28° Congresso Interassociativo AMD-SID Lombardia 2022

Chirurgia Bariatrica (& DMT2)

Diego Foschi

P.fr. Chirurgia Generale

Università degli Studi di Milano

Istituto Clinico San Gaudenzio, Novara

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Auditorium Giorgio Gaber - Grattacielo Pirelli

Piazza Duca d'Aosta, 3 - Milano

SID fondata nel 1964 Società Italiana di Diabetologia

AMD 1974 ANNO DI FONDAZIONE ASSOCIAZIONE MEDICI DIABETOLOGI

ANNALS OF SURGERY
Vol. 222, No. 3, 339–352

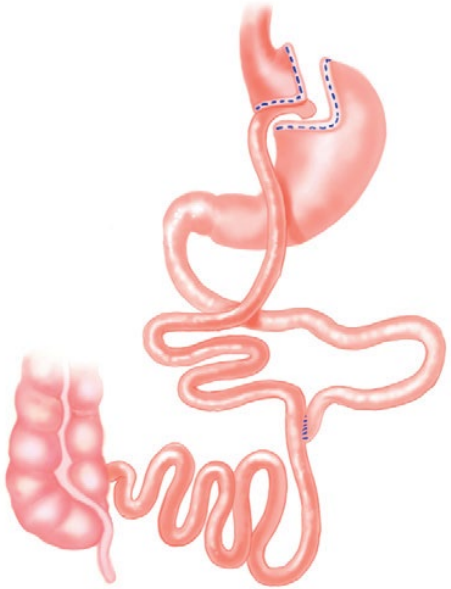
Who Would Have Thought It?

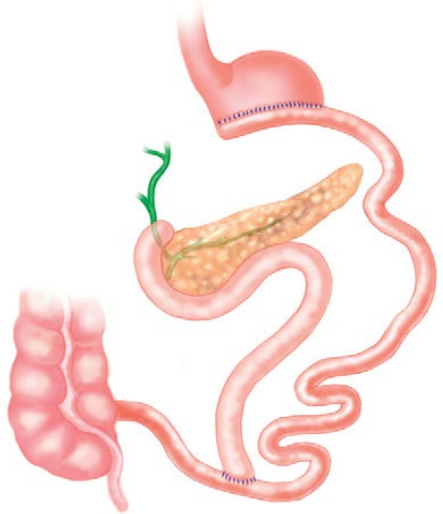
An Operation Proves to Be the Most Effective Therapy for Adult-Onset Diabetes Mellitus

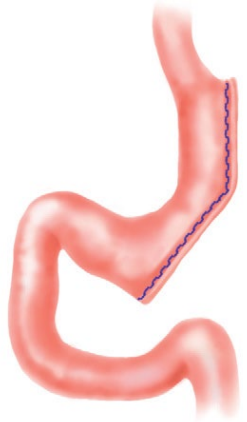
Walter J. Pories, M.D., Melvin S. Swanson, Ph.D., K
Stuart B. Long, B.S., Patricia G. Morris, B.S.N., Bre
Hisham A. Barakat, Ph.D., Richard A. deRamon, M
Jeanette M. Dolezal, Ph.D., and Lynis Dohm, Ph.D.

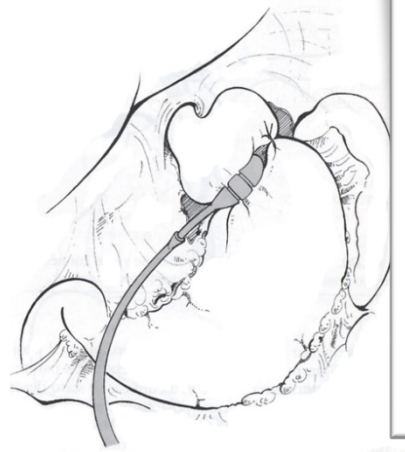
patient, who presented on
surgery, with a plasma gl
required 90 U of insulin be
the next day, her sliding-s
creased to 8 U, and, after
vember 22, 1980), she rec
therapy and was maintaini

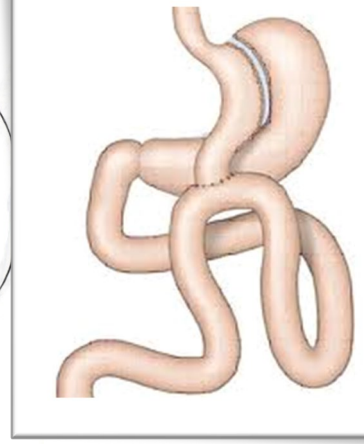
Initially, we ascribed th
loss resulting from food r
do not eat much, especiall
a limited outflow through t
initial patients received nc
received only 30 mL of a
hours, supplemented by wa
surgery. With time, additi
however, it became appare
solely to weight loss was











Biliopancreatic Diversion

Nicola Scopinaro, M.D., Gian Franco Adami, M.D., Giuseppe M. Marinari, M.D., Ezio Gianetta, M.D., Enrico Traverso, M.D., Daniele Friedman, M.D., Giovanni Camerini, M.D., Giorgio Baschieri, M.D., Alessandro Simonelli, M.D.

Department of Surgery, University of Genoa School of Medicine, Largo Rosanna Benzi, 8, 16132 Genoa, Italy

Abstract. Biliopancreatic diversion (BPD) has made reacceptable the malabsorptive approach to the surgical treatment of obesity. The procedure, in a series of 2241 patients operated on during a 21-year period, caused a mean permanent reduction of about 75% of the initial excess weight. The indefinite weight maintenance appears to be due to the existence of a threshold absorption capacity for fat and starch, and thus energy, and the weight loss is partly due to increased resting energy expenditure. Beneficial effects other than those consequent to weight loss or reduced nutrient absorption included permanent normalization of serum glucose and cholesterol without any medication and on totally free diet in 100% of cases, both phenomena being due to a specific action of the operation. Operative mortality was less than 0.5%. Specific late complications included anemia, less than 5% with adequate iron or folate supplementation (or both); stomal ulcer, reduced to 3.2% by oral H_2-blocker prophylaxis; bone demineralization, increasing up to the fourth year and tending to decrease thereafter, with need of calcium and vitamin D supplementation; neurologic complications, totally avoidable by prompt vitamin B administration to patients at risk; protein malnutrition, which was reduced to a minimum of 3% with 1.3% recurrence, in exchange with a smaller weight loss, by adapting the volume of the gastric remnant and the length of the alimentary limb to the patient's individual characteristics. It is concluded that the correct use of BPD, based on the knowledge of its mechanisms of action, can make the procedure an effective, safe one in all hands.

Because of the absence of a blind loop and of the malabsorption
essentially selective for fat and starch, biliopancreatic diversion
(BPD) is free of the complications pertaining to JIB [3, 4].
Moreover, BPD has a wide "therapeutic interval" because by
varying the length of the intestinal limbs any degree of fat, starch,
and protein malabsorption can be created, thereby adapting the
procedure to the population's or even the patient's characteristics
to obtain the best possible weight loss results with minimum
complications [5]. This extreme flexibility also allows us to neu-
tralize the consequences of intestinal adaptation phenomena. The
qualities of BPD have gradually led to reacceptance of malab-
sorption as a surgical approach to obesity therapy, the procedure
being used increasingly in its many versions in the Western world.

