IMPACTO DE LA CIRUGÍA BARIATRICA EN LA ENFERMEDAD CARDIOVASCULAR

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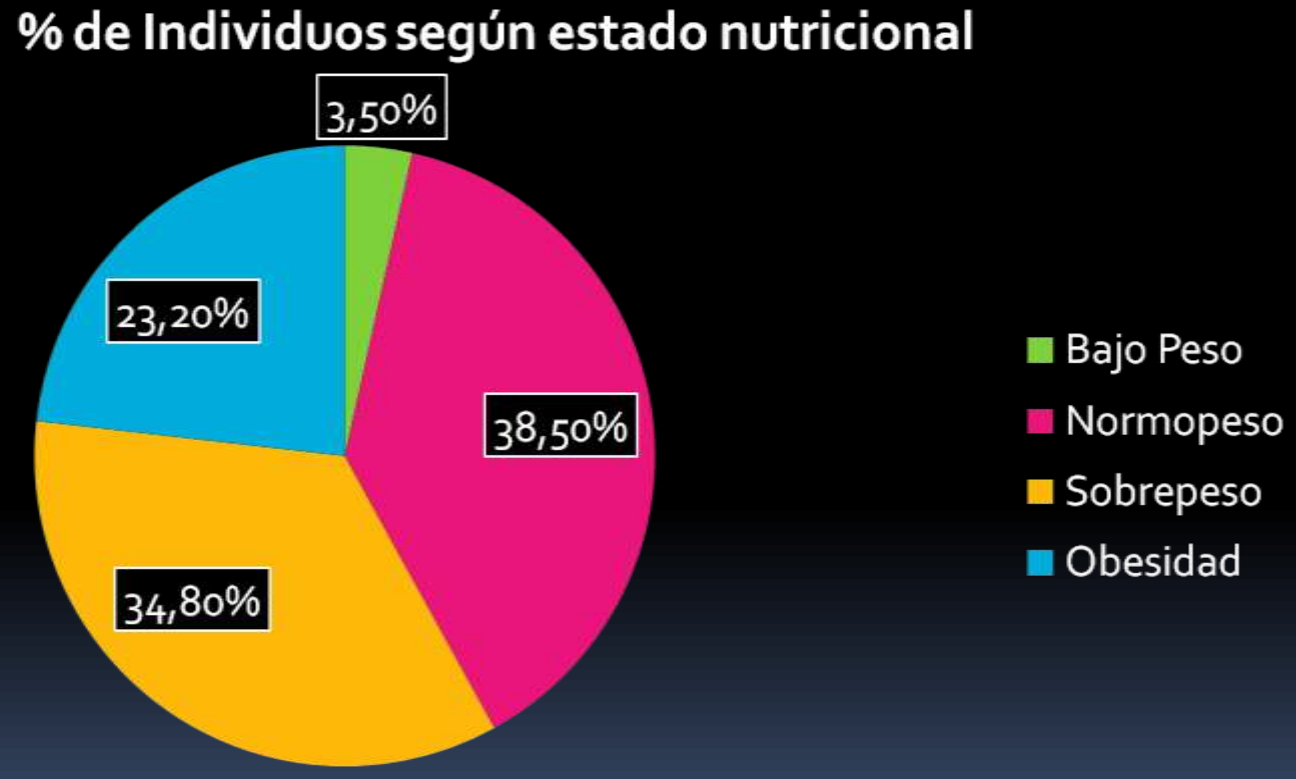
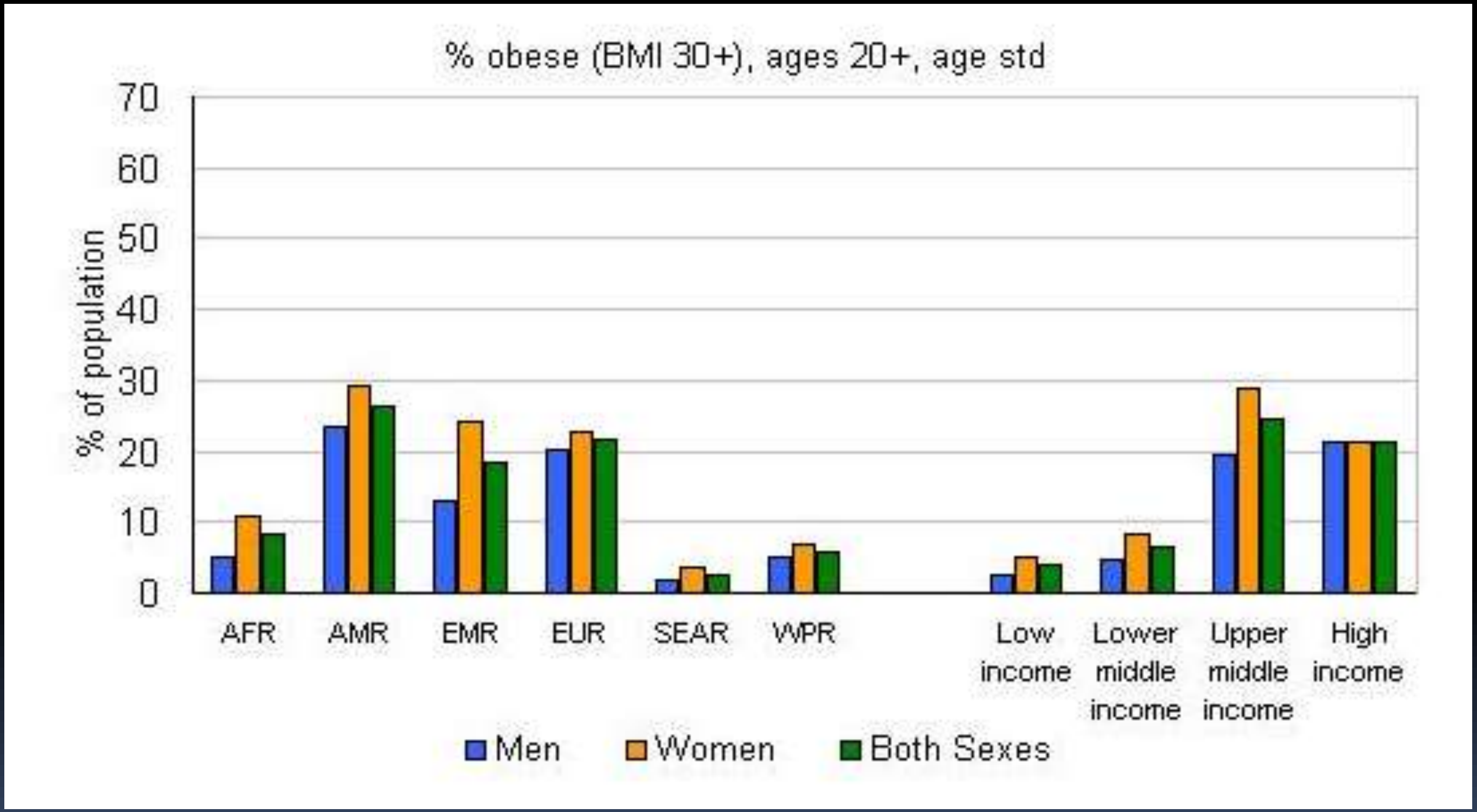
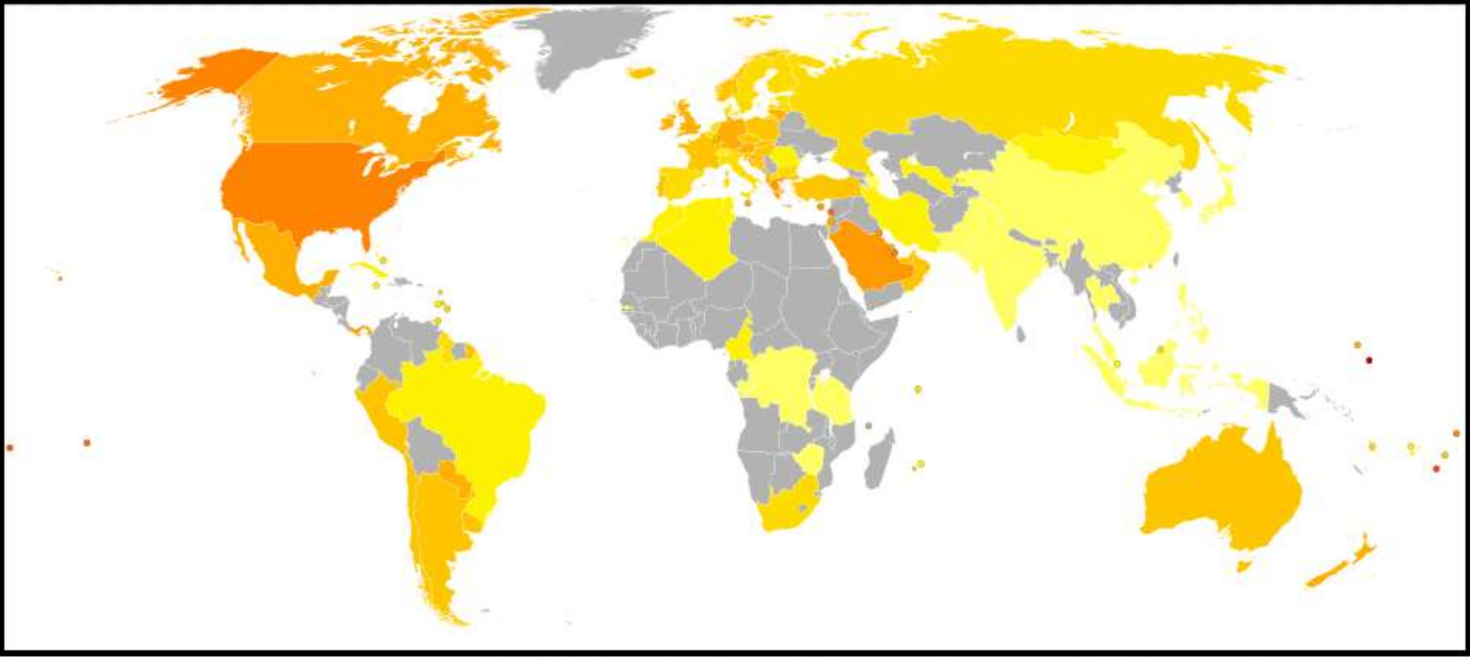
Año 2015

Primera Encuesta Nacional de Factores de Riesgo de Enfermedades no Trasmisibles en Población General. Año 2011. MSP y BS/OPS




% obese (BMI 30+), ages 20+, age std
% of population
70
60
50
40
30
20
10
0
AFR
AMR
EMR
EUR
SEAR
WPR
Low income
Lower middle income
Upper middle income
High income
Men
Women
Both Sexes



World obesity prevalence among males (left) and females (right).[167] <5% 5–10% 10–15% 15–20% 20–25% 25–30% 30–35% 35–40% 40–45% 45–50% 50–55% >55%

More

Lokal_Profil

Map of Obesity in Adult Males (% of adult population with en:BMI 30+) per country. Using data updated until December 2008.

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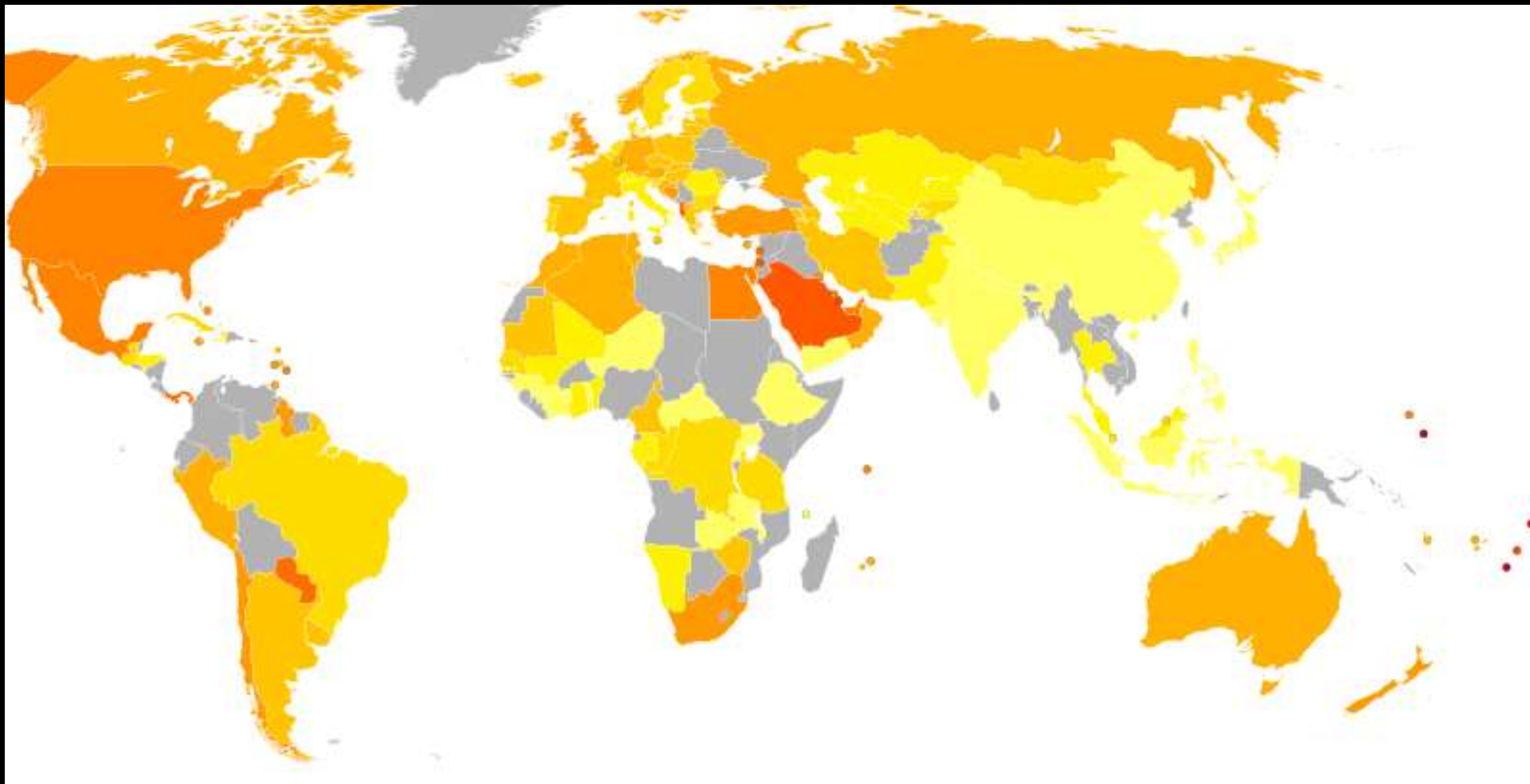
File: World map of Male Obesity, 2008.svg

Uploaded by Lokal Profil

Created: 28 January 2009



(left) and females (right).[167] <5% 5–10% 10–15% 15–20% 20–25% 25–

45% 45–50% 50–55% >55%

More d

lt population with en:BMI 30+) per country. Using data updated until December

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File: World map of Female Obesity, 2008.svg

Uploaded by Lokal Profil

Created: 28 January 2009

And from The Practical Guide

A Guide to Selecting Treatment

	BMI Category (kg/m^2)				
Treatment	25-26.9	27-29.9	30-34.9	35-39.9	≥40
Diet, physical activity and behavior	With comorbidities	With comorbidities	+	+	+
Pharmaco-therapy		With comorbidities	+	+	+
Surgery				With comorbidities	+

- Prevention of weight gain with lifestyle therapy is indicated in any patient with a BMI ≥ 25 kg/m^2, even without comorbidities, while weight loss is not necessarily recommended for those with a BMI of 25–29.9 kg/m^2 or a high waist circumference, unless they have two or more comorbidities.
- Combined therapy with a low-calorie diet (LCD), increased physical activity, and behavior therapy provide the most successful intervention for weight loss and weight maintenance.
- Consider pharmacotherapy only if a patient has not lost 1 pound per week after 6 months of combined lifestyle therapy.

http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm

The JAMA Network

From: **Increases in Clinically Severe Obesity in the United States, 1986-2000**

Arch Intern Med. 2003;163(18):2146-2148. doi:10.1001/archinte.163.18.2146

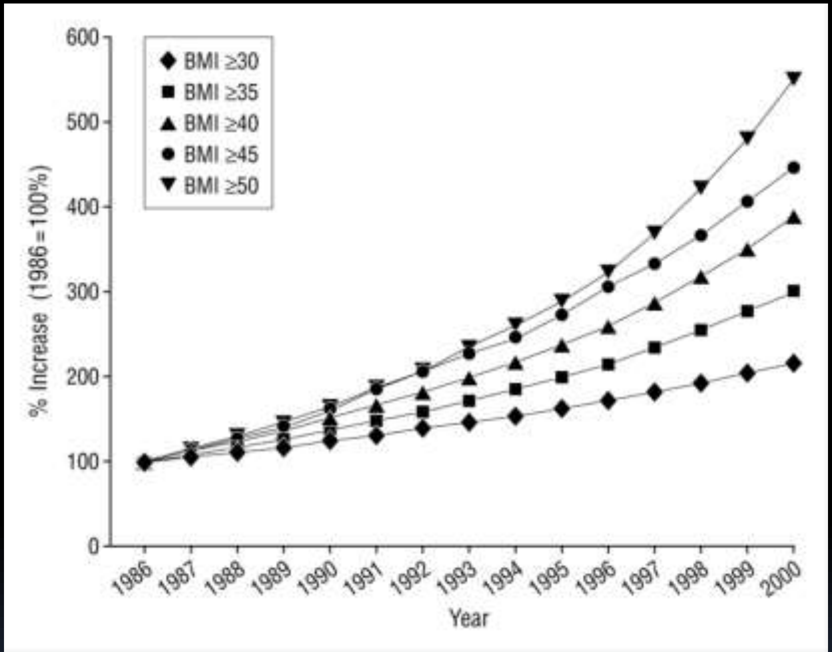

Figure Legend:

Prevalence growth by severity of obesity. Calculations are based on the Behavioral Risk Factor Surveillance Survey. BMI indicates body mass index (calculated as weight in kilograms divided by the square of height in meters).

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UNIVERSIDAD NACIONAL DE ASUNCION
FACULTAD DE CIENCIAS MÉDICAS
ESCUELA DE POSTGRADO

CURSO DE ENDOCRINOLOGIA Y METABOLISMO

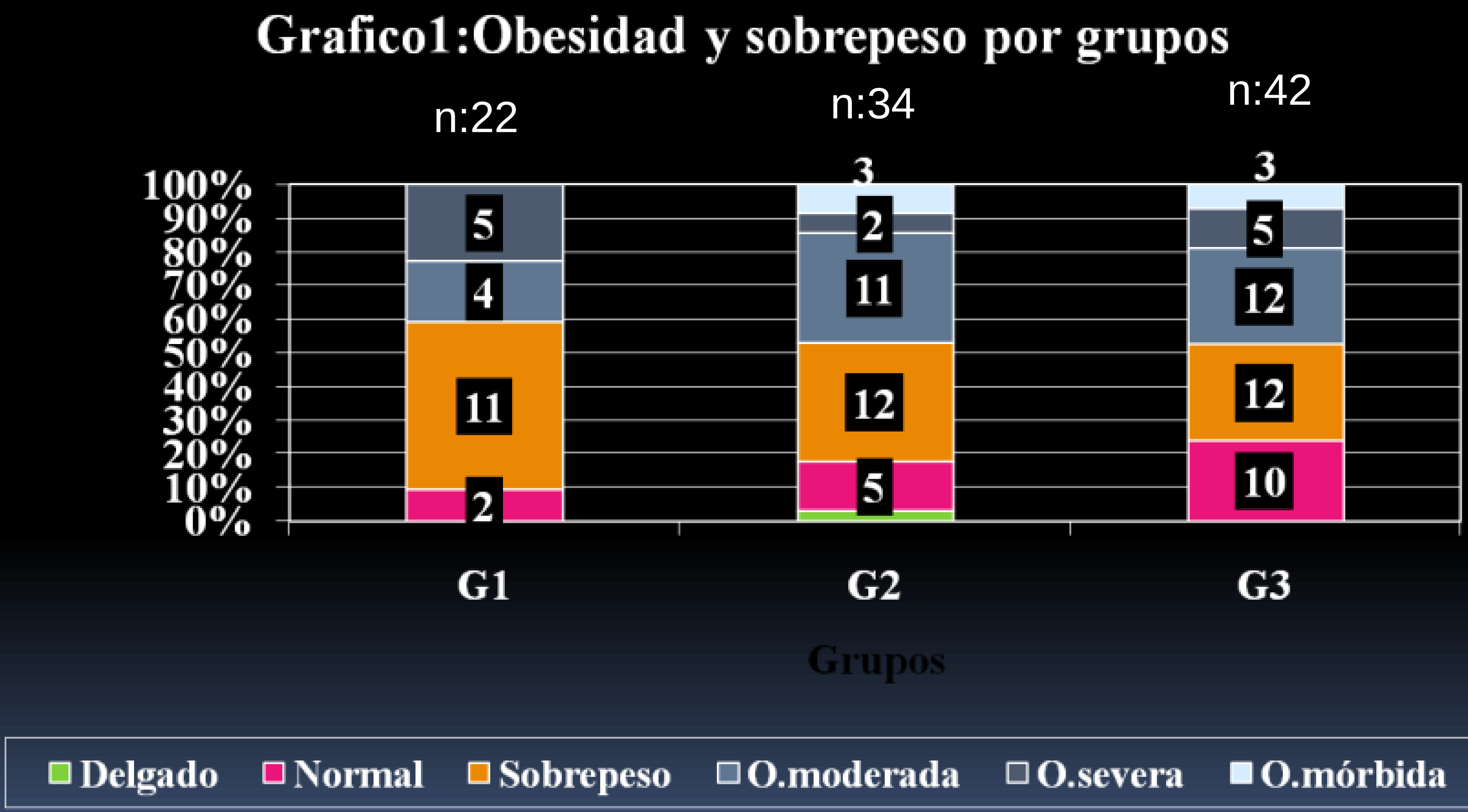
PREVALENCIA DE OBESIDAD Y SOBREPESO EN UNA POBLACION DE EMPLEADOS PUBLICOS

TESINA

Elvio Dario Bueno Colman

Año 2001

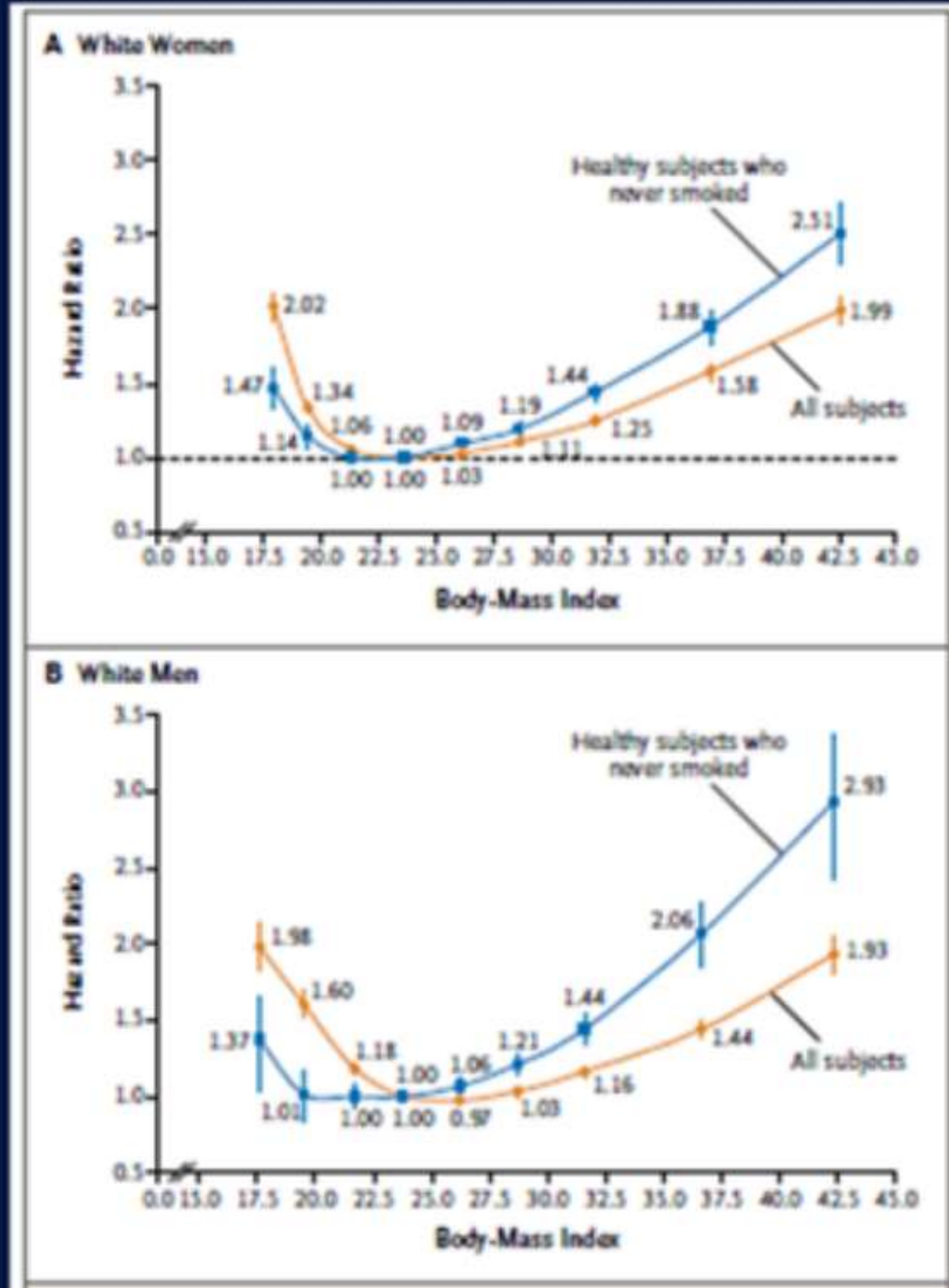
PREVALENCIA DE OBESIDAD Y SOBREPESO EN UNA POBLACION DE EMPLEADOS PUBLICOS



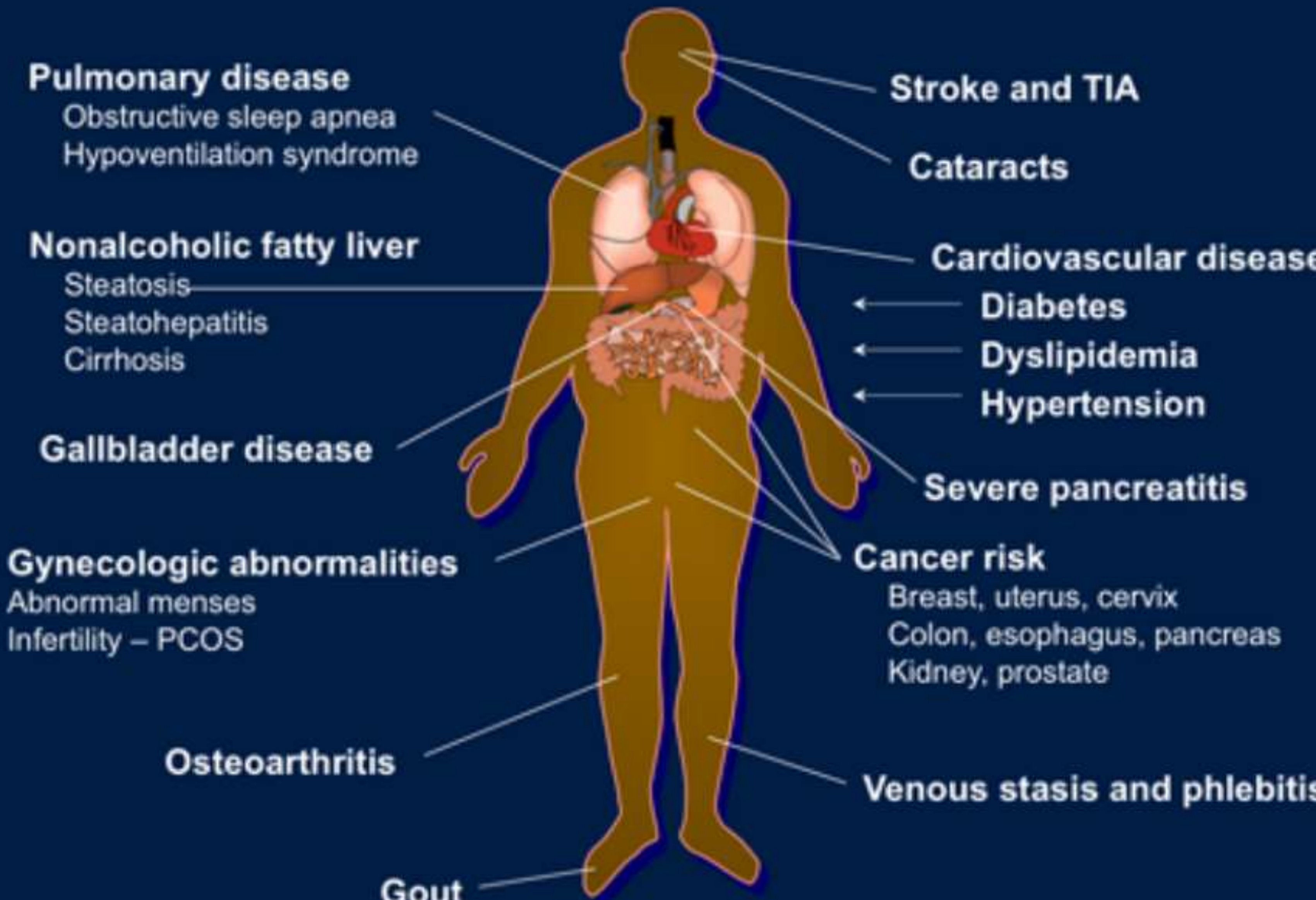
Body-Mass Index and Mortality among 1.46 Million White Adults
N Engl J Med. 2010;363:2211-9.

