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ORIGINAL

Is Single Anastomosis Sleeve Ileal (SASI) Bypass Superior to Laparoscopic Sleeve Gastrectomy (LSG) among Patients with obesity in Kirkuk City? A Retrospective Study

¿Es el bypass ileal en manga con anastomosis única (SASI) superior a la gastrectomía laparoscópica en manga (LSG) entre los pacientes con obesidad de la ciudad de Kirkuk? Un estudio retrospectivo

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Abstract

Introduction and aim: In the past twenty years, bariatric surgery has witnessed a huge demand by patients with obesity, especially those who suffer from related diseases. The current study aimed to compare the outcomes of a single anastomosis sleeve ileal bypass (SASI) and laparoscopic sleeve gastrectomy (LSG).

Methods: In this cohort retrospective study, 80 obese adult patients who underwent bariatric surgery participated, 40 of them for SASI versus 40 others for LGS surgery in a private hospital in Kirkuk governorate, northern Iraq. All participants were followed up after the sixth and twelfth months after the operation. The outcomes were evaluated through of weighing loss, betterment of comorbidities, and complications that were observed after surgery.

Results: The results showed that the percentage of excess weight loss at six months after surgery was analogous between both surgeries while bypassing SASI showed a clear elevation of EWL% at twelve months postoperatively when compared with LGS. As for comorbidities, the improvement in type 2 diabetes mellitus and GERD by bypassing SASI was significantly better than that of LGS. As for postoperative complications, it has been proven that there are fewer complications after SASI surgery compared to LGS, but not significant.

Conclusions: It was concluded that bypassing the SASI gave better results, especially after twelve months of the operation, and further articles are needful to compare the outcomes of SASI bypass over a longer term.

Key words: Bariatric surgery, SASI, LSG, weight loss, comorbidities.

Resumen

Introducción y objetivo: En los últimos veinte años, la cirugía bariátrica ha sido testigo de una enorme demanda por parte de los pacientes con obesidad, especialmente los que padecen enfermedades relacionadas. El objetivo del presente estudio era comparar los resultados de la derivación ileal en manga con anastomosis única (SASI) y la gastrectomía en manga laparoscópica (LSG).

Metodología: En este estudio retrospectivo de cohortes participaron 80 pacientes adultos obesos que se sometieron a cirugía bariátrica, 40 de ellos para SASI frente a otros 40 para cirugía LSG en un hospital privado de la gobernación de Kirkuk, en el norte de Irak. Se realizó un seguimiento de todos los participantes al sexto y al duodécimo mes de la operación.

Resultados: Los resultados se evaluaron mediante la pérdida de peso, la mejora de las comorbilidades y las complicaciones observadas tras la intervención. Los resultados mostraron que el porcentaje de pérdida de exceso de peso a los seis meses de la intervención era análogo entre ambas cirugías, mientras que la derivación SASI mostraba una clara elevación del LPE% a los doce meses del postoperatorio en comparación con la LGS. En cuanto a las comorbilidades, la mejora de la diabetes mellitus tipo 2 y la ERGE mediante la derivación de la SASI fue significativamente mejor que la de la LGS. En cuanto a las complicaciones postoperatorias, se ha demostrado que hay menos complicaciones tras la cirugía del SASI en comparación con el LGS, pero no significativas.

Conclusiones: Se llegó a la conclusión de que la derivación del SASI daba mejores resultados, sobre todo a los doce meses de la operación, y son necesarios más artículos para comparar los resultados de la derivación del SASI a más largo plazo.

Palabras clave: Cirugía bariátrica, SASI, LSG, pérdida de peso, comorbilidades.

