Esophageal Dysphagia

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Esophageal Anatomy

- Muscular tube connecting the pharynx to the stomach
- Esophagus begins where the inferior pharyngeal constrictor merges with the cricopharyngeus
  - Upper esophageal sphincter (UES)
- 18 to 26 cm in length
- Lower esophageal sphincter (LES)
  - Thickened circular smooth muscle
  - 40 cm from incisors
- Extrinsic indentations
  - Anterior body of C7 (worsen by osteophytes)
  - Arch of the aorta, the left mainstem bronchus
  - Diaphragmatic hiatus
Four layers:

- Mucosa
- Submucosa
- Muscularis propria
- Adventitia; no serosa.
Esophageal Mucosa
- Nonkeratinized, stratified squamous epithelium

Gastric lining
- Columnar epithelium (rugae)

Z-line
- Junction of the squamous epithelium and columnar epithelium

Cephalad movement
- Barrett’s esophagus.
Muscularis propria

- **Skeletal and smooth muscle**
  - Skeletal muscle (Proximal 1/3)
  - Mixed (Middle 1/3)
  - Smooth muscle (Distal 1/3)

- **Inner circular**

- **Outer longitudinal layers.**
Innervation mainly by Vagus n.

- **Auerbach’s (myenteric) plexus**
  - Between the two muscle layers
  - Controls esophageal peristalsis
  - Acetylcholine mediates contraction
  - Nitric oxide relaxation

- **Meissner's plexus**
  - Submucosal layer
  - Sensory input
  - Pain sensation overlap with the heart and respiratory system
Esophageal Peristalsis

- At rest
  - UES & LES tonically contracted

- Immediately after a swallow
  - UES pressure falls transiently

- Shortly thereafter
  - LES pressure falls and remains low until the peristaltic contraction closes the LES
Dysphagia

- Greek *dys* (difficulty, disordered) and *phagia* (to eat)
- Sensation that food is hindered in its passage from the mouth to the stomach
- Most patients complain that food
  - “sticks,” “hangs up,” “stops,” or “just won't go down right”
- Anatomically classified into two separate clinical categories:
  - Oropharyngeal and esophageal.
- Psychiatric disorders can amplify this symptom.
- Dysphagia is a common symptom
  - Present in 12% of patients admitted to an acute care hospital and in more than 50% of those in a chronic care facility.
History

Three questions are crucial:

1. What type of food or liquid causes symptoms?
   - Mechanical vs neuromuscular defect
   - Primarily solids
     - Structural lesion - peptic stricture, ring, or malignancy
     - Both solid and liquid
       - a motility disorder like achalasia or scleroderma

2. Is the dysphagia intermittent or progressive?
   - Esophageal rings tend to cause intermittent solid food dysphagia
   - Strictures and cancer cause progressive dysphagia

3. Does the patient have heartburn?
   - Complication of GERD - Esophagitis, stricture & Barrett’s
History

- **Location of dysphagia**
  - Limited value (Referred from any site)

- **Weight loss**
  - Significance and duration of the disease

- **Dietary changes**
  - Nature and severity of disease.

- **Dysphagia must be distinguished from odynophagia**
  - Associated with an inflammatory condition (esophagitis)
Diagnostic Tools

- Esophagogram
- Endoscopy
- Esophageal Manometry
- pH probe
- Esophageal Ultrasound
- CT, MRI
Esophagogram

- Double-contrast barium esophagogram
- Usually the first specific diagnostic test in the evaluation of esophageal dysphagia
- Detect subtle narrowing or esophageal webs that may not be appreciated on endoscopy
Endoscopy

- Procedure of choice to evaluate the mucosa of the esophagus
- Detection of structural abnormalities

Flexible esophagoscopy
- Used by GI service
- Transorally
- Diameters approaching 1cm
- Allows the insufflation of air to distend the esophagus and more easily see all of the mucosa
- Magnified view, suction, irrigation, and biopsy ports.
- Requires intravenous sedation setting
Rigid esophagoscopy

