

Laparoscopic Roux-en-Y gastric bypass for management of failed vertical banded gastroplasty and adjustable gastric banding: a prospective study

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Background

Laparoscopic Roux-en-Y gastric bypass (LRYGBP) is currently one of the most commonly used procedures for revisional surgery after failed vertical banded gastroplasty or adjustable gastric banding. The aim of our study was to analyze the surgical outcomes of 70 consecutive patients who underwent revisional surgery to LRYGBP in 2 years.

Patients and methods

The prospectively constructed database, medical records, demographic and surgical details, results, and complication of all patients who underwent revision to LRYGBP were analyzed.

Results

There were 70 patients, comprising 50 females and 20 males, with a mean age of 42.3 ± 8.6 years (range, 28–60 years) and mean Deg;BM;Deg;l of $40.0 \pm 9.5 \text{ kg/m}^2$ (range, 38.4–65.5 kg/m^2). The primary operation was adjustable gastric banding in 45 cases and vertical banded gastroplasty in 25 cases. In 20 patients, band removal was done before revision, and in 25 patients, band removal occurred during operation. There were five conversions to open surgery. A total of seven patients presented with major complications; the hospital stay averaged 5.8 days (range, 4–22 days). The mean percent excess body weight loss at 6 and 12 months was 60.4 ± 25.5 and 82.3 ± 21.4 , respectively. Mean percent low Deg;BM;Deg;l at 6 and 12 months was 20 ± 6.1 and $30.2 \pm 12.4 \text{ kg/m}^2$, respectively.

Conclusion

The LRYGBP as a revisional procedure is feasible, safe, and effective in most patients, but surgical complications are not uncommon.

Keywords:

gastric bypass, laparoscopic, morbid obesity, restrictive bariatric procedures

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Introduction

Bariatric surgery is a safe and effective long-term treatment for obesity. There has been an increasing number of primary bariatric operations done over the past 25 years [1].

As a result of this increasing trend, revisional bariatric procedures are expected to increase. The incidence of revisional bariatric procedures is between 30 and 60%. Over a decade of follow-up, ~29–39% of patients who underwent vertical band gastroplasty (VBG) will require revision. The revision rate for patients who underwent adjustable gastric band (AGB) is between 10.5 and 60% [2].

Several technical and logistical challenges are faced when performing laparoscopic revisional bariatric surgery; thus, we should take into consideration many preoperative, operative, and postoperative guidelines. The indications for revisional bariatric surgery include inadequate weight loss, weight

regain, or complications that can occur after VBG or AGB owing to pouch or anastomotic dilation. The main goals of revisional surgery for weight loss are either to restore gastric restrictive capacity, add a malabsorptive element, or both [3].

Marked adhesions and altered anatomy are the main challenges for revisional procedures. They are expected to be more complex with increased morbidity compared with primary procedures. Conversion from purely restrictive procedures to Roux-en-Y gastric bypass has been the most common surgical strategy for many surgeons [4].

Once technical advances were available, and surgical skills were mastered, laparoscopic Roux-en-Y gastric

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bypass (LRYGBP) became the preferred revision procedure. Success in bariatric surgery is generally defined as an initial loss of more than 50% of excess body weight loss. There is also the classification according to Maclean, defining an excellent result as BMI less than 30, BMI 30–35 as good, and a poor result or failure as BMI more than 35. Success is also defined as a resolution of comorbidities and improvement in the quality of life [5].

Aim

The aim was to analyze the results of LRYGBP as a management option for failed VBG or AGB regarding complications, success, and rate of weight loss.

Patients and methods

In this prospective study, 70 revision cases performed between July 2018 and July 2020 in Ain Shams University hospitals were included. This research was performed at the Department of General Surgery, Ain Shams University Hospitals. Ethical Committee approval and written, informed consent were obtained from all participants. All cases were identified and analyzed regarding patient age, sex, weight, type of primary procedure, type of revision, concomitant procedures, duration of surgery, and length of hospital stay. The mean low BMI and body weight excess loss at 6 and 12 months were recorded together with demographic characteristics, preoperative conditions, surgical details, morbidity, and mortality. The preoperative anatomical evaluation included upper gastrointestinal tract endoscopy and computed tomography three dimensional) contrast study. The cause of failure was identified both via extensive clinical and laboratory

evaluations. Written consent was taken from all patients discussing the operative revisional technique and the expected results and the possible complications.

