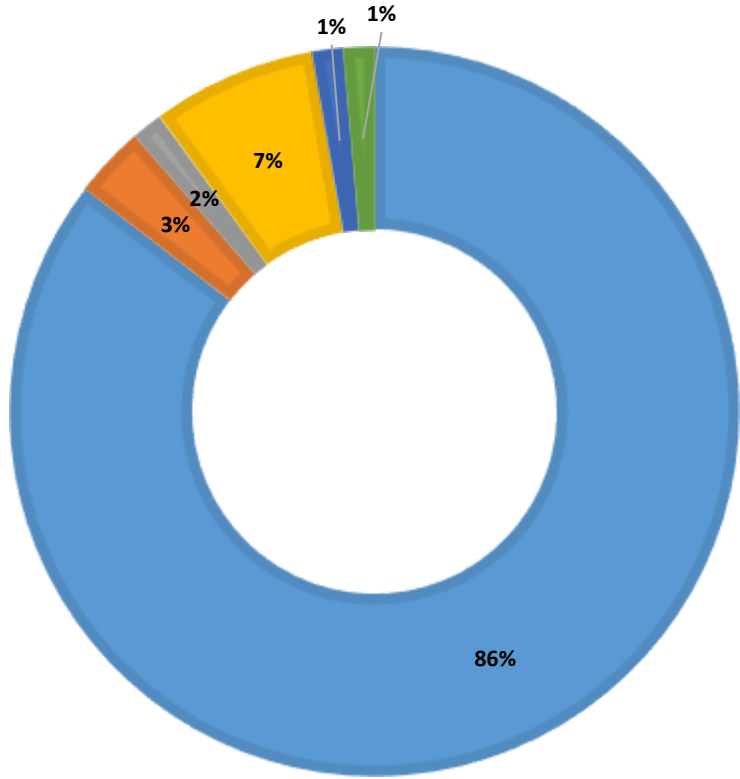


Revisional Surgery after Bypass for Recurrent Weight Gain: To What? When?

Dr Muffazal Lakdawala

Director of Department of Minimal Access Surgical Science and General Surgery

Sir H.N. Reliance Foundation Hospital, Mumbai.



■ RYGB ■ SG ■ OAGB ■ Revision ■ Band removal ■ Balloon

RYGB – Roux-en-Y gastric Bypass

LSG – Laparoscopic Sleeve Gastrectomy

OAGB – One Anastomosis Gastric Bypass

Revision:

- SG to RYGB
- Limb lengthening
- Limb shortening
- Mini Gastric Bypass to Single Anastomosis
- Duodenal-Ileal bypass
- Redo-gastrojejunostomy

Band removal

Endoscopic Balloon/ Swallowable Balloon

Reasons for Revisional Bariatric Surgery

- Inadequate weight loss
- Weight Recidivism or Weight Regain
- Complications related to the procedure

Revisional Surgery for Weight Regain after Bypass – When?

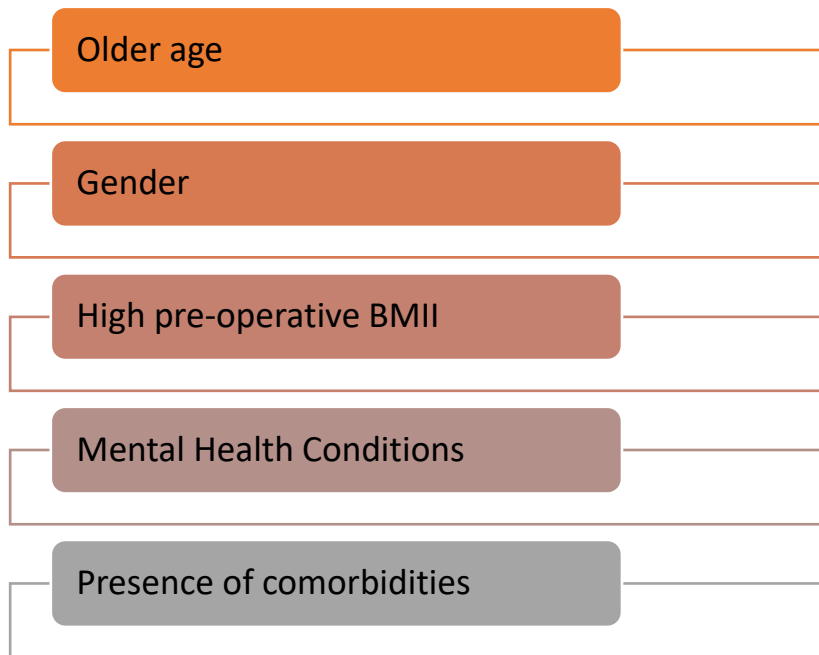
The prevalence of weight regain post-RYGB is 3.9%

Definitions of Weight regain:

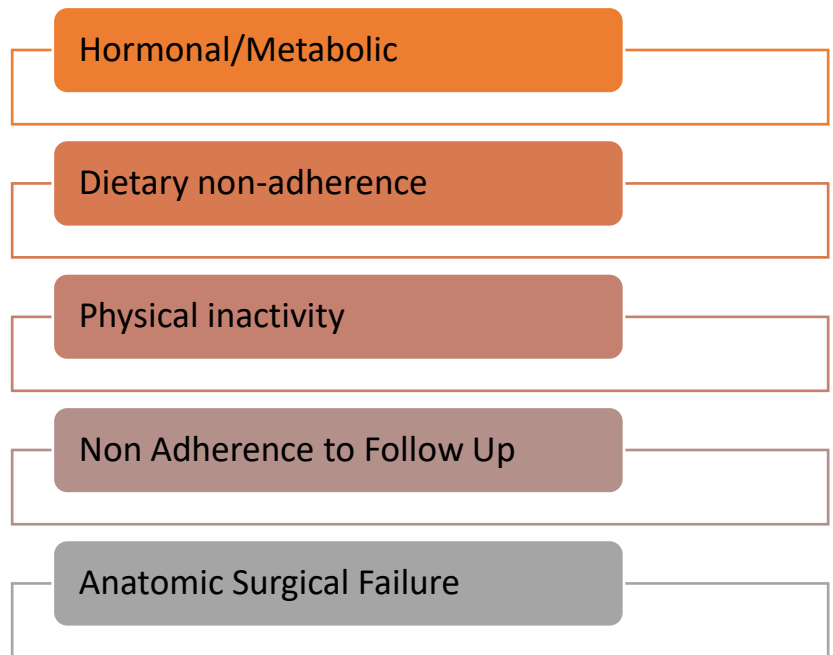
- **Nadir weight %** $\geq 10\%$ or $> 15\%$ of nadir weight
- **Nadir weight kg** ≥ 10 kg from nadir
- **BMI** ≥ 5 BMI kg/m² points from nadir
- **Increase in BMI** > 35 kg/m² after successful WL

A patient must undergo revisional bariatric surgery when their weight loss is deemed as insufficient weight loss by the bariatric team and recurrence of comorbidities is observed.

Predictors of weight regain



Causes of weight regain

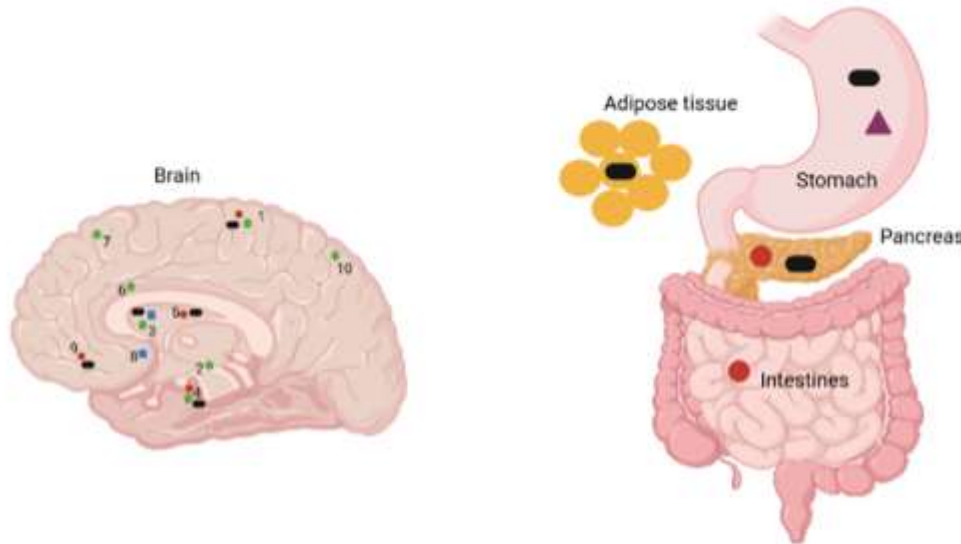


Pharmacotherapy for Management of Weight Regain after RYGB

Review > EClinicalMedicine. 2023 Mar 20;5(8):101882. doi: 10.1016/j.eclinm.2023.101882.
eCollection 2023 Apr.

Pharmacotherapy of obesity: an update on the available medications and drugs under investigation

Marlene Chakhtoura¹, Rachelle Haber¹, Malak Ghezzawi¹, Caline Rhayem¹, Raya Tcheroyan²,
Christos S Mantzoros³



Medication	Central site of action	Peripheral site of action
● GLP-1 Receptor Agonists	1,3,4,5,9	Gastrointestinal tract
■ Naltrexone/Bupropion	1,2,3,4,6,7,10	None
■ Phentermine/Topiramate	2,3,8	None
▲ Orlistat	None	Gastrointestinal tract
● GIP/GLP-1 dual agonists	1,3,4,5,9	Adipose tissue, gastrointestinal tract

Site of action of FDA approved anti-obesity medications.

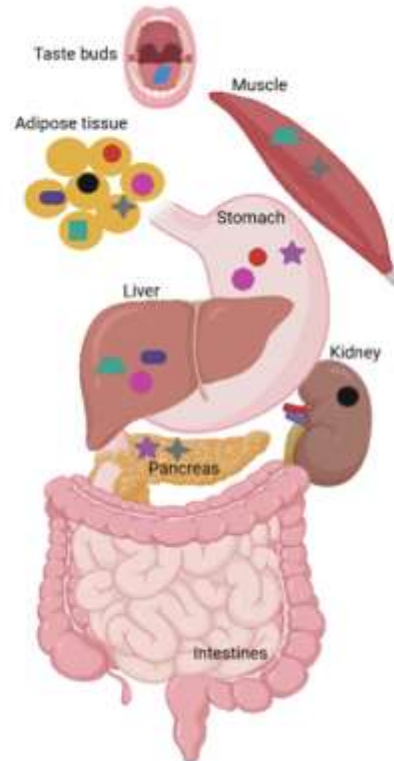
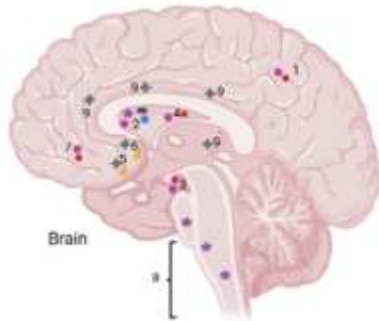
- (1) Parietal cortex
- (2) Hippocampus
- (3) Hypothalamus
- (4) Insula
- (5) Putamen
- (6) Dorsal anterior cingulate
- (7) Superior frontal cortex
- (8) Nucleus accumbens
- (9) Orbitofrontal cortex
- (10) Superior parietal cortex

Pharmacotherapy for Management of Weight Regain after RYGB

Review > EClinicalMedicine. 2023 Mar 20;58:101882. doi: 10.1016/j.eclim.2023.101882.
eCollection 2023 Apr.

