Obesity Surgery (2020) 30:3453–3458
https://doi.org/10.1007/s11695-020-04587-0

ORIGINAL CONTRIBUTIONS

Vertical Banded Gastroplasty Revision to Gastric Bypass Leads to Effective Weight Loss and Comorbidity and Dysphagia Symptom Resolution

Dimitrios I. Athanasiadis[1] · Sara Monfared[1] · Jennifer N. Choi[1] · Don Selzer[1] · Ambar Banerjee[1] · Dimitrios Stefanidis[1]

Published online: 15 April 2020

Abstract

Purpose Up to 50% of patients with vertical banded gastroplasty (VBG) experience failure or complications in the mid- and long-term and present for revisional bariatric surgery. This study aimed to review our experience for patient outcomes after VBG revisions and compare their benefits to those of primary laparoscopic Roux-en-Y gastric bypass (LRYGB) operations.

Materials and Methods Data from patients who underwent VBG revision between 2009 and 2015 at a center of excellence were reviewed. Patient demographics, symptoms, comorbidities, weight loss, reinterventions, reoperations, and hospital stay were analyzed and compared with those of primary LRYGB patients (control group).

Results Fifty-two patients (88.5% female, 55 ± 9.6 years old) underwent revisional surgery during the study period (86.5% LRYGB, 11.5% VBG reversal, and 2% sleeve gastrectomy). Patients presented 17.3 ± 7.2 years after their VBG for weight regain (55.8%), dysphagia (19.2%), or both (25%). Patients who underwent conversion to LRYGB for weight regain and for mix-symptoms had similar weight loss to the control group (38.2 ± 11.8 vs 35.6 ± 7.7, $p = 0.108$), along with similar comorbidity resolution. However, even though the early (< 30 days) complication rate was similar between the two groups, the conversion group had higher 4-year reoperation rate (29% vs 9.5%, $p < 0.001$) and length of stay (5.4 ± 5.3 vs 2.6 ± 3.1, $p < 0.001$). Additionally, dysphagia resolved in all the patients of our cohort.

Conclusions VBG conversion to LRYGB leads to significant weight loss, resolution of dysphagia, and comorbidities similarly to the primary LRYGB operations. However, higher mid-term complication rates should be expected.

Keywords Bariatric surgery · Revision · Vertical banded gastroplasty · Weight loss · Comorbidity resolution

Introduction

Vertical banded gastroplasty (VBG) is a bariatric procedure which was widely performed in the 1980s [1–3]. This procedure fell out of favor 20 years ago and is rarely performed today due to disappointing mid- and long-term outcomes and high reoperation rates (30–79%) [4–10]. Patients with a VBG typically present today for weight regain, gastro-gastric fistula formation, dysphagia, maladaptive and other eating difficulties, and excessive weight loss due to narrowing or erosion at the banded segment [11]. The laparoscopic Roux-en-Y gastric bypass (LRYGB) is the most commonly performed revisional procedure after VBG [12–14] as it provides sufficient weight loss [1, 15, 16] and can help relieve dysphagia or eating difficulties. Nevertheless, it remains unclear how the clinical outcomes of weight loss and comorbid condition resolution following conversion of VBG to LRYGB compare to a primary LRYGB. The purpose of this study was to assess

✉ Dimitrios Stefanidis
dimstefa@iu.edu

Dimitrios I. Athanasiadis
dathanas@iu.edu

Sara Monfared
smonfare@iupui.edu

Jennifer N. Choi
jenchoi@iupui.edu

Don Selzer
dselzer@iupui.edu

Ambar Banerjee
banerjam@iupui.edu

[1] Department of Surgery, Indiana University School of Medicine, 545 Barnhill Dr., Indianapolis, IN 46202, USA

mid-term postoperative outcomes after conversion of VBG to LRYGB and compare them with the outcomes following primary LRYGB procedure.

