New anti-obesity medications VS surgery for recurrent weight gain after metabolic bariatric surgery

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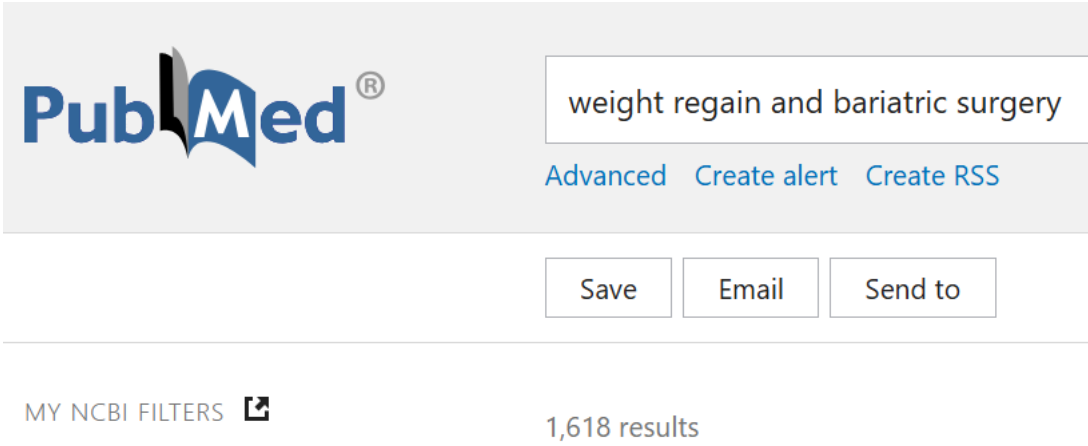
I have no potential conflict of interest to report

What is weight regain?

Weight regain (WR) is defined as progressive weight regain that occurs after achievement of an initial successful weight loss (defined as EWL>50%)



Prevalence of recurrent weight gain after bariatric surgery

Laparoscopic adjustable gastric banding (LAGB)

A large prospective multicenter Swedish study involving 4000+ participants found that 10 years after laparoscopic adjustable gastric banding (LAGB), patients regained 38% of the maximal weight they lost at 1 year

A meta-analysis involving 2000+ participants revealed that WR after LSG was 27.8% (range 14–37%) at long-term follow-up (≥ 7 years)

A meta-analysis involving 1700+ participants revealed that WR after RYGB was 3.9% at long-term follow-up (3-7 years)

Risk factors for weight regain after bariatric surgery

TABLE 1

Risk Factors for Weight Regain After Bariatric Surgery

- Unrealistic expectations of surgical outcomes ("magic bullet" theory)
- Lack of commitment to necessary lifestyle change: meal planning, food selection, physical activity, support groups
- Nonadherence to nutrition recommendations (protein, fluid, micronutrient supplementation)
- Sedentary lifestyle
- Lack of postoperative follow-up with MD and RD
- Uncontrolled or untreated behavioral health conditions, or drug/alcohol abuse
- Inadequate support or strong disapproval from person of significance regarding the choice to have surgery
- Maladaptive eating: mindless eating, soft food syndrome, grazing, skipping meals, night eating, and/or consistent dietary indiscretions

Weight Regain after Metabolic Surgery: Beyond the Surgical Failure

by Juan Salazar [1,*], Pablo Duran [1], Bermary Garrido [1], Heliana Parra [1], Marlon Hernández [1], Clímaco Cano [1], Roberto Añez [2], Henry García-Pacheco [3,4], Gabriel Cubillos [5], Neidalis Vasquez [5], Maricarmen Chacin [6,7] and Valmore Bermúdez [6,7,*]

Risk Factors for Weight Regain after MS: Is It All about the Surgery?

has comprehension of its mechanisms, and thus, the therapeutic approach, Psychological, behavioral, endocrine metabolic, genetic, and anatomical factors have been associated with WR

Anatomic and Surgical Factors; Endocrine and Metabolic Factors; Lifestyle: Eating Patterns and Physical Activity; Psychological Factors and Mental Health; reoperative and Other Factors; higher BMI before surgery; socioeconomically advantaged patients; Moreover, time elapsed after surgery, iron deficiency, work activity related to eating, and comorbidities such as T2DM have been linked to WR.

Weight regain after BS: what should we do?

Multidisciplinary Approach for Weight Regain—how to Manage this Challenging Condition: an Expert Review

Maria Paula Carlin Cambi [1] · Giorgio Alfredo Pedroso Baretta [1] · Daniéla De Oliveira Magro [2] · Cesar I
Igor Braga Ribeiro [4] · Pichamol Jirapinyo [5] · Diogo Turiani Hourneaux de Moura [4,5]

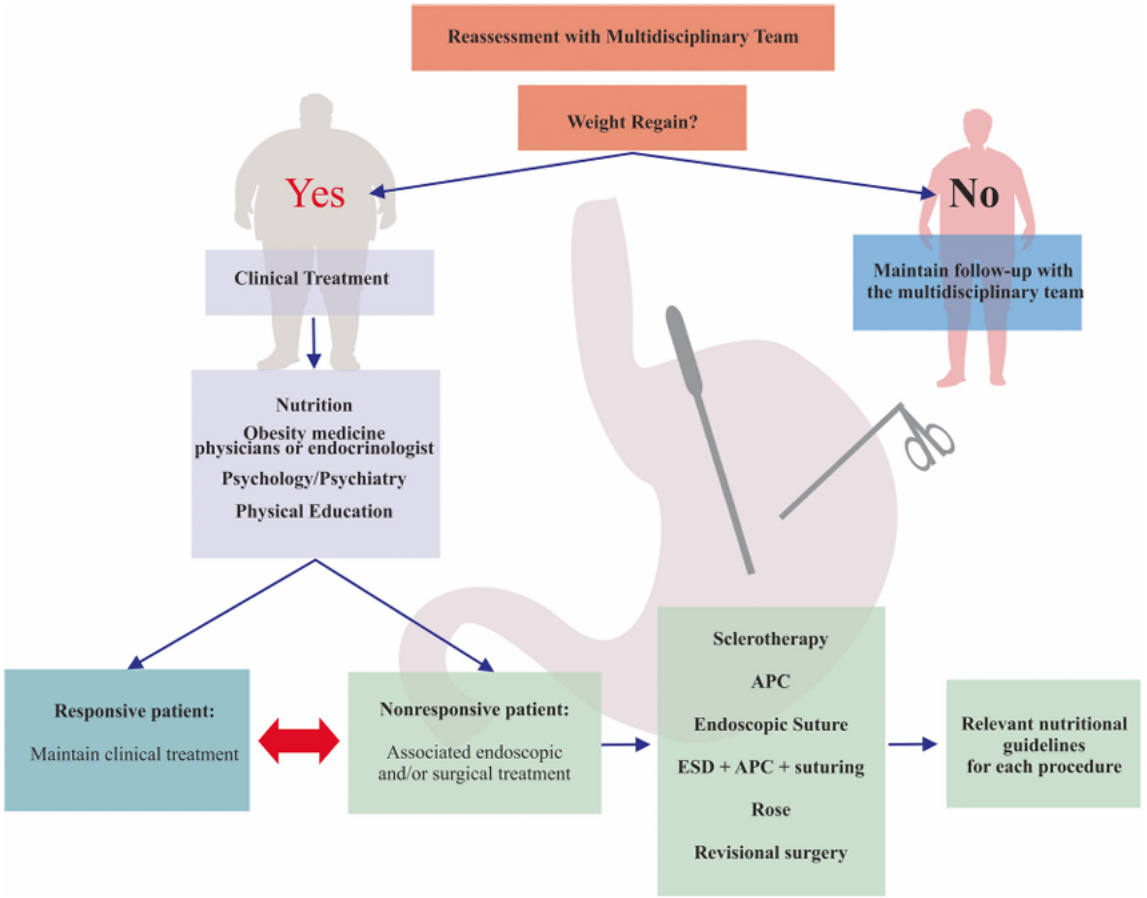
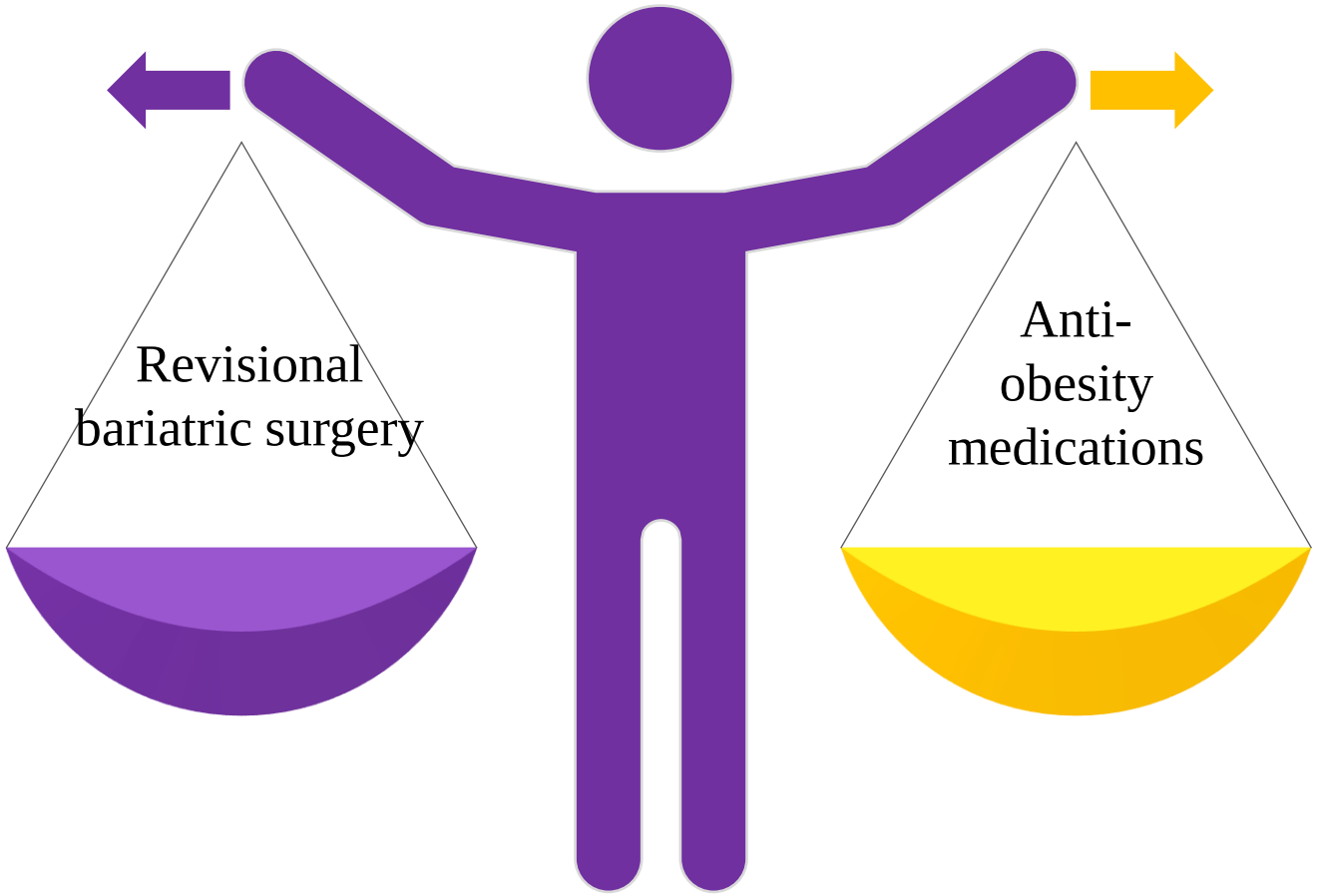


