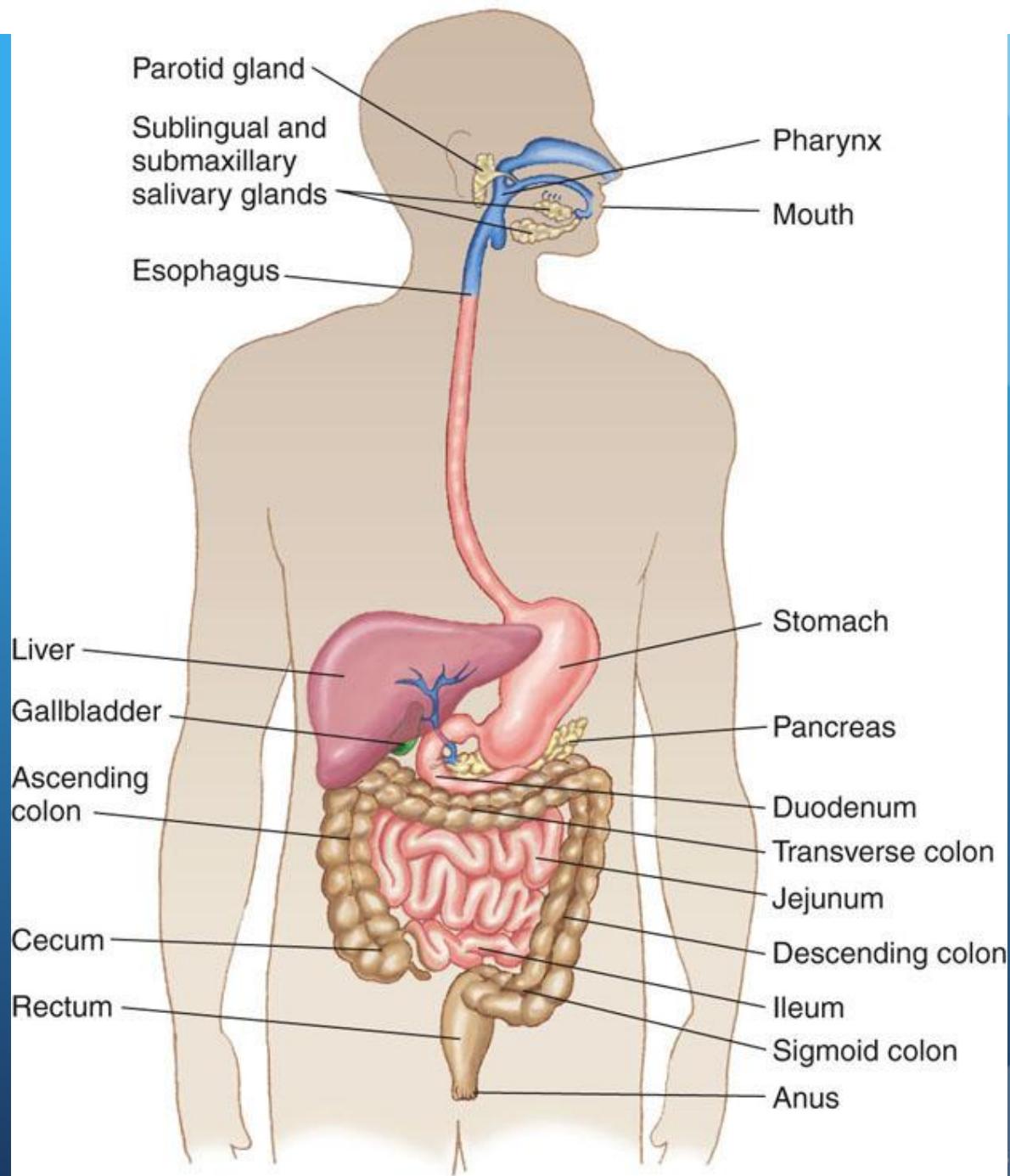


Upper Gastrointestinal Tract

KNH 406

Upper GI - A&P

- GI tract - long tube ~ 15 ft.
- Upper GI - mouth, pharynx, esophagus, stomach
- Accessory organs - pancreas, biliary system, liver
- Four basic functions: motility, secretion, digestion, absorption



Upper GI - A&P

- Motility - movement of food by propulsion and contractions
- Secretions - water, electrolytes, enzymes, bile salts, mucus
- Digestion - complex molecules converted to simplest form
- Absorption - basic molecules, electrolytes, water, vitamins & minerals provide nutrients to the cells

Upper GI - A&P

- Oral Cavity Motility
 - Mastication
- Oral Cavity Secretions
 - Saliva from 3 sets of salivary glands
 - Water
 - Electrolytes - sodium chloride, bicarbonate, potassium
 - Proteins - enzymes, mucus, lysozymes

