

Lap sleeve gastrectomy vs. lap gastric bypass after gastric band failure in morbid obese patient

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Abstract: Background: Laparoscopic gastric band had gained a great popularity as a bariatric operation due to its simplicity and good short-term outcomes, while its long term out comes have been shown to be not that favorable. This study aimed to compare laparoscopic sleeve gastrectomy (LSG) with laparoscopic gastric bypass (LRYGB) as a revisional procedure for treatment of gastric band failure. **Methods:** From June 2013 to November 2016, 29 patients (19 females and 10 males) who had either LSG or LRYGB for failed gastric banding at bariatric center, Elite Hospital, Riyadh, KSA were enrolled to our study. Patients were divided into 2 groups, group (A) included 16 patients (10 females and 6 males), where LSG was performed and group (B) included 13 patients (9 females and 4 males), where LRYGB was done. Patient demographics, indications for revision, operative and postoperative data were recorded. Perioperative and clinical outcomes were compared between both groups. **Results:** 29 patients with gastric band failure were candied for revisional bariatric surgery, divided into 2 groups. In group (A) (n = 16), LSG were performed in concurrence with the band removal as a one-stage operation in 13 (81.3%), while 3 (18.7%) patients were performed in two-stages. while in group (B) (n = 13), one-stage operation were done for 11 (84.6%) patients and only 2 (15.4%) patients underwent two-stages surgery. Mean age for group (A) was 37.3±15.3 years, while it was 36.9±17.21 for group (B). Mean BMI was 44.5±10.2 kg/m² for group (A), and 45.5±16.31 kg/m² for group (B). Mean operative time for Group (A) was 143.6±25.12 minutes, while it was 216±56.36 minutes for Group (B) with a significant statistical difference. Mean length of hospital stay were 2.9±1.3 days and 3.1±0.8 for group (A) and (B) respectively. One case (7%) in group (B) had leakage from the gastro-jejunal anastomosis that needed reoperation. The excess weight loss (%EWL) at 3, 6, 12 and 18 months were 29.7±10.2%, 43.3±16.21%, 50.4±17.6% and 48.9±16.83% respectively for group (A), while in group (B), it was 30.8±9.41%, 45.3±8.62%, 51.32±14.31% and 50.52±13.42 % respectively without a significant statistical difference. **Conclusion:** conversion to LRYGB as well as LSG, after gastric band failure, is feasible and safe with a significant advantage in terms of further weight loss after surgery.

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Keywords: Gastric band failure- Revisional surgery- LSG-LRYGB

1. Introduction

The rate of obesity has markedly increased over the last decades and is currently reaching epidemic proportions. Obesity is a disease usually associated with many co-morbidities like hypertension, diabetes mellitus, dyslipidemia, cardiovascular disease, sleep apnea and osteoarthritis.(1) Bariatric surgery can greatly improve and treat theseco-morbidities as reported in recent literatures, (2, 3) and considered as the most effective long-term approach for treatment of morbid obesity. (5)

Laparoscopic gastric band had gained popularity as a bariatric operation due to its simplicity and good short-term outcomes; however, it is associated with complications (slippage, erosion, and prolapse) and failure in reaching target weight loss. (5)

Laparoscopic gastric band was approved by the FDA in June 2001, and to date more than 300,000 gastric bands have been done worldwide. The gastric band is currently the third most frequently performed bariatric surgical procedure after laparoscopic gastric

bypass (LRYGB) and laparoscopic sleeve gastrectomy (LSG). (6)

The great acceptance of laparoscopic gastric banding is mainly due to its simplicity as it is considered the least invasive bariatric surgical procedure with the potential of full reversibility. Many authors have reported acceptable short-term results with a reduction of the excess weight of more than 50% in most patients over a 2- to 5-year period. (7, 8)

However, by more experience, gastric banding has been associated with high rate of long-term failures, including weight regain, and complications such as enlargement of the gastric pouch, slippage of the band, and band erosion or migration. (9-13)

The most common operation performed after gastric band failure is the removal of the gastric band without replacement. This approach effectively corrects and treats the band complications, but still there is a high incidence of recurrence or persistence of the obesity. (14)

Patients with the gastric band who had failed to lose at least 50% of excess weight or have regained more than 5 points of their BMI are candidates for a revisional procedure. Also, any patient with pouch enlargement, slippage, or erosion is also considered on a case-by-case basis for revisional surgery. The decision for band removal with or without revision is made in consultation with the patient. When a revisional procedure is decided, then LSG or LRYGB is typically offered to the patient. (5)

In this study, we compare the feasibility, outcome, early and late complication of laparoscopic sleeve gastrectomy (LSG) and laparoscopic gastric bypass (LRYGB) as surgical options for treatment of gastric band failure.