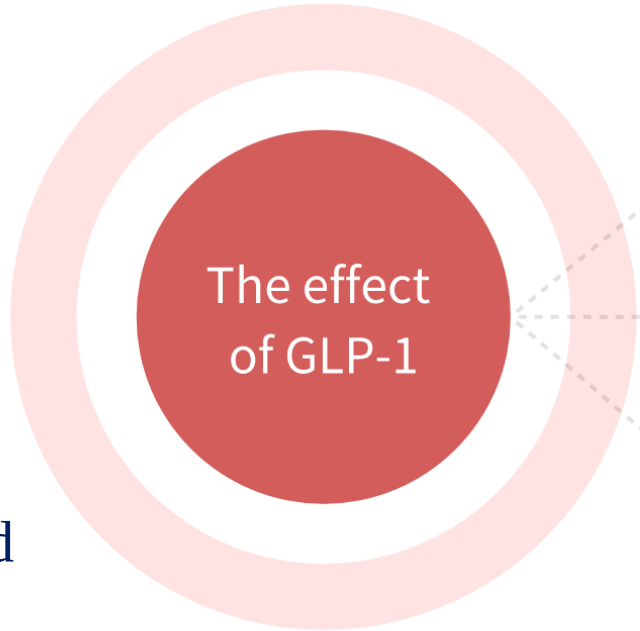
Fig. 2 Algorithm to treatment of weight regain after bariatric surgery

- **Behavioral intervention**
- **Medications**
- **Endoscopic approach**
- **Revisional Bariatric Surgery**


Revisional bariatric surgery
Anti-obesity medications

Anti-obesity Medications (GLP-1)

GLP-1 (Glucagon-Like Peptide-1) receptor agonists are a class of drugs used to treat type 2 diabetes and obesity, which work by mimicking the effects of the endogenous GLP-1 hormone. GLP-1 is a hormone secreted by intestinal cells after food intake and plays an important role in blood sugar control and weight management



1 Enhance insulin secretion

GLP-1 receptor agonists increase insulin secretion by activating pancreatic GLP-1 receptors in a glucose-dependent manner, reducing the risk of hypoglycemia.

2 Inhibit glucagon secretion

Inhibit the secretion of glucagon, a hormone that increases blood sugar levels. By reducing its secretion, they help lower blood glucose levels.

3 Delay gastric emptying & Reduce appetite

GLP-1 receptor agonists slow gastric emptying, extending satiety, which helps reduce food intake and promote weight loss. They also reduce appetite by acting on the brain's appetite control centers.