Upper GI - A&P

- Esophagus
 - Sphincters at either end
 - Four layers of tissue: mucosa, submucosa, muscle, adventitia
 - Chief function is motility
 - Swallow phases:
 - Oral preparatory phase
 - Oral
 - Pharyngeal
 - Esophageal

Upper GI - A&P

- Stomach - Motility
 - Filling, storage, mixing, emptying
 - 50 mL empty - stretches to 1000 mL
 - Pyloric sphincter

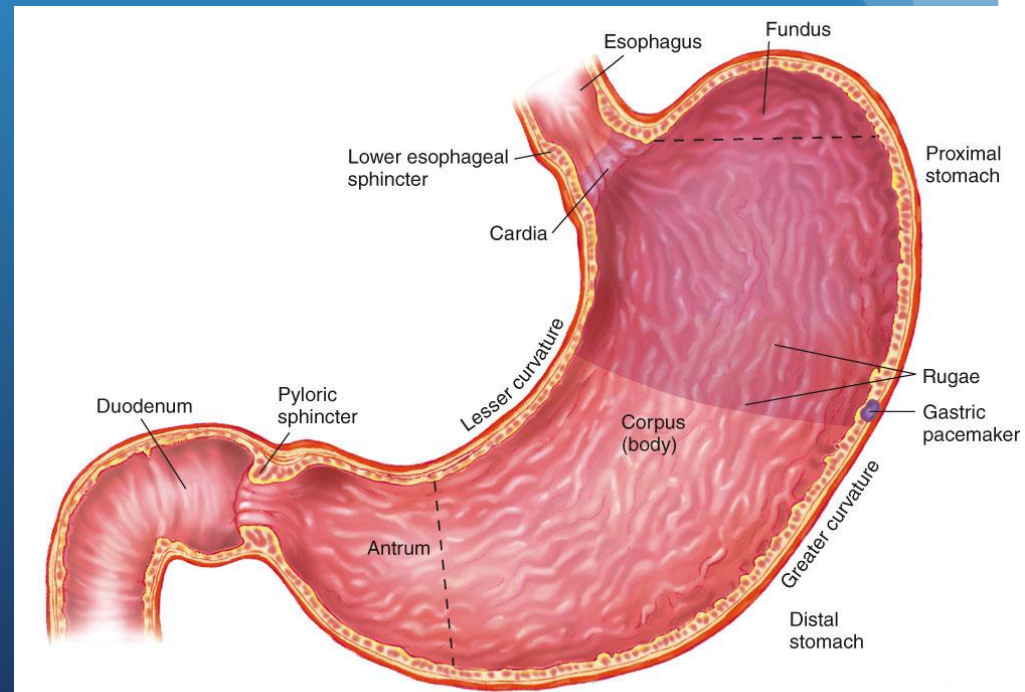


TABLE 16.2

Control of Gastric Secretions

The Stomach Mucosa and the Gastric Glands

Type of Secretory Cell	Product Secreted	Stimuli for Secretion	Function(s) of Secretory Product
Exocrine cells			
Mucous cells	Alkaline mucus	Mechanical stimulation by contents	Protects mucosa against mechanical, pepsin, and acid injury
Chief cells	Pepsinogen	Acetyl choline (ACh), gastrin	When activated, begins protein digestion
Parietal cells	Hydrochloric acid	ACh, gastrin, histamine	Activates pepsinogen, breaks down connective tissue, denatures proteins, kills micro-organisms
	Intrinsic factor		Facilitates absorption of vitamin B ₁₂
Endocrine/paracrine cells			
Enterochromaffin-like (ECL) cells	Histamine	ACh, gastrin	Stimulates parietal cells
G cells	Gastrin	Protein products, ACh	Stimulates parietal, chief, and ECL cells
D cells	Somatostatin	Acid	Inhibits parietal, G, and ECL cells

Upper GI - A&P

- Stomach - release of secretions
 - Phases:
 - Cephalic - release of HCL and pepsinogen stimulated by tasting, smelling, seeing food
 - Gastric - when food enters the stomach
 - Intestinal - inhibitory; slows gastric secretions and prepares small intestine for receipt of acidic chyme

Upper GI - A&P

- Stomach - Digestion & Absorption
 - Mechanical and chemical
 - HCL denatures protein structure and converts pepsinogen to pepsin
 - Pepsin cleaves proteins
 - Absorption is limited except for alcohol & aspirin

TABLE 16.9**Nutrition Interventions: Texture Modifications for Problems in Chewing and Swallowing**

