METABOLIC & BARIATRIC SURGERY

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NOTHING TO DISCLOSE

OBJECTIVES

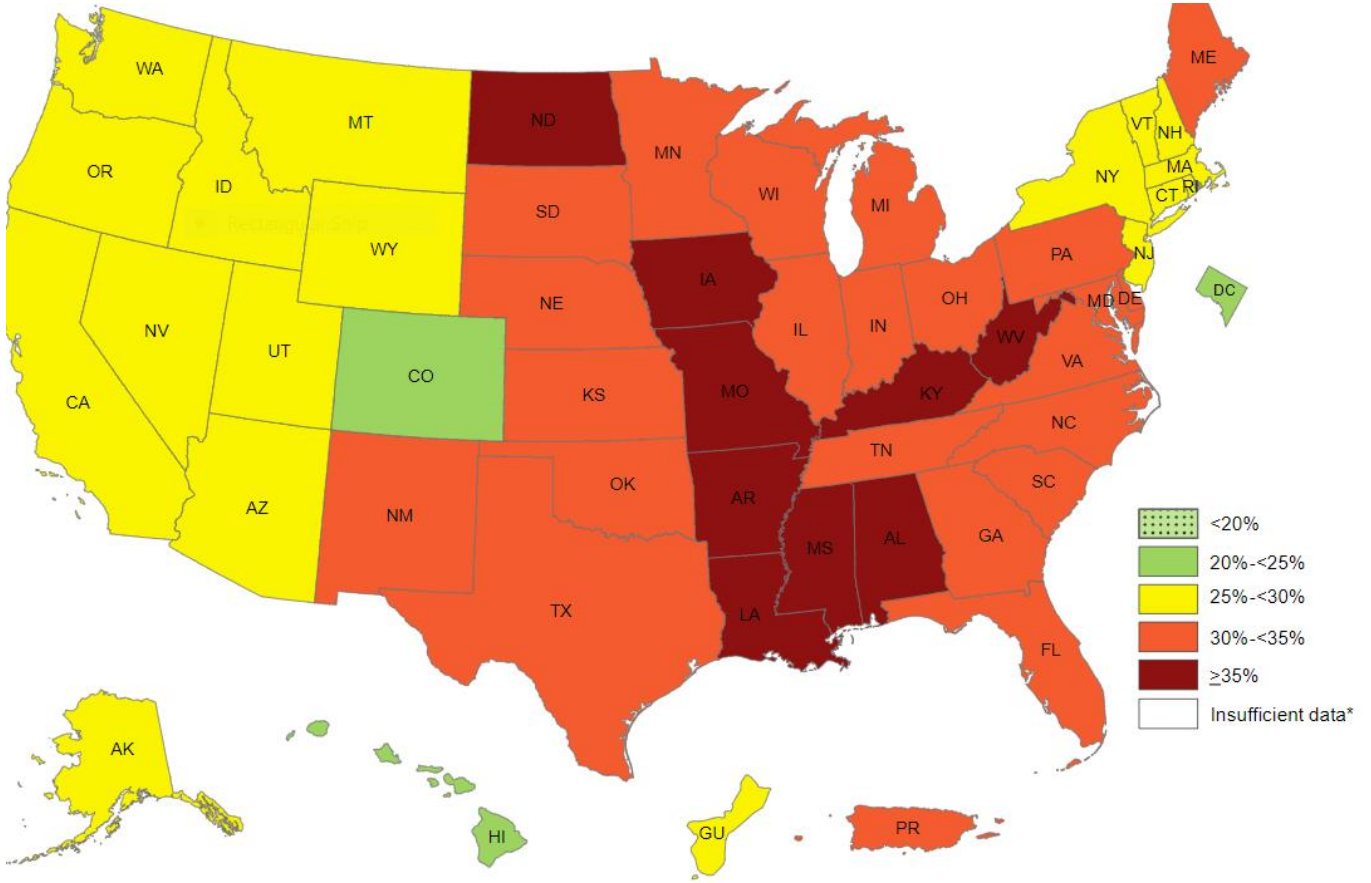
Background

What it takes

What’s next

CURRENT OBESITY CRISIS

42% of adults in the United States suffer from obesity



Centers for Disease Control and Prevention (CDC) 2018

THE OBESITY CRISIS

- We spend over $270 Billion per year on obesity-related health problems
- The medical cost for people who have obesity was $1,429 higher than those of normal weight

New Society of Actuaries Study 2013, CDC Adult Obesity Facts 2020

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ASSOCIATED COMORBIDITIES

- High blood pressure
- Heart failure
- Venous stasis/blood clots
- Pulmonary hypertension
- Obstructive sleep apnea
- Hypoventilation syndrome
- Asthma
- Type II Diabetes
- High cholesterol
- Fatty liver disease
- Depression/Anxiety
- Reflux/heartburn
- Gallstones
- Degenerative joint disease
- Degenerative disc disease
- Osteoarthritis
- Ventral hernias
- Urinary incontinence
- Irregular periods/PCOS
- Skin infections
- Headaches

1863: RUDOLF VIRCHOW PROPOSED THE LINK BETWEEN CANCER AND INFLAMMATION

- Uterine
- Breast – 12% per 5 BMI
- Gastric
- Esophageal
- Hepatic
- Colon – 30% higher
- Renal
- Pancreatic – 1.5x higher

Obesity and Cancer Risk. Metabolism 2019

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CASE 1

- Chris is at thanksgiving dinner with his extended family. He overhears his uncle Mike making negative comments about his cousin Bryan's weight. Chris wants to defend his cousin, as he knows weight gain is caused by a variety of things.
- Name a few reasons for weight gain.