Results and complications of BPD, after more than 20 years of
clinical use, are well known by all bariatric surgeons. Therefore
the main purpose of this article is to describe the physiology of the
operation, the knowledge of which has increased considerably. A
full understanding of the mechanisms of action of BPD is of
paramount clinical importance, as it enables surgeons to exploit
the flexibility of the procedure to adapt it to a particular patient
population.

Weight and Type 2 Diabetes after Bariatric Surgery: Systematic Review and Meta-analysis

Henry Buchwald, MD, PhD,[a] Rhonda Estok, RN, BSN,[b] Kyle Fahrbach, PhD,[b] Deirdre Banel, BA,[b]
Michael D. Jensen, MD,[c] Walter J. Pories, MD,[d] John P. Bantle, MD,[e] Isabella Sledge, MD, MPH[b]

Table 8 Overview of Weight Loss, Surgical Procedure, and Diabetes Resolution

	Total	Gastric Banding	Gastroplasty	Gastric Bypass	BPD/DS
% EBWL	55.9	46.2	55.5	59.7	63.6
% Resolved overall	78.1	56.7	79.7	80.3	95.1
% Resolved <2 y	80.3	55.0	81.4	81.6	94.0
% Resolved ≥2 y	74.6	58.3	77.5	70.9	95.9

%EBWL = percent excess body weight loss; BPD/DS = biliopancreatic diversion/duodenal switch.

Time of DMT2 remission after bariatric surgery

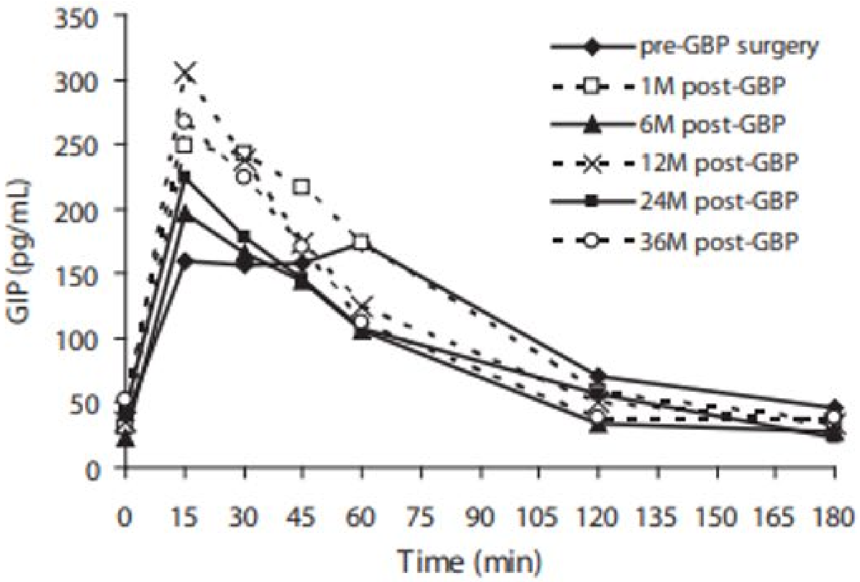
Authors	Source	Subjects (n)	BMI (kg/m²)	Diabetes /IGT	Time since operation	Diabetes improvement/ remission/ IGT reversal	Type of operation
Pories WJ et al.	Ann Surg 1987	141	≥40	88/53	10 days	100%	RYGB
Rubino F et al.	Ann Surg 2004	6	≥40	6	3 weeks	100%	RYGB
Cohen R et al.	Surg Obes Relat Dis 2006	37	<35	37	6 months	97%	RYGB
Smith BR et al.	Am Surg 2008	59	≥40	59	1 month	42%	RYGB
Laferrère B et al.	Diabetes Care 2007	8	>35	8	1 month	100%	RYGB
Laferrère B et al.	JCEM 2008	9	≥35	9	1 month	100%	RYGB
TOTAL 207/53 RYGB							
Mingrone et al.	Diabetologia 1997	7	≥40	7	3 months	100%	BPD
Mingrone et al.	Diabetes 1999	2	21/20.1	2	3 weeks	100%	BPD
Guidone C et al.	Diabetes 2006	10	≥40	10	1 week–1 month	100%	BPD
Mari A et al.	Diabetologia 2006	20	≥40	11/9	1 week	100%	BPD
Scopinaro N et al.	Obes Surg 2008	443	≥40	443	1–2 months	74%	BPD
Briatore L et al.	Obesity 2008	9	≥40	9	1 month	100%	BPD
Salinari S et al.	Diabetes Care 2009	9	≥40	9	1 month	100%	BPD
Chiellini C et al.	Diabetologia 2009	5	<35	5	1 month	100%	BPD
TOTAL 496/9 BPD							

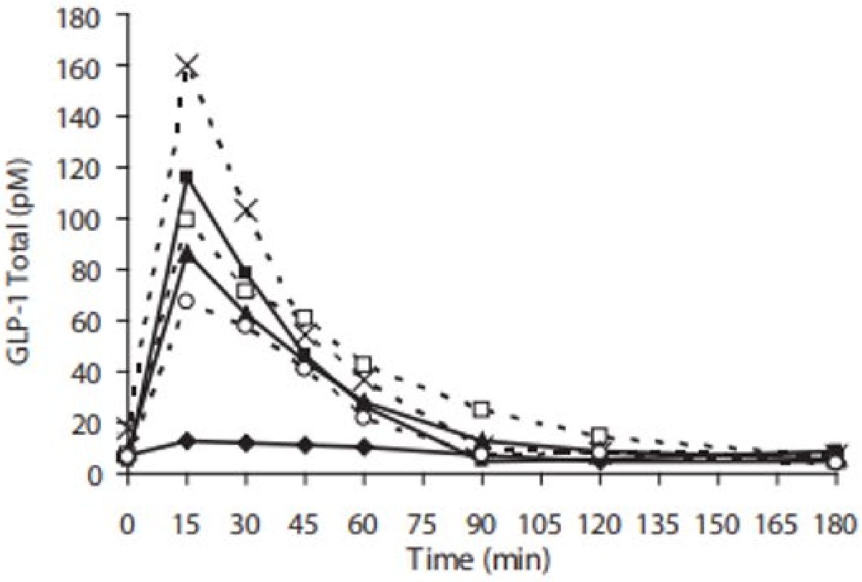
G. Mingrone, 2009

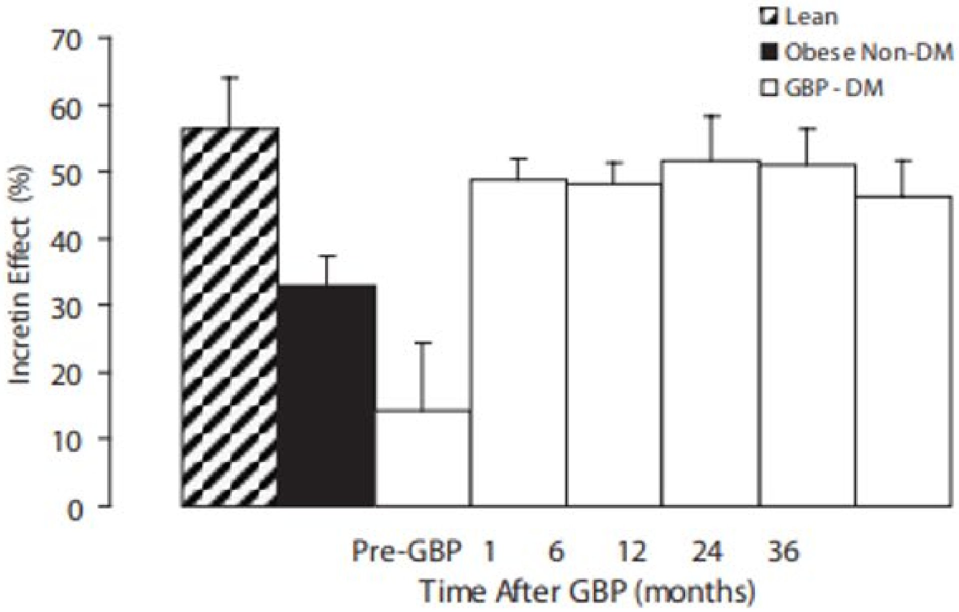
Effect of gastric bypass surgery on the incretins