Effects of GLP-1-RA use on weight loss after MBS

+ Topic：Once-Weekly Semaglutide in Adults with Overweight or Obesity

+ Authors：John P.H. Wilding, D.M.,et al. Publication time：2021

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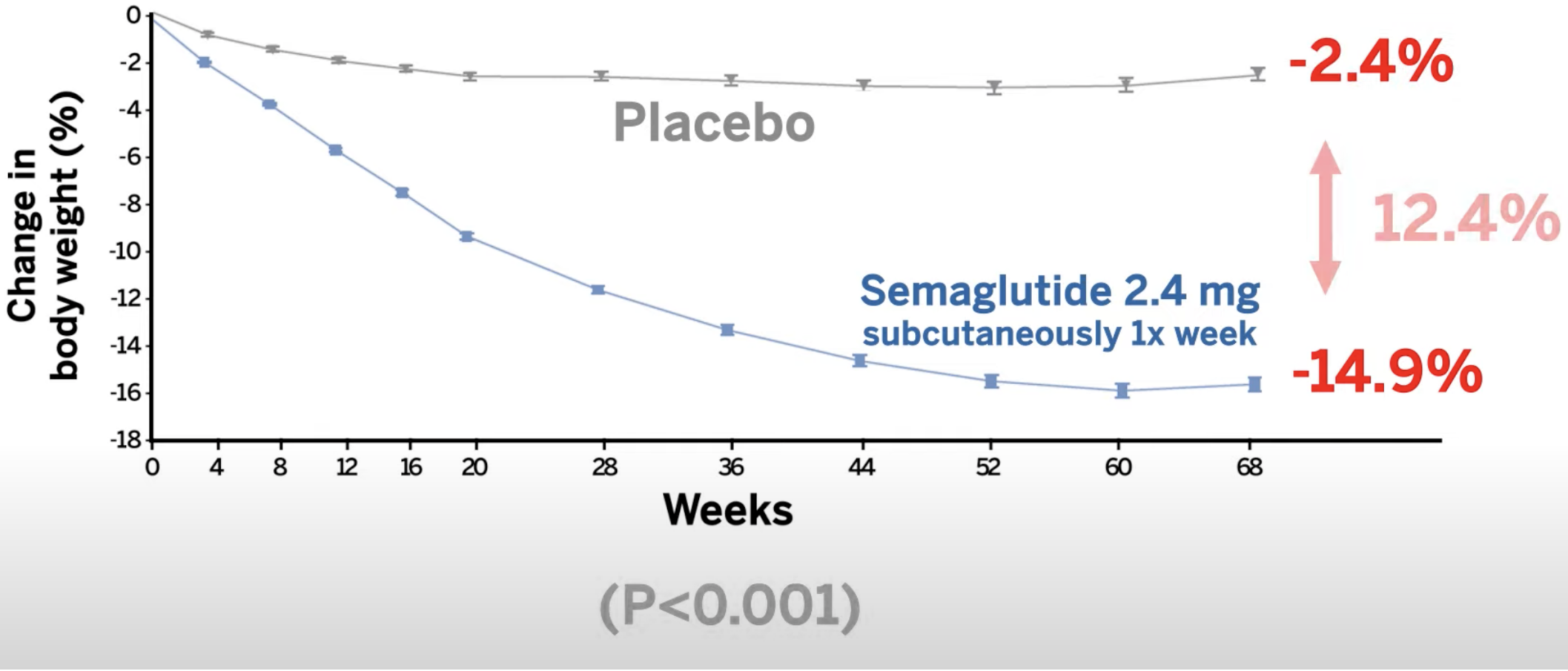
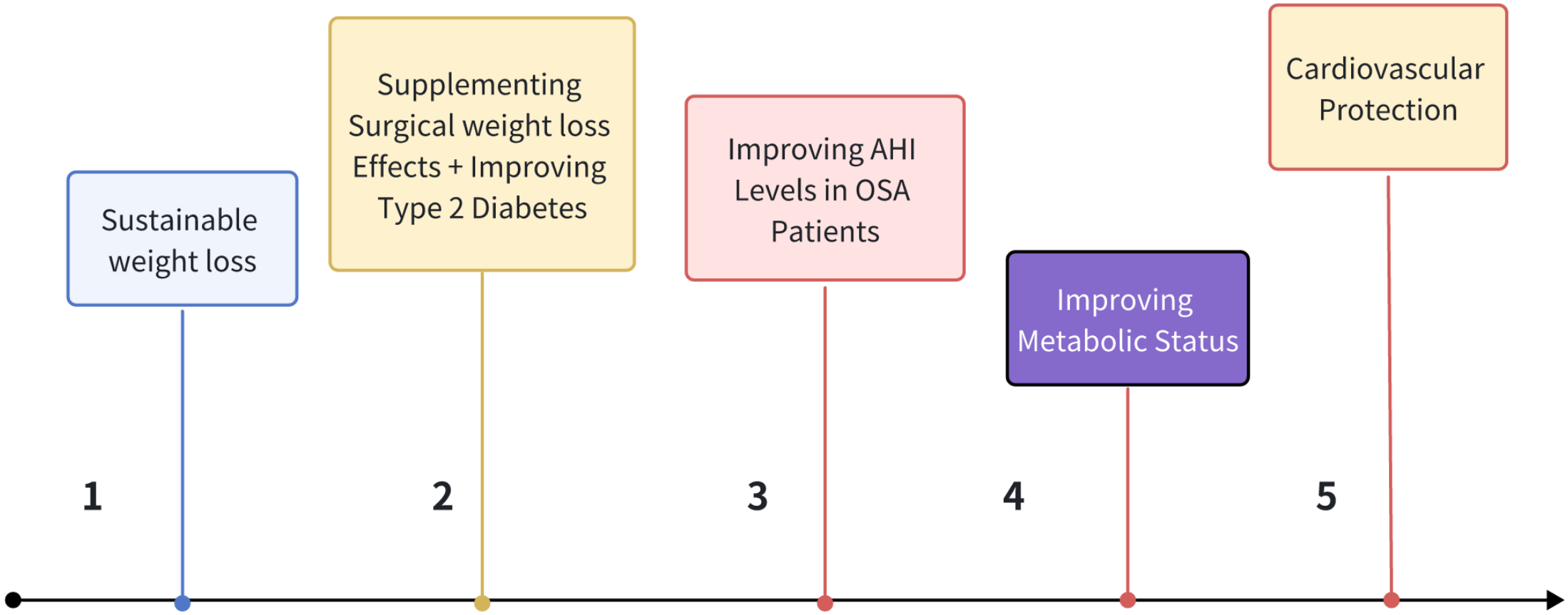
Once-Weekly Semaglutide in Adults with Overweight or Obesity

John P.H. Wilding, D.M., Rachel L. Batterham, M.B., B.S., Ph.D., Salvatore Calanna, Ph.D., Melanie Davies, M.D., Luc F. Van Gaal, M.D., Ph.D., Ildiko Lingvay, M.D., M.P.H., M.S.C.S., Barbara M. McGowan, M.D., Ph.D.,

Pharmacological Effects



Support Anti-obesity Medications



Considerations for Using GLP-1 in Patients with Recurrent Weight Gain After BS

1. Sustainable weight loss

A review evaluating GLP-1RA use in patients who regained weight.

Studies	Study design	Number of subjects	Type of surgery	Inclusion criteria	Time since the operation	Type of GLP-1-RA	Time on GLP-1-RA treatment	Weight loss under GLP-1-RA treatment
Rye et al. [34]	Retrospective	20	RYGB/LSG/VBG/AGB	WR > 10% WL < 20%	6.3 years	Liraglutide 3	28 weeks	−9.7%
Muratori et al. [42]	Retrospective	20	LSG/RYGB/LAGB	Gained in BMI postoperative weight loss	4.5 years	Liraglutide 3 mg/day	10.9 months	−5.2 kg/m^2
Wharton et al. [35]							ths	−5.5%
Colbourne et al. [43]	Retrospective	68	RYGB/SG/AGB/revisional surgery	IWL after BS: >25% after LSG/RYGB or >20% after LAGB	>1 year after LSG/RYGB or >2 years after LAGB	Liraglutide 3 mg/day	13 months	−5.3%
Suliman et al. [36]							s	-6.1%
Lautenbach et al. [45]	Retrospective	44	RYGB/SG	Those with continuous WR after nadir of IWL (EWL < 50% after BS) without type 2 DM	64.7 months	Semaglutide 0.5 mg/week	6 months	−10.3%
Abrahamsson et al. [37]								−10.4%
Jensen et al. [46]	Retrospective	50	RYGB/SG	Those with WR after BS	72 months	29: Liraglutide 3 mg/day 21: Semaglutide 1 mg/week	6 months	−8.8%
Creange et al. [38]							ks	−9.45%
Murvelashvili et al. [47]	Retrospective	207	RYGB/VSG/AGB	Those were prescribed medication after BS due to BMI > 30 kg/m^2 or >27 kg/m^2 with obesity related comorbidities	8 years	92: Liraglutide 3 mg/day 115: Semaglutide 1 mg/week	12 months	−12.92% by semaglutide −8.77% by liraglutide
Rigas et al. [39]							s	−13.4%
Talbot et al. [40]							ıs	−7.2%
Mok et al. [49]	Prospective, randomized, placebo-controlled	70 35: liraglutide + life style intervention 35: placebo + lifestyle intervention	RYGB/SG	WL < 20% from the day of surgery Suboptimal GLP-1 response (<2× increase in meal stimulated GLP-1 levels)	52.1 months	Liraglutide 3 mg/day vs. placebo saline injection	24 weeks	−8.82% vs. −0.54% Estimated treatment difference: −8.03%
Shehadeh et al. [41]	Retrospective	25	SG/GB/GBP/Last both	Gained >25% of weight loss and did not respond to lifestyle intervention	—	Liraglutide 3 mg/day	3 months	−10%

2. Supplementing Surgical weight loss Effects + Improving Type 2 Diabetes

Although BS can significantly reduce body weight and improve type 2 diabetes, some patients may not achieve ideal glycemic control or experience weight regain during the weight loss plateau after surgery. In these cases, GLP-1 receptor agonists can serve as an adjunctive treatment to help patients maintain weight loss results and further improve blood glucose levels.

Source: Molecular Metabolism (Impact Factor: 8.568)

GLP-1 receptor agonists in the treatment of type 2 diabetes - state-of-the-art

Michael A Nauck [1], Daniel R Quast [2], Jakob Wefers [2], Juris J Meier [2]

Affiliations + expand

PMID: 33068776 PMCID: PMC8085572 DOI: 10.1016/j.molmet.2020.101102

Free PMC article

3. Improving AHI Levels in OSA Patients

Effect of liraglutide 3.0 mg in individuals with obesity and moderate or severe obstructive sleep apnea: the SCALE Sleep Apnea randomized clinical trial

A Blackman,[1,*] G D Foster,[2] G Zammit,[3] R Rosenberg,[4] L Aronne,[5] T Wadden,[6] B Claudius,[7] C B Jensen,[7] and E Mignot[8], on behalf of the SCALE study group[9]

Objective:

To investigate whether liraglutide 3.0 mg reduces OSA severity compared with placebo using the primary end point of change in apnea–hypopnea index (AHI) after 32 weeks. Liraglutide's weight loss efficacy was also examined.

