Surg Endosc (2015) 29:2217–2223
DOI 10.1007/s00464-014-3928-5

Conversion of failed laparoscopic adjustable gastric banding to Roux-en-Y gastric bypass is safe as a single-step procedure

M. Emous · J. Apers · C. Hoff · A. P. van Beek · E. Totté

Received: 8 May 2014 / Accepted: 16 September 2014 / Published online: 16 October 2014

Abstract
Background Several different procedures have been proposed as a revisional procedure for treatment of failed laparoscopic adjustable gastric banding (LAGB). Laparoscopic Roux-en-Y gastric bypass (LRYGB) has been advocated as the procedure of choice for revision. In this study, we compare the single- and two-step approaches for the revision of failed LAGB to LRYGB.
Method All patients who underwent bariatric surgery were included in a prospective database. For the purpose of this study, patients who underwent revisional surgery from LAGB to LRYGB were selected. Records for individual patients were completed by data review. Complication rates and weight development were recorded until 2 years postoperatively. Data were compared between both procedures and with complications rates reported in literature.
Results Revisional gastric bypass surgery was performed in 257 patients. This was done as a planned single-step procedure in 220 (86 %) patients without indications for acute band removal and in 32 patients as a planned 2 step procedure. Five patients were planned as a single-step procedure but were intraoperatively converted to a 2-step procedure based on poor pouch tissue quality. No postoperative mortality occurred in both groups. No differences in early major morbidity and stricture formation were seen between the two groups. Gastric ulceration was more frequently observed after 2-steps procedure (8.5 vs. 1.7 %, $p < 0.05$). In comparison with data reported in literature, the single-step procedure had similar to lower complication rates. Percentage excess weight loss two years after revisional gastric bypass procedure was, respectively, 53 versus 67 % ($p = 0.147$) for single- and two-step procedure.
Conclusion In patients without indications for acute band removal, the planned conversion of gastric banding to Roux-Y gastric bypass can be safely done in a single-step procedure without increase in morbidity and no difference in postoperative weight loss.

Keywords Obesity · Bariatric · Surgical · Complications

Morbid obesity is a growing healthcare problem across the world. In the Netherlands, 35.4 % of the adult population suffers from obesity and 11.8 % of the adult population from morbid obesity [1]. Weight-loss surgery is the only way to achieve sustained weight loss, resolve comorbidities and improve longevity [2]. Adjustable gastric banding has long been the first choice for weight-loss surgery as it is a relatively simple operation with low postoperative morbidity and mortality rates, especially since the introduction of the laparoscopic approach. Excess weight loss can be reached, ranging from 44 to 68 % after 4 years and from 38 to 46 % in 10–12 years. [3–6] In the long-term, a large proportion (25 %) of patients with gastric banding needs revisional surgery because of disappointing weight-loss results or banding complications [6–8].

The relative disadvantages of LAGB include the need for frequent follow-up and band adjustment, and there is

Part of the presented study was presented on the 18th World Congress IFSO Istanbul 28–31 August 2013.

M. Emous (✉) · J. Apers · C. Hoff · E. Totté
Department of Bariatric and Metabolic Surgery, Medisch Centrum Leeuwarden, Henri Dunantweg 2, 8934 AD Leeuwarden, The Netherlands
e-mail: marloes.emous@znb.nl

A. P. van Beek
Department of Endocrinology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands

potential for adverse band-related symptoms such as food intolerance, vomiting and reflux disease [6, 9]. In addition, late-complication rates after LAGB are common and even increase with time. The most frequent complications are band slippage, band erosion, pouch dilatation and port complications [6–8, 10]. For these reasons, the surgical revision rate is high. Even using the pars flaccida technique, revision is still substantial and ranges between 18 and 30 % after 5–8 years [3, 7, 8].

Surgical options for patients with band complications, insufficient weight loss or weight regain include removal, repositioning or replacement of the band, or conversion to an alternative procedure, such as gastric sleeve, gastric bypass or duodenal switch [11]. In the case of failed gastric banding, the procedure of choice is removal of the gastric band and performance of a gastric bypass [12]. Conversion to gastric bypass is often performed as a two-step procedure but it can be performed as a one-step operation [13–15]. However, there are no data available on the safety of the one-step procedure in a large population. For this reason, we reviewed the early and late complications and the postoperative weight loss results of the conversion of failed LAGB to LRYGB as a one-step procedure in patients.