Pharmacotherapy of obesity: an update on the available medications and drugs under investigation

Marlene Chakhtoura ¹, Rachelle Haber ¹, Malak Ghezzawi ¹, Caline Rhayem ¹, Raya Tcheroyan ²,
Christos S Mantzoros ³



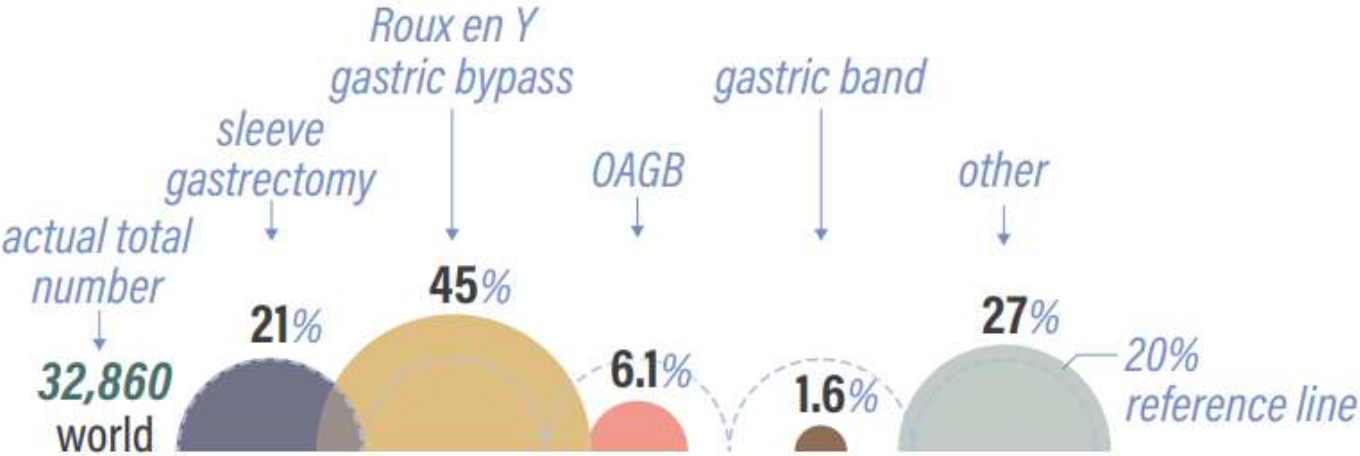
Medication	Central site of action	Possible peripheral site of action
● GLP-1/glucagon dual agonists	1,3,4,7	Adipose tissue, gastrointestinal tract
● GIP/GLP-1/glucagon tri agonists	1,2,3,4,7	Adipose tissue, gastrointestinal tract, liver
■ Y2R agonists	2	None
★ Amylin receptor agonists	2,8	Stomach, pancreas
● SGLT-2 inhibitors	None	Adipose tissue, kidneys
▲ Methylphenidate	5,6	None
▲ Glabridin analogue	None	Liver, muscle
✦ Oxytocin	5,6,9	Adipose tissue, pancreas, muscle
● Leptin sensitizers	2	Adipose tissue, liver
■ Vitamin E	None	Adipose tissue
■ Taste receptor activator	None	Mouth

Site of action of Drugs under development for treatment of obesity.

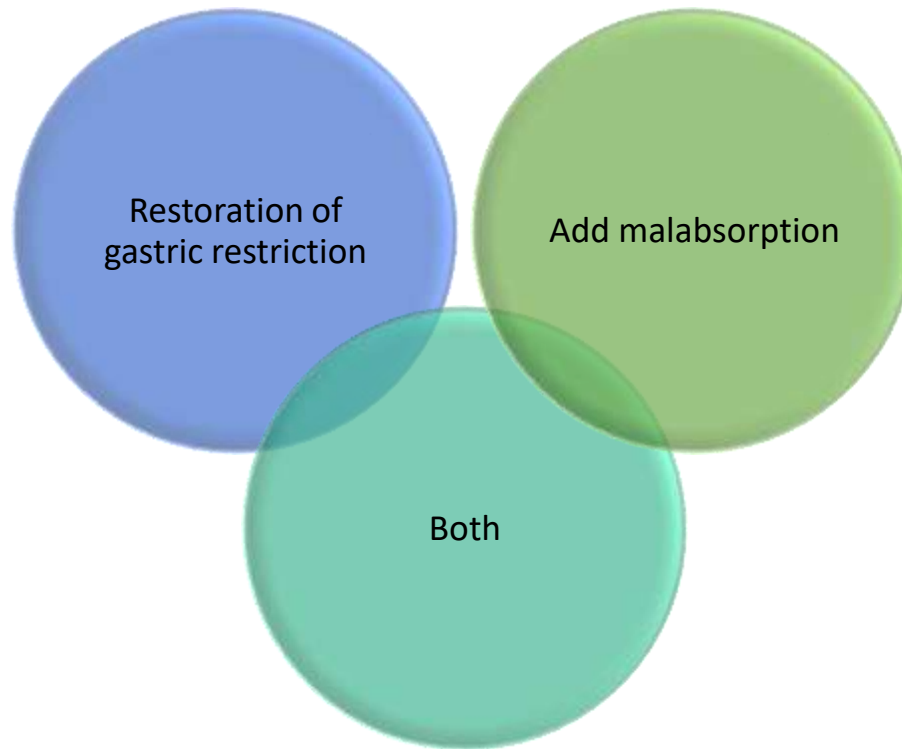
- (1) Parietal cortex
- (2) Hypothalamus
- (3) Insula
- (4) Putamen
- (5) Nucleus accumbens
- (6) Striatum
- (7) Orbitofrontal cortex
- (8) Hindbrain
- (9) Mesolimbic system

World Total of Revisional Procedures

Revisional Procedures by Type:



Goals of Revisional Surgery for Weight Regain after RYGB:



Revisional Surgery for Weight Regain after Bypass – To What?

- Surgical revision of the pouch and GastroJejunal Stomal size
- Placement of an adjustable or nonadjustable band around a gastric pouch in case of Non-banded Bypass
- Lengthening the biliopancreatic to increase the malabsorptive or bypass component of the operation
Type 1/ Type 2
- Conversion to SADI-S One stage / Two Stage
- Conversion to Duodenal Switch (DS) One stage / Two Stage

Salvage banding for failed Roux-en-Y gastric bypass

Guy H E J Vijgen¹, Ruben Schouten, Nicole D Bouvy, Jan Willem M Greve

Author	Year	Patients (n)	FU	BMI			%EBMIL		Pouch dilation?	Band	Complications	
				Initial	Revision	FU	Revision	FU			<30 days	>30 days
Kyzer (A*)	2001	12	27	—	29.9	25.4	—	—	Yes	AGB ¹	—	Gastric volvulus (n = 1), tubing tear (n = 1), ventral hernia (n = 3)
Kyzer (B*)				—	44.8	33.4	—	—	Yes	AGB ²		
Chin	2009	8	12	62.6	48.4	41.6	37.8	55.9	No	AGB ²		Port flip (n = 2), wound hematoma (n = 1)
Heath	2009	1	42	42.1	31.0	26.0	64.9	94.2	Yes	AGB ³	—	—
Dapri	2009	6	14	36.3	29.5	26.4	60.2	87.6	No	NAGB ⁴	—	—
Bessler	2010	22	12†	52.6	44.8	—	28.3	—	ND	AGB ³	—	Small bowel obstruction (n = 1), band slippage (n = 1), port infection (n = 1)
Irani	2011	42	26	50.4	43.3	33.8	28.0	65.4	ND	AGB ²	Enterotomy (n = 1)	Band slippage (n = 1), band erosion (n = 2), dysphagia (n = 1)
Meesters	2012	12	28	47.8	39.6	34.2	36.0	59.6	ND	AGB ²	Pneumothorax (n = 1),	Gastrojejunal ulcer (n =

The results of all 9 studies that were included in this review report a further increase in weight loss after salvage banding for failed RYGB. In case of insufficient weight loss or technical pouch failure after RYGB, all reports suggest that **salvage banding is a safe and feasible revisional procedure**.

Long-term results for gastric banding as salvage procedure for patients with weight loss failure after Roux-en-Y gastric bypass

Shinban Liu ¹, Christine J Ren-Fielding ², Bradley Schwack ², Marina Kurian ², George A Fielding ²

The mean body mass index before RYGB was 48.9 kg/m².

Before LAGB, patients had an average body mass index of 43.7 kg/m², with 10.4% total weight loss and 21.4% excess weight loss after RYGB.

At 5-year follow-up, patients (n = 20) had a mean body mass index of 33.6 kg/m² with 22.5% total weight loss and 65.9% excess weight loss after LAGB.

The long-term reoperation rate for complications related to LAGB was 24%, and 8% of patients ultimately had their gastric bands removed.

The results of the study show that LAGB had good long-term data as a revisionary procedure for weight loss failure after RYGB

Reversal of Long-Term Weight Regain After Roux-en-Y Gastric Bypass Using Liraglutide or Surgical Revision. A Prospective Study

Fritz F Horber ¹, Rudolf Steffen ²

Group	N	BMI-0 ⁺	BMI-24 [*]	delta BMI-lost	Follow-up of weight change (kg) after intervention (months)						
		kg/m ²	kg/m ²	kg/m ²	0 months	3 months	6 months	9 months	12 months	18 months	24 months
DC (controls)	30	27.1 ± 5.0	27.2 ± 4.5	- 0.1 ± 1.7	75 ± 15	75 ± 15	75 ± 15	76 ± 14	76 ± 13	75 ± 13	75 ± 13
LG (liraglutide)	34	31.2 ± 4.0 [#]	26.4 ± 3.5	4.8 ± 2.9 [£]	84 ± 13 [#]	80 ± 13	77 ± 12	76 ± 12	74 ± 11	73 ± 10	72 ± 9 [£]
ES (endosurgery)	15	31.0 ± 4.2 [#]	30.0 ± 4.4 [§]	1.0 ± 0.9	83 ± 14 [#]	80 ± 14	80 ± 14	80 ± 14	80 ± 14 [§]	-----	-----
FP (Fobi) [§]	16	34.2 ± 4.9 [#]	28.7 ± 4.6	5.5 ± 2.9 [£]	96 ± 12 [#]	90 ± 12	88 ± 12	85 ± 12	83 ± 11	82 ± 12	79 ± 10 [£]

Impact of treatment modality on weight regain 9 years after RYGB

+BMI-0 depicts BMI at the beginning of liraglutide therapy, endosurgery, or Fobi-ring implantation, respectively

*BMI-24 depicts BMI after 24 months of liraglutide therapy or after Fobi-ring implantation and 12 months after endosurgery, respectively

§All patients demanded additional drug therapy after 12 months of treatment

§Laparoscopic pouch revision with Fobi-ring

Reversal of Long-Term Weight Regain After Roux-en-Y Gastric Bypass Using Liraglutide or Surgical Revision. A Prospective Study

Fritz F Horber ¹, Rudolf Steffen ²

- Weight regain during more than 6 years after RYGB can be safely and effectively reversed with liraglutide.
- Compared with revisional surgery with Ring Placement, pharmacotherapy with liraglutide was low risk and resulted in an improvement in hypertension and dyslipidemia.
- Daily subcutaneous injections of liraglutide make a valid option to treat weight regain after RYGB.
- This study also recommends using liraglutide as first-line therapy for the treatment of weight regain after RYGB.