2. Methods

This is a retrospective analytic study where 29 patients (19 females and 10 males) who had gastric band failure and underwent revisional bariatric surgery either LSG or LRYGB at bariatric center, Elite Hospital, Riyadh, KSA from June 2013 to November 2016 were enrolled. 8 of the 29 patients had the gastric band fixation at bariatric center, Elite Hospital from 2007- 2012 and the other 21 patients had the band fixation at other hospitals. Indications for the revisional procedures included insufficient weight loss (< 50% EWL), weight regain, and intractable band complications. The 29 patients were divided into 2 groups, group (A) included 16 patients (10 females and 6 males), where LSG was performed and group (B) included 13 patients (9 females and 4 males), where LRYGB was done.

Preoperatively, all patients in this study underwent an upper GIT endoscopy to rule out any erosion, esophagitis, hiatal hernia, or pouch dilatation. X-RAY abdomen with barium swallow

was done to evaluate the band position, size of the pouch, and presence of esophageal dilation. Routine preoperative investigations were done (blood tests, including complete blood picture, liver function tests, coagulation profile, renal function tests and ECG) and all patients had preoperative assessment by anesthesiologist, cardiologist, psychiatrist, and endocrinologist. The choice of revisional procedure was determined according to presence of associated co-morbidities such as diabetes mellitus, presence of hiatal hernia or moderate to severe GERD, patient's past surgical history, and patient's preferences and life style.

Whenever possible, we performed both the gastric band removal and the revisional surgery- either LSG or LRYGB- at the same session to avoid a second operation and to decrease the cost of the procedure. In certain circumstances where performing definitive procedures after band removal would have carried a higher risk, we opted for only band removal with later elective definitive surgery. These cases included significant adhesion or fibrosis, band complication such as erosion or perforation or intraoperative significant hemorrhage.

Surgical technique:

Patients in this study were booked and performed as one step surgical procedure, except the cases presented with acute symptoms such as band erosion, (where there was an indication for urgent removal of the gastric band) were booked for a two-step procedure. In cases where the two-step procedure was decided, the gastric band removal was planned briefly after presentation (according to the severity of band complications) and the second step procedure was done few months afterward.

Gastric band removal:

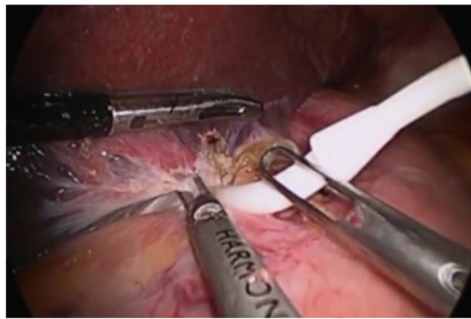


Figure 1: dissection of the adhesion between the liver and the band

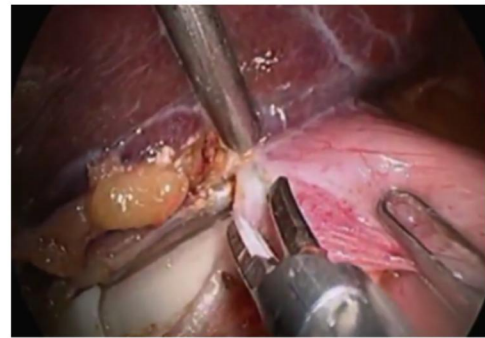
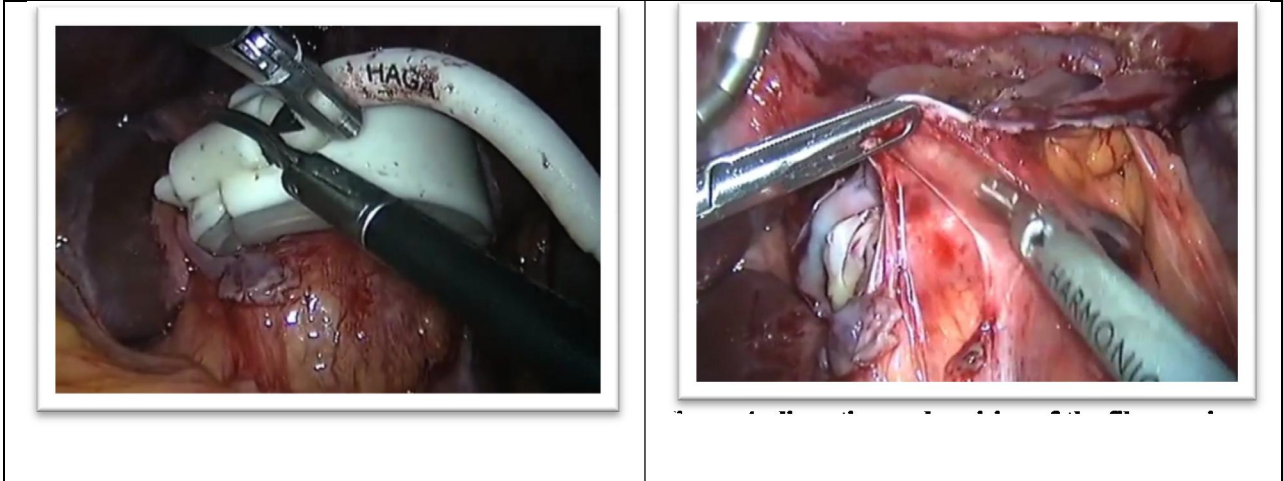


Figure 2: dissection of the adhesion over the band



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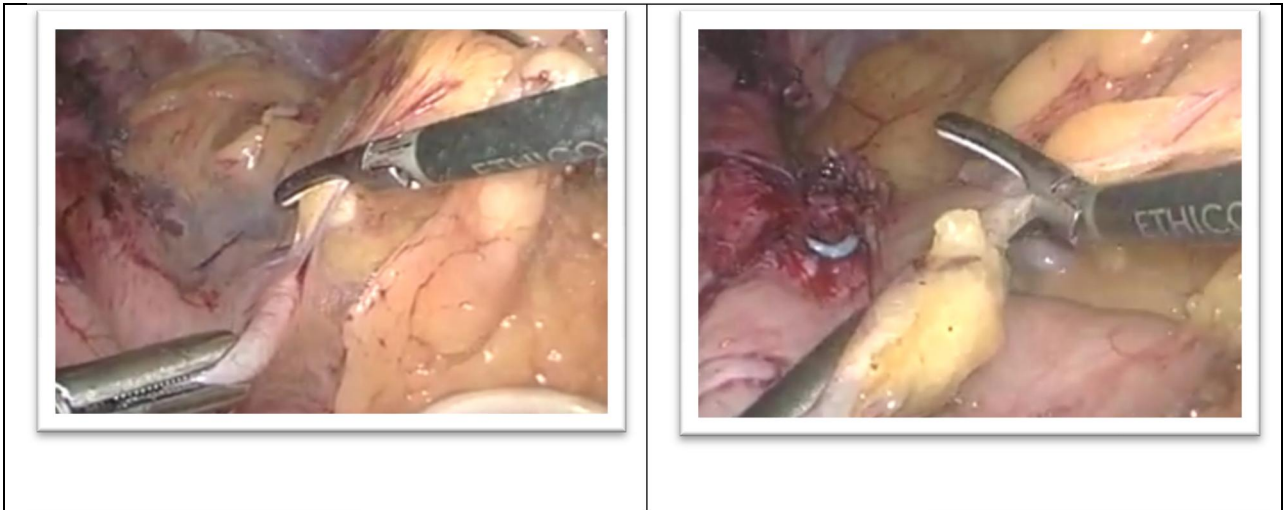


Figure 7 division of the stomach using successive Endo GIA linear cutter tri-stapler

Division of the greater omentum was done 4 cm proximal to the pylorus up to the angle of his and left crus of diaphragm using Liga Sure device, then over 36 French bougie, (Figures 5 & 6) division of the stomach using successive Endo GIA linear cutter tri-stapler (by Covidien) was done. The first fire in most of cases was black staples as the tissues at this area were thick. (Figures 7) Thick staples also were chosen for last firings due to fibrosis. Leak test was performed at the end of the procedure.