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Introduction

Because of the prevalence of obesity and its causes, it can be considered that losing weight is one of the most important medical treatments currently[1]. Losing excess weight has a significant interest on health, survival, and quality of life, as with adequate weight loss, many patients will feel cured of their comorbidities[2]. Bariatric surgery has confirmed to be the preferred treatment for obesity[3], as it is advised for obese individuals with a BMI super than 40 kg/m^2 or greater than 35 kg/m^2 when related with comorbidities such as diabetes mellitus/ type 2[4,5]. Although the history of bariatric surgery dates back to the fifties of the last century through the ileojejunal bypass and the other procedures that followed, which achieved significant weight loss, but they failed to attract patients with obesity, and they were not appreciated[6]. By the 2000s, the implementation of a laparoscopic approach to composition abdominal operation, including bariatric surgery, and improved safety and better documentation of clinical efficacy led to an increase in surgery among patients with obesity in several countries[7]. Bariatric surgery includes a wide range of techniques, and the efficacy of each is relatively well-established. The choice of one technique over another is subject to many criteria, such as the clinical and psychological characteristics of the patient, the availability of appropriate infrastructure, the preference of the surgeon, and the expertise of the medical team[8-10]. Laparoscopic sleeve gastrectomy (LSG) is a common bariatric surgical technique due to its fewer complications compared to the rest, and it is considered a permanent and irreversible surgery[11]. It comprises laparoscopic amputation of further than three-quarters of the largest gastric curvature, resulting in the formation of a minimal parochial tube-like structure with a remaining bulk of 100 ml. This size leads to early satiation and weighing loss[12]. Single anastomosis sleeve ileal (SASI) bypass is a new metabolic operation count on a slight gastric bypass and Santoro operation in which side-to-side sleeve gastrectomy is followed[13]. The first documentation on the impact of SASI in patients with obesity showed perfect results for the recent surgical technique[14]. The current study aims to compare the short-term outcomes of SASI and LSG surgeries as curing options for patients with obesity.

Patients & methods

This retrospective cohort analytical study was conducted on 80 patients with obesity who underwent LSG (**Figure 1**) or SASI (**Figure 2**) bariatric surgery, which spanned from the beginning of 2019 to the end of 2021. Their data was obtained from Al-Salam Hospital, located in the center of Kirkuk Governorate, northern Iraq. Depending on the multidisciplinary protocol[15], inclusion criteria for the two surgeries in the current study were obese individuals with a BMI >40 kg/m^2 or >35 kg/m^2 with at least one co-morbidity, of both sexes and ages of 22 -55 years only who carried out twelve months of follow-up after SASI or LSG surgery.

On the other hand, the exclusion criteria were as follows: patients with incomplete data, less than 18 years of age, pregnant women who underwent SASI or LSG as revision surgery, and those who did not complete at least 12 months of follow-up. A comparison was made between patients with obesity who underwent one of the obesity operations, either SASI or LSG, in terms of the following: the main variables including gender (male/female), age (years), weight (kg), body mass index (kg/m^2), medical comorbidities and postoperative complications. In order to evaluate the surgical outcomes between both types, a follow-up was conducted at 6 and 12 months postoperatively for the following: excessive weight loss, comorbidities, and postoperative complications.

Pre-operative procedures

All obese individuals conducted a preoperative assessment, including detailed history taking of each patient regarding eating habits, comorbidities, and prior medications for morbid obesity, if any. Then, a clinical and laboratory checking was complete, including the percentage of glucose in the blood and the lipid profile. The body mass index of each patient was calculated in addition to a complete pre-operative cardiopulmonary assessment for each patient.

Surgeries

Surgical techniques included both laparoscopic sleeve gastrectomy (LSG) and single anastomosis sleeve ileal (SASI) bypass, which were performed under general anesthesia by expert bariatric surgeons with a five-trocar approach (**Figure 3**) as previously described[16]. Pneumo-peritoneum was performed, and then a visible trocar (10 mm) was incorporated. Then, with a direct view, a trocar of diameter (5 mm) was positioned down the xiphoid process to introduce the Nathanson Liver Retractor. Also, two further working trocars (5 mm) were set in the right and left mid-clavicular lines and a 12 mm trocar for the stapler. Concerning SASI bypass, it is a modern proceeding that necessitate a sleeve gastrectomy with a single gastric-ileal anastomosis (usually, we count 250 cm of small bowel from the duodenojejunal junction). Determining the chosen of surgical techniques was established by a combined decision between the patient and the bariatric surgeon, taking into consideration the consultation of the obesity physician, dietician, and anesthesiologist.

Table I: Dates of the outpatient visit for follow-up after discharge from the hospital.

Visit times	Duration in months (Ms)
once/week	first M
once/month	for 3 Ms
once/every three months	for 12 Ms

Figure 1: LSG operation.