A systematic review of the effect of gastric pouch and/or gastrojejunostomy (stoma) size on weight loss outcomes with Roux-en-Y gastric bypass

Kamal Mahawar ^{1, 2}, Alistair J Sharples ³, Yitka Graham ^{4, 5}

Total of 14 studies (two of which were randomized) evaluating the effect of pouch sizes on weight loss outcomes after RYGB.

- The randomized studies found that larger pouches were associated with worse weight loss and diabetes outcomes.
- 21mm diameter stoma may not offer better outcomes than 25 mm but may be associated with higher rates of stenosis.
- Further studies are required to evaluate the effect of different pouch or stoma on weight loss outcomes with RYGB.

Transoral outlet reduction with full thickness endoscopic suturing for weight regain after gastric bypass: a large multicenter international experience and meta-analysis

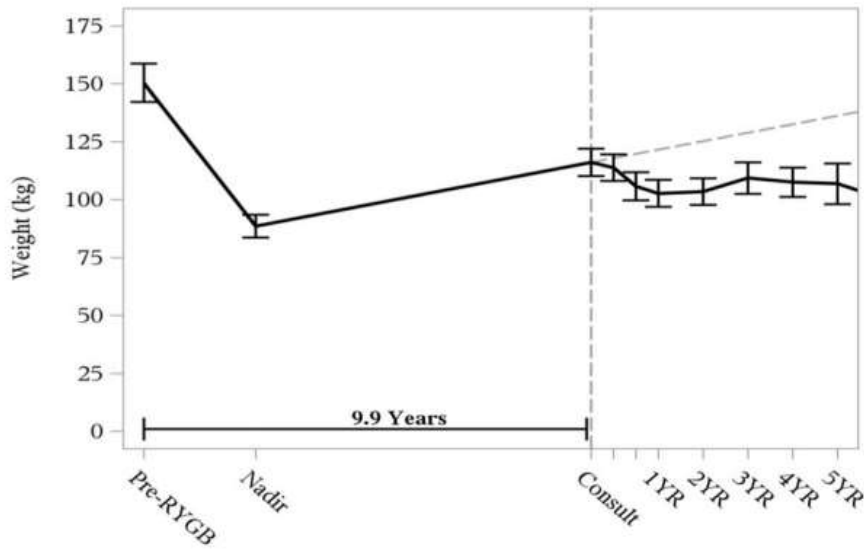
Eric J Vargas¹, Fateh Bazerbachi¹, Monika Rizk¹, Tarun Rustagi², Andres Acosta¹, Erik B Wilson³, Todd Wilson³, Manoel Galvao Neto⁴, Natan Zundel⁴, Manpreet S Mundi⁵, Maria L Collazo-Clavell⁵, Shah Meera⁵, H S Abu-Lebdeh⁵, Paul A Lorentz⁵, Karen B Grothe⁶, Matthew M Clark⁶, Todd A Kellogg⁷, Travis J McKenzie⁷, Michael L Kendrick⁷, Mark D Topazian⁷, Christopher J Gostout⁷, Barham K Abu Dayyeh⁸

TORe is a minimally invasive weight loss intervention that, in conjunction with a robust lifestyle and behavioral intervention program, offers an effective management strategy for weight regain after RYGB in a select group of patients with dilated gastrojejunal anastomosis (GJA).

	Study cohort (N = 130)	Patel 2016 (N = 50)	Kumar 2016 (N = 150)
Age (years)	47.12 ± 8.55	50.9 ± 10.89	51.2 ± 9.97
BMI (kg/m ²)	36.8 ± 6.84	41.4 ± 9.5	40.1 ± 8.57
Years from RYGB	8.4 ± 4.78	9.6 ± 3.3	8.6 ± 3.67
Weight regain (kg)	24.6 ± 16.6	23.9 ± 12.7	35.3
% weight regain	38.8%	39.7%	49.7%
Pre GJ stoma (mm)	28 ± 4.74	29.6 ± 6.3	24.1 ± 7.34
Final GJ stoma (mm)	8.3 ± 1.42	6 ± 2.2	9 ± 2.44
Weight gain arrest 6 months (%)	78% (n = 84)	97% (n = 50)	100% (n = 144)
Weight gain arrest 12 months (%)	77% (n = 70)	77% (n = 50)	100% (n = 109)
Weight loss 6 months (Kg)	9.31 ± 6.7 (n = 84)	7.5 ± 8.62 (n = 31)	10.6 ± 8.4 (n = 144)
Weight loss 12 months (Kg)	7.75 ± 8.4 (n = 70)	5.83 ± 11(n = 30)	10.5 ± 12.5 (n = 109)
Weight loss 18–24 months (Kg)	8 ± 8.8 (n = 46)	N/A	9 ± 1.7 (n = 63)
% EWL at 12 months	20.2 ± 10	11 ± 21	24.9 ± 27
% TWL at 12 months	6 ± 7.0 kg	N/A	9.5 ± 0.9 kg
Adverse events	Nausea 14%	Nausea 14%	N/A
	Pain 18%	Pain 4%	
	Esophageal tear requiring endoscopic clipping <1%		
	Balloon dilation of narrowed GJA after TORe (5%)		

Five-year results of endoscopic gastrojejunostomy revision (transoral outlet reduction) for weight gain after gastric bypass

Zachary M Callahan ¹, Bailey Su ², Kristine Kuchta ², John Linn ², JoAnn Carbray ², Michael Ujiki ²



Weight loss journey of patients. Patients gradually regained weight after undergoing gastric bypass; this trajectory was arrested by endoscopic revision and weight loss from revision was sustained at all time points. RYGB Roux-en-Y gastric bypass

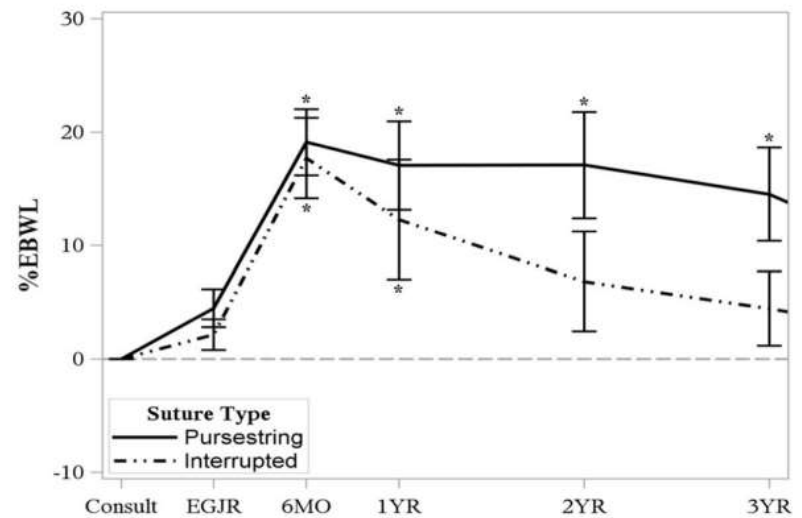
Five-year results of endoscopic gastrojejunostomy revision (transoral outlet reduction) for weight gain after gastric bypass

Zachary M Callahan¹, Bailey Su², Kristine Kuchta², John Linn², JoAnn Carbray², Michael Ujiki²

	Sample size	Weight loss (kg)	Percent excess body weight loss (% ± SD)
Consult	70	0.0 ± 0.0	0.0 ± 0.0
EGJR	70	2.3 ± 5.7	3.5 ± 9.5
6 months	66	10.7 ± 11.6	18.5 ± 18.2
1 year	42	8.5 ± 11.5	14.9 ± 20.6
2 years	36	6.9 ± 10.7	12.2 ± 19.8
3 years	31	5.3 ± 9.1	8.7 ± 14.9
4 years	23	3.1 ± 12.0	3.2 ± 21.6
5 years	18	3.9 ± 13.1	7.0 ± 23.8

EGJR endoscopic gastrojejunostomy revision

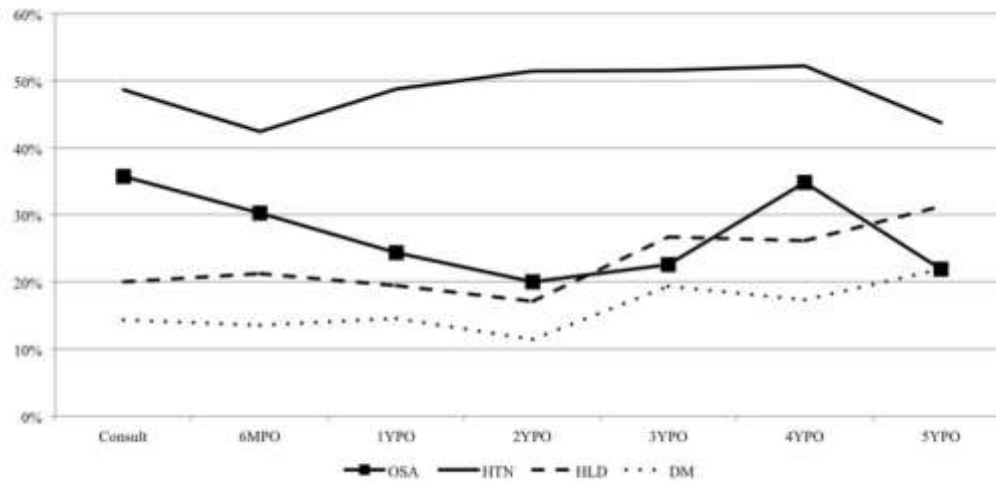
Weight loss and percent excess body weight loss after EGJR



Percent excess body weight loss (%EBWL), purse string versus interrupted suture pattern. Using consult weight as the reference, **the purse string method provided greater %EBWL at all time points.** While the interrupted suture pattern also demonstrated significant %EBWL at 6 months and 1 year, this weight loss was not sustained in the long term. EGJR endoscopic gastrojejunostomy revision, *Statistical significance

Five-year results of endoscopic gastrojejunostomy revision (transoral outlet reduction) for weight gain after gastric bypass

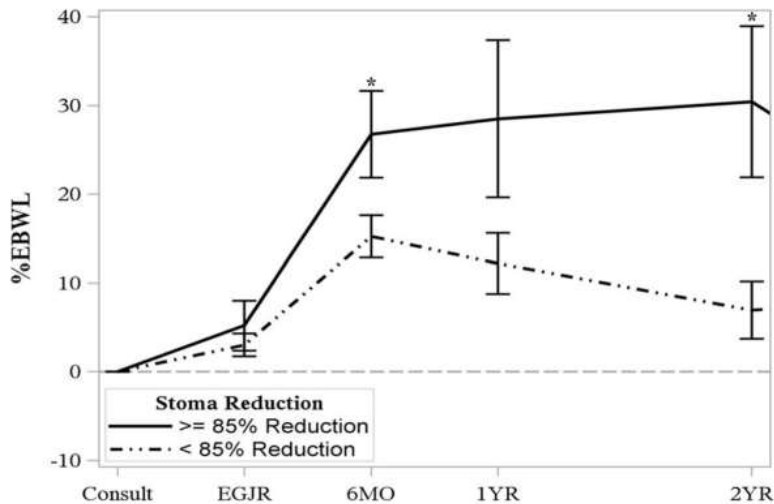
Zachary M Callahan ¹, Bailey Su ², Kristine Kuchta ², John Linn ², JoAnn Carbray ², Michael Ujiki ²