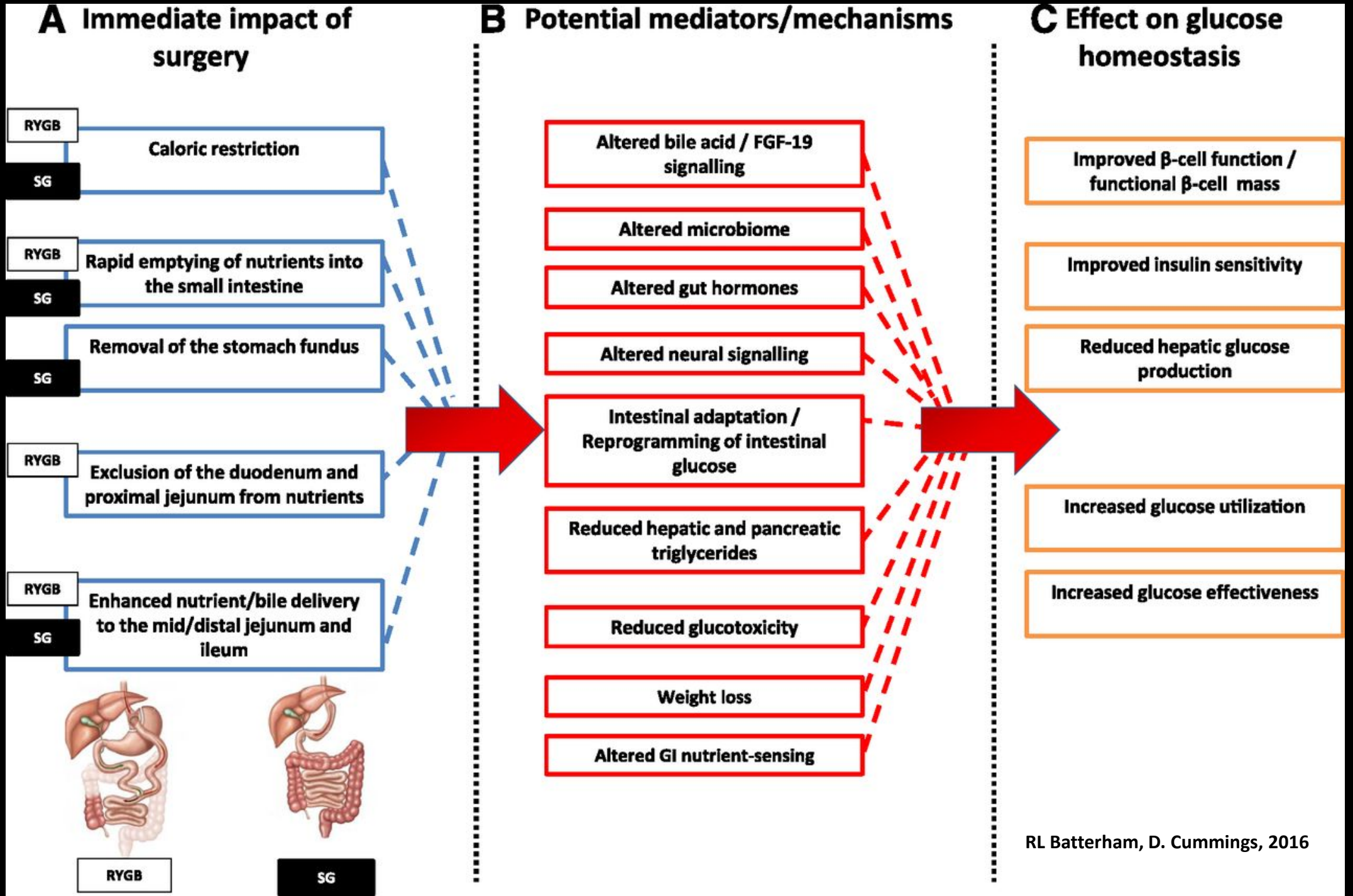
B. Laferrère

Diabetes & Metabolism 35 (2009) 513–517








A Immediate impact of surgery
B Potential mediators/mechanisms
C Effect on glucose homeostasis
RYGB
SG
Caloric restriction
RYGB
SG
Rapid emptying of nutrients into the small intestine
SG
Removal of the stomach fundus
RYGB
Exclusion of the duodenum and proximal jejunum from nutrients
RYGB
SG
Enhanced nutrient/bile delivery to the mid/distal jejunum and ileum
RYGB
SG
Altered bile acid / FGF-19 signalling
Altered microbiome
Altered gut hormones
Altered neural signalling
Intestinal adaptation / Reprogramming of intestinal glucose
Reduced hepatic and pancreatic triglycerides
Reduced glucotoxicity
Weight loss
Altered GI nutrient-sensing
Improved β-cell function / functional β-cell mass
Improved insulin sensitivity
Reduced hepatic glucose production
Increased glucose utilization
Increased glucose effectiveness
RL Batterham, D. Cummings, 2016

The Diabetes Surgery Summit Consensus Conference

Recommendations for the Evaluation and Use of Gastrointestinal Surgery to Treat Type 2 Diabetes Mellitus

Francesco Rubino, MD,† Lee M. Kaplan, MD, PhD,‡ Philip R. Schauer, M*
and David E. Cummings, MD,¶ on behalf of the Diabetes Surgery Summit

2007

Objectives: To develop guidelines for the use of gastrointestinal surgery to treat type 2 diabetes and to craft an agenda for further research.

Background: Increasing evidence demonstrates that bariatric surgery can dramatically ameliorate type 2 diabetes. Not surprisingly, gastrointestinal operations are now being used throughout the world to treat diabetes in association with obesity, and increasingly, for diabetes alone. However, the role for surgery in diabetes treatment is not clearly defined and there are neither clear guidelines for these practices nor sufficient plans for clinical trials to evaluate the risks and benefits of such "diabetes surgery."

kg/m^2. Clinical trials to investigate the exact role of surgery in patients with less severe obesity and diabetes are considered a priority. Furthermore, investigations on the mechanisms of surgical control of diabetes are strongly encouraged, as they may help advance the understanding of diabetes pathophysiology.

Conclusions: The DSS consensus document embodies the foundations of "diabetes surgery," and represents a timely attempt by leading scholars to improve access to surgical options supported by sound evidence, while also preventing harm from inappropriate use of unproven procedures.

