# Aerodigestive Problems: When It's Hard to Swallow and to Breathe

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## Presenter

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## Objectives

- Review the basic mechanisms and causes of dysphagia in pediatric patients
- Explain recommended treatment approaches for dysphagia in children
- Recognize when feeding modifications may be indicated.
- Understand the utility of other therapies like surgeries and intensive therapy in pediatric patients with dysphagia.
- Review when patients would benefit from an Aerodigestive consultation

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## Definitions

- Aspiration
  - Entry of foreign material into the airway below the vocal cords
- Dysphagia
  - Any difficulty or abnormality of swallowing

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## Dysphagia vs Aspiration

- There are several types of dysphagia.
- Oropharyngeal dysphagia with good cough and vocal cord closure doesn't result in aspiration.
- Aspiration can happen without symptoms: Silent Aspiration

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## Dysphagia: Abnormal/Difficult Swallowing

- There are 4 phases of swallowing.
- There are 3 types of dysphagia.


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## How will patients present?

- Aspiration

  Aspiration Syndromes

- Dysphagia

  Difficulty feeding

  Inability to gain weight

  Oral aversion

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## Aspiration Syndromes

- Aspiration Pneumonia or Pneumonitis
- Foreign Body Aspiration
- Aspiration 'bronchitis'
  - Adults: Diffuse Aspiration Bronchiolitis
  - Pediatrics: Chronic Cough, Asthma, Recurrent Bronchiolitis

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## Common Clinical Scenarios

- A 9-year-old with severe developmental delay and CP vomited, then developed hypoxemia, fever, and chest x-ray opacities.
- A 2-year-old has a cough and unilateral wheezing, hyperinflation of the lungs.

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## Common Clinical Scenarios

- A 12-month-old has asthma symptoms that seem difficult to control and chokes with bottles.
- A 9-month-old chokes with bottles, doesn't cough otherwise.
- A 4-month-old has a hard time finishing bottles and starts to refuse them.

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## Confirming Diagnosis

- Suspect, suspect, suspect
- SLP evaluation
- VFSS (Swallow Study or Modified Barium Study)
- FEES (Endoscopic exam done while awake)
- Empirical trials of modifications

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## VFSS = MBS = barium coated food/liquids

- Transient Laryngeal Penetration-Passage of material into the Laryngeal vestibule that does not pass through the true vocal folds transiently
- Deep Laryngeal Penetration- Passage of material into the laryngeal vestibule to the level of the true vocal folds

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## VFSS = MBS = barium coated food/liquids

- Aspiration:

  Entry of material below the true vocal folds

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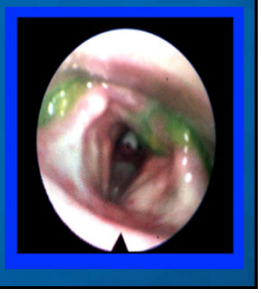
## FEES: flexible endoscopic evaluation of swallow

- Scope passes through the nose.
- Can be done while BF
- Trained eyes
- Vocal Folds visualization



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## Confirming Diagnosis

- SLP evaluation: Low sensitivity as it may MISS silent aspiration.
- VFSS: provides diagnosis and guidance on treatments.
- FEES: requires more trained staff and patients' tolerance.
- Empirical trials of modifications

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## Oropharyngeal Dysphagia: 'Factors' Involved

- Muscles/Nerves
- Vocal Cords
- Normal Anatomy

⇔

- Volume
- Flow
- Breathing

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## Oropharyngeal Dysphagia: 'Factors' Involved

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A newborn is fed from a cup and chokes. What caused it?

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## Oropharyngeal Dysphagia: 'Factors' Involved

- Muscles/Nerves
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A 4-month-old on HFNC for bronchiolitis, chokes with their home regular bottle. What caused it?

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## Oropharyngeal Dysphagia: 'Factors' Involved

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⇔

- Volume
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- Breathing

A 5-year-old drinks from a cup 1 hour after general anesthesia and chokes. What caused it?

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## Oropharyngeal Dysphagia: 'Factors' Involved

- Muscles/Nerves
- Vocal Cords
- Normal Anatomy

⇔

- Volume
- Flow
- Breathing

A 6-month-old coughs and chokes with every bottle unless they use an ultra-preemie nipple.