- Used by otolaryngologists
- Requires general anesthesia
- Examine the full extent of the esophagus
- View is not magnified
- Esophagus is not distended
- Allows use of instrumentation
- The risks of general anesthesia and the rigid esophagoscopy
Transnasal Esophagoscopy

- Flexible esophagoscopy
  - Smaller size (5mm) allows their passage through the nasal cavity
- Topical anesthesia
- “Easily” performed clinic procedure
- Patient can returned to work after the appointment
- Allows the insufflation of air to distend the esophagus and more easily see all of the mucosa.
Transnasal Esophagoscopy

- Patient is asked to swallow as scope is gently advanced through the UES
- Air is insufflated into esophagus
- If mucosal lesions or irregularities are found multiple biopsies are taken with biopsy forceps passed through the biopsy port

Fig. 4.23 Angulation of 180° retroflexes the tip to see the lesser curve...
Postma et al in 2005

- Review of 711 consecutive patients examined with transnasal esophagoscopy
- They used a spray combination of 0.05% oxymetazoline and 4% lidocaine in the nasal cavity
- If biopsy or a longer procedure is required, one Tessalon Perle is used
- Seventeen of 711 procedures (3%) were terminated due to a tight nasal vault and 2 due to a self-limited vasovagal response
- 50% incidence of significant findings
Esophageal Manometry

- Measures intraluminal pressures
  - LES, esophageal body & UES

- With each swallow
  - Strength
  - Timing
  - Sequencing of pressure events

- Indicated for patients who need recurrent intraluminal pressure assessment
  - Achalasia
  - Diffuse esophageal spasm
Dysphagia

- Difficulty Initiating Swallows
  - Oropharyngeal Dysphagia
    - Solids Only
      - Mechanical Obstruction
        - Intermittent: Esophageal Ring
        - Progressive: Stricture/Malignancy
    - Intermittent: Esophageal Ring
  - Esophageal Dysphagia
    - Food "sticks" after swallow
      - Solids and Liquids
        - Motility Disorder
          - Intermittent: Esophageal Spasm
          - Progressive: Achalasia/Scleroderma
Achalasia

- Primary esophageal motility disorder
  - Insufficient LES relaxation
  - Loss of esophageal peristalsis

- Pathologic
  - Loss of ganglion cell in the myenteric plexus
  - Infiltrate of T lymphocytes, eosinophils, and mast cells
  - Selective loss of postganglionic inhibitory neurons, which contain both nitric oxide and vasoactive intestinal polypeptide

- Symptoms
  - Dysphagia to solids and liquid
  - Regurgitation
  - Chest pain
Achalasia Diagnosis

- Best initial diagnostic study
  - Barium esophagram with fluoroscopy
  - Esophageal dilation
  - Closed LES
  - Loss peristalsis
  - Bird's beak
Esophageal manometry

- Establish the diagnosis

- Absent or incomplete LES relaxation

- Loss peristalsis
Endoscopy

- Exclusion of pseudoachalasia by carcinoma at the GE junction
Treatment

Pneumatic dilation
- Should be a surgical candidates
  - 2% to 5% risk of perforation
- After dilation need a gastrograffin study followed by barium swallow to exclude esophageal perforation
- Good to excellent relief of symptoms in 50% to 93% of patients

Surgical myotomy
- Myotomy across the LES
- Laparoscopy with a response rate of 80% to 94%
- Complication- GERD in 10% to 20%
High risk for pneumatic dilation or surgery

- **Botox**
  - Effective in about 85% of patients
  - Symptoms recur in more than 50% of patients after 6 months

- Pharmacologic treatment with nitrates or calcium-channel blockers
Non-achalasia Motility Disorders

- Diffuse esophageal spasm (DES)
  - Simultaneous and repetitive contractions in the esophageal body
  - Normal LES relaxation
  - Dysphagia if the contraction amplitudes are low
  - Chest pain if the contraction amplitudes are high
Diffuse esophageal spasm

Diagnosis

- Esophagogram
  - "corkscrew" esophagus
- Manometry
  - Simultaneous and repetitive contractions in the esophageal body

Treatment

- Medications that relax the esophagus
  - Nitrates and calcium-channel blockers
Scleroderma

