OBES SURG
DOI 10.1007/s11695-014-1314-y

ORIGINAL CONTRIBUTIONS

Quality of Life, Weight Loss and Improvement of Co-morbidities After Primary and Revisional Laparoscopic Roux Y Gastric Bypass Procedure—Comparative Match Pair Study

Elemer Mohos · Zoltán Jánó · Doris Richter · Elizabeth Schmaldienst · Gábor Sándor · Petra Mohos · Miroslav Horzov · Gábor Tornai · Manfred Prager

Abstract
Background The prevalence of morbid obesity and its co-morbidities is dramatically increasing, as is the extent of weight loss surgery. A large number of patients after various bariatric procedures need revisional intervention for various reasons. We investigated the efficacy and the safety of revisional laparoscopic Roux Y gastric bypass (LRYGB) among our patients, who were revised as a consequence of inadequate weight loss or weight regain after previous bariatric interventions.
Methods A comparative, double-centre, match pair study was performed comparing the data of 44 patients after revisional surgery with 44 patients after primary gastric bypasses, focusing on weight loss, life quality and improvement of co-morbidities. Matching criteria were age, gender, preoperative BMI and follow-up period. Previous procedures consisted of 23 gastric bandings, 13 sleeve resections, 4 LRYGB and 4 vertical banded gastroplasties.
Results Extra weight loss (EWL) was significantly reduced after revisional gastric bypasses compared to primary intervention (EWL 66 vs. 91 %, $p<0.05$). Life quality scores were also decreased in the revisional group compared to the control group without statistical significance (SF 36 score 635 vs. 698.5, $p=0.22$; Moorehead-Aldert II score 1.4 vs. 2.0, $p=0.10$). The resolution rate of co-morbidities (T2DM, hypertension, gastro-oesophageal reflux (GER), osteoarthrosis, sleep apnoea) was also higher after primary gastric bypasses.
Conclusions Revisional LRYGB is an effective and safe method for patients with inadequate weight loss after previous bariatric surgery concerning weight reduction, life quality and improvement of co-morbidities. Our results indicate lower efficacy of revisional compared to primary LRYGB reaching statistical significance in regard to weight loss.

Keywords Bariatric surgery · Revisional laparoscopic Roux Y gastric bypass · Efficacy · Safety · Case match analysis

Introduction

The frequency of severe obesity has increased considerably in the last decades, not only in the USA but also in Europe and in various other countries. The only method for morbid obesity which seems to be effective in the long term is weight loss surgery [1–7], so the number of these procedures has risen very rapidly worldwide in the last 20 years. In the 1980s, the vertical banded gastroplasty was a favoured type of obesity surgery, but as it was later revealed, a large proportion of patients after vertical banded gastroplasty (VBG) needs revisional surgery owing to dysphagia, severe gastro-oesophageal reflux or inadequate weight loss [1, 8, 9]. Later, the adjustable gastric band implantation became one of the most often applied weight loss surgical procedures, but nowadays, it seems to be evident that the failure rate of the method—band and patient related—in 10 years is around 50 % [4, 9–13]. Laparoscopic gastric sleeve resection is also becoming more and more popular worldwide, but about 30 %

E. Mohos (✉) · Z. Jánó · G. Sándor · P. Mohos · M. Horzov · G. Tornai
Department of General Surgery, Territory Hospital Veszprém, Kórház street 1, Veszprém 8200, Hungary
e-mail: mohose@freemail.hu

D. Richter · E. Schmaldienst · M. Prager
Department of General Surgery, Territory Hospital Oberwart, Dornburggasse 80, Oberwart 7400, Austria

Published online: 10 June 2014

of the patients have to be reoperated on owing to severe gastro-oesophageal reflux (GER) or weight increase caused by dilatation of the gastric tube [14, 15]. Therefore, the demand for revisional bariatric procedures has increased remarkably in the last few years. The most frequently applied rescue operation is the laparoscopic Roux Y gastric bypass (LRYGB) [1, 16]. The feasibility, the safety and the efficacy of revisional gastric bypass, indicated by the varied complications of previous bariatric procedures, have already been analysed in other studies [1, 3, 8, 10, 11, 16–19]. As there are different indications for revisional interventions (for example, dysphagia, GER, insufficient weight loss, etc.), selection bias can modify the outcome of the different trials. For this reason, we aimed to examine the efficacy of revisional gastric bypass among our patients, who were revised because of insufficient weight loss or weight regain. As the revisional procedures are generally more demanding, compared to the primary interventions, the safety of the intervention was also investigated.