What caused it?

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## Confirming Diagnosis

- SLP evaluation: Low sensitivity as it may MISS silent aspiration.
- VFSS: provides diagnosis and guidance on treatments.
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- Empirical trials of modifications

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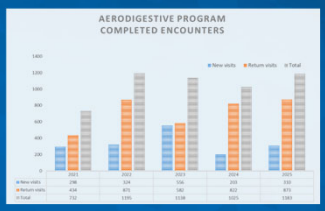
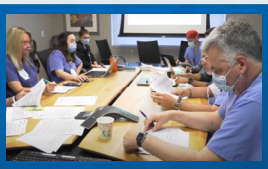
## Aerodigestive Center

- 3 Peds Pulm
- 3 GI
- 3 ENT
- 4 SLP
- 2 RNs
- 1 RD and 1 SW



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## Oropharyngeal Dysphagia

- Muscles/Nerves:
  - Neurologic Abnormality. Primary or secondary.
  - Prematurity. In-Utero Drug Exposure.
  - Chiari Malformation. Tumors/Stroke
- Vocal Folds
  - Vocal Cord Paralysis
- Posterior tracheal wall
  - Laryngeal Cleft or H-type TEF
- Breathing
  - Laryngomalacia
  - Upper Airway Obstruction

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## Oropharyngeal Dysphagia: Work Up

- Muscles/Nerves:
  - Neurologic Abnormality. Primary or secondary.
  - Prematurity. In-Utero Drug Exposure.
  - Chiari Malformation. Tumors/Stroke
- Vocal Folds
  - Vocal Cord Paralysis
- Posterior tracheal wall
  - Laryngeal Cleft or H-type TEF

→

- Muscles/Nerves:
  - Neurologic Exam
  - Developmental Milestones
  - Dysmorphic Features
- Vocal Folds
  - Voice exam
  - ENT referral
- Posterior tracheal wall
  - Airway scopes in OR

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## Oropharyngeal Dysphagia: Management

- Nutrition
- Prevention of FB and/or Aspiration Pneumonia
- Control of chronic bronchitis.
- Maintenance of oral skills
- Quality of life
- Control of dysphagia symptoms
- Sialorrhea control

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## Oropharyngeal Dysphagia: 'Factors' Involved

- Muscles/Nerves
- Vocal Cords
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- Volume
- Flow
- Breathing

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## Oropharyngeal Dysphagia: 'Factors' Involved

- Muscles/Nerves
- Vocal Cords
- Normal Anatomy

- Volume
- Flow
- Breathing

Thicker liquids = less flow = less volume = less dysphagia = less aspiration.

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## Oropharyngeal Dysphagia: 'Factors' Involved

- Muscles/Nerves
- Vocal Cords
- Normal Anatomy

⇔

- Volume
- Flow
- Breathing

Nipple change/technique/pacing= less flow = less volume = less dysphagia = less aspiration.

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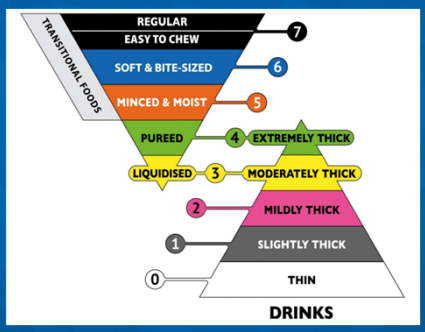
## Thickeners: IDDSI (newer scale)

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## Thickeners: IDDSI (newer scale)

0: Thins, MOST formulas

1: Slightly Thick, some AR formula

2: Mildly thick, previous nectar

3: Moderately thick, previous honey

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## Thickeners: Evidence

In improving dysphagia symptoms:

- Expert opinion: VAST
- Radiographic evidence: Swallow studies
- Endoscopic evidence: FEES
- Large studies: Mainly adults
- Pediatric: Many studies use it as a GOAL

In preventing respiratory symptoms:

Pediatric: Expert Opinion

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## Thickeners: Pearls

- Breastmilk: no cereal as it would be digested
- Cereal: rice vs oat, oat is currently preferred
- Commercial thickeners: NEC risk in prematures
- Gel-mix: special mixing includes heating and waiting.