(*Ann Surg* 2010;251: 399–405)

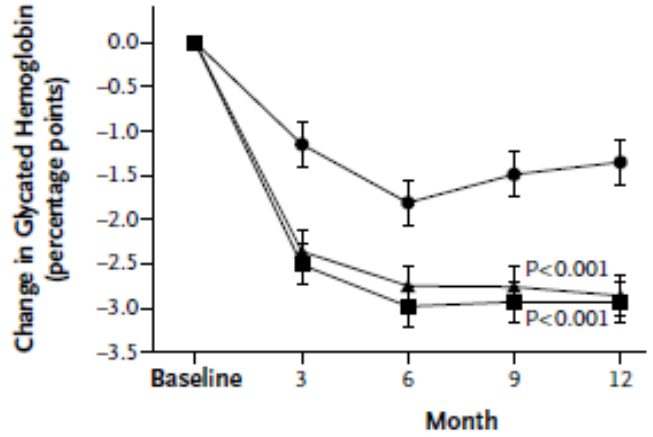
The NEW ENGLAND JOURNAL of MEDICINE
ESTABLISHED IN 1812 APRIL 26, 2012 VOL. 366 NO. 17

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.

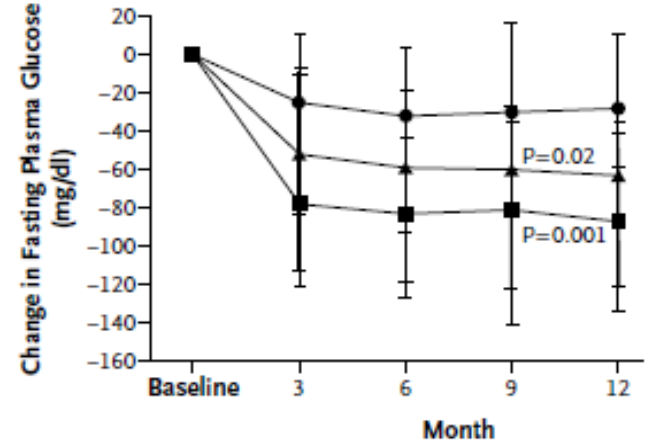
● Intensive medical therapy ■ Roux-en-Y gastric bypass ▲ Sleeve gastrectomy

A Change in Glycated Hemoglobin



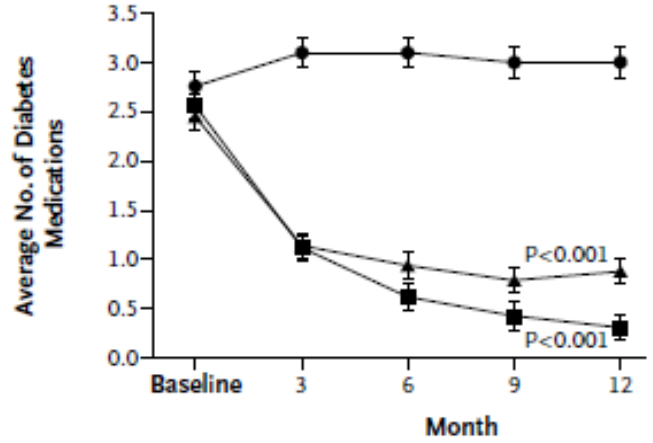
Value at Visit					
Intensive medical therapy	8.9	7.7	7.1	7.4	7.5
Roux-en-Y gastric bypass	9.3	6.8	6.3	6.4	6.4
Sleeve gastrectomy	9.5	7.1	6.7	6.7	6.6

B Change in Fasting Plasma Glucose



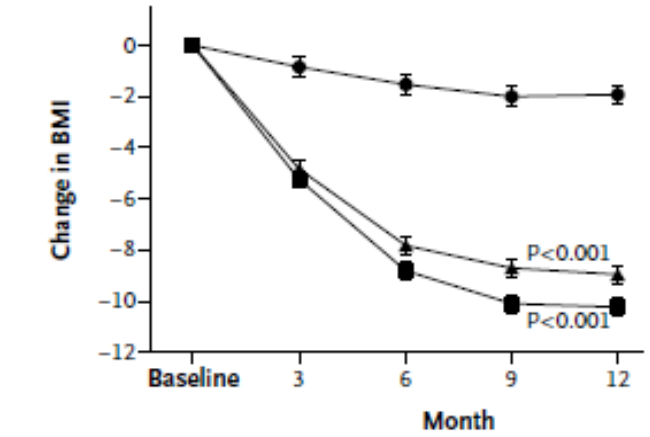
Value at Visit					
Intensive medical therapy	155	122	113	120	120
Roux-en-Y gastric bypass	193	109	96	96	99
Sleeve gastrectomy	164	118	104	102	97

C Average No. of Diabetes Medications



Value at Visit					
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 Change in BMI

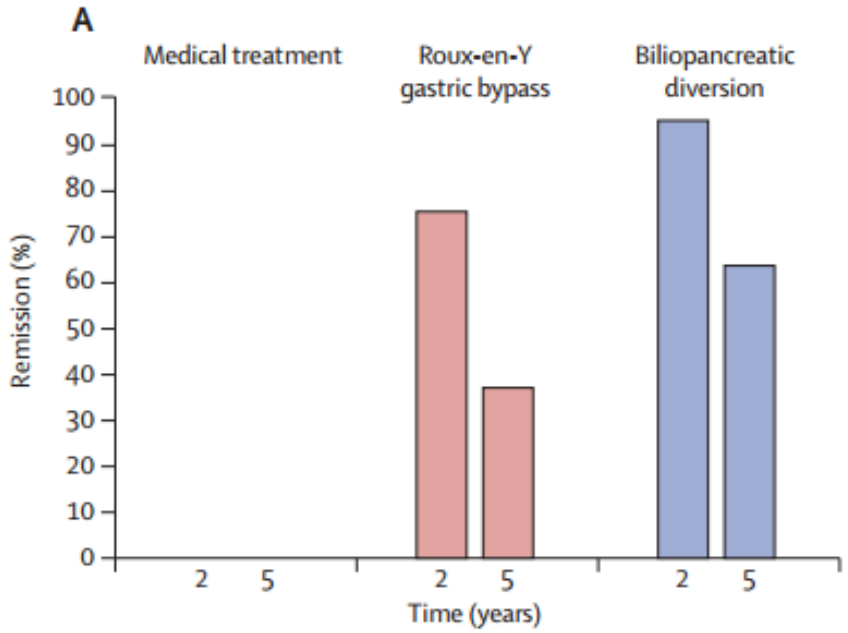


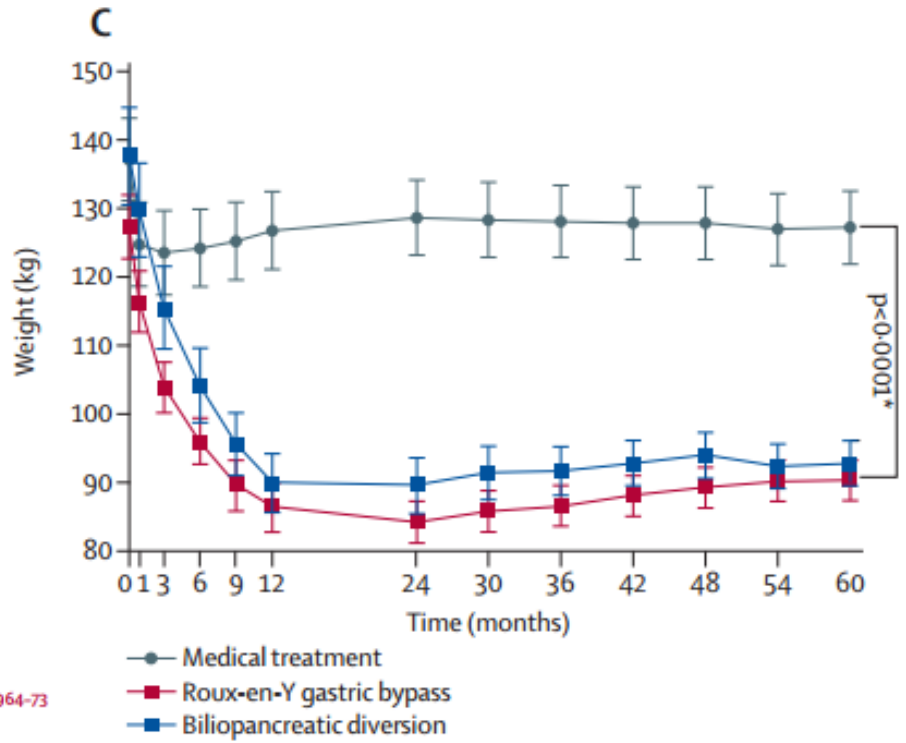
Value at Visit					
Intensive medical therapy	36.3	35.4	34.8	34.5	34.4
Roux-en-Y gastric bypass	37.0	31.8	28.2	26.9	26.8
Sleeve gastrectomy	36.1	31.3	28.3	27.3	27.2

