

Feeding and swallowing disorders in infants

Arik Alper, M.D.

Assistant Professor

Department of Pediatrics

Section of Pediatric Gastroenterology / Hepatology

Yale University School of Medicine

Disclosure

I have no relevant financial relationships to this activity.

Learning Objectives

- 1) Define infant dysphagia, chronic aspiration and laryngeal penetration.
- 2) Discuss the differential diagnosis of dysphagia in children including chronic aspiration, GERD and eosinophilic esophagitis.
- 3) Explore different treatment modalities of feeding disorders and proper utilization of diagnostic tools.

1. 14-month old boy, past medical history remarkable for prematurity (ex 24-weeker) presents with recurrent vomiting episodes, worsening after meals.
2. 19-month old baby girl with no remarkable past medical history presents with feeding intolerance of solid foods (tolerating well liquids).
3. 3-month old baby boy with trisomy 21 presents with chronic cough, back arching and vomiting during meals
4. 1-month old baby boy presents with acute onset of cyanosis and lack of response, resolved within 3 minutes
5. 7-month old baby girl, history of prematurity, g-tube fed, NPO, vomits after meals

Introduction

Oropharyngeal dysphagia is defined as difficulty or improper swallowing of oral solids, liquids or both. It can lead to oropharyngeal aspiration.

Common GI causes of dysphagia

Chronic aspiration

GERD

Eosinophilic esophagitis

Phases of swallowing

1. Oral preparatory phase
2. Oral transit phase
3. Pharyngeal phase
4. Esophageal phase

Introduction

Aspiration occurs when pharyngeal secretions, food material or gastric contents enter the larynx and trachea, below the vocal cords, and can descent into the lungs.

Laryngeal penetration occurs when the foreign material only enters the laryngeal vestibule but does not descend below the vocal cords.

