CHAPTER 10

The Gastrointestinal System

The gastrointestinal (GI) system takes in food, transforms it into nutrient molecules, absorbs these into the blood, and excretes whatever is indigestible. Many GI complaints in the ambulatory older population are not caused by organic disease but are functionally based. It should be kept in mind, however, that serious disruptions in this system can and do occur. Hiatal hernia, gallstones, diverticulosis, and cancer of the colon are especially prevalent in older adults. Thus, any complaint involving the gastrointestinal system should be thoroughly investigated.

The status of the GI system has significant influence on an individual's nutritional state because various disease conditions influence the absorption of nutrients and the ability to ingest a well-balanced diet. Furthermore, age-related changes in other body systems, the presence of diseases and their treatment, plus various psychosocial issues affect the ability of older adults to purchase and prepare food necessary to maintain adequate health. Whether or not individuals ingest the necessary carbohydrates, fats, proteins, vitamins, minerals, and water, and the manner in which they are digested once they are eaten, are also important variables. Because eating is a major source of satisfaction for older adults, we must be alert to specific age-related changes in the GI system and to major pathological conditions and medical treatments that may prevent or reduce the enjoyment of eating.

Symptoms of GI disturbances are often not those typically present in younger age groups. For example, older persons seem to complain less of pain when they have appendicitis or a peptic ulcer. GI bleeding might go unnoticed for days; even irritation and early perforation may not be as evident as in the young. Fever and an increase in white blood cell count are not always present when there is an infection. Furthermore, symptoms of diseases in other organ systems are often displayed as GI connected; changes in appetite, weight loss, or vomiting are symptoms that often indicate disease in other organ systems.

COMPONENTS AND FUNCTIONS OF THE GASTROINTESTINAL SYSTEM

The components of the gastrointestinal system are organized into two divisions:

1. The alimentary canal (the gastrointestinal or GI tract), a coiled, hollow, muscular tube with an opening at each end, digests food and absorbs digested particles into the blood. It consists of (a) mouth, (b) pharynx, (c) esophagus, (d) stomach, (e) small intestine (duodenum, jejunum, ileum), and (f) large intestine (cecum, appendix, colon, rectum, anal canal).
2. Accessory digestive organs and digestive glands consisting of (a) organs (teeth, tongue, gallbladder), (b) glands (liver, pancreas), and (c) salivary glands (parotid, submandibular, tubuloalveolar). These glands produce various secretions contributing to digestion (see Fig. 10.1).

Digestion

Food enters the mouth (ingestion) and is propelled through the gastrointestinal tract by swallowing and by involuntary peristalsis (contraction and relaxation) of the muscles in the walls of the esophagus, stomach, and small and large intestines. During this passage, food material is also acted on by mechanical and chemical digestion. *Mechanical digestion (breakdown of food material)* is accomplished by chewing movements in the mouth, churning movements in the stomach, and rhythmic contractions and relaxation in segments of the small intestine. *Chemical digestion* is a process in which enzymes secreted by the various digestive glands break down large food molecules into substances more readily absorbed through the lining of the GI tract. Carbohydrates are broken down into galactose, glucose, and fructose; fats into fatty acids and glycerol; and proteins into amino acids. These products are transported from the GI tract (mostly through the walls of the small intestine) to the blood and lymph systems. The large intestine then propels the undigestible material toward the anus, where it is expelled as feces (Marieb & Hoehn, 2013).

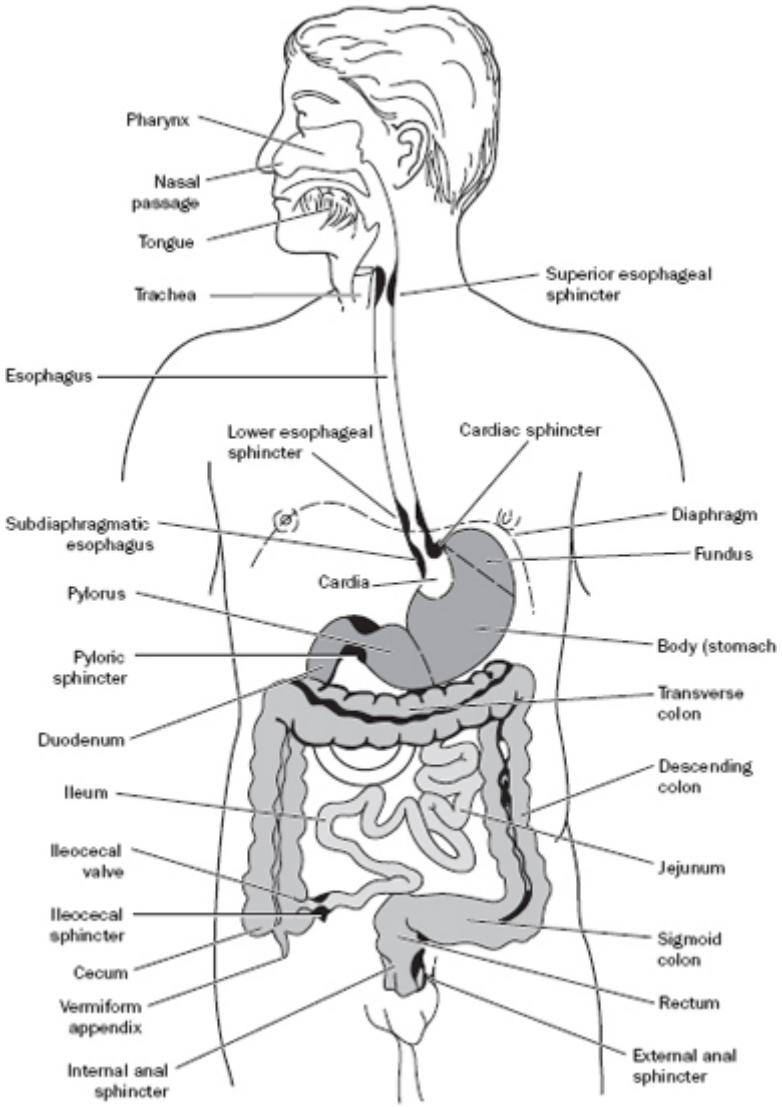

Figure 10.1. The digestive system.

