Laparoscopic Roux-en-Y Gastric Bypass for Failed Vertical Banded Gastroplasty

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Abstract

Background Although the vertical banded gastroplasty (VBG) is effective in achieving weight loss without metabolic side effects during the first few years, late failures cause weight regain in about 20% of the patients. The laparoscopic Roux-en-Y gastric bypass (LRYGB) is the procedure of choice to convert a failed VBG.

Materials and Methods Between August 2014 and June 2016, 37 patients (23 females and 14 males) underwent revisional LRYGBs after failed VBGs. Thirty-four patients had open VBGs and two patients had laparoscopic butterfly gastroplasties. These patients completed follow-ups of at least 1 year.

Results The median operating time was 164 min (range 132–246), and the mean length of the hospital stay was 2.4 days (range 2–7). The mean body mass index (BMI) of the study group was 42.5 kg/m², while the mean BMI and the percentage of excess body weight loss (%EBWL) for the patients 6 months after the operation were 31.7 kg/m² and 52.1%, respectively. The mean BMI and %EBWL for the patients 1 year after the operation were 29.5 kg/m² and 67.7%, respectively. There were neither intraoperative complications nor postoperative mortalities, but the overall complication rate was 22% (eight patients).

Conclusion An LRYGB following a VBG is technically challenging, but safe, with low morbidity and mortality rates. Moreover, a revisional LRYGB provides excellent weight loss results.

Keywords Roux-en-Y gastric bypass · Vertical banded gastroplasty · Laparoscopy · Reoperation · Bariatric surgery

Abbreviations

BMI	Body mass index
DVT	Deep venous thrombosis
DM	Diabetes mellitus
EBW	Excess body weight
EBWL	Excess body weight loss
GER	Gastroesophageal reflux
GIT	Gastrointestinal tract
HTN	Hypertension
LRYGB	Laparoscopic Roux-en-Y gastric bypass
OSA	Obstructive sleep apnea
USA	United States of America
UGI	Upper gastrointestinal
VBG	Vertical band gastroplasty

Introduction

The National Institutes of Health Consensus Conference defined the role of gastrointestinal surgery in the treatment of morbid obesity, and they endorsed the vertical banded gastroplasty (VBG) and gastric bypass as accepted procedures for the treatment of morbidly obese patients [1]. However, Van Gemert et al. reported that up to 56% of VBG patients would need revisional surgery over a period of 12 years, mainly due to a failure to maintain adequate weight loss [2]. In a series of 153 patients, Vasas et al. concluded that the laparoscopic Roux-en-Y gastric bypass (LRYGB) was a safe and effective revisional bariatric operation for VBG patients [3]. The aim of this study was to review our experience with conversion from VBG to RYGBP and to examine the safety of revisional RYGBP.

Materials and Methods

From August 2014 to June 2016, 37 patients (23 females and 14 males) underwent revisional surgery after failed VBGs.

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Thirty-four of the patients had open VBGs and two had laparoscopic butterfly gastroplasties. The mean age of the patients was 46 years (21–57). The indications for the revisional surgeries were insufficient weight loss in 12% of patients and late weight regain in 88% of them. Revisional LRYGBP was done within 2 years after previous VBG in 24% of patients, within 2 to 5 years in 57% of patients and after 5 years in 19% of them. Although 43 patients needed conversion during the study period, six patients with failed VBG were excluded due to severe heart and chest diseases.

A patient was eligible for surgery if they had a body mass index (BMI) ≥ 40 or ≥ 35 kg/m² with an obesity-related comorbidity and if there was no untreated mental illness associated with a psychosis or substance abuse. All the patients were informed of the risks inherent in undergoing a revisional laparoscopic gastric bypass surgery and the possibility of conversion to open surgery, as well as the potential benefits of this surgery and the alternatives to it. We were sure of the failure of previous conservative treatment programs (diet, exercise, behavior therapy, and drug therapy) for all the patients. Each patient underwent a thorough preoperative workup, including computed tomographic (CT) virtual gastroscopy, upper gastrointestinal tract (UGIT) endoscopy, abdominal ultrasound, and medical clearance by an endocrinologist, psychiatrist, and nutritionist. Informed consent was obtained from all individual participants included in the study.

The preoperative evaluations showed that nine patients (25%) had type 2 diabetes mellitus (DM), seven patients (19.4%) had hypertension (HTN), three (8.3%) had obstructive sleep apnea (OSA), four (11%) had dysphagia after VBG, and six (16%) had repeated vomiting especially after eating protein meals. These patients completed at least 1 year of follow-up visits. The patient data was reviewed for gender, obesity-related comorbidities at the baseline, preoperative and postoperative weight, BMI, preoperative investigations, operative details, length of stay, postoperative complications, and improvement or remission of obesity-related comorbidities. Remission of diabetes mellitus, hypertension, or OSA was considered when the patients were able to discontinue all the medications with normal hemoglobin A1c (DM), blood pressure (HTN), and polysomnography (OSA) and considered to be improved with a discontinuation or decrease in the dose of one or more drugs, but not all. The diabetic patients on insulin were considered to be improved if they were able to discontinue the insulin. The weight loss was expressed as the percentage of excess body weight loss (%EBWL).

