Case study: Weight Regain after Surgery

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Bariatric Surgery: Weight Regain

Luca Busetto – Disclosures

- Novo Nordisk
- Bruno Farmaceutici
- Rythm
- Pronokal
- Therascience
- Enzymmanagement

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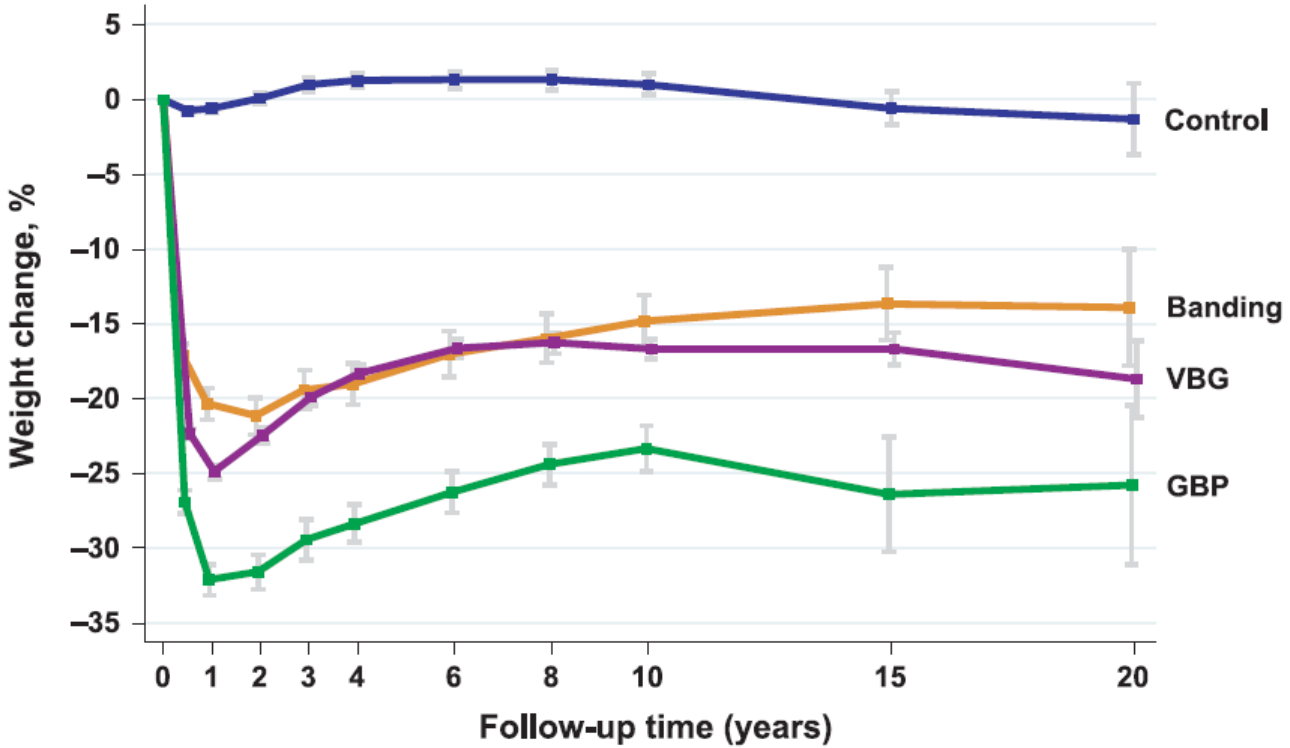
Bariatric Surgery: weight regain



No. examined						
Control	2037	1490	1242	1267	556	176
Banding	376	333	284	284	150	50
VBG	1369	1086	987	1007	489	82
GBP	265	209	184	180	37	13

Review of the key results from the Swedish Obese Subjects (SOS) trial – a prospective controlled intervention study of bariatric surgery

Sjöström L. J Int Med 2013;273:219

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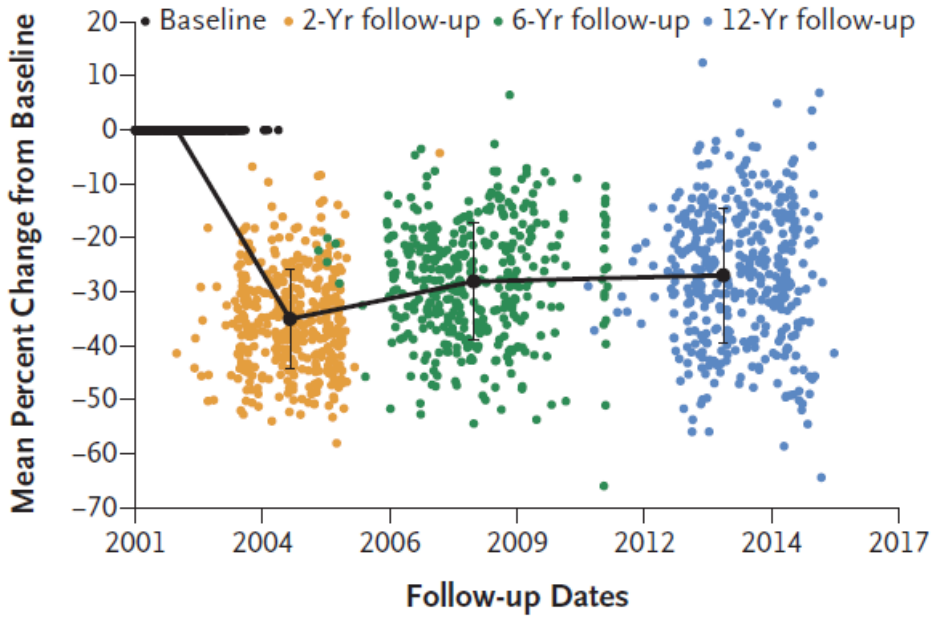
Bariatric Surgery: Weight regain

A Mean Percent Change in Body Weight from Baseline to Years 2, 6, and 12 in the Surgery Group



No. of Patients	Baseline	2 Yr	6 Yr	12 Yr
Surgery group	418	409	379	387
Deaths	—	3	9	14
Total	418	412	388	401

Weight and Metabolic Outcomes 12 Years after Gastric Bypass

Adams T et al. NEJM 2017;377:1143

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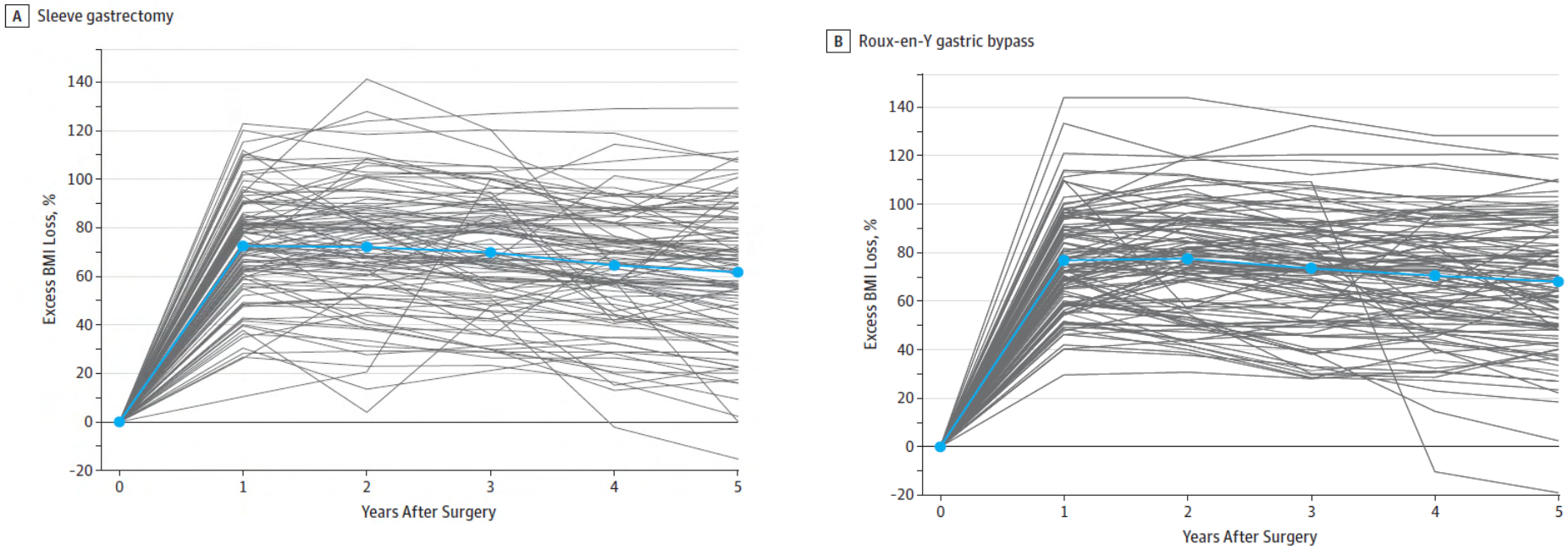
Bariatric Surgery: Weight Regain



Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity
The SM-BOSS Randomized Clinical Trial

There was a significant trend ($P < .001$) for a linear decrease in excess BMI loss over the follow-up period for both treatment groups (for sleeve gastrectomy, slope, –3.05% [95% CI, –4.53% to –1.58%] per year; $P < .001$; intercept, 77.0% [95% CI, 72.07%-81.85%]; $P < .001$ and for Roux-en-Y gastric bypass, slope, –2.34% [95% CI, –3.72% to –0.97%] per year; $P = .001$; intercept, 80.4% [95% CI, 75.9%-85.0%]; $P < .001$).

Peterli R et al. JAMA 2018;319:255

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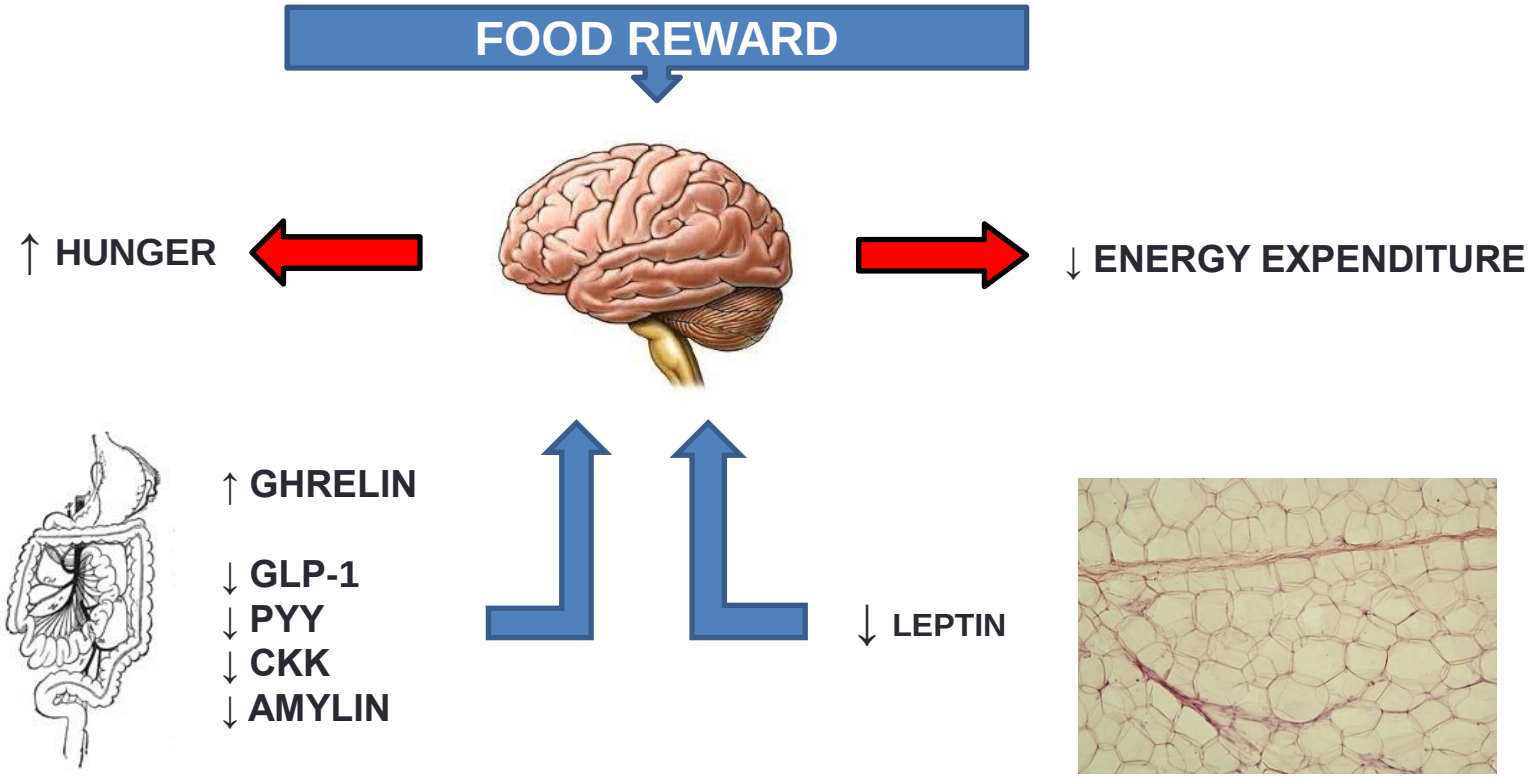
Bariatric Surgery: Weight Regain