In group B where LRYGB was performed:

The formation of the pouch was done by Endo GIA linear cutter tri-stapler (by Covidien) purple and tan staples. The creation of the gastric pouch was started just below the scar tissue of the removed gastric band, 4–5 cm below the gastro-esophageal junction at the lesser curvature. The estimated volume of the pouch was about 60cc.

Retraction of the transverse colon was done for exposure and identification of the Treitz's ligament.

Transection of the jejunum was performed 60cm distal to the angle of Treitz forming the biliopancreatic limb. Then the alimentary limb of 150 cm is measured and jejunostomy was done using Endo GIA linear cutter tan tri-stapler (by Covidien), then closure of the stapler entry site was done in two layers using Vicryl 3/0 suture. The omentum was divided, the alimentary limb was brought antecolic and antegastric position, then Gastro-jejunostomy was performed using purple stapler and the stapler entry site was closed in two layers using Vicryl 3/0 suture. Gastrografin swallow test was performed at the 1st postoperative day to exclude the leakage and ensure the integrity of the gastro-enteric anastomosis.

Data was collected and compared for both groups as regarding, operative time, operative and postoperative complications, hospital stay and weight reduction after 3, 6, 12, 18 months.

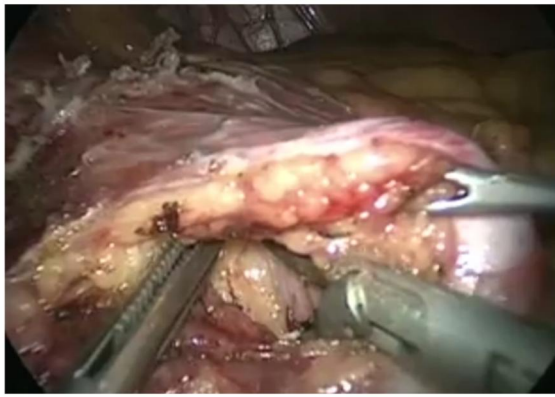
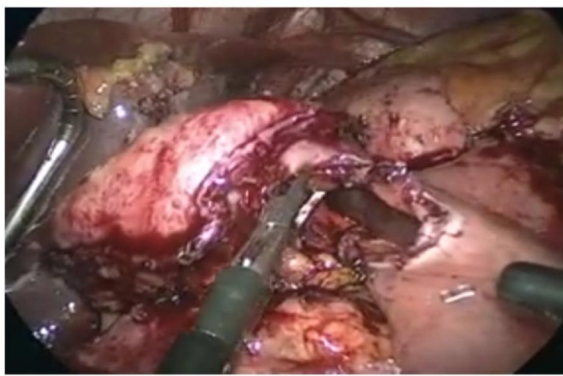


Figure 10 Gastro-jejunostomy using GIA linear cutter tri-stapler



Figure 11 jejunostomy using GIA linear cutter tri-stapler



3. Results:

This is a retrospective analytic study where 29 patients (19 females and 10 males) who had gastric band failure and underwent revisional bariatric surgery either LSG or LRYGB at bariatric center, Elite Hospital, Riyadh, KSA from June 2013 to November 2016 were enrolled. Patients were divided into 2 groups, group (A) included 16 patients (10

females and 6 males), where LSG was performed and group (B) included 13 patients (9 females and 4 males), where LRYGB was done as a revisional bariatric surgery. Mean age for group A was 37.3±15.3 years, while it was 36.9±17.21 for group B. Mean BMI was 44.5±10.2 kg/m² for group A, and 45.5±16.31 kg/m² for group B with no significant statistical difference. (Table 1)

Table (1): preoperative data for both groups.

	Group A (LSG)	Group B (LRYGB)	P value
Numbers patients	16	13	NS
Sex M/F	6/10	4/9	NS
Mean age(years)	37.3±15.3	36.9±17.21	0.435
Mean BMI	44.5±10.2 kg/m ²	45.5±16.31 kg/m ²	0.627

As regarding to the indication for revisional surgery after gastric band, for group (A) it was the following, 14 (87.5%) patients for insufficient weight loss and weight regain, 1(6.25%) patient for band erosion, 1(6.25%) patient for band slipping. For

group (B) it was, 10 (76.9%) patients for Insufficient weight loss and weight regain, 1(7.7%) patient for band slipping and 2(15.4%) patient for Pouch dilatation. (Table 2)

Table (2): indication for revisional surgery after gastric band.

