

Bariatric Surgery and Post Surgery Care

**2022 EASO Obesity Masterclass Summer School
Les Pensieres of the Fondation Merieux
Annecy 11-15 July, 2022**



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Bariatric Surgery & Post Surgery Care

Luca Busetto – Disclosures

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

Bariatric Surgery & Post Surgery Care

TOPICS

- Indications / contraindications
- Long-term results on body weight and comorbidities
- Choice of the surgical procedure
- Post Surgery Care

Bariatric Surgery & Post Surgery Care

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Bariatric Surgery: Indications

Table 2. A guide to deciding the initial level of intervention to discuss with the patient

BMI, kg/m ² *	WC, cm*		Co-morbidities
	men < 94, women < 80	men ≥ 94, women ≥ 80	
25.0–29.9	L	L	L ± D
30.0–34.9	L	L ± D	L ± D ± S**
35.0–39.9	L ± D	L ± D	L ± D ± S
≥40.0	L ± D ± S	L ± D ± S	L ± D ± S

L = Lifestyle intervention (diet and physical activity); D = consider drugs; S = consider surgery.

*BMI and waist circumference cut-off points are different for some ethnic groups.

**Patients with type 2 diabetes on individual basis.

European Guidelines for Obesity Management in Adults

Volkan Yumuk^a Constantine Tsigos^b Martin Fried^c
Karin Schindler^d Luca Busetto^e Dragan Micic^f
Hermann Toplak^g for the Obesity Management Task Force of
the European Association for the Study of Obesity

Bariatric Surgery: Contraindications

Interdisciplinary European Guidelines on Metabolic and Bariatric Surgery

Martin Fried^a Volkan Yumuk^b Jean-Michel Oppert^c Nicola Scopinaro^d
Antonio J. Torres^e Rudolf Weiner^f Yuri Yashkov^g Gema Frühbeck^h

Contraindications Specific for Bariatric Surgery

1. Absence of a period of identifiable medical management.
2. Patient who is unable to participate in prolonged medical follow-up.
3. Non-stabilized psychotic disorders, severe depression, personality and eating disorders, unless specifically advised by a psychiatrist experienced in obesity.
4. Alcohol abuse and/or drug dependencies.
5. Diseases threatening life in the short term.
6. Patients who are unable to care for themselves and have no long-term family or social support that will warrant such care.

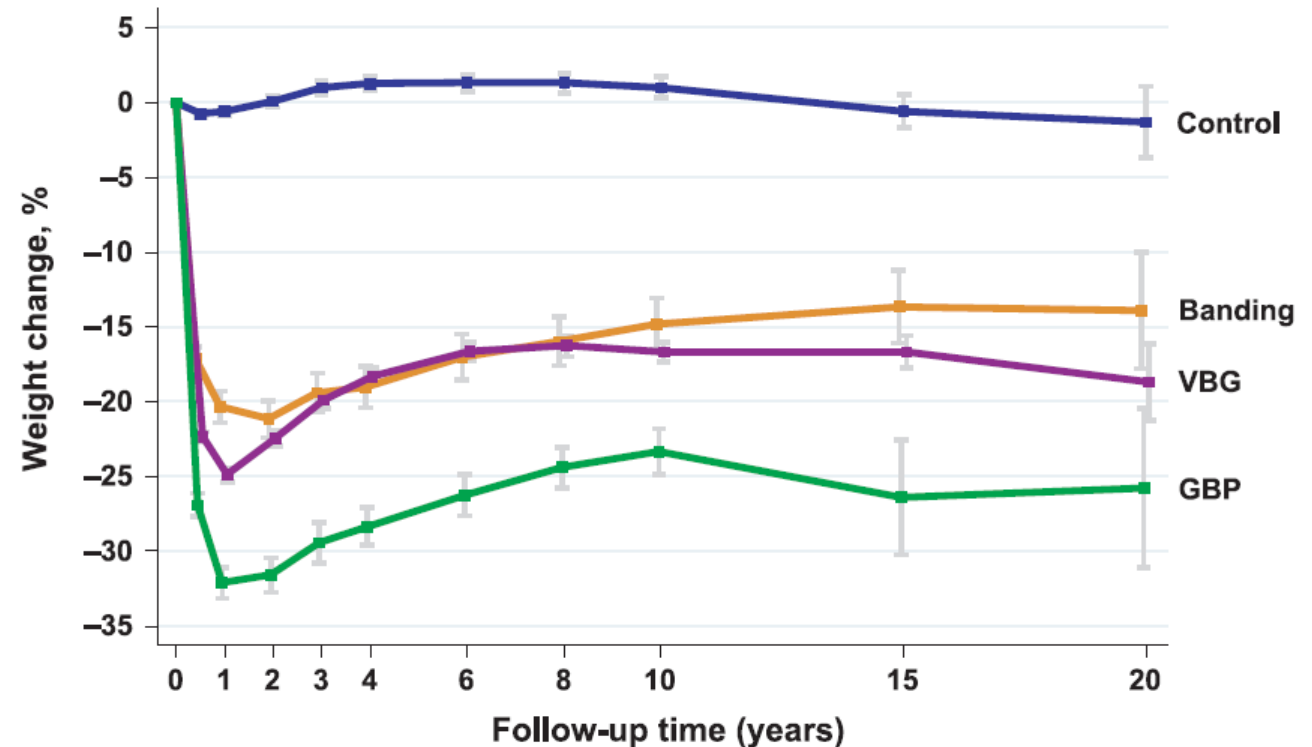
Bariatric Surgery & Post Surgery Care

TOPICS

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- **Long-term results on body weight and comorbidities**
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Bariatric Surgery: Long-term results

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



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

Sjöström L. J Int Med 2013;273:219

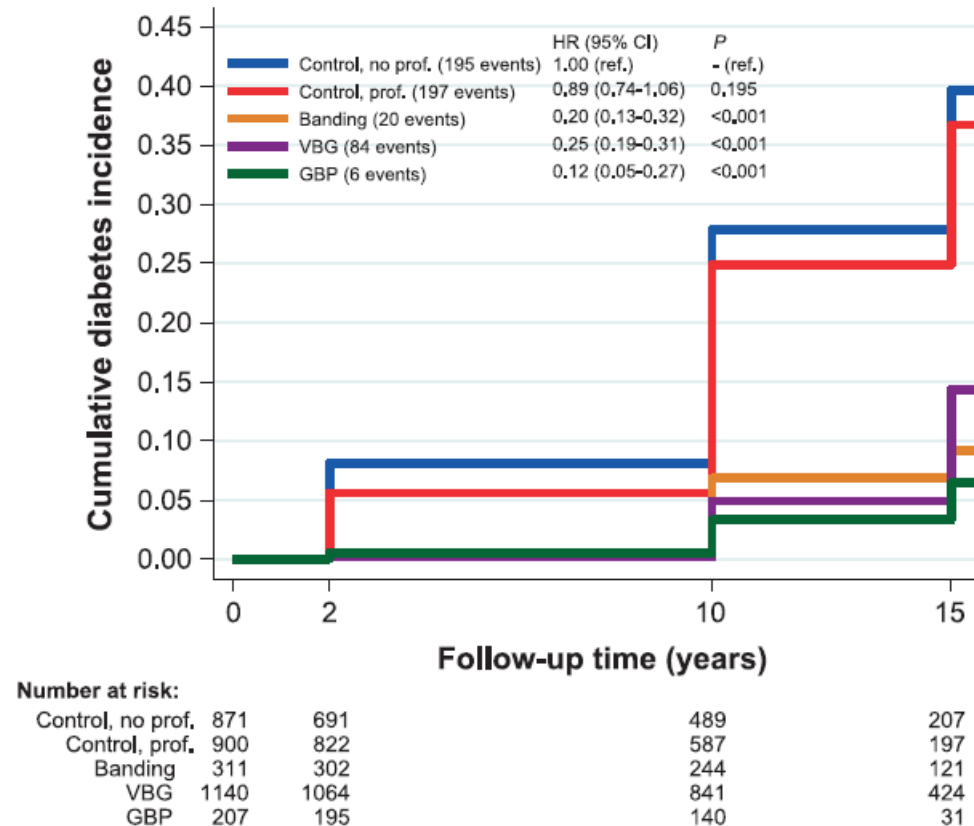
Bariatric Surgery: Long-term results

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

NNT:

