

# Single Anastomosis Sleeve Ileal By-Pass (SASI) as a Redo Surgery After Failed Sleeve Gastrectomy

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## ABSTRACT

**Introduction:** A failed Laparoscopic Sleeve Gastrectomy (LSG) presents a challenging problem for bariatric surgeons. Single Anastomosis Sleeve Ileal bypass (SASI) procedure appears as a new metabolic and bariatric surgery based on Santoro's operation, in which a sleeve gastrectomy is followed by a side to side gastroileal anastomosis. This study is aiming to evaluate SASI as revisional surgery after a failed LSG.

**Methods:** This study included the outcomes of 28 patients who required a revisional surgery after failed LSGs. The patients' demographic data, indications for revisional surgery, perioperative complications, and postoperative outcomes were recorded.

**Conclusion:** Laparoscopic single anastomosis sleeve ileal bypass is new promising bariatric surgery and effective, safe and simple revisional surgery after failed LSG. Moreover, its results are comparable with other more difficult revisional surgery with fewer complications. However, long term follow up period and more no. of patients are required for proper evaluation of postoperative weight loss, metabolic changes and nutritional statuses of the patients.

**Keywords:** Bariatric surgery; Revisional surgery; Sleeve gastrectomy

## INTRODUCTION

Laparoscopic sleeve gastrectomy is one of the most common bariatric surgeries worldwide now due to its safety and simplicity with good results especially in the short term [1]. However, there is a huge debate on its long term results regarding weight loss in super-obese patients with BMI exceeding 50 kg/m<sup>2</sup> as it's associated with a high incidence of weight regain or insufficient weight loss. It may also be associated with de-novo Gastro-Oesophageal Reflux Disease (GERD) in some patients [2]. These long term results were explained by marked variation in LSG technique and not standardizing one technique yet [3].

Single Anastomosis Sleeve Ileal bypass (SASI) technique is started by sleeve gastrectomy that is followed by gastroileal loop anastomosis [4]. By this way, we have two pathways, the normal pathway in which minority of the food path for normal nutrient absorption and the gastroileal pathway in which the majority of the food pass to induce the metabolic effect [5]. This new operation is characterized by a low incidence of complications,

especially leak and reflux (GERD) due to the presence of low pressure in the stomach [6].

This study is aiming to evaluate the short term outcomes of laparoscopic single anastomosis sleeve ileal bypass as a redo surgery after failed LSG with respect to postoperative weight loss and post-operative complications.

## MATERIALS AND METHODS

### Patient's and methods

This prospective study was conducted in Ain Shams university hospitals from May 2017 to March 2019 on 28 patients who required a revisional surgery after failed LSGs. All patients underwent single anastomosis sleeve ileal bypass in the bariatric unit at the Department of General Surgery at El Demerdash hospital in Cairo, Egypt. An approval from the ethical committee at the Faculty of Medicine at Ain Shams University was obtained to conduct this study.

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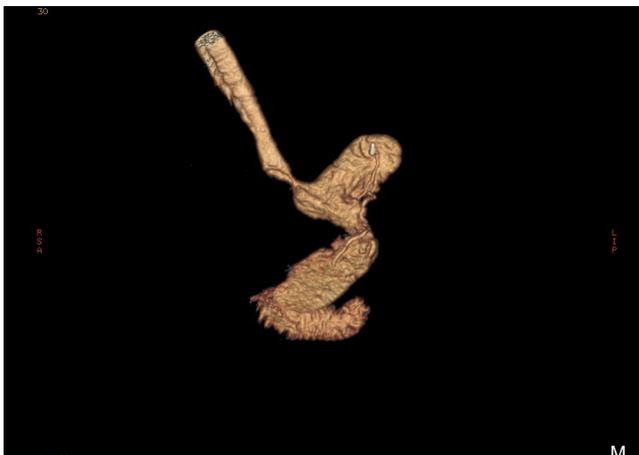
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This study included patients with BMI of more than 40 kg/m<sup>2</sup> complaining of progressive weight regain or insufficient weight loss (less than 50% of the excess weight loss) 18 months after LSG. Also, patients suffering from LSG long term complications such as GERD not responding to medical treatment or with pathological changes (Barrett oesophagus) were involved in this study.