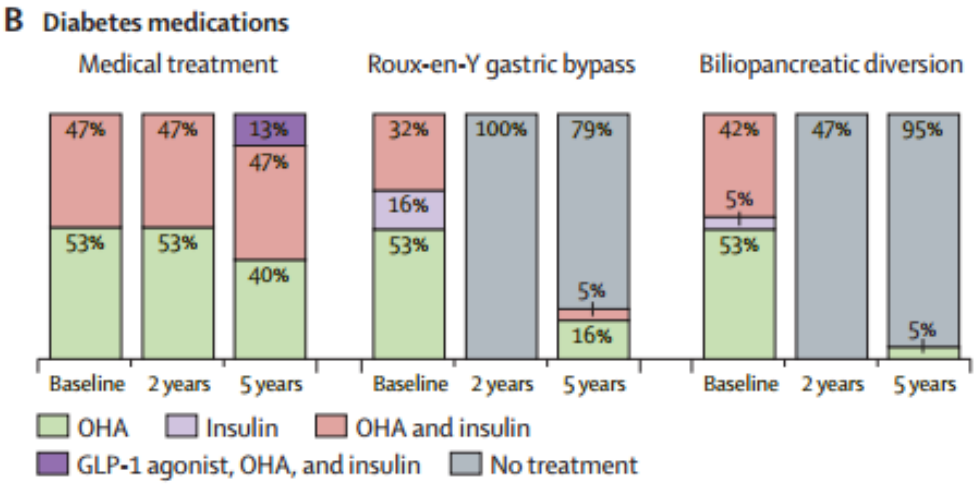
Bariatric–metabolic surgery versus conventional medical treatment in obese patients with type 2 diabetes: 5 year follow-up of an open-label, single-centre, randomised controlled trial

Geltrude Mingrone, Simona Panunzi, Andrea De Gaetano, Caterina Guidone, Amerigo Iaconelli, Giuseppe Nanni, Marco Castagneto, Stefan Bornstein, Francesco Rubino

Lancet 2015; 386: 964–73

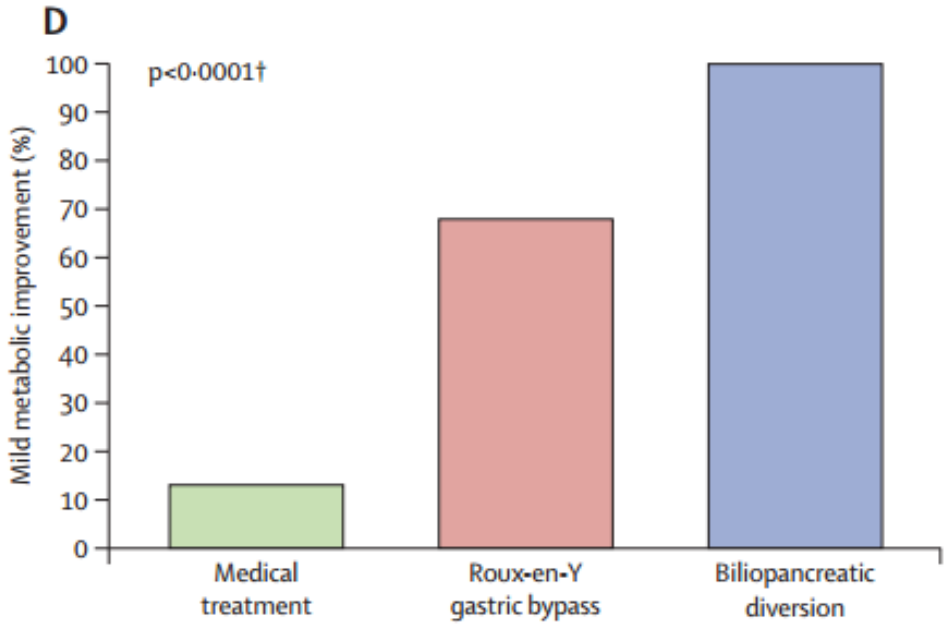






Number of OHA tablets

	Medical treatment	Roux-en-Y gastric bypass	Biliopancreatic diversion
Baseline	3 (0)	2·53 (1·12)	2·84 (0·69)
2 years	3 (0)	0 (0)	0 (0)
5 years	3 (0)	0·32 (0·67)	0·11 (0·46)



Roux-en-Y Gastric Bypass Versus Medical Treatment for Type 2 Diabetes Mellitus in Obese Patients

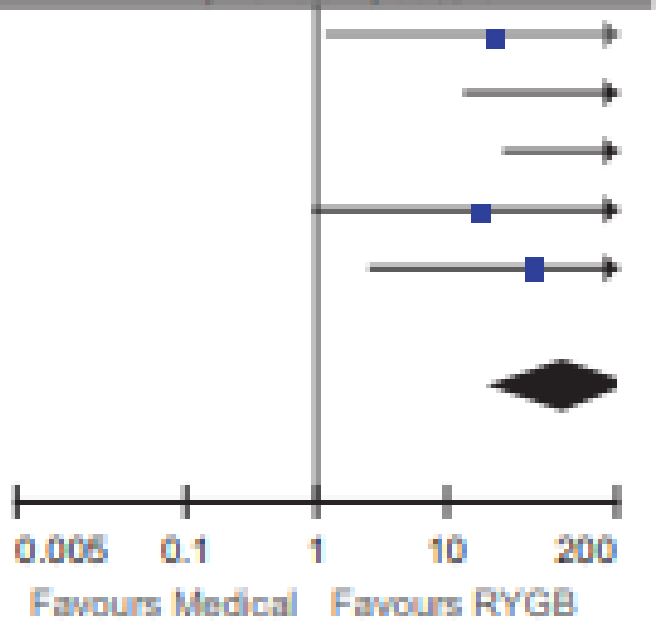
A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Yong Yan, MM, Yanhua Sha, MM, Guoxiang Yao, MD, Shiguang Wang, MM, Fanzhi Kong, MM,

	RYGB		Medical			Odds Ratio	Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI
Courcoulas 2015	8	18	0	14	19.4%	23.48 [1.22, 453.35]	
Ikramuddin 2015	40	60	0	59	21.2%	235.10 [13.82, 3998.51]	
Liang 2013	28	31	0	34	18.9%	561.86 [27.85, 11335.33]	
Mingrone 2015	7	19	0	15	19.5%	18.60 [0.97, 358.26]	
Schauer 2014	17	48	0	40	21.0%	45.00 [2.60, 777.50]	
Total (95% CI)		176		162	100.0%	76.37 [20.70, 281.73]	
Total events	100		0				