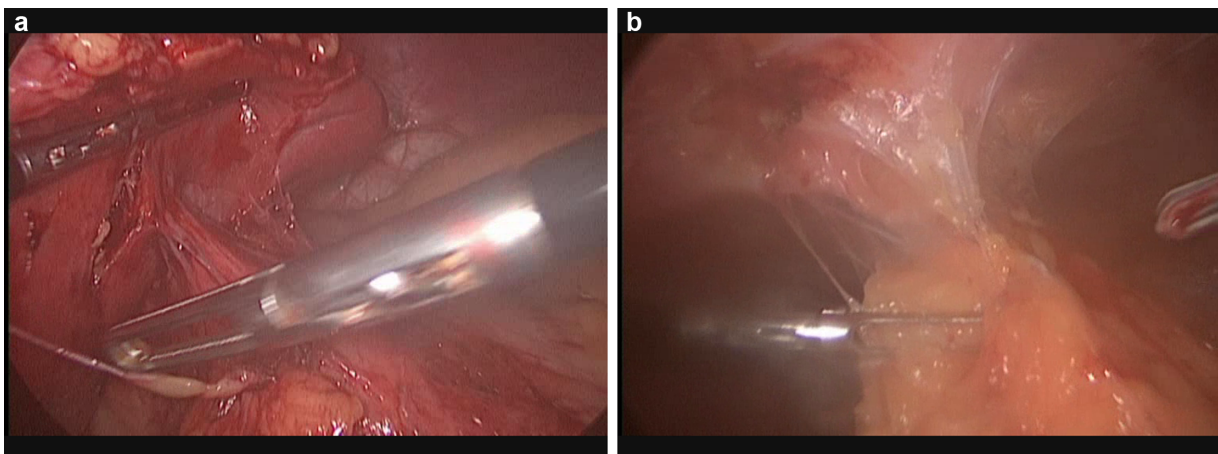
Surgical strategy and technique

In all patients with a history of AGB placement in whom a second surgical procedure was considered owing to insufficient weight loss, weight regain, band intolerance, or nonseptic complications, attempts were made to remove band with LRYGBP in one surgical procedure. In patients with band erosion, the band was removed laparoscopically at first, and the revisional bypass technique was done 6 months later.

Patients with a history of VBG and insufficient weight loss, weight regain, or complications such as severe gastroesophageal reflux disease or food intolerance were converted to LRYGBP.

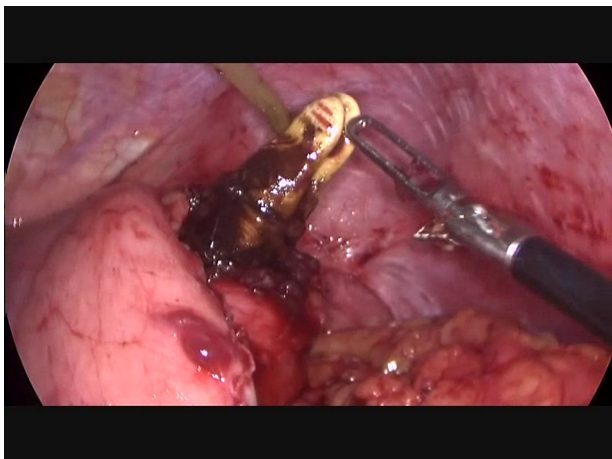
Pneumoperitoneum was established using a Veress needle. An abdominal pressure between 15 and 18 mmHg was used. Adhesions from previous surgeries were dissected (Fig. 1a,b). In patients with AGBs, gastro-gastric sutures were divided to unfold the gastric fundus and to get access to the angle of His; the band was transected and removed, with its fibrous capsule also removed (Fig. 2). A gastric pouch was constructed by firing a 60-mm linear staple horizontally from a window at the lesser omentum between the edge of the stomach and the Latarjet nerve (Fig. 3). The stomach was divided ~2 cm below the original AGB placement or 2 cm above the Marlex mesh in patients with previous VBG. The gastric pouch was then completed by transecting the stomach vertically toward the angle of His (Fig. 4).