IFG: 1.3

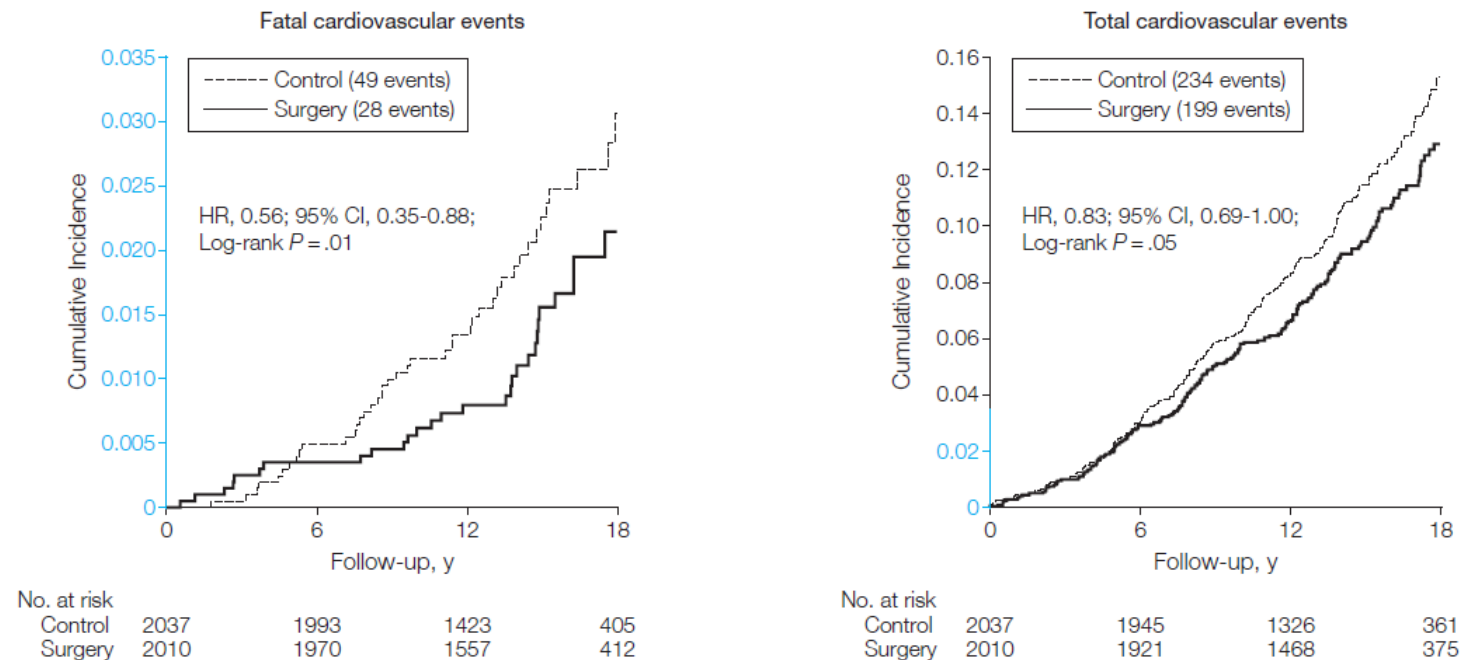
NFG: 7.0



Bariatric Surgery: Long-term results

Bariatric Surgery and Long-term Cardiovascular Events

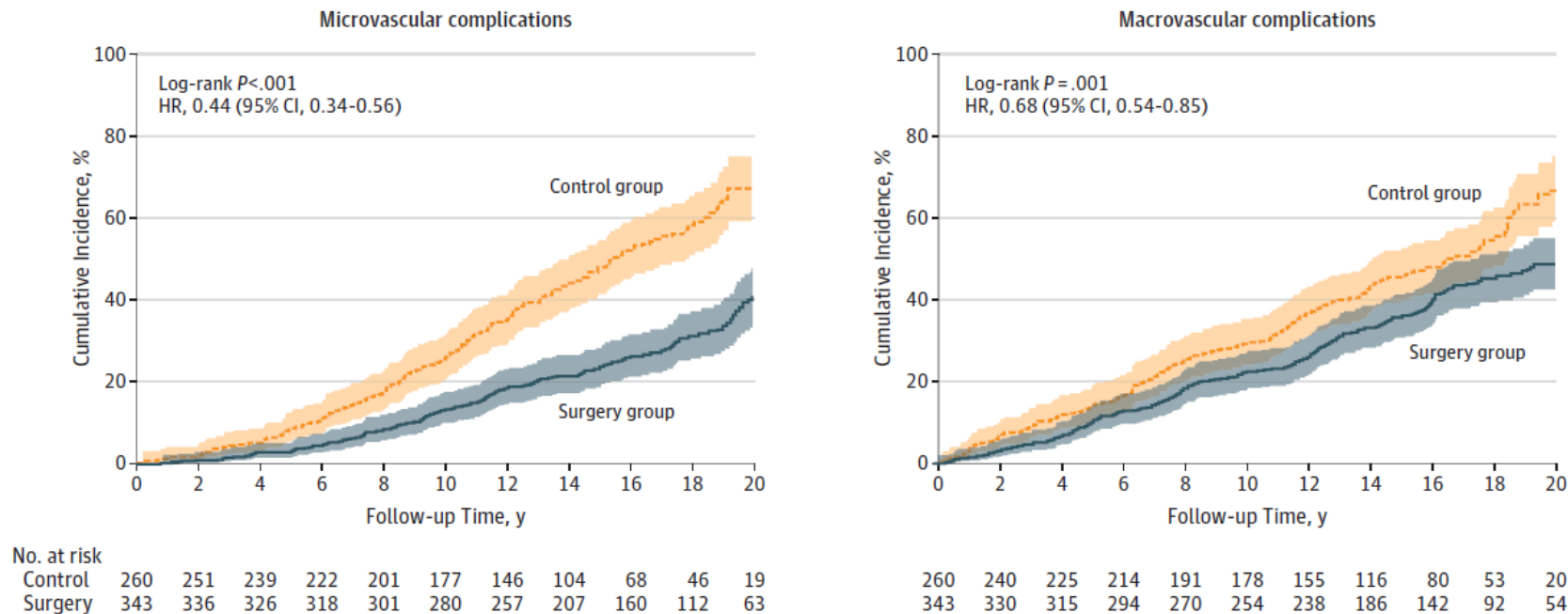
Figure 2. Kaplan-Meier Unadjusted Cumulative Incidence of Fatal and Total Cardiovascular Events in the Control and Surgery Groups of the Swedish Obese Subjects Study



Bariatric Surgery: Long-term results

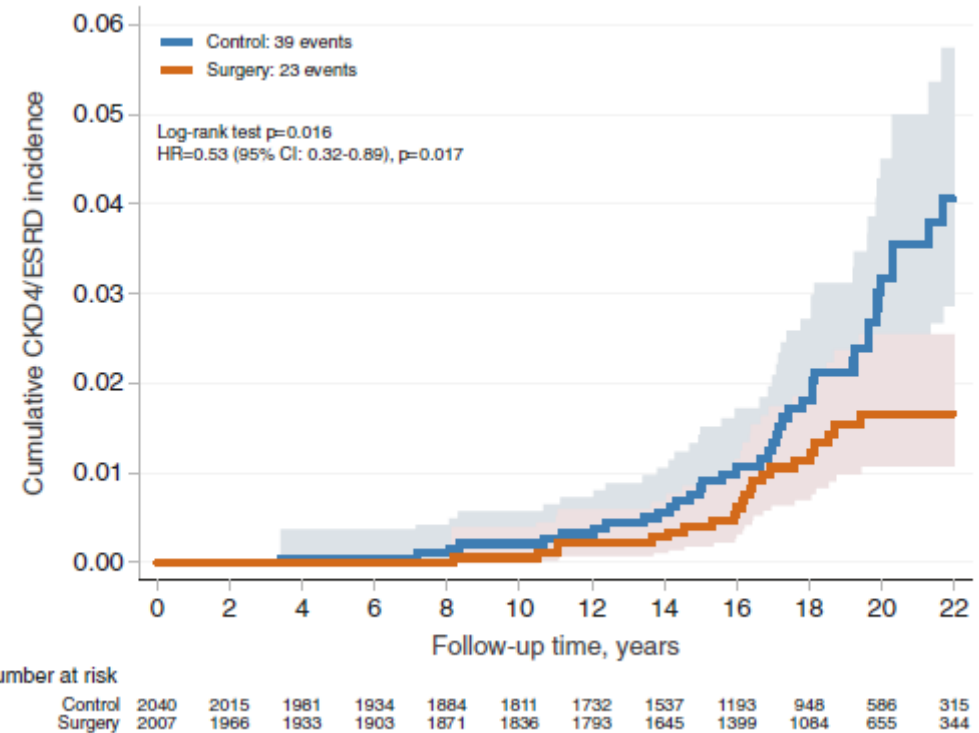
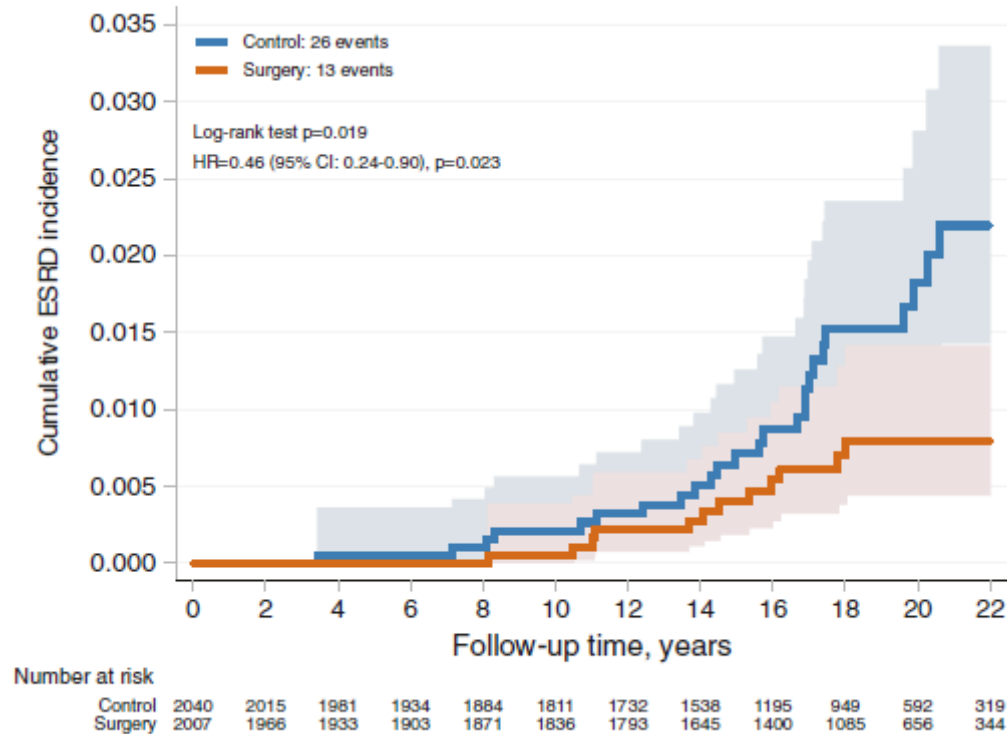
Association of Bariatric Surgery With Long-term Remission of Type 2 Diabetes and With Microvascular and Macrovascular Complications