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 3.92$, $df = 4$ ($P = 0.42$); $I^2 = 0\%$

Test for overall effect: $Z = 6.51$ ($P < 0.00001$)



Metabolic Surgery in the Treatment Algorithm for Type 2 Diabetes: a Joint Statement by International Diabetes Organizations

Francesco Rubino[1] · David M. Nathan[2] · Robert H. Eckel[3] · Philip R. Schauer[4] ·

2015

Generalities	1-5
Metabolic Surgery	6-11
Patient Selection	12-17
Preoperative work-up	18-20
Procedures	21-24
Postoperative follow-up	25-32

OBES SURG (2017) 27:2–21

Table 1 International societies that have ratified and/or endorsed the DSS-II consensus statements and guidelines

Partner diabetes organizations that helped develop and have ratified the DSS-II consensus statements and guidelines:	Country
American Diabetes Association (ADA)	USA
International Diabetes Federation (IDF)	International
Diabetes UK (DUK)	UK
Chinese Diabetes Society (CDS)	China
Diabetes India (DI)	India
Other organizations that formally endorse the DSS-II consensus statements and guidelines (to date):	
American Association of Clinical Endocrinologists (AACE)	USA
American College of Surgeons (ACS)	USA
American Gastroenterological Association (AGA)	USA
American Society for Metabolic and Bariatric Surgery (ASMBS)	USA
Argentinian Society of Diabetes (SAD)	Argentina
Argentinian Society for Bariatric and Metabolic Surgery (SACO)	Argentina
Asia-Pacific Bariatric and Metabolic Surgery Society (APBMSS)	International
Association of British Clinical Diabetologists (ABCD)	UK
Australian Diabetes Society (ADS)	Australia
Belgian Diabetes Association (ABD)	Belgium
Brazilian Society of Diabetes (SBD)	Brazil
Brazilian Society of Bariatric and Metabolic Surgery (SBCBM)	Brazil
British Obesity and Metabolic Surgery Society (BOMSS)	UK
Czech Society for the Study of Obesity (CSSO)	Czech Republic
Chilean Society of Endocrinology and Diabetes (SCED)	Chile
Chilean Society for Bariatric and Metabolic Surgery (SCCBM)	Chile
Endocrine Society	USA
European Association for the Study of Obesity (EASO)	International
French Society of Diabetes (SFD)	France
French Society of Bariatric and Metabolic Surgery (SOFFCO)	France
German Diabetes Society (DDG)	Germany
German Society for Obesity Surgery (CA-ADIP)	Germany
Hellenic Diabetes Association (HDA)	Greece
International Federation for the Surgery of Obesity & Metabolic Disorders (IFSO)	International
Israel Diabetes Association (IDA)	Israel
Italian Society of Bariatric & Metabolic Surgery (SICOB)	Italy
Italian Society of Diabetology (SID)	Italy
Japan Diabetes Society (JDS)	Japan
Latin American Association of Diabetes (ALAD)	International
Mexican College of Bariatric and Metabolic Surgery (CMCOEM)	Mexico
Mexican Society of Nutrition and Endocrinology (SMNE)	Mexico
Qatar Diabetes Association (QDA)	Qatar
Saudi Diabetes and Endocrine Association (SDEA)	Saudi Arabia
Society of American Gastrointestinal and Endoscopic Surgeons (SAGES)	USA
Society for Endocrinology (SfE)	UK
Society for Surgery of the Alimentary Tract (SSAT)	USA
South African Society for Surgery Obesity and Metabolism (SASSO)	South Africa
Spanish Society for Bariatric and Metabolic Surgery (SECO)	Spain
Spanish Society of Diabetes (SED)	Spain
The Obesity Society (TOS)	USA

This table indicates the societies that, at the time this article went to press, had officially ratified and/or endorsed the DSS-II consensus statements and guidelines. Additional international medical and scientific societies are currently considering endorsing these results as well

Chirurgia metabolica : Italia 2015-2020

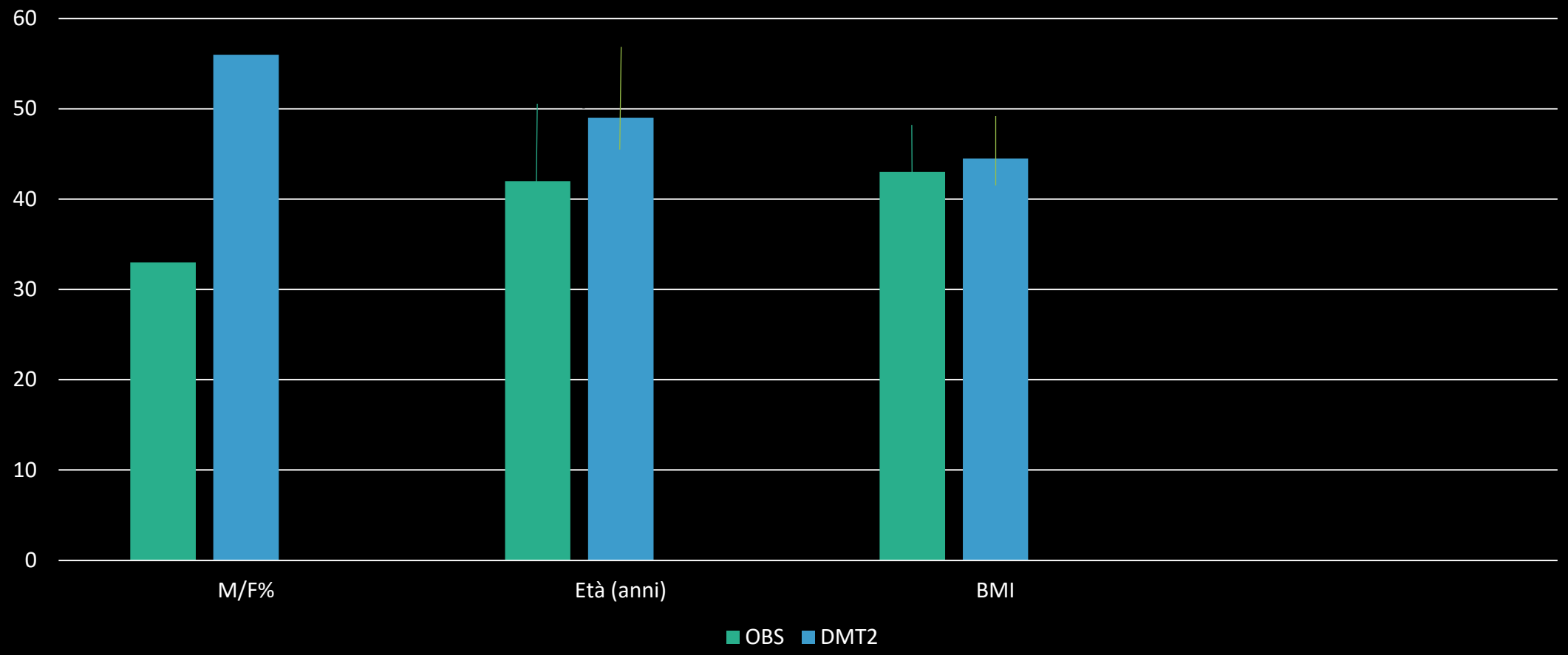
R 1/10

Il diabete in Italia. Anno 2016 Istat | Istituto Nazionale di Statistica

percentuale di persone obese che soffrono di diabete è al 28,9% per gli uomini e al 32,8% per le donne