- Connective tissue disease

- Peristalsis is absent in the distal two-thirds

- Mild dilation of the distal esophagus

- LES becomes incompetent

- Associated
  - Aspiration pneumonia
  - Reflux esophagitis with Barrett's esophagus
Esophageal Strictures

- Loss of lumen area
  - Normal 20 mm in diameter
- Dysphagia main symptom
  - Less than 15 mm
- Worse with large food pieces such as meat and bread
- Acid/peptic stricture accounting for the majority of cases (60%–70%).
ETIOLOGY OF ESOPHAGEAL STRICTURES

<table>
<thead>
<tr>
<th>Intrinsic strictures</th>
<th>Extrinsic strictures</th>
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<tbody>
<tr>
<td>Acid peptic</td>
<td>Pulmonary/mediastinal malignancies</td>
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<tr>
<td>Pill-induced</td>
<td>Anomalous vessels and aneurysms</td>
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<td>Chemical/lye</td>
<td>Metastatic submucosal infiltration (breast cancer, mesothelioma, adenocarcinoma of</td>
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<td>Post-nasogastric tube</td>
<td>gastric cardia)</td>
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<td>Infectious esophagitis</td>
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<td>Sclerotherapy</td>
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<td>Surgical anastomotic</td>
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<td>Congenital</td>
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<td>Systemic inflammatory disease</td>
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<td>Epidermolysis bullosa</td>
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Diagnosis

- **Esophagogram**
  - Initial diagnostic study
  - Delineate the stricture

- **Endoscopy**
  - Evaluate the mucosa

- Distal stricture
- Caustic ingestion
- Normal mucosa
- Barrett's metaplasia
Treatment

Esophageal dilation

- Depends on the length and diameter
- Tight or complex strictures
  - Less than 10 mm in diameter
  - Greater than 2 cm in length
  - Best managed with wire-guided bougies under fluoroscopic and endoscopic control
- Simple strictures can be dilated with Maloney dilators
- Progressively over weeks to months with a gradual increase in the diameters of the dilators
- Most patients have relief of dysphagia after dilation to a diameter of 40 to 54 French with no requirement for maintenance dilations
- Radiation-induced or malignant strictures are at higher risk of perforation
To minimize the risk of perforation, the "rule of threes" applies

- No more than three sequential dilators should be performed per session
- Refractory strictures can be treated endoscopically with injection of triamcinolone into the stricture in all four quadrants prior to dilation
- More recently, endoscopically placed temporary nonmetallic expandable stents (Polyflex)
  - Effective in refractory benign strictures
Esophageal Rings & Webs

- **Symptoms**
  - Intermittent solid food **dysphagia**, aspiration, and regurgitation

- **Rings**
  - Circumferential
  - Mucosa or muscle
  - Most commonly occur in the distal esophagus
  - Schatzki's ring occurs at the GEJ

- **Webs**
  - Only part of the esophageal lumen
  - Always mucosal
  - Located in the proximal esophagus
  - Association with iron deficiency (Plummer and Vinson)
Diagnosis

- Barium Esophagogram
  - Most sensitive test

- Endoscopic visualization
  - Normal-appearing mucosal
  - Cervical webs are associated with carcinoma

Treatment

- Endoscopic dilation
- Large bougie or balloon (15 to 20 mm) so as to fracture the ring
- Refractory rings
  - Pneumatic dilation (large balloon)
  - Electrosurgical incision
  - Surgical resection
  - Treat GERD
Dysphagia lusoria

- Aberrant right subclavian artery
  - Arises from the left side of the aortic arch
  - Compress the posterior esophagus
  - 20% of cases anterior

- Barium esophagogram
  - Indentation at the level of the third and fourth thoracic vertebrae

- Confirmation
  - CT, MRI, arteriography, or EUS

- Endoscopy
  - Right radial pulse may diminish with compression of the right subclavian artery

- Esophageal manometry
  - High-pressure zone at the location of the aberrant artery

- Symptoms usually respond to changes in diet to soft consistency and small size

- When necessary, surgery relieves the obstruction by reanastomosing the aberrant artery to the ascending aorta
Gastroesophageal Reflux Disease