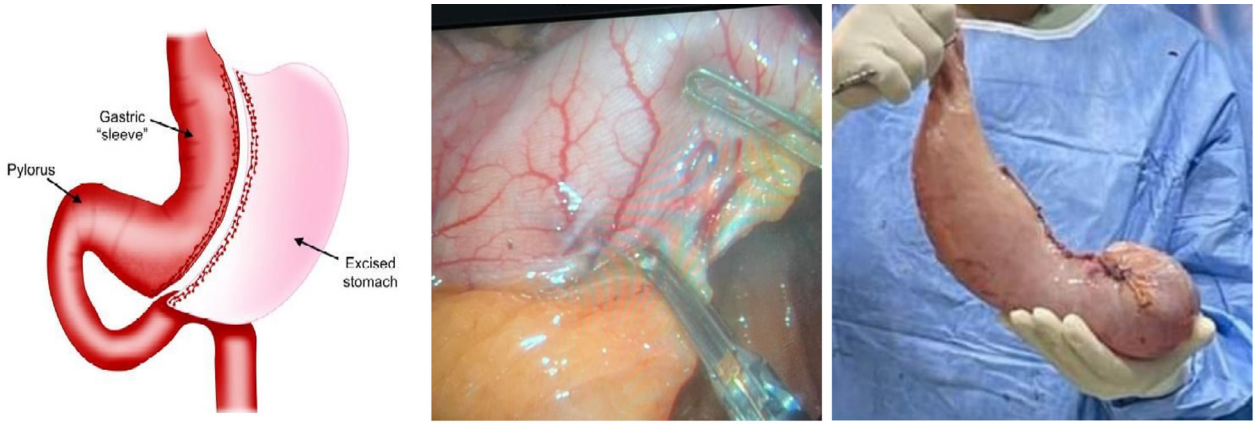


Figure 2: SASI bypass.

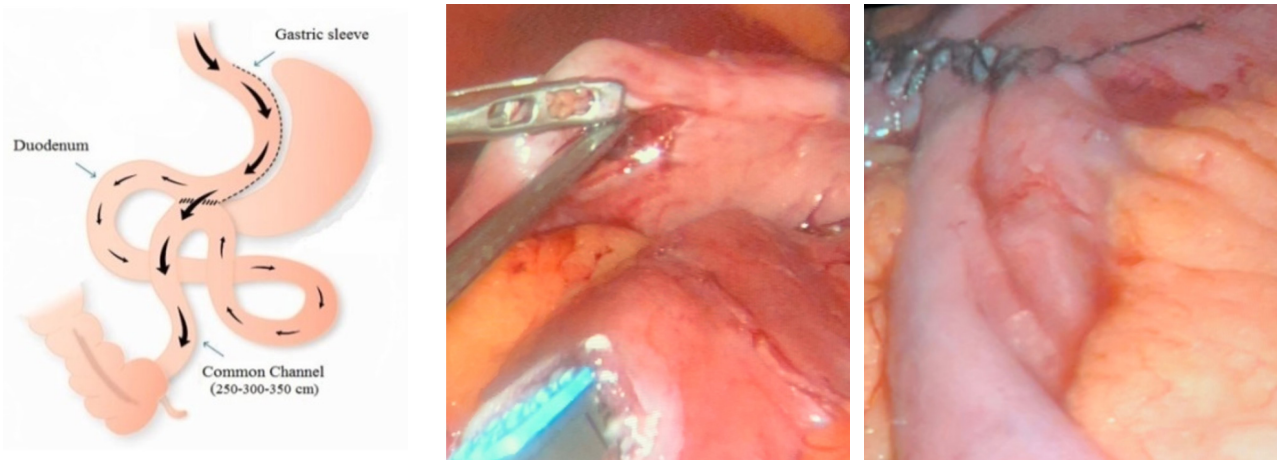
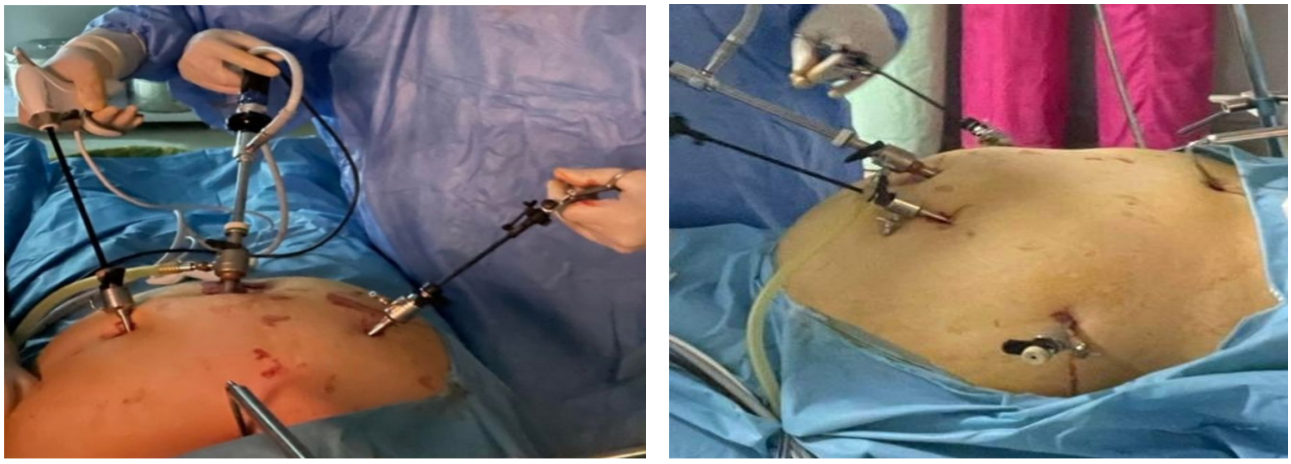