The Mouth

When food enters the mouth, saliva is secreted by the salivary glands. The secretion of saliva is primarily a reflexive activity, although it is conditioned to some extent by learned experiences. For example, think of some food you like and your mouth

will probably “water”; the thought alone is sufficient to trigger a salivation response. Each day 2 or 3 pints of saliva are produced. The functions of saliva are (a) to moisten and lubricate mouth surfaces and thus aid in both speech and swallowing; (b) to partially dissolve food, which can then better stimulate the taste buds; (c) to lubricate food so it can be swallowed more easily; (d) to initiate the digestive process through the direct action of salivary enzymes; and (e) to act as a cleanser for the mouth cavity and teeth.

Thirty-two permanent teeth are located on the upper and lower jaw, and the tongue is attached to the floor of the mouth. When the jaws open and close, the tongue moves the food about, mixing it with saliva while the teeth chew it into smaller pieces to facilitate swallowing.

The Pharynx and Esophagus

During the act of swallowing, food of a suitable size is pushed back toward the throat by the tongue into the pharynx, the common passageway for both food and air. Once food reaches the pharynx, the act of swallowing becomes involuntary and is no longer under voluntary control. The swallowing center in the medulla and pons of the brainstem takes over swallowing action at this point. The pharynx contracts when food enters it, forcing food substances into the esophagus. The position of the tongue during the first stage of swallowing prevents food from returning to the mouth. Food does not normally pass into the nasal cavity because the soft palate moves up to block off the cavity, nor does food enter the larynx (the respiratory passage) because the muscles of the larynx seal off the laryngeal opening. At this time the vocal cords draw tightly together, and during the act of swallowing respiration is inhibited. Thus, food has but one place to go—into the esophagus and then into the stomach.

The rhythmic alternating muscular contractions and relaxations of peristalsis literally push food down the esophagus. Most food passes from the mouth to the stomach in 6 to 7 seconds. At the junction of the esophagus and stomach is a circular muscle called the cardiac or gastroesophageal sphincter that opens, allowing food to enter the stomach, and then closes to prevent regurgitation.

The Stomach

Located in the upper left side of the abdominal cavity, the stomach temporarily stores food while it is further broken down by chemical and mechanical action. Proteins are particularly acted on in the stomach. In its empty state, the stomach resembles a deflated balloon with longitudinal reggae (folds or creases). Its concave inner surface is called the lesser curvature, and the convex outer surface is called the greater curvature. Fortunately for those who enjoy eating, the stomach can expand (within limits) depending on the amount of food delivered to it.

About 30 to 40 million gastric glands are located in the stomach. These produce gastric secretions such as pepsin, a protein-digesting enzyme; lipase, a fat-digesting enzyme; hydrochloric acid, which causes the stomach to be very acidic, thus killing bacteria in the food; intrinsic factor, necessary for vitamin B_{12} absorption in the small intestine; and mucin, which produces an alkaline mucus that protects the walls of the stomach from the stomach’s highly caustic gastric juices.

Food in the stomach is continually pushed by peristaltic movements that churn, pulverize, and thoroughly mix it with gastric juices, breaking it down into a mushlike liquid called chyme. At the lower end of the stomach is the pyloric sphincter, a circular muscle separating the stomach from the small intestine and functioning as an effective strainer. It allows liquids to pass through first, carbohydrates next, then proteins, and lastly fats (the hardest and slowest to digest). The emptying of the stomach’s contents into the duodenum, the first section of the small intestine, is a gradual process usually completed in about 3 to 5 hours. Emotional states such as excitement, fear, anger, or grief inhibit gastric motility and alter glandular secretions.

The Small Intestine, Liver, Gallbladder, and Pancreas

Considered to be the major digestive organ of the body, the small intestine is a coiled tube connecting the stomach to the large intestine. It is the longest part of the alimentary system. Here the majority of absorption occurs and digestion is completed. It includes three sections: the duodenum, the jejunum, and the ileum. On the inner surface of the small intestine are fingerlike projections called villi, where digested food is absorbed into the blood and lymph systems. Food moves through the small intestine by peristaltic and segmentation action (contractions of segments of the small intestine), while rhythmical movements churn and mix it with bile, pancreatic, and intestinal juices to facilitate the absorption of carbohydrates, proteins, fat, vitamins, minerals, and water.

Glandular digestive secretions come from the liver, gallbladder, and pancreas. The liver, the largest gland in the body, is located primarily in the right upper section of the abdomen and contains four lobes. Arterial blood from the aorta enters the liver through the hepatic portal vein and empties into the inferior vena cava.

The gallbladder is located in a depression on the under surface of the liver. Bile, a fat emulsifier, is produced by the hepatocytes (liver cells) in the liver and is concentrated and stored in the gallbladder. Bile leaves the liver through the hepatic duct, which fuses with the cystic duct from the gallbladder to form the common bile duct entering the duodenum. Hepatocytes also store the fat-soluble vitamins A, D, E, and K, pick up nutrients from the blood, store glucose as glycogen, make plasma proteins from amino acids, and break down heme (iron-containing pigment) from hemoglobin to create bilirubin. They also play an important role in detoxifying substances such as drugs and alcohol.

