



# Investigating the child with a cough

Each month we present authoritative advice on the investigation of a common clinical problem, specially commissioned for family doctors by the Board of Continuing Medical Education of the Royal Australasian College of Physicians.



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Children who present with recurrent episodes of wheeze, cough and breathlessness usually have asthma and cause no diagnostic dilemma for GPs. In the last 30 years, much continuing medical education has been directed towards the diagnosis and management of childhood asthma. This is appropriate given the morbidity of this condition; however, there has been a tendency to believe that asthma is the only important respiratory problem in children. This article focuses on a different group of children, those who have cough without wheeze. Most of these children do not have asthma and will not respond to asthma medications.

For convenience, the main situations considered in this article are cough lasting at least two weeks and recurrent episodes of cough without wheeze. Both these clinical scenarios are common in general practice. Establishing an exact diagnosis is often difficult and management options are limited.

## Prolonged cough Causes

The definition of prolonged cough is somewhat arbitrary. Most parents and doctors would

regard coughing for more than two weeks as meeting the criterion for a prolonged cough. Table 1 lists the more important causes of a prolonged cough.

Acute bronchitis is an acute febrile illness in which cough is the predominant sign. The maximum concentration of cough receptors in the airways is in the larynx, trachea and bronchi. Many children whose respiratory illness is labelled as an upper respiratory tract infection have cough as a prominent feature. These children have inflammation in the larynx, trachea or bronchial tree. Some people believe that postnasal drip or other upper respiratory tract secretions stimulate cough receptors in the larynx – this view is not held by most respiratory paediatricians.

The cough in viral bronchitis may be dry or loose. When the cough is loose, in most cases the sputum is swallowed rather than being expectorated. If wheeze is associated with a viral respiratory infection, asthma is the likely diagnosis. The absence of wheeze makes asthma unlikely. The cough in viral bronchitis usually resolves after one to two weeks but may last longer. If it does, the possibility of complications, such as segmental collapse or bacterial infection, should be considered.

### IN SUMMARY

- Viral bronchitis is a common cause of cough.
- Whooping cough should be considered in a child with prolonged cough.
- Cough without wheeze is usually not asthma.
- Chest x-ray is the first investigation to consider in the child with prolonged or recurrent cough.
- CT scan of the chest is the investigation of choice for bronchiectasis.
- A thorough history is of more value than most available investigations.

Whooping cough remains a significant cause of prolonged cough. The typical illness begins with a runny nose and cough. The cough becomes progressively worse and is paroxysmal in nature. The child may cough until his or her face is red and then becomes cyanosed. Post-tussive vomiting is a feature, and the coughing may cause subconjunctival haemorrhage (Figure). Although the textbook description is that the coughing spasms end with the whoop that gives the disease its name, a whoop is often absent. Furthermore, immunisation against pertussis does not provide complete protection. In both immunised and nonimmunised children, the most common cause of a paroxysmal cough lasting one to three months is pertussis. Between paroxysms the child is well. If exhausted and concerned parents present with a story that their completely well looking child has had a terrible cough for weeks, whooping cough must be considered.

*Mycoplasma pneumoniae* infection is a frequent cause of bronchitis and pneumonia, particularly in school-aged children. Most children are not particularly unwell and often present a week or two after the onset of fever and cough. Headache, malaise, sore throat, runny nose and other constitutional symptoms may be present.

Tuberculosis is rare but an important consideration in migrant and indigenous children, particularly when there has been weight loss associated with cough.

Foreign body inhalation needs to be remembered as a possible cause, especially in younger children.

### Investigations

An abnormal chest x-ray may, according to the clinical picture, support a diagnosis of *Mycoplasma* infection or suggest the need to consider a foreign body or tuberculosis.

Clinical suspicion is the most important investigation for whooping cough. A marked lymphocytosis may be present. Unfortunately, very few laboratories find it easy to culture *Bordetella pertussis*, and an elevated serum IgA to pertussis may clinch the diagnosis.

For *Mycoplasma* infection, the definitive test is specific IgM.

A Mantoux test is used to detect tuberculosis.



Figure. Subconjunctival haemorrhages in a girl with whooping cough.