Figure 3. Cumulative Incidence of Microvascular and Macrovascular Diabetes Complications in the Surgery and Control Groups



Bariatric Surgery: Long-term results

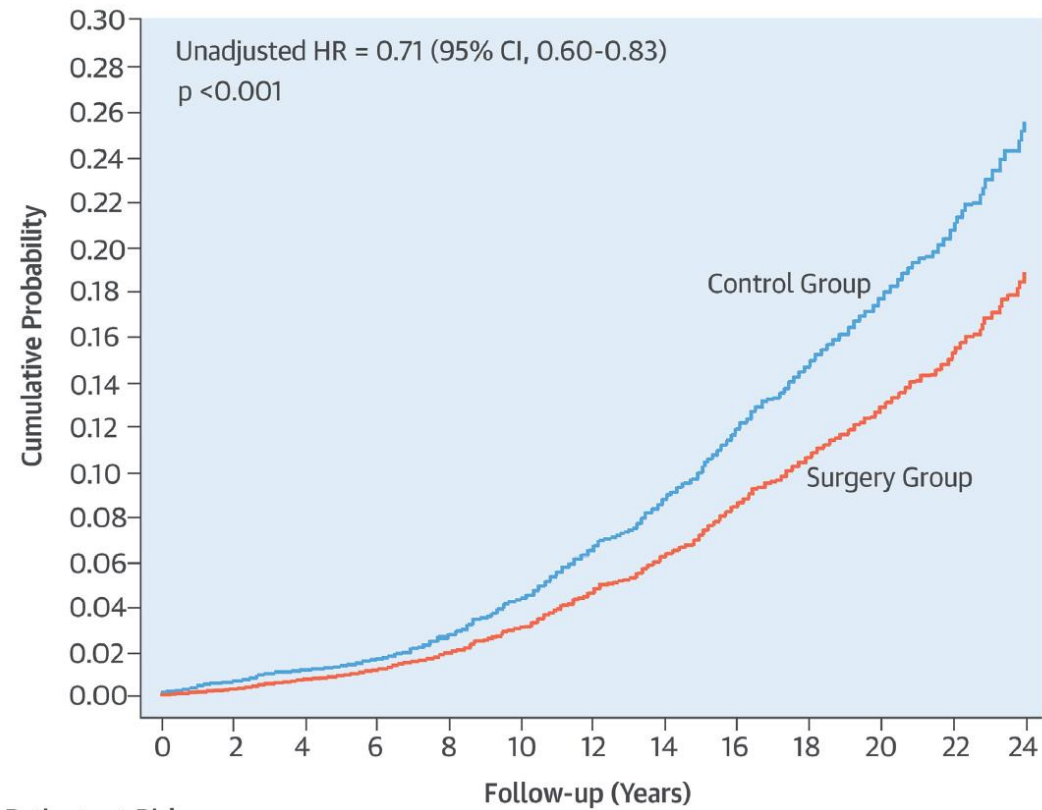
Incidence of end-stage renal disease following bariatric surgery in the Swedish Obese Subjects Study



Shulman A. Int J Obes 2018;42:964

Bariatric Surgery: Long-term results

Bariatric Surgery and the Risk of New-Onset Atrial Fibrillation in Swedish Obese Subjects

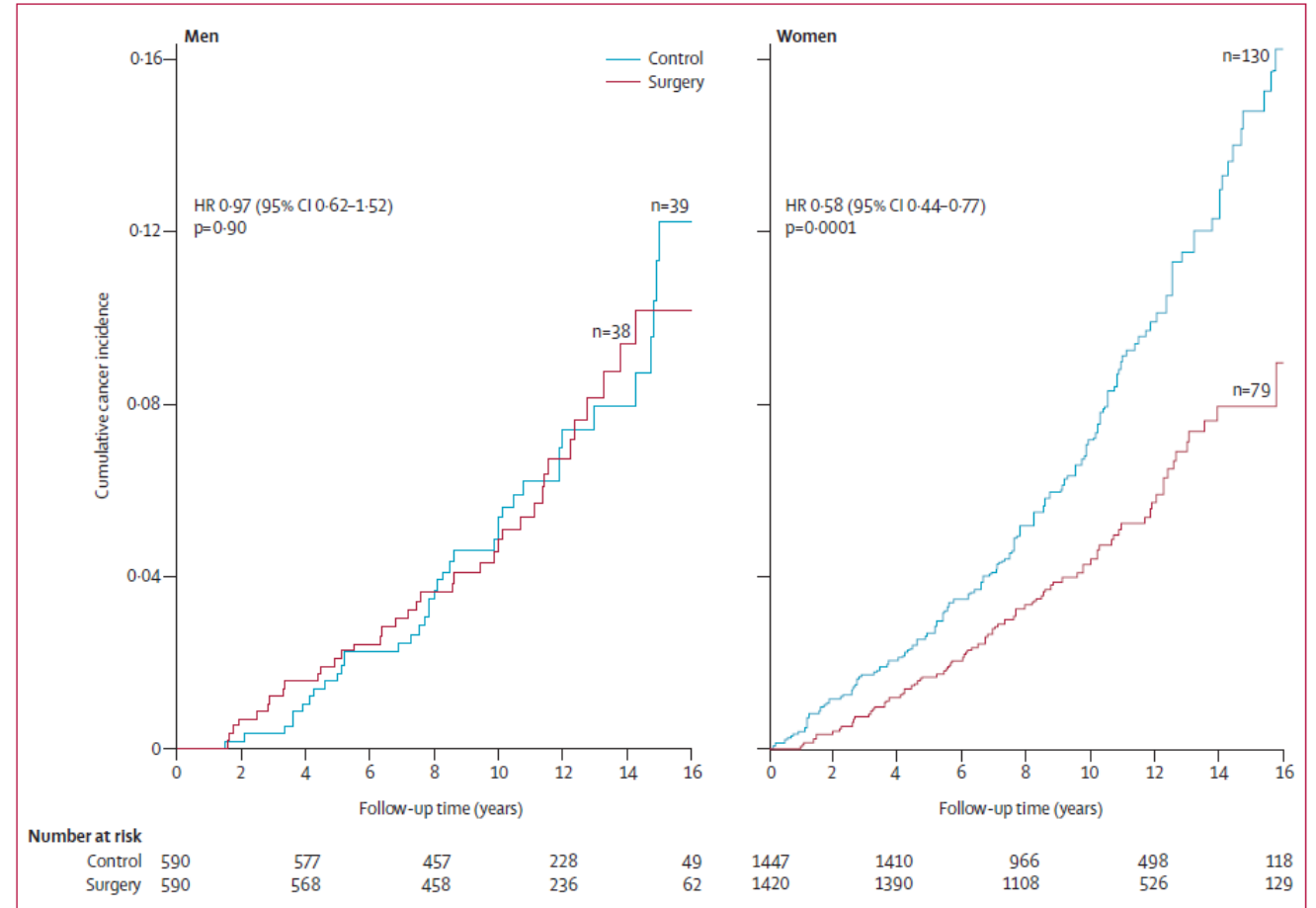


Patients at Risk						
Control	2,021	1,979	1,840	1,574	570	114
Surgery	2,000	1,955	1,853	1,615	617	134

Jamaly S et al. JACC 2016;68:2497

Bariatric Surgery: Long-term results

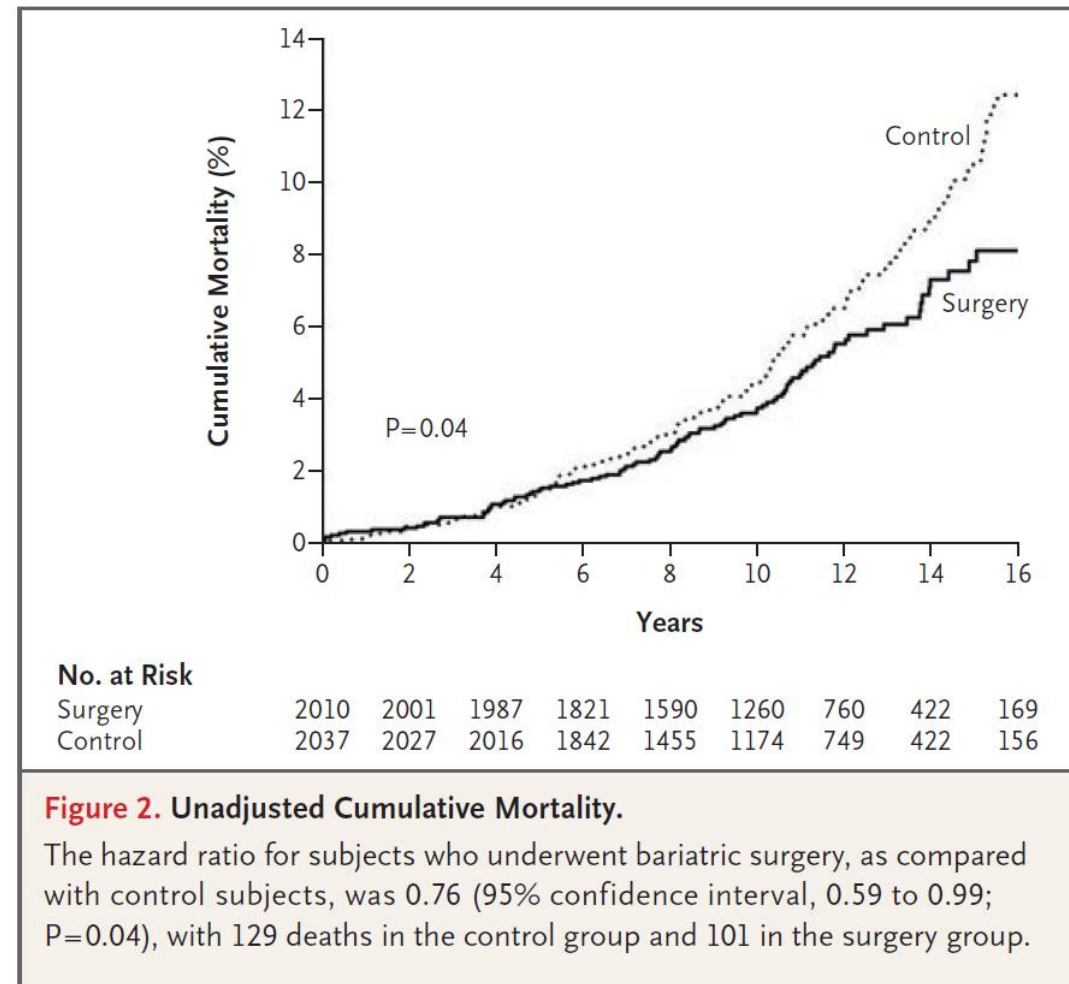
Effects of bariatric surgery on cancer incidence in obese patients in Sweden (Swedish Obese Subjects Study): a prospective, controlled intervention trial