The pancreas extends across the upper abdomen behind the stomach and is the largest enzyme producer in the body. It functions in two ways: through exocrine secretions that are carried through ducts and through endocrine secretions that empty hormones directly into the bloodstream. *Exocrine cells* secrete pancreatic juice-containing enzymes such as trypsin, amylase (which breaks down starches), and lipases (protein- and fat-digesting enzymes) via the pancreatic duct into the common bile duct, which enters the duodenum. *Endocrine glands* produce insulin and glucagon, which regulate the metabolism of carbohydrates in the islets of Langerhans of the pancreas.

The Large Intestine

Anatomically, the large intestine is about 5 feet long, is not arranged in folds as is the small intestine, and does not have villi on its interior surface. The first part of the large intestine, the cecum, is a pouch from which projects a narrow tube, the appendix, on the right side of the body. Rupture of the appendix is dangerous because body waste material is then expelled into the body cavity, resulting in peritonitis (inflammation of the abdominal cavity). The colon part of the large intestine includes ascending, transverse, descending, and sigmoid sections. The sigmoid colon joins the rectum, which merges with the anal canal and terminates in the anus. The anal canal has an internal involuntary anal sphincter and an external anal sphincter, which is under voluntary control.

Food residue enters the large intestine from the small intestine through a valve (ileocecal valve), which prevents backflow. In the large intestine, residue is subjected to strong muscle action that carries the remaining undigestible substances (feces) to the lower part of the large intestine (the colon), where periodically it passes into the rectum to be expelled through the anus. Defecation is a reflexive act initiated by the accumulation of feces in the rectum. Because voluntary control of the anal sphincter muscle is absolutely required for social acceptability, one of the most devastating assaults on self-image is to experience partial or total loss of bowel control.

Defecation habits vary greatly among individuals, and it is of practical importance in gerontological education to recognize that substantial variation is both common and normal. Relying on a laxative every day may do more harm than good because this easily fosters medicinal dependency. Dependence on laxatives leads to sluggishness of the intestinal musculature and a need for continued artificial stimulation. Such unnecessary dependence may set the stage for the development of serious gastrointestinal problems. Exercise, proper diet, and reduced stress promote regularity in normal GI systems at any age. These factors are especially important in older adults.

AGE-RELATED CHANGES IN THE GASTROINTESTINAL SYSTEM

Although age-related changes have been identified in the various components of the GI system, they evidently exert relatively little effect on overall functioning of the GI tract. The process of digestion slows with age and may become somewhat less efficient, but marked changes are not common and the system usually remains adequate to meet most reasonable demands imposed on it. In spite of this resilience, many older adults' complaints center around various gastrointestinal problems. Over the years, folklore and misconceptions about digestive functioning and age have played a considerable part in encouraging older adults to attribute various signs and symptoms of digestive malfunctions to age alone. It is much more likely that lifestyle factors such as poor dietary choices, lack of adequate fluid intake, lack of bulk in the diet, excessive straining when defecating, and lack of exercise are more responsible for many of the common GI complaints than age.

Specific age-related changes in the GI system are difficult to identify, but tend to include the following:

Mouth. Tooth enamel and dentin gradually wear down, making teeth more susceptible to cavities. Older teeth often appear darker or stained. In recent years the number of older adults without teeth has declined in the United States, probably because of better preventive dental care, although geographic and socioeconomic factors are important determinants of adequate dental care. Still, about 25% of adults 65 and older are without teeth (edentulous; Tabloski, 2014). Also, many older adults have dentures that often create discomfort. There is a decrease in saliva production, although the commonly reported dry mouth is more likely caused by nutritional disturbances, medication side effects, and pathological conditions rather than normal aging. Neuromuscular changes can affect chewing and swallowing and both tend to slow with age. Taste buds decrease in number with age, possibly affecting taste acuity and enjoyment of food.

Throughout life the mouth is exposed to continual trauma from substances ingested, such as alcohol, drugs, and nicotine, which may eventually accentuate age-related changes or produce disease. For these reasons it is often difficult to differentiate between pathological conditions and normal age-related changes.

Esophagus. Weaker smooth muscle of the esophagus and lessened sphincter motility (presbyesophagus) can cause delayed emptying of food into the stomach, although to what extent this occurs is somewhat debatable. If it does occur, it increases the risk of gastroesophageal reflux disease (GERD), which is quite common in older people. These changes may cause the older adult to have a feeling of fullness, difficulty in swallowing, pain beneath the sternum, and regurgitation of stomach contents back into the esophagus. Nevertheless, barring the effect of disease, only minimal changes in the esophagus have been found to be associated with age.

Stomach. There appears to be some slowing of gastric emptying with age. Decreased hydrochloric acid has long been assumed to be an age-related change, but research now suggests infection (especially with *Helicobacter pylori*) as a more likely cause of decreased hydrochloric acid.

Small intestine. With age a slight decrease in most digestive enzyme secretions is seen, which may affect the absorption of some nutrients. Also, decreased muscle tone may result in slower peristalsis, especially in those who are sedentary.

Large intestine. Both decreased anal sphincter tone and muscle tone can delay movement and expulsion of material from the large intestine, possibly contributing to constipation.

Liver, gallbladder, and pancreas. The liver decreases in size and weight but usually continues to function normally. Blood flow in the liver declines somewhat with age. Drug metabolism by the liver may become less efficient, especially in drug overload. With age, gallstones may tend to increase in the gallbladder. Fewer pancreatic enzymes are produced, but there is no appreciable decline in fat, carbohydrate, and protein digestion. Thus, although activities of these structures tend to slow with age, age-related effects appear to be relatively minimal.

