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REVIEW ARTICLE

Revision of Roux-En-Y Gastric Bypass for Weight Regain: a Systematic Review of Techniques and Outcomes

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Abstract
Background Weight regain has led to an increase in revision of Roux-en-Y gastric bypass (RYGB) surgeries. There is no standardized approach to revisional surgery after failed RYGB. We performed an exhaustive literature search to elucidate surgical revision options. Our objective was to evaluate outcomes and complications of various methods of revision after RYGB to identify the option with the best outcomes for failed primary RYGB.
Method A systematic literature search was conducted using the following search tools and databases: PubMed, Google Scholar, Cochrane Clinical Trials Database, Cochrane Review Database, EMBASE, and Allied and Complementary Medicine to identify all relevant studies describing revision after failed RYGB. Inclusion criteria comprised of revisional surgery for weight gain after RYGB.
Results Of the 1200 articles found, only 799 were selected for our study. Of the 799, 24 studies, with a total of 866 patients, were included for a systematic review. Of the 24 studies, 5 were conversion to Distal Roux-en-y gastric bypass (DRYGB), 5 were revision of gastric pouch and anastomosis, 6 were revision with gastric band, 2 were revision to biliopancreatic diversion/duodenal switch (BPD/DS), and 6 were revision to endoluminal procedures (i.e., stomaphyx). Mean percent excess body mass index loss (%EBMIL) after revision up to 1 and 3-year follow-up for BPD/DS was 63.7 and 76 %, DRYGB was 54 and 52.2 %, gastric banding revision 47.6 and 47.3 %, gastric pouch/anastomosis revision 43.3 and 14 %, and endoluminal procedures at 32.1 %, respectively. Gastric pouch/anastomosis revision resulted in the lowest major complication rate at 3.5 % and DRYGB with the highest at 11.9 % when compared to the other revisional procedures. The mortality rate was 0.6 % which only occurred in the DRYGB group.
Conclusion All 866 patients in the 24 studies reported significant early initial weight loss after revision for failed RYGB. However, of the five surgical revision options considered, BPD/DS, DRYGB, and gastric banding resulted in sustained weight loss, with acceptable complication rate.

Keywords Roux-en-Y · Gastric bypass · Bariatric surgery · Revision · Conversion · Weight gain · Weight regain · Weight recidivism

Introduction

Currently, bariatric surgery remains the gold standard of treatment for sustainable weight loss and reduction of comorbidities in morbidly obese patients when compared to other non-surgical options including behavioral modification, diet modification, drug therapy, and exercise [1–4]. Roux-en-Y Gastric Bypass (RYGB) still remains one of the most commonly performed bariatric surgery in the USA [5, 6]. RYGB is a restrictive/malabsorptive procedure that creates a small gastric pouch limiting food intake and calorie absorption [7]. The divided 15–30 mm pouch is anastomosed to the Roux limb of small bowel [8].

Over the last decade, long-term weight loss after RYGB has been remarkable. However, approximately 10-20 % of patients either regain weight or fail to achieve significant weight loss [9]. RYGB failure is due to both anatomical and

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technical circumstances as well as the inability to adopt a healthy lifestyle [10]. Anatomical reasons for RYGB failure include a loss of restriction with gastric pouch enlargement, dilation of gastrojejunostomy, and fistula development between the gastric pouch and the remnant of the stomach [11].

Weight recidivism is complex and requires a thorough review of the primary operation, and identification of a safe and alternate operative approach for revision. Revisional surgery is associated with high perioperative morbidity, inconsistent long-term results, and high-risk to benefit ratio when compared to the primary procedure [12–14]. There is a significant paucity of research regarding revisional surgery for failed RYGB and the options of surgery techniques are scarce. Selection of the appropriate revision after failed RYGB has been based on localized experiences of various bariatric centers and no single method has been shown to be superior to another.

This systematic review summarizes the various revision surgery techniques for failed RYGB due to weight gain from multiple studies. We aim to elucidate the various revisional techniques after failed RYGB to determine the procedures that provide the best outcome.

