

# One-anastomosis Gastric Bypass (OAGB) after Failed Laparoscopic Sleeve Gastrectomy: A Single Centre Prospective Study of 3 Years of Follow up

**Mohamed Abo Naga, MD; Mostafa Nagy, MD; Amr H Afifi, MD**

General Surgery Department, Faculty of Medicine, Ain Shams University, Egypt

**Introduction:** In 2018, sleeve gastrectomy was the most common bariatric procedure performed in the USA, accounting for 61.4% of all procedures. Nevertheless, more than half of the patients who underwent primary restrictive bariatric procedures like Laparoscopic Adjustable Gastric Banding (LAGB) and Laparoscopic Sleeve Gastrectomy (LSG) experience failure in achieving or maintaining weight loss. Therefore, Revisional surgeries are needed to overcome this failure.

**Aim of work:** The aim of current study was to assess effectiveness of one anastomosis gastric bypass (OAGB) as a revisional surgery after failed LSG regarding weight loss, EWL, TBWL, complication rate, and remission of obesity related morbidities.

**Patients and methods:** We included 83 patients with failed weight loss after single previous laparoscopic sleeve gastrectomy who underwent OAGB as a revisional surgery.

**Results:** the mean %TBWL was 33.3, 39.9 and 42.1 at 12, 26 and 36 months of follow up. Postoperative complications rate was 10% (Bleeding, Wound infection & RTI) (2.5%, 2.5% & 5%). There was a 61.8% full remission of Dm & HTN.

**Conclusions:** This study suggest OAGB is an effective revisional bariatric surgery for patients who didn't reach sufficient loss of weight loss or maintain their weight after failed laparoscopic sleeve gastrectomy with higher rates of weight loss and lower rates of early complications.

**Key words:** OAGB, revisional surgery, failed LSG.

## Introduction

Wide range of management options for obesity including dietary programs, behaviour therapy, pharmacological therapy and physical activity programs exist. Bariatric surgery remains a pronounced option for satisfactory weight loss.<sup>1</sup>

LSG is the most common weight loss surgery performed worldwide. In the United States, sleeve gastrectomy made up the majority, specifically 61.4%, of all bariatric procedures conducted in 2018. In 2018, there was a 10.8% rise in the overall quantity of bariatric surgeries conducted in the United States, with 252,000 surgeries performed, compared to the previous year's 228,000 surgeries.<sup>2</sup>

As there is increase in the number of bariatric surgeries, there is a corresponding increase in the number of revisional surgeries. A Multicenteric study conducted in Poland revealed that 46.81% of patients did not achieve successful weight loss after their initial bariatric surgery. This could be due to either an inadequate amount of weight loss or the regaining of weight. The most commonly conducted revisional procedure is the one-anastomosis gastric bypass (OAGB).<sup>3</sup>

Revisional surgeries vary after failed LSG. Roux-en-Y gastric bypass (RYGB), OAGB, re-sleeve gastrectomy, single-anastomosis duodeno-ileal bypass, and duodenal switch are potential revisional surgery options after failed LSG surgery.<sup>4</sup>

Each of these procedures has distinct indications. For example, RYGB is frequently employed as a Revisional procedure for GERD patients. OAGB provides a safe and efficient alternative revisional procedure for failed LSG to RYGB surgeries.<sup>5</sup>

OAGB only requires one anastomosis, whereas RYGB requires more, resulting in a shorter surgical procedure time, a quicker learning process and less potential for leaks at different sites.<sup>6-8</sup>

A study conducted by Chiappetta et al found that the weight loss, readmission rate, and minor postoperative complications were similar between those who underwent OAGB and RYGB in a retrospective analysis. The operation time of OAGB was shorter.<sup>9</sup>

Debs et al. presented the findings from a 2-year follow-up study on the outcomes of OAGB in patients who had previously undergone failed LSG, seventy-seven patients who previously had a failed Laparoscopic Sleeve Gastrectomy (LSG), it was found that those who underwent One Anastomosis Gastric Bypass (OAGB) experienced satisfactory total weight loss (TWL%), excess weight loss (EWL%), and excess body mass index loss (EBMIL%). Additionally, they encountered few post operative complications.<sup>8</sup>

Another study conducted by Kermansaravi et al included 23 patients who underwent OAGB after a failed LSG and followed up for a period of 5 years.

