Weight-regain after RYGB:Does the pouch size matter?

- **Ricardo Cohen MD**

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- Immediate Past-President, IFSO LAC
- Past-President, Brazilian Society for Bariatric and Metabolic Surgery (2011-2012)

- Disclosures

- Research Grant, J&J Medical, Brasil
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- Research Grant, Hospital Oswaldo Cruz Bioscience Institute
- Speaker, J&J Medical, Medtronic, GI Dynamics, Vifor Pharma

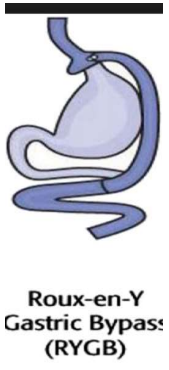
- SAB: GI Dynamics

Definitions of weight regain

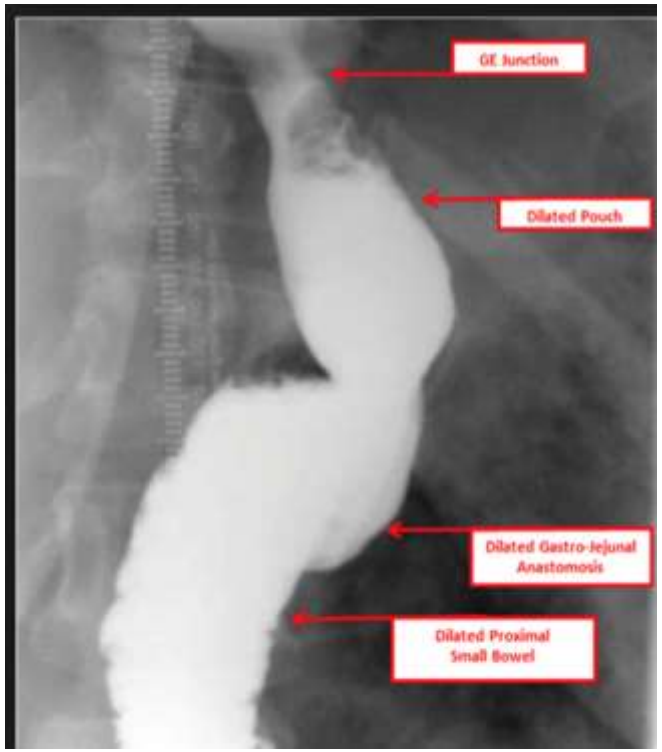
- **Any weight regain**
- **% of total weight lost at nadir**
- **% of excess weight loss (%EWL)**
- **% of weight change from nadir**
- **Minimum increase in kilograms**

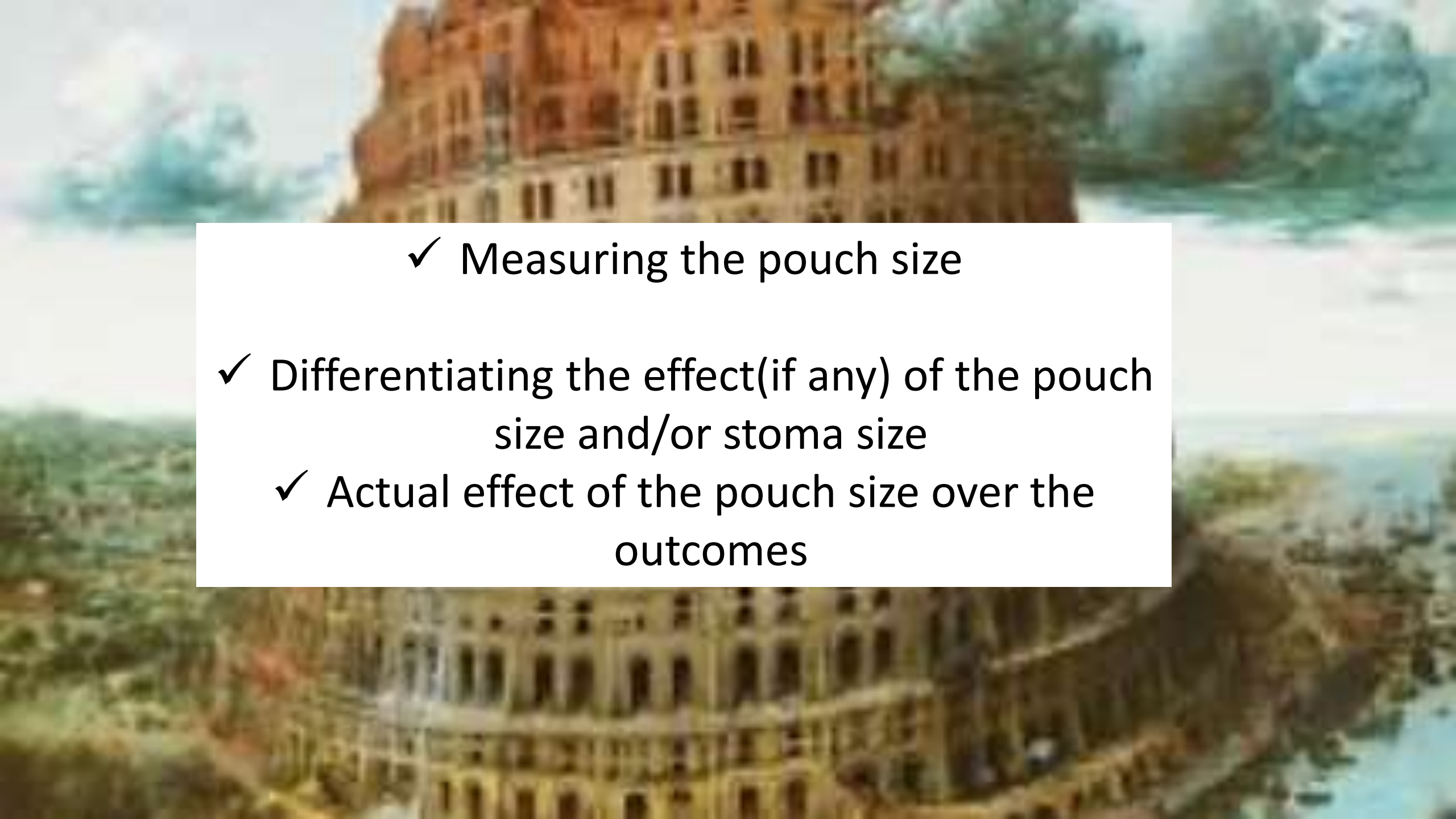
Babel Tower

Different operations, better weight-related outcomes. WR varies from 5 to up to 20% of weight-lost in over 10y of FU



Pouch enlargement

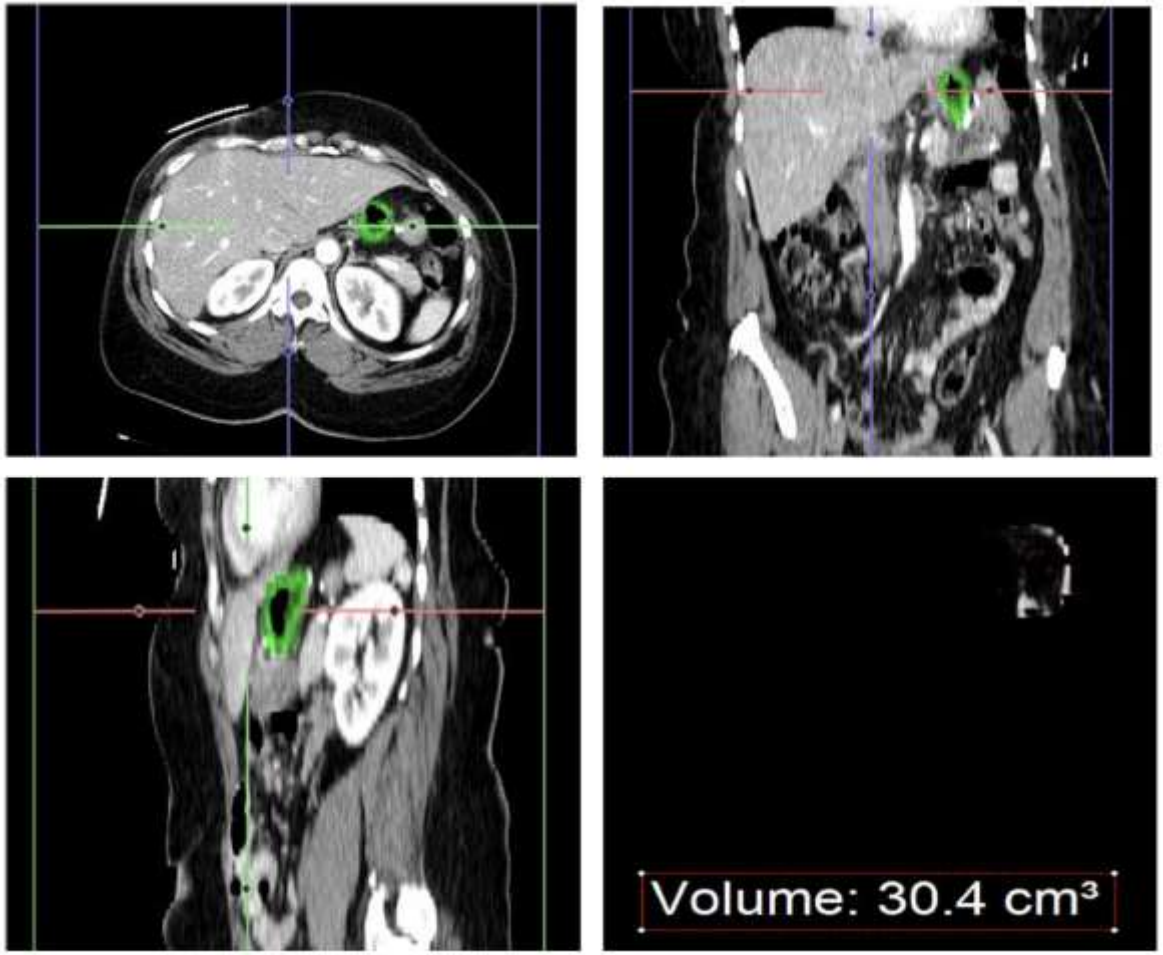




- ✓ Measuring the pouch size
- ✓ Differentiating the effect(if any) of the pouch size and/or stoma size
- ✓ Actual effect of the pouch size over the outcomes

