

# *Bariatric endoscopic procedures & metabolic surgery*

Presenters: Dr Adrian Sartoretto & Dr Georgia Rigas



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## *Acknowledgement of Country*

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## Presenters



**Dr Georgia Rigas** is a Fellow of the RACGP and also Chair of the RACGP Specific Interests Obesity Management Network. She is also the senior Bariatric Medical Practitioner at Australia's first accredited Bariatric Centre of Excellence at St George Private Hospital, Sydney.

Dr Rigas is recognised as a "SCOPE-certified Obesity Doctor" by the World Obesity Federation and serves on a number of medical advisory committees-both nationally and internationally.



**Dr Adrian Sartoretto** is a Gastroenterologist & Hepatologist with a subspecialty interest in Bariatric Endoscopy. Dr Sartoretto has been a Clinical Lecturer with the University of Sydney since 2012.

He joined The BMI Clinic in 2016 and took on a leadership role, greatly expanding the multidisciplinary team and developing a unique, comprehensive lifestyle program to complement bariatric endoscopic interventions.

## Learning Objectives

- Describe the metabolic mechanism of action underpinning bariatric metabolic surgery
- Describe recent bariatric endoscopic therapies which have been developed
- Provide aftercare to patients who have undergone bariatric endoscopy or metabolic surgery
- Identify red flag symptoms to look out for in patients who have undergone bariatric endoscopy or surgery, which warrant urgent referral back to hospital/ clinic of origin

## What do we know thus far?

Many patients **want and expect** weight loss guidance from Health Care Professionals. (1)  
Having the conversation and formally diagnosing and documenting overweight or obesity **strongly predicts**

→ treatment plan in place

→ subsequent weight loss. (2)

People with obesity are on a weight gain trajectory

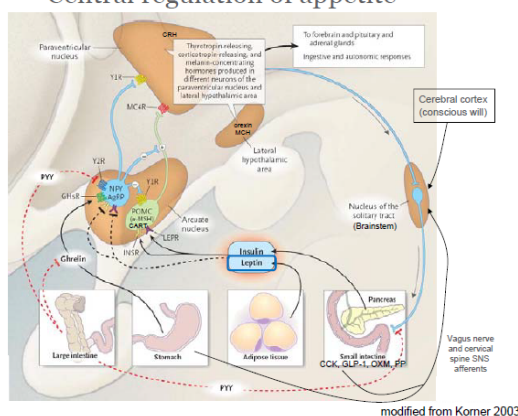
BMI is genetically predetermined & genetics play an important role

(1) Rose SA. Physician weight loss advice and patient weight loss behavior change: A literature review and meta-analysis of survey data. *International journal of obesity* (2005). 2013;37(1):118; 118-128; 128.

(2) Bardia A, Holtan SG, Slezak JM, Thompson WG. Diagnosis of obesity by primary care physicians and impact on obesity management. *Mayo Clin Proc.* 2007;82(8):927-932.

## What do we know thus far? Body weight is vigorously defended

### Central regulation of appetite

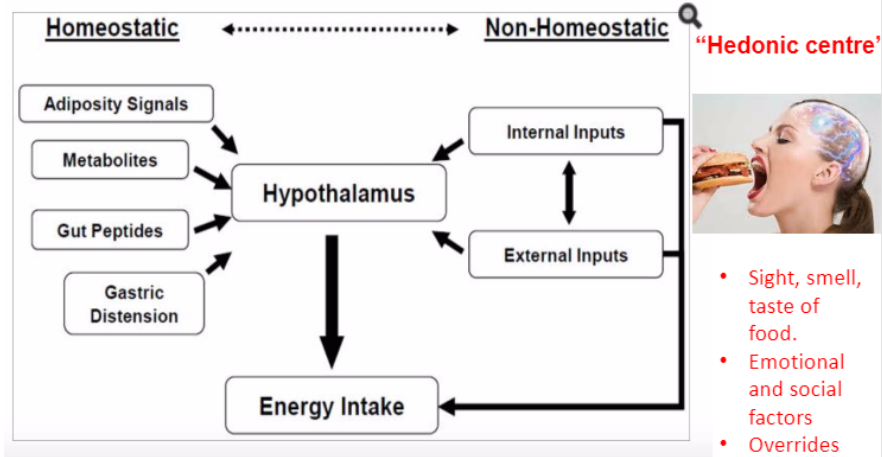


As one loses weight:

- ↓ leptin
- ↓ insulin
- ↓ CCK

- 1) Hunger hormones:
  - ↑ Ghrelin increased appetite
  - ↑ GIP increased fat storage
- 2) Reduced energy expenditure

## Hunger is not the only trigger for eating:

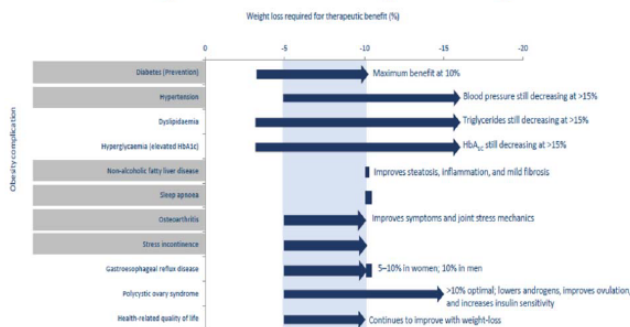


- Sight, smell, taste of food.
- Emotional and social factors
- Overrides the homeostatic mechanisms

Cornier MC, *Physiol Behav* 2011; 104(4) 608-612.

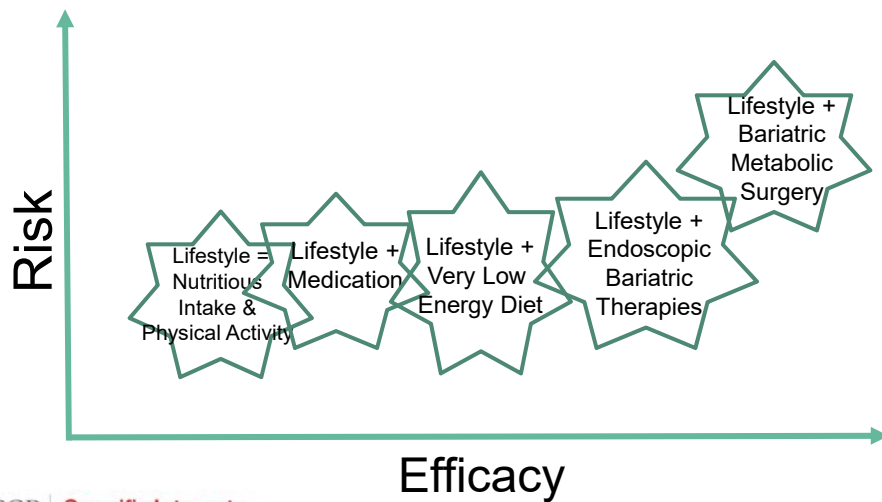
## What do we know thus far? Clinically meaningful weight loss

5–10% weight loss is clinically meaningful



Cefalu WT et al. *Diabetes care* 2015;38(8):1567-82. Wingler F et al. *J Health Psychol.* 2013;10:574-86.