### Table 1. Causes of prolonged cough

- Viral bronchitis
- Bacterial bronchitis
- Whooping cough
- Mycoplasma* infection
- Tuberculosis
- Foreign body

### Table 2. Causes of recurrent cough

- Recurrent acute bronchitis
- Irritative bronchitis (passive smoking)
- Recurrent croup
- Bronchiectasis
  - cystic fibrosis
  - post-infections
  - immunodeficiency
  - other causes
- Aspiration
  - gastro-oesophageal reflux
  - dyscoordinate swallowing
  - H-type tracheo-oesophageal fistula
- Focal lesions
  - tracheomalacia
- Psychogenic
- Asthma
- Postnasal drip (controversial)

### Recurrent cough

#### Causes

There is some overlap in the causes of recurrent cough and the causes of prolonged cough. Table 2 lists some of the causes of recurrent cough.

Although it is important to try to distinguish children who have recurrent episodes of cough and who are well between episodes from those who have a persistent daily cough, many parents find this a surprisingly difficult distinction to make. Similarly, it may be difficult for parents to distinguish a daily productive cough, which suggests suppurative lung disease (bronchiectasis), from a dry cough, which is associated with croup or tracheomalacia or may be psychogenic. Asking the child to cough may prove very helpful.

Recurrent episodes of cough without wheeze, especially in association with coryzal symptoms, are characteristic of recurrent acute bronchitis. In some cases there may be no obvious evidence of acute infection. An infective bronchitis may indeed be the cause, but this also raises the possibility of:

- recurrent aspiration, secondary to gastro-oesophageal reflux, dyscoordinate swallowing, or a combination of the two (in rare cases, an H-type tracheo-oesophageal fistula is the cause of aspiration)
- irritative bronchitis, secondary to the effects of parental smoking.

A barking cough, usually with inspiratory stridor, suggests croup. Recurrent episodes of viral croup are usually obvious. Less well recognised is spasmodic croup. The characteristic feature of this is a child who goes to bed completely well and wakes up in the middle of the night with a barking cough and stridor. The absence of prodromal viral symptoms often leads to the erroneous belief that this could not be croup.

The child with tracheomalacia may also have a barking cough, associated with stridor and wheeze. In this case the

cough will have been present from early in life.

Loose cough every day is the hallmark of bronchiectasis. One of the causes of bronchiectasis, cystic fibrosis, may be missed on newborn screening testing. Other causes of bronchiectasis include:

- incompletely resolved lower respiratory tract infection
  - recurrent aspiration
  - retained foreign body
  - immunodeficiency
  - immotile cilia syndrome.
- If your secretary tells you that there

is a child in the waiting room with a terrible cough, the diagnosis is likely to be psychogenic. The cough has a honking quality, rather like the sound of a goose.

The diagnosis of asthma always needs to be considered in the child with recurrent cough. If wheeze has never been

present, asthma is possible but unlikely.

### Investigations

A chest x-ray is the initial investigation in the child with persistent loose cough. Unfortunately, a normal x-ray does not exclude bronchiectasis and a CT scan of

the chest will often reveal abnormalities that are not apparent on x-ray.

CT scanning in children requires particular expertise and in young children a general anaesthetic, so it is wise to seek a consultant paediatric opinion before this test is undertaken.

Sweat testing for cystic fibrosis requires a specialised biochemistry service that performs the test regularly, to avoid the risk of false-positive and false-negative results.

Older children (from about 6 years) will be able to perform simple spirometry before and after bronchodilators. The presence of airways obstruction that persists after bronchodilators supports a diagnosis of bronchiectasis and is an absolute indication for referral.

The possibility of lung disease secondary to reflux is difficult to prove or exclude. Even if reflux is present, we need to distinguish a casual from a causal association. A history of cough related to feeding is suggestive of a causal association. Barium swallow is of limited value. A 24-hour oesophageal pH study where the parents document cough (so that one can look for a correlation between falls in oesophageal pH and onset of cough) is likely to be more helpful but requires admission to hospital. Often a trial of anti-reflux therapy is the diagnostic investigation that is chosen.

Bronchoscopy is indicated if there is suspicion of an anatomical abnormality (such as tracheomalacia) or a foreign body, and it may be helpful in addition to a CT scan of the chest in assessing bronchiectasis.

### Summary

Children with recurrent cough and prolonged cough often present a diagnostic challenge. A thorough history is of more value than most available investigations. Chest x-ray, lung function and other specific investigations all have a role, but their use needs to be guided by the patient's clinical features. **MT**