Methods

Upon institutional review board approval, the prospectively maintained local MBSAQIP database was reviewed for all patients with prior history of a VBG who underwent another bariatric operation between October 2009 and October 2015. This study time frame was chosen to provide at least 4-year postoperative follow-up to obtain mid-term outcomes for this patient population. If patient data were incomplete or longer follow-up was missing, a manual review of the electronic medical record (EMR) was completed. Only patients who were $\geq$ 18 years old were included in the study. All patients who underwent any type of revision including a conversion to another procedure or a reversal of the VBG were included in the study.

Data collected included patient demographics such as age, gender, preoperative BMI, presence of comorbidities such as diabetes mellitus (DM-II), hyperlipidemia (HLD), hypertension (HTN), and obstructive sleep apnea (OSA) at the initial office visit, the indication for revision, and type of revisional procedure. The indications for revision were extracted from preoperative bariatric surgeon notes and endoscopic and imaging studies (esophagogastroduodenoscopy or upper GI studies). Early postoperative morbidity was assessed through length of stay (LOS), early (30 day) reinterventions, early (30 day) reoperations, and 90-day mortality, while late morbidity was evaluated based on late (> 30 day) reinterventions and reoperations during the follow-up period. Reinterventions were defined as one or more endoscopic or interventional radiology procedures related to their bariatric surgery during the follow-up period. Weight loss at 2 and 4 years was also recorded. According to the best practices, mean change in BMI (ΔBMI) was used to represent weight loss. ΔBMI was defined as follows: Initial BMI – Postop BMI.

In addition, resolution of dysphagia (if present preoperatively) and comorbidities (DM-II, HLD, HTN, and OSA) was recorded at the 4th year after surgery. Comorbid condition remission was identified when respective medications/CPAP device was discontinued or a normal sleep study was recorded. Dysphagia resolution was based on physician notes from the EMR.

Operative Technique

Conversion to LRYGB

Following adhesiolysis and exposure of the stomach, we proceeded with the application of a linear stapler on the gastric pouch 1–2 cm above the level of the prior band to avoid firing the stapler at the scarred tissue. Using endoscopic guidance, the gastric pouch would then be created by firing the linear stapler vertically toward the angle of His and medial to the prior VBG staple line to avoid scarred tissue and misfiring of the stapler. By using this approach, any gastro-gastric fistula that was present between the pouch and remnant was divided safely. Occasionally, part of the remnant fundus might need to be removed to address the fistula, but this was not necessary the majority of time. On the other hand, the left gastric artery was always identified and preserved during gastric pouch formation to avoid critical ischemia. Occasionally, in the presence of dense adhesions and distorted anatomy, the initial horizontal staple line would be carried all the way to the greater curvature, the short gastric vessels of the fundus were taken down, and the fundus removed after the vertical staple line was created. As mentioned, special attention was paid to not cross the previous staple line and thick staple loads were used to avoid risk of staple line malformation or failure. The remaining operative steps were similar to the standard LRYGB procedure described by Wittgrove et al. [17] with a 100 cm antecolic, antegastric Roux limb and stapled end-to-side gastrojejunostomy using a transoral 25 mm circular stapler.

VBG Reversal

After clearing all the adhesions and removing the gastric band, two gastrostomies were made. One was made in the gastroplasty pouch, and the other was made lateral to the anterior staple line. Each jaw of a linear stapler was inserted through each gastrostomy and the stapler fired across the gastroplasty septum. Alternatively, the procedure was accomplished transgastrically with insertion of ballooned trocars inside the stomach and the septum division performed under direct vision. The gastrotomy was closed with laparoscopic suturing or stapling. The return of normal anatomy was confirmed with endoscopy.