Busetto L et al. Eur J Int Med 2021;93:3

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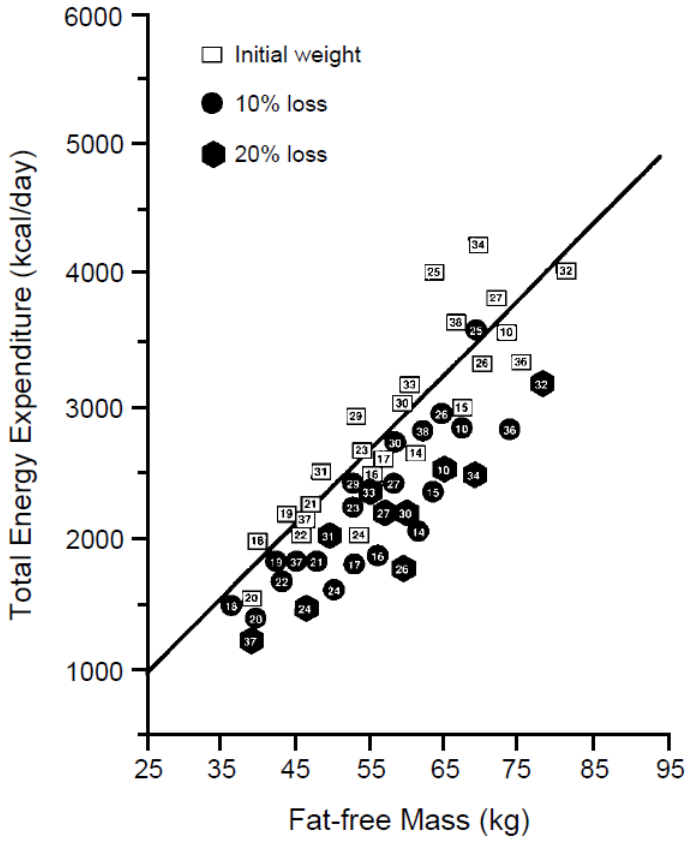

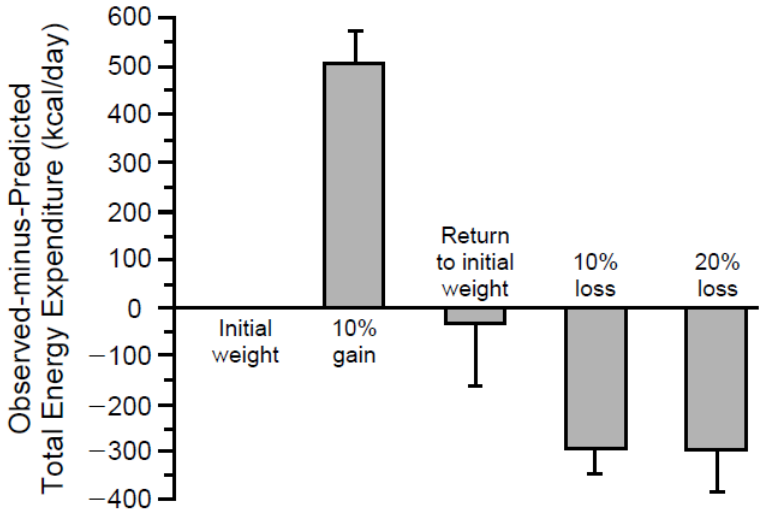

Metabolic Adaptation

A reduction in basal metabolism rate not accounted for the changes in either body mass or body mass components occurring with weight loss

Leibell RL et al. New Engl J Med 1995;332:621

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Bariatric Surgery: Weight Regain

Modifications of Resting Energy Expenditure After Sleeve Gastrectomy

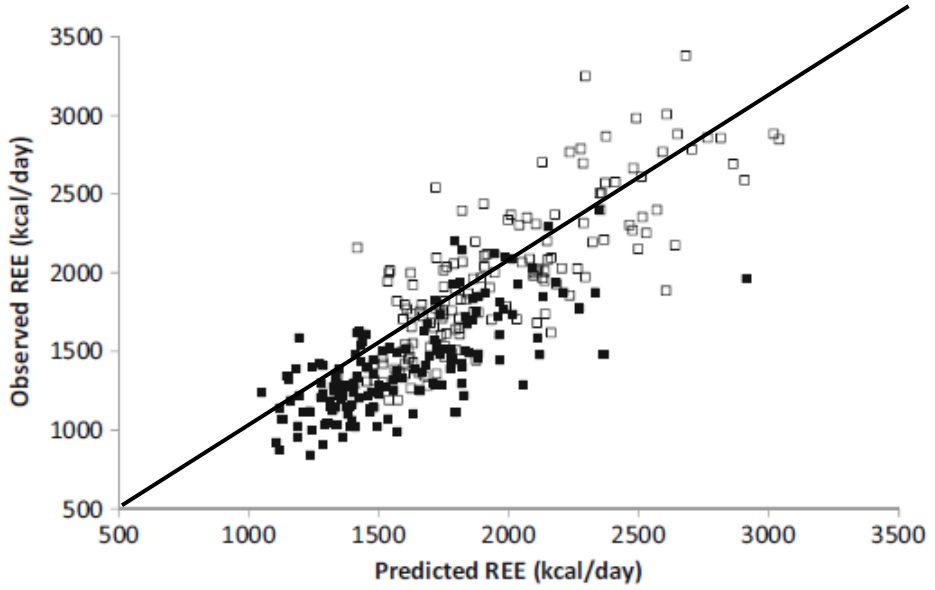

Fig. 1 Distribution of the predicted and observed REE values before (open symbols) and 12 months after sleeve gastrectomy (closed symbols). Most of the observed post-surgery REE values are distributed below the identity line, confirming the existence of a certain degree of metabolic adaptation

METABOLIC ADAPTATION

- 199 ± 238 kcal/day

Bettini S et al. Obes Surg 2018;28:2481

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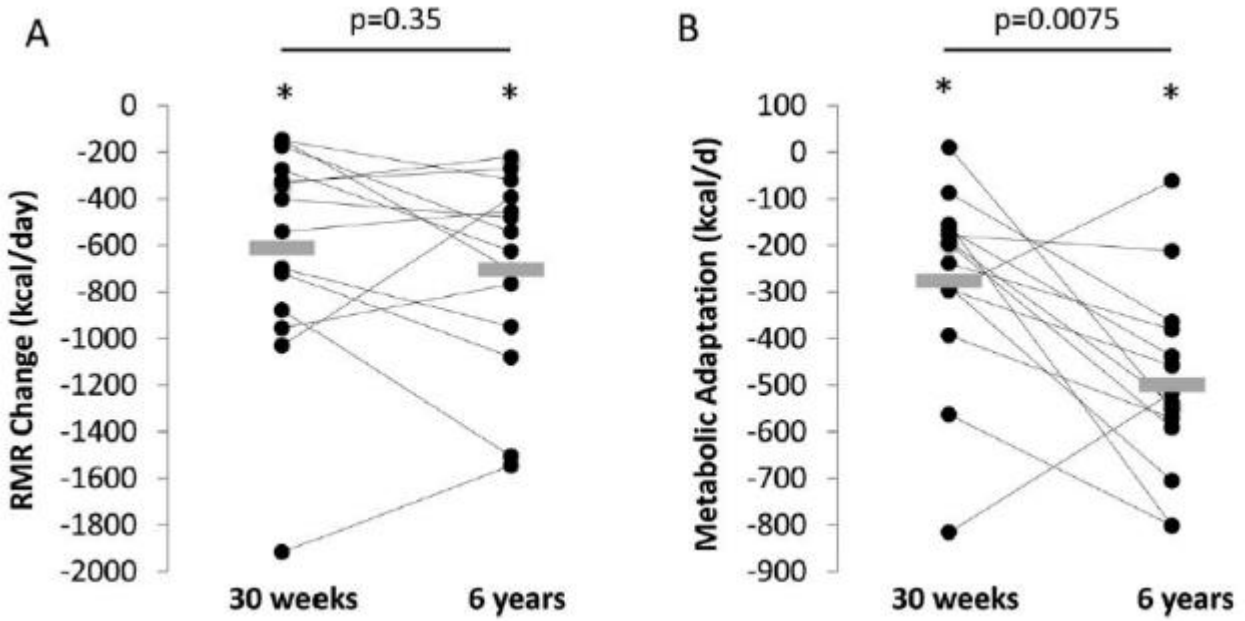

