

Bariatric Surgery

728-655

Mary S. Hayney, PharmD, MPH, BCPS

Professor of Pharmacy (CHS)

Learning Objectives

- Identify the bariatric surgery strategies that can affect nutrient and drug absorption
- Consider changes in drug distribution and metabolism following bariatric surgery
- Replace nutrients that may be deficient
- Discuss the rationale for medications that are commonly used following bariatric surgery

Reading Assignment

Pharmacotherapy. A Pathophysiologic Approach, 11th edition. Chapter 161. Obesity Pages 2540-3

Good reference to know about.

Bland CM, Quidley AM, Love BL, Yeager C, McMichael B, Bookstaver PB. Long-term pharmacotherapy considerations in the bariatric surgery patient. *Am J Health Syst Pharm.* 2016;73(16):1230-1242. doi:10.2146/ajhp151062

Reading guide for Chapter 161—three pages, but table 4 covers two of those pages.

Probably not needed!

Use the learning objectives to guide your reading. The learning objectives have been chosen because of their relevance to immunology pharmacotherapy and are the source of the exam questions.

Study questions

List the anticipated changes to drug absorption following bariatric surgery.

Which vitamins and electrolytes are likely to require supplementation?

Why are each of these medications often used post-op?

PPI

Ursodiol

Which classes of medications are likely to require dosing changes post-op?

What are the population effects on chronic disease in patients who have bariatric surgery?

Which class of medication is generally not used (precaution or contraindication) following bariatric surgery?

Recommend contraception post-bariatric surgery.

Who?

- BMI ≥ 40 kg/m² for whom other methods of weight loss failed
- BMI ≥ 35 kg/m² with significant comorbidities (HTN, type 2 diabetes, obstructive sleep apnea)
- Consider BMI ≥ 30 -34.9 kg/m² with diabetes or metabolic syndrome,
 - Lack of long-term data



Outcomes

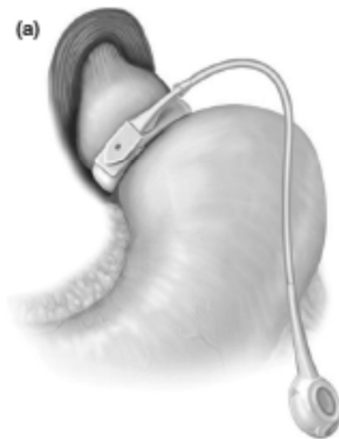
- 23% (range 14-52%) reduction in 1-2 years
- 16% reduction after 10 years
- Post-op complications: leaks, bleeding infection, PE (mortality 0.1-1.2%)
- Decreases risk of stroke, MI, CVD, type 2 diabetes, cancer (in women)
- 52% mortality reduction compared to those with no surgery



Strategies

- General malabsorption
 - Jejunioileal bypass
 - Jejunocolic bypass
- Restrictive
 - Vertical banded gastroplasty
 - Gastric band
 - Gastric stapling
 - Sleeve gastrectomy
- Restriction +malabsorption
 - Roux-en-Y bypass
- Restriction +malabsorption +maldigestion
 - Biliopancreatic diversion with partial gastrectomy
 - Distal gastric bypass
 - Duodenal switch

