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Safety and efficacy of single-stage conversion of failed adjustable gastric band to laparoscopic Roux-en-Y gastric bypass: a case–control study

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Abstract
Background We conducted the following study to evaluate the safety and efficacy of single-stage conversion of failed laparoscopic adjustable gastric band (LAGB) to laparoscopic Roux-en-Y gastric bypass (LRYGB) as compared to a cohort of primary LRYGB patients.
Methods A single-institution, prospectively maintained bariatric database was used to retrospectively identify consecutive patients who underwent single-stage removal of LAGB with concomitant conversion to LRYGB between the years of 2007 and 2013. The study cohort was matched 1:1 for age, gender, body mass index (BMI), and approximate date of operation to patients who underwent primary LRYGB. Primary endpoints were operative time, complication rate, length of hospital stay (LOS), and percent excess BMI lost (%EBMIL) at 24-month follow-up.
Results Ninety-four conversion patients met inclusion criteria. There were no statistically significant differences in the mean LOS (3.1 vs. 3.0 days, $p = 0.97$) or the major complication rate (3.2 vs. 1.1 %, $p = 0.62$) at 30 days postoperatively. Likewise, 30-day minor complication rates, including readmission, were similar between groups (7.5 vs. 6.4 %, $p = 0.77$). The average operative time was significantly longer for conversion compared to primary LRYGB (193.5 vs. 132 min; $p < 0.01$). At most recent follow-up after conversion or primary LRYGB, median %EBMIL was 61.3 and 77.3 % ($p < 0.01$), percent total weight loss was 23.6 and 30.5 % ($p < 0.01$), and percent change in BMI was 23.4 and 30.5 % ($p < 0.01$), respectively. Median follow-up time was 17 and 18.6 months after conversion and primary LRYGB, respectively.
Conclusion Single-stage conversion of LAGB to LRYGB is safe with an acceptable complication rate and similar LOS compared to primary LRYGB.

Keywords Gastric banding · Revisional surgery · Gastric bypass · Obesity · Outcomes

Obesity has become a global health concern, and bariatric surgery has shown to be the most effective therapy for morbid obesity, resulting in sustainable weight loss and improvement in obesity-related comorbidities [1–4]. Laparoscopic adjustable gastric band (LAGB) placement is a commonly performed bariatric operation with proven short-term efficacy and safety [5–8]. Long-term data, however, have revealed concerns regarding sustainable weight loss and complications resulting from the LAGB [9–11]. Consequently, a growing number of LAGB are being removed due to inadequate weight loss and band-related complications.

There are many different strategies for treating patients with LAGB who are concerned with inadequate weight loss or suffering from band-related complications. Removal of the band has been associated with nearly universal weight regain [12]. Conversion of a failed LAGB to a salvage bariatric procedure such as a laparoscopic sleeve

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gastrectomy or laparoscopy Roux-en-Y gastric bypass (LRYGB) has been reported as relatively safe with varying efficacy [13–25]. However, there is no consensus in the bariatric community as to whether conversion is best performed as a single-stage operation or as two procedures. Furthermore, few studies have compared revisional LRYGB to primary LRYGB in terms of weight loss [14, 20, 26]. The purpose of this study was to review our experience with single-stage conversion of LAGB to LRYGB in regard to both safety and efficacy as compared to a matched cohort undergoing primary LRYGB.

Methods

A single-institution, prospectively maintained bariatric database was used to retrospectively identify consecutive patients with planned single-stage removal of LAGB with concomitant conversion to LRYGB between the years of 2007 and 2013. Ninety-six cases were identified. Single-stage conversion of LAGB to LRYGB was aborted in 2 (2.1 %) patients due to technical difficulty and surgeon discretion. Ninety-four patients who underwent conversion from LAGB to LRYGB were identified and matched in a 1:1 ratio with a control cohort of patients who underwent LRYGB as a primary bariatric surgery during the same period. Patients were matched based on age, gender, preoperative BMI at time of conversion, and year of operation. Collected data included demographic characteristics, preoperative BMI, indications for primary or conversion surgery, time from previous bariatric surgery to revisional surgery, operative time, intraoperative complications, length of stay (LOS), 30-day reoperation rate, 30-day readmission rate, 30-day morbidity, 30-day mortality, and percent excess BMI lost (%EBMIL) at 6-, 12-, 18-, and 24-month intervals. Percent EBMIL was calculated using the following equation: (preoperative BMI − current BMI)/(preoperative BMI − 25) × 100.

