



# Laparoscopic Single Anastomosis Duodeno-ileal Bypass-Sleeve Gastrectomy versus Laparoscopic Sleeve Gastrectomy

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## Authors' contributions

*This work was carried out in collaboration among all authors. Author MSA designed the study, performed the statistical analysis and wrote the protocol. Author HAN wrote the first draft of the manuscript. Author AMR managed the analyses of the study. Authors TMEG and EAM managed the literature searches. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** In an attempt to simplify the effective BPD-DS procedure- the same way Rutledge simplified RYGB by doing one loop end-to-side anastomosis – and to preserve its principles, the single anastomosis duodeno-ileal bypass with sleeve gastrectomy (SADI-S) was first described in 2007 by Sánchez-Pernaute and Torres as they did Sleeve gastrectomy followed by 1-loop duodenoileostomy, with 250 cm between anastomosis and ileocecal valve. Anastomosis performed in antecolic and isoperistaltic manner.

Purpose to assess weight loss between the two procedures, in addition to OR time and LOS.

**Patients and Methods:** The interventions were led at Beni-suef University Hospital between January 2018 and December 2019, after the patients fitted both the inclusions and exclusions criteria. This study consisted of 36 patients which were randomized into 2 groups. Group (A): 18

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patients assigned for Single Anastomosis Duodeno-ileal bypass – Sleeve Gastrectomy [SADI-S]. Group (B): 18 patients assigned for Sleeve Gastrectomy.

**Results:** The SADI-S group achieved mean excess weight loss of 65.8% ±5.2 at 6 months and 93% ± 9.7at 12 months postoperative and mean percentage of total weight loss of 31.3%± 4.3at 6 months and 44.3% ± 6.4 at 12 months postoperative. On the other hand, Sleeve gastrectomy group reached mean excess weight loss of 43.7% ±8.3 at 6 months and 67.2% ± 6.3 at 12 months postoperative and mean percentage of total weight loss of 20.3%± 4 at 6 months and 32.7% ± 6.8 at 12 months postoperative. There is a statistically significant difference between both groups at all follow up visits (p-value < 0.001).

**Conclusion:** SADI-S/OADS is more effective than LSG regarding weight loss.SADI-S/OADS took more operative time and longer hospital stay than LSG.

*Keywords: Laparoscopic single anastomosis; duodeno-ileal bypass-sleeve gastrectomy; laparoscopic sleeve gastrectomy.*

## 1. INTRODUCTION

The first bariatric procedure was the jejunoileal bypass followed by the jejunoileal bypass, which resulted in substantial weight loss but unacceptable life threatening complication rates. These procedures along with several others have fallen out of favor over the years, due to failure rates, health risks, and severe deficiencies. Currently, laparoscopic Roux-en-Y gastric bypass (RYGB) and laparoscopic sleeve gastrectomy (LSG) are most commonly performed for surgical treatment of morbid obesity [1]. SADI-S compared with DS eliminates the Roux-en-Y gastric bypass by creating an omega loop, and because of pylorus preservation, bile diversion is unnecessary as the natural barrier remains in place [2]. Preservation of the pylorus provides control of solid stool emptying, reducing the chances of dumping syndrome and assisting in the maintenance of a physiologically based rate of gastric emptying [3]. SADI-S benefits over DS included reduction of the operative risk by eliminating one anastomosis with potentially similar weight loss and health benefits [4]. More reports on outcomes of LSG with patients followed for more than 5 years are starting to appear—a fact that will produce long-term efficacy data. However, it is important to point out that the large number of variations in surgical technique causes great difficulty in establishing comparable outcomes at the present time [5]. The bariatric community has made an effort to come to an agreement in major technical issues through the consensus on LSG [6].

## 2. MATERIALS AND METHODS

### 2.1 Study Sample

The study consisted of 36 patients which were randomized into 2 groups. Patients were

enrolled in the study after giving written informed consent.

- **Group (A):** 18 patients assigned for Single Anastomosis Duodeno-ileal bypass – Sleeve Gastrectomy [SADI-S].
- **Group (B):** 18 patients assigned for Sleeve Gastrectomy.

#### Inclusion criteria:

1. Patients who had BMIs of 40 Kg/m<sup>2</sup> or more, or between 35 Kg/m<sup>2</sup> and 40 Kg/m<sup>2</sup> with obesity related comorbidities that could be improved if they lose weight.
2. Age (18-65) years old.
3. Patients were generally fit for anesthesia and surgery.