Medical comorbidities. The percentage of patients with medical comorbidities was not altered by EGJR. OSA obstructive sleep apnea, HTN hypertension, HLD hyperlipidemia, DM diabetes mellitus

Five-year results of endoscopic gastrojejunostomy revision (transoral outlet reduction) for weight gain after gastric bypass

Zachary M Callahan¹, Bailey Su², Kristine Kuchta², John Linn², JoAnn Carbray², Michael Ujiki²



Percent excess body weight loss, stoma reduction. Patients who underwent $\geq 85\%$ reduction in stoma diameter sustained superior weight loss at 6 months, 1 year, and 2 years after revision compared to

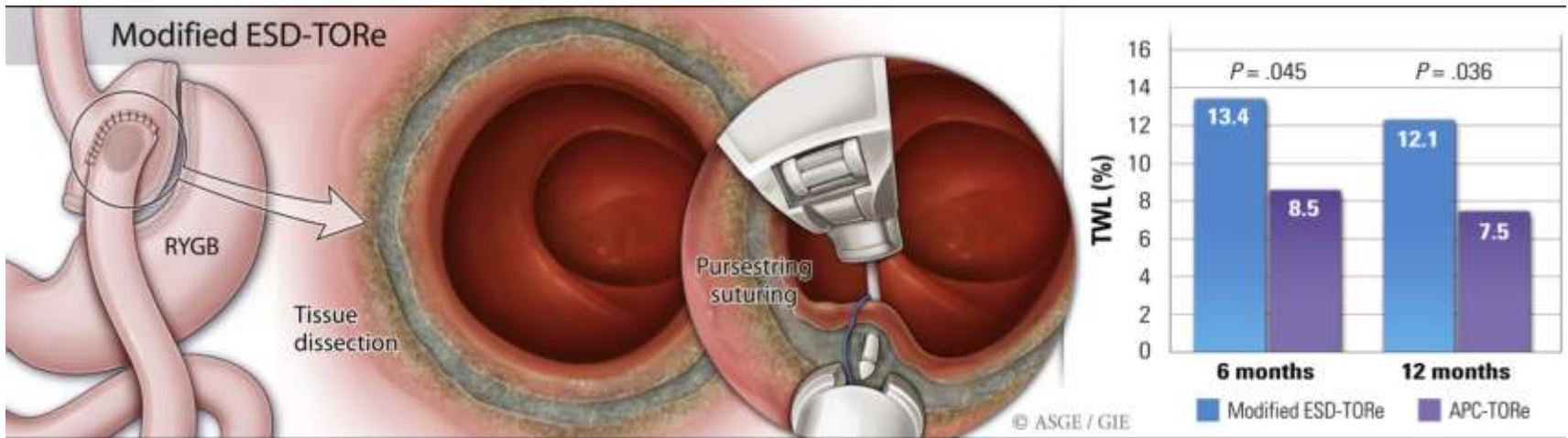
	GG fistula absent		GG fistula present		P value
	N	%EBWL (mean \pm SD)	N	%EBWL (mean \pm SD)	
Consult	61	0	9	0	–
EGJR	61	4.2 \pm 9.8	9	-0.9 \pm 5.3	0.03*
6 months	57	19.2 \pm 18.9	9	13.8 \pm 13.0	0.41
1 year	36	16.0 \pm 21.7	6	8.5 \pm 12.2	0.42
2 years	29	11.0 \pm 21.3	7	17.2 \pm 11.6	0.47
3 years	25	8.1 \pm 14.0	6	11.1 \pm 19.8	0.66

EGJR endoscopic gastrojejunostomy revision, GG gastrogastric fistula, %EBWL percent excess body weight loss. *Statistical significance

The study demonstrated weight loss in patients up to 5 years after EGJR but with minimal effect on medical comorbidities. These results suggest that EGJR, particularly the purse string method with large reduction in stoma diameter, is a safe and effective treatment option for the challenging patient population that experiences weight gain after gastric bypass.

Endoscopic submucosal dissection with suturing for the treatment of weight regain after gastric bypass: outcomes and comparison with traditional transoral outlet reduction (with video)

Pichamol Jirapinyo¹, Diogo T H de Moura², Christopher C Thompson¹



TORe. Technical success rate was 100%, with no severe adverse events.

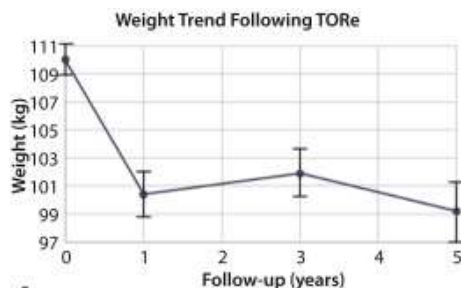
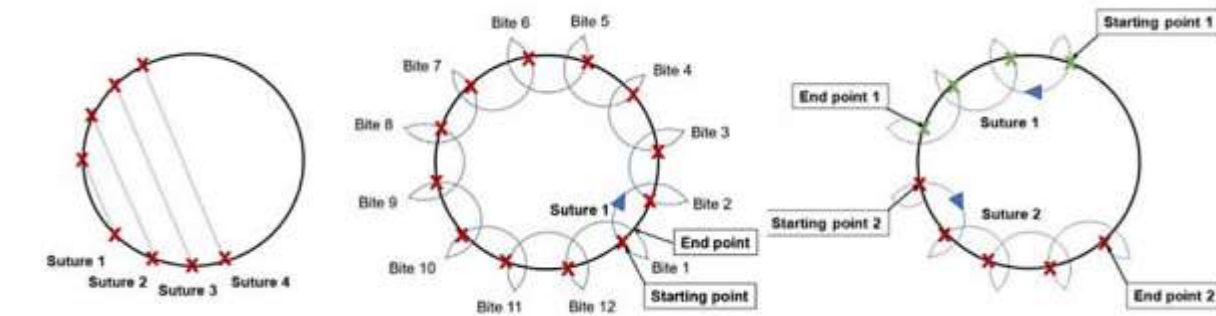
At 12 months, **the ESD-TORe group experienced greater weight loss compared with the APC-TORe group** (12.1% ± 9.3% vs 7.5% ± 3.3% TWL, respectively; P = .036).

Combining endoscopic tissue dissection with suturing provides greater and more durable weight loss for patients with weight regain after RYGB.

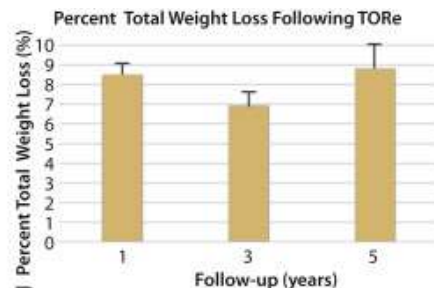
Five-year outcomes of transoral outlet reduction for the treatment of weight regain after Roux-en-Y gastric bypass

Pichamol Jirapinyo¹, Nitin Kumar², Mohd Amer AlSamman³, Christopher C Thompson¹

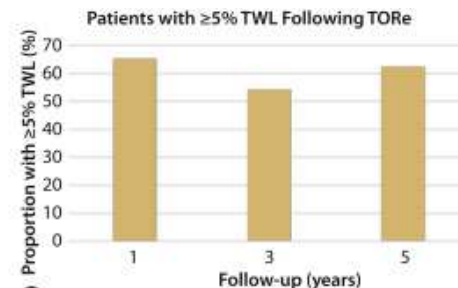
Suture patterns used for transoral outlet reduction (TORe) - interrupted, pursestring and running patterns



A



B

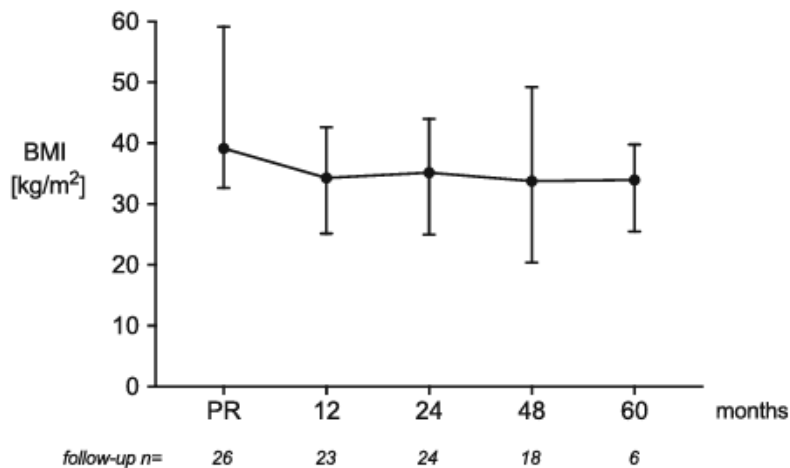


C

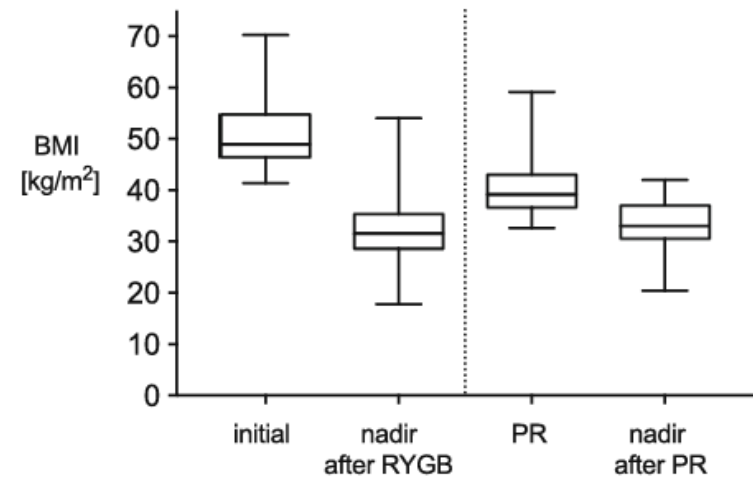
Long-term efficacy of transoral outlet reduction (TORe) at treating weight regain after Roux-en-Y gastric bypass (RYGB). **A.** Weight (kg) plotted by time (mean \pm standard error of the mean), **B.** Percent total weight loss and **C.** patients with $\geq 5\%$ TWL following TORe.