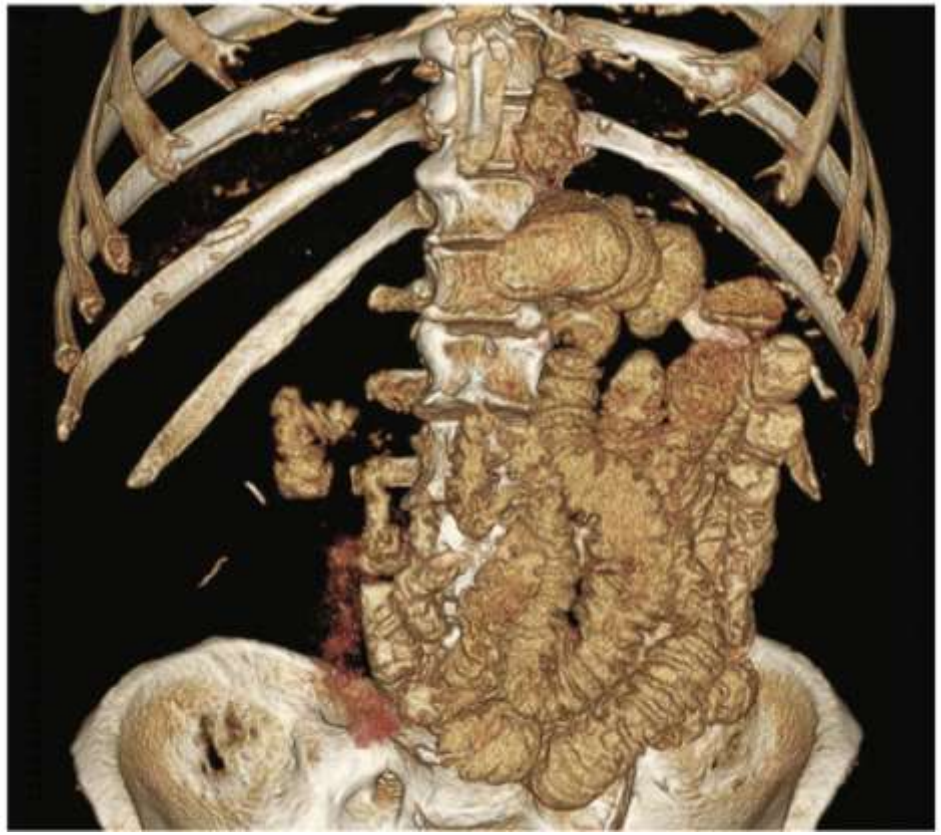
Measuring the pouch size

TeraRecon® CT based 3D reconstruction



Ayuso et al, Obes Surg, 2022

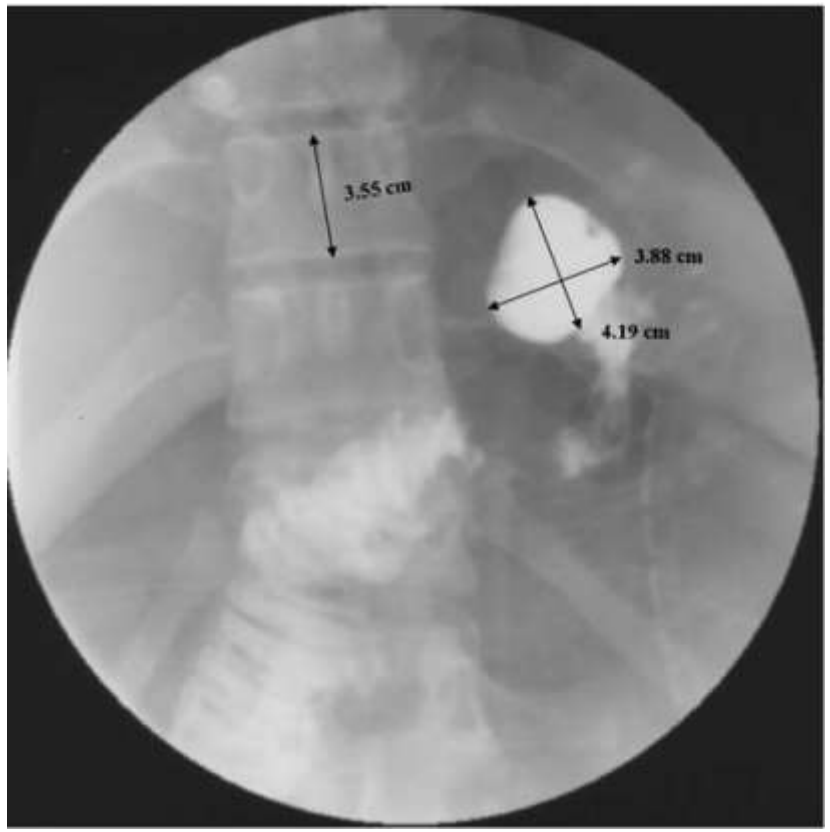
3D reconstruction and multiplanar reformatting through Vitrea® software



Ricciopo, Obes Surg,2018

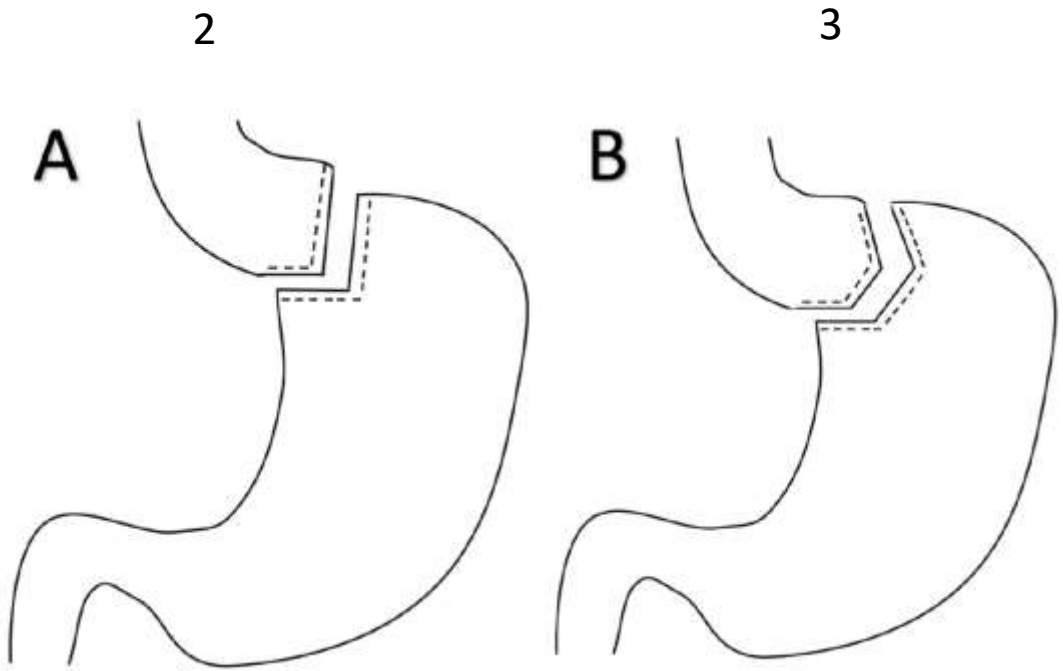
Measuring the pouch size

area (cm2) on an anteroposterior radiograph at maximum pouch distention



Roberts, Surg Endosc 2007

Number of vertical staple fires



Haghighat, Ann Med&Surg,2022
O'Connor, SOARD,2008

Measuring the pouch size

Average pouch size =1.5 times the diameter
of the small bowel distal to the GJ anastomosis

Table 1. Categories for pouch size

Pouch Size	Description
Size I	Smaller than average pouch
Size II	Average pouch
Size III	Larger than average pouch
Size IV	Over 3 times the size of an average pouch

Table 2. Categories for amount of fundus

Amount of Fundus	Description
Fundus 0	No fundus appreciated
Fundus I	Slight amount of fundus barely noted
Fundus II	Fundus noted
Fundus III	Large amount of fundus noted
Fundus IV	Majority of the pouch was fundus

