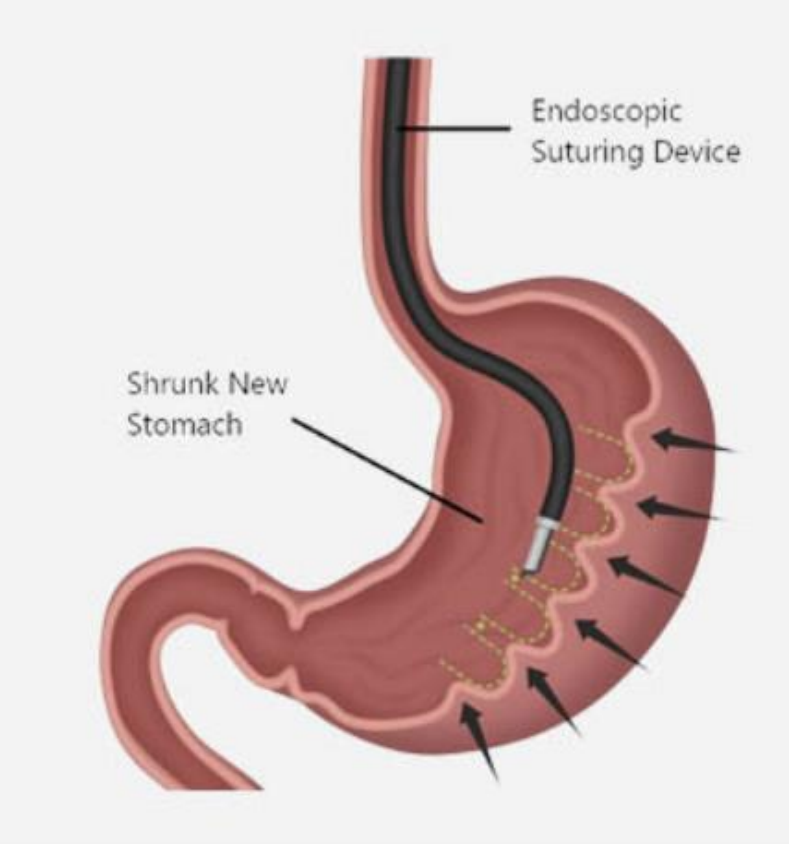
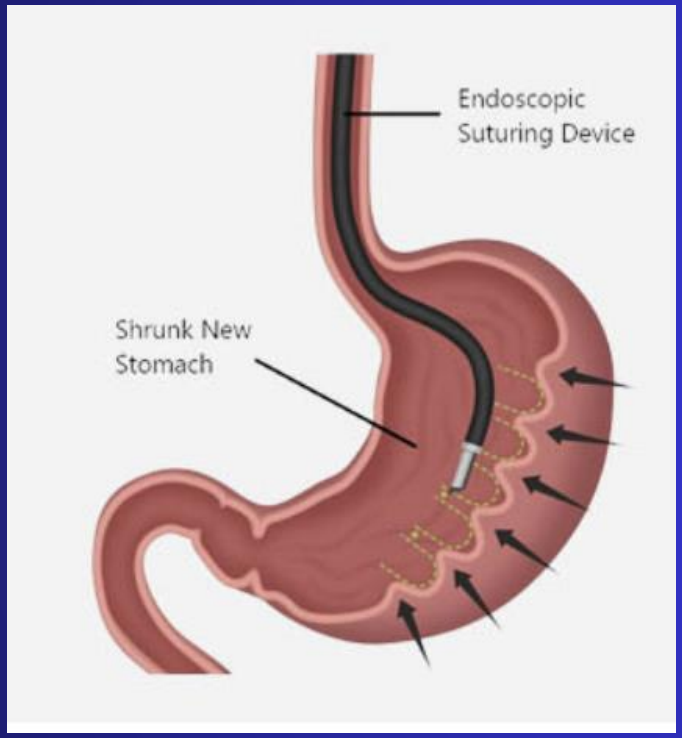
# REVISION
# ENDOSCOPIC SLEEVE GASTROPLASTY

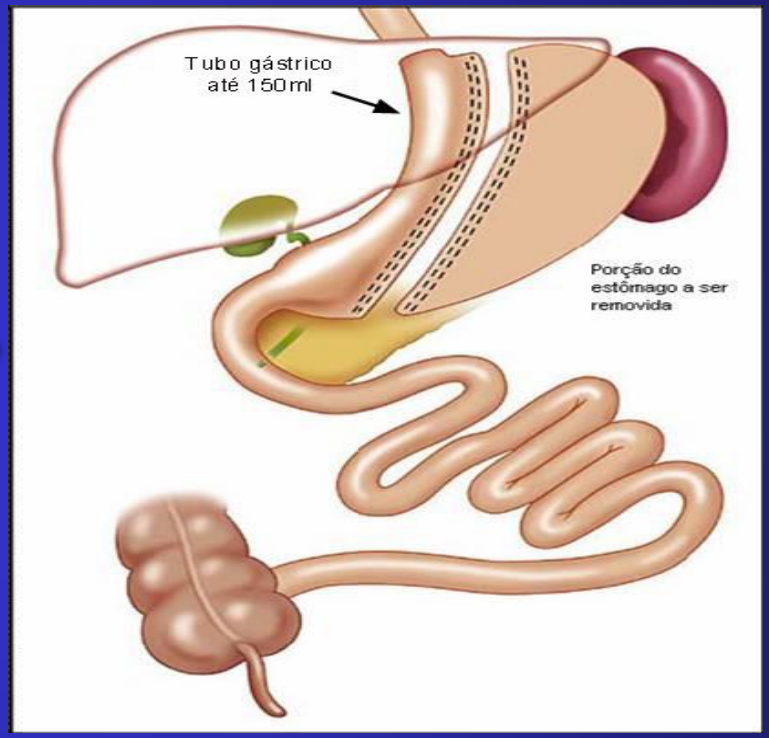



IFSO
XXVIII IFSO World Congress
9-12 September 2025 | Santiago, Chile

Nilton Kawahara
2025

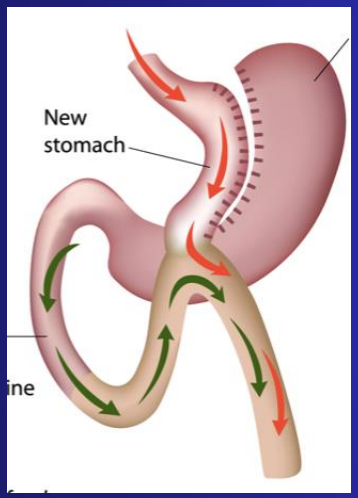
# REVISION ESG
# 1st STEP

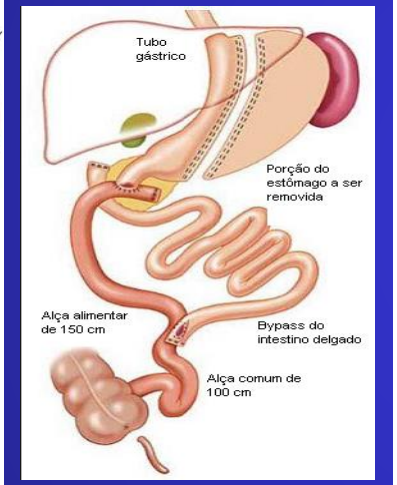


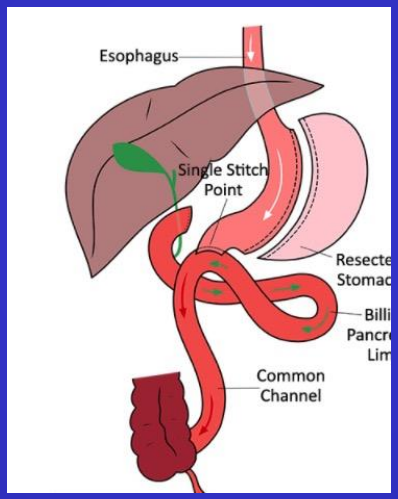



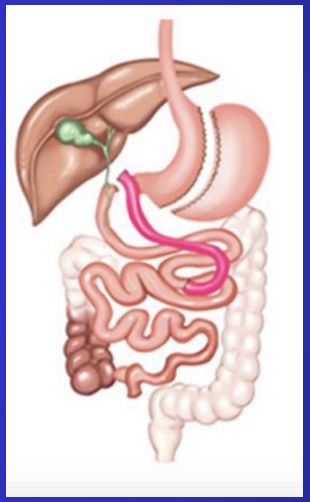

- ESG
- SLEEVE

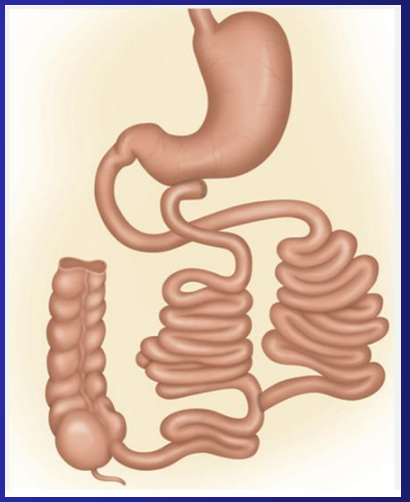
# REVISION for ESG
# OPTIONS





- OAGB
- MET- DS
- SADI-S
- ILEAL-INT
- BTI

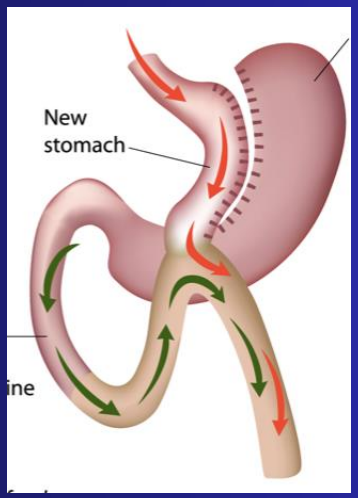
# REVISION for ESG

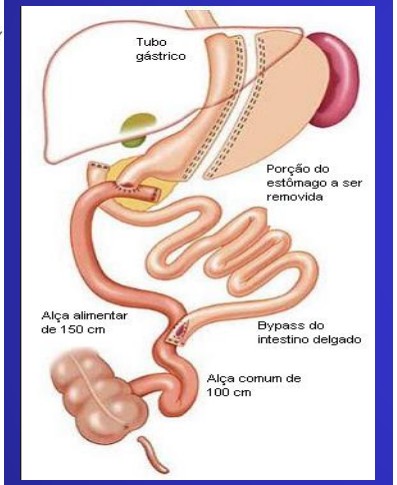
- Age
- Gender
- IMC
- Comorbidities
- GERD
- Intestinal Movements
- Eating Behavior
- Multidisciplinary Approach

