

Recurrent Weight Gain after RYGBP

When does distalization become an option?

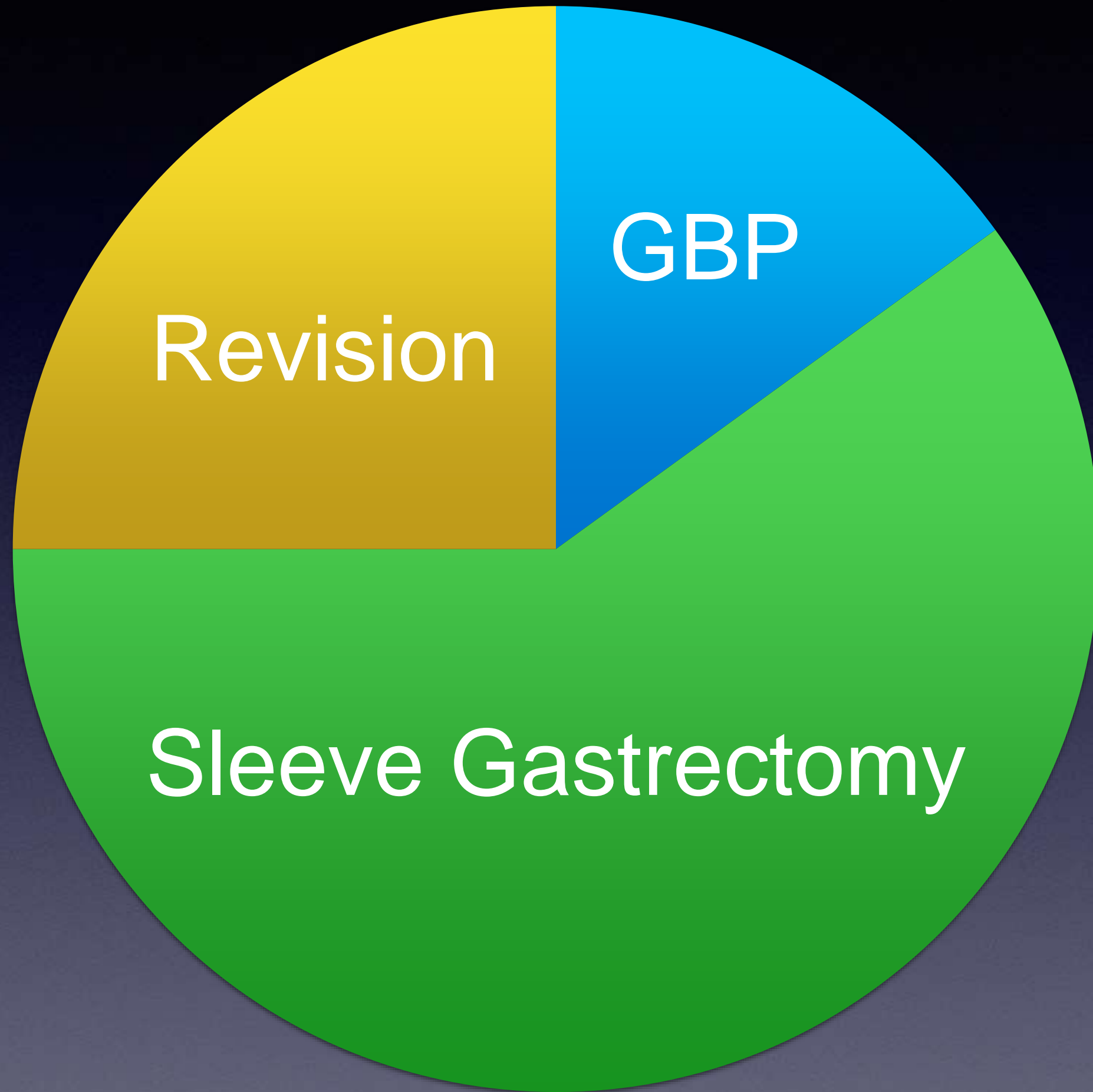
Kelvin D Higa, MD, FACS
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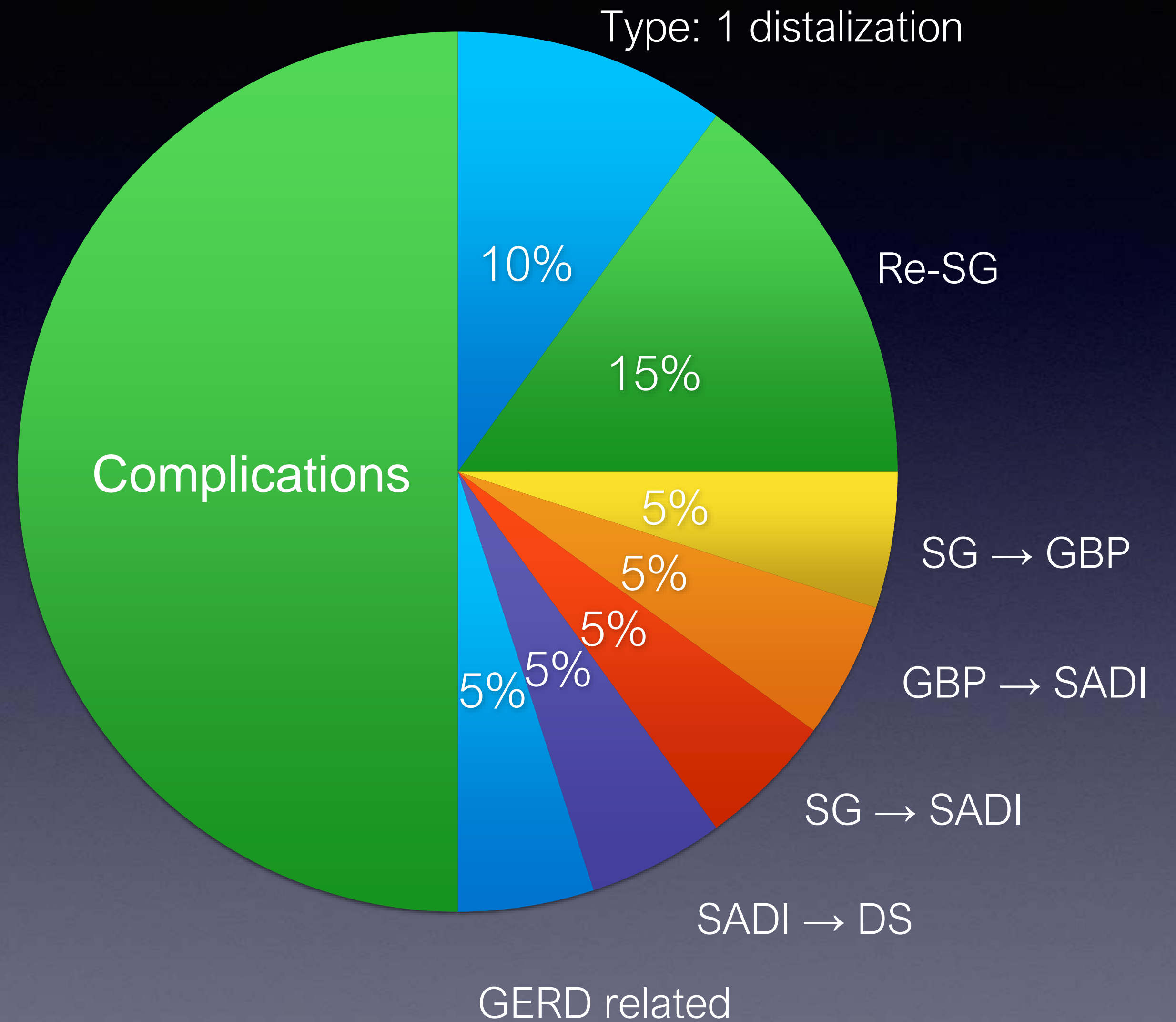
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Primary



Revision



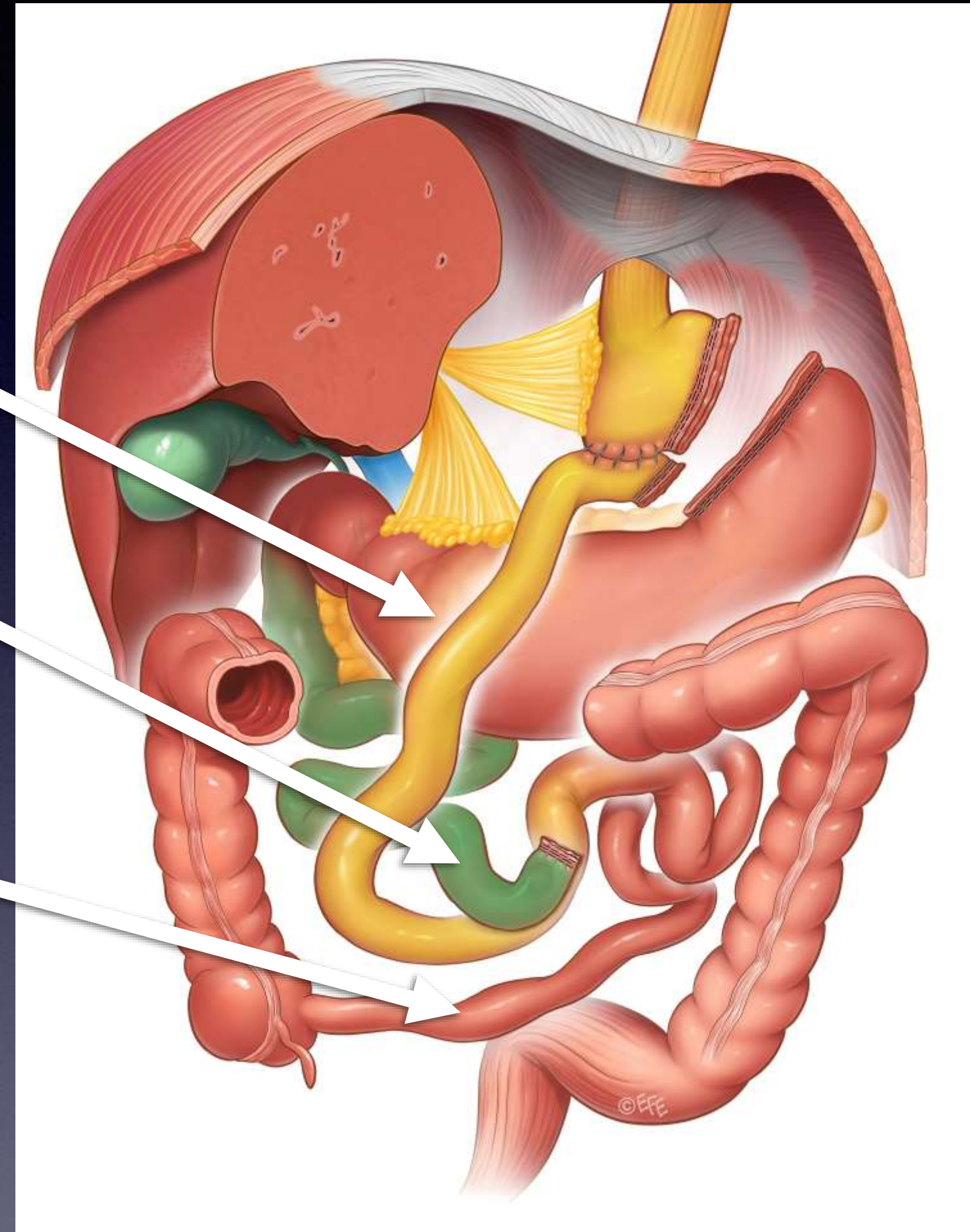
Bariatric Surgery—How Much Malabsorption Do We Need?—A Review of Various Limb Lengths in
Different Gastric Bypass Procedures
Felsenreich D, et al. Journal of Clinical Medicine 2021

Alimentary Limb (AL)

Biliopancreatic Limb (BPL)

Common Limb (CL)

