

## Esophageal Disorders

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### Educational Goals

At the end of the section on esophageal disorders, you should understand:

1. The three important questions in the symptom differential of common causes of dysphagia. These should provide a strong suspicion of the diagnosis by categorizing into obstructive versus motor disorders.. Know the typical presentation of common disorders.
2. The consequences of Eosinophilic infiltration of the esophagus.
3. The important components in pathophysiology, presentation and complications of gastroesophageal reflux disease (GERD) .
4. Endoscopy (not barium study) is the appropriate test to evaluate patients with dysphagia or chronic GERD. Understand the reasons why this is so.
5. Chest pain from GE reflux or esophageal motility disorders (i.e., diffuse esophageal spasm) can mimic angina. The evaluation always begins with ruling out cardiac disease.

### Key Words

- o achalasia
- o adenocarcinoma
- o ambulatory pH monitoring
- o barium swallow
- o Barrett's esophagus
- o botulinum toxin (botox)
- o CREST syndrome
- o diffuse esophageal spasm
- o dysphagia
- o esophageal manometry
- o esophageal moniliasis
- o esophageal ulcer
- o eosinophilic esophagitis
- o GERD
- o globus sensation
- o lower esophageal (Schatzki's) ring
- o mechanical obstruction
- o motility disorder
- o nutcracker esophagus
- o odynophagia
- o peptic stricture
- o Plummer Vinson syndrome
- o pneumatic dilatation
- o Schatzki's ring
- o scleroderma
- o squamous cell carcinoma
- o surgical myotomy
- o transient LES relaxation
- o upper esophageal web
- o Zenker's diverticulum

### Introduction

The esophagus is a predominantly muscular organ of transport propulsing liquids and solids from the mouth to the stomach.

### Symptoms of Esophageal Dysfunction:

Odynophagia  
Dysphagia  
Heartburn  
Chest Pain

### Odynophagia

1. Pain with swallowing. Usually indicates a severe inflammatory process in the esophagus which disrupts the esophageal mucosa. Common situations are:
  - A. Infection in esophagus in patient with AIDS (Candida, herpes, CMV)
  - B. Pill induced esophageal ulcer (alendronate, doxycycline, KCl, vitamin C, aspirin and NSAIDS).

**Dysphagia** is the subjective awareness of difficulty in swallowing. It is often the presenting symptom, and the underlying disease process is usually not apparent; dysphagia indicates organic disease and evaluation is required.

1. Types of dysphagia

- A. Oropharyngeal: Difficulty initiating a swallow (transfer dysphagia), or coughing or choking with swallowing due to aspiration.
1. May be caused by a great variety of muscle, neural, or local diseases. The underlying disease is usually readily apparent, with dysphagia a complicating problem. Examples include a recent cerebrovascular accident, polymyositis, myasthenia gravis
  2. Food may pass into nasopharynx or larynx (aspiration)
    - a. Associated symptoms: difficulty initiating a swallow, choking or coughing with swallowing, nasal regurgitation.
    - b. Often worse with liquids
  3. X-ray studies (cine swallowing study) show retention of barium in valleculae or pyriform sinuses, or barium in respiratory tract.
- B. Esophageal - sticking of food during passage to the stomach (a transport problem).
1. Careful history is very helpful in esophageal dysphagia.
    - a. Not odynophagia (pain with swallowing)
    - b. Not globus sensation - This is the sensation that there is a lump in the throat that is always present, may improve with swallowing.
    - c. Hx alone should give strong suspicion of correct dx in up to 85% of cases
    - d. Three **major** questions:
      - 1) Food Type causing symptoms
        - a) Solids only – mechanical/obstructive disorder
        - b) Both liquids and solids – motor/motility disorder
      - 2) Localization
        - a) At suprasternal notch - not specific
        - b) Along sternum - more specific
      - 3) Intermittent or progressive symptoms (progressive means dysphagia to smaller and smaller pieces of solid, and then even to liquids).
    - e. Important associated symptoms
      - 1) Presence of heartburn
      - 2) Chest pain
      - 3) Nighttime cough
  2. Dysphagia due to mechanical obstruction (typically solid food only – upper endoscopy critical for diagnosis)
    - a. Major causes of dysphagia:
      - 1) Peptic stricture (secondary to chronic esophagitis)
        - a) Usually a long history of heartburn and antacid use - symptoms may remit as stricture develops
        - b) Fixed narrowing in distal esophagus
        - c) Usually readily seen on barium swallow
      - 2) Lower esophageal (Schatzki's) ring
        - a) Thin mucosal invagination in distal esophagus, at gastroesophageal junction
        - b) Asymptomatic ring present in about 10% of normals
        - c) Easily missed on barium swallow if not looked for specifically, so include solid/marshmallow bolus.
        - d) Diagnosis strongly suggested by typical history - intermittent dysphagia for solids if esophageal lumen 1.2 cm -2.0 cm (more common), persistent if lumen < 1.2 cm.
      - 3) Carcinoma: progressive dysphagia: initially only for solid food
        - a) History of progressive dysphagia
        - b) Physical exam may show extreme weight loss
        - c) Irregular narrowing of esophageal lumen on barium swallow
        - d) Diagnosis confirmed by esophagoscopy with biopsy and/or cytology
        - e) Adenocarcinoma and squamous cell carcinoma have same clinical presentation.