Registro SICOb 64.355 casi
DMT2 7.148

Caratteristiche antropometriche OBS vs DMT2-OBS



Indicazioni alla chirurgia metabolica

- Opzionale estensione a pazienti DMT2 (non controllato) con BMI>30
- DMT2 (non controllato) come unica comorbilita’ necessaria in pazienti con BMI>35 (opzione di trattamento raccomandata)
- Trattamento chirurgico raccomandato in pazienti DMT2 con BMI>40 indipendentemente dal controllo terapeutico della malattia

risultato atteso : incremento della chirurgia metabolica

DMT2: Indicazioni alla Chirurgia

Year	Class I Obesity	Class II Obesity	Class III Obesity
2015	44	233	743
2016	30	271	874
2017	53	312	919
2018	70	340	934
2019	62	343	987
2020	44	281	608
	303 (4.2%)	1,780 (24.9%)	5,065 (70.8%)

Chirurgia metabolica vs bariatrica : complicanze

Complicanze	OBS. N. 57.207 (%)	DMT2-OBS N. 7.148 (%)
Complicanze generali minori	85 (1.19)	433 (0.75)**
Complicanze cardio-respiratorie	34 (0.47)	145 (0.25)
DVT-Embolia	24 (0.33)	38 (0.045)**
Rabdomiolisi	10 (0.13)	6 (0.01)**
Emoperitoneo	71 (0.99)	345 (0.6%)**
Emorragia gastro-enterica	48 (0.67)	108 (0.18%)**
Laparocele	9 (0.12)	18 (0.03)**
Infezione di ferita	7 (0.09)	58 (0.10%)
Occlusione	13 (0.18)	60 (0.1)
Stenosi	6 (0.08)	30 (0.05)
Deiscenza-perforazione-sepsi	101 (1.4)	637 (1.1)

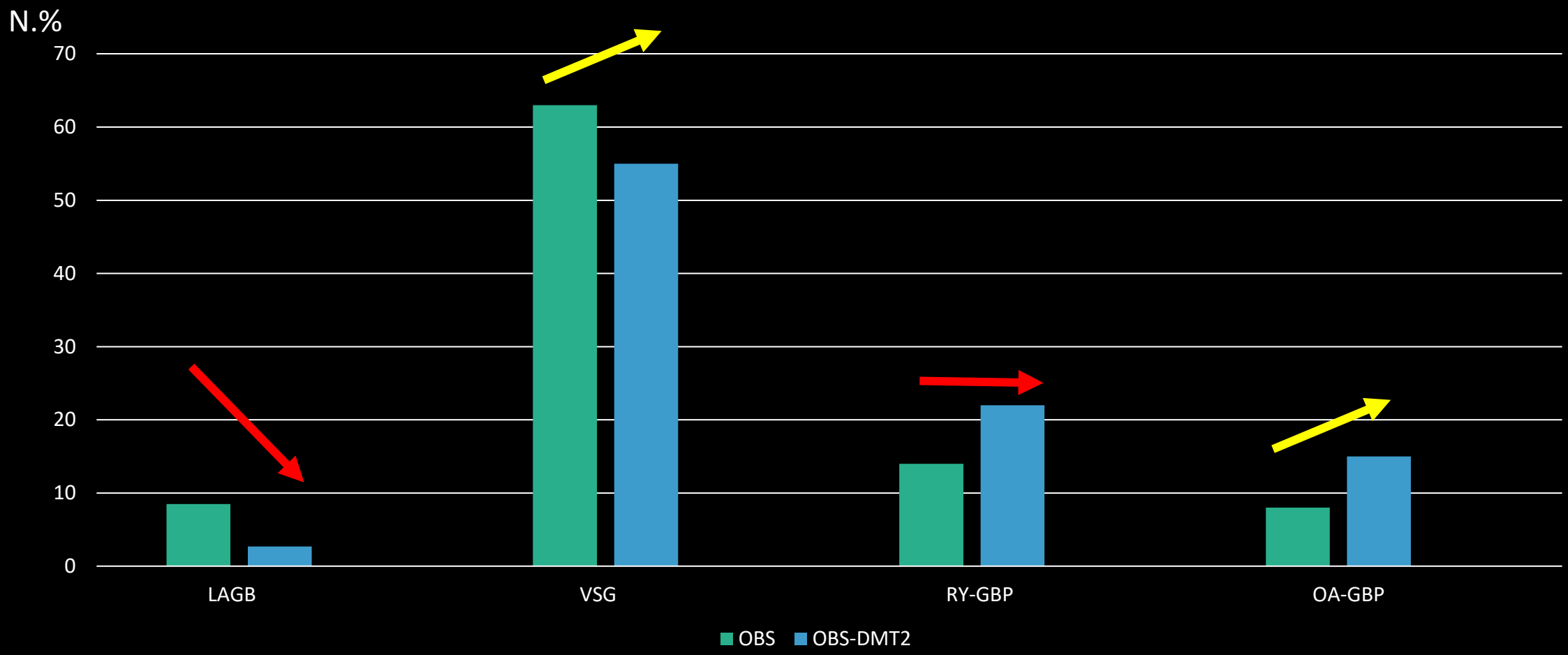
CHIRURGIA METABOLICA: INDICAZIONI PER COMORBILITA'

Comorbilità	N. OBS-DMT2: 7,148 (-50)	N. OBS : 57,207	Statistica
Ipertensione	3,817 (53.4%)	8,690 (15.1%)	§
Dislipidemia	3,016 (42,2%)	5,932 (10.3%)	§
OSAS	2,015 (28.2%)	4,601 (8.04%)	§
OHS	807 (11.3%)	2,030 (3.64%)	§
Miocardiopatia	115 (1,61%	175 (0.3%)	§
NAFLD	3,038 (42.5%)	11,134 (19.4%)	§
Colelitiasi	378 (5.2%)	1,522 (2.66%)	§
GERD	739 (10.3%)	3,610 (6.31%)	§
Ernia Iatale	635 (8.8%)	3,077 (5.37%)	§
Artropatia	1,572 (21.9%)	6,992 (12.2%)	§