Sjöström L. Lancet Oncol 2009;10:653

Bariatric Surgery: Long-term results

Effects of Bariatric Surgery On Mortality in Swedish Obese Subjects



Sjöström L. New Engl J Med 2007;357:741

Bariatric Surgery & Post Surgery Care

TOPICS

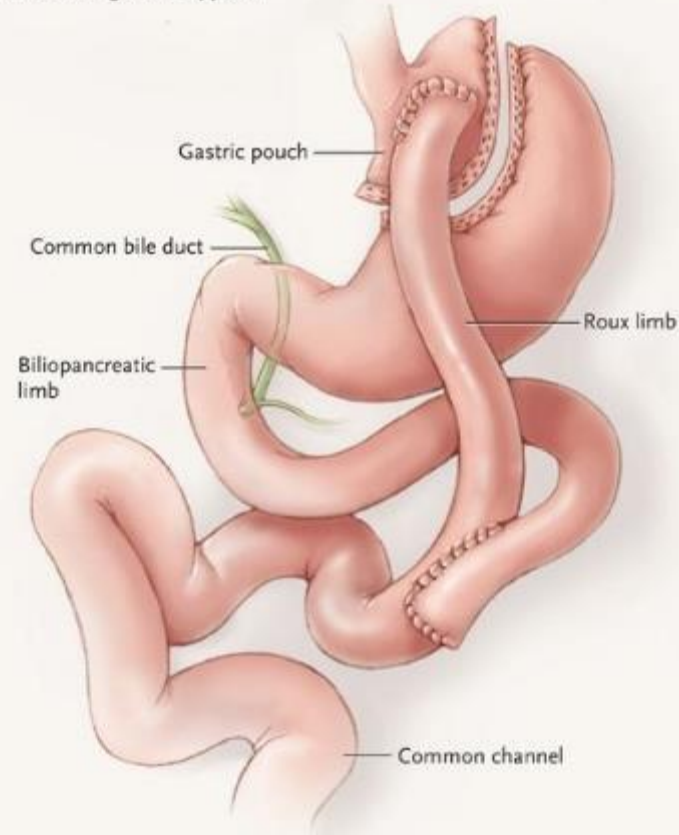
- Indications / contraindications
- Long-term results on body weight and comorbidities
- **Choice of the surgical procedure**
- Post Surgery Care

Bariatric Surgery: Choice of the procedure

B Sleeve gastrectomy



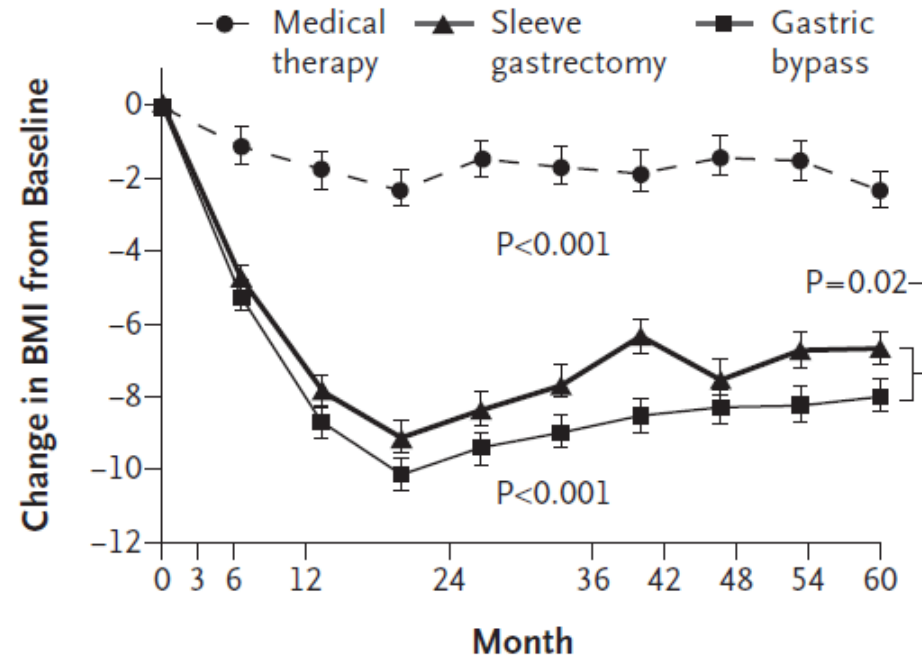
C Roux-en-Y gastric bypass



Bariatric Surgery: Choice of the procedure

Bariatric Surgery versus Intensive Medical Therapy for Diabetes — 5-Year Outcomes

C Body-Mass Index



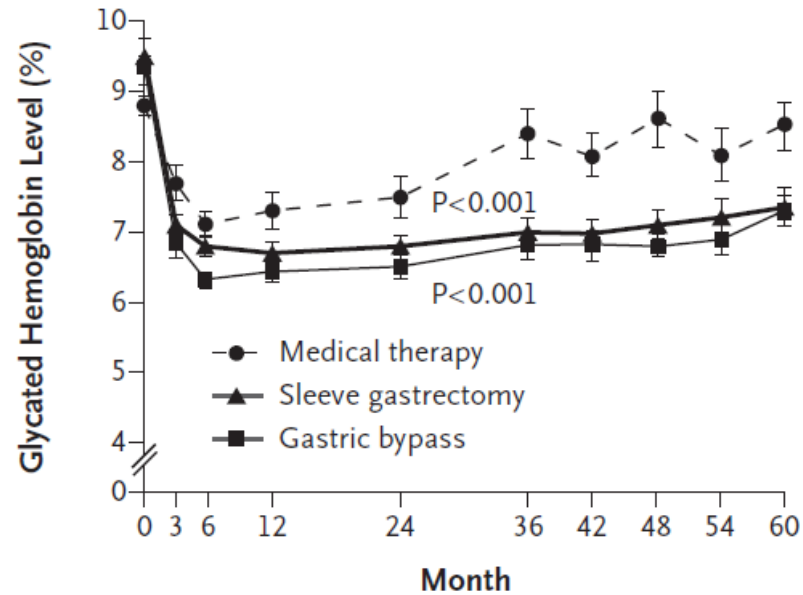
Mean Value at Visit

Medical therapy	36.4	34.1	35.0	34.8	35.1	34.0
Gastric bypass	37.0	26.9	27.4	28.2	28.6	28.9
Sleeve gastrectomy	36.0	26.9	27.7	28.1	28.2	29.3

Schauer PA. NEJM 2017;376:641

Bariatric Surgery: Choice of the procedure

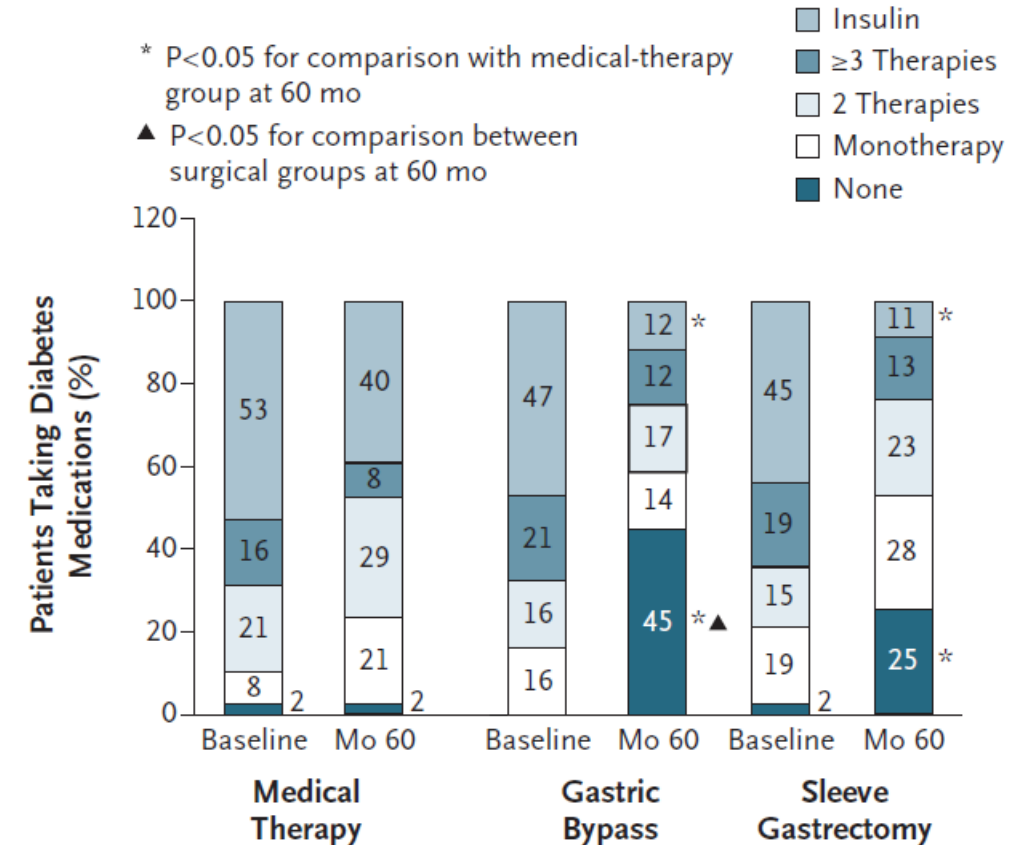
A Glycated Hemoglobin



Mean (median) Value at Visit

Medical therapy	8.8 (8.6)	7.3 (6.8)	7.5 (7.2)	8.4 (7.7)	8.6 (8.2)	8.5 (8.0)
Gastric bypass	9.3 (9.4)	6.4 (6.2)	6.5 (6.4)	6.8 (6.6)	6.8 (6.8)	7.3 (6.9)
Sleeve gastrectomy	9.5 (8.9)	6.7 (6.4)	6.8 (6.8)	7.0 (6.7)	7.1 (6.6)	7.4 (7.2)