Methods

A systematic search was conducted using the following search tools and databases: PubMed, Google Scholar, Cochrane Clinical Trials Database, Cochrane Review Database, EMBASE, and Allied and Complementary Medicine AMED). Search terms included (Roux-En-Y OR Gastric bypass OR Bariatric surgery) AND [(Revision or Conversion) OR (Weight gain or Weight regain or Weight recidivism)]. Keywords were used instead of MeSH to ensure recent articles without Mesh were not excluded. The primary health measure was weight gain after RYGB surgery. All abstracts generated by the search terms were screened and reviewed for relevance by the authors, and consensus was achieved on inclusion. Full texts of all relevant and key articles were reviewed and their references were mined to identify any other articles missed by our search criteria. The most recent search was performed in February 2015.

The inclusion criteria for publications were studies that reported revisional bariatric surgeries after initial primary RYGB procedure. Studies were excluded if they reported on less than two patients, presented results from revisions of other primary procedures other than RYGB, or had an indication for revision that did not include weight regain.

After the review was complete, 401 studies were excluded because these studies reported on conversion to RYGB or did not mention weight regain as the reason for revision leaving us with 799 studies. After a secondary evaluation of these remaining articles, only 24 met the criteria to be included in our study. An overview of the included studies is provided in Table 1. A variety of revision techniques were utilized, ranging from major operations (both laparoscopic and open) to endoscopic procedures, but unfortunately, only few studies have consistently reported outcomes. We identified many case reports but most were excluded due to very short-term follow-up or failure to report outcomes and complications. Almost all of the studies were case series and no comparative studies were found.

The investigators reviewed all selected articles and then extracted the following variables from the original articles: primary operative technique, revisional operative technique, short and long-term outcomes and complications after revisional surgery.

Results

A total of 1200 articles were found and 799 were selected for our study. Twenty-four out of the 799 studies were included for a systematic review with a total of 866 patients. For studies that reported age and sex, the mean age was 45 years, and the male to female ratio was 1:4. Five studies were conversion to Distal Roux-en-y gastric bypass (DRYGB), five were revision of the gastric pouch and anastomosis, six were revision using a gastric band (five adjustable and one nonadjustable), two were revision to biliopancreatic diversion/duodenal switch (BPD/DS), and 6 endoluminal procedures including transoral outlet reduction endoscopy (TORe), Restorative Obesity Surgery Endoscopic (ROSE), endoscopic sclerotherapy, and endoscopic gastric plication (Table 1). The studies reported percent excess weight loss (%EWL) varying from 20–79.4 %, and body mass index (Kg/m^2, BMI) varying from 26.4 to 44.2 after 6–60 months follow-up. However, there was a significant lack of %EWL at the time of revision in most studies. Furthermore, it was not clear in many studies whether the %EWL was inclusive starting from the original surgery or from the revision surgery. Data on Body Mass Index (kg/m^2, BMI) was found at the time of the initial surgery, the nadir, at revision, and postoperatively in the many studies (Table 1). Therefore, excess body mass index and percent excess body mass index loss (%EBMIL) were calculated using the BMI at the time of the revision as the baseline, since we are evaluating weight loss as a result of the revision surgery irrespective of the BMI at the original surgery. Weighted average percent excess body mass index loss (%EBMIL) after revision up to 1 and 3-year follow-up for BPD/DS was 63.7 and 76 %, DRYGB was 54 and 52.2 %, gastric banding revision 47.6 and 47.3 %, gastric pouch/anastomosis revision 43.3 and 14 %, and endoluminal procedures at 32.1 %, respectively [Figs. 1 and 2]. In our cohort of study, complications were considered to be major if these required intervention or caused major morbidity or mortality including staple

Table 1 Reported series on different revision types with weight outcomes and complications