Exclusion criteria included patients with severe debilitating nutritional deficiency, history of psychiatric problem, drug or alcohol addiction or malignancy, patients who were contraindicated for general anaesthesia or laparoscopy (e.g. having major medical co-morbidity such as cardiac patients). Patients with the volume of gastric sleeve in perioperative CT volumetry less than 250 ml were referred to a nutritionist for proper assessment (Figures 1 and 2).



**Figure 1:** CT volumetry showed missed funds post LSG.



**Figures 2:** CT volumetry showed the volume of the retained stomach more than 250 ml.

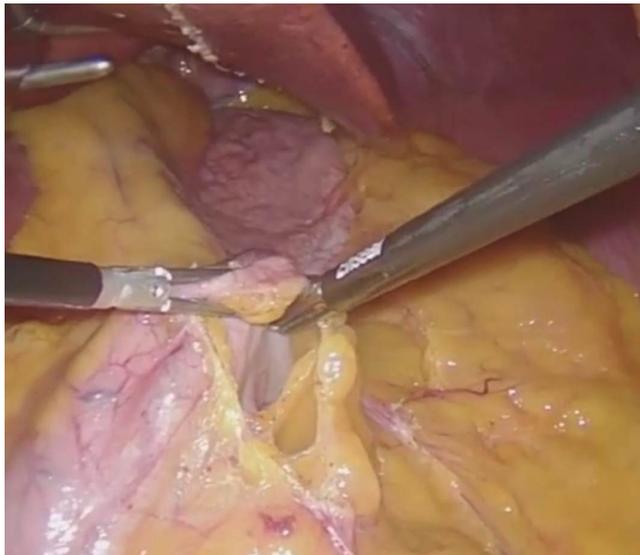
Before the operation, assessment of patients' general conditions, mental statuses and obesity-associated co-morbidities such as diabetes, hypertension or cardiovascular diseases were performed.

Full preoperative workup including blood chemistries, ultrasonography, CT volumetry, upper endoscopy, pH manometry was performed for all patients.

Informed consent was taken from all patients before the operation after explaining benefits, possible risks and long-term consequences of the conversion to bypass surgery. One week before the operation, patients were informed to eat a high protein diet and perform regular exercises. 24 hour before the operation patients were allowed to only take clear fluids. All operation procedures were performed by laparoscopy under general anaesthesia. Prophylactic doses of anticoagulant and antibiotic were administered in induction.

Intraoperative, patients were intubated in a supine position before inducing pneumoperitoneum through a 10 mm umbilical visiport 0.5 mm trocar was placed under the xiphoid process for the insertion of the liver retractor. Two 12 mm trocars were placed on the right and left middle clavicular lines respectively for the surgeon instruments. Then for assistance, 5 mm trocar was placed on the left anterior axillary line.

First of all adhesion between left lobe of the liver and anterior surface of the stomach should be carefully separated, then deflation of the stomach was done after insertion of oral Ryle. Separation of the greater curve from the omentum was started 5 cm from the pylorus up to the cardio-oesophageal junction to ensure full mobilization of gastric funds (Figure 3). Adhesiolysis to all adhesion between pancreases and the posterior surface of the stomach. After detaching the stomach from the great curvature, a 40-French orogastric tube was inserted in the stomach and into the duodenum. Using linear staplers, trimming of the gastric sleeve was performed starting 5 cm from the pylorus up to the angle of Hiss. Methylene blue test was done. The position was changed to a Trendelenburg position. The transverse meso-colon was retracted toward the head of the patient and 300 cm was counted from the ileocecal junction then an antecolic side to side anastomosis was done with the posterior wall of the stomach in the area between the antrum and the body with 45 mm linear stapler. Vicryl 3/0 continuous stitch was used for closing gastroentrotomy. A naso-gastric tube was placed in the gastric pouch and finally leak test was performed using methylene blue then the resected stomach was then removed. Therefore, the operation ended with a gastric tube having two outlets; one to the duodenum which is the normal pathway of the digestive tract and one to the ileum. Drains were left.