	Group A n=16 (LSG)	Group Bn=13(LRYGB)
Band Migration	0(0%)	0(0%)
Band Erosion	1(6.25%)	0(0%)
Slipping	1(6.25%)	1(7.7%)
Pouch dilatation	0 (0%)	2(15.4%)
Insufficient weight loss and weight regain	14 (87.5%)	10(76.9%)

All cases in both groups were done laparoscopically without the need for conversion to open surgery. The median time between the primary procedure and the revisional surgery was 37 months (range 13–98). Mean operative time for group (A) was 143.6±25.12 minutes, while it was 216±56.36 minutes for group (B), with a significant statistical difference between both groups. One case in group (B) needed reoperation due to leakage from the gastro-jejunal anastomosis, this case was diagnosed

by CT abdomen with oral and IV contrast done on 2nd postoperative day for sever agonizing abdominal pain. In Group (A), gastric band removal and LSG were performed as one stage in 13 (81.3%) patients and only 3 (18.7%) patients needed Two –stage surgery. For group (B) 11 (84.6%) patients were done as one stage surgery while 2 (15.4%) patients were done as two –stage surgery. Mean length of hospital stay were 2.9±1.3 days and 3.1±0.8 for group (A) and (B) respectively. (Table 3)

Table (3): operative time, hospital stay for both groups.

	Group A (LSG)	Group B (LRYGB)	P value
Mean operative time (min)	143.6±25.12	216±56.36	<0.001*
Two –stagesurgery	3 (18.7%)	2 (15.4%)	NS
One-stagesurgery	13 (81.3%)	11 (84.6%)	NS
Conversion to open	0(0%)	0(0%)	NS
length of stay (day)	2.9±1.3	3.1±0.8	0.426
Reoperation	0(0%)	1(7.7%)	ND

Wound infection occurred in 1(6.25%) patient in group (A). Intra operative bleeding that required blood transfusion occurred in 1(6.25%) patient in group (A). One case (7.7%) in group B (LRYGB)

had leakage from the gastro-jejunal anastomosis that needed reoperation. Overall mortality for both groups was 0%. No cases showed intestinal obstruction for both group during the follow up period. (Table 4)

Table (4): postoperative complications in both groups.

	Group A (LSG)	Group B (LRYGB)	P value
Wound infection	1(6.25%)	0(0%)	NS
Bleeding required blood transfusion	1(6.25%)	0(0%)	NS
Leakage	0(0%)	1(7.7%)	NS
Mortality	0(0%)	0(0%)	NS
Small bowel obstruction	0(0%)	0(0%)	NS
Reoperation	0(0%)	1(7.7%)	NS

The excess weight loss (%EWL) at 3, 6, 12 and 18 months was 29.7±10.2%, 43.3±16.21%, 50.4±17.6% and 48.9±16.83% respectively for group (A), while in group (B), it was 30.8±9.41%,

45.3±8.62%, 51.32±14.31% and 50.52±13.42 % respectively without a significant statistical difference. (Table 5)

Table (5): %EWL for both groups at 3, 6, 12 and 18 months.

	Group A (LSG)	Group B (LRYGB)	P value
Mean %EWL 3 months	29.7±10.2	30.8±9.41	0.641
Mean %EWL 6 months	43.3±16.21	45.3±8.62	0.324
Mean %EWL 12 months	50.4±17.6	51.32±14.31	0.837
Mean %EWL 18 months	48.9±16.83	50.52±13.42	0.528