## *Therapeutic Spectrum for Obesity*



## *Bariatric Metabolic Surgery*

**Dr Georgia Rigas BScMed MBBS FRACGP**  
**General Practitioner | RACGP SI Obesity Management Network**  
**Chair**  
**Senior Bariatric Medical Practitioner**

## Polling questions: Bariatric surgery in Australia

Whilst recognising that not all patients with obesity want or need bariatric metabolic surgery,....

Q1: What percentage of patients who meet the NHMRC guidelines criteria actually have bariatric surgery per year?

- a. 0-5%
- b. 6-10%
- c. 11-20%
- d. 21-30%
- e. 31-40%

Q2: What percentage of bariatric metabolic surgery is performed in public hospitals?

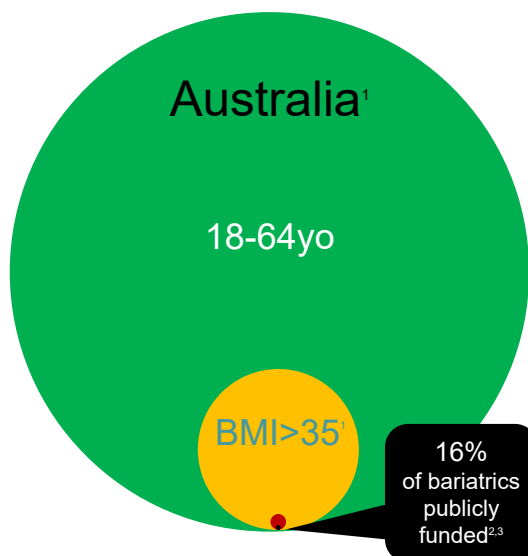
- a. 0-5%
- b. 6-10%
- c. 11-20%
- d. 21-30%
- e. 31-40%

Q3: Do you think bariatric metabolic surgery makes people lose weight?

- a. Yes
- b. No



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To find out what obesity management services are available in your State or Territory, please direct all email enquiries to:  
[gpsi@racgp.org.au](mailto:gpsi@racgp.org.au)

1. ABS 4364.0.55.001 - National Health Survey: First Results, 2014-15.

2. AIHW National Hospital Morbidity Database. Procedures and healthcare interventions (ACHI 8th edition), Australia, 2013-14.

3. Australian Department of Human Services [www.humanservices.gov.au/corporate/statistical-information-and-data/medicare-statistics](http://www.humanservices.gov.au/corporate/statistical-information-and-data/medicare-statistics)

# Bariatric Surgery is cost effective

Recommendation	Grade	Comments
13. For adults with BMI > 40 kg/m <sup>2</sup> or adults with BMI > 35 kg/m <sup>2</sup> and comorbidities that may improve with weight loss, bariatric surgery may be considered, taking into account the individual situation.	A	Table C18–C23 Appendix C

### Cost and resource implications

Numerous studies have reported that bariatric surgery is a cost-effective weight loss intervention compared with nonsurgical treatment of obesity, and that the magnitude of estimates of costs and outcomes is large (Keating et al. 2009; Picot et al. 2009; Sjöström et al. 2007; Vos et al. 2010). In people with newly diagnosed type 2 diabetes compared to those with established diabetes (at least 2 years since diagnosis) surgery has been shown to be a cost-effective option (Keating et al. 2009).

Research reported on surgery in Australian public health services can be limited and the majority of procedures are performed in private hospitals (Korda 2012; AIHW 2010b). Services for bariatric surgery and necessary follow-up may be more limited in rural and remote areas. The additional cost and resource implications to the individual and the health system include frequent follow-up and monitoring, transport issues in both urban and rural areas, and accessibility to services and providers. The sustained lifestyle changes and additional intensive interventions that may be required to ensure the effectiveness of surgery should also be factored in to individual and health system costs. Subsequent surgical procedures (for weight loss, complications or cosmetic procedures) should also be considered as a significant cost implication to the individual and health system.

### Practice point

j	Bariatric surgery, when indicated, should be included as part of an overall clinical pathway for adult weight management that is delivered by a multidisciplinary team (including surgeons, dietitians, nurses, psychologists and physicians) and includes planning for continuing follow-up.
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The image contains several anatomical diagrams illustrating different bariatric surgical procedures:

- Gastric Bypass (RNY):** Shows the stomach being divided into a small gastric pouch and a bypassed portion. The duodenum is bypassed, and the jejunum is connected to the pouch. Labels include: Gastric pouch, Bypassed portion of stomach, Jejunum, Bypassed duodenum, food, and digestive juice.
- Sleeve Gastrectomy:** Shows the removal of the greater curvature of the stomach, leaving a sleeve. Labels include: Esophagus, Sleeve, Stomach Removed, Pylorus, and Gastric Reservoir.
- Roux-Y Esophagojejunostomy:** Shows the esophagus connected to the jejunum, bypassing the stomach. Labels include: Jejunum, Jejunum, and Common Intestine.
- Other Procedures:** Diagrams showing the removal of the gallbladder, spleen, and liver, and the connection of the duodenum to the small intestine. Labels include: Esophagus, Gallbladder Removed, Liver, Spleen, Duodenum, Single Jejunostomy, Duodenal Sigmoid, Pyloric Valve, Common Channel, Appendix, and Bypassed portion of small intestine.

And variations thereof...

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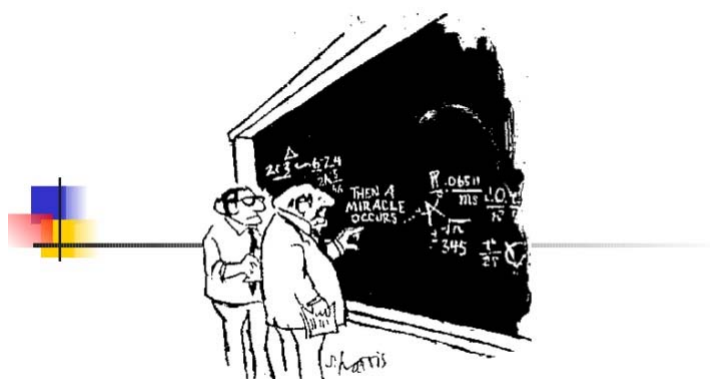
## *Surgery as a therapeutic tool*



View Bariatric metabolic surgery as an **enabler** for lifestyle modification:

- Reduced hunger/ increased satiety
- Effectively reduce main meal portions
- Malabsorption of micro (LGBP) or macro nutrients (BPD)

## *So how does bariatric metabolic surgery work?*



I think you should be more explicit here in step two.



