

WHEEZY TODDLERS

Clare Peckham, Consultant Paediatrician
Royal Lancaster Infirmary

INTRODUCTION

The wheezy toddler is a common problem encountered in general practice, community and hospital paediatrics. Between the ages of one and three years, much of the debate amongst clinicians and parents about a child's wheezing centres on whether or not the child has asthma. It is generally agreed that most recurrent wheeze in infants and children under three years is likely to have resolved by the age of five or six years, particularly where there is no evidence of atopy⁽¹⁾. Toddlers are thought to have a tendency to wheeze more than adults because their airways are small relative to lung size and during expiration their less rigid airways and chest walls are more likely to collapse or become obstructed with secretions.

In the UK, 25% of acute paediatric hospital admissions are due to wheezing in the pre-school child, and this can rise to 50% during winter epidemics of RSV infection. Recent studies have stated that 40-50% of pre-school children have had recurrent wheeze over the preceding 12 months⁽²⁾.

DEFINITION

It is important to correctly diagnose wheeze in toddlers, as there is often confusion between parents and other carers about what wheeze actually is. A careful history is therefore essential. Some parents refer to wheeze as a 'rattle'; others describe upper airway noises rather than true wheeze.

Questions to ask with a wheezy toddler

- what does parent mean by wheeze?
- is it inspiratory or expiratory?
- is there stridor or wheeze?
- is the wheeze constant?
- is there a cough?

Wheezing is impossible to measure in terms of lung function in the toddler.

Recent studies recording childhood airway noises have shown agreement of parents and doctors for labelling sounds as about 50%⁽³⁾. It must thus be remembered that parents and professionals do not use the same words for labelling breathing sounds in children.

For the purposes of definition in this article wheezing is equivalent to intrathoracic airway obstruction. Oedema, mucus plugging and muscular bronchoconstriction cause this obstruction.

AETIOLOGY

Risk factors for wheezing in toddlers involve a number of issues implicated in both infant wheezing and older childhood asthma. There are important differences between the two age groups. Exposure to environmental tobacco smoke in utero and postnatally, and viral infection are more

important in younger children, whilst atopy and aero-allergen exposure are more common predisposing factors in the older child. A small protective effect is thought to exist by breast-feeding. Bronchiolitis in the first six months also predisposes to wheezing in toddlers, although it must be remembered that acute viral bronchiolitis only affects about 1-2% of the population⁽⁴⁾. Low birth weight and illnesses such as chronic lung disease, congenital heart disease and cystic fibrosis also predispose a toddler to wheeze. Current genetic population studies are in progress investigating certain gene loci associated with the development of asthma (?chromosome 5 for asthma and IgE, and chromosome 11 for atopy).

DIAGNOSIS

A clear history is essential. The pattern of wheezing is important, particularly in terms of management. Wheezy-associated viral episodes are accompanied by symptom-free intervals. Chronic recurrent wheeze with daily symptoms and often a night-time cough are more suggestive of atopy. Other clinical features such as degree of work of breathing, hyperinflation and respiratory rate are indicators of severity, together with obvious signs of distress and hypoxia. Crepitations are heard in viral episodes but if they persist between episodes an alternative diagnosis should be sought.

Vomiting, poor feeding, failure to thrive, inspiratory and expiratory noises, asymmetrical auscultatory findings, stridor and a hoarse voice or cry are all features that may suggest a less common diagnosis.

Causes of wheeze in a toddler

Commonest: Recurrent episodic wheeze
Early asthma

Less common: infection

- post pertussis
- mycoplasma
- obliterative bronchiolitis (post viral)

developmental abnormality

- bronchomalacia
- bronchial compression
- congenital heart disease
- tracheal granuloma/stricture

congenital lung abnormality

- lobar emphysema
- bronchogenic cyst
- cystic adenomatous malformation

impaired respiratory tract defence

- cystic fibrosis
- immune deficiency
- ciliary dyskinesia

recurrent aspiration

- gastro-oesophageal reflux
- swallowing disorders
- tracheo-oesophageal fistula
- laryngeal cleft

INVESTIGATIONS

If there are unusual features or a lack of response to treatment, investigations should be undertaken in the secondary care environment. Initial tests might include pulse oximetry, cough swab, chest x-ray and immunoglobulins. In some cases specific allergen skin prick tests are done, CF genetics and CT scan. Rarely, a child may be referred to a tertiary centre for bronchoscopy, oesophageal pH studies or nasociliary brushings.

TREATMENT

Treatment of the wheezy toddler involves avoidance of trigger factors, parental education and action plans, as well as specific therapeutic treatment. Wheezy under-fives can be managed by the primary care team, vital roles being played by practice or asthma nurses. Where there is doubt about the underlying diagnosis, poor response to treatment, or parental anxiety, referral to a specialist team is appropriate.