Subjects/Methods:

In this randomized, double-blind trial, non-diabetic participants with obesity who had moderate (AHI 15–29.9 events h^{-1}) or severe (AHI ⩾30 events h^{-1}) OSA and were unwilling/unable to use continuous positive airway pressure therapy were randomized for 32 weeks to liraglutide 3.0 mg (n=180) or placebo (n=179), both as adjunct to diet (500 kcal day^{-1} deficit) and exercise. Baseline characteristics were similar between groups (mean age 48.5 years, males 71.9%, AHI 49.2 events h^{-1}, severe OSA 67.1%, body weight 117.6 kg, body mass index 39.1 kg m^{-2}, prediabetes 63.2%, HbA_{1c} 5.7%).

Results:

After 32 weeks, the mean reduction in AHI was greater with liraglutide than with placebo (−12.2 vs −6.1 events h^{-1}, estimated treatment difference: −6.1 events h^{-1} (95% confidence interval (CI), −11.0 to −1.2), P=0.0150). Liraglutide produced greater mean percentage weight loss compared with placebo (−5.7% vs −1.6%, estimated treatment difference: −4.2% (95% CI, −5.2 to −3.1%), P<0.0001). A statistically significant association between the degree of weight loss and improvement in OSA end points (P<0.01, al was demonstrated *post hoc*. Greater reductions in glycated hemoglobin (HbA_{1c}) and systolic blood pressur (SBP) were seen with liraglutide versus placebo (both P<0.001). The safety profile of liraglutide 3.0 mg was similar to that seen with doses ⩽1.8 mg.

Conclusions:

As an adjunct to diet and exercise, liraglutide 3.0 mg was generally well tolerated and produced significantly greater reductions than placebo in AHI, body weight, SBP and HbA_{1c} in participants with obesity and moderate/severe OSA. The results confirm that weight loss improves OSA-related parameters.

The primary mechanism by which GLP-1 receptor agonists impact Obstructive Sleep Apnea (OSA) is through weight reduction. In the trial, improvements in OSA endpoints were associated with the extent of weight loss.

Effect of liraglutide 3.0 mg in individuals with obesity and moderate or severe obstructive sleep apnea: the SCALE Sleep Apnea randomized clinical trial

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Efficacy and safety of liraglutide in patients with type 2 diabetes mellitus and severe obstructive sleep apnea

Wenlong Jiang [1], Weiguo Li [2], Jing Cheng [1], Wen Li [1], Fangzhou Cheng [3]

Results: Of 90 patients, 45 were randomized to the intervention arm (with liraglutide) and 45 to the control arm (without liraglutide). One patient in the liraglutide group dropped out of the study on day 8 after enrollment due to obvious gastrointestinal symptoms. No significant differences were found between the two groups in baseline demographics, clinical characteristics, cardiac function indicators, or sleep disorder respiratory indices (P > 0.05). After 3 months, the body mass index (BMI), apnea hypopnea index (AHI), and mean systolic blood pressure in the liraglutide treatment group were significantly lower than those in the control group (P < 0.05). The minimum oxygen saturation was significantly higher in the liraglutide group compared with that in the control group after 3 months of follow-up (P < 0.05). No difference was found between the two groups in the

Liraglutide treatment in a patient with HIV, type 2 diabetes and sleep apnoea–hypopnoea syndrome

M D García de Lucas [1], J Olalla Sierra [2], J Piña Fernández [3]

Results: 27 subjects age 46 ± 9 years, 23% females and 15% African American completed the study protocol. 18 subjects were in the treatment arm and 9 were controls. The overall AHI for the treated group decreased from 50 ± 32 to 38 ± 30 (P = 0.002). 70% of the subjects in the treatment arm showed a decline in (AHI) by 44% or 20 ± 12 events per hour (Fig). 30% showed no response to treatment AHI 52 ± 41 at baseline vs 55 ± 39 at follow-up. There was no significant change in AHI in subjects who did not receive the drug (baseline AHI = 32.6 ± 21 vs 33.2 ± 21.2 at follow-up). BMI in responders was 39.3 ± 9.6 at baseline and 39.3 ± 10.7 at follow-up (P= NS). There also was no change in BMI for the controls 33.8 ± 2.6 vs 33.8 ± 2.4 at baseline and follow-up respectively.
apnea hypopnea index pre and post liraglutide responders only.jpg
Conclusion: Treatment of adult patients with OSA with GLP-1RA for a period of 4 weeks is associated with significant improvement in OSA severity. The drug effect is independent from weight loss. This family of drugs could be a promising new therapeutic for the treatment of OSA.

4. Improving Metabolic Status

非酒精性脂肪性肝病（nonalcoholic fatty liver disease，NAFLD）：GLP-1通过肠-胰-肝轴表现出不依赖胰岛素的直接肝脏保护作用，可刺激肝脏脂肪生成、葡萄糖摄取、减少肝脏糖异生并改善胰岛素抵抗。并通过改善肝线粒体功能、胰岛素敏感性和抑制受损内质网的应激反应降低肝脏脂肪变性、肝细胞损伤，具有肝脏保护作用。

- International Journal of Molecular Sciences（IF=5.6)

GLP-1 Receptor Agonists in Non-Alcoholic Fatty Liver Disease: Current Evidence and Future Perspectives

Riccardo Nevola [1], Raffaella Epifani [1], Simona Imbriani [1], Giovanni Tortorella [1], Concetta Aprea [1], Raffaele Galiero [1], Luca Rinaldi [1], Raffaele Marfella [1], Ferdinando Carlo Sasso [1]

Affiliations + expand

PMID: 36675217 PMCID: PMC9865319 DOI: 10.3390/ijms24021703

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5. Cardiovascular Protection

• - 鉴于OSA患者心血管风险较高，近年研究发现，某些GLP-1受体激动剂对心血管系统具有保护作用，能够降低心血管事件的风险。对于有心血管疾病风险的肥胖患者，减重手术后使用GLP-1受体激动剂可能提供额外的心血管保护。

• Nature Reviews Cardiology（最新IF 49.6）发表的一篇综述总结了GLP-1受体激动剂的心血管获益证据以及作用机制。

nature reviews cardiology

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Review Article | Published: 28 March 2023