Madan, Obes Surg, 2007

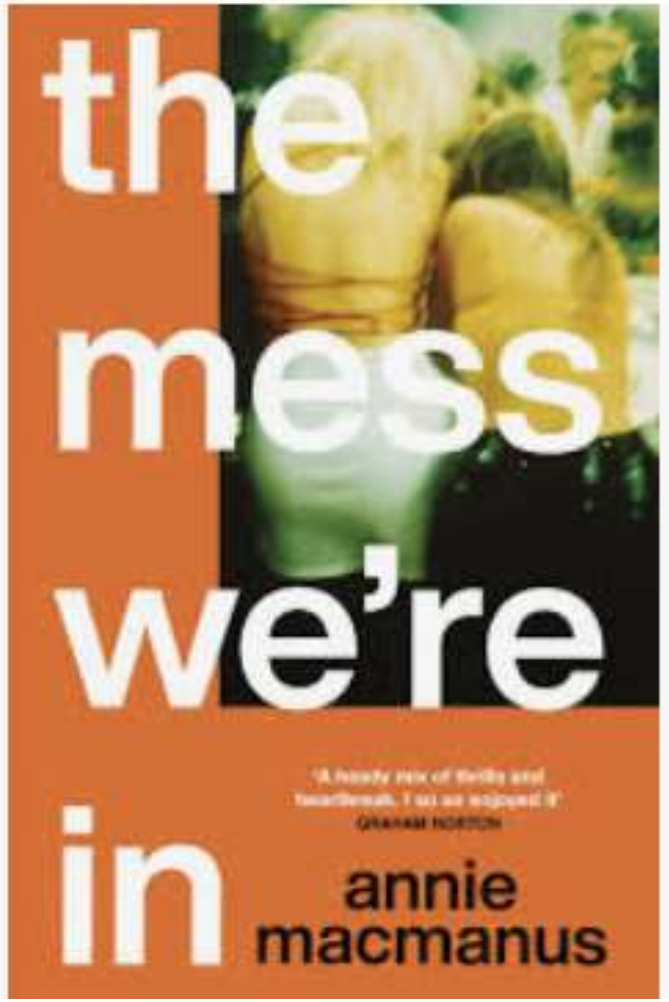
Measuring the pouch size

A pouch is “big”when:
Length > 6cm and /or
Width> 5cm

Measured through an instrument inserted in the endoscope working channel

Heneghan, SOARD,2012

Measuring the pouch size



There is **NO** relation between the pouch size and weight regain

ELSEVIER

Surgery for Obesity and Related Diseases 8 (2012) 408–415

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Influence of pouch and stoma size on weight loss after gastric bypass

Helen M. Heneghan, M.D., Panot Yimcharoen, M.D., Stacy A. Brethauer, M.D., Matthew Kroh, M.D., Bipan Chand, M.D.*

Bariatric and Metabolic Institute, Cleveland Clinic Foundation, Cleveland, Ohio

Received April 13, 2011; accepted September 13, 2011

Multivariate analysis of factors associated with weight regain after RYGB

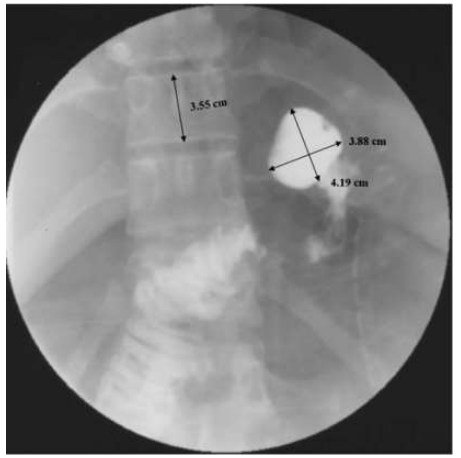
Variable	OR (95% CI)	*P* value
Pouch length >6 cm	.8 (.2–2.6)	.661
Pouch width >5 cm	1.5 (.5–4.6)	.488
Pouch volume >25 cm^2*	1.7 (.4–6.2)	.455
Stoma diameter >2 cm	1.5 (1.1–2.1)	.010
Stapler technique (circular versus linear)	.8 (.5–1.2)	.302
Pre-RYGB BMI >50 kg/m^2	2.2 (1.2–4.0)	.007
Interval from RYGB >5 yr	5.6 (3.0–10.5)	<.001

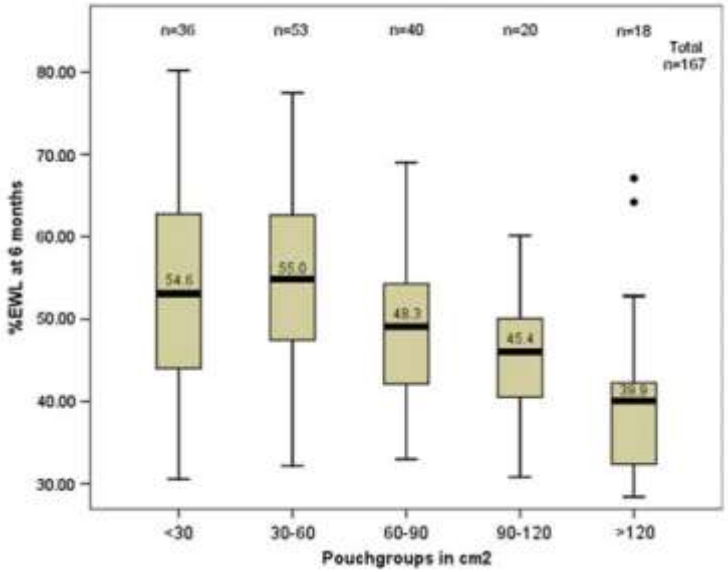
N.S

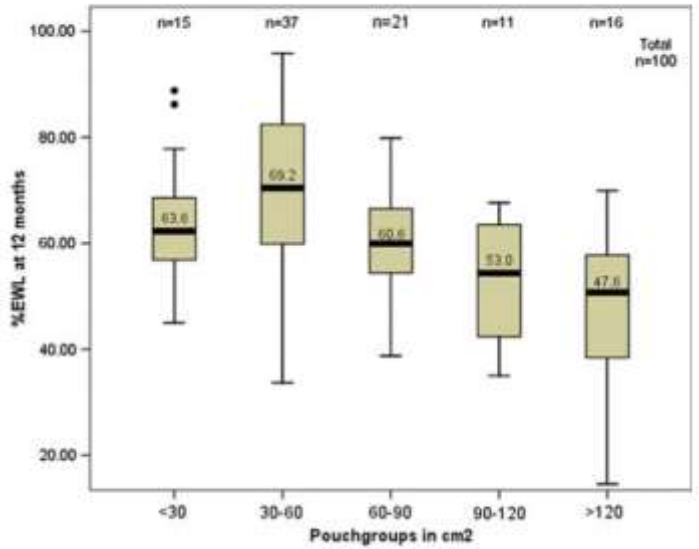
Size matters: gastric pouch size correlates with weight loss after laparoscopic Roux-en-Y gastric bypass

Surg Endosc, 2007

K. Roberts,[1] A. Duffy,[1] J. Kaufman,[1] M. Burrell,[2] J. Dziura,[3] R. Bell[1]





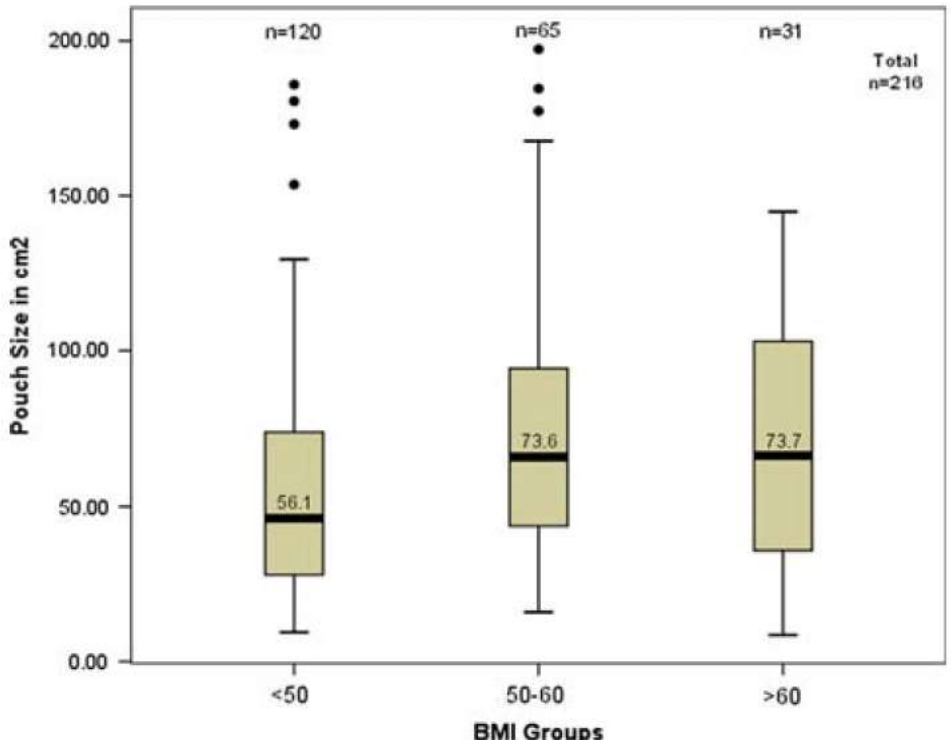


Pouches > 120 ml correlates with modest WL

Size matters: gastric pouch size correlates with weight loss after laparoscopic Roux-en-Y gastric bypass