Any Cause Mortality According to Body-Mass Index for All Study Participants and for Healthy Subjects Who Never Smoked.

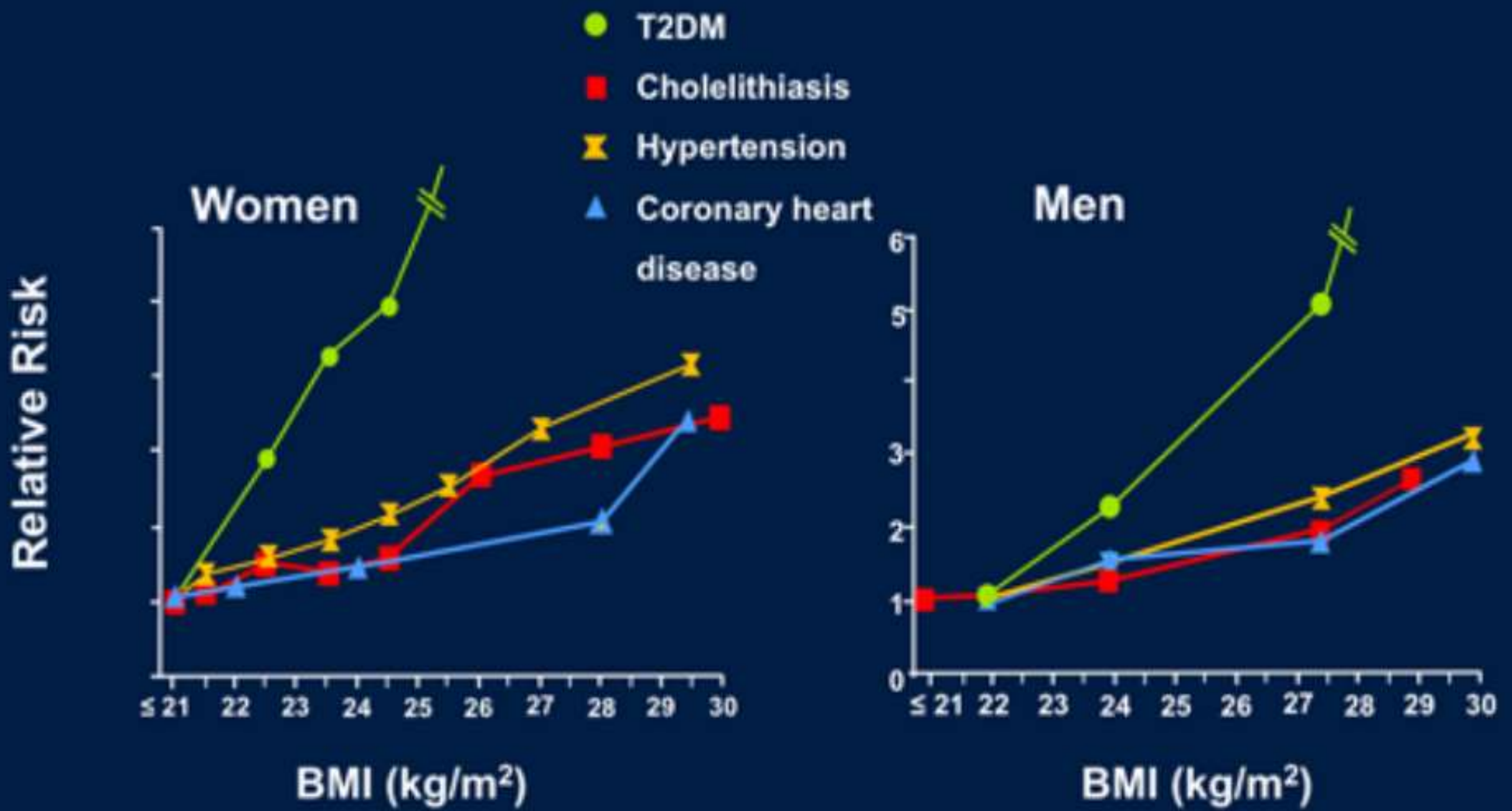
The hazard ratios were calculated with the use of age as the underlying time scale, were stratified by study, and were adjusted for alcohol intake (grams per day), educational level, marital status, and overall physical activity. Subjects were deemed healthy if they had no cancer or heart disease at baseline.



Medical Complications of Obesity



Relationship Between BMI and Comorbidities



Willett WC, et al. *N Engl J Med.* 1999;341(6):427-434. Copyright © 1999 Massachusetts Medical Society.

Bariatric surgery 2

Mechanisms of changes in glucose metabolism and bodyweight after bariatric surgery

Sten Madsbad, Carsten Dirksen, Jens J Holst

www.thelancet.com/diabetes-endocrinology **Vol 2 February 2014**

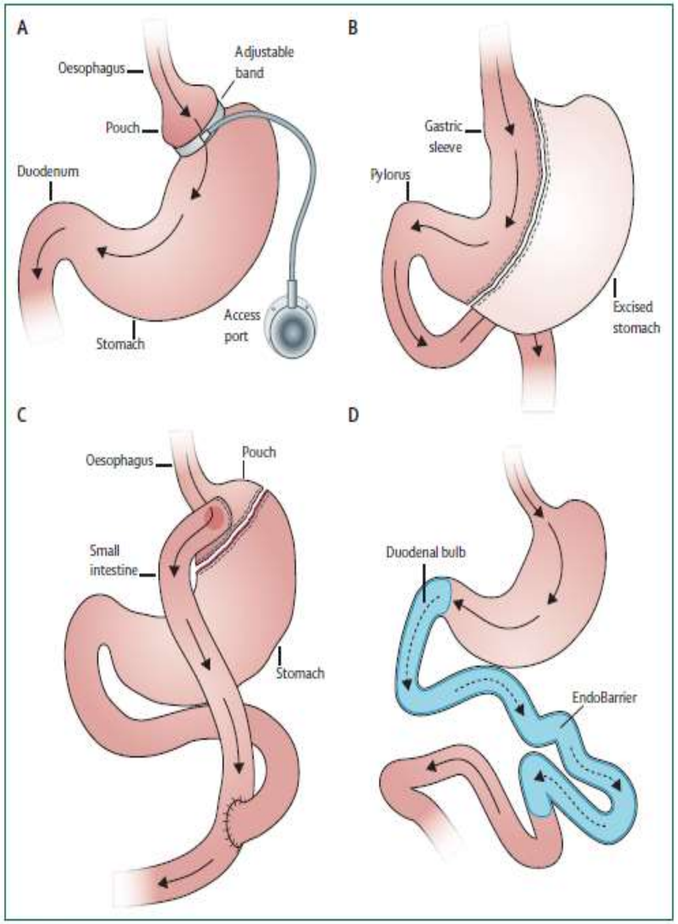


Figure 1: Bariatric surgery procedures

(A) Laparoscopic adjustable gastric banding is a restrictive procedure, wherein a small bracelet-like silicone band is placed proximally around the stomach to produce a pouch of about 30 mL volume with a small opening through which food can enter the rest of the stomach.[8] The band is lined by an inflatable cuff linked to a subcutaneous abdominal reservoir, allowing adjustment of the pouch outflow. (B) Sleeve gastrectomy creates a narrow tube after longitudinal excision of most (70–80%) of the stomach.[8] (C) The laparoscopic Roux-en-Y gastric bypass procedure creates a gastric pouch of about 30 mL volume, which is drained via a Roux-en-Y anastomosis created by division of the proximal jejunum 50–75 cm distal to the ligament of Treitz, bringing the distal segment (the alimentary [Roux] limb) up to form a gastroenterostomy, and joining the proximal segment (the secretory limb) to the small bowel about 100 cm below the point of division. Thus, nutrients bypass the major part of the stomach, the duodenum, and the upper part of the jejunum, and are mixed with biliary and pancreatic secretions at the site of the entero-entero anastomosis.[8] (D) The EndoBarrier gastrointestinal liner is placed endoscopically via the mouth. The device is a 60 cm fluoropolymer sheath, which is positioned in the duodenum bulb and fastened into place with an anchor, and stretches into the first part of the small bowel. The device lines the mucosal surface of the bowel, preventing contact with ingested food and fluids. Digestive enzymes from the duodenum are also prevented from mixing with food over this distance.

	LAGB	VSG	RYGB
GLP-1	→ ↓	↑	↑
Peptide YY	→	↑	↑
Oxyntomodulin	No data	No data	↑
GIP	→	↑ →	↓ → ↑
Cholecystokinin	No data	↑	↑
Ghrelin	↓ → ↑	↓ → ↑	↓ → ↑
Leptin	↓	No data	↓
Energy expenditure	↓	↓	↓
Food intake	↓	↓	↓
Bile acids	→	→	↑
Gut microbiota	Altered	Altered	Altered
Insulin secretion	↓ →	↑	↑
Hepatic insulin sensitivity	↑	↑	↑
Muscle insulin sensitivity	↑	↑	↑
Gastric emptying	→	↑	↑

More than one arrow means that data are conflicting. LAGB=laparoscopic adjustable gastric banding. VSG=vertical sleeve gastrectomy. RYGB=Roux-en-Y gastric bypass. GLP-1=glucagon-like peptide 1. →=no change. ↓=decreased. ↑=increased. GIP=gastric inhibitory polypeptide (also known as glucose-dependent insulinotropic peptide).

***Table*: Mechanisms of weight loss and remission of type 2 diabetes after bariatric surgery**

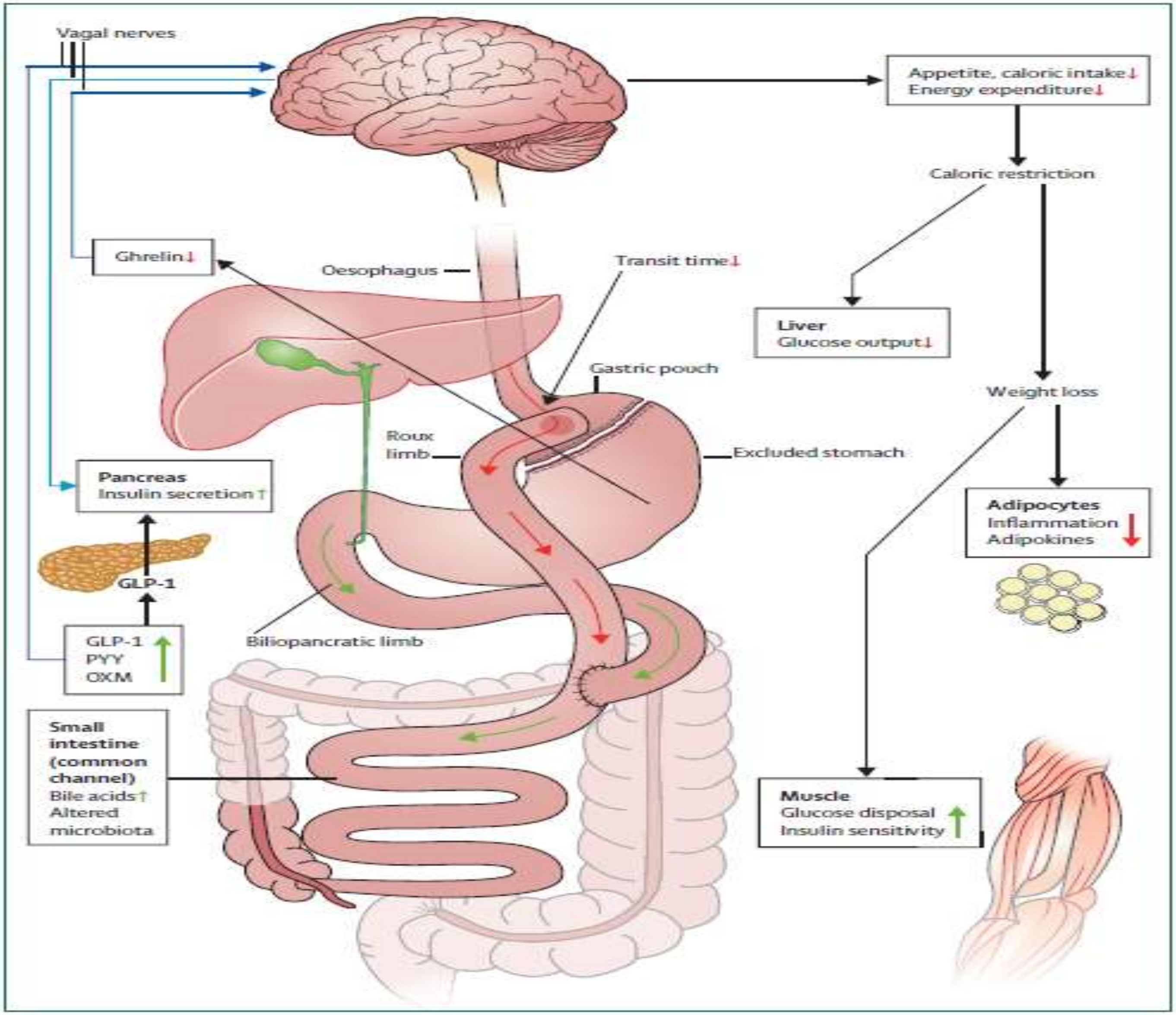


***Figure 3:* Mechanisms of RYGB important for weight loss and improved glycaemic control**

Early effects of Roux-en-Y gastric bypass are induction of postprandial increases in glucagon-like peptide 1 (GLP-1), peptide YY (PYY), and oxyntomodulin (OXM) because of the fast entry of food into the small intestine (alimentary [Roux] limb and common channel), while ghrelin secretion is reduced. Together, these changes are probably the main causes of reduced appetite and food intake. The exaggerated GLP-1 response also accounts for the increase in insulin secretion seen in patients with type 2 diabetes after RYGB. Reduced perioperative caloric intake increases hepatic insulin sensitivity within a few days after surgery. Later effects (ie, after major weight loss occurs) include improvements in skeletal-muscle insulin sensitivity. The importance of increased concentrations of bile acids in the blood and changes in intestinal microbiota with respect to weight loss and remission of diabetes is unclear.

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Surgery Decreases Long-term Mortality, Morbidity, and Health Care Use in Morbidly Obese Patients

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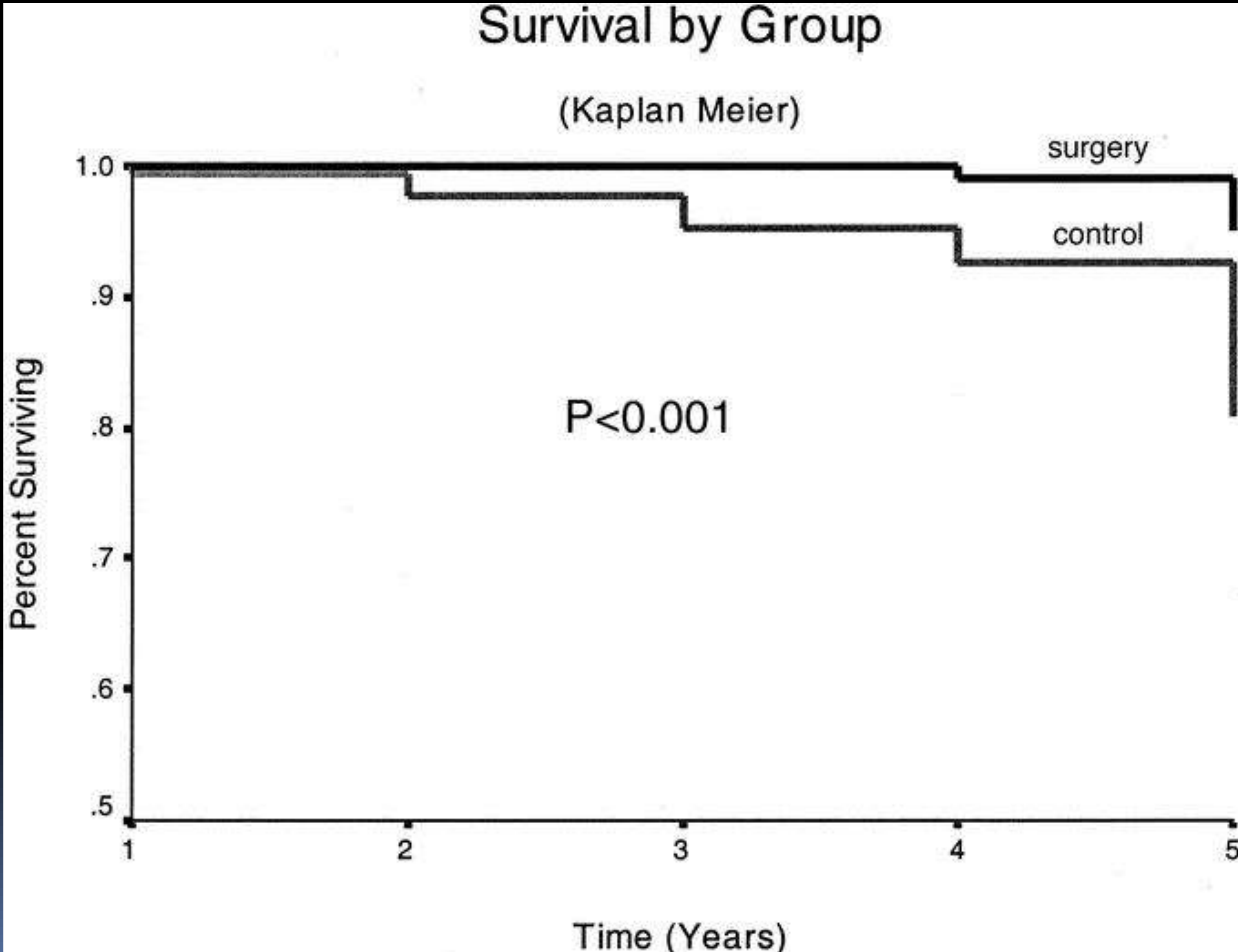

Survival by Group
(Kaplan Meier)
surgery
control
P<0.001
Percent Surviving
1.0
.9
.8
.7
.6
.5
1
2
3
4
5
Time (Years)

TABLE 2. Weight Loss, Bariatric Surgery Cohort

Parameter	Mean	SD	Min–Max
Initial weight (kg)	136.4	28.4	77–284
Initial BMI	50.0	8.2	36–98
Ideal body weight (kg)	64.1	8.4	45–114
Initial excess weight (kg)	72.4	23.8	29–205
Excess BMI	26.5	7.8	12–66
Final weight (kg)	88.8	22.9	42–199
Final BMI	32.6	7.3	16–62
% Initial excess weight loss	67.1	23.7	1–130
% Initial BMI reduction	34.6	12.1	1–65
Overall follow-up (years)	5.3	3.8	1–16

TABLE 4. Five-Year Morbidity and Mortality

Condition/disease	Cohort: Bariatric Surgery n	Cohort: Bariatric Surgery %	Cohort: Controls n	Cohort: Controls %	Relative Risk Reduction: Estimate	Relative Risk Reduction: 95%	Relative Risk Reduction: CI	P Value
Blood and blood-forming organs	4	0.39	41	0.72	0.54	0.19	1.50	0.230
Cancer	21	2.03	487	8.49	0.24	0.17	0.39	0.001
Cardiovascular and circulatory	49	4.73	1530	26.69	0.18	0.12	0.22	0.001
Digestive	377	36.43	1414	24.66	1.48	1.42	1.78	0.001
Endocrinological	98	9.47	1566	27.25	0.35	0.32	0.38	0.001
Genitourinary	77	7.44	551	9.61	0.77	0.63	0.97	0.027
Infectious diseases	90	8.70	2140	37.33	0.23	0.17	0.25	0.001
Musculoskeletal	50	4.83	682	11.90	0.41	0.32	0.55	0.001
Nervous system	25	2.42	228	3.98	0.61	0.44	0.93	0.010
Psychiatric and mental	45	4.35	470	8.20	0.53	0.41	0.73	0.001
Respiratory	28	2.71	651	11.36	0.24	0.17	0.36	0.001
Skin	38	3.67	305	5.32	0.69	0.48	0.96	0.027
Mortality	7	0.68	354	6.17	0.11	0.04	0.27	0.001

TABLE 5. Five-Year Health Care Use

Parameter	Cohort: Bariatric	Cohort: Controls	*P* Value
	Mean (SD) [95% CI]	Mean (SD) [95% CI]	
Hospitalizations	2.75 (3.44) [2.53–2.95]	3.17 (3.22) [3.08–3.25]	0.001
Hospital stay (days)	21.05 (38.97) [18.67–23.43]	36.59 (25.41) [33.33–39.83]	0.001
Physician visits	9.62 (15.8) [8.66–10.59]	17.00 (21.74) [16.53–17.67)]	0.001
Total direct costs* (1996 Canadian $)	8,813 (2,344) [7623–8743]	11,854 (2,1220) [9,948–12,758]	0.001

*Includes costs for surgery and postsurgical care

The NEW ENGLAND JOURNAL of MEDICINE

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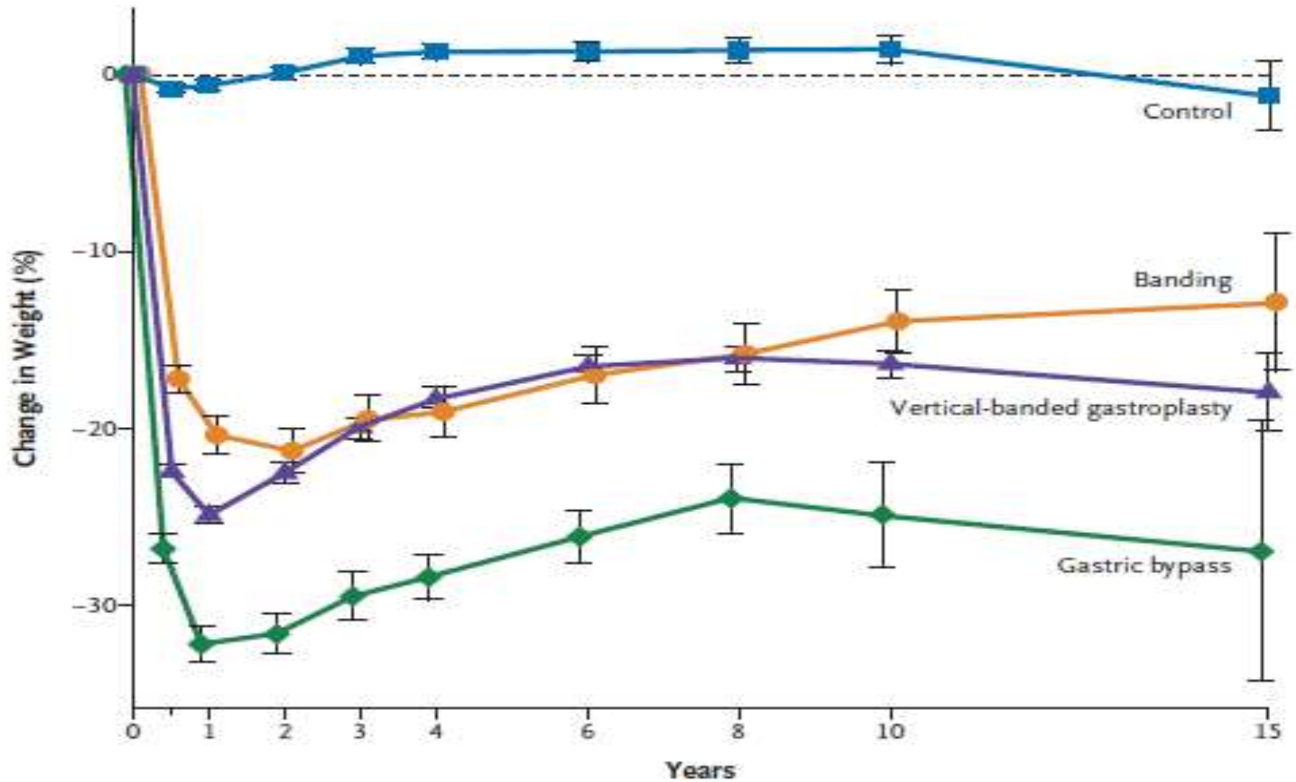
Effects of Bariatric Surgery on Mortality in Swedish Obese Subjects