Surgical Technique

Subcutaneous low molecular weight heparin for deep vein thrombosis (DVT) prophylaxis was administered 12 h preoperatively. The patients were admitted on the morning of the surgery, and a third-generation cephalosporin was

administered 1 h preoperatively. Elastic stockings were used perioperatively, and the surgery was performed under general anesthesia. The patients were placed in the supine position with the table in the reverse Trendelenburg position.

The LRYGB technique included the formation of a small gastric pouch and antecolic-antegastric Roux-en-Y reconstruction (Fig. 1). A five-port technique was used. The abdomen was inflated using a Veress needle, and ENDOPATH XCEL Bladeless Trocars (Ethicon Endo-Surgery Inc., Cincinnati, OH, USA) were inserted under direct visualization. Any anterior abdominal wall adhesions and adhesions between the liver and the stomach were lysed. Next, a Mediflex Nathanson Liver Retractor (Cook Medical Inc., Bloomington, IN, USA) was introduced just below the xiphoid process and to the left, and the retractor was fixed to the operating table. We divided the stomach above the mesh and at least 1 cm above the previous VBG stapling line and passed a 36-F bougie. A gastric pouch based on the lesser curve was created by the sequential deployment of a 60-mm Endo GIA Universal Stapler (black Tri-Staple cartridge; Autosuture Division of Covidien, Plymouth, MN, USA).

A 150-cm biliopancreatic limb was measured, and the jejunum was divided with a 60-mm Endo GIA stapler (white cartridge). The mesentery was divided with a 5-mm ultrasonic dissector (Harmonic Scalpel; Ethicon Endo-Surgery, Cincinnati, Ohio, USA), and a gastrojejunal anastomosis was created with a 30-mm Endo GIA stapler (3.5-mm blue cartridge). The common stapling defect was closed over a nasogastric tube with two layers of 2–0 absorbable V-Loc sutures (Autosuture Division of Covidien) in a running fashion.

A 70-cm alimentary canal was measured, and a stapled side-to-side jejunojejunostomy was created utilizing a 60-mm linear endostapler (white cartridge). Then, the common stapling defect was closed with 2–0 absorbable V-Loc sutures in a running fashion (Fig. 2). The mesenteric defects at the jejunojejunostomy site and Petersen's space were closed with 2–0 non-absorbable running sutures. The gastrojejunal anastomosis was then tested with methylene blue injected through the nasogastric tube. If an anastomotic leak was identified, a repair was attempted laparoscopically with interrupted sutures, and the anastomosis was reevaluated. We removed the nasogastric tube at the end of the operation.

Proton pump inhibitors were used in all the patients for the first 4 months postoperatively. For DVT prophylaxis, each patient received a daily subcutaneous injection of low molecular weight heparin for 14 days postoperatively. The patients were seen by the surgeon on day 10 and at 1, 3, 6, 9, 12, and 24 months postoperatively.

IBM SPSS Statistics for Windows Version 22.0 (IBM Corp., Armonk, NY, USA) was used for the data analysis. The data were expressed as means for the quantitative parametric measures, in addition to both the number and percentage for the categorized data.

Fig. 1 Gastric pouch of vertical banded gastroplasty (VBG)

Results

All the patients completed 1-year follow-ups. The mean BMI of the patients in the study group was 42.5 kg/m^2 (35–54). The mean BMI and %EBWL of the patients 6 months after the

operation were 31.7 kg/m^2 (24–46) and 52.1%, respectively. One year after the operation, the mean BMI and %EBWL of the patients were 29.5 kg/m^2 (20–41) and 67.7%, respectively.

The median operating time was 164 min (range 132–246), and the mean length of the hospital stay was 2.4 days (range

Fig. 2 Creation of gastrojejunostomy

Table 1 Complications after revisional LRYGBP

Complications		
Minor complications	Three patients (8%) had persistent severe nausea, vomiting, and dehydration	One patient (2.8%) had a port site infection
Major complications	Three patients (8%) had postoperative massive hemorrhage	One patient (2.8%) developed stenosis due to a marginal ulcer at the gastrojejunostomy

2–7). One case was converted to an open surgery due to the extensive adhesions from the previous VBG, and this patient was excluded from the study (this patient discharged from hospital 4 days after the operation and had smooth postoperative course). A total 36 patients were analyzed with regard to the postoperative outcomes.

Minor complications occurred in four patients (11%). Three patients were readmitted due to persistent severe nausea, vomiting, and dehydration, but their gastrografin studies were normal. These patients' symptoms resolved with inpatient medical treatment. The other patient had a port site infection.

