

GENERAL PATHOLOGY

The Digestive System

The digestive system is composed of a continuous tract beginning with the oral cavity and ending at the anus. This tract, called the alimentary canal or the gastrointestinal (GI) tract, is complemented by accessory organs that convert food and fluids into a form that permits the body to absorb nutrients.

The GI tract is divided into two sections: the upper GI tract, which consists of the oral cavity (mouth), esophagus, and stomach, and the lower GI tract, which consists of the intestines.

• Six Functions of the Digestive System

1. Ingestion

2. Mechanical processing

3. Digestion

4. Secretion

5. Absorption

6. Excretion.

The Upper Gastrointestinal Tract Digestion: begins in the oral cavity where food is broken apart by mastication, which is a technical term for chewing.

Saliva produced by the salivary glands moistens the food.

From the pharynx, the food bolus passes into the esophagus where it is lubricated with mucus before being carried into the stomach by wavelike muscular contractions called peristalsis.

The stomach is the center of the system, both physically and functionally. Its first job is to act as a temporary storage place for the food while it does its second job: secreting acid and enzymes to help break down proteins, fats, and carbohydrates.

The partially digested food (chyme) passes through the pyloric sphincter, a muscle at the distal end of the stomach, and into the duodenum.

The Lower Gastrointestinal

Tract The lower GI tract begins with the small intestine, which extends from the pyloric sphincter to the first part of the large intestine.

Although it is about 20 feet in length, it is known as the small intestine because it is smaller in diameter than the large intestine.

The small intestine is divided into three parts:

the duodenum, jejunum and ileum. From the duodenum, chyme moves into the jejunum and from there into the ileum.

The ileocecal sphincter controls the flow from the ileum into the cecum, the first part of the large intestine.

Accessory Organs

The salivary glands, liver, gallbladder, and pancreas, although not part of the alimentary canal, play a key role in the digestive process and are referred to as accessory organs of the digestive system.

Salivary Glands

The senses of taste and smell stimulate the salivary glands to secrete saliva, a watery liquid that contains enzymes that begin the digestive process. Saliva also helps eliminate bacteria in the mouth and keeps the teeth and tongue clean.

Liver

The liver, located in the upper right quadrant of the abdomen under the dome of the diaphragm, plays many important roles in digestion, metabolism, and detoxification of harmful substances.

One of its main digestive functions is the manufacture and secretion of bile. Our bodies need bile to process fats before they are released into the bloodstream.

Once bile is produced in the liver, it travels down the common bile duct to the gallbladder for storage.

Gallbladder

Although the liver produces and recycles bile, the gallbladder, which is located in a depression under the liver, stores, condenses, and delivers the bile to the small intestine.

Pancreas

The pancreas is an elongated feather-shaped organ that lies posterior to the stomach. It has both digestive and endocrine functions. It produces digestive enzymes that aid in processing carbohydrates and fats in foods as well as secreting hormones directly into the bloodstream.

Disorders of the Upper Gastrointestinal Tract

- **Parotitis**: is an inflammation of the parotid gland.

Dysphagia: difficulty in swallowing.

- **Esophagitis:** inflammation of the esophagus.
- **Hiatus** [from the Latin word hiatus (opening); -al (adjective suffix)] hernia [the Latin word hernia (rupture)]: stomach protruding into the thoracic cavity.
- **Gastroesophageal reflux disease:** upward flow of stomach acid into the esophagus.
- **Gastritis:** inflamed gastric mucosa.

Acute gastritis is usually transient in nature.

The inflammation may be accompanied by hemorrhage into the mucosa (acute hemorrhagic gastritis) and, sometimes by sloughing (erosions) of the superficial mucosa (acute erosive gastritis).

The latter is a severe form of the disease & an important cause of acute gastrointestinal bleeding.

Although a large number of cases have no obvious cause (idiopathic), acute gastritis is frequently associated with

1. Heavy use of nonsteroidal anti-inflammatory drugs (NSAIDs), particularly aspirin, cancer chemotherapeutic drugs, or radiation
2. Excessive consumption of alcohol, heavy smoking, and ingestion of strong acids or alkali as in suicidal attempts
3. Uremia
4. Severe stress (e.g., trauma, burns, surgery)
5. Mechanical trauma (e.g., nasogastric intubation)
6. Distal gastrectomy (reflux of duodenal contents).

Chronic Gastritis is defined as "chronic inflammation of the gastric mucosa that eventuates in mucosal atrophy and intestinal metaplasia". The epithelial changes may progress to dysplasia, which constitute a soil for the development of carcinoma.