**Figure 3:** Separation of the greater curve from the adhesive omentum.

The standard clinical protocol was used for all patients postoperatively. In which all patients kept on NPO for 48 hours followed by clear liquids with low calories for 1 week and low-caloric semisolid food for 2-4 weeks. The full diet was subsequently introduced. Patients were discharged from the hospital on the second day after the operation after excluding leakage by gastrographin study. Postoperative follow-up protocol included patient visit once every week for one month then once every 3 months for one year to evaluate surgical outcomes i.e. change in BMI, any early post-operative complications i.e. bleeding leak, or late postoperative complication i.e. reflux other nutritional complications.

**RESULTS**

Twenty-eight patients (18 females and 10 males) with an average BMI of 45.6 kg/m<sup>2</sup> ranging between 40.5 kg/m<sup>2</sup> and 58.4 kg/m<sup>2</sup> and a mean age of 30.7 ranging between 22 and 52 underwent revisional laparoscopic SASI after failed LSG. The mean interval time from the primary operation was 24.2 months (range 18-40 months).

In the current study, thirteen patients were complaining from weight regain and ten patients had unsatisfactory weight loss, while the remaining five patients were complaining from reflux esophagitis not responding to medical treatment (which proved to be acidic reflux by pH manometry).

The mean duration of intervention was 60.3 min (ranging from 45.3 min to 120.5 min) and the mean length of hospital stay was 2.3 days (ranging from 2 to 20 days). The mean BMI decreased during the first year after the operation from 45.6 kg/m<sup>2</sup> preoperatively to 32.1kg/m<sup>2</sup> postoperatively (ranging from 24.8 kg/m<sup>2</sup> to 41.5kg/m<sup>2</sup>) Table 1.

**Table 1:** Shows demographic data for patients.

Gender N (%)	Male	18	64.28%
	Female	10	36.72%

Age	Range	22	52
	Mean ± SD	30.7	6.1
BMI kg/m <sup>2</sup> before redo surgery	Range	40.5	58.4
	Mean ± SD	45.6	2.22
Operative time	Range	45.3	120.5
	Mean ± SD	60.3	23.6
Hospital stay	Range	2	20
	Mean ± SD	2.3	0.132

Intraabdominal bleeding occurred in one patient in the first day after the operation and upon re-exploration, the perigastric hematoma was found with no active bleeding, proper hemostasis was done and the patient was discharged 3 days later. One patient suffered from repeated vomiting due to anastomotic stenosis 7 month after the operation, which was improved after balloon dilatation

Two patients complained of poor weight loss 6 months after the operation, however, after obtaining a proper postoperative history, we found that they were not following the prescribed nutritional regimen.

One patient suffered from the mild symptom of reflux, which was proved to be biliary reflux by upper GIT endoscopy and ph manometry. This patient responds well to lifestyle modification with medical treatment.

There is no postoperative nutritional complication in our patient's i.e. the mean plasma levels of haemoglobin and albumin did not significantly change after the operation. Finally no postoperative leakage or mortality in our study.

**DISCUSSION**

Although LSG considered golden standard procedure for loss of weight due to its simplicity and its good short term results, yet its long term results seemed to be unsatisfactory [7].

SG, is a restrictive procedure, depending mainly on reducing the size of the stomach making it more tubular in shape by removing the fundus and greater curvature. SG is not a malabsorptive procedure therefore patients were in risk of weight regain especially with high caloric fluid intake [8].

In addition to non-standardization of LSG technique by using bougies with deferent sizes, incomplete removal of the fundus, increase the incidence of redilation of the stomach in the long term [9].