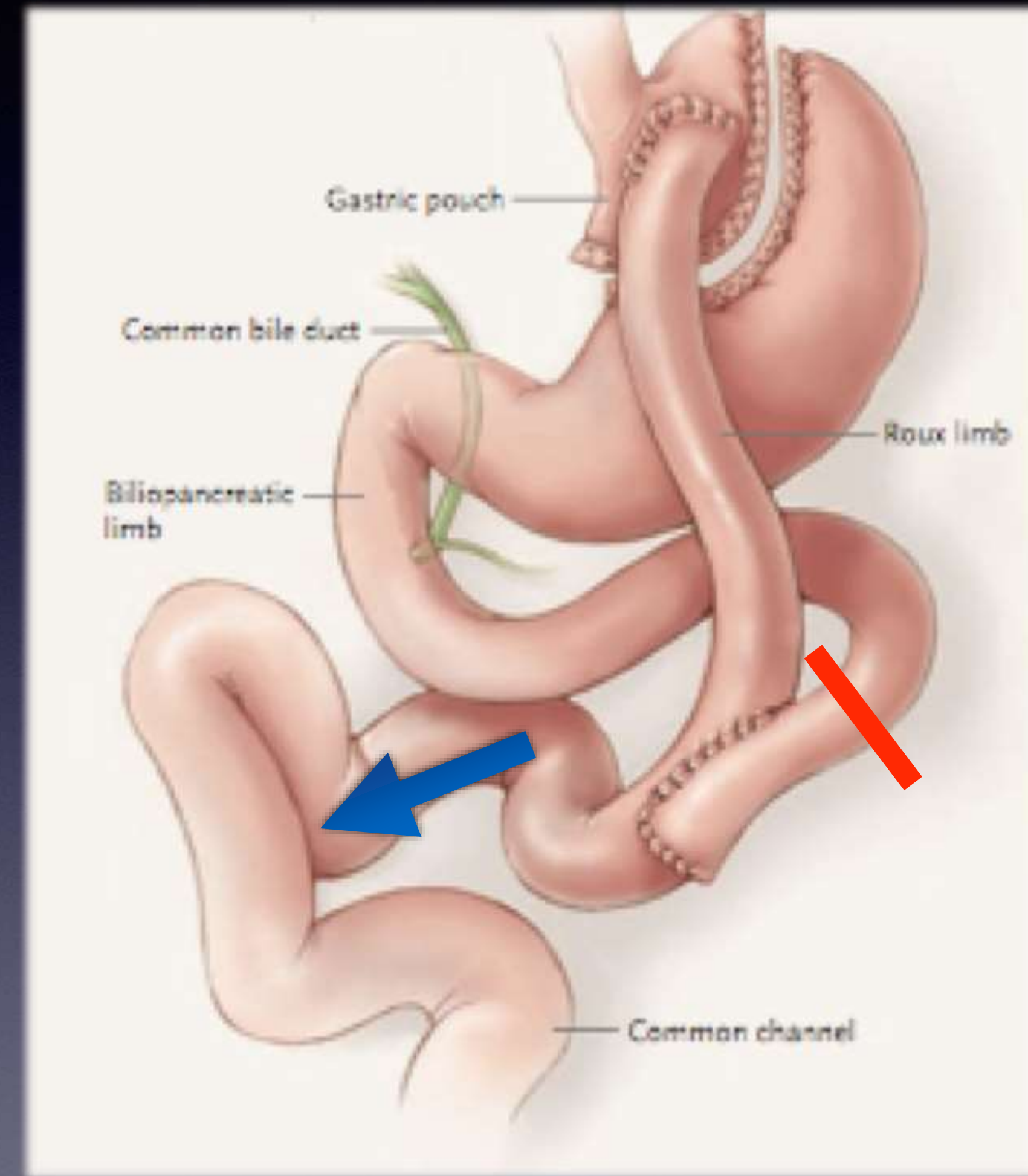
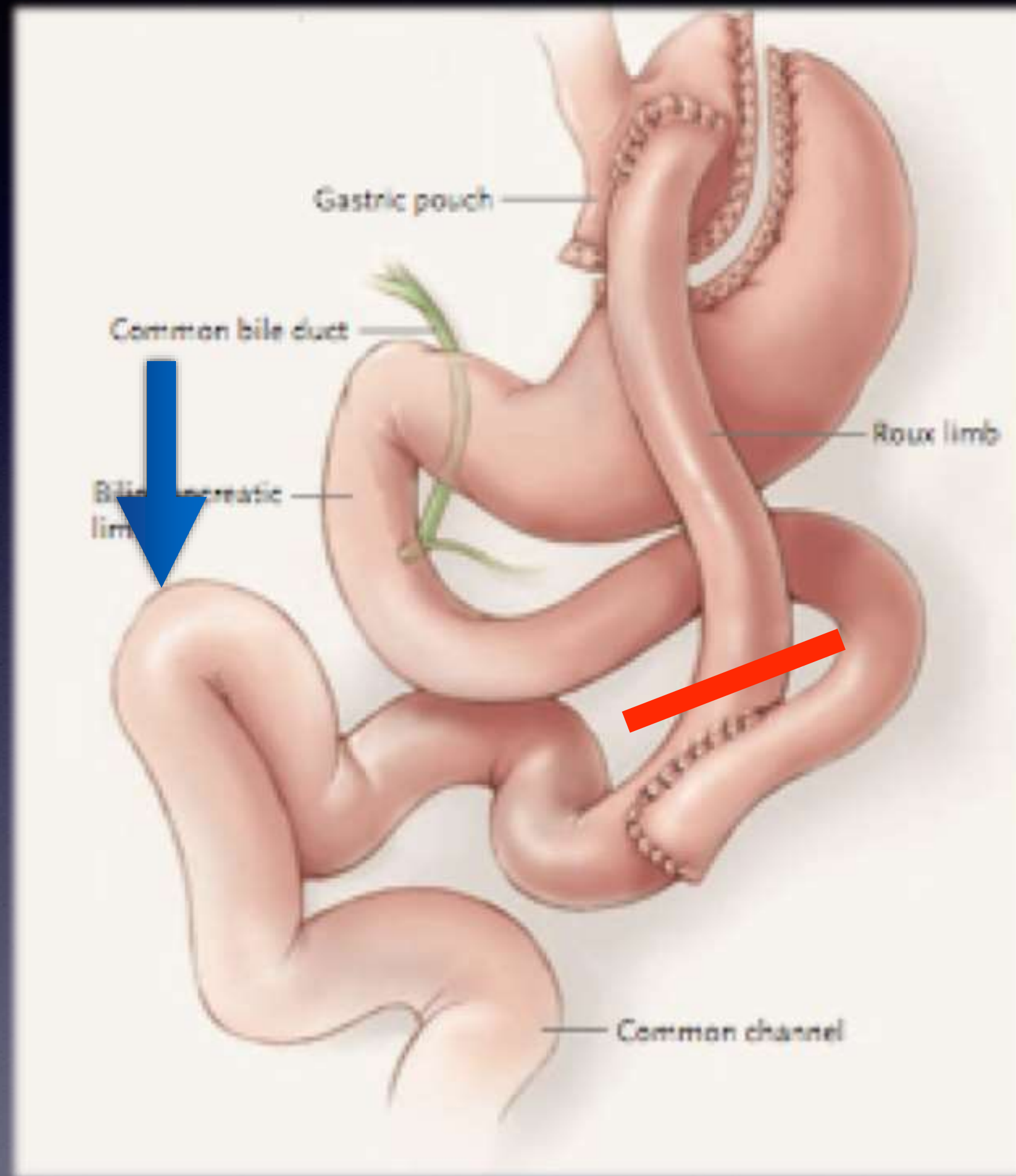
$TALL = AL + CL$





Distalization

Type: 1

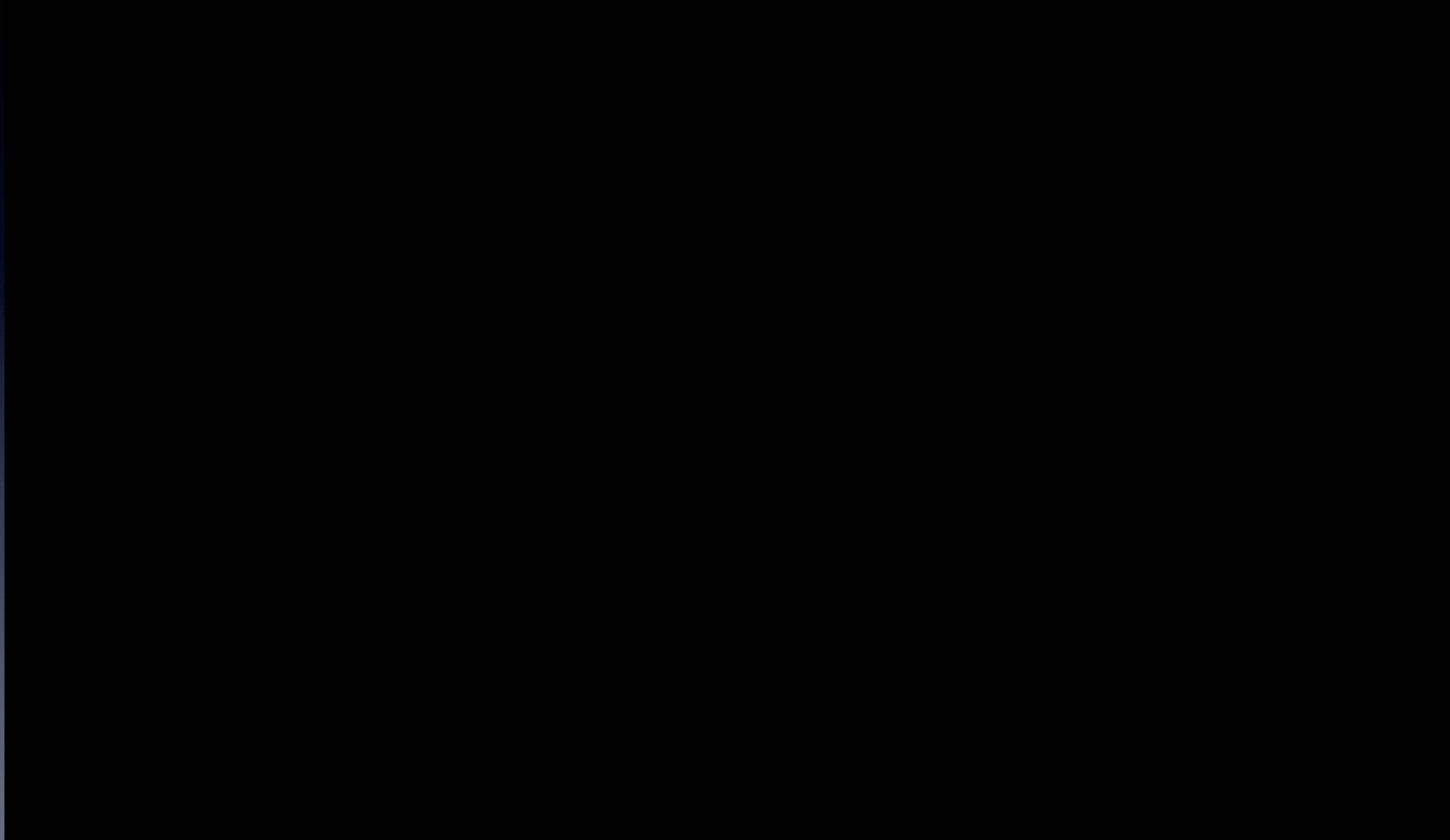
Type: 2



General Concepts

- Small bowel length varies - no correlation with excessive fat mass.
- Measurement of small bowel is subjective $\pm 20\%$.
- Type: 1 distalization .
- Type: 2 distalization .
- TALL needs to be at least 4m in most patients to avoid significant malnutrition/diarrhea.
- Better weight loss with “weight regain” vs “non-responders”.