Bronchodilators

The response to bronchodilators for relief of wheeze in infants is unpredictable and evidence is lacking. The efficacy of bronchodilators appears to improve with age. Anecdotal evidence suggests that ipratropium bromide (Atrovent) may be more effective than salbutamol in the first year of life but there have been no controlled studies. Atrovent is an antimuscarinic bronchodilator. The preferred route of administration is inhalation via an MDI and a spacer and facemask (or mouthpiece in the older toddler). Atrovent is prescribed with the 'Nebuhaler' which is compatible with terbutaline and budesonide MDIs.

This is an important factor for compliance. Newer, smaller baby aerochambers are popular with parents and well-tolerated by the patients. They are certainly worth the extra cost.

Toddlers are usually unable to activate the valve in the spacer device and so should be held in the correct position, either lying or head slightly tipped back with the spacer tipped so that the valve is open. The mask should be properly sealed around the mouth. Several puffs may be required (5-10 100 mcg puffs of salbutamol are equivalent to a nebulised dose of 2.5-5 mg). The method of one puff followed by 5-10 breaths is recommended by our asthma team. This is repeated until the requisite number of puffs has been administered. Apparent failure to respond to treatment is sometimes due to incorrect technique, and a surprising number of parents in clinic report never having been shown how to administer the inhaler properly.

Beta 2 agonists are effective relievers in the toddler age group, and appear more so over the age of one year. They should only be used for relief of symptoms, rather than on a regular daily basis. There is increasing evidence that they may be just as effective when given by an MDI and spacer rather than by jet nebuliser (and indeed a cheaper alternative) in the older child able to tolerate the mouthpiece⁽⁵⁾. Bronchodilator syrups are much less effective than inhaled beta 2 agonists and have more systemic side-effects. In infants under one year there is little evidence to support their use in relieving symptoms. In fact the current BTS guidelines state that oral beta 2 agonists have no place in the treatment of acute asthma in children under two.

In those with viral-induced wheeze, prompt use of a reliever may be all that is required. In the acute severe episode where inhaled treatment is not effective with an

MDI, then nebulised treatment, preferably in hospital with oxygen, is necessary. (If the saturations are less than 92% the guidelines advise administering oxygen and nebulised therapy.) It is important to note that some children under one may suffer initial paradoxical bronchoconstriction and mild hypoxaemia with nebulised beta 2 agonists. This does not happen with MDIs, and spacer and facemask. The proportion of a nebuliser solution that reaches the lungs is generally accepted as being close to 10%⁽⁶⁾.

Occasionally intravenous theophyllines are required and/or intravenous salbutamol in the extremely severe attack, and rarely complete ventilatory support.

The use of nebulisers at home in wheezy toddlers for the administration of beta agonists or steroids is controversial. They should be reserved for those patients where there is underlying chronic disease, or very poor compliance with treatments otherwise. Their use should be closely supervised and monitored.

Steroids

Inhaled steroids as preventer therapy have little place in the treatment of wheezy toddlers who simply have wheeze-associated viral episodes. Instead, each episode should be treated promptly with beta agonists for symptom relief. A short course of soluble oral prednisolone is of unproven benefit in those with an acute viral wheezy episode. However, in those toddlers who are believed to have early onset asthma, prednisolone at a dose of 1-2 mg per kg is advocated in the new guidelines. Children who are on regular inhaled steroids as prevention may benefit from doubling the dose of their preventer at the first sign of an upper respiratory tract infection. There is little clinical evidence, however, to support this practice. Toddlers who are thought to be atopic, or who have other underlying lung pathology such as chronic lung disease or cystic fibrosis, and who wheeze, may benefit from regular inhaled steroids as prevention treatment. The usual starting dose of budesonide is 100mcgs twice a day. The dose of inhaled steroids should always be lowered to the most effective dose whenever possible.

Commonly used steroid inhalers are beclomethasone, budesonide and fluticasone propionate, the latter achieving the same effect as the other two with half the dose. In atopic toddlers, those with a clear family history and those with daily symptoms, low-dose inhaled steroids show benefit after three to seven days of regular use. Growth retardation is not a significant problem with regular low-dose preventative inhaled steroids but the CSM recommends that height be monitored during prolonged treatment. There have also been reports of adrenal suppression with high-dose fluticasone and attention to the dosages given is essential. The safe upper limit in children under five is unknown.

In wheezy toddlers treated with a short course of oral steroids for an acute episode, there is no need to wean off the dose and in appropriate cases parents may be instructed to start treatment as early as possible during an exacerbation.

Other treatments

Long-acting beta agonists such as salmeterol may be added to the treatment of older children (over four years of age) with high usage of bronchodilators during the day. However, their use in the toddler age group remains unclear with clinical trials lacking. They act for up to 12 hours and inhibit bronchoconstriction induced specifically by exercise. Sodium cromoglycate prevents mediator release from mast cells and reduces reflex vagal stimulation. It is no longer mentioned in the most recent guidelines for the management of asthma in children.