Lars Sjöström, M.D., Ph.D., Kristina Narbro, Ph.D., C. David Sjöström, M.D., Ph.D., Kristjan Karason, M.D., Ph.D., Bo Larsson, M.D., Ph.D., Hans Wedel, Ph.D., Ted Lystig, Ph.D., Marianne Sullivan, Ph.D., Claude Bouchard, Ph.D., Björn Carlsson, M.D., Ph.D., Calle Bengtsson, M.D., Ph.D., Sven Dahlgren, M.D., Ph.D., Anders Gummesson, M.D., Peter Jacobson, M.D., Ph.D., Jan Karlsson, Ph.D., Anna-Karin Lindroos, Ph.D., Hans Lönroth, M.D., Ph.D., Ingmar Näslund, M.D., Ph.D., Torsten Olbers, M.D., Ph.D., Kaj Stenlöf, M.D., Ph.D., Jarl Torgerson, M.D., Ph.D., Göran Ågren, M.D., and Lena M.S. Carlsson, M.D., Ph.D., for the Swedish Obese Subjects Study

Figure 2 depicts the cumulative overall mortality during a period of up to 16 years. Subjects in the

iatric surgery appeared more relevant than either the degree of subsequent weight loss or the type

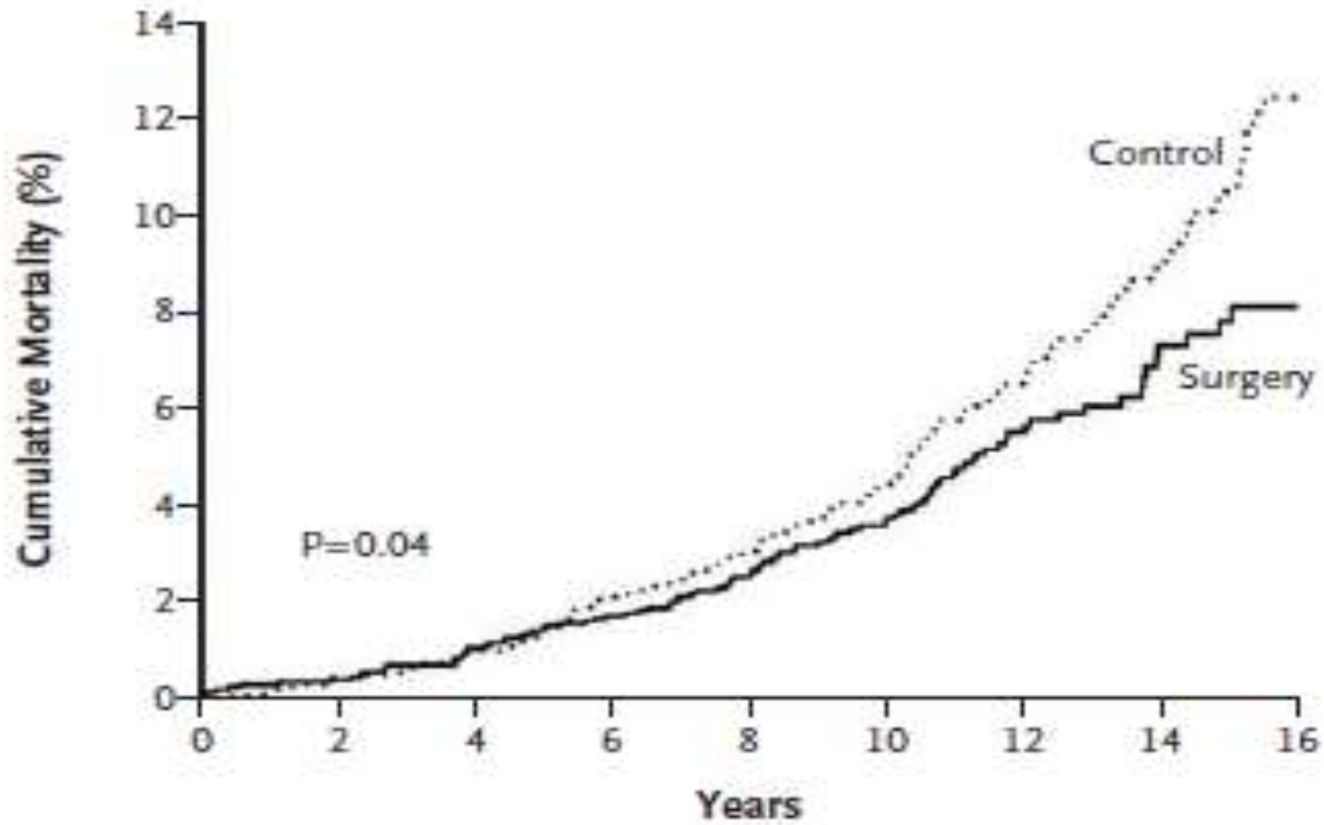


No. Examined

Control	2037	1768	1660	1553	1490	1281	982	886	190
Banding	376	363	357	328	333	298	267	237	52
Vertical-banded gastroplasty	1369	1298	1244	1121	1086	1004	899	746	108
Gastric bypass	265	245	245	211	209	166	92	58	10

Figure 1. Mean Percent Weight Change during a 15-Year Period in the Control Group and the Surgery Group, According to the Method of Bariatric Surgery.

I bars denote 95% confidence intervals.



No. at Risk

Surgery	2010	2001	1987	1821	1590	1260	760	422	169
Control	2037	2027	2016	1842	1455	1174	749	422	156

Figure 2. Unadjusted Cumulative Mortality.

The hazard ratio for subjects who underwent bariatric surgery, as compared with control subjects, was 0.76 (95% confidence interval, 0.59 to 0.99; $P=0.04$), with 129 deaths in the control group and 101 in the surgery group.

DIABETES

The NEW ENGLAND JOURNAL of MEDICINE

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Lifestyle, Diabetes, and Cardiovascular Risk Factors 10 Years after Bariatric Surgery

Lars Sjöström, M.D., Ph.D., Anna-Karin Lindroos, Ph.D., Markku Peltonen, Ph.D., Jarl Torgerson, M.D., Ph.D., Claude Bouchard, Ph.D., Björn Carlsson, M.D., Ph.D., Sven Dahlgren, M.D., Ph.D., Bo Larsson, M.D., Ph.D., Kristina Narbro, Ph.D., Carl David Sjöström, M.D., Ph.D., Marianne Sullivan, Ph.D., and Hans Wedel, Ph.D., for the Swedish Obese Subjects Study Scientific Group*

ABSTRACT

BACKGROUND

Weight loss is associated with short-term amelioration and prevention of metabolic and cardiovascular risk, but whether these benefits persist over time is unknown.

METHODS

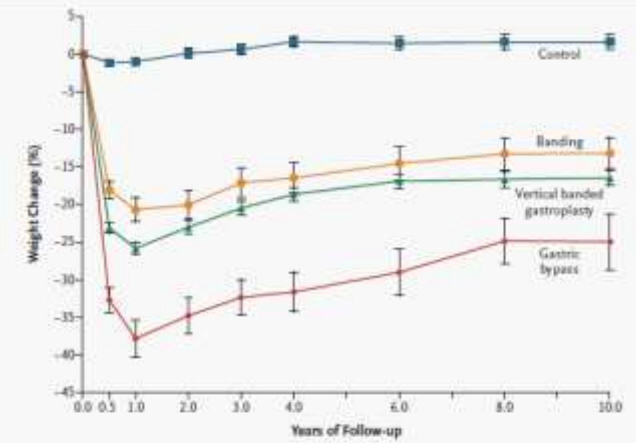
The prospective, controlled Swedish Obese Subjects Study involved obese subjects who underwent gastric surgery and contemporaneously matched, conventionally treated obese control subjects. We now report follow-up data for subjects (mean age, 48 years; mean body-mass index, 41) who had been enrolled for at least 2 years (4047 subjects) or 10 years (1703 subjects) before the analysis (January 1, 2004). The follow-up rate for laboratory examinations was 86.6 percent at 2 years and 74.5 percent at 10 years.

RESULTS

After two years, the weight had increased by 0.1 percent in the control group and had decreased by 23.4 percent in the surgery group (P<0.001). After 10 years, the weight had increased by 1.6 percent and decreased by 16.1 percent, respectively (P<0.001). Energy intake was lower and the proportion of physically active subjects higher in the surgery group than in the control group throughout the observation period. Two- and 10-year rates of recovery from diabetes, hypertriglyceridemia, low levels of high-density lipoprotein cholesterol, hypertension, and hyperuricemia were more favorable in the surgery group than in the control group, whereas recovery from hypercholesterolemia did not differ between the groups. The surgery group had lower 2- and 10-year incidence rates of diabetes, hypertriglyceridemia, and hyperuricemia than the control group; differences between the groups in the incidence of hypercholesterolemia and hypertension were undetectable.

CONCLUSIONS

As compared with conventional therapy, bariatric surgery appears to be a viable option for the treatment of severe obesity, resulting in long-term weight loss, improved lifestyle, and, except for hypercholesterolemia, amelioration in risk factors that were elevated at baseline.



No. of Subjects	0.0	0.5	1.0	2.0	3.0	4.0	6.0	8.0	10.0
Control	627	585	594	587	577	563	542	535	627
Banding	156	150	154	153	149	150	147	144	156
Vertical banded gastroplasty	451	438	438	438	429	417	412	401	451
Gastric bypass	34	34	34	34	33	32	32	29	34

Figure 1. Weight Changes among Subjects in the SOS Study over a 10-Year Period.

All data are for subjects who completed 10 years of the study. The average weight change in the entire group of surgically treated subjects was almost identical to that in the subgroup of subjects who underwent vertical banded gastroplasty. The I bars represent the 95 percent confidence intervals.

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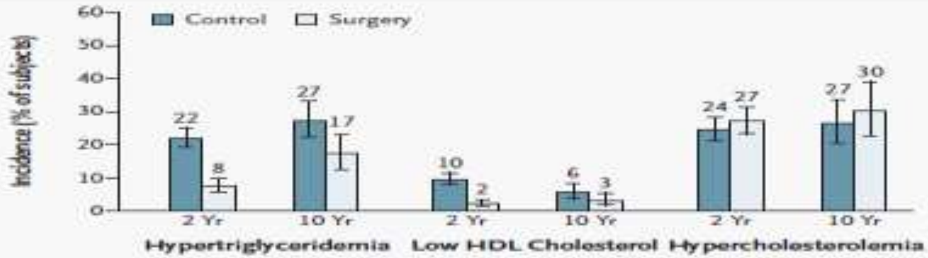
ESTABLISHED IN 1812 DECEMBER 23, 2004 VOL. 351 NO. 26

Lifestyle, Diabetes, and Cardiovascular Risk Factors 10 Years after Bariatric Surgery

Lars Sjöström, M.D., Ph.D., Anna-Karin Lindroos, Ph.D., Markku Peltonen, Ph.D., Jarl Torgerson, M.D., Ph.D., Claude Bouchard, Ph.D., Björn Carlsson, M.D., Ph.D., Sven Dahlgren, M.D., Ph.D., Bo Larsson, M.D., Ph.D., Kristina Narbro, Ph.D., Carl David Sjöström, M.D., Ph.D., Marianne Sullivan, Ph.D., and Hans Wedel, Ph.D., for the Swedish Obese Subjects Study Scientific Group*

ABSTRACT



	Hypertriglyceridemia 2 Yr	Hypertriglyceridemia 10 Yr	Low HDL Cholesterol 2 Yr	Low HDL Cholesterol 10 Yr	Hypercholesterolemia 2 Yr	Hypercholesterolemia 10 Yr
No. of subjects						
Control	801	281	1174	440	596	188
Surgery	731	225	1293	431	504	135
Odds ratio	0.29	0.61	0.21	0.57	1.27	1.16
95% CI	0.21–0.41	0.39–0.95	0.14–0.32	0.29–1.15	0.95–1.69	0.69–1.95
P value	<0.001	0.03	<0.001	0.12	0.11	0.57

	Diabetes 2 Yr	Diabetes 10 Yr	Hypertension 2 Yr	Hypertension 10 Yr	Hyperuricemia 2 Yr	Hyperuricemia 10 Yr
No. of subjects						
Control	1402	539	770	279	1017	382
Surgery	1489	517	623	215	1044	342
Odds ratio	0.14	0.25	0.78	0.75	0.22	0.49
95% CI	0.08–0.24	0.17–0.38	0.60–1.01	0.52–1.08	0.15–0.31	0.34–0.71
P value	<0.001	<0.001	0.06	0.13	<0.001	<0.001

Figure 3. Incidence of Diabetes, Lipid Disturbances, Hypertension, and Hyperuricemia among Subjects in the SOS Study over 2- and 10-Year Periods.

Data are for subjects who completed 2 years and 10 years of the study. The bars and the values above the bars indicate unadjusted incidence rates; I bars represent the corresponding 95 percent confidence intervals (CIs). The odds ratios, 95 percent CIs for the odds ratios, and P values have been adjusted for sex, age, and body-mass index at the time of inclusion in the intervention study.

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Bariatric Surgery and Prevention of Type 2 Diabetes in Swedish Obese Subjects

Lena M.S. Carlsson, M.D., Ph.D., Markku Peltonen, Ph.D., Sofie Ahlin, M.D., Åsa Anveden, M.D., Claude Bouchard, Ph.D., Björn Carlsson, M.D., Ph.D., Peter Jacobson, M.D., Ph.D., Hans Lönroth, M.D., Ph.D., Cristina Maglio, M.D., Ingmar Näslund, M.D., Ph.D., Carlo Pirazzi, M.D., Stefano Romeo, M.D., Ph.D., Kajsa Sjöholm, Ph.D., Elisabeth Sjöström, M.D, Hans Wedel, Ph.D., Per-Arne Svensson, Ph.D., and Lars Sjöström, M.D., Ph.D.

ABSTRACT

BACKGROUND

Weight loss protects against type 2 diabetes but is hard to maintain with behavioral modification alone. In an analysis of data from a nonrandomized, prospective, controlled study, we examined the effects of bariatric surgery on the prevention of type 2 diabetes.

METHODS

In this analysis, we included 1658 patients who underwent bariatric surgery and 1771 obese matched controls (with matching performed on a group, rather than individual, level). None of the participants had diabetes at baseline. Patients in the bariatric-surgery cohort underwent banding (19%), vertical banded gastroplasty (69%), or gastric bypass (12%); nonrandomized, matched, prospective controls received usual care. Participants were 37 to 60 years of age, and the body-mass index (BMI; the weight in kilograms divided by the square of the height in meters) was 34 or more in men and 38 or more in women. This analysis focused on the rate of incident type 2 diabetes, which was a prespecified secondary end point in the main study. At the time of this analysis (January 1, 2012), participants had been followed for up to 15 years. Despite matching, some baseline characteristics differed significantly between the groups; the baseline body weight was higher and risk factors were more pronounced in the bariatric-surgery group than in the control group. At 15 years, 36.2% of the original participants had dropped out of the study, and 30.9% had not yet reached the time for their 15-year follow-up examination.

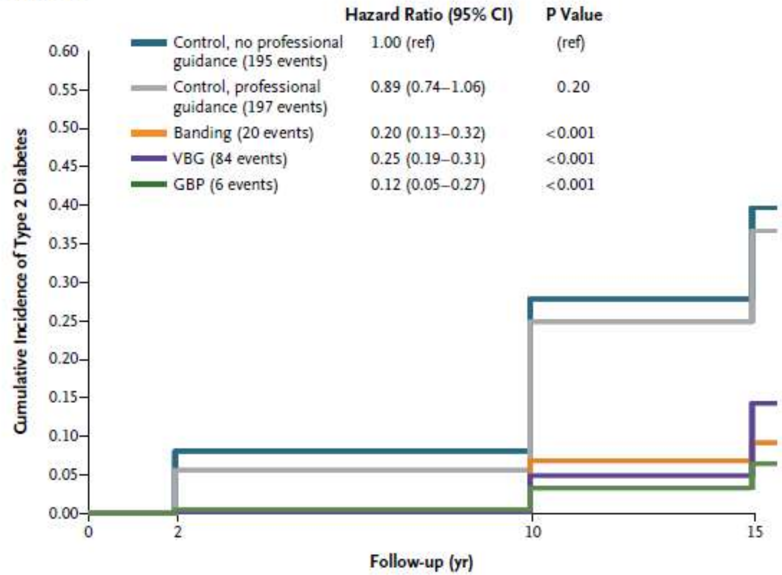
RESULTS

During the follow-up period, type 2 diabetes developed in 392 participants in the control group and in 110 in the bariatric-surgery group, corresponding to incidence rates of 28.4 cases per 1000 person-years and 6.8 cases per 1000 person-years, respectively (adjusted hazard ratio with bariatric surgery, 0.17; 95% confidence interval, 0.13 to 0.21; P<0.001). The effect of bariatric surgery was influenced by the presence or absence of impaired fasting glucose (P=0.002 for the interaction) but not by BMI (P=0.54). Sensitivity analyses, including end-point imputations, did not change the overall conclusions. The postoperative mortality was 0.2%, and 2.8% of patients who underwent bariatric surgery required reoperation within 90 days owing to complications.

CONCLUSIONS

Bariatric surgery appears to be markedly more efficient than usual care in the prevention of type 2 diabetes in obese persons. (Funded by the Swedish Research Council and others; ClinicalTrials.gov number, NCT01479452.)

B Surgery and Control Subgroups



No. at Risk

Control, no professional guidance	871	691	489	207
Control, professional guidance	900	822	587	197
Banding	311	302	244	121
VBG	1140	1064	841	424
GBP	207	195	140	31

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Bariatric Surgery versus Conventional Medical Therapy for Type 2 Diabetes

Geltrude Mingrone, M.D., Simona Panunzi, Ph.D., Andrea De Gaetano, M.D., Ph.D., Caterina Guidone, M.D., Amerigo Iaconelli, M.D., Laura Leccesi, M.D., Giuseppe Nanni, M.D., Alfons Pomp, M.D., Marco Castagneto, M.D., Giovanni Ghirlanda, M.D., and Francesco Rubino, M.D.

ABSTRACT

BACKGROUND

Roux-en-Y gastric bypass and biliopancreatic diversion can markedly ameliorate diabetes in morbidly obese patients, often resulting in disease remission. Prospective, randomized trials comparing these procedures with medical therapy for the treatment of diabetes are needed.

METHODS

In this single-center, nonblinded, randomized, controlled trial, 60 patients between the ages of 30 and 60 years with a body-mass index (BMI, the weight in kilograms divided by the square of the height in meters) of 35 or more, a history of at least 5 years of diabetes, and a glycated hemoglobin level of 7.0% or more were randomly assigned to receive conventional medical therapy or undergo either gastric bypass or biliopancreatic diversion. The primary end point was the rate of diabetes remission at 2 years (defined as a fasting glucose level of <100 mg per deciliter [5.6 mmol per liter] and a glycated hemoglobin level of <6.5% in the absence of pharmacologic therapy).

RESULTS

At 2 years, diabetes remission had occurred in no patients in the medical-therapy group versus 75% in the gastric-bypass group and 95% in the biliopancreatic-diversion group (P<0.001 for both comparisons). Age, sex, baseline BMI, duration of diabetes, and weight changes were not significant predictors of diabetes remission at 2 years or of improvement in glycemia at 1 and 3 months. At 2 years, the average baseline glycated hemoglobin level (8.65±1.45%) had decreased in all groups, but patients in the two surgical groups had the greatest degree of improvement (average glycated hemoglobin levels, 7.69±0.57% in the medical-therapy group, 6.35±1.42% in the gastric-bypass group, and 4.95±0.49% in the biliopancreatic-diversion group).

CONCLUSIONS

In severely obese patients with type 2 diabetes, bariatric surgery resulted in better glucose control than did medical therapy. Preoperative BMI and weight loss did not predict the improvement in hyperglycemia after these procedures. (Funded by Catholic University of Rome; ClinicalTrials.gov number, NCT00888836.)

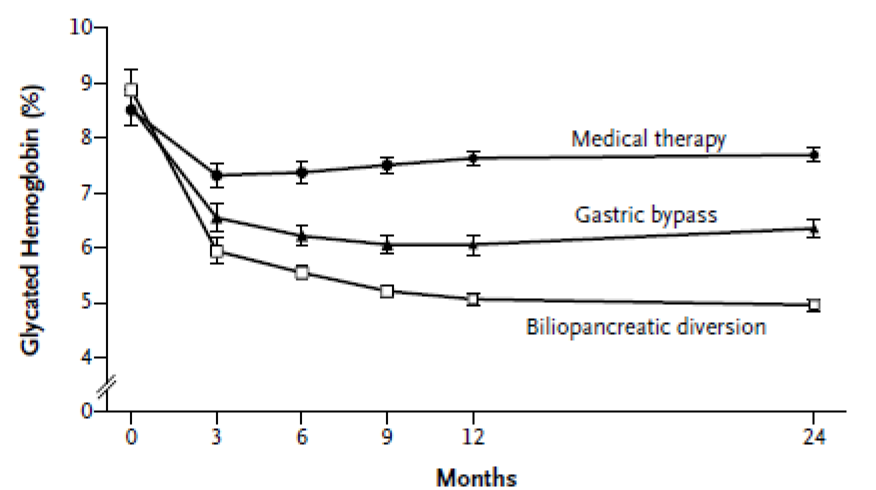


Figure 2. Glycated Hemoglobin Levels during 2 Years of Follow-up.

N Engl J Med 2012;366:1577-85.
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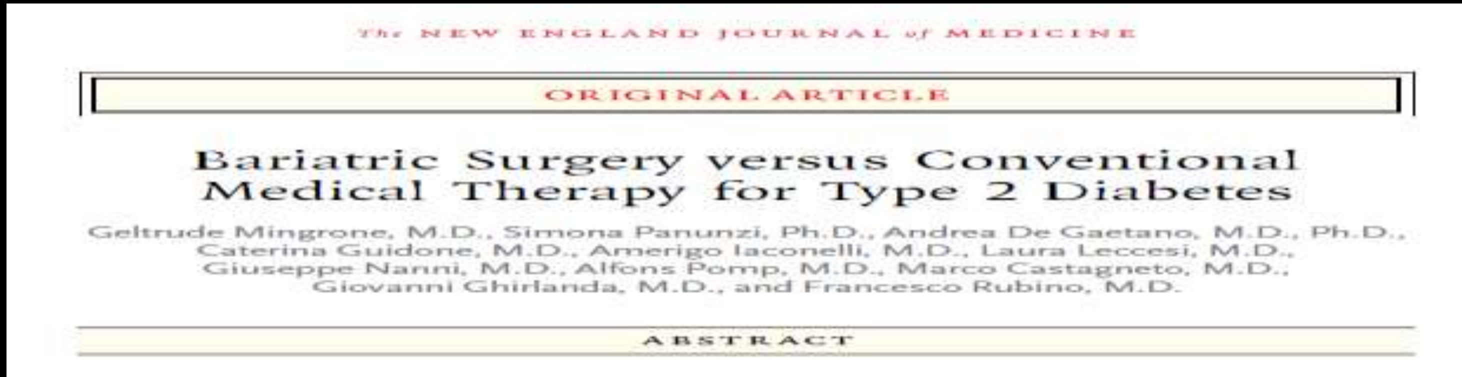
Table 2. Average Absolute Values and Percentage Changes at 2 Years.*

Variable	Medical Therapy (N=18)	Biliopancreatic Diversion (N=19)	Gastric Bypass (N=19)	P Value†			
				Overall	Biliopancreatic Diversion vs. Medical Therapy	Gastric Bypass vs. Medical Therapy	Gastric Bypass vs. Biliopancreatic Diversion
Glucose (mmol/liter)	7.83±1.66	3.89±0.67	5.69±3.07	<0.001	<0.001	0.005	0.03
Change from baseline (%)	−14.37±11.93	−56.23±10.01	−37.81±33.75				
Glycated hemoglobin (%)	7.69±0.57	4.95±0.49	6.35±1.42	<0.001	<0.001	0.003	0.001
Change from baseline (%)	−8.39±9.93	−43.01±9.64	−25.18±20.89				
Cholesterol (mmol/liter)							
Total	4.91±0.87	2.77±0.81	4.27±0.77	<0.001	<0.001	0.31	<0.001
Change from baseline (%)	−16.82±11.60	−49.25±11.52	−6.83±27.03				
High-density lipoprotein	1.05±0.20	1.08±0.16	1.47±0.31	<0.001	0.61	<0.001	0.01
Change from baseline (%)	6.03±6.25	12.98±20.66	29.66±18.21				
Low-density lipoprotein	2.98±0.83	1.25±0.71	2.20±0.72	<0.001	<0.001	1.00	<0.001
Change from baseline (%)	−20.31±15.24	−64.63±15.93	−17.21±36.21				
Triglycerides (mmol/liter)	1.91±0.39	0.96±0.32	1.15±0.48	<0.001	<0.001	1.00	0.001
Change from baseline (%)	−18.28±7.84	−56.79±16.70	−21.17±41.23				
Blood pressure (mm Hg)							
Systolic	134.44±10.97	129.21±8.04	132.11±10.45	0.32	1.00	1.00	0.40
Change from baseline (%)	−11.15±12.71	−14.55±12.63	−9.02±7.51				
Diastolic	87.28±9.32	82.37±4.21	84.21±4.79	0.13	0.23	1.00	0.24
Change from baseline (%)	−7.14±11.51	−13.06±8.97	−7.30±9.42				
Weight (kg)	128.06±19.77	89.53±17.84	84.29±13.35	<0.001	<0.001	<0.001	1.00
Change from baseline (%)	−4.74±6.37	−33.82±10.17	−33.31±7.88				
Excess weight lost (%)	9.29±12.94	69.36±17.60	68.08±12.70	<0.001	<0.001	<0.001	1.00
Body-mass index	43.07±6.44	29.19±4.90	29.31±2.64	<0.001	<0.001	<0.001	1.00
Change from baseline (%)	−4.73±6.37	−33.82±10.17	−33.31±7.88				
Waist (cm)	116.33±12.14	103.53±16.94	98.58±13.06	<0.001	<0.001	<0.001	1.00
Change from baseline (%)	−7.69±7.80	−20.70±8.34	−19.91±8.44				

* Plus–minus values are means ±SD.