For the most part, aging has little significant effect on GI functioning, although age-related changes may make older adults more susceptible to functional changes and GI disease. Gastrointestinal complaints should always be evaluated for possible pathological conditions rather than the effects of aging.

AGE-RELATED DISORDERS OF THE GASTROINTESTINAL SYSTEM

Age-Related Disorders of the Mouth

Multiple mouth problems may occur in older adults. These can develop from age-related changes in the mouth, poor nutrition, inadequate dental hygiene, decayed teeth, and bacterial invasion of the tissues. Various health disorders caused by endocrine, cardiovascular, and mental impairments also contribute to mouth problems. A number of medications, such as chemotherapy drugs or drugs prescribed for seizures, often irritate mouth tissues. Taste sensations can be diminished by loss of taste buds, mouth or gum inflammation, smoking, and the ingestion of alcohol or other toxic substances.

Xerostomia (dry mouth). Some older persons suffer from dry mouth resulting from a variety of causes, such as decreased salivary secretions, dehydration, diabetes, hormonal or vitamin deficiencies, anemia, and radiation therapy. About 400 drugs cause xerostomia, primarily the antihistamines, antipsychotics, antidepressants, antianxiety drugs, antihypertensives, anticholinergics, decongestants, and diuretics (Linton, 2007; Tabloski, 2014). Alcohol and tobacco use add to mouth problems. To compensate for dry mouth, older adults sometimes “dunk” their food in liquids to promote ease of chewing. Synthetic saliva or oral swab sticks help rehydrate the mouth. A careful review of an individual’s drug regimen should be undertaken with a view to discontinuing drugs causing dry mouth if they are not absolutely needed. Increasing fluid intake, chewing gum, or using sugar-free mints are also helpful.

Dysphagia (difficulty swallowing). Dysphagia results from a variety of causes, such as weakened muscles of the esophagus, less efficient sphincter functioning, loss of teeth, poorly fitting dentures, atrophy of chewing muscles, and decreased salivation. A stroke or accident may suddenly impair swallowing, whereas diseases such as Parkinson’s, myasthenia gravis, and multiple sclerosis or pharyngeal tumors gradually interfere with swallowing (Eliopoulos, 2014; Stamm, Wiersema-Bryant, & Ward, 2011).

Swallowing usually takes about 20 seconds. A normal swallow has three stages: the oral stage, in which food is mixed with saliva to form a bolus ready to be swallowed; the pharyngeal stage, when the bolus is propelled into the esophagus; and

the esophageal stage, in which the bolus is sent to the stomach by peristaltic activity (Tabloski, 2014). Impairment in swallowing is best diagnosed by a multidisciplinary team of therapists, dietitians, physicians, and nurses. Assessment involves observing the swallowing reflex, the pocketing of food in the mouth, choking or coughing, spitting or leaking food from the mouth, and regurgitating food through the mouth or nose. A swallowing video fluoroscopy or modified barium swallow helps to analyze the stages of swallowing and diagnose the difficulty more accurately.

Efforts to promote adequate swallowing and food intake include reducing distractions and increasing the time allowed for swallowing. Some individuals need to swallow twice to empty the pharyngeal tract. Those with difficulty swallowing should sit up straight, have the head flexed forward when they swallow, and remain upright for at least 15 minutes after eating. After a stroke involving the mouth and throat, it helps to place the food on the unaffected side of the mouth with the spoon placed on the tongue and rocked back and forth. Do not touch the teeth or place the spoon too far down the mouth. At times it may be helpful to hold the mouth shut during swallowing or retrieve food from the cheek if it is stored there. If liquids are not readily swallowed, they may need to be thickened. Never wash down food with liquids. Teaching the individual and family methods to facilitate swallowing is very important for recovery of function and for safety (Donahue, 1990). Speech therapists are professionals trained to rehabilitate individuals with swallowing disorders.

Dental caries. Dental caries involves progressive loss of tooth surfaces linked with bacterial plaque. There are two types of dental caries: (a) coronal, involving the tooth enamel; and (b) root caries, located around the tooth root. The latter is more prevalent in older adults. Some factors considered as causes of caries formation in the general population are smoking, increased carbohydrate in the diet, susceptible teeth, plaque formation, and bacteria in the mouth (Kart, Metress, & Metress, 1992). Older adults are at higher risk for caries because of decreased saliva production, which reduces adequate cleaning of the teeth and gums; recessed gums that expose root surfaces; chronic disease; dry mouth; and lack of effective mouth and tooth care. Prevention of caries depends on daily brushing and flossing, as well as at least a biyearly dental assessment and professional teeth cleaning. Other preventive measures include topical applications of fluoride, chewing fibrous foods, and reducing carbohydrate intake, especially soft, sticky, sugary snacks.

Periodontal disease. Bacteria in gum crevices surrounding the roots of the teeth cause gingivitis (inflammation of the gums) and, if not treated, periodontitis with bone involvement. Risk factors include smoking, diabetes, nutrition, some medications, stress, and illnesses. Calcified deposits around teeth also contribute to periodontal disease. Because periodontitis is asymptomatic until it has progressed significantly, it is considered a leading cause of tooth extractions in middle and late adulthood. It also contributes to systemic infections in older adults (Eliopoulos, 2014). Signs of periodontal disease are bleeding gums, bad breath, permanent teeth that are loose, any change in the bite, and any change in the way partial dentures fit.