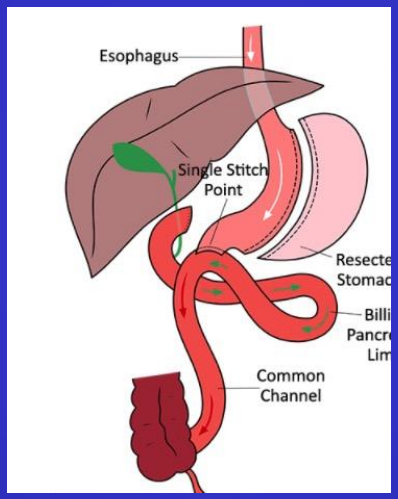
# REVISION for ESG

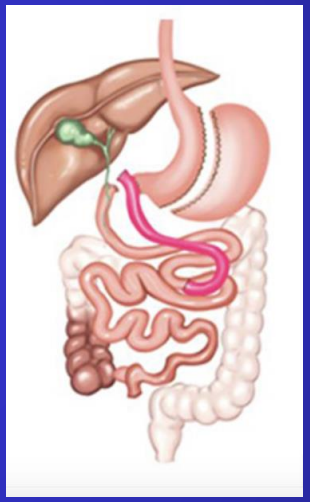
- Re-Sleeve / Sleeve + Intestinal Diversion
- Metabolic improvements
- Ileal Surgeries
- Measurement of whole jejunalileal intestine
- Proportional Intestinal Diversion
- Anastomosis
- Reinforcement / Drain
- Metabolic Duodenal Switch

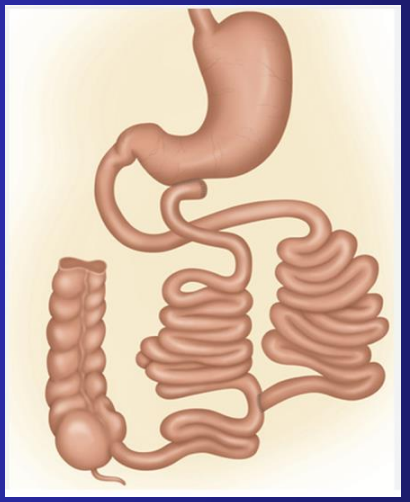
# REVISION for ESG
# OPTIONS



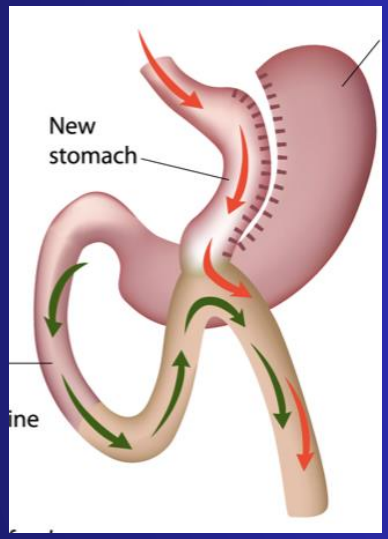



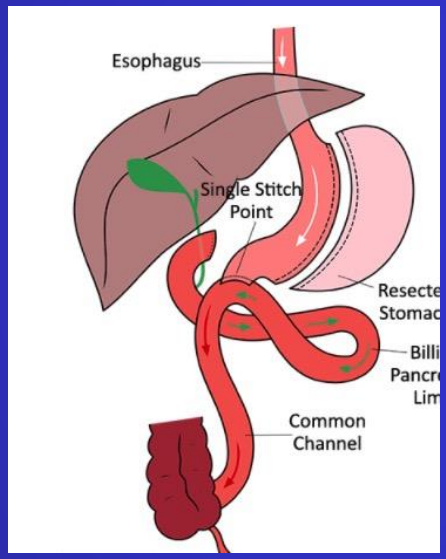



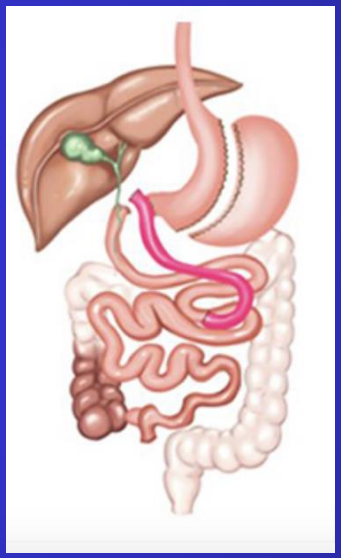


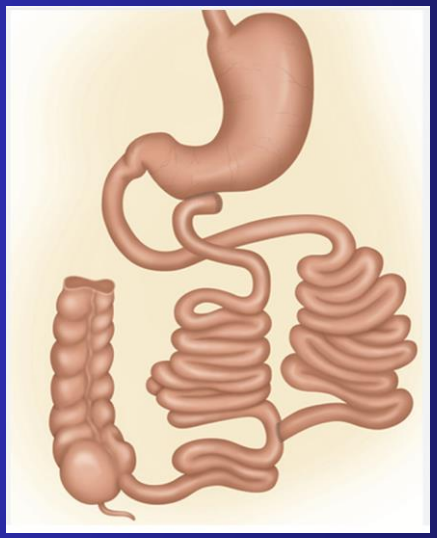
- OAGB
- MET- DS
- SADI-S
- ILEAL-INT
- BTI/SASI

# EMERGING
# Bariatric Metabolic Surgeries



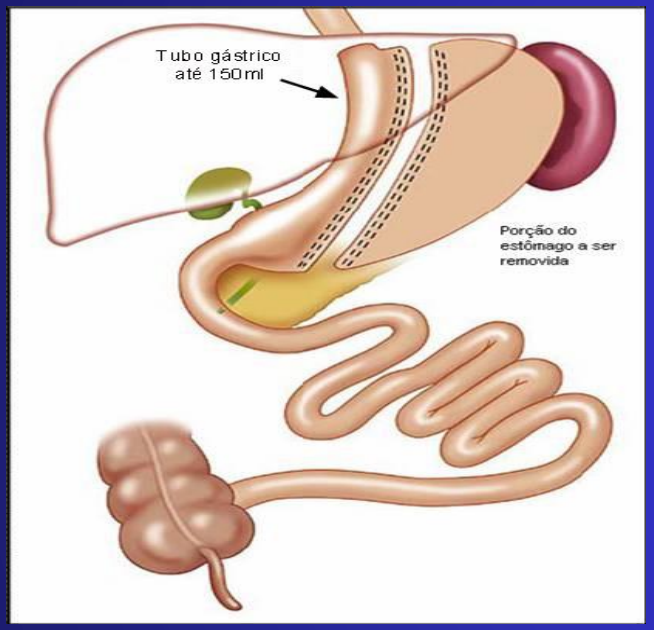





- OAGB
- SADI-S
- ILEALINTER
- BTI/SASI

# Sleeve Gastrectomy
# 2nd Step




Metabolic Duodenal Switch

SADI-S (Pernaute/Torres)

Ileal interposition with DS ( De Paula)

Transit Bipartition/BTI (Santoro)

SASI

OAGB ( Rutledge /Carbajo)

# Bariatric Surgeries Meta-analysis

Long-Term Outcomes After Bariatric Surgery: a Systematic Review and Meta-analysis of Weight Loss at 10 or More Years for All Bariatric Procedures and a Single-Centre Review of 20-Year Outcomes After Adjustable Gastric Banding

| Procedure | No. of reports | Weighted mean % EWL | Mean % EWL range | Reoperation rate range |
|---|---|---|---|---|
| RYGB | 16 | 55.4 | 27–69 | 8–64% |
| OAGB | 2 | 80.9 | 70–84 | 2–14% |
| LAGB | 17 | 45.9 | 27–66 | 8–78% |
| BPD | 4 | 71.5 | 64–73 | NR |
| DS | 7 | 75.2 | 61–94 | 3–37% |
| Sleeve | 2 | 57.0 | 53–62 | 32–36% |
| Gastroplasty | 7 | 50.9 | −10–62 | 10–40% |

The single reports of fixed band and plication from Table 6 are not included

*RYGB* Roux-en-Y gastric bypass, *OAGB* one anastomosis gastric bypass, *LAGB* laparoscopic adjustable gastric band, *BPD* biliopancreatic diversion, *DS* duodenal switch,, , NR = not recorded