† P values for the overall comparisons were calculated with the use of analysis of variance. P values for the comparisons between each of the two surgical procedures and medical therapy and for the comparison between the two types of surgery were calculated with the use of the Bonferroni method in post hoc analyses.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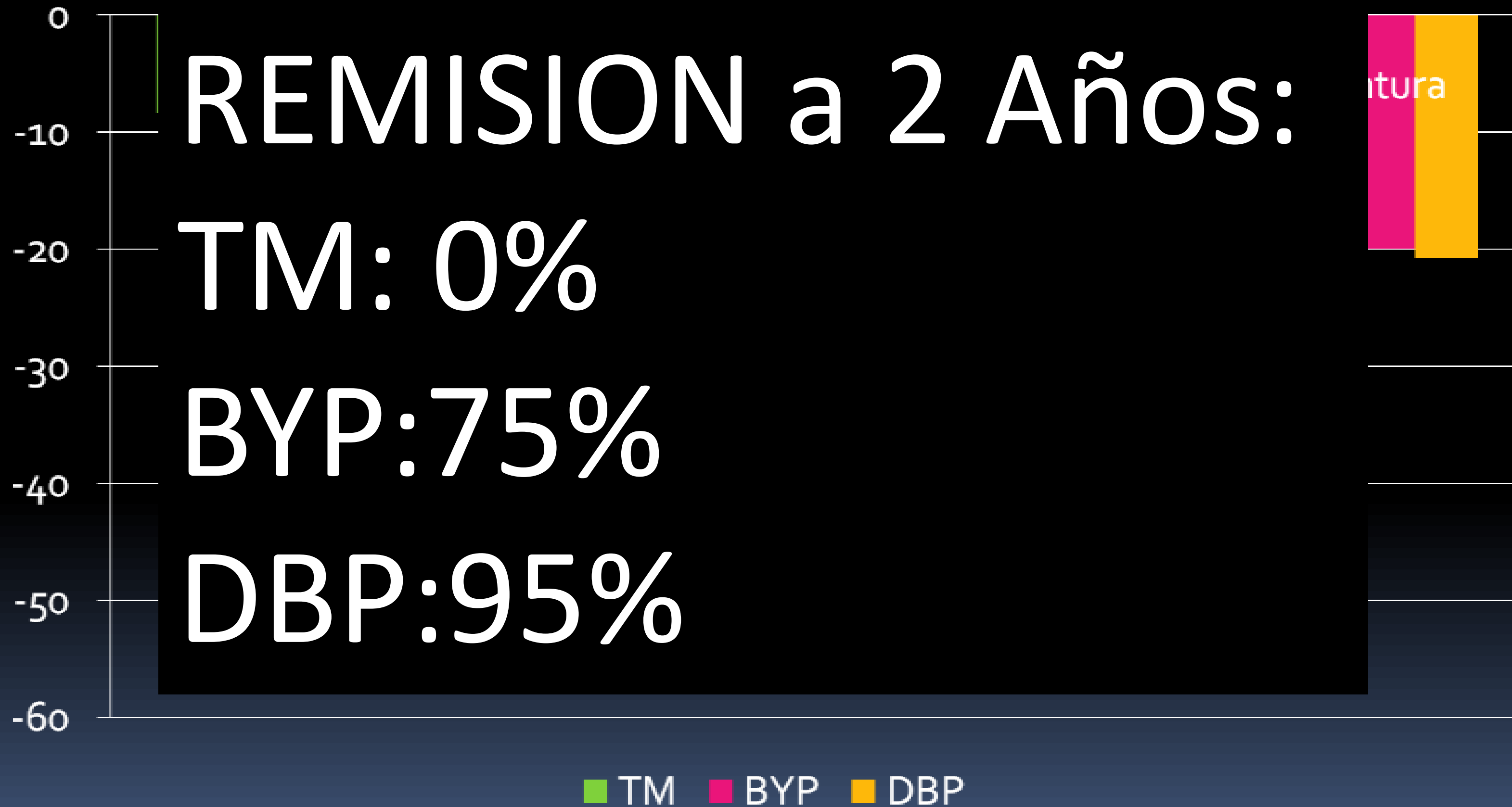
ABSTRACT

REMISION a 2 Años:

TM: 0%

BYP:75%

DBP:95%



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 APRIL 26, 2012 VOL. 366 NO. 17

Bariatric Surgery versus Intensive Medical Therapy in Obese Patients with Diabetes

Philip R. Schauer, M.D., Sangeeta R. Kashyap, M.D., Kathy Wolski, M.P.H., Stacy A. Brethauer, M.D., John P. Kirwan, Ph.D., Claire E. Pothier, M.P.H., Susan Thomas, R.N., Beth Abood, R.N., Steven E. Nissen, M.D., and Deepak L. Bhatt, M.D., M.P.H.

ABSTRACT

BACKGROUND

Observational studies have shown improvement in patients with type 2 diabetes mellitus after bariatric surgery.

METHODS

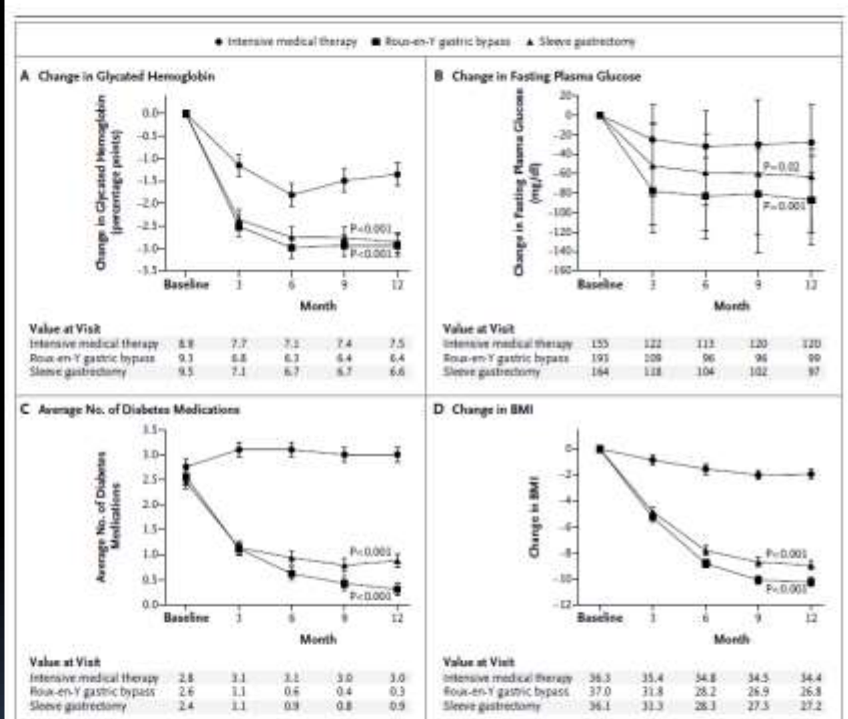
In this randomized, nonblinded, single-center trial, we evaluated the efficacy of intensive medical therapy alone versus medical therapy plus Roux-en-Y gastric bypass or sleeve gastrectomy in 150 obese patients with uncontrolled type 2 diabetes. The mean (±SD) age of the patients was 49±8 years, and 66% were women. The average glycated hemoglobin level was 9.2±1.5%. The primary end point was the proportion of patients with a glycated hemoglobin level of 6.0% or less 12 months after treatment.

RESULTS

Of the 150 patients, 93% completed 12 months of follow-up. The proportion of patients with the primary end point was 12% (5 of 41 patients) in the medical-therapy group versus 42% (21 of 50 patients) in the gastric-bypass group (P=0.002) and 37% (18 of 49 patients) in the sleeve-gastrectomy group (P=0.008). Glycemic control improved in all three groups, with a mean glycated hemoglobin level of 7.5±1.8% in the medical-therapy group, 6.4±0.9% in the gastric-bypass group (P<0.001), and 6.6±1.0% in the sleeve-gastrectomy group (P=0.003). Weight loss was greater in the gastric-bypass group and sleeve-gastrectomy group (−29.4±9.0 kg and −25.1±8.5 kg, respectively) than in the medical-therapy group (−5.4±8.0 kg) (P<0.001 for both comparisons). The use of drugs to lower glucose, lipid, and blood-pressure levels decreased significantly after both surgical procedures but increased in patients receiving medical therapy only. The index for homeostasis model assessment of insulin resistance (HOMA-IR) improved significantly after bariatric surgery. Four patients underwent reoperation. There were no deaths or life-threatening complications.

CONCLUSIONS

In obese patients with uncontrolled type 2 diabetes, 12 months of medical therapy plus bariatric surgery achieved glycemic control in significantly more patients than medical therapy alone. Further study will be necessary to assess the durability of these results. (Funded by Ethicon Endo-Surgery and others; ClinicalTrials.gov number, NCT00432809.)



A — Value at Visit

Value at Visit	Baseline	3	6	9	12
Intensive medical therapy	8.8	7.7	7.1	7.4	7.5
Roux-en-Y gastric bypass	9.3	6.8	6.3	6.4	6.4
Sleeve gastrectomy	9.5	7.1	6.7	6.7	6.6

B — Value at Visit

Value at Visit	Baseline	3	6	9	12
Intensive medical therapy	155	122	113	120	120
Roux-en-Y gastric bypass	193	109	96	96	99
Sleeve gastrectomy	164	118	104	102	97

C — Value at Visit

Value at Visit	Baseline	3	6	9	12
Intensive medical therapy	2.8	3.1	3.1	3.0	3.0
Roux-en-Y gastric bypass	2.6	1.1	0.6	0.4	0.3
Sleeve gastrectomy	2.4	1.1	0.9	0.8	0.9

D — Value at Visit

Value at Visit	Baseline	3	6	9	12
Intensive medical therapy	36.3	35.4	34.8	34.5	34.4
Roux-en-Y gastric bypass	37.0	31.8	28.2	26.9	26.8
Sleeve gastrectomy	36.1	31.3	28.3	27.3	27.2

Figure 1. Changes in Measures of Diabetes Control from Baseline.

Values for change in glycated hemoglobin (Panel A), change in fasting plasma glucose (Panel B), the average number of diabetes medications (Panel C), and change in body-mass index (BMI) (Panel D) were plotted at 3, 6, 9, and 12 months. Least-square means and standard errors from a repeated measures model are plotted for glycated hemoglobin, average number of medications, and BMI; medians and interquartile ranges are plotted for fasting plasma glucose. P values are for the comparison between each surgical group and the medical-therapy group and were calculated from a repeated-measures model that considers data over time.

The NEW ENGLAND JOURNAL of MEDICINE

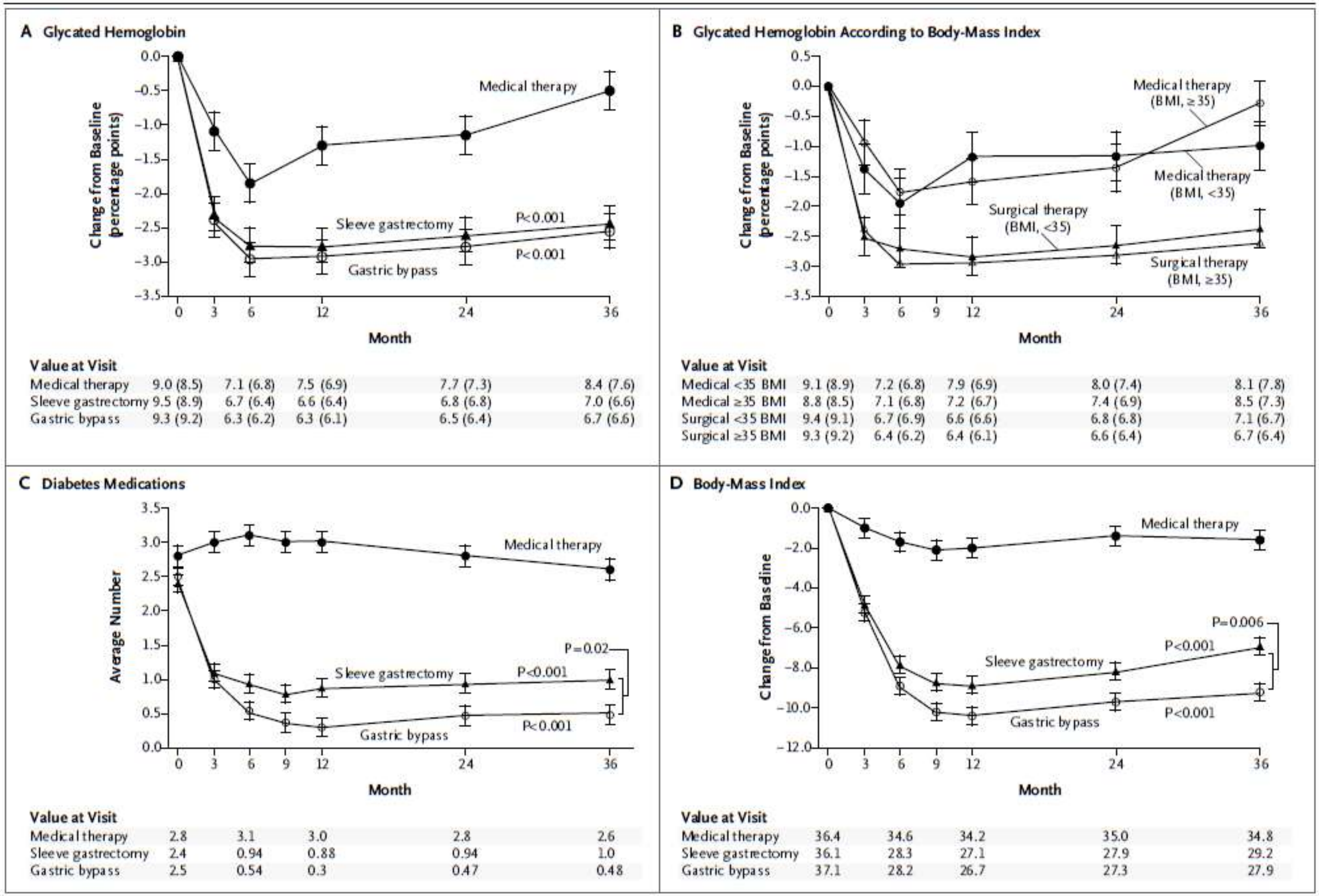
ORIGINAL ARTICLE

Bariatric Surgery versus Intensive Medical Therapy for Diabetes — 3-Year Outcomes

Philip R. Schauer, M.D., Deepak L. Bhatt, M.D., M.P.H., John P. Kirwan, Ph.D., Kathy Wolski, M.P.H., Stacy A. Brethauer, M.D., Sankar D. Navaneethan, M.D., M.P.H., Ali Aminian, M.D., Claire E. Pothier, M.P.H., Esther S.H. Kim, M.D., M.P.H., Steven E. Nissen, M.D., and Sangeeta R. Kashyap, M.D., for the STAMPEDE Investigators*

ABSTRACT

This article was published on March 31, 2014, at NEJM.org.


A Glycated Hemoglobin
Change from Baseline (percentage points)
Medical therapy
Sleeve gastrectomy
Gastric bypass
P<0.001
P<0.001
Month
Value at Visit
Medical therapy 9.0 (8.5) 7.1 (6.8) 7.5 (6.9) 7.7 (7.3) 8.4 (7.6)
Sleeve gastrectomy 9.5 (8.9) 6.7 (6.4) 6.6 (6.4) 6.8 (6.8) 7.0 (6.6)
Gastric bypass 9.3 (9.2) 6.3 (6.2) 6.3 (6.1) 6.5 (6.4) 6.7 (6.6)
B Glycated Hemoglobin According to Body-Mass Index
Change from Baseline (percentage points)
Medical therapy (BMI, ≥35)
Medical therapy (BMI, <35)
Surgical therapy (BMI, <35)
Surgical therapy (BMI, ≥35)
Month
Value at Visit
Medical <35 BMI 9.1 (8.9) 7.2 (6.8) 7.9 (6.9) 8.0 (7.4) 8.1 (7.8)
Medical ≥35 BMI 8.8 (8.5) 7.1 (6.8) 7.2 (6.7) 7.4 (6.9) 8.5 (7.3)
Surgical <35 BMI 9.4 (9.1) 6.7 (6.9) 6.6 (6.6) 6.8 (6.8) 7.1 (6.7)
Surgical ≥35 BMI 9.3 (9.2) 6.4 (6.2) 6.4 (6.1) 6.6 (6.4) 6.7 (6.4)
C Diabetes Medications
Average Number
Medical therapy
Sleeve gastrectomy
Gastric bypass
P=0.02
P<0.001
P<0.001
Month
Value at Visit
Medical therapy 2.8 3.1 3.0 2.8 2.6
Sleeve gastrectomy 2.4 0.94 0.88 0.94 1.0
Gastric bypass 2.5 0.54 0.3 0.47 0.48
D Body-Mass Index
Change from Baseline
Medical therapy
Sleeve gastrectomy
Gastric bypass
P=0.006
P<0.001
P<0.001
Month
Value at Visit
Medical therapy 36.4 34.6 34.2 35.0 34.8
Sleeve gastrectomy 36.1 28.3 27.1 27.9 29.2
Gastric bypass 37.1 28.2 26.7 27.3 27.9

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CLINICAL STUDY

Obesity-related cardiovascular risk factors after weight loss: a clinical trial comparing gastric bypass surgery and intensive lifestyle intervention

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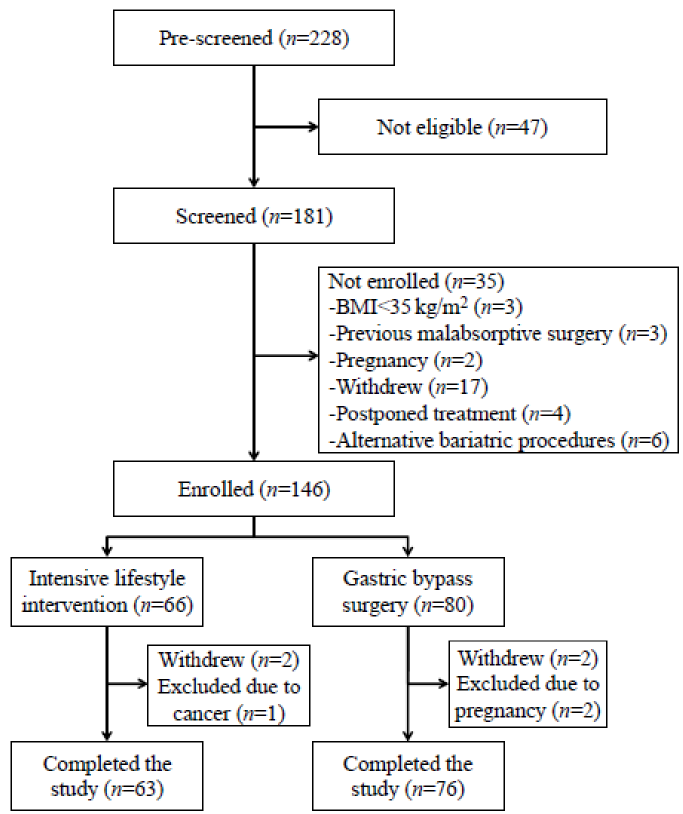


Figure 1 Flow of participants throughout the study.

Figure 2 Schedule of stays during the 1-year lifestyle programme at Evjeklinikken.

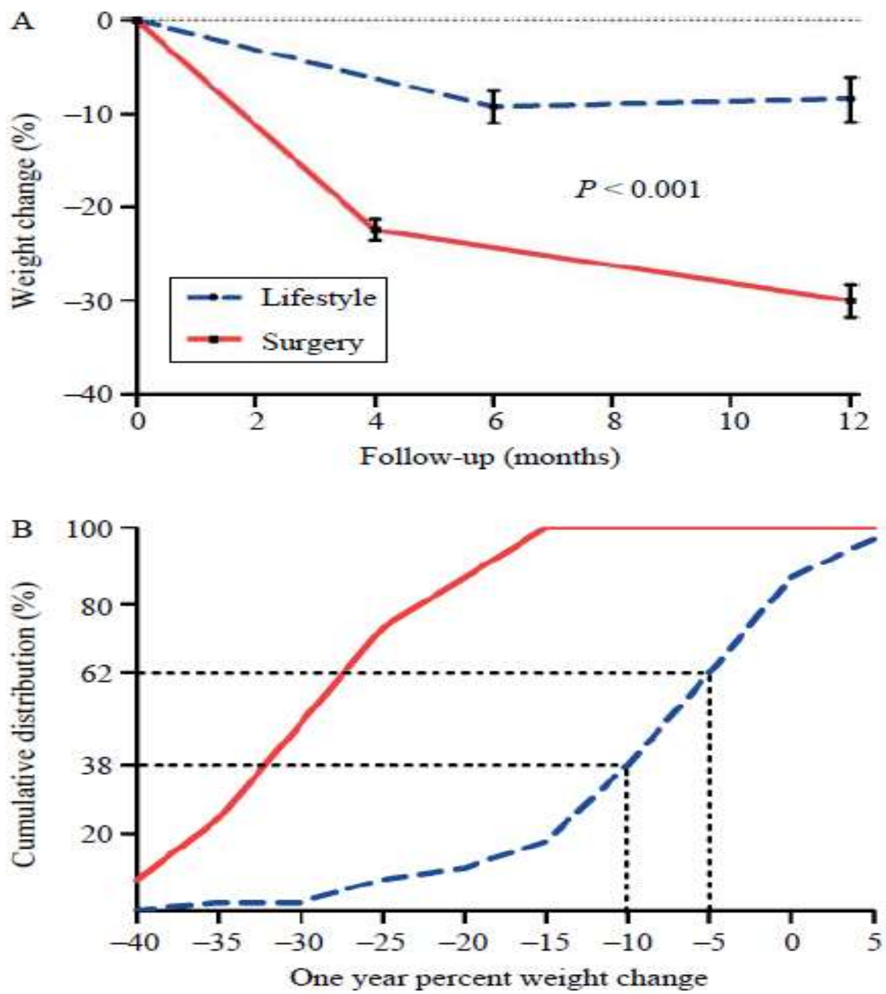
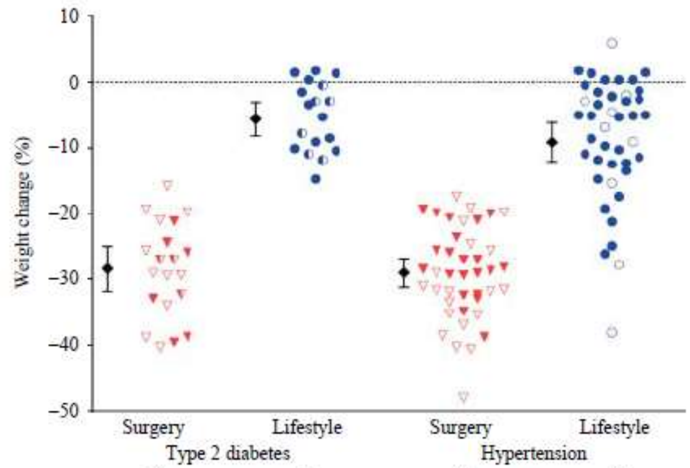


Figure 3 Mean (95% CI) percentage weight change during follow-up (A) and distribution of 1-year changes in weight (B) within the surgery and lifestyle groups. Repeated measures ANOVA was used to compare the change in weight between the two study groups.

Table 2 Changes from baseline in various continuous variables. Unadjusted within-group changes are given as mean (S.D.). Adjusted between-group differences and corresponding *P* value were calculated with the use of analysis of covariance and presented as mean (95% CI). All between-group differences were adjusted for gender, age, baseline body mass index, and baseline values. Furthermore, fasting and 2-h glucose, insulin and HbA1c were adjusted for change in the usage of glucose lowering agents; systolic and diastolic blood pressure and pulse pressure were adjusted for change in the usage of anti-hypertensive drugs; and total cholesterol, low and high density lipoprotein cholesterol, and triglycerides were adjusted for the change in the usage of statins.

	Surgery ($n=76$)	**Lifestyle** ($n=63$)	**Adjusted between-group difference, mean** (95% CI)	***P* value**
Weight (kg)[a]	−41.3 (13.1)	−10.7 (12.0)	−27.6 (−31.7 to −23.5)	<0.001
Body mass index (kg/m^2)	−14.0 (4.1)	−3.7 (4.2)	−9.4 (−10.8 to −8.0)	<0.001
Waist circumference (cm)[a]	−30.3 (10.5)	−10.3 (10.6)	−17.8 (−21.3 to −14.4)	<0.001
Waist-to-hip ratio	−0.06 (0.06)	−0.01 (0.07)	−0.05 (−0.07 to −0.03)	<0.001
Glucose, fasting (mmol/l)	−1.9 (2.0)	−0.8 (1.0)	−0.8 (−1.1 to −0.5)	<0.001
Glucose, 2 h (mmol/l)	−4.2 (3.2)	−1.6 (1.9)	−2.4 (−3.0 to −1.8)	<0.001
Insulin, fasting (pmol/l)	−142 (96)	−53 (84)	−77 (−100 to −54)	<0.001
HbA1c (%)	−0.4 (0.9)	−0.1 (0.5)	−0.2 (−0.3 to −0.0)	0.047
Systolic blood pressure (mmHg)	−14 (16)	−10 (15)	−4 (−8 to −0)	0.028
Diastolic blood pressure (mmHg)	−12 (10)	−6 (11)	−5 (−8 to −2)	0.002
Pulse pressure (mmHg)	−2 (14)	−4 (12)	1 (−3 to 4)	0.760
Total cholesterol (mmol/l)	−1.2 (1.1)	−0.7 (0.8)	−0.4 (−0.6 to −0.2)	<0.001
LDL cholesterol (mmol/l)	−1.0 (0.8)	−0.5 (0.7)	−0.5 (−0.7 to −0.4)	<0.001
HDL cholesterol (mmol/l)	0.2 (0.3)	0.0 (0.2)	0.2 (0.2 to 0.3)	<0.001
Triglycerides (mmol/l)	−0.9 (1.0)	−0.4 (0.8)	−0.2 (−0.3 to −0.0)	0.014
C-reactive protein (mg/l)	−2.1 (2.2)	−1.4 (3.6)	−1.0 (−1.5 to −0.6)	<0.001
Adiponectin (μg/ml)	3.9 (3.8)	1.8 (3.2)	2.0 (1.0 to 3.0)	<0.001
Energy intake (MJ/day)	−4.7 (4.5)	−3.5 (3.5)	−1.7 (−2.3 to −1.0)	<0.001

LDL, low density lipoprotein, HDL, high density lipoprotein.
[a]Not adjusted for body mass index.