Method

Data

From January 2008 to December 2011, all patients who underwent bariatric surgery at the Centre for Obesity at the Medical Centre Leeuwarden were included in a prospective database. For the purpose of this study, we performed a retrospective review of prospectively collected data. Patients who underwent revisional surgery from LAGB to LRYGB were selected and analysed. Records for individual patients were completed by data review. Data are reported according to the STROBE statement [16].

Patients

All patients were aged between 18 and 65 years at the time of the primary LAGB, in accordance with international guidelines [17]. Indications for revisional procedures included: insufficient weight loss (<50 % EWL), weight regain (>5 BMI points) with healthy lifestyle and diet or band-related complications in a well-motivated patient. Preoperative assessment of patients eligible for revisional surgery included counselling by dietician and psychologist in order to exclude non-adjusted eating patterns or eating disorders. If detected, these issues were addressed before surgery was considered.

Preoperative procedures

All patients were preoperatively consulted with and received extensive information about the procedures, possible complications, expectations for weight loss, changes in lifestyle, eating behaviour and the importance of exercise. A gastrograffin swallow X-ray was routinely performed on all patients prior to surgery. In case of suspicion of ulceration or erosion, an endoscopic evaluation was performed. Dietary advice prior to surgery consisted of a three-week high-protein, low-carbohydrate diet.

Definition and evaluation of band complications

All band complications were documented preoperatively, either by endoscopy, radiological imaging, or cultures from cutaneous fistula or access port (Table 1).

Band migration or slipping was visualised on a gastrograffin swallow. Band erosions were detected by gastroscopy. Band infection was defined by abscesses near the band on CT-scan or positive cultures from cutaneous fistula or access port. Pouch or oesophageal dilatation was also demonstrated by the gastrograffin swallow and failed to improve by emptying the band. Severe band intolerance was defined as dysphagia, odynophagia, vomiting or reflux interfering in daily life in the presence of a deflated band and in the absence of other band complications as described above.

Table 1 Indications for revisional gastric bypass surgery in patients undergoing a one- and two-step procedure

	One step $N = 220$ (%)	Two step[a] $N = 37$ (%)	p value
Band complications			
Erosion	0	2 (5.4)	**<0.001**
Migration	7 (3.2)	2 (5.4)	0.496
Leakage of band	3 (1.4)	1 (2.7)	0.543
Slipping	15 (6.7)	9 (25.7)	**<0.001**
Dysmotility	38 (17.3)	12 (35.1)	**0.012**
Infection of band	0	1 (0.5)	0.681
Pouch formation	19 (8.6)	6 (13.5)	0.346
Indications not related to band complications			
Insufficient weight loss	81 (36.8)	8 (21.6)	0.072
Weight regain	63 (28.2)	13 (37.8)	0.234
Insufficient weight loss and weight regain	19 (8.6)	1 (5.4)	0.213
Reason unknown	19 (8.6)	2 (5.4)	0.507

Significant p values are in bold

Data are absolute numbers (percentage). p value by Chi square

[a] More indications in one patient possible

One- or two-step procedure

One-step procedures were planned after the preoperative preparations described above. In the two-step procedure, the removal of the band was planned briefly after presentation (depending on the severity of band complications) and the second step took place after the above preoperative procedure and was planned several months after band removal. Patients presenting with acute symptoms such as infection, migration or erosion of the band with an indication for acute band removal were booked for a two-step procedure. Patients with severe band intolerance in combination with slipping or pouch formation that did not improve by deflating, and who were not willing to wait for a planned one-step procedure, were also booked for a two-step procedure. All other patients were booked for a one-step procedure.

Operative technique

We performed a standardised operation protocol in all patients. We used the six trocarts technique and first removed the band and performed an adhesiolysis of the angle of His. The capsula of the band on the stomach was occasionally divided or removed. Then we continued to perform the bypass. The formation of the pouch was done by linear stapling (Ethicon Endo-Surgery, Inc, Cincinnati, USA). We started the creation of the pouch just below the scar tissue of the band, approximately 4–5 cm below the gastro-oesophageal junction at the lesser curvature. The staple line of the pouch is created just outside the scarred and compromised tissue and, therefore, probably bigger than it would be in primary procedure. The estimated volume of the pouch was 60–80 cc. The biliopancreatic limb was measured at 80 cm from the angle of Treitz. With this loop, the gastro-enterostomy was made by linear stapling and the anterior defect was closed with sutures. An alimentary limb of 150 cm was measured, and the latero-lateral entero-enterostomy was fashioned with the endoscopic linear stapler and interrupted sutures. Control of integrity of both anastomoses was performed by methylene and air-leak testing after introduction of a gastric tube by the anaesthesiologist. In occurrence of leakage, additional sutures were placed. After testing for both anastomoses, the Roux-en-Y construction was completed by dividing the loop with linear stapling between the two anastomoses. The technique of the one-step revisional procedure is also described by Hii [15]. All anastomoses were covered by tissue col (Baxter). The mesenteric defects were not routinely closed. Operative procedure times were recorded for all operations, however, for 10 operations these data were not available. On the first postoperative day, a gastrografin swallow was performed to check the integrity of the gastroenteric anastomosis in prospect of oral intake.