Pouch Reshaping for Significant Weight Regain after Roux-en-Y Gastric Bypass

Yves Borbély¹, Carmen Winkler², Dino Kröll², Philipp Nett²



Evolution of body mass index (BMI) after pouch reshaping (PR)



Body mass index (BMI) during follow-up (n=26 at all time points). RYGB Roux-en-Y gastric bypass, PR pouch reshaping

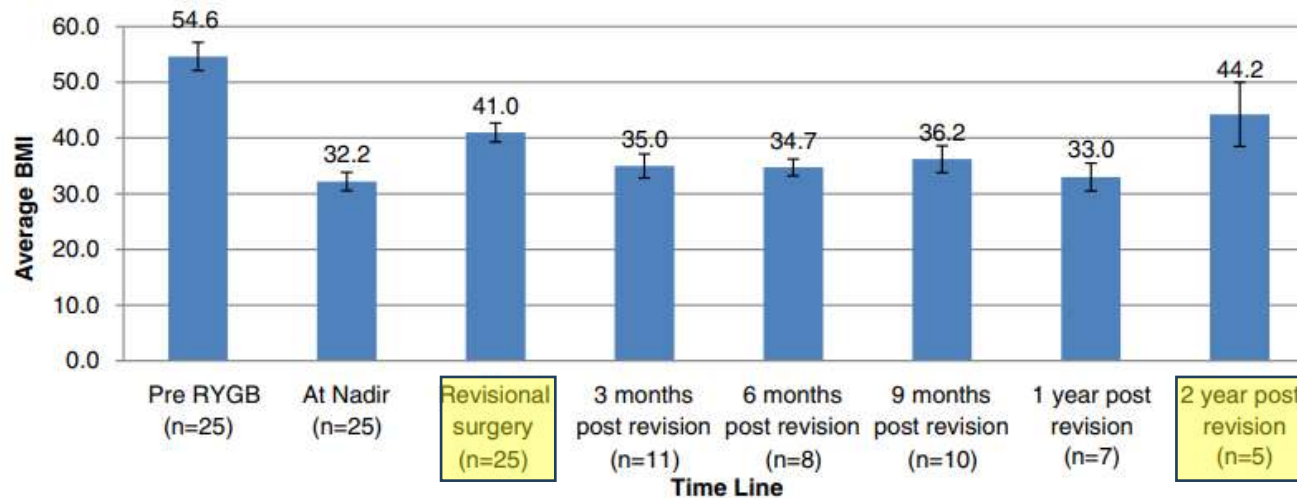
Minor complications (grade ≤ 2) occurred in seven (27 %) patients and major complications (grade ≥ 3) in four patients (15 %).

Comorbidities were resolved in 81 %. After 48 months, median BMI was 33.8 kg/m² (20.4-49.2) and %EBMIL was 61.4 (39.1-121.2)

PR leads to prolonged weight stabilization around the previous nadir. However, its associated perioperative morbidity must not be disregarded.

Midterm outcomes of revisional surgery for gastric pouch and gastrojejunal anastomotic enlargement in patients with weight regain after gastric bypass for morbid obesity

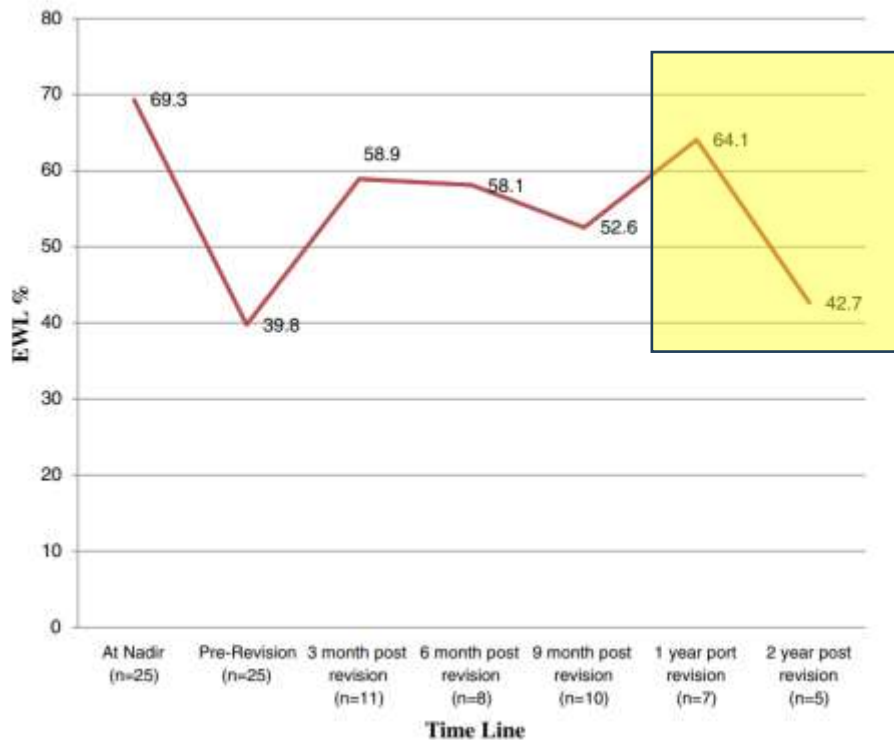
Abdulrahman Hamdi ¹, Christopher Julien, Phillip Brown, Ian Woods, Anas Hamdi, Gezzer Ortega, Terrence Fullum, Daniel Tran



Bar chart showing average BMIs along a time interval. BMI: Body mass index, RYGB: Roux-en-Y gastric bypass

Midterm outcomes of revisional surgery for gastric pouch and gastrojejunal anastomotic enlargement in patients with weight regain after gastric bypass for morbid obesity

Abdulrahman Hamdi ¹, Christopher Julien, Phillip Brown, Ian Woods, Anas Hamdi, Gezzer Ortega, Terrence Fullum, Daniel Tran



Change in %EWL over time from original RYGB nadir to 2 years post revision of Gastrojejunostomy. EWL: Excess weight loss

Laparoscopic gastric pouch and gastrojejunostomy revision can be performed safely with significant weight loss up to 1 year postoperatively.

Outcomes of revisional treatment modalities in non-complicated Roux-en-Y gastric bypass patients with weight regain

David Nguyen ¹, Fernando Dip, Jorge A Huaco, Rena Moon, Hira Ahmad, Emanuele LoMenzo, Samuel Szomstein, Raul Rosenthal

%EWL shown as mean \pm standard deviation

	Number of patients, N=44	Total mean %EWL for all time periods	%EWL from primary operation to pre-revision	%EWL from pre-revision to post-revision*	%EWL from primary operation to post-revision
Group A	N=30 (68.1 %)	42.3 (\pm 13.6)	42.6 (\pm 16.0)	28.6 (\pm 21.6)	55.8 (\pm 14.1)
Group B	N=8.0 (18.1 %)	54.3 (\pm 4.2)	51.7 (\pm 0)	52.0 (\pm 41.8)	59.1 (\pm 0)
Group C	N=6.0 (13.6 %)	29.6 (\pm 19.9)	8.1 (\pm 36.2)	33.4 (\pm 23.4)	47.3 (\pm 29.6)
Total mean %EWL for all groups			34.13 (\pm 23.0)	38 (\pm 12.35)	54.0 (\pm 6.0)

Group A **trimming of the pouch with or without redo GJ anastomosis (TPA)**, Group B **TPA and rerouting of the Roux limb from retrocolic retrogastric to antecolic antegastric**, Group C **TPA with remnant gastrectomy**. Follow-up in the post-revision stage is 6, 12, 18, 24, 36, and 48 months *p=0.096

Outcomes of revisional treatment modalities in non-complicated Roux-en-Y gastric bypass patients with weight regain

David Nguyen ¹, Fernando Dip, Jorge A Huaco, Rena Moon, Hira Ahmad, Emanuele LoMenzo, Samuel Szomstein, Raul Rosenthal

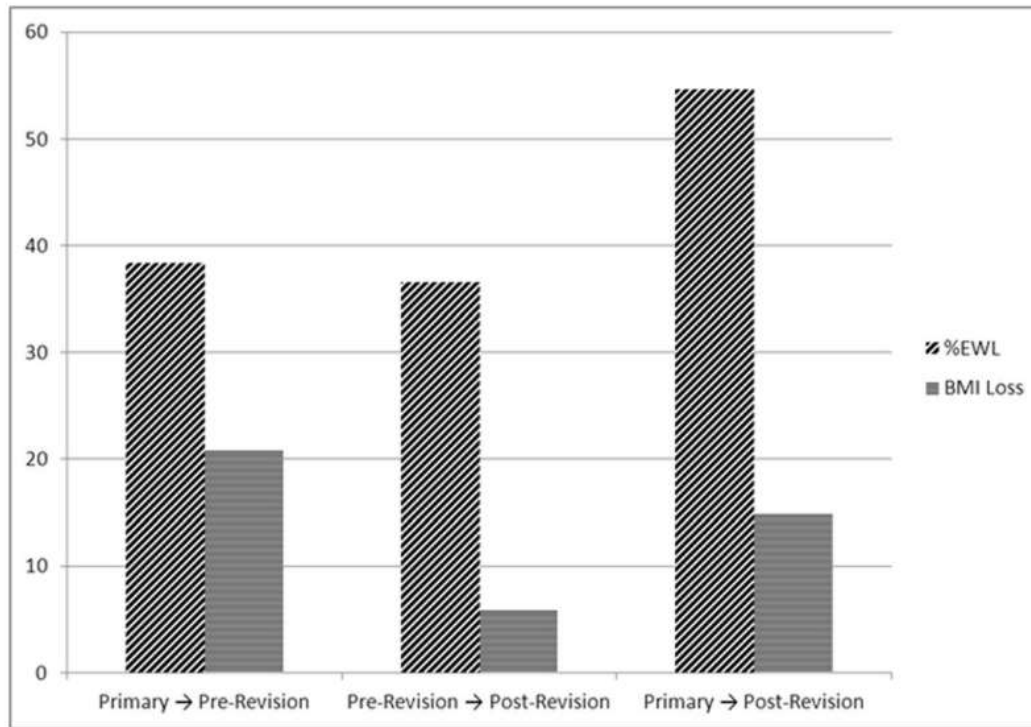
BMI loss (BMIL) shown as mean \pm standard deviation

	Number of patients, N=44	Total mean BMIL for all time periods	BMIL from primary operation to pre-revision	BMIL from pre-revision to post-revision*	BMIL from primary operation to post-revision
Group A	N=30 (68.1 %)	11.2 (\pm 5.7)	13.0 (\pm 8.0)	4.9 (\pm 4.6)	15.8 (\pm 7.5)
Group B	N=8 (18.1 %)	8.3 (\pm 2.9)	5.2 (\pm 11.6)	8.8 (\pm 8.3)	10.8 (\pm 12.4)
Group C	N=6 (13.6 %)	7.8 (\pm 4.8)	4.3 (\pm 10.4)	5.9 (\pm 6.1)	13.3 (\pm 8.5)
Total mean BMIL for all groups			7.5 (\pm 4.7)	6.5 (\pm 2.0)	13.3 (\pm 2.5)

Group A trimming of the pouch with or without redo GJ anastomosis (TPA), Group B TPA and rerouting of the Roux limb from retrocolic retrogastric to antecolic-antegastric, Group C TPA with remnant gastrectomy. Follow-up in the post-revision stage is 6, 12, 18, 24, 36, and 48 months *p=0.227

Outcomes of revisional treatment modalities in non-complicated Roux-en-Y gastric bypass patients with weight regain

David Nguyen ¹, Fernando Dip, Jorge A Huaco, Rena Moon, Hira Ahmad, Emanuele LoMenzo, Samuel Szomstein, Raul Rosenthal



Graphical representation of mean %EWL and BMI loss (kg/m²) at the three different time periods

Trimming of the pouch and/or anastomosis appears to be a safe and effective revisional modality for patients with insufficient weight loss or weight regain after gastric bypass in the hands of experienced surgeons.