Surg Endosc, 2007

K. Roberts,[1] A. Duffy,[1] J. Kaufman,[1] M. Burrell,[2] J. Dziura,[3] R. Bell[1]

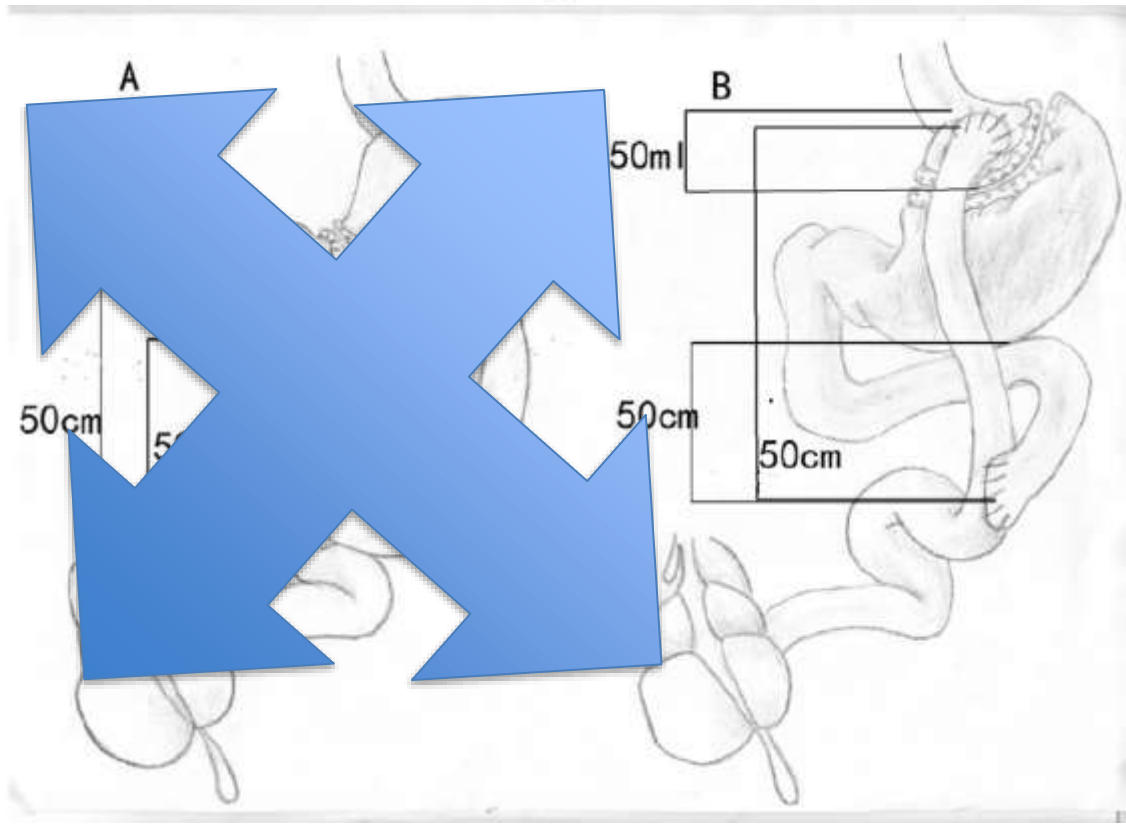


Bigger pouches correlated with higher BMIs

Higher BMIs , more aggressive disease

Comparison of the effects of Roux-en-Y gastrojejunostomy and LRYGB with small stomach pouch on type 2 diabetes mellitus in patients with BMI <35 kg/m^2

Bo Yi, M.D.[a], Juan Jiang, M.D.[a], Liyong Zhu, M.D.[a], Pengzhou Li, M.D.[a], Ibrahim Im, M.D.[b], Shaihong Zhu, M.D.[a,*]



- ✓ Better Wl and T2D control
- ✓ Less marginal ulcers

There is **NO** relation between the pouch size and weight regain

Why Size Matters: an Evaluation of Gastric Pouch Size in Roux-en-Y Gastric Bypass Using CT Volumetric Analysis and its Effect on Marginal Ulceration

Obesity Surgery (2022)

Sullivan A. Ayuso[1] · Jordan N. Robinson[1] · Leslie M. Okorji[1] · Kyle J. Thompson[2] · Iain H. McKillop[1] · Timothy S. Kuwada[1] · Keith S. Gersin[1] · Selwan D. Barbat[1] · Roc W. Bauman[1] · Abdelrahman Nimeri[1]

Marginal ulcers and no relation to WI/WR

Obesity Surgery, **17**, 317-320

Does Pouch Size Matter?

Atul K. Madan, MD, FACS[1]; David S. Tichansky, MD, FACS[1]; Jerry C. Phillips, MD[2]

Visual measure of pouch size and remaining fundus

Table 3. Weight loss and success by pouch size

Grade	%EWL	Success A	Success B	Success C
Size I	70%	92%	78%	92%
Size II	74%	100%	93%	86%
Size III	64%	100%	87%	100%
P value (all NS)	0.59	0.42	0.54	0.56

Table 4. Weight loss and success by amount of fundus

Grade	%EWL	Success A	Success B	Success C
Fundus 0	72%	92%	77%	92%
Fundus I	69%	92%	71%	92%
Fundus II	72%	94%	87%	94%
Fundus III	66%	100%	83%	83%
P value (all NS)	0.92	0.92	0.78	0.92

Pouch size does not matter

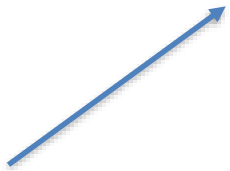
Importance of pouch size in laparoscopic Roux-en-Y gastric bypass: a cohort study of 14,168 patients

Surg Endosc,2015

David Edholm[1] · Johan Ottosson[2] · Magnus Sundbom[1]

Table 3 Multivariate analysis showing correlation between variables and EBMIL% at 6 weeks and 1 year, respectively

	EBMIL% at 6 weeks		EBMIL% at 1 year	
	p	Coefficient (95 % confidence interval)	*p*	Coefficient (95 % confidence interval)
Male gender	<.001	2.81 (2.35–3.27)	<.001	−6.4 (−7.16 to −5.67)
Age at surgery (years)	<.001	−.080 (−.098 to −.062)	<.001	−.34 (−.37 to −.31)
Preoperative BMI (kg/m^2)	<.001	−1.0 (−1.1 to .97)	<.001	−2.09 (−2.15 to −2.03)
Diabetes	.025	.65 (.082–1.22)	<.001	−6.45 (−7.37 to −5.53)
Length of staplers used for pouch (cm)	<.001	−.16 (−.22 to −.09)	.29	−.05 (−.16 to .051)



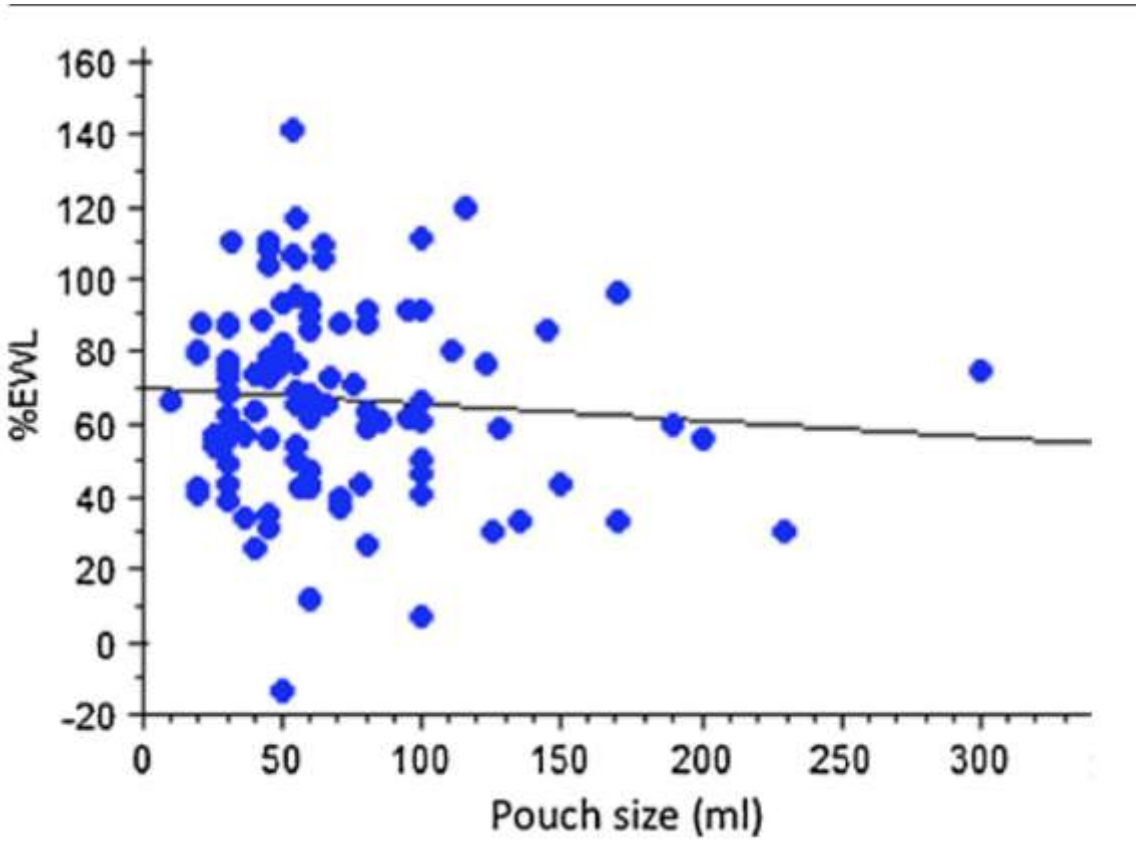
Measure technique

A small pouch resulted in better initial weight loss, but at 1 year pouch size did not affect EBMIL%

Pouch Size After Gastric Bypass Does not Correlate with Weight Loss Outcome

Obes Surg 2011

Philippe Topart · Guillaume Becouarn · Patrick Ritz

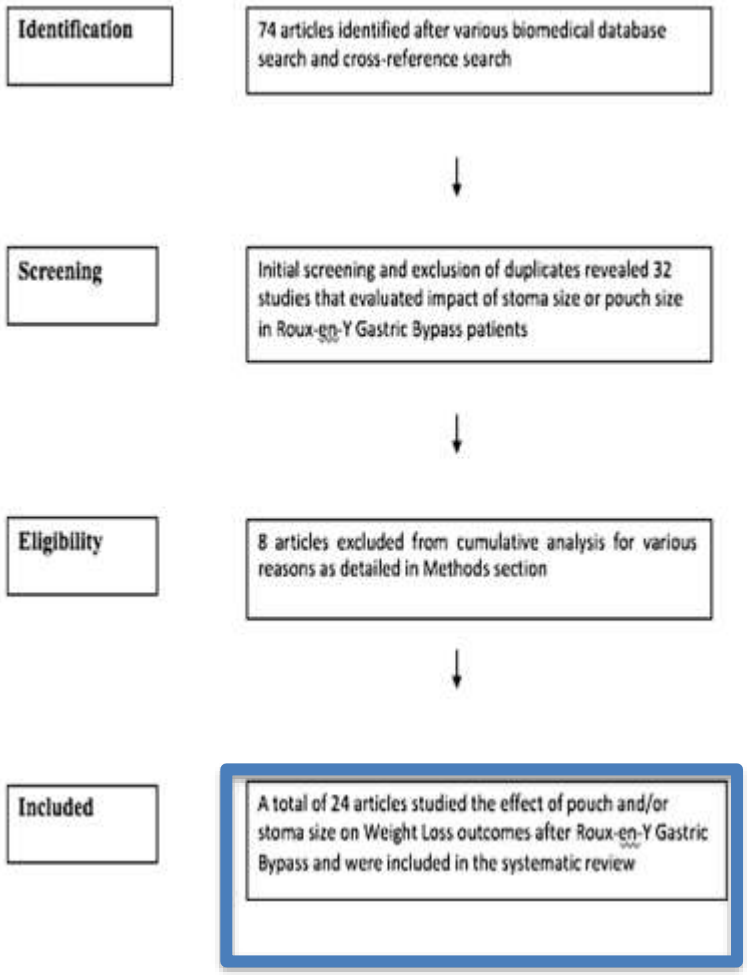


No correlation!