Postoperative care

Patients were allowed to eat fluid meals for three weeks from the first postoperative day on in case of the absence of leakage on the gastrografin swallow. Most patients were discharged from hospital two to four days after revisional surgery and 24 h after band removal. Before discharge, patients were informed about signs of complications and pressed to call the outpatient clinic or emergency department in case of fever, new severe abdominal pain, vomiting, melena, hematemesis and failure to eat. In the event of these alarm symptoms, gastrografin swallows and blood tests for infections and/or CT-scanning were made to rule out leakage of anastomosis. Postoperative counselling was done by the surgeon at 4 weeks and 12 months after surgery and yearly thereafter. After surgery all patients were given a 2-year-long sequential group meeting programme, including counselling by a bariatric nurse practitioner and appointments with a dietician, a psychologist and a physiotherapist. Follow-up rates after 1 and 2 years (22–26 months) postoperatively were 93 and 75 %, respectively.

Definition of postoperative complications

Complications that developed within 30 days after surgery were classified as early complications. Major complications in this group included anastomotic leakage, intra-abdominal abscess formation, myocardial infarction, pulmonary embolism, cerebrovascular accident (CVA), any reoperation, and death.

Late complications were complications that developed more than 30 days postoperatively. We registered gastric ulcer formation or stricture of gastrojejunal anastomosis as late complications.

Weight loss

The ideal weight of every patient was estimated based on a target BMI of 25. The percentage of excess weight loss (%EWL) was calculated as ((operative weight – follow-up weight)/operative excess weight) $\times$ 100.

Statistics

The analyses were all carried out using the PASW (SPSS, Inc., Armonk, NY, USA) Statistics 20 package. Data are presented as mean ($\pm$SD), median (ranges), frequencies or percentages, where appropriate. Chi square with Yates correction for continuity was used for comparison of

proportions. Significance was assumed for p values lower than 0.05.

Results

Patient characteristics

Between 2008 and 2011, 257 patients were treated for failed banding by removal of the band and construction of a Roux-en-Y gastric bypass. The median age of patients was 43 (range 23–70) and 83 % were female. Gastric banding was performed in other hospitals in 173 patients (67 %). The median time between LAGB and LRYGB was 57 months (range 7–219) and follow up after revisional procedures was 29 months (range 1–69). The mean age in the one-step and two-step groups was 44 and 42 years, respectively ($p = 0.252$). No difference in follow-up time was seen between the two patient groups (29 and 31 months, $p = 0.342$)

Indications and planning of revisional surgery

Indications for revisional gastric bypass surgery in patients are shown in Table 1. A one-step procedure was performed in 220 patients (85.6 %). The most frequent indications for revisional surgery in this group were related to insufficient weight loss or weight regain. Band-related complications were especially dysmotility, slipping and pouch formation. Some patients had more than one indication for revision. In 32 patients, a two-step procedure was planned and performed. The primary reasons for band removal in the two-step group were slipping, pouch formation or dysmotility in which conservative treatment failed and not insufficient weight loss or weight regain. In addition, five patients were planned as a one-step procedure but converted to a two-step procedure on the basis of surgical judgement of damage or poor tissue quality of the pouch (1 erosion; 2 perforations; 1 extreme pouch formation with thin wall; and 1 suspicion of malignancy, which, during follow up, proved to be scar tissue). Two patients died in the follow-up period (one in each group), one of myocardial infarction and one after suicide by depression, both not attributable to surgery.

Peri-operative details

Cumulative duration of both removal of gastric band and the performance of gastric bypass was, respectively, 118 min (range 57–315) and 222 min (range 114–331) for one- and two-step procedures ($p = 0.000$). The average operation time of laparoscopic removal of the gastric band as the first step in the two-step procedure was 76 min (range 27–175). The average operation time of gastric bypass as the second step in the two-step procedure was 115 min (range 61–263).