Revisional Surgery for Insufficient Loss or Regain of Weight After Roux-en-Y Gastric Bypass: Biliopancreatic Limb Length Matters

Marko Kraljević¹, Thomas Köstler¹, Julian Sösstrunk¹, Ioannis I Lazaridis², Amy Taheri³, Urs Zingg¹, Tarik Delko⁴

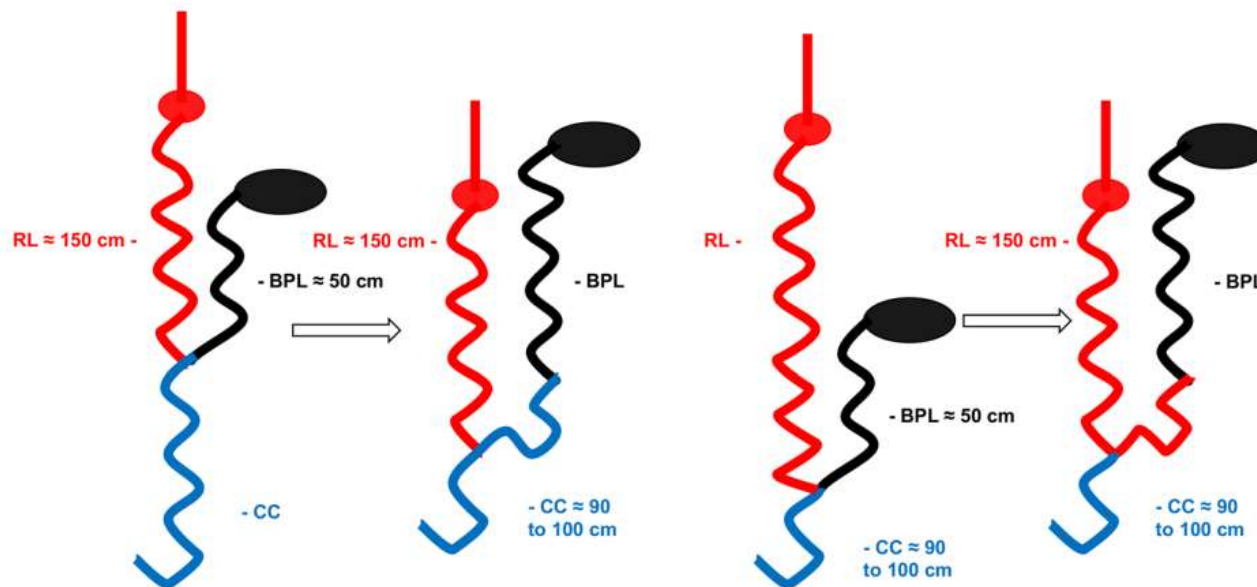
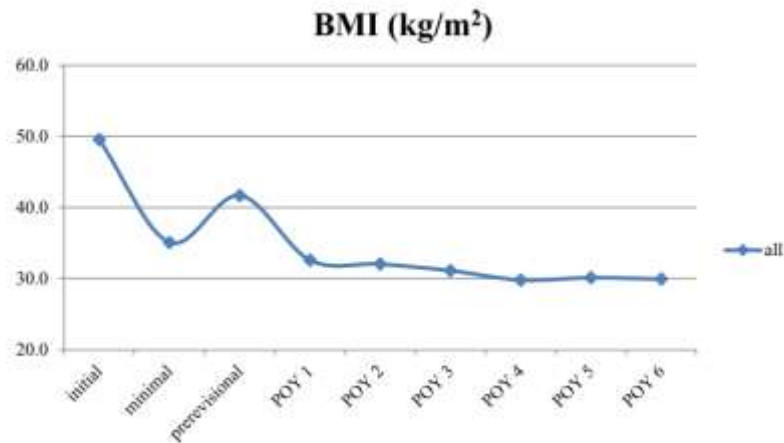


Diagram of revisional procedures with conversion either from Proximal RYGB (PRYGB) or Very very long limb (VVLL RYGB) to a long biliopancreatic limb RYGB (BPL RYGB).

Revisional Surgery for Insufficient Loss or Regain of Weight After Roux-en-Y Gastric Bypass: Biliopancreatic Limb Length Matters

Marko Kraljević¹, Thomas Köstler¹, Julian Sösstrunk¹, Ioannis I Lazaridis², Amy Taheri³, Urs Zingg¹, Tarik Delko⁴



BMI and total %EWL in patients undergoing revisional surgery for failed RYGB over the study period. BMI body mass index; POY postoperative year; EWL excess weight loss

Revisional Surgery for Insufficient Loss or Regain of Weight After Roux-en-Y Gastric Bypass: Biliopancreatic Limb Length Matters

Marko Kraljević¹, Thomas Köstler¹, Julian Sösstrunk¹, Ioannis I Lazaridis², Amy Taheri³, Urs Zingg¹, Tarik Delko⁴

Grade	Complication type	< 30 days	> 30 days
I	Incisional hernia	0	1
II	Pneumonia	1	0
II	Hypoalbuminemia*	0	2
II	Severe steatorrhea**	0	4
III	Surgical site infection	5	0
III	Bleeding	1	0
III	Small bowel obstruction	1	1
III	Incisional hernia	0	6
III	Internal hernia	0	1
III	Ulcer	0	2
III	Hypoalbuminemia*	0	6
III	Severe steatorrhea**	0	2
IV	Leak	0	0
V	Death	0	0

*Albumin < 30 g/L; **Required further therapy

	n (%)
Albumin < 30 g/L	8
Vitamin A	4
Vitamin B ₁₂	14
Vitamin D	17
Vitamin K	2
Ferritin	3
Zinc	7
Calcium	4

Early and late surgery-related morbidity and mortality according to the Clavien-Dindo classification over the study period

Nutritional deficiencies after conversion to BPL RYGB

Conversion from RYGB to BPL RYGB leads to significant additional weight loss in the long term. However, the morbidity is relevant, especially severe protein malnutrition and the frequency of revisional surgery

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

Saber Ghiassi¹, Kelvin Higa², Steven Chang³, Pearl Ma³, Aaron Lloyd³, Keith Boone³, Eric J DeMaria⁴

	BMI kg/m ²	Range	%EWL	%TWL	Δ BMI	Q7	FU (%)
Index RYGB	48.4 ± 9.0	35.8–79.7	–	–	–		–
At distalization	40.6 ± 7.3	24.5–64.9	33.6 ± 24.6	–	–		–
30 d postdistalization	38.1 ± 6.8	24.7–63.1	18.2 ± 8.9	6.1 ± 2.3	2.5 ± 1.0		96/96 (100)
6 mo postdistalization	34.3 ± 6.2	24.4–49.8	44.1 ± 32.8	13.8 ± 7.1	5.7 ± 3.3		73/81 (90.1)
1 yr postdistalization	34.4 ± 6.6	24.5–47.3	41.9 ± 28.3	15.3 ± 9.6	6.4 ± 4.5		42/60 (70.0)
2 yr postdistalization	33.1 ± 7.0	25.8–47.9	53.7 ± 26.3	19.4 ± 9.4	8.0 ± 4.2		18/33 (54.5)
3 yr postdistalization	32.2 ± 7.2	25.5–48.7	65.7 ± 22.0	24.2 ± 6.9	10.2 ± 3.2		10/20 (50)

BMI = body mass index; %EWL = percent excess weight loss; %TWL = %total weight loss; RYGB = Roux-en-Y gastric bypass.

Follow-up and weight loss before and after distalization using total alimentary limb length (TALL) of 400 to 450 cm

	BMI kg/m ²	Range	%EWL	%TWL	Δ BMI	Follow-up (%)
Index RYGB	60.4 ± 6.8	50.6–71.3	–	–	–	–
At distalization	54.6 ± 5.1	50.1–64.9	16.6 ± 12.9	–	–	–
30 d postdistalization	51.4 ± 5.3	46.7–63.1	11.0 ± 4.1	5.9 ± 2.1	3.2 ± 1.1	11/11 (100)
6 mo postdistalization	46.2 ± 3.3	39.5–49.8	27.1 ± 10.5	14.7 ± 5.9	8.1 ± 3.5	8/9 (88.9)
1 yr postdistalization	46.1 ± .9	45.0–47.3	29.0 ± 11.3	16.1 ± 7.3	9.2 ± 4.9	6/7 (85.7)
2 yr postdistalization	46.3 ± 2.2	44.7–47.9	25.0 ± 1.3	13.3 ± 1.5	7.1 ± 1.2	2/4 (50)
3 yr postdistalization	44.5 ± 6.0	40.3–48.7	32.0 ± 12.7	16.8 ± 5.8	8.9 ± 2.5	2/4 (50)

BMI = body mass index; %EWL = percent excess weight loss; %TWL = %total weight loss; RYGB = Roux-en-Y gastric bypass.

Outcomes in the subgroup of 11 patients who were **super-obese before distalization using total alimentary limb length (TALL) of 400 to 450 cm**

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

Saber Ghiassi ¹, Kelvin Higa ², Steven Chang ³, Pearl Ma ³, Aaron Lloyd ³, Keith Boone ³, Eric J DeMaria ⁴

	Predistalization rate	6 mo resolution	1 yr resolution	2 yr resolution	3 yr resolution
Sleep apnea	11/96 (11.46%)	4/7 (57.14%)	2/4 (50.00%)	1/1 (100.00%)	1/1 (100.00%)
GERD	22/96 (22.92%)	10/15 (66.67%)	8/12 (66.67%)	2/5 (40.00%)	2/5 (40.00%)
Hyperlipidemia	17/96 (17.71%)	4/12 (33.33%)	4/10 (40.00%)	1/3 (33.33%)	1/3 (33.33%)
Hypertension	55/96 (57.29%)	6/36 (16.67%)	6/21 (28.57%)	1/9 (11.11%)	0/8 (.00%)
Diabetes	28/96 (29.17%)	11/21 (52.38%)	6/9 (66.67%)	4/5 (80.00%)	3/3 (100.00%)

GERD = gastroesophageal reflux disease.

Resolution of co-morbid conditions after distalization using total alimentary limb length (TALL) of 400 to 450 cm

	HbA1C (n)	Serum glucose (n)
Predistalization	7.0	141.3 mg/dL
6 mo postdistalization	5.8 (10)	116.8 mg/dL (10)
1 yr postdistalization	6.0 (8)	105.43 mg/dL (7)
2 yr postdistalization	6.8 (6)	105.3 mg/dL (9)
3 yr postdistalization	5.07 (3)	123.8 mg/dL (5)

Mean glycosylated hemoglobin (HbA1C) and serum glucose before and after distalization using total alimentary limb length (TALL) of 400 to 450 cm

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

Saber Ghiassi¹, Kelvin Higa², Steven Chang³, Pearl Ma³, Aaron Lloyd³, Keith Boone³,
Eric J DeMaria⁴

Conclusion:

Revision of RYGB to distal bypass in a select subset of patients with recurrent morbid obesity and self-reported hunger/food cravings resulted in substantial weight loss and resolution of obesity-related co-morbidities.

The potential for protein calorie malnutrition and diarrhea is high in patients with a TALL of 300 cm.

Creation of a TALL of 400 to 450 cm seems to be reasonable and offer good weight loss, improvement in co-morbidities, and pronounced metabolic effects without causing significant malnutrition.