Food Groups	Foods Recommended	Foods Not Recommended
Beverages	All	None
Breads and Cereals	Oatmeal, Cream of Wheat, grits, and other hot, cooked cereals; dry ready-to-eat cereals softened with milk or other liquid; pasta; rice; other cooked grains	Initially not recommended to consume high-fiber cereals and bran; tough or chewy breads (i.e., bagels or French bread); breads with tough crusts; crackers, chips with hard edges; popcorn; anything containing coconut, seeds, or dried fruits
Fats	All	None unless not tolerated
Fruits	All cooked fruits without skins or seeds; soft fresh fruits without skins or seeds; fruit juices without pulp	Tough, crunchy raw fruits with hard edges; coconut; dried fruits
Meats and Protein Sources	Tender cooked meats without skin or bones; eggs; soy tofu; cheese, cottage cheese; dried beans and peas	Tough, stringy, high-fat, or fried meats; cooked cheeses; crunchy peanut butter
Vegetables	All cooked soft without skins or seeds; vegetable juices and sauces	Raw, stringy, or crunchy vegetables; cooked vegetables with skins or seeds

Pathophysiology - Oral Cavity

- Nutrition Therapy/Evaluation
 - Increase frequency of meals
 - Bland foods served at room temp.
 - Liberal use of fluids
 - Preference for cold and frozen foods
 - Oral hygiene
 - Monitor using food diary, observation, or kcal count
 - Monitor weight gain or maintenance

Pathophysiology - Esophagus

- GERD - reflux of gastric contents into the esophagus
 - Incompetence of LES
 - Increased secretion of gastrin, estrogen, progesterone
 - Hiatal hernia
 - Cigarette smoking
 - Use of medications
 - Foods high in fat, chocolate, spearmint, peppermint, alcohol, caffeine

Pathophysiology - Esophagus

- GERD - symptoms
 - Dysphagia
 - Heartburn
 - Increased salivation
 - Belching
 - Pain radiating to back, neck, or jaw
 - Aspiration
 - Ulceration
 - Barrett's esophagus

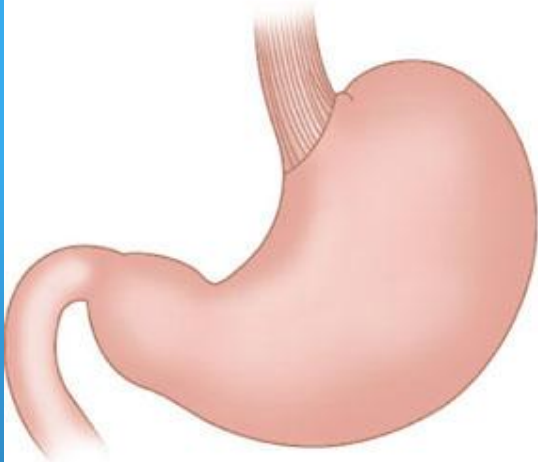
Pathophysiology - Esophagus

- GERD - Treatment
 - Medical management
 - Modify lifestyle factors
 - Medications - 5 classes
 - Surgery
 - Fundoplication
 - Stretta procedure

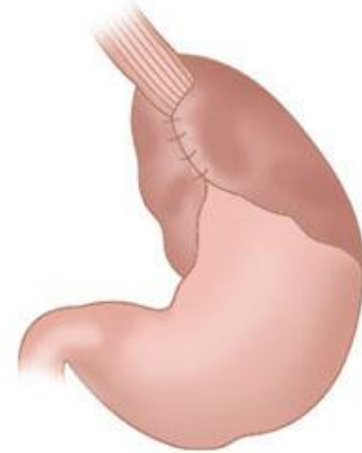
TABLE 16.11**Medications for Treatment of GERD**