Statistical Analysis

Student's *t* test was performed for the comparison of continuous variables between the groups such as patient age, BMI, and ΔBMI. Chi-square test was used for the comparison of non-continuous data such as the comorbidities, reoperations, reinterventions, and mortality. Multivariable linear regression analysis was performed for continuous variables (BMI and ΔBMI) to investigate whether the outcomes were affected by a group allocation controlling for age and gender as possible confounders. Multivariable logistic regression analysis was performed for non-continuous variables controlling for age and gender again. For comorbidity remission at four postoperative year follow-up, the analysis was controlled for the preoperative presence of each comorbidity. The parameter

compared the VBG with LRYGB due to a weight regain group to a reference of primary LRYGB group with the dependent variables.

Results

A total of 52 patients underwent a VBG revision during the study period. All the initial operations were completed open. Of those, 45 (86.5%) underwent a VBG conversion to LRYGB, 1 (2%) underwent a VBG conversion to LSG, and 6 (11.5%) a laparoscopic VBG reversal. No laparoscopic case was converted to open. Revisions took place 17.3 ± 7.2 years after the primary VBG. Revisional patient baseline characteristics and postoperative outcomes were compared with 766 patients after primary LRYGB (control group) that occurred during the same study period by the same surgeons (Table 1). Indication for the revision included weight regain, dysphagia, or a combination of both (Table 2). Weight regain was the main concern of the group with the mixed symptoms, based on both the physician notes and their high preoperative BMI, and thus was analyzed as such. The six VBG reversals were performed to address dysphagia. The one conversion to LSG, which was performed for weight regain, was selected due to strong patient preference. Patients who were operated for weight regain had similar demographics with the rest of the patients who underwent VBG reoperations with the exception of having a higher BMI (49.7 ± 9.4 vs 32.2 ± 10.3, $p < 0.001$), and younger age (52.7 ± 8.9 vs 62.6 ± 8.2, $p = 0.001$). One death occurred in the VBG to LRYGB group related to recurrent *Clostridium difficile* colitis that led to sepsis and multiorgan failure during the postprocedure hospitalization.

Table 1 Baseline group comparisons

Variable	Total VBG revisions	Primary LRYGB	*p* value
N	52	766	
Females, *n* (%)	88.5%	78%	0.074
Age, year, mean ± SD	55 ± 9.6	45.1 ± 11.9	*< 0.001*
Baseline BMI, mean ± SD	45.6 ± 12.0	46.9 ± 8.1	0.303
Presence of DM-II at baseline	32.7%	35.2%	0.716
Presence of HLD at baseline	36.5%	36.1%	0.947
Presence of HTN at baseline	67.3%	62.5%	0.488
Presence of OSA at baseline	53.4%	42%	0.095

DM-II, diabetes mellitus II; *HLD*, hyperlipidemia; *HTN*, hypertension; *LRYGB*, laparoscopic Roux-en-Y gastric bypass; *OSA*, obstructive sleep apnea; *SD*, standard deviation; *VBG*, vertical banded gastroplasty

Table 2 Indications for revision and anatomical causes

Variable	Patients, *n* (%)
Weight regain	29 (55.8)
Gastro-gastric fistula	18 (34.6)
Pouch dilation	4 (7.7)
Not reported	7 (13.5)
Dysphagia	10 (19.2)
Stricture at band site	8 (15.4)
Not reported	2 (3.8)
Concurrent weight regain and dysphagia	13 (25)
Stricture at band site	5 (9.6)
Pouch dilation	3 (5.8)
Not reported	5 (9.6)

We then proceeded with the sub-group analysis of the VBG to LRYGB for weight regain in patients and the control group. The available 4th year data regarding weight loss for the control group and the VBG to LRYGB for weight regain group were 37.5% and 72.5%, respectively. As for the comorbidities, the average available 4th year data of the control group were 41.6%, and 80% in the VBG to LRYGB for weight regain group.