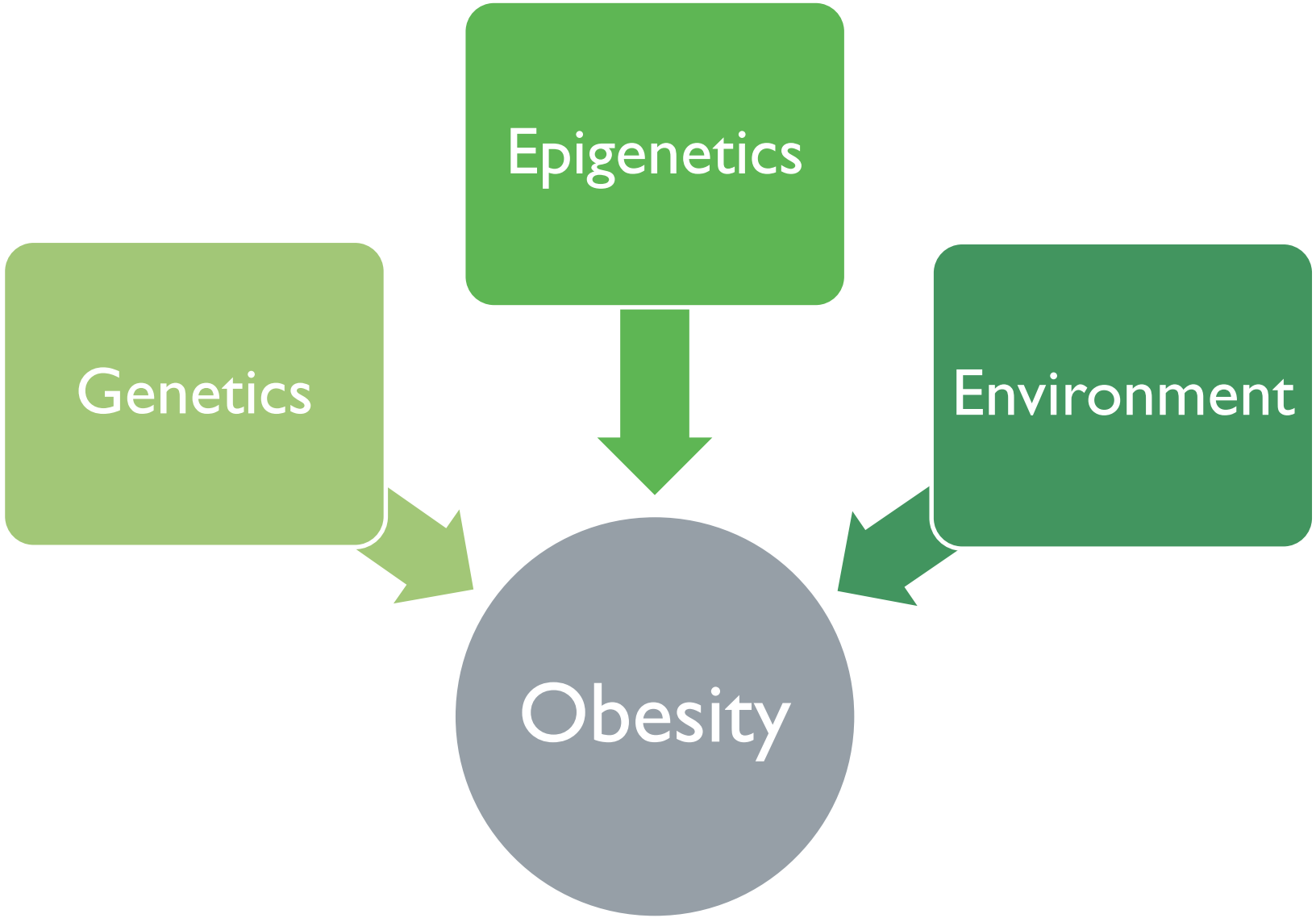
Genetics

Epigenetics

Environment

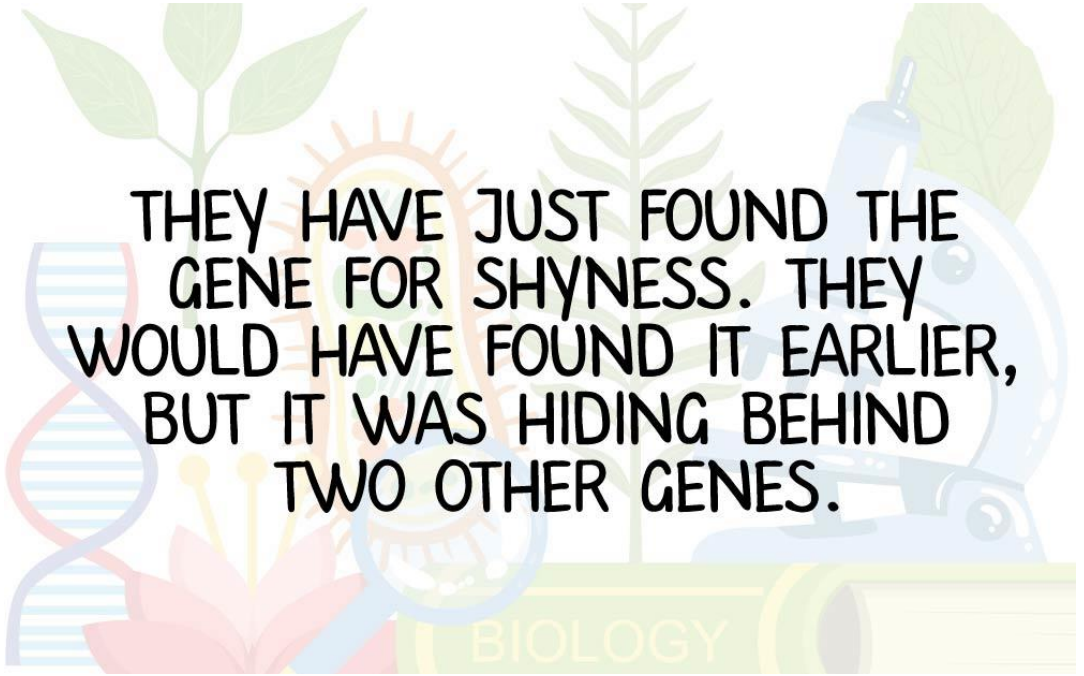
- Diet
- Physical activity
- Medications (anti-psychotics, anti-depressants, steroids, gabapentin, diabetes medications etc.)
- Medical/Behavioral health reasons (ex. Hypothyroidism, Depression)

CASE 1


Epigenetics
Genetics
Environment
Obesity

Genetics

- Estimated to contribute 40-70%. Over 900 genes!
- Genes determine how the body responds to the environment
- They can determine your metabolic rate, how you burn fat
- Genes put you at risk, making you more susceptible to obesity



Goodarzi et al. Genetics of obesity, Lancet 2018.


LOW
price!
life
life

WHAT'S WITH OUR FOOD?

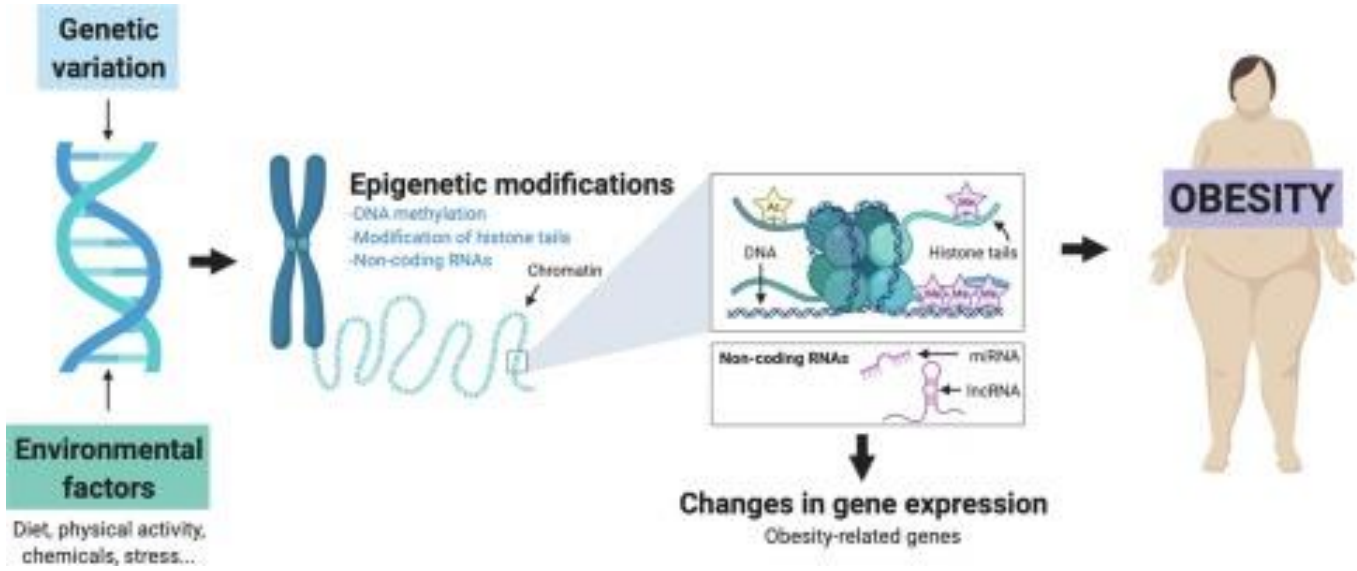
- Highly processed food products decrease diversity of gut bacteria and increase glucose intolerance as well as inflammation in the gut.
- Microbiome has been shown to interact with the host in several ways in health and disease, including (1) modulating the inflammatory host response to the gut, (2) synthesizing small molecules and proteins that are taken up by the host and (3) changing the amount of available energy in the diet.

Zinocker, M, Lindseth, I. The Western Diet-Microbiome-Host Interaction and its Role in Metabolic Disease. *Nutrients.* 2018, 10; 365.