Figure 1



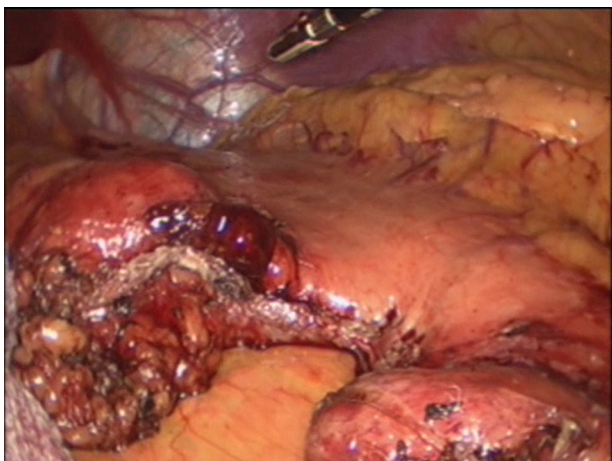
(a) Adhesions from previous surgeries were dissected. (b) Adhesions from previous surgeries were dissected.

Figure 2



The band was transected and removed, with its fibrous capsule also removed.

Figure 4

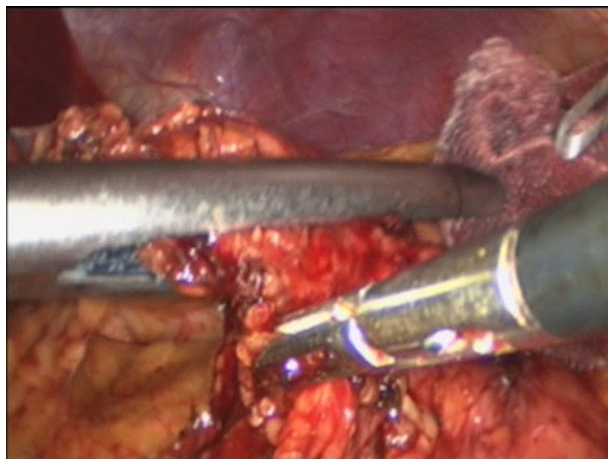


The gastric pouch was then completed by transecting the stomach vertically towards the angle of His.

A 32-F bougie was used for guidance. The Roux-en-Y gastric bypass was completed in antecolic and antegastric fashion constructing stapled side-to-side jejunojunos-tomy and a two-layered hand-sewn gastrojejunostomy (Fig. 5).

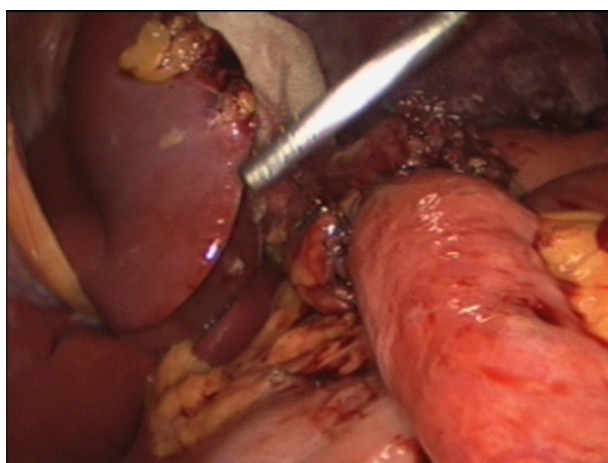
The length of the biliopancreatic limb was ~75 cm and the alimentary limb was 150 cm. Both the Petersen space and the mesenteric defect at the jejunojunos-tomy were closed using nonabsorbable sutures. An intraoperative leak test was done using both methylene blue test and the air bubble test. A closed suction device was routinely left in place. A gastrografin study was performed on the second postoperative day to roll out the gastric leak and gastric outlet obstruction. Liquids were started on the second postoperative day, and patients were

Figure 3



A gastric pouch was constructed by firing a 60-mm linear staple horizontally from a window at the lesser omentum between the edge of the stomach and the Latarjet nerve.

Figure 5



The Roux-en-Y gastric bypass was completed in antecolic and antegastric fashion constructing stapled side-to-side jejunojunos-tomy and a two-layered hand-sewn gastrojejunostomy.

kept on minced food for 3 weeks. Normal diet and vitamin supplements were initiated 1 month after surgery.

