

# Esophagus

## ***Cervical Esophagus***

The cervical portion of the esophagus is about 5 cm long. It starts below the cricopharyngeus muscle, and it appears as a continuation of the inferior constrictor muscle of the pharynx. A space between the right and left inferior constrictor muscles posteriorly just above the cricopharyngeus muscle is the site where a Zenker's diverticulum develops. The beginning of the cervical esophagus is marked by the level of C6, and the end by the lower border of T1 curves slightly to the left in its descent.

## ***Thoracic Esophagus***

The thoracic portion of the esophagus is approximately 20 cm long (see Figure 33-1 ) and starts at the thoracic inlet. In the upper portion of the thorax, it is closely related to the posterior wall of the trachea. This close relationship is responsible for the early spread of cancer of the upper esophagus into the trachea, and it may limit the surgeon's ability to resect such a tumor. Above the level of the tracheal bifurcation, the esophagus courses to the right of the descending aorta and then moves to the left, passing behind the tracheal bifurcation and the left main bronchus.

## ***Abdominal Esophagus***

The abdominal portion of the esophagus is approximately 2 cm long and includes a part of the LES. It begins as the esophagus passes through the diaphragmatic hiatus and is surrounded by the phrenoesophageal membrane, a fibroelastic ligament that arises from the subdiaphragmatic fascia as a continuation of the transversalis fascia lining the abdomen. The upper leaf of the membrane attaches in a circumferential fashion around the esophagus about 1–2 cm above the level of the hiatus.

## ***Blood Supply, Lymphatics, and Innervation***

The cervical portion of the esophagus receives its main blood supply from the inferior thyroid artery. The thoracic portion receives blood from the bronchial and esophageal arteries. Seventy-five percent of individuals have one right-sided and two left-sided bronchial arteries, and usually two esophageal branches arise directly from the aorta. The blood supply of the abdominal portion of the esophagus comes from the ascending branch of the left gastric artery and from the right and left inferior phrenic arteries

The capillaries of the esophagus drain into a submucosal and periesophageal venous plexus, from which the esophageal veins originate. In the cervical region, the esophageal veins empty into the inferior thyroid vein; in the thoracic region, they empty into the bronchial, azygos, or hemiazygos veins; and in the abdominal region, they empty into the coronary vein. The lymphatics

channels are located almost exclusively below the muscularis mucosa in the submucosa of the esophagus. They are so dense and interconnected that they constitute a plexus

## ***The Swallowing Mechanism***

Swallowing can be started at will, or it can be reflexively elicited by the stimulation of the anterior and posterior tonsillar pillars or the posterior lateral walls of the hypopharynx.

## ***Lower Esophageal Sphincter***

The LES represents the barrier that confines the gastric juice to the stomach and protects the acid-sensitive squamous esophageal mucosa from injury by refluxed gastric juice. As is true for any valve, failure of the LES can occur in two completely opposite ways, which lead to two distinct clinical disease entities. Regardless of the type of LES failure, the secondary effects are produced proximally in the esophagus. Failure of the LES to relax or to open appropriately leads to the inability of the esophagus to propel food into the stomach, esophageal distention, and the condition known as *achalasia*. On the other hand, failure of the LES to remain closed leads to an increased exposure of the squamous epithelium to gastric juice and the condition known as *gastroesophageal reflux disease* (GERD).

## **EVALUATION OF ESOPHAGEAL FUNCTION**

### ***Radiographical Evaluation***

The first diagnostic test in patients with suspected esophageal disease should be a barium swallow that includes a full assessment of the stomach and the duodenum.<sup>[13]</sup> Videotaping the study greatly aids in the evaluation by providing the surgeon with a real-time visualization of bolus transport and the size and reducibility of the hiatal hernia. The study also provides anatomical information, such as the presence of obstructing lesions and structural abnormalities of the foregut.

### ***Endoscopic Examination***

Endoscopic evaluation of the esophagus in practice is the physical examination of the foregut and is a critical part of the assessment of a patient with esophageal disease and is indicated even if the video esophagram is normal.