# Background (BPD > DS)

Obesity Surgery, 8, 267–282

**Biliopancreatic Diversion with a Duodenal Switch**

**Douglas S. Hess MD, FACS; Douglas W. Hess MD**

*Wood County Hospital, Bowling Green, OH, USA*

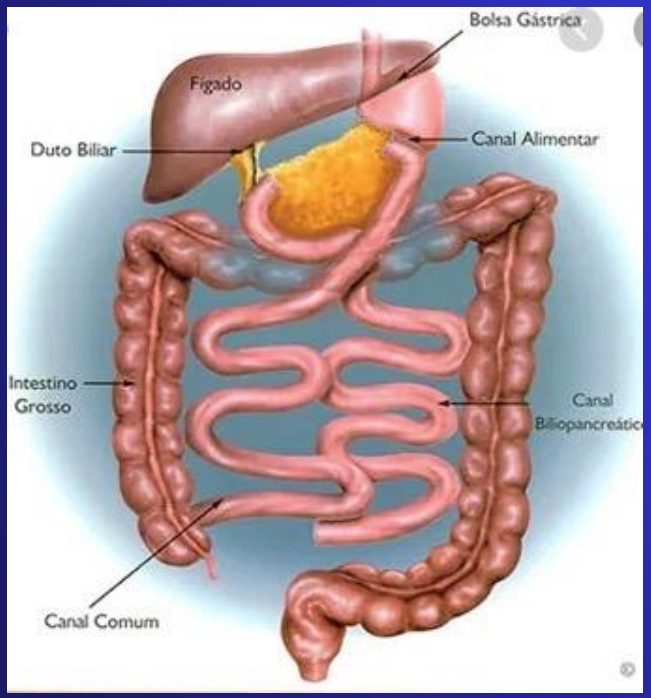




WORLD JOURNAL OF SURGERY 1998
Volume 22, Number 9, 947-954, DOI: 10.1007/s002689900498