Fothergill et al. Obesity 2016;24:1612-9

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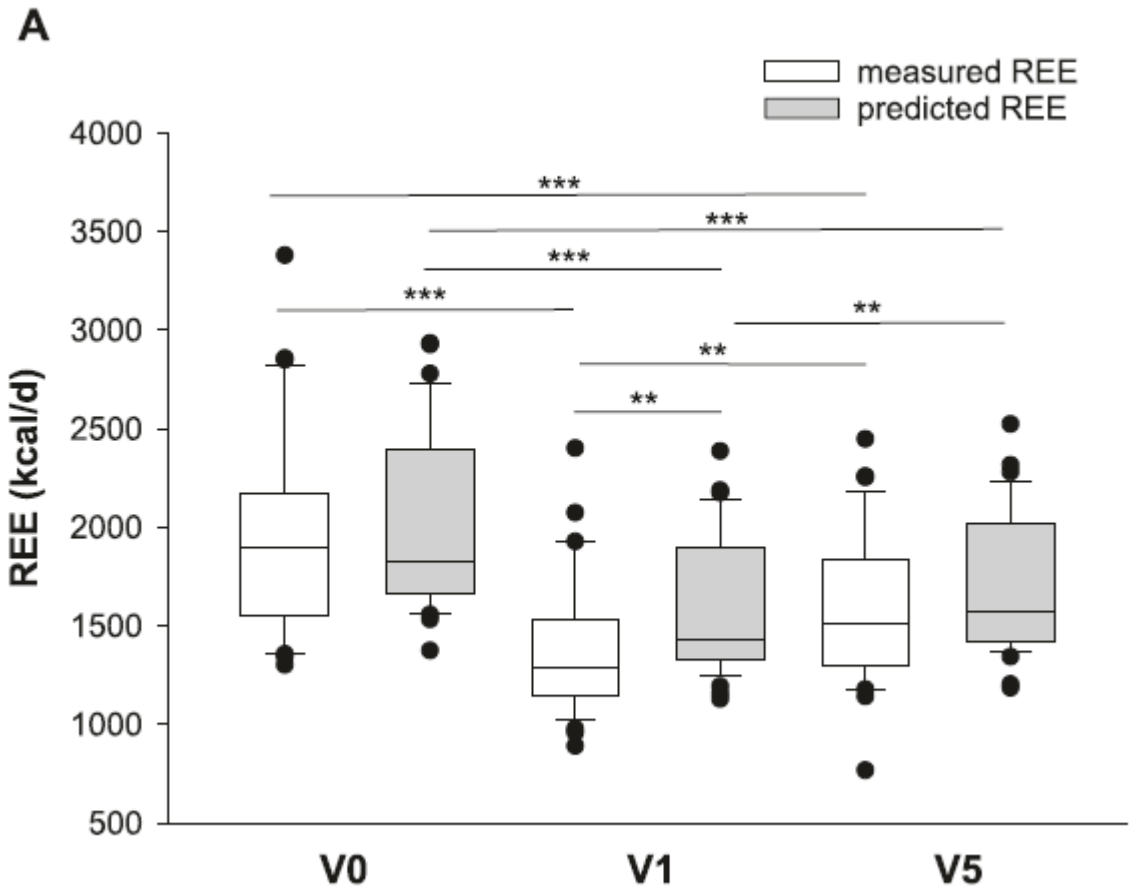
Bariatric Surgery: Weight Regain

Metabolic Slowing Vanished 5 Years After Sleeve Gastrectomy in Patients With Obesity and Prediabetes/ Diabetes



Bettini S et al. JCEM 2022; June 1

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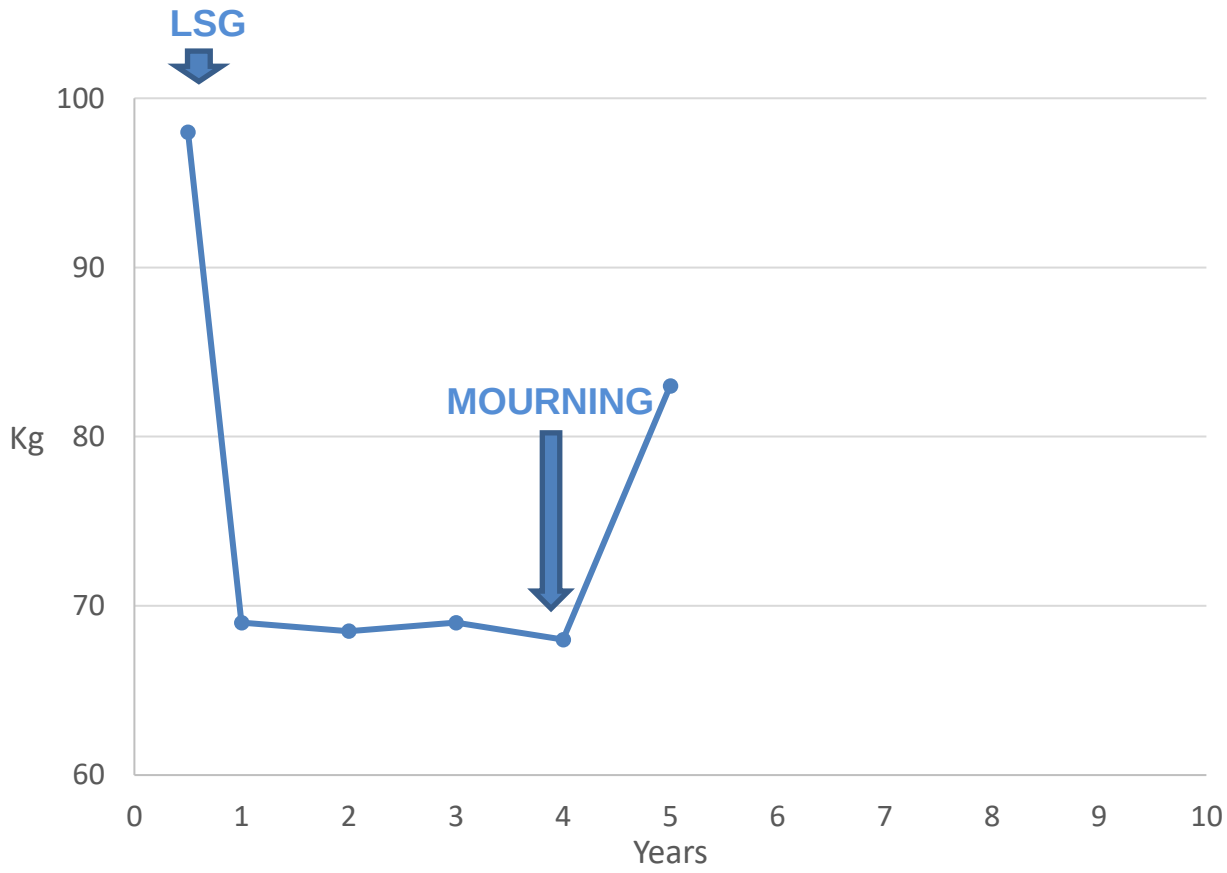
The case of Rosella

Age: 56 years
BMI: 37,3 kg/m^2

T2DM in metformin
Mild depression in the past

Long-standing obesity
Regular eating at meals
Sometimes snacking at home



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Bariatric Surgery: Weight regain

Question 1. What you should perform FIRST for Rosella?

- **Revisional Surgery**
- **Reinforcement of the lifestyle modifications programme**
- **Prescription of an anti-obesity medication**

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Bariatric Surgery: Weight regain

Question 1. What you should perform FIRST for Rosella?

A. Reinforcement of the lifestyle modifications programme

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Bariatric Surgery: Weight regain

Postoperative Behavioral Variables and Weight Change 3 Years After Bariatric Surgery

Table 2. Predicted Year 3% Weight Change for 3 Modifiable Behaviors Together[a]

	Predicted Year 3% Weight Change (SE)			Predicted Difference (95% CI) of Year 3 % Weight Change			*P* Value		
Procedure	Pattern 1	Pattern 2	Pattern 3	Pattern 2 Minus Pattern 1	Pattern 3 Minus Pattern 1	Pattern 3 Minus Pattern 2	Pattern 2 vs Pattern 1	Pattern 3 vs Pattern 1	Pattern 3 vs Pattern 2
RYGB (n = 1513)	−24.6 (1.6)	−33.2 (0.6)	−38.8 (0.8)	−8.6 (−12.8 to −4.3)	−14.2 (−18.7 to −9.8)	−5.7 (−7.8 to −3.5)	<.001	<.001	<.001
LAGB (n = 509)	−7.1 (2.0)	−18.6 (1.2)	−26.4 (1.6)	−11.5 (−17.8 to −5.2)	−19.3 (−25.6 to −13.0)	−7.8 (−11.9 to −3.7)	<.001	<.001	<.001

Abbreviations: LAGB, laparoscopic adjustable gastric banding; RYGB, Roux-en-Y gastric bypass.

[a] The following are the behavior patterns: behavior pattern 1, never self-weighed, always kept eating when full, and always ate continuously; behavior pattern 2, always self-weighed, never kept eating when full, and never ate continuously; and behavior pattern 3, started self-weighing, stopped eating when full, and stopped eating continuously. Never indicates participant reported not doing the behavior at baseline or at any follow-up time; always, participant reported doing the behavior at baseline and at every follow-up time; started, participant reported not doing the behavior at baseline and doing the behavior at every follow-up time; and stopped, participant reported doing the behavior at baseline and not doing the behavior at every follow-up time.

Mitchell JE et al. JAMA Surg 2016;151:752

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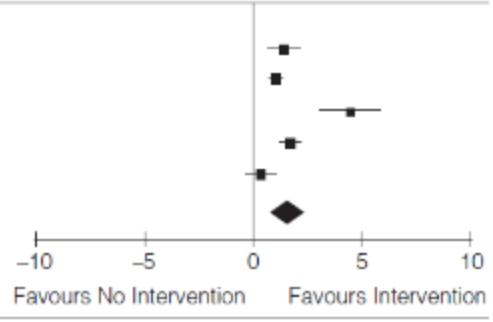
Bariatric Surgery: Weight regain

Post-operative behavioural management in bariatric surgery: a systematic review and meta-analysis of randomized controlled trials

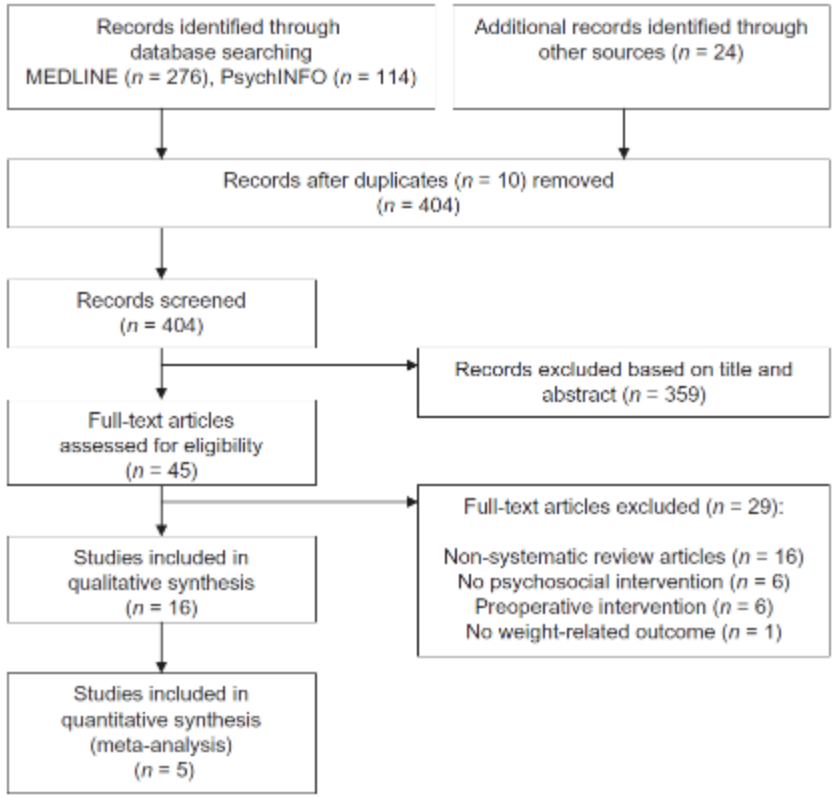
Table 3 Forest plot of standardized mean differences in a random-effects model for percentage of excess weight loss in treatment and control group patients 6–12 months after start of the intervention

Study or subgroup	Intervention			No intervention			Weight	Standardized mean differences IV, random, 95% CI
	M	SD	Total	M	SD	N		
Kalarchian *et al.* (2011) (44)	5.8	3.5	18	0.9	3.2	18	20.1%	1.43 (0.69, 2.17)
Nijamkin *et al.* (2012) (38)	79.6	15.5	72	63.8	14.2	72	23.5%	1.06 (0.71, 1.41)
Papalazarou *et al.* (2010) (41)	76.4	4.1	15	57.5	4.1	15	13.6%	4.49 (3.07, 5.90)
Sarwer *et al.* (2012) (47)	26.1	1.5	41	23.5	1.5	43	22.3%	1.72 (1.21, 2.22)
Tucker *et al.* (1991) (46)	55	15.9	17	48.8	17.9	15	20.5%	0.36 (–0.34, 1.06)
Total (95% CI)			163			163	100.0%	1.60 (0.82, 2.38)

Heterogeneity: $Tau^2 = 0.64$; $Chi^2 = 31.04$, df = 4 ($P < 0.00001$); $I^2 = 87\%$
Test for overall effect: Z = 4.04 ($P < 0.0001$)



CI, confidence interval; df, degrees of freedom; M, mean; N, number of patients; SD, standard deviation.