	Type 2 diabetes: Surgery	Type 2 diabetes: Lifestyle	Hypertension: Surgery	Hypertension: Lifestyle
No.	20	18	41	40
remission (n, %)	14 (70%)	6 (33%)	20 (49%)	9 (23%)
OR (95% CI)	4.7 (1.2–18.4)		33 (1.3–8.6)	
P value	0.027		0.016	

Figure 4 Remission of type 2 diabetes and hypertension at 1 year correlated to percentage weight change in individuals treated with gastric bypass surgery or intensive lifestyle intervention. Red triangles represent patients treated with gastric bypass surgery, while blue circles represent subjects who chose lifestyle intervention. Open triangles/circles denote complete remission of type 2 diabetes and remission of hypertension, half filled triangles/circles denote partial remission of type 2 diabetes and filled triangles/circles denote no remission. For definitions of partial and complete remission of type 2 diabetes, see 'Subjects and methods' section. Mean percentage weight changes (black diamonds) within the groups are shown with bars extending from the diamonds representing 95% CI. Odds ratios (OR) were calculated using logistic regression analyses. Combined (partial and complete) remission of type 2 diabetes was used in the analysis.

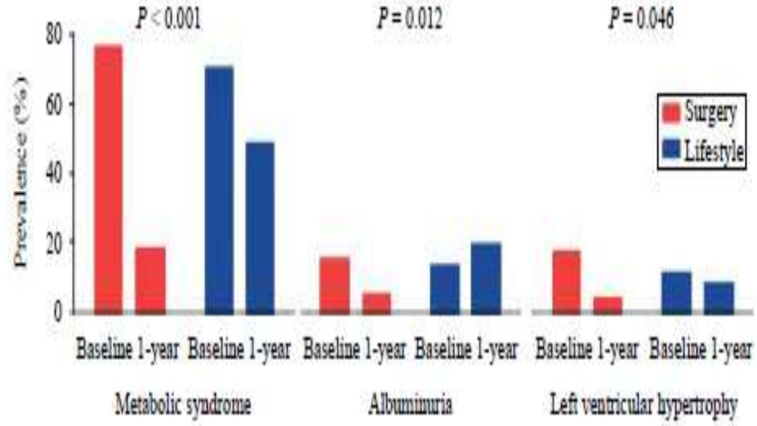


Figure 5 The prevalence of metabolic syndrome, albuminuria and left ventricular hypertrophy in the treatment groups at both baseline and 1-year follow-up. Between-group differences at 1 year were adjusted for differences in prevalence at baseline using logistic regression analyses. *P* values are for comparisons between surgery and lifestyle groups.

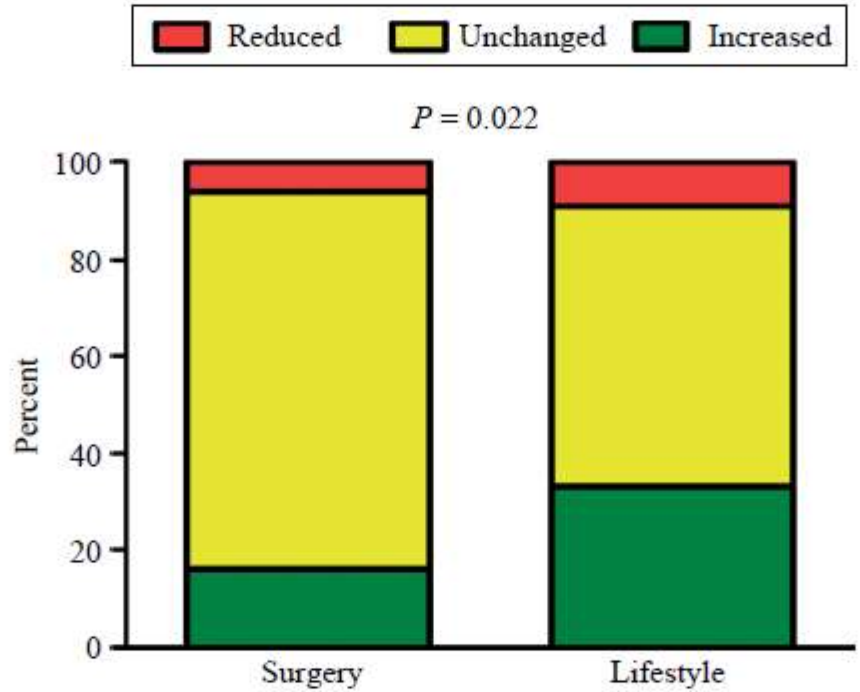


Figure 6 Change in physical activity during 1-year follow-up. The proportion of participants who went from being physically active ($\geq$150 min of moderate or $\geq$60 min of vigorous aerobic physical activity per week) to inactive (reduced) were still physically active or inactive (unchanged) or went from being physically inactive to active (increased). The changes were adjusted for baseline activity level using linear regression analysis. *P* value is for comparisons between surgery and lifestyle groups.

Effect of Weight Loss on Predicted Cardiovascular Risk: Change in Cardiac Risk After Bariatric Surgery

John A. Batsis, Abel Romero-Corral,† Maria L. Collazo-Clavell,‡ Michael G. Sarr,§ Virend K. Somers,† Lee Brekke,‖ and Francisco Lopez-Jimenez†*

OBESITY Vol. 15 No. 3 March 2007 779

Table 2. Change in cardiovascular risk factors over time

	Operative group				Non-operative group				Difference between operative and non-operative group change	
	Baseline (n = 197)	Follow-up (n = 197)	Change	*p*	Baseline (n = 163)	Follow-up (n = 163)	Change	*p*	Change	*p**
Weight (kg)	139 ± 27	96 ± 25	−44	<0.001	126 ± 9	126 ± 26	0.4	0.71	−44	<0.001
% excess weight	128 ± 41	57 ± 40	−71	<0.001	102 ± 13	103 ± 36	0.2	0.85	−72	<0.001
BMI (kg/m^2)	49.5 ± 8.9	34.1 ± 8.2	−15	<0.001	44.0 ± 5.7	43.8 ± 7.8	0.02	0.93	−15	<0.001
Blood pressure										
Systolic (mm Hg)	134 ± 16	121 ± 16	−12	<0.001	133 ± 18	128 ± 16	−5	<0.001	−7	<0.001
Diastolic (mm Hg)	80 ± 10	72 ± 11	−8	<0.001	77 ± 11	76 ± 10	−1	0.26	−7	<0.001
Heart rate (bpm)	79 ± 11	72 ± 11	−6	<0.001	80 ± 11	78 ± 13	−2	0.15	−4	0.006
Laboratory data										
Serum cholesterol										
Total (mM)	5.14 ± 0.99	3.97 ± 0.84	−1.17	<0.001	5.34 ± 1.15	5.00 ± 1.08	−0.34	<0.001	−0.83	<0.001
High-density lipoprotein (mM)	1.17 ± 0.29	1.42 ± 0.39	0.24	<0.001	1.15 ± 0.35	1.26 ± 0.32	0.11	<0.001	0.13	<0.001
Low-density lipoprotein (mM)	3.03 ± 0.83	1.99 ± 0.63	−1.04	<0.001	3.13 ± 0.92	2.82 ± 0.85	−0.32	<0.001	−0.72	<0.001
Triglycerides (mM)	2.12 ± 1.31	1.25 ± 0.66	−0.87	<0.001	2.56 ± 2.43	1.99 ± 1.09	−0.57	<0.001	−0.30	<0.001
Fasting blood glucose (mM)	6.53 ± 2.04	5.27 ± 1.19	−1.25	<0.001	6.68 ± 2.82	6.50 ± 2.46	−0.17	0.32	−1.08	<0.001
Creatinine (μ M)	88.5 ± 0.01	81.3 ± 13.3	−4.42	<0.001	88.5 ± 0.01	88.4 ± 16.8	0	0.78	−4.42	NS

NS, not significant.
* *p* values are for the differences between means of groups.

Table 3. Medication use among operative and non-operative patients at baseline and at latest follow-up

	Operative group (n = 197)			Non-operative group (n = 163)			% difference between delta in operative group and delta in non-operative group	
	Baseline [n (%)]	Follow-up [n (%)]	*p*	Baseline [n (%)]	Follow-up [n (%)]	*p*	Change (%)	*p*
Use of anti-hypertensive medications	90 (45)	66 (33)	<0.001	62 (38)	88 (54)	<0.001	−21	<0.001
Median number of anti-hypertensive medications	2 (1–4)	1 (1–4)	<0.001	1 (1–5)	2 (1–4)	0.06	−1	<0.001
Use of lipid-lowering medications	33 (16)	13 (6)	<0.001	23 (14)	58 (35)	<0.001	−29	<0.001
Use of statin medications	29 (14)	12 (6)	<0.001	20 (12)	51 (31)	<0.001	−25	<0.001
Use of insulin or oral hypoglycemic agents	45 (22)	15 (7)	<0.001	29 (17)	50 (30)	<0.001	−23	<0.001

Blood pressure medications included: angiotensin converting enzymes, angiotensin receptor blockers, beta-blockers, calcium channel blockers, and diuretics (loop/thiazide).
Lipid-lowering medications = Questran, fibrates, niacin, and statins.

Table 4. Risk models examining all-cause mortality, cardiovascular mortality, and cardiovascular events

	Operative group				Non-operative group				
	Baseline (%) (n = 173)	Follow-up (n = 173)	% change	95% CI	Baseline (%) (n = 139)	Follow-up (n = 139)	% change	95% CI	Intergroup *p*
Model 1: main model									
All-cause mortality	10.4 (n = 18)	5.8 (n = 10.1)	−4.6	3.62 to 5.51*	9.4 (n = 13.1)	9.2 (n = 12.8)	−0.2	−0.6 to 1.02†	<0.001*
CV death	5.8 (n = 10.1)	2.6 (n = 4.5)	−3.3	2.3 to 4.2*	5.3 (n = 7.4)	4.9 (n = 6.8)	−0.4	−0.37 to 1.24†	<0.001*
CV event	37.0 (n = 64)	18.2 (n = 31.5)	−18.8	16.8 to 20.7*	30.0 (n = 41.8)	29.9 (n = 41.5)	−0.2	−1.77 to 2.08†	<0.001*
Model 2: proportion of deaths expected in the operative group if they had been in the non-operative group instead									
All-cause mortality	10.4 (n = 18)	9.9 (n = 17.2)	−0.5						
CV death	5.8 (n = 10.1)	5.6 (n = 9.6)	−0.3						
CV events	37.0 (n = 64)	34.3 (n = 59.3)	−2.7						
Model 3: 10-year estimates if all patients were 45 years old									
All-cause mortality	8.1 (n = 14)	4.3 (n = 7.4)	−3.8	3.12 to 4.42*	6.7 (n = 9.3)	7.0 (n = 9.7)	0.3	−0.95 to 0.32†	<0.001*
CV death	4.4 (n = 7.6)	1.8 (n = 3.1)	−2.6	1.98 to 3.2*	3.6 (n = 5.0)	3.6 (n = 5.1)	0.1	−0.61 to 0.49†	<0.001*
CV events	38.1 (n = 65.9)	17.7 (n = 30.6)	−20.4	18.4 to 22.4*	30.8 (n = 42.8)	31.2 (n = 43.5)	0.5	−2.62 to 1.67†	<0.001*

CI, confidence interval; CV, cardiovascular; NHANES, National Health and Nutrition Examination Study. Data show the changes in the 10-year risk estimates for operative and non-operative patients based on NHANES I risk functions. The number represents risk estimates per 100 patient years. In parentheses, the estimated total number of patients are given based on each sample size. Percentages were rounded to the nearest tenth, and changes were rounded to the nearest thousandth. 95% CIs represent the mean number of events estimated.

* $p < 0.001$.

† $p > 0.05$, not statistically significant.

Table 5. Predicted deaths and events prevented by bariatric surgery in 10 years for each 100 patients

	Prevented	95% CI	No. needed to treat
All-cause mortality	4.1 deaths	3.04–5.16	24.4
CV death	3.0 deaths	1.93–3.99	33.7
CV events	16.1 CV events	13.6–18.5	6.2
CV events or death	15.6 events	13.3–17.9	6.4

CI, confidence interval; CV, cardiovascular.

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TABLE 3. Preoperative and Postoperative Liver Grade and Stage (n = 70)

	Score					
	0	1	2	3	4	P*
Steatosis						
First biopsy	1 (1.4)	6 (8.6)	29 (41.4)	31 (44.3)	3 (4.3)	<0.001
Second biopsy	45 (64.3)	18 (25.7)	6 (8.6)	1 (1.4)	0	
Inflammation						
First biopsy	5 (7.1)	45 (64.3)	16 (22.9)	4 (5.7)	0	<0.001
Second biopsy	28 (40.0)	41 (58.6)	1 (1.4)	0	0	
Grade						
First biopsy	5 (7.1)	18 (25.7)	28 (40.0)	19 (27.1)		<0.001
Second biopsy	31 (44.3)	35 (50.0)	3 (4.3)	1 (1.4)		
Stage						
First biopsy	14 (20.0)	30 (42.9)	15 (21.4)	9 (12.9)	2 (2.9)	<0.001
Second biopsy	28 (40.0)	32 (45.7)	3 (4.3)	5 (7.1)	2 (2.9)	

Data are presented as n (%).
*Extension of the McNemar test.

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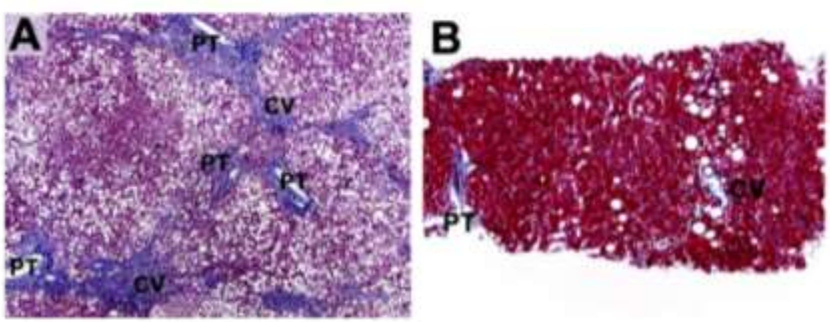

FIGURE 3. Another patient's liver biopsies pre- and postbariatric surgery. A, Preoperatively, the liver demonstrates diffuse (severe) steatosis and portal-to-central bridging fibrosis (wedge biopsy, Trichrome stain). B, Postoperatively (8.5 months postoperative), there is mild residual centrilobular steatosis and no evidence of significant fibrosis (trichrome stain).

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Bariatric Surgery Reduces Features of Nonalcoholic Steatohepatitis in Morbidly Obese Patients

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Altmetric 55

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Methods

From May 1994 through May 2013, one hundred and nine morbidly obese patients with biopsy-proven NASH underwent bariatric surgery at the University Hospital of Lille, France (the Lille Bariatric Cohort). Clinical, biological, and histologic data were collected before and 1 year after surgery.

Results

One year after surgery, NASH had disappeared from 85% of the patients (95% confidence interval [CI]: 75.8%−92.2%). Compared with before surgery, patients had significant reductions in mean ± SD body mass index (BMI, from 49.3 ± 8.2 to 37.4 ± 7) and level of alanine aminotransferase (from 52.1 ± 25.7 IU/L to 25.1 ± 20 IU/L); mean levels of γ-glutamyltransferases were reduced from 51 IU/L before surgery (interquartile range [IQR], 34−87 IU/L) to 23 IU/L afterward (IQR, 14−33 IU/L) and mean insulin resistance index values were reduced from 3.6 ± 0.5 to 2.9 ± 0.5 (*P* < .01 for each comparison). NASH disappeared from a higher proportion of patients with mild NASH before surgery (94%) than severe NASH (70%) (*P* < .05) according to Brunt score. In histologic analysis, steatosis was detected in 60% of the tissue before surgery (IQR, 40%−80%) but only 10% 1 year after surgery (IQR, 2.5%−21.3%); the mean nonalcoholic fatty liver disease score was reduced from 5 (IQR, 4−5) to 1 (IQR, 1−2) (each *P* < .001). Hepatocellular ballooning was reduced in 84.2% of samples (n = 69; 95% CI: 74.4−91.3) and lobular inflammation in 67.1% (n = 55; 95% CI: 55.8−77.1). According to Metavir scores, fibrosis was reduced in 33.8% of patients (95% CI: 23.6%−45.2%). Patients whose NASH persisted 1 year after surgery (n = 12) had lost significantly less weight (change in BMI, 9.1 ± 1.5) than those without NASH (change in BMI, 12.3 ± 0.6) (*P* = .005). Patients who underwent laparoscopic gastric banding lost less weight (change in BMI, 6.4 ± 0.7) than those who underwent gastric bypass (change in BMI, 14.0 ± 0.5) (*P* < .0001), and a higher proportion had persistent NASH (30.4% vs 7.6% of those with gastric bypass; *P* = .015).

Conclusions

Bariatric surgery induced the disappearance of NASH from nearly 85% of patients and reduced the pathologic features of the disease after 1 year of follow-up. It could be a therapeutic option for appropriate morbidly obese patients with NASH who do not respond to lifestyle modifications. More studies are needed to determine the long-term effects of bariatric surgery in morbidly obese patients with NASH.

HEPATOLOGY

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Liver Failure and Liver Disease

FREE

Nonalcoholic fatty liver disease: Improvement in liver histological analysis with weight loss

John B. Dixon[1,†,*], Prithi S. Bhathal[2], Norman R. Hughes[2] and Paul E. O'Brien[1]

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Issue

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4	Portal fibrosis of greater than 75% tracts

* There are two scores for cellular injury, (1) Mallory bodies and (2) ballooning degeneration, that were scored independently.

Table 2. Summary of Grading and Staging for NASH as Proposed by the American Association for the Study of Liver Diseases Single Topic Conference[23, 24]

Grade	
Grade 1, mild	Steatosis in 33% to 66% of lobules, occasional ballooning degeneration in zone 3, mild lobular inflammation with or without mild portal inflammation
Grade 2, moderate	Steatosis, ballooning present in zone 3, lobular inflammation with polymorphs in association with ballooned hepatocytes, pericellular fibrosis, or both, with or without mild chronic inflammation; none, mild, to moderate portal inflammation
Grade 3, severe	Steatosis: usually >66%, Marked ballooning especially zone 3, scattered lobular acute and chronic inflammation, plus mild to moderate portal inflammation (not marked)
Stage	
1	Perivenular and pericellular fibrosis limited to zone 3
2	Stage 1 plus focal or extensive portal fibrosis
3	Bridging fibrosis, focal or extensive
4	Cirrhosis with or without residual perisinusoidal fibrosis

Scores for steatosis, lobular inflammation, centrilobular fibrosis, Mallory bodies, and ballooning degeneration all improved significantly with weight loss. There were no significant changes in any of the scores for portal fibrosis or inflammation (Table 4). There were no histological features that changed unfavorably with weight loss.

Table 4. Histologic Scores for the 36-Paired Biopsies Reported Blinded to the Patient's Identity, Clinical Features and Timing

Feature*	Scores 0	1	2	3	4	*P* Value
Steatosis						
A	1	3	6	12	14	
B	21	9	2	3	1	<0.001
Lobular inflammation						
A	12	5	8	8	3	
B	25	8	3	0	0	<0.001
Fibrosis						
A	13	5	7	10	1	
B	29	4	1	1	1	<0.001
Mallory bodies						
A	15	9	12			
B	34	1	1			<0.001
Ballooning degeneration						
A	10	12	14			
B	27	9	0			<0.001
Portal inflammation (extent)						
A	1	18	4	5	8	
B	2	13	8	10	3	0.9
Portal inflammation (intensity)						
A	1	28	8	1		1.0
B	2	24	9	1		
Portal fibrosis						
A	13	12	4	4	3	0.34
B	11	10	5	5	5	

* A = Pre-weight loss or index biopsy and B = follow-up biopsy.
P values calculated using Wilcoxon signed rank test.

HIPERLIPIDEMIA

Results of surgery: long-term effects on hyperlipidemia[1,2]

John J Gleysteen

Am J Clin Nutr 1992;55:591S–3S. Printed in USA. © 1992 American Society for Clinical Nutrition

TABLE 2
Lipid profiles with partial ileal bypass (PIB) and gastric bypass (GB)

	Total cholesterol		HDL-C		Triglycerides	
	PIB	GB	PIB	GB	PIB	GB
	mmol/L		*mmol/L*		*mmol/L*	
Preoperative	6.50 ± 0.96	5.04 ± 1.08	1.03 ± 0.25	1.11 ± 0.33	2.33 ± 1.88	1.87 ± 0.63
At 5 y	4.71 ± 0.91	4.68 ± 1.01	1.08 ± 0.26	1.37 ± 0.36	2.60 ± 1.88	1.61 ± 0.76
Change (%)	−23%*	−7%	+4%†	+23%*	+20%*	−13%

* Percent change significant, $P < 0.01$.
† Percent change significant, $P = 0.02$.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Bariatric Surgery versus Conventional Medical Therapy for Type 2 Diabetes

Geltrude Mingrone, M.D., Simona Panunzi, Ph.D., Andrea De Gaetano, M.D., Ph.D., Caterina Guidone, M.D., Amerigo Iaconelli, M.D., Laura Leccesi, M.D., Giuseppe Nanni, M.D., Alfons Pomp, M.D., Marco Castagneto, M.D., Giovanni Ghirlanda, M.D., and Francesco Rubino, M.D.

ABSTRACT

Table 2. Average Absolute Values and Percentage Changes at 2 Years.*

Variable	Medical Therapy (N=18)	Biliopancreatic Diversion (N=19)	Gastric Bypass (N=19)	P Value†			
				Overall	Biliopancreatic Diversion vs. Medical Therapy	Gastric Bypass vs. Medical Therapy	Gastric Bypass vs. Bilio-pancreatic Diversion
Glucose (mmol/liter)	7.83±1.66	3.89±0.67	5.69±3.07	<0.001	<0.001	0.005	0.03
Change from baseline (%)	−14.37±11.93	−56.23±10.01	−37.81±33.75				
Glycated hemoglobin (%)	7.69±0.57	4.95±0.49	6.35±1.42	<0.001	<0.001	0.003	0.001
Change from baseline (%)	−8.39±9.93	−43.01±9.64	−25.18±20.89				
Cholesterol (mmol/liter)							
Total	4.91±0.87	2.77±0.81	4.27±0.77	<0.001	<0.001	0.31	<0.001
Change from baseline (%)	−16.82±11.60	−49.25±11.52	−6.83±27.03				
High-density lipoprotein	1.05±0.20	1.08±0.16	1.47±0.31	<0.001	0.61	<0.001	0.01
Change from baseline (%)	6.03±6.25	12.98±20.66	29.66±18.21				
Low-density lipoprotein	2.98±0.83	1.25±0.71	2.20±0.72	<0.001	<0.001	1.00	<0.001
Change from baseline (%)	−20.31±15.24	−64.63±15.93	−17.21±36.21				
Triglycerides (mmol/liter)	1.91±0.39	0.96±0.32	1.15±0.48	<0.001	<0.001	1.00	0.001
Change from baseline (%)	−18.28±7.84	−56.79±16.70	−21.17±41.23				
Blood pressure (mm Hg)							
Systolic	134.44±10.97	129.21±8.04	132.11±10.45	0.32	1.00	1.00	0.40
Change from baseline (%)	−11.15±12.71	−14.55±12.63	−9.02±7.51				
Diastolic	87.28±9.32	82.37±4.21	84.21±4.79	0.13	0.23	1.00	0.24
Change from baseline (%)	−7.14±11.51	−13.06±8.97	−7.30±9.42				
Weight (kg)	128.06±19.77	89.53±17.84	84.29±13.35	<0.001	<0.001	<0.001	1.00
Change from baseline (%)	−4.74±6.37	−33.82±10.17	−33.31±7.88				
Excess weight lost (%)	9.29±12.94	69.36±17.60	68.08±12.70	<0.001	<0.001	<0.001	1.00
Body-mass index	43.07±6.44	29.19±4.90	29.31±2.64	<0.001	<0.001	<0.001	1.00
Change from baseline (%)	−4.73±6.37	−33.82±10.17	−33.31±7.88				
Waist (cm)	116.33±12.14	103.53±16.94	98.58±13.06	<0.001	<0.001	<0.001	1.00
Change from baseline (%)	−7.69±7.80	−20.70±8.34	−19.91±8.44				

* Plus–minus values are means ±SD.

† P values for the overall comparisons were calculated with the use of analysis of variance. P values for the comparisons between each of the two surgical procedures and medical therapy and for the comparison between the two types of surgery were calculated with the use of the Bonferroni method in post hoc analyses.

APNEA DEL SUEÑO

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PAPER

Polysomnography before and after weight loss in obese patients with severe sleep apnea

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Table 1 Studies reporting AHI at diagnostic PSG before and after bariatric surgery

Author/year	*Surgery*	*Number*	*AHI baseline*	*AHI follow-up*
Charuzi *et al*[22] (1992)	RYGB, VBG	47/51	60.8 ± 35.5	8.0 ± 11.8
Sugerman *et al*[17] (1992)	RYGB	40/110	64 ± 39	26 ± 26
Scheuller *et al*[19] (2001)	BPD and VBG	15/not stated	96.9	11.3
Rasheid *et al*[20] (2002)	RYGB	11/100	56 ± 13	23 ± 7
Guardiano *et al*[21] (2003)	RYGB	8/34	55 ± 31	14 ± 17

RYGB: Roux-en-Y gastric bypass; VBG: vertical banded gastroplasty; BPD: biliopancreatic diversion. Number: the actual number to have a second PSG study/number of possible eligible subjects.