Timothy Sweeney and John Morton. The Human Gut Microbiome, JAMA Surg. 2013 Jun; 148 (6) 563-569

Epigenetics

- Heritable changes which affect gene function without modifying their DNA sequence
- Examples of this are DNA methylation, histone modifications that affect genes like growth hormones, or regulators of gene expression controlling growth
- Early environmental influences induce epigenetic variation, thereby permanently affecting metabolism and chronic disease risk



Van Dijk et al Clinical Epigenetics (2015)7;66

CASE 2

- Susan is a 37 F with a BMI of 41. She is interested in weight loss surgery.
- Pmhx: PCOS, HTN, prediabetes, hyperlipidemia
- Pshx: c-section
- Social history: occasional ETOH, non-smoker

CASE 2 Q&A

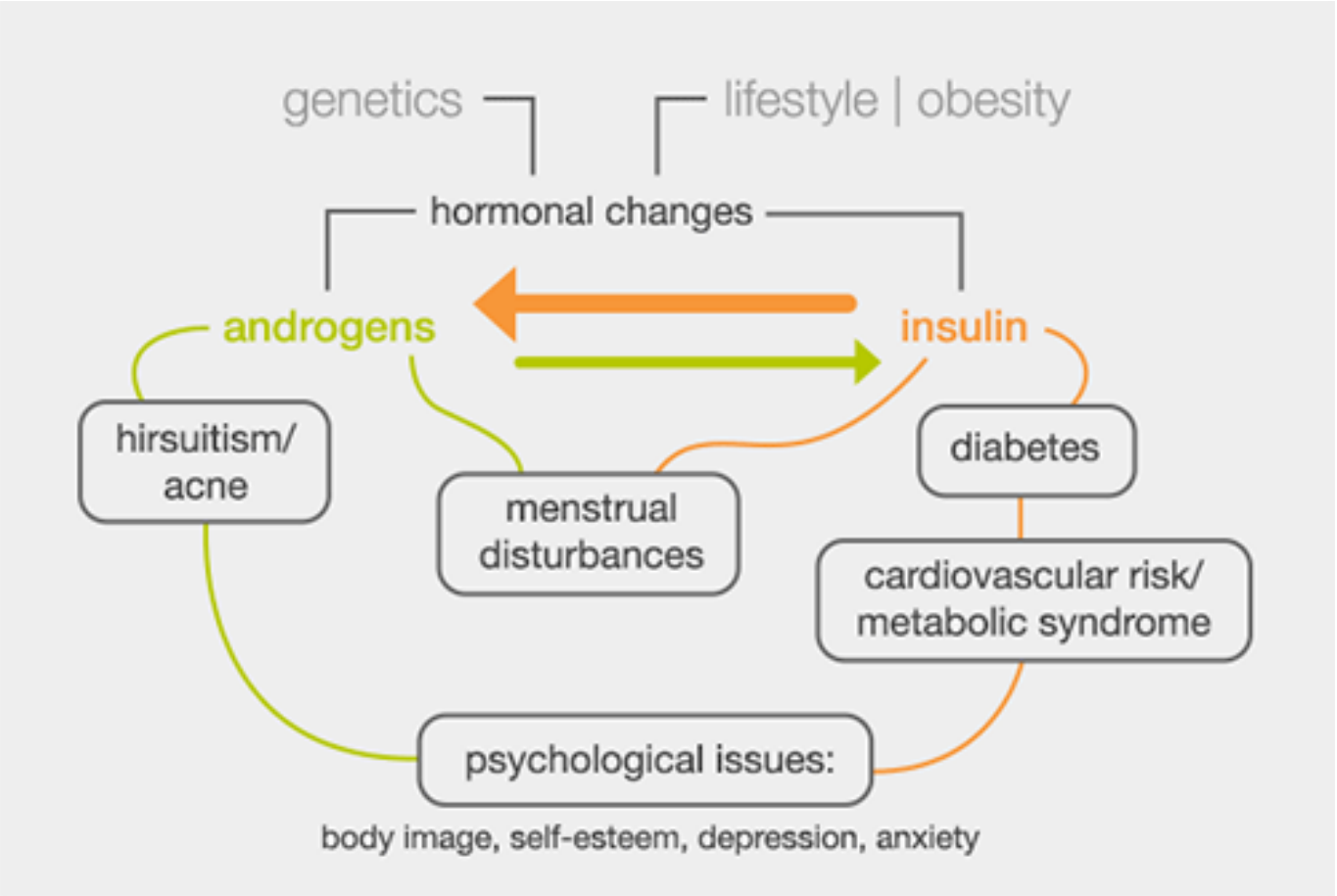
- Is she a candidate for surgery?
- Of her comorbidities, which do you anticipate to improve with weight loss?

CANDIDACY FOR SURGERY

1. Failed dietary therapy
2. BMI > 40 kg/m² OR BMI > 35 kg/m² with associated comorbidity
3. Optimization of other co-morbid conditions
4. Non-smoker
5. Psychological disorder undergoing treatment
6. Drug/alcohol addiction in remission (at least 6 months)
7. Health maintenance/screening up to date

- Pmhx: PCOS, HTN, prediabetes, hyperlipidemia

- All of Susan's comorbidities should improve. In fact, fertility is substantially improved in patient's with PCOS due to a reduction of insulin resistance. Therefore, as Susan is of child-bearing age, contraceptive methods should be discussed prior to surgery.



Teede et al. BMC Med. 2010

CASE 2 Q&A

- Susan wants to know if there are other ways she can lose weight? Are they as effective as surgery?

CASE 2 Q&A

- Alternatives to weight loss surgery include:
  - Diet
  - Exercise
  - Anti-obesity Medications

CASE 2 Q&A

Which of the following medications is the most effective and best tolerated medication for weight loss?

- Orlistat
- Metformin
- Phentermine
- Semaglutide

D. Semaglutide

ANTI-OBESITY MEDICATIONS

Name of Drug	Alternate Name	MOA	Side Effects	Contraindications	Pre-drug Testing
Qsymia	Combo phentermine/topiramate	Suppresses GABA receptor/Carbonic anhydrase inhibitor	Parasthesias, dizziness, dysgeusia, insomnia, constipation, dry mouth, increased heart rate	Hx of cardiac disease, pregnancy, glaucoma, hyperthyroidism	EKG, pregnancy test
Topiramate	Topamax	Carbonic anhydrase inhibitor	Parasthesias, dizziness, dysgeusia, insomnia, constipation, dry mouth; topiramate individually has risk of acute myopia in glaucoma, kidney stones	Pregnancy- cause cleft lip/palate; glaucoma	Pregnancy test
Phentermine	Phentermine	Suppresses GABA receptor	Increased heart rate; administer late in the day to avoid insomnia; headache, dry mouth, dizzy, irritable, nausea, vomiting, diarrhea, constipation	Hx of cardiac disease, should not be used with MAOIs- risk of serotonin syndrome, pregnancy, nursing, drug abuse, hyperthyroidism, galucoma, agitated states	EKG

Contrave	Naltrexone/Buproprion	Buproprion is a reuptake inhibitor of dopamine and norepinephrine; naltrexone is an opioid antagonist	Increased blood pressure; black box warning for suicidality; nausea	MAOIs, chronic opioids, uncontrolled HTN, history of seizures, conditions that predispose to seizures, benzos, barbituates, antiepileptic drugs	BP monitoring and control
Victoza/Saxenda	Liraglutide	GLP-1 agonist	Nausea, increase in HR, decrease in BP; pancreatitis, gallbladder disease hypoglycemia in diabetics	Personal or family history of medullary thyroid cancer or MEN, pregnant	
Ozempic/Wegovy	Semaglutide	GLP-1 agonist	GI, retinopathy	MEN2, pregnancy, breast feeding	
Xenical	Orlistat	inhibits pancreatic lipase and gastric lipase	Lower serum glucose and improves insulin sensitivity; improves BP, total cholesterol, LDL; fecal urgency, fecal incontinence, flatus, can decrease absorption of other meds like cyclosporine, levothyroxine, warfarin, amiodarone, antiepileptic agents, antiretrovirals, liver injury	Chronic diarrhea	Vitamin levels, can affect fat-soluble vitamins

AOM CONTINUED

With diet, exercise, and physician support,

what percentage of patients with a BMI > 30 kg/m^2

keep weight off for ≥ 5 years ?