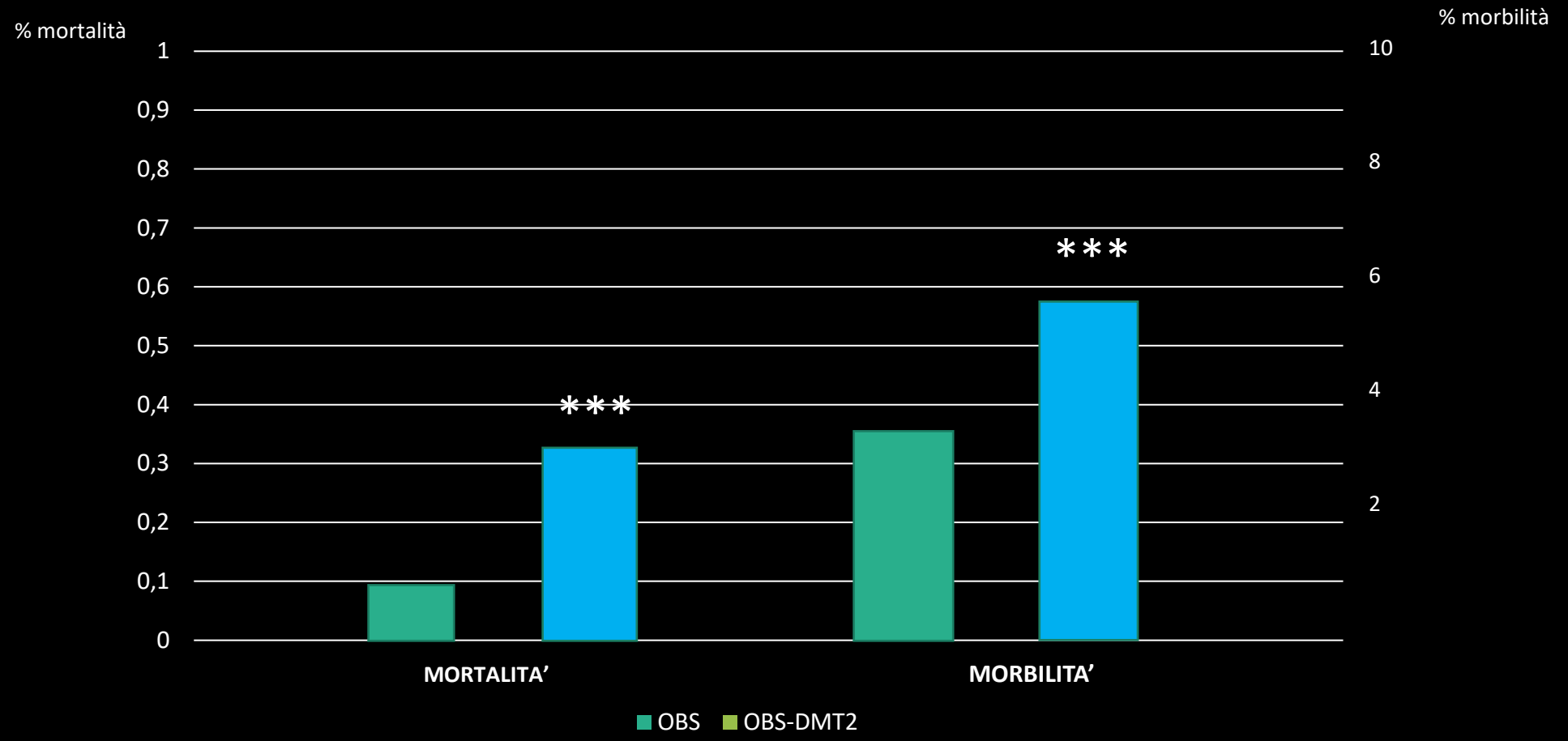
Workup preoperatorio in DMT2-OBS

workup	DMT2- OBS 7.148
Valutazione multidisciplinare	7148
Colesterolemia/Trigliceridemia	7138 (99.8%)
Glicemia	7140 (99.8%)
HbA_1C	150 (2.1%)
Insulina- Peptide C	148 (2.07%)
Curva da carico di Glucosio	150 (2.1%)

Chirurgia bariatrica versus metabolica: gli interventi



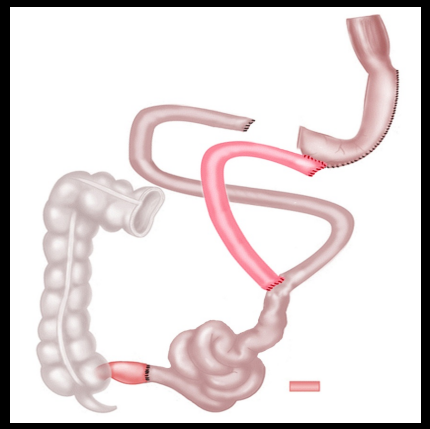
Chirurgia metabolica vs bariatrica: mortalità e morbilità



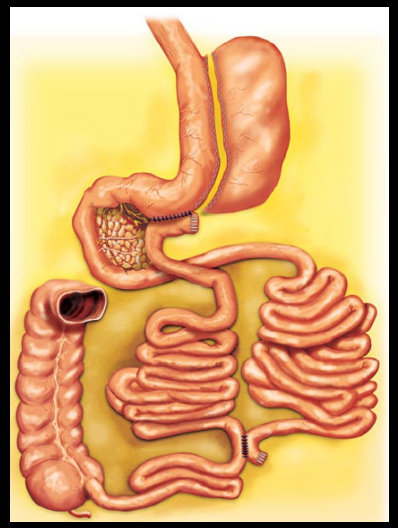
Conclusioni

- La chirurgia metabolica in Italia è largamente sottoutilizzata ($\sim 10\%$)
- I pazienti con obesità e DMT2 sono più anziani e con BMI più elevato (ritardo dell'intervento ?)
- La maggiore morbilità e mortalità dei pazienti OBS-DMT2 potrebbe essere elemento ostativo alla chirurgia metabolica
- L'impatto del DSS-II nella pratica clinica ha portato ad un incremento dell'indicazione chirurgica nel 5% dei casi.
- In base al work-up preoperatorio, l'attenzione è riservata all'aspetto bariatrico e non metabolico: OBS > DMT2
- In base agli interventi effettuati (RY-GBP e OA-GBP preferiti), l'obbiettivo terapeutico sembra essere la riduzione del peso corporeo
- Ad oggi, la chirurgia dei pazienti OBS-DMT2 sembra ricadere nella sfera bariatrica piuttosto che in quella metabolica

Interventi



Interposizione Ileale



Bipartizione Intestinale

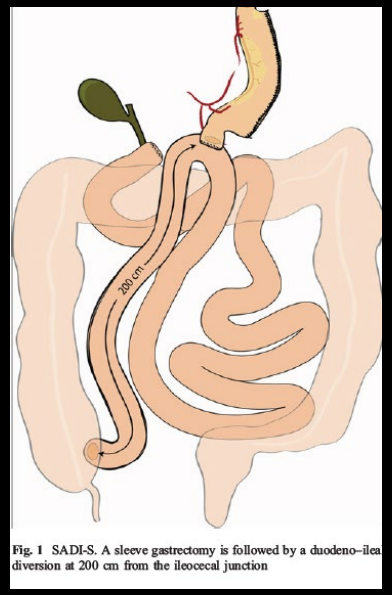
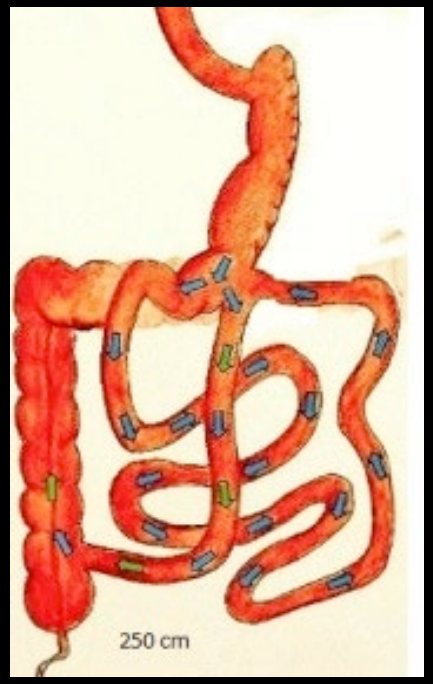


Fig. 1 SADI-S. A sleeve gastrectomy is followed by a duodeno–ileal diversion at 200 cm from the ileocecal junction

SADI-S



SASI-S