- f) Squamous cell carcinoma – heavy smoking and alcohol increase risk. The number of new cases is stable in the U.S., or slightly decreasing.
  - g) Adenocarcinoma – arises in Barrett's Esophagus which is a complication of chronic GERD. Adenocarcinoma of the esophagus is increasing in incidence and now accounts for 60 -80 % of Esophageal Carcinoma in the U.S.
- b. Minor causes of dysphagia:
- 1) Esophageal diverticulum
    - a) Proximal (Zenker's): oropharyngeal dysphagia
    - b) Distal: occasionally will cause dysphagia by mechanically obstructing the lumen
  - 2) Plummer Vinson Syndrome: iron deficiency anemia and associated dysphagia secondary to an upper esophageal web
  - 3) Esophageal moniliasis
    - a) Usually in compromised host
    - b) Often odynophagia is a major problem
    - c) "Cobblestone esophagus" on x- ray
3. Dysphagia due to neuromuscular (motility) disorders (dysphagia for solids and liquids)
- a. Major causes (esophageal manometric studies often give specific diagnosis)
    - 1) Achalasia

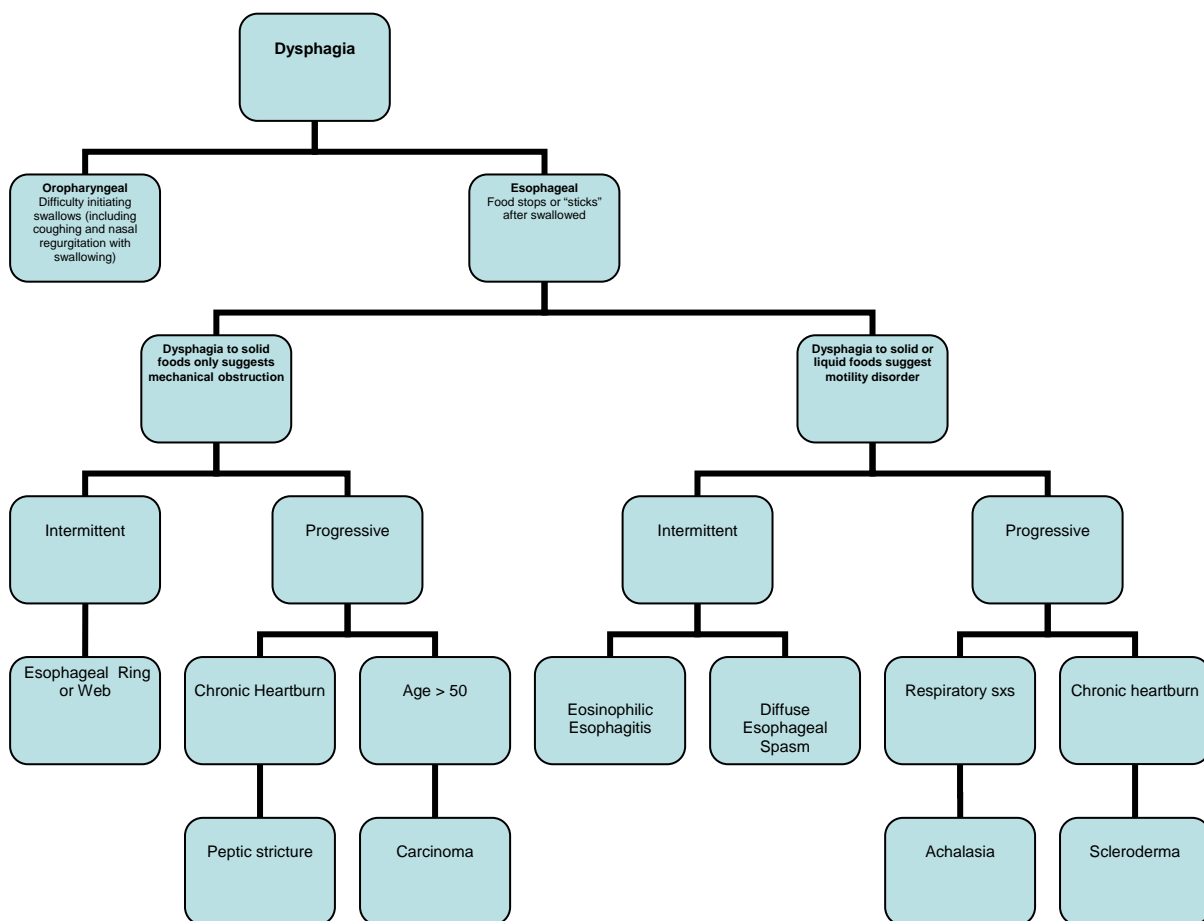
Manometric Abnormalities:

      - a) Hypertensive LES (often)
      - b) Incomplete relaxation of the LES which results in an obstructing gradient (most important cause of symptoms)
      - c) Aperistalsis of the esophageal body

**Clinical Features:**

      - a) Slowly progressive symptoms
      - b) Nocturnal respiratory symptoms common
      - c) In older individual, with greater weight loss, and shorter duration of symptoms, think of "pseudo achalasia" or secondary achalasia due to malignant invasion at the esophago-gastric junction caused by carcinoma of the distal esophagus, proximal stomach, lymphoma or adjacent bronchogenic carcinoma.