Revisional LRYGB as well as primary LRYGB was performed by five bariatric surgeons at our institution. Preoperative workup included a routine upper gastrointestinal contrast study prior to surgery with the addition of an upper endoscopy at the discretion of the operating surgeon. All patients undergoing single-stage revision of LAGB to LRYGB received a preoperative dose of 5000 units subcutaneous heparin for thromboembolism prophylaxis. Preoperative antibiotics were administered prior to incision in compliance with institutional protocol. Revisional LRYGB was performed using a four- or five-trocar technique excluding the liver retractor. The procedure began with lysis of adhesions and removal of gastrogastric plication sutures with subsequent removal of the gastric band. We did not routinely remove the fibrous capsule underlying the gastric band and commonly stapled across the capsule, employing larger stapler loads for thickened tissue as needed. Subsequently, the stomach was divided and stapled with a linear stapler to create a 30- to 50-cc gastric pouch. A 40-cm biliopancreatic limb and a 100- to 120-cm Roux limb were then created. A side-to-side jejunojejunal anastomosis was performed using a linear stapler, and the mesenteric defect was routinely closed. An end-to-side, antecolic, antegastric gastrojejunal anastomosis was performed using a linear stapler. The gastrojejunal anastomosis was closed using a hand-sewn vicryl suture, and a second layer was closed by approximating the jejunal serosa anteriorly to the gastric serosa. A leak test was routinely performed using methylene blue or air. Peterson's space was routinely closed. The use of a drain was left to the discretion of the operating surgeon. The subcutaneous gastric band port was routinely removed. Patients undergoing primary LRYGB underwent the procedure as noted above.

The primary endpoint was %EBMIL. Secondary endpoints included major (anastomotic leak, pulmonary embolism, death) and minor (infection, readmission, transfusion) postoperative complications. We used the Chi-square test or Fisher's exact test to assess categorical variables and the *t* test or Mann–Whitney *U* test to assess continuous variables. Fischer's exact test was used when one or more cells in the contingency table had expected counts <5 (Table 3). To assess the influence of primary versus conversion LRYGB on the endpoint of %EBMIL, we used Gray's test to compare cumulative incidence curves between the two matched cohorts. Patients with missing data were excluded from each respective analysis. A p value less than 0.05 was considered statistically significant. Data were analyzed using SAS version 9.3 (Cary, NC).

Results

Ninety-four patients undergoing conversion of LAGB to LRYGB were matched 1:1 to a cohort of patients undergoing primary LRYGB, with respect to age, gender, preoperative BMI, and year of surgery (Table 1). Fourteen patients lacked follow-up data and were excluded from the analysis. The median overall age was 42 years, with 86 % female patients and a median preoperative BMI of 42.4 kg/m^2. There were no significant differences in demographic data between the matched conversion and primary LRYGB cohorts. Patients in the primary LRYGB had a statistically higher incidence of diabetes than those in the conversion group (35.1 vs. 10 %, $p < 0.0001$). There was no statistical difference in the incidence of other obesity-related comorbidities between the two groups.

Table 1 Preoperative characteristics of the conversion LRYGB and primary LRYGB groups

Variable	Conversion	Primary LRYGB	*p*
Number	94	94	
Age at bypass, years	42.0 (32.0–50.0)	42.0 (33.0–49.0)	0.96
Female	81 (86.2 %)	81 (86.2 %)	>0.99
Preoperative BMI	42.4 (38.7–47.9)	42.3 (39.0–47.3)	0.88
Comorbidities			
Diabetes	10 (10.6 %)	33 (35.1 %)	<0.0001
Obstructive sleep apnea	15 (16.0 %)	26 (27.7 %)	0.0520
Hypertension	26 (27.7 %)	37 (39.4 %)	0.0892
Hyperlipidemia	16 (17.0 %)	21 (22.3 %)	0.3590
GERD	25 (26.6 %)	24 (25.5 %)	0.8680

