All that Wheezes is Not Asthma: Chronic Cough in Children



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Meet Emily

 Emily, 15-months, is brought to your office for a checkup.



 Emily has been wheezing since she was six-months-old.

 The wheezing does clear between episodes and she does experience weeks when she is well and her breathing is normal.

- She has been treated with an inhaled steroid and an inhaled bronchodilator.
- The bronchodilator is sometimes helpful during exacerbations.
- Her parents are concerned and ask, "is this asthma, or is there something else going on?"

For the answers to these questions, read

Wheezing is common during childhood, especially early childhood. In a prospective study of children in Arizona, 48.5% had at least one wheezing episode by the age of six. Wheezing is common during childhood, especially early childhood. In a prospective study of children in Arizona, 48.5% had at least one wheezing episode by the age of six.¹

Viral infections are the most common trigger of wheezing in young children. Factors associated with an increased likelihood of wheezing include:

- exposure to environmental tobacco smoke (including prenatal exposure),
- male gender,
- daycare attendance and
- crowded conditions.

Furthermore, a respiratory syncytial virus infection is a common cause of wheezing in young children.² However, rhinovirus, influenza and other respiratory viruses are also implicated.³

Many children who do not have asthma outgrow wheezing caused by viruses during their preschool years. Of the children in the Arizona study who had ever wheezed, 41% were classified as transient early wheezers and had not wheezed for at least one year by the age of six.¹

When is it asthma?

Almost 28% of the children with early wheezing (before the age of three) in the Arizona study continued to wheeze at age six. Since it can be difficult to differentiate the children with transient early wheeze from those who have asthma, some physicians tend to only make the diagnosis of asthma retrospectively (i.e., after an older child has continued to wheeze). However, young children can have asthma attacks. Common reasons for the exacerbation of asthma include:

- exposure to triggers including respiratory viruses,
- environmental tobacco smoke,
- dust mites and
- other allergens.

Non-compliance with asthma therapies can lead to persistent symptoms. Review of valved holding chamber and metered dose inhaler used at each visit can be helpful. Young children can be leery of the devices at first, but reassurance and review of the techniques in the doctor's office can be helpful for parents. Using controller medications as needed, instead of daily, can lead to inadequate symptom control. Asthma education and formation of an asthma action plan are the cornerstones of good asthma care.⁴

What else could it be?

Other conditions can present with chronic wheezing in early childhood (Table 1). Some factors that may suggest causes other than asthma and viral infections include:

- early age of onset,
- lack of identifiable triggers,
- abnormal findings during inspiration,
- the character of the wheeze,
- lack of well periods between exacerbations and
- presence of signs and symptoms of other medical conditions.

Cystic Fibrosis affects 1 in 3,600 children born in Canada.

Table 1

Different diagnoses of chronic wheezing in early childhood

- Asthma
- Viral-associated wheeze (transient early wheezing)
- Gastroesophageal reflux disease
- Aspiration
- Anatomical abnormalities
- Cystic fibrosis
- Primary ciliary dyskinesia
- Other respiratory tract infections
- Cardiac disease
- Immunodefeciency

Gastroesophageal reflux (GER) and swallowing dysfunction are other common contributors to chronic wheezing in children. Protective airway responses when GER occurs can lead to bronchoconstriction and increased production of airway secretions. Although these children may have a history of coughing or choking while being fed, or spitting up after having been fed, some children may be asymptomatic.

Tachypnea and respiratory distress can also cause secondary GER. Testing for gastroesophageal reflux disease (GERD) may be helpful and an empiric trial of GERD therapy may result in a dramatic decrease in respiratory symptoms.⁵

Also, anatomical abnormalities causing airway collapse or obstruction may present with wheezing. Parents may report inspiratory stridor associated with larygomalacia as wheezing. The wheeze associated with tracheomalacia and bronchomalacia can be monophonic, compared with the polyphonic wheezes generated in smaller airways. Tracheoesophageal fistula is usually diagnosed in the newborn period, but patients with rare H-type fistulas may present months or years after the onset of symptoms.

Vascular rings, slings and a double aortic arch can cause large airway compression.