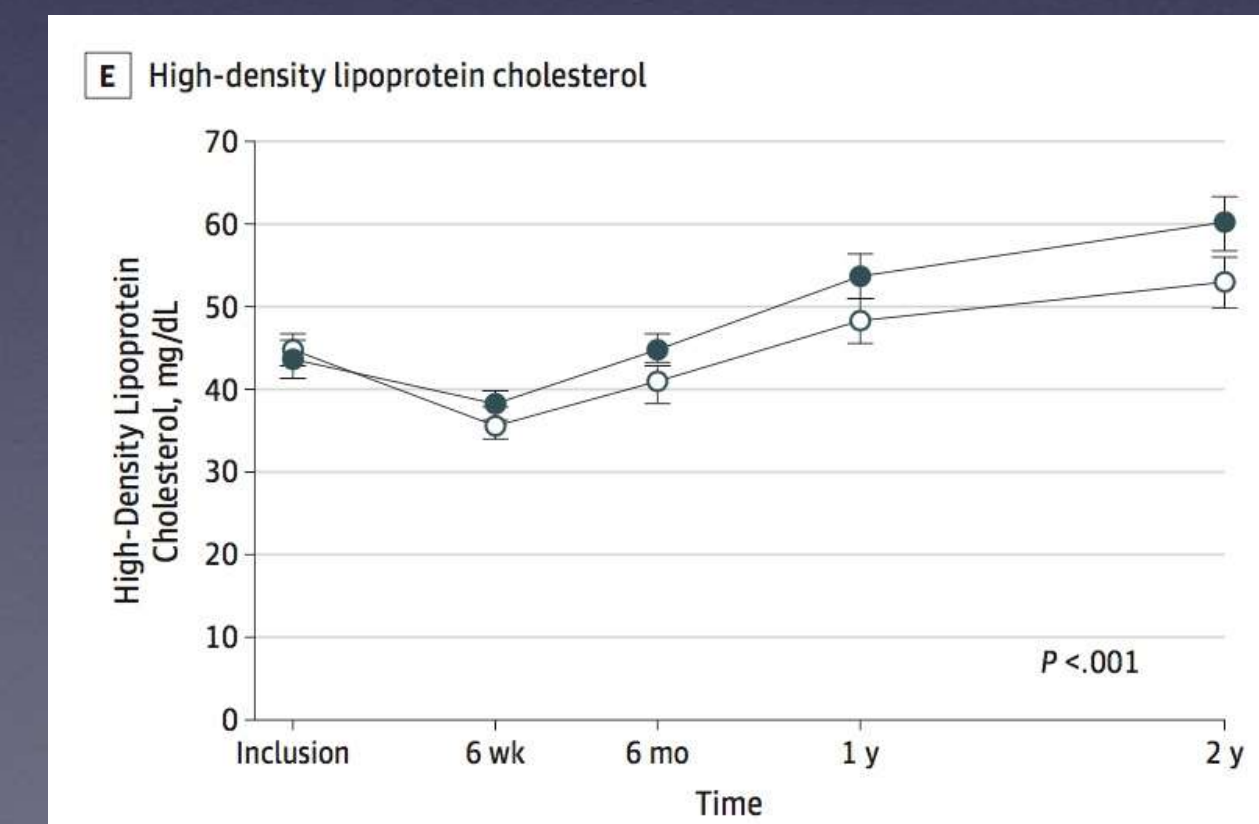
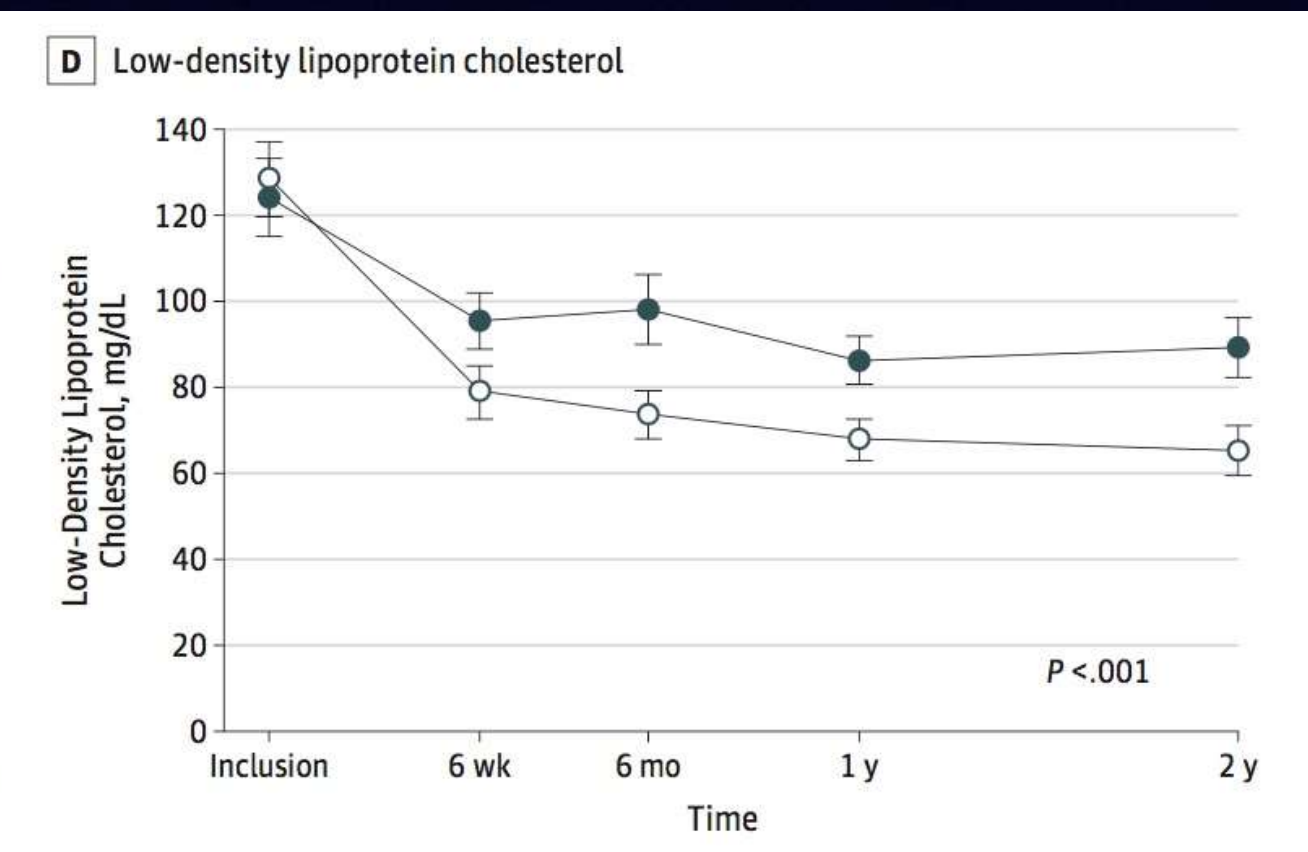
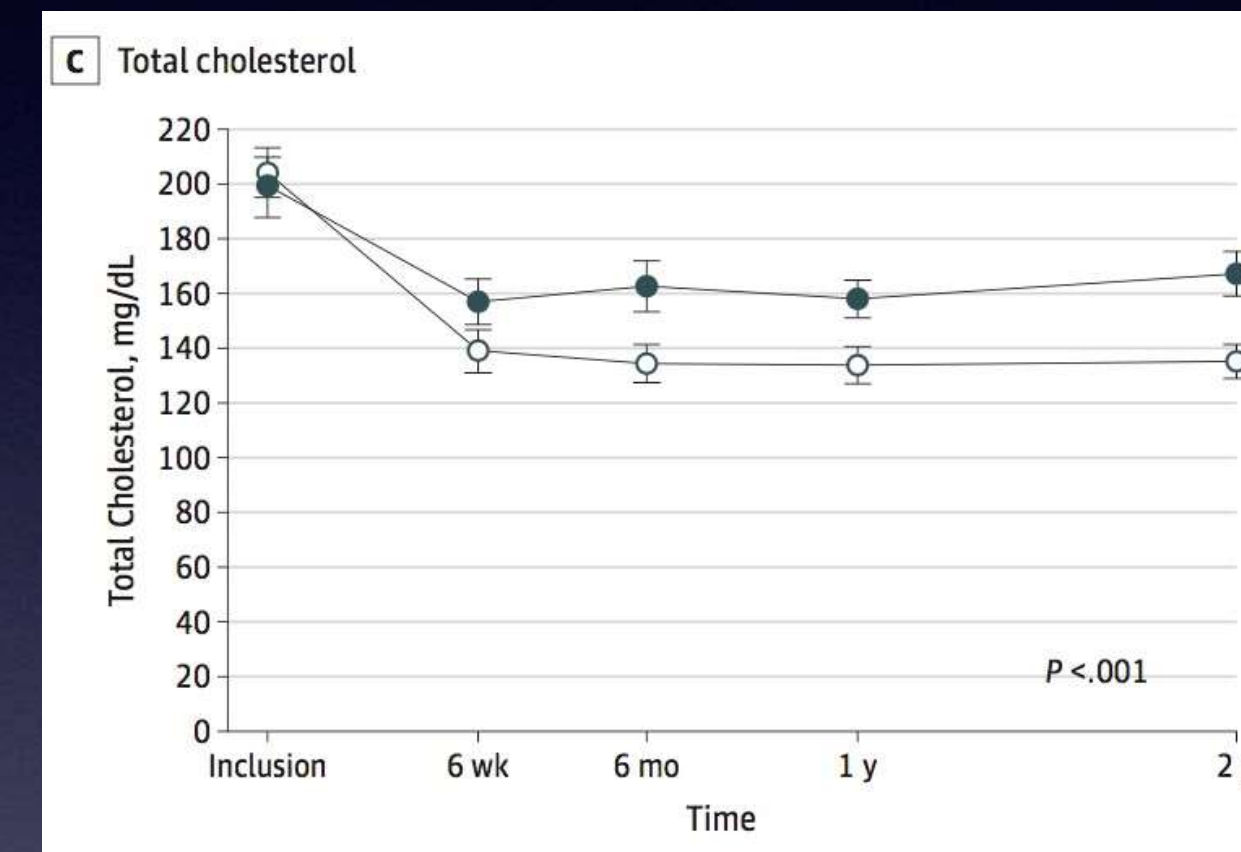
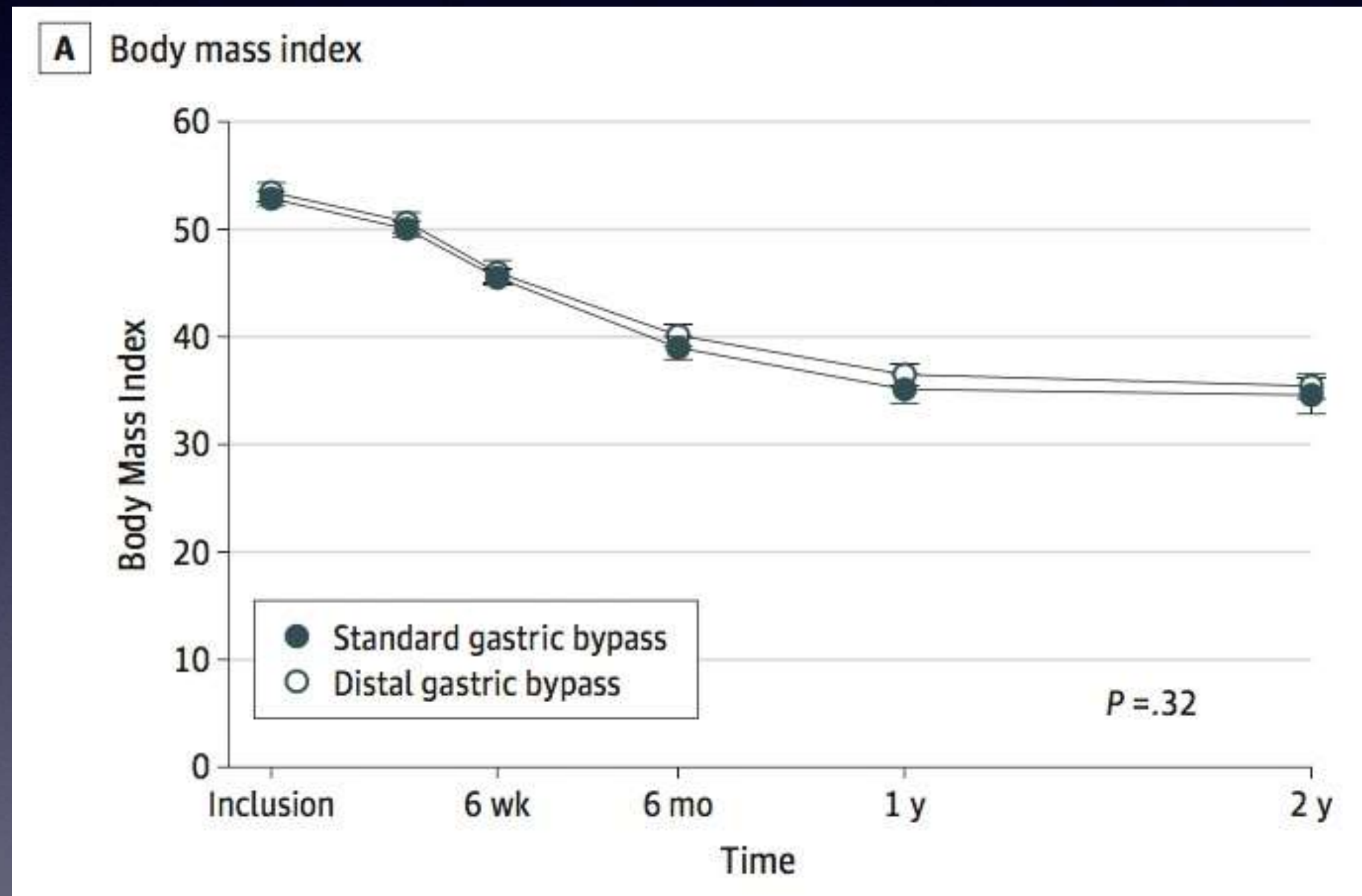
GBP: Pouch Reduction



Standard vs Distal Roux-en-Y Gastric Bypass in Patients With Body Mass Index 50 to 60. A Double-blind, Randomized Clinical Trial (Type: 2 Distalization)