All the patients experienced successful weight reduction, with the highest level of weight loss occurring two years after the surgery. Remission of medical comorbidities took place one year after the surgery.<sup>7</sup>

The LSG procedure is commonly done, but both patients and surgeons find it unsatisfactory when there is no sufficient weight loss or maintaining the weight loss. Revisional surgeries are necessary to overcome failure of weight loss. OAGB is a common revisional procedure. We aim to evaluate its effectiveness after failed LSG.

### Aim of work

The primary objective was to assess effectiveness of OAGB as a revision procedure after failed LSG regarding weight loss, EWL, TWL. The secondary outcome was to measure complication rate, and remission of obesity related morbidities.

### Patients and methods

#### Study design:

A prospective study done at Ain Shams university surgical hospital over a period of 3 years.

**Study population:** Patients with failed weight loss, insufficient weight loss or failed to maintain weight loss, after LSG underwent one-anastomosis gastric bypass.

**Inclusion criteria:** All patients  $\geq 18$  years old with failed weight loss or failed to maintain weight loss, after single previous laparoscopic sleeve gastrectomy were included.

LSG failure was defined as an unsatisfactory weight loss (Excess Weight Loss (EWL) less than 50% in one year), a BMI more than 35 kg/m<sup>2</sup> after being reached the suitable weight, 25% EWL increase from the nadir weight, or regain of more than 15% of total weight loss (TWL).

Total body weight loss (TBWL) = pre-operative weight – post operative body weight.

Total Weight Loss percentage (TWL%) = (pre-operative weight – follow up weight)/(pre-operative weight) X 100.

Excess weight loss percentage (EWL%) = (pre-op weight – follow up weight)/(pre-operative weight – ideal body weight) X 100

Ideal body weight was calculated using BMI value 25.

**Exclusion criteria:** Patients who had underwent previous gastrointestinal surgery, psychiatric diseases, pregnant or refused to participate in the study were excluded.

**Sample size:** A minimal sample size of 23 subjects, measured at 4 time points, achieved 95% power to detect differences among the means using a Regular F Test at a 0.05 significance level depending on results of Bhandari et al. 2019.

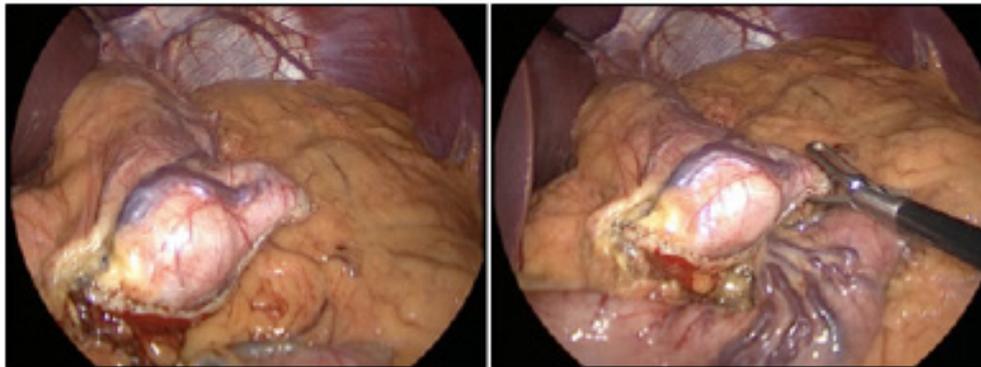
#### Data collection:

- Sociodemographic, preoperative, and operative data were collected from patient records in a standardized form including: patient's hospital code, age, gender comorbidities (DM, HTN), clinical history and examination, preoperative investigations, CT volumetry (Oral and IV contrast), upper GI endoscopy, duration of surgery, blood loss, and intraoperative complications.
- Then postoperative follow up was done at surgical clinic during regular intervals 6, 12, 24 and 36 months. Patients were assessed for postoperative BMI, EWL, TWL, postoperative complications, and remission of comorbidities of obesity.
- To avoid missing data, patients were phone called for postoperative data or called for surgery clinic.