      - d) X-ray features
        - (1) Dilated esophagus
        - (2) Smoothly tapered distal end ("bird beak")
        - (3) Air/fluid level in posterior mediastinum
        - (4) Absent gastric air bubble
      - e) Diagnosis best made by upper endoscopy and either/abdominal cat scan or endoscopic ultra sound to rule out a secondary achalasia
      - f) Treatment: botulinum toxin (botox); pneumatic dilatation or surgical myotomy (laparoscopic)
    - 2) Scleroderma
      - a) Weak lower esophageal sphincter and low amplitude or nonexistent contractions in the esophageal body
      - b) Usually heartburn and regurgitation are major symptoms
      - c) Often associated Raynaud's syndrome
      - d) Physical examination will show skin changes: Hardened and thickened skin on face, telangiectasia, sclerodactyly, or calcinosis cutis (CREST syndrome)
    - 3) Diffuse esophageal spasm (DES)
      - a) May present as severe chest pain, often relieved by nitroglycerin. Dysphagia is intermittent.
      - b) Manometric findings are less specific, simultaneous (non-peristaltic) contractions are required for dx, they must be intermixed with some peristaltic contractions.
      - c) Diagnosis requires symptoms of dysphagia and/or chest pain plus definite esophageal manometric abnormalities
    - 4) Eosinophilic Esophagitis (EE) – Has emerged over the past 10 – 15 years as a leading cause of dysphagia for solid and liquids.