Classification of Medication	Generic and/or Trade Names	Precautions
Antacids	Alka-Seltzer, Maalox, Mylanta, Pepto-Bismol, Roloids, and Riopan, are usually the first drugs recommended to relieve heartburn and other mild GERD symptoms. Many brands on the market use different combinations of three basic salts—magnesium, calcium, and aluminum—with hydroxide or bicarbonate ions to neutralize the acid in your stomach.	Antacids, however, have side effects. Magnesium salt can lead to diarrhea, and aluminum salts can cause constipation. Aluminum and magnesium salts are often combined in a single product to balance these effects. Calcium carbonate antacids, such as Tums, Titralac, and Alka-2, can also be a supplemental source of calcium. They can cause constipation as well.
Foaming agents	Work by covering your stomach contents with foam to prevent reflux. These drugs may help those who have no damage to the esophagus (Gaviscon is one type of agent).	
H ₂ blockers	Impede acid production—medications available include: cimetidine (Tagamet HB), famotidine (Pepcid AC), nizatidine (Axid AR), and ranitidine (Zantac 75). They are available in prescription strength and over the counter.	These drugs provide short-term relief, but over-the-counter H ₂ blockers should not be used for more than a few weeks at a time. They are effective for about half of those who have GERD symptoms. Many people benefit from taking H ₂ blockers at bedtime in combination with a proton pump inhibitor.
Proton pump inhibitors	Proton pump inhibitors are more effective than H ₂ blockers and can relieve symptoms in almost everyone who has GERD and include omeprazole (Prilosec), lansoprazole (Prevacid), pantoprazole (Protonix), rabeprazole (Aciphex), and esomeprazole (Nexium), which are all available by prescription.	
Prokinetics	Helps strengthen the sphincter and makes the stomach empty faster. This group includes bethanechol (Urecholine) and metoclopramide (Reglan). Metoclopramide also improves muscle action in the digestive tract.	These drugs have frequent side effects that limit their usefulness.

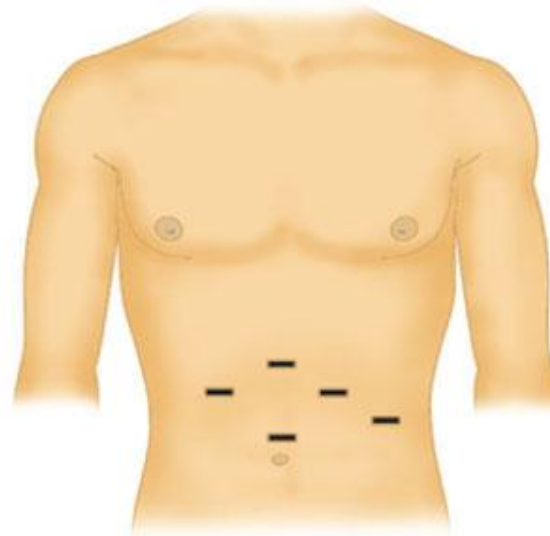
Nissen fundoplication



Normal stomach



After the wrap



Abdominal incisions

Pathophysiology - Esophagus

- GERD - Nutrition Therapy
 - Identify foods that worsen symptoms
 - Assess food intake esp. those that reduce LES pressure, or increase gastric acidity
 - Assess smoking and physical activity
 - Small, frequent meals
 - Weight loss if warranted
 - See Table 16.12

Pathophysiology - Esophagus

- Dysphagia - difficulty swallowing
 - Potential causes -
 - Drooling, coughing, choking
 - Weight loss, generalized malnutrition
 - Aspiration to aspiration pneumonia
 - Treatment requires health care team
 - dg by bedside swallowing, videofluoroscopy, barium swallow

Pathophysiology - Esophagus

- Dysphagia - Nutrition Therapy
 - Use acceptable textures to develop adequate menu
 - National Dysphagia Diet 1,2,3
 - Use of thickening agents and specialized products
 - Monitor weight, hydration, and nutritional parameters

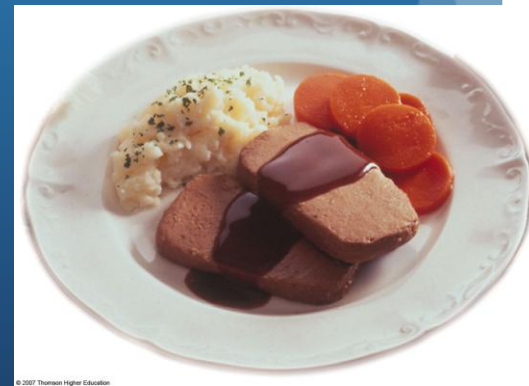


TABLE 16.15**National Dysphagia Diet 1, 2, and 3****National Dysphagia Diet 1 (NDD-1) “Dysphagia Pureed”**

Food Allowed	Food Not Allowed	Sample Menu
Includes foods of “pudding-like” consistency that are smooth or pureed with no lumps.	Gelatin desserts, fruited yogurt, peanut butter, unblenderized cottage cheese, scrambled, fried, or hard cooked eggs.	Pureed chicken, mashed potatoes with gravy, pureed carrots, applesauce, and chocolate pudding.

National Dysphagia Diet 2 (NDD-2) “Dysphagia Mechanically Altered”

Food Allowed	Food Not Allowed	Sample Menu
Foods that are moist and soft textured such as tender ground or finely diced meats, soft cooked vegetables, soft ripe or canned fruit, and some moistened cereals.	Bread, dry cake, rice, cheese cubes, corn, and peas.	Scrambled egg, pancake with syrup, flaked cold cereal with milk, banana, orange juice (beverages thickened as appropriate).