Number (%) or median (interquartile range)

BMI body mass index, *GERD* gastroesophageal reflux disorder, *LRYGB* laparoscopic Roux-en-Y gastric bypass

Patients undergoing conversion LRYGB had a median BMI of 44.3 kg/m^2 at the time of initial gastric banding and a BMI of 42.4 kg/m^2 at the time of conversion LRYGB (Table 2). The median time from LAGB to LRYGB was 44 months (interquartile range [IQR], 31–59), and 16 patients underwent a band revision during the interim period. Indications for conversion to gastric bypass were inadequate weight loss (74.5 %), band intolerance (66 %), esophageal disorders (20.2), band prolapse (11.7 %), band malposition (6.4 %), and port/tubing complications (4.3 %).

There was no mortality in either group (Table 3). There was no statistical difference in 30-day major or minor complication rates between the two groups. The revision group had 10 patients with one complication within 30 days after surgery: two anastomotic leaks (2.1 %), one pulmonary embolus (1.1 %), two superficial wound infections (2.1 %), three readmissions for abdominal pain or dehydration (3.2 %), and two patients requiring transfusion (2.1 %). The primary LRYGB group had seven patients with at least one complication within 30 days after surgery: one anastomotic leak (1.1 %), one case of colitis secondary to clostridium difficile infection (1.1 %), and five readmissions for abdominal pain or dehydration (5.3 %). There was no incidence of anastomotic stenosis in either group. There was no difference in readmission rates between the two groups of patients. Median operative time was significantly higher in the revisional group (193.5 min, IQR 168.0–228.0) as compared to the primary LRYGB group (132.0 min, IQR 115.0–160.0, $p = 0.0001$). All cases were successfully performed laparoscopically.

Table 2 Characteristics of patients undergoing conversion LRYGB

Variable	Number (%) or median (IQR)
Number	94
BMI at banding	44.3 (41.8 to 48.5)
BMI at LRYGB	42.4 (38.7 to 47.9)
%EBMIL at conversion	14.6 (−1.1 to 25.0)
Months to conversion	44.0 (31.0 to 59)
Previous band revision	16 (17.0)
Indication for conversion	
Inadequate weight loss[a]	70 (74.5)
Band intolerance[b]	62 (66.0)
Dilated esophagus	19 (20.2)
Band prolapse	11 (11.7)
Band malposition	6 (6.4)
Port/tubing complication	4 (4.3)

BMI body mass index, *LRYGB* laparoscopic Roux-en-Y gastric bypass, *%EBMIL* percent excess body mass index lost = (preoperative BMI − current BMI)/(preoperative BMI − 25) × 100

[a] Defined as %EBMIL < 25 %

[b] Band intolerance defined as symptomatic reflux, dysphagia, or fill intolerance

Median follow-up was 17 months (IQR 10.9–23.0) and 18.6 months (IQR 10.3–24.6) in the conversion and primary groups, respectively ($p = 0.20$). One-year follow-up was 68.9 % ($n = 62/90$) in the primary cohort and 72.6 % ($n = 61/84$) in the conversion cohort. Two-year follow-up was 30.0 % ($n = 27/90$) in the primary cohort and 15.5 % ($n = 13/84$) in the conversion cohort. At most recent follow-up after conversion or primary LRYGB, median %EBMIL was 61.3 and 77.3 % ($p < 0.01$), percent total weight loss was 23.6 and 30.5 % ($p < 0.01$), and percent change in BMI was 23.4 and 30.5 % ($p < 0.01$), respectively. Percent EBMIL > 50 % was achieved in 57 (67.9 %) patients in the conversion group, compared with 74 (82.2 %) in the primary LRYGB cohort ($p = 0.03$) (Table 4). The cumulative incidence of patients who achieved %EBMIL > 50 % after primary or conversion LRYGB is shown in Fig. 1.