- a. Often presents with solid food bolus obstruction.
  - b. In children often associated with reflux symptoms.
  - c. Often associated with other allergic conditions, i.e., asthma, eczema, etc.
  - d. "Ribbed or feline" esophagus at endoscopy.
  - e. Characterized by > 15-20 eosinophils/per high power field in biopsy.
  - f. Esophagus at risk for perforation at dilatation.
  - g. Treatment with oral or systemic steroids, dietary restriction. Dilatation is performed after medical treatment
4. Important laboratory tests for evaluation of dysphagia
- a. Barium swallow (esophagogram) - screening test for dysphagia patients.
  - b. Esophagoscopy (with biopsy) - most important test in suspected mechanical lesions: particularly to R/O carcinoma. Is also required in achalasia to R/O adenocarcinoma at the GE junction causing "secondary achalasia."
  - c. Esophageal manometry - often specific for motility disorders



### Heartburn ( Gastroesophageal Reflux/GERD )

1. Definition: A burning retrosternal sensation, usually occurring within 1-2 hours after eating or when lying down or bending over; often with radiation cephalad and with an associated acid taste, and relieved by upright posture and/or antacids, or even glass of water.
2. Prevalence: A very common problem in the U.S. (occurs daily in about 10% of the adult population and occasionally in > 1/3). Very common during pregnancy.
3. Pathogenesis:
  - A. Primarily due to acidic gastroesophageal reflux disease (GERD). The role of alkaline or bilious gastroesophageal reflux is not clear.

- B. Reflux secondary to factors modifying anti-reflux competence of the lower esophageal sphincter (see Table 1). Foods may also irritate the esophageal mucosa - citrus juices, coffee, tomato products, alcohol (?)
  - C. Important components in pathogenesis.
    - 1. Defective and weak LES pressure barrier
    - 2. Abnormal and inappropriate, **transient LES relaxations**.
    - 3. Gastric factors - Acid/pepsin; Bile; Volume
    - 4. Esophageal clearing defects
      - a. Peristalsis
      - b. Gravity
      - c. Salivary flow: volume and HCO<sub>3</sub>
    - 5. Delayed gastric emptying.
  - D. Relation to hiatus hernia - present concepts indicate there is no clear cause-and-effect relation to hiatus hernia, although GERD may be worse in some patients with large hiatus hernia.
4. Associated symptoms:
    - A. Regurgitation - effortless flow of gastric material into mouth (bitter taste)
    - B. Pulmonary symptoms - such as adult onset asthma and/or cough; particularly at night. Can be due to reflex response to acid reflux into the distal esophagus or actual aspiration.
    - C. Hoarseness; laryngitis
    - D. Chest pain (perhaps associated with motility disorders)
    - E. Disturbed sleep due to increased protective arousals or awakenings which initiate swallows to clear the acid refluxate. In such cases, acid suppression may allow better, less interrupted sleep.
  5. Laboratory tests
    - A. 24 hour ambulatory esophageal pH monitoring - a direct test for reflux, is the "gold-standard" test for gastroesophageal reflux. It is also considered the most specific test for gastroesophageal reflux disease. Measures pH in proximal and distal esophagus and stomach continuously for 24 hours.
    - B. Endoscopy (with biopsy) - Useful but invasive, to rule out other pathology. Endoscopic biopsy is sensitive for reflux esophagitis. Endoscopy is only test that evaluates for Barrett's esophagus, and so is required if long-standing history of heartburn.
    - C. Bernstein test - (optional) infusion of acid into the esophagus. A positive test is defined by reproducing the patient's typical symptom. It indicates acid sensitivity of the esophagus and is considered to be fairly specific for reflux injury.
  6. Treatment
    - A. Lifestyle changes: no eating for 3 hours before lying down, elevate head of bed, avoid foods or medications that can worsen reflux (see Table 1), stop smoking, if overweight, loose weight.
    - B. Acid suppression: histamine-2 receptor antagonists, proton pump inhibitors, and antacids for immediate relief
  7. Complications of GERD:
    - A. Esophagitis
    - B. Peptic stricture
    - C. Esophageal hemorrhage
    - D. Esophageal ulcer
    - E. Pulmonary symptoms
    - F. Barrett's esophagus change of mucosa of distal esophagus from squamous mucosa to intestinal metaplastic (specialized) columnar mucosa. Definition is intestinal type mucosa with goblet cells above the esophago-gastric junction. For "long segment" Barrett's, the classical definition is: extension of columnar (usually salmon or pink colored) mucosa more than 3 cm. above the esophago-gastric junction. Barrett's esophagus has a greatly increased risk of adenocarcinoma. Current recommendation for patients with Barrett's esophagus is to perform surveillance endoscopy and biopsy every 1-2 years. The finding of low grade dysplasia warrants closer observation. The finding of high grade dysplasia suggests high risk of cancer (actually small foci of cancer often already present and missed on biopsies). Please note that heartburn may decrease in Barrett's patients since columnar epithelium is much less acid sensitive. Severe