### ***Esophageal Manometry***

Stationary esophageal manometry is performed by passing a catheter containing pressure sensor ports (usually spaced 5 cm apart) into the esophagus to measure contraction pressures and waveform in the esophageal body and the resting pressure and response to swallowing of the sphincters. **Manometry is indicated whenever a motor abnormality of the esophagus is suspected by the symptoms of dysphagia, odynophagia, chest pain, heartburn, and regurgitation**

## ***Ambulatory 24-Hour pH Monitoring***

The development of 24-hour pH monitoring was a major advance in the unraveling of the pathophysiology of GERD. All previous tests had relied on the identification of reflux by a provocative maneuver, which had little relevance to the patient's daily activities. **Twenty-four-hour pH monitoring made it possible to determine if the time of esophageal exposure to gastric juice in a patient over a 24-hour period was greater than what was found in normal subjects.**

## **EVALUATION OF THE ESOPHAGUS**

### ***History and Physical Examination***

Symptoms of esophageal dysfunction are heartburn, regurgitation, dysphagia and odynophagia. Other symptoms such as bad taste, sore throat, hoarseness, cough, globus, hiccup, aspiration pneumonia, asthma, chest pain, nausea, vomiting, bloating, hematemesis, and melena may be associated with esophageal diseases. Physical examination of the esophagus is indirect and focuses on head and neck, thoracic, and abdominal findings. **History and physical examination should concentrate on uncovering systemic diseases with esophageal manifestations**

## **Congenital T.E.F**

## **Achalasia**

**Achalasia is a degenerative esophageal disease culminating in aperistalsis of the esophageal body and abnormal relaxation of the lower esophageal sphincter**, Patients complain of progressive dysphagia, regurgitation, and weight loss. Chest pain is reported more commonly in younger patients and manifests early on in the disease; however, it typically affects a minority of patients and, therefore is not a major complaint. Recurrent respiratory infection, aspiration pneumonia, and lung abscess may be initial presentations and herald advanced disease. **Most patients seek medical attention only after significant and irreversible damage to the esophageal myenteric neural plexus has occurred.**

**Barium esophagogram is the single best diagnostic test for achalasia.** Classic findings are esophageal dilation, aperistalsis, impaired esophageal emptying, and symmetrical tapering at the esophagogastric junction (bird's beak or ace of spades appearance)

**Esophagoscopy is essential to exclude pseudoachalasia** (secondary esophageal obstruction secondary to malignancies), which may be clinically indistinguishable from primary achalasia. **Biopsy during esophagoscopy is necessary to assess the esophageal mucosa.** Symptom relief is no longer the measure of successful outcome, since 30% of treated patients with symptom control have poor esophageal emptying by barium radiographs.<sup>[134]</sup> **The treatment of achalasia is palliative and directed at reduction of lower esophageal sphincter pressure and improvement of esophageal emptying.** Calcium channel blockers and long acting nitrates relax smooth muscle and provide transient, but incomplete, relief of symptoms. Unpleasant side effects may limit their use. The persistence of dysphagia, despite reduction of lower esophageal sphincter

pressure in a placebo-controlled study of nifedipine, emphasizes the inadequacy of medical management of achalasia.<sup>[129]</sup>

Endoscopic injection of botulinum toxin has been used to treat achalasia. Palliation is temporary, lasting 6 months, with recurrent symptoms in more than 50% of patients

Pneumatic dilation with modern instruments is successful in controlling symptoms. Open modified Heller myotomy performed transabdominally or transthoracically has been successful in the treatment of achalasia. The extent of myotomy is critical to good long-term outcome. A 3-cm extension of the myotomy onto the stomach is superior to a lesser myotomy for symptomatic and physiological effects

## **BENIGN ESOPHAGEAL DISEASES AND THEIR TREATMENT**

### ***Hiatal Hernia***

**Herniation of abdominal contents through the esophageal hiatus is a common occurrence.** With provocative maneuvers that increase intraabdominal pressure, **55% of patients undergoing barium esophagram were found to have herniation of the stomach into the chest.** Symptoms are secondary to reflux, incarceration or strangulation of herniated organs, or compression of thoracic structures. There are four types of hiatal hernia, each with its own symptom presentation. **Type I, or sliding hiatal hernia, is the most common type**