Recap: as one loses weight

- ↓ leptin
- ↓ insulin
- ↓ CCK

1) Hunger hormones

- ↑ Ghrelin increased appetite
- ↑ GIP increased fat storage

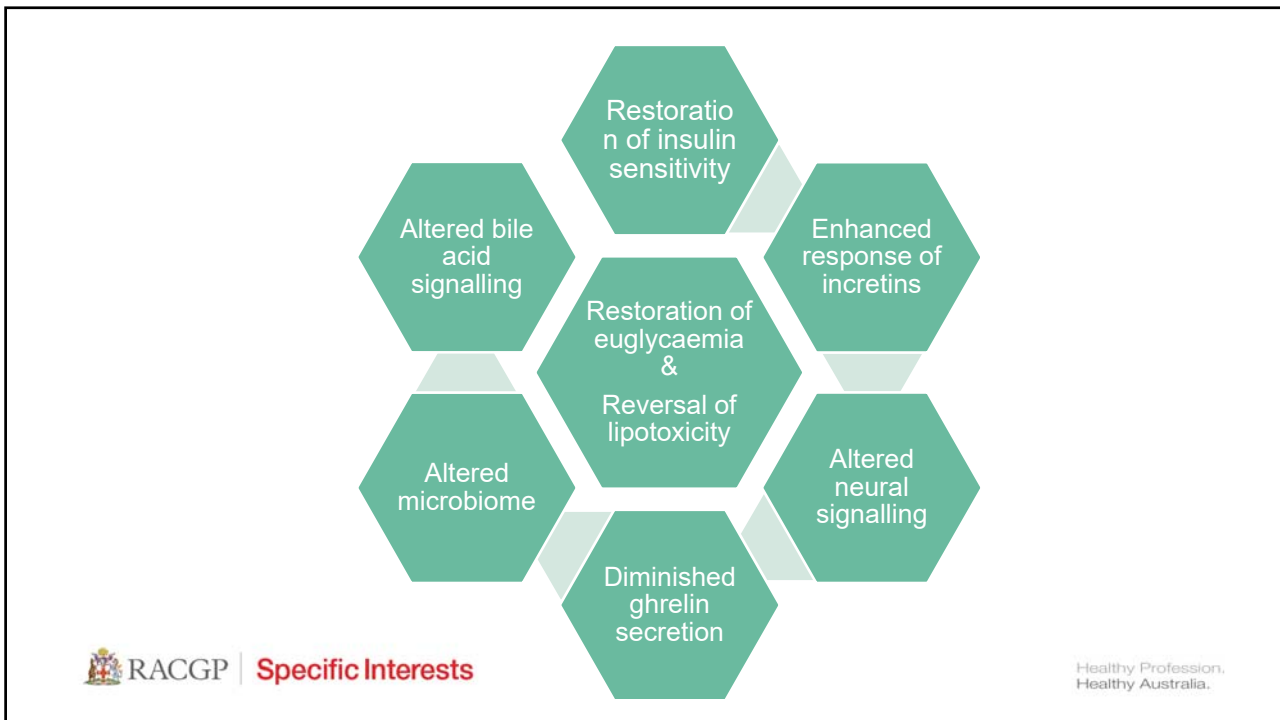
2) Reduced energy expenditure

**Table 1.** Physiological changes after the most commonly performed bariatric surgery pr

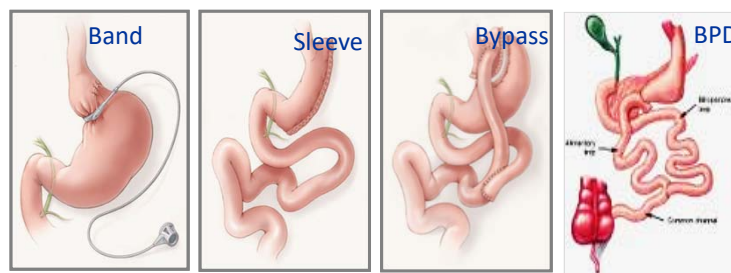
	RYGB	VSG	AGB
Appetite	↓	↓	↓
Plasma ghrelin	↑/↓/↔	↓	↑
Plasma GLP-1	↑	↑	↔
Plasma PYY	↑	↑	↔
Plasma Oxyntomodulin	↑	?	?
Plasma CCK	↔	↔/↑	?
Plasma leptin	↓	↓	↓
Gastric emptying	↑/↓	↑	↔
Caloric malabsorption	Minimal for fat only	?	?
Energy expenditure	↑/↓/↔	↔	?
Food preferences	↓ Consumption of fat and sugar	↓ Consumption of fat and sugar	↔ Or ↑ consumption of fat and sugar
Glycaemic improvements	Early and sustained, weight-dependent and -independent	Early and sustained, weight-dependent and -independent	Gradual and sustained, weight-dependent
Early postprandial insulin release	↑, Early and sustained	↑, Early and sustained	↔
Insulin resistance	↓	↓	↓
Plasma bile acids	↑	↑	↔
Gut microbiota	Significant changes	?	?

Abbreviations: AGB, adjustable gastric banding; CCK, cholecystokinin; DPP, dipeptidyl peptidase co-transporter; VSG, vertical sleeve gastrectomy; ↑, increase in parameter; ↓, decrease; ↔, no animal studies.

J A Tadross & CW le Roux  
The mechanisms of weight loss  
after bariatric surgery  
Int J of Obesity (2009) 33,S28-S32

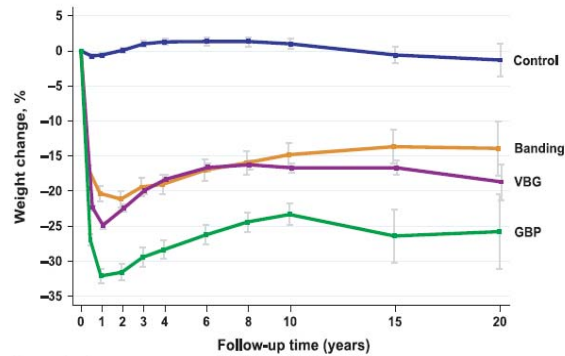


## Bariatric metabolic operations compared



Malabsorption	-	-	+	+++
Type 2 Diabetes effect	+	++	++	+++
Hormonal Effects	+	++	+++	+++
Excess Weight loss	+	++	+++	++++