Figure 3: Trocar positions.



Study Outcomes

Concentrate on still up in the air as per recently detailed standard results by Brethauer and partners (2015) in bariatric and metabolic medical procedures[9] following a year of every system. Body weight and structure were evaluated occasionally utilizing bioelectrical impedance examination. The principal results were as per the following: first, the level of abundance weight reduction (% EWL) and the adjustment of the weight file. The level of EWL was determined as [(preoperative weight - weight at follow-up)/overabundance weight before surgery] x 100. Also, the improvement of comorbidity, here comorbidity improvement was checked by infectious prevention and drug apportioning. Improvement in diabetes mellitus/type 2 was considered as no less than 25% off in fasting plasma glucose and no less than 1% off in HBA1c with treatment with hypoglycemic medications. Thirdly, regarding postoperative difficulties, the characterization of products was adjusted as Class I to IV as per the Clavien-Dindo Order.

Statistical analysis

according to the use of SPSS, concentrate on information was broke down. The information was introduced as one or the other mean ± standard deviation (SD) or as numbers and rates. Both parametric and nonparametric procedures were utilized for spellbinding measurements as fitting. Contrasts between both SASI and LGS measures were looked at utilizing a chi-square investigation of patterns. Thinking about that outcomes at $p < 0.05$ were genuinely critical.

Results

Basic characteristics

This study evaluated 80 patients who underwent SASI or LSG bypass and finished 12 months of follow-up. As reviewed in the **table II**, 10 of them were men while 70 were women, with a mean age of 38.1±6.99 years. The mean weight was 129.88±17.30 (kg), and the BMI was 45.60±4.96 (kg/m^2). Diabetes mellitus was detected in 31 (38.8%) patients, hypertension in 19 (23.8%) patients, GERD in 16 (20.0%) patients, hyperlipidemia in 13 (16.3%) patients, and obstructive sleep apnea in 8 (10.0%) patients. When comparing between 2 surgeries, no clear differences were noted with regard to the basic characteristics mentioned above, as well as the associated diseases.

Wight loss after SASI and LGS

According to the results, weight loss was registered at six- and twelve-month follow-ups after the two surgical techniques, as indicated by a reduction in weight and BMI compared to the preoperative baseline data. There was no considerable difference between SASI and LGS in weighing loss at six months postoperative. Rather, and were found a difference in mean ± sd in body weight (80.3±11.2 vs. 87.2±9.5) and body mass index (27.6±2.6 vs. 31.2±3.5) at the twelve-month follow-up with statistical significance. Same for EWL% at six months postoperative without a significant difference between SASI and LGS, but bypassing SASI caused a remarkable rising EWL% at twelve months (70.8±14.6) compared to LGS (62.4±11.7) as shown in **table III**.

Associated comorbidities improvements

Twelve months after surgery (**Table IV**), SASI bypass had a statistically greater rate of improvement in diabetes/type

Table II: Basic characteristics of patients with obesity (80) undergoing bariatric surgery.