**Type II hiatal hernias, or rolling hiatal hernias, are very uncommon** They result from a defect in or isolated weakness of the phrenoesophageal ligament, allowing a portion of the stomach to herniate through the hiatus while the esophagogastric junction remains anchored in the abdomen. Symptoms of gastric obstruction, strangulation, anemia, and, less commonly, shortness of breath and arrhythmia result from gastric herniation through the hiatus and the presence of the stomach in the chest. Type III, or mixed hiatal hernias, are the second most common type ( Figure 35-13 ). Patients may present with either reflux or symptoms of type II hernias or both. As type III hernias increase in size, there may be organoaxial volvulus with the potential for strangulation. In many patients, these hernias may be a progression of type I hernias.<sup>[89]</sup> Type IV hiatal hernias contain the stomach and other abdominal contents such as colon, spleen, small bowel, and pancreas ( Figure 35-14 ). The term paraesophageal hernia is sometimes used to describe any type II, III, or IV hiatal hernia. Symptomatic hiatal hernias should be repaired. Repair of asymptomatic types II and III hernias is controversial. The potential for strangulation and gastric necrosis has been advocated as the prime reason to repair paraesophageal hernias in all patients, particularly since 50% mortality was initially reported when this complication occurred

### ***Gastroesophageal Reflux Disease***

Transient LES relaxation, a normal occurrence typically after meals, results in reflux of gastric contents into the esophagus that is rapidly cleared. However, failure of the antireflux barrier produces acid reflux of pathological proportions, GERD. The LES and diaphragmatic hiatal mechanism are the major components of the reflux barrier

The typical symptoms of GERD are acid reflux, regurgitation, and dysphagia. Other symptoms, such as chest-pain, asthma, and laryngitis, are termed atypical symptoms and are less likely to be attributable to acid reflux and are, thus, less likely to respond to treatment. Successful control of symptoms with proton pump inhibitors (PPIs) is an excellent clinical confirmation of suspected GERD. Investigation must confirm that abnormal reflux is present by 24-h pH monitoring and the presence of mucosal injury confirmed by esophagoscopy and biopsy. Further, it must define the structural and functional abnormalities via barium esophagram and manometry. In patients with suspected gastric drainage abnormalities, a nuclear medicine gastric emptying study is required. The presence of typical symptoms that respond to PPI therapy and the presence of abnormal acid exposure, determined by 24-h pH monitoring, are reliable predictors of successful surgical treatment of GERD. The mainstay of therapy for GERD is medical management. PPI can heal esophagitis in over 90% of patients. Indications for surgical management of uncomplicated GERD are volume regurgitation not controlled with PPI, the prospect of life-long therapy in a young patient, and side effects or tolerance of medical therapy. **Restoration of the intraabdominal esophagus requires the reduction of the hiatal hernia and mobilization of the esophagus.** This portion of the operation necessitates recognition of the short esophagus

## ***Esophageal Injuries***

### **Strictures**

Erosive or corrosive injury, trauma, or malignancy can result in a fixed esophageal stenosis that subsequently restricts swallowing and produces dysphagia. Generally, the patient does not perceive difficulty swallowing until the esophageal lumen is one half its normal diameter. Since the obstruction is structural, dysphagia associated with esophageal stricture is unremitting and reproducible

### **Corrosive Injuries**

**Corrosive injuries of the esophagus are caused by the ingestion of strong acid or alkali.** There is a bimodal distribution of age and etiology. In children under 5 years of age, ingestion is usually accidental—the result of an inquisitive toddler ingesting improperly stored corrosive agents. The first swallow of the noxious substance usually stops further ingestion and injury. **In adults, the ingestion of large volumes of caustic agents is a suicide attempt.**

### **Early Management**

**Obtaining a history of the estimated amount and the nature of the ingested agent is critical to directing treatment.**<sup>[48]</sup> Bleach and phosphate detergents are irritants that rarely produce significant injury. **The ingestion of strong acid produces coagulation necrosis, which may limit the depth of injury.** However, rapid passage and pooling in the stomach can promote gastric injury.<sup>[88]</sup> Ingestion of viscous alkali produces liquifaction necrosis and an increased depth of injury.