With diet, exercise, and physician support,

what percentage of patients with a BMI > 30 kg/m^2

keep weight off for ≥ 5 years ? **6%**

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With diet, exercise, physician support and surgery

what percentage of patients with a BMI > 30 kg/m^2

keep weight off for ≥ 5 years ?

With diet, exercise, physician support and surgery

what percentage of patients with a BMI > 30 kg/m^2

keep weight off for ≥ 5 years? 80%

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WHAT IS "SET POINT" THEORY?

HAVING A SET POINT FOR WEIGHT IS LIKE HAVING AN INTERNAL THERMOSTAT

If the temperature falls below 70, the heat comes on

If the temperature rises above 70, the AC comes on

NOW LET’S SAY YOUR BODY WEIGHT IS SET AT 70 KG = 154 POUNDS

If your weight falls below 70 kg, your metabolism (RMR) slows down to conserve energy and stop weight loss

If your weight rises above 70 kg, your metabolism (RMR) can speed up to get rid of the excess weight

SO WHY DON'T WE GET RID OF THE WEIGHT GAIN THEN?

- If you keep gaining weight or maintain your weight at a higher place for long enough, your body eventually adapts to this weight gain and changes your set point through hormones (leptin, grehlin, PYY, GIP, GLP-1) to this higher weight

- This is a form of metabolic adaptation

Persistent metabolic adaptation 6 years after "The Biggest Loser" competition. *Obesity.* 2016 Aug;24(8):1612-9.

Weight loss is accompanied by a slowing of resting metabolic rate (RMR) that is often greater than expected based on the measured changes in body composition

This phenomenon is called "metabolic adaptation" or "adaptive thermogenesis"

RMR was substantially reduced at the end of the competition indicating a large degree of metabolic adaptation

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BL STUDY

THEY HYPOTHESIZED THAT THE BL PARTICIPANTS WOULD CONTINUE TO EXPERIENCE METABOLIC ADAPTATION YEARS AFTER THE COMPETITION

ALSO HYPOTHESIZED THAT THE DEGREE OF METABOLIC ADAPTATION WOULD CORRELATE WITH WEIGHT REGAIN

BL STUDY

Average age: 34

Average BMI: 49.5

Average weight at start of program: 325 pounds

Average **weight loss** at end of program (30 weeks): 198 pounds

BL STUDY

Average RMR at start of program: 2607 kcal/day

Average RMR at end of program: 1996 kcal/day

-611 kcal/day

This decrease in metabolic rate persisted at the 6 year follow up.

AVERAGE WEIGHT REGAIN AT 6 YEARS POST-PROGRAM WAS 90 POUNDS

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Q: If diet and exercise does not help me MAINTAIN my weight loss, what should I do?

A permanent decrease in RMR is not observed in Gastric Bypass surgery patients

After 1 year, RMR returns to normal

Your body finds it's new "set weight"

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CASE 3

- Steve is a 70 male with history of CAD s/p stent (8 months ago) on Plavix, T2DM (A1c 8), high cholesterol, current smoker with suspected sleep apnea who is tired of hearing about his weight. He comes to you asking for advice. Is he a candidate for surgery?


#TEDLASSO
OH YES.

CASE 3 Q&A

- Are diet and exercise effective treatment of diabetes?

STAMPEDE TRIAL, NEJM 2017

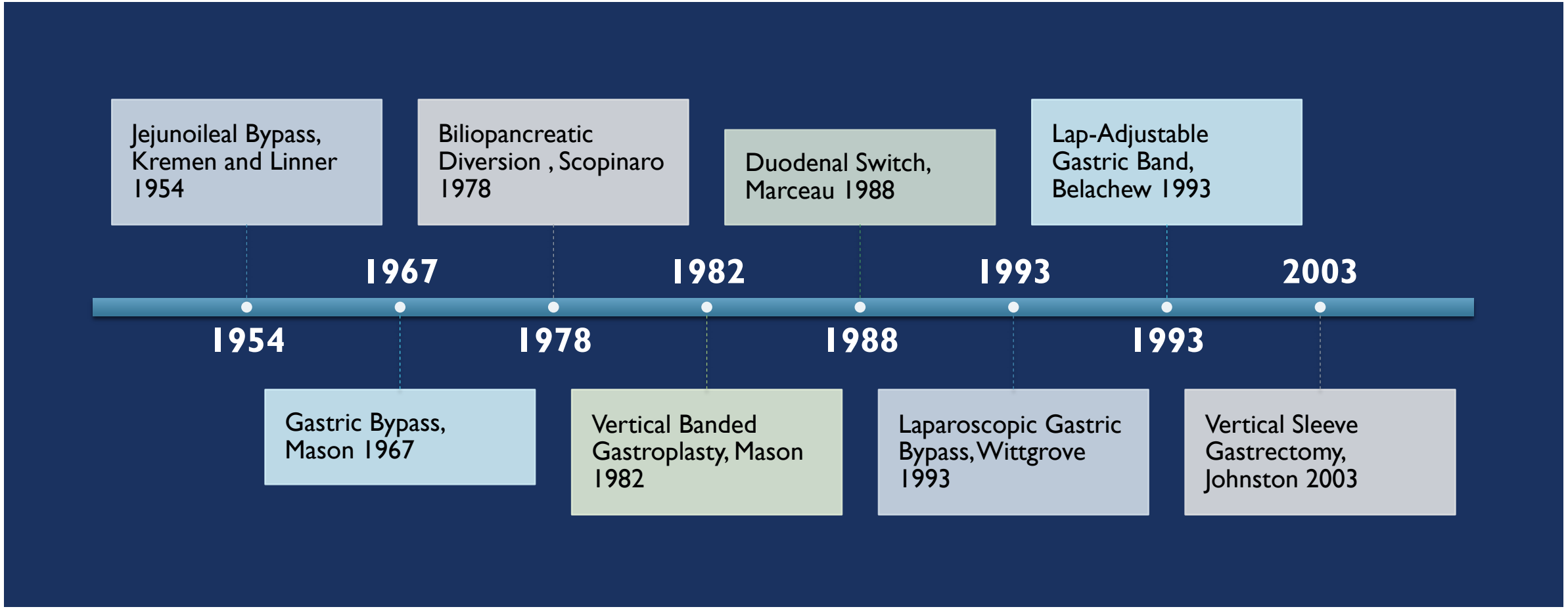
- 5-year outcome data, in patients with DM and BMI 27-43; bariatric surgery + medical therapy > medical therapy alone
  - Most surgical patients achieved a Hgb A1c of 6 or less without the use of diabetic medications, whereas none of the patients in the medical-therapy group reached that target without the use of diabetes medications
  - A duration of diabetes less than 8 years was main predictor of achieving a Hgb A1c < 6
    - Underscores the importance of early surgical intervention for maximal glycemic benefit
- Sleeve and bypass more effective than intensive medical therapy alone in decreasing or resolving hyperglycemia
- RYGB had increased weight loss and more patients stopped DM meds compared to LSG (45% vs. 22%)