Dysphagia Mixed is a term used by some institutions to designate a customized puree (NDD-1) diet that also allows one mechanically altered (NDD-2) item. Sample meal: orange juice, vanilla yogurt, cream of wheat cereal, scrambled egg.

Mechanical Soft is another alternative diet that allows bread, cake, and rice in addition to the NDD-2 mechanically altered diet. Sample menu: diced chicken with gravy, steamed rice, Harvard beets, pound cake, and fresh strawberries.

National Dysphagia Diet 3 (NDD-3) "Dysphagia Advanced"

Food Allowed	Food Not Allowed	Sample Menu
Includes most regular foods except very hard, sticky, or crunchy items. Bread, rice, cake, shredded lettuce, and tender, moist meats are allowed.	Not allowed are hard fruit and vegetables, corn skins, nuts, and seeds.	Vegetable soup, shredded lettuce salad with dressing, turkey sandwich with mayonnaise, fresh ripe melon, and chocolate chip cookie with no nuts.

Liquids

The following terminology is recommended by the National Dysphagia Diet Task Force to describe the viscosity of beverages and other liquids on the dysphagia diet:

Spoon-thick

Honey-like

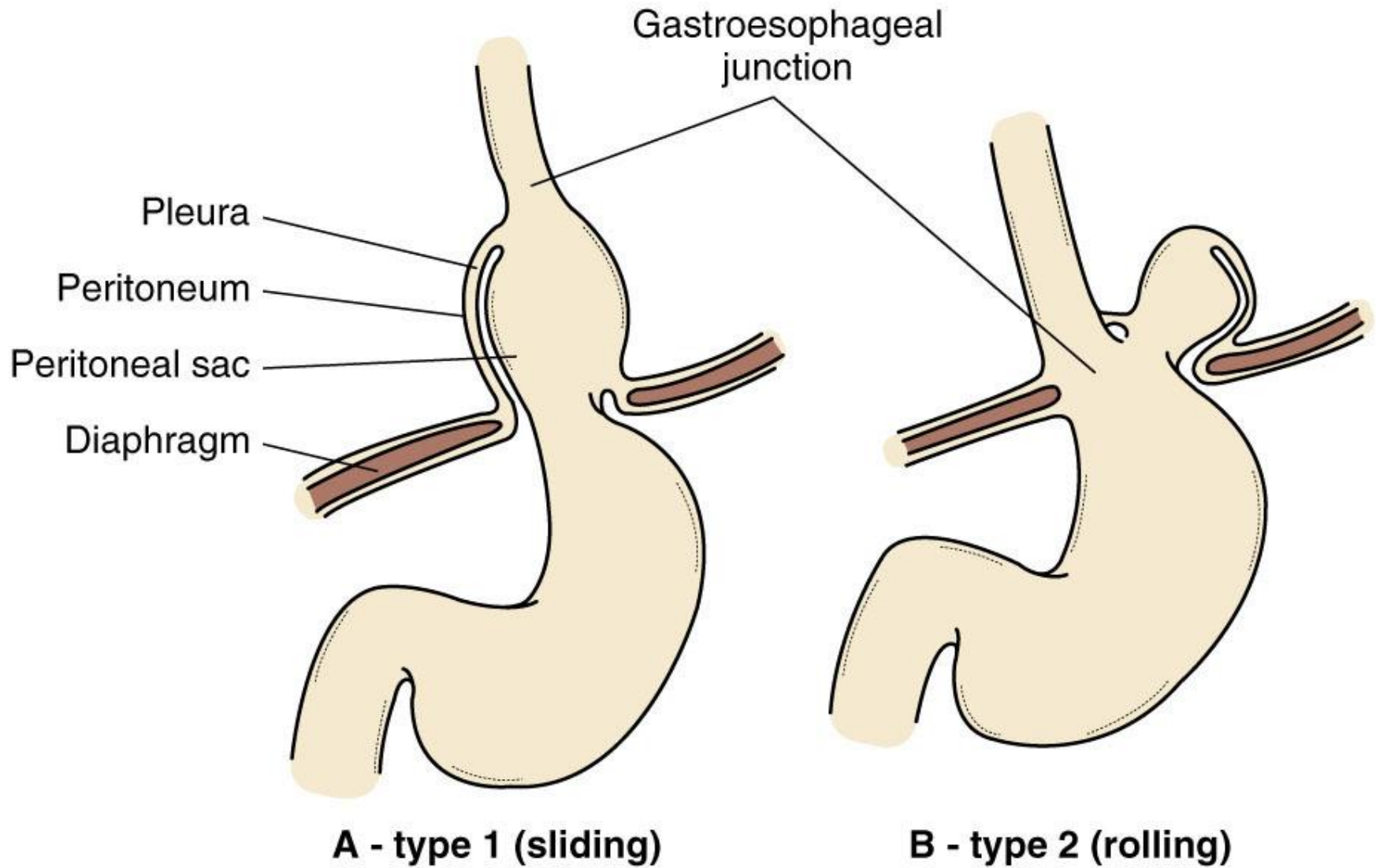
Nectar-like

Thin liquids: Allows all liquids, including water, ice, milk, milk shakes, juice, coffee, tea, carbonated beverages, frozen desserts, and gelatin.