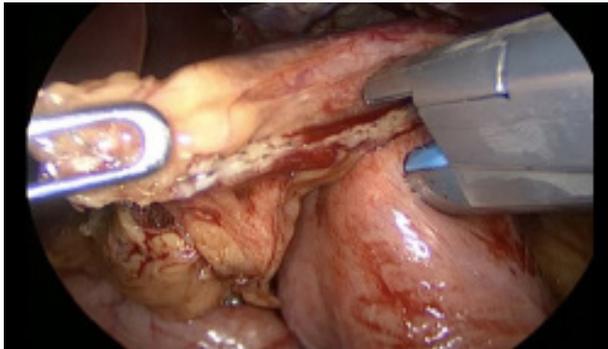
**Operative details:** Careful adhesiolysis was done for adhesions from previous operation if present. The sleeved stomach was horizontally divided at the crow's foot level using a linear tri-stapler Covidien® using black cartridges. A gastric pouch that was long and narrow was created using a linear tri-stapler Covidien® using black cartridges starting from a point distal to the crow's foot and extending to the side of the angle of His. The procedure was done using a 42-Fr bougie. Gastrojejunostomy was created around 2 meters away from the ligament of Treitz using linear stapler Covidien® using blue cartridges. Afterwards, the stapler entry was closed using a continuous PDS sutures followed by patency and leak test (**Figs. 1-5**)



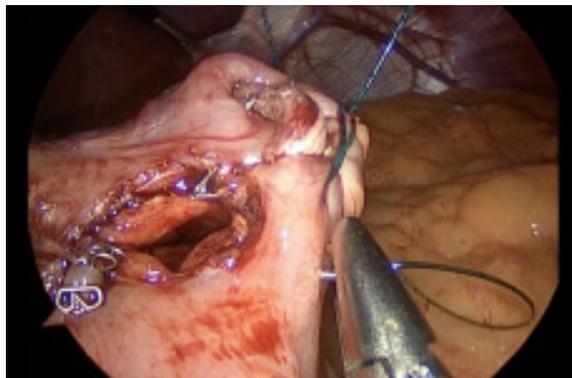
**Fig 1: Careful Adhesiolysis.**



**Fig 2: Creating Gastric Pouch.**



**Fig 3: Performing Gastrojejunostomy.**



**Fig 4: Stapler Entry Closure.**



**Fig 5: Tube drain insertion.**

### Statistical analysis

The data that had been collected underwent a thorough review to ensure its accuracy and completeness. It was then coded and underwent analysis using IBM SPSS statistics software version 28.0 by IBM.

In terms of descriptive statistics, the mean and standard deviation were utilized to explain numeric data that follows a specific statistical distribution. On the other hand, the median and interquartile range were employed for numeric data that does not adhere to a specific statistical distribution. Non-numerical data was described using frequency and percentage. Appropriate statistical tests were employed based on the nature of the data for accurate analysis. The ANOVA test was employed to determine the statistical significance of the variation among means of multiple study groups. The Post Hoc Test was employed to compare the means of all potential pairs of groups. P-value <0.05 will be used as the level of significance.

**Ethical considerations:** Informed consent was signed from patients who were invited and accepted to be involved in the research. All the data of patients were confidential, and they weren't mentioned by name at any published data. Patients had the right to refuse joining the research or withdraw at any time from the study without affecting their chances to receive the traditional therapy.