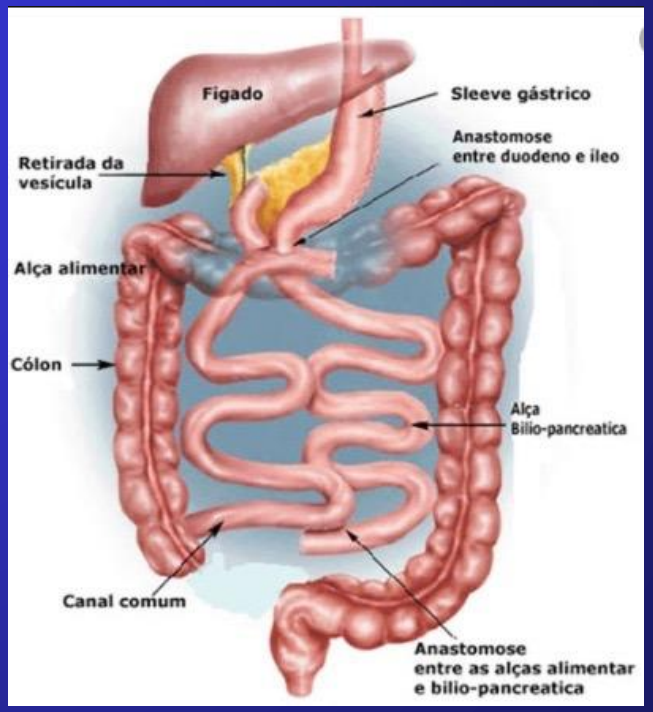

Biliopancreatic Diversion with Duodenal Switch

P. Marceau, F.-S. Hould, S. Simard, S. Lebel, R.-A. Bourque, M. Potvin and S. Biron

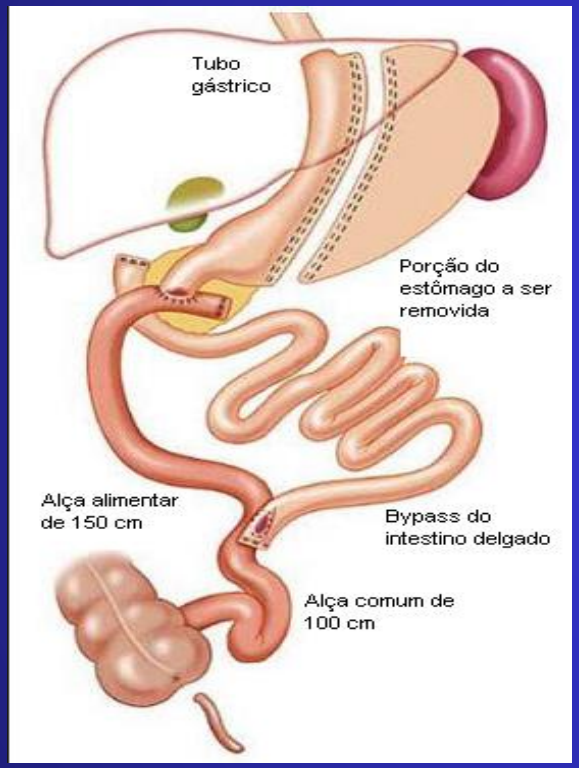



Marceau

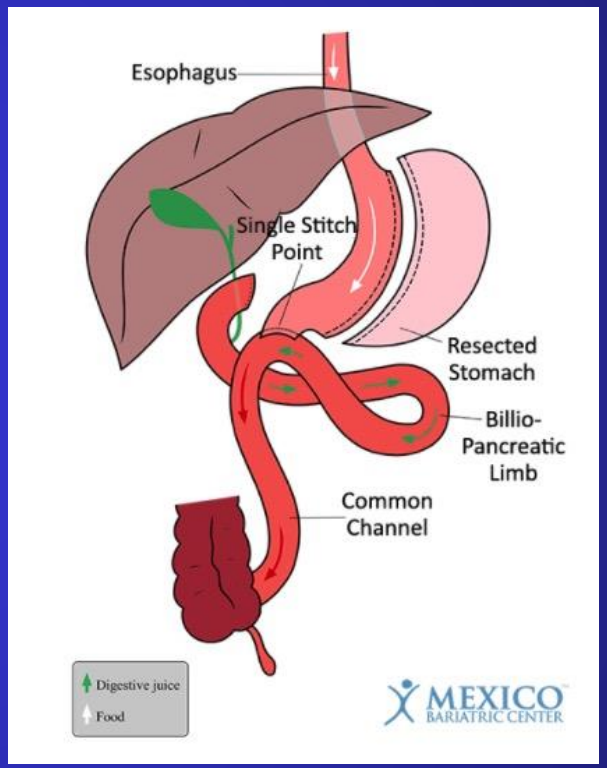
Hess 1988



# Duodenal Switch
# One or Two Anastomosis

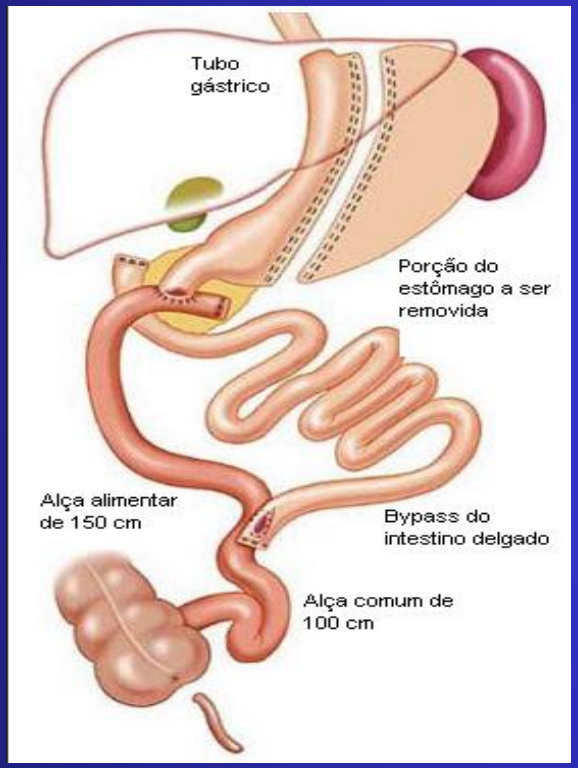



Duodenal Switch
1988

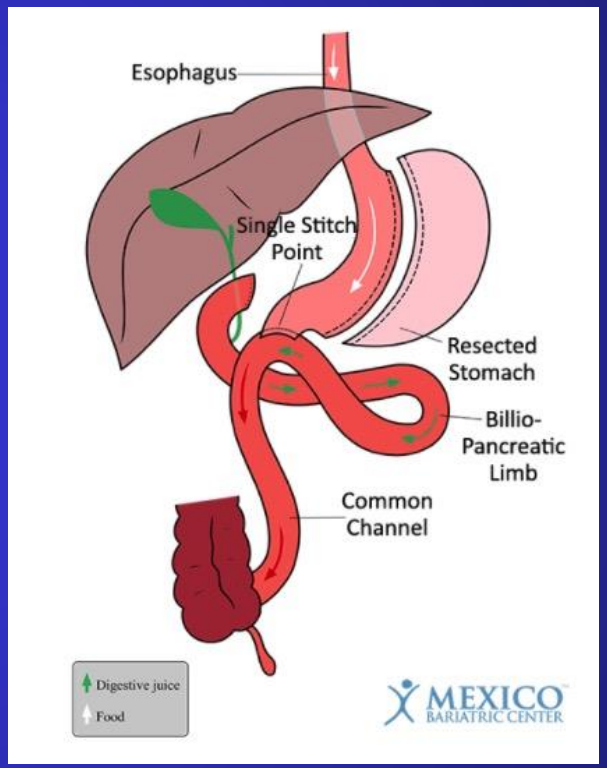



SADI-S/OADS
2007

# Duodenal Switch And Limbs Length




Duodenal Switch

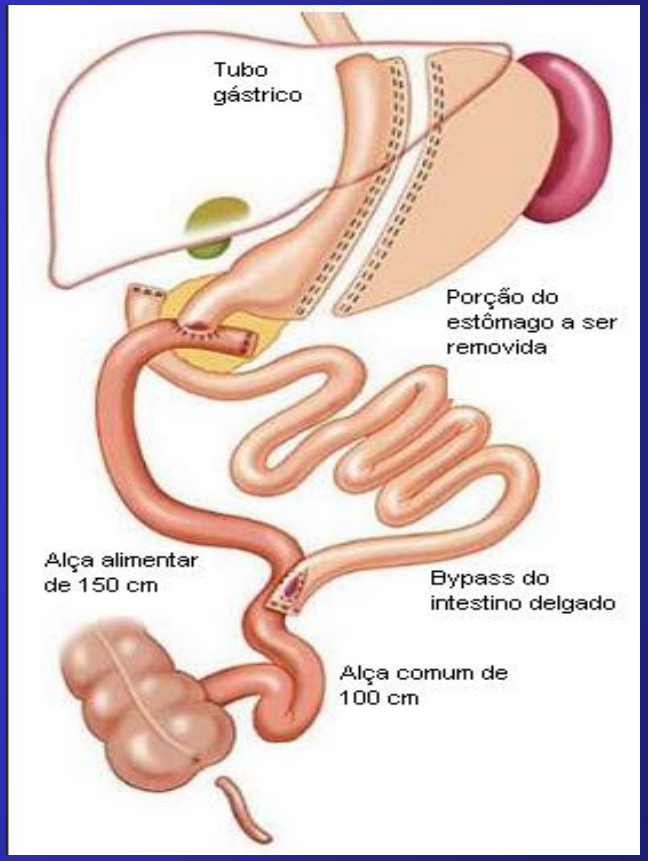



SADI-S OADS

# Limbs in Duodenal Switch

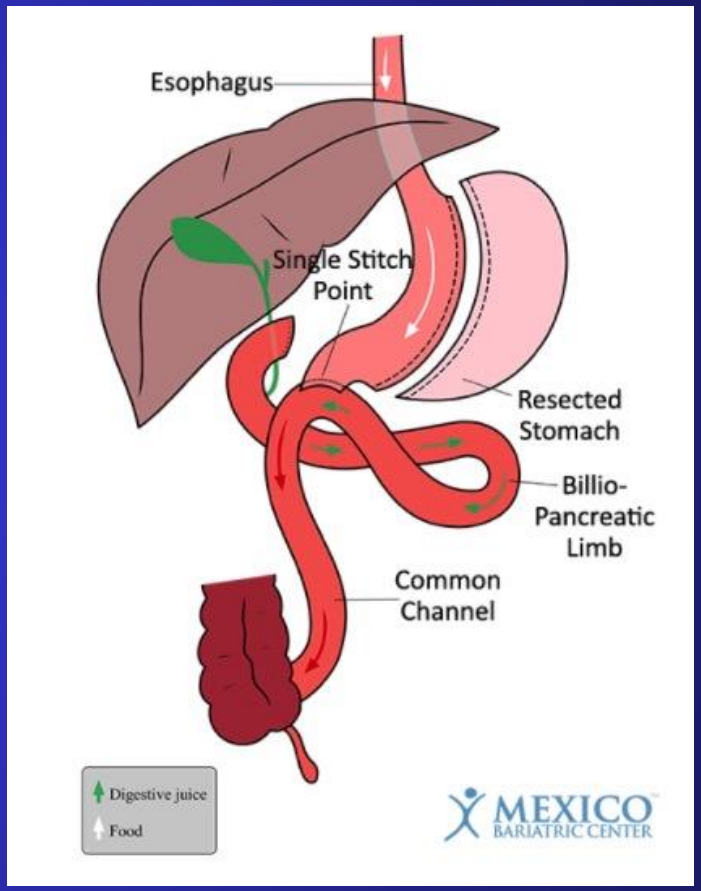
Hess (1988)

AA: 40% Total JejunoIleal
CC: 10% Total JejunoIleal
CC: 75 cm/100cm/125cm
BP: ???



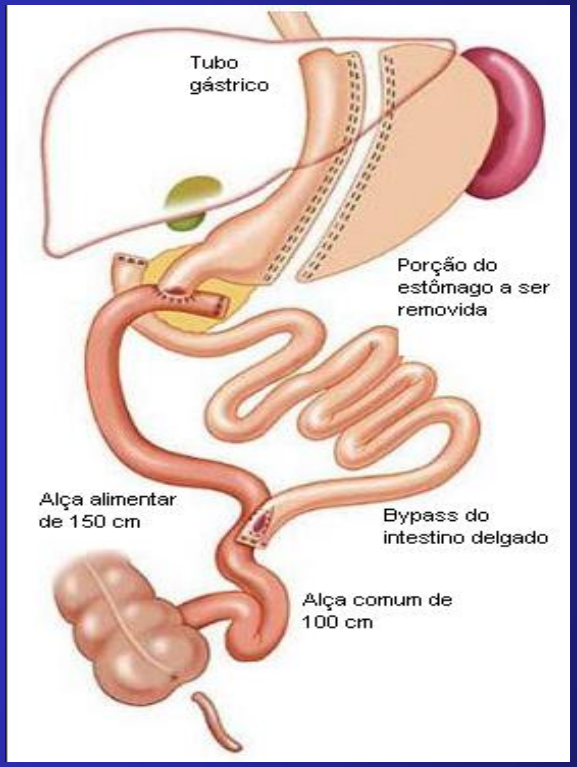
# Limbs in SADI-S

- Total J-I Limb : 600 cm
- CC Limb : 200/250/300 cm
- A Limb : 0 cm (Bile Reflux !!!)
- BP Limb : (300/350/400 cm) ???



# Limbs in Classic Duodenal Switch

- Total J-I Limb : 600 cm
- CC Limb : 100 cm
- A Limb : 150 cm
- BP Limb : ??? ( 350 cm )




Hess / Marceau 1988

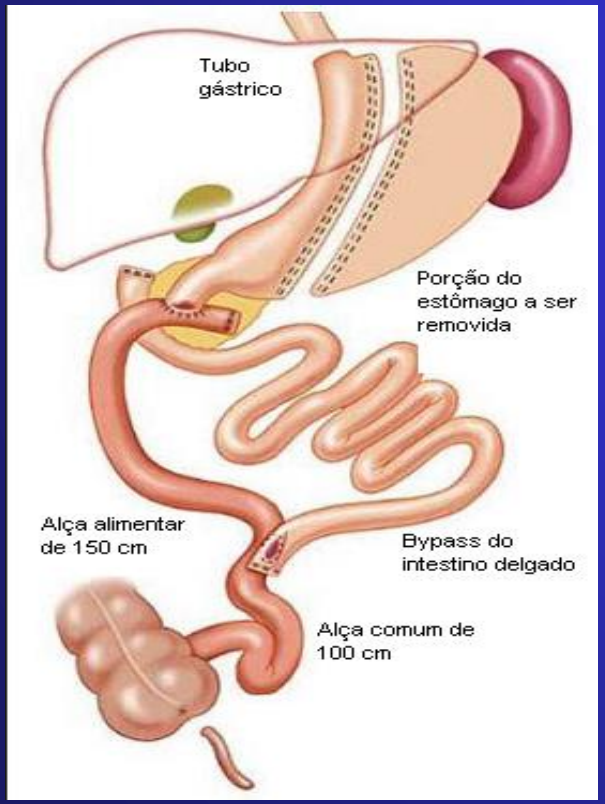
# Mechanism of Action

Review | Open Access | Published: 09 December 2017

Metabolic surgery for the treatment of type 2 diabetes in obese individuals

David E. Cummings & Francesco Rubino

*Diabetologia* **61**, 257–264(2018) | Cite this article

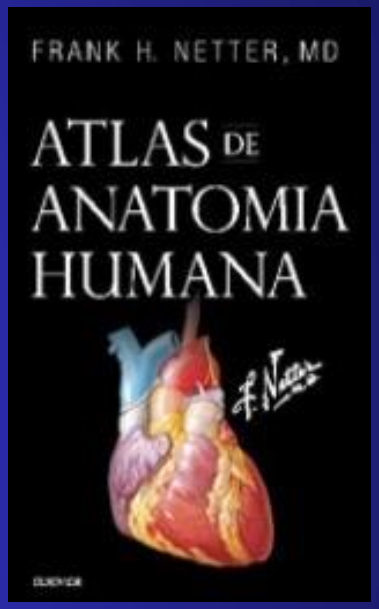



## Weight-independent glucose-lowering mechanisms of metabolic surgery

1. Favourable changes in gut hormones
   a) Increased GLP-1 secretion and, hence, insulin (plus augmented postprandial peptide YY (PYY) and oxyntomodulin levels, contributing to weight loss)
   b) In some cases, compromised secretion of the diabetes-promoting peptide ghrelin
2. Favourable changes in bile acid signalling
3. Increased glucose metabolism by the small intestine
4. Changes in intestinal nutrient sensing that improve insulin sensitivity, through both neural and humoral pathways
5. Reduced intestinal glucose transport via SGLT1
6. Reduced circulating branched-chain amino acids
7. Possible alterations in gut microbiota (although evidence is stronger for a role in weight loss than in improved glucose homeostasis)