Three patients had postoperative massive hemorrhage (two patients had hematemesis and one had intraabdominal bleeding), and they were managed conservatively with blood and fresh frozen plasma transfusions. No mortalities were reported during the 1-year follow-up period.

One patient developed stenosis due to a marginal ulcer at the gastrojejunostomy site 8 months after the LRYGB. It was treated with endoscopic balloon dilation (three consecutive dilations at 15-day intervals). This patient was heavy smoker, so we prescribed a proton pump inhibitor at a dose of 40 mg once daily for life.

There was a complete resolution of the GIT symptoms in all of our patients. Dysphagia completely resolved in all patients after the LRYGB. Vomiting also disappeared in all patients.

A significant resolution of the comorbidities was recorded after the LRYGB. Twenty-five percent of the patients had DM preoperatively, and, at the 1-year follow-up, the DM had resolved in 88.9% and improved in 11.1% of the patients. The mean preoperative fasting blood sugar and HbA1c levels were 149.2 mg/dl and 7.6%, respectively, which decreased to 92 mg/dl and 5.1%, respectively, 1 year postoperatively. Patients with OSA had a complete remission as proved by polysomnography, and we noticed a remission in HTN (71.4% at 1 year). The mean blood pressure decreased from 135.2 mmHg preoperatively to 101.4 mmHg 1 year postoperatively.

Discussion

The common indications for a VBG revision are regaining weight due to gastric pouch and stoma dilation and/or a change of eating habits (consuming more “sweets”), in addition to stenosis at the stoma outlet, vomiting, band erosion, and severe GERD resistant to medical treatment [4, 5]. Several studies have proven that an LRYGB is the procedure of choice to convert a failed VBG [6–8]. However, revisional bariatric surgery is technically challenging, with numerous difficulties related to the altered anatomy and adhesions. In addition, identifying previous staple lines is not always easy, especially after an undivided VBG. The presence of fibrotic

Fig. 3 Creation of the new gastric pouch

Fig. 4 Mistakes during creation of gastric pouch

tissues makes the staple lines fragile and more prone to leakage. Moreover, it has been shown that multiple prior procedures increase the risk of developing postoperative complications, especially major morbidity [9].

The mean operative time was 164 min (range 132–246) in our study. The mean postoperative hospital stay in this study was 2.4 days (range 2–7). The studies of Iannelli et al., Iannelli et al., and Vasas et al. showed that the mean hospital stays after the revisional LRYGBs were 6.8 days (range 4–9), 11.7 days (range 4–30), and 4.3 days, respectively [3, 4, 10].

In this study, 6 months after the LRYGB, the mean BMI dropped from 42.5 kg/m² (35–54) to 31.7 kg/m² (24–46), and the mean %EBWL was 52.1%. One year after the LRYGB, the mean BMI dropped to 29.5 kg/m² (20–41), and the mean %EBWL was 67.7%.

In the studies of Mognol et al. and Gys et al., the %EBWL after 1 year of the revisional LRYGBs were 62 and 78%, respectively [11, 12]. Suter et al. study showed that the %EBWL after 6 months and 1 year of the revisional LRYGBs were 73 and 76%, respectively [13]. Cariani and Amenta compared the weight losses in two groups of homogeneous patients who underwent traditional LRYGBs and LRYGB on VBGs, respectively. After 3 years of follow-up, the weight loss curves were similar between the groups [14].

In this study, there were neither intraoperative complications nor postoperative mortalities, and the overall complication rate was 22% (eight patients) (Table 1). Four patients (11%) had minor complications: three patients (8%) had postoperative vomiting and dehydration and one patient had a port site wound infection. In addition, there were four patients (11%) with major complications: three patients (8%) developed postoperative massive bleeding and one patient developed stenosis at the gastrojejunostomy site 8 months after the

LRYGB. The morbidity and mortality rates after the revisional LRYGBs in the study of Suter et al. were 11.8 and 0.5%, respectively [13]. The studies of Marsk et al., Gagné et al., and Iannelli et al. showed no mortality and the morbidity rates were 12.2, 19, and 22.2%, respectively [10, 15, 16].

Overall, revisional bariatric surgery, including the LRYGB, is technically challenging, and it is associated with higher complication and mortality rates when compared with the primary procedure [17]. Cadière et al. reported gastrojejunal leaks in 6 of 43 patients (14%) after VBG conversions to LRYGBs [18]. However, Jones reported that the conversion of a previous gastroplasty to an LRYGB, when compared to performing a gastroplasty revision, resulted in a lower complication rate and much better weight loss [19].

During creation of the new gastric pouch, we should be sure that our new stapling line is at right and least 1 cm away from the old stapling line to avoid creation of gastric mucocele (closed pouch with no communication with the rest of the stomach) (Figs. 3 and 4).

Conclusion

The VBG has been associated with significant reoperation rates for failures and/or complications. The conversion of a VBG to an LRYGB can be performed safely with a good outcome regarding weight loss and the treatment of VBG complications.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Studies with Human Participants All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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