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 Shikora⁴

Weight outcomes

	Before RNYGB	Before Distalization	6 months (from distalization)	12 year (from distalization)	24 months (from distalization)	Mean follow-up of 18.3 months
Weight (lbs)	<i>n</i> = 22 333.6 (± 50.1)	<i>n</i> = 22 267.5 (± 35.7)	<i>n</i> = 20 227 (± 39.9)	<i>n</i> = 19 211.2 (± 38.4)	<i>n</i> = 6 206.17 (± 31)	<i>n</i> = 18 ^a 191.58 (± 38.2)
Weight change (lbs) [total from original]	-- [-]	-- [66.0 (± 44.1)]	41.1 (± 20) [101.5 (± 48.1)]	58.4 (26.3) [118.7 (± 54.4)]	67.3 (± 36.6) [148.3 (± 53.3)]	71.6 (± 41.3) [133.6 (± 55.0)]
BMI (kg/m ²)	54.1 (± 8.5)	43.0 (± 5.5)	33 (± 12.3)	34.5 (6.5)	34.13 (± 2.7)	31 (± 5.5)
BMI change (kg/m ²) [total from original]	-- [-]	-- [11.0 (± 7.5)]	6.6 (± 3.3) [16.7 (± 7.6)]	9.2 (± 4.5) [19.8 (± 9.1)]	11.57 (± 7.0) [26.1 (± 8.7)]	11.8 (± 7.4) [22.2 (± 9.9)]
%EWL [total from original]	-- [-]	-- [35.0% (± 19.6)]	40.2% (± 20.7) [58.5% (± 20.5)]	55.5% (± 29.4) [67.0% (± 20.7)]	51.85% (± 21.6) [71.1% (± 12.5)]	62.3% (± 32.4) [77.8% (± 23.6)]
%TWL [total from original]	-- [-]	-- [18.9% (± 11.2)]	15.5% (± 7.1) [30.2% (± 11.7)]	21.9% (± 9.5) [35.1% (± 12.3)]	24.1% (± 12.2) [40.9% (± 11.3)]	25.4% (± 14.4) [40.2% (± 13.3)]

RYGB Roux-en-Y gastric bypass, *BMI* Body Mass Index, *EWL* excess weight loss, *TWL* total weight loss

^a Excludes reversals and death

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

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 Shikora⁴

	n	Mean (SD)	Range	Reference range	% low or high
Nutrition labs follow-up (months)	19	20.8 (± 14.6)	0–58.4	–	–
Albumin	17	3.6 (± 0.64)	2.3–4.6	(3.5–5.2)	29.4% low
Hemoglobin	18	11.9 (± 1.3)	9.5–14	(11.5–16.4)	38.9% low
Hematocrit	18	36.7 (± 3.8)	30.5–43.4	(36–48)	38.9% low
Iron	17	66.4 (± 24)	36–123	(37–158)	5.9% low
Ferritin	18	131.6 (± 106)	16–333	(10–170)	31.3% high
Folate	19	18.2 (± 4.1)	9.1–24	(5.3–99)	0% low
Vitamin A	18	33.1 (± 22.8)	2.1–72.5	(32.5–78)	44.4% low
Vitamin B1	17	152.5 (± 44.3)	74–211	(70–180)	11.8% low
Vitamin B12	18	859.8 (± 589)	172–2000	(400–900) ^b	22.2% low
Vitamin D	18	25.3 (± 15)	7–72	(30–80) ^c	72.2% low
Vitamin E	16	6.8 (± 2.3)	2.1–11.9	(5.5–17)	25.0% low
Vitamin K	18	0.1 (± 0.1)	0.03–0.47	(0.10–2.20)	66.7% low
Ceruloplasm	16	23.7 (± 10.4)	9–50	(20–60)	18.8% low
Copper	16	0.97 (± 0.5)	0.46–2.13	(0.75–1.45)	31.3% low
Magnesium	17	1.98 (± 0.2)	1.6–2.2	(1.7–2.6)	5.9% low
Parathyroid Hormone	18	70.5 ^a (± 38.2)	29–154	(15–65)	50% high
Zinc	17	0.57 ^a (± 0.2)	0.16–0.79	(0.66–1.10)	82.4% low

Postoperative nutritional data - a Out of reference range **b** Our Weight Loss Surgery Center considers a Vitamin B12 level less than 400 as low for bariatric patients although our institutional range is 250–900 **c** Our Weight Loss Surgery Center considers a Vitamin D level less than 30 as low for bariatric patients although our institutional range is 20–80

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 Shafran ¹, Samuel A Shikora ¹,
Melissa C Majumdar ¹, Scott A Shikora ⁴

Conclusion:

Limb distalization (LD) provides substantial additional weight loss, reasonable maintenance of weight loss, additional remission of comorbidities, and overall good patient satisfaction.

There are some nutritional morbidities; however, with close follow-up and education, most patients do not require invasive intervention.

A Common Channel length of 200 cm may be favorable in achieving the desired weight loss with a balance of decreased nutritional complications.

Based on the results and others, revision of RYGB with LD by lengthening the BP limb for weight regain/inadequate weight loss is an effective procedure for motivated patients with reliable follow-up and compliance

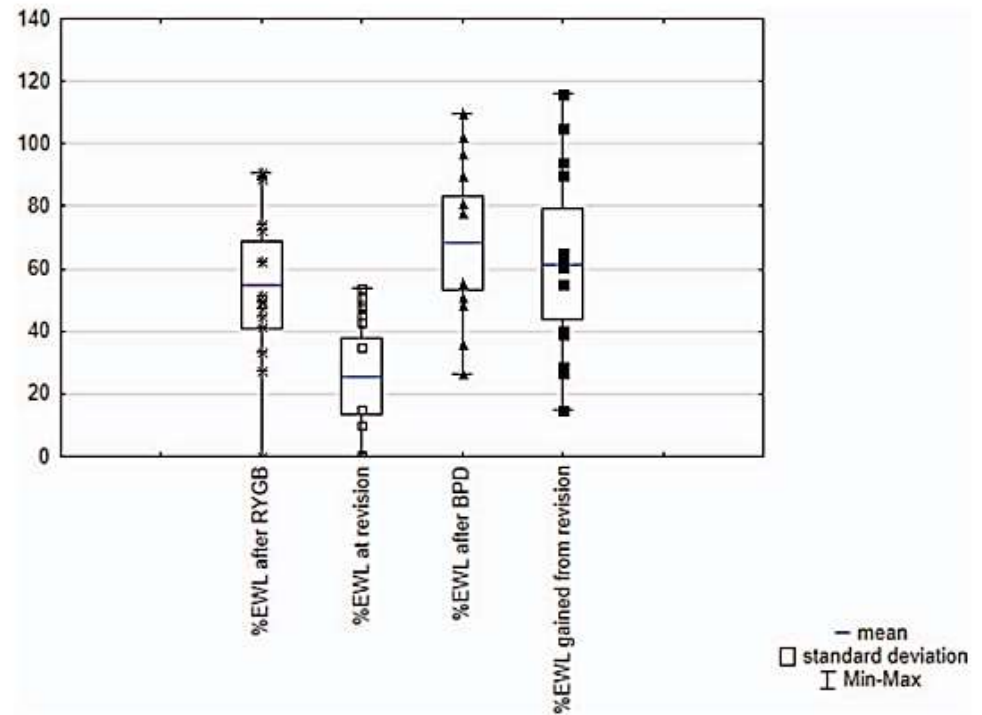
One-stage conversion of Roux-en-Y gastric bypass to a modified biliopancreatic diversion with duodenal switch using a hybrid sleeve concept

Philippe Topart ¹, Guillaume Becouarn ²

The gastrojejunal anastomosis of the RYGB was untouched and the gastric fundus was resected.

The gastric continuity was restored by an anastomosis between a short segment of the alimentary limb and the gastric antrum.

A standard BPD/DS was then performed without restoration of the jejunal continuity.



Evolution of the percentage of excess weight loss (%EWL)

One-stage conversion of Roux-en-Y gastric bypass to a modified biliopancreatic diversion with duodenal switch using a hybrid sleeve concept

Philippe Topart ¹, Guillaume Becouarn ²

N = 14

Mean body mass index (BMI) - 44.3 6.0 kg/m²

Mean %EWL - 33.4%

Percentage of total weight loss (%TWL) of 15.3 11.7%.

The BMI before RYGB was 54.4 13.1 kg/m², with half of the patients being super-obese.

The 30-day complication rate was 28.5%.

No patient was lost to follow-up over a mean 25.8 months and the BMI of the 12 patients with a follow-up ≥ 3 months is 33.2 \pm 7.2 kg/m².

With reference to the initial weight of the patients, the mean %EWL is 73.5% and %TWL is 37.6 16.0%.

On average, patients benefited from a 21.1% TWL through the conversion of their RYGB

This procedure allows for an easier conversion of RYGB to BPD/DS and appears to be the most effective procedure for resuming weight loss.

Nutritional consequences and weight loss are similar to the primary BPD/DS results. However, the benefits and risks must be carefully assessed according to the definition of weight loss failure.

Conversion of failed Roux-en-Y gastric bypass to biliopancreatic diversion with duodenal switch: outcomes of 9 case series

Hamzeh M Halawani¹, Fernando Bonanni², Abraham Betancourt², Gintaras Antanavicius²



Mean Body Mass (BMI) Index trend over 4 periods. BMI before gastric bypass, lowest BMI, BMI before biliopancreatic diversion with duodenal switch (BPD-DS) conversion and BMI post BPD-DS conversion.

No morbidities, reoperation, or readmission over 30 days postoperatively were reported. No leaks or mortalities were identified.

Conversion of failed RYGB to BPD-DS for weight regain is shown to be technically feasible and offers satisfactory weight loss. Proper patient selection and extensive workup preoperatively may decrease the complication rate of the conversion.

Mid-term outcomes of gastric bypass weight loss failure to duodenal switch

Amit Surve ¹, Hinali Zaveri ¹, Daniel Cottam ², LeGrand Belnap ¹, Walter Medlin ¹, Austin Cottam ¹

Weight loss outcomes at 3, 6, 9, 12, 18, and 24 months post-revision DS (RYDS and SADS)

	Value					
Mo. after revision DS	3	6	9	12	18	24
Patients (n), (%)	25/28, (89.2%)	23/27, (85.1%)	20/24, (83.3%)	18/22, (81.8%)	14/19, (73.6%)	11/15, (73.3%)
%EWL*	31.2 (26, 36.5)	45.1 (40.8, 49.5)	51 (47.4, 54.7)	54.2 (50.3, 57.9)	56 (51.3, 60.7)	56.4 (51.3, 61.5)
%TWL*	15.2 (12.6, 17.7)	22.2 (19.9, 24.5)	25.8 (23.9, 27.6)	27.7 (25.8, 29.5)	28.9 (26.5,31.2)	29.2 (26.6, 31.8)
Change in BMI* (kg/m ²)	7.1 (5.6, 8.6)	10.5 (9.1, 11.9)	12.3 (11.2, 13.4)	13.3 (12.2, 14.4)	14 (12.6, 15.4)	14.2 (12.6, 15.8)
BMI* (Kg/m ²)	42 (40.2, 43.9)	40.1 (38.4, 41.8)	38.3 (36.5, 40)	36.3 (34.3, 38.4)	33 (30.4, 35.9)	29.9 (26.5, 33.4)
%EBMIL*	41 (33.3, 48.6)	58.3 (51.9, 64.8)	66.3 (61, 71.5)	70.2 (64.6,75.7)	72.4 (65.6, 79.2)	72.9 (65.5, 80.2)

BMI = body mass index; DS = duodenal switch; %EBMIL = percent excess BMI lost; %EWL = percent excess weight loss; RYDS = Roux-en-Y reconstruction duodenal switch; SADS = single-anastomosis duodenal switch; %TWL = percent total weight loss

*Values are expressed as means (95% CI).