Patients and Methods

In the County Hospital Oberwart (Austria), bariatric procedures have been regularly performed by two surgeons (MP and ME) since 2005. Till July 1, 2013, 452 LRYGB and 69 laparoscopic gastric sleeve resections were carried out. Bariatric surgery was also established by us in 2010 at the County Hospital Veszprém (Hungary); up to January 7, 2013, 205 LRYGB and 19 laparoscopic gastric sleeve resections (LGS) were carried out at this hospital. Altogether in the two centres, 657 LRYGB and 88 LGS were accomplished by the two surgeons. The data (patient demographics, extra weight loss (EWL), pre and post-operative BMI, rate and resolution of co-morbidities, early and late morbidity) were prospectively computed and collected in the database of the hospitals. Altogether, 81 revisional gastric bypasses were performed, 62 for insufficient weight loss, 11 for severe GER and 8 for dysphagia. If a patient did not succeed in coming under BMI of 35 kg/m^2 or after sufficient body weight reduction regained weight and exceeded BMI of 35 kg/m^2, this was defined as insufficient weight loss. From the group of 62 patients with insufficient weight loss, 16 were excluded because of a too short follow-up period (under 1 year) and 2 other patients were not available. Finally, we had 44 patients with inadequate loss of weight after different previous bariatric interventions, 23 of them had the adjustable gastric band procedure, 13 were after laparoscopic gastric sleeve resection (LGS), 4 after LRYGB and 4 after VBG (Table 1). The group of 44 revisional patients were matched one-to-one with 44 patients after primary LRYGB from our database. The matching criteria were preoperative BMI, age, gender and follow-up time. The preoperative data of the two groups of patients (BMI, body weight, age, rate of co-morbidities, follow-up period) were comparable and did not reach statistical significance (Table 2).

Table 1 Data of the bariatric procedures of the two centres

Total number of bariatric operations (January 1, 2005 to July 1, 2013)		745
LRYGB		657
Laparoscopic gastric sleeve resection		88
Revisional LRYGB		81
Indication	Inadequate weight loss	62
	GER	11
	Dysphagia	8
Revisional LRYGB for inadequate weight loss		62
Exclusion owing to follow-up <1 year		16
Not available		2
Revisional LRYGB for inadequate weight loss included into the study		44
Previous procedure	Laparoscopic gastric banding	23
	Laparoscopic gastric sleeve resection	13
	LRYGB	4
	VBG	4

Surgery

During the surgical intervention, a standard form of LRYGB operation was applied in both groups of patients: gastric pouch of 50 ml, alimentary limb 150 cm, and bilio-pancreatic limb 100 cm. The gastro-entero anastomosis was created with a circular stapler of 21 mm. The details of the procedure applied by us were described earlier [14]. In 17 cases after gastric banding, the band was removed during the revisional gastric bypass operation; in the remaining 6 cases, it had already been taken out previously. In four of our patients, when the previous intervention was LRYGB, during the revisional gastric bypass, an alimentary loop of 150 cm was created in each case (at the beginning of our clinical practice, an alimentary limb of 100 cm and a bilio-pancreatic limb of 60 cm were routinely performed), and in two patients additionally, the dilated pouch was reduced and the GEA was reconstructed.

Follow-Up

Post-operatively, the patients were regularly checked: four visits in the first year and two visits yearly thereafter. The follow-up visit included anamnestic data, checking of body weight and the co-morbidities, laboratory results (blood test, clinical chemistry, vitamin B12, D3, folic acid, iron and protein levels) and abdominal ultrasound examination. Sixty-five percent of the patients comes regularly, 25 % comes irregularly and 10 % of them does not come at all (even when they are called by phone) to the follow-up visits. Follow-up time

Table 2 Patients' characteristics

	Revisional gastric bypass	Primary gastric bypass	*p* value
Number of patients	44	44	
Mean preoperative BMI, kg/m^2 (SD)	41.3 (4.6) (before the first bariatric procedure 51.1)	43.7 (4.1)	0.20
Mean preoperative body weight, kg (SD)	114.3 (12.7) (before the first bariatric procedure 140.9)	123.7 (14.6)	0.15
Mean age (years) (SD)	46.2 (11.2)	45.4 (13.1)	0.63
Gender (female/male)	32/12	32/12	
Co-morbidities (no. of patients)			
T2DM	12	10	
Hypertension	25	24	
GER	12	8	
Osteoarthrosis	34	30	
Sleep apnoea	9	7	
Follow-up period (months) (SD)	38.2 (11.6)	39.9 (12.5)	0.79

under 1 year was an exclusion criterion of the study. The mean follow-up period was 38.2 months in the revisional and 39.9 months in the primary gastric bypass group (p=0.79).