Author	Year	N	Revision type	Interval to revision (months)	Pre-revision BMI (kg/m^2)/%EWL			Post-revision BMI (kg/m^2)/%EWL				Major complications % (*n*)
					At Primary	Nadir	At Revision	≤1 yr	≤3 yr	≤5 yr	≤10 yr	
Rawlins et al.	2011	29	Distal-RYGB	–	57.9	–	48.1/26.6	35.3/60.9	31.9/69.8	31.5/68.8	–	24 (7)
Brolin et al.	2008	49	Distal-RYGB	–	–	–	46		35.0/48	–	–	8 (4)
Fobi et al.	2001	65	Distal-RYGB		54	–	41.9	-	34.6	–	–	32 (21)
Sugerman et al.	1997	27	Distal-RYGB	55	57	–	46.0/30.0	37.0/61.0	35.0/67.0	33.0/69.0	35	44 (12)
Dapri et al.	2011	7	Distal-RYGB	41	43.2	34.4/49.1	36.1/33.7	–	29.5/57.6	–	–	29 (2)
Iannelli et al.	2012	20	Pouch revision	51	45.8	31.2	35.6	28.7/72.2	29.6/68.6	–	–	30 (6)
Parikh et al.	2011	14	Pouch revision	41	46.8	30.5	35.5/48.9	32.9/12.0	–	–	–	7 (1)
Morales et al.	2010	23	Pouch revision	–	59	36	42	37	–	–	–	22 (5)
Tran et al.	2014	25	Pouch revision	–	54.6	32.2	41	33	44.2	–	–	8 (2)
Muller et al.	2005	5	Pouch revision	32	45.7	–	35.2	31.3	–	–	–	20 (1)
Dapri et al.	2009	6	Non-adjustable gastric band	26.2	36.3	–	29.5/47.0	26.4/70.4	–	–	–	0 (0)
Kyzer et al.	2001	12	Adjustable gastric band	94	–	–	–	–	–	–	–	
Bessler et al.	2010	22	Adjustable gastric band	18	52	–	44.8	-/27	-/42.3	-/47	–	14 (3)
Irani et al.	2011	43	Adjustable gastric band	79	50.4	–	43.3	34.5/34.0	34.0/38.0	–	–	14 (6)
Chin et al.	2009	8	Adjustable gastric band	90.5	62.6	41.1	48.4	41.6/24.3	37.6/48.7	–	–	13 (1)
Gobble et al.	2008	11	Adjustable gastric band	66	53.2	–	43.4	–	37.1/59.0	–	–	9 (1)
Parikh et al.	2007	12	Biliopancreatic diversion/Duodenal switch	45.6	53.9	31.6	40.7	30.7/62.7	–	–	–	33 (4)
Keshishian	2004	47	Biliopancreatic diversion/Duodenal switch	132	53.2	34.0/70.0	49.2	–	30.8/71.0	–	–	9 (4)
Jirapinyo P et al.	2013	25	Transoral outlet reduction Endoscopy (TORe)	72	–	–	43	–	–	–	–	8 (2)
Raman et al.	2011	37	Restorative Obesity Surgery Endoscopic (ROSE)	62.4	46.3	27.9	33.4	-/23.6	–	–	–	5 (2)
Horgan et al.	2010	116	Restorative Obesity Surgery Endoscopic (ROSE)	45.6	52.4	30.8	39.9	-/18.0	–	–	–	0 (0)
Ryou et al.	2009	5	Restorative Obesity Surgery Endoscopic (ROSE)	56	48	30.3	36.3	33.4	–	–	–	0 (0)
* Abu et al.	2012	231	Endoscopic Sclerotherapy	68.4	50	–	–	–	–	–	–	6 (14)
Tran et al.	2013	27	Endoscopic Gastric Plication	72	46	29	37	33.0/20.0	–	–	–	0 (0)