Rudolph A & Hilbert A. Obes Rev 2013;14:292

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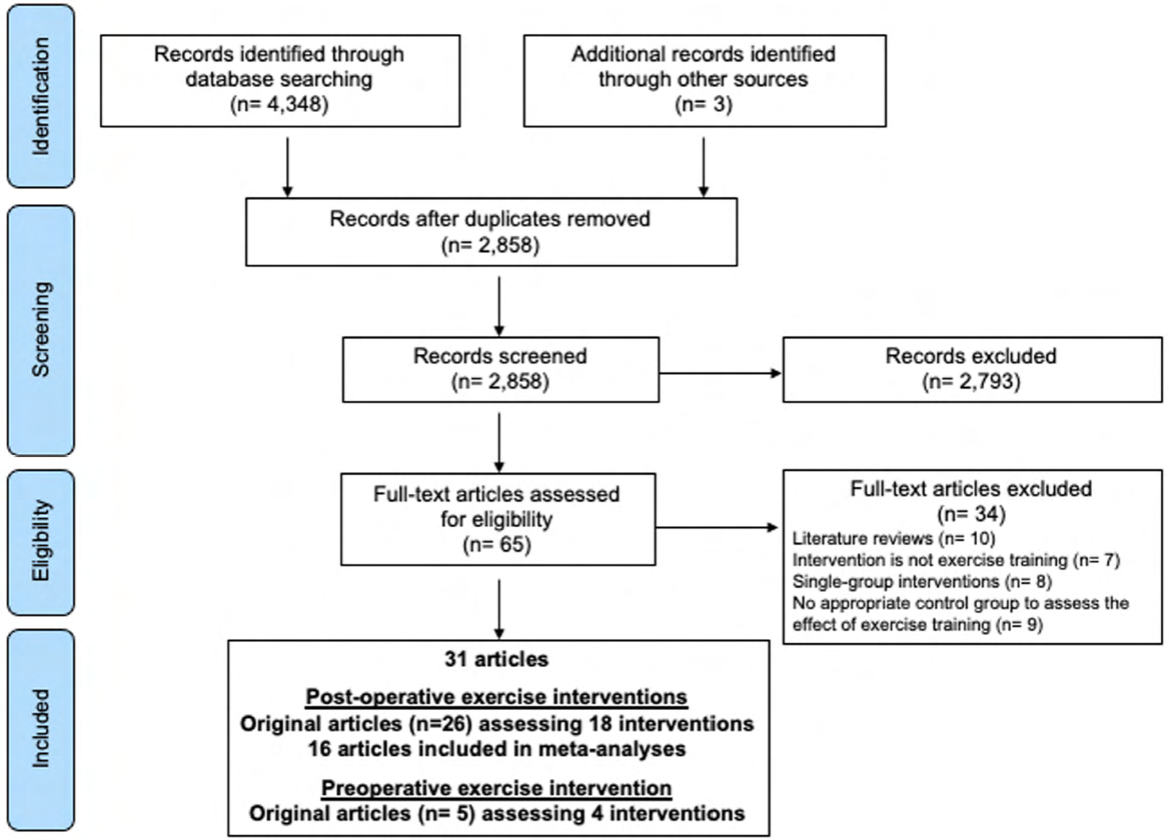
Bariatric Surgery: Weight regain

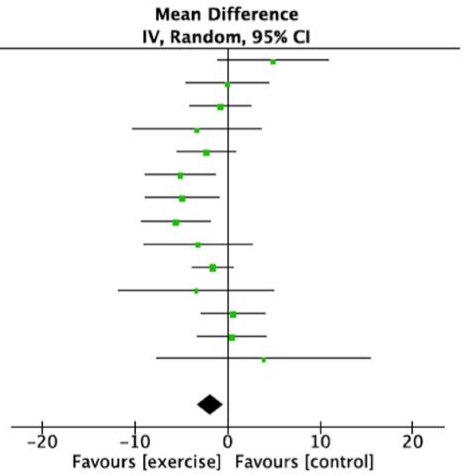
Effect of exercise training before and after bariatric surgery: A systematic review and meta-analysis



(A) Change in body weight (in kg)

Study or Subgroup	Weight	Mean Difference IV, Random, 95% CI
Campanha-Versiani	4.3%	4.90 [-1.10, 10.90]
Castello	6.7%	0.00 [-4.49, 4.49]
Coen (a)	9.9%	-0.80 [-4.06, 2.46]
Coleman	3.4%	-3.28 [-10.21, 3.65]
Daniels	10.3%	-2.30 [-5.45, 0.85]
Hassannejad (a)	8.3%	-5.10 [-8.89, -1.31]
Hassannejad (b)	7.8%	-4.90 [-8.87, -0.93]
Herring	8.7%	-5.60 [-9.26, -1.94]
Huck	4.4%	-3.20 [-9.08, 2.68]
Mundbjerg (a)	14.2%	-1.60 [-3.79, 0.59]
Onofre	2.5%	-3.40 [-11.72, 4.92]
Oppert	9.4%	0.60 [-2.83, 4.03]
Shah	8.6%	0.50 [-3.20, 4.20]
Stegen	1.4%	3.90 [-7.61, 15.41]
Total (95% CI)	**100.0%**	**-1.81 [-3.20, -0.43]**

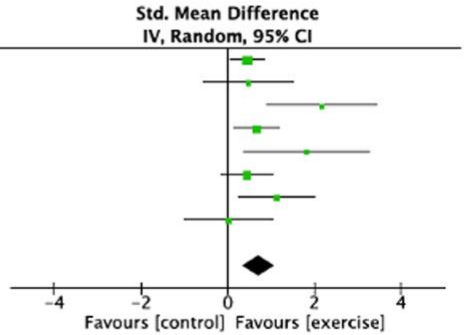
Heterogeneity: $Tau^2 = 2.28$; $Chi^2 = 20.14$, df = 13 (P = 0.09); $I^2 = 35\%$
Test for overall effect: Z = 2.56 (P = 0.01)
95% Prediction Intervals: (-5.4, 1.8)



(A) Change in VO_2max

Study or Subgroup	Weight	Std. Mean Difference IV, Random, 95% CI
Coen (b)	23.5%	0.44 [0.05, 0.84]
Huck	8.7%	0.47 [-0.56, 1.50]
Marchesi	6.3%	2.16 [0.89, 3.43]
Mundbjerg (b)	19.3%	0.66 [0.14, 1.18]
Onofre	5.1%	1.82 [0.38, 3.26]
Oppert	17.2%	0.45 [-0.14, 1.04]
Shah	10.9%	1.13 [0.25, 2.01]
Stegen	8.9%	0.02 [-0.99, 1.04]
Total (95% CI)	**100.0%**	**0.70 [0.35, 1.06]**

Heterogeneity: $Tau^2 = 0.10$; $Chi^2 = 12.09$, df = 7 (P = 0.10); $I^2 = 42\%$
Test for overall effect: Z = 3.89 (P < 0.0001)



Bellicha A et al. Obes Rev 2021;22(S4):e13296

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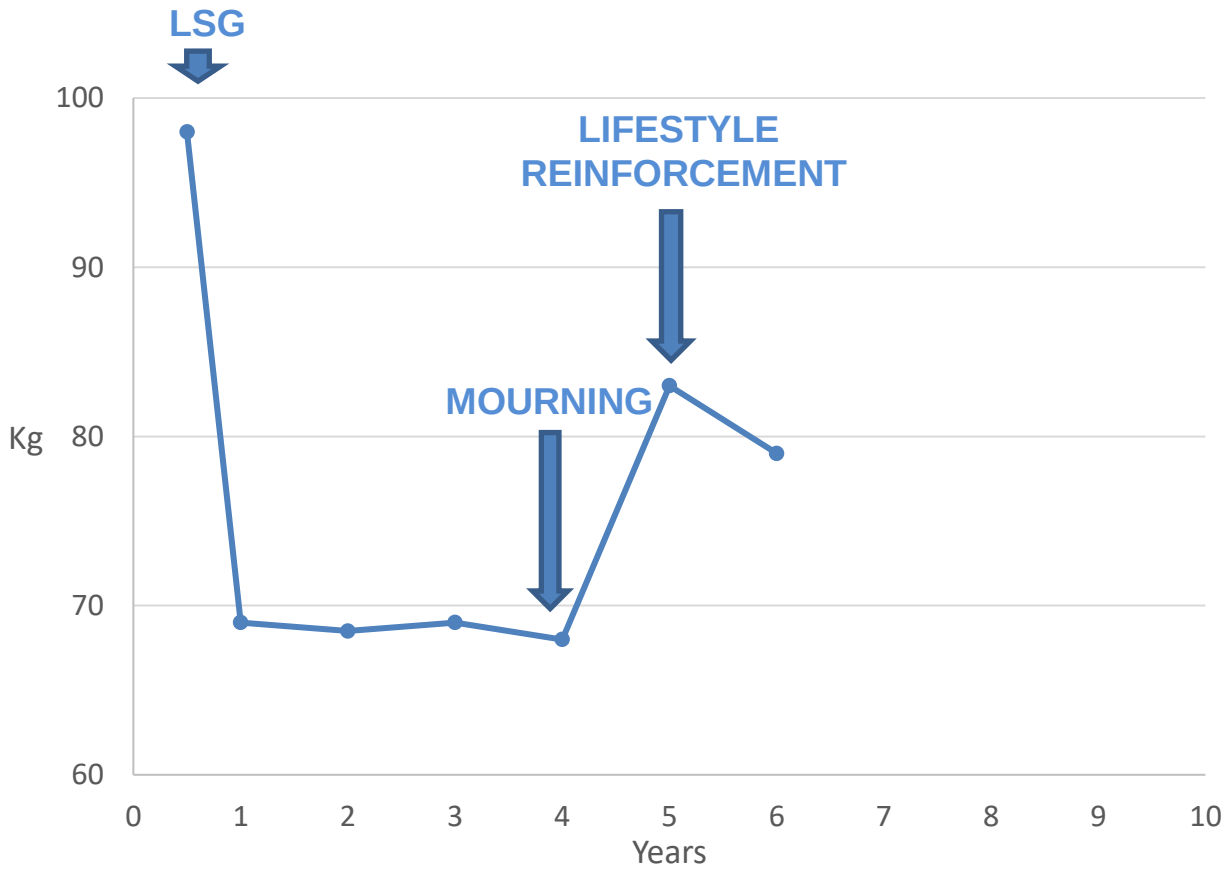
The case of Rosella



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Bariatric Surgery: Weight regain

Question 2. What you should perform SECOND for Rosella?

A. Reinforcement of the lifestyle modifications programme

- **Revisional Surgery**
- **Prescription of an anti-obesity medication**

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Bariatric Surgery: Weight regain

Question 2. What you should perform SECOND for Rosella?

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B. Prescription of an anti-obesity medication

- **Revisional Surgery**

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Bariatric Surgery: Weight regain

The utility of weight loss medications after bariatric surgery for weight regain or inadequate weight loss: A multi-center study

Methods

We completed a restrospective study to identify patients who had undergone bariatric surgery in the form of a Roux-en-Y gastric bypass (RYGB) or a sleeve gastrectomy from 2000–2014. From this cohort, we identified patients who were placed on weight loss pharmacotherapy postoperatively for inadequate weight loss or weight regain. We extracted key demographic data, medical history, and examined weight loss in response to surgery and after the initiation of weight loss pharmacotherapy.