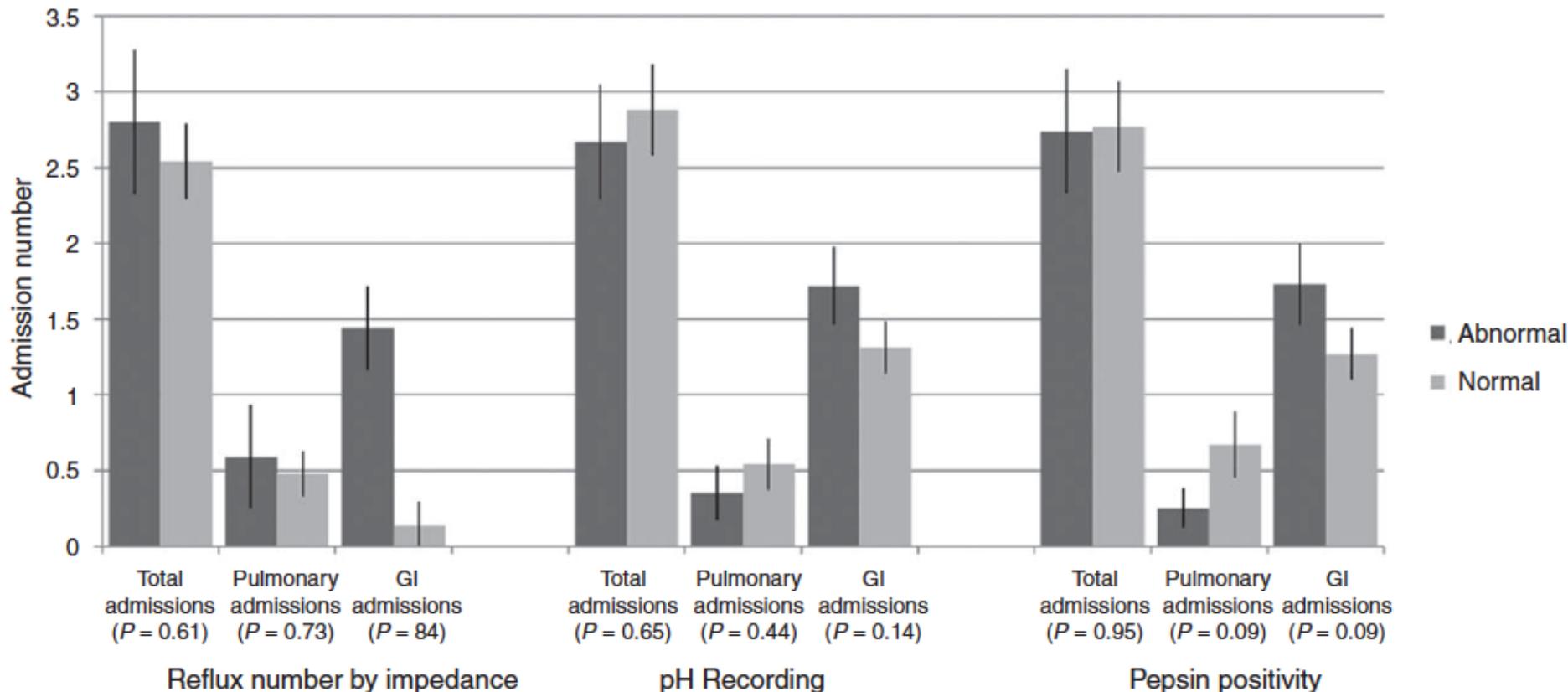
Risk factors for chronic aspiration

1. Neurologic impairment
2. Anatomical anomalies
3. Pulmonary disease
4. GI disorders
5. Others

GERD?

A

Reflux burden does not predict number of total admissions,
even after adjusting for aspiration



Aspiration - consequences

Airway injury due to acute aspiration appears very quickly. Aspirated gastric content appears within 12-18 seconds. Extensive atelectasis appears within 3 minutes. Acute pneumonia may occur within hours, and granulomatous changes appear within 48 hours.

Diagnosis for chronic aspiration

1. Clinical history
2. Physical exam
3. Imaging
4. Feeding evaluation
5. MBS
6. FEES
7. Radionucleotide salivary exam
8. Triple scope

Clinical manifestations

- Fussiness with meals
- Noisy breathing after meals
- Turning head away from bottle
- Arching during feeds
- Coughing during and after meals
- Clinically improved with thicker consistencies