Statistical analysis

Data were presented as mean±SD for continuous variables or characteristics and percent for categorical variables or characteristics.

Results

In the 2 years of our series, revision surgery to LRYGBP was performed in 70 patients whose demographic characteristics are shown in Table 1. The initial operation was AGB in 45 patients, whereas in 25 patients, it was VBG.

Table 1 Demographics characteristics of the patients, as well as preoperative and operative data

Parameters	Values
Number of patients	70
Female/male	50/20
Age (mean±SD)	42.3±8.6 (range, 28–60)
BMI (mean±SD)	40.1±9.5 kgm ² (range, 28.2–65.5)
Weight (mean±SD)	121±20.5 (range, 82–170)
Mean hospital stay	Average 5.8 days (range, 4–22)
Mean procedure duration	210 min (range, 120–350)
Initial bariatric operation	AGB 45–VBG 25
Time of band removal	
Before revision	20 (28.6%) patients
With revision	25 (35.7%) patients
Conversion to open surgery	5 (7.1%) patients
Surgical complications	7 (10%) patients
Long-term complications (6–12 ms)	4 (5.7%) patients

AGB, adjustable gastric banding; VBG, vertical banded gastroplasty.

Table 3 Weight loss parameters after revision to laparoscopic Roux-en-Y gastric bypass

	6 months 20/20	1 year 12/12
%BWL	21.3±7.8	27.5±10.6
%EBWL	60.4±25.5	82.3±21.4
%BMIL	20±6.1	30.2±12.4
BMI (kg/m ²)	31.6±5.7	27.5±5.6

BWL, body weight loss; EBWL, excess body weight loss.

Indications of revision are demonstrated in Table 2. In 20 patients, the band had been removed in a previous operation, and in 25 patients who had the band still in place, band removal and LRYGBP were performed in the same procedure. Overall, five laparoscopic procedures were converted to open surgery owing to dense adhesions and bloody dissection. The mean operative time was 210 min (range, 120–375 min). A total of seven patients developed major complications, three patients developed a gastric leak which necessitated surgical drainage and feeding jejunostomy, and four patients developed gastric leak who were managed successively via an endoscopic stent. There were five cases that had converted to open surgery; two of these patients had narrow gastrojejunostomy with recurrent vomiting that happened on the third postoperative day requiring surgical revision after being confirmed by contrast study. Another two patients had narrow jejunostomy and open intervention occurred, and these two patients developed wound dehiscence that required surgical closure. The fifth patient had developed major gastric leak, with fever, abdominal pain, and signs of peritonitis; surgical intervention was done with oversewing of leakage site, peritoneal lavage,

Table 2 Medical complications that led to revisional surgery

	AGB (N=45)		VBG (N=25)
	Previously removed (20)	Currently removed (25)	
Band intolerance/insufficient weight loss	8	10	12
Weight regain	4	5	13
Band migration	3	4	–
Band rupture	3	4	–
Severe GERD	2	2	0

AGB, adjustable gastric banding; GERD, gastroesophageal reflux disease; VBG, vertical banded gastroplasty.

wide-pore intraperitoneal drain. The patient underwent TPN and intravenous antibiotics postoperatively till improvement. Regarding long-term complications, two patients developed small bowel obstruction a year after revision, owing to adhesions in one patient, whereas the other had internal herniation via Peterson's defect, and another two patients developed stricture of the gastrojejunostomy and had endoscopic balloon dilatation, which resolved stricture successfully. Body weight loss and BMI losses are demonstrated in Table 3. Mean surgical time were 210 min (range, 120–350 min), mean hospital stay was 5.8 days (range, 4–22 days), and mean follow-up duration ranged from 7 to 19 months. Weight loss at 6 months and 1 year is shown in Table 3. A total of 64 patients had lost more than 50% of excess body weight 1 year after surgery. Mean percent BMI loss was 20±6.1 after 6 months, and 30.2±12.4 at 1 year, with no mortality.

Discussion

Revisional bariatric surgery is becoming more common owing to the rapid increase in patients undergoing surgery for morbid obesity. Unfortunately, there is no significant amount of data to help the surgeon decide which revisional procedure to perform based on the patient previous bariatric procedure [6].