Quality of Life Parameters

Two standardized, internationally adapted questionnaires (SF 36 and Moorehead-Aldert II) and one department-specific survey form were applied. The SF 36 focuses on the following eight aspects of life quality: general health, physical functioning, role-physical, role-emotional, social functioning, bodily pain, vitality and mental health. The maximal score in each eight aspects is 100. The Moorehead-Aldert II (MA-II) QLQ test estimates six different areas of everyday life: general self-esteem, physical activity, social contacts, satisfaction concerning work, pleasure related to sexuality and surveys concerning eating behaviour. The minimal score is −0.5 and the maximal is +0.5 in each aspect in a scale of ten degrees, which means that the minimal total score is −3 and the maximal is +3. The third, department-specific questionnaire was drawn up by us and focused on weight change and on the improvement of the obesity-associated co-morbidities (type 2 diabetes mellitus (T2DM), hypertension, GER, osteoarthrosis, sleep apnoea).

Statistical Assessment

The patients' data were collected and computed (Microsoft Excel) from the previous hospital records and from the questionnaires filled in by the patients. The scores of SF 36 were calculated using the handbook and the standard software of the questionnaire. To compare the data (continuous variables) of the two patient groups and to calculate the p value, the Mann-Whitney U test was employed. The different data are expressed as mean values, and the standard deviations (SD) are also given. The p value under 0.05 was accepted to signify a significant statistical difference.

Results

Weight Loss

In both groups of patients, effective body weight reduction was observed, but after primary gastric bypass, the weight loss was more pronounced reaching a statistically significant difference (mean EWL in the revisional group was 66 % and in the primary gastric bypass group 91 %, p<0.05) (extra weight: excess body weight, exceeding the theoretical weight

Table 3 Weight loss parameters after revisional and primary gastric bypass

	Revisional gastric bypass	Primary gastric bypass	*p* value
Mean preoperative body weight, kg (SD)	114.3 (12.79)	123.7 (14.6)	0.15
Mean post-operative body weight, kg (SD)	87.7 (20.6)	76.1 (13.2)	
Mean weight loss, kg (SD)	26.6 (12.3)	47.6 (16.8)	
Mean extra weight loss, % (SD)	66 (38.3)	91 (18.9)	0.05
Mean preoperative BMI, kg/m^2 (SD)	41.3 (4.6)	43.7 (4.1)	
Mean post-operative BMI, kg/m^2 (SD)	31.6 (6.8)	26.7 (3.8)	
Mean BMI lost, kg/m^2 (SD)	9.7 (9.7)	17.0 (4.3)	0.01

Table 4 Results of the QLQ test SF 36 after revisional and primary gastric bypass

	Revisional gastric bypass	Primary gastric bypass	*p* value
General health	79.5	78.1	
Physical function	85.9	97.7	
Role physical	88.6	93.2	
Role emotional	87.8	100	
Social functioning	82.7	90.9	
Bodily pain	75	90.6	
Vitality	61.4	70.0	
Mental health	74	78.0	
Total score	635.0	698.5	0.22

calculated for BMI 25 kg/m^2; extra weight loss (EWL): the percentage of the lost extra weight). In regard to the lost BMI after the two procedures (9.7 and 17.0 kg/m^2), the difference was more expressive ($p<0.01$). The measured data are detailed in Table 3.

Quality of Life Parameters

The mean total score measured by the SF 36 questionnaire was 635 in the revisional gastric bypass group and 698.5 in the primary group. The difference does not reach statistical significance ($p=0.22$). This result corresponds with the score of the normal, representative European population for both groups of patients [14] (Table 4).

In respect to the questionnaire MA-II, the patients after revisional gastric bypass achieved a mean total score of 1.4, and after the primary operation, the mean total score was 2.0 ($p=0.10$). The achieved total scores of both patient groups correspond to "good result" (second degree in a scale of five categories). The difference was not proved to be statistically significant (Table 5).