MBS findings

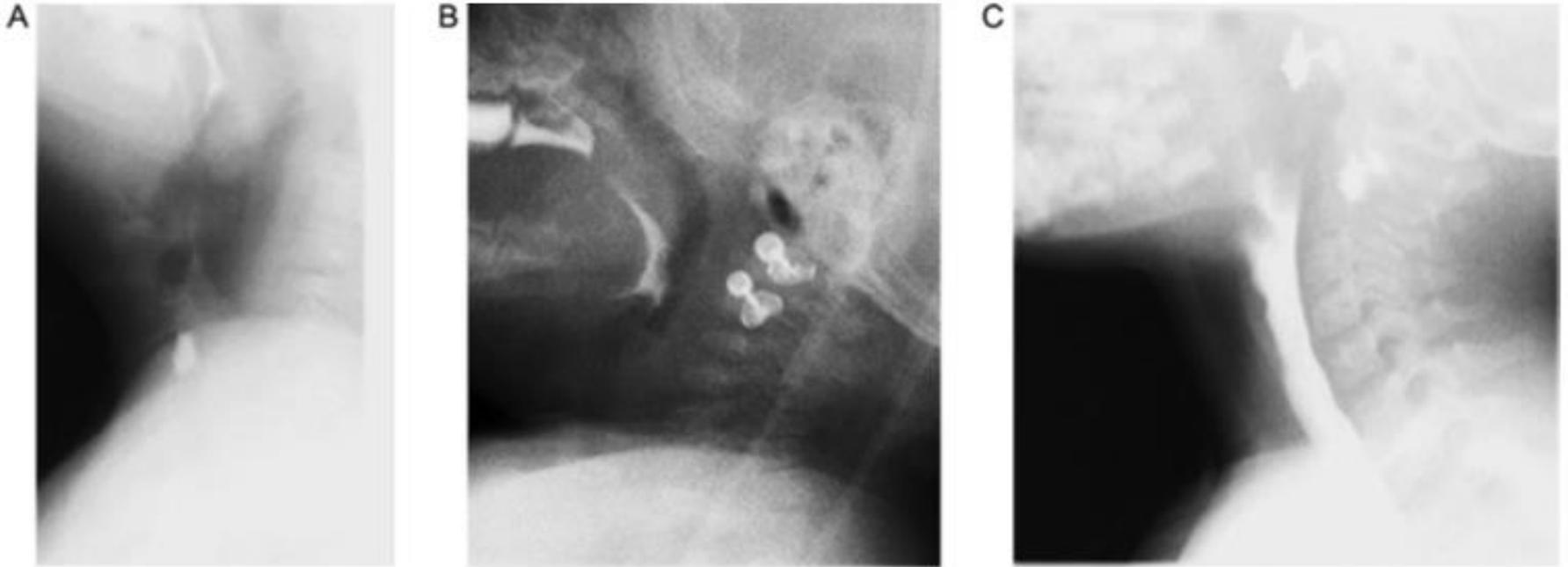


Fig. 1. VFSS outcomes. (A) Tracheobronchial aspiration in a 2-year-old male. (B) Laryngeal penetration in a 6-month-old female. (C) Neither aspiration nor penetration in a 5-year-old female.

Endoscopy versus MBS

- Randomized prospective study of 126 adult patients with dysphagia, randomly assigned to either endoscopy or MBS.
 - Clinical decision based on results.
 - Monitored for 1 year for any development of pneumonia.
- Similar rates of pneumonia between the groups.
Both diagnostic tests are equal.

Treatment

- Feeding modifications
- Feeding therapy?
- Gastrostomy ? Nissen fundoplication ?

Thickeners

Starch based thickeners:

Gum-based thickeners:

Xanthan gum:

Carbo gum

Infant cereal:

Food pureed (fruits, vegetables, yogurt):

NEC and commercial thickeners

- 3 cases of NEC reported in preterm infants receiving SimplyThick
- The concern is that feeding premature infants with xanthan gum-based thickener not only stimulates the immature gut by increase in water, sugars, SCFA and bile acids in the distal small intestine and colon, but also may directly active gut lymphocytes and macrophages to trigger an excessive inflammatory cascade

Prognosis

- Prognosis is variable and depends on underlying factors, cause and duration of aspiration and amount and nature of aspirate.
- Also depends in utilization of diet modifications, feeding tubes and surgical interventions.
- Better lung function prior to the insult is associated with better outcome.
- Poor cognitive function is associated with worse outcome.

Common GI causes of dysphagia

Chronic aspiration

GERD

Eosinophilic esophagitis

Pediatric GERD

- GER – passage of gastric content into the esophagus with or without regurgitation/vomiting
- GERD – when the reflux leads to **troublesome symptoms** and/or complications.