B Diabetes Medications



Bariatric Surgery versus Intensive Medical Therapy for Diabetes — 5-Year Outcomes

Schauer PA. NEJM 2017;376:641

Bariatric Surgery: Choice of the procedure

Table 1. Baseline Demographic Characteristics^a

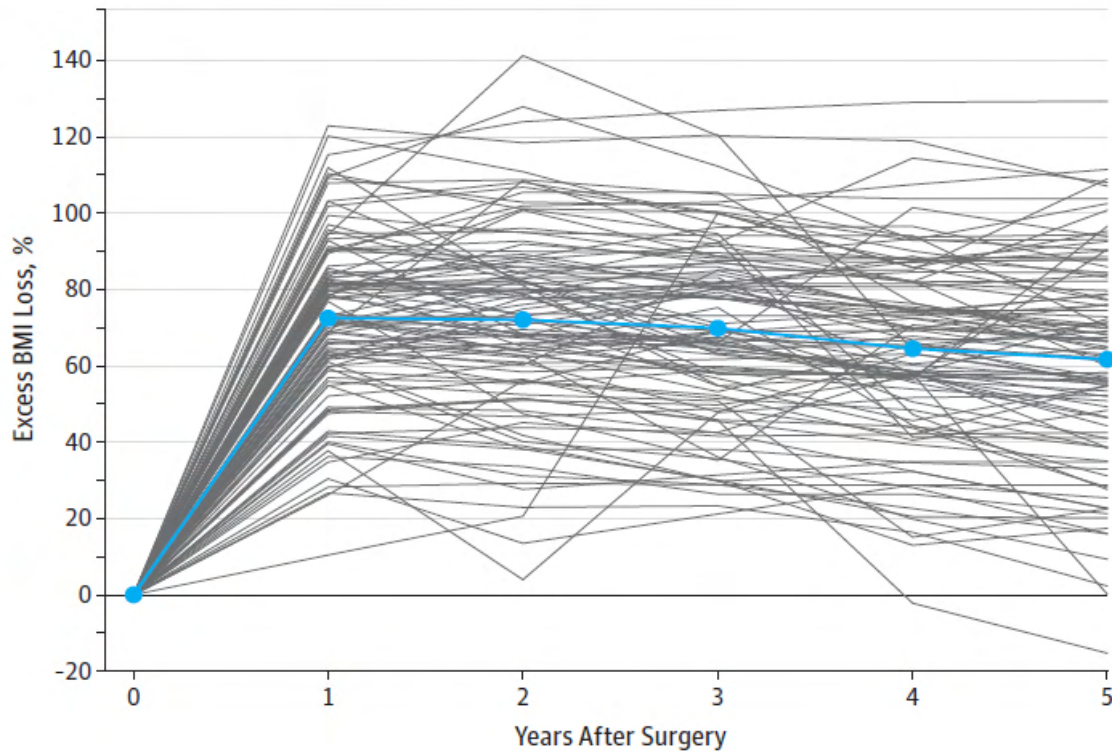
Characteristics	Sleeve Gastrectomy (n = 107)	Roux-en-Y Gastric Bypass (n = 110)
Age, mean (SD), y	43.0 (11.1)	42.1 (11.2)
Female	77 (72.0)	79 (71.8)
Weight, mean (SD), kg	123.5 (19.4)	124.8 (19.8)
Body mass index, mean (SD) ^b	43.6 (5.2)	44.2 (5.3)
Type 2 diabetes	26 (24.3)	28 (25.5)
Dyslipidemia	72 (67.3)	56 (50.9)
Gastroesophageal reflux	47 (43.9)	51 (46.4)
Hypertension	67 (62.6)	65 (59.1)
Obstructive sleep apnea	51 (47.7)	46 (41.8)
Back or joint pain	65 (60.7)	75 (68.2)
Hyperuricemia	16 (15)	11 (10)
Depression	21 (19.6)	12 (10.9)

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

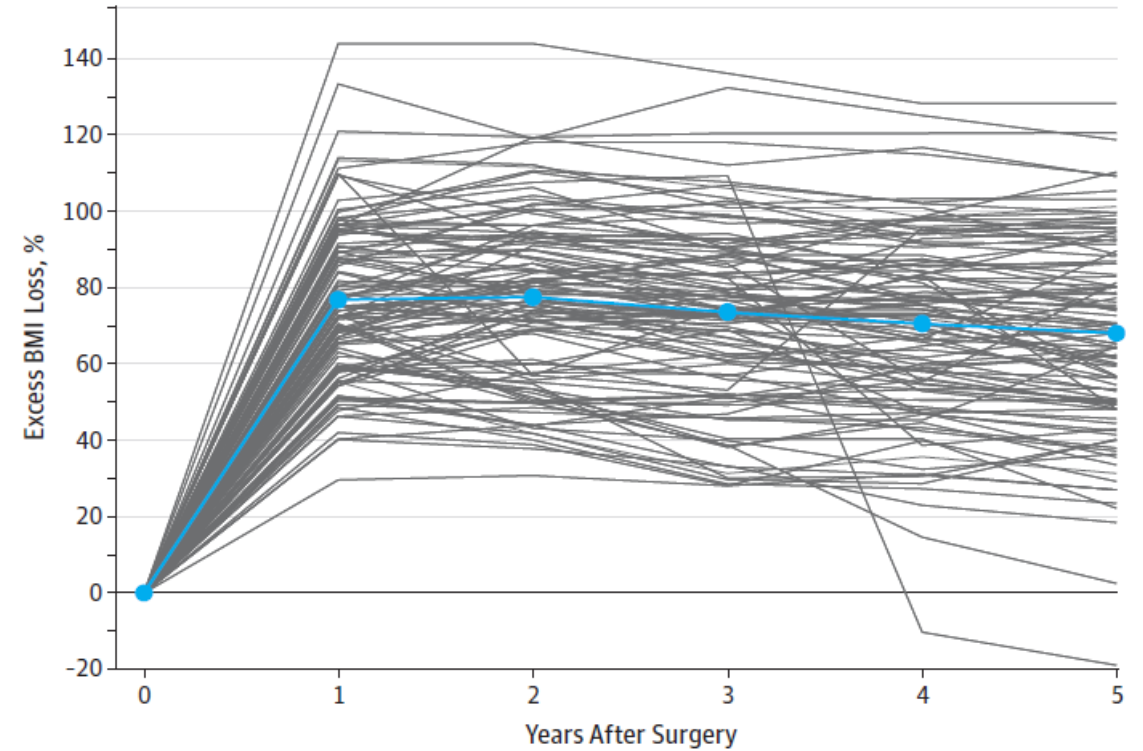
Peterli R et al. JAMA 2018;319:255

Bariatric Surgery: Choice of the procedure

A Sleeve gastrectomy



B Roux-en-Y gastric bypass



Effect of Laparoscopic Sleeve Gastrectomy
vs Laparoscopic Roux-en-Y Gastric Bypass
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Peterli R et al. JAMA 2018;319:255

Bariatric Surgery: Choice of the procedure

Table 5. Mortality and Adverse Events Requiring Reoperation or Endoscopic Intervention

Events	No. With Event/Total No. (%)		Absolute Difference (95% CI) ^a
	Sleeve Gastrectomy	Roux-en-Y Gastric Bypass	
Early morbidity (0-30 d)	1/107 (0.9)	5/110 (4.5)	-0.19 (-0.57 to 0.20)
Leak	0	1	
Infection	0	3	
Obstruction	1	1	
Death	0	1 ^b	
Late morbidity (1 mo-5 y)	15/101 (14.9)	18/104 (17.3)	-0.05 (-0.25 to 0.16)
Operative			
Conversion to Roux-en-Y gastric bypass due to gastroesophageal reflux	9	NA	
Small bowel obstruction	0	2	
Internal hernia	0	9	
Incisional hernia	1	1	
Gastroscopy necessary: laparoscopy	NA	1	
Severe dumping	0	3 ^c	
Insufficient weight loss	5 ^d	2	
Death	0	1 ^e	
Total reoperations or interventions	16/101 (15.8)	23/104 (22.1)	-0.10 (-0.29 to 0.09)
Total mortality	0	2/104 (1.9)	-0.50 (-0.82 to -0.18)