### Swedish Obese Subjects (SOS) trial: Prospective controlled intervention study of bariatric surgery



Sjostrom L. et al *Bariatric Surgery and Long term Cardiovascular events*,  
Journal of the American Medical Association 2012; 307 (1): 56-65

## Safe but not without risk



Bariatric metabolic surgery is as safe as an elective laparoscopic cholecystectomy \*

Revisional surgery *may* be required:

- LABG: Gastric pouch dilation, band erosion, leaks to band system, weight regain, gallstones
- LSG : GORD, staple-line leak, abdominal pain, gallstones, nutritional deficiency, weight regain
- LGBP: Abdominal pain, staple-line leak, stomach ulcer, intestinal obstruction, gallstones, nutritional deficiency, weight regain

Aminian, A. How safe is metabolic/diabetes surgery? A  
journal of pharmacology and therapeutics (2015) 17  
p198

## When to refer

BMI 40 (= Class III obesity, previously called *morbid* obesity)

BMI 35 + medical comorbidity/ complication of obesity

BMI 30 + poorly controlled diabetes\*

Willing to engage in lifelong care\*

Previous attempts to lose weight

Acceptable operative risks

NH&MRC Guidelines 2013



## Contraindications

- Non- stabilised medical disorders
- Active cancer
- Patient not willing to commit to the postop care plan<sup>^</sup>
- Unable to provide consent
- ?over 65yo
- Relative C/I: Untreated or non-stabilised psychological disorders\*

<sup>^</sup> J.Himpens et al Ann of Surgery 2010; P O'Brien et al Ann of Surgery 2013

\* "Treatment should be started before surgery" NHMRC Guidelines, 2013

## *Polling Question*

### *Who should you refer to?*

#### FEATURES OF CLUSTER GROUP (1):

Offer quickest turn around  
 Cheapest  
 Hosts lovely GP luncheons/ dinners  
 Personal friend of yours

#### FEATURES OF CLUSTER GROUP (2):

Had a multi disciplinary team in the practice  
 Has extensive experience  
 Has an academic post ie teaches students

#### FEATURES OF CLUSTER GROUP (3):

Has good bedside manner  
 Has a friendly telephone receptionist  
 Takes phone calls from GPs with queries

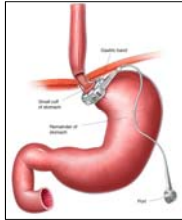
## *Who to refer to?*

- Extensive experience: high volume center
  - Shown to have ↓ postoperative complications\*
- Offer a variety of operations ≈ tailor to patient's health profile
- Multidisciplinary team



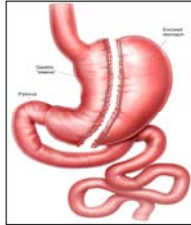
\*N.T. Nguyen et al, Annals of Surgery, 2004

## Bariatric surgery - complications

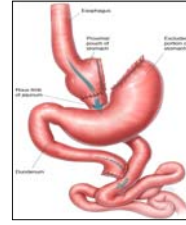


- Perforation
- GIT Hemorrhage
- Gut ischaemia
- Band slippage
- Band erosion

Early: <30 days  
Late: >30 days



- Perforation
- GIT Hemorrhage
- Anastomotic leaks
- Strictures
- Reflux
- Gut ischaemia



- Perforation
- GIT Hemorrhage
- Anastomotic leaks
- Gastro-gastric fistulas
- Gut ischaemia
- Anastomotic strictures
- Bowel Obstruction

Aminian, A. How safe is metabolic/diabetes surgery? A journal of pharmacology and therapeutics (2015) 17 p198

## Importance of Aftercare

- Achieve optimal benefit from therapy
- Delivery of education and support
- Prevention or early diagnosis of complications



## Routine minimal daily nutrient supplementation post operatively

Mechanick et al Obesity 2013(21)S1-27

	LAGB	SG/RYGB
Multivitamin with mineral*	1	2
Calcium citrate	1200-1500mg (From diet and as citrate^ supplements, split into 500- 600mg doses, taken with meals)	1200-1500mg (From diet and as citrate^ supplements, split into 500- 600mg doses, taken with meals)
Vitamin D#	At least 3000 IU, titrated to >30 ng/ml	At least 3000 IU, titrated to >30 ng/ml
Vitamin B12	NO	As needed to maintain levels+
Fe (total from multi plus additional)	NO	45-60mg (On empty stomach)

\*including folic acid 400ug, copper 2mg, iron and thiamine

^Carbonate requires acid for absorption

#In cases of severe vitamin D malabsorption, oral doses may need to be as high as 50,000 units 1 to 3 times weekly to daily

+Usually 350-1000ug orally or may need IM/intranasally

Nutrient marker	Before surgery	In 1st year: every 3-6 months	On each anniversary
● Gastric band ● Sleeve gastrectomy ● RYGB			
Vitamin D	● ● ●	● ●	● ● ●
Folate	● ● ●	● ●	● ● ●
Vitamin B <sub>12</sub>	● ● ●	● ●	● ● ●
Iron studies	● ● ●	● ●	● ● ●
Homocysteine	● ● ●	● ●	if indicated from baseline/previous test
Zinc	● ● ●	● ●	● ● ●
Vitamin A	● ● ●	● ●	● ● ●
Magnesium	● ● ●	● ●	optional, if indicated
PTH		if indicated	
Selenium	optional	● ●	● ● ●
Thiamine	optional		if persistent vomiting
Copper	optional (if persistent unresolving problems with iron levels)		

## Abdominal Pain

Any pt who has lost weight:

- Could be gallstones; arrange abdominal ultrasound +/-HIDA

LAGB pt:

- Could be a slipped or strangulated band->need to come to clinic ASAP for review

LSG:

- Could be a leak -> need to come to clinic ASAP for review

RYGBP:

- Could be small bowel obstruction: urgent referral to surgical clinic or ED-> the bowel could become necrotic within 24-48 hours

Bypass ( RYGBP or omega):

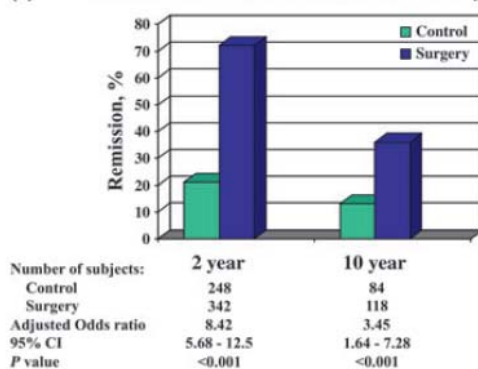
- Could be stomal ulcer->refer back to surgeon to perform a gastroscopy

## CHRONIC DISEASE MODEL OF CARE

*Comorbidity & complications of obesity need regular review*

*eg Diabetes remission-may relapse*

(a) SOS. Remission from diabetes over 2 and 10 years



- 2yrs: 72% were in remission
- HOWEVER at 10yrs: 50% had relapsed

Take home messages:

1. Diabetic patients still require routine surveillance, even if in remission
2. Relapse is a normal expectation of dealing with a chronic disease



## *Bone Health*

- Important for all bariatric procedures
- Test for: Ca, Mg, PO4, vit D, PTH\*
- Baseline bone DEXA scan and in other patients identified as high risk; repeat DEXA at 2-5 years\*
- Gastric bypass: supplement with calcium & vitamin D for life; others *prn*

\*AAACE/TOS Bariatric Surgery guidelines, 2013

## *Anemia*

### Iron deficiency:

- exclude other common causes
- ↓ red meat intake- may need supplementation
- bypass will need supps (stores deplete with time)

### Vitamin B12:

- important to measure Active B12
- needs replacing with bypass,
- sometimes needs replacing with LSG too

## *Occasionally bariatric patients at risk of thiamine (vitamin B1) deficiency*

### **Potential causes:**

- Gastric resection procedures (sleeve, bypass operations)
- Prolonged vomiting
- Excessive alcohol intake
- lowered acid environment in sleeve and bypass *may* be an issue

**Refer** to hospital for treatment-iv thiamine

## *Fat soluble vitamins*

Definitely monitor in SAGB (omega loop bypass) SADI & BPD

- Vitamins A,D,E,&K
- Measure at least 6 months
- Oral supplements

## *Emotional Support*

- Mental well being improves for most, not all
- Surgery *may* interfere with hedonistic pathways
- Alcoholism- esp RYGBP<sup>^</sup>
- Higher incidence of relationship breakdowns
- RYGBP: sl ↑ risk of accidental & non accidental death\*
- Body image disorders eg loose skin
- Weight regain-> reinforces “failure” shame/guilt

<sup>^</sup> W.C. King et al JAMA 2012  
\* J Bhatti et al JAMA Surgery 2015



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## *GORD/Reflux*

### **LAGB:**

- Could be a slipped or overtight band->need to come to clinic ASAP for review (if possible arrange a barium swallow)

### **LSG:**

- Expected, will need PPI +/-H2 rec antagonist
- If intractable->may need to be converted to RYGBP

### **Bypass (RYGBP or omega):**

- Could be stomal ulcer->refer back to surgical clinic to perform a gastroscopy

### **SAGB (omega loop bypass):**

- At risk of bile reflux -> refer back to surgical clinic



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## *“Inadequate” weight loss*

- NO such thing as “failure”; should be viewed as partial responders to Rx
- Look beyond the kilos on the scale
- Shift the emphasis to :
  1. Improved weight related comorbidities
  2. Improved fitness
  3. Improved function
  4. Improved QOL

## *Should we worry about weight regain?*

- How much wt regain is too much?
- ?10% of their nadir weight \*
- ? Worsening of associated co-morbidities

\* Karmali et al Obesity Surgery 2013;23 p 1922

## *Red Flag symptoms*

- Protracted vomiting- think B1&EUC
- Dehydration
- Abdominal pain
- Neurological symptoms
- Significant GORD
- Recurrent chest infections/pneumonia
- Nutritional deficiencies
- Patient is *considering* pregnancy
- If in doubt-> refer back



## *Summary: Role of GP*

- reinforce healthy eating behaviour
- reinforce healthy lifestyle habits
- monitoring and reviewing nutritional status
- compliance with vitamins and supplements
- referral to relevant specialists and health professionals
- regular follow-up: adopt a chronic disease model of care



**BMI**  
BARIATRIC & METABOLIC  
INSTITUTE



**THE BMI**  
CLINIC

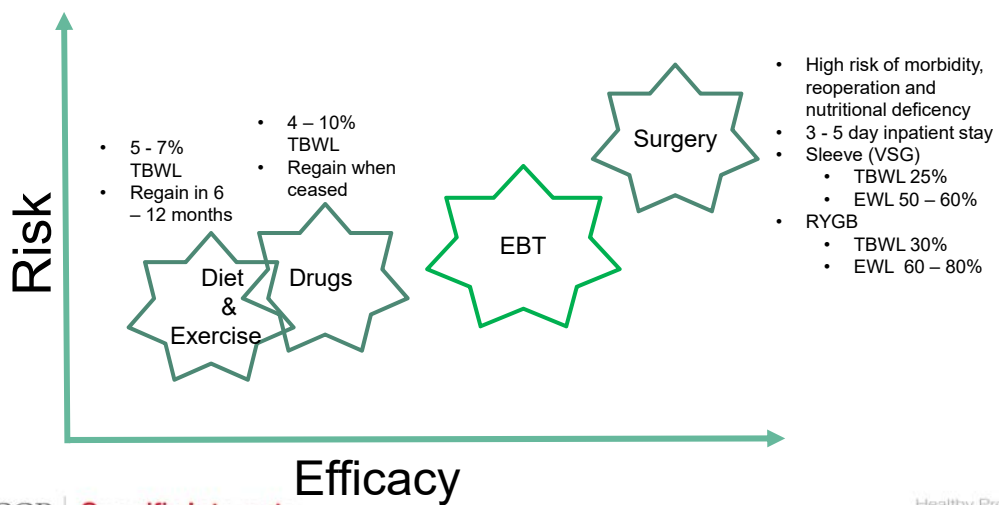
**Dr Adrian Sartoretto BMedSc MBBS FRACP**  
Gastroenterologist | Bariatric Endoscopist

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## *Therapeutic Spectrum for Obesity*



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## *Role of Endoscopic Bariatric Therapies*

Prospective thresholds for EBTs have been set jointly by ASMBS and ASGE

Goal of all EBTs is to offer

- Clinically meaningful weight loss
  - EWL >25% (and TBWL >10%) at 12 months
- Lower risk
- Lower requirement for resources
- Improved patient acceptance

May be used as:

- Primary therapy
- Adjunctive (Bridging) therapy
- Revisional therapy

## *EBTs and Lifestyle Intervention*

ALL EBTs to date demonstrate a positive correlation between efficacy and frequency/intensity of lifestyle interventions (dietetic, exercise and behavioural)

- EBTs should be considered amplifiers of lifestyle change

It is recommended that all EBTs are accompanied by a multiphase lifestyle intervention that is:

- Intensive ( $\geq 12$  contacts within the first 6 months) before moving into a lower intensity maintenance phase
- Comprehensive- including dietary, behavioural and exercise interventions
- Last a period of at least 12 months

## *Modes of action*

### Gastric therapies

- Slowing of gastric emptying
- Restriction
- Aspiration

### Small bowel therapies

- Malabsorption
- Changes in bile salt metabolism/absorption
- GI hormone changes (GLP1)
- ? Microbiome