Regarding early postoperative morbidity, VBG patients revised to LRYGB for weight regain had a longer length of stay in the hospital compared with the control (5.4 ± 5.3 vs 2.6 ± 3.1, $p < 0.001$) but comparable early reoperation and reintervention rates. As for late morbidity, the same patients experienced a statistically higher rate of mid-term reoperations and clinically but not statistically significant reinterventions. The comparisons of postoperative morbidity and resolution of preoperative comorbid conditions can be found in Table 3. The most common reoperations between all the revisional VBG patients ($n = 14/49$, 28.6%) were for incisional/ventral hernias ($n = 7/14$, 50%) followed by two exploratory laparotomies for postoperative leaks (one early in < 30 days and one late > 30 days) and one for a bleeding ulcer 40 days following the discharge from the hospital ($n = 3/14$, 21.4%), GJ revisions due to stenosis ($n = 3/14$, 14.3%), and internal hernias ($n = 1/14$, 7.1%). There were 18 patients who underwent a reintervention. The most common findings were strictures and ulcers ($n = 12/18$, 66.7%) followed by normal anatomy ($n = 4/18$, 22.2%).

Dysphagia was completely resolved in all patients. The VBG reversal patients along with the patient who was reversed to LSG experienced no complications.

The BMI and ΔBMI were similar between the groups and are reported in Table 4. In our multivariable linear regression analysis and multivariable binary logistic regression analysis after controlling for age and gender, we found a higher reoperation risk for the VBG to LRYGB group but otherwise

Table 3 Comorbidities and complications

Variable	VBG to LRYGB for weight regain	Primary LRYGB	*p* value
Comorbidities			
Baseline DMI-II, (total *n*)	32.5%, (40)	35.2%, (776)	0.729
DM-II at 4 years, (total *n*)	10.8%, (37)	9.4%, (329)	0.785
Baseline HLD, (total *n*)	37.5%, (40)	36.1%, (776)	0.856
HLD at 4 years, (total *n*)	12.5%, (32)	12.4%, (331)	0.984
Baseline HTN, (total *n*)	67.5%, (40)	62.5%, (776)	0.524
HTN at 4 years, (total *n*)	29%, (31)	23%, (331)	0.446
Baseline OSA, (total *n*)	60%, (40)	42%, (776)	*0.025*
OSA at 4 years, (total *n*)	16.7%, (30)	7.2%, (319)	0.068
Reoperations	*n* = 38	*n* = 604	
< 30 day reoperations during 4 years	5.3%	2.6%	0.329
> 30 day reoperations during 4 years	29%	9.5%	*< 0.001*
Reinterventions	*n* = 38	*n* = 604	
< 30 day reinterventions during 4 years	5.6%	4.3%	0.779
> 30 day reinterventions during 4 years	26.3%	15.9%	0.092
Mortality	*n* = 40	*n* = 776	
90 day mortality	2.5%	0.13%	*0.003*

DM-II, diabetes mellitus II; *HLD*, hyperlipidemia; *HTN*, hypertension; *LRYGB*, laparoscopic Roux-en-Y gastric bypass; *OSA*, obstructive sleep apnea; *SD*, standard deviation; *VBG*, vertical banded gastroplasty

similar weight loss and comorbidity resolution outcomes for both groups. (Table 5).

Discussion

Given the frequency by which VBG was being performed in the 1980's and a number of associated complications, bariatric surgeons are likely to encounter patients with a VBG that requires revision [4, 18, 19]. In our study, the main indications for VBG revision were weight regain and dysphagia symptoms. During a four-year follow-up, it was observed that conversion to LRYGB for weight regain had adequate ΔBMI and comorbidity resolution similar to primary LRYGB, while LRYGB revision for dysphagia led to complete symptomatic relief. Nevertheless, revisional surgery was associated with high reoperation and reintervention rates.