JAMA Surgery Published online September 14, 2016

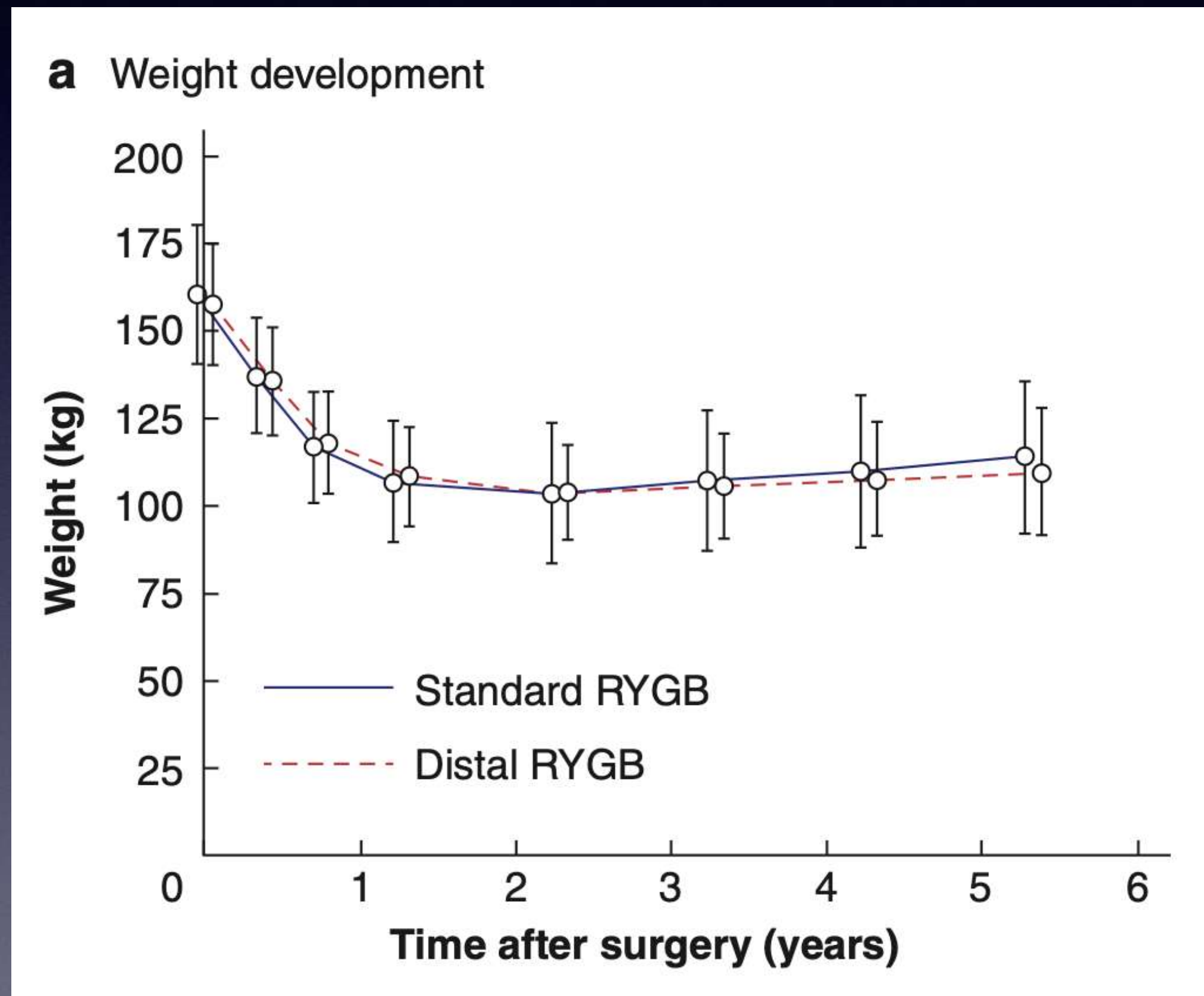
Standard gastric bypass **AL 150 cm** and BPL 50 cm vs **CL 150 cm** and BPL 50 cm.



Standard versus distal Roux-en-Y gastric bypass in patients with BMI 50–60 kgm²: 5-year outcomes of a double-blind, randomized clinical trial

Salte, et al. BJS Open, 2021

Standard gastric bypass **AL 150 cm** and BPL 50 cm vs **CL 150 cm** and BPL 50 cm.



↓ vitamin A & D in type 2 distal GBP

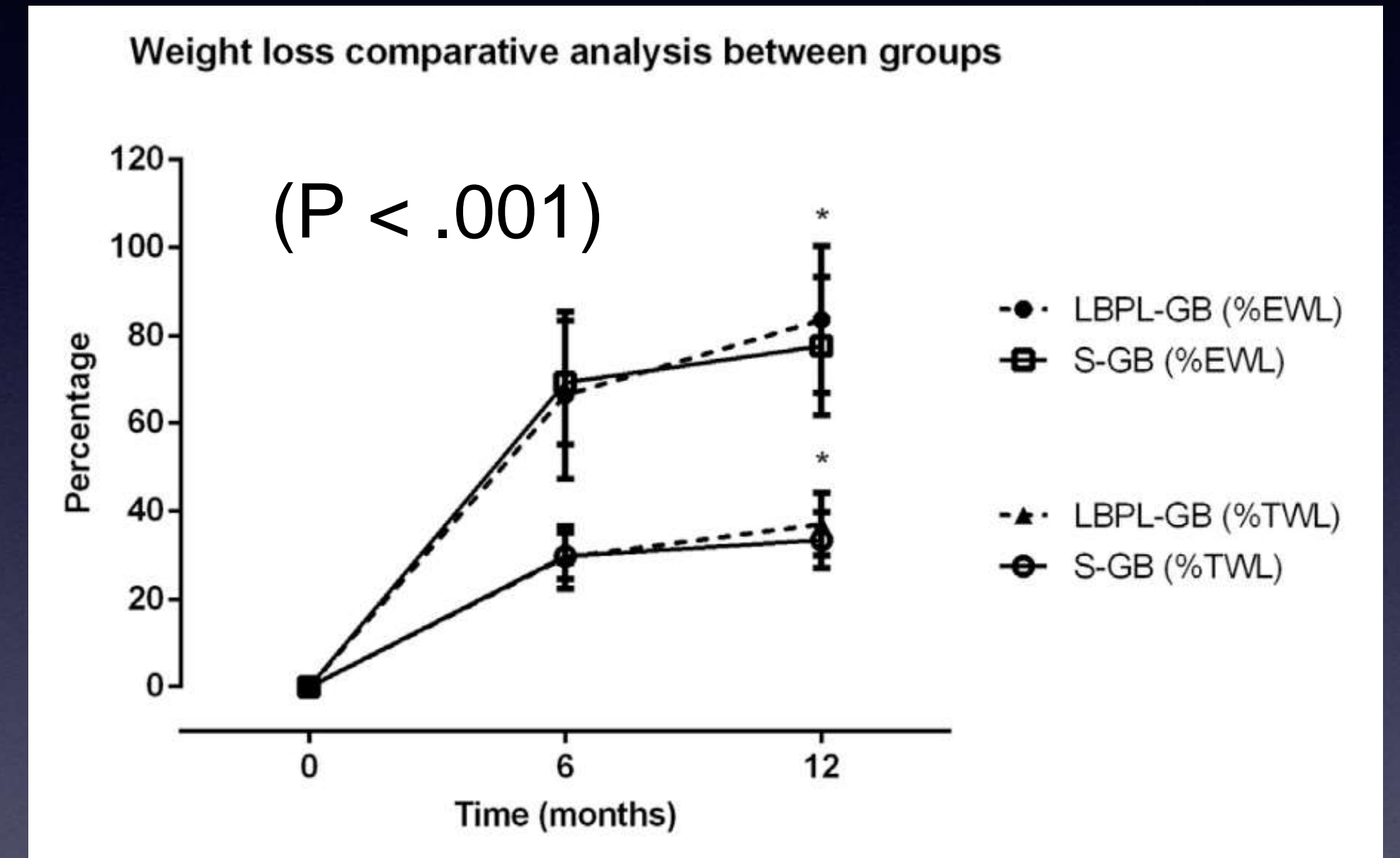
No difference in:
Weight loss
QOL
Adverse events
Eating behavior
GI symptoms
Energy intake/BMR

Long versus short biliopancreatic limb in Roux-en-Y gastric bypass: short-term results of a randomized clinical trial.

Zerrweck C, Herrera A, et al. SOARD 2021

Standard gastric bypass AL 150 cm and **BPL 50 cm** vs AL 50 cm and **BPL 150 cm**.

- 210 patients - 12 month results
- Long BPL: 37.1% ± 7.1% TWL
- Short BPL: 33.5% ± 6.4% TWL
- HbA1C: 5.4 vs 5.2 (p=.001)
- No difference in nutrition, complication rate



The role of total alimentary limb length in Roux-en-Y gastric bypass: a systematic review

Wang A, et al. SOARD 2022

- 21 studies reported TALL
- 4/6 reported relationship between TALL and weight loss.
- If TALL < 4m and CL < 2m, revision rates were 3.4 - 63.6% for protein malnutrition.

Table 3
Effect of total alimentary limb length on weight loss and co-morbidity improvement

Authors	Total pts, n	BMI	TSBL, cm	BPL, cm	RL, cm	CC, cm	TALL, cm	Gastric pouch size, mL	Weight loss			T2D, n (%)	HTN, n (%)	HLD, n (%)
									EWL, %	TWL, %	Change BMI			
Gadiot et al. [10]	196	42.7 ± 4.5	587 (390–890)	60	422 (210–730)	100	522	—	84.3	34.2	—	22 (68.8)	32 (46.4)	48 (58.8)
Shah et al. [26]	211	42.3 ± 4.4	598 (355–985)	60	150	383 (145–755)	533	—	85.3	33.6	—	25 (53.2)	45 (57.7)	48 (55.8)
	69	54.6 (50–81.1)	620 (420–870)	60	150	410 (estimated)	560	—	62.0*	36.0*	—	—	—	—
	88	58.5 (50.2–73.4)	—	200	270 (estimated)	150	420	—	71.0	40.0	—	—	—	—
Kalfarentzos et al. [12]	30	57.4 (50–68.3)	—	200	220 (estimated)	200	420	—	69.0	39.0	—	—	—	—
	75	56.2 ± 7.3	—	80	—	100	—	15 ± 5	55.8*	—	18.6*	15 (100)	33 (75.0)	29 (80.6%)
	44	51.7 ± 7.4	—	—	250	100	350	15 ± 5	77.3	—	22.5	12 (100)	15 (88.2)	21 (87.5)
Kaska et al. [14]	841	57.1 ± 9	—	—	400	100	500	40 ± 10	72.1	—	25.4	178 (97.8)	170 (80.9)	252 (91.6)
	51	43.3 ± 5.7	470.9 ± 108.23	68.8 ± 8.48	157.9 ± 50.11	237 ± 59.75	394	30–40	—	—	2 ± 5.4	38 (74.5)	—	—
Kellum et al. [13]	42	45.1 ± 5.5	—	133.2 ± 17.50	151.4 ± 27.97	193.5 ± 56.72	344	—	—	—	17.3 ± 4.2	40 (95.2)	—	—
	49	57.9 ± 8.3	—	—	100–200	50–150	250	50	72.4* ± 15.0	—	25.1*	—	—	—
Scruggs et al. [15]	92	58.6 ± 9.6	—	75	150	—	—	—	55.1 ± 24.7	—	20.3	—	—	—
	8	42.7 ± 9	—	60	90	—	—	30	—	46.9	—	—	—	—
	8	51.4 ± 9	—	—	90	180–240	270–310	—	—	56.9	—	—	—	—

pts = patients; BMI = body mass index; TSBL = total small bowel length; BPL = biliopancreatic limb; RL = Roux limb; CC = common channel; TALL = total alimentary limb length; EWL = excess weight loss; TWL = total weight loss; T2D = type 2 diabetes; HTN = hypertension; HLD = hyperlipidemia.
Co-morbidities are listed as number and present improvement or resolution.
* *P* < .05 when compared against the other cohort.

Alice Wang et al. / Surgery for Obesity and Related Diseases 18 (2022) 555–564



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

Daniel D. Tran¹ · Ifeanyi D. Nwokeabia² · Stephanie Purnell² · Syed Nabeel Zafar¹ · Gezzer Ortega¹ · Kakra Hughes¹ · Terrence M. Fullum¹

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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

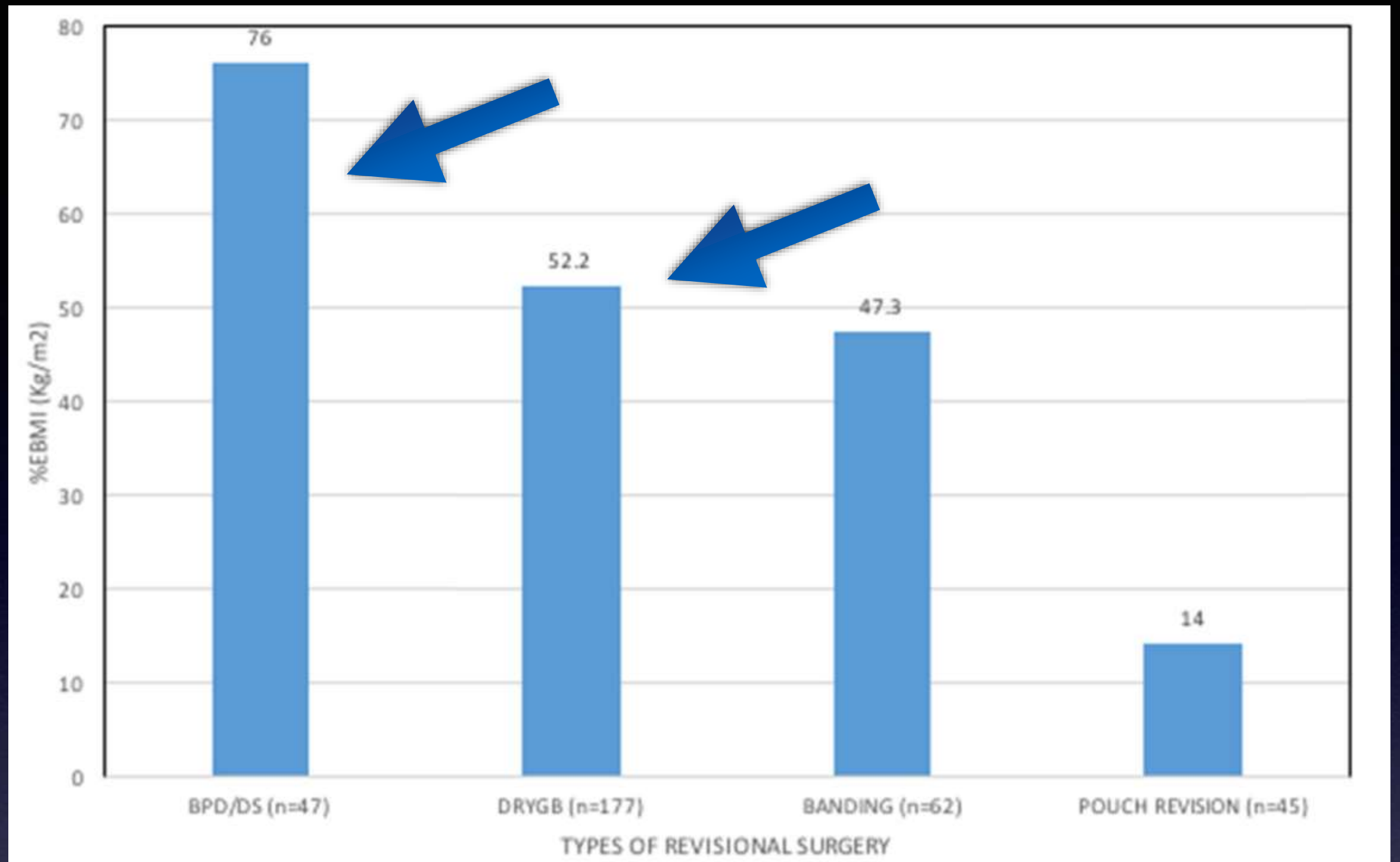
Currently, bariatric surgery remains the gold standard of treatment for sustainable weight loss and reduction of comorbidities in morbidly obese patients when compared to other non-surgical options including behavioral modification, diet modification, drug therapy, and exercise [1–4]. Roux-en-Y Gastric 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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Type: 1 distalization
vs
Type: 2 distalization

