage in either group. One patient (6.7%) in each group had stenosis, and there were no cases of GERD in the SASI group, while 2 patients (13.3%) in the Sleeve group experienced GERD (P = 0.483). Additionally, both groups had one patient (6.7%), each experiencing vomiting and dehydration with no significant difference (P = 1.0).

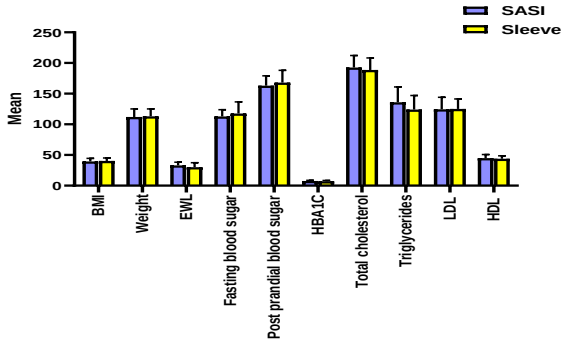

Figure 4. Follow-up findings in the studied groups at 3 months.

Table 5. Follow-up findings in the studied groups at 3 months.

		SASI (N=15)	SLEEVE (N=15)	P-VALUE
BODY MASS INDEX	Mean ± SD	39.4±5.1	40.3±4.9	0.647
WEIGHT (KG)	Mean ± SD	112±13	113±12	0.762
ESTIMATED WEIGHT LOSS (%)	Mean ± SD	33.1±5.1	30.1±7.2	0.192
FASTING BLOOD SUGAR	Mean ± SD	112.9±11	117.7±18.9	0.401
POST PRANDIAL BLOOD SUGAR	Mean ± SD	163±16	168±20	0.480
HBA1C	Mean ± SD	7.7±0.9	7.2±1.2	0.195
TOTAL CHOLESTEROL	Mean ± SD	192.5±19.6	188.6±19.6	0.590
TRIGLYCERIDES	Mean ± SD	136±25	124±23	0.203
LDL	Mean ± SD	124.5±19.6	125.1±16.2	0.923
HDL	Mean ± SD	44.9±5.8	43.9±4.7	0.615
UNCONTROLLED HYPERTENSION	n (%)	7 (46.7)	6 (40)	0.713
STOP DIABETIC TREATMENT	n (%)	6 (40)	5 (33.3)	0.705

LDL: Low-density lipoprotein; HDL: High-density lipoprotein.

At the three-month mark, there were no statistically significant differences observed between the SASI and Sleeve groups in terms of body mass index (BMI) (P = 0.647), weight (P = 0.762), estimated weight loss (P = 0.192), fasting blood sugar levels (P = 0.401), post-prandial blood sugar (P = 0.480), HbA1c (P = 0.195), total cholesterol (P = 0.590), triglycerides (P = 0.203), LDL (P = 0.923), HDL (P = 0.615), uncontrolled hypertension (P = 0.713), and the percentage of patients whose stopped diabetic treatment (P = 0.705).

Table 6. Follow-up findings in the studied groups at 6 months.

		SASI (N=15)	SLEEVE (N=15)	P-VALUE
BODY MASS INDEX	Mean±SD	34.8±4.7	37.4±5	0.151
WEIGHT (KG)	Mean±SD	98±14	103±13	0.354
ESTIMATED WEIGHT LOSS (%)	Mean±SD	46.2±9.2	43.1±7.2	0.313
FASTING BLOOD SUGAR	Mean±SD	100±14	103±18	0.565
POST PRANDIAL BLOOD SUGAR	Mean±SD	148±18	151±20	0.736
HBA1C	Mean±SD	5.9±0.3	6.2±1.2	0.358
TOTAL CHOLESTEROL	Mean±SD	165±19	173±21	0.227
TRIGLYCERIDES	Mean±SD	114±25	111±23	0.762
LDL	Mean±SD	103±20.6	112.9±16.2	0.152
HDL	Mean±SD	47±4.7	45.3±4.6	0.318
UNCONTROLLED HYPERTENSION	n (%)	5 (33.3)	3 (20)	0.682
DIABETES STATUS				
RESOLVED	n (%)	12 (80)	10 (66.7)	0.727
IMPROVED	n (%)	2 (13.3)	3 (20)	
UNCHANGED	n (%)	1 (6.7)	2 (13.3)	
STOP DIABETIC TREATMENT	n (%)	7 (46.7)	6 (40)	0.713

LDL: Low-density lipoprotein; HDL: High-density lipoprotein.

At the six-month mark, there were no statistically significant differences observed between the SASI and Sleeve groups in terms of body mass index (BMI) (P = 0.151), weight (P = 0.354), estimated weight loss (P = 0.313), fasting blood sugar (P = 0.565), post-prandial blood sugar (P = 0.736), HbA1c (P = 0.358), total cholesterol (P = 0.227), triglycerides (P = 0.762), LDL (P = 0.152), HDL (P = 0.318), and the prevalence of uncontrolled hypertension (P = 0.682).