The indications used for revision in this study are similar to those reported in prior series. [11] Gastro-gastric fistulas or pouch dilations leading to weight regain and strictures in the area of the band leading to dysphagia and excessive weight loss are typically described [19, 20]. Some patients with strictures from the band were found to have prominent weight regain which is probably due to the multifactorial nature of the weight regain including bad eating habits, lack of exercise, and depression [21, 22]. The majority of our patients were revised to LRYGB with weight loss outcomes and comorbidity resolution similar to that after primary LRYGB; this is in line with the existing literature even though most studies do not report comorbidity outcomes. [23, 24]. One patient was converted to sleeve gastrectomy (SLG) due to patient preference, but this approach may not be ideal for all. This procedure has a higher reported leak rate and potentially poorer weight loss [23]. On the other hand, six patients underwent

Table 4 BMI and weight loss differences after surgery

Variable	VBG to LRYGB for weight regain (%)	Primary LRYGB (%)	*p* value
Baseline BMI, mean ± SD, (total *n*)	47.8 ± 10.4, (40)	46.9 ± 8.1, (776)	0.444
2nd year BMI, mean ± SD, (total *n*)	36.7 ± 9.3, (25)	32.9 ± 7.1, (461)	*0.01*
2nd year ΔBMI, mean ± SD, (total *n*)	15.7 ± 8.6, (25)	13.9 ± 6.8, (461)	0.220
4th year BMI, mean ± SD, (total *n*)	38.2 ± 11.8, (29)	35.6 ± 7.7, (291)	0.108
4th year ΔBMI, mean ± SD, (total *n*)	12.4 ± 11.3, (29)	10.8 ± 6.9, (291)	0.255

ΔBMI, change in BMI; *LRYGB*, laparoscopic Roux-en-Y gastric bypass; *SD*, standard deviation; *VBG*, vertical banded gastroplasty

Table 5 Multivariate regression analysis at 4 years postoperatively between primary LRYGB and VBG to LRYGB for weight regain in patients

Dependent variable	Odds ratio	95% Confidence Interval	*p* value
DMI-II remission	0.622	0.176–2.197	0.461
HLD remission	0.862	0.249–2.985	0.815
HTN remission	0.859	0.351–2.107	0.741
OSA remission	0.372	0.120–1.158	0.088
Early reoperations	2.113	0.459–9.736	0.337
Late reoperations	3.417	1.602–7.288	*0.001*
Early reinterventions	1.431	0.322–6.364	0.638
Late reinterventions	1.903	0.888–4.078	0.098
	Coefficient		
ΔBMI	1.712		0.243

EWL, excess weight loss; *DM-II*, diabetes mellitus II; *HLD*, hyperlipidemia; *HTN*, hypertension; *OSA*, obstructive sleep apnea; *SD*, standard deviation; *VBG*, vertical banded gastroplasty

VBG reversal for severe dysphagia and vomiting leading to excessive weight loss. While dysphagia is resolved, obesity recurred as expected with a BMI gain of 10 kg/m^2 2 years later. Thus, the risks and benefits of VBG reversal should be carefully considered preoperatively as the resultant weight gain may necessitate additional revisional bariatric operations as suggested by other authors as well. [23]. The increased perioperative morbidity and mortality compared with primary bariatric surgery are not surprising and well known in the literature. [13, 25, 26] Even though the mortality rate in our study was significantly higher in the conversion to LRYGB group compared with control, there was only one, non-related to a complication of the procedure, death which inflated the mortality rate due to the small sample size. Similarly, a 0–2% mortality rate has been reported in similar series [19, 27]. The reoperation rates following revisional surgery during the 4 year follow-up period were higher than after primary LRYGB procedures but in line with those reported in the literature [19, 25, 28]. The most common indications were reinterventions for anastomotic complications (such as strictures and ulcers) followed by reoperations for incisional/ventral hernias. It should be noted the increased risk of incisional hernia is more likely related to the original procedure performed open at the patient's weight apogee [29]. Furthermore, the LOS was longer following VBG to LRYGB conversion than primary LRYGB. This result appears to be typical [30] with only few exceptions [25]. Reported weight loss outcomes after VBG revision vary in the literature [19, 20, 25]. Our patients who underwent conversion of VBG to LRYGB compared favorably with those that underwent a primary LRYGB. This study went a step further demonstrating that comorbidities resolve in a similar fashion to primary LRYGB.