Glucagon-like peptide 1 cardiovascular benefits

John R. Ussher & Daniel J. Drucker

Nature Reviews Cardiology **20**, 463–474 (20

9639 Accesses | **37** Citations | **135** Altme

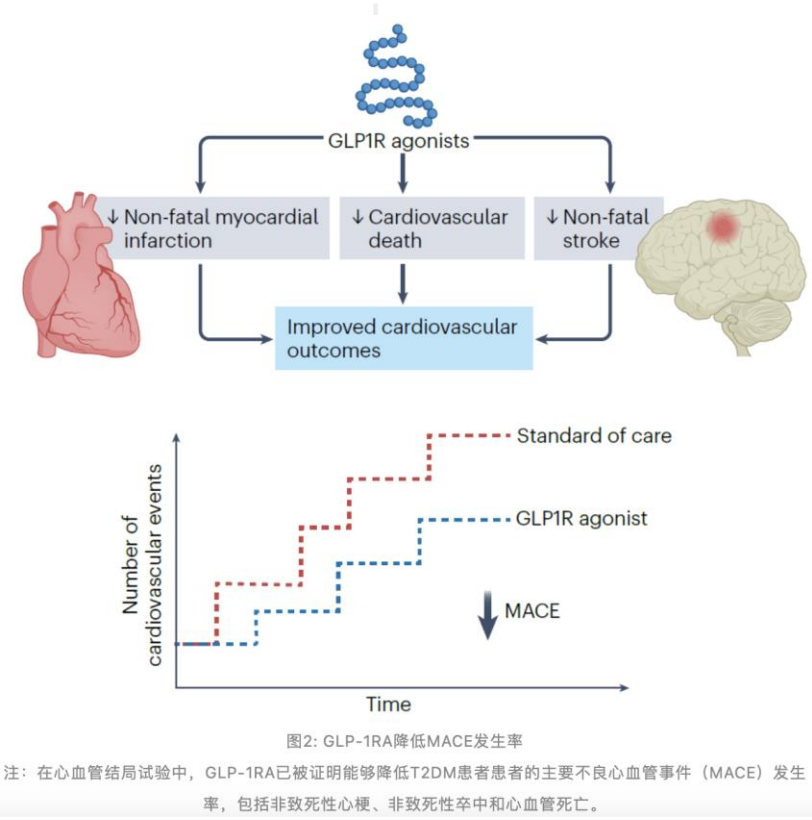


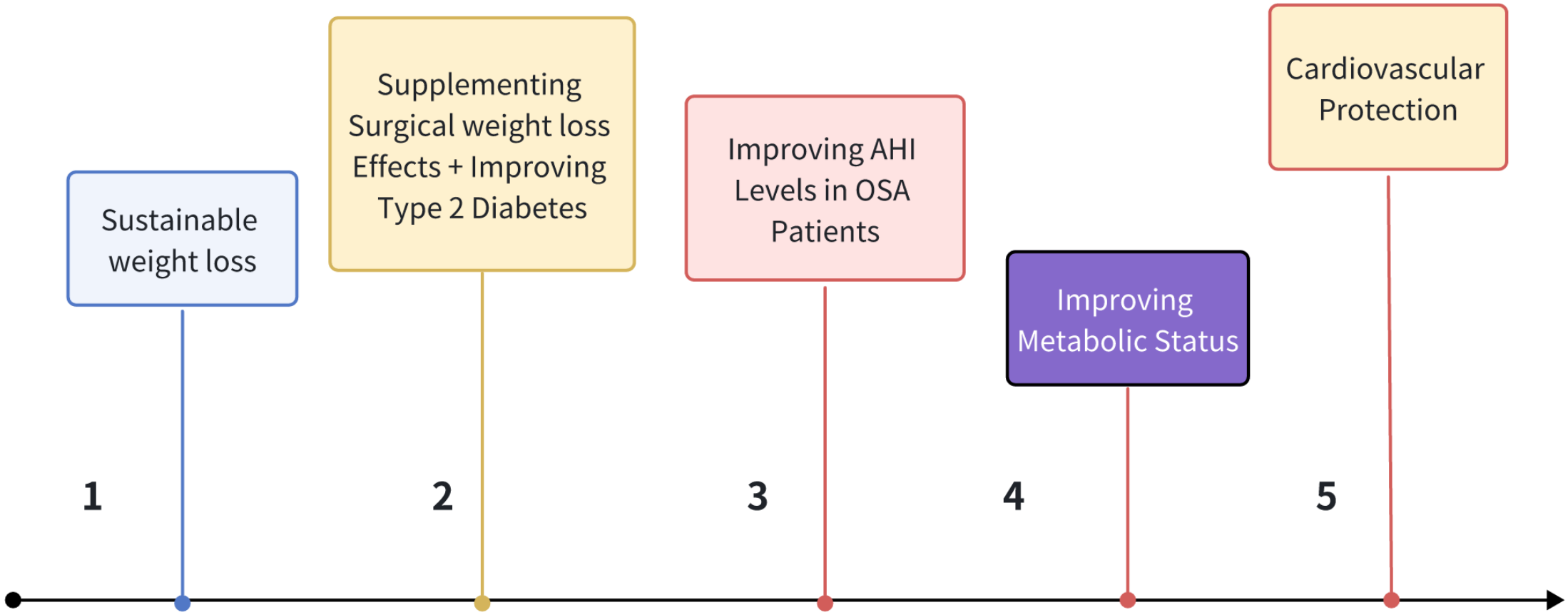
图2: GLP-1RA降低MACE发生率

注：在心血管结局试验中，GLP-1RA已被证明能够降低T2DM患者患者的主要不良心血管事件（MACE）发生率，包括非致死性心梗、非致死性卒中和心血管死亡。

• 2型糖尿病患者的心血管结局试验结果表明，GLP-1受体激动剂可降低非致死性心肌梗死、非致死性卒中和心血管死亡风险。

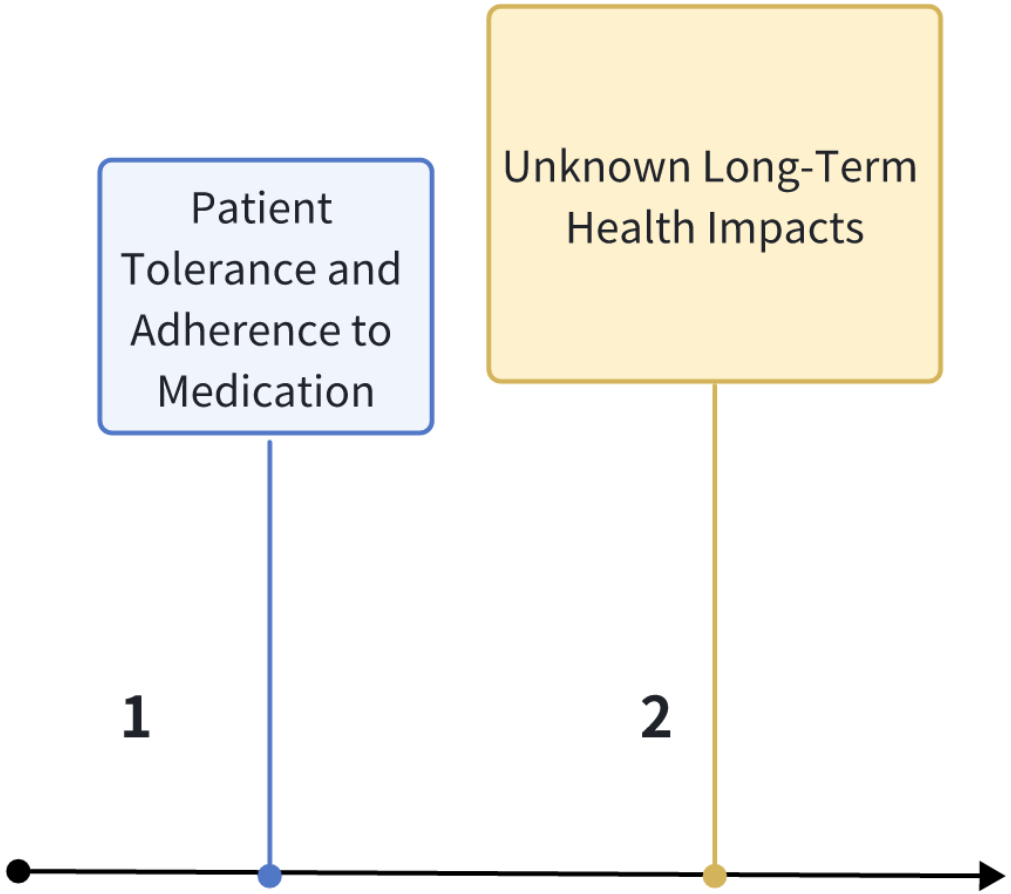
• GLP-1受体激动剂通过降低血糖、血压和血脂、改善炎症、降低体重来降低心血管疾病发病率。

Support Anti-obesity Medications



Considerations for Using GLP-1 in Patients with Recurrent Weight Gain After BS

Considerations for NOT Using GLP-1 in Patients w
Recurrent Weight Gain After BS



1. Patient Tolerance and Adherence to Medication

October 5, 2023

Risk of Gastrointestinal Adverse Events Associated With Glucagon-Like Peptide-1 Receptor Agonists for Weight