Theophyllines are rarely used in wheezy toddlers but are placed in the guidelines as an add-on therapy, for when an inhaled long-acting beta 2 agonist is ineffective. Most recently, the leukotriene receptor antagonist, monteleukast, has been shown to be effective in asthmatic toddlers. It is now licensed for children aged six months and above, and there are plans to decrease this to six months of age. The guidelines suggest monteleukast as an add-on therapy when regular preventer treatment is unsuccessful, but they also suggest its use if inhaled steroids cannot be used. Monteleukast has the added advantage of being an oral formulation in the form of a chewable cherry-flavoured tablet (4mg for ages two to five) making it more tolerable and possibly likely to improve compliance. (For infants over six months, it comes in granule form which can be sprinkled over cereal or yoghurts etc. The dose is again, 4mg.) Evidence for improved compliance is, however, lacking. We have certainly had some success with its use in those asthmatic toddlers (with definite atopy) on high doses of inhaled steroids that have not been effective in preventing relapses.

It must be remembered that the commonly-encountered non-atopic viral wheezy toddler simply needs monitoring and symptomatic relief from beta 2 agonists, and is not going to need any add-on treatments at all. Antibiotics are **not** required in the routine management of wheeze, although atypical infections causing wheeze such as mycoplasma do occur occasionally and would warrant treatment with erythromycin or clarithromycin. Referrals to outpatients of toddlers with almost definite viral wheeze, have often had several courses of antibiotics for cough in the past, and this can be difficult in terms of future management unless clear explanations are given to the parents about the aetiology and pathology of these episodes.

Asthma nurses are invaluable for the monitoring of drug administration and compliance both in primary care and hospital. A written emergency treatment plan should be available for every parent or carer of a wheezy toddler so that immediate action may be taken during an acute wheezy episode. If a child has been symptom-free for three months or more, tailoring of the treatment should be considered.

PREVENTION

Avoidance of cigarette smoking completely and not just in front of the toddler is the single most important preventive measure. Not having pets in the home is another measure, particularly if there is a positive family history of asthma. Breast-feeding for more than just a few weeks may also help prevent wheezing. Effective demonstration of inhaler technique and parental education should also prevent exacerbations by maintaining compliance with preventive therapies. Regular follow-up of toddlers on preventive inhaled steroids is important. Early referral to a specialist for those patients refractory to treatment or where the diagnosis is doubtful is essential.

CONCLUSION

Wheezy toddlers are commonly pre-school children who wheeze episodically with viral infections. The diagnosis is almost entirely reliant on symptoms that can be variable. These children often have a good prognosis and are a different group to those who have day-to-day wheeze without infections. The mainstay of treatment involves reliever inhalers, mainly beta agonists for acute episodes. Those toddlers with regular symptoms where atopy is suspected should respond to regular inhaled steroids. Spacers should be used, with clear demonstration of technique. Monitoring of growth is important in toddlers receiving regular inhaled steroids.

Failure to respond to beta 2 agonists and/or inhaled steroids warrants further investigation, preferably by a paediatrician with an interest in respiratory paediatrics. Asthma nurses have an invaluable role in the management of wheezy toddlers, both in the community and in hospital. The current BTS guidelines should be adhered to when the diagnosis of asthma is likely.

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A Fishy Asthma Remedy

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Sanjay Kumar: New Delhi

A 159-year-old traditional remedy of offering 'fish medicine' to cure asthma has been challenged in the Indian courts. The Indian Medical Association has questioned the secrecy surrounding the ingredients of the medicine, invoking the provisions of the Drugs and Magical Remedies Act 1954.

Thousands of people with asthma travel to Hyderabad for the annual gathering where the medicine is delivered free to the patient in the mouth of a live fish. The herbal medicine is placed in the mouth of a 5-7cm long murrel fish and the patient is made to swallow the live fish, repeating this ritual annually for three years. The medicine's ingredients have been guarded zealously by the Bathini Goud family, which claims a saint gave its formula to their ancestor Veeranna Goud in 1845, forbidding them from making the ingredients public.

"The medicine would lose its efficacy if we broke the pledge and it will fall prey to unbridled commercialisation," Bathini Harinath Goud said. "We have been offered unlimited money in the past in return for disclosure of the formula by pharmaceutical companies, but we prefer to spend money from our savings and give the medicine free to all the patients."

"Hundreds of thousands of people have been completely cured of asthma with this medicine," claims Mr Goud. He said that some 650,000 patients with asthma took the medicine this year, a figure disputed by Dr Rao, secretary of the Charminar branch of the Indian Medical Association in Hyderabad, who says that according to official records only 52,000 fish were sold.

"There is no evidence that it works," Dr Ajit Vigg, head of respiratory and critical care medicine at Apollo Hospital, Hyderabad, said. "On the contrary, we have seen 10-15% patients whose condition has worsened."

Dr Rao added that as the medicine was administered without using gloves to a large number of people, communicable diseases could be spread.