Restrictive gastric procedures were very well accepted by many surgeons in the 1980s and 1990s. Among the main reasons for wide acceptance were the low surgical morbidity and mortality, relatively short learning curve, low risk for protein malnutrition and vitamin deficiency, and the potential for full reversibility with a rather simple operation. Some patients, however, present insufficient weight loss or develop complications that require surgical revision [7].

In our series, 70 patients undergoing revision were included, comprising 50 women and 20 men.

Overall, 45 patients of them had the previous restrictive procedure in the form of AGB, and 25 had VBG. All of them had undergone revisional surgery in the form of LRYGBP owing to insufficient weight loss. Band intolerance occurred in 18 patients in the group that had AGB, and 12 patients in the group that had VBG. Weight regain was seen in nine patients of AGB group, and 13 patients of VBG group. Band migration occurred in seven patients who had AGB. Band rupture occurred in seven patients of AGB group, and severe gastroesophageal reflux disease was noticed in four patients who had AGB.

Surgical alternatives for patients with surgical complications from restrictive procedures include undoing the procedures, going back to normal anatomy. This is undoubtedly the easiest surgical alternative but leads to weight regain in virtually all patients; another alternative is to redo the original operation which generally includes restapling or rebanding [8].

There is evidence suggesting that failure of a restrictive operation should not be managed by repeating the same operation, as it may replicate the same bad results or lead to the same complications. Van Gemert *et al.* [9] reported a series of 16 patients in whom a VBG was restored. Surgical complications or insufficient weight loss occurred in 68% of patients. In another study, Weber *et al.* [10] found that the mean reduction of BMI at 1 year after rebanding in 30 patients was only 1.3 kg/m². In our series, BMI was 31.6±5.7 at 6 months, which was reduced to 27.5±5.6 kg/m² after 1 year of revisional surgery.

Some authors, on the contrary, have reported good results with rebanding. The third option is to convert the restrictive operation to a different procedure. The most common operation used for revision is LRYGBP and biliopancreatic diversion, and RYGBP either open or laparoscopic. Mognol *et al.* [11] reported a decrease of the body mass index by 11 kg/m² at 1 year of excess body weight loss, and Spivak *et al.* [12] also showed a reduction of 12.1 kg/m² at a similar follow-up. Our patients presented a reduction of 12.6 kg/m² at 1 year after surgery, which is very similar to the results with LRYGBP performed as the initial procedures.

Bariatric surgery revisions are technically more demanding and have a high risk of postoperative complications than the primary operation. Satisfactory long-term weight loss with LRYGBP as a revision procedure needs to be compared with the

surgical morbidity and mortality. Schouten *et al.* [13] reported a series of 101 patients who were converted from VBG to open RYGBP and found that at least 55% of the patients developed a surgical complication. Overall, 18% presented with more than one complication, and 4% required reoperation to treat complications. Surgical mortality in their series was 2%. In the analysis of our series, no surgical mortality was found (0%), which is the same rate seen in another study done by Zakaria and Elhoofy [14], where seven (10%) cases had major postoperative complications, 3 cases had gastric leak managed via endoscopic drainage, and four cases had developed gastric leak managed via successful stenting. The complication rate is comparable with another study done by Suter *et al.* [15], where the complication rate was 11.8%, and five cases had developed conversion to open surgery owing to stricture at gastrojejunostomy (two cases) and jejunojejunostomy (two cases); one of them developed severe gastric leak with signs of peritonitis and subjected to open surgical intervention. Our incidence of conversion to open surgery in a revisional procedure was 7.1% (five patients). Our leakage rate at revisional surgery was 11.4% (eight patients), which is closely related to the 10% observed in surgical revision.

There is one complication of AGB that deserves a particular analysis, which is band erosion. Some authors have successively performed closure of the gastric perforation and conversion to RYGBP in the same surgical procedure. Some authors have suggested that patients are at less risk if band removal and the management of gastric erosion is performed first and the revision to RYGBP is performed later; we have preferred such option. Moreover, in the five patients in whom gastric erosion was noticed, the procedure was performed as a two-stage procedure, with a 6-month interval without morbidity.

Conclusion

We can conclude that LRYGBP is feasible and effective for patients with failed restrictive procedures. It needs to be realized, however, the complication rate is higher when compared with the initial procedure.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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