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## Thickeners: Pearls

- If there is NEC risk (premature or <12mo):
  - cereal for formula, gel-mix for BM
- No NEC risk:
  - cereal for formula, commercial thickeners for BM
- Medicaid does approve commercial thickeners.
- AR formula: variable, =< Slightly Thick or IDDSI 1

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## Oropharyngeal Dysphagia: 'Factors' Involved

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NPO = No Aspiration

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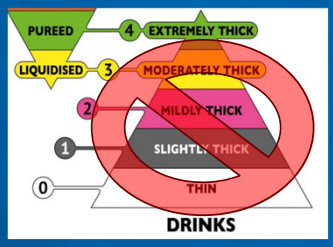
## Oropharyngeal Dysphagia: NSS




- No Safe Swallow Liquid Consistency

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## Oropharyngeal Dysphagia: NSS

NSS on VFSS → ER for Admission → Hospitalist Discussion

NSS on VFSS → Immediate Discussion with Aero → Urgent Aero visit → Discuss management and work up with Aero

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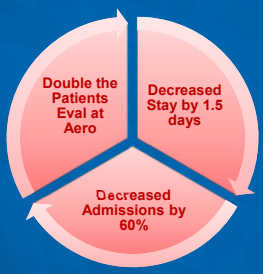
## Oropharyngeal Dysphagia: NSS




- High % of patients with global developmental delay
- Small number of patients with anatomical problems
- Safe consistency was eventually identified in about 50% of infants

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## Oropharyngeal Dysphagia: 'Factors' Involved

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⇔

- Volume
- Flow
- Breathing

Therapy/Stimulation = Stronger nerves/muscles = Less Aspiration

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## Electrical Stimulation

In improving dysphagia symptoms:

- Expert opinion: Center dependent, decreasing.
- Radiographic evidence: Swallow studies in some populations
- Large studies: Post-stroke Adults
- Pediatric: CP and Complex Care small studies.

In preventing respiratory symptoms:

Pediatric: None.

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## Oropharyngeal Dysphagia: 'Factors' Involved

- Muscles/Nerves
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- Volume
- Flow
- Breathing

Normal Laryngeal/Esophageal anatomy = No aspiration

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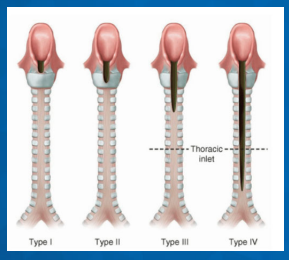
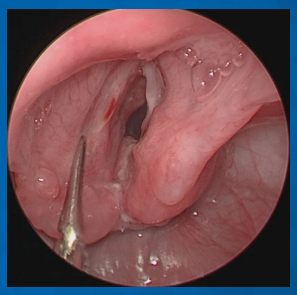
## Laryngeal-Esophageal Clefts



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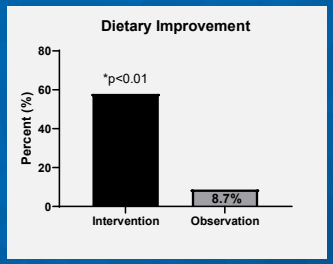
## Laryngeal-Esophageal Clefts: Evidence

- Multiple Retrospective Studies.
- CoA Data: There is *an improvement* in most patients after repair.

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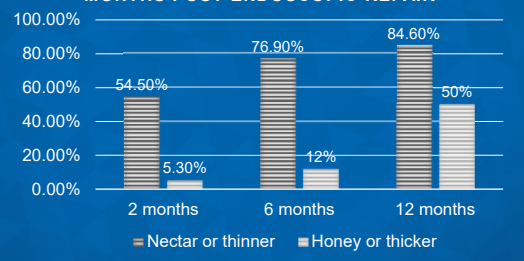
## LE Clefts: Evidence

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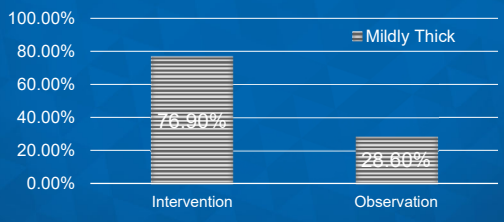
## LE Clefts: Evidence