A systematic review of the effect of gastric pouch and/or gastrojejunostomy (stoma) size on weight loss outcomes with Roux-en-Y gastric bypass

Kamal Mahawar[1,2] · Alistair J. Sharples[3] · Yitka Graham[1,2]

Surg Endosc, 2019



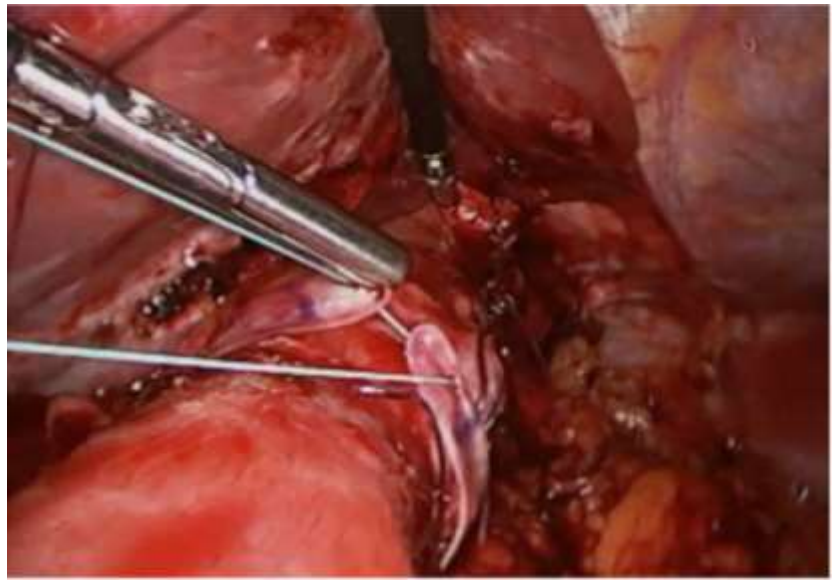
- ✓ **No quality data**
- ✓ **No pouch's standard measure**
- ✓ **Confounding factors (high BMI, T2D)**
- ✓ **Difficult to establish causal relation of poor WL or WR with the size of the pouch**

Outcomes after resizing/trimming the pouch

Banding the pouch and revising the stoma

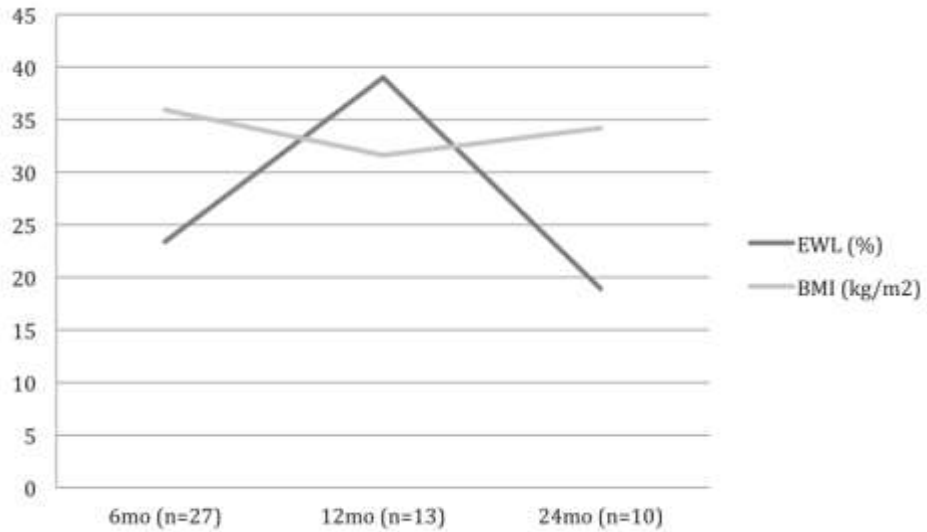
Treatment of Weight Regain Following Roux-en-Y Gastric Bypass: Revision of Pouch, Creation of New Gastrojejunostomy and Placement of Proximal Pericardial Patch Ring

Rena C. Moon · Andre F. Teixeira · Muhammad A. Jawad



Gender (*n*)	
Female	44 (95.7 %)
Male	2 (4.3 %)
Age (years)[a]	45.1±8.9 (range, 23–69)
Pre-RYGB BMI (kg/m^2)[b]	50.6±9.2 (range, 38.6–83.6)
Pre-revision BMI (kg/m^2)	40.1±6.8 (range, 29.2–56.8)
Period from RYGB to revision (months)[b]	69.9±24.3 (range, 18–116)

Obes Surg, 2014


45
40
35
30
25
20
15
10
5
0
6mo (n=27)
12mo (n=13)
24mo (n=10)
EWL (%)
BMI (kg/m2)

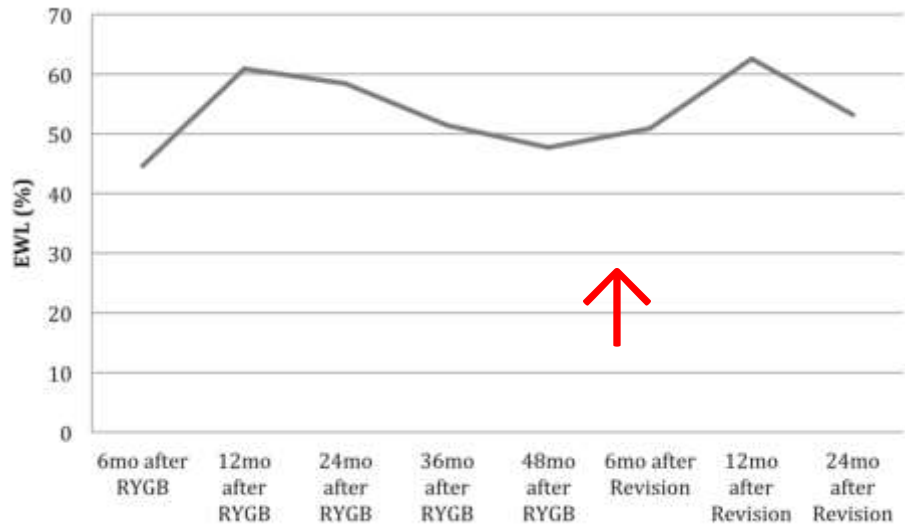

70
60
50
40
30
20
10
0
EWL (%)
6mo after RYGB
12mo after RYGB
24mo after RYGB
36mo after RYGB
48mo after RYGB
6mo after Revision
12mo after Revision
24mo after Revision

Table 2 Reasons for readmission and intraoperative findings of patients requiring readmission after revision of gastric bypass with pericardial patch

Gender	Age (years)[a]	BMI (kg/m^2)[a]	Comorbidities	Time elapsed after the revision	Reasons for readmission	Reoperation
F	50	40.0	None	26 d	Nausea/vomiting	Removal of PP
M	35	36.1	GERD	40 d	Nausea/vomiting	N/A
F	23					astomosis
F	45					al of PP
F	54					astomosis
F	56	32.1	HTN	4 d	Abdominal pain	Repair of perforated ulcer, removal of PP
F	39	38.0	OSA	4 mo	Abdominal pain, fever	N/A
				6 mo	Abdominal pain	Resection of ulcer, esophagojejunostomy
F	31	41.4	None	30 d	Nausea/vomiting	N/A – endoscopic removal of PP

Several complications

Conclusion:

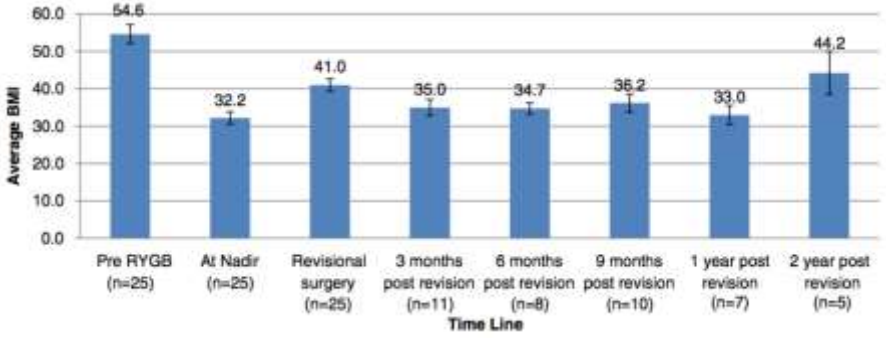
A bovine pericardium ring and new GJ anastomosis are not safe procedures and does not lead to good results @ 24 mo FU