dysplasia is generally treated with esophagectomy, although newer endoscopic ablation treatments and photodynamic therapy are increasingly used in the appropriate clinical setting.

### Esophageal Chest Pain

1. Because of its location in chest and similar innervation, esophageal pain may mimic pain from coronary artery disease, even including an exertional component and relief with nitroglycerin.
  - A. Etiology of recurring angina-like chest pain:
    1. Coronary artery disease: 50-70%
    2. Esophageal abnormally: 20-30%
    3. Musculoskeletal disorders: 5-10%
    4. Other: 5-10%
  2. Esophageal abnormalities causing chest pain:
    - A. Gastroesophageal reflux disease (GERD)
    - B. Esophageal motility disorders -
      1. "Nutcracker esophagus" (NE)
      2. Diffuse esophageal spasm (DES)
      3. Non-specific esophageal motility disorder (NEMD)
      4. Achalasia
      5. Hypertensive LES
  3. Diagnostic approach for esophageal cause of chest pain:
    - A. Associated history
      1. Heartburn or regurgitation
      2. Dysphagia or odynophagia
    - B. Esophageal manometry: may find motility abnormalities at baseline (this is likely to be a time when patient is not having their pain, since chest pain is usually intermittent) These motility abnormalities at baseline suggest that there is an abnormal motility event which causes the patient's chest pain. This event is rarely identified.
      1. "Nutcracker esophagus"  
High amplitude (>180 mmHg, normal <60 mmHg) peristaltic contractions
      2. Diffuse esophageal spasm
        1. Simultaneous (non-peristaltic) contractions occurring with at least 20% of wet swallows intermixed with peristaltic contractions.
        2. Other associated findings: Repetitive peaks (>2/wave); Long duration (>6 sec); Spontaneous contractions; May be high amplitude; Maybe abnormal LES
      3. Non-specific esophageal motility disorder (NEMB)
      4. Achalasia
      5. Hypertensive LES (optional, now considered part of NEMD)
        - a. Elevated LES pressure (>45 mmHg)
        - b. Incomplete LES relaxation
        - c. Normal peristalsis
    - C. Ambulatory 24 hour esophageal pH monitoring  
Best means to evaluate possible GERD as a cause of chest pain; if episodes of pain are associated with episodes of esophageal acid exposure than GERD is a likely etiology of the chest pain.
    - D. Esophagoscopy: Often performed to "R/O significant pathology" such as unsuspected esophagitis, esophageal ulcer
    - E. Barium esophagogram-non-invasive test to R/O other pathology, generally not indicated in evaluation of chest pain alone. Useful to:
      1. Support diagnosis of achalasia
      2. Double contrast studies may show specific mucosal lesions in esophagitis
      3. Diagnose large hiatal hernia
      4. R/O stricture
  4. Critical concerns:
    - A. Never accept an esophageal defect as the cause of chest pain until significant coronary disease is excluded.