SASI emerged as a new surgical procedure that combined both restrictive and malabsorptive effect for weight loss with the presence of normal digestive track pathway as it doesn't exclude any parts of the digestive system and therefore it doesn't interfere with the important digestive functions [4].

In addition to its simplicity in comparison to other revisional bariatric surgeries, SASI has a minimal incidence of leakage or serious morbidity attributed to minimal tension on gastroileostomy anastomosis which was made at the dependent part of the area between antrum and body of the stomach [10].

In this study, the mean duration of intervention was 60.3 min (ranging from 45.3 min to 120.5 min) and the mean length of hospital stay was 2.3 days (ranging from 2 to 18 days), in comparison study done by Patrick et al. [11], they stated that the mean operative time of re-sleeve was 43 min (range 29 min-70 min) and the mean hospital stay was 3.9 days (range 3-16 days), another study done by Phillip et al. [12], they stated that the main operative time for conversion of the failed sleeve to Roux en Y Gastric bypass was 71.6 min and main hospital stay was 2 days. From which we can say that there is no considerable difference as regard operative time and the hospital stay between SASI and other revisional surgeries.

In a study done by Iannelli et al. [13] on selected a group of 13 patients underwent resleeve, the mean BMI dropped from 44.6 kg/m<sup>2</sup> to 32.3 kg/m<sup>2</sup>, in another study done by Phillip et al. [12] mean BMI decrease from 42.5 (± 6.0) kg/m<sup>2</sup> to 39.5 (± 5.5) kg/m<sup>2</sup> after conversion of the failed sleeve to Roux en y gastric bypass. In our study, the mean BMI decreased during the first year after the operation from 45.6 kg/m<sup>2</sup> preoperatively to 32.1 kg/m<sup>2</sup> postoperatively (ranging from 24.8 kg/m<sup>2</sup> to 41.5 kg/m<sup>2</sup>).

In this study, one patient had intra-abdominal bleeding on the first day after the operation which needs re-exploration and one patient had anastomotic stenosis which responded well to balloon dilation. No leaks were recorded in this study. In a study done by, Dapri et al. [14]. On re-sleeve group, they recorded one early gastric leak that required treatment for 58 days and more than one endoscopic stent placement. This can be explained by increased intragastric pressure after re-sleeve, in contrast in SASI the intragastric pressure is decreased after the operation. In another study done by Daniel et al. [15], they stated that strictures and leakage are common complications after revisional LRYGB due to distal pouch ischemia. But In SASI due low anastomotic level with a lower tension and rich blood supply, the incidence of a leak is much lower.

One of our patients complained from biliary reflux after surgery and he responds well for lifestyle modifications and medical treatment, on the other side study done by Petersen et al. [16], on patients underwent re-sleeve they found that the lower oesophageal sphincter pressure increased significantly after surgery, independently of weight loss with an increased incidence of reflux and leak.

In our study, there is no postoperative nutrition complications i.e. mean plasma levels of haemoglobin and albumin, due to the presence of normal GIT pathway. On the other side in a study done by Homan et al. [17], they compared nutritional complications for RYGB and BPD-DS after SG and they found that deficiencies were much higher in RYGB than BPD-DS (82% vs. 57%).

## CONCLUSION

Laparoscopic single anastomosis sleeve ileal bypass is new promising bariatric surgery. It is effective, safe and simple revisional surgery after failed LSG. Moreover, it results is comparable with other more difficult revisional surgery with fewer complications. However, long term follows up period and more no of patients are required for proper evaluation of postoperative weight loss, metabolic changes and nutritional statuses of the patients.

## DECLARATIONS

### Conflict of interest

The authors report no conflicts of interest.

### Ethical approval

An approval from the ethical committee at the faculty of Medicine at Ain Shams University was obtained to this study.

### Informed consent

Informed consent was obtained from all individual participants included in the study.

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