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Table 3. Adverse Events.*

Adverse Event	Semaglutide (N=1306)			Placebo (N=655)		
	No. of participants (%)	No. of events	Events/100 person-yr	No. of participants (%)	No. of events	Events/100 person-yr
Any adverse event	1171 (89.7)	9658	566.1	566 (86.4)	3302	398.0
Serious adverse events	128 (9.8)	164	9.6	42 (6.4)	53	6.4
Adverse events leading to discontinuation of drug or placebo	92 (7.0)	123	7.2	20 (3.1)	23	2.8
Gastrointestinal disorders	59 (4.5)	78	4.6	5 (0.8)	5	0.6
Fatal events†‡	1 (0.1)	1	0.1	1 (0.2)	3	0.3
Adverse events reported in ≥10% of participants§						
Nausea	577 (44.2)	1068	62.6	114 (17.4)	146	17.6
Diarrhea	412 (31.5)	766	44.9	104 (15.9)	138	16.6
Vomiting	324 (24.8)	636	37.3	43 (6.6)	52	6.3
Constipation	306 (23.4)	390	22.9	62 (9.5)	73	8.8
Nasopharyngitis	281 (21.5)	480	28.1	133 (20.3)	216	26.0
Headache	198 (15.2)	387	22.7	80 (12.2)	104	12.5
Dyspepsia	135 (10.3)	179	10.5	23 (3.5)	30	3.6
Abdominal pain	130 (10.0)	175	10.3	36 (5.5)	41	4.9
Upper respiratory tract infection	114 (8.7)	158	9.3	80 (12.2)	116	14.0
Safety focus areas¶						
Gastrointestinal disorders‖	969 (74.2)	4309	252.6	314 (47.9)	739	89.1
Gallbladder-related disorders	34 (2.6)	42	2.5	8 (1.2)	8	1.0
Hepatobiliary disorders‖	33 (2.5)	40	2.3	5 (0.8)	5	0.6
Cholelithiasis	23 (1.8)	24	1.4	4 (0.6)	4	0.5
Hepatic disorders	31 (2.4)	37	2.2	20 (3.1)	24	2.9
Acute pancreatitis**	3 (0.2)	3	0.2	0	—	—
Cardiovascular disorders†	107 (8.2)	134	7.2	75 (11.5)	96	10.5
Allergic reactions	96 (7.4)	108	6.3	54 (8.2)	63	7.6
Injection-site reactions	65 (5.0)	99	5.8	44 (6.7)	82	9.9
Malignant neoplasms†	14 (1.1)	14	0.8	7 (1.1)	7	0.8
Psychiatric disorders‖	124 (9.5)	160	9.4	83 (12.7)	113	13.6
Acute renal failure	3 (0.2)	4	0.2	2 (0.3)	2	0.2
Hypoglycemia	8 (0.6)	15	0.9	5 (0.8)	7	0.8

Table 2. Risks of Biliary Disease, Pancreatitis, Bowel Obstruction, and Gastroparesis Among Users of GLP-1 Agonists vs Bupropion-Naltrexone

Outcomes	GLP-1 agonists, HR (95% CI)[a]		Bupropion-naltrexone
	Crude	Adjusted[b]	
Primary analysis			
Biliary disease	1.48 (0.88-2.47)	1.50 (0.89-2.53)	1 [Reference]
Pancreatitis	10.33 (1.44-74.40)	9.09 (1.25-66.00)	1 [Reference]
Bowel obstruction	5.16 (1.27-21.00)	4.22 (1.02-17.40)	1 [Reference]
Gastroparesis	3.31 (1.04-10.50)	3.67 (1.15-11.90)	1 [Reference]
Sensitivity analyses			
Exclusion of hyperlipidemia			
Biliary disease	1.50 (0.88-2.56)	1.46 (0.84-2.51)	1 [Reference]
Pancreatitis	9.80 (1.36-70.79)	7.99 (1.10-58.30)	1 [Reference]
Bowel obstruction	4.43 (1.08-18.20)	3.63 (0.87-15.10)	1 [Reference]
Gastroparesis	3.32 (1.04-10.60)	3.67 (1.14-11.80)	1 [Reference]
Analysis with less-restrictive obesity definition[c]			
Biliary disease	1.29 (0.92-1.80)	1.20 (0.85-1.69)	1 [Reference]
Pancreatitis	6.19 (1.99-19.30)	5.94 (1.90-18.60)	1 [Reference]
Bowel obstruction	3.11 (1.28-7.54)	2.44 (1.00-5.95)	1 [Reference]
Gastroparesis	2.11 (1.09-4.09)	2.35 (1.20-4.58)	1 [Reference]
E-values for adjusted HRs[d]			
Biliary disease	2.36		
Pancreatitis	17.67		
Bowel obstruction	7.91		
Gastroparesis	6.80		

Table 1. Characteristics of Semaglutide, Liraglutide, and Bupropion-Naltrexone Users

	Semaglutide	Liraglutide	Bupropion-naltrexone
No.	613	4144	654
Age, mean (SD), y	53.5 (11.9)	51.3 (12.2)	45.2 (11.1)
Sex, %			
Male	55.8	61.0	82.4
Female	44.2	39.0	17.6
Follow-up, median (IQR), y	0.6 (0.2-1.1)	1.7 (0.8-3.1)	1.7 (0.7-2.9)
Covariates, %			
Alcohol[a]	2.9	0.4	0.6
Smoking[a]	8.7	12.5	9.9
Hyperlipidemia[b]	55.6	22.8	11.5
Abdominal surgery[c]	0	0.12	0
US region			
Northeast	18.3	25.8	18.3
Southeast	34.6	26.1	34.6
Midwest	33.1	30.3	33.1
Southwest	0.2	2.6	0.3
West	13.9	15.3	12.4
In[illegible]			
Biliary disease	11.7 (5)	18.6 (162)	12.6 (16)
Pancreatitis	4.6 (2)	7.9 (71)	1.0 (1)
Bowel obstruction	0	8.1 (73)	1.7 (2)
Gastroparesis	9.1 (4)	7.3 (66)	3.1 (3)

[illegible]轻瘫和肠梗阻的风险。

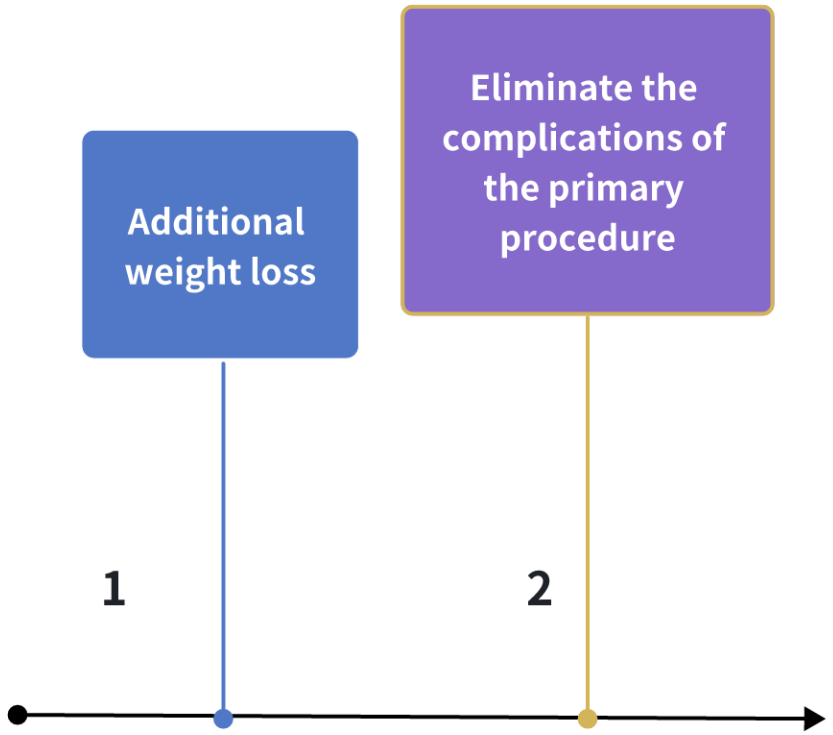
2. Unknown Long-Term Health Impacts

2.曾经的减重网红：Sibutramine （西布曲明）：

- 西布曲明从 1997 年被 FDA 批准在美上市到 2010 年被 FDA 要求退市经历了长达 13 年的时间。
- 西布曲明的确有降低食欲，减轻体重的作用，问题在于西布曲明的副作用，主要有头痛、口干、失眠、头晕等。它还可能对消化系统、神经系统、心血管系统等产生影响，导致内分泌代谢失调、精神紧张、睡眠障碍、心梗、脑卒中、心脏骤停等可能出现的风险。
- 而目前获FDA 批准上市的GLP-1药物最早上市的利拉鲁肽至今仅有 9 年的时间、司美格鲁肽（2年）替尔泊肽（1年）。所以现在还很难下定义说这些药物的长期使用是安全可靠的。

raújo, J. R., & Martel, F. (2012). Sibutramine effects on central mechanisms regulating energy homeostasis. Current
europharmacology, 10(1), 49–52. https://doi.org/10.2174/157015912799362788IF: 5.3 Q1

Considerations for Using RS in Patients with Recurrent Weight Gain After BS



1. Additional weight loss

Re-sleeve gastrectomy (ReSG)
The largest series to date, by Nedelcu *et al*. (92), reported the results of 61 ReSG cases in patients with poor weight loss and weight regain.

The average BMI and %EWL in the cohort fluctuated from 38.1 kg/m^2 and 51.2% before revision, to 29.8 kg/m^2 and 62.7% 20 months after.

Review Article

Surgical approach of weight regain after bariatric surgery

Xavier Guarderas[1], Ramiro Cadena-Semanate[2^], Glenda Herrera[3], A. Daniel Guerron[4]

1. Additional weight loss

LSG to LRYGB

LRYGB is a safe, feasible, and effective revisional option for LSG, with most patients experiencing satisfactory weight loss at a mean follow-up of ~18 months.