Patients with first-degree injuries require no specific treatments; the incidence of stricture is low. Patients with second- and third-degree burns are at increased risk of early mortality and late

complications. The esophagus should be allowed to reepithelize; early dilation may increase stricture formation and increase the risk of perforation

Frequent clinical assessment is necessary to detect and treat necrosis of the esophagus or stomach. Resection of the involved organ or organs with delayed reconstruction is recommended for transmural necrosis with mediastinitis or peritonitis. Tracheoesophageal fistula complicating caustic injury should be managed with esophageal resection and exclusion and tracheostomy.<sup>[19]</sup> Reconstruction is delayed for several months. Patients without acute complications should be placed on a bland liquid or mechanical soft diet and prophylactic acid suppression medication.

Ingestion of small alkali disc batteries presents a particular threat to small children. Severe esophageal injury may result within hours of ingestion. This results from current generation, seepage of extremely corrosive contents from damaged cases, and pressure necrosis. Careful endoscopic removal is aimed at preserving the integrity of the battery case.<sup>[83]</sup> **Passage of batteries through the stomach or lower GI tract is uneventful.**

### *Late Management*

Dilation of caustic strictures should begin about 8 weeks after injury. Although retrograde dilation has been proposed as the safest technique, it requires gastrostomy. Prograde guided bouginage or balloon dilation has been successful. Short strictures not responding to initial dilation may benefit from local steroid injection followed by repeat dilation

### *Perforation*

**Perforation of the esophagus results in a chemical and infectious mediastinitis, which is lethal unless treated early and effectively. Iatrogenic injury is the most common cause of perforation.**<sup>[66]</sup> The incidence of this complication is less than 0.05% during diagnostic endoscopy but increases with the complexity of the procedure and underlying esophageal pathology. **A perforation rate up to 17% has been documented following dilation of caustic strictures.**<sup>[69][108]</sup> In addition to instrumentation, the esophagus may be injured during any procedure performed in the vicinity of the esophagus. **Trauma and spontaneous (barogenic) rupture are the next most common cause of perforation.** The esophagus is normal in about 50% of perforations. Pathological changes in the remaining cases include benign strictures in 25% of patients, diverticula in 15%, carcinoma in 10%, and achalasia in 5%.<sup>[13][66]</sup>

A high index of suspicion is important for early recognition of injury. Symptoms of spontaneous rupture are often nonspecific and include acute chest and/or abdominal pain, odynophagia, dyspnea, and fever. A catastrophic presentation with acute sepsis may be seen. **Any patient reporting symptoms following instrumentation of the esophagus should be considered to have a perforation until proven otherwise.** Pleural effusion, pneumothorax, pneumomediastinum, and subcutaneous emphysema are nonspecific chest X-ray findings. However, chest X-rays are diagnostic in only 15% of patients and may be normal in 10%.<sup>[49]</sup> The clinical diagnosis of esophageal perforation is confirmed by barium esophagram ( Figure 35-24 ). This is first performed with gastrograffin aqueous contrast material and, if negative, repeated with barium. Up to 22% of perforations will be missed if only aqueous contrast is used.<sup>[17]</sup>

## Esophageal Foreign Bodies

The majority of ingested foreign bodies occur in toddlers.<sup>[139]</sup> In younger adults, ingested foreign bodies are usually associated with drug or alcohol use or psychiatric illness. In older adults, with either dentures or esophageal pathology, a food bolus may serve as the impacted foreign body. The site of impaction is invariably at a physiological or pathological area of narrowing. Plain film and contrast radiography are diagnostic in the majority of patients. Most small blunt objects pass into the distal GI tract without difficulty. Blunt impacted foreign bodies may be removed with an esophagoscope and balloon catheters or baskets

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1.Regarding the *Esophagus* all true except one :

- A. The cervical portion of the esophagus is about 5 cm long.
- B. above the cricopharyngeus muscle is the site where a Zenker's diverticulum develops.
- C. The beginning of the cervical esophagus is marked by the level of C6, and the end by the lower border of T1 curves slightly to the left in its descent.
- D. The thoracic portion of the esophagus is approximately 5 cm long.**
- E. The cervical portion of the esophagus receives its main blood supply from the inferior thyroid artery.