### Results

In our study, a total number of 83 patients underwent OAGB surgery following failed laparoscopic sleeve gastrectomy. Demographic characteristics of the participants before revisional surgery were shown in **(Table 1)**. The mean age of the patients was 47 years, with female predominance (73.75%). Approximately 15% of the patients had HTN, 17.5% had DM, and 10% had both HTN and DM.

There was a notable and statistically significant decrease in BMI over the course of the follow-up period (p value <0.001) with a mean of 43.3 and 25 at 3 & 36 months postoperatively. There was also a

significant increase in both %TBWL and % EWL at the follow up period with a mean %TBWL and % EWL of 42.1 and 107.5 at 36 months postoperatively, respectively. (Table 2, Fig. 6)

The mean operative time for OAGB was recorded as 75 minutes with a 2 days median length of post operative hospital stay. Notably, a significant proportion of patients, approximately 61.8%, experienced full remission of their comorbidities.

Most patients, 90%, did not encounter any postoperative complications.

However, a small percentage experienced bleeding and wound infections, 2.5% each, while 5% developed RTIs. Bile reflux occurred in only 5% of the patients, with 3.75% of cases managed conservatively and 1.25% required conversion surgery to RYGB (Table 3).

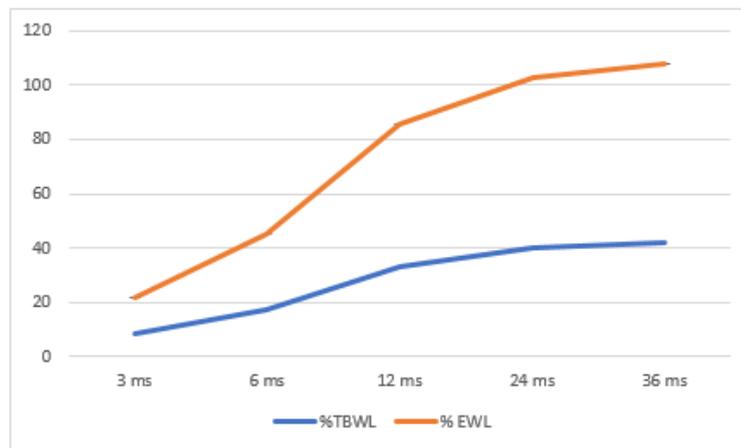


Fig 6: Follow-up %TBWL & % EWL after OAGB.

Table 1: Patients characteristics

	Mean ± SD	Median (IQR)
<b>Age</b>	47 ± 4.49	48 (43 - 51)
<b>Sex</b>		
Male	21	26.25%
Female	59	73.75%
<b>Comorbidities</b>		
DM	14	17.5%
HTN	12	15.0%
HTN & DM	8	10.0%
<b>Weight (Kg)</b>	113.54 ± 23.36	105.16 (96.34 - 127.74)
<b>Height (M)</b>	1.61 ± 0.09	1.61 (1.55 - 1.65)
<b>BMI (kg/M2)</b>	43.35 ± 6.59	42 (37.5 - 49)

Table 2: Follow-up weight

	After 3 months	After 6 months	After 12 months	After 24 months	After 36 months	Test of Significance	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	F Test Value	p-Value
<b>BMI</b>	39.3 ± 6.03	35.8 ± 5.5	29.4 ± 4.5	26.3 ± 4.2	25 ± 3.5	2100	<0.001*
<b>%TBWL</b>	8.5 ± 0.6	17.4 ± 1.4	33.3 ± 1.8	39.9 ± 3.3	42.1 ± 3.4	5044	<0.001*
<b>% EWL</b>	21.9 ± 5.5	44.9 ± 11.9	85.9 ± 22.2	102.8 ± 26.2	107.5 ± 24.4	1199	<0.001*

**Table 3: Operation and operative outcome**

		Mean ± SD / N	Median (IQR) / %
<b>Operative time (Minutes)</b>		75.28 ± 13.63	74 (64.5 - 86.5)
<b>Hospital stays (Day)</b>		2.19 ± 0.39	2
<b>Resolution of comorbidities</b>	Partial remission	10	29.4%
	Full remission	21	61.8%
<b>Bile Reflux</b>	No	76	95%
	Yes	4	5%
<b>Post operative complications</b>	bleeding	2	2.5%
	RTI	4	5%
	Wound infection	2	2.5%