# Anatomy of the Small Intestine






- Jejuno-Ileum: 3 - 12 m
- 40% Jejunum
- 60% Ileum

# Anatomical study of the length of the human intestine

G. Hounnou · C. Destrieux · J. Desmé · P. Bertrand
S. Velut

**Table 1** Length of several intestinal segments relative to the sex of the subjects ($n = 200$). *Min*, minimum; *Avg*, average; *Max*, maximum; *ET (s)*, standard deviation; *M-W*, man-woman difference; *P*, statistical significance

| Intestinal segment | Length (cm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Men (M) | | | | Women (F) | | | | Total | | | | M-W *P* |
| | Min | Avg | Max | ET (s) | Min | Avg | Max | ET (s) | Min | Avg | Max | ET (s) | |
| Duodenum (1) | 17 | *27.8* | 56 | 6.8 | 17 | *25.2* | 48 | 5.4 | 17 | *26.5* | 56 | 6.3 | 0.001 |
| Jejuno-ileum (2) | 365 | *643.9* | 1,000 | 110.8 | 280 | *573.8* | 840 | 97.1 | 280 | *608.7* | 1,000 | 109.6 | $P < 10^{-4}$ |
| Small intestine (1 + 2) | 390 | *670.7* | 1,030 | 113.1 | 298 | *599.2* | 860 | 98.2 | 298 | *634.9* | 1,030 | 111.6 | $P < 10^{-4}$ |
| Right colon (3) | 40 | *74.1* | 146 | 17.4 | 40 | *71.9* | 125 | 16.5 | 40 | *73* | 146 | 16.9 | 0.364 |
| Left colon (4) | 33 | *94.2* | 220 | 27.2 | 34 | *82.9* | 123 | 20.1 | 33 | *88.5* | 220 | 24.5 | 0.003 |
| Colon (3 + 4) | 80 | *166* | 313 | 36.2 | 80 | *155* | 214 | 28.6 | 80 | *160.5* | 313 | 33 | 0.03 |
| Whole intestine (1 + 2 + 3 + 4) | 550 | *836.7* | 1,316 | 132.1 | 378 | *754.2* | 1,013 | 111 | 378 | *795.5* | 1,316 | 128.5 | $P < 10^{-4}$ |

Surg Radiol Anat (2002) 24: 290–294
DOI 10.1007/s00276-002-0057-y

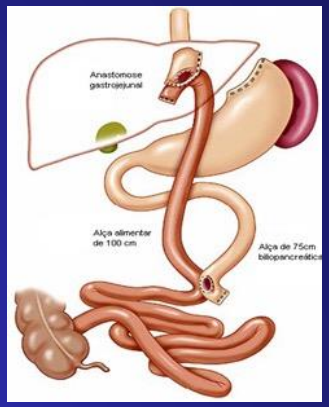
# Variations in the Small Intestine Size

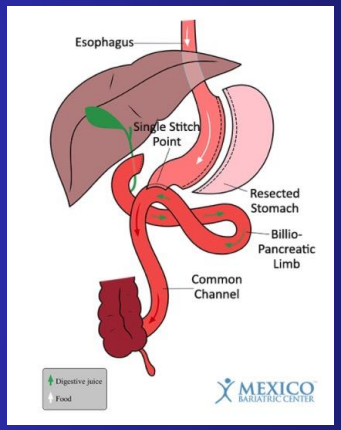
- Jejuno-Ileum: 4 - 10 m ( 40% J / 60% I)
- 400 cm - Jejunum: 160 cm/Ileum: 240 cm
- 600 cm - Jejunum: 240 cm/Ileum: 360 cm
- 1000 cm -Jejunum: 400 cm/Ileum: 600 cm

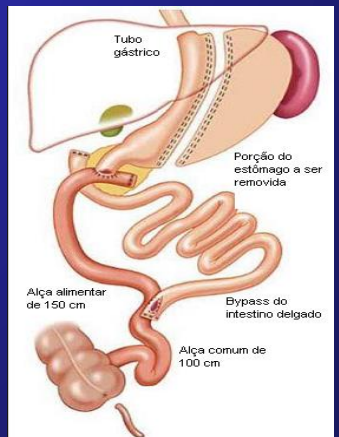
Nilton Kawahara
2010

# Surgical Limbs in MBS

- Biliopancretic Limb: Metabolism !!!
- Common Channel: Malabsorption.
- Alimentary Limb: Prevention of Biliary Reflux / Absorption ?.

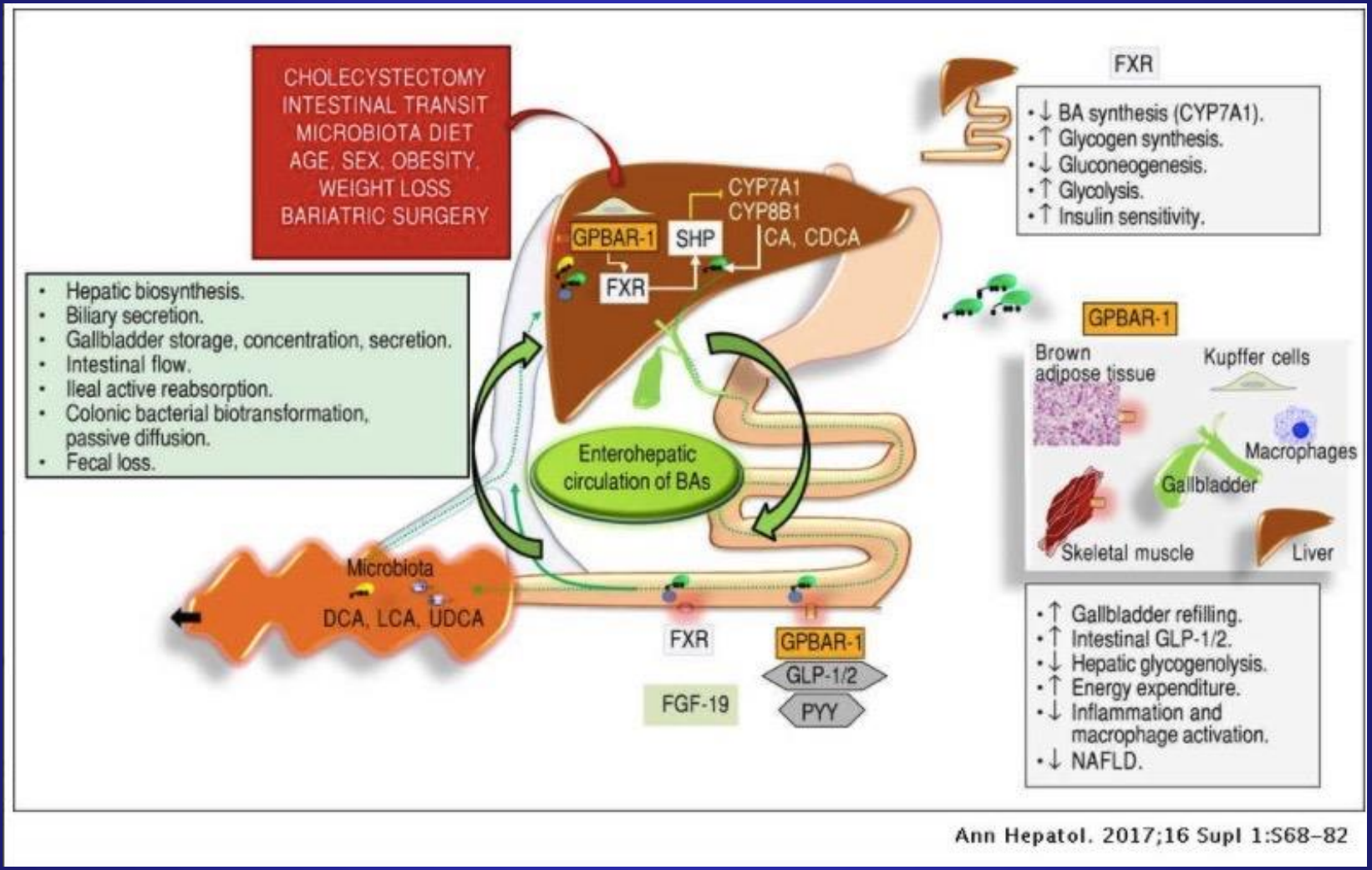



Nilton Kawahara
2010

# Mechanism of Action




Ann Hepatol. 2017;16 Supl 1:S68-82

Review > J Diabetes Investig. 2018 Jan;9(1):13-20. doi: 10.1111/jdi.12687. Epub 2017 Jun 12.

**Role of gut microbiota, bile acids and their cross-talk in the effects of bariatric surgery on obesity and type 2 diabetes**

Haijun Liu [1], Cheng Hu [1 2], Xueli Zhang [1], Weiping Jia [2]

# Bile Acid and BP Limb

Obes Surg. 2020 Jul;30(7):2528-2537. doi: 10.1007/s11695-020-04506-3.