#### Exclusion criteria:

1. Previous gastric or duodenal surgery.
2. Endocrine disorders excluding diabetes mellitus.
3. Psychiatric illness.
4. Recent diagnosis of malignancy.
5. Heavy smokers and alcoholics.

The percentage of total body weight loss (%TBWL) and excess body weight loss (EBWL) was quantified in both groups at 6 and 12 months with laboratory tests conducted in the same periods.

Total body weight loss (TBWL) at a certain time was calculated as follows: baseline weight – body weight at that time.

Percentage of total body weight loss (%TBWL) at a certain time was calculated as follows: (Total body weight loss/Baseline total body weight) X 100

The ideal body weight was calculated as follows: Height in meters squared (m<sup>2</sup>) X 25.

Excess weight was calculated as follows:  
Baseline weight – ideal body weight

The percentage of excess body weight loss (%EBWL) was calculated as follows: [(base line weight– actual weight)/excess weight] X 100

**2.2 Outcomes**

**Primary outcomes (Most important outcomes assessed):**

- The percentage of total body weight loss (%TBWL) and percentage of excess body weight loss (%EBWL) were quantified in both groups at 6 and 12months.

**3. RESULTS AND DISCUSSION**

SADI-S is a novel bariatric operation based on the principles of biliopancreatic diversion (BPD) [7]. The reason for developing a new technique or for modifying a pre-existing one was to simplify the procedure, to decrease the potential complication rate, and to maintain or even to improve, if possible, the outcomes of the original operation [8]. In our study the mean operative time was 189.9± 31.4 min in SADI- S group and 97.5± 35.2 min in LSG group with p-value of ≤0.005. There is a statistical difference as SADI-S took more time. This may be explained by: The duodenal dissection took some more time to avoid injury of the duodenum, the gastroduodenal artery or even the common bile duct. The duodeno-ilealanastomosis took more time as, the duodenoileostomy was fashioned as end to side anastomosis to avoid stapling the pyloric ring in case of side to side anastomosis [9]. Similarly Lin et al. [10] reported a mean operation time (min) 95.8 ± 27.8 in LSG. Unlike Topart et al. [11] who reported a mean operative time in SADI-S 100.8 minutes (range 69.9-

181.7). While Gebelli et al. [12] reported a mean Surgical time 115 min (80-180) in SADI-S.

In our study the mean hospital stay was 2.9 days ± 1 in SADI-S group and 1.8 days ± 0.42 in LSG group with statistical significance between both groups (P-value ≤0.001). On the other hand studies reported a longer hospital stay. Moon et al. [13] reported a mean hospital stay of 4.1 ± 2.7 days in SADI-S. Also Nelson et al. [14] reported a mean length of hospital stay of 4.3± 2.6 days (range, 3-24). Six patients had a prolonged hospital stay (longer than five days) due to decreased oral intake (n=3), atelectasis (n=1), postoperative bleeding (n=1), and duodeno- ileal obstruction with perforation of the small bowel (n=1). While in LSG, Lin et al. [10] reported length of postoperative hospital stay (days) 3.9 ± 1.4.(10).Our study shows shorter hospital stay which could be because of patients' smooth recovery as we had no intra-operative or early post-operative complications.

In the present study regarding total and excess weight loss which were our primary outcomes, SADI-S group achieved mean excess weight loss of 46%± 7.5% at 3 months, 65.8%± 5.2% at 6months, 93% ± 9.7 at 12 months postoperative and mean total weight loss of 22% ± 5.2% at 3months, 31.3% ± 4.3% at 6months and 44.3% ± 6.4 at 12 months postoperative. On the other hand, Sleeve gastrectomy group reached mean excess weight loss 27.6%± 6.3% at 3 months, 43.7%± 8.3% at 6months, 67.2% ± 6.3 at 12 months postoperative and mean total weight loss of 12.8% ± 2.9% at 3months, 20.3% ± 4% at 6months and 32.7 % ± 6.8 at 12 months postoperative. There is a statistically significant difference between both groups (P-value < 0.001). This may be attributed to: The Longer restriction tube in case of SADI-S that includes a sleeve part, antrum and small proximal duodenal pouch.