CASE 3 Q&A

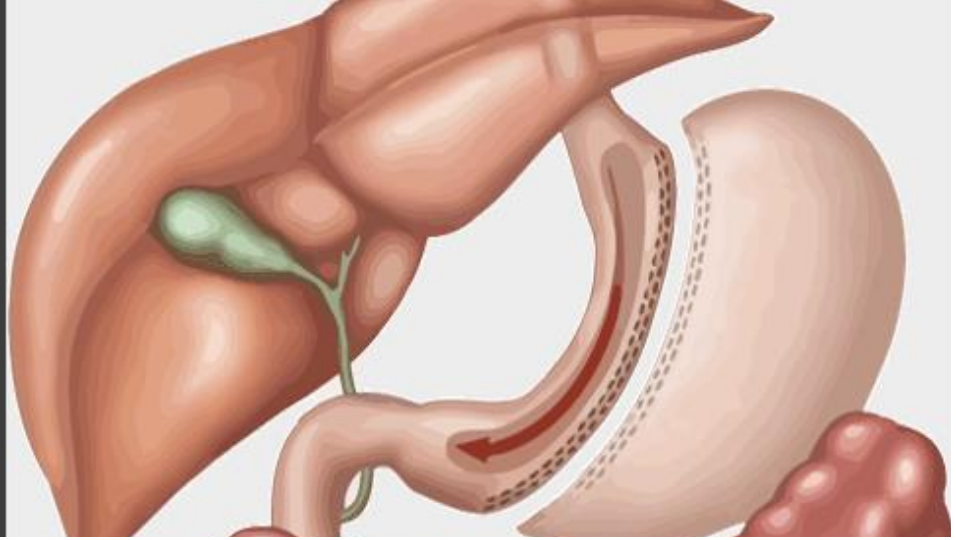
- How can he be better optimized for surgery?

CASE 3 Q&A

- Smoking cessation
- Blood sugar management
- Sleep study eval
- Initiate diet and exercise program

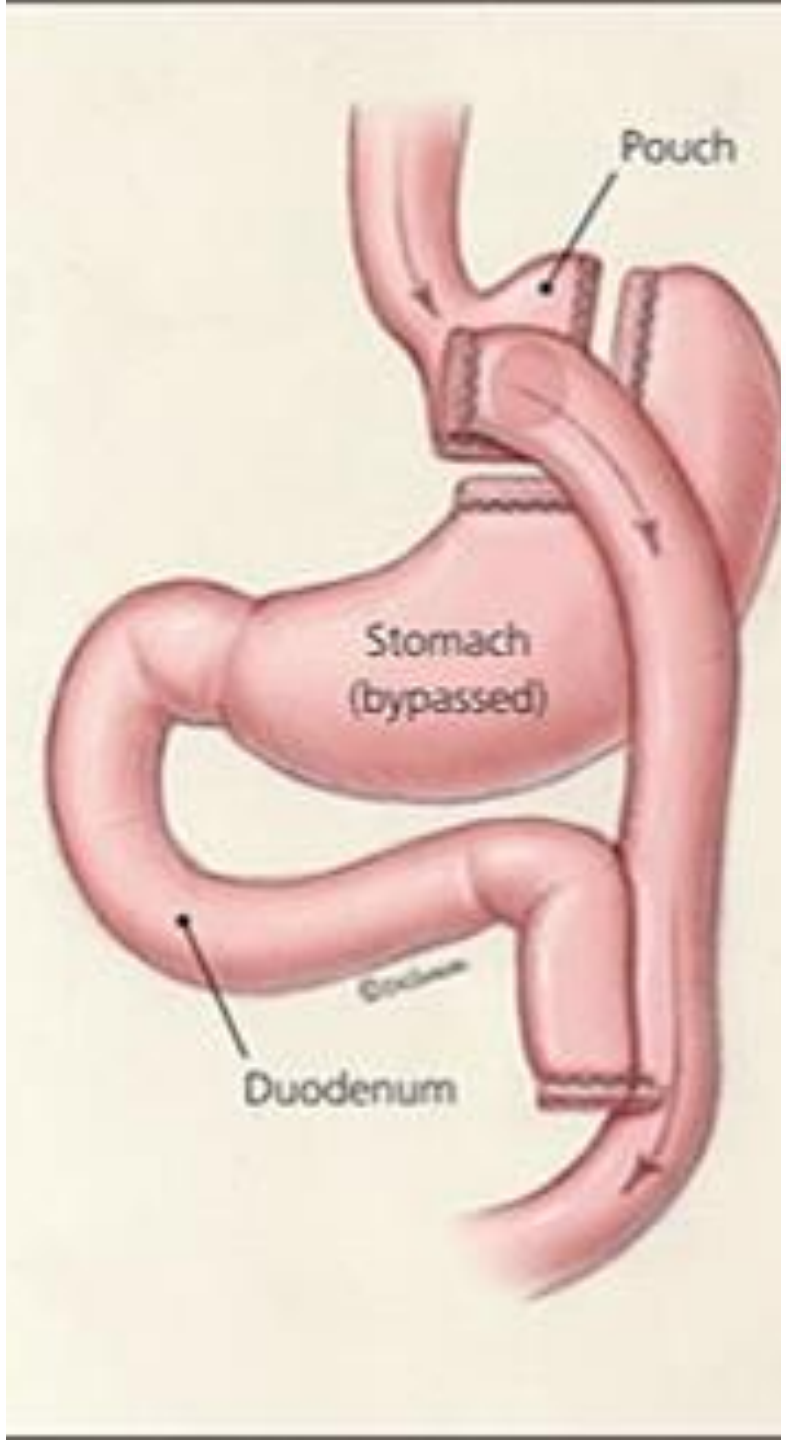


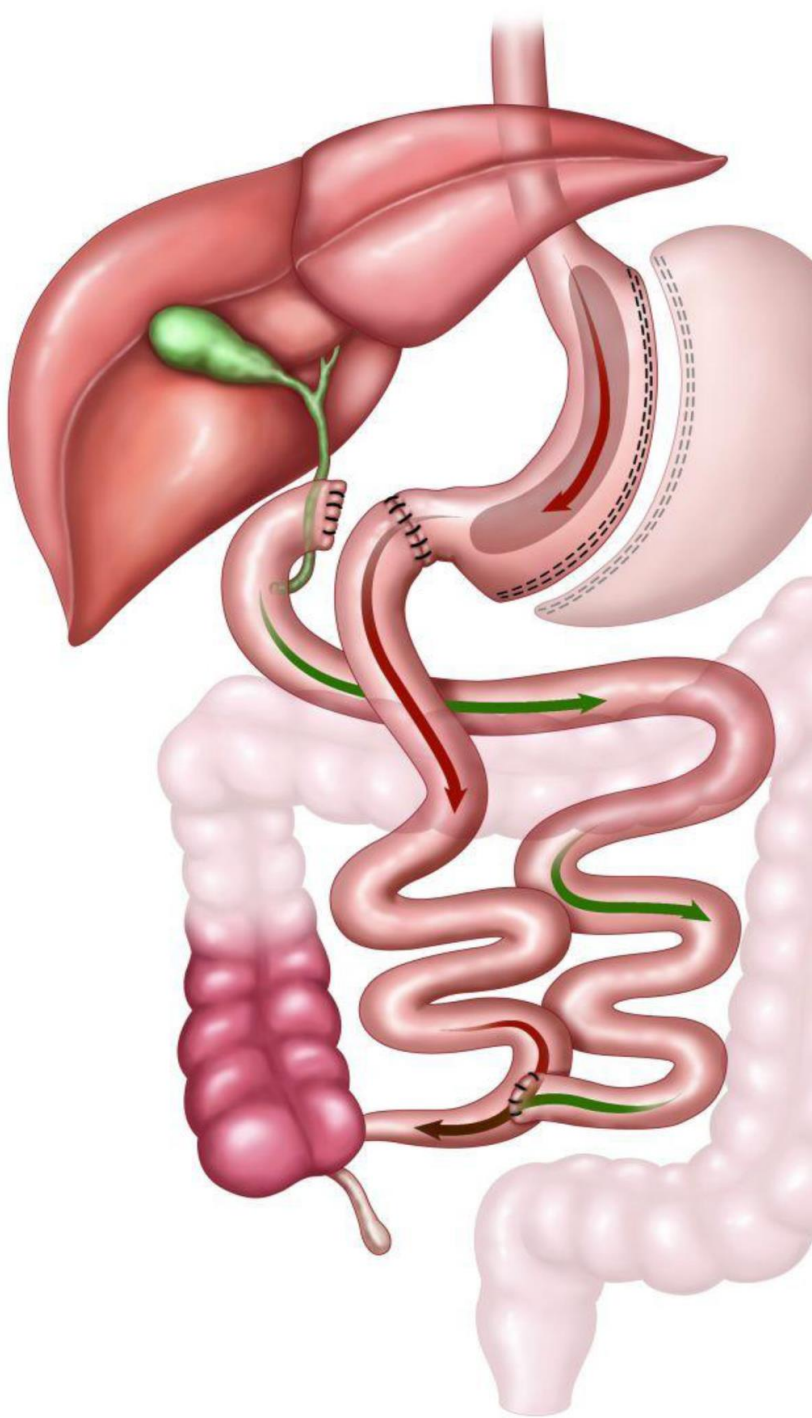
WHERE DID WE BEGIN?