2.Regarding the evaluation of esophageal function all the following true except one:

- A. The first diagnostic test in patients with suspected esophageal disease should be a barium swallow that includes a full assessment of the stomach and the duodenum
- B. Endoscopic evaluation of the esophagus in practice is the physical examination of the foregut and is a critical part of the assessment of a patient with esophageal disease.
- C. Manometry is indicated whenever a motor abnormality of the esophagus is suspected by the symptoms of dysphagia, odynophagia, chest pain, heartburn, and regurgitation
- D. Twenty-four-hour pH monitoring made it possible to determine if the time of esophageal exposure to gastric juice in a patient over a 24-hour period was greater than what was found in normal subjects.
- E. History and physical examination less impartment in evaluation .**

3.Regarding achalasia all true except one :

- A. Achalasia is a degenerative esophageal disease culminating in peristalsis of the esophageal body and abnormal relaxation of the lower esophageal sphincter.
- B. Most patients seek medical attention only after significant and irreversible damage .
- C. Barium esophagogram is the single best diagnostic test for achalasia
- D. Esophagoscopy not essential to exclude pseudoachalasia.**
- E. Biopsy during esophagoscopy is necessary to assess the esophageal mucosa.
- F. The treatment of achalasia is palliative and directed at reduction of lower esophageal sphincter pressure and improvement of esophageal emptying.

4.Regarding Hiatal hernia all true except one :

- A. Herniation of abdominal contents through the esophageal hiatus is a common occurrence.
- B. 55% of patients undergoing barium esophagram were found to have herniation of the stomach into the chest.
- C. Type I, or sliding hiatal hernia, is the rare type.**
- D. Type II hiatal hernias, or rolling hiatal hernias, are very uncommon
- E. Restoration of the intraabdominal esophagus requires the reduction of the hiatal hernia and mobilization of the esophagus

5.Regarding the *Esophageal Injuries* all true except one :

- A. Corrosive injuries of the esophagus are caused by the ingestion of strong acid or alkali
- B. In adults, the ingestion of large volumes of caustic agents is a suicide attempt.
- C. Obtaining a history of the estimated amount and the nature of the ingested agent is not impartment to directing treatment.**
- D. The ingestion of strong acid produces coagulation necrosis, which may limit the depth of injury
- E. Passage of batteries through the stomach or lower GI tract is uneventful.

6.Regarding the perforation of the esophagous all true except one :

A. Perforation of the esophagus results in a chemical and infectious mediastinitis, which is lethal unless treated early and effectively

**B. Iatrogenic injury is the less common cause of perforation.**

C. A perforation rate up to 17% has been documented following dilation of caustic strictures

D. Trauma and spontaneous (barogenic) rupture are the next most common cause of perforation

E. Any patient reporting symptoms following instrumentation of the esophagus should be considered to have a perforation until proven otherwise

7.Regarding esophageal foreign bodies all true except one :

A. The majority of ingested foreign bodies occur in toddlers.

B. In younger adults, ingested foreign bodies are usually associated with drug or alcohol use or psychiatric illness.

**C. Plain film and contrast radiography are diagnostic in the small groups of patients.**

D. Most small blunt objects pass into the distal GI tract without difficulty.

E. Blunt impacted foreign bodies may be removed with a esophagoscope.

## **True and false statements:-**

1.there are three normal patters of esophageal peristalsis occur food ingestion.

2.carcinoma of esophagus can be spread to the mediastinal structures be local metastasis only.

3.barium esophagogram in esophageal leiomyoma showed clear margin rat tail appearance.

4.esophageal tear can occur in normally gross appearance esophagus.

**5.achalasia of esophagus can be presented by effortless vomiting shortly after meal.**

**6.total remission can be achieved after corrosive esophageal injury.**

**7.esophagoscopy and biopsy is traditionally used in cases of hiatal hernia.**

**8.perpendicular implantation of the esophagus to the stomach is a factor in formation of lower esophageal sphincter.**

**9.esophagoscopy is essential to exclude pseudo-achalasia.**

**10.type I hiatal hernia (rolling) is the commonest type of hiatal hernia and can be seen in normal population.**