Treatment programs include regular dental assessments, plaque removal, brushing and flossing, gum surgery, and bone grafts if needed. Older disabled individuals may benefit by using assistive devices that help them hold a toothbrush and dental floss and by learning how to do good preventive care themselves. Health care providers are responsible for thousands of older adults in short- and long-term health care settings, so concerted efforts are necessary to teach nurses and nursing assistants effective mouth care techniques. An even greater challenge involves continual monitoring of mouth care provided to older residents of nursing homes to ensure it is adequate.

Oral cancer. Oral cancer appears in many forms in older adults. Lumps, swelling, a sore throat that does not heal, white scaly patches (leukoplakia), persistent pain, numbness, and bleeding of mucous membranes of the tongue and mouth are all warning

signs. These symptoms may be mostly prevented by an adequate diet, appropriate vitamin intake, and regular observation of mouth and tongue tissues, especially if dentures or jagged teeth cause continual irritation or if the individual is a smoker or drinks alcohol, two major risk factors for oral cancers.

Leukoplakia can be a precursor to cancer, and any white scaly patch or reddened area in the mouth should be assessed by a dentist or primary care practitioner for diagnosis, biopsy, and treatment. Most cancerous lesions are squamous cell cancers and need to be identified early. Treatment depends on type of lesion, size, and location. Surgery, radiation, and chemotherapy are the most common treatment options (Tabloski, 2014). Regular dental checkups and teaching older adults and caregivers how to inspect the mouth and tongue tissue are imperative for prevention or early detection.

Age-Related Disorders of the Esophagus

Chronic complaints of discomfort by older adults, such as heartburn, substernal pain, belching, and general discomfort in the region above the stomach, often relate to the esophagus. Often esophageal pain is thought to be cardiac pain. Whether it is esophageal reflux (backflow), spasm of the sphincter, or esophagitis (inflammation of the esophagus) caused by acid reflux, a diagnosis of the complaint is essential. Whereas anginal pain (caused by spasms of the coronary arteries that supply blood to the heart muscle) presents as pressurelike pain on exertion with accompanying blood pressure or pulse changes, esophageal pain is associated with eating; lying down; stooping; or drinking tea, coffee, or acidic juices. Obesity, smoking, and overeating contribute to esophageal reflux. Anginal pain usually responds to nitroglycerin, whereas esophageal pain is relieved by medications such as antacids, sitting upright, or taking antispasmodic drugs (Heitkemper & Carnevali, 1993; Tabloski, 2014). “Pill esophagitis” is esophageal injury caused by pills that do not pass to the stomach but remain in the esophagus. To prevent this, medications should be taken sitting upright and with at least 8 ounces of water.

Cancer of the esophagus. The incidence of cancer of the esophagus has decreased somewhat, but most people who develop esophageal cancer are older, often between 50 and 70 (Eliopoulos, 2014). Ninety-five percent of esophageal cancers are squamous cell cancers, which are caused by poor oral hygiene, alcohol abuse, or smoking. Initially, individuals with this cancer may have difficulty swallowing solids; later, the difficulty extends to liquids. Diagnosis is confirmed by viewing the esophagus with a scope, computed tomography (CT) and MRI scans, barium swallow, and biopsy. Sections of the esophagus may be surgically removed, followed by chemotherapy or radiation therapy. Laser therapy and photodynamic therapy are also possible treatment options. Often, however, diagnosis is made too late for a positive prognosis.

Gastroesophageal reflux disease. Gastroesophageal reflux disease (GERD) occurs in individuals who have had a long history of reflux esophagitis, especially those older than age 65 (Tabloski, 2014). It is the most common upper GI problem in adults (Heitkemper, 2007). In GERD, stomach contents flow up into the esophagus and irritate it. Symptoms may include mild or more severe heartburn, indigestion, severe chest pain, regurgitation, and dysphagia. GERD may be exacerbated by medications; certain foods or liquids such as coffee, alcohol, citrus, and spicy foods; eating meals high in fat; and eating 2 to 3 hours before bedtime. In addition, smoking, obesity, and anxiety also contribute to GERD. Sometimes cancer in the form of Barrett’s esophagus occurs in those with GERD when symptoms are not well controlled.

Diagnosis is made by taking a personal history, barium studies, and upper gastroscopy with biopsy. Treatment involves lifestyle modifications and drug therapy. Elevating the head of the bed; reducing the size of the evening meal; avoiding caffeine, alcohol, fat, and chocolate; and reducing weight are all appropriate. Antacids, histamine receptor antagonists (also called histamine blockers), and proton pump inhibitors (PPIs) are useful in controlling symptoms. Surgery is available if other treatments do not reverse esophageal erosion (Heitkemper, 2007; Linton, 2007; Tabloski, 2014).

Hiatal hernia. In hiatal hernia, a portion of the stomach slides or rolls up through the opening where the esophagus passes through the diaphragm. Hiatal hernias are classified as sliding, in which a part of the stomach slides into the chest cavity, especially when lying down, or rolling or paraesophageal, in which part of the stomach rolls up through the diaphragm, forming a pocket alongside the esophagus. Probable causes of hiatal hernia include muscle weakness around the diaphragmatic opening, kyphosis (hunchback), scoliosis (lateral curvature of the spine), and straining during bowel movements. Other major risk factors are obesity, smoking, and age. Hiatal hernia may be present for years but go unnoticed until symptoms such as heartburn, regurgitation, belching, difficulty swallowing, indigestion, or chest pain occur. Symptoms should always be assessed by a primary care practitioner. Diagnosis usually involves a barium swallow and esophagoscopy (Eliopoulos, 2014). Individuals with hiatal hernia are advised to eat three small meals each day, refrain from eating 3 to 4 hours before going to bed, elevate the head of the bed 3 to 6 inches, maintain weight within a normal range, avoid straining and stooping, take antacids 1 to 3 hours after meals and before bedtime, and avoid alcohol, chocolate, fats, peppermint, and smoking. In some cases surgery is required to repair the hernia.

