



Anatomy of the Esophagus

The esophagus is responsible for transporting food and liquid boluses from the pharynx to the stomach, preventing excessive reflux or regurgitation, and allowing for eructation or occasional regurgitation.

Microscopic Anatomy

- From innermost to outermost layers, the esophagus is composed of mucosa, submucosa, muscularis (circularly oriented internally, and longitudinally oriented externally), and a thin layer of connective tissue known as the adventitia, in contrast to the majority of the GI tract, which has a true serosa.
- This histology is most relevant when considering the pathophysiology of esophageal diverticula, which can be roughly divided into two types: *pulsion and traction*. Pulsion diverticula are caused by excessive pressure within the esophageal lumen, resulting in the mucosa and submucosa herniating through the weakest point of the muscularis layer. Therefore, pulsion diverticula do not usually contain any muscularis or adventitia within their walls, and are classified as false diverticula. In contrast, traction diverticula are caused by external forces on the esophagus (usually mediastinal inflammation), resulting in an outpouching of all four layers (i.e. a true diverticulum).
- The most common example in the realm of otolaryngology is a Zenker's diverticulum, which is caused by excessive tonic contraction of the cricopharyngeus, with the displaced pharyngeal pressure eventually causing herniation through Killian's triangle.
 - Chaudhry SR, Bhimji SS. Anatomy, Thorax, Esophagus. [Updated 2018 Oct 27]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2018 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK482513/>
 - Yam J, Bhimji SS. Esophageal Diverticula. [Updated 2018 Nov 6]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2018 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK532858/>

Gross anatomy

- The esophagus is generally between 23 and 25 cm long in adults.
- Three segments of the esophagus- cervical (from the cricopharyngeus to the suprasternal notch), thoracic (suprasternal notch to the diaphragm), and abdominal (from the diaphragm to the esophagogastric junction). The cervical segment is joined anteriorly to the trachea by loose connective tissue, and posteriorly to the bodies of C6-C8 by the prevertebral fascia. The thoracic duct sits on the left of the esophagus at C6.
- Arterial supply: through the inferior thyroid artery superiorly, aortic esophageal arteries in the thorax, and the left gastric and left phrenic arteries inferiorly.



- Venous drainage: through the azygous system and the portal venous system.
- Innervation: supplied by both the Vagus nerve, which contains parasympathetic motor fibers and afferents as well, and the thoracic spinal nerves (T1 through T10), which contain sympathetic innervation and are thought to contribute primarily to sphincteric function. Importantly, the recurrent laryngeal nerve contains motor fibers which control the upper third of the muscular esophagus, which contains striated muscle fibers, and includes the cricopharyngeus; studies have shown that there is no detectable thoracic contribution to this component. The lower two thirds of the esophagus contains smooth muscle fibers, and is innervated by both the intrathoracic vagus and the thoracic spinal nerves, via the myenteric plexus. The myenteric plexus is responsible for coordinating the thoracic esophageal peristaltic wave.
 - Mashimo H, Goyal RK. Physiology of esophageal motility. In: GI Motility online (2006) doi: 10.1038/gimo3, 16 May 2006.
 - Gray H. Chapter XI: Splanchnology. In: Lewis WH (editor). Anatomy of the human body, 20th edition. New York: Philadelphia, Lea & Febiger; 1918.

The Two Sphincters

- Upper esophageal sphincter (UES): easily identifiable histologically, and consists of distinct muscles, including contributions from the bilateral inferior constrictor muscles and the cricopharyngeus. The defect in muscular coverage between these three muscles is known as Killian's triangle, which sits just above the cricopharyngeus. Below the cricopharyngeus, there is Laimer's triangle, which is another relative defect in muscular coverage, as the longitudinal muscle layer in the midline does not fully coalesce for the first several cm of the cervical esophagus. The UES is tonically contracted and closed in the resting state.
- Lower esophageal sphincter (LES): not composed of any distinct muscle, but represents a general thickening of the muscularis propria for a 2-4cm segment, as well as a significant contribution from the right diaphragmatic crus. The lower esophageal sphincter is normally closed in the resting state.
 - Mashimo H, Goyal RK. Physiology of esophageal motility. In: GI Motility online (2006) doi: 10.1038/gimo3, 16 May 2006.
 - Nguyen D, Moslemi M, Rawashdeh B, Meyer M, Garagozlo C, et al. (2014) Laimer's Diverticulum, A Rare True Diverticulum Inferior to the Cricopharyngeus: Report of a Case and Review of the Literature. J Clin Case Rep 4:423. doi:10.4172/2165-7920.1000423