PROCEDURAL OPTIONS

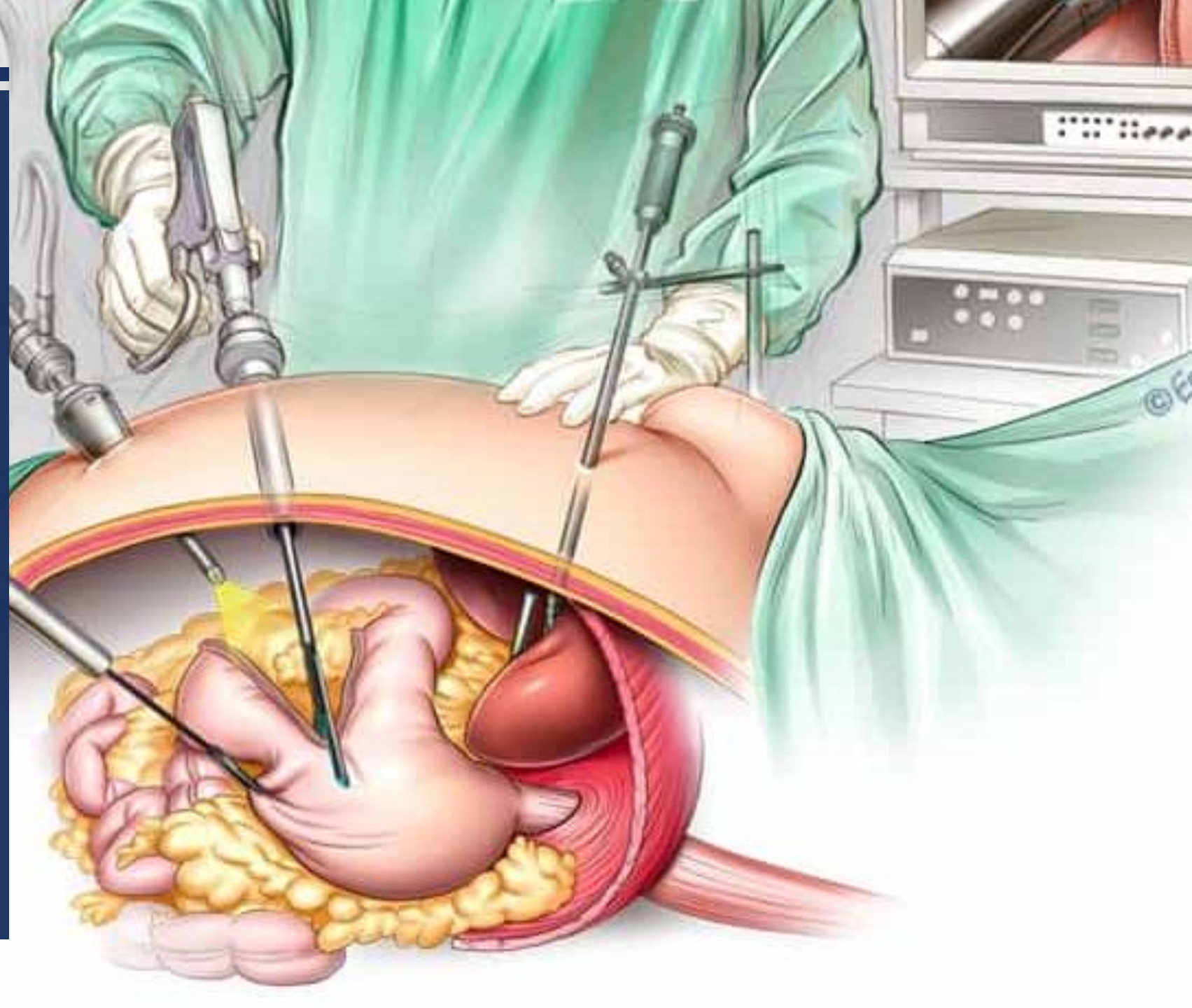
- Sleeve gastrectomy
- Roux-en-y gastric bypass
- Biliopancreatic Duodenal Switch