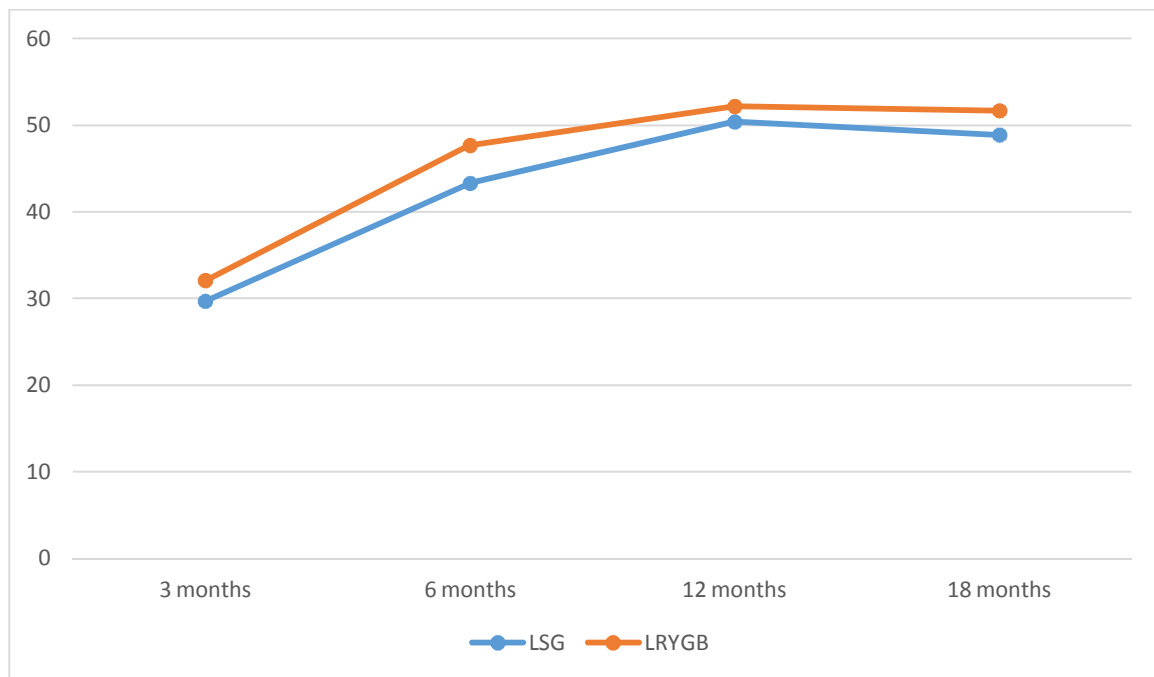


Figure (1): %EWL for both groups at 3, 6, 12 and 18 months.

4. Discussion

Laparoscopic gastric band had gained popularity as a bariatric operation due to its simplicity and good short-term outcomes, while its long term outcomes have been shown to be not that favorable. (5)

Laparoscopic gastric band failure rate reaches up to 30% and still there is a controversy about the type of revisional surgical procedures following gastric band failure.(5) The type of revisional surgical procedures is depending upon BMI, associated co-morbidities,

past surgical history, and preoperative findings such as GERD, hiatus hernia or Pouch dilatation over the band. Finally, the decision was made after considering all the previous factors, as well as the patient's preference. (15)

Removal of the gastric band should be accompanied by excision of a fibrotic ring (fibrous capsule) around the stomach to avoid incomplete and improper firing of the stapler and so decreasing the incidence of leak. (16)

There are many studies reported that LRYGB as a revisional procedure is better in terms of weight loss when compared to the LSG, (17-19) on the other hand, other studies reported that revisional LSG is safe and feasible and more effective on weight loss. (20-22)

Revisional surgery after gastric band failure can be performed as either a one-step or two steps procedures. The one-step procedure has the advantage of lowering the cost and avoidance of 2nd operation. (23) Still it is not clear whether one-stage or two-stage is the best option for the revisional procedure.

In this study, all cases were performed as one-step surgical procedure, except the cases presented with acute symptoms such as band erosion (where there was an indication for acute removal of the gastric band).

Mean age for group (A) and (B) were 37.3 ± 15.3 and 36.9 ± 17.21 years respectively. The mean BMI was 44.5 ± 10.2 kg/m² and 45.5 ± 16.31 kg/m² for group A and B respectively.

In this study the indications for revisional surgery after gastric band were mainly for insufficient weight loss and weight regain for both groups. In group (A) were, 14 (87.5%) patients for insufficient weight loss and weight regain, 1 (6.25%) patient for band erosion, 1 (6.25%) patient for band slipping. For group (B) were 10 (76.9%) patients for insufficient weight loss and weight regain, 1 (7.7%) patient for band slipping and 2 (15.4%) patient for Pouch dilatation. **M. Emous et al** reported the indication for gastric band removal and revisional surgery as Migration in 7 (3.2%) cases, Leakage of band in 3 (1.4%) cases, slipping in 15 (6.7%) cases, Pouch formation in 19 (8.6%) cases, Dysmotility 38 (17.3), and for insufficient weight loss and weight regain in 138 cases (62.8%). **O. A. Khan et al** reported 10 (50%) cases presented with weight regain and 10 (50%) presented with pathological symptoms secondary to band complication, migration in 7 (35%) cases and band erosion in 3 (15%) cases.