META-ANALYSIS

Types, Safety, and Efficacy of Limb Distalization for Inadequate Weight Loss After Roux-en-Y Gastric Bypass

A Systematic Review and Meta-analysis With a Call for Standardized Terminology

Hosam Hamed, MD, Mahmoud Ali, MD, and Youssif Elmahdy, MD

Objective: Comprehensive classification and evaluation of the outcome of limb distalization (LD) for inadequate weight loss after roux-en-y gastric bypass (RYGB)

Background: Limb distalization is a revisional malabsorptive procedure for the management of inadequate weight loss after RYGB. Multiple studies with small sample sizes reported the outcome of LD. This meta-analysis aims to reach a higher level of evidence regarding the safety and efficacy of the procedure.

Methods: A systematic search, including all studies on LD for management of inadequate weight loss after RYGB. The search engines included were PubMed, Embase, Web of Science, Cochrane Library, Scopus, and EBSCOhost.

Results: Fourteen studies were included. The pooled estimates of the mid-term percentage of excess weight loss (%EWL), diabetic, and hypertension remission were 50.8%, 69.9%, and 59.8%, respectively. The rate of surgical revision for the management of protein-energy malnutrition (PEM) was 17.1%. The %EWL was significantly higher with older age and good response to index surgery ($P = 0.01, 0.04$, respectively). Less total alimentary limb length was not associated with better %EWL ($P = 0.9$), but it was significantly associated with severe PEM ($P = 0.01$).

Conclusions: LD has an encouraging rate of resolution of comorbidities. A judicious patient selection is essential for better weight loss after LD. Type I LD with total alimentary limb length ≥ 350 cm was associated with less risk of malnutrition. PEM is a life-threatening complication that may require revisional surgery years after LD. Future studies on LD, adopting standardized surgical practice and terminology, will allow a more conclusive assessment of the outcome of the procedure.

Keywords: distal gastric bypass, revision, short common channel, weight recidivism, weight regain

(Ann Surg 2021;274:271–280)

Roux-en-y gastric bypass (RYGB) was the most frequently performed bariatric procedure until sleeve gastrectomy (SG) came to the fore in 2013.¹ The percentage of excess weight loss (%EWL) after RYGB is 40% to 70% after a 5-year follow up.^{2,3} However, about 10% to 40% of patients experience inadequate weight loss (IWL) with persistence or recurrence of comorbidities after 5 to 7 years.^{4–6} Suboptimal outcomes after RYGB have been attributed to psychosocial, behavioral, dietary, genetic, and anatomical factors.⁴ A judicious multidisciplinary approach is crucial for proper

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The authors report no conflicts of interest.

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management of IWL after RYGB, and surgical revision is the last resort after exhaustion of conservative measures.^{7,8}

Revisional restrictive procedures included pouch reduction, smaller anastomotic reconstruction, conversion to SG, and pouch banding.¹ Endoscopic, rather than surgical, approach is preferred in restrictive revision because of less invasive nature with similar outcomes.^{1,7} However, %EWL after endoscopic revision ranged from 9% to 30% at the very most.⁹ This modest %EWL is usually unsatisfactory for patients who underwent RYGB in the first place. Also, there is a substantial group of patients who has no anatomical cause of IWL as gastro-gastric fistula, pouch enlargement, or anastomotic dilatation.¹⁰

Revisional malabsorptive procedures, including duodenal switch \pm biliopancreatic diversion (DS \pm BPD) and limb distalization (LD), are other options in the armamentarium for management. DS \pm BPD after RYGB was associated with satisfactory %EWL up to 71% after 3 years.¹¹ However, conversion to DS \pm BPD is a demanding procedure that entails high gastro-gastric anastomosis, SG, duodenal division, and multiple intestinal anastomoses.^{5,8} Moreover, a strict long-term follow-up to avoid protein-energy malnutrition (PEM) is another concern after the failed primary procedure.¹² LD or distal RYGB (D-RYGB) is the most frequent malabsorptive revision for IWL after RYGB.¹⁰