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

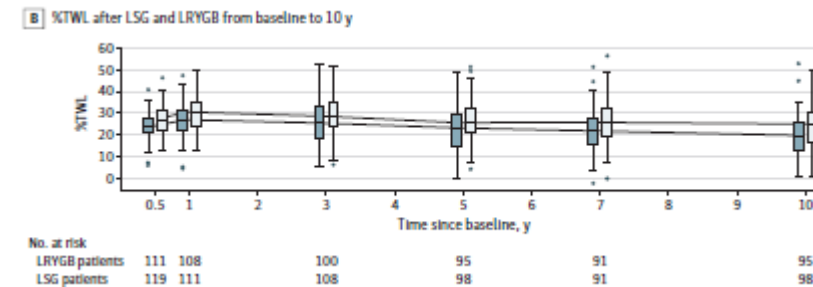
Peterli R et al. JAMA 2018;319:255

Bariatric Surgery: Choice of the procedure

Table 3. Minor and Major Late Complications After Laparoscopic Sleeve Gastrectomy (LSG) and Laparoscopic Roux-en-Y Gastric Bypass (LRYGB) Reported Cumulatively After 30 Days to 10 Years of Follow-up

	No. (%)		P value
	LSG (n = 121)	LRYGB (n = 119)	
Minor complications			
Vomiting/dehydration	0	3 (2.5)	NA
Gastroesophageal reflux	38 (31.4)	8 (6.7)	NA
Ulcer/stricture at gastrojejunal anastomosis	2 (1.7)	8 (6.7)	NA
Dumping	1 (0.8) ^a	3 (2.5)	NA
Fistula and abscess	1 (0.8) ^b	0 (0.0)	NA
Ureterolithiasis	0	1 (0.8)	NA
Adhesion-related Intestinal obstruction	0	1 (0.8)	NA
Ventral hernia	0	1 (0.8)	NA
Suspected Internal herniation	0	1 (0.8)	NA
Nonspecific abdominal pain	0	1 (0.8)	NA
Anemia	0	1 (0.8)	NA
Hypokalemia	0	1 (0.8)	NA
Total	42 (34.7)	29 (24.4)	.08 ^c
Major complications			
Fistullectomy	1 (0.8) ^b	0 (0.0)	NA
Gastroesophageal reflux	14 (11.6) ^a	0 (0.0)	NA
Internal herniation	0	18 (15.1) ^d	NA
Incisional hernia	3 (2.5)	3 (2.5) ^d	NA
Candy cane/blind loop resection	0	1 (0.8)	NA
Abdominal pain and stricture	0	1 (0.8)	NA
Sleeve stenosis	1 (0.8)	0 (0.0)	NA
Total	19 (15.7)	22 (18.5) ^d	.57 ^c

Effect of Laparoscopic Sleeve Gastrectomy vs Roux-en-Y Gastric Bypass on Weight Loss, Comorbidities, and Reflux at 10 Years in Adult Patients With Obesity The SLEEVEPASS Randomized Clinical Trial



Salminen P et al. JAMA Surg 2022, June 22

Bariatric Surgery & Post Surgery Care

TOPICS

- Indications / contraindications
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- Choice of the surgical procedure
- **Post Surgery Care**

Bariatric surgery: Post Surgery Care

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

Luca Busetto^a Dror Dicker^b Carmil Azran^c Rachel L. Batterham^{d, e, f}
Nathalie Farpour-Lambert^g Martin Fried^h Jøran Hjelmæsæthⁱ Johann Kinzl^j
Deborah R. Leitner^k Janine M. Makaronidis^{d, f} Karin Schindler^l
Hermann Toplak^k Volkan Yumuk^m

Obesity *Facts*
The European Journal of Obesity

Obes Facts 2017;10:597–632

Bariatric Surgery: Post Surgery Care

Topics

- Nutritional management
- Micronutrients supplementation
- Management of co-morbidities
- Pharmacotherapy after bariatric surgery
- Pregnancy after bariatric surgery
- Psychological aspects
- Weight regain prevention

Obesity Facts
The European Journal of Obesity

Obes Facts 2017;10:597–632

Bariatric Surgery: Post Surgery Care

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- Weight regain prevention

Cathy Breen
Cathy Breen
Luca Busetto

Luca Busetto

Obesity Facts
The European Journal of Obesity

Obes Facts 2017;10:597–632

Bariatric surgery: Post surgery care

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Obesity Facts
The European Journal of Obesity

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Bariatric surgery: Post Surgery Care

Table 9. List of graded clinical practical recommendations for pharmacotherapy after bariatric surgery

Recommendations	Level of evidence	Grade of recommendation*
The potential effects and consequences that any bariatric procedure may have on absorption and action of medications should be carefully considered before surgery, especially for medications where changes in blood levels may have critical effects on patients conditions or can cause significant adverse events	3	C
After surgery, plasma drug levels should be checked more frequently for those drugs requiring periodic plasma levels control.	3	C
If possible, liquid oral dosage forms should be used instead of solid dosage forms for at least two months after surgery.	4	D
NSAIDs, salicylates, corticosteroids and other drugs that may cause gastric damage should be avoided.	3	D
Oral contraceptives should be replaced by non-oral contraceptives due to reduced efficacy after gastric bypass and bilio-pancreatic diversion.	3	D

Bariatric Surgery: Post Surgery

Topics

- Nutritional management
- Micronutrients supplementation
- Management of co-morbidities
- Pharmacotherapy after bariatric surgery
- Pregnancy after bariatric surgery
 - Benefits and risks of pregnancy after bariatric surgery
 - Food intake and micronutrients supplementation in pregnancy
 - Glucose tolerance tests in pregnant women with RYGB
 - Risk of internal hernias
- Psychological aspects
- Weight regain prevention

Obesity Facts
The European Journal of Obesity

Obes Facts 2017;10:597–632

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Bariatric Surgery: Post Surgery Care

Table 11. Effects of bariatric surgery on maternal and foetal outcomes [112–114]

Maternal outcomes	Risk	Foetal outcomes	Risk
Gestational diabetes	reduced	small for gestational age	increased
Gestational hypertension	reduced	premature labour	increased
Miscarriage	limited data	low birthweight	increased
Post-partum haemorrhage	limited data	large for gestational age	reduced
Pre-eclampsia	reduced	perinatal mortality	no difference

Bariatric Surgery: Post Bariatric Care

Table 12. Recommended nutritional screening and supplementation during pregnancy [6, 104, 121]

Micronutritional marker	Laboratory testing (each trimester)	Dose for supplementation
Vitamin B1	serum B1 levels	prenatal multivitamins (preparations may vary by country)
Vitamin K	serum vitamin K	prenatal multivitamins (preparations may vary by country)
Vitamin A	serum vitamin A	prenatal multivitamins (preparations may vary by country)
Zinc	serum zinc levels	prenatal multivitamins (preparations may vary by country)
Vitamin D	serum 25-hydroxy vitamin D	cholecalciferol 1,000 IU daily (higher doses may be required in deficient states)
Folate	serum folate	400 µg or 5 mg if type 2 diabetes or BMI >30 until 12th week
Iron	full blood count, serum ferritin, serum iron and iron binding capacity	ferrous sulphate 200 mg orally 2-3 times daily
Calcium	serum adjusted calcium, parathyroid hormone	calcium citrate 1,000–1,200 mg
Vitamin B12	full blood count, Serum vitamin B12	1 mg intramuscular injection every 12 weeks
Protein	serum albumin	60 g protein daily as part of balanced diet

Bariatric Surgery: Post Surgery Care

Table 10. List of graded clinical practical recommendations for the management of pregnancy after bariatric surgery

Recommendations	Level of evidence	Grade of recommendation*
Pregnancy is not recommended in the first 12–18 months following bariatric surgery.	3	D
Antenatal care should be offered at a specialised centre with experience in pregnancy following bariatric surgery, via a specialist multidisciplinary antenatal care team.	4	D
Micronutrient supplementation should be provided to all women who are pregnant following bariatric surgery, in the form of a prenatal multivitamin preparation, B12 injections and oral calcium supplements.	3	D
Screening for gestational diabetes should be offered, however the conventional oral glucose tolerance test should be avoided. Serial capillary glucose monitoring should be used as an alternative.	4	D
Women presenting with abdominal pain in pregnancy should be offered urgent expert assessment, particularly for complications related to the primary bariatric surgical procedure.	3	D

Post-bariatric surgery follow-up

Clinical Practice Guidelines for Childbearing Female Candidates for Bariatric Surgery, Pregnancy, and Post-partum Management After Bariatric Surgery

Ciangura C et al. *Obes Surg* 2019;29:3722

Pregnancy after bariatric surgery: Consensus recommendations for periconception, antenatal and postnatal care

Shawe J et al. *Obes Rev* 2019;20:1507

Post-bariatric surgery follow-up

✓ Healthy pregnancies after bariatric surgery



Contraception

- Postpone pregnancy until weight has stabilised
- Avoid oral contraception and encourage long-acting reversible contraceptive methods such as IUD



Diet

- Reduce quick-absorbing carbohydrates and opt for protein and low glycaemic index alternatives
- Avoid caffeine and alcohol
- Frequent, smaller meals



Surgical issues

- Inflate and deflate LAGB according to hyperemesis, GWG, and fetal growth
- Assess for internal herniation when abdominal pain is reported and treat promptly



Diabetes

- Avoid OGTT due to risk of dumping syndrome
- Monitor HbA1c every trimester if personal history of diabetes or risk factors
- CGM or seven point CBG between 24 and 28 weeks



Supplements

Vit D >40mcg Iron 45-60mg
Vit E 15mg Copper 2mg
Vit K 90-120µg Selenium 50µg
Thiamine >12mg
Zinc 8-15mg per 1mg copper
Calcium 1200-1500mg
Vit A 5000IU (B-carotene)
Folic acid 0.4mg, 4-5mg for GDM/obesity



Mental health

- Screen for substance abuse, anxiety, or other mental health disorders
- Offer follow up during and after pregnancy



Fetal monitoring

- Monitor fetal growth every trimester
- Assess for congenital anomalies or developmental problems such as intracranial bleeds



Gestational weight gain

- Monitor GWG according to IOM guidelines and screen for associated complications if necessary



Nutrient levels

- Check serum indices (micronutrients, protein and albumin, FBC, INR) after surgery, preconception, and every trimester in pregnancy and supplement as necessary



Breastfeeding

- Breast milk is not compromised after surgery and breastfeeding is recommended
- Monitor maternal micronutrients during lactation

Shawe J et al. Obes Rev 2019;20:1507

Bariatric Surgery: Post Surgery Care

Topics

- Nutritional management
- Micronutrients supplementation
- Management of co-morbidities
- Pharmacotherapy after bariatric surgery
- Pregnancy after bariatric surgery
- Psychological aspects
 - Psychological follow-up and support
 - Behavioral problems (alcoholism, drug abuse, suicide)
 - Post-surgical eating avoidance disorders
- Weight regain prevention

Obesity Facts
The European Journal of Obesity

Obes Facts 2017;10:597–632

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Bariatric Surgery: Post Surgery Care

Alcohol and substance abuse, depression and suicide attempts after Roux-en-Y gastric bypass surgery.