This study has several implications for the management of patients with a prior VBG. Weight regain and dysphagia resolve equally well after conversion to LRYGB. As a result, LRYGB should be considered the preferred conversion procedure. While VBG reversal is also effective in resolving dysphagia, it may be less than ideal given the subsequent weight gain and obesity recurrence. Nevertheless, given the increased perioperative risk, patients should be carefully selected based on individual risk and counseled about the anticipated risks and benefits.

The present study's limitations include utilizing patient data retrospectively and only from a single center; nevertheless, the majority of the data were collected prospectively. Another limitation is that the VBG group was inevitably older at baseline and may have biased our comparison with the primary LRYGB group. However, the multivariable analysis that adjusted for the difference in age between groups confirmed our findings. Finally, another potential bias is the limited 4-year follow-up rate in our clinic. However, every effort was made to increase our data availability such as by contacting our patients and manually searching their charts through physician notes which increased our data availability substantially.

Conclusions

This study highlights that conversion of VBG to LRYGB has similar results as primary LRYGB in terms of the weight loss, resolution of comorbidities, and dysphagia relief. These promising results come at the expense of higher postoperative LOS and reoperations than primary LRYGB. Therefore, even though the increased operative risk should be carefully evaluated during preoperative planning, patients with VBG should not be deprived of conversion to LRYGB and its benefits on weight loss and comorbidity resolution.

Compliance with Ethical Standards

Conflict of Interest Drs. Dimitrios I. Athanasiadis, Sara Monfared, Jennifer N. Choi, Don Selzer, Ambar Banerjee, and Dimitrios Stefanidis have no conflict of interest.

Ethical Approval For this type of study, formal consent was not required.

Informed Consent Informed Consent does not apply.

References

1. Tevis S, Garren MJ, Gould JC. Revisional surgery for failed vertical-banded gastroplasty. Obes Surg. 2011;21:1220–4.
2. Gomez CA. Gastroplasty in the surgical treatment of morbid obesity. Am J Clin Nutr. 1980;33:406–15.
3. Eckhout GV, Willbanks OL, Moore JT. Vertical ring gastroplasty for morbid obesity. Five year experience with 1,463 patients. Am J Surg. 1986;152:713–6.