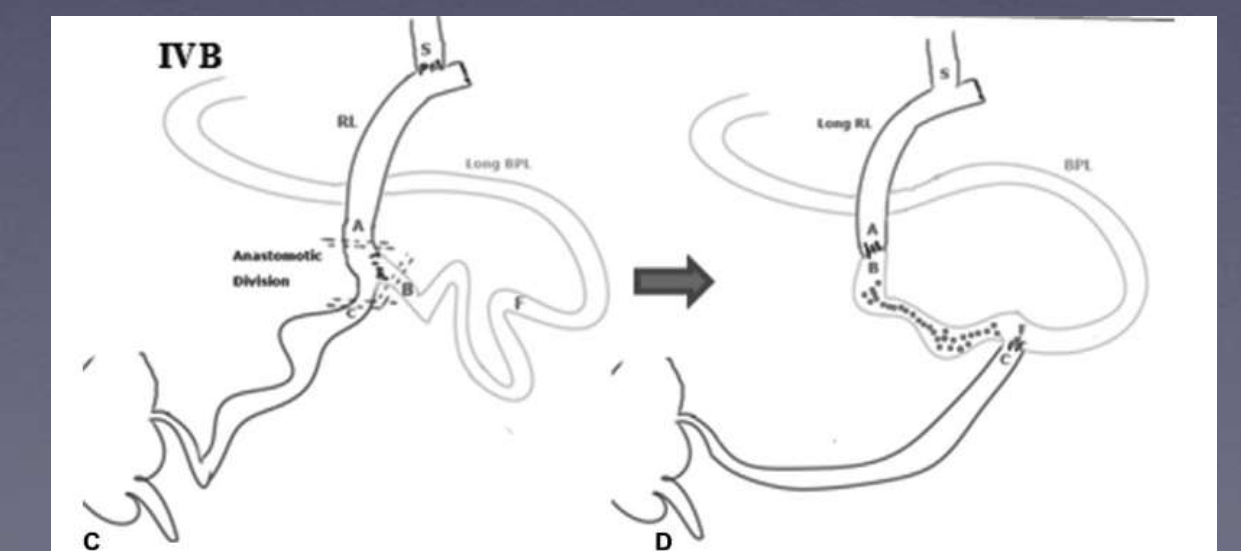
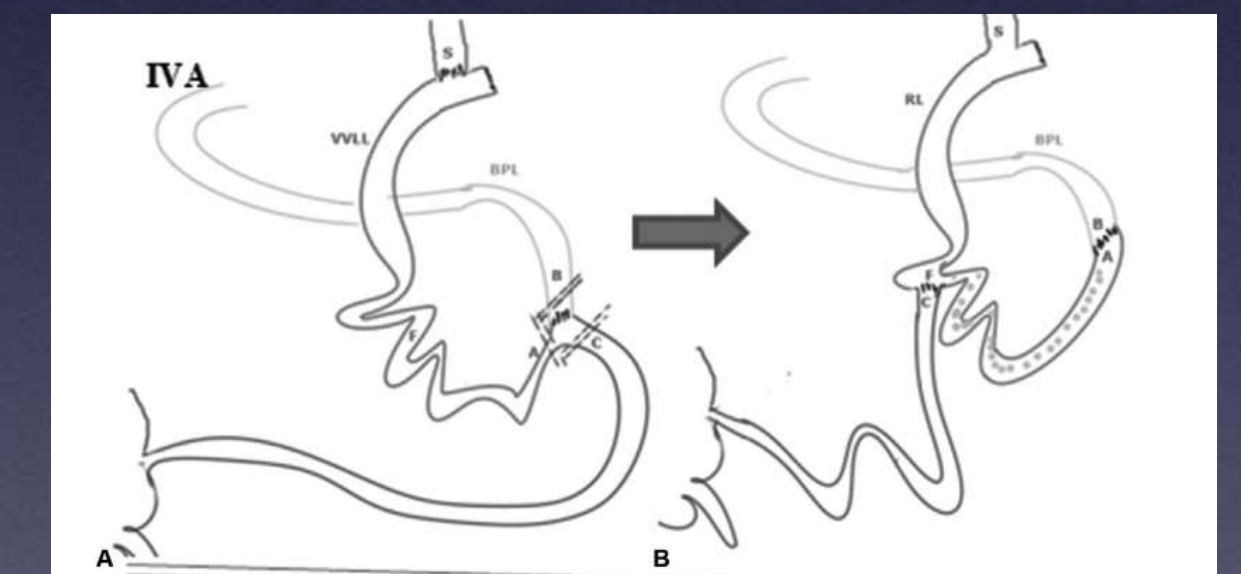
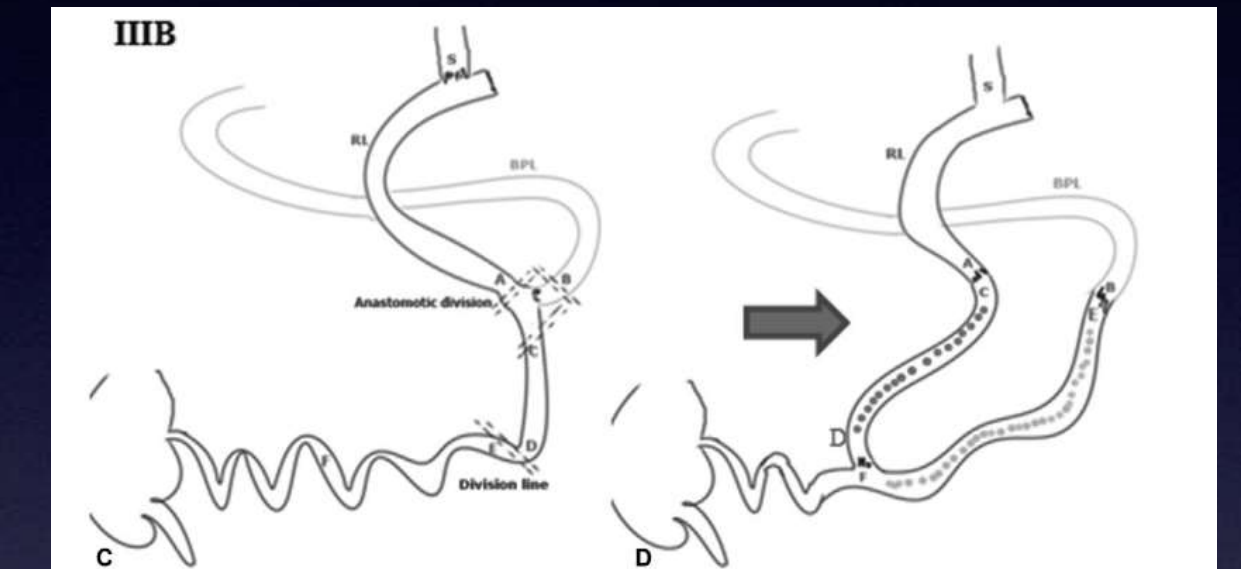
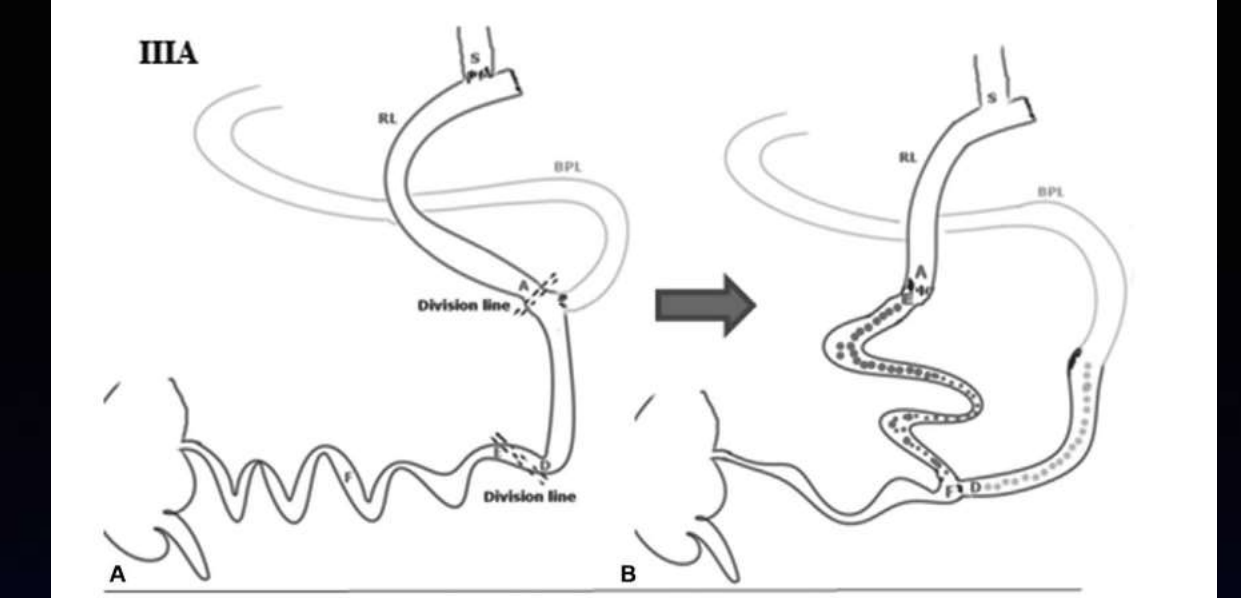
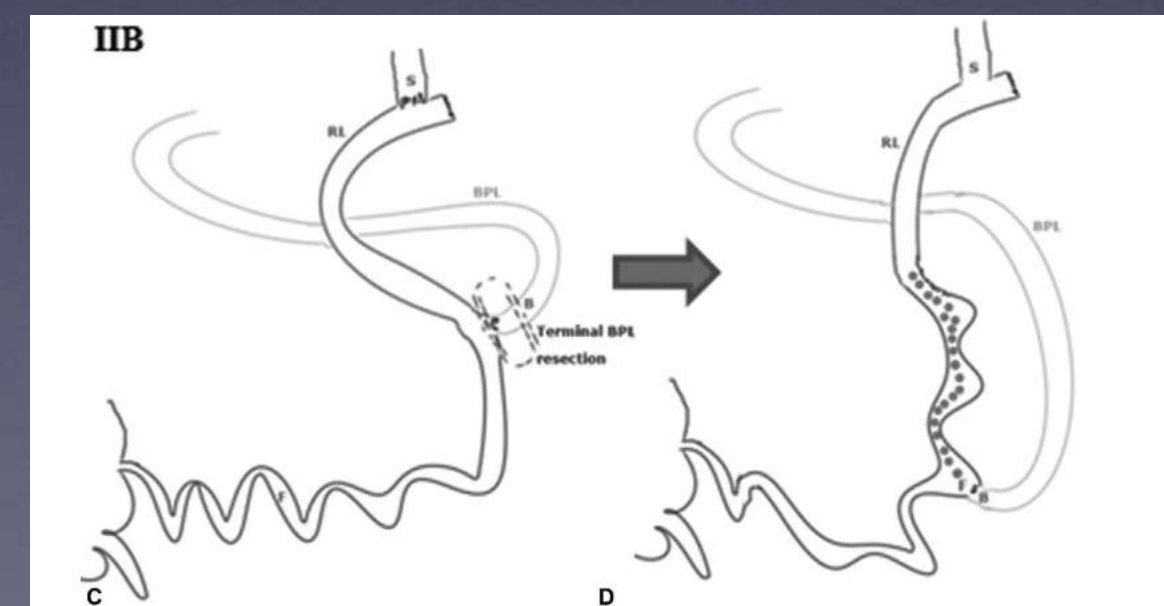
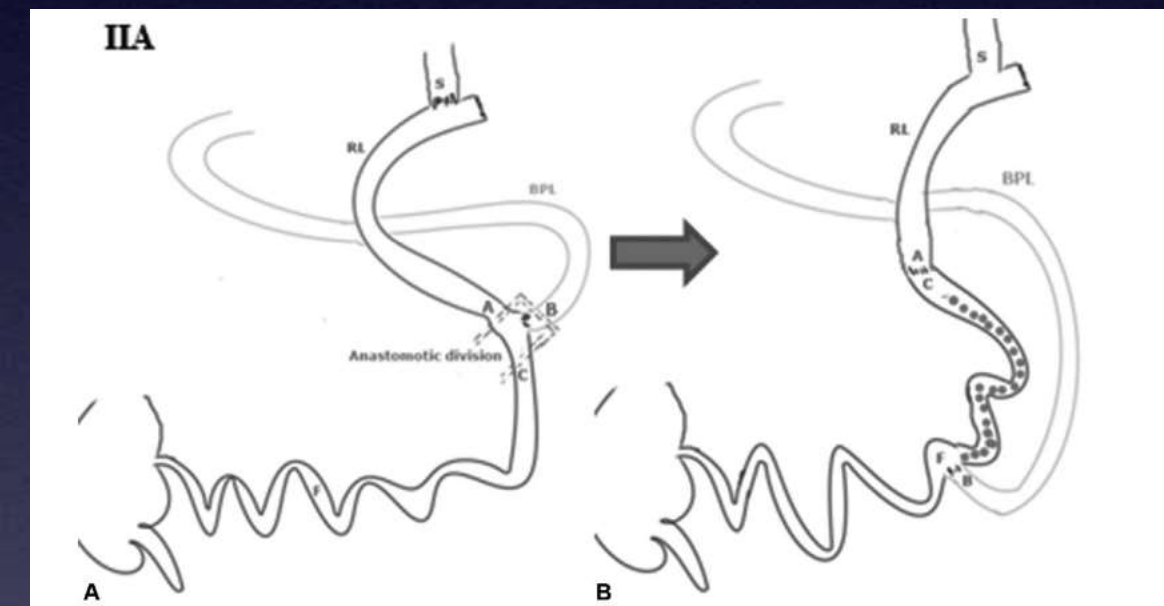
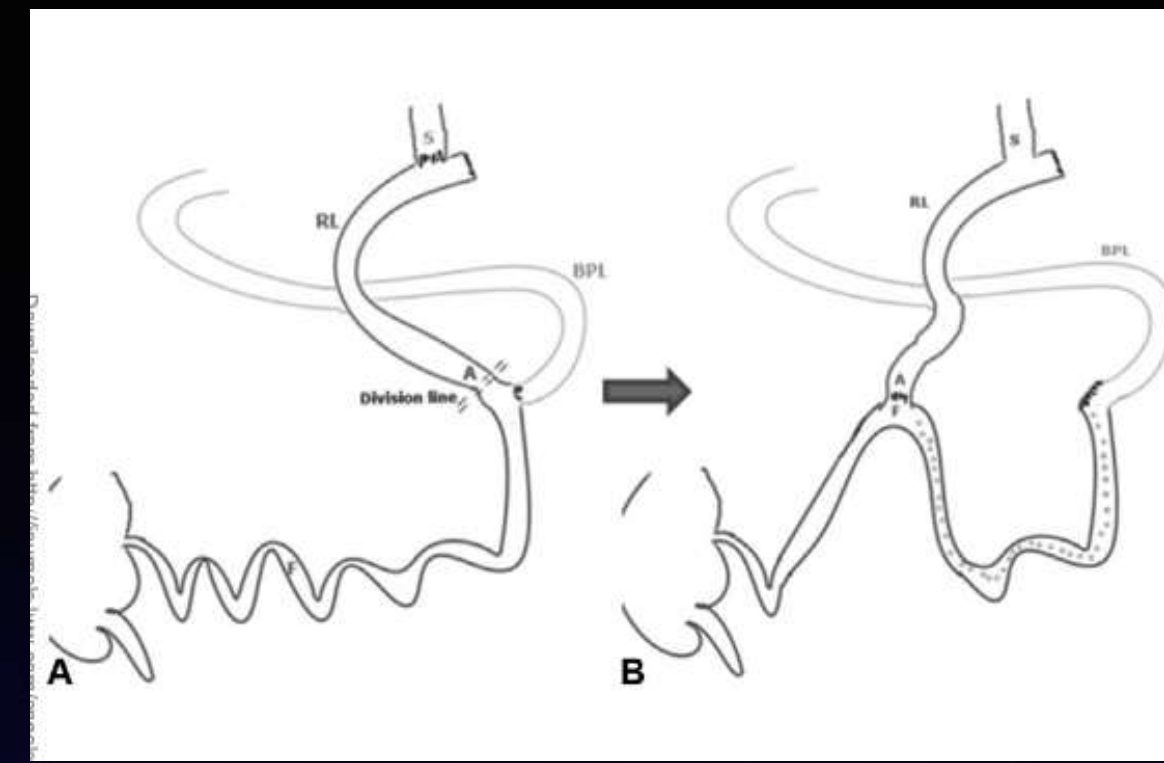
Limb distalization, rather than D-RYGB, is a better term for the description of the procedure as the index surgery may be long Roux limb (LRL) RYGB, which is a form of D-RYGB. We propose a more comprehensive, yet simple, classification of various techniques of LD. The classification included four types of LD, which are type I (biliopancreatic LD); type IIA, IIB (Roux LD); type IIIA, IIIB (Both LD); and type IVA, IVB (LD after LRL RYGB or after long biliopancreatic limb RYGB) (Figs. 1–4). Multiple studies with relatively small sample sizes have described the outcome of LD in regards to safety and weight loss progress. No available meta-analysis has exclusively studied the outcome of LD. The objective of this study is to systematically assess the efficacy and safety of LD for IWL after RYGB.

METHODS

This is a systematic review and meta-analysis on LD for the management of IWL after RYGB. The primary outcome was short and mid-term weight loss progress. Secondary outcomes included early postoperative complications, resolution of comorbidities, the occurrence of hypoalbuminemia, and the need for surgical revision. The PROSPERO international prospective register of systematic reviews was searched using broad terms (roux-en-y, gastric bypass), and none of the resulting 168 records addressed our research question.

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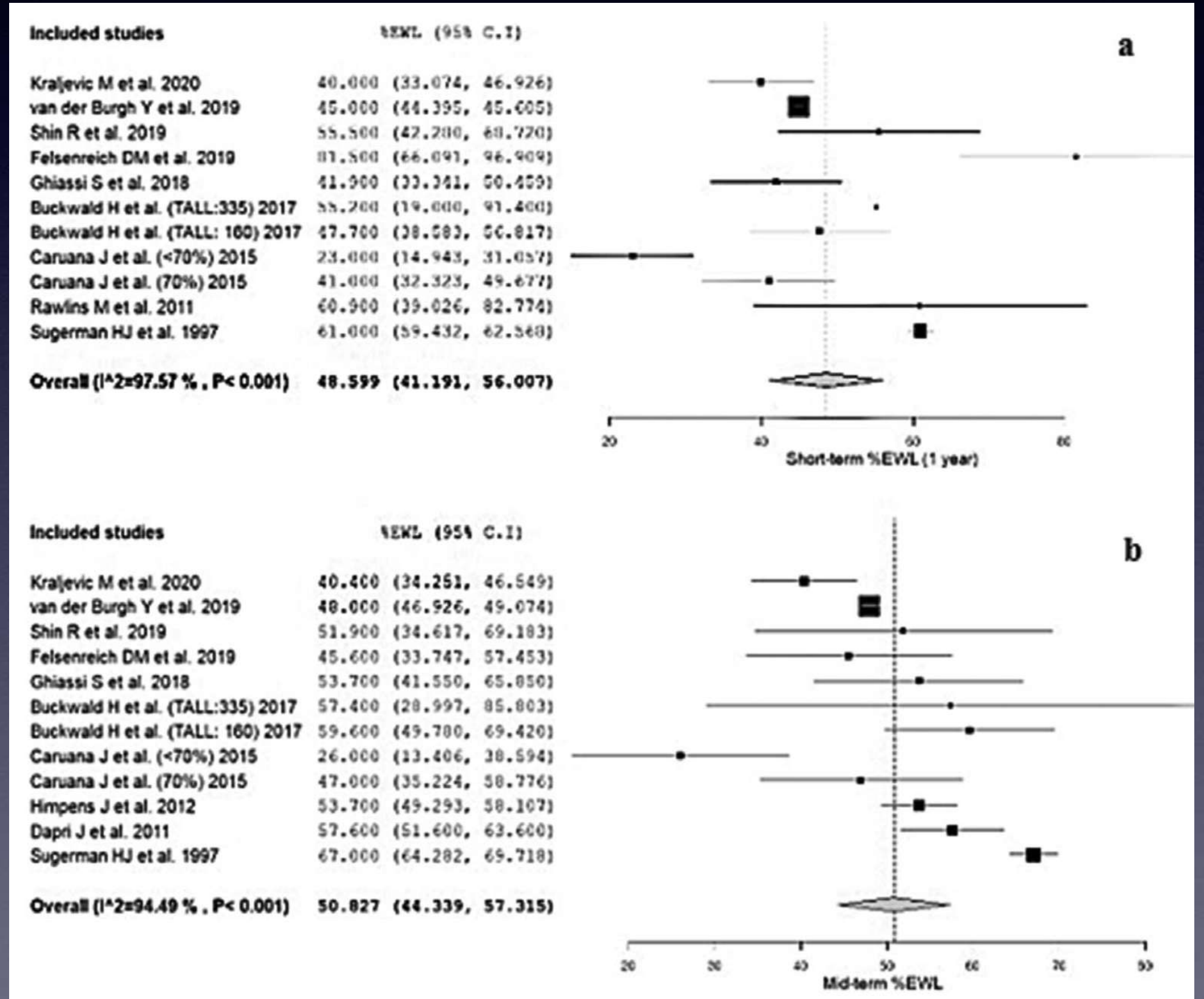
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“Type I LD with total alimentary limb length 350 cm was associated with less risk of malnutrition.”