## Discussion

The present study aimed to evaluate the effectiveness of OAGB surgery as a revisional surgery after a failed LSG. In terms of weight loss outcomes, the current study reported %TBWL values of 8.5, 33.3, 39.9, and 42.1 at 3, 12, 24, and 36 months following the revisional surgery. These findings indicate a significant reduction in body weight, suggesting successful weight management after OAGB surgery. These results are comparable to the findings reported by Chiappetta et al with %TBEL of 8.3 & 15.8 at 3 and 12 months of follow up.<sup>9</sup>

Similar results were published by Poublon et al where the %TBWL mean values were 24.1 and 22.5 and those reported by Bhandari et al with %TBWL of 22.05, 20.97 and 15.03 at 12, 24 and 36 months, respectively.<sup>10,11</sup>

Furthermore, when assessing the BMI, the current study reported mean values of 29.4, 26.3 & 25 at 12, 24, and 36 months of follow up, reflecting successful weight management. Similarly, BMI was reported to decrease from 40.9 at 3 months follow up to 36.6 at 12 months by Chiappetta et al.<sup>9</sup> Unlike results of Poublon et al. (2020), where BMI showed decrease from 40.9 preoperative to 30.7 at 12 months but then it started increasing to 30.8 at 24 months and 31.1 at 36 months.<sup>10</sup> This study reported a mean %EWL of 85.86% & 102.75 % at first and second year follow up which was a bit higher than that reported by Campanelli et al (72% & 80%) & results reported by Lessing et al. (2020) (67.2% at I year follow up period).<sup>12,13</sup>

The mean operative time in this study was 75 minutes with a 2 days average hospital stay. Unlike Lessing et al, reporting a longer operation time of 108 minutes and hospital stay (5 days).<sup>13</sup> Also, Musella et al reported a 95 minutes operation time with a mean hospital stay of 4 days.<sup>14</sup> Meanwhile, Campanelli et al reported a shorter operation time of 36 minutes with a mean length of stay of 2 days.<sup>12</sup>

Our study showed a lower rate of post operative complications (10%) compared to Lessing et al (14.2%).<sup>13</sup> Also, this study showed a similar rate of wound infection (2.5%) compared to Campanelli et al & Poublon et al (2.3 % & 2.7%), higher rate of bile reflux compared to Campanelli et al (5% vs 1.1%), however, a lower than Poublon et al (11.9%).<sup>10,12</sup> As regard bleeding, this study showed higher bleeding compared to Campanelli et al., Poublon et al. and Carbajo et al. studies (2.5% vs 1.1%, 0.5% & 0.16 %). Being consistent with these previous studies, no mortalities were reported.<sup>10,12,15</sup> Unlike Musella et al. who reported mortality rate of 0.2 %.<sup>14</sup>

Participants in the study showed a 29.4% partial remission of comorbidities and 61.8% full remission. Similarly, Campanelli et al reported 60% complete remission of all comorbidities, Poublon et al. also showed a 96.9% remission of Type 2 DM and Chiappetta et al. reported a 100% remission of DM and 66.7% remission of HTN.<sup>9,10,12</sup> Similarly, Chiappetta et al. reported 88% & 81.8% remission of type 2 DM and HTN by the end of first year postoperative, supporting our finding of the beneficial effect of OAGB in reducing obesity related comorbidities.<sup>9</sup>

Thus, we conclude that OAGB is a safe and revisional surgery after failed previous Laparoscopic sleeve gastrectomy with higher rates of weight loss and a low rates of complications.