4. van Gemert WG, van Wersch MM, Greve JW, et al. Revisional surgery after failed vertical banded gastroplasty: restoration of vertical banded gastroplasty or conversion to gastric bypass. Obes Surg. 1998;8:21–8.
5. Desaive C. A critical review of a personal series of 1000 gastroplasties. Int J Obes Relat Metab Disord. 1995;19(Suppl 3): S56–60.
6. Paran H, Shargian L, Shwartz I, et al. Long-term follow-up on the effect of silastic ring vertical gastroplasty on weight and co-morbidities. Obes Surg. 2007;17:737–41.
7. Balsiger BM, Poggio JL, Mai J, et al. Ten and more years after vertical banded gastroplasty as primary operation for morbid obesity. J Gastrointest Surg. 2000;4:598–605.
8. Schouten R, Wiryasaputra DC, van Dielen FM, et al. Long-term results of bariatric restrictive procedures: a prospective study. Obes Surg. 2010;20:1617–26.
9. Suter M, Jayet C, Jayet A. Vertical banded gastroplasty: long-term results comparing three different techniques. Obes Surg. 2000;10: 41–6. discussion 7
10. Baltasar A, Bou R, Arlandis F, et al. Vertical banded gastroplasty at more than 5 years. Obes Surg. 1998;8:29–34.
11. Schouten R, van Dielen FM, van Gemert WG, et al. Conversion of vertical banded gastroplasty to Roux-en-Y gastric bypass results in restoration of the positive effect on weight loss and co-morbidities: evaluation of 101 patients. Obes Surg. 2007;17:622–30.
12. Iannelli A, Martini F, Gugenheim J. Laparoscopic conversion of Roux-en-Y gastric bypass to sleeve gastrectomy for intractable marginal ulcer. Surg Obes Relat Dis. 2015;11:262–4.
13. Westling A, Ohrvall M, Gustavsson S. Roux-en-Y gastric bypass after previous unsuccessful gastric restrictive surgery. J Gastrointest Surg. 2002;6:206–11.
14. Mognol P, Chosidow D, Marmuse JP. Roux-en-Y gastric bypass after failed vertical banded gastroplasty. Obes Surg. 2007;17:1431–4.
15. Mognol P, Chosidow D, Marmuse JP. Laparoscopic conversion of laparoscopic gastric banding to roux-en-Y gastric bypass: a review of 70 patients. Obes Surg. 2004;14:1349–53.
16. Cadiere GB, Himpens J, Bazi M, et al. Are laparoscopic gastric bypass after gastroplasty and primary laparoscopic gastric bypass similar in terms of results? Obes Surg. 2011;21:692–8.
17. Wittgrove AC, Clark GW, Tremblay LJ. Laparoscopic gastric bypass, Roux-en-Y: preliminary report of five cases. Obes Surg. 1994;4:353–7.
18. Miller K, Pump A, Hell E. Vertical banded gastroplasty versus adjustable gastric banding: prospective long-term follow-up study. Surg Obes Relat Dis. 2007;3:84–90.
19. Marsk R, Jonas E, Gartzios H, et al. High revision rates after laparoscopic vertical banded gastroplasty. Surg Obes Relat Dis. 2009;5: 94–8.
20. Cordera F, Mai JL, Thompson GB, et al. Unsatisfactory weight loss after vertical banded gastroplasty: is conversion to Roux-en-Y gastric bypass successful? Surgery. 2004;136:731–7.
21. Amundsen T, Strommen M, Martins C. Suboptimal weight loss and weight regain after gastric bypass surgery-postoperative status of energy intake, eating behavior, physical activity, and psychometrics. Obes Surg. 2017;27:1316–23.
22. Conceicao E, Mitchell JE, Vaz AR, et al. The presence of maladaptive eating behaviors after bariatric surgery in a cross sectional study: importance of picking or nibbling on weight regain. Eat Behav. 2014;15:558–62.
23. Brethauer SA, Kothari S, Sudan R, et al. Systematic review on reoperative bariatric surgery: American Society for Metabolic and Bariatric Surgery Revision Task Force. Surg Obes Relat Dis. 2014;10:952–72.
24. van Wezenbeek MR, Smulders FJ, de Zoete JP, et al. Long-term results after revisions of failed primary vertical banded gastroplasty. World J Gastrointest Surg. 2016;8:238–45.
25. Gagne DJ, Dovec E, Urbandt JE. Laparoscopic revision of vertical banded gastroplasty to roux-en-Y gastric bypass: outcomes of 105 patients. Surg Obes Relat Dis. 2011;7:493–9.
26. Sugerman HJ, Kellum Jr JM, DeMaria EJ, et al. Conversion of failed or complicated vertical banded gastroplasty to gastric bypass in morbid obesity. Am J Surg. 1996;171:263–9.
27. Gonzalez R, Gallagher SF, Haines K, et al. Operative technique for converting a failed vertical banded gastroplasty to Roux-en-Y gastric bypass. J Am Coll Surg. 2005;201:366–74.
28. Thoreson R, Cullen JJ. Indications and results of reversal of vertical banded gastroplasty (VBG). J Gastrointest Surg. 2008;12:2032–6.
29. Reoch J, Mottillo S, Shimony A, et al. Safety of laparoscopic vs open bariatric surgery: a systematic review and meta-analysis. Arch Surg. 2011;146:1314–22.
30. Vasas P, Dillemans B, Van Cauwenberge S, et al. Short- and long-term outcomes of vertical banded gastroplasty converted to Roux-en-Y gastric bypass. Obes Surg. 2013;23:241–8.