Conversion of Proximal to Distal Gastric Bypass for Failed Gastric Bypass for Superobesity

Harvey J. Sugerman, M.D., John M. Kellum, M.D., Eric J. DeMaria, M.D.

The purpose of this study was to analyze outcome following malabsorptive distal gastric bypass (D-GBP) in superobese patients who were reoperated for recurrent obesity comorbidity after a failed standard gastric bypass (S-GBP). Twenty-seven formerly superobese patients with a failed S-GBP converted to a D-GBP were studied. The small bowel was anastomosed 250 cm from the ileocecal valve to the disconnected Roux limb; the bypassed small intestine was connected to the ileum 50 cm from the ileocecal valve in five patients between 1985 and 1986 and 150 cm from the ileocecal valve in 22 patients thereafter. Comorbidity was reassessed yearly following conversion to D-GBP. Malnutrition occurred in all five patients with a 50 cm "common tract"; all required further revision and two died of hepatic failure. Three of 22 patients with a 150 cm common tract were reoperated with bowel lengthening because of malnutrition. Initial body mass index was $57 \pm 2 \text{ kg/m}^2$ and fell from $46 \pm 2 \text{ kg/m}^2$ before revision to $37 \pm 2 \text{ kg/m}^2$ at 1 year and $32 \pm 2 \text{ kg/m}^2$ at 5 years after revision; the percentage of excess weight lost went from $30 \pm 4\%$ to $61 \pm 4\%$ at 1 year and $69 \pm 5\%$ at 5 years after revision. Preoperative comorbidity in patients undergoing revision included 14 with insulin-dependent type II diabetes mellitus, 11 with sleep apnea, 14 with hypoventilation, 13 with hypertension, and two with venous stasis ulcers. Obesity comorbidity was corrected within 1 year in all but two patients with hypertension and remained stable in all patients followed for 5 years. Revision of a failed S-GBP to a 150 cm common tract D-GBP corrects failed weight loss and severe obesity comorbidity but requires nutritional support to prevent protein-calorie malnutrition, iron and fat-soluble vitamin deficiencies, and further revision in some patients to correct malnutrition. A 50 cm common tract has an unacceptable morbidity and mortality. (J GASTROINTEST SURG 1997;1:517-525.)

A standard gastric bypass (S-GBP) with a 45 cm Roux limb, a 15 ml gastric pouch, and a 1 cm gastrojejunostomy has been found to produce a significantly greater weight loss than a banded gastroplasty in both randomized prospective studies¹⁻⁴ and retrospective studies.⁵ The S-GBP provides the loss of 66% excess weight (%EWL), defined as the loss of weight in excess of ideal body weight (IBW) according to the 1983 Metropolitan Life Insurance tables,⁶ at 2 years, 60% at 5 years, and 50% at 10 years after surgery.⁷⁻⁹ However, in 15% of patients this procedure will fail through inadequate weight loss or weight regain from the excessive ingestion of high-fat "junk" foods, which crumble and pass through the stoma without resistance, or through the loss of or failure to develop symptoms of dumping syndrome with the ingestion of high-calorie liquids and sweets, the so-called "soft"

calories.^{1-5,7-11} This is associated with inadequate control or recurrence of preoperative obesity comorbid conditions such as severe hypertension, diabetes, hypoventilation, sleep apnea, or venous stasis ulcers. Restapling a disrupted staple line will often produce a return to the patient's previous weight loss curve; this can usually be detected by the history of a marked increase in the ability to eat high-fiber foods and an upper gastrointestinal radiographic series demonstrating early filling of the distal bypassed stomach with contrast material. Revision of a dilated stoma is almost always unsuccessful.¹²

It seemed reasonable to evaluate a more aggressive approach using a malabsorption procedure that might be warranted in particularly severe cases. We chose to use a modification of the partial biliopancreatic bypass procedure, which differed from the original op-

From the Division of General and Trauma Surgery, Department of Surgery, Medical College of Virginia, Virginia Commonwealth University, Richmond, Va.
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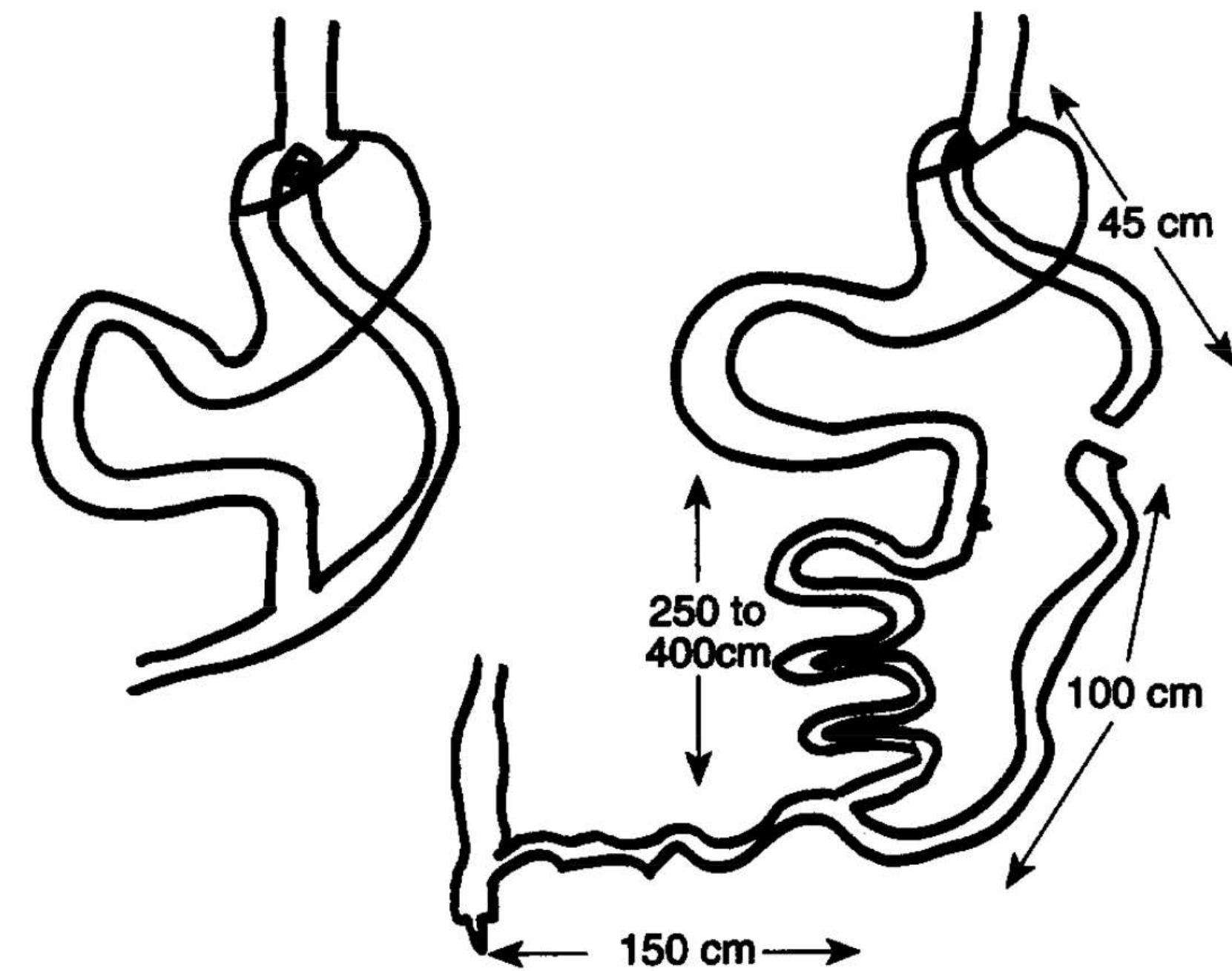


Fig. 1. Schematic of conversion of S-GBP to 150 cm D-GBP. Distal small bowel transected 250 cm from the ileocecal valve and proximal end anastomosed to the disconnected 45 cm Roux limb. Bypassed small bowel, or "biliopancreatic limb," anastomosed to the ileum at 150 cm from the ileocecal valve. This creates a 145 cm "alimentary limb," a 150 cm "common limb," and a 250 to 400 cm "biliopancreatic limb."

J Gastrointestinal Surgery 1997

Conversion of Proximal to Distal Gastric Bypass for Failed Gastric Bypass for Superobesity

Harvey J. Sugerman, M.D., John M. Kellum, M.D., Eric J. DeMaria, M.D.

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- 5 patients with 50 cm CC
 - 2 died of hepatic failure
 - 3 re-operation for severe malnutrition
- 22 patients with 150 cm CC
 - 3 re-operation for severe malnutrition

Table III. Obesity comorbidity before and after conversion to D-GBP

	Before S-GBP	Before D-GBP	1 yr after D-GBP
Type II diabetes mellitus	14	6	0
Sleep apnea	11	7	0
Hypoventilation	14	5	0
Hypertension	13	11	2
Venous stasis	2	2	0

Revision of Roux-en-Y Gastric Bypass with Limb Distalization for Inadequate Weight Loss or Weight Regain

Reuben D. Shin^{1,2} · Michael B. Goldberg^{1,3} · Allison S. Shafran¹ · Samuel A. Shikora¹ · Melissa C. Majumdar¹ · Scott A. Shikora¹

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Abstract

Background Of patients undergoing Roux-en-Y gastric bypass (RYGB), 15–35% of patients fail to achieve “adequate” weight loss or regain significant weight. Multiple solutions have been proposed, but not well studied. We report our experience with limb distalization with lengthening the biliopancreatic (BP) limb and shortening the common channel (CC).

Methods We retrospectively reviewed data from patients undergoing laparoscopic limb distalization for excess weight loss (EWL) <50% or BMI >35 kg/m² after RYGB from 2012 to 2017. The BP limb was lengthened and CC was shortened to 100–200 cm. Perioperative outcomes such as morbidity, weight loss, nutritional deficiencies, comorbidity remission, and operative details were analyzed.

Results Twenty-two patients were included. The mean BMI prior to RYGB was 54.1 ± 8.5 kg/m² and 43.0 ± 5.5 kg/m² prior to limb distalization. The mean follow-up was 18.3 ± 12.9 months with a mean BMI change, %EWL, and %TWL (total weight loss) of 11.8 ± 7.4 kg/m², 62.3 ± 32.4%, and 25.4 ± 14.4%, respectively. The total mean BMI change, %EWL, and %TWL from RYGB was 22.2 ± 9.9 kg/m², 77.8 ± 23.6%, and 40.2 ± 13.3%, respectively. Of patients with persistent comorbidities, remission rates of diabetes, hypertension, and gastroesophageal reflux disease were 100%, 17%, and 38%, respectively. The mean operative time was 132.6 ± 54.4 min and mean hospital stay was 2.2 ± 1.3 days. Overall morbidity was 27.3%. Three patients (13.6%) developed nutritional deficiencies requiring reversal surgery.

Conclusion In patients with inadequate weight loss or weight regain after RYGB, limb distalization with lengthening of the BP limb is an effective procedure for additional weight loss and further improvement of comorbidities. Nutritional complications are a risk, but can be minimized with close follow-up and patient compliance.

Keywords Limb distalization · Shortened common channel · Long biliopancreatic limb · Revisional gastric bypass surgery

Introduction

There have been significant changes in weight loss surgery over the years, but Roux-en-Y gastric bypass (RYGB) currently remains the gold standard for weight loss and resolution of obesity-related comorbidities. The outcomes of the technique

have been well studied and boasts promising results with a 60–80% mean excess weight loss (EWL), high rates of improvement of comorbidities, low complication rates, and reasonable long-term weight loss maintenance [1–4]; however, studies have shown that RYGB does not yield the same results for everyone. Fifteen to 35% of patients fail to achieve “adequate” weight loss or significantly regain weight after surgery, which is traditionally defined by EWL <50% or a BMI >35 kg/m² [4, 5]. This rate is even higher in superobese patients (BMI >50 kg/m²) at about 40% [6]. For these patients, multiple surgical and endoscopic techniques have been employed without consistent or meaningful success [7–13].