Mid-term outcomes of gastric bypass weight loss failure to duodenal switch

Amit Surve¹, Hinali Zaveri¹, Daniel Cottam², LeGrand Belnap¹, Walter Medlin¹, Austin Cottam¹

	Albumin	Calcium	Vitamin B1	Vitamin B12	Vitamin A	Vitamin D
Pre-revision DS						
Value*	3.9 ± .4	9.3 ± .5	128.3 ± 54.4	405.8 ± 285	40.5 ± 14.8	23.9 ± 13.5
Range	3–4.5	8.4–10.5	32.6–251.4	148–1589	30–51	5.3–60
Abnormal Labs (n)	3/32	1/32	3/32	3/32	1/32	14/32
≥ 6 mo (n: 17/27)						
Value*	3.8 ± .8	9 ± .6	146.4 ± 49.7	716.4 ± 721.5	39.3 ± 15.4	45.7 ± 27.7
Range	2–4.3	7.8–9.9	81.3–208.4	281–2000	25–57	18.9–96
Abnormal Labs (n)	2/17	1/17	0/17	0/17	0/17	3/17
≥ 12 mo (n: 14/22)						
Value*	3.6 ± .9	8.9 ± .8	100.9 ± 34.6	742.5 ± 425	36 ± 12.9	45.1 ± 27.7
Range	1.7–4.6	7.8–10.3	50–147.2	384–1459	24–57	11–96
Abnormal Labs (n)	3/22	5/22	1/22	2/22	0/22	2/22
Normal Range	3.5–5.5 g/dL	8.5–10.2 mg/dL	74–222 nmol/L	200–1100 pg/mL	24–90 ug/dL	25–80 ng/mL

DS = duodenal switch.

*Values are expressed as mean ± standard deviation.

Nutritional outcomes in patients post revision DS

A laparoscopic revision from RYGB to DS is an effective weight-loss operation with midterm follow-up of 2 years. However, complication rate is significant compared with primary procedures

Conversions of Roux-en-Y gastric bypass to duodenal switch (SADI-S and BPD-DS) for weight regain

Rena C Moon¹, Layth Alkhairi¹, Alyssa Jameson Wier¹, Andre F Teixeira¹, Muhammad A Jawad²

Test	Reference range	Preop (n = 15)	6 months (n = 7)	1 year (n = 4)	2 year (n = 2)	Abnormal		
						Preop	1 year	2 year
Hemoglobin (g/L)	Male 132.0–171.0 Female 117.0–155.0	128.3 (16.8)	116.6 (14.4)	107.3 (8.7)	106.0 (1.4)	25%	75%	100%
Protein (g/L)	61.0–81.0	69.9 (4.9)	64.3 (8.5)	65.8 (4.6)	70.0 (2.8)	None	25%	None
Albumin (g/L)	36.0–51.0	40.4 (2.7)	39.6 (15.4)	37.0 (1.6)	38.5 (2.1)	14%	25%	None
Calcium (mmol/L)	2.15–2.55	2.31 (0.08)	2.01 (0.46)	2.21 (0.14)	2.19 (0.02)	13%	50%	None
AST (ukat/L)	0.17–0.60	0.33 (0.07)	0.49 (0.23)	0.42 (0.09)	0.41 (0.10)	None	None	None
ALT (ukat/L)	0.10–0.68	0.34 (0.16)	0.53 (0.34)	0.38 (0.16)	0.28 (0.11)	None	None	None

AST aspartate aminotransferase, ALT alanine aminotransferase

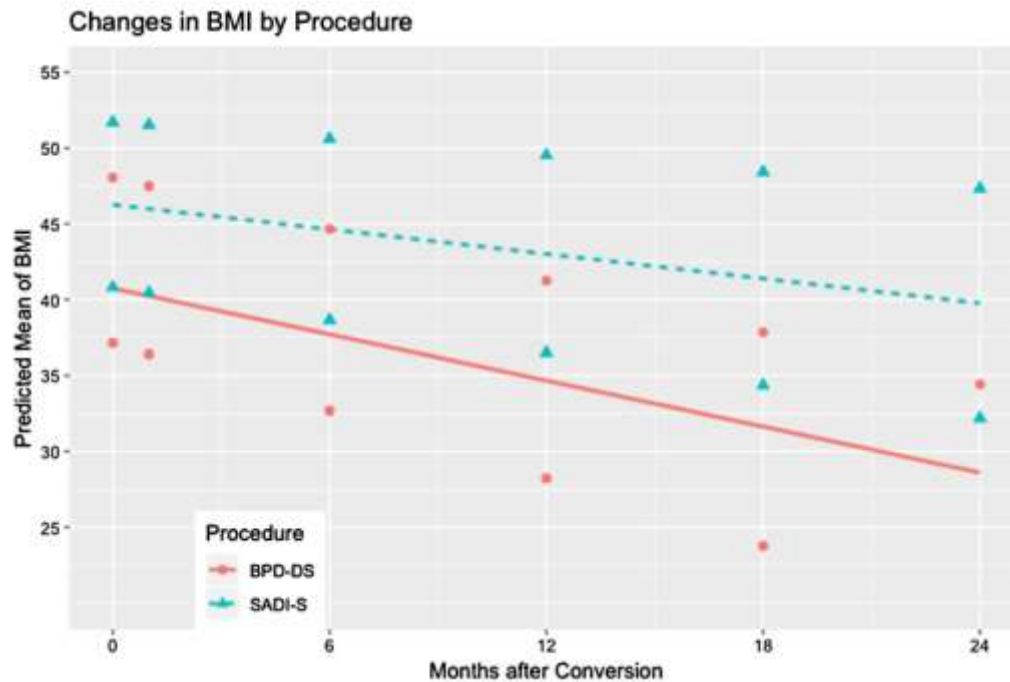
Test	Reference range	6 months (n = 7)	1 year (n = 4)	2 year (n = 2)	Abnormal		
					6 months	1 year	2 year
Vitamin A (umol/L)	0.7–2.3	1.2 (0.4)	0.9 (0.4)	1.0 (0.3)	None	25%	None
Vitamin D, 25-hydroxy (nmol/L)	74.9–249.6	78.5 (44.2)	65.0 (21.5)	43.7 (22.9)	33%	75%	100%
Vitamin E, alpha tocopherol (umol/L)	1.2–3.9	1.9 (0.5)	1.6 (0.1)	1.5 (0.1)	17%	None	None
Vitamin B ₁₂ (pmol/L)	155.7–698.1	894.4 (517.1)	547.0 (253.7)	412.2 (238.5)	57%	25%	None
PTH, intact (ng/L)	15–65	52.4 (17.0)	51.0 (14.4)	80 (16.0)	20%	33%	50%
Ferritin, serum (pmol/L)	33.7–337.1	74.2 (44.8)	29.2 (12.6)	10.1 (4.7)	14%	50%	100%

PTH parathyroid hormone

Conversions of RYGB to SADI-S and BPD-DS can provide significant additional weight loss. Malnutrition can develop after the conversion, and further research is needed for evaluating safety

Conversions of Roux-en-Y gastric bypass to duodenal switch (SADI-S and BPD-DS) for weight regain

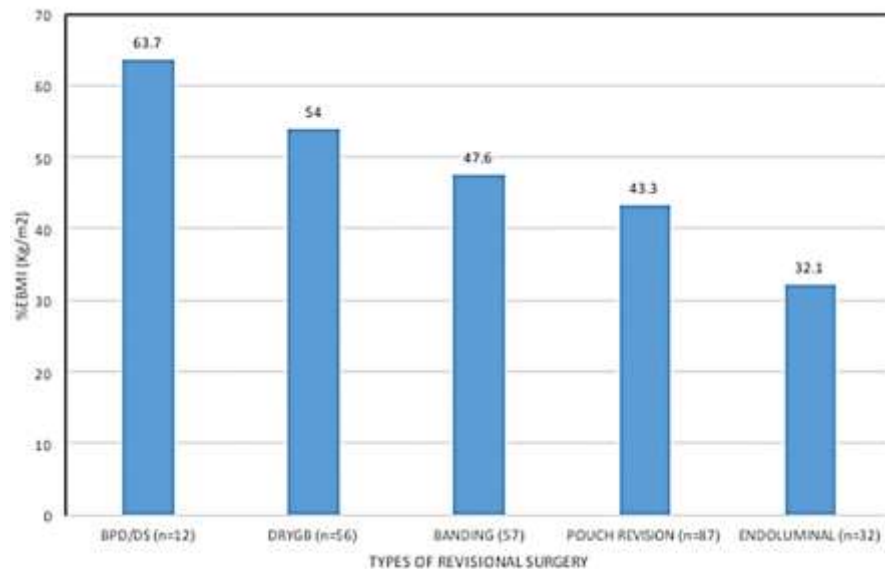
Rena C Moon¹, Layth Alkhairi¹, Alyssa Jameson Wier¹, Andre F Teixeira¹, Muhammad A Jawad²



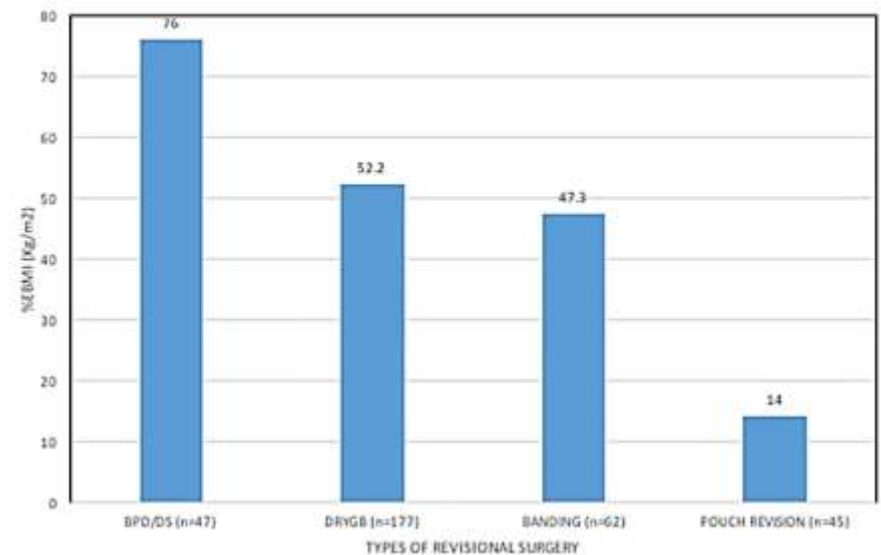
Predictive changes in body mass index (BMI) by the procedure. BMI body mass index, BPD-DS Biliopancreatic diversion with duodenal switch, SADI-S Single anastomosis duodeno-ileal bypass with sleeve

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 Zafar³, Gezzer Ortega³, Kakra Hughes³, Terrence M Fullum³



Weighted means of the % EBMI (Kg/m2) at ≤1 year



Weighted means of the %EBMI (Kg/m2) at ≤3 years

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.** (DRYGB - Distal Roux-en-y gastric bypass)