Improvement of Co-morbidities

The changes in T2DM, in hypertension, in GER, in osteoarthrosis and in sleep apnoea were analysed in both groups of patients. Sixty-six percent of the patients with T2DM after revisional and 100 % after primary gastric bypass became normoglycaemic without treatment and diet in the post-operative period. In the remnant 33 % of the patients in the revisional group, a substantial therapy reduction was achieved. Hypertension was resolved in 66 % of the patients after revisional and in 75 % of the patients after primary bypass. The antihypertensive treatment was reduced in a large majority of the referral patients. GER and sleep apnoea were resolved in almost all patients in both groups. A higher proportion of the patients with osteoarthrosis was resolved in the primary bypass group compared to the revisional group. The details are listed in Table 6.

Complication Rate

Neither mortality nor leakage occurred in either group of patients. Two relaparoscopies in the revisional and another one in the primary group were performed owing to bleeding on the first and second post-operative day. In both groups, one patient developed a small bowel obstruction in the late post-operative period caused by Petersen's defect. In both cases, laparoscopy, reposition of the small bowel loops and closure of the defect were carried out (Table 7).

Discussion

The increasing number of bariatric surgical procedures all over the world results necessarily in the growth of the need for revisional interventions. The safety and the efficacy of the

Table 5 Results of the QLQ test MA-II after revisional and primary gastric bypass

	Revisional gastric bypass	Primary gastric bypass	*p* value
General self-esteem	0.3	0.4	
Physical activity	0.3	0.3	
Social contacts	0.3	0.3	
Satisfaction concerning on work	0.3	0.4	
Pleasure related to sexuality	0.0	0.3	
Focus on eating behaviour	0.2	0.3	
Total score	1.4	2.0	0.10

Table 6 The improvement of co-morbidities after revisional and primary gastric bypass

		Revisional gastric bypass, n=44	Primary gastric bypass, n=44
T2DM	Number of patients	12	10
	Resolved	8 (66 %)	10 (100 %)
	Th. reduction	4 (33 %)	–
Hypertension	Number of patients	25	24
	Resolved	16 (64 %)	18 (75 %)
	Th. reduction	7 (28 %)	6 (25 %)
	No change	2 (8 %)	–
GER	Number of patients	12	8
	Resolved	11 (91 %)	8 (100 %)
	Th. reduction/alleviation	1 (9 %)	–
Osteoarthrosis	Number of patients	34	30
	Resolved	10 (28 %)	27 (90 %)
	Th. reduction/alleviation	19 (64 %)	3 (10 %)
	No change	5 (14 %)	–
Sleep apnoea	Number of patients	9	7
	Resolved	8 (88 %)	6 (86 %)
	Alleviation	1 (12 %)	1 (14 %)

different types of revisional operations are extensively investigated. Nowadays, the LRYGB seems to be the gold standard revisional intervention [1, 8, 10, 16]. We compared the results achieved after primary and revisional LRYGB, applying a match pair study among our patients between 2005 and July 1, 2013. As we tried to eliminate the bias originating from different indications of the revisional procedure, only those patients were selected for the study who were reoperated on owing to insufficient weight loss or weight regain. We found that the difference in EWL after revisional (66 %) compared to primary (91 %) procedures reached statistical significance ($p<0.05$). A number of reasons might be responsible for this outcome.

First, the patients after the initial bariatric procedure had already lost some part of their extra weight, which may decrease the potential for further weight loss and accordingly the efficacy of the second procedure [1]. We have calculated the sum EWL of the initial bariatric procedure and the revisional gastric bypass (calculating the body weight before the initial and after the revisional intervention). The EWL of the two procedures together was 81 %. Considering this result, it may be suspected that the expectable weight loss after revisional LRYGB can be more accurately predicted, if the body weight before the initial procedure is used for the calculation.

Another reason for the smaller body weight reduction after revisional LRYGB can be the eating habits of the patients. Diet-related no compliance may occur more often among those patients who fail to achieve a significant weight reduction after some bariatric procedure. If the patient does not give up this unhealthy eating behaviour even after the revisional LRYGB, it may contribute to the experienced lower EWL [1, 20].