Total postoperative hospital stay was three days (range 2–71) for one-step and 5 days [3–18] for two-step procedures ($p = 0.201$), respectively

Complications of revisional surgery

All patients were seen in outpatient clinics after 4 weeks, therefore, all early major complications could be scored. No mortality was seen after operation. The total early complication rate for major morbidity was 4.6 % in both groups combined (Table 2). No myocardial infarction, CVA or pulmonary embolism was seen. No differences were seen in stricture formation or leakage of the gastro-jejunal anastomosis between both procedures. The latter complication was treated in four patients by laparoscopy, drainage and, if possible, suture repair of the leak. Two patients received a stent and percutaneous drainage. One patient was treated by laparoscopic lavage of the abdomen and antibiotics. Hospital stay was prolonged in all patients with complications. One patient had a severe sepsis due to anastomotic leakage, which was treated on the ICU, total hospital stay in this patient was 71 days. The only difference in the late-complication rate was seen in the development of gastric ulcers, which was more frequent after two-step procedures than after one-step procedures (8.5 vs. 1,7 %, $p = 0{,}03$). The median time after revisional bypass for developing gastric ulcers was 21 months (range 7–30); for stenosis it was 13 months (range 9–17).

Weight loss

Weight loss and BMI before and after primary gastric banding and revisional gastric bypass surgery are shown in Table 3. Thirteen patients gained weight after the revisional procedure, one by 10 BMI points, the others by within three BMI points. Twenty-five patients reached a BMI lower than 26 (10 of these were in the two-step group). The median Excess Weight Loss percentage (%EWL) 29 months after one-and two-step procedures was 53 % (range 112–181) and 67 % (range 22–151; $p = 0.147$), respectively.

Discussion

In this large single-centre study, we show that a planned conversion of LAGB to Roux-Y gastric bypass can be safely done in a one-step procedure. Complication rates were comparable between one- and two-step procedures. Also, the need for conversion to a two-step procedure was

Table 2 Complications after revisional gastric bypass surgery in patients undergoing one- and two-step procedures

	One step $N = 220$	Two step $N = 37$	p value*	References review Coblijn [22]	References cohort Hii [14] $N = 82$
Early postoperative complications					
Leakage of gastroenterostomy	5 (2.3)	2 (4.5)	0.279	1.8 %	
Intraabdominal abscess (no signs of leakage)	2 (0.9)	0	0.560		
Bleeding necessitating operation	1 (0.5)	0	0.681	0.9 %	
Suspicion of leakage but negative laparoscopy	2 (0.9)	0	0.560		
Mortality	0	0		0 %	
Total major morbidity	10 (4.6)	2 (4.5)	0.711		
Late postoperative complications					
Gastric ulcer formation	4 (1.8)	3 (1.8)	**0.030**		16 (2.4)
Stricture formation at anastomosis	1 (0.5)	1 (2.7)	0.151		19.5 %

Significant p value is in bold

Data are absolute numbers (percentage). Asterisk indicates p value by Chi square between one-step and two-step revisional procedures

Table 3 Weight and BMI development after primary gastric banding and at time of and after one- and two-step revisional gastric bypass procedures

	One-step procedure			Two-step procedure			
	Weight (kg)	BMI	%EWL	Weight	BMI	%EWL	p value
At gastric banding	135 (79–197)	46 (29–65)		133 (100–197)	43 (35–59)		0.978[b]
Lowest reached after gastric banding	105 (60–169)	36 (22–55)		100 (57–142)	31 (20–42)		0.005[b]
At revisional procedure	121 (65–211)	40 (25–70)		120 (72–160)	40 (25–51)		0.881[b]
Last visit[a]	93 (56–199)	32 (20–66)		90 (60–139)	29 (20–42)		0.074[b]
Total %EWL from gastric bypass			53 % (−112 to 181)			67 % (−23 to 151)	0.147
Total %EWL starting from gastric banding			67 % (−4 to 175)			77 % (11–140)	0.027

Data are median (range)

[a] Median follow up 29 months after gastric bypass

[b] Calculated on BMI

low. Several studies already showed the feasibility of converting gastric banding to gastric bypass [18, 19]. This is the first study that shows the safety in a large homogenous cohort of more than 250 patients operated in a small period of time (four years).