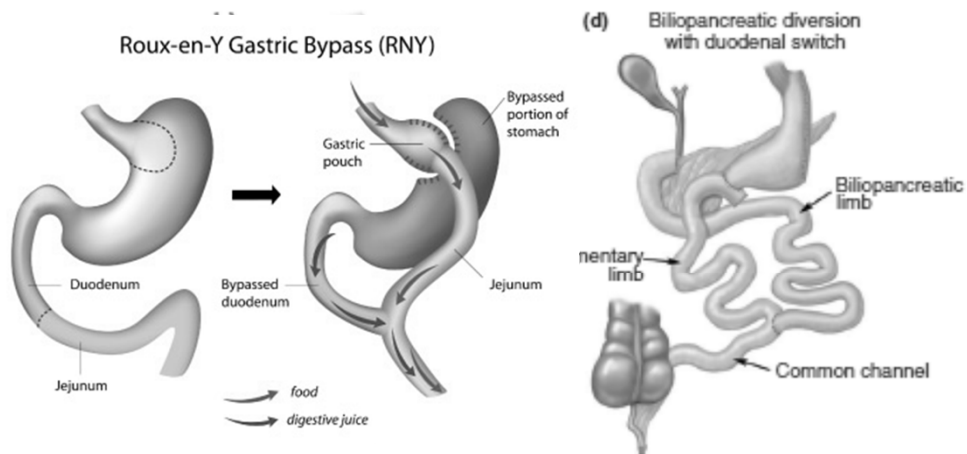
Gastric
banding



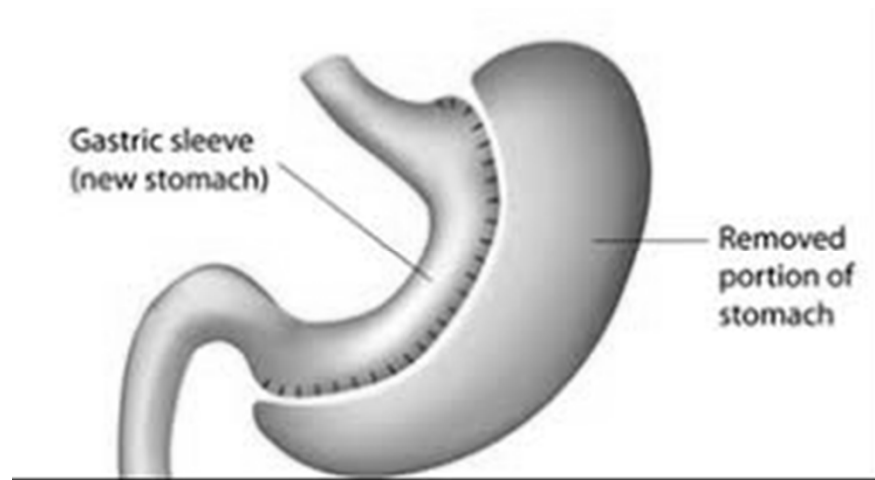
Sleeve
gastrectomy



Roux-en-Y
bypass



Biliopancreatic
diversion with
duodenal
switch



Sleeve gastrectomy; can be done laparoscopically

Implantable devices

- Electrical stimulation: intermittently blocks communication with vagus nerve to increase satiety
- Gastric balloon: endoscopically placed balloon that occupies space in stomach
- Patient often regains weight after device turned off or removed



Multiple devices are approved; from Obalon website.

Protein

- Protein deficiency (albumin $<3.5\text{gm/dl}$)
- Severity depends on surgical procedure
- Loss of lean muscle mass
- Symptoms include hair loss and edema
- Intake 60-80gm/day, maybe more
- Emphasis on branched chain amino acids



Calcium

- Serum calcium not reflective of loss or deficiency
- Malabsorption and lactose intolerance
- Calcium citrate better absorbed than carbonate
- Consider vitamin D; bisphosphonate if bone loss



Magnesium

- Serum magnesium poor indicator of body stores
- Deficiency may start pre-op
- Proton pump inhibitor therapy may lead to low magnesium
- Magnesium citrate better bioavailability than other preparations
- Diarrhea frequently accompanies oral replacement



B vitamins

- Many symptoms
 - B1: Muscle weakness, cardiac, neuro
 - B12: anemia, weakness, tingling in fingers and toes
- Replacement protocols
- Maintenance supplements necessary lifelong



Vitamin D

- Deficiency often present pre-op
 - Recommend pre-op screening
 - Replacement if indicated
- Observed in bypass and restrictive surgery
- May need 5000 IU/day; 50K 2-3x/day in biliopancreatic diversion
- Consider VitD25(OH) at least 24ng/ml



Other fat soluble vitamins

- No recommendations for vitamin A daily supplementation
- Vitamin E 800-1200IU/day to prevent or treat deficiency
- Vitamin K usually obtained from diet
 - Treat deficiency if needed



Iron deficiency

- Anemia common long-term complication
- Also common in obese individuals
- Similar rates in bypass and restrictive surgery
 - Decreased surface area for absorption
 - Decreased gastric acid secretion
 - Increased inflammation
 - Frequent intolerance of red meat
- Oral iron supplement poorly tolerated and absorbed; only prophylaxis
- Treat deficiency with parenteral iron



Zinc deficiency

- Deficiency often present pre-op
- No standard recommendations for supplementation
- Can interfere with iron and copper absorption



Drug absorption and distribution

- Decreased surface area for absorption
 - Less access to stomach acid or intestinal enzymes
 - Drugs primarily absorbed in proximal small intestine which is often bypassed
 - Less access to intestinal CYP and Pgp
- Decreased bioavailability for drugs with long absorption time



Drug absorption and distribution

- Gastric emptying disorders
- Changes in volume of distribution as fat lost



Drug Use

- Decreased use of cholesterol and diabetes meds
- No change in use of antidepressants
 - 20-50% have mood disorder



Antidepressants

- Vd decrease for TCA and SSRI
- Decrease in absorption
- Dose adjustments recommended based on symptoms



Drug issues

- Need for acid suppression variable
 - PPI
 - H2 antagonist
- Obesity is risk factor for GERD
- Type of procedure confers risk
 - Gastric sleeve may increase (but variable)
 - Small number need acid suppression post-op if not needed pre-op
- Acid suppressive therapy at one year decreased from 38% to 30%



Diabetes meds

- Decreased use of oral antidiabetic agents and insulin
- Increased absorption of metformin in RYGB



Medications for Hyperlipidemia

- Almost 60% decrease in need for antilipemic agents
- Single study showed increase in atorvastatin bioavailability



Antihypertensive agents

- 43% used antihypertensive agents pre-op and 17% used them post-op
- Only propranolol and atenolol have been studied



Antibiotics

- Lower blood concentrations of azithromycin
- Increase dose of moxifloxacin recommended



Analgesics

- No NSAIDs
 - High risk of gastric ulcer and mucosal erosions



Contraception

- Guidelines recommend against pregnancy for 12-18 months
 - Avoid maternal or fetal harm due to vitamin, mineral deficiencies
- Lower absorption of oral contraceptives
- Flaccid skin makes transdermal or subdermal difficult or unreliable
- Diaphragms, female condoms, vaginal rings difficult to insert in obese patients
 - Refit with even minor weight loss



IUD recommended

- Copper or levonorgestrel intrauterine device (IUD)
 - Avoids decreased medication absorption
 - Avoids weight gain associated with hormonal implants
- IUD standard of care



Alcohol

- Decreased gastric emptying leads to rapid alcohol absorption



Short-Term Medications

- Crushed or liquid meds for about 2 weeks
- Risk of gall stones high with rapid weight loss
 - Ursodiol 300mg twice daily for about 6 months post-op
- Need for acid suppression at least 2 months
 - PPI
 - H2 antagonist