Characteristics	Surgical Techniques			
	Total N=80	SASI N=40	LGS N=40	P-value
Male/ Female	oct-70	jul-33	mar-37	0.18
Age (years) Mean±SD	38.1±6.99	39.1±6.84	37.1±7.09	0.72
Weight (kg) Mean±SD	129.88±17.30	128.57±16.42	131.2± 18.26	0.36
BMI (kg/m^2) Mean±SD	45.60± 4.96	44.82±5.37	46.37±4.45	0.67
Diagnosed Comorbidities NO. (%)				
Diabetes Mellitus	31 (38.8)	17 (21.3)	14 (17.5)	0.49
Hypertension	19 (23.8)	11 (13.8)	8 (10.0)	0.43
GERD	16 (20.0)	5 (6.3)	11 (13.8)	0.09
Hyperlipidemia	13 (16.3)	6 (7.5)	7 (8.8)	0.76
Obstructive Sleep Apnea	8 (10.0)	5 (6.3)	3 (3.8)	0.45

Table III: Weight loss upon follow-up in the 6 and 12 months after the operation.

Variables		Surgical Techniques		P-value
		SASI	LGS	
Wight	6-month postoperative	95.3±11.2	99.4±13.2	0.16
	12-month postoperative	80.3±11.2	87.2±9.5	0.01
	P-value	< 0.0001	< 0.0001	-
BMI	6-month postoperative	32.4± 4.9	34.8±4.6	0.31
	12-month postoperative	27.6±2.6	31.2±3.5	0.03
	P-value	< 0.0001	0.002	-
EWL %	6-month postoperative	45.3±11.4	41.7±10.2	0.12
	12-month postoperative	70.8±14.6	62.4±11.7	< 0.0001
	P-value	< 0.0001	< 0.0001	-

Table IV: Improvement in obesity-associated comorbidities at twelve months after two surgeries.

Comorbidities	Surgical Techniques		P-value
	SASI	LGS	
Diabetes Mellitus/Type 2	15/17 (88%)	7/14 (50%)	0.04
Hypertension	7/11 (64%)	5/8 (63%)	0.69
GERD	4/5 (80%)	3/11 (27%)	0.01
Hyperlipidemia	5/6 (83%)	5/7 (71%)	0.56
Obstructive Sleep Apnea	5/5 (100%)	3/3 (100%)	0.1

2 than LGS (88% vs. 50%, p = 0.04). Both measures showed approximate improvement in hypertension (p = 0.69), hyperlipidemia (p = 0.56), and sleep apnea (p = 0.1). After all patients with GERD underwent endoscopy before and after surgery during follow-up, SASI bypass showed significant improvement compared to GLS (80% vs. 27%, p = 0.01).

Complications

The study did not record any intra-operative complication, as well as deaths. There were 2 (5%) complications after bypass SASI versus 4 (10 %) after LGS surgery, indicating that LGS had a higher complications rate. Knowing that the variation between the two surgeries was not considerable (p = 0.70). Where bleeding occurred in one patient and obstruction in another patient after bypassing SASI. While the complications after LGS were as follows: bleeding in two patients, leakage in one patient, and obstruction in another patient. All these complications, whether bypassing SASI or LGS, were from the second to third grade on the Clavien-Dindo classification (**Table V**). There were 2 (5%) complications after the SASI bypass versus 4 (10%) after LGS surgery.