TABLE 16.16**Thickening Agents and Specialty Food Products Used to Treat Dysphagia**

Product	Manufacturer
<i>Thickening Agents for Liquids</i>	
Thicken up	Novartis
Frutex	Crescent Foods
Thick n Easy	Hormel Health Labs
Thick-it	Precision Foods, Inc.
Thick Set	Bernard Fine Foods, Inc.
Thixx	Bernard Fine Foods, Inc.
<i>Specialty Food Products</i>	
Shape&Serve™	Hormel Health Labs
Puree Appeal	Novartis
NutraBalance	Ross Labs
Pureed meats	Tavis Meats, Inc.
Pureed foods	Zartc Foods

Hiatal Hernia



Pathophysiology - Stomach

- Gastritis
 - Inflammation of the gastric mucosa
 - Primary cause: *H. pylori* bacteria
 - Alcohol, food poisoning, NSAIDs
 - Symptoms: belching, anorexia, abdominal pain, vomiting
 - Type A - automimmune
 - Type B - *H. pylori*
 - Increases with age, achlorhydria
 - Treat with antibiotics and medications

Pathophysiology - Stomach

- Peptic ulcer disease - ulcerations of the gastric mucosa that penetrate submucosa
 - Gastric or duodenal
 - *H. pylori*
 - NSAIDs, alcohol, smoking
 - Certain foods, genetic link
 - Increased risk of gastric cancer



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Pathophysiology - Stomach

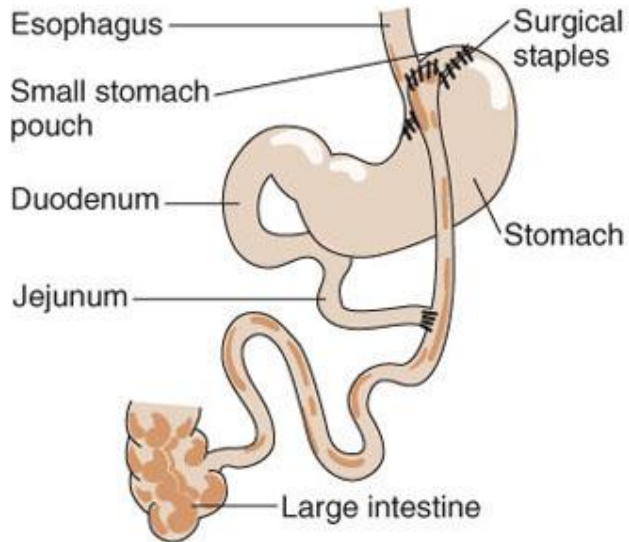
- Peptic Ulcer Disease
 - Symptoms: epigastric pain relieved or worsened by abdominal pain, burning sensation
 - Relieved with eating or antacids
 - Rebound gastrin release - more pain
 - Presence of blood in the stool or vomit
 - Treatment: triple/quadruple therapy of meds, surgery

Pathophysiology - Stomach

- Peptic Ulcer Disease - Nutrition
 - Restrict only those foods known to increase acid secretion
 - Black and red pepper, caffeine, coffee, alcohol, individually non-tolerated foods
 - Consider timing and size of meal
 - Do not lie down after meals
 - Small, frequent meals