Table 3 Thirty-day outcomes of the revision LRYGB and primary LRYGB groups

Variable	Conversion	Primary LRYGB	*p*
Number (%)	94 (50.0)	94 (50.0)	
Operative time (min)	193.5 (168.0–228.0)	132.0 (115.0–160.0)	<0.01
Major	3 (3.2)	1 (1.1)	0.6210[a]
Anastomotic leak	2 (2.1)	1 (1.1)	>0.9999[a]
Pulmonary embolism	1 (1.1)	0 (0.0)	>0.9999[a]
Minor	7 (7.5)	6 (6.4)	0.7738
Superficial surgical site infection	2 (2.1)	0 (0.0)	0.4973[a]
Clostridium difficile infection	0 (0.0)	1 (1.1)	>0.9999[a]
Readmission	3 (3.2)	5 (5.3)	0.7206[a]
Required transfusion	2 (2.1)	0 (0.0)	0.4973[a]
Postoperative length of stay (days)	3.1	3.0	0.97
30-day mortality	0 (0.0)	0 (0.0)	>0.9999

Number (%) or median (interquartile range)

BMI body mass index, *LRYGB* laparoscopic Roux-en-Y gastric bypass

[a] Fisher's exact test

Table 4 Long-term outcomes of conversion LRYGB versus primary LRYGB groups

Variable	Conversion	Primary LRYGB	*p*
Number	94	94	
Median (IQR) %EBMIL			
6 months, $n = 79, 89$	47.3 (39.6–65.1)	61.4 (48.9–74.1)	<0.01
12 months, $n = 51, 65$	64.8 (45.6–90.6)	79.8 (61.8–95.6)	0.07
18 months, $n = 37, 50$	71.8 (49.3–97.5)	83.7 (68.9–98.7)	0.07
24 months, $n = 26, 39$	75.2 (42.4–97.6)	80.2 (51.4–99.5)	0.67
%EBMIL > 50%	57 (67.9)	74 (82.2)	0.03

Number (%) or median (interquartile range)

%EBMIL percent excess body mass index lost = (preoperative BMI − current BMI)/(preoperative BMI − 25) × 100

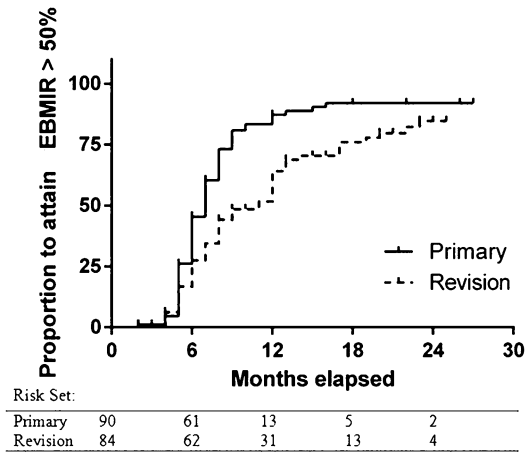

Fig. 1 Cumulative incidence of %EBMIL > 50 % in conversion LRYGB versus primary LRYGB ($p = 0.0006$ by Gray's test). *%EBMIL* percent excess body mass index lost = (preoperative BMI − current BMI)/(preoperative BMI − 25) × 100

Discussion

LAGB was one of the most frequently performed bariatric procedures of the last decade [27]. Long-term data showing revision and explantation rates upward of 60 % have sharply diminished the role of LAGB as a primary bariatric procedure [28, 29]. Laparoscopic single-stage revision of LAGB to LRYGB has been shown to be a safe and effective salvage procedure for patients with inadequate weight loss and/or band intolerance [16]. Revisional surgery after failed LAGB has also been shown to confer a higher risk of postoperative complications [30–32]. Moreover, questions still persist about the efficacy of weight loss after revisional LRYGB since few comparative studies have been done to evaluate outcomes after revisional versus primary LRYGB [18, 20, 33, 34]. Our study is one of the largest of its kind comparing a matched cohort of patients undergoing primary LRYGB to patients undergoing revision of LAGB to LRYGB.

