ABC of Asthma

JOHN REES

DEFINITION AND DIAGNOSIS

Asthma is a common condition yet it continues to be underdiagnosed and undertreated. Asthma is easy to recognise in patients who develop wheezing and airflow obstruction shortly after a specific stimulus, but there is no universally acceptable definition of asthma that includes more chronic illness.

The characteristic feature of asthma is reversibility of airflow obstruction over short periods of time, usually either bronchoconstriction in response to specific stimuli or bronchodilatation in response to treatment.

Clinically, the important feature is the recognition of airflow obstruction and the appropriate treatment, rather than the precise diagnostic label used. Nevertheless, the use of terms such as "wheezy bronchitis" in children with asthma, intended to spare parental anxiety, is associated with inadequate use of bronchodilator therapy and is therefore best avoided. The particular problems of diagnosing asthma in young children will be dealt with in a later article.

A commonly used definition of asthma is: a disease characterised by wide variations over short periods of time in resistance to airflow in intrapulmonary