LRYGB has proven to be particularly effective to overcome GERD, as over 90% of patients report symptom remission after surgery

Table 1. Weight loss outcomes in the literature after the conversion of LSG to LRYGB

Reference	Patients (WR or IWL)	Pre-LSG BMI (kg/m^2)	Mean interval between LSG and LRYGB in months	Pre conversion BMI (LRYGB) (kg/m^2)	Mean follow-up after conversion in months (LRYGB)	BMI at final follow-up (kg/m^2)	Pre-conversion % EWL	% EWL at final follow-up
AlSabah *et al.* (100)	36 [12]	52	N/A	41	12	36	37.9%	61.3%§
Antonopulos *et al.* (101)	144 [83]	N/A	43.2 (16.0–132.0)	41.7 (29.4–60.1)	12	32.5 (19.1–45.6)	20.7% (0–65.9%)	61.2% (−10% to 142.9%)§
Casillas *et al.* (97)	48 [27]	45.8†	26 [2–60]†	40.8	24	N/A	40.5%	35.4%‡
Quezada *et al.* (98)	50 [28]	36.4 (34.0–40.0)	49 [24–67]†	35.4 (33.9–37.9)	36	28.6 (24.0–36.0)	15.5% (5–27%)	70.5% (36–92%)§
Iannelli *et al.* (99)	40 [29]	47.7 (37.8–66.0)	32.6 (8.0–113.0)	39.2 (34.0–50.0)	18.6 (9.0–60.0)	30.7 (20.8–43.0)	29.7% (10–52.9%)	48.6% (4.6–102.7%)‡/64.5% (24.1–103.0%)§
Carmeli *et al.* (102)	19 [10]	44.5 (±5.1)	36.2 (±17.4)	39.8 (±5.7)	15.6 (±9.0)	30.0 (±4.8)	28% (±16.4%)	66.6% (±33.9%)§
Homan *et al.* (103)	43 [11]	50 [40–59]	30 [9–56]	39 [36–48]	34 [14–79]	N/A	34% (8–60%)	57% (20–91%)§

1. Additional weight loss

LSG to BPD-DS
A retrospective analysis investigated 43 patients who underwent either BPD-DS (n=25) or LRYGB (n=18) after failed primary LSG and found that Revisional BPD-DS demonstrated greater %EWL than RYGB at a median follow-up of 34 months (72% vs. 54%; P=0.02).

Secondary surgery after sleeve gastrectomy: Roux-en-Y gastric bypass or biliopancreatic diversion with duodenal switch

Jens Homan [1], Bark Betzel [2], Edo O Aarts [2], Kees J H M van Laarhoven [3], Ignace M C Janssen [2], Frits J Berends [2]

1. Additional weight loss

LRYGB to Gastric pouch banding (GPB)
a Systematic Review with 24 studies involving 866 patient found that re-GPB achieving satisfactory weight reduction in the short and mid-terms (Mean percent excess body mass index loss (%EBMIL) 47.3% at 1–3 years follow-up)

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

Daniel D Tran [1], Ifeanyi D Nwokeabia [2], Stephanie Purnell [2], Syed Nabeel Zafar [3], Gezzer Ortega [3], Kakra Hughes [3], Terrence M Fullum [3]

Affiliations + expand

PMID: 27138603 DOI: 10.1007/s11695-016-2201-5

1. Additional weight loss

LRYGB conversion to Laparoscopic pouch resizing (LPR)
a study involving 20 LRYGB patients followed for a mean of 20 months after undergoing secondary LPR found that an average 69% %EWL at final follow-up.

> Surg Obes Relat Dis. IF: 3.5 Q1 2013 Mar-Apr;9(2):260-7. doi: 10.1016/j.soard.2012.05.003.
Epub 2012 May 11.

Gastric pouch resizing for Roux-en-Y gastric bypass failure in patients with a dilated pouch

Antonio Iannelli [1], Anne-Sophie Schneck, Xavier Hébuterne, Jean Gugenheim

Affiliations + expand

PMID: 22695174 DOI: 10.1016/j.soard.2012.05.003

1. Additional weight loss

LRYGB conversion to distal LRYGB (D-LRYGB)
A retrospective study involving 29 patients found a %EWL of 60.9% at 1 year and 68.8% 5 years after conversion

Comparative Study > Surg Obes Relat Dis. IF: 3.5 Q1 2011 Jan-Feb;7(1):45-9.
doi: 10.1016/j.soard.2010.08.013. Epub 2010 Sep 15.

Revision of Roux-en-Y gastric bypass to distal bypass for failed weight loss

M Logan Rawlins [1], Donovan Teel 2nd, Kim Hedgcorth, John P Maguire

Affiliations + expand

PMID: 21111688 DOI: 10.1016/j.soard.2010.08.013

1. Additional weight loss

LRYGB conversion to duodenal switch (BPD/DS)

A systematic review investigating 24 studies involving 866 patient reported that the percentage of EWL after converting RYGB to DS was 62.7% at one year and 71% at three years, showing significant and sustained WL

Review > Obes Surg. IF: 2.9 Q1 2016 Jul;26(7):1627-34. doi: 10.1007/s11695-016-2201-5.

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

Daniel D Tran [1], Ifeanyi D Nwokeabia [2], Stephanie Purnell [2], Syed Nabeel Zafar [3], Gezzer Ortega [3], Kakra Hughes [3], Terrence M Fullum [3]

Affiliations + expand

PMID: 27138603 DOI: 10.1007/s11695-016-2201-5

2. Eliminate the complications of the primary procedure

> Obes Surg. IF: 2.9 Q1 2023 Nov;33(11):3463-3471. doi: 10.1007/s11695-023-06832-8.
Epub 2023 Sep 28.

Revisional Bariatric Surgery due to Complications: Indications and Outcomes

Alireza Khalaj [1], Maryam Barzin [2], Amir Ebadinejad [3], Maryam Mahdavi [2], Navid Ebrahimi [2], Majid Valizadeh [2], Farhad Hosseinpanah [4]

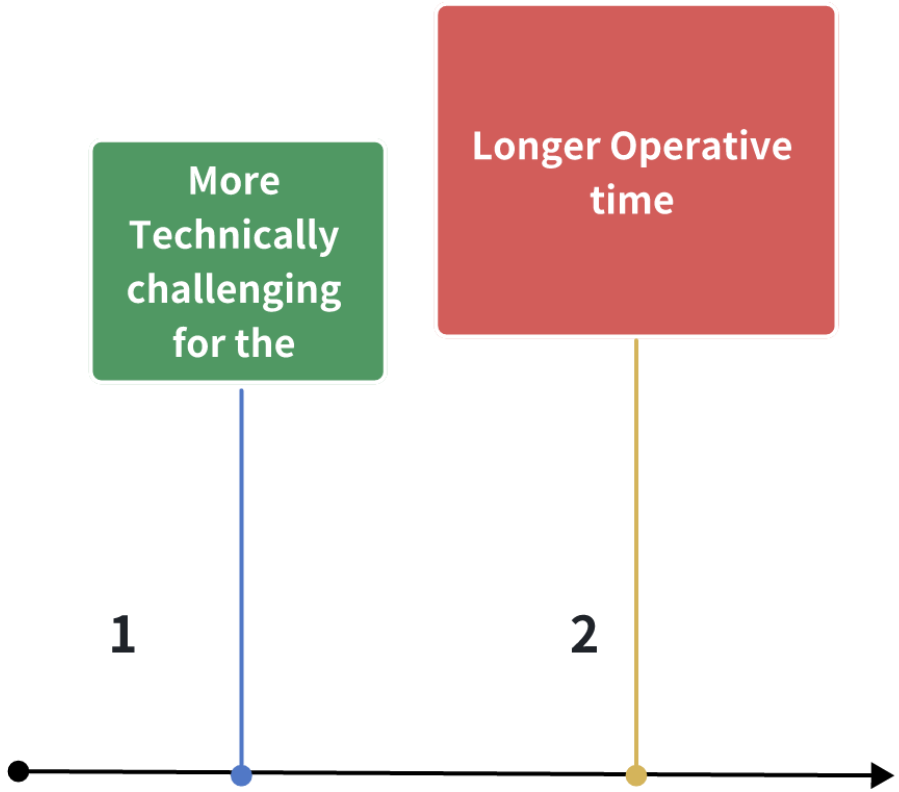
Affiliations + expand

PMID: 37770774 DOI: 10.1007/s11695-023-06832-8

The most common complications leading to revisional operations are gastric acid reflux, bile reflux, fistula, leak, unexplained abdominal pain, protein-calorie malnutrition (PCM), and stricture.

