Infant Dysphagia: Contributions from Atypical Anatomy

KYLA O’BOYLE, MS, CCC-SLP
MERCY ONE DES MOINES MEDICAL CENTER
MARCH 28, 2019

Introduction & Presentation Overview

Anatomy and Physiology
Severity and Interventions
Clinical Presentations
Case Studies

Questions

Aspiration in Infants
Infants that aspirate do so SILENTLY
Aspiration not typically correlated with physiologic instability
Bolus flow in aspiration in infants vs adults
Response to aspiration

Babies are Just Different

Normal Swallow

Aspiration in Infants

Laryngomalacia Overview

Congenital condition
Present in 45-75% of pediatric patients with stridor
Hallmark is inhalator stridor
Onset
- Shortly after birth with average age presentation 2 weeks (Olney et al 1999)
Progression
- Typically worsens over first 6 months with gradual improvement
Resolution
- Most cases are symptom free by 18-24 months (Thompson et al 2007; Holinger et al 1967)

Diagnosis via Flexible Fiberoptic Laryngoscopy

Common Findings
- Inspiratory prolapse of the arytenoids
- Redundant arytenoid mucosa
- Shortened aryepiglottic folds
- Omega shaped and/or elongated/scleral epiglottis
Laryngomalacia

Etiology

Multifactorial
- Anatomic
- Inflammatory
- Neurological

Severity Ratings Per Thompson et al 2017

- Mild Laryngomalacia
  - Inspiratory stridor
  - With or without cough during feeding
- Moderate Laryngomalacia
  - Inspiratory stridor
  - Choking or gagging during feeds, frequent regurgitation, brief apneas or cyanotic episodes OR intermittent dyspnea with retractions (did not require interventions)
- Severe Laryngomalacia
  - Stridor
  - Life-threatening issues: failure to thrive, apneas, cyanosis or dyspnea requiring interventions, pectus excavatum, pulmonary HTN, or cor pulmonale

Surgical Interventions

- Only indicated in about 10-15% of cases with average age at surgery 3-5 months
- Tracheotomy
- Supraglottoplasty based on type of laryngomalacia
  - CO2 Laser vs cold instrumentation
  - Epiglottopexy
    - Generally successful
    - 10% occurrence of complications including aspiration


Retrospective cohort study with 324 patients with laryngomalacia
Abnormal swallow function confirmed with CSE/MBSS and/or FEES in 80% of patients with dysphagia symptoms
Abnormal swallow function found in two-thirds of laryngomalacia patients with no subjective dysphagia
Aspiration in Infants

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- Bolus flow in aspiration in infants vs adults
- Response to aspiration

Feeding Interventions

Pre-feeding skill development
- Initiating and advancing PO intake
- Nipple selection
- Positioning
- External pacing
- Thickening

Case Studies in Laryngomalacia

- Birth history
- Clinical Swallow Evaluation
- Complicating factors
- MBSS Findings
- Outcomes

Standard Interventions

- Proactive interventions:
  - Pre-feeding skill development
- Gentle initiation of oral feeds

- Reactive interventions:
  - Positioning
  - Flow rate selection or modification
  - Feeding strategies/External Pacing
  - Thickening

Thickening for Infants

- Dysphagia and/or Reflux
- AAP and FDA positions
  - Digestive immaturity, malabsorption, NEC
  - No standards
  - Thicker used, Recipes, Viscosities Used, Measuring, Mixing, dwell time and warming thickened feeds
  - Starch-based Thickeners
  - Commercial Thickeners
  - Rice cereal

Madhoun et al. (2015) Neonatal Nursing Reviews
Rice Cereal

Macros shift from protein and fat to carbs which may lead to excessive weight gain (Horvath et al., 2008)

Introduction of solids prior to 4 months
- Associated with obesity (six fold increase) at age 3, (Grummer-Strawn et al., 2006)
- Decreased duration of breastfeeding (Huh et al., 2013)
- Increased risk of diabetes, eczema, and celiac disease (Harris et al., 2005; Tarini et al., 2006)

Constipation (Mascarenhas et al., 2005)

Additional iron and inorganic Arsenic (Jaskele, et al., 2013; McCallum, 2011)

Unreliable for thickening breastmilk

IDDSI Flow Test

https://youtu.be/R6hWc38lbs (procedure instructions)

International Dysphagia Diet Standardization Initiative (IDDSI)

Goals of IDDSI
- Establish and international standard for fluids and modified foods

Development of Framework

ASHA Endorsement
- Recently announced
- 2 year transition plan

Reflux Formulas for Dysphagia?

Line Spread Study
- Enfamil AR approached statistically significant differences in viscosity vs standard formulas other reflux formulas (McFall et al 2014)

Sheer rates are dramatically different for common formulas
- Enfamil AR 20 kcal at 50 mPa s: 76
- Similac Sensitive for Fussiness and Gas (20 kcal) at 50 mPa s: 6 (Frazier et al 2016)

Clinical Findings at MMC

Use of Enfamil AR 24 kcal formula

IDDSI Syringe Testing
- Warmed 3-4
- Cold 7
Changes in MBSS Practices

Viscosity Matched Barium
- Slightly thick formulas
- Patients with added rice cereals for reflux
- Use for pediatric MBSImP?

Possible Implications for Adult Patients
- Health drinks
- Patient and family education/empowerment

Barium and Infant Formula
- Enfamil AR 20 kcal - NECTAR
- Similac Sensitive for Gas and Fussiness - Thin

References


Conclusions

45-75% of infants with stridor have laryngomalacia
Most infants with identified laryngomalacia have some abnormal swallow function
Current typing or severity ratings are not predictive of the presence or absence of dysphagia or aspiration
Highlights need for CSL as well as instrumental evaluations for children with suspected or confirmed laryngomalacia

Questions?

koboyle@mercydesmoines.org