The type of initial procedure may play also an important role in the reduced EWL achieved by the revisional LRYGB. If a restrictive procedure fails to yield a significant weight loss, a malabsorptive revisional surgery has a better chance to achieve an accurate EWL. After a failed malabsorptive procedure, another (revisional) malabsorptive intervention has a lower potential for further body weight reduction [10, 11, 21,

Table 7 Complication rate after revisional and primary gastric bypass

	Revisional gastric bypass, n=44	Primary gastric bypass, n=44
Mortality	–	–
Leakage	–	–
Bleeding (relaparoscopy)	2	1
Post-operative small bowel obstruction owing to Petersen defect (relaparoscopy)	1	1
Conversion to open	0	0
Port site infection	7	4

22]. That is why we tried to increase the malabsorptive effect of the initial LRYGB in four of our cases, who underwent revisional gastric bypass because of insufficient weight loss or weight regain. The alimentary loop was made longer in these patients (from 100 to 150 cm). Each of them achieved sufficient further weight loss.

In relation to the quality of life, the patients also reached good scores after revisional and primary gastric bypass. The result achieved with SF 36 corresponds to the European representative standard, and the MA-II test yielded also "good" scoring (second category in a scale of five degrees) in both groups of patients. The results seem to be better in the primary gastric bypass group without reaching statistical significance. The observed difference might be explained by the higher post-operative BMI (31.6 vs. 26.7 kg/m^2) and with the lower resolution rate of the co-morbidities in the revisional group. Moreover, the regular application of the QoL tests during the follow-up may play an important role in detecting and screening those patients, who are predisposed for depression, as the unexpected suicide rate is higher after bariatric surgery.

Focusing on safety, theoretically a higher complication rate might be expected after the revisional procedure owing to a longer op. time and to the adhesions and scar formation caused by the initial surgical intervention [3, 17]. In spite of this, no leakage occurred in both of our groups, which can be explained on the one hand by the relatively low number of patients involved into the study, and on the other, the routinely performed intraoperative gastroscopy and air test might have also contributed to the avoidance of the insufficiency of the suture lines. The intraoperative air test revealed leakage in the suture line of the gastro-entero anastomosis in two patients in the revisional group, which was corrected by additional stitches (Vicryl 3-0). In the primary group, no positive leakage test was observed. We believe that the intraoperative gastroscopy and air test is an important method to decrease the leakage rate in gastric bypass surgery, especially in revisional interventions [23].

Concerning the improvement of the investigated co-morbidities associated with severe obesity, a higher resolution rate was observed in the primary group compared to the revisional, which was more expressive in relation to T2DM and to osteoarthrosis. This outcome might be explained by the presumably more prolonged existence of severe obesity in the revisional group. A longer lasting high insulin resistance caused by obesity may lead more probably to the exhaustion and depletion of the ß cells, decreasing the chance of the resolution of T2DM [24]. Prolonged overweight may cause also the lower resolution rate of the degenerative joint disease observed in the revisional group. The routinely applied pantoprazol in a daily dose of 40–80 mg to each of our patients after gastric bypass surgery may contribute to the high resolution rate of GER in both groups of patients.

Our paper has some limitations, decreasing the relevance of the found results. The first limitation is the low number of patients involved in the study, especially in the subgroups of the different co-morbidities. We tried to avoid some selection bias originating from the different indications for the revisional surgery, which is why only those patients were involved in the study who did not succeed in sufficient weight loss or regained weight after the initial procedure. This decreased the number of patients who could be included. Another limitation is the relatively low BMI in both groups of patients. The BMI of the patients for revisional surgery is generally lower, owing to regular medical control. As the preoperative BMI was one of the matching criteria in the study, the mean BMI was lower in both groups of patients compared to bariatric surgical patients.

Conclusions

We conclude that the LRYGB, as a revisional procedure, is an effective and safe method for further weight loss in those patients who did not succeed in losing sufficient weight or regained it after the initial bariatric surgical intervention. After the revisional LRYGB, the quality of life corresponds to the representative European standard, and a remarkable resolution of the obesity-associated co-morbidities was achieved. The results seem to be better after primary LRYGB surgery, reaching statistical significance related to EWL. Further investigations are needed to reinforce our data and to be able to screen those bariatric surgical patients who presumably cannot succeed in losing sufficient weight after gastric banding or after gastric sleeve resection. These patients should be treated initially with LRYGB, avoiding the need for the revisional procedure and the higher rate of the irreversible co-morbidities, associated with the prolonged existence of severe obesity.

Conflict of Interest All authors have no conflict of interest.