Pathophysiology - Stomach

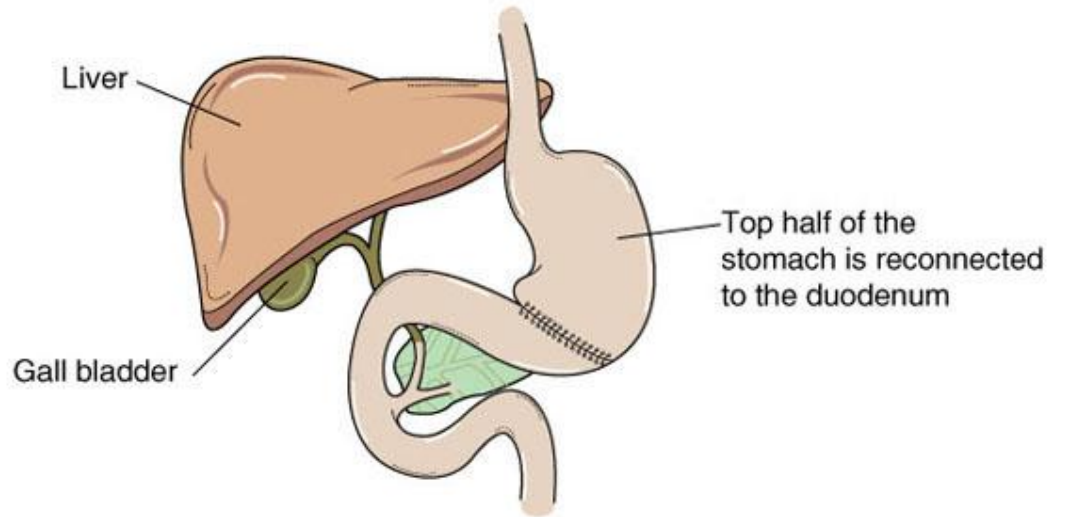
- Gastric Surgery
 - With complications: hemorrhage, perforation, obstruction
 - Vagotomy
 - Vagotomy with pyloroplasty
 - Billroth I & II, Roux-en-Y
 - See Fig. 16.9



In gastric bypass, the surgeon constructs a small stomach pouch and creates an outlet directly to the jejunum.

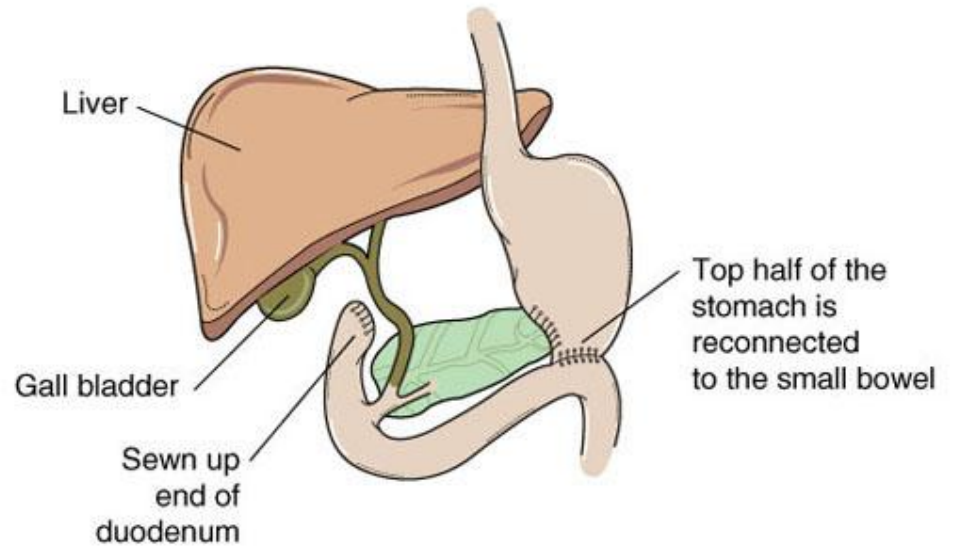
A

Billroth I (after)



B This operation removes part of the stomach

Billroth II (after)