Since complication rates after LAGB are common, the need for revisional procedures is increasing [6–8, 10]. Schouten et al. described a 'decision tree' for the treatment of failed banding [12]. They argued that in case of poor weight loss or banding complications such as pouch formation or erosion, conversion to gastric bypass must be proposed. Rebanding can only be considered in case of adequate weight loss and banding problems such as leakage or migration without other complications. Revision to another procedure can be done by either a one-step or two-step approach. The one-step procedure has the advantage of circumventing the need for a second operation 2–3 months later and thereby results in a shorter cumulative operation time and hospital stay [14]. Several studies describe the one-step procedure without comparing it with a two-step procedure [13, 18, 20, 21]. In addition, a recent population-based study showed not only an increase in reoperations after gastric banding, but also that patients had more adverse outcome after revisional surgery than patients with primary gastric bypass [22]. A recent review of literature by Coblijn showed higher complication rates of revisional procedures compared with primary procedures [23].

A disadvantage of the one-step approach could be the potentially higher risk of anastomotic leakage because of the fibrosis that is present after removal of the band. However, the series of Hii, Apers, and Van Nieuwenhoven, in which patients who underwent a one-step procedure were compared with those who underwent a two-step procedure, showed no differences in anastomotic leakage

[13–15]. All these studies were limited to a relatively small patient group. In our large cohort we confirm their results.

Another possible disadvantage of the one-step procedure is anastomotic stricture formation, which is suggested to be significantly higher after the one-step approach [14, 15]. In both series, circular stapling is used. In our series, by contrast, we used linear stapling for creation of the gastroenterostomy, which may explain the differences. Significant differences in ulcer formation were seen in the two-step group; we have no straightforward explanation for this. In theory, the possibility exists that in the two-step approach the creation of the pouch is in vascular-compromised tissue because of scarring. In case of the one-step procedure, scar tissue is easily recognised and stapling takes place around this vascular-compromised tissue.

Weight-loss results showed a difference between one- and two-step procedures of 14 % (53 vs. 67) without statistic significance. However, calculating from before gastric banding until the last visit after revisional procedure, the two-step group reached a lower BMI and a higher cumulative %EWL. This difference is due to the higher %EWL after gastric banding, in favour of the two-step procedure. In this group, all patients suffered from banding complications such as dysmotility, slipping, etc. Therefore, intake was possibly lower than in the one-step group, and, therefore, they reached a higher %EWL. As a result we think that the cumulative %EWL from banding and gastric bypass is more indicative of the results than the %EWL after revisional gastric bypass alone.

Our study has an observational design and, therefore, bias could have been introduced. The indications for one- or two-step procedures were not strictly agreed upon in advance, and, therefore, some patients with subjective severe complaints were given a two-step procedure. Furthermore, indications for one-step revisional surgery were predominantly insufficient weight loss or weight regain, while indications for two-step conversion were mainly due to complications. This selection may have led to unbalanced comparisons between both groups. On the other hand, it is a description of daily surgical practise and shows that with careful selection of patients the complication rates were excellent compared to both two-step procedures and those reported in the literature [23].

In general, we advise that patients with an acute indication for band removal, such as infection, slipping, migration or erosion, are more suitable for a separated two-step procedure, undergoing definitive gastric bypass several months after band removal. This is not only for safety reasons but also because these patients should be properly informed and prepared in terms of their expectations after gastric bypass. These aspects are usually time consuming and impossible to plan for prior to acute band removal. In all other patients, in our experience the majority, elective band removal can be safely combined with simultaneous gastric bypass surgery.

Acknowledgments We like to thank miss S. Evans for editing and correcting linguistic errors.

Disclosure M Emous, J Apers, C Hoff, AP van Beek, E Totté have no conflicts of interest or financial ties to disclose.