Table 3 Paired anthropometric, polysomnographic and biochemical measures for 25 subjects

	First pre-LAGB	*Second following weight loss*	*P-value*
BMI (kg/m^2)[a]	52.7±9.5	37.2±7.2	<0.001
Weight (kg)[a]	154±35	105±22	<0.001
Neck circumference (cm)[a]	47.9±4.3	41.6±4.3	<0.001
Waist circumference (cm)[a]	150.1±18.7	126.0±16.1	<0.001
Systolic BP (mmHg)[a]	140.6±22.6	128.6±23.6	0.08
Diastolic BP (mmHg)[a]	88.3±14.1	84.3±13.1	0.33
AHI (events per hour)[a]	61.6±31.9	13.4±13	<0.001
Arousal index[a]	48.2±34	18.4±13	<0.001
Sleep efficiency (%)[a]	71±18	79±10	0.12
Sleep time[a]	316±98	333±67	0.55
REM sleep (min)[a]	27.7±22	55.8±24	<0.001
REM/total sleep (%)[a]	8.7±7.5	16.3±5.8	<0.001
Stage 3 and 4/NREM (%)[a]	15±14	26±10	0.02
ESS[a]	13.0±7.0	3.8±3.0	<0.001
Using CPAP[b]	92%	24%	<0.001
Fasting glucose (mmol/l)[a]	5.9±1.6	4.8±0.6	0.002
HbA1c (%)[a]	6.1±1.1	5.2±0.4	0.002
Fasting plasma insulin[a]	31.4±18.3	11.8±5.8	<0.001
QUICKI[a]	0.21±0.06	0.26±0.04	0.005
Total cholesterol (mmol/l)[a]	5.29±0.93	5.06±0.85	0.11
Fasting triglycerides (mmol/l)[a]	2.01±0.89	1.14±0.41	<0.001
HDL-cholesterol (mmol/l)[a]	1.10±0.23	1.37±0.35	<0.001
LDL-cholesterol (mmol/l)[a]	3.29±0.87	3.16±0.76	0.30
Metabolic syndrome (*n* (%))	20 (80%)	3 (12%)	<0.001

[a]Mean ± standard deviation, unpaired Student's *t*-test. [b]χ^2-test. QUICKI = 1/((log$_e$ insulin)+ (log$_e$ fasting plasma glucose)); paired Student's *t*-test.

The American Journal of Medicine

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Clinical research study

Effects of Surgical Weight Loss on Measures of Obstructive Sleep Apnea: A Meta-Analysis

David L. Greenburg, MD, MPH[a, b], Christopher J. Lettieri, MD[c], Arn H. Eliasson, MD[c]

Abstract

Objective

Limited evidence suggests bariatric surgery can result in high cure rates for obstructive sleep apnea (OSA) in the morbidly obese. We performed a systematic review and meta-analysis to identify the effects of surgical weight loss on the apnea-hypopnea index.

Methods

Relevant studies were identified by computerized searches of MEDLINE and EMBASE (from inception to March 17, 2008), and review of bibliographies of selected articles. Included studies reported results of polysomnographies performed before and at least 3 months after bariatric surgery. Data abstracted from each article included patient characteristics, sample size who underwent both preoperative and postoperative polysomnograms, types of bariatric surgery performed, results of preoperative and postoperative measures of OSA and body mass index, publication year, country of origin, trial perspective (prospective vs retrospective), and study quality.

Results

Twelve studies representing 342 patients were identified. The pooled mean body mass index was reduced by 17.9 kg/m^2 (95% confidence interval [CI], 16.5-19.3) from 55.3 kg/m^2 (95% CI, 53.5-57.1) to 37.7 kg/m^2 (95% CI, 36.6-38.9). The random-effects pooled baseline apnea hypopnea index of 54.7 events/hour (95% CI, 49.0-60.3) was reduced by 38.2 events/hour (95% CI, 31.9-44.4) to a final value of 15.8 events/hour (95% CI, 12.6-19.0).

Conclusion

Bariatric surgery significantly reduces the apnea hypopnea index. However, the mean apnea hypopnea index after surgical weight loss was consistent with moderately severe OSA. Our data suggest that patients undergoing bariatric surgery should not expect a cure of OSA after surgical weight loss. These patients will likely need continued treatment for OSA to minimize its complications.

Keywords

Bariatric surgery; Meta-analysis; Obesity; Obstructive sleep apnea

FUNCIÓN CARDIACA

Effects of Bariatric Surgery on Cardiovascular Function

by Hutan Ashrafian, Carel W. le Roux, Ara Darzi, and Thanos Athanasiou

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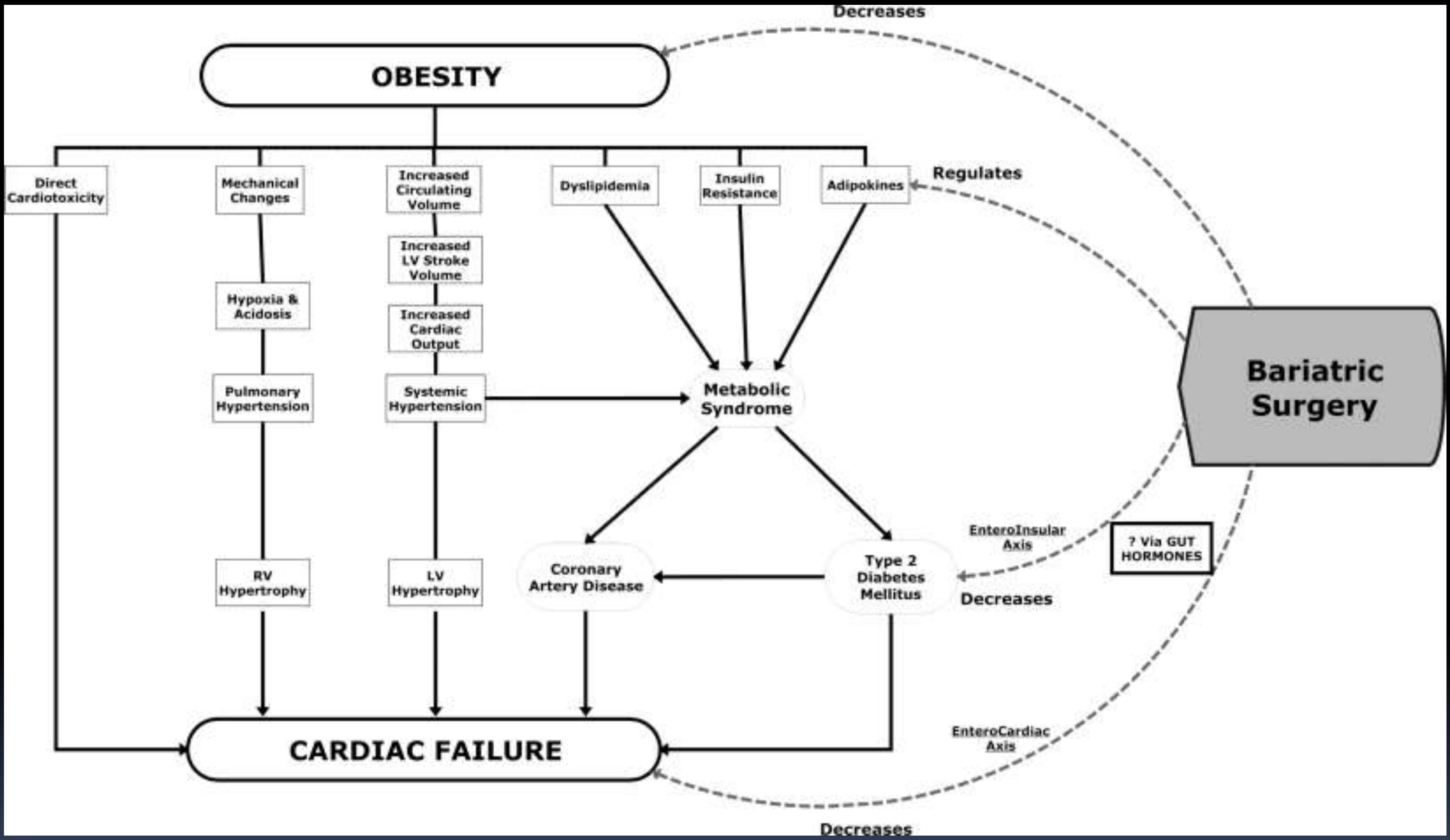

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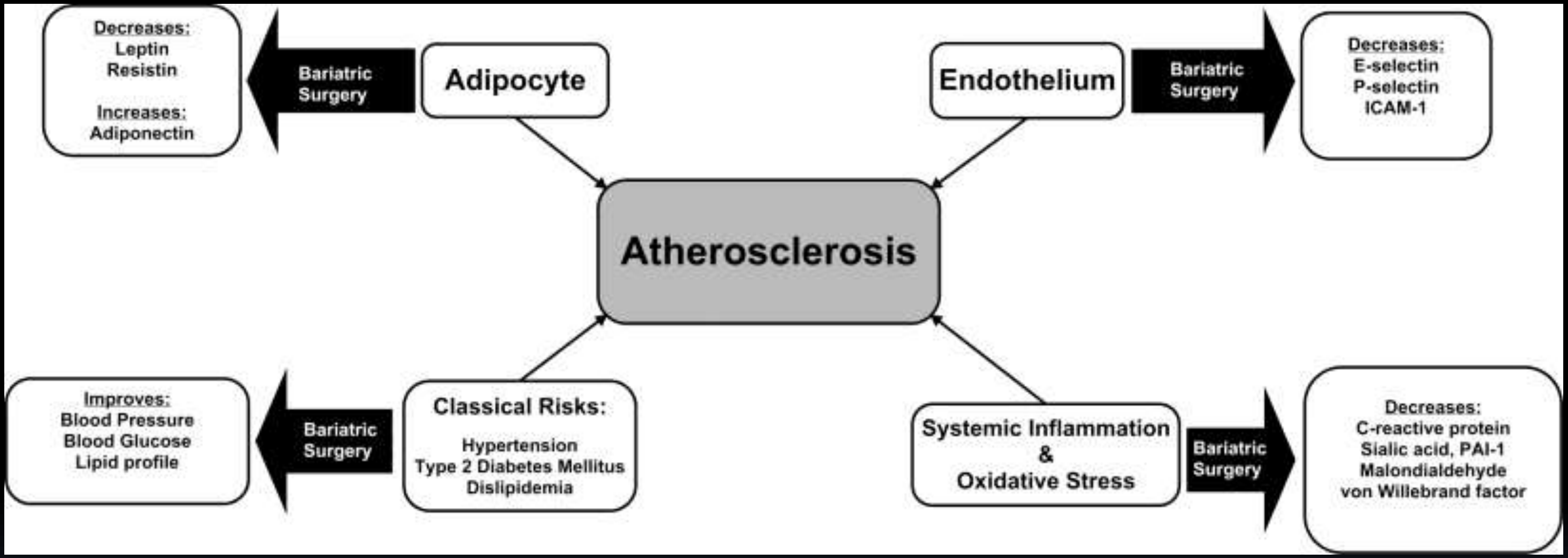

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Abstract ▾ Send to: ▾

Am J Cardiol. 2010 Feb 15;105(4):550-6. doi: 10.1016/j.amjcard.2009.09.057.

Structural and functional changes in left and right ventricles after major weight loss following bariatric surgery for morbid obesity.

Garza CA[1], Pellikka PA, Somers VK, Sarr MG, Collazo-Clavell ML, Korenfeld Y, Lopez-Jimenez F.

⊕ Author information

Abstract

Obesity and bariatric surgery have been associated with changes in ventricular function and structure. The aim of the present study was to assess the long-term changes in left ventricular (LV) and right ventricular (RV) function and structure in patients with morbid obesity-body mass index >or=40 kg/m(2) or >or=35 kg/m(2) with co-morbidities-who had lost weight after bariatric surgery compared to nonsurgical controls. We reviewed 57 patients with morbid obesity who had undergone gastric bypass surgery and who had undergone echocardiography before and after surgery. A reference group (n = 57) was frequency matched for body mass index (+/-2 kg/m(2)), gender, age (+/-2 years), and follow-up duration (+/-6 months). After a mean follow-up of 3.6 years, the LV mass and LV mass indexed by height had decreased in the patients who had undergone bariatric surgery and had lost weight. In contrast, these measurements had increased in the patients who had not undergone bariatric surgery. The difference between these 2 groups remained significant after adjusting for potential confounders. At follow-up, neither the patients nor controls showed a significant change in ejection fraction, LV myocardial performance index, or RV myocardial performance index. In the study population as a whole, multivariate analysis showed a positive correlation between the change in body weight and ventricular septum thickness (R = 0.33), posterior wall thickness (R = 0.31), LV mass (R = 0.38), RV end-diastolic area (R = 0.22), and estimated RV systolic pressure (R = 0.39), all with p values <0.05. In conclusion, body weight changes in patients with morbid obesity were associated with changes in LV structure independent of improvement in obesity-related co-morbidities, including obstructive sleep apnea. Weight loss improved the RV end-diastolic area and might prevent progression to RV dysfunction.

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Surg Obes Relat Dis. 2007 Sep-Oct;3(5):503-7.

Bariatric surgery improves cardiac function in morbidly obese patients with severe cardiomyopathy.

McCloskey CA[1], Ramani GV, Mathier MA, Schauer PR, Eid GM, Mattar SG, Courcoulas AP, Ramanathan R.

⊕ Author information

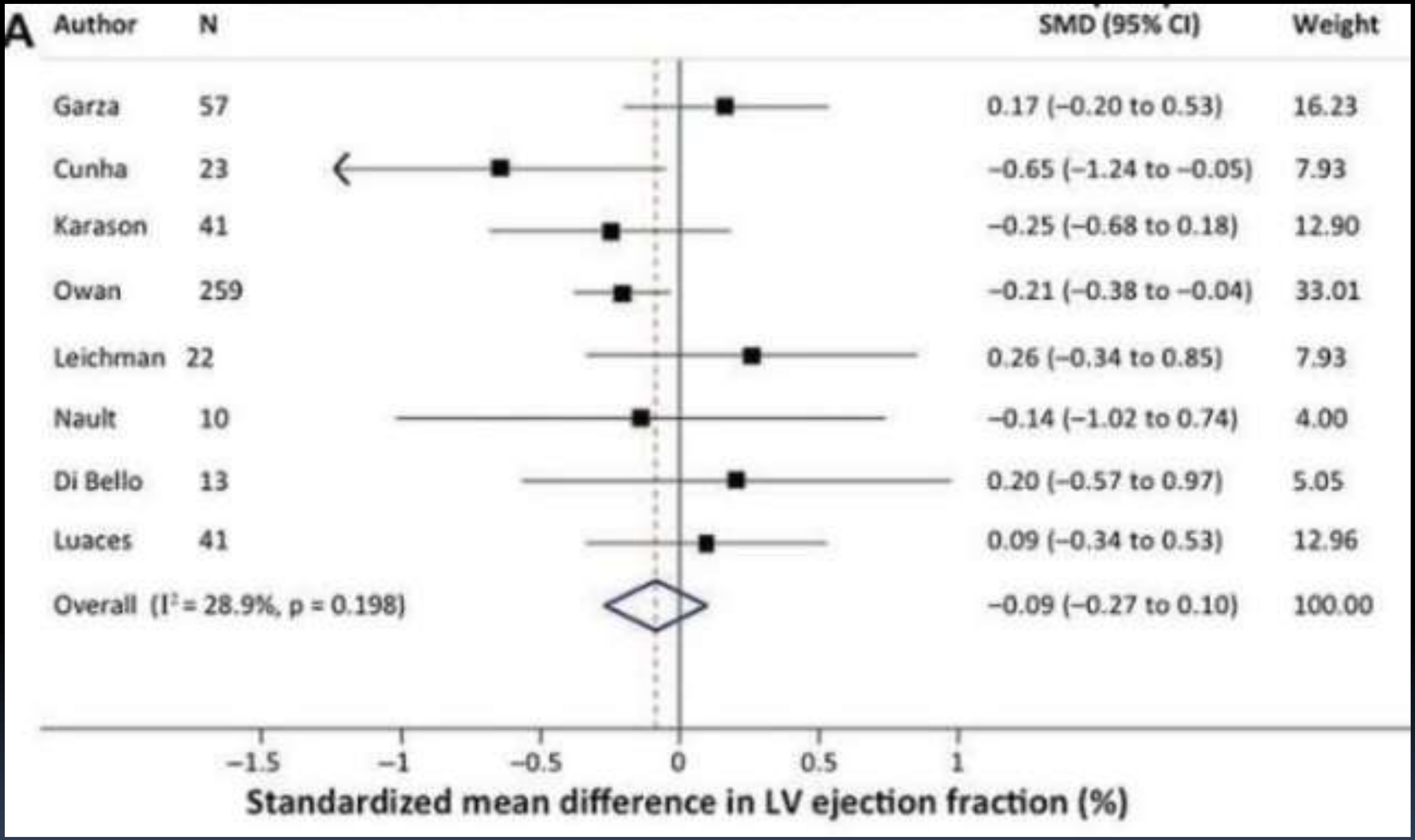
Abstract

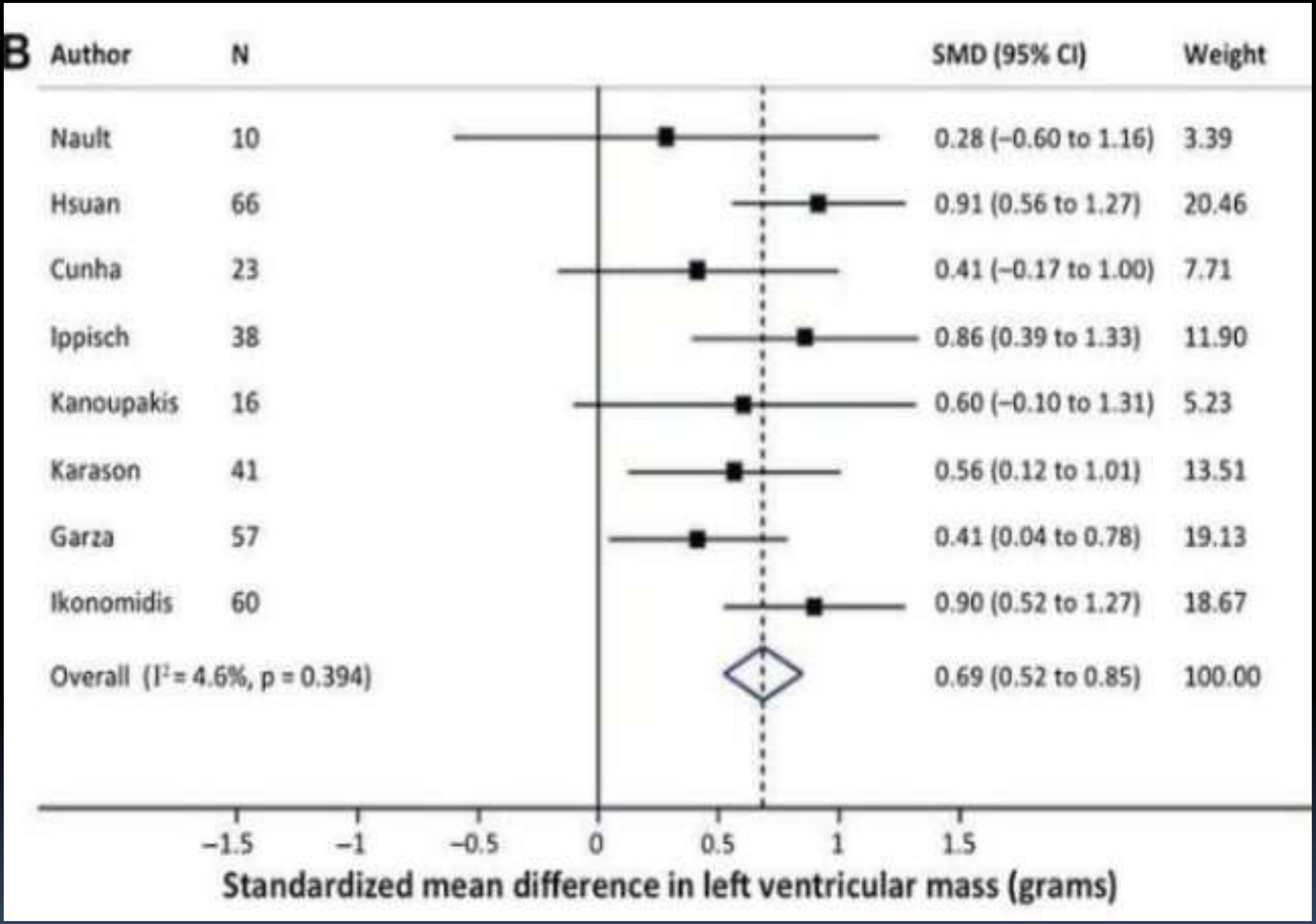
BACKGROUND: Longstanding morbid obesity can be associated with severe cardiomyopathy. However, the safety and efficacy of bariatric surgery in patients with severe cardiomyopathy has not been studied, and the effect of surgical weight loss on postoperative cardiac function is also unknown. In addition, morbidly obese patients have significantly increased mortality associated with cardiac transplantation, often precluding them from becoming recipients.

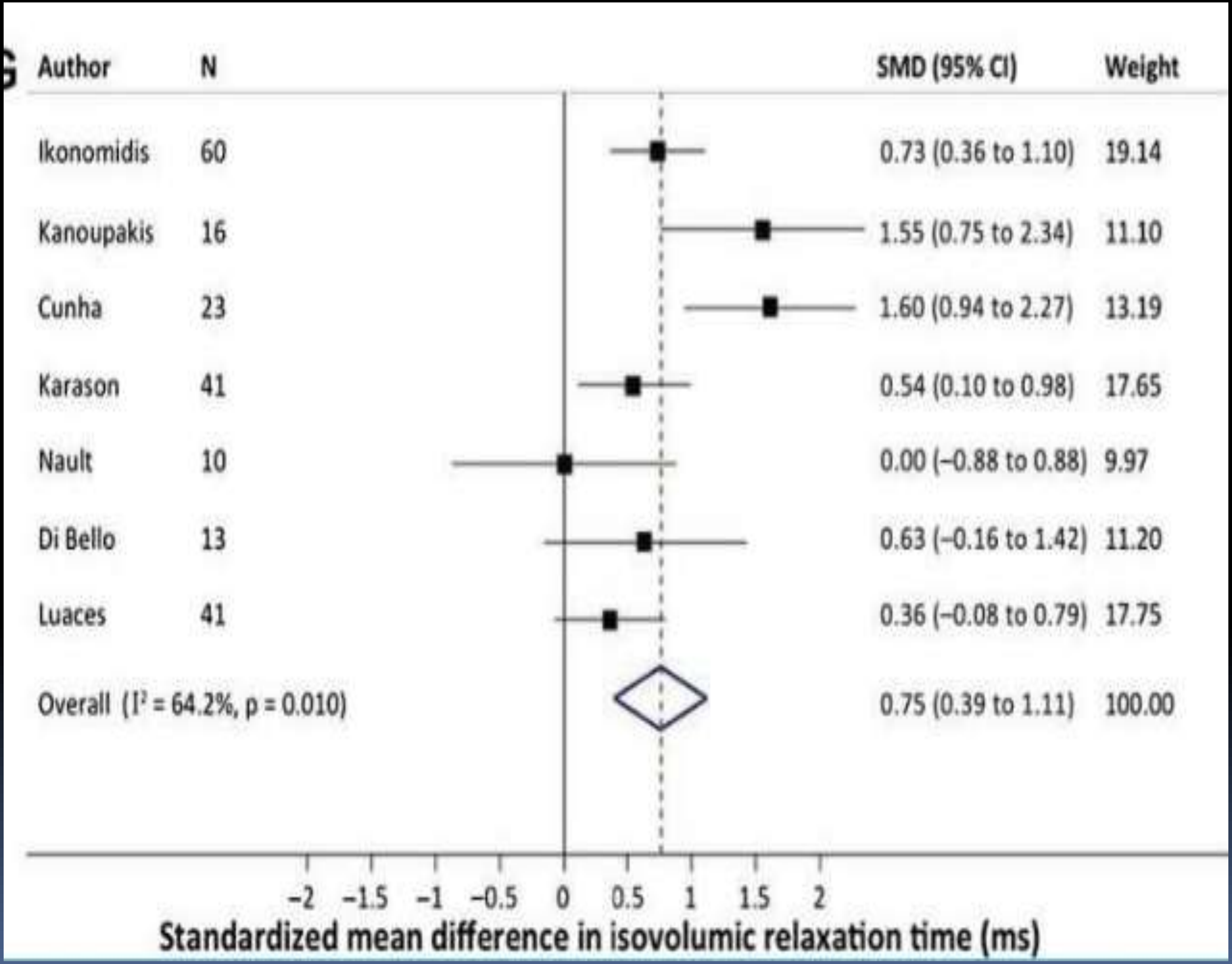
METHODS: A retrospective study of patients with a left ventricular ejection fraction < or =35% who underwent bariatric surgery (1998-2005) was performed. Short-term morbidity/mortality, length of stay, excess weight loss, pre- and postoperative left ventricular ejection fraction, and New York Heart Association (NYHA) functional class were assessed.

RESULTS: A total of 14 patients (10 men and 4 women) with a mean preoperative body mass index of 50.8 +/- 2.04 kg/m(2) underwent bariatric surgery (10 underwent laparoscopic Roux-en-Y gastric bypass, 1 open Roux-en-Y gastric bypass, 2 sleeve gastrectomy, and 1 laparoscopic gastric banding). The complications were pulmonary edema in 1, hypotension in 1, and transient renal insufficiency in 2. The median length of stay was 3.0 days (range 2-9). The mean excess weight loss at 6 months was 50.4%, with a decrease in the mean body mass index from 50.8 +/- 2.04 kg/m(2) to 36.8 +/- 1.72 kg/m(2). The mean left ventricular ejection fraction at 6 months had significantly improved from 23% +/- 2% to 32% +/- 4% (P = .04), correlating with improved functional capacity, as measured by the NYHA classification. Preoperatively, 2 patients (14%) had an NYHA classification of IV, 6 (43%) a classification of III, and 6 (43%) a classification of II. At 6 months postoperatively, no patient had an NYHA classification of IV, 2 (14%) had a classification of III, and 12 (86%) an NYHA classification of II. Two patients had undergone cardiac transplant evaluations preoperatively and underwent successful transplantation after weight loss.