The major etiologic associations of chronic gastritis are:

1. Chronic infection by *H. pylori*
2. autoimmune damage
3. Excessive alcohol consumption & heavy cigarette smoking
4. post-antrectomy (due to reflux of bile-containing duodenal secretions)
5. Outlet obstruction, uremia, and other rare causes

PEPTIC ULCER DISEASE

An ulcer is defined as "a breach in the mucosa of the alimentary tract that extends into the submucosa or deeper."

Although they may occur anywhere in the alimentary tract, they are most common in the duodenum and stomach.

Ulcers have to be distinguished from erosions.

The latter is limited to the mucosa and does not extend into the submucosa.

Peptic Ulcers are chronic, most often solitary lesions and usually small. They occur in any portion of the GIT exposed to the aggressive action of acid-peptic juices.

The male-to-female ratio for duodenal ulcers is 3:1, and for gastric ulcers 2:1. Women are most often affected at or after menopause.

The complications of peptic ulcer disease are:

1. Bleeding is the most frequent complication (20%). It may be life-threatening; fatal in 25% of the affected patients. It may be the first warning of an ulcer.
2. Perforation is much less frequent (5% of patients) but much more serious being fatal in 60% of patients.
3. Obstruction (from edema or scarring) occurs in 2%, most often due to pyloric channel ulcers but may occur with duodenal ulcers. Total obstruction with intractable vomiting is rare.
4. Malignant transformation does not occur with duodenal ulcers and is extremely rare with gastric ulcers.

Disorders of the Lower Gastrointestinal Tract

- **Appendicitis:** a common acute inflammatory disease. The appendix can become abscessed and may rupture, causing peritonitis (an inflammation of the peritoneum, which is the sac that lines the abdominal cavity).
- **Cholelithiasis:** a condition in which stones reside in the gallbladder or bile ducts.
- **Cholecystitis:** inflammation of the gallbladder.
- **Hepatitis:** inflammation of the liver
- **Jaundice:** a symptom of hepatitis characterized by a yellow appearance of skin or eyes.
- **Cirrhosis of the liver:** chronic liver disease.

Colonoscopy: visual examination of the colon with a colonoscope

TUMORS

Benign Tumors

Leiomyomas are the most common benign tumors of the esophagus.

Malignant Tumors

Carcinomas of the esophagus

(5% of all cancers of the GIT) have, generally, a poor prognosis because they are often discovered too late. Worldwide, squamous cell carcinomas constitute 90% of esophageal cancers, followed by adenocarcinoma.

Other tumors are rare.

TUMORS OF THE STOMACH

These can be classified as benign and malignant lesions.

BENIGN TUMORS

Gastric polyps in the alimentary tract, the term polyp is applied to any nodule or mass that projects above the level of the surrounding mucosa. They are uncommon and classified as non-neoplastic or neoplastic.

Hyperplastic polyps (the most frequent; 90%) are small, sessile and multiple in about 25% of cases. There is hyperplasia of the surface epithelium and cystically dilated glandular tissue.

Adenomatous polyp (adenoma) (10% of polypoid lesions) They contain proliferative dysplastic epithelium and hence have malignant potential. They are usually single, and may grow up to 4 cm in size before detection. Up to 40% of gastric adenomas contain a focus of carcinoma; there may also be an adjacent carcinoma that is why histologic examination of all gastric polyps is obligate

CANCERS OF THE STOMACH

Carcinoma is the most important and the most common (90%) of malignant tumors of the stomach.

Next in order of frequency are lymphomas (5%); the rest of the tumors are even rarer e.g., carcinoids, and gastrointestinal stromal tumors (GISTs), leiomyosarcoma, and schwannoma.

Crohn Disease Pathological Features

When fully developed, Crohn disease is characterized pathologically by

1. Sharply segmental and typically transmural involvement of the bowel by an inflammatory process with mucosal damage
2. The presence of - Small noncaseating granulomas - Deep fissures that may eventuate in the formation of fistulae

Clinical Features

The disease usually begins with intermittent attacks of diarrhea, fever, and abdominal pain, spaced by asymptomatic periods lasting for weeks to many months.

In those with colonic involvement, occult or overt fecal blood loss may lead to anemia.

Extraintestinal manifestations of this disease include

1. Arthritis & finger clubbing
2. Red nodules of the skin
3. Primary sclerosing cholangitis.
4. Renal disorders
5. Systemic amyloidosis
6. An increased incidence of cancer of GIT in patients with long standing progressive CD.