Reoperative bariatric surgery is considered technically more challenging than primary bariatric surgery due to the need for adhesiolysis, distortion of natural tissue planes, and in the particular case of failed LAGB, handling of the fibrous capsule underlying the band. In our practice, we do not routinely remove in entirety the fibrous capsule underlying the band prior to creating our new staple line unless there is a specific indication to do so. We have not found compelling evidence that suggests removal of the fibrous capsule to be a necessary step or superior method of performing a revisional procedure. Nonetheless, as a result of these challenges, the morbidity with revisional surgery is typically higher than with primary procedures. In our study, there was no significant difference in complication rates between primary and revisional surgery for patients undergoing single-stage conversion of an LAGB to LRYGB. Revisional procedures did have a significantly longer operative duration, consistent with the increased degree of difficulty and added operative steps in removing a gastric band in conjunction with performing an LRYGB.

Our study revealed significant differences in long-term weight loss outcomes in primary and conversion LRYGB groups. At the point of longest follow-up, 67.9 % of patients in the conversion groups achieved >50 % %EBMIL as compared to 82.2 % of primary LRYGB patients ($p = 0.03$). Notably, however, our conversion cohort had on average 14.6 % EBMIL at the time of conversion from their original LAGB placement and inadequate weight loss was cited as the primary indication for revision (74.5 %). Our data suggest that while revisional surgery is not as effective as primary LRYGB in terms of long-term weight loss, there is still a profound effect for patients failing to achieve adequate weight loss after LAGB.

Our reported complication rate, operative time, and LOS are similar to other published results from studies investigating conversion from LAGB to LRYGB [24, 35–37]. Major complication rates were 3.2 and 1.1 % for the conversion and primary cohorts, respectively. There was no difference in LOS. The conversion group had two anastomotic leaks at the gastrojejunal anastomosis, and there was one leak in the primary LRYGB which was at the jejunojejunostomy site and complicated by a hematoma. There were no incidences of anastomotic stricture in either group. Total complication rates between the two groups were not statistically different.

While we believe that single-stage conversion of failed LAGB to LRYGB is a safe and effective means of treating morbidly obese patients, we acknowledge the role of a two-stage procedure when necessary. Revisional surgery is fraught with unexpected findings, such as band erosion, which may necessitate the use of a two-staged approach. Single-stage conversion offers the advantages of reduced waiting time and potential weight regain for patients, financial incentives associated with a single operation, greater access to services and potentially greater coverage for procedures, and a more efficient utilization of resources.

The limitations of our study are multifold. Although we maintain our bariatric database in a prospective manner, our study is retrospective by nature with inherent biases. While we believe our follow-up of 24 months is adequate for this analysis, longer follow-up period may establish differences in outcomes over greater time periods. Moreover, at 24 months, our study includes 65 of the original 188 patients, representing 35 % of the original study population. Loss to follow-up at this time point indicates that our analysis may be underpowered and biased from differential censoring. Moreover, while we present one of the largest study populations found in the literature examining this issue, there are limitations to the power of our study to detect differences between groups. Assuming a 1 % control group (i.e., primary cohort) leak rate, this study with 94 patients per group has approximately 9 % power to detect a 1 % difference between groups.

Conclusion

Single-stage conversion of LAGB to LRYGB is a safe and effective method of treating patients with failed LAGB due to inadequate weight loss or complications of the band.

Compliance with ethical standards

Disclosure Drs. Samakar, McKenzie, Madenci, Tavakkoli, Vernon, Shikora, Robinson and Mr. Kaberna have no conflicts of interest or financial ties to disclose.