## Mechanism of Bile Acid Reabsorption in the Biliopancreatic Limb After Duodenal-Jejunal Bypass in Rats

Tomotaka Ueno [1], Naoki Tanaka [2], Hirofumi Imoto [1], Masamitsu Maekawa [3], Atsushi Kohyama [1], Kazuhiro Watanabe [1], Fuyuhiko Motoi [1], Takashi Kamei [1], Michiaki Unno [1], Takeshi Naitoh [1]

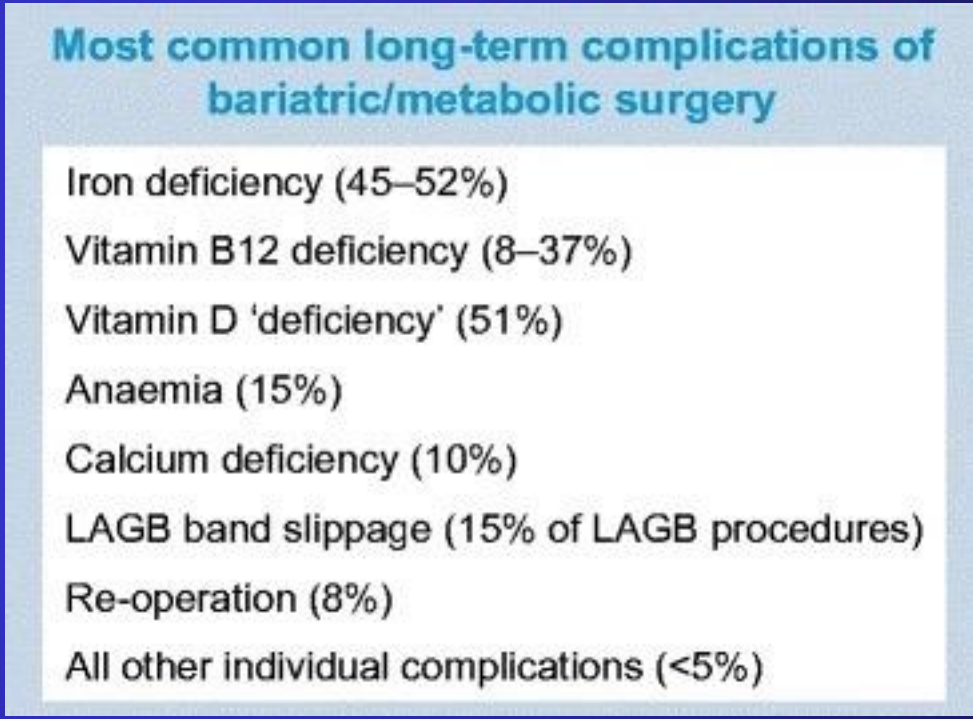
Obes Surg. 2019 Jun;29(6):1901-1910. doi: 10.1007/s11695-019-03790-y.

## Changes in Enterohepatic Circulation after Duodenal-Jejunal Bypass and Reabsorption of Bile Acids in the Bilio-Pancreatic Limb

Ichiro Ise [1], Naoki Tanaka [1], Hirofumi Imoto [1], Masamitsu Maekawa [2], Atsushi Kohyama [1], Kazuhiro Watanabe [1], Fuyuhiko Motoi [1], Michiaki Unno [1], Takeshi Naitoh [3]

# Late Complications

- ↓ Protein: 3-20% !!!
- DRGE: 5-15%
- Weight Regain: < 5%.
- Steatorrea:  30%.
- Internal Hernia: < 1%.
- GI Ulcers: < 1%.



# SMALL BOWEL LENGHT


**If you don’t measure, you don’t know!**

**Douglas S. Hess, MD, FACS**
Bowling Green, OH, USA
E-mail: doughess@wcnet.org

## Single Versus Double-Anastomosis Duodenal Switch: Single-Site Comparative Cohort Study in 440 Consecutive Patients

Pablo Finno[1] · Javier Osorio[1] · Amador García-Ruiz-de-Gordejuela[1] · Anna Casajoana[1] · María Sorribas[1] · Víctor Admella[1] · Mónica Serrano[1] · Joao Batista Marchesini[2] · Almino C. Ramos[3] · Jordi Pujol-Gebellí[1]



- N=440 ( DS 259 / SADI-S 181 )
- Comorbities Remission similar
- EWL similar at 2 years
- BMI > 55 kg/m2 (91) - DS (80%vs50%)
- DMT2 remission DS vs SADI-S ( 100%vs75%)
- DS more long term complications (vit/min)

> Obes Surg. 2021 Aug;31(8):3667-3674. doi: 10.1007/s11695-021-05469-9. Epub 2021 May 12.

# Revisional Laparoscopic SADI-S vs. Duodenal Switch Following Failed Primary Sleeve Gastrectomy: a Single-Center Comparison of 101 Consecutive Cases

Javier Osorio [1], Claudio Lazzara [2], Victor Admella [2], Sofia Franci-León [2], Jordi Pujol-Gebellí [2]

- N=101( DS 55 / SADI-S 46 )
- TWL  DS 41,7% vs SADI-S 35,3%
- EWL DS 75,3% vs SADI-S 64,1% at 2 years
- DMT2 remission DS vs SADI-S 76,9%vs44,4%)
- SADI-S >>> DS ( 3 patients )
- DS more supplementation (vit/min)
- No Mortality

> Obes Surg. 2022 Mar;32(3):682-689. doi: 10.1007/s11695-021-05879-9. Epub 2022 Jan 15.

# Long-Term Results of Single-Anastomosis Duodeno-ileal Bypass with Sleeve Gastrectomy (SADI-S)

Andrés Sánchez-Pernaute [1], Miguel Ángel Rubio Herrera [2], Natalia Pérez Ferré [2], Carlos Sáez Rodríguez [3], Clara Marcuello [2], Clara Pañella [3], Leyre Lopez Antoñanzas [3], Antonio Torres [3], Elia Pérez-Aguirre [3]

- N=164 ( 2007 - 2015 )
- LL 50/200cm, 99/250cm, 15/300cm
- EWL 87%/5y , 80%/10y
- Early Complications > 3 leaks
- 12 Revisional Surgery for Hypoproteinemia
- No mortality

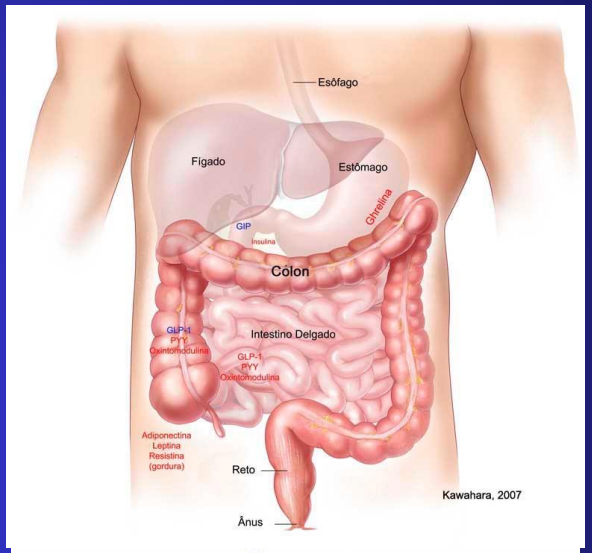
# Duodenal Switch vs. Single-Anastomosis Duodenal Switch (SADI-S) for the Treatment of Grade IV Obesity: 5-Year Outcomes of a Multicenter Prospective Cohort Comparative Study

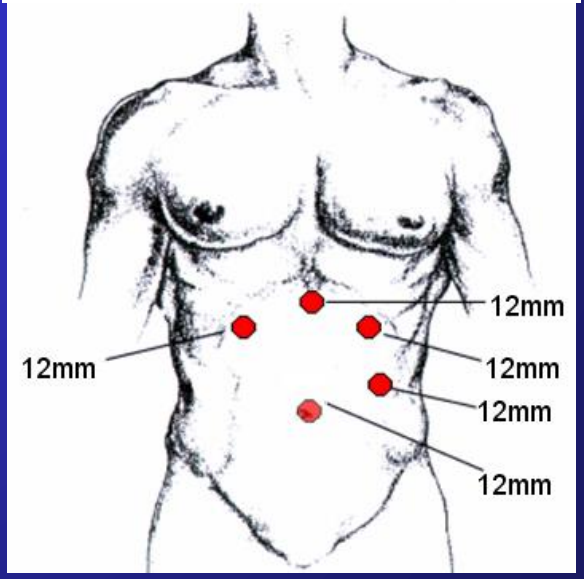
Jordi Pujol Gebellí [# 1], Claudio Lazzara [# 2], Amador García Ruiz de Gordejuela [1], Mario Nora [3], Ana Marta Pereira [3], Andrés Sánchez-Pernaute [4], Javier Osorio [1], Lucia Sobrino [1], Antonio J Torres García [4]

- N=87 ( DS 43 / SADI-S 44 )
- BMI DS 52,9 kg/m2 SADI-S 52,5 kg/m2
- %EWL DS 80,5% SADI-S 68,6%
- DMT2 remission DS vs SADI-S ( 92,8%vs68,6%)
- DS more lower VitB12, Iron, VitE, Zinc
- Reoperation DS 1  SADI-S 3 ( 2 bile reflux )

# How I measure the small bowel

- Two non-traumatic graspers with 10cm markers
- Starting from ileo-cecal valve to Treitz angle
- After 30-40 cm go from RF to RHC
- Stitch every 100 cm