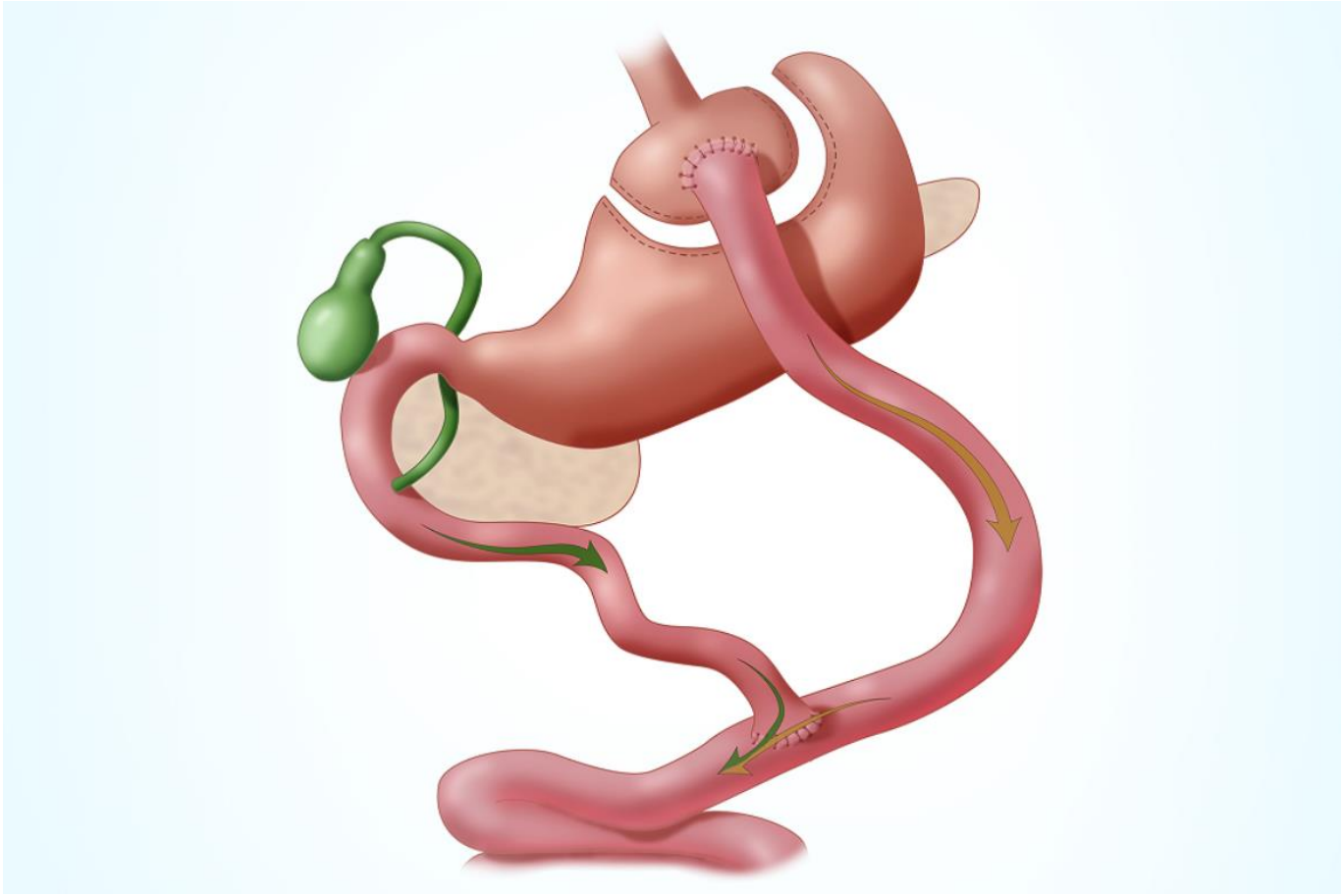
SLEEVE

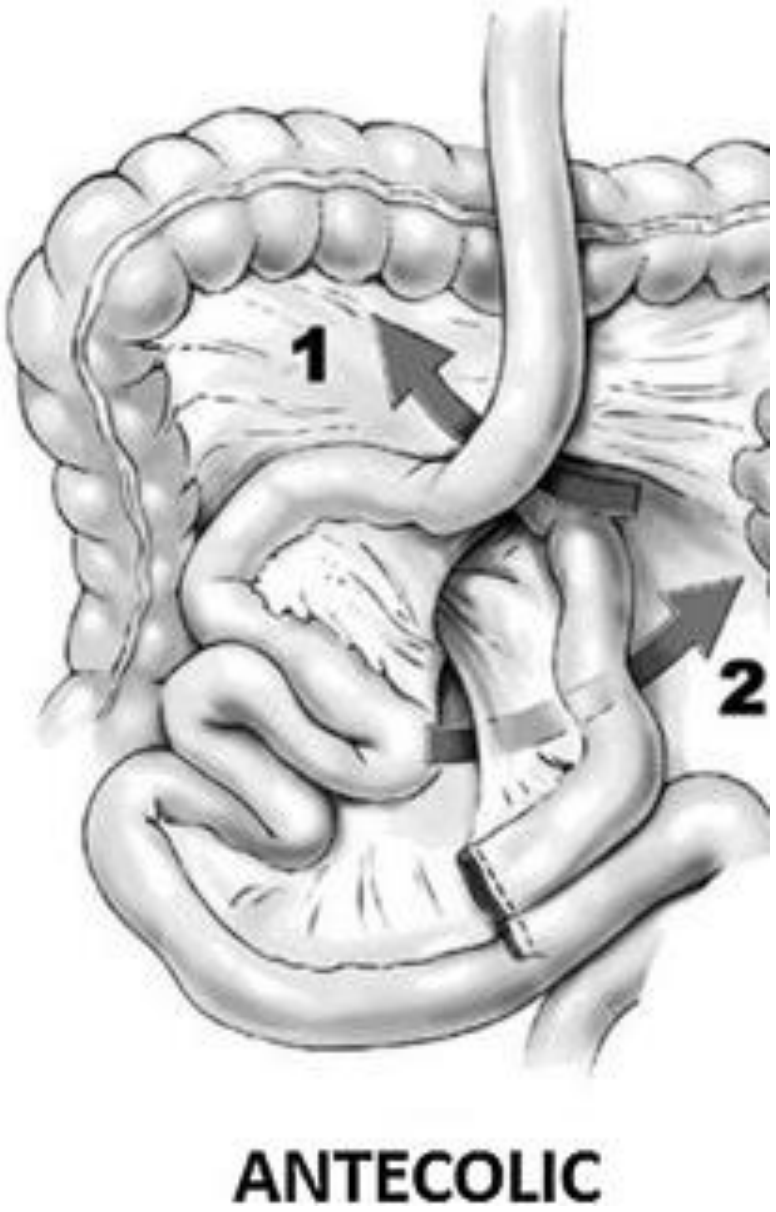
- Laparoscopic or robotic approach
- Goal resection 70-80% of the stomach
- Increase the rate of emptying of the stomach into the small intestine
- 60% EWL
- Risk of GERD, leak, stenosis, spiraling

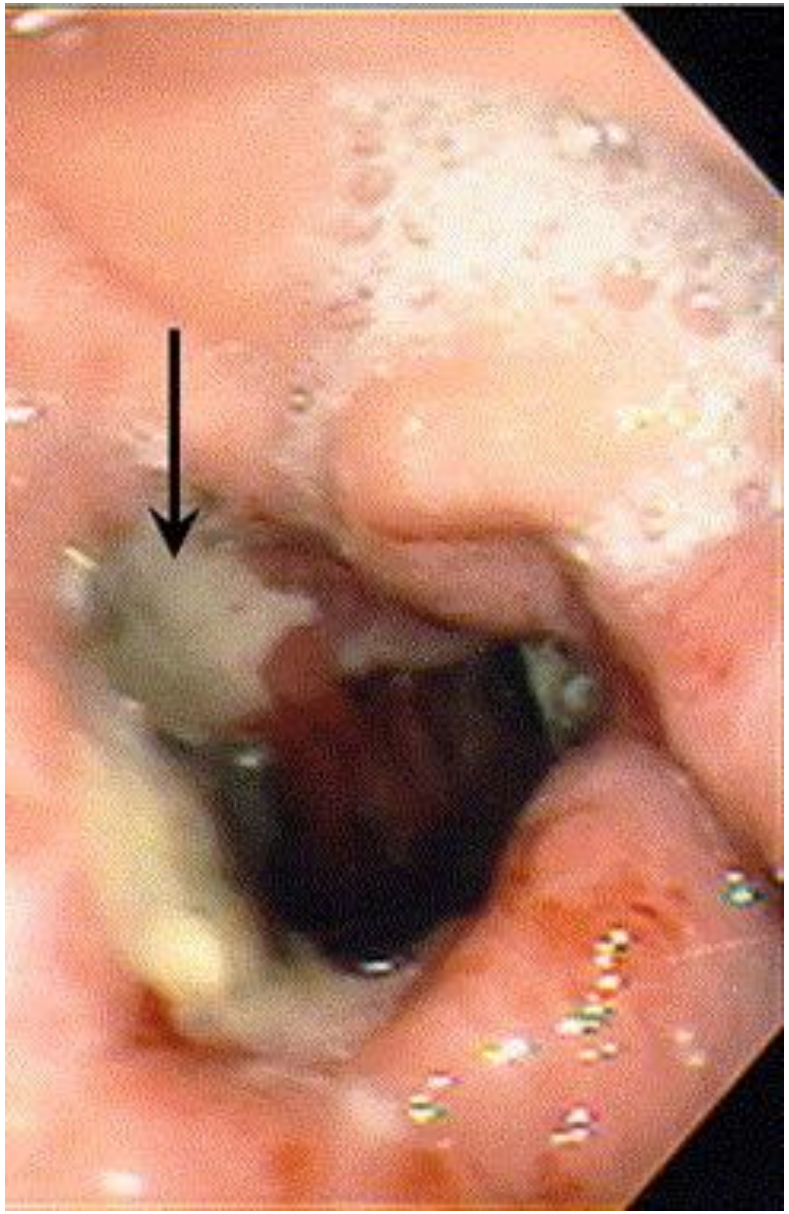


GASTRIC BYPASS

- Laparoscopic or robotic approach
- Goal to create a 30-cc pouch with bypass to distal jejunum/proximal ileum
- Increase emptying to small intestine
- Benefit 70% EWL