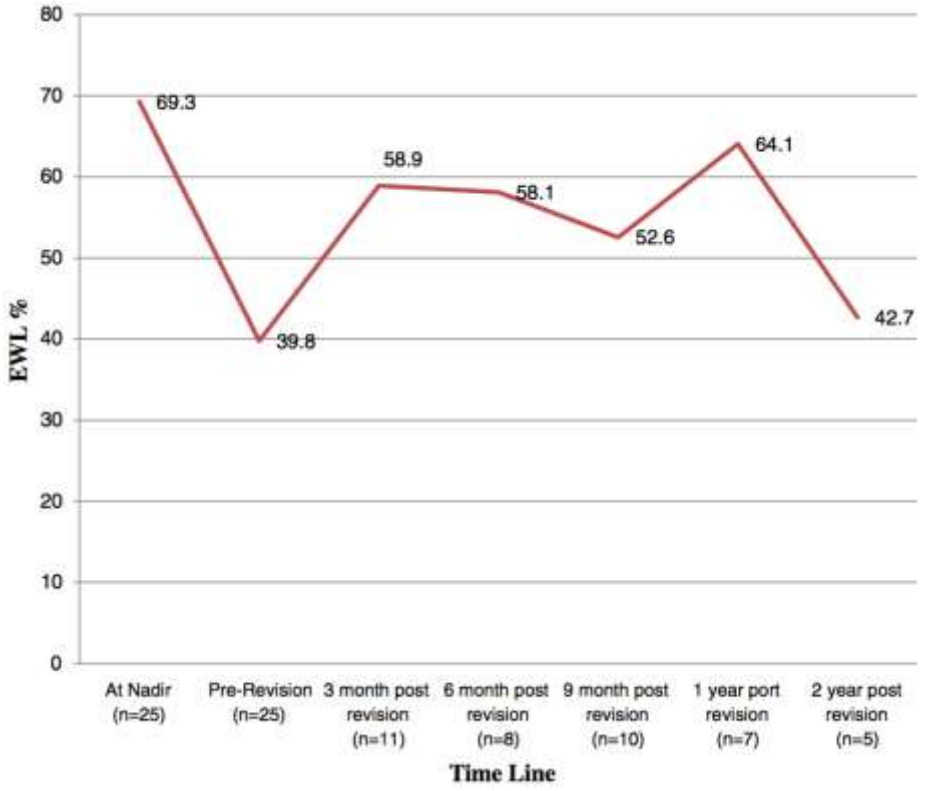
Midterm Outcomes of Revisional Surgery for Gastric Pouch and Gastrojejunal Anastomotic Enlargement in Patients with Weight Regain After Gastric Bypass for Morbid Obesity

Abdulrahman Hamdi · Christopher Julien · Phillip Brown · Ian Woods · Anas Hamdi · Gezzer Ortega · Terrence Fullum · Daniel Tran

- Retrospective series(n = 25)
- Revisional surgery:
  - ”En bloc”G-J resection
  - ”New”pouch(4-5cm GE junction)
  - Redo of the anastomosis(1-1,5cm)

Obes Surg, 2014





- @ 1 year it seems to carry good EWL
- Long term data needed

REVIEW

OBESITY Reviews WILEY

Efficacy and safety of revisional treatments for weight regain or insufficient weight loss after Roux-en-Y gastric bypass: A systematic review and meta-analysis

Aug 2023

Rutger J. Franken[1] | Josephine Franken[1] | Nina R. Sluiter[1] | Ralph de Vries[2] | Sjoerd Euser[3] | Victor E. A. Gerdes[4,5] | Maurits de Brauw[1]

Trimming/resizing the pouch

TABLE 3 Number of patients at each FU point.

	At revision	12 months	24 months	36 months	48 months	60 months
APC	828[1–4,10]	439[47–49,54]	74[48]	21[48]	-	-
Pouch/GJA revision	116[31–34]	74[32,34]	44[31,33]	30[34]	-	22[34]
LGB + pouch resizing	75	13	10	29	-	-
D-RYGB	434[18–23,30,50,52,53]	298[18,19,21–23,50,52,53]	206[18,19,21–23,50,52,53]	151[18,19,21,22,50,52,53]	94[18,23,50,52,53]	100[23,30,50,52]
DS	23[17]	21[17]	20[17]	-	-	-

REVIEW

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- ✓ **TBWL = 17.2 @ 12 months**
- ✓ **Scarce long-term data**
- ✓ **6% leaks and 4% stoma stenosis**

Is there any relation between pouch size and weight regain?

- Cohen et al, unpublished data

❖1998-2018 – 8880 RYGB

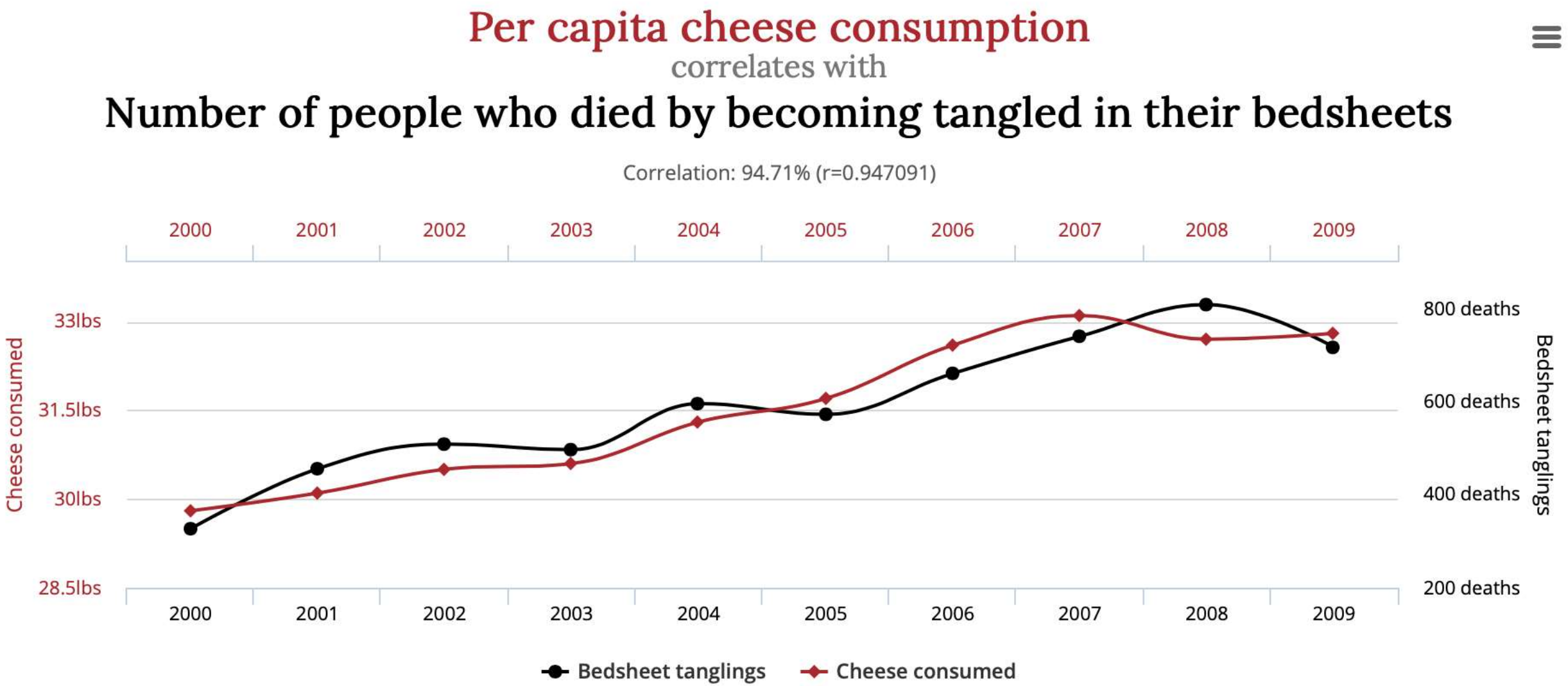
❖ 4614 pts still followed

❖Pouch measured through 3D CT

❖670 (14%) patients with weight regain (> 20% nadir)