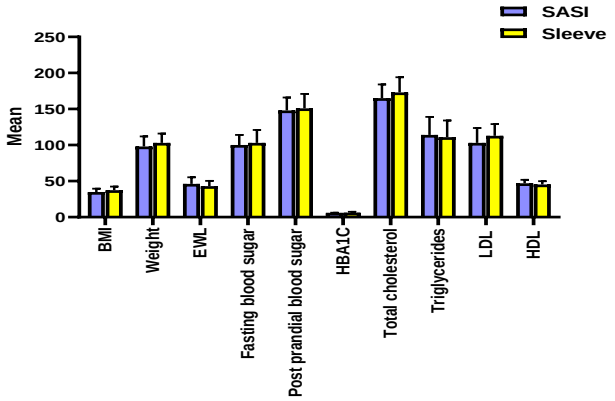

Figure 5. Follow-up findings in the studied groups at 6 months.

Table 7. Follow-up findings in the studied groups at 12 months.

		SASI (N=15)	SLEEVE (N=15)	P-VALUE
BODY MASS INDEX	Mean±SD	30.1±4.4	31.9±3.5	0.226
WEIGHT (KG)	Mean±SD	85±14	94±13	0.094
ESTIMATED WEIGHT LOSS (%)	Mean±SD	73±9	60±9	<0.001*
FASTING BLOOD SUGAR	Mean±SD	91±12	94±18	0.569
POST PRANDIAL BLOOD SUGAR	Mean±SD	131±25	133±19	0.779
HBA1C	Mean±SD	5.1±0.5	5.5±1.1	0.204
TOTAL CHOLESTEROL	Mean±SD	146±21	150±16	0.505
TRIGLYCERIDES	Mean±SD	93.9±21	89.7±14.8	0.529
LDL	Mean±SD	89.6±19.9	92.9±16.9	0.635
HDL	Mean±SD	49.7±4.8	45.8±4.4	0.026*
UNCONTROLLED HYPERTENSION	N (%)	3 (20)	2 (13.3)	1.0
DIABETES STATUS				
RESOLVED	n (%)	13 (86.7)	12 (80)	1.0
IMPROVED	n (%)	1 (6.7)	2 (13.3)	
UNCHANGED	n (%)	1 (6.7)	1 (6.7)	
STOP DIABETIC TREATMENT	n (%)	13 (86.7)	12 (80)	1.0

* Significant P-value; LDL: Low density lipoprotein; HDL: High density lipoprotein.

At 12 months, a significant difference was observed in estimated weight loss (P < 0.001), with SASI patients achieving a higher weight loss (73 ± 9) compared to Sleeve patients (60 ± 9). Additionally, there was a significant difference in HDL levels (P = 0.026), with SASI patients having a higher mean HDL (49.7 ± 4.8) compared to Sleeve patients (45.8 ± 4.4).

The remaining parameters, such as body mass index (BMI) (P = 0.226), weight (P = 0.094), fasting blood sugar (P = 0.569), post-prandial blood sugar (P = 0.779), HbA1c (P = 0.204), total cholesterol (P = 0.505), triglycerides (P = 0.529), and LDL (P = 0.635), did not show any significant differences between the SASI and Sleeve groups.

Regarding the prevalence of uncontrolled hypertension and diabetes status, no significant differences were observed between the two groups (P = 1 for each). Most patients had resolved or improved diabetes status. Moreover, similar percentages of patients who stopped diabetic treatment in both the SASI and Sleeve groups were reported (P = 1.0).

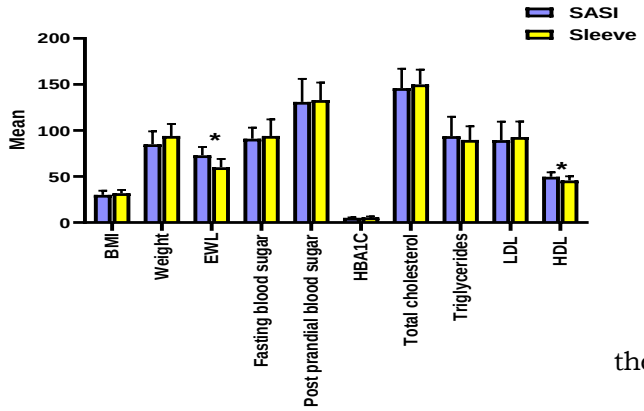

Figure 6. Follow-up findings in the studied groups at 12 months.

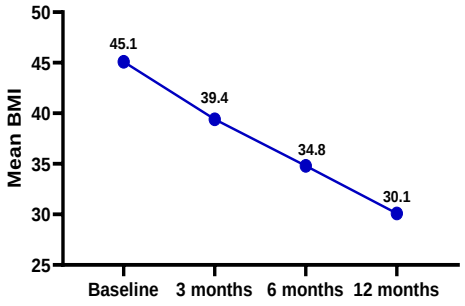

Figure 7. BMI at baseline and follow-up in the SASI Group.

