



Esophageal Disorders

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INTRODUCTION

The esophagus appears to be a simple organ with a single function—the transmission of ingested food and fluids to the stomach. This task is achieved, however, by a tightly coordinated pattern of motility, coupled with protective barriers that prevent gastric secretions from entering the esophagus and pharynx. Derangement of these activities can cause a significant number of distressing symptoms that, taken together, are among the most commonly reported gastrointestinal symptoms that are sufficient to cause patients to seek medical care.

NORMAL FUNCTION OF THE ESOPHAGUS

The tubular esophagus begins after the cricopharyngeus muscle and consists of a muscular tube averaging 20 to 22 cm in length (range, 17 to 30 cm). It is composed proximally of skeletal muscle and distally of smooth muscle. Autopsy studies indicate that the proximal 5% or so of tubular esophagus is skeletal muscle, the middle 35% is mixed, and the distal 60% is smooth muscle. The muscular layers are arranged in circular and longitudinal bundles. The esophagus has no serosal layer. Situated between the muscular layers is the myenteric plexus, and between the circular muscle layer and the muscularis mucosa is the submucosal or Meissner's plexus. The ganglia of the myenteric plexus are more prominent in the smooth muscle areas of the tubular esophagus and are thought to integrate messages from the vagus nerve to the muscles of the esophagus.

At the junction of the esophagus and the stomach is a zone of higher resting pressure referred to as the lower esophageal sphincter (LES). This sphincter has no clearly defined anatomic structure, and the current thinking is that it is principally composed of the circular muscle of the distal 2 to 3 cm of the esophagus in conjunction with the oblique muscle fibers running from the lesser curvature to the greater curvature of the stomach (the gastric sling fibers). The right crus of the diaphragm supports the LES in its barrier by physically encircling it and providing mechanical support, particularly during physical exertion.

The process of swallowing is complex and requires fine coordination involving multiple muscle groups. The process begins with the tongue and pharynx, both of which are densely innervated. The pharyngeal musculature is controlled by the trigeminal, facial, glossopharyngeal, vagus, and hypoglossal nerves. Vagal neurons controlling the pharynx and skeletal muscle of the esophagus originate from the nucleus ambiguus. Although the smooth muscle portions of the tubular esophagus are innervated by the vagus nerve—and it is the vagus nerve that controls peristalsis under physiologic conditions—peristalsis in this portion

of the esophagus will continue even if vagal innervation is removed. The neural plexuses of the smooth muscle esophagus control its activity via excitation of circular and longitudinal muscle bundles by muscarinic receptors or via inhibition of the circular muscle layer by nonadrenergic, noncholinergic neurotransmitters: nitric oxide and vasoactive intestinal polypeptide.

Swallowing begins when a food bolus is propelled into the pharynx from the mouth under voluntary muscle control. In rapid sequence and with precise coordination, the larynx is elevated and the epiglottis seals the airway; the upper esophageal sphincter opens; and the bolus is propelled into the tubular esophagus. Peristaltic pressures ranging 40 to 180 mm Hg are generated. The measured pressure tends to be lower in the more proximal portions of the esophagus and greater in the distal smooth muscle portions. The pressures vary not only by location but also by consistency (i.e., solid or highly viscous boluses require greater pressures), volume, and temperature of the bolus itself. Movement through the tubular esophagus is controlled by the vagus nerve, concomitantly with initiation of the swallow. The LES relaxes to gastric baseline and remains relaxed (deglutitive inhibition) as the bolus is propelled distally. Once the bolus has been propelled into the stomach, the LES returns to its state of tonic contraction, preventing movement back into the esophagus.

SYMPTOMS OF ESOPHAGEAL DISEASE

Heartburn (pyrosis) is the most common symptom of esophageal disease, occurring in 44% of Americans at least once a month. About 10% of persons in the United States experience heartburn every day. It is most often described as a burning sensation in the epigastrium that rises into the chest. Patients often move their hand up and down between the xiphoid and sternal angle when describing this symptom. Given that heartburn is a cardinal sign of gastroesophageal reflux, it tends to occur after meals, when the patient is lying supine, or after an increase in intra-abdominal pressure (e.g., bending or lifting). Specific types of food, including fatty or spicy foods and chocolate, may also induce heartburn. Symptoms are often relieved temporarily by antacid preparations. Heartburn may be accompanied by regurgitation of bitter or sour fluid into the back of the throat or by excessive saliva production (so-called *water brash*), which is caused by a vagal reflex.

Dysphagia refers to a sensation of difficulty swallowing; patients report that a food bolus “gets stuck” or “goes down slowly.” Although patients may point to their neck or chest when describing where the bolus gets held up, the location to which