Age-Related Disorders of the Stomach

Gastritis (inflammation of the stomach). Gastritis is an inflammation of the stomach mucosa. It may be acute or chronic, diffuse or localized. A common cause is *Helicobacter pylori* infection. This infection is typically acquired in childhood and often presents as chronic gastritis. Older adults may be more prone to this infection because they grew up in a time when sanitary standards were not as rigid as today (Ignatavicius, 2013a; Linton, 2007).

Other common causes of gastritis are long-term nonsteroidal antiinflammatory drug (NSAID) use, which often causes irritation of the gastric mucosa, and lifestyle factors such as excessive alcohol intake and eating large quantities of spicy, irritating foods (Heitkemper, 2007). Symptoms include belching, abdominal pain, nausea and vomiting, heartburn after meals, and a poor appetite.

Diagnosis generally includes endoscopy studies with possible biopsy, stool samples, and serum antibody tests. Treatment for acute gastritis involves finding the specific cause and eliminating it or avoiding it. Drugs provide symptom relief and reduce the irritation of the gastric mucosa. Treatment for chronic gastritis focuses not only on finding and eliminating the cause but also on appropriate lifestyle modifications and adherence to strict drug regimens. Gastritis often precedes gastric ulcers.

Gastric (peptic) ulcer. A gastric ulcer is an erosion of the mucous membrane of the lower esophagus, stomach, pylorus (the lower portion of the stomach opening into the duodenum), or duodenum. This type of ulcer is common in older people, and they are more likely to have complications than younger adults. It often begins as an acute condition and gradually becomes chronic over the years. Its symptoms are usually milder and less specific than in those who are younger, so diagnosis is more difficult. However, morbidity and mortality rates are higher for older adults than for the general population. *Helicobacter pylori* infections are found in approximately 90% to 95% of those with duodenal ulcers.

Typical symptoms are pain in the upper abdomen, weight loss, nausea, vomiting, and thirst, although many older adults do not report these symptoms until major complications occur. Older adults showing unusual weight loss, general debility, anemia, or any abdominal distress should be suspected as possibly having a gastric ulcer. A review of medications is advised because many medications such as NSAIDs and anticoagulant drugs cause stomach irritation. Smoking and chronic alcohol abuse are also significant factors. Bleeding is the most common complication and accounts for one half to two thirds of all fatalities related to ulcers. Perforation is another major complication of gastric ulcer disease and involves spilling gastric or

duodenal contents into the peritoneal cavity. A third major complication is gastric outlet obstruction, in which emptying stomach contents is slowed and eventually becomes virtually impossible.

Diagnosis relies primarily on endoscopy, as well as serum antibody tests, gastric analysis, blood tests, and stool examination. Other diagnostic procedures may be added as needed. Treatment includes drugs such as histamine-2 (H_2) receptor antagonists or proton pump inhibitors (the drugs of choice) to decrease gastric secretion, reduce spasms, or reduce hydrochloric acid. Antacids and antibiotics are also useful therapeutic regimens and can be effective in reducing symptoms and preventing reoccurrences. Individuals are encouraged to stop smoking; reduce stress; rest; eat three meals a day of well-tolerated foods; and avoid coffee (both caffeinated and decaffeinated), cola, tea, meat extracts, very hot or cold foods, and irritating drugs (Smeltzer & Bare, 1992). Surgery may be necessary for those who do not respond to medical and lifestyle management.

Cancer of the stomach. Stomach cancer is common in individuals who have little or no hydrochloric acid in the stomach or who have chronic gastritis. Dietary factors, smoking, obesity, *H. pylori* infections, and gastritis are risk factors. Early symptoms are few or absent, but in time weight loss, anorexia (loss of appetite), abdominal pain, nausea, vomiting, and anemia occur. Viewing the stomach with a scope and obtaining a biopsy of tissue is the usual diagnostic procedure. Ultrasound, CT scanning, and upper GI barium studies help in more precise diagnosis. Blood studies and stool examination are also useful diagnostic tools. Surgery is the treatment of choice, but this cancer is often discovered only in the later stages, when metastasis (spreading) has already occurred. Chemotherapy or radiation therapy may then be used to control the disease or alleviate symptoms (Heitkemper, 2007).

Age-Related Disorders of the Small Intestine

Although the small intestine is less often diseased than other parts of the GI system, obstructions characterized as mechanical or paralytic may occur. Both antibiotics and surgery are used for treatment, depending on the specific cause. Ischemia (decrease of blood supply to the intestines) or even infarcts (occlusion of the blood vessels serving the intestine) may occur as a result of cardiac failure or thromboembolisms (blood clots). Other causes of obstruction include strangulation (a constriction or shutting off of the blood supply to the bowel), radiation injury, and local irritants. Cancer is rare in the small intestine but it can occur, even in the appendix (Kart, Metress, & Metress, 1992). Surgery is usually the treatment of choice.

Age-Related Disorders of the Large Intestine

Appendicitis. Appendicitis is the most common inflammatory lesion of the bowel. It is not rare in older adults, but its classic signs and symptoms, such as fever and severe abdominal pain, are often absent. The individual becomes acutely ill and may even die if the cause is not identified quickly enough. Those who are obese, have diabetes, or whose appendix is retroperitoneal (behind the peritoneum) are most likely to be symptomless. Often appendicitis is not diagnosed until the attack begins to subside. Confirming diagnostic tests are ultrasound or CT scans. Surgery is not performed until the condition is stabilized. Antibiotics are often used to reduce inflammation and infection.