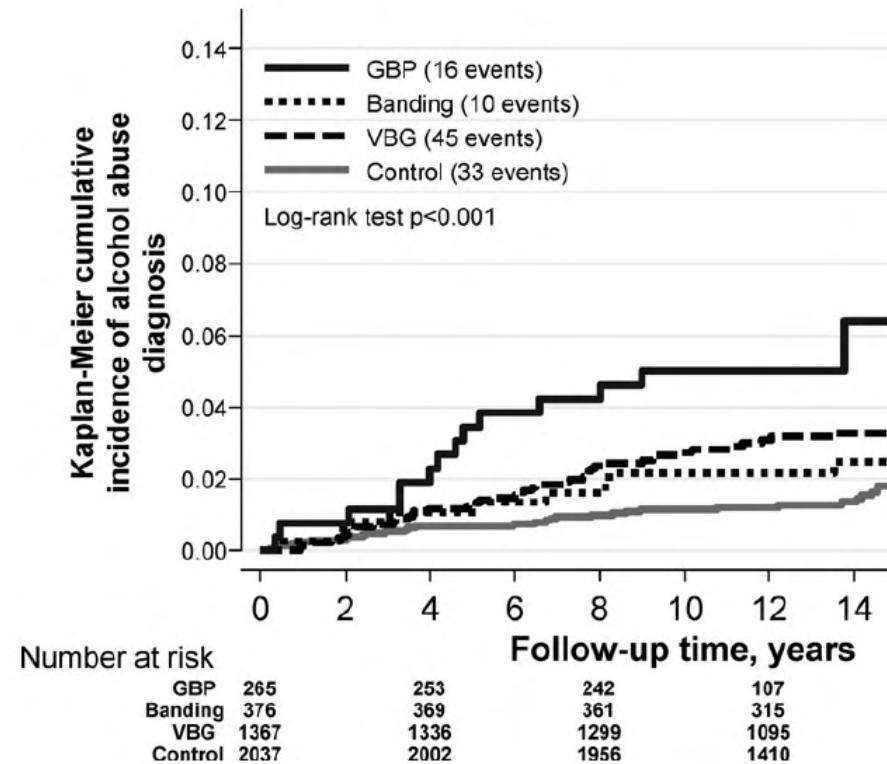
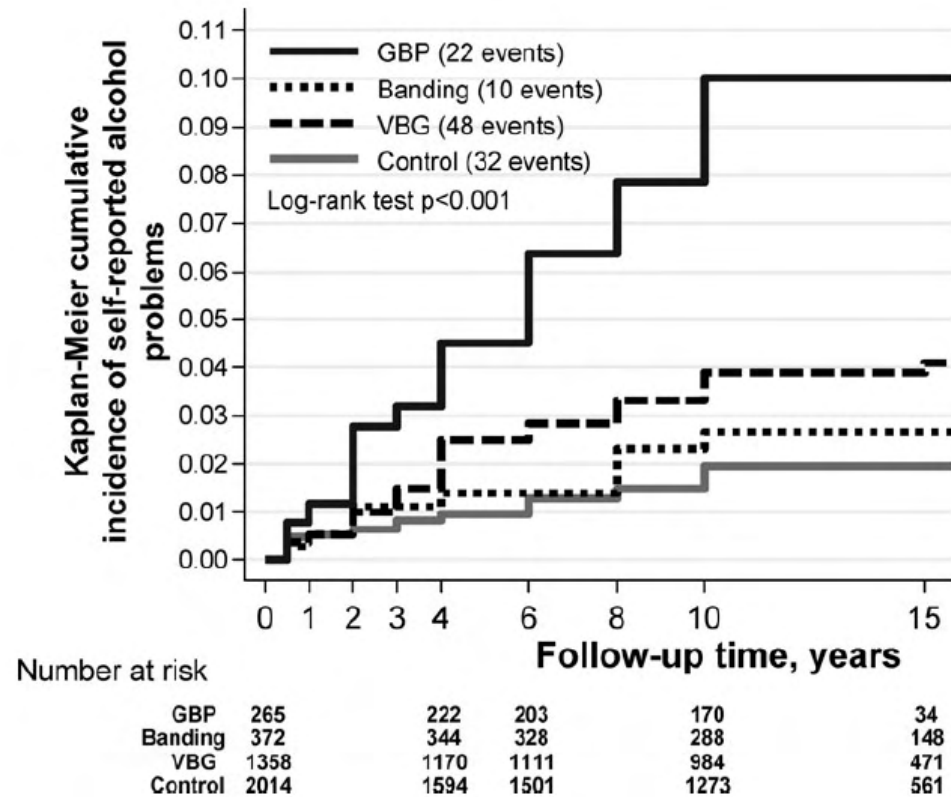
Table 2 Preoperative incidence rate per 10 000 person-years, incidence rate ratio and postoperative hazard ratio for psychiatric diagnoses in the total gastric bypass surgery cohort compared with the general population, stratified by sex

	Preoperative IR		Preoperative IRR			Postoperative HR		
	RYGB cohort	Reference cohort	Total	Men	Women	Total	Men	Women
Alcohol abuse	8.34	7.40	1.13 (1.00, 1.27)	0.70 (0.57, 0.85)	1.39 (1.20, 1.61)	2.73 (2.36, 3.15)	2.90 (2.30, 3.67)	2.59 (2.15, 3.12)
Substance abuse	6.75	3.76	1.80 (1.56, 2.06)	0.98 (0.74, 1.28)	2.23 (1.90, 2.61)	3.17 (2.52, 3.99)	2.38 (1.47, 3.85)	3.48 (2.67, 4.53)
Depression	29.50	12.24	2.41 (2.25, 2.58)	1.27 (1.06, 1.51)	2.81 (2.61, 3.03)	3.20 (2.81, 3.65)	3.35 (2.50, 4.48)	3.17 (2.74, 3.68)
Suicide attempt	21.18	10.61	2.00 (1.84, 2.16)	1.21 (1.00, 1.46)	2.27 (2.08, 2.47)	2.85 (2.40, 3.39)	3.12 (2.11, 4.60)	2.76 (2.27, 3.35)

Values in parentheses are 95 per cent confidence intervals. IR, incidence rate; IRR, incidence rate ratio; HR, hazard ratio; RYGB, Roux-en-Y gastric bypass.

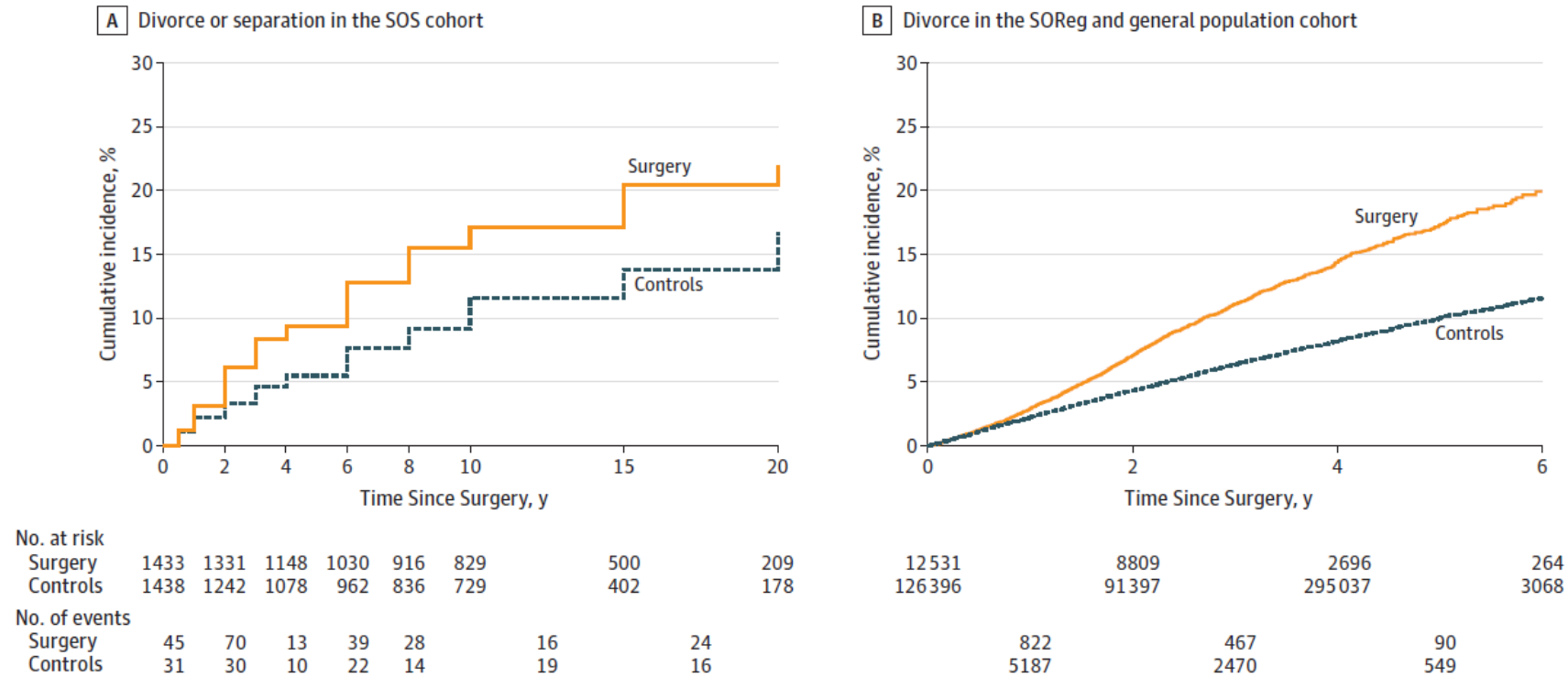
Bariatric Surgery: Post Surgery Care

Alcohol Consumption and Alcohol Problems After Bariatric Surgery in the Swedish Obese Subjects Study



Bariatric Surgery: Post Surgery Care

Figure 3. Cumulative Incidence of Divorce or Separation After Bariatric Surgery



A, Cumulative incidence of divorce or separation in the Swedish Obese Subjects (SOS) study (hazard ratio [HR] = 1.54; 95% CI, 1.25-1.90; $P < .001$).