CONCLUSION: The results of our study have shown that bariatric surgery for patients with cardiomyopathy is feasible and effective. Surgically induced weight loss results in both subjective and objective improvement in cardiac function. In addition, surgical weight loss can provide a bridge to transplantation in patients who were prohibited secondary to their morbid obesity.


A
Author
N
SMD (95% CI)
Weight
Garza 57 0.17 (−0.20 to 0.53) 16.23
Cunha 23 −0.65 (−1.24 to −0.05) 7.93
Karason 41 −0.25 (−0.68 to 0.18) 12.90
Owan 259 −0.21 (−0.38 to −0.04) 33.01
Leichman 22 0.26 (−0.34 to 0.85) 7.93
Nault 10 −0.14 (−1.02 to 0.74) 4.00
Di Bello 13 0.20 (−0.57 to 0.97) 5.05
Luaces 41 0.09 (−0.34 to 0.53) 12.96
Overall (I² = 28.9%, p = 0.198) −0.09 (−0.27 to 0.10) 100.00
−1.5
−1
−0.5
0
0.5
1
Standardized mean difference in LV ejection fraction (%)


B
Author
N
SMD (95% CI)
Weight
Nault
10
0.28 (−0.60 to 1.16)
3.39
Hsuan
66
0.91 (0.56 to 1.27)
20.46
Cunha
23
0.41 (−0.17 to 1.00)
7.71
Ippisch
38
0.86 (0.39 to 1.33)
11.90
Kanoupakis
16
0.60 (−0.10 to 1.31)
5.23
Karason
41
0.56 (0.12 to 1.01)
13.51
Garza
57
0.41 (0.04 to 0.78)
19.13
Ikonomidis
60
0.90 (0.52 to 1.27)
18.67
Overall (I² = 4.6%, p = 0.394)
0.69 (0.52 to 0.85)
100.00
−1.5
−1
−0.5
0
0.5
1
1.5
Standardized mean difference in left ventricular mass (grams)



G
Author
N
SMD (95% CI)
Weight
Ikonomidis
60
0.73 (0.36 to 1.10)
19.14
Kanoupakis
16
1.55 (0.75 to 2.34)
11.10
Cunha
23
1.60 (0.94 to 2.27)
13.19
Karason
41
0.54 (0.10 to 0.98)
17.65
Nault
10
0.00 (−0.88 to 0.88)
9.97
Di Bello
13
0.63 (−0.16 to 1.42)
11.20
Luaces
41
0.36 (−0.08 to 0.79)
17.75
Overall (I² = 64.2%, p = 0.010)
0.75 (0.39 to 1.11)
100.00
−2 −1.5 −1 −0.5 0 0.5 1 1.5 2
Standardized mean difference in isovolumic relaxation time (ms)

Original Investigation | September 16, 2015

Effect of Bariatric Surgery vs Medical Treatment on Type 2 Diabetes in Patients With Body Mass Index Lower Than 35

Five-Year Outcomes

ONLINE FIRST

Chih-Cheng Hsu, MD[1,2,3]; Abdullah Almulaifi, MD[2]; Jung-Chien Chen, MD[2]; Kong-Han Ser, MD[2]; Shu-Chun Chen, RN[2]; Kai-Ci Hsu, MS[3]; Yi-Chih Lee, MHA[2]; Wei-Jei Lee, MD[2]

[+] Author Affiliations

JAMA Surg. Published online September 16, 2015. doi:10.1001/jamasurg.2015.2602 Text Size: A A A

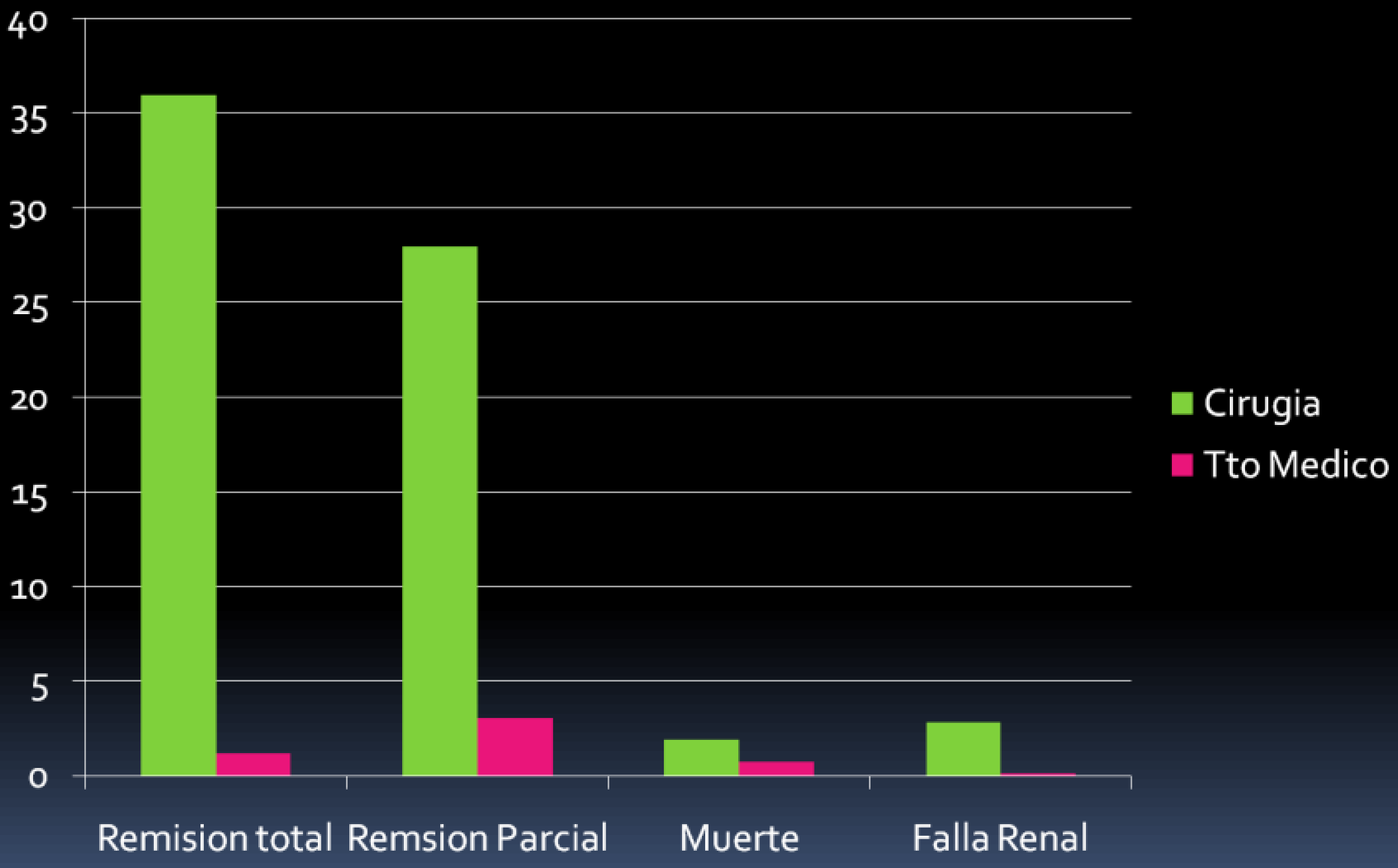
Objective To compare the 5-year efficacy between gastrointestinal metabolic surgery and medical treatment on glycemic control and diabetes remission in patients with T2DM and body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) lower than 35.

Design, Setting, and Participants This retrospective cohort study compares long-term outcomes for mildly obese patients with T2DM receiving metabolic surgery (n = 52) vs medical treatment (n = 299). The surgical group, enrolled from August 20, 2007, to June 25, 2008, and followed up through December 31, 2013, received standard sleeve gastrectomy (n = 19) or bypass (n = 33) procedures in a regional hospital. The medical group, selected from a nationwide community cohort that was recruited from August 27, 2003, to December 31, 2005, and followed up through December 31, 2012, was matched with the surgical group by age, BMI, and diabetes duration.

Main Outcomes and Measures Glycated hemoglobin (HbA_{1c}) reduction and prolonged complete and partial diabetes remission (defined as HbA_{1c} <6.0% and 6.0%-6.5% of total hemoglobin [Hb; to convert to proportion of total Hb, multiply by 0.01], respectively, for those who were exempted from any antidiabetic drugs for 5 years).

Results At the end of the fifth year, the surgical group had a mean weight loss of 21.0% (from a mean [SD] BMI of 31.0 [2.4] to 24.5 [2.7]), their mean (SD) HbA_{1c} decreased from 9.1% (2.1%) to 6.3% (1.1%) of total Hb, 18 participants (36.0%) had complete remission, 14 (28.0%) had partial remission, 1 (1.9%) died, and 1 (1.9%) had end-stage renal disease. In the same follow-up period in the medical group, 3 (1.2%) had complete remission, 4 (1.6%) had partial remission, 9 (3.0%) died, and 2 (0.7%) had end-stage renal disease; their mean HbA_{1c} remained around 8% of total Hb (mean [SD], 8.1% [1.8%] of total Hb at baseline and 8.0% [1.6%] of total Hb at 5 years), and BMI also stayed similar (mean [SD], 29.1 [2.4] at baseline and 28.8 [2.6] at 5 years). The HbA_{1c} reduction and complete and partial remission rates were all significantly larger in the surgical group as compared with the medical group (all $P < .001$). However, the mortality rate and end-stage renal disease incidence were not significantly different in these 2 comparison groups ($P = .66$ and .37, respectively).

Conclusions and Relevance For mildly obese patients with T2DM, the improvement in glycemic control from metabolic surgery lasts at least 5 years. However, the survival benefit and lifelong adverse outcomes require more than 5 years to be established.


40
35
30
25
20
15
10
5
0
Remision total
Remsion Parcial
Muerte
Falla Renal
Cirugia
Tto Medico

Original Investigation | August 05, 2015

Long-term Metabolic Effects of Laparoscopic Sleeve Gastrectomy

ONLINE FIRST

Inbal Golomb, BSc[1]; Matan Ben David, MD[2]; Adi Glass, BSc[1]; Tamara Kolitz, MD[3]; Andrei Keidar, MD[1,2]
[+] Author Affiliations

JAMA Surg. Published online August 05, 2015. doi:10.1001/jamasurg.2015.2202

Text Size: A A A

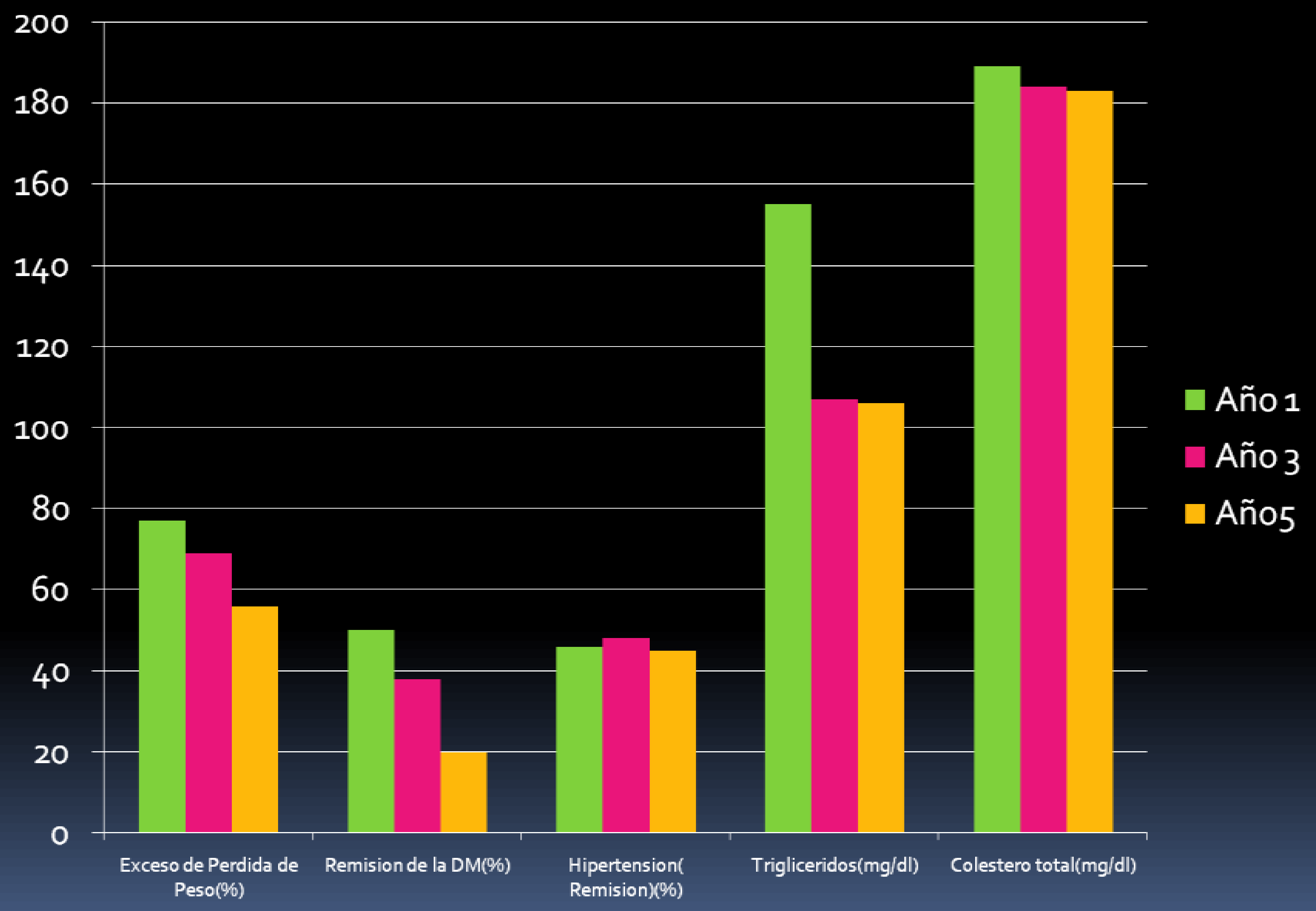
Objective To investigate the long-term effects of LSG on weight loss, diabetes mellitus, hypertension, dyslipidemia, and hyperuricemia.

Design, Setting, and Participants Cohort study using a retrospective analysis of a prospective cohort at a university hospital. Data were collected from all patients undergoing LSGs performed by the same team between April 1, 2006, and February 28, 2013, including demographic details, weight follow-up, blood test results, and information on medications and comorbidities.

Main Outcomes and Measures Excess weight loss, obesity-related comorbidities, and partial and complete remission at 1, 3, and 5 years of follow-up.

Results A total of 443 LSGs were performed. Complete data were available for 241 of the 443 patients (54.4%) at the 1-year follow-up, for 128 of 259 patients (49.4%) at the 3-year follow-up, and for 39 of 56 patients (69.6%) at the 5-year follow-up. The percentage of excess weight loss was 76.8%, 69.7%, and 56.1%, respectively. Complete remission of diabetes was maintained in 50.7%, 38.2%, and 20.0%, respectively, and remission of hypertension was maintained in 46.3%, 48.0%, and 45.5%, respectively. Changes in high-density lipoprotein cholesterol level (mean [SD] level preoperatively and at 1, 3, and 5 years, 46.7 [15.8], 52.8 [13.6], 56.8 [16.0], and 52.4 [13.8] mg/dL, respectively) and triglyceride level (mean [SD] level preoperatively and at 1, 3, and 5 years, 155.2 [86.1], 106.3 [45.3], 107.2 [53.4], and 126.4 [59.7] mg/dL, respectively) were significant compared with preoperative and postoperative measurements ($P < .001$). The decrease of low-density lipoprotein cholesterol level was significant only at 1 year ($P = .04$) and 3 years ($P = .04$) (mean [SD] level preoperatively and at 1, 3, and 5 years, 115.8 [33.2], 110.8 [32.0], 105.7 [25.9], and 110.6 [28.3] mg/dL, respectively). The changes in total cholesterol level did not reach statistical significance (mean [SD] level preoperatively and at 1, 3, and 5 years, 189.5 [38.2], 184.0 [35.4], 183.4 [31.2], and 188.1 [35.7] mg/dL, respectively). No changes in comorbidity status correlated with preoperative excess weight. Hypertriglyceridemia was the only comorbidity whose remission rates at 1 year of follow-up (partial/complete, 80.6%; complete, 72.2%) correlated with percentage of excess weight loss (76.8%) ($P = .005$).

Conclusions and Relevance Undergoing LSG induced efficient weight loss and a major improvement in obesity-related comorbidities, with mostly no correlation to percentage of excess weight loss. There was a significant weight regain and a decrease in remission rates of diabetes and, to a lesser extent, other comorbidities over time.


200
180
160
140
120
100
80
60
40
20
0
Exceso de Perdida de Peso(%)
Remision de la DM(%)
Hipertension(Remision)(%)
Trigliceridos(mg/dl)
Colestero total(mg/dl)
Año 1
Año 3
Año5

Algunas preguntas adicionales de un diabetólogo

- Si el LOOK Ahead no pudo demostrar disminución de la mortalidad
- Si el ACCORD, el VADT, mostraron que ser muy estrictos en el control metabolico, puede aumentar el riesgo cardiovascular o por lo menos no disminuirlo
- ¿ Que pasa con los pacientes en remisión, cual será su mortalidad a largo plazo?

Invited Commentary

Is Metabolic and Bariatric Surgery a Population Solution for Obesity and Type 2 Diabetes?

Robin P. Blackstone, MD

Metabolic and bariatric surgery (MBS) is shown to be more effective in the treatment of type 2 diabetes mellitus and obesity than medical weight loss in the retrospective study comparing surgical and medical cohorts with body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) lower than 35 in this issue of *JAMA Surgery*.[1] Rates of follow-up are 96.2% in the surgical group and 83.6% in the medical group at 5 years. The effect of treatment for diabetes and obesity followed up for 5 years demonstrates durability. A comparison of 2 MBS procedures, gastric bypass (n = 33 at baseline) and sleeve gastrectomy (n = 19 at baseline), shows higher complete remission of type 2 diabetes for gastric bypass than for sleeve gastrectomy (46.9% vs 16.7%, respectively) and comparable results between the 2 procedures in the treatment of obesity. The procedure groups are small. The indication for procedure choice was patient preference. The BMI range is appropriate as East Asian patients and citizens of Asian ancestry in the United States are affected by diabetes at a much lower BMI than other groups.[2]

Related article

This study offers comparable rates of diabetes remission and obesity with MBS as shown in prospective studies with 3-year follow-up and higher BMI.[3,4] Results of MBS were equally durable in patients with BMI higher than 35 at 6 years[5] and 20 years.[6] Also, MBS results in effective treatment for other components of the metabolic syndrome,[7] and the quality-adjusted life-years of bariatric surgery meet criteria for an effective intervention.[8] The question remains: should MBS be

The barriers are significant. Cost of the procedure, complications, lack of surgical manpower, poor access to financially supported care, the problems of weight regain, and clinician and payer bias against surgery limit application as a population solution. These barriers are unlikely to change and may be magnified in very large populations. In China alone, more than 90 million people have type 2 diabetes.[9] However, the need to find an effective solution is urgent based on predictions of the future.[10]

How are we going to meet this challenge if not with surgery? Many advocate adopting behavioral treatment, which has far less efficacy and durability but is more widely applicable.[11] Weight regain appears to be driven by the genetic reset that occurs when epigenetic changes hardwire the phenotype of obesity.[12] How else can it be explained that when a person loses weight in comparison with a similar patient who was always lean, the formerly obese patient has to take in significantly fewer calories to maintain the same weight?[13] The study of MBS in animal models and humans is helping to unlock critical relationships in signaling in the gut-brain axis. Scientists working in molecular genetics are exposing epigenetic inherited interactions that may be able to be manipulated to affect obesity.[14,15] This new knowledge will need to engender disruptive innovation that can be widely applied to the population at risk, is inexpensive to administer, and can be repeated as necessary. The pace of this work needs to be accelerated with increased funding and collaboration.

Surgeons work at improving the safety of MBS and to define the groups who will most benefit. Medical colleagues work to improve the delivery of behavioral models and pharmaceuticals. Scientists collaborate with both groups to define the mechanism of disease. Our collective response has neither the scope nor the scale to stem or reverse the tide of this disease. Access to all modalities of treatment should be expanded, keeping our collective fingers in the dike to salvage people in this generation. However, the long-term solution to the management of obesity within our respective populations awaits discovery. Additional answers need to be urgently sought and tested.

Agricultura
Ganaderia
Metalurgia
10.000 AC

Paleolitico
Mesolitico
Neolitico

RECOLECCION Y CAZA

Agua de mar

Miel

Prehistoria

Arroz
Trigo
Papa

Edad Antigua

Vino 7440
Cerveza 4000

LECHE 5000

Antigüedad clásica

Antigüedad tardía

Azucar cristalizada

Minas de Cardona

Granos Molidos

Aceites 5000-600

Alta Edad Media

CARNE

Siglo IV-VI

Plena Edad Media

Edad Media

Baja Edad Media

Crisis de la Edad Media

Revolución Industrial

siglo XV

Edad Moderna

siglo XVI

siglo XVII

siglo XVIII

Procesamiento
Industrial
De los granos

Edad Contemporánea

CARNE CON MAS GRASA
Alimetados con granos y balanceados
1885. 4 años-2 años-14 mesea

siglo XIX

siglo XX

siglo XXI

1970
Enriquecimiento
Cromatografico
Jarabe de Maiz

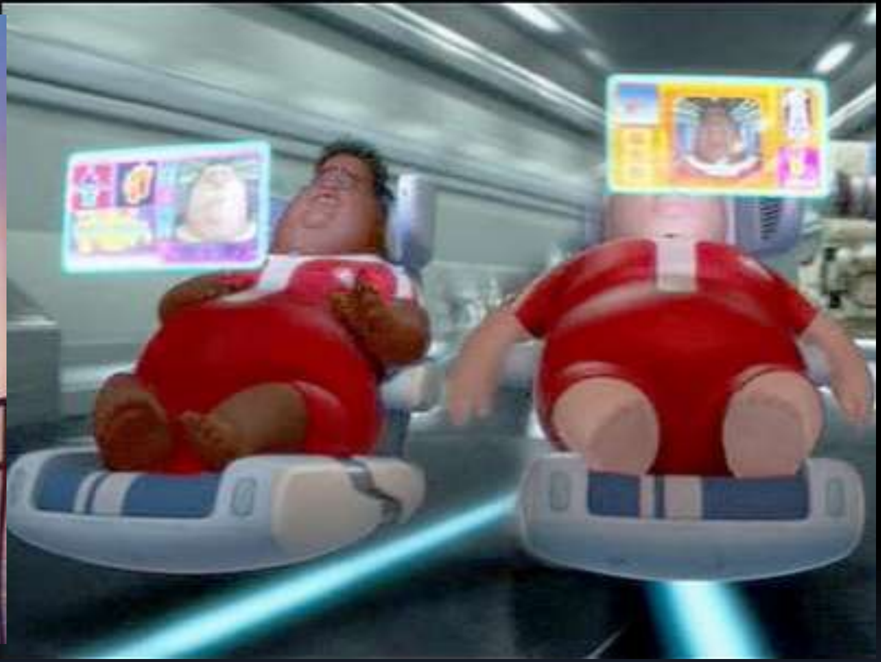
75% fabrica
15% agregado
Natural

siglo XXII

- Aumento de oferta de alimentos con alta carga glucémico.
- Alteraciones históricas en la composición de micronutrientes.
- Desequilibro a favor de alimentos acidificantes.
- Mucho Sodio y Bajo Potasio.
- Disminución a la mitad de la fibra recomendable (25-30 gr/dia).

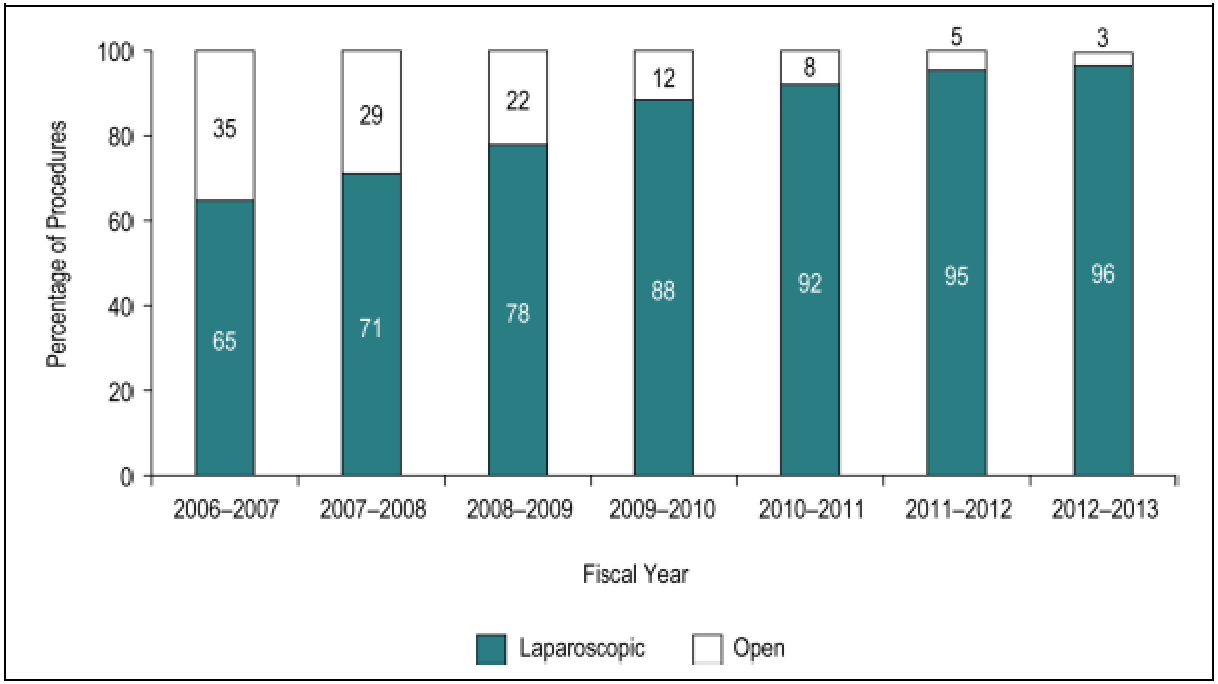
EL PLACER

- Mecanismo de defensa ancestral
- Definido fisiológicamente
- Debería ser balanceado por el raciocinio
- Pero no se toma en cuenta la ambición
- El germen de la propia destrucción?
- Que mas vamos a inventar para sobrevivir?