## *Mechanism of Intra-gastric Balloon Therapy*

### Reduced appetite, early & prolonged satiety

- Delayed gastric emptying
- Restrictive component (with preferential fundal filling)
- Intra-gastric weight

### Behavioural effects

- Punitive effects of over- or rapid-eating
- Punitive effects of poor food choices (esp. high fat content)





## *Typical Clinical Course*

Honeymoon period (6 hours)

Adaptation Period

- 3 – 5 days (peak by day 3)
- Colicky pain
- Nausea +/- Vomiting
- Reflux
- Lethargy

Symptoms after week 1 should never be considered “normal”

- Acute post prandial symptoms typically result from hyperphagia, tachyphagia
- Other causes may include: gastric accretion, antral impaction, hyperinflation, ulceration, pancreatitis, cholelithiasis

## *Gastric Balloon Patient Selection*

Eligibility

- Age < 70yrs
- BMI  $\geq 27$  kg/m<sup>2</sup>
- (Eradicate *H pylori*)

Contraindications

- History of gastric surgery (including fundoplication)
- Hiatus hernia > 5cm
- Active peptic ulcer disease
- Vascular lesions (eg GAVE)
- Strictures (eg oesophageal)
- Pregnancy and breastfeeding
- Regular use of NSAIDs

## Orbera

- First of the modern “Large volume” IGBs
- Spherical shape
- Fixed volume
- 6 month implantation time
- TBWL 12 – 15% at 12 months

Orbera  
Intragastric  
Balloon  
System



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## Spatz 3

- Third generation adjustable balloon
- Twelve month dwell time
- Only available adjustable balloon
  - TBWL 17 – 19%
  - Advantage in improving early tolerability and balloon retention by downward adjustment
  - Advantage in improved weight loss and response rates
  - Increased risk of gastric ulceration (2 – 5%)



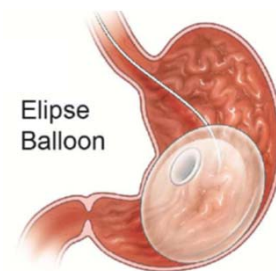
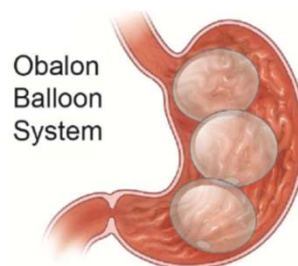
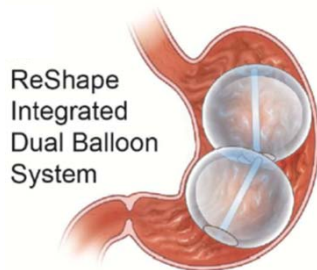
Spatz  
Adjustable  
Balloon  
System



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## Watch this space...



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## Safety

	Orbera	Spatz	Total
N	32,735	1020	41,863
Hyperinflation*	164 (.5%)	5 (.5%)	205 (.5%)
Hyperinflation†	146 (.5%)	4 (.4%)	166 (.4%)
Spontaneous deflation	206 (.6%)	11 (1.1%)	365 (.9%)
Migrations‡	8 (.02%)	0 (0%)	24 (.06%)
Migrations†	28 (.1%)	2 (.2%)	79 (.2%)
Ulcer*	13 (.04%)	6 (.6%)	28 (.07%)
Ulcer†	32 (.1%)	52 (5.1%)	113 (.3%)
Bleeding*	12 (.04%)	1 (.1%)	20 (.05%)
Bleeding†	30 (.1%)	2 (.2%)	39 (.1%)
Perforations on implant	0 (0%)	0 (0%)	0 (0%)
Perforations (during treatment)	9 (.03%)	1 (.10%)	14 (.03%)
Perforations on explant	2 (.01%)	0 (0%)	6 (.01%)
Total	650 (2%)	84 (8.2%)	1059 (2.5%)

**Intolerance:** 7–10% Orbera; 1-3 % Sp3)

**Ulcer:** 1:250 (Sp3 5.7%, but 90% did not require IGB removal)

**Perforation:** 1:2500

**Migration:** 1:500, but 75% resolve spontaneously (1:1600 risk of surgery for SBO)

**Death:** 1: 10,000

SD = standard deviation; IGB = intragastric balloons; TBW = total body weight; BMI = body mass index.

\*Treated by balloon removal.

†Treated conservatively.

‡Treated surgically.

Neto et al Brazilian Consensus  
Guidelines on IGB SOARD 2017

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## Abdominal Pain

Thorough history and examination

- Exclude NSAIDs, ensure PPI adherence, diet history, weight loss history, GI bleeding
- Beware the panicked patient with severe apprehension for abdominal exam
  - Often a sign of antral impaction and severe gastric distention (NBM + CT + NGT)
- Ensure IGB in LUQ

Approach should be standardized

- NBM or CF diet (+/- enzymes)
- Lipase (+/- amylase)
- FBC, LFT, EUC, CMP, CRP
- CT if clinical concern for perf; US if suspect cholelithiasis
- Liaise early with bariatric Endoscopist

Cause of pain should be resolved within 1 week of onset; if ongoing, urgent endoscopy is warranted



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- IGB in appropriate position
- Non-obstructed
- Marked gastric distention
- Semi solid material in fundus

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## *ESG*

### Endoscopic Sleeve Gastroplasty (ESG)

- Incisionless transoral endoscopic procedure
- Developed at the Mayo Clinic in 2012
- Running sutures are applied along the greater curvature of the stomach to reduce gastric volume
- Able to be performed as a day only procedure
- No implanted device
- No device retrieval

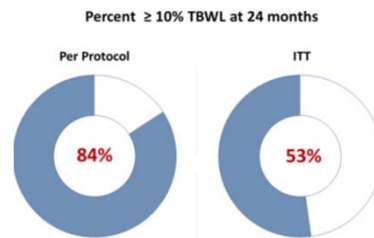


## *ESG- Indications and contraindications*

- Eligibility:
  - BMI  $\geq 30$  kg/m<sup>2</sup>
  - Declines conventional bariatric surgical intervention
- Contraindications:
  - Family history of gastric malignancy
  - Active *H pylori* infection
  - Active gastric ulceration
  - Requirement for gastric surveillance (eg Gastric intestinal metaplasia or atrophic gastritis)
  - Decompensated organ failure
  - Known vascular anomalies (mucosal or abdominal)
  - Obligate therapeutic anticoagulation
  - Pregnancy or lactation

# ESG – Published Results

- TBWL 14-16% at 6 months<sup>1,2</sup>
- TBWL approximates 20% at 24 months<sup>1,2</sup>
- Reported complication rate of ~ 1%
  - Most commonly peri-gastric inflammatory collection
- Sustained significant improvements in HbA1c, WC, Systolic BP, TG and ALT in one series<sup>1</sup>
- Weight loss is related to intensity of lifestyle intervention<sup>3</sup>