Results

A total of 319 patients (RYGB = 258; sleeve gastrectomy = 61) met inclusion criteria for analysis. More than half (54%; n = 172) of all study patients lost≥5% (7.2 to 195.2 lbs) of their total weight with medications after surgery. There were several high responders with 30.3% of patients (n = 96) and 15% (n = 49) losing≥10% (16.7 to 195.2 lbs) and≥15% (25 to 195.2 lbs) of their total weight, respectively.

Stanford FM et al. SOARD 2017;13:491

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Bariatric Surgery: Weight regain

Efficacy of adjuvant weight loss medication after bariatric surgery

Prescribed weight loss medications

Weight loss medication	Dosage	
		209 pts
Phentermine	• 37.5 mg daily for 3 mo at a time	**156 pts (74.6%)**
Phentermine/ Topiramate ER	• 3.75 mg/23 mg daily for 14 d followed by • 7.5 mg/46 mg daily maintenance dose And • This dose was increased to the intermediate dose of 11.25 mg/69 mg (if the patient did not lose about 5% weight in 12 weeks) And • Titration to the full dosage of 15 mg/92 mg (if patients did not achieve 5% weight loss with the previous dose)	**25 pts (12.0%)**
Lorcaserin	• 10 mg twice daily	**18 pts (8.6%)**
Naltrexone SR/ Bupropion SR	• 8 mg/90 mg daily titrated to a full dose of 32 mg/360 mg by increasing weekly until on the full dose after 4 wk	**10 pts (4.8%)**

Topiramate ER = topiramate extended-release; Naltrexone SR/Bupropion SR = naltrexone sustained-release/bupropion sustained-release.

Hanipah ZN et al. SOARD 2018;14:93-98

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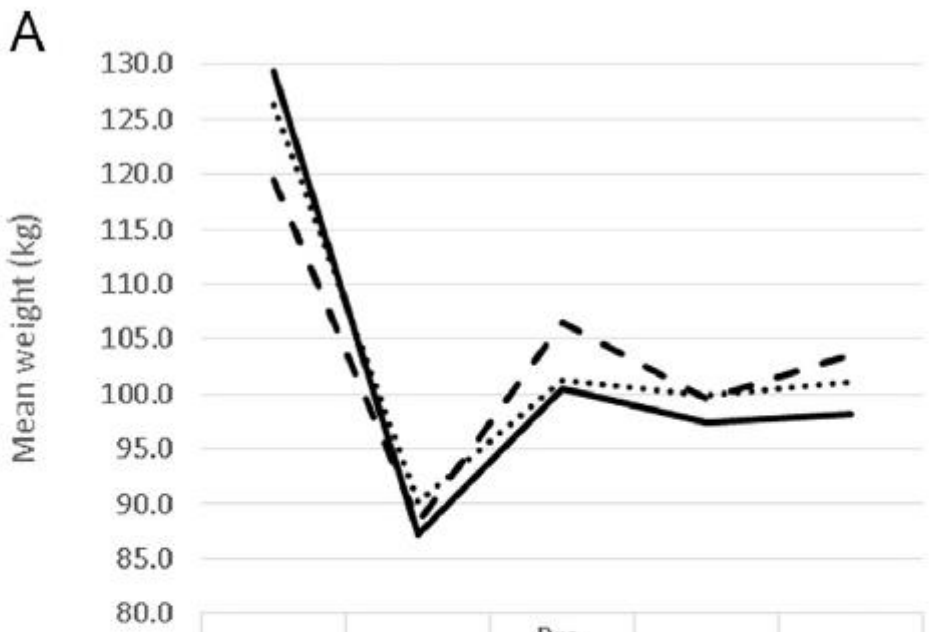
Bariatric Surgery: Weight regain

Efficacy of adjuvant weight loss medication after bariatric surgery



	Pre-surgery	Nadir	Pre-pharmacotherapy	3-month	12-month
LAGB	119.5	88.3	106.5	99.6	103.6
RYGB	129.3	87.2	100.5	97.4	98.2
SG	126.3	90.1	101.2	99.9	101.1

Hanipah ZN et al. SOARD 2018;14:93-98

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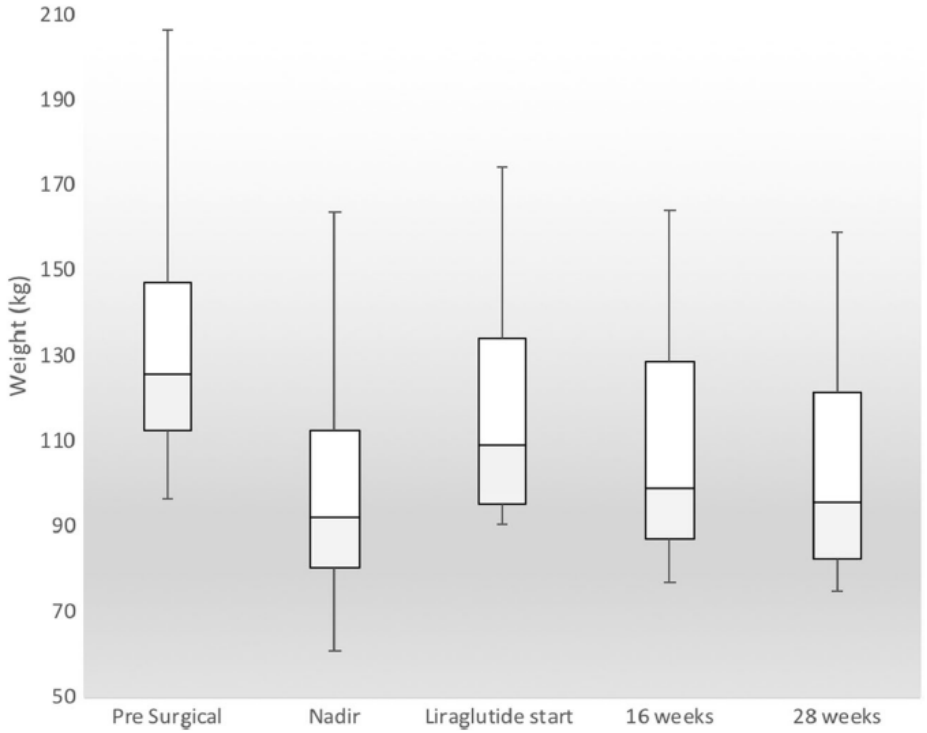
Bariatric Surgery: Weight regain

Efficacy of High-Dose Liraglutide as an Adjunct for Weight Loss in Patients with Prior Bariatric Surgery

Fig. 2 Median weight at each point of interest. Box and whisker plot of median patient weight pre-surgery (126.25 kg), nadir (92.45 kg), prior to starting liraglutide (109.55 kg), after 16 weeks of liraglutide (99.4 kg), and after 28 weeks of liraglutide (95.9 kg). Bottom and top of box represent the first and third quartiles, respectively. The ends of the whiskers represent the minimum and maximum of the data



Rye P et al. Obes Surg 2018;28:3553

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Bariatric Surgery: Weight regain

Liraglutide 3.0 mg for the management of insufficient weight loss or excessive weight regain post-bariatric surgery

TABLE 1 Patient characteristics by type of bariatric surgery

Variable	Roux-en-Y bypass	Gastric band	Gastric sleeve
Sample size (n)	53	50	14
Age (y)	49.9 ± 9.1	52.5 ± 9.5	51.4 ± 10.3
Men (n, %)	3 (5.7)[a]	8 (16.0)	4 (28.6)
Pre-bariatric surgery BMI (kg/m^2)	50.8 ± 11.2	47.6 ± 13.1[e]	52.2 ± 11.9
Maximum weight change post-bariatric surgery (kg)	−51.6 ± 23.5[a,b]	−29.8 ± 23.3[e]	−34.7 ± 19.5
Weight change from lowest post-bariatric surgery weight to initiation of liraglutide 3.0 mg (kg)	19.0 ± 13.5	25.4 ± 20.4[e]	15.8 ± 14.1
Weight change from lowest post-bariatric surgery weight to initiation of liraglutide 3.0 mg (%)[c]	44.8 ± 54.9[a]	80.0 ± 79.7[f]	48.4 ± 31.7[g]
Preliraglutide BMI (kg/m^2)	39.0 ± 7.0[a,b]	45.4 ± 11.0	45.4 ± 9.6
Weight change on liraglutide 3.0 mg (kg)	−7.1 ± 8.7[d]	−6.0 ± 7.2[d]	−4.5 ± 4.5[d]
Weight change on liraglutide 3.0 mg (%)	−6.6 ± 7.1	−4.9 ± 5.6	−3.6 ± 3.0
Attained 5% weight loss (n, %)	25 (47.2)	19 (38.0)	5 (35.7)
Attained 10% weight loss (n, %)	13 (24.5)[a]	6 (12.0)	0 (0.0)
Treatment time (mo)	8.0 ± 7.6	6.8 ± 6.7	8.6 ± 7.3
Reported nausea with liraglutide 3.0 mg (n, %)	15 (28.3)	12 (24.0)	5 (35.7)

Wharton S et al. Clin Obes 2019;9:e12323

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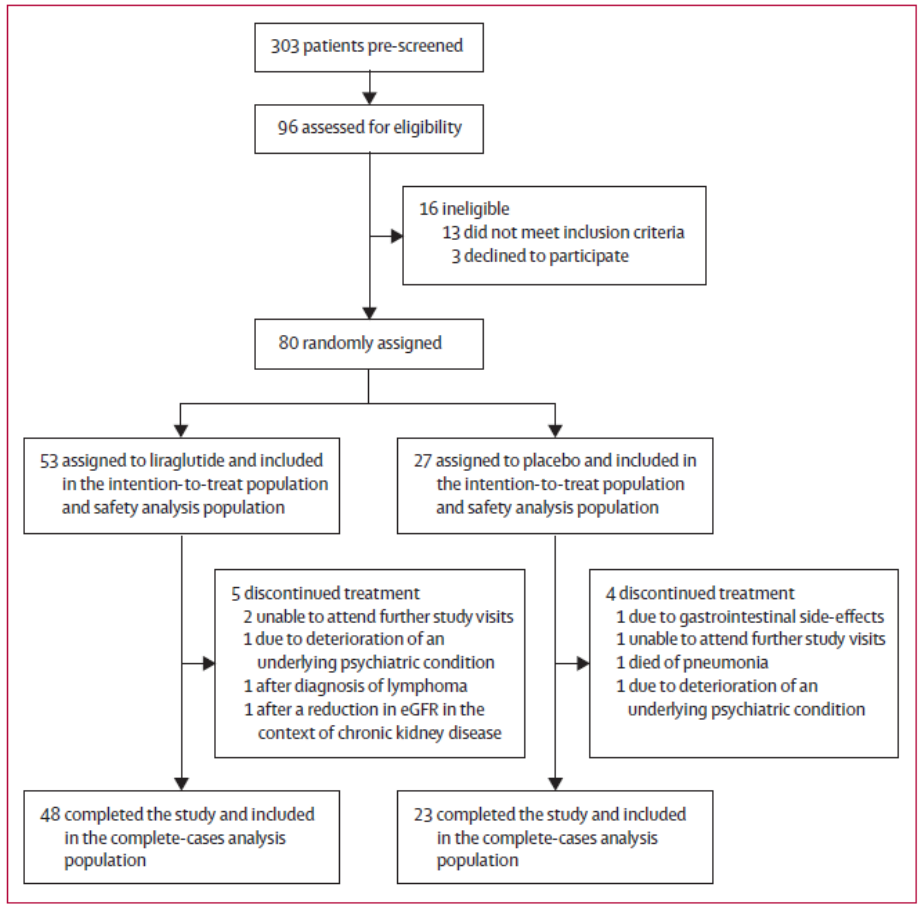
Bariatric Surgery: Weight regain