NON
SMETTERE
MAI
D'IMPARARE

Figure 6: Trend in Open and Laparoscopic Bariatric Surgeries, 2006–2007 to 2012–2013



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JULY 30, 2009 VOL. 361 NO. 5

Perioperative Safety in the Longitudinal Assessment of Bariatric Surgery

The Longitudinal Assessment of Bariatric Surgery (LABS) Consortium

Study Overview

- This prospective, multicenter, observational study shows 30-day outcomes for a composite end point (death, venous thromboembolism, reintervention, or failure to be discharged from the hospital within 30 days after surgery) among consecutive patients undergoing bariatric surgery
- The overall risks of death and adverse outcomes were low but were increased among patients who had the highest body-mass index and certain coexisting conditions
- The short-term safety of bariatric surgery should be considered in conjunction with both the long-term effects and the risk of living with extreme obesity

Adverse Outcomes within 30 Days after Surgery, According to Surgical Procedure

Table 2. Adverse Outcomes within 30 Days after Surgery, According to Surgical Procedure.

Outcome	Total (N=4610)*	Laparoscopic Adjustable Gastric Banding (N=1198)	Laparoscopic Roux-en-Y Gastric Bypass (N=2975)	Open Roux-en-Y Gastric Bypass (N=437)	P Value†
	number (percent)				
Death	15 (0.3)	0	6 (0.2)	9 (2.1)	<0.001
Deep-vein thrombosis or venous thromboembolism	20 (0.4)	3 (0.3)	12 (0.4)	5 (1.1)	0.05
Tracheal reintubation	20 (0.4)	2 (0.2)	12 (0.4)	6 (1.4)	0.004
Endoscopy	51 (1.1)	1 (0.1)	45 (1.5)	5 (1.1)	<0.001
Operation					
Tracheostomy	11 (0.2)	0	6 (0.2)	5 (1.1)	0.001
Placement of percutaneous drain	16 (0.3)	0	13 (0.4)	3 (0.7)	0.48
Abdominal operation	118 (2.6)	9 (0.8)	94 (3.2)	15 (3.4)	<0.001
Failure to be discharged by day 30	17 (0.4)	0	13 (0.4)	4 (0.9)	0.02
Composite end point‡	189 (4.1)	12 (1.0)	143 (4.8)	34 (7.8)	<0.0001

* The total excludes 166 procedures, including 117 sleeve gastrectomies, 47 biliopancreatic diversions with or without a duodenal switch, 1 vertical banded gastroplasty, and 1 open adjustable gastric banding.

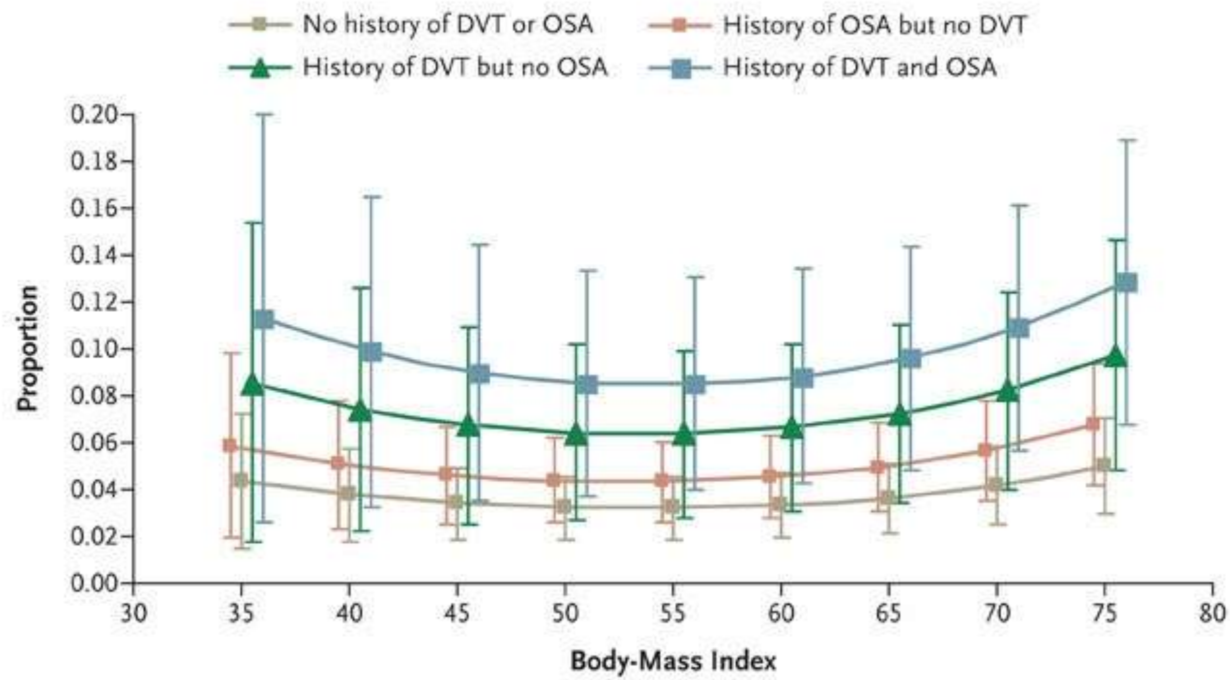
† P values are for the comparison between treatment groups. Values were calculated with the use of the chi-square test.

‡ This end point is a composite of death; deep-vein thrombosis or venous thromboembolism; reintervention with the use of a percutaneous, endoscopic, or operative technique; or failure to be discharged from the hospital within 30 days after surgery.

The Longitudinal Assessment of Bariatric Surgery (LABS) Consortium. N Engl J Med 2009;361:445-454

The NEW ENGLAND JOURNAL of MEDICINE

Predicted Probabilities of Adverse Outcomes, According to a History of Deep-Vein Thrombosis or Venous Thromboembolism (DVT) or Obstructive Sleep Apnea (OSA)



BMI	30 to <40	40 to <45	45 to <50	50 to <55	55 to <60	60 to <65	65 to <70	70 to <75	≥75	Total
No. of patients	623	1304	1156	722	417	205	90	52	38	4607
No. of events	23	51	30	25	29	13	5	4	9	189
Event rate (%)	3.7	3.9	2.6	3.5	7.0	6.3	5.6	7.7	23.7	4.1

The Longitudinal Assessment of Bariatric Surgery (LABS) Consortium. N Engl J Med 2009;361:445-454

The NEW ENGLAND JOURNAL of MEDICINE

Original Investigation | September 16, 2015

Effect of Bariatric Surgery vs Medical Treatment on Type 2 Diabetes in Patients With Body Mass Index Lower Than 35

Five-Year Outcomes ONLINE FIRST

Chih-Cheng Hsu, MD[1,2,3]; Abdullah Almulaifi, MD[2]; Jung-Chien Chen, MD[2]; Kong-Han Ser, MD[2]; Shu-Chun Chen, RN[2]; Kai-Ci Hsu, MS[3]; Yi-Chih Lee, MHA[2]; Wei-Jei Lee, MD[2]

[+] Author Affiliations

JAMA Surg. Published online September 16, 2015. doi:10.1001/jamasurg.2015.2602 Text Size: A A A

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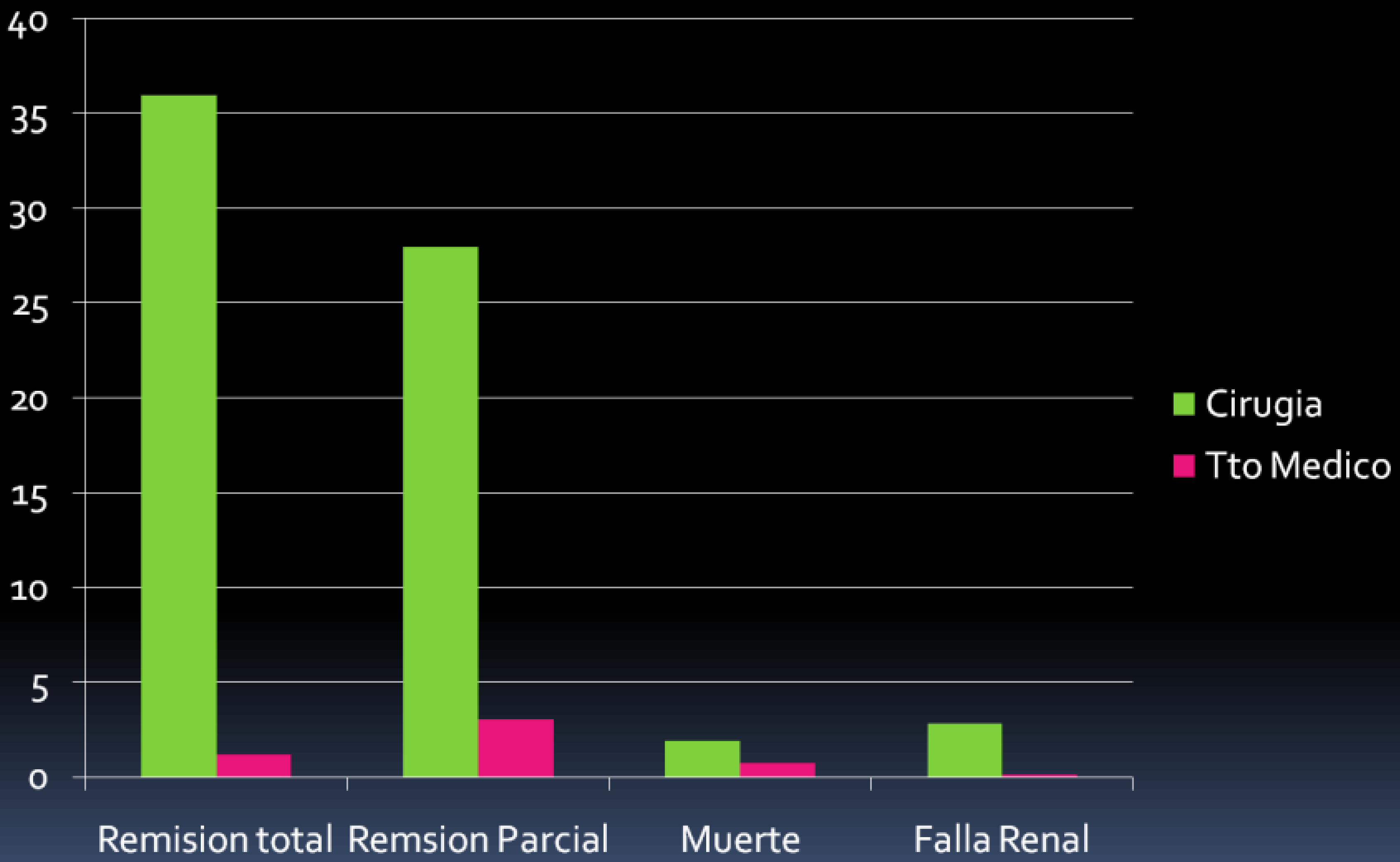
Design, Setting, and Participants This retrospective cohort study compares long-term outcomes for mildly obese patients with T2DM receiving metabolic surgery (n = 52) vs medical treatment (n = 299). The surgical group, enrolled from August 20, 2007, to June 25, 2008, and followed up through December 31, 2013, received standard sleeve gastrectomy (n = 19) or bypass (n = 33) procedures in a regional hospital. The medical group, selected from a nationwide community cohort that was recruited from August 27, 2003, to December 31, 2005, and followed up through December 31, 2012, was matched with the surgical group by age, BMI, and diabetes duration.

Main Outcomes and Measures Glycated hemoglobin (HbA_{1c}) reduction and prolonged complete and partial diabetes remission (defined as HbA_{1c} <6.0% and 6.0%-6.5% of total hemoglobin [Hb; to convert to proportion of total Hb, multiply by 0.01], respectively, for those who were exempted from any antidiabetic drugs for 5 years).

Results At the end of the fifth year, the surgical group had a mean weight loss of 21.0% (from a mean [SD] BMI of 31.0 [2.4] to 24.5 [2.7]), their mean (SD) HbA_{1c} decreased from 9.1% (2.1%) to 6.3% (1.1%) of total Hb, 18 participants (36.0%) had complete remission, 14 (28.0%) had partial remission, 1 (1.9%) died, and 1 (1.9%) had end-stage renal disease. In the same follow-up period in the medical group, 3 (1.2%) had complete remission, 4 (1.6%) had partial remission, 9 (3.0%) died, and 2 (0.7%) had end-stage renal disease; their mean HbA_{1c} remained around 8% of total Hb (mean [SD], 8.1% [1.8%] of total Hb at baseline and 8.0% [1.6%] of total Hb at 5 years), and BMI also stayed similar (mean [SD], 29.1 [2.4] at baseline and 28.8 [2.6] at 5 years). The HbA_{1c} reduction and complete and partial remission rates were all significantly larger in the surgical group as compared with the medical group (all $P < .001$). However, the mortality rate and end-stage renal disease incidence were not significantly different in these 2 comparison groups ($P = .66$ and .37, respectively).

Conclusions and Relevance For mildly obese patients with T2DM, the improvement in glycemic control from metabolic surgery lasts at least 5 years. However, the survival benefit and lifelong adverse outcomes require more than 5 years to be established.



40
35
30
25
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0
Remision total
Remsion Parcial
Muerte
Falla Renal
Cirugia
Tto Medico

Original Investigation | August 05, 2015

Long-term Metabolic Effects of Laparoscopic Sleeve Gastrectomy

ONLINE FIRST

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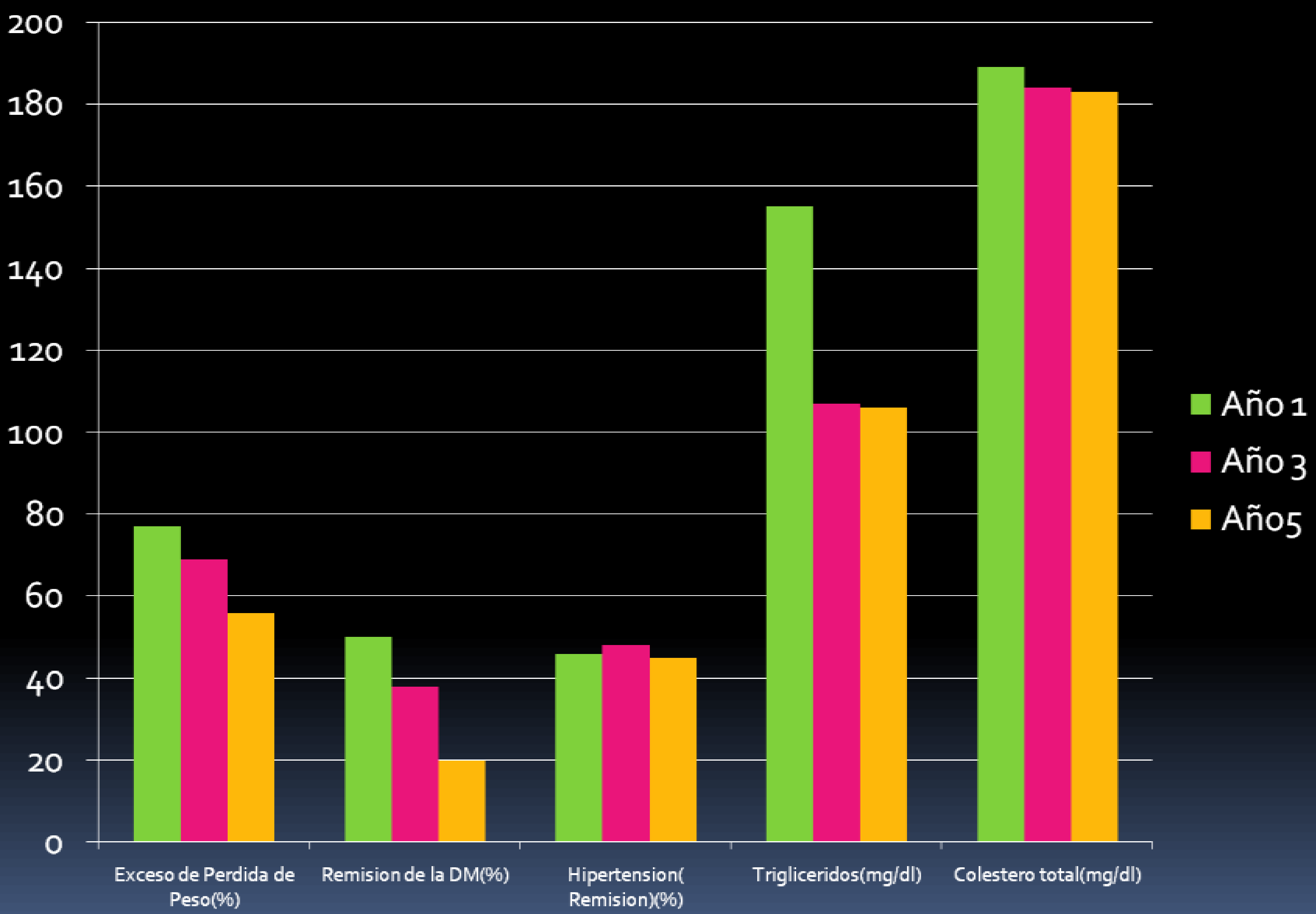
Objective To investigate the long-term effects of LSG on weight loss, diabetes mellitus, hypertension, dyslipidemia, and hyperuricemia.

Design, Setting, and Participants Cohort study using a retrospective analysis of a prospective cohort at a university hospital. Data were collected from all patients undergoing LSGs performed by the same team between April 1, 2006, and February 28, 2013, including demographic details, weight follow-up, blood test results, and information on medications and comorbidities.

Main Outcomes and Measures Excess weight loss, obesity-related comorbidities, and partial and complete remission at 1, 3, and 5 years of follow-up.

Results A total of 443 LSGs were performed. Complete data were available for 241 of the 443 patients (54.4%) at the 1-year follow-up, for 128 of 259 patients (49.4%) at the 3-year follow-up, and for 39 of 56 patients (69.6%) at the 5-year follow-up. The percentage of excess weight loss was 76.8%, 69.7%, and 56.1%, respectively. Complete remission of diabetes was maintained in 50.7%, 38.2%, and 20.0%, respectively, and remission of hypertension was maintained in 46.3%, 48.0%, and 45.5%, respectively. Changes in high-density lipoprotein cholesterol level (mean [SD] level preoperatively and at 1, 3, and 5 years, 46.7 [15.8], 52.8 [13.6], 56.8 [16.0], and 52.4 [13.8] mg/dL, respectively) and triglyceride level (mean [SD] level preoperatively and at 1, 3, and 5 years, 155.2 [86.1], 106.3 [45.3], 107.2 [53.4], and 126.4 [59.7] mg/dL, respectively) were significant compared with preoperative and postoperative measurements ($P < .001$). The decrease of low-density lipoprotein cholesterol level was significant only at 1 year ($P = .04$) and 3 years ($P = .04$) (mean [SD] level preoperatively and at 1, 3, and 5 years, 115.8 [33.2], 110.8 [32.0], 105.7 [25.9], and 110.6 [28.3] mg/dL, respectively). The changes in total cholesterol level did not reach statistical significance (mean [SD] level preoperatively and at 1, 3, and 5 years, 189.5 [38.2], 184.0 [35.4], 183.4 [31.2], and 188.1 [35.7] mg/dL, respectively). No changes in comorbidity status correlated with preoperative excess weight. Hypertriglyceridemia was the only comorbidity whose remission rates at 1 year of follow-up (partial/complete, 80.6%; complete, 72.2%) correlated with percentage of excess weight loss (76.8%) ($P = .005$).

Conclusions and Relevance Undergoing LSG induced efficient weight loss and a major improvement in obesity-related comorbidities, with mostly no correlation to percentage of excess weight loss. There was a significant weight regain and a decrease in remission rates of diabetes and, to a lesser extent, other comorbidities over time.



200
180
160
140
120
100
80
60
40
20
0
Exceso de Perdida de Peso(%)
Remision de la DM(%)
Hipertension(Remision)(%)
Trigliceridos(mg/dl)
Colestero total(mg/dl)
Año 1
Año 3
Año5

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Perioperative Safety in the Longitudinal Assessment of Bariatric Surgery

The Longitudinal Assessment of Bariatric Surgery (LABS) Consortium

Study Overview

- This prospective, multicenter, observational study shows 30-day outcomes for a composite end point (death, venous thromboembolism, reintervention, or failure to be discharged from the hospital within 30 days after surgery) among consecutive patients undergoing bariatric surgery
- The overall risks of death and adverse outcomes were low but were increased among patients who had the highest body-mass index and certain coexisting conditions
- The short-term safety of bariatric surgery should be considered in conjunction with both the long-term effects and the risk of living with extreme obesity

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Adverse Outcomes within 30 Days after Surgery, According to Surgical Procedure

Table 2. Adverse Outcomes within 30 Days after Surgery, According to Surgical Procedure.

Outcome	Total (N=4610)*	Laparoscopic Adjustable Gastric Banding (N=1198)	Laparoscopic Roux-en-Y Gastric Bypass (N=2975)	Open Roux-en-Y Gastric Bypass (N=437)	P Value†
	number (percent)				
Death	15 (0.3)	0	6 (0.2)	9 (2.1)	<0.001
Deep-vein thrombosis or venous thromboembolism	20 (0.4)	3 (0.3)	12 (0.4)	5 (1.1)	0.05
Tracheal reintubation	20 (0.4)	2 (0.2)	12 (0.4)	6 (1.4)	0.004
Endoscopy	51 (1.1)	1 (0.1)	45 (1.5)	5 (1.1)	<0.001
Operation					
Tracheostomy	11 (0.2)	0	6 (0.2)	5 (1.1)	0.001
Placement of percutaneous drain	16 (0.3)	0	13 (0.4)	3 (0.7)	0.48
Abdominal operation	118 (2.6)	9 (0.8)	94 (3.2)	15 (3.4)	<0.001
Failure to be discharged by day 30	17 (0.4)	0	13 (0.4)	4 (0.9)	0.02
Composite end point‡	189 (4.1)	12 (1.0)	143 (4.8)	34 (7.8)	<0.0001

* The total excludes 166 procedures, including 117 sleeve gastrectomies, 47 biliopancreatic diversions with or without a duodenal switch, 1 vertical banded gastroplasty, and 1 open adjustable gastric banding.

† P values are for the comparison between treatment groups. Values were calculated with the use of the chi-square test.

‡ This end point is a composite of death; deep-vein thrombosis or venous thromboembolism; reintervention with the use of a percutaneous, endoscopic, or operative technique; or failure to be discharged from the hospital within 30 days after surgery.

The Longitudinal Assessment of Bariatric Surgery (LABS) Consortium. N Engl J Med 2009;361:445-454

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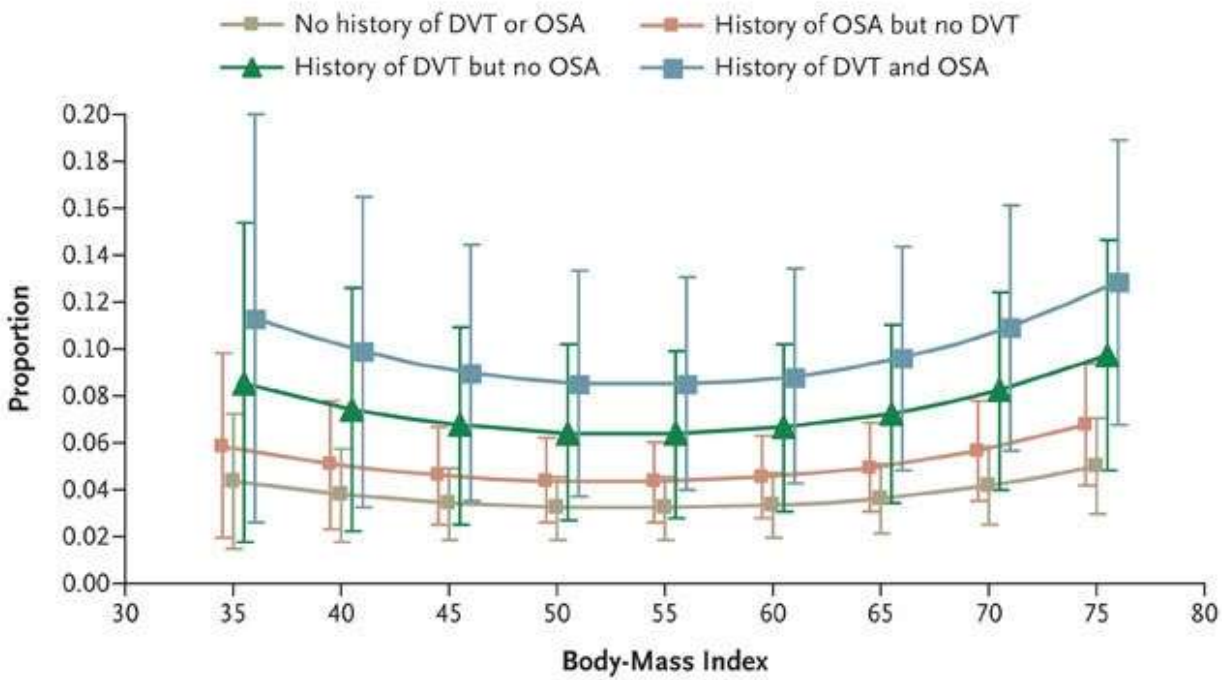
Predicted Probabilities of Adverse Outcomes, According to a History of Deep-Vein Thrombosis or Venous Thromboembolism (DVT) or Obstructive Sleep Apnea (OSA)



BMI	30 to <40	40 to <45	45 to <50	50 to <55	55 to <60	60 to <65	65 to <70	70 to <75	≥75	Total
No. of patients	623	1304	1156	722	417	205	90	52	38	4607
No. of events	23	51	30	25	29	13	5	4	9	189
Event rate (%)	3.7	3.9	2.6	3.5	7.0	6.3	5.6	7.7	23.7	4.1

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