Diarrhea. Diarrhea is generally more serious in older adults than in younger persons because the homeostatic equilibrium of the elderly is more precarious. Rapid loss of fluid in older age can quickly lead to dehydration and electrolyte imbalance, both potentially life-threatening conditions. Factors contributing to diarrhea include fecal impaction, laxative abuse, intestinal infections, medications, diverticulitis, malignancy, and food or water impurities. It is not uncommon for older adults to have

alternating bouts of constipation and diarrhea, although usually one will be more dominant. Any change in bowel habits, especially if persistent over a few weeks or accompanied by pain, fever, or weight loss, should be thoroughly investigated by a primary care practitioner.

Diagnosis involves a thorough history, laboratory tests, stool analysis, and a colonoscopy or radiological studies with barium contrast. Treatment involves adequate fluids and electrolytes such as sodium, chloride, potassium, calcium, bicarbonate, and magnesium. Antidiarrheal medications to slow peristalsis in the intestines are also commonly prescribed, but only for a short period.

Constipation. *Constipation* is defined as difficulty in passing hard, dry stools or as a decrease in the frequency of an individual's normal pattern of elimination. Normal patterns of bowel elimination vary considerably from one person to another. For instance, a normal pattern for one person might be one or more bowel movements a day, but another person may have three or fewer a week. Some older adults believe "regularity" means a bowel movement every day; if this does not happen, they believe they are constipated. Therefore, complaints about constipation must be evaluated carefully and always with reference to normal bowel activity for that particular person.

Factors contributing to constipation include (a) slowed intestinal motility with age, although generally this is not a highly significant factor for most older adults; (b) too little bulk in the diet and reduced fluid intake; (c) certain medications; (d) depression; (e) lack of exercise; and (f) cancer of the colon and a variety of other medical conditions. Some of these factors involve lifestyle choices and can therefore be modified quite easily.

Guidelines to help avoid constipation include the following:

(a) Drink 8 or more glasses of water a day.
(b) Eat high-fiber foods regularly.
(c) Avoid refined carbohydrates.
(d) Exercise regularly.
(e) Allow adequate time for bowel movements when the urge to defecate occurs.
(f) Do not use laxatives for prolonged periods.
(g) If constipation persists, get a complete medical evaluation.

In most cases constipation in older adults can be resolved with non-medical approaches. Only a few require the use of selected medicines. Fiber-rich foods, increased fluid intake, and regular exercise are highly recommended. Other possibilities are synthetic bulk agents, and some medications that also include stool softeners. Laxatives that are irritating should be avoided. To reiterate, the use of laxatives regularly is not recommended because they may injure the mysenteric plexus and actually reduce the ability to relieve constipation.

Because there are many reasons for constipation, ranging from functional reasons to serious pathological conditions, any change in usual bowel habits over several weeks, especially if accompanied by weight loss, fever, or pain, should be thoroughly investigated by a qualified primary care practitioner.

Diverticulosis and diverticulitis. Diverticulosis is the presence of pouches in the intestinal wall and is very common in older adults. It may occur in either the small or large intestine but typically in the large intestine. If inflammation occurs in a pouch, diverticulitis results. Complications of diverticulitis include possible perforation, abscess, and bleeding. Diverticular disease affects about 50% of the U.S. population by the age of 80. Weakened muscle mass, diets high in refined carbohydrates, and

lack of dietary fiber are assumed to be primary causes. Most individuals with diverticulosis experience no pain, but if diverticulitis develops, pain in the left lower quadrant, fever, and abdominal tenderness are common.

Diagnosis uses blood studies, urinalysis, radiographs, ultrasound, and CT scans as well as a thorough physical examination. A barium enema or colonoscopy may be desirable if the individual does not have acute diverticulitis because there is danger of the possibility of perforation if the situation is acute. Treatment revolves around dietary modifications to include high fiber intake, weight reduction, and a regular exercise regimen (but not exercises that increase intraabdominal pressure). For those with complications, bowel resection or colostomy may be necessary.

Cancer of the colon and rectum. Colorectal cancer (cancer of the colon and rectum) is one of the most common malignancies and the third most common cause of cancer death in the United States (Ignatavicius, 2013b). Incidence increases throughout life and almost doubles for each decade older than age 50. Some of these cancers develop from polyps (tumors on a stem) in the colon that grow slowly over time, and symptoms do not occur until the disease is quite advanced. However, other flat growths in the colon are now known to be more likely to be cancerous than polyps (Marieb & Hoehn, 2013). Risk factors include (a) age older than 50, (b) history of rectal and colon polyps, (c) personal and family history of rectal and colon polyps, (d) history of chronic inflammatory bowel disease, (e) diet high in fat and low in fiber, (f) lack of exercise, (g) smoking, and (h) drinking more than two alcoholic drinks a day.

The signs and symptoms of colon cancer include changes in bowel habits, rectal bleeding, weakness, and weight loss. Symptoms may not occur until after the cancer has been present for some time, and pain is often not experienced until late in the disease.

Diagnostic procedures generally involve a thorough history and physical examination, fecal occult blood test, sigmoidoscopy, colonoscopy, ultrasound, CT and MRI scans, and complete blood work. Treatment is dependent on the stage of cancer involvement. Malignant tumors may be removed with a colo-noscope or laser, but when the tumor has invaded the walls of the intestine, a colon resection and possibly a colostomy (opening of the bowel through the abdomen) or lymph node removal may be necessary. Radiation and chemotherapy are also used, as is biologic or targeted therapy as deemed necessary.