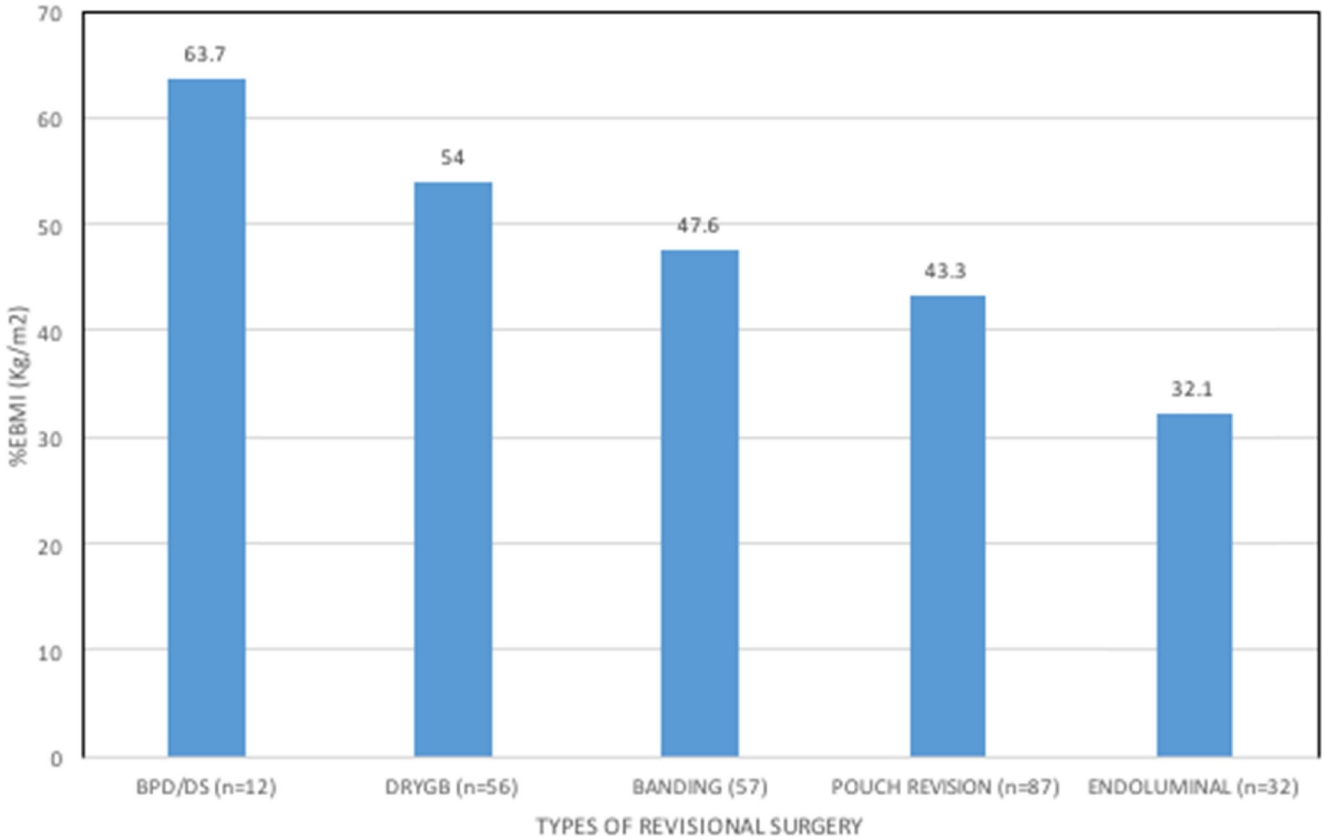

Fig. 1 Weighted means of the % EBMIL (Kg/m2) at ≤1 year

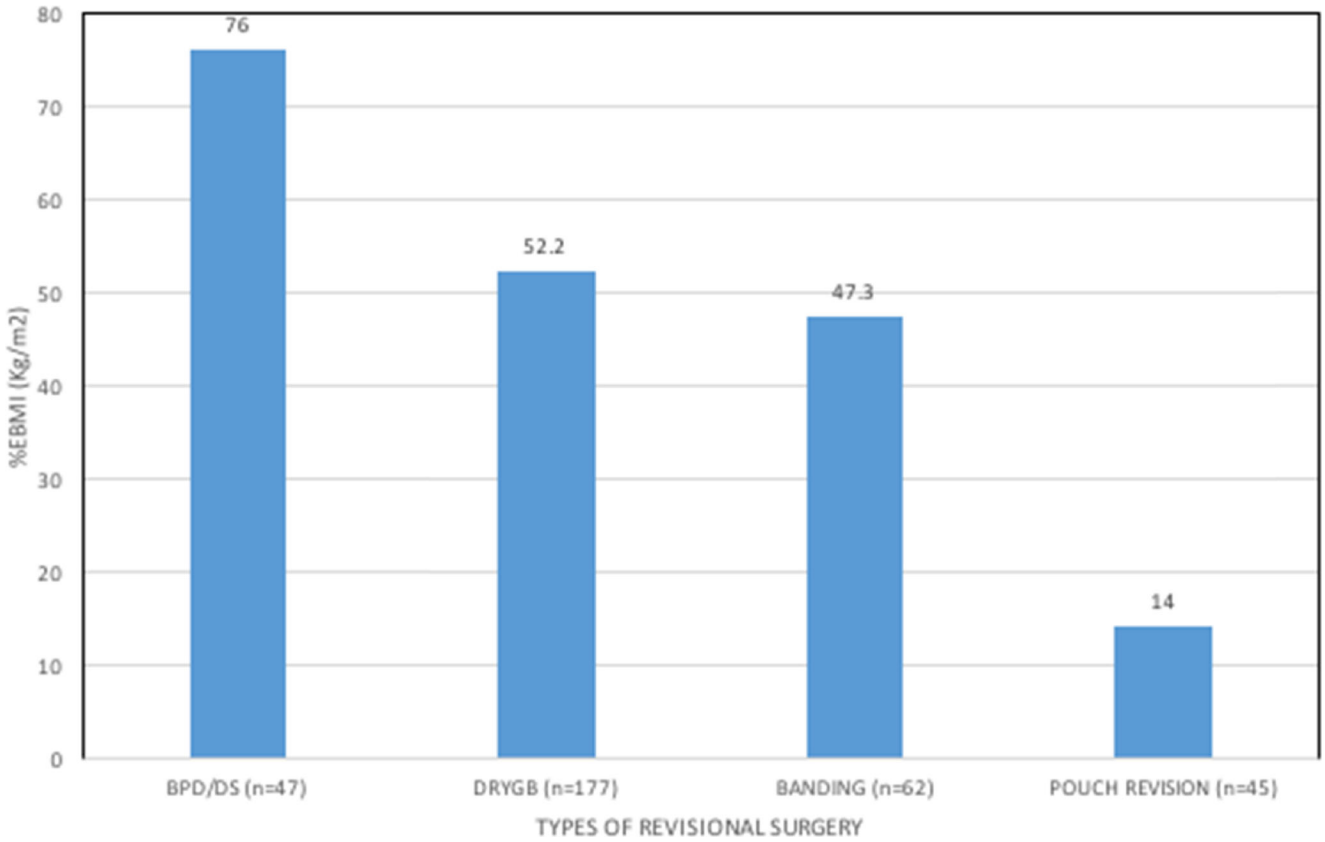

Fig. 2 Weighted means of the %EBMIL (Kg/m2) at ≤3 years

line/gastrointestinal leak, significant bleeding, acute abdomen, gastric or intestinal obstruction, pulmonary embolus, band slippage or erosion, band port malfunction, stricture/stenosis at the gastrojejunostomy, incisional hernia, intra-abdominal abscess or major wound infection, severe malnutrition and short bowel syndrome, and death. The minor complications include dumping syndrome, diarrhea, self-limited nausea or vomiting, minor bleeding, and minor wound infection, seroma, or hematoma. Weighted averages were used to compute major complication rates which occurred in 11.9 % of DRYGB patients, 7.6 % of endoluminal patients, 4 % of BPD/DS patients, 3.8 % of gastric banding patients, and 3.5 % of pouch/stoma revision patients. The mortality rate for DRYGB was 0.6 %, while the other revisional procedures reported zero mortality.