Ethical approval For this type of study (retrospective) formal consent is not required.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

1. Buchwald H (2005) Consensus conference statement bariatric surgery for morbid obesity: health implications for patients, health professionals and third-party payers. Surg Obes Relat Dis 1:371–381
2. Buchwald H, Avidor Y, Braunwald E, Jensen MD, Pories W, Fahrbach K, Schoelles K (2004) Bariatric surgery: a systematic review and meta-analysis. JAMA 292:1724–1737
3. Buchwald H, Estok R, Fahrbach K, Banel D, Jensen MD, Pories WJ, Bantle JP, Sledge I (2009) Weight and type 2 diabetes after bariatric surgery: systematic review and meta-analysis. Am J Med 122:248–256
4. Colquitt JL, Picot J, Loveman E, Clegg AJ (2009) Surgery for obesity. Cochrane Database Syst Rev 2:CD003641

5. Cunneen SA, Phillips E, Fielding G, Banel D, Estok R, Fahrback K, Sledge I (2008) Studies of Swedish adjustable gastric band and Lap-Band: systematic review and meta-analysis. Surg Obes Relat Dis 4:174–185
6. Lancaster RT, Hutter MM (2008) Bands and bypasses: 30-day morbidity and mortality of bariatric surgical procedures as assessed by prospective, multi-center, risk-adjusted ACS-NSQIP data. Surg Endosc 22:2554–2563
7. O'Brien PE, Macdonald L, Anderson M, Brennan L, Brown WA (2013) Long-term outcomes after bariatric surgery: fifteen-year follow-up of adjustable gastric banding and a systematic review of the bariatric surgical literature. Ann Surg 257(1):87–94
8. Favretti F, Segato G, Ashton D, Busetto L, De Luca M, Mazza M, Ceoloni A, Banzato O, Calo E, Enzi G (2007) Laparoscopic adjustable gastric banding in 1,791 consecutive obese patients: 12-year results. Obes Surg 17(2):168–175
9. Suter M, Calmes JM, Paroz A, Giusti V (2006) A 10-year experience with laparoscopic gastric banding for morbid obesity: high long-term complication and failure rates. Obes Surg 16(7):829–835
10. DeMaria EJ, Sugerman HJ, Meador JG, Doty JM, Kellum JM, Wolfe L, Szucs RA, Turner MA (2001) High failure rate after laparoscopic adjustable silicone gastric banding for treatment of morbid obesity. Ann Surg 233(6):809–818
11. Kindel T, Martin E, Hungness E, Nagle A (2014) High failure rate of the laparoscopic-adjustable gastric band as a primary bariatric procedure. Surg Obes Relat Dis 10(6):1070–1075
12. Aarts EO, Dogan K, Koehestanie P, Janssen IMC, Berends FJ (2014) What happens after gastric band removal without additional bariatric surgery? Surg Obes Relat Dis. doi:10.1016/j.soard.2013.10.014
13. Santos BF, Wallaert JB, Trus TI (2014) Band removal and conversion to sleeve or bypass: are they equally safe? Surg Endosc. doi:10.1007/s00464-014-3584-9
14. Martin MJ, Mullenix PS, Steele SR, See CS, Cuadrado DG, Carter PL (2004) A case-match analysis of failed prior bariatric procedures converted to resectional gastric bypass. Am J Surg 187:666–671
15. Topart P, Becouarn G, Ritz P (2009) One-year weight loss after primary or revisional Roux-en-Y gastric bypass for failed adjustable gastric banding. Surg Obes Relat Dis 5:459–462
16. Sanchez H, Cabrera A, Cabrera K, Zerrweck C, Mosti M, Sierra M, Dominguez G, Herrera MF (2008) Laparoscopic Roux-en-Y gastric bypass as a revision procedure after restrictive bariatric surgery. Obes Surg 18:1539–1543
17. van Wageningen B, Berends FJ, Van Ramshorst B, Janssen IF (2006) Revision of failed laparoscopic adjustable gastric banding to Roux-en-Y gastric bypass. Obes Surg 16:137–141
18. te Riele WW, Sze YK, Wiezer MJ, Van Ramshorst B (2008) Conversion of failed laparoscopic gastric banding to gastric bypass as safe and effective as primary gastric bypass in morbidly obese patients. Surg Obes Relat Dis 4:735–739