- B. Presence of esophageal motility abnormality = Esophagus is probably the cause of the patient's chest pain. Confirmation of this can do much to allay patient's fear that they have cardiac disease.
- C. Don't fail to look for GE reflux in patients with unexplained symptoms such as chest pain, laryngitis, hoarseness, asthma (and other respiratory symptoms)
- D. Dysphagia must always be considered an organic symptom and will require an upper endoscopy for further evaluation.

**Table 1. Lower Esophageal Sphincter (LES) Pressure Changes After Drugs And Foods**

<u>Increase LES Pressure</u>	<u>Decrease LES Pressure</u>
<b>Foods, etc.</b>	
Protein	Fat
Antacids	Chocolate
	Alcohol
	Peppermint/Onions
	Smoking
<b>Drugs</b>	
Cholinergic (bethanechol)	Anticholinergic (atropine)
Dopamine antagonist (metoclopramide)	Calcium channel antagonist
	Theophylline
	Nitrate
	Xylocaine
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<b>Non Cardiac Chest Pain</b>	<b>Dysphagia</b>
of 910 cases, 255 had abnormal manometry:	of 251 cases, 132 had abnormal manometry:
48% Nutcracker esophagus	10%
36% Non-specific motor disorder	39%
10% Diffuse esophageal spasm	13%
4% Achalasia	36%
2% Hypertensive LES	2%

(Adapted from Reference # 9)

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## **QUESTIONS**

1. A 78 yo male with a history of hypertension, hyperlipidemia presents to your office with complaints of progressive dysphagia to solids for 1 month. He has noticed that his pants are loose on him. He has an EGD, radiologic evaluation and manometry testing. Of the following, the most likely diagnosis is:

- a. Scleroderma
- b. Pseudoachalasia ("secondary achalasia") from adenocarcinoma of the GE junction
- c. Eosinophilic esophagitis
- d. Sarcoidosis of esophagus
- e. Idiopathic achalasia

Answer: B. Pseudoachalasia is more common in older age groups, in patients with recent onset of symptoms, and in those with weight loss. Eosinophilic esophagitis and sarcoidosis are not likely to present in this age group with recent onset of symptoms. Idiopathic achalasia is possible however usually presents in patients at a younger age and with a more gradual onset of symptoms. Upper endoscopy and CT scan or endoscopic ultrasound of EG junction will be necessary to separate idiopathic from secondary achalasia.

2. Which of the following statements regarding Barrett's esophagus is most accurate?

- a. Patients with Barrett's esophagus may have a 50-fold increase risk of developing adenocarcinoma of the esophagus
- b. The incidence of adenocarcinoma has risen rapidly over the last several years while the incidence of squamous cell carcinoma of the esophagus has declined rapidly in the United States.
- c. Severe heartburn is seen in almost all patients with Barrett's esophagus
- d. Barrett's esophagus is diagnosed endoscopically by the appearance of salmon tongues above the EG junction

Answer: A. The risk of adenocarcinoma is much higher in patients with Barrett's esophagus than in the general population. The incidence of squamous cell carcinoma is steady. Once Barrett's develops 25-30% of patients may no longer experience heartburn symptoms since the columnar is less sensitive to acid than squamous epithelium. A biopsy of the esophagus is required to make the diagnosis of Barrett's esophagus.

3. A 62 yo woman presents with dysphagia to solid food which has gradually worsened over the past 2 years. After a thorough history and physical you set the patient up for further testing. Which of the following should be the first test to evaluate this patient's symptoms?

- a. Upper endoscopy
- b. esophageal manometry
- c. trial of PPI once daily
- d. Chest x-ray
- e. barium esophagram

Answer: A. Dysphagia should never be considered a functional symptom. The patient is suffering from dysphagia and the first testing should be endoscopy to detect most structural causes of dysphagia and to perform biopsies if needed. Manometry, chest x-ray, and barium esophagram may all be utilized in the work up of this patient but an EGD will be needed to rule out a carcinoma, stricture, or ring in the esophagus.