Discussion

Banding Revision of RYGB

ASGB is a purely restrictive procedure that compartmentalizes the upper stomach into a gastric pouch by placing an adjustable prosthetic band (typically a silicone ring connected to an infusion port) just distal to the gastroesophageal junction. Early in the history of adjustable gastric banding, Kyzer et al. reported that it is a feasible and safe technique, which was used as a revisional procedure on 37 patients after primary weight regain [15]. Only 12 of these patients had RYGB originally. Although the author stated that there was a 10-BMI-point drop for patients with BMI ≥ 35 and a 4-BMI-point drop for those with BMI ≤ 35, these were not unique to post gastric bypass patients. Thus, there was insufficient data to determine the efficacy of the procedure with respect to weight regain after gastric bypass. Bessler et al. reported a respectable 47 % EWL up to and beyond 5-year follow-up of the revision, and 57 % when combined with the original surgery [16]. Few authors make this distinction in the %EWL, which is quite important to determine the efficacy of the revisional procedure. Many comorbidities, including hypertension, hyperlipidemia, sleep apnea, GERD, and osteoarthritis, had significantly improved or resolved at most recent follow-up. Irani et al., who had the largest banding revision series of 43 patients, reported a mean BMI of 34 at 2 years, corresponding to a calculated %EBMIL of 51 %, which is excellent as a revisional procedure [17]. Dapri et al. with only six patients in their study, after placement of a non-adjustable silicone ring, the average %EWL was 70.4 ± 30.4 % at 1 year [18]. However, they placed the band in patients with an average BMI of 29.5 Kg/m^2. The band was not place tightly over the pouch, suggesting that the weight loss was due to the reduction of pouch compliance preventing over eating. Non-adjustable gastric band is not commonly used nor is it currently recommended in the USA. In general, the common theme suggested by the authors favoring gastric banding is that it has low major initial complication rate, requires no modification of the RYGB anatomy, and practically has zero mortality [16, 19]. Unfortunately, it is now well known that the rate of primary gastric band explant due to long-term complications exceed 50 % in many series. Overall, gastric banding is the third most successful revisional procedures in our review with acceptable complication rate. However, longer-term study with a larger cohort of patients is required to make definitive conclusion about the use of gastric banding as a revision procedure for gastric bypass failure.

Endoscopy Revisions of RYGB

We reviewed several endoscopic procedures for RYGB failure consisting of transoral outlet reduction (TORe), Restorative Obesity Surgery Endoscopic (ROSE), endoscopic sclerotherapy, and endoscopic gastric plication (EGP). TORe involves placement of sutures around the dilated gastrojejunal anastomosis which are then tightened to reduce the anastomotic aperture. ROSE is an endoscopic technique used to reduce the size of the gastric pouch and stoma by placement of anchors to create tissue folds at the stoma and around the pouch wall. Sclerotherapy involves reduction of the diameter of the gastrojejunostomy by creating tissue scars using an injectable sclerosant. Similar to the ROSE procedure, EGP entails usage of a surgical device (Stomaphyx) to create gastric plications or folds that are held together using polypropylene fasteners deployed under endoscopic visualization to reduce the size of the pouch and the gastrojejunal anastomosis. Using the Overstitch Endoscopic Suturing System (TORe) to reduce the size of the gastrojejunostomy, Jirapinyo et al. reported an average weight lost of 10.8 kg (56.3 %) of the 24 kg regained after RYGB at 1 year [20]. However, there was no data on %EWL or BMI postoperatively to make meaningful comparison to determine the efficacy of this procedure. ROSE procedure outcomes were reported by several investigators [11, 21, 22]. Weight loss outcome was dismal with loss of only three BMI points on average in one series and a %EWL of 23.5 in another at 1 year. Abu et al. reported a relatively large series of 231 patients who underwent endoscopic sclerotherapy as a revisional procedure for weight regain after gastric bypass [23]. The average weight loss at 6 months was 4.5 kg. Many patients did not gain nor lose weight and were reported as weight regain stabilization. This method should not be considered a revisional procedure because weight loss is too negligible to have any effect on patient's comorbidities. Most endoscopic series did not report weight loss in terms of %EWL or BMI due to very small changes, but rather in actually kg of weight loss. This reporting methodology artificial inflates any success the procedure might have had, and it poses significant challenges for meaningful comparison to

determine the efficacy of the procedure. We published 1-year data on our own 27 patients who underwent EGP [24]. Unfortunately, all patients regained to their pre revision weight at 1 year despite close follow-up and dietary counseling. Upon repeat endoscopy, we found that most of the plicated gastric folds became undone, and most of the fasteners were not found indicating poor longevity. The %EBMIL was lowest at 32.1 % at up to 1 year, and there was severe paucity of data beyond 1 year. We have since abandoned this procedure in our practice. Except for some bleeding with endoscopic sclerotherapy, most investigators reported very low complication rate with endoscopic procedures. However, due to the poor short-term results and unproven outcome, we believe these procedures should not be offered to patients for revisions of gastric bypass. Furthermore, these procedures are generally not covered by insurance, and thus the heavy financial burden is borne by the patients.