## Reference

1. Kim EY: Definition, mechanisms and predictors of weight loss failure after bariatric surgery. *J Metab Bariatr Surg.* 2023; 11(2): 39–48.
2. Brethauer SA, Morton JM: American Society for Metabolic and Bariatric Surgery 2018 estimate of metabolic and bariatric procedures performed in the United States. *Surg Obes Relat Dis [Internet].* 2020.
3. Major P, Zarzycki P, Rymarowicz J, Wysocki M, Łabul M, Hady HR: Revisional operations among

- patients after surgical treatment of obesity: A multicenter Polish Revision Obesity Surgery Study (PROSS). *Wideochir Inne Tech Maloinwazyjne*. 2022; 222: 372–9.
4. Zhou SLSJSZJ: Department. Revisional surgeries of laparoscopic sleeve gastrectomy. 2021; 575–88.
  5. Kermansaravi M, Shahmiri SS, DavarpanahJazi AH, Valizadeh R, Berardi G, Vitiello A, et al: One anastomosis/mini-gastric bypass (OAGB/ MGB) as revisional surgery following primary restrictive bariatric procedures: A systematic review and meta-analysis. *Obes Surg*. 2021; 31(1): 370–83.
  6. Alaa Abbas Sabry, Hytham Mostafa Mohamed MMH and MAFE. Laparoscopic mini gastric bypass as a revisional procedure after failed primary restrictive bariatric surgery. *Ain Shams Medical Journal*. 2020; 71(1): 221–35.
  7. Kermansaravi M, Karami R, Valizadeh R, Rokhgireh S: Five - year outcomes of one anastomosis gastric bypass as conversional surgery following sleeve gastrectomy for weight loss failure. *Sci Rep [Internet]*. 2022; 1–7.
  8. Debs T, Petrucciani N, Kassir R, Juglard G, Gugenheim J, Iannelli A, et al: Laparoscopic conversion of sleeve gastrectomy to one anastomosis gastric bypass for weight loss failure. *Mid-Term Results*. 2020; 2259–65.
  9. Chiappetta S, Stier C, Scheffel O, Squillante S, Weiner RA: Mini/one anastomosis gastric bypass versus roux-en-y gastric bypass as a second step procedure after sleeve gastrectomy-a retrospective cohort study. *Obes Surg*. 2019; 29(3): 819–27.
  10. Poublon N, Chidi I, Bethlehem M, Kuipers E, Gadiot R, Emous M, et al: Correction to: One anastomosis gastric bypass vs. Roux-en-Y gastric bypass, remedy for insufficient weight loss and weight regain after failed restrictive bariatric surgery (*Obesity Surgery*, (2020), 30, 9, (3287-3294), 10.1007/s11695-020-04536-x). *Obes Surg*. 2020; 30(9) :3295.
  11. Bhandari M, Humes T, Kosta S, Bhandari M, Mathur W, Salvi P, et al: Revision operation to one-anastomosis gastric bypass for failed sleeve gastrectomy. *Surg Obes Relat Dis [Internet]*. 2019; 15(12): 2033–7.
  12. Campanelli M, Bianciardi E, Benavoli D, Bagagli G, Lisi G, Gentileschi P: Laparoscopic banded one anastomosis gastric bypass: A single-center series. *J Obes*. 2022; 2022.
  13. Lessing Y, Nevo N, Pencovich N, Abu-Abeid S, Hazzan D, Nachmany I, et al: One anastomosis gastric bypass as a revisional procedure after failed laparoscopic adjustable gastric banding. *Obes Surg*. 2020; 30(9): 3296–300.
  14. Musella M, Susa A, Greco F, De Luca M, Manno E, Di Stefano C, et al: The laparoscopic mini-gastric bypass: The Italian experience: Outcomes from 974 consecutive cases in a multicenter review. *Surg Endosc*. 2014; 28(1): 156–63.
  15. Carbajo MA, Luque-de-León E, Jiménez JM, Ortiz-de-Solórzano J, Pérez-Miranda M, Castro-Alija MJ: Laparoscopic one-anastomosis gastric bypass: Technique, results, and long-term follow-up in 1200 patients. *Obes Surg*. 2017; 27(5): 1153–67.