The RYGB was initially thought to assert its effects by a combined restrictive and malabsorptive mechanism; however, over the years, it has been demonstrated that the RYGB is mostly a restrictive operation [14–17]. The biliopancreatic

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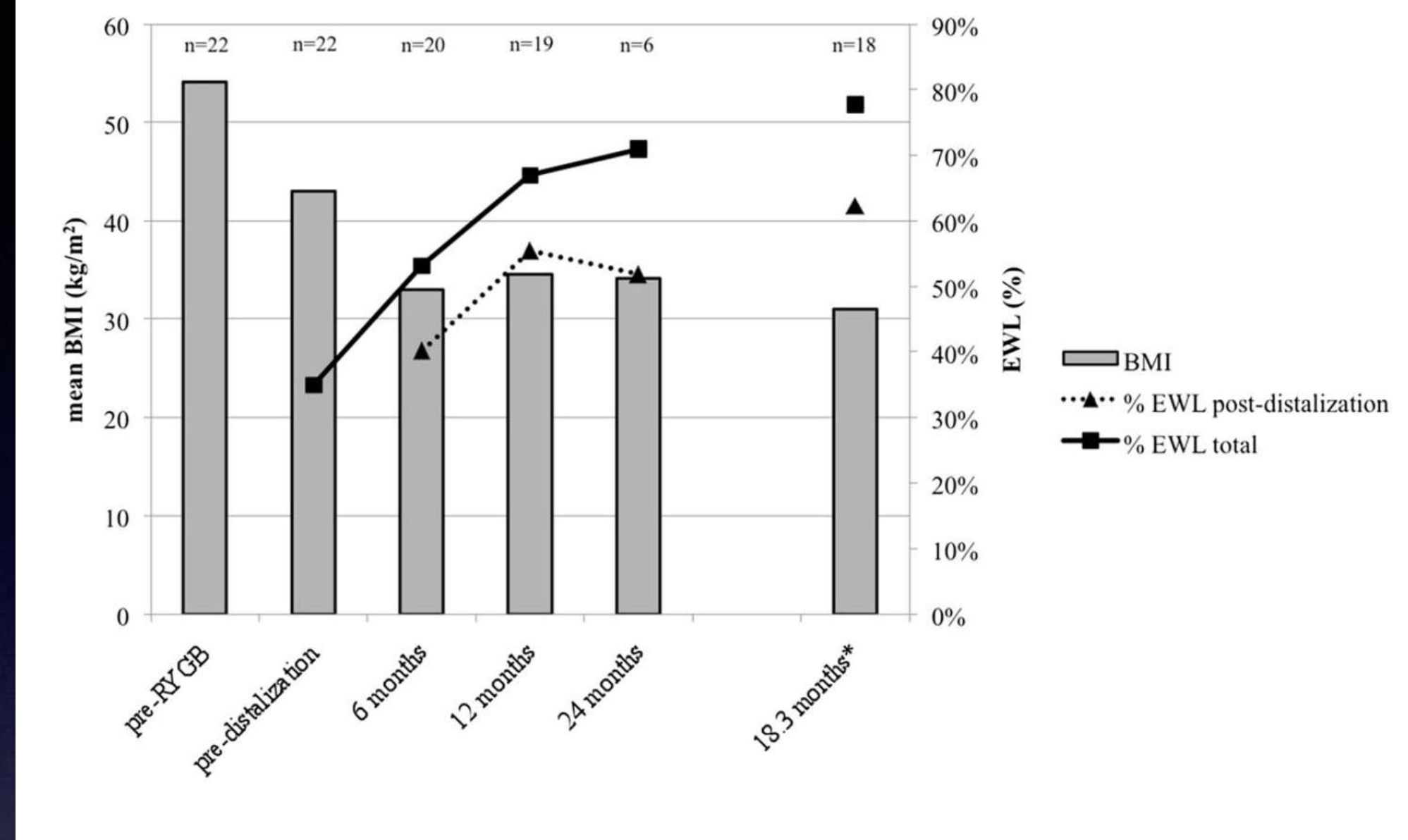


Table 5 Comorbidity outcomes

	Pre-distalization	Post-distalization remission
Hypertension	6/22 (27%)	1/6 (17%)
Diabetes	4/22 (18%)	4/4 (100%)
GERD	8/22 (36%)	3/8 (38%)
Obstructive sleep apnea	5/22 (23%)	NA

GERD gastroesophageal reflux disease; NA not available



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22 patients

- BMI: 54.1 ± 8.5 kg/m² and 43.0 ± 5.5 kg/m² prior to limb distalization.
- F/U: 8.3 ± 12.9 months
- %TWL: 25.4 ± 14.4%
- Morbidity: 27.3%.
- Three patients (13.6%) required additional surgery for malnutrition

90 patients

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ORIGINAL CONTRIBUTIONS

Failed Roux-en-Y Gastric Bypass—Long-Term Results of Distalization with Total Alimentary Limb Length of 250 or 300 cm

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Abstract
Background Weight loss failure or weight regain may occur after Roux-en-Y gastric bypass (RYGB). Revisional surgery includes distalization. However, few studies have looked at the associations between the total alimentary limb length (TALL) and weight loss outcomes, none with long-term results.
Objectives Peri- and postoperative outcomes were assessed after employing TALL of either 250 cm or 300 cm in the failed RYGB.
Methods This study is a retrospective cohort analysis of 90 patients that underwent laparoscopic distalization between January 2006 and January 2016 due to failed RYGB. The index RYGB was modified to TALL of 250 cm ($n=48$) or of 300 cm ($n=42$) which entailed elongating the bilio-pancreatic limb (BPL) and transposing the Roux limb (RL) to a common limb (CL) of 100 cm and 150 cm, respectively. Long-term weight loss outcomes along with nutritional and vitamin status were analyzed.
Results Preoperative BMI at distalization was 38.6 kg/m². After 8 years, excess weight loss (EWL) was 61.8%. No differences between the two groups were seen in weight loss outcomes or early surgical complication rates (6.7%). However, more vitamin and nutritional deficiencies were present in the TALL 250-cm group (50.0% and 35.4%, respectively) versus the TALL 300-cm group (33.3% and 14.3% respectively), which led to laparoscopic revision in 27 patients by lengthening the TALL with 100 cm. Patients with weight regain after index RYGB had in average 59.9% higher EWL than patients with EWL failure.
Conclusion Distalization of the failed RYGBP is safe and effective, but TALL should not be shorter than 300 cm (and CL 150 cm) due to high rates of malnutrition. Adequate supplementation and long-term follow-up are mandatory to prevent serious malnutrition.

Keywords Failed Roux-en-Y gastric bypass · Weight loss failure · Weight regain · Revisional surgery · Distalization · Total alimentary limb length · TALL · Common limb · Common channel · Malnutrition

Key points

- Ninety patients with a failed RYGB due to weight regain and/or weight loss failure underwent type 2 distalization by shortening the total alimentary limb length (TALL) to either 250 cm or 300 cm.
- Promising long-term (8 years) weight loss results were seen in both variants of the distalization with however a very high rate of malnutrition in TALL 250 cm vs TALL 350 cm which led to another surgical revision in 27 patients in total.
- Patients with weight regain has better weight loss outcomes as opposed to those with weight loss failure.

Background

Roux-en-Y gastric bypass (RYGB) is an effective treatment option against obesity and its associated medical problems [1, 2]. However, with time, up to 40% of patients experience weight loss failure and/or weight regain, and different strategies have been implemented to counter this problem [3, 4]. Revisional surgery consists of pouch resizing, salvage

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- TALL of 250 cm ($n = 48$) or of 300 cm ($n = 42$)
- BMI at distalization was 38.6 kg/m²
- EWL was 61.8% @ 8 years
- TALL 250-cm group 50.0% vitamin and 35.4% nutritional deficiencies
- TALL 300-cm group 33.3% vitamin and 14.3% nutritional deficiencies
- 27 patients (30%) required intestinal lengthening
- Patients with weight regain had in average 59.9% higher EWL than patients with initial weight loss failure



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SURGERY FOR OBESITY
AND RELATED DISEASES

Original article

Conversion of standard Roux-en-Y gastric bypass to distal bypass for weight loss failure and metabolic syndrome: 3-year follow-up and evolution of technique to reduce nutritional complications

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Abstract

Background: Standard proximal Roux-en-Y gastric bypass (RYGB) fails to achieve long-term weight maintenance and/or control of metabolic syndrome in up to 35% of patients.

Objectives: To improve the performance of the standard proximal gastric bypass by increasing the biliopancreatic limb length at the expense of the common channel.

Settings: Academic-affiliated private practice.

Methods: A retrospective review of all patients who underwent conversion to distal RYGB from 2010 to 2016 was performed. RYGB was modified by dividing the Roux limb at the jejunojejunostomy and transposing it distally to create a shortened total alimentary limb length (TALL) of 250 to 300 cm in the initial 11 patients. Of these, 7 developed protein calorie malnutrition and diarrhea requiring a second procedure to lengthen the common channel an additional 100 to 150 cm (TALL 400–450 cm), leading to resolution of all symptoms. The subsequent 85 patients were converted to distal RYGB with TALL 400 to 450 in a single-stage operation.

Results: Ninety-six RYGB patients underwent conversion to distal RYGB. The mean body mass index and mean excess weight loss at the time of distalization was 40.6 kg/m² and 33.6%. At 1, 2, and 3 years after distalization, the mean body mass index was reduced to 34.4, 33.1, and 32.2 kg/m², respectively, and excess weight loss improved to 41.9%, 53.7%, and 65.7%, respectively. Diabetes resolved in 66.7%, hypertension resolved in 28.6%, hyperlipidemia resolved in 40%, and sleep apnea resolved in 50% at 1 year. The 30-day complication rate and reoperation rates were 6.3% and 5.2%; an additional 7.3% (7/96) required reoperation for limb lengthening. Hypoalbuminemia developed in 21% at 3 years, but no increase in iron deficiency was observed. Calcium metabolism was affected by the distalization procedure to a greater degree as 21% of patients had low corrected calcium levels, 77% were deficient in vitamin D, and parathyroid hormone levels were above normal in 64% at 3 years.

Conclusion: Revision of proximal RYGB to distal RYGB results in substantial improvement in weight loss and resolution of co-morbidities at 3 years. Diarrhea and protein calorie malnutrition were seen frequently in patients with TALL of 250 to 300 cm, whereas patients with TALL 400 to

Demographics and Results

Number of Patients	96		
Average Age	50.8 ± 9.7		
Average Pre-RYGB BMI	48.4 ± 9 kg/m ²		
Average Pre-Distalization BMI	40.6 ± 7.3 kg/m ²		
	1 year	2 year	3 year
%TWL after RYGB	15.3 ± 9.6%	19.4 ± 9.4%	24.2 ± 6.9%
Follow-up	70%	54.5%	50%

Comorbidity Resolution

	@ distalization	1 year	2 years	3 years
DM	28 patients	66.7%	80%	100%
HTN	55 patients	28.6%	11.1%	0
Lipid	17 patients	40%	33.3%	33.3%
OSA	11 patients	50%	100%	100%
GERD	22 patients	66.7%	40%	40%

Nutritional and Vitamin Levels

	Normal Range	Pre	6 Month	1 Year	2 Year	3 Year
Albumin (gm/dL)	(3.4 - 5.0)	3.8 ± 0.3	3.6 ± 0.4	3.7 ± 0.6	3.7 ± 0.4	3.6 ± 0.5
Hemoglobin (g/dL)	(12.3 - 15.3)	12.8 ± 1.2	12.5 ± 1.0	12.2 ± 1.4	12.1 ± 1.0	11.7 ± 1.5
Protein (gm/dL)	(6.4 - 8.2)	7.4 ± 0.5	6.8 ± 0.6	6.7 ± 0.7	6.5 ± 0.7	6.5 ± 0.7
Iron (ug/dL)	(50 - 170)	77.5 ± 33.3	83.0 ± 29.6	75.0 ± 29.7	67.3 ± 20.6	73.7 ± 50.2
Corrected Ca (mg/dL)	(8.5 - 10.1)	9.1 ± 0.4	9.1 ± 0.3	9.2 ± 0.4	9.0 ± 0.4	8.9 ± 0.6
PTH (pg/mL)	(10 - 65)	49.8 ± 24.0	82.5 ± 37.5	71.7 ± 35.8	83.1 ± 32.8	85.3 ± 37.0
B1 (nmol/L)	(78 - 185)	112.8 ± 54.5	126.7 ± 30.4	116.3 ± 38.4	116.6 ± 37.1	97.8 ± 42.0
B12 (pg/mL)	(200 - 1100)	679.0 ± 399.2	757.0 ± 413.2	955.1 ± 626.0	894.2 ± 596.6	885.5 ± 517.3
Vit-A (mcg/dL)	(38 - 106)	N/A	40.3 ± 11.7	28.1 ± 9.7	31.0 ± 1.4	33.0 ± 0.0
Vit-D (ng/mL)	(30 - 100)	30.8 ± 14.8	20.7 ± 11.9	23.6 ± 12.9	24.2 ± 9.3	24.6 ± 16.3

Type:1 Distalization



When does distalization become an option?

- Comorbid conditions: DM, TG, lipidemia
- Weight gain > Inadequate weight loss
- Intact nutrition and compliant with advised supplements
- Careful with TALL < 4 m
- Must measure entire small bowel length