Biliopancreatic Diversion/Duodenal Switch Revisions of RYGB

BPD/DS involves the creation of a partial sleeve gastrectomy with preservation of the pylorus, creation of a Roux limb, a long biliopancreatic limb, and a short common channel [25]. Conversion from a RYGB to BPD/DS procedure is technically challenging and basically involves two separate procedures that can be performed at once or as a staged procedure depending on the expertise of the surgeon and the length of time under anesthesia. The procedure requires the take down of the gastrojejunostomy, reestablishment of the gastrogastric continuity, followed by a sleeve gastrectomy. The switch is next established by a duodenal division, gastrojenunostomy, then conversion of the jejunojejunostomy into a long biliopancreatic limb, a 150-cm alimentary limb, and a 100-cm common limb. There are few surgeons who perform BPD/DS and fewer yet who perform this revision. Parikh et al. and Keshishian et al. reported their experience with this revision in 12 and 47 patients, respectively [26, 27]. There was excellent %EWL reported at 62.7 % at 1 year and 71 %EWL at up to 3 years, corresponding to %EBMIL of 63.7, and 76 %, respectively. Major complication is relatively low at 4.0 %. Although it has the best long-term weight loss with acceptable complication profile, revision using BPD/DS has not gained wide acceptance due to the complexity of the procedure and the concern for long-term severe malnutrition.

Gastric Pouch and Anastomotic Revision of RYGB

Gastric pouch and anastomotic revision entails laparoscopic reduction of the size of the dilated gastric pouch and/or the gastrojejunostomy by a partial resection of the gastric pouch and redo the anastomosis and keeping the stoma size at 1.5 cm or less. Morales et al. reported laparoscopic pouch revisions proved comparable in safety and efficacy to open revisional procedures [28]. Lannelli et al. suggested that laparoscopic pouch revision is valuable as a short-term revision option for weight regain after Roux-en-y gastric bypass [29]. They reported a %EWL greater than 72 % at 12 months follow-up and although 30 % of patients developed complications including intra-abdominal abscess and pulmonary embolism, there were no perioperative mortalities. On the other hand, Parikh et al. reported that the procedures are ineffective for failed RYGB as they only achieved a %EWL of less than 26 % after 12 months [30]. We published our data on 25 patients and the results at 1 year follow-up were promising with a mean drop of 8 BMI points. Unfortunately, at 2 years, there was no statistically significant difference from the pre-revision weights. In fact the patients had a higher BMI than at the time of revision. Our findings correspond to results from the other series [31]. Overall, the %EBMIL was good at 43.3 % at 1 year, but dropped dramatically to 14 % at up to 3 years. The major complication rate was lowest at 3.5 % across the reported series, with no mortality. We conclude that the short-term results of this revision method showed early promise. However, a much larger cohort is required to elucidate the efficacy of this method over a longer period.

Conversion from RYGB to Distal Gastric Bypass

Conversion from a failed standard RYGB bypass or other bariatric operations to a distal RYGB (DRYGB) was reported by several investigators [32–40]. DRYGB was also performed as the initial operation for the super obese patients in some studies [34, 41, 42]. There are two main techniques of performing the DRYGB that are substantially different from one another. The first technique was used by Sugerman et al. (Medical College of Virginia technique) in the mid 1980s and subsequently in which the jejunojejunostomy was taken down at the alimentary side and re-anastomosed to the ileum at a point 150 cm proximal to the ileocecal valve [37]. In effect, the alimentary limb remains at its original size of 100–150 cm, the common channel at 150 cm, and a very long unmeasured BP limb. Incidentally, a similar technique was used by Torres at the same time as the primary operation but was published several years earlier [34]. Subsequently, Fox et al. also employed a similar technique for their revisions [35, 36]. Finally, a close variant of the same technique was used by Rawlins et al. [33]. For ease of discussion, we will call the above technique type I DRYGB. The second technique was proposed by Brolin et al. as a variation in which the BP limb was taken down at the jejunojejunostomy and re-anastomosed to a point 75 cm proximal to the ileocecal valve. The common channel was then measured at 75 cm, the biliopancreatic limb (BP) at 15–25 cm or whatever the original length was, with a very long unmeasured Roux limb [38]. Again, for the purpose of discussion, we will call this technique type II DRYGB. Authors who performed revisions to type I DRYGB