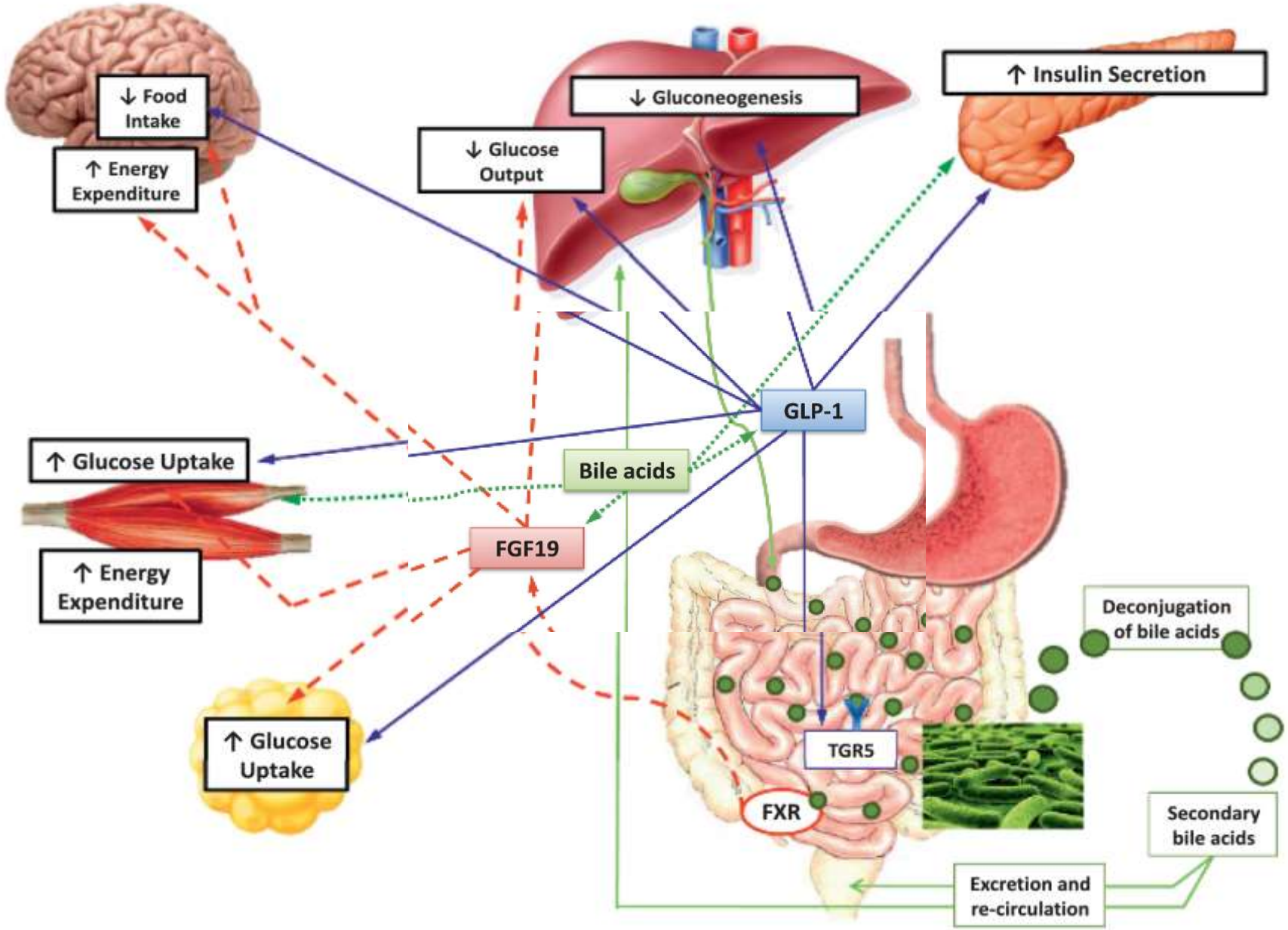
❖483 (72%) with "anatomically normal" pouch size (25-35 ml)

It seems that it's an association without causation



Conclusions

- ✓ Obesity is a chronic and progressive disease
- ✓ WR/IWL is poorly defined
- ✓ Pouch measurement techniques are not standardized
- ✓ Restriction is not a mechanism
- ✓ No robust evidence of pouch size and outocmes
- ✓ No robust evidence that trimming/resizing the pouch may provide significant and sustained WL



Baterham & Cummings, 2016


Thank you
ricardo.cohen@haoc.com.br

And T2D ?

Roux-en-Y
Gastric Bypass
(RYGB)

+

13 Randomized Controlled Trials

	BMI<35kg/m²	Groups	Number of patients	Follow-up(months)	T2D remission criteria
Dixon[29]	22%	AGB x control	60	24	HbA1c<6,2%
Schauer	36%	RYGB X SG	150	60	HbA1c<6 %
Mingrone[32,33]	0	RYGB x BPD x control	60	60	HbA1c<6,5%
Ikramuddin[34,3	59%	RYGB x control	120	24	HbA1c<6 %

All studies, achieved better glucocentric outcomes than Med Tx

Courcoulas[38,39]	43%	RYGB x AGB x control	69	36	HbA1c<6,5%
Wentworth[40]	100%	AGB x control	51	24	Glicemia em jejum<126mg/dl
Parikh[41]	100%	RYGB /AGB/SG x control	57	6	HbA1c<6,5%
Ding[42]	34%	AGB x control	45	12	HbA1c<6,5%
Cummings[43]	25%	RYGB X SG	43	12	HbA1c<6 %
Shah[45]	85%	RYGB X SG	80	24	HbA1c<6,5%
Cohen **	100%	RYGB x control	100	24	HbA1c<7%

** glucose control was not the 1ary endpoint

Is weight regain always linked to T2DM recurrence?

Long term remission and recurrence of T2DM following BS

	N	Follow up	Remission criteria	Type of surgery	Initial remission	Relapse	Long-term remission
Jiménez et al	153	≥ 2 years (2.9±1.1 y)	A1c<6.5%+ FPG<126 mg/dL + off medication	GBP/SG (64/36%)	75% (115/153)	12% (14/115)	
Di Giorgi et al	42	≥ 3 years (5.0±1.9 y)	A1c<6.0%+ FPG<126 mg/dL+off medication	GBP	64% (27/42)	26% (7/27)	**48%**
Adams et al			mal rang	GBP	75% (66/88 at 2y)	14% (12/87)	**62%**
Brethauer			medication	G/GB	59% (127/217 at 2y)	19% (24/127)	**50%**
Arterburn et al	4434	>5 years	A1c<6.5%+ FPG<126 mg/dL + off me	GBP	84.3% (at 1 y)	40.2%	**50%**
Chikunguwo et al	177	≥ 5 years 8.6 (5-16 y)	Off medication	GBP	88.7% (157/177)	43% (68/157)	**50%**
Sjostrom et al	342	10 years	FPG<126 mg/dL+off medic	GBP/GB/VBG	72% At 2 years	50%	**36%**

Weight regain

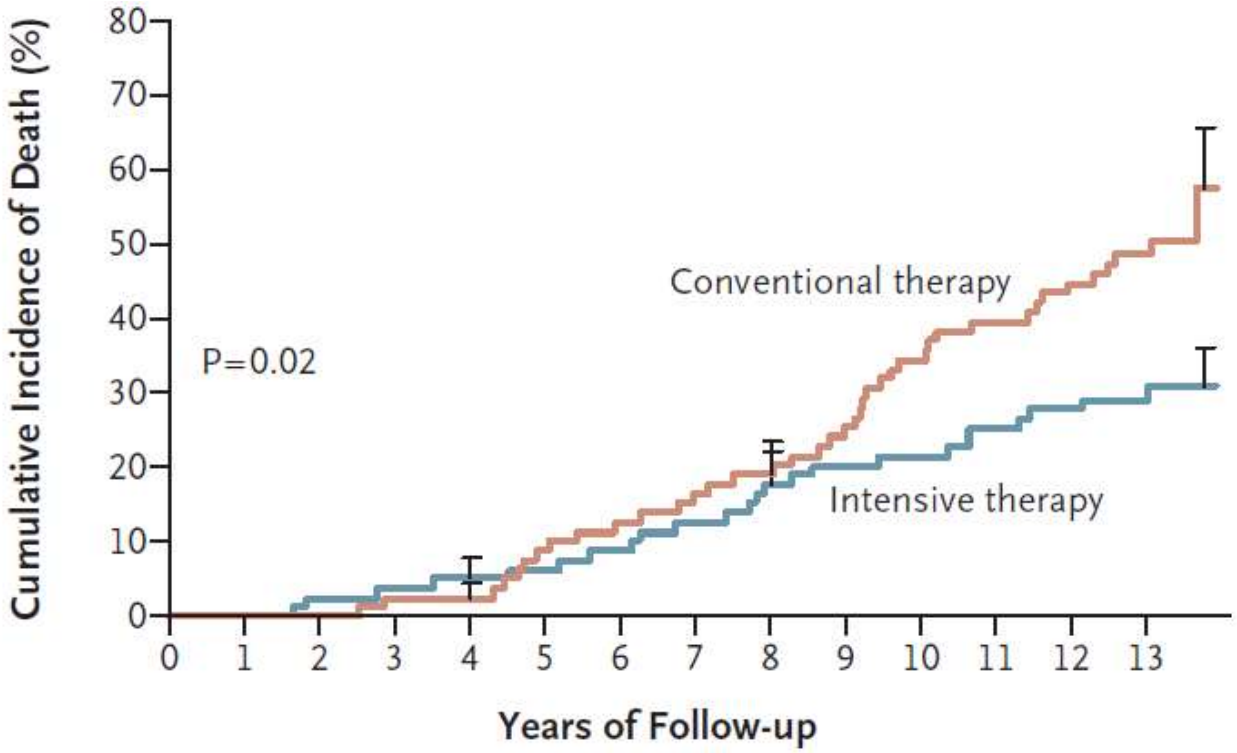
Weight gain not related to T2DM recurrence

Weight regain in restrictive operations

idal, unpublished; Di Giorgi , SOARD 2010; Adams, JAMA 2012; Chikunguwo, SOARD 2010; Sjostrom, N Eng J Med 2004.