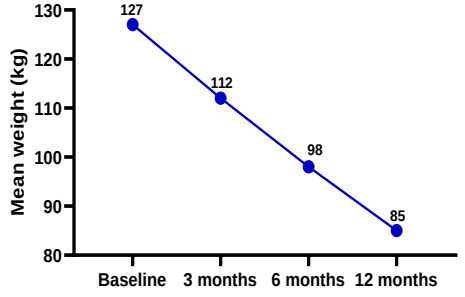

Figure 8. Weight at baseline and follow-up in the SASI Group.

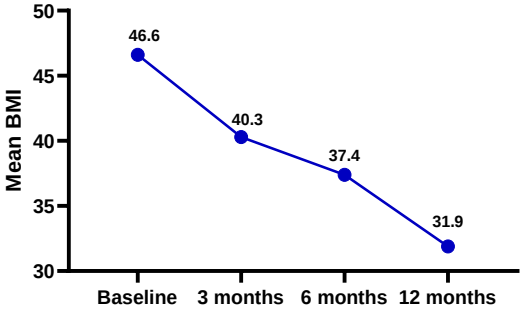

Figure 9. BMI at baseline and follow-up in the Sleeve group.

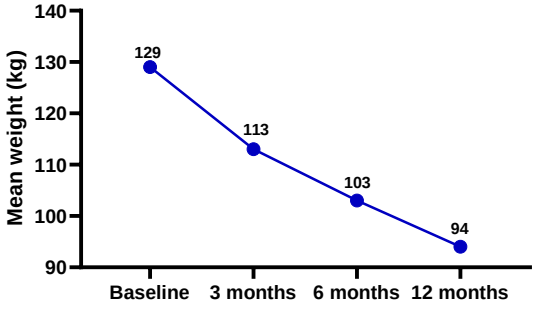

Figure 10. Weight at baseline and follow-up in the Sleeve group.

4. Discussion

Our investigation found that the average operative duration was significantly longer in the SASI group compared to the S.G. group (117 ± 11 versus 81 ± 7, respectively, p < 0.001).

This came in the same line with Emile et al. The study found that the SASI bypass procedure had a higher operation duration compared to the S.G. procedure (108.7 vs 92.8 min, p < 0.0001).[4]

Regarding the operative time of SASI, we had a mean operative time of 117 ± 11 mins, considered longer than Mahdy and Schou, which was 114 ± 30.5 mins. This could be explained by the many cases he has performed, so he is considered the inventor of the SASI operation.[5]

Concerning the prevalence of uncontrolled hypertension, our investigation's findings indicate that no statistically significant differences were noticed between the two groups.

Emile et al. Research findings indicate that two distinct processes were implemented, resulting in similar improvement levels in hypertension and hyperlipidemia.[4]

Concerning weight reduction following the surgeries, our study showed a statistically significant reduction in weight and BMI after both surgeries, either at 3M, 6M or after 12M. However, no statistically significant differences between both groups were recorded at 3M and 6M. However, at 12M, a significant difference was observed in estimated weight loss (P < 0.001), with SASI patients achieving a higher weight loss (73 ± 9) compared to Sleeve patients (60 ± 9).

In the same line, Madyan et al. It has been demonstrated that in the context of SASI, there was a notable reduction in the average preoperative BMI (53.7 ± 5.9) at six months (39.9 ± 5.2) and subsequently at 12 months (33.6 ± 6) following the surgical procedure. At 6 months, the average %EWL was 44.3 ± 7.8, and at 12 months, it was 65.2 ± 12.6.[6]

According to our research, there was no significant difference in the occurrence of complications across the groups under investigation. In neither group were there any documented instances of bleeding or leaks. One patient (6.7%) in each group had stenosis, and the SASI group did not have any GERD instances, whereas the Sleeve group had two patients (13.3%) with GERD (P = 0.483). Additionally, both groups had one patient (6.7%), each experiencing vomiting and dehydration with no significant difference (P = 1.0).

Likewise, Emile et al., which encompassed 116 patients, showed that there were no statistically significant distinctions (p = 0.056) in the problems that occurred in 12 (20.7%) patients following S.G. and 4 (6.9%) patients following SASI bypass.[4]

Mahdy and Schou The SASI Bypass demonstrated a notable enhancement in managing Type 2 Diabetes Mellitus (T2DM) through various mechanisms. These mechanisms encompass function restriction, leading to a substantial decrease in caloric intake, and the bipartition mechanism facilitates the swift entry of undigested chyme to enhance nutritive stimulation in the distal gut. Additionally, a smaller portion of the meal is passed through the duodenum to mitigate excessive nutritive stimulation in the proximal gut.[5]

Our study's findings indicate that there were no statistically significant differences in the prevalence of uncontrolled hypertension between the two groups.

Emile et al. Research findings indicate that two distinct processes were implemented, resulting in similar improvement levels in hypertension and hyperlipidemia.[4]

4. Conclusion

Research has demonstrated that bariatric surgery is the most effective method for managing severe obesity. It may accomplish and maintain significant weight loss over an extended duration. Furthermore, bariatric surgery can achieve better resolution of T2DM and hypertension than intensive medical therapy alone.

Disclosure

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

Authorship

All authors have a substantial contribution to the article

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Conflicts of interest

There are no conflicts of interest.

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