reported that the operation was well tolerated when the common limb measured between 100 and 150 cm. Excess weight loss (EWL) at 1 year ranged from 61 to 90 %, and at 5 years, EWL ranged from 68 to 85 %. Srikanth et al., with more than 10-year follow-up, reveal the EWL was still significant at 77 % [35]. The most concerning sequelae of type I DRYGB revision are the metabolic complications. Protein calorie malnutrition (PCMN) was observed in 8 to 31 % of patients, with the need for temporary total parenteral nutrition (TPN) observed in 14 to 21 %. Reversal or lengthening of the common channel was required in 5 to 14 % of patients. When the common channel was made to be 50 cm, all of these patients required reversal, and two died from hepatic failure [37]. Brolin et al., who performed type II DRYGB revision, reported that the 1-year excess weight loss was 48 %. PCMN was observed in 7 % of patients, with 7 % requiring temporary TPN, and 6 % required reversal. Fobi et al. extended the length of the biliopancreatic limb by an additional 50 % of the total common limb length, which was not measured [32]. However, it would be safe to assume that the common limb length in this operation was at least 300 cm or longer depending on the total initial bowel length. Therefore, this operation does not fall into the two categories described above. However, the authors reported a 7 BMI point decrease, corresponding to a 43 % excess weight loss at 1 year. PCMN still occurred in 23 % of patients, with 9 % requiring reversal. It would be difficult to compare the outcomes between type I and type II DRYGB since the numbers are too low to permit meaningful statistical analysis. However, one can observe the apparent better weight loss, but higher nutritional complication of the type I DRYGB. Type II DRYGB resulted in a less satisfactory initial weight loss, which could be explained by the fact that the increase in the alimentary Roux limb length (as opposed to the increase in the BP limb length) is where additional calories could be absorbed. Revision to DRYGB represents the second best operation after BPD/DS with the %EBMIL of 54 % at 1 year and 52.2 % at 3 years. However, this procedure also has the highest complication rate of 11.9 %, of which nearly half were due to protein calorie malnutrition. To date, we have performed 15 revisions using the type I DYRGB. Our not-yet-published results are excellent up to 2 years. However, two patients required reversal due to severe malnutrition. We attributed this complication to patients' non-compliance rather than procedural.

Overall, it appeared that the type I DRYGB revisions has excellent weight loss profile that can be sustained for 3 years or more. However, it also has one of the highest potential for nutritional complications.

Study Limitations

A obvious limitation of our study is inherent in the fact that there are a number of different revisional procedures and the variation of reporting methodology of outcomes and complications. Many series reported outcomes from multiple different original surgeries, thus rendering the data useless for our purpose because we were only interested in the outcomes of revisions of gastric bypass. Most series have small number of patients. The absent of follow-up data of and attrition rates for patients in some of the studies limits our ability to make meaningful conclusion. Finally, there is a significant paucity of data beyond 2 years in many series.

Conclusion

Most of 866 patients in the 24 studies were found to have significant initial weight loss after surgical revision for failed RYGB. Transoral endoscopic revision methods produced no significant short or long-term weight loss and should not be offered to patients. ASGB produced reasonable short-term result, but a larger cohort and long-term complication (removal) data is needed to make meaningful conclusions. Resizing the gastric pouch and stoma has reasonable short-term outcome, but sustainable weight loss is not observed in current studies. Conversion to BPD/DS has excellent sustained weight loss with low complication rate. Unfortunately, only a few centers perform this procedure with negligible numbers to have any real impact on the population at large. Finally, conversion to DRYGB is a relatively uncomplicated procedure that resulted in very good sustained weight loss, with acceptable complication rate. We believe that, given the current literature, it should be the procedure of choice for failed RYGB.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no competing interests.

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors. For this type of study formal consent is not required.

Informed Consent Does not apply.

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