19. Brolin RE, Cody RP (2008) Weight loss outcome of revisional bariatric operations varies according to the primary procedure. Ann Surg 248:227–232
20. Zingg U, McQuinn A, DiValentino D, Kinsey-Trotman S, Game P, Watson D (2010) Revisional vs. primary Roux-en-Y gastric bypass—a case-matched analysis: less weight loss in revisions. Obes Surg 20:1627–1632
21. Radtka JF III, Puelo FJ, Wang L, Cooney RN (2010) Revisional bariatric surgery: who, what, where, and when? Surg Obes Relat Dis 6:635–642
22. Mongol P, Chosidow D, Marmuse JP (2004) Laparoscopic conversion of laparoscopic gastric banding to Roux-en-Y gastric bypass: a review of 70 patients. Obes Surgt 14:1349–1353
23. Spivak H, Beltran OR, Slavchev P, Wilson EB (2007) Laparoscopic revision from LAP-BAND to gastric bypass. Surg Endosc 8:1388–1392
24. Marin-Perez P, Betancourt A, Lamota M, Menzo EL, Szomsteins S, Rosenthal R (2014) Outcomes after laparoscopic conversion of failed adjustable gastric banding to sleeve gastrectomy or Roux-en-Y gastric bypass. BJS 101:254–260
25. Weber M, Muller MK, Michel JM, Belal R, Horber F, Hauser R, Clavien PA (2003) Laparoscopic Roux-en-Y gastric bypass, but not rebanding, should be proposed as rescue procedure for patients with failed laparoscopic gastric banding. Ann Surg 238:827–833
26. Mor A, Keenan E, Portenier D, Torquati A (2013) Case-matched analysis comparing outcomes of revisional versus primary laparoscopic Roux-en-Y gastric bypass. Surg Endos 27:548–552
27. Buchwald H (2008) Introduction and current status of bariatric procedures. Surg Obes Relat Dis 4:21–26
28. Victorzon M, Tolonen P (2013) Mean fourteen-year, 100% follow-up of laparoscopic adjustable gastric banding for morbid obesity. Surg Obes Relat Dis 5:753–757
29. Elnahas A, Graybiel K, Farrokhyar F, Gmora S, Anvari M, Hong D (2013) Revisional surgery after failed laparoscopic adjustable gastric banding: a systematic review. Surg Endos 27:740–745
30. Roller JE, Provost DA (2006) Revision of failed gastric restrictive operations to Roux-en-Y gastric bypass: impact of multiple prior bariatric operations on outcome. Obes Surg 16:865–869
31. Ikramuddin S, Kellogg TA, Leslie DB (2007) Laparoscopic conversion of vertical banded gastroplasty to a Roux-en-Y gastric bypass. Surg Endosc 21:1927–1930
32. Khaitan L, Van Sickle K, Gonzalez R, Lin E, Ramshaw B, Smith CD (2005) Laparoscopic revision of bariatric procedures: is it feasible? Am Surg 6:206–211
33. Deylgat B, D'Hondt M, Pottel H, Vansteenkiste F, Van Rooy F, Devriendt D (2012) Indications, safety, and feasibility of conversion of failed bariatric surgery to Roux-en-Y gastric bypass: a retrospective comparative study with primary laparoscopic Roux-en-Y gastric bypass. Surg Endosc 26:1997–2002
34. Delko T, Kostler T, Peev M, Esterman A, Oertli D, Zingg U (2014) Revisional versus primary Roux-en-Y gastric bypass: a case-matched analysis. Surg Endosc 28:552–558
35. Carr WRJ, Jennings NA, Boyle M, Mahawar K, Balupuri S, Small PK (2015) A retrospective comparison of early results of conversion of failed gastric banding to sleeve gastrectomy or gastric bypass. Surg Obes Relat Dis 2:379–384
36. Aarts E, Koehestanie P, Dogan K, Berends F, Janssen I (2014) Revisional surgery after failed gastric banding: results of one-stage conversion to RYGB in 195 patients. Surg Obes Relat Dis 10:1077–1083
37. Emous M, Apers J, Hoff C, van Beek AP, Totte E (2015) Conversion of failed laparoscopic adjustable gastric banding to Roux-en-Y gastric bypass is safe as a single-step procedure. Surg Endosc 29(8):2217–2223