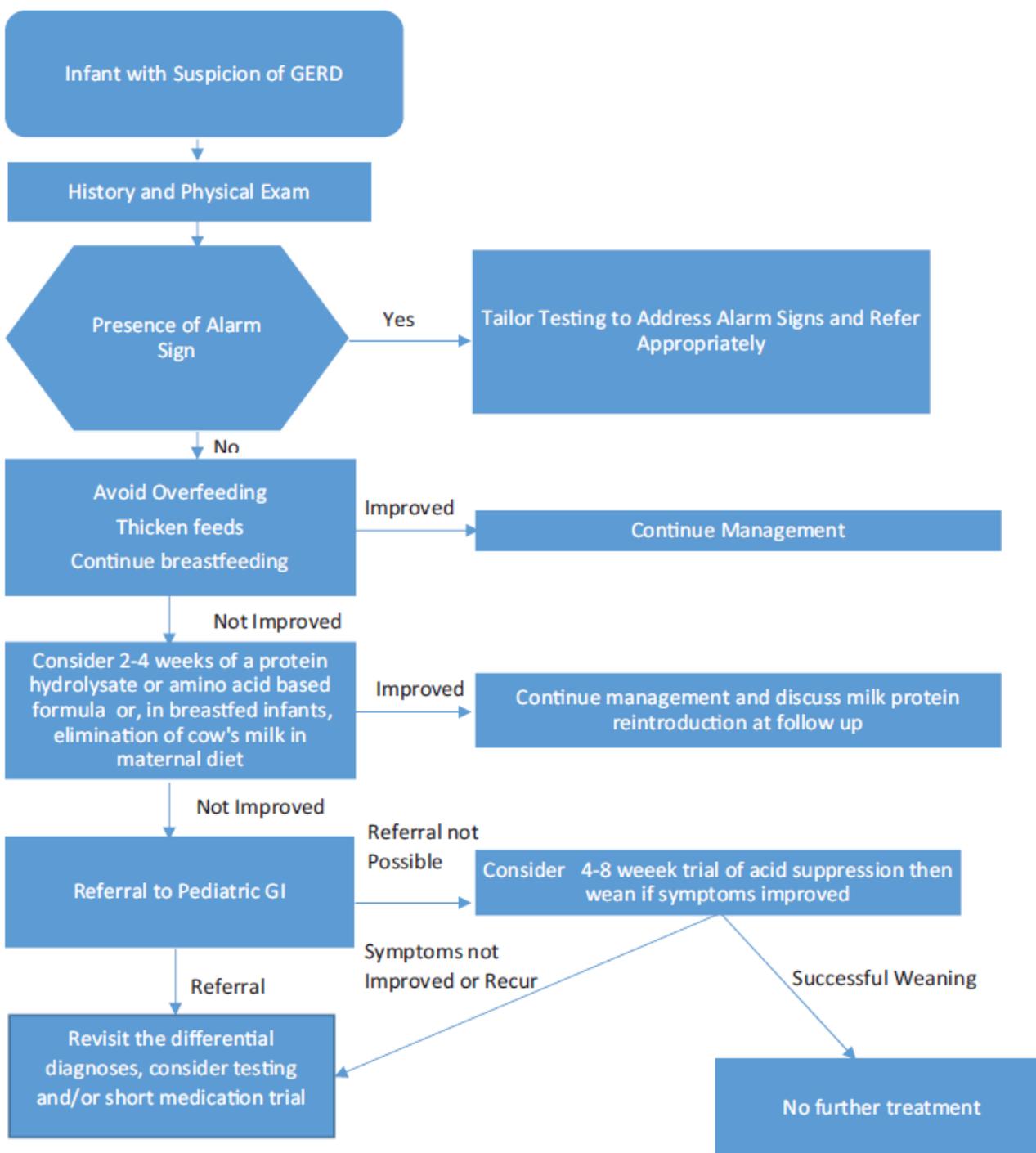
Differentiating the two in infants is challenging :
excessive crying, back arching, regurgitating,
irritability

TABLE 1. Symptoms and signs that may be associated with gastroesophageal reflux disease in infants and children 0 to 18 years old

Symptoms	Signs
General	General
Discomfort/irritability*	Dental erosion
Failure to Thrive	Anemia
Feeding refusal	
Dystonic neck posturing (Sandifer syndrome)	
Gastrointestinal	Gastrointestinal
Recurrent regurgitation with/ without vomiting in the older child	Esophagitis
Heartburn/chest pain [†]	Esophageal stricture
Epigastric pain [†]	Barrett esophagus
Hematemesis	
Dysphagia/odynophagia	
Airway	Airway
Wheezing	Apnea spells
Stridor	Asthma
Cough	Recurrent pneumonia
Hoarseness	associated with aspiration
	Recurrent otitis media

TABLE 2. "Red flag" symptoms and signs that suggest disorders other than gastroesophageal reflux disease