B, cumulative incidence of divorce in the Scandinavian Obesity Surgery Registry

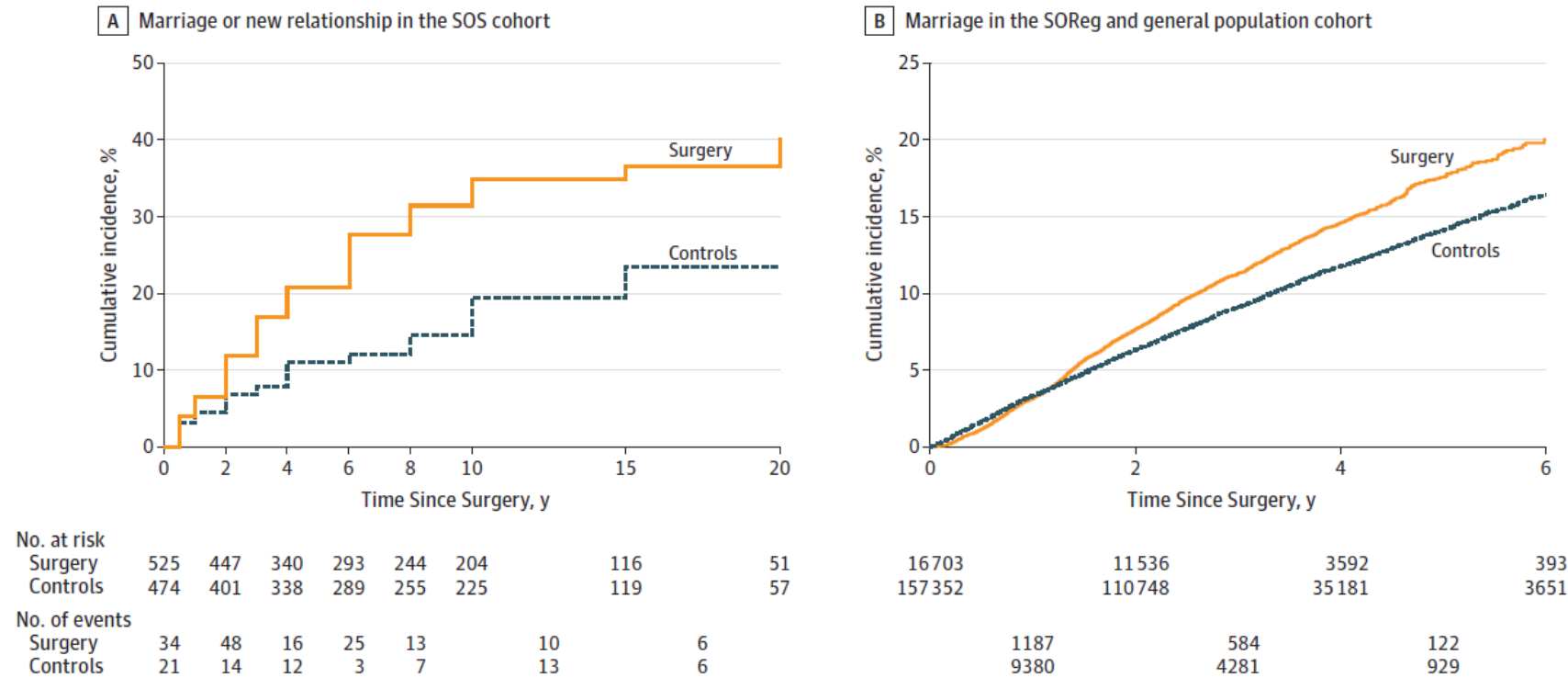
(SOReg)/general population cohort (hazard ratio = 1.74; 95% CI, 1.64-1.84; $P < .001$).

Associations of Bariatric Surgery with changes in Interpersonal Relationship Status

Bruze G. JAMA Surgery 2018;153:654.

Bariatric Surgery: Post Surgery Care

Figure 1. Cumulative Incidence of Marriage or New Relationship After Bariatric Surgery



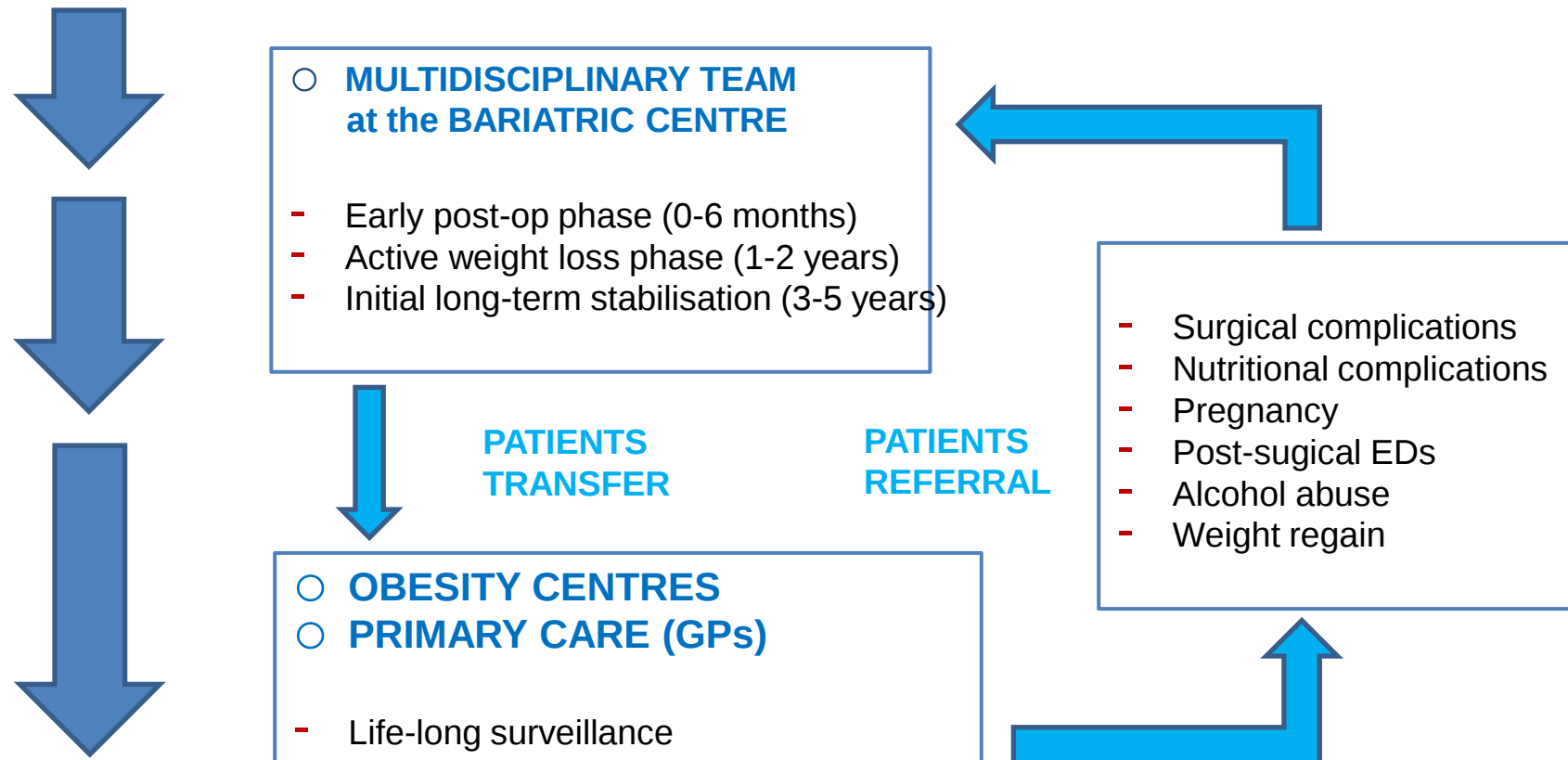
A, Cumulative incidence of marriage or new relationship in the Swedish Obese Subjects (SOS) study (hazard ratio [HR] = 1.95; 95% CI, 1.48-2.57; $P < .001$). B,

cumulative incidence of marriage in the Scandinavian Obesity Surgery Registry (SOReg)/general population cohort (HR = 1.24; 95% CI, 1.18-1.30; $P < .001$).

Associations of Bariatric Surgery with changes in Interpersonal Relationship Status

Post-bariatric surgery follow-up

A proposal for a network-based bariatric follow-up



Post-bariatric surgery follow-up



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Post-bariatric surgery follow-up

Grazie !!!



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