Mean operative time were 143.6 ± 25.12 and 216 ± 56.36 minutes for group (A) and group (B) respectively with a significant statistical difference between both groups. In a study done by **Raquel**

Gonzalez et al, (24) the mean operative time (min) for LSG as a revisional surgery after band failure was 136.16 ± 57.41 which is similar to our results for LSG group. **Markus Weber et al**, (25) reported an operative time of 215 ± 62.7 minutes for LRYGB after band failure, these results near to our results for group (B). While the operative time for LRYGB as a revisional surgery was 118 min (range 57–315) in a study done by **M. Emous et al**, (26) which was shorter than our results for group (B). **Mirto Foletto et al**, (27) reported an operative time 120 min. (range 90–180) for LSG as a revisional surgery after band failure.

In this study Gastric band removal and LSG were performed as one stage in 13 (81.3%) patients and as two-stage surgery for 3 (18.7%) patients. For group (B), 11 (84.6%) patients underwent band removal and LRYGB as one stage surgery while 2 (15.4%) patients were done as two-stages surgery. **M. Emous et al** reported that single-step procedure was done in 220 (86 %) patients without indications for acute band removal and in 32 (14%) patients as a planned 2 step procedure. In a study done by **O. A. Khan et al** 17 (85%) case sunder went revisional surgery as one stage procedure, and 3 (15%) cases only as two-stages surgery.

In this study mean length of hospital stay were 2.9 ± 1.3 and 3.1 ± 0.8 days respectively for group (A) and (B). **Raquel Gonzalez et al**, (24) reported Mean length of stay of 3 ± 1 days for LSG and 2.64 ± 1 days for LRYGB as a revisional surgery after band removal; these results were near to our results. While **Markus Weber et al**, (25) reported 8.9 ± 4.9 days as hospital stay after LRYGB, which was longer than our results. In a study done by **O. A. Khan et al**, (28) the mean length of hospital stay was 4.4 ± 0.7 days which was longer than our results but still shorter than the results reported by **Markus Weber et al**.

In the present study, wound infection occurred in 1 (6.25%) patient in group (A) which was treated by antibiotic and dressing for 5 days. Intra operative bleeding that required blood transfusion occurred in one (6.25%) patient in group (A). In group (B), one patient (7.7%) had leakage from the gastro-jejunal anastomosis that needed reoperation on the 2nd postoperative day. Mortality rate was 0% for both groups. In the study done by **Raquel Gonzalez et al**, regarding conversions from band to LSG, there were no complications, no conversions to open, and no reoperations and the leak rate was 0 %. **Markus Weber et al** reported the following results; wound infection in 2 (6.25%) cases, and reoperation in 4 cases (12.5%) due to small bowel obstruction in 2 (6.25%) cases, 1 case for leak and 1 case for Intra-abdominal abscess. **M. Emous et al** reported 5 (2.3%) cases Leakage from gastro-enterostomy that required

reoperation and 2 (0.9%) cases intra-abdominal abscess and mortality rate was 0%. **Acholonu et al.** (22) reported a 13% complication rate following conversion of band to LSG. **Foletto et al.** (27) reported 5% leak rate and 2% mortality rate in their series of 57 patients undergoing LSG after LAGB failure. **Goitein et al.** (21) reported complication rate of 6% and a conversion rate to open surgery in 4% of cases of revisional LSG.

In the present study, the excess weight loss (%EWL) at 3, 6, 12 and 18 months was 29.7±10.2%, 43.3±16.21%, 50.4±17.6% and 48.9±16.83% respectively for group (A), while in group (B), it was 30.8±9.41%, 45.3±8.62%, 51.32±14.31% and 50.52±13.42 % respectively without a significant statistical difference. **Raquel Gonzalez et al** reported 53.04 % and 64.4 % as %EWL at 6 and 12 months following LSG, and 36.2 % and 46 % at 6 and 12 months following LRYGB **Emous et al** reported 53 % and 67 % as (%EWL) after 29 months for one-and two-step procedures respectively.

Conclusions:

Laparoscopic conversion of a failed gastric band to LSG as well as LRYGB is safe and feasible with an acceptable %EWL with no statistical difference between the two procedures. This study has limitations such as a small number of cases and a short follow-up period, larger series with longer follow-up are needed to confirm these results.

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