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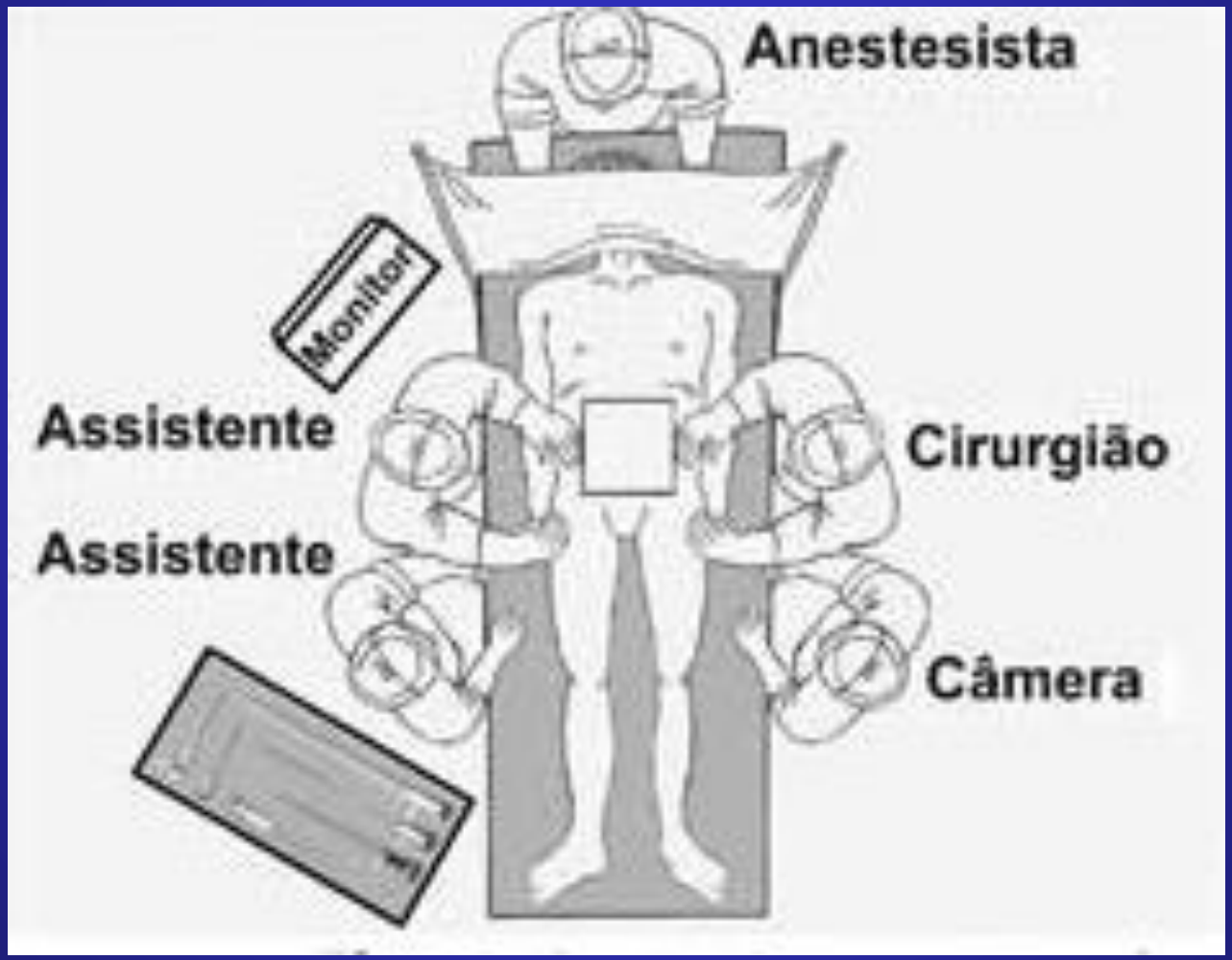
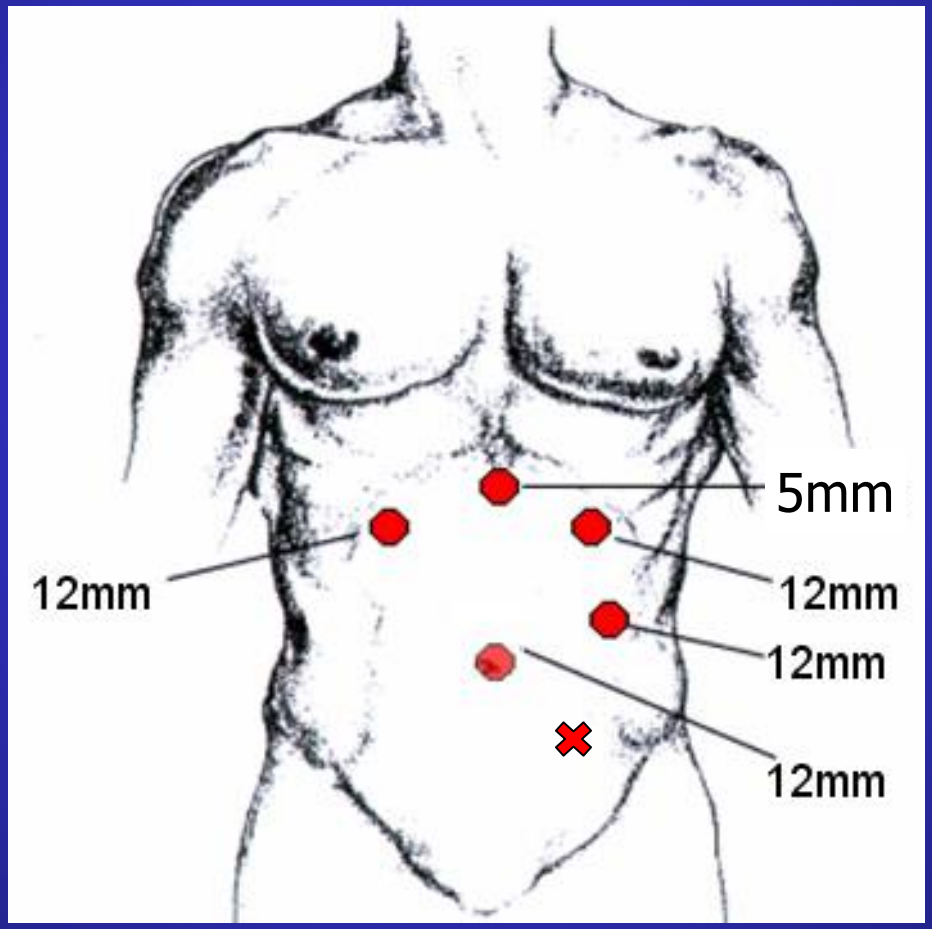
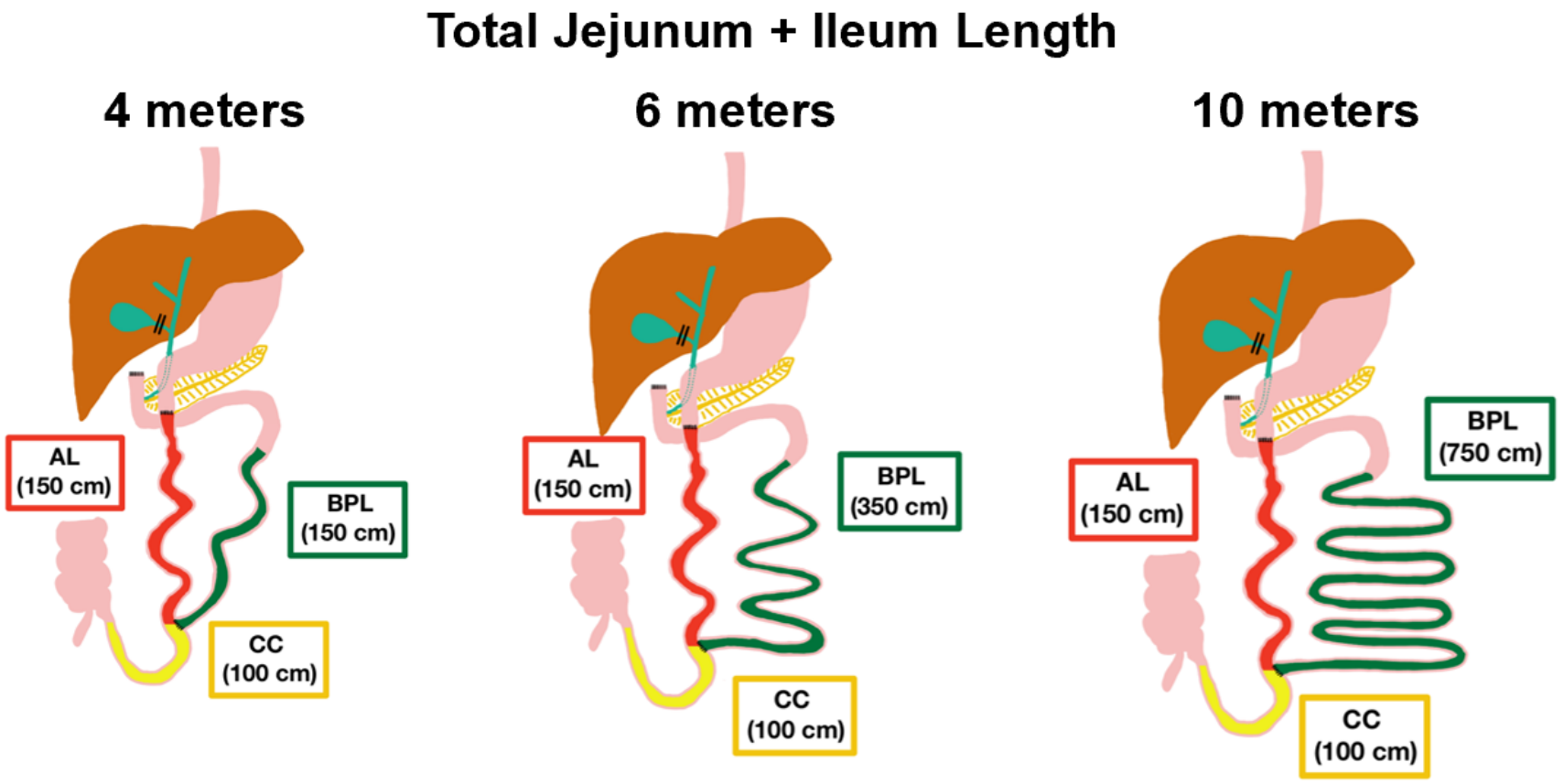
# Surgical Team



# Trocars Placement



# Classic Duodenal Switch: Small Intestine



# Metabolic Duodenal Switch

- Total Jejuno-Ileum : ( 40% J / 60% I)
- BPL - Whole Jejunum (40% J-I )
- CC : 30/40/50% Ileum
- AA : 50/60/70% Ileum

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# Metabolic SADI-S

- Total Jejuno-Ileum: ( 40% J / 60% I)
- ABP : 100% Jejunuo
- CC :  100 % Ileum
- No AA !!!