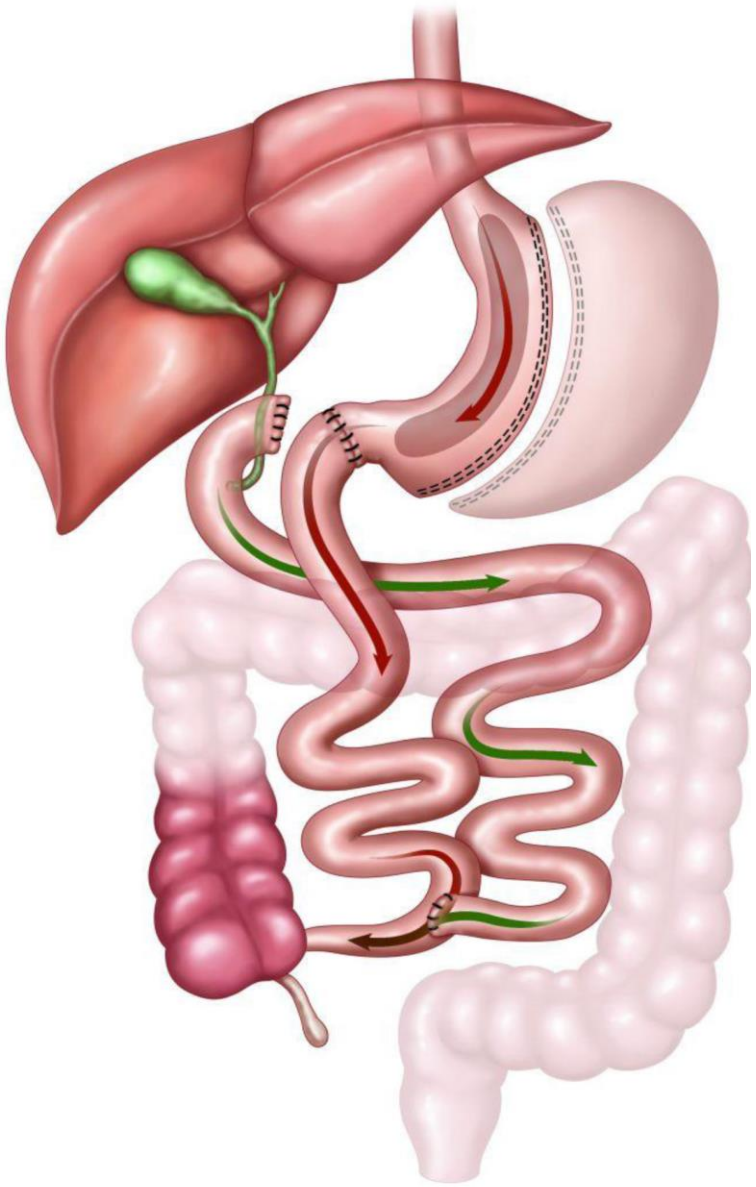






RISKS

- Marginal ulcer
- Ulcer perforation/stricture
- Dumping
- Internal hernia
- Vitamin & mineral deficiencies



DUODENAL SWITCH

- Sleeve + cholecystectomy + intestinal bypass
- 150-300 cm common channel
- Increases emptying to distal small bowel
- 80-100% EWL
- Risk of GERD, sleeve stenosis/spiral, internal hernia, dumping, chronic diarrhea, greatest risk of vitamin & mineral deficiencies

HOW DO THESE OPERATIONS WORK TO ACHIEVE WEIGHT LOSS?

No use for "restrictive" or "malabsorptive"

These are outdated and inaccurate terms

Weight loss is achieved by complex hormonal signaling

Benefits of bariatric surgery occur within DAYS after surgery, even before weight loss takes place

CASE 5

Carlos is a 29 M who is 2.5 months s/p lap sleeve. He comes to your office for a visit even though he does not have an appointment. He reports his coworkers tell him he has been “off”. During your interview, he will get confused and lose his train of thought. He seems forgetful.

What vitamin deficiency are you concerned for?
How would you manage this patient?

CASE 5

- Thiamine deficiency
- For bonus points- what other physical exam findings can you check for?
- For extra bonus points- what is the most common vitamin deficiency in bariatric patients?

- Admit to the hospital! Start IV thiamine at 500 mg TID until symptoms improve. Then transition to 250 mg PO thiamine until levels are normal and then resume regular dosing with bariatric multivitamins.
- What if patients do not tolerate regular bariatric multivitamins?

FUTURE DIRECTIONS

FUTURE DIRECTIONS

- Anticipate bariatric surgery utilization will increase
  - Payor coverage, increase in prevalence
- Increase in revisions
- Development/acceptance of new procedures

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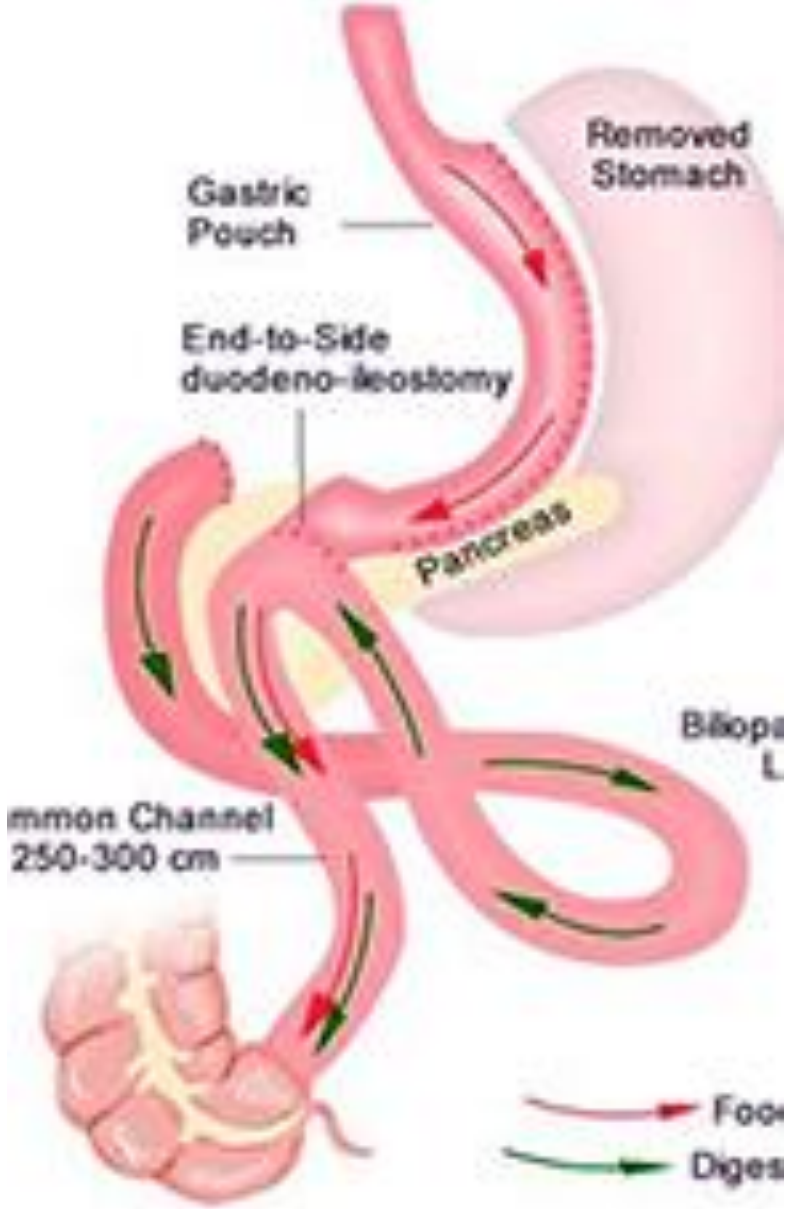
SINGLE ANASTOMOSIS DUODENO-ILEOSTOMY (SADI-S)

- Variation of the duodenal switch
- Also known as SIPS, SADS, LDS
- Sleeve gastrectomy with duodenal ileal anastomosis
- Optional cholecystectomy
- Reported 95% EWL (BMJ)



SADI CONTINUED

Technically easier to perform

Faster OR time, less time under anesthesia, more cost-effective operation

In theory, more robust than sleeve

THANK YOU

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