Ref.	Centre	N	6m ESG - TBWL	2yr ESG - TBWL
Lopez-Nava 2017	Spain	154	15.8	19.5
Sharaiha 2017	U.S.	91	14.4	20.9
Lopez-Nava 2017	Multicentre study (Spain: Madrid, USA: Mayo, Weill-Cornell)	248	15.2	18.6



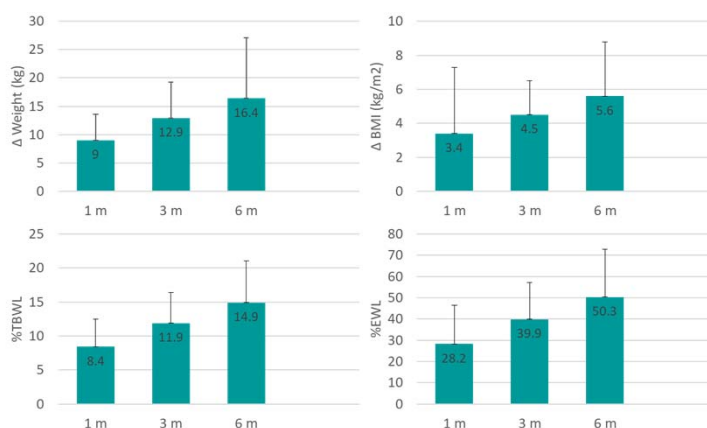
1. Sharaiha et al Clinical Gastroenterology & Hepatology 2017
2. Lopez-Nava et al Obesity Surgery 2017
3. Lopez-Nava et al Endoscopy International Open 2016

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# Our Experience



- Consecutive ESG patients from three centres:
  - Australia: The BMI Clinic
  - The US: Johns Hopkins and UT Health
- Study period Feb 2016 to May 2017
- N = 112; average BMI 37.9 kg/m<sup>2</sup>
- 10 patients with previous IGB experience



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## Predictors of Outcome



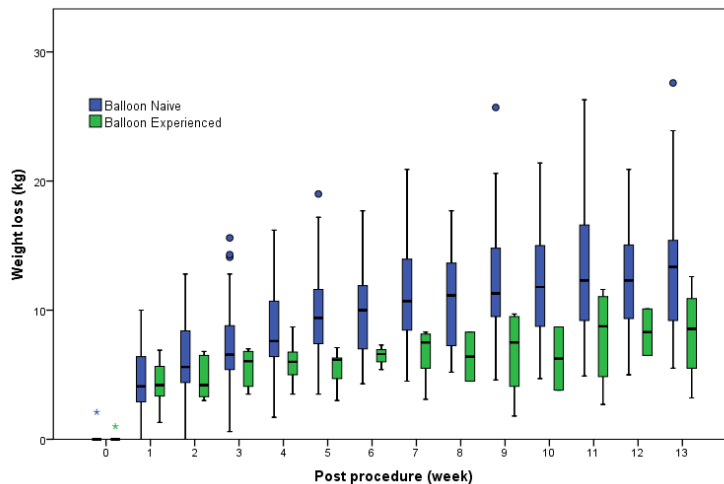
Predictors include:

Positive

- Baseline BMI
- Male sex
- Allied Health follow up

Negative

- Gastric Balloon Experience



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## ESG and Conventional Surgery

No RCT data, but...

J Gastrointest Surg (2018) 22:267–273  
<https://doi.org/10.1007/s11605-017-3615-7>



ORIGINAL ARTICLE

### Endoscopic Sleeve Gastropasty, Laparoscopic Sleeve Gastrectomy, and Laparoscopic Band for Weight Loss: How Do They Compare?

Aleksey A. Novikov<sup>1</sup> • Cheguevara Afaneh<sup>2</sup> • Monica Saumoy<sup>1</sup> • Viviana Parra<sup>3</sup> •  
 Alpina Shukla<sup>4</sup> • Gregory F. Dakin<sup>2</sup> • Alfons Pomp<sup>2</sup> • Enad Dawod<sup>1</sup> • Shawn Shah<sup>1</sup> •  
 Louis J. Aronne<sup>4</sup> • Reem Z. Sharaiha<sup>1</sup>

## Study Summary

- 12 month retrospective cohort study of 278 patients; included initial experience with ESG
  - LSG 120 pts; ave BMI 47.2 kg/m<sup>2</sup>
  - ESG 91 pts; ave BMI 38.6 kg/m<sup>2</sup>
  - LAGB 67 pts; ave BMI 45.0 kg/m<sup>2</sup>
- 12 month TBWL%
  - LSG 29.3% vs ESG 17.6% vs LAGB 13.3%
  - When analysed by BMI 30 - 40 kg/m<sup>2</sup>, no significant difference in weight loss between interventions
- However, much lower morbidity with ESG
  - LSG 9.17% vs ESG 2.20% vs LAGB 8.97%
- Average inpatient stay (days)
  - LSG 3.09 vs ESG 0.32 vs LAGB 1.66

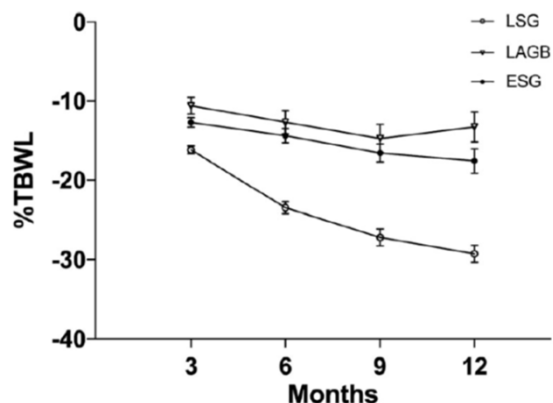
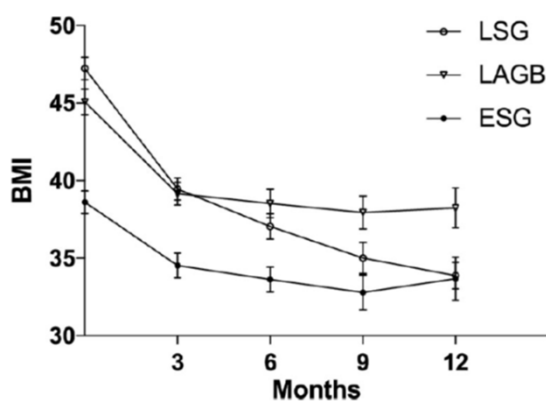