Adjunctive liraglutide treatment in patients with persistent or recurrent type 2 diabetes after metabolic surgery (GRAVITAS): a randomised, double-blind, placebo-controlled trial

Miras AD et al. Lancet Diabetes Endocrinol 2019;7:549

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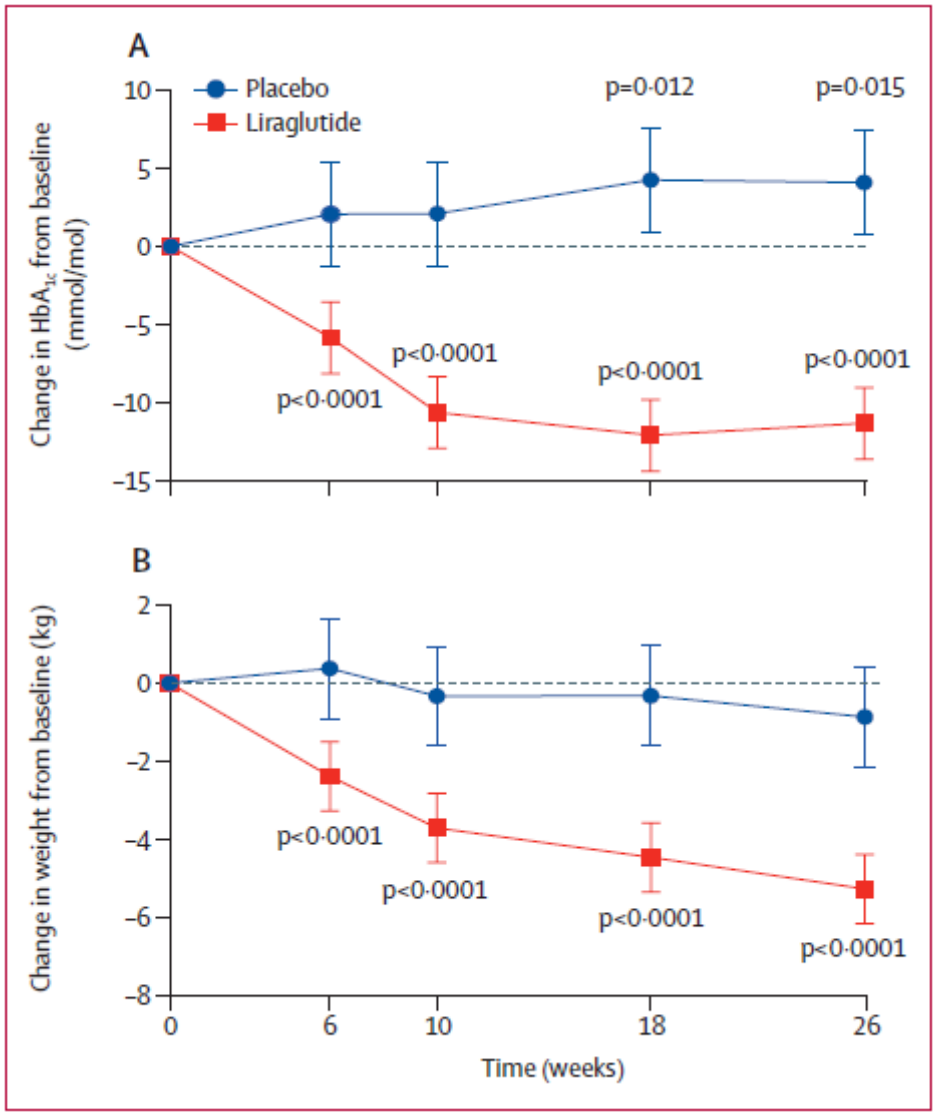

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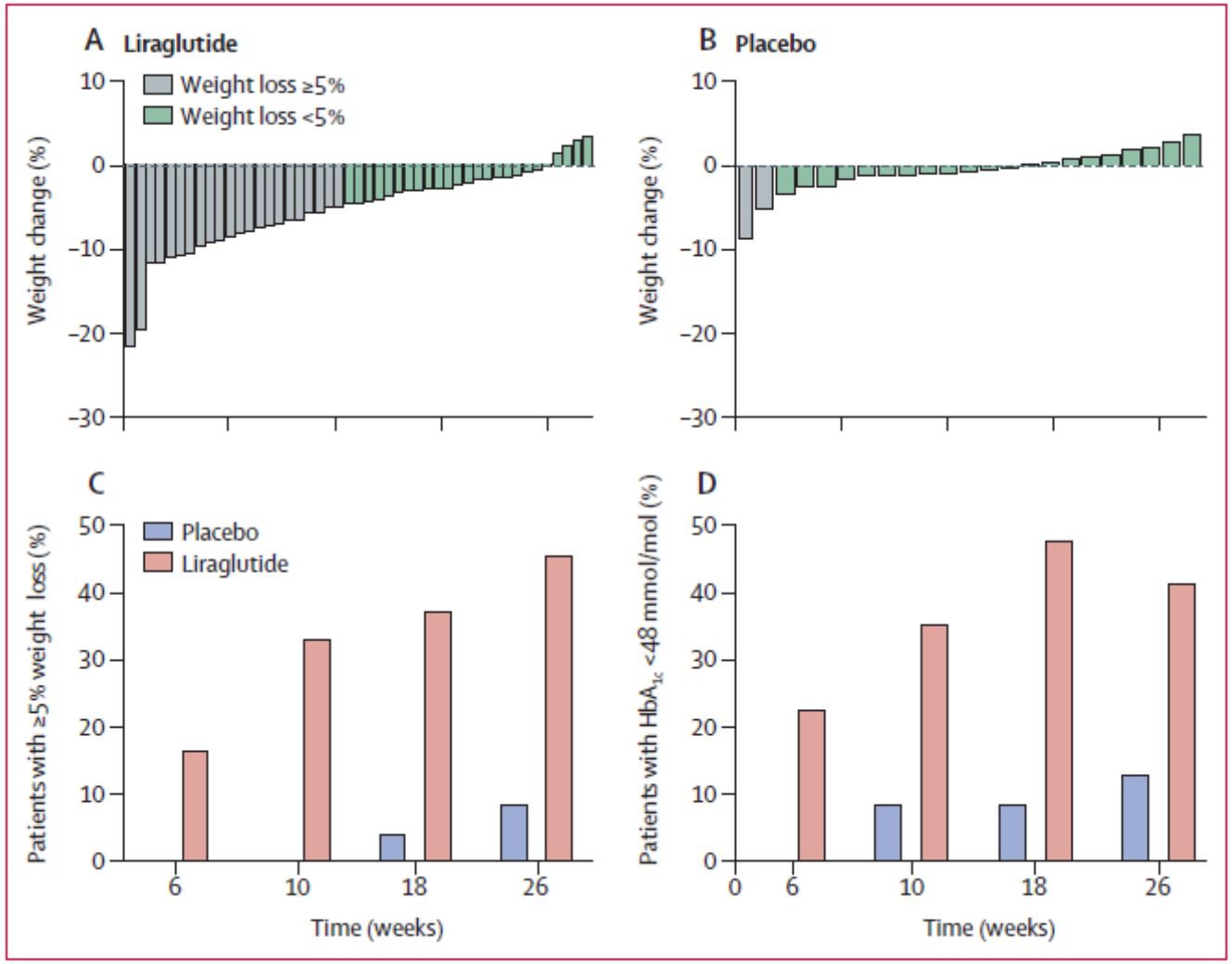

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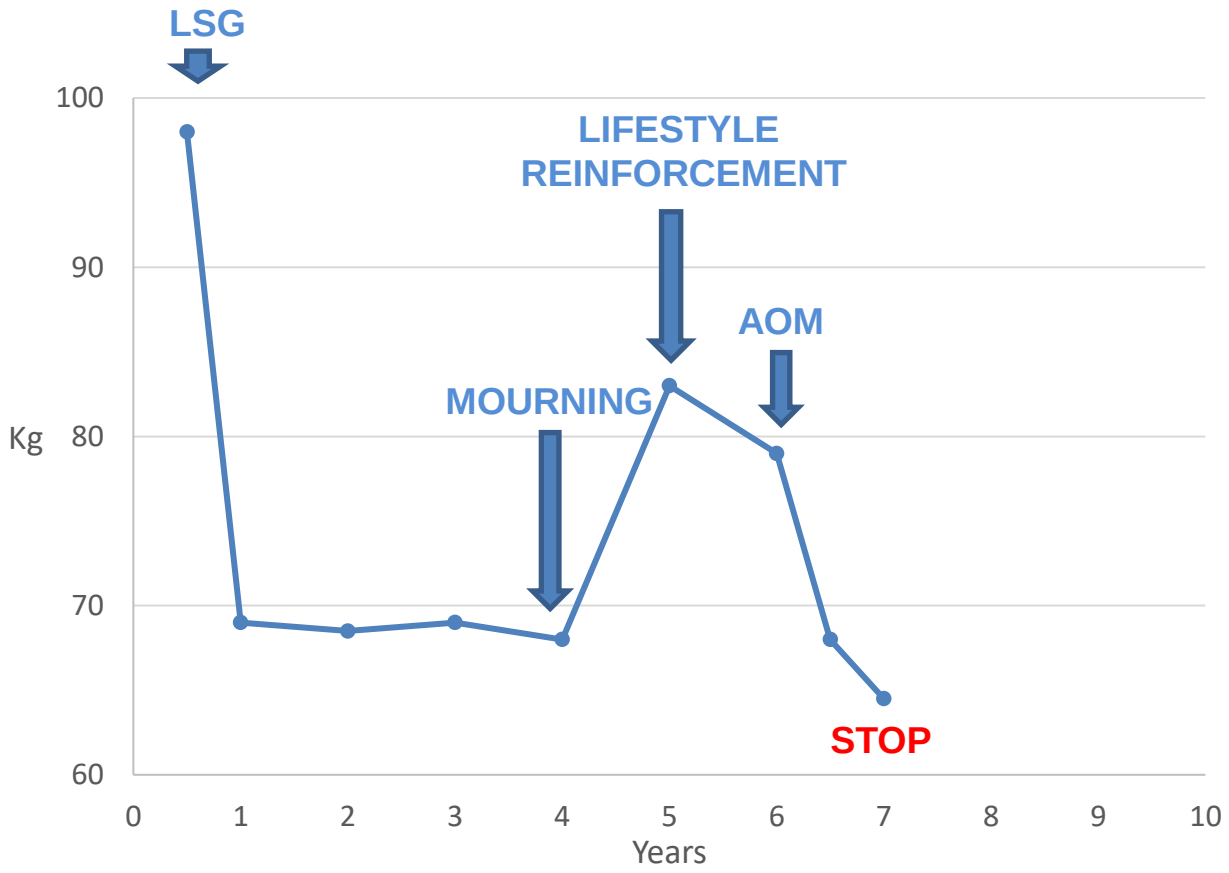