RISK
MITIGATION

STENO 2: the power of doing things together



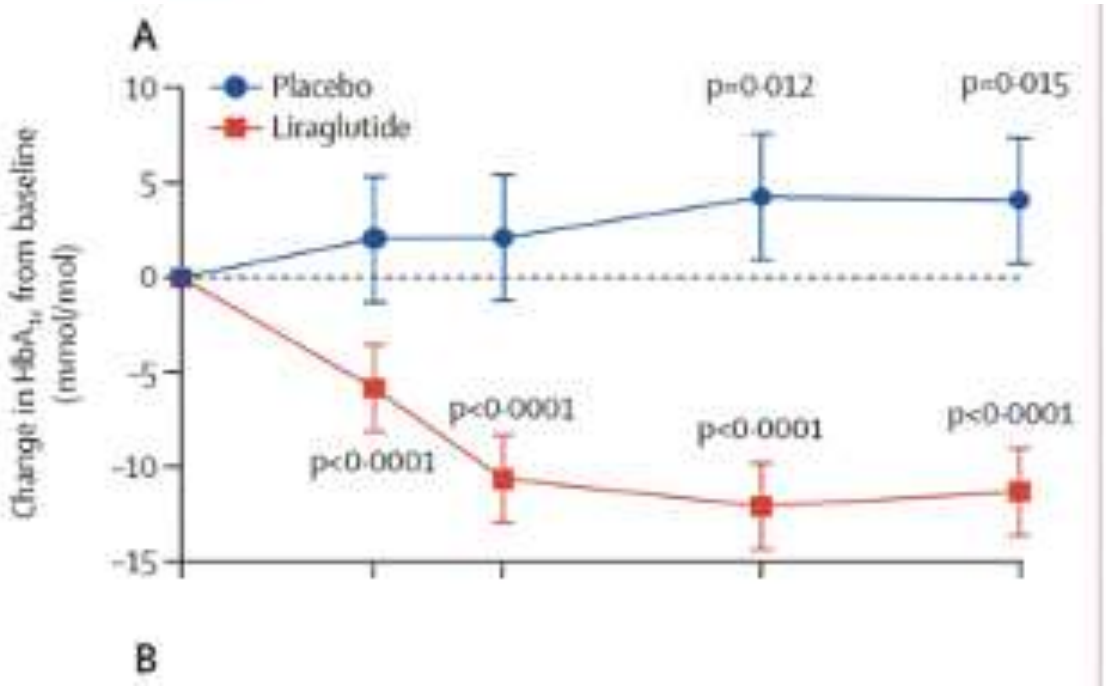
No. at Risk

Intensive therapy	80	78	75	72	65	62	57	39
Conventional therapy	80	80	77	69	63	51	43	30

Gaede NEJM 2008

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

Alexander Dimitri Miras, Belén Pérez-Pevida*, Madhawi Aldhwayan, Anna Kamocka, Emma Rose McGlone, Werd Al-Najim, Harvinder Chahal, Rachel L Batterham, Barbara McGowan, Omar Khan, Veronica Greener, Ahmed R Ahmed, Aviva Petrie, Samantha Scholtz, Stephen R Bloom, Tricia M Tan*



RCT of f a GLP-1 analogue as adjunctive treatment for persistent or recurrent type 2 diabetes after bariatric or metabolic surgery

Microvascular Outcomes after Metabolic Surgery

MOMS trial

Research

JAMA Surgery | Original Investigation

Effect of Gastric Bypass vs Best Medical Treatment on Early-Stage Chronic Kidney Disease in Patients With Type 2 Diabetes and Obesity

A Randomized Clinical Trial

Ricardo Vitor Cohen, MD; Tiago Veiga Pereira, PhD; Cristina Mamédio Aboud, RN; Tarissa Beatrice Zanata Petry, MD; José Luis Lopes Correa, MD; Carlos Aurélio Schiavon, MD; Carlos Eduardo Pompílio, MD; Fernando Nogueira Quirino Pechy, MD; Ana Carolina Calmon da Costa Silva, MD; Fernanda Lendimuth Gomes de Melo, MD; Lívia Porto Cunha da Silveira, MD; Pedro Paulo de Paris Caravatto, MD; Helio Halpern, MD; Frederico de Lima Jacy Monteiro, MD; Bruno da Costa Martins, MD; Rogerio Kuga, MD; Thais Mantovani Sarian Palumbo, RDN; Neil Gerard Docherty, PhD; Carel Wynand le Roux, MD, PhD

2 years outcomes of a 5 years follow-up trial

June3, 2020

MOMS trial

- **Best Medical Treatment**

✓Metformin
✓GLP1 RA
✓SGLT-2 i
✓Insulin
✓Glitazones
✓DPP4 i
✓ACEi/ARB
✓Statins
✓Diuretics

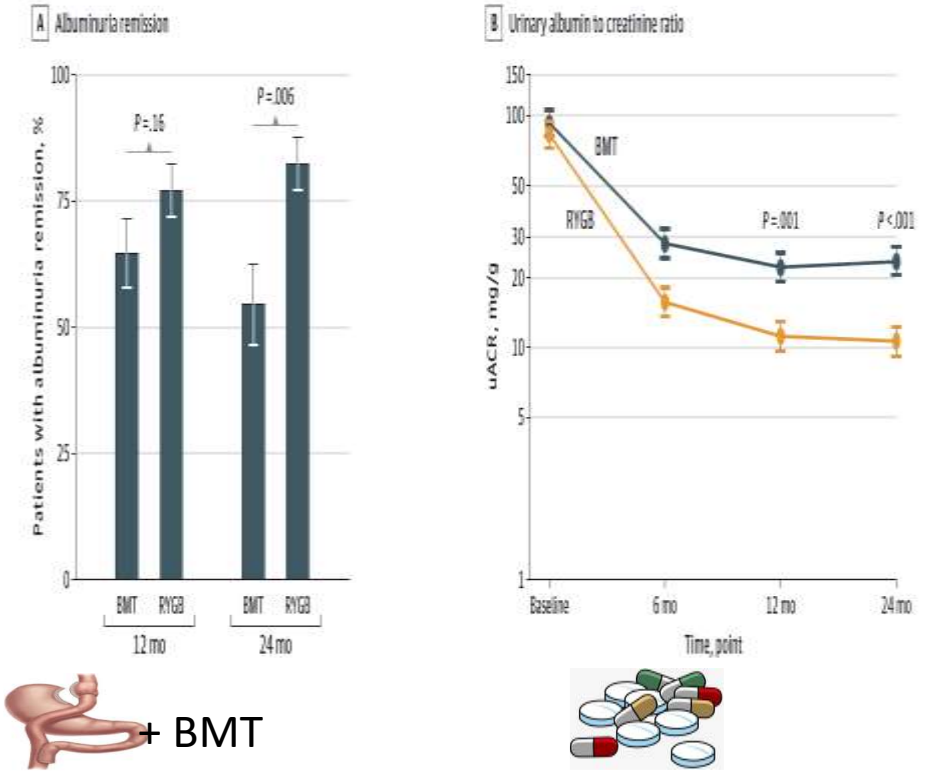
+

- **RYGB + BMT**

✓ACE/ARB
✓Statins
✓Metformin
✓Multivitamins

MOMS trial

Primary outcome - uACR



+ BMT

84%* **x** **56%** *p= 0.006

Early stage CKD remission

Remission of albuminuria with eGFR > 60 ml/min

+ BMT

82% * @ 24 mo

48% @ 24 mo

Obesity Surgery
https://doi.org/10.1007/s11695-020-04934-1

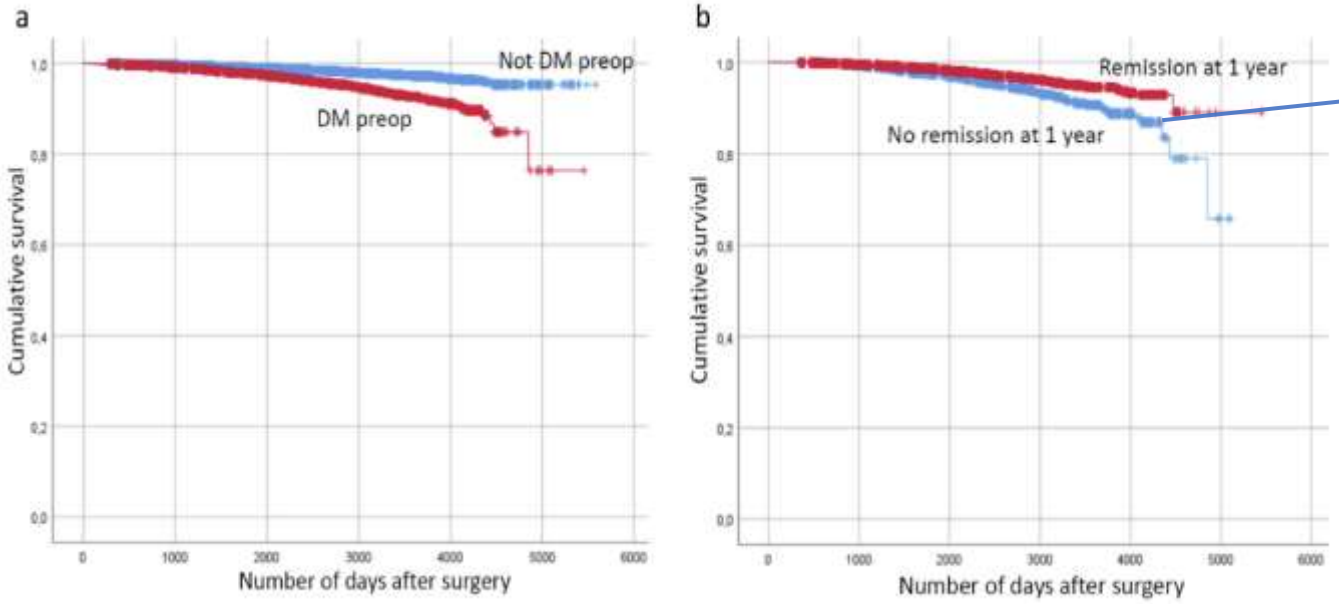
BRIEF COMMUNICATION

Bariatric Surgery: There Is a Room for Improvement to Reduce Mortality in Patients with Type 2 Diabetes

Carel W. le Roux [1] · Johan Ottosson [2,3] · Erik Näslund [2,4] · Ricardo V. Cohen [5] · Erik Stenberg [2,3] · Magnus Sundbom [2,6] · Ingmar Näslund [2,3]

Received: 6 July 2020 / Revised: 13 August 2020 / Accepted: 14 August 2020

SoReg, Scandinavian Obesity Surgery Registry
65,345 patients with up to 10-year follow-up



Pharmacotherapy

T2DM pts who achieved remission within 1 year after surgery had lower mortality than those who did not remit

IT IS NOT SURGERY x MED Tx

+

For better and safer long-term outcomes


Thank you
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