The American Cancer Society (www.cancer.org) recommends the following protocol of preventive measures for cancer of the colon.

Beginning at age 50, both men and women should follow one of these testing schedules:

- Flexible sigmoidoscopy every 5 years *or*
- Colonoscopy every 10 years *or*
- Double contrast barium enema every 5 years *or*
- CT colonography (virtual colonoscopy) every 5 years

Additional recommendations include the following:

- Obtaining a fecal occult blood test, which identifies blood in the stool not seen by visual examination, every year after age 50 *or* a yearly fecal immunochemical test
- Increasing fruit and vegetable intake, lowering dietary fat to 20% to 25% of total calories (mostly unhydrogenated types from plant origins or unsaturated fats), and getting the majority of carbohydrates from whole grains; limiting red meat; and ensuring adequate intake of calcium, vitamin D, antioxidants, and folic acid
- Exercising at least 30 minutes a day, avoiding smoking, maintaining a healthy weight, and limiting alcohol use

Hemorrhoids. Hemorrhoids are varicose veins in the anal canal. External hemorrhoids appear outside the external anal sphincter and internal hemorrhoids appear above the internal anal sphincter. Chronic constipation, straining during bowel movements, and prolonged sitting contribute to hemorrhoids. Symptoms include rectal itching, protrusion of the internal hemorrhoids into the anal canal, bleeding during bowel movements, and pain related to the external hemorrhoids. Hemorrhoids can be diagnosed by digital examination and sigmoidoscopy or colonoscopy. Treatment depends on size but generally involves a high-fiber diet and adequate fluids, along with stool softeners, sitz baths, and suppositories of hydrocortisone cream, topical anesthetics, or analgesics. If hemorrhoids continue to bleed, itch, or cause pain, nonsurgical procedures or surgical removal may be the treatments of choice. Nonsurgical methods include rubber band ligation or cryotherapy (rapid freezing of the hemorrhoid). Surgical procedures involve surgical excision of the hemorrhoid (hemorrhoidectomy).

Age-Related Disorders of the Pancreas

Cancer of the pancreas. Cancer of the pancreas is a leading cause of cancer death in the United States. It is difficult to diagnose early and is usually first discovered in the late stages of development. Known risk factors are age, diabetes, smoking, alcohol use, family history, high-fat diet, and exposure to certain chemicals (Heitkemper, Croghan, & Cox-North, 2007). Initially symptoms may be vague, but eventually anorexia, weight loss, fatigue, chills or fever, possibly pain, and jaundice occur. Transabdominal ultrasound, CT, and MRI scans are commonly used in diagnosis. Tumor markers are also used, but these techniques generally only detect advanced stages of the disease. Chemotherapy or radiation may relieve pain and shrink the tumor somewhat but have minimal success in increasing survival time. Surgery is the most effective treatment, but prognosis for pancreatic cancer is poor because it is often not diagnosed early enough.

Age-Related Disorders of the Liver

Cirrhosis. Cirrhosis of the liver involves inflammation and degeneration of the liver. Its highest incidence is in men, and most who acquire it are between the ages of 40 and 60. Four types of cirrhosis have been identified: (a) alcoholic, caused by alcohol abuse; (b) postnecrotic, a complication of hepatitis; (c) biliary, associated with biliary infection or obstruction; and (d) cardiac, from severe right-sided heart failure. Early symptoms include GI disturbances, fever, and enlargement of the liver as a result of cells filled with fat. The liver takes on a “hobnail” appearance. Weakness, weight loss, jaundice, and later chronic liver failure and circulation obstruction are common.

Diagnosis of cirrhosis involves liver function studies. Treatment is long term and tedious, focusing primarily on a diet high in carbohydrates, proteins, and vitamins. Fat intake must be limited. Antacids are used to relieve gastric distress, often vitamins are prescribed, and potassium-sparing diuretics are used to relieve fluid buildup in the abdomen. Rest is necessary and alcohol consumption is prohibited (Heitkemper, Croghan, & Cox-North, 2007).

Age-Related Disorders of the Gallbladder

Gallstones (cholelithiasis). Cholelithiasis is the presence of stones in the gallbladder and cholecystitis is the inflammation of the gallbladder, usually associated with cholelithiasis. Incidence is higher for women and individuals older than 40 years. Other factors significant in the occurrence of gallbladder disease are familial tendency, obesity, and sedentary lifestyle. Cholelithiasis can occur with infections and disturbance in cholesterol metabolism or any other circumstance in which the balance of cholesterol, bile salts, and calcium is changed so that precipitation of these substances occurs. Stones often stay in

the gallbladder with no symptoms, but if they migrate to the cystic duct or common bile duct they can be extremely painful. Symptoms are upper right quadrant pain, nausea, vomiting, jaundice, and inability to tolerate fatty foods. If the duct is obstructed, dark urine and light-colored stools are typical.

Diagnosis involves ultrasonography and is 90% accurate in detecting the presence of stones. Laboratory tests are useful in determining inflammation. Laparoscopic surgical removal is the most common treatment, and it is usually quite effective. Medicines that dissolve the stones may also be used if surgical procedures are not deemed appropriate (Heitkemper, Croghan, & Cox-North, 2007).

SUMMARY

Although the gastrointestinal tract is the focus of numerous complaints by older adults, it stands the test of time better than some of the other organ systems in the human body. Many gastrointestinal complaints in older age result from inappropriate or unhealthy lifestyle behaviors rather than from the aging process per se. It is believed that many functional disorders and diseases can very likely be avoided by more careful attention and adherence to healthy diets, regular exercise, stress reduction, and other positive health regimens.

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