**Table 1. Operative time in both groups**

	Group A (SADI-S) Mean (SD)	Group B (LSG) Mean (SD)	Test of significance	P-value
<b>Operative time (minutes)</b>	189.9(31.4)	97.5(35.2)	Independent-samples t test t ( 34) = 8.3	≤0.005**

**Table 2. Hospital stay in both groups**

	(SADI-S) Mean (SD)	(LSG) Mean (SD)	Test of significance	P-value
<b>Hospital stay (days)</b>	2.9(1)	1.8(0.42)	Independent-samples Mann-Whitney U test	≤0.001**

**Table 3. Body weight parameters in both groups**

	Group A (SADI-S)				Group B (LSG)				Test of significance	P-value
	Mean (SD)	Median	Min	Max	Mean (SD)	Median	Min	Max		
<b>Body weight (kg)</b>	130.6 (17.2)	127	105	160	131.5 (13.2)	128.5	114	158	Independent-samples t test t ( 34) = 0.17	0.86
<b>% EBWL in 6 months</b>	65.8 (5.2)	65.25	57	76	43.7 (8.3)	42.5	30	57	Independent-samples t test t ( 34) = 9.6	≤0.001
<b>% TBWL in 6 months</b>	31.3 (4.3)	31.2	19.8	37.8	20.3 (4)	20.1	13.8	28.3	Independent-samples t test t ( 34) = 7.96	≤0.001
<b>% EBWL in12months</b>	93 (9.7)	91	76	117	67.2 (6.3)	67	55	78	Independent-samples t test t ( 34) = 9.48	≤0.001
<b>% TBWL in 12months</b>	44.3 (6.4)	44.6	26.5	52.3	32.7 (6.8)	32	21	49	Independent-samples t test t ( 34) = 5.28	≤0.001

Sanchez-Pernaute et al. [15] reported similar results in patients underwent SADI-S with mean excess weight loss of 53.6% ± 13.1 at 3 months 81.6% ± 17.0 at 6 months, 87.8% ± 8.0 at 9 months, 94.7% ± 19.1 at 12 months, 98.6% ± 20.9 at 18 months and was maintained over 100% during the third postoperative year. Only one patient (2%) has failed to achieve a 50% excess weight loss (46% at 2 years); he is a 55-year-old man who suffered a myocardial infarction 6 months after surgery. Formerly, his weight loss had been satisfactory; after the cardiac event, he spent 1 month in a hospital and stood some months under strict repose, and started regaining weight. While in LSG, Nabil et al. [16] reported similarly excess weight loss 67% at 12 month postoperative. Felsenreich et al. [17] reported excess weight loss 49% at 12 month postoperative.

Different results were observed in different SADI-S studies. Moon et al. [13] reported percentage of total weight loss of 23.1, 37.1 and 44.7% at 6, 12, and 24 months, respectively. The Percentage of excess BMI loss was 41.9, 68.1, and 80.8% at 6, 12, and 24 months, respectively. But Cottam et al. [18] reported mean %TBWL of 26.8, 36.3, 41 at 6, 12 and 18 months postoperative, with mean BMI of 30.2 at 12 months postoperative. It is noteworthy that Cottam et al. [18], stated that OADS/SADI-S patients did not lose significant additional amount of weight after 15 months (P = .076). However Surve et al.[19] reported excess weight loss range of (61.7% to 87%) at 12 months postoperative, and excess weight loss Range of (83.7% to 93.9%) at 24 months postoperative. Shoar et al. [20] underwent a systematic review with a total of 12 studies including 581 SADI-S patients (217 males and 364 females). OADS/SADI-S was a primary procedure in 508 patients (87.4%) and a conversion procedure in 73 patients (12.6%). Shoar et al. [20] reported that the average %EWL was 30% at 3 months, 55% at 6 months, 70% at 12 months, and 85% at 24 months.

#### 4. CONCLUSION

SADI-S/OADS is more effective than LSG regarding weight loss. SADI-S/OADS took more operative time and longer hospital stay than LSG.

#### CONSENT AND ETHICAL APPROVAL

- ✓ Approval by the institution ethical committee has been taken.

- ✓ Informed consent was taken after explaining the study objective and the procedures to potential participants. Participation was voluntary and we informed the participants that the decision would not affect the quality of care they receive.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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