Respiratory Concerns in Children with Down Syndrome

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Respiratory Concerns in Children with Down Syndrome

- Overview
- Respiratory infections
- Airway issues
- Sleep issues
- Pulmonary vascular issues
Respiratory Concerns in Children with Down Syndrome: Overview

- Most common reason for children to be admitted to the hospital.
- Respiratory infections can be more severe, and hospitalization often results in admission to the intensive care unit.
Anatomical features in DS that contribute to respiratory concerns

- Craniofacial features
  - Narrowed nasopharynx
  - Flattened mid-face
  - Macroglossia
- Adenotonsillar hypertrophy
- Airway size
Other features of DS that contribute to respiratory concerns

- Low tone (hypotonia)
  - Upper airway muscles: dysphagia
  - Airway: malacia
- Gastroesophageal reflux
  - Contribution to adenotonsillar hypertrophy
  - Contribution to airway inflammation
- Cardiac disease
- Obesity
Pearl #1: Anatomical features and physiologic contributors specific to Down Syndrome result in malacia

- Definition: softening or loss of consistency in any of the organs or tissues
- Origin: Greek *malakía*
  softness, tenderness, weakness
- Laryngomalacia, tracheomalacia, bronchomalacia, airway malacia
Respiratory Concerns in Children with DS: Respiratory Infections

• Respiratory infection is a significant burden.
  – Bronchiolitis
  – URI/LRTI: upper respiratory infection and lower respiratory tract infection
  – Pneumonia
Respiratory Concerns in Children with DS: Respiratory Infections

• The specific defect in the immune system is not clear, although a number of studies suggest developmental delay.

• Chronic aspiration is a significant contributor.
Pearl #2: Developmental delay in Down Syndrome can refer to more than the nervous system.

- Coordination of swallow
- Immune development
Pearl #3: Water (reflux) damage can be significant in children with DS.
Symptoms of chronic aspiration

• Chronic cough
• Wheezing not controlled by asthma medications
• Pneumonia
• Radiographic findings that suggest chronicity
  – Right middle lobe syndrome
  – Bronchiectasis
Evaluation for recurrent pneumonia

- Swallowing evaluation to look for aspiration
- Studies looking for reflux
- Chest radiograph when well
- CT scan
- Bronchoscopy and bronchoalveolar lavage
- Immune evaluation
- Allergy evaluation
Respiratory Concerns in Children with Down Syndrome: Airway Issues

Symptoms that reflect airway issues:

- **Stridor**: Inspiratory wheeze that suggests upper airway obstruction.
- **Wheeze**: Expiratory wheeze that suggests lower airway disease, including asthma.
- **Dyspnea**: Shortness of breath
- **Retractions**: Use of accessory muscles
Upper airway abnormalities

- Narrowing of the nasopharyngeal passages
- Macroglossia
- Adenotonsillar hypertrophy
- Laryngomalacia, worsened by reflux
Lower airway abnormalities

- Subglottic stenosis
  - May be more likely following intubation, as tracheal diameter is smaller
- Tracheobronchomalacia
- Tracheal stenosis
Definition of asthma

• Chronic inflammation
• Airway reactivity to specific triggers
• Reversible airway obstruction
• Manifest as symptoms that can include cough, wheeze, and dyspnea
Asthma in Down Syndrome

• Studies have been equivocal about whether there is increased risk of asthma in children with DS.

• Infants with DS who have bronchiolitis, including RSV, are more likely to require hospitalization.
Evaluation for airway issues

- Careful history
- Physical exam
- Chest radiograph
- Bronchoscopy
- Sleep study
- Echocardiogram
Respiratory Concerns in Children with Down Syndrome: Sleep Issues

- Impact on other development
- Obstructive sleep apnea
- Review of anatomic features
- Increased BMI associated with OSA
- AAP recommendation: Screening at age 1
- Importance of sleep study
- Complication: pulmonary hypertension
Respiratory Concerns in Children with Down Syndrome: Pulmonary vascular issues

• Heart disease, with increased pulmonary blood flow
• Hypoxia
• Airway obstruction
Pulmonary hypertension in newborns with DS

- Persistent pulmonary hypertension
- Can occur with or without heart disease
- “Delay” in vascular remodeling
Review of Pearls

• Anatomical features and physiologic contributors specific to DS result in malacia.
• Developmental delay in DS can refer to more than the nervous system.
• Water damage can be significant.
What Health-Care Providers Can Do to Reduce Respiratory Disease

• Look for aspiration.
• Vaccinate against influenza and pneumococcus.
• Address sleep issues.
What Parents Can do to Reduce Respiratory Disease

• Reduce exposure to viral respiratory infections.

• Maintain a healthy lifestyle to boost the immune system and to reduce obesity.

• Reduce exposure to environmental tobacco smoke.
Suggested Reading

Pulmonary Complications of Down Syndrome during Childhood
Karen M. McDowell and Daniel Craven, Cincinnati Children’s Hospital Medical Center
Journal of Pediatrics, 2011