Discussion

The current study compared the results of two bariatric procedures (SASI and LGS). Bypassing SASI has been shown by follow-up results to be more effective for obesity with diabetes mellitus /type 2 and GERD than LGS, in addition to its higher ability to lose weight, especially after a year of operation. SASI can be considered as a new approach to surgical remediation of obesity based on the concept of bipartite division, which is essentially a technical amendment of else proceeding, sleeve gastrectomy with two transitional sections, pioneered by Santoro and his collagen[16]. SASI bypassing requires at least one gastric anastomosis. Practically, this procedure is based on SG, and in a previous study, the addition of an intestinal anastomosis was demonstrated to prompt early satiation and promote DM/T2 alleviation[14]. This sidestep permits quick passage of undigested chyme into the distal digestive tract, prompting more proficient discharge of GLP-1 and PYY. These chemicals diminish the rate at which the stomach purges, making the stomach practically more modest (utilitarian limitation). Subsequently, insulin discharge is improved, and focal satiety is upgraded[18,19]. As for LGS, a common bariatric procedure, it is technically the simplest procedure. Although it provides better results, especially in superlative patients with obesity, but with a possible consequence of regaining weight up to 75% in 6 years post-operation, so it is considered a significant problem[20]. Most baseline variable data in the two groups were convergent, although there were some differences that may reverberate the route each surgical technique was selected for patients. Patients with obesity who had LGS (37.1 ± 7.09) were lesser in age than patients who had SASI surgery (39.1 ± 6.84); younger patients may be more likely to regain weight after the operation. Because re-weighting after LGS enable facilely managed with re-sleeve or switching to bypass surgery, this may elucidate the expansion of LGS in younger patients with obesity[21]. The LGS group had a slightly higher body mass index than) 46.37±4.45 (SASI patients (44.82±5.37). This is consistent with a previous study by Otto et al. in 2016, which demonstrated that SG surgery is efficient in patients with a mean BMI of about 55 kg/m^2 [22]. The proportions of patients who underwent the two surgeries, whether SASI or LGS, were almost similar in terms of their suffering from comorbidities, as no statistically significant difference was recorded. Both surgeries carried out noteworthy weighing loss and BMI with a raise in % EWL after six and twelve months post-operatively. The variance between the two surgical techniques in terms of weighing loss outcomes after six months was not significant, but after twelve months, bypassing SASI proved to be significantly better than LGS. Weight loss after the first six months of surgery is based on a restrictive effect during this initial period, followed by a significant onset of the effect of hormonal changes[23,24]. After SASI, losing weight is primarily caused by a neuroendocrine response resulting from the early receipt of nutrients in the distal gut, prompting the secretion of the distal gastrointestinal hormone and inducing a sense of satiety[13,25]. The two procedures had similar proportions of amelioration in hypertension, hyperlipidemia, and obstructive sleep apnea.

Table V: Complications after two surgeries.

Complications	Surgical Techniques			P-value
	Total	SASI	LGS	
Bleeding	3 (3.8%)	1 (1.3%)	2 (2.5%)	0.70
Obstruction	2 (2.5%)	1 (1.3%)	1 (1.3%)	
Leakage	1 (1.3%)	0 (0.0%)	1 (1.3%)	
	Clavien- Dindo classification			
Class	SASI		LGS	
I	0		0	
II	1		2	
III	1		2	
IV	0		0	

SASI medical procedure accomplished all the more measurably more noteworthy improvement in diabetes mellitus/type 2 as well as GERD contrasted with LGS. This huge improvement in diabetes is through a few systems, for example, limitation of capability followed by a noticeable diminishing in caloric admission, a bipartition approach that permits expedient passage of somewhat processed food (chyme) to enhance the dietary feeling of the distal digestive tract, and crossing of a negligible piece of the feast out of the duodenum to decrease excitement unnecessary food admission of the proximal digestive tract[14,16]. In a recent study by Wu et al. (2022) to compare the outcomes of SASI and SG surgeries using a rodent model with diabetes, they concluded that the SASI procedure is a better alternative because it has perfect outcomes in the treatment of obesity and metabolism with a lower risk of hypoalbuminemia[26]. In another review, Romero et al. assessed the results and attainability of their SASI strategy for 43 patients who finished a year after a medical procedure. Among the 25 patients, a reduction from diabetes happened in 95.8% of them[27]. Concerning the improvement in gastroesophageal reflux illness in the wake of bypassing SASI, which came to 80%[16]. In a recent systematic review of the short-term outcome of SASI in the treatment of morbid obesity, which was conducted in 10 studies including 941 patients, the crude percentages of patients with GERD reached 92%[28]. When comparing the complication rates of both surgical techniques, there was no clear significant difference (0.70), which means that both are safe with little risk[29,30,31]. One of the limitations of the current study is that the valuation of the results was short-term, about one year after each operation. Although, the follow-up of patients after the operation for a longer period of more than several years is also required. In addition, the necessary nutritional parameters, such as some proteins, minerals, and vitamins, were not regularly evaluated after each procedure.

Conclusions

Accurately chosen of the bariatric procedure according to every obese patient's condition has the most important role in achieving the best possible outcomes. There was no clear difference between the outcomes of both procedures at six months after the operation. But at twelve months after SASI bypass, a greater decrease in body weighing and BMI, increased % EWL, and better improvement in diabetes/type 2 and GERD were observed compared to LGS. The study recommends conducting another study to estimate the long-term outcomes of both surgical procedures, as well as other prospective studies comparing SASI with obesity surgery techniques

Conflict of Interest

The authors declare that there is no conflict of interest.

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