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## Laryngeal-Esophageal Clefts: Evidence

1. **Patients with a small cleft and mild dysphagia may spontaneously improve.**
2. **A cleft repair is not a guarantee of immediate improvement.**
3. **The severity of the dysphagia predicts how much response there is to a cleft repair.**

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## Other Management Strategies

- Chiari I Decompression: Some evidence of dysphagia resolution. *Not Immediate.
- Laryngomalacia: Time helps dysphagia. Surgery can make it worse.
- H-type TEF: Immediate resolution of symptoms.

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## Controlling the Aspiration Bronchitis/Bronchiolitis

- In pediatrics, it can always be asthma, so challenging
- Treatment is all expert opinion-based
  - Inhaled/Nebulized Steroids
  - Azithromycin
  - Acid suppression is not indicated anymore

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## Saliva Aspiration Bronchitis or Sialorrhea

- Confirmation:
  - NM: Salivagram
- Reduce saliva production:
  - Medical management: atropine drops, glycopyrrolate, scopolamine
- Surgical reduction:
  - Botox Injections
  - DROOL: ligation/removal salivary glands
  - Laryngeal-tracheal separation

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## Summary

- Diagnosis
  - VFSS (MBS)
  - FEES
  - SLP assessment
- Etiology workup
  - Neuro exam
  - Developmental exam
  - Airway scopes
- Management
  - Reduce Flow / Thickeners
  - NPO
  - Treat the 'asthma' (Pulm)
  - Nutrition/Oral Skills/QoL
- Etiology management
  - LE cleft repair
  - Chiari I repair
  - Vocal Folds interventions
  - TEF repair

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## Case 1

- A 6-month-old comes for a checkup.
- Choking with feeds. Sometimes stops bottles.

**Next Step?**

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## Confirming Diagnosis

- SLP evaluation: Low sensitivity as it may MISS silent aspiration.
- VFSS: provides diagnosis and guidance on treatments.
- FEES: requires more trained staff and patients' tolerance.
- Empirical trials of modifications

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## 6-month-old, next steps:

- Muscles/Nerves:
  - Neurologic Abnormality. Primary or secondary.
  - Prematurity. In-Utero Drug Exposure.
  - Chiari Malformation. Tumors/Stroke
- Vocal Folds
  - Vocal Cord Paralysis
- Posterior tracheal wall
  - Laryngeal Cleft or H-type TEF

- Muscles/Nerves:
  - Neurologic Exam: NORMAL
  - Developmental Milestones: AS EXPECTED
- Vocal Folds: NORMAL VOICE.
- Posterior tracheal wall: ?

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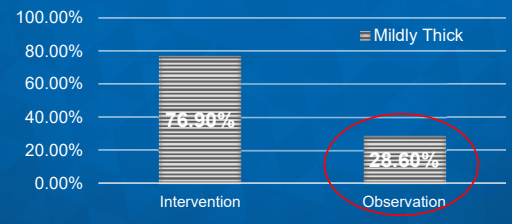
## LE Clefts: Evidence

% OF PATIENTS WITH DYSPHAGIA RESOLUTION BY VFSS AT 6 MONTHS POST ENDOSCOPIC REPAIR OR DIAGNOSIS

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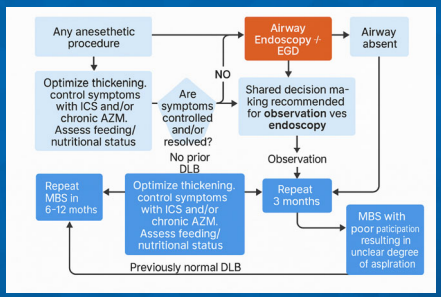
## 9 month old, still symptomatic

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## 9 Month Old, Still Symptomatic

- Control respiratory symptoms
- Maintain adequate weight gain
- Prevent aversion
- Optimize anesthesia use when indicated

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## When to refer to Aerodigestive

- Patient needs work up for why they aspirate
- Patient has uncontrolled respiratory symptoms
- Patient has malnutrition or severe aversion
- Patient could benefit from scopes

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