C This operation removes part of the stomach

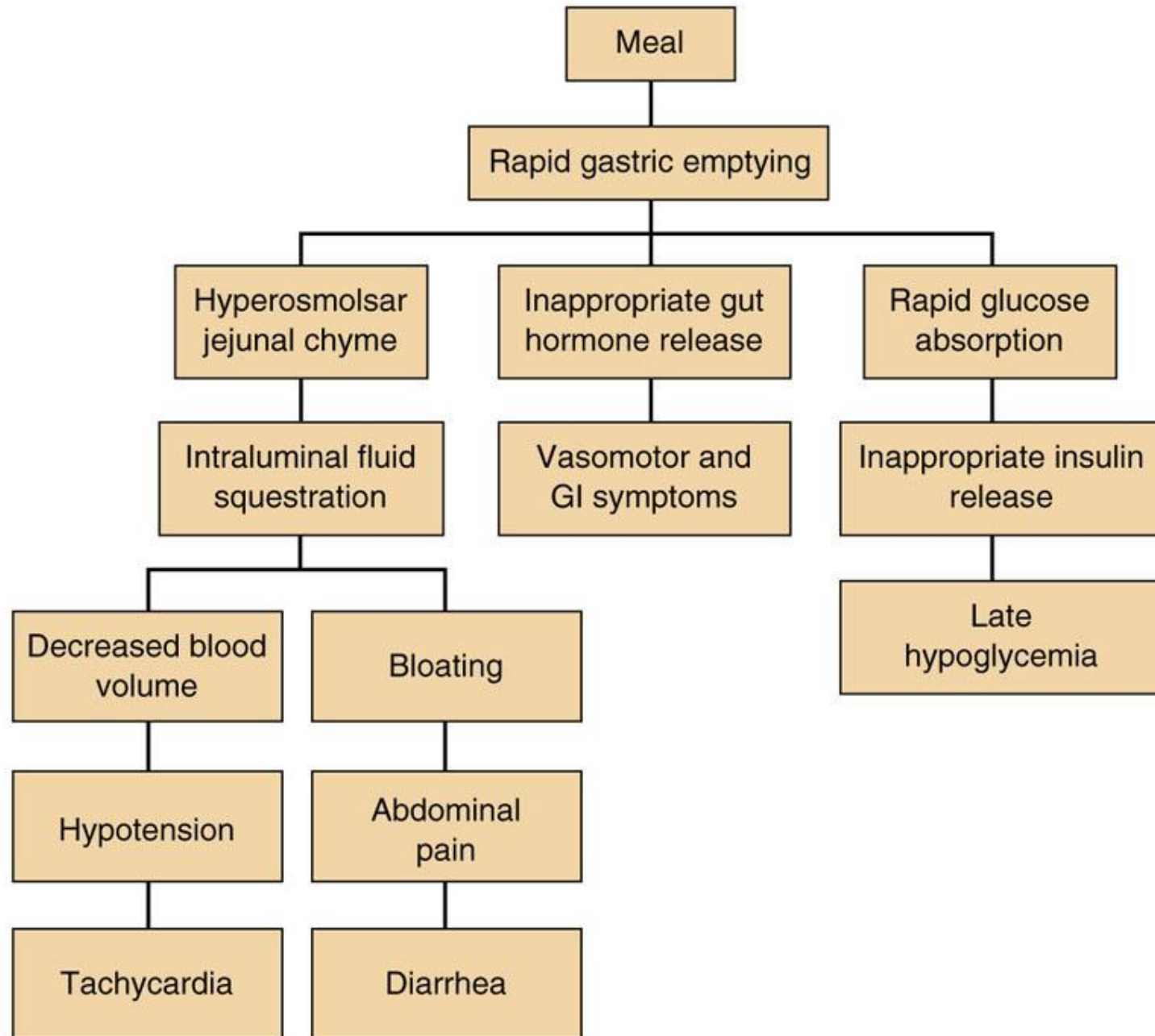
Pathophysiology - Stomach

- Gastric Surgery - Nutrition Implications
 - Reduced capacity
 - Changes in gastric emptying & transit time
 - Components of digestion altered or lost
 - Decreased oral intake, maldigestion, malabsorption

Pathophysiology - Stomach

- Gastric Surgery - Dumping Syndrome
 - Increased osmolar load enters small intestine too quickly from stomach
 - Release of hormones, enzymes, other secretions altered
 - Food “dumps” into small intestine

Pathophysiology of Dumping Syndrome



Pathophysiology - Stomach

- Gastric Surgery - Dumping Syndrome
 - Early dumping - 10-20 min.; diarrhea, dizziness, weakness, tachycardia
 - Intermediate - 20-30 min.; fermentation of bacteria produces gas, abdominal pain, etc.
 - Late dumping - 1-3 hrs.; hypoglycemia

Pathophysiology - Stomach

- Gastric Surgery - Dumping Syndrome
 - Other nutritional concerns: vitamin and mineral deficiencies, lack of intrinsic factor, iron deficiency, osteoporosis

Pathophysiology - Stomach

- Dumping Syndrome - Nutrition
 - “Anti-dumping” diet
 - Slightly higher in protein & fat
 - Avoid simple sugars & lactose
 - Calcium & vitamin D
 - Liquid between meals
 - Small, frequent meals
 - Lie down after meals
 - Assess for weight loss, malabsorption, and steatorrhea

TABLE 16.21

Nutrition Interventions after Gastric Surgery

Initially avoid all simple sugars. Do not start clear liquids as first oral feeding.

The first meals should consist of protein, fat, and complex carbohydrate, but with only one or two food items at a time. Patients may be initially lactose intolerant.

Slowly progress to five or six small meals each day with each containing a protein source such as eggs, meat, poultry, fish, milk, yogurt, cottage cheese, cheese, peanut butter, dried beans, lentils, or tofu.

Consume liquids 30 minutes to 1 hour after consuming solid food.

Lie down after eating.

Consider addition of functional fibers to delay gastric emptying and assist with treatment of diarrhea.