- GERD is recognized in about 10-15% of the population

- Reflux esophagitis
  - Changes in the esophageal mucosa
  - Present in 30% to 40%

- Barrett's esophagus
  - 10% to 20%

- Defects in the esophagogastric barrier such as
  - LES incompetence
  - Transient relaxation of LES
  - Hiatal hernia
GERD Diagnosis

Classic symptom is heartburn
- Retrosternal burning discomfort and acid regurgitation
- Other symptoms are dysphagia, odynophagia, and belching

Laryngopharyngeal reflux (LPR)
- Hoarseness, throat clearing, dysphagia, increased phlegm and globus sensation
Management

Treatment

– Initial empiric trial in the absence of alarm signs

– Diagnostic testing
  
  if there is a failure to respond to an empiric course of antisecretory therapy
  
  if alarm signs such as dysphagia, odynophagia, weight loss, chest pain, or choking are present.
pH probe

- Ambulatory 24-hour esophageal pH monitoring
  - Gold standard for the diagnosis of GERD
  - Detect and quantify gastroesophageal reflux
  - Correlate symptoms temporally with reflux
Bravo pH probe

- Size of a capsule
- Placed endoscopically
  - 6 cm above the GEJ
- Transmits to a recording device
- 48 hours of pH data
- Falls off after 4 to 10 days
- Patients prefer this device over the catheter-based system due to reduced discomfort
Endoscopy

- Reflux esophagitis
  - Erosions or ulcerations
- pH probe results are normal in 25% of patients with erosive esophagitis
Barrett's esophagus

- Potentially serious complication of long-standing GERD
- Stratified squamous epithelium of the distal esophagus is replaced by intestinal columnar metaplasia
- It is the most significant outcome of chronic GERD and predisposes patients to the development of esophageal adenocarcinoma.
MALIGNANT STRICTURES

- 12,000 new cases each year in the United States
- Squamous cell carcinoma (SCC)
  - Black males
  - Alcohol and tobacco abuse
  - History of caustic esophageal injury
  - Other conditions including achalasia, Plummer-Vinson syndrome, and a history of head and neck SCC
  - Have also been associated with human papillomavirus.
- Adenocarcinoma
  - White males
  - Well-documented association with GERD
  - Barrett's esophagus
MALIGNANT STRICTURES

Malignant obstruction
- Late presentation and carries a poor prognosis
- Dysphagia is rapidly progressive
- Diagnosis
  - Endoscopy with mucosal biopsy
  - Evaluation includes staging
    - CT and Endoscopic US
- Staging is based on the TNM classification
  - T1 or T2 without nodal or metastatic disease, can be treated with surgery alone
- Patients with more advanced disease
  - Neoadjuvant chemotherapy/radiation before surgical resection
Cricopharyngeal Dysfunction

- The cricopharyngeus remains contracted between swallows

Cricopharyngeal achalasia
- Muscle fails to completely relax
- smooth posterior impression on the hypopharynx
Zenker’s Diverticulum

Esophageal diverticula are classified based on:

– Anatomic location
– Mechanism of origin (pulsion or traction).

Zenker's diverticulum (ZD)

– Pulsion type diverticulum

  Herniation of esophageal mucosa and submucosa through an area of weakened esophageal musculature

– Annual incidence of 2 per 100,000 people per year
– Males predominance (2 to 3 times)
Zenker’s Diverticulum

- **Killian's dehiscence or triangle**
  - Between the cricopharyngeal muscle and inferior constrictor muscle

- **Killian-Jamieson's area**
  - Between the oblique and transverse fibers of the cricopharyngeal muscle

- **Laimer's triangle**
  - Between the cricopharyngeal muscle and the most superior esophageal wall circular muscles
Diagnosis

- **History**
  - Progressive dysphagia
    - 90% of patients presenting with ZD
  - Regurgitation of food
  - Unprovoked aspiration
  - Noisy deglutition

- **Barium Esophagogram**
Treatment

- **Surgery**
  - Cricopharyngeal myotomy

- **External**
  - cricopharyngeal myotomy
  - Diverticulum is excised and the defect closed
Endoscopic
References