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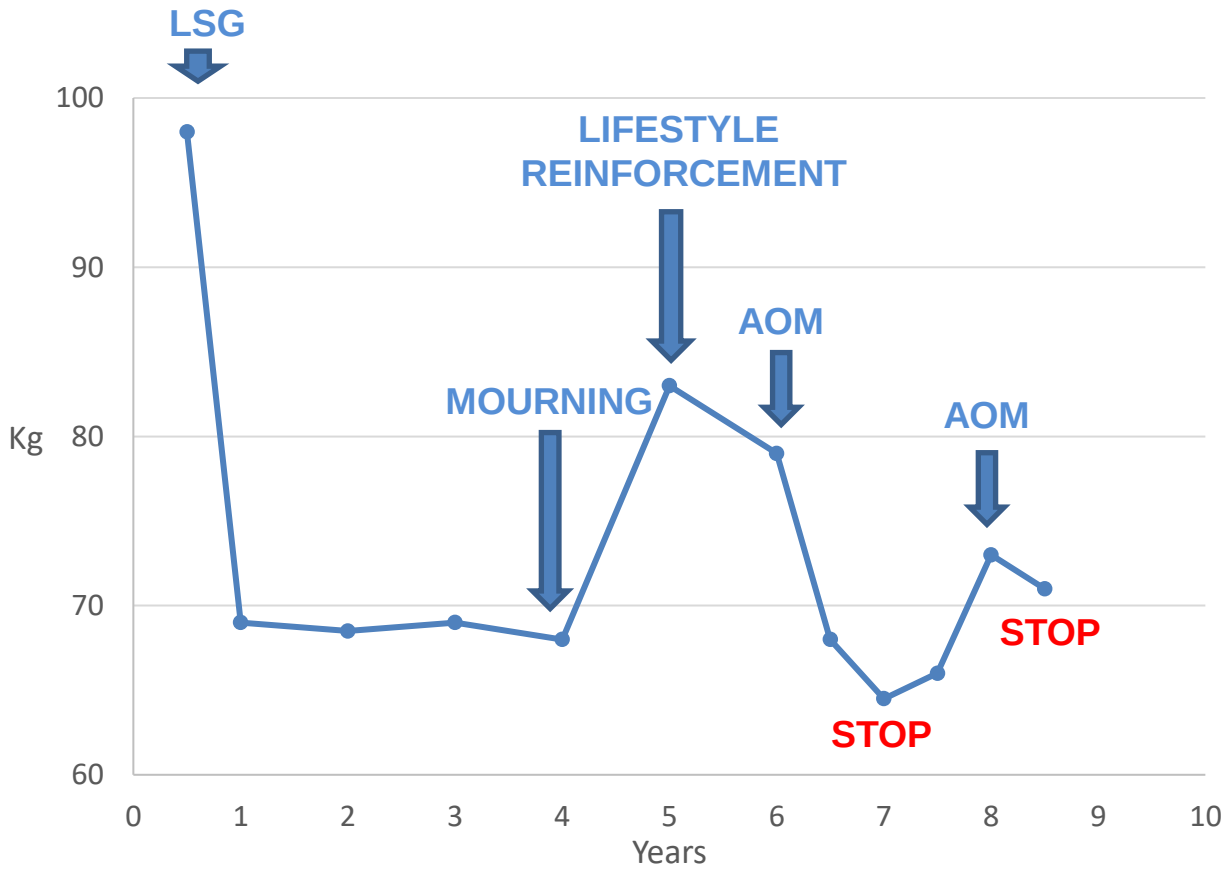
for the Study of Obesity

The case of Rosella



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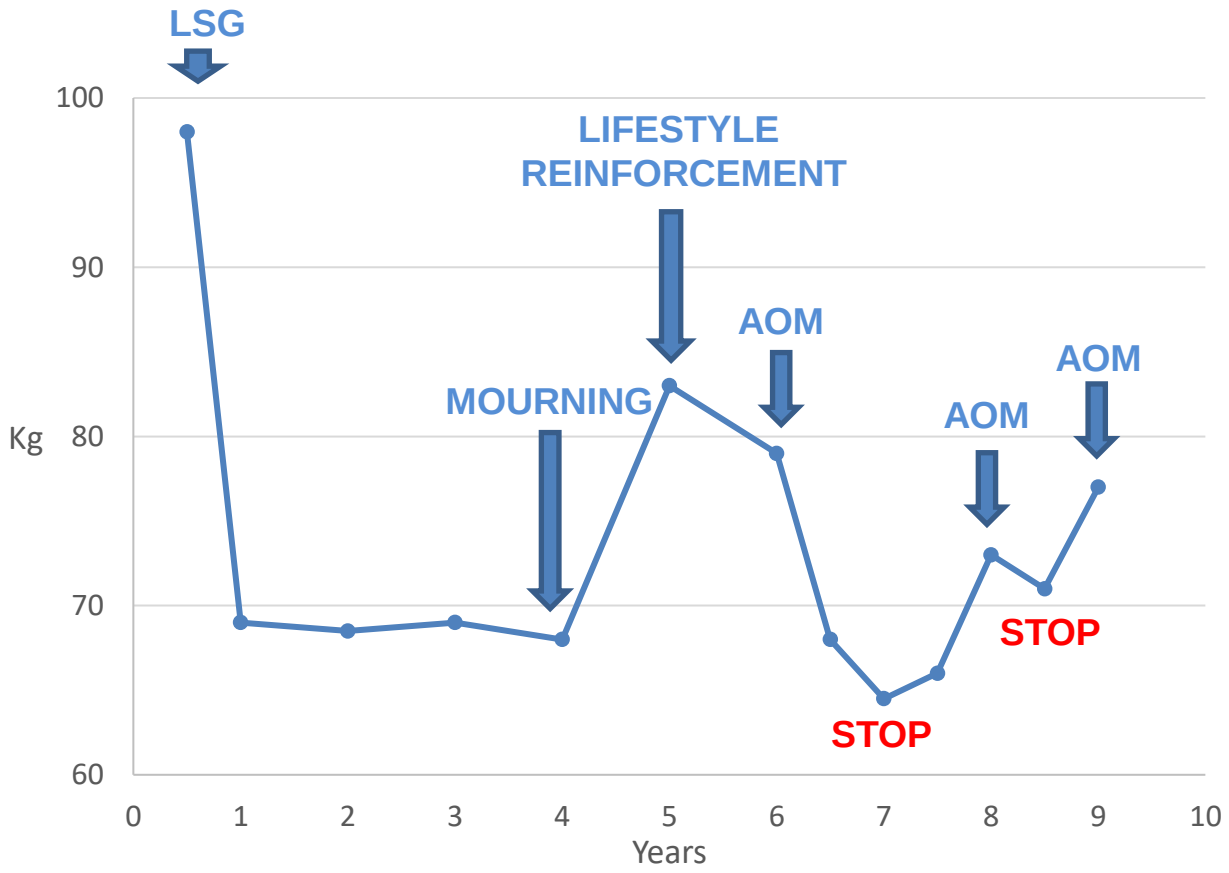

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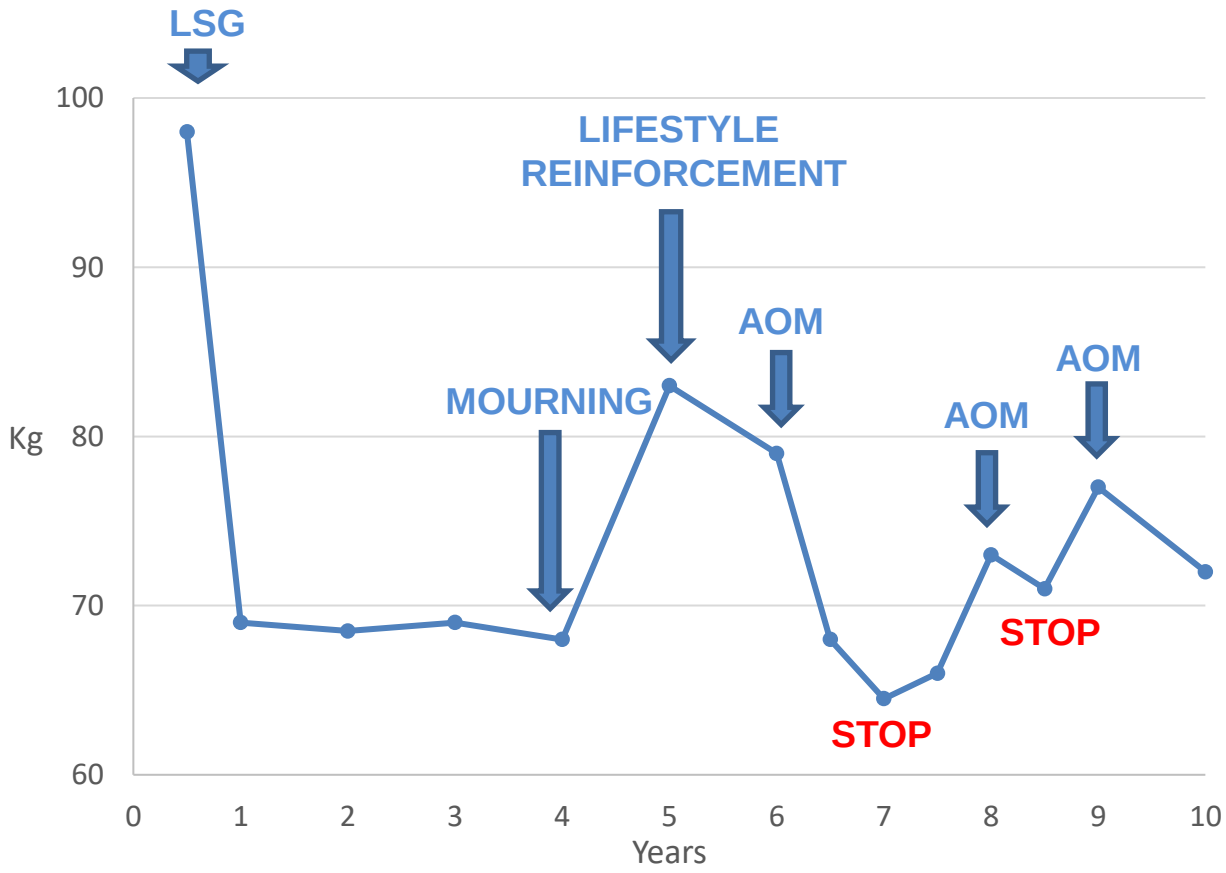

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Bariatric Surgery: Weight regain

What you should perform for Rosella?