A retrospective study investigating 203 patients who required revisional surgery due to various complication from primary surgery including gastroesophageal reflux disease (GERD) (n=17, 45.9%), protein-calorie malnutrition (PCM) (n=14, 37.8%), and unexplained abdominal pain (n=5, 13.5%). In the postoperative follow-up, most patients exhibited improvement in signs and symptoms related to underlying causes

Considerations for NOT Using RS in Patients with Recurrent Weight Gain After BS



1. More Technically challenging for the surgeons

Reoperative bariatric surgery is considerably more challenging than primary surgery due to post-operative adhesions, distorted tissue planes, and altered anatomy.

Adhesions, which are scar tissue forming between abdominal tissues and organs after surgery, can obscure the surgical field, restrict the natural movement of organs and tissues, and increase the risk of accidental injury to surrounding structures during reoperative bariatric surgery.

Altered Planes and anatomy: The normal anatomical planes become disrupted and distorted due to scarring and tissue remodeling, making it more difficult to identify and separate tissues.

> Obes Surg. IF: 2.9 Q1 2005 Mar;15(3):316-22. doi: 10.1381/0960892053576785.

Reoperative laparoscopic Roux-en-Y gastric bypass: an experience with 49 cases

J M Calmes [1], V Giusti, M Suter

Affiliations + expand

PMID: 15826463 DOI: 10.1381/0960892053576785

2. Longer Operative time

A systematic review and meta-analysis of 21 studies comparing primary and revisional laparoscopic Roux-en-Y gastric bypass (LRYGB) surgeries revealed that revisional surgeries were significantly longer than primary surgeries by an average of 44.57 minutes ($p = 0.00001$).

Obes Surg. 2018; 28(7): 2083–2091.

Published online 2018 May 11. doi: 10.1007/s11695-018-3300-2 IF: 2.9 Q1

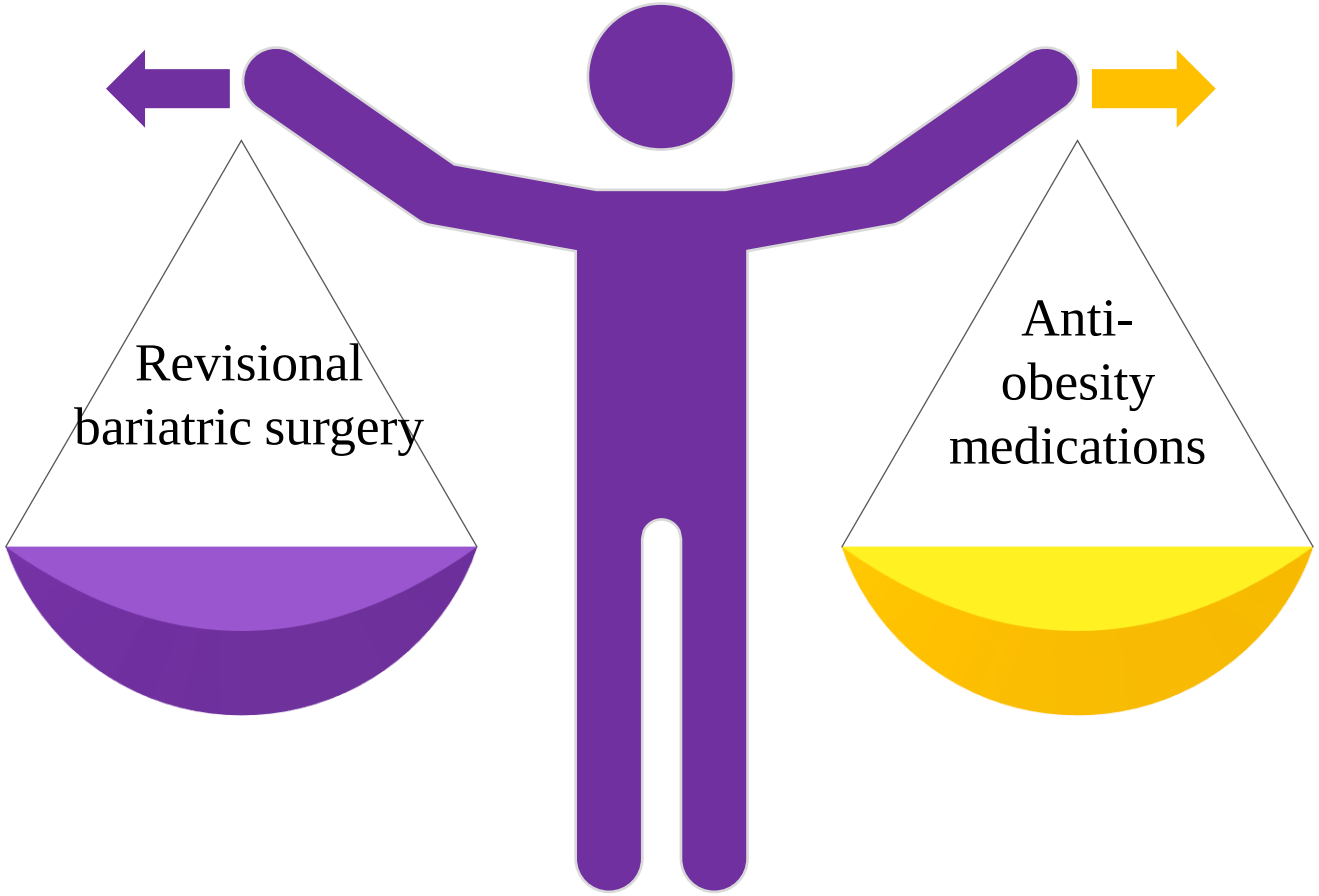
PMCID: PMC6018598 IF: 2.9 Q1

PMID: 29748735 IF: 2.9 Q1

Revisional Gastric Bypass Is Inferior to Primary Gastric Bypass in Terms of Short- and Long-term Outcomes—Systematic Review and Meta-Analysis

Michał Pędziwiatr,[1,2] Piotr Małczak,[1,2] Mateusz Wierdak,[1,2] Mateusz Rubinkiewicz,[1] Magdalena Pisarska,[1,2] Piotr Major,[1,2] Michał Wysocki,[1,2] W.Konrad Karcz,[3] and Andrzej Budzyński[1,2]

What should we choose ?



Several factors must be taken into account

1. **Cause of Weight Regain**:
   Analyze the specific reasons for weight regain. If the issue stems from the initial surgery's limited effectiveness (e.g., pouch dilation or metabolic adaptation), revision surgery might be more appropriate. However, if the regain is due to lifestyle changes, poor dietary habits, or lack of exercise, medication or behavioral intervention might be more effective.
2. **Patient's Overall Health**:
   Assess the patient's overall health, including any new comorbidities (e.g., diabetes, cardiovascular disease) or contraindications to surgery. For patients with severe comorbidities, medication treatment might be a safer option.
3. **Type of Initial Surgery**:
   The type of initial bariatric surgery impacts the choice of revision procedures. For instance, patients who underwent gastric bypass might need re-routing or adjustments, while those with sleeve gastrectomy might require dilation repair or additional surgical interventions.

Several factors must be taken into account

4.Patient's Preferences and Compliance:

Understand the patient’s attitude towards undergoing another surgery and their compliance with lifestyle changes. If the patient is reluctant to undergo surgery again or prefers a non-invasive approach, medication treatment might be more suitable.

5.Long-term Outcomes:

Compare the long-term outcomes of revision surgery versus medication treatment, including the stability of weight control, improvement of comorbidities, and changes in quality of life. Revision surgery generally offers more durable weight loss, but medication treatment provides flexibility and control.

6.Cost and Risk:

Revision surgery typically comes with higher costs and greater risks, while medication treatment is usually less expensive and involves fewer risks. Therefore, the patient’s financial situation and acceptance of surgical risks should also be taken into account.

By thoroughly evaluating these factors, a more personalized treatment plan can be developed for the patient.

Summary

- Both anti-obesity medications and surgical approaches have their roles in managing recurrent weight gain after metabolic bariatric surgery.

- The choice of treatment should be tailored to the individual patient's needs, considering the underlying causes of weight regain, potential benefits, and risks associated with each option.

Questions & comments are welcome

New anti-obesity medications vs surgery for recurrent weight gain after metabolic bariatric surgery

Acknowledgements

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