Acquired causes of airway narrowing include:

- tracheal or esophageal foreign bodies,
- airway papillomas,
- lymphadenopathy and
- subglottic or tracheal stenosis.

Vocal cord dysfunction can present with noisy breathing, despite a normal speaking voice.

What are the most serious causes of chronic cough?

Cystic fibrosis (CF) affects 1 in 3,600 children born in Canada.⁶ Although most young children with undiagnosed CF also show failure to thrive, respiratory symptoms can be the main presenting complaint. Primary ciliary dyskinesia (PCD) is a condition in which abnormal ciliary function leads to chronic ear, sinus and lung infections. The diagnosis of PCD is made by a biopsy of the ciliated airways.

Other infections can lead to prolonged respiratory symptoms. Pertussis most commonly affects young infants, the unimmunized and older adolescents. Tuberculosis should also be considered in children with respiratory symptoms and risk factors for exposure. Chronic sinusitis and post-nasal drip can also cause chronic cough.

Chronic respiratory symptoms can also be a sign of an underlying immunodeficiency. IgA deficiency affects 1 in 400 to 3,000 individuals.

Although cardiac disease often presents with other symptoms, wheezing can be associated with new or worsening heart conditions. Development of cardiomyopathy, primary pulmonary hypertension, or a high-flow ventricular septal defect may be heralded by shortness of breath upon exertion

Table 2

Key points on history and physical exam

History

- Birth history (*i.e.*, prematurity, early respiratory distress)
- Age at onset of symptoms
- Description of respiratory sounds (*i.e.*, inspiratory/expiratory, harsh/soft, etc.)
- Growth and development
- Feeding issues
- Signs/symptoms of infections or other illnesses
- Family history (i.e., asthma, allergies, CF)

Physical examination

- Growth parameters (with growth curve)
- Respiratory rate and oxygen saturation (if
- available)
- Upper respiratory tract
- Inspection of wall shape and work up of breathing
- Breath sounds and phase of respiration in which they occur
- Cardiac and GI exam
- Skin and extremities (*i.e.*, clubbing, cyanosis, eczema)

CF: Cystic fibrosis GI: Gastrointestinal

and by wheezing.

Chronic respiratory symptoms can also be a sign of an underlying immunodeficiency. Immunoglobulin (IgA) deficiency affects one in every 400 to 3,000 individuals.⁷ Immunoglobulin G (IgG) subclass deficiency and common variable immunodeficiency should be considered; however, severe immunodeficiencies are rare. Patients with risk factors should be offered testing for human immunodeficiency virus infection. Chronic granulomatous disease and complement deficiencies may also present with recurrent respiratory infections.

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How should patients be diagnosed?

Evaluation of a child with chronic wheeze starts with a thorough history and physical examination (Table 2). Investigations and therapies proceed in a step-wise manner, guided by the information obtained from the history and physical exam (Table 3).

Table 3

Investigations and therapies

First-line

- Chest X-ray
- Pulmonary function testing (if the child is able to perform it)

Second phase

- Complete blood cell count with differential
- Sweat chloride test
- Trial of GER therapy

Narrowing it down

- (based on history and physical exam)
 - GI studies
 - Barium swallow
 - Videofluoroscopic swallowing study
 - pH probe
- Infectious disease studies
 - Pertussis culture
 - TB skin test
- Immunology studies
 - Immunoglobulin levels and CH50
 - Quantitative antibody titres to vaccine components (*i.e.*, tetanus, HIB or Streptococcus pneumonia, measles)
 - Nitroblue tetrazolium test
 - HIV test
 - Cardiac evaluation
 - EKG
 - Echocardiogram
- Ciliary biopsy (nasal or tracheal)
- Sinus CT scan
- Chest CT scan

GERD: Gastroesophageal reflux disease GI: Gastrointestinal TB: Tuberculosis EKG:Electrocardiograph CH50: Complement assay HIB: *Haemophilus influenza* type B Unfortunately, there is currently no test to determine whether a child will only have transient early wheezing. However, when wheezing is not improving on standard asthma therapy or does not follow a typical pattern, determining whether other conditions may be contributing factors is important and can be reassuring to parents.



References

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