References

1. Swinkels H (2011) Trendcijfers gezondheidsenquête 1981–2009. gebruik geneeskundige voorzieningen, gezondheidsindicatoren en leefstijl. centraal bureau voor de statistiek, 2011. accessed may 2011, at. 2011. Report No.: http://www.cbs.nl/NR/rdonlyres/9FDDE4AF-22BE-4714-A3B9-B984D805E1CC/0/2011trendcijfersgezondheidsenqu%EAte19812009art.pdf
2. Colquitt J, Picot J, Lovemen E, Clegg A (2009) Surgery for obesity (review). Cochrane Database of Systematic Reviews. 2009(2)
3. Spivak H, Abdelmelek MF, Beltran OR, Ng AW, Kitahama S (2012) Long-term outcomes of laparoscopic adjustable gastric banding and laparoscopic roux-en-Y gastric bypass in the united states. Surg Endosc 26(7):1909–1919
4. Himpens J, Cadiere GB, Bazi M, Vouche M, Cadiere B, Dapri G (2011) Long-term outcomes of laparoscopic adjustable gastric banding. Arch Surg 146(7):802–807
5. Franco JV, Ruiz PA, Palermo M, Gagner M (2011) A review of studies comparing three laparoscopic procedures in bariatric surgery: sleeve gastrectomy, roux-en-Y gastric bypass and adjustable gastric banding. Obes Surg 21(9):1458–1468
6. Chapman AE, Kiroff G, Game P, Foster B, O'Brien P, Ham J et al (2004) Laparoscopic adjustable gastric banding in the treatment of obesity: a systematic literature review. Surgery 135(3):326–351
7. Zuegel NP, Lang RA, Huttl TP, Gleis M, Ketfi-Jungen M, Rasquin I et al (2012) Complications and outcome after laparoscopic bariatric surgery LAGB versus LRYGB. Langenbecks Arch Surg 397:1235–1241
8. Van Nieuwenhove Y, Ceelen W, Stockman A, Vanommeslaeghe H, Snoeck E, Van Renterghem K et al (2011) Long-term results of a prospective study on laparoscopic adjustable gastric banding for morbid obesity. Obes Surg 21(5):582–587
9. Snow JM, Severson PA (2011) Complications of adjustable gastric banding. Surg Clin North Am 91(6):1249–1264
10. Hamdan K, Somers S, Chand M (2011) Management of late postoperative complications of bariatric surgery. Br J Surg 98(10):1345–1355
11. 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 Endosc 27(3):740–745
12. Schouten R, Japink D, Meesters B, Nelemans PJ, Greve JW (2011) Systematic literature review of reoperations after gastric banding: is a stepwise approach justified? Surg Obes Relat Dis 7(1):99–109
13. Apers JA, Wens C, van Vlodrop V, Michiels M, Ceulemans R, van Daele G et al (2013) Perioperative outcomes of revisional laparoscopic gastric bypass after failed adjustable gastric banding and after vertical banded gastroplasty: experience with 107 cases and subgroup analysis. Surg Endosc 27:558–564
14. Van Nieuwenhove Y, Ceelen W, Van Renterghem K, Van de Putte D, Henckens T, Pattyn P (2011) Conversion from band to bypass in two steps reduces the risk for anastomotic strictures. Obes Surg 21(4):501–505

15. Hii MW, Lake AC, Kenfield C, Hopkins GH (2012) Laparoscopic conversion of failed gastric banding to roux-en-Y gastric bypass. Short-term follow-up and technical considerations. Obes Surg 22(7):1022–1028
16. von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP et al (2007) The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet 370(9596):1453–1457
17. Fried M, Hainer V, Basdevant A, Buchwald H, Dietel M, Finer N et al (2008) Inter-disciplinary european guidelines on surgery of severe obesity. Vnitr Lek 54(4):421–429
18. Moon RC, Teixeira AF, Jawad MA (2013) Conversion of failed laparoscopic adjustable gastric banding: sleeve gastrectomy or roux-en-Y gastric bypass? Surg Obes Relat Dis 9:901–907
19. Perathoner A, Zitt M, Lanthaler M, Pratschke J, Biebl M, Mittermair R (2013) Long-term follow-up evaluation of revisional gastric bypass after failed adjustable gastric banding. Surg Endosc 27(11):4305–4312
20. Mognol P, Chosidow D, Marmuse JP (2004) Laparoscopic conversion of laparoscopic gastric banding to roux-en-Y gastric bypass: a review of 70 patients. Obes Surg 14(10):1349–1353
21. 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(2):137–141
22. Worni M, Ostbye T, Shah A, Carvalho E, Schudel IM, Shin JH et al (2013) High risks for adverse outcomes after gastric bypass surgery following failed gastric banding: a population-based trend analysis of the united states. Ann Surg 257(2):279–286
23. Coblijn UK, Verveld CJ, van Wagensveld BA, Lagarde SM (2013) Laparoscopic roux-en-Y gastric bypass or laparoscopic sleeve gastrectomy as revisional procedure after adjustable gastric band-a systematic review. Obes Surg 23(11):1899–1914