Symptoms and signs	Remarks
General	
Weight loss	Suggesting a variety of conditions, including systemic infections
Lethargy	
Fever	
Excessive irritability/pain	
Dysuria	May suggest urinary tract infection, especially in infants and young children
Onset of regurgitation/vomiting >6 months or increasing/persisting >12–18 months of age	Late onset as well as symptoms increasing or persisting after infancy, based on natural course of the disease, may indicate a diagnosis other than GERD
Neurological	
Bulging fontanel/rapidly increasing head circumference	May suggest raised intracranial pressure for example due to meningitis, brain tumor or hydrocephalus
Seizures	
Macro/microcephaly	
Gastrointestinal	
Persistent forceful vomiting	Indicative of hypertrophic pyloric stenosis (infants up to 2 months old)
Nocturnal vomiting	May suggest increased intracranial pressure
Bilious vomiting	Regarded as symptom of intestinal obstruction. Possible causes include Hirschsprung disease, intestinal atresia or mid-gut volvulus or intussusception
Hematemesis	Suggests a potentially serious bleed from the esophagus, stomach or upper gut, possibly GERD-associated, occurring from acid-peptic disease*, Mallory-Weiss tear† or reflux-esophagitis.
Chronic diarrhea	May suggest food protein-induced gastroenteropathy‡
Rectal bleeding	Indicative of multiple conditions, including bacterial gastroenteritis, inflammatory bowel disease, as well as acute surgical conditions and food protein-induced gastroenteropathy rectal bleeding‡ (bleeding caused by proctocolitis)
Abdominal distension	Indicative of obstruction, dysmotility, or anatomic abnormalities



Pediatric GERD

- History and physical examination are sufficient to establish a diagnosis of uncomplicated infantile reflux.
- Note: fussiness, crying and back arching with or without spitting up on an otherwise thriving infant (with no “red flags”) → no need for diagnostic testing and therapies (despite an intense pressure by families).
- EGD: usually in older infants that have persistent symptoms on PPI or inability to wean off PPI
- PH/impedance esophageal monitoring : persistent symptoms, no erosions on EGD

Treatment of pediatric GERD – step 1&2

- Use of thickeners may slightly improve the occurrence or regurgitation/vomiting symptoms.
- Feeding modifications, while no sufficient evidence exist to advocate their use, should be considered prior to using more costly and risky interventions.
- Hydrolyzed formulas and amino acid based formulas are not part of GERD treatment. However as GERD and CMP allergy have clinical similarity, consider a trial of those formulas as a step 2.
- For each intervention we need a minimum of 2 weeks to assess for clinical improvement.

Not part of GERD treatment:

1. Positioning therapy (left side, head elevation) – unclear if this improves reflux symptoms.
2. Probiotics
3. Massage therapy
4. Parental tobacco avoidance
5. Complementary therapy
6. Dietary supplementation

What about medical treatment?