A. Reinforcement of the lifestyle modifications programme

B. Prescription of an anti-obesity medication

C. Revisional Surgery

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Bariatric Surgery: Weight regain

IFSO Worldwide Survey 2016: Primary, Endoluminal, and Revisional Procedures

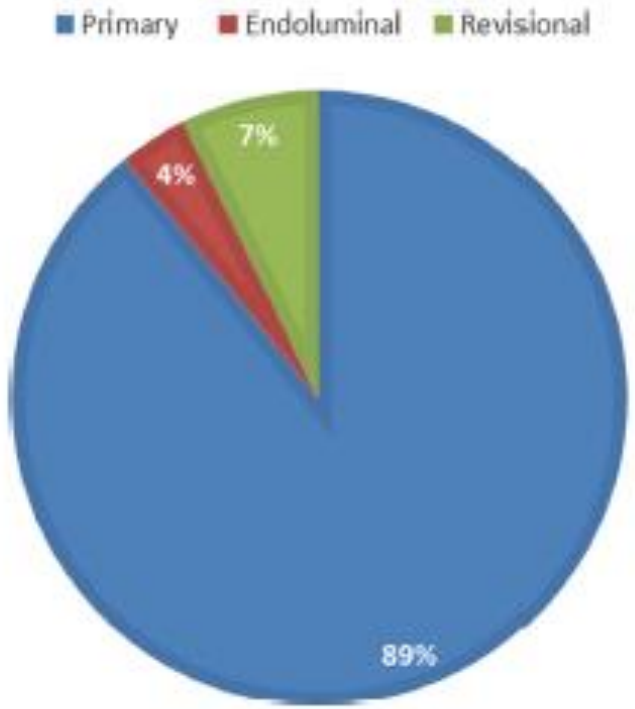

Fig. 8 The number of endoluminal, primary, and revisional procedures

Angrisani L et al. Obes Surg 2018

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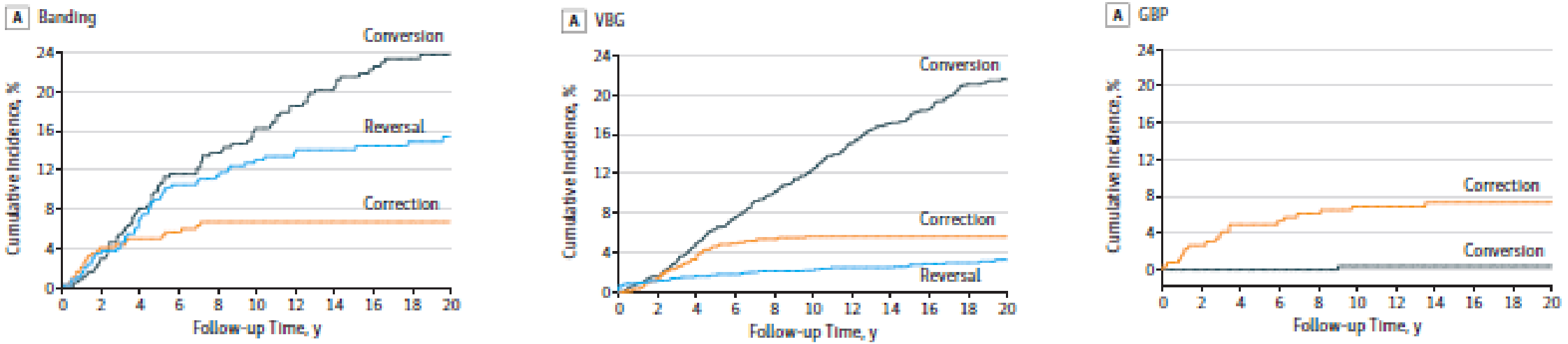
Bariatric Surgery: Weight regain

Reoperations After Bariatric Surgery in 26 Years of Follow-up of the Swedish Obese Subjects Study



Hjorth S et al. JAMA Surg 2019;154:319

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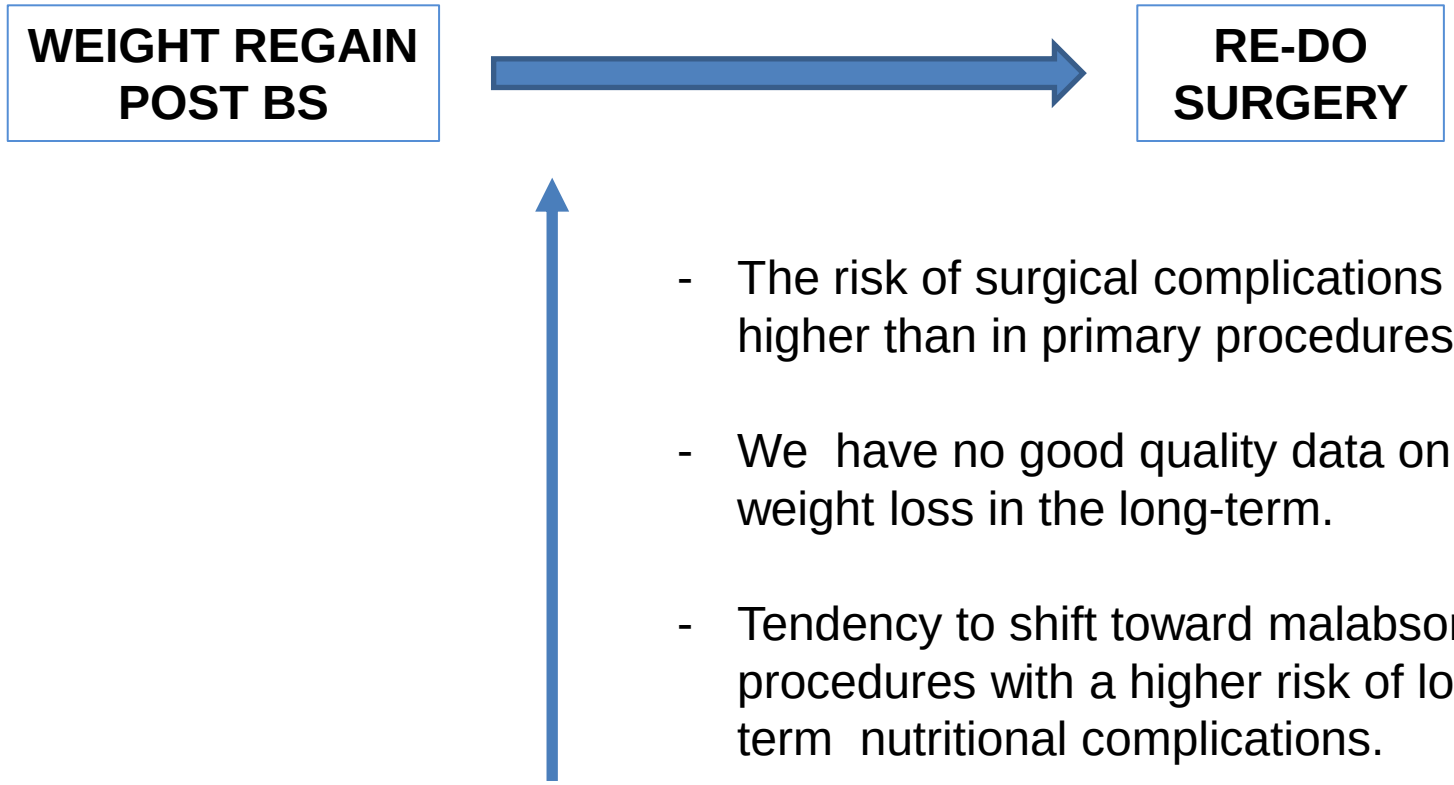
Bariatric Surgery: Weight regain



- The risk of surgical complications is higher than in primary procedures.
- We have no good quality data on weight loss in the long-term.
- Tendency to shift toward malabsorptive procedures with a higher risk of long-term nutritional complications.

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Bariatric Surgery: Weight regain

Clinical practice guidelines of the European Association for Endoscopic Surgery (EAES) on bariatric surgery: update 2020 endorsed by IFSO-EC, EASO and ESPCOP

Table 1 Summary of recommendations

Revisional surgery	No evidence-based criteria for indication to revisional bariatric/metabolic surgery are available to date The panel advises that the clinical decision to proceed to revisional bariatric/metabolic surgery be based on a complete multidisciplinary assessment of the patient, as recommended for the primary procedure	Position statement

Di Lorenzo N et al. Surg Endoscopy 2020;34:2332.

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Bariatric Surgery: Weight regain

Practical Recommendations of the Obesity Management Task Force of the European Association for the Study of Obesity for the Post-Bariatric Surgery Medical Management

Obesity Facts
The European Journal of Obesity
Obes Facts 2017;10:597–632

Table 14. List of graded clinical practical recommendations on weight regain prevention and management after bariatric surgery

Recommendations	Level of evidence	Grade of recommendation*
Weight regain after bariatric surgery is a result of hormonal and metabolic alterations, surgical failure, nutritional non-adherence, mental health issues and physical inactivity.	3	D
Enforcing and sustaining healthy lifestyle facilitates weight regain prevention.	3	D
Adding anti-obesity drugs and/or re-do operations may halt weight regain or create further weight loss when applied at optimal timing.	3	D

Busetto L et al. Obes Facts 2017;10:597

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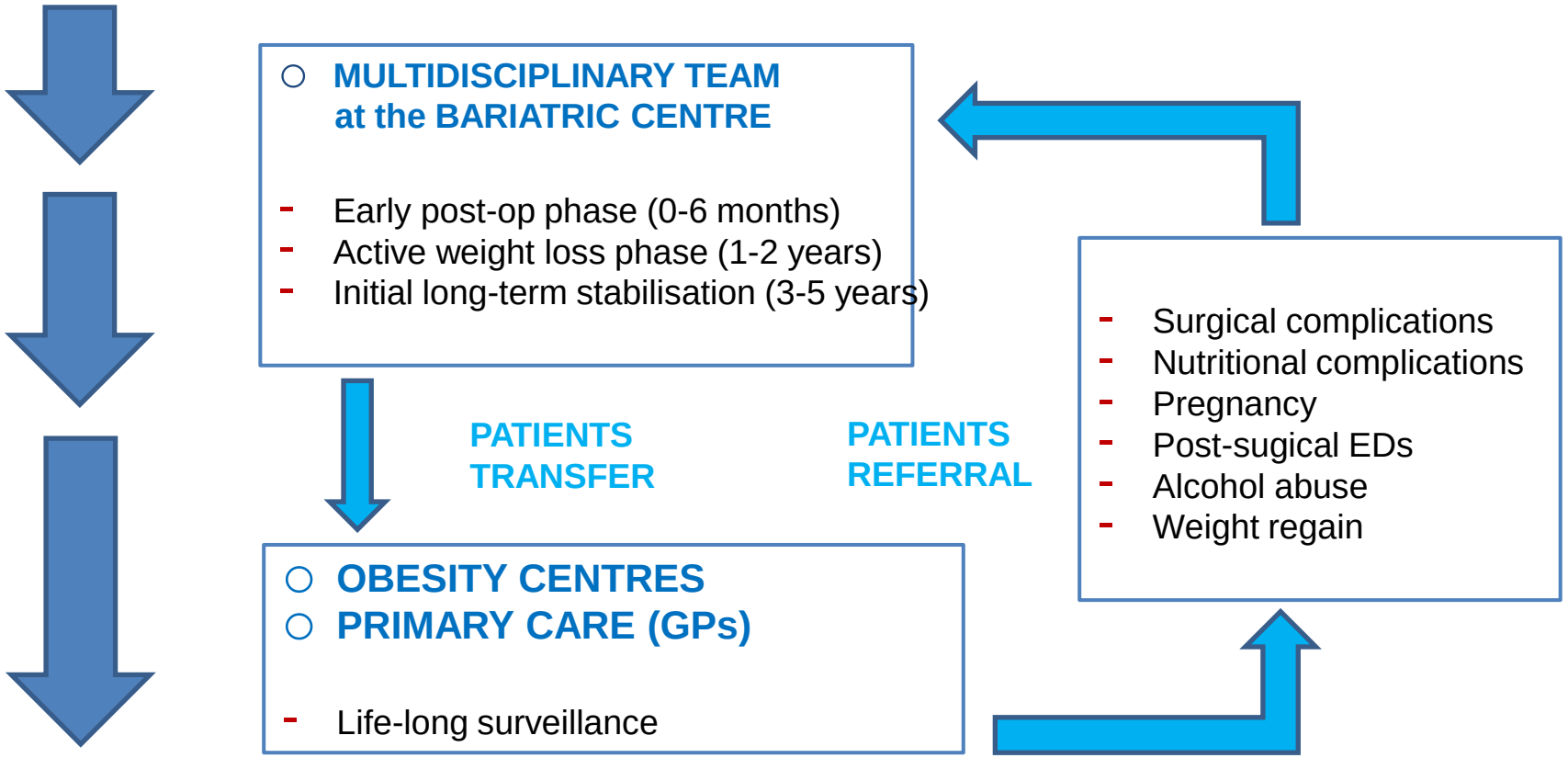
Post-bariatric surgery follow-up

A proposal for a network-based bariatric follow-up



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Post-bariatric surgery follow-up

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Grazie !!!

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