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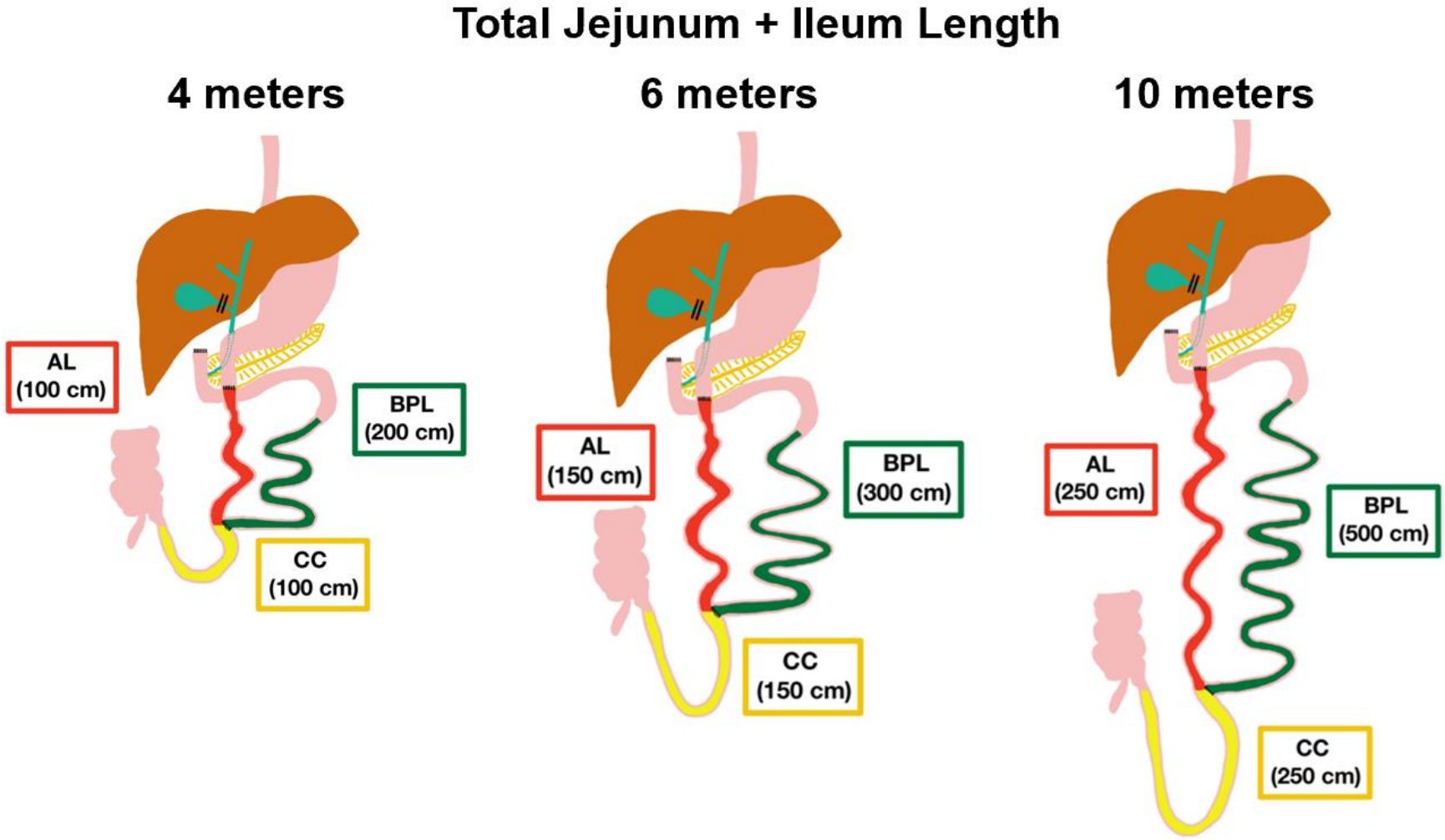
# Metabolic Duodenal Switch
# Small Intestine



# Metabolic Duodenal Switch: The Old Is New Again - 14/11/17

Doi : 10.1016/j.jamcollsurg.2017.07.674

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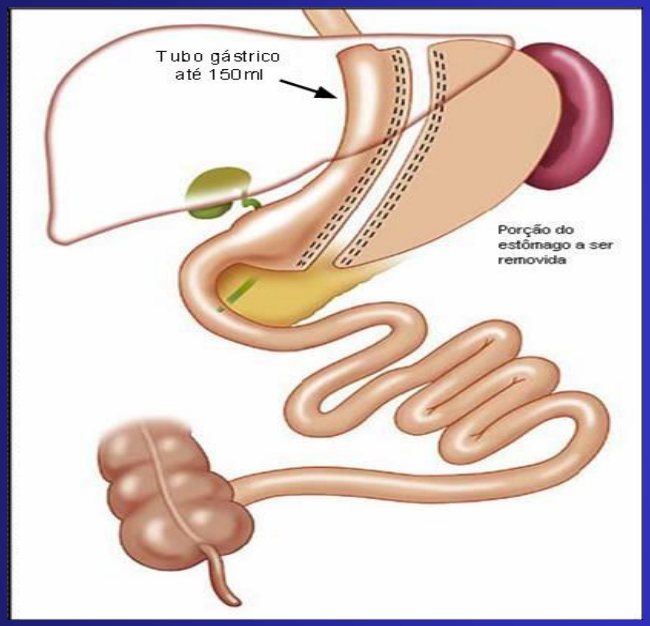
**Sirio Libanes Topographic Anatomy Division-University of Sao Paulo Medical School, Sao Paulo, Brazil**

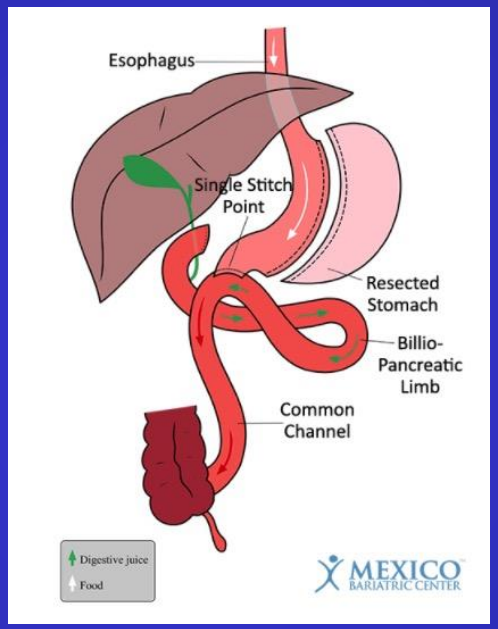
RESULTS: Sixty percent were men (18-60 years old). Mean BMI was 37 ; Mean excess WL was 36% . Dyslipidemia was corrected in 100%. Diabetes remission occurred in 90%. Hyperter There were no nutritional or vitamin deficiencies. No stenosis or anastomotic ulcer were present. There was no mortality

Surgery for Obesity and Related Diseases

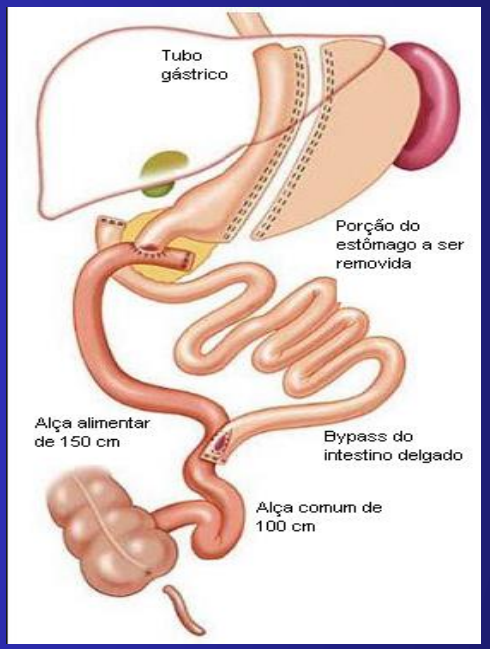
# SLEEVE > OADS > DS




SLEEVE




SADI-S/OADS




DS

# CONCLUSION

- DS and SADI-S are safe and effective with consistent outcomes for bariatric and metabolic patients
- DS and SADI-S has similar rates of comorbidities remission and weight loss in a long term FU, but with better results for BMI > 50 kg/m2
- Measuring the whole small intestine is essential for a tailored intestinal diversion, which lowers the risk of bad outcomes.
- More prospective and randomized studies are necessary!!!