Common GI causes of dysphagia

Chronic aspiration

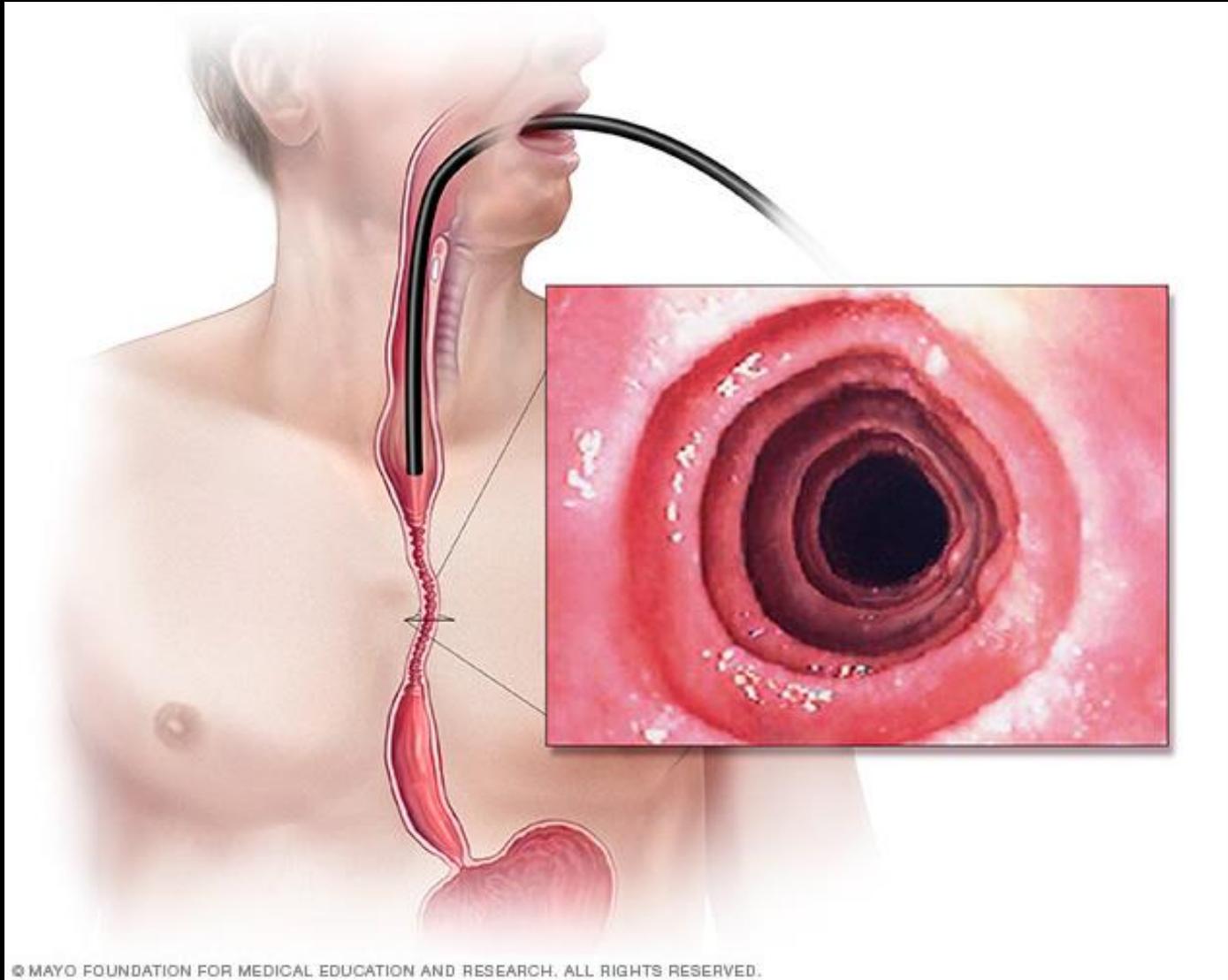
GERD

Eosinophilic esophagitis

Eosinophilic esophagitis

- Characterized by significant eosinophilic infiltrate in the esophagus
- Etiology is an increased immunological response to allergen exposure
- Strong link to those with atopy

Eosinophilic esophagitis



Eosinophilic esophagitis- diagnosis

- Symptoms of esophageal inflammation: pain, heartburn, emesis, food impaction, dysphagia
- Requirement of biopsy showing >15 eos/hpf
- Exclusion of other disorders with similar clinical presentation

Eosinophilic esophagitis

- Clinical symptoms – age variability
 - Infants and toddlers: food refusal, vomiting, pain/discomfort when eating
 - School age: chronic abdominal pain and vomiting
 - Adolescence: reflux, dysphagia, recurrent food impaction

Eosinophilic esophagitis - treatment

- Topical steroids
- Elimination diet (milk, soy, wheat, eggs, peanut, shellfish)
- Biological agents

1. 14-month old boy, past medical history remarkable for prematurity (ex 24-weeker) presents with recurrent vomiting episodes, worsening after meals.
2. 19-month old baby girl with no remarkable past medical history presents with feeding intolerance of solid foods (tolerating well liquids).
3. 3-month old baby boy with trisomy 21 presents with chronic cough, back arching and vomiting during meals
4. 1-month old baby boy presents with acute onset of cyanosis and lack of response, resolved within 3 minutes
5. 7-month old baby girl, history of prematurity, g-tube fed, NPO, vomits after meals