References

1. Zingg U, McQuinn A, DiValentino D, et al. Revisional vs. primary Roux-en-Y gastric bypass—a case-matched analysis. Obes Surg. 2010;20:1627–32.
2. Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: a systematic review and meta-analysis. Am J Med. 2004;122:248–56.
3. Mor A, Keenan E, Portenier D, et al.: Case-match analysis comparing outcome of revisional versus primary laparoscopic Roux-en-Y gastric bypass. Surg Endosc. Published online: 17 July 2012.
4. DeMaria EJ, Sugerman HJ, Meador JG, et al. High failure rate after laparoscopic silicone adjustable gastric banding for treatment of morbid obesity. Ann Surg. 2001;233:809–18.

5. National Institutes of Health. Consensus statement: gastrointestinal surgery for severe obesity. Nutrition. 1996;12:397–402.
6. Weber M, Müller MK, Michel JM, et al. Laparoscopic Roux-en-Y gastric bypass, but not rebanding should be proposed as rescue procedure for patients with failed laparoscopic gastric banding. Ann Surg. 2003;238:827–34.
7. te Riele WW, Sze YK, Wiezer MJ, et al. 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. 2008;4:735–9.
8. Tevis S, Garren MJ, Gould JC. Revisional surgery for failed vertical-banded gastroplasty. Obes Surg. 2011;21:1220–4.
9. Iannelli A, Schneck AS, Ragot E, et al. Laparoscopic sleeve gastrectomy as revisional procedure for failed gastric banding and vertical banded gastroplasty. Obes Surg. 2009;19:1216–20.
10. Elnahas A, GraybielK, Farrokhyar F, et al.: Revisional surgery after failed laparoscopic adjustable gastric banding: a systemic review. Surg Endosc. Published online: 31 August 2012.
11. Fronza JS, Prystowsky JB, Hungness ES, et al. Revisional bariatric surgery at a single institution. Am J Surg. 2010;200:651–4.
12. Buchwald H. Oien D M: Metabolic/bariatric surgery worldwide 2011. Obes Surg. 2013;23:427–36.
13. Spivak H, Abdelmelek MF, Beltran OR, et al. Long-term outcomes of laparoscopic adjustable gastric banding and laparoscopic Roux-en-Y gastric bypass in the United States. Surg Endosc. 2012;26:1909–19.
14. Mohos E, Schmaldienst E, Prager M. Quality of life parameters, weight change and improvement of co-morbidities after laparoscopic Roux Y gastric bypass and laparoscopic sleeve resection—comparative study. Obes Surg. 2011;21(3):288–94.
15. Himpens J, Dapri G, Cadière GB. A prospective randomized study between laparoscopic gastric banding and laparoscopic isolated sleeve gastrectomy: results after 1 and 3 years. Obes Surg. 2006;16(11):1450–6.
16. Deylgat B, D'Hondt M, Pottel H, et al. Indication, safety and feasibility of conversion of failed bariatric surgery to Roux-en-Y gastric bypass: a retrospective comparative study with primary Roux-en gastric bypass. Surg Endosc. 2012;26:1997–2002.
17. 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.
18. Topart P, Becouarn G, Ritz P. One year weight loss after primary and revisional Roux-en-Y gastric bypass for failed adjustable gastric banding. Surg Obes Relat Dis. 2009;5:459–62.
19. Owens BM, Owens ML, Hill CW. Effect of revisional bariatric surgery on weight loss frequency of complications. Obes Surg. 1996;6:479–84.
20. Song, Fernstom MH. Nutritional and physiological considerations after bariatric surgery. Aesth Surg. 2008;28:195–9.
21. Brolin RE, Cody RP. Weight loss outcome of revisional bariatric operations varies according to the primary procedures. Ann Surg. 2008;248:227–32.
22. Zundel N, Hernandez JD. Revisional surgery after restrictive procedures for morbid obesity. Surg Laparosc Endosc Percut. 2010;20(5):338–43.
23. Mohos E, Schmaldienst E, Richter D, et al. Examination of the efficacy and safety of intraoperative gastroscopic testing of the gastrojejunal anastomosis in laparoscopic Roux Y bypass surgery. Obes Surg. 2011;21:1592–6.
24. Fazylov R, Eliana S, Stephen M. Laparoscopic Roux-en-Y gastric bypass in morbidly obese patients ≥55 years old. Obes Surg. 2008;18(6):656–9.