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## Weight Loss



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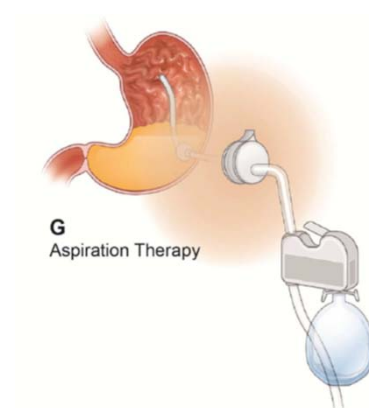
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# *Emerging and Investigational Therapies*

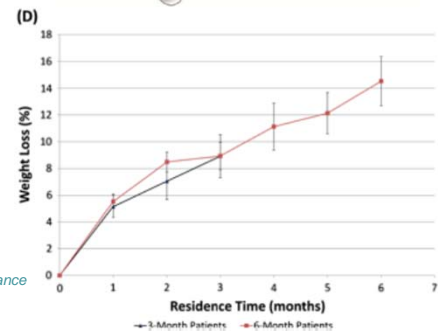
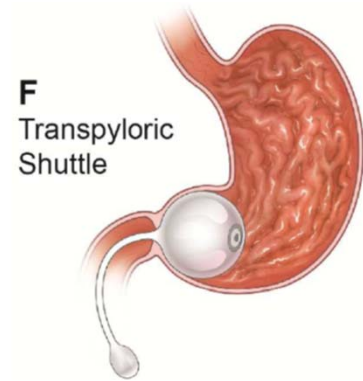
## *Aspire Assist*

- Venting Gastrostomy tube
  - 20 min procedure; fully reversible
  - Allows removal of approx. 30% of ingested calories following each meal (after 20 mins)
- EWL 37.2% +/- 26.7% (PP) at 12 months
  - 15-21% TBWL
  - Ongoing weight loss at 2 years
  - Weight loss in excess of aspirated calories
- Common side effect of granulation tissue. Electrolyte abnormality uncommon.



## TransPyloric Shuttle

- Slows gastric emptying
- Very well tolerated
- Under investigation in US (RCT) and Australia (Single Arm)
  - Feasibility study published 2014 of 20 patients with ongoing weight loss throughout study period (6 months). EWL 41% TBWL 14.5%
  - Complicated by ulcers in 10% (2 pts)
- 12 month (or longer?) residence



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## POSE

- “Primary Obesity Surgery, Endoluminal”
- Gastric plication focussed on fundus (and distal body)
- Failed to meet primary endpoint in pivotal trial  
4.94±7.04% TBWL (although 13.04±1.4% in Europe)
  - Likely owing to flawed study design (allowed cross-over if failed to lose adequate weight; low intensity lifestyle intervention)
- Offered in Europe and Middle East

**H**  
POSE  
Procedure



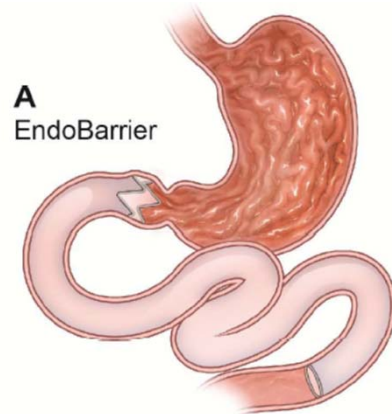
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## *EndoBarrier*

- 60cm Duodenal liner
  - Purportedly induces malabsorption by preventing ingested food from mixing with bile and pancreatic juices, and limiting contact with small intestine
  - Likely also GI hormonal changes owing to altered GI nutrient sensing
  - Complicated by ~2% risk of hepatic abscess
    - Anchor design issues; ? Role of PPI.
- Poor weight loss (<10% TBWL) but impressive improvements in HbA1c
- No longer TGA approved
  - Likely to be redesigned and released

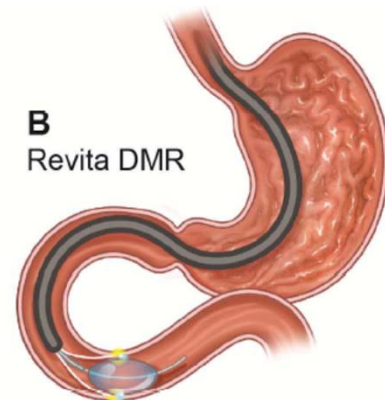


## *Fractyl- Duodenal Mucosal Resurfacing*

- Cauterises 10 – 15cm duodenal mucosa
- Injects fluid to act as safety buffer to prevent full thickness burns & strictures
  - Circulates hot water via balloon to effect cuffs of mucosal burns

### First in Man results

- Baseline early G1 obese HbA1c  $9.6 \pm 1.4\%$
- Absolute reduction of  $1.2 \pm 0.3\%$  was seen in HbA1c at 6 months
- Minimal weight loss of roughly 3%TBWL at 6 months
- 2 strictures; treated with balloon dilatation



## *Incisionless Anastomosis System- GI Windows*

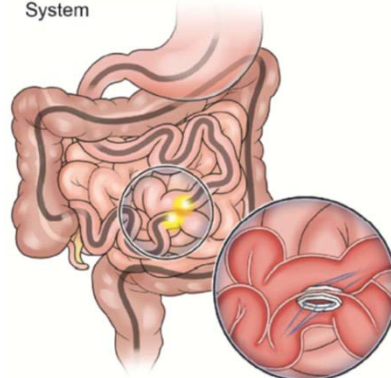
Magnets aligned from prox. jejunum and distal ileum under fluoroscopy

- Magnets induce pressure necrosis and fistula formation, creating a bidirectional “bypass”

First in Man, 10 subjects (mean BMI 41kg/m<sup>2</sup>)

- 10.6% TBWL at 6 months
- 4/10 had DM2 at baseline (HbA1c 7.8%) and experienced a -1.8% reduction (despite reducing or stopping all anti-diabetic meds)
- Resolved prediabetes within 6 months
- Overnight observation, discharged 24 hours and no complications\*!

**D**  
Incisionless Anastomotic System



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## *Future Directions*

- Improved devices and techniques
  - Durability, safety, device delivery & retrieval, efficacy
- Combination therapy with pharmacologic agents to augment efficacy and/or stabilise weight
- EBTs in combination (eg IGB and EndoBarrier) or in series (eg multiple IGBs)
- Conventional bariatric surgery augmented with EBT (eg LSG + Fractyl/GI Windows)

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## *Summary*

- EBTs represent effective therapies positioned between pharmacotherapy and conventional surgery
- Adjunctive lifestyle intervention is critical for short and long term efficacy
- May be used as primary interventions or as bridging procedures
- Numerous therapies are available or are under investigation
  - Represents a potential paradigm shift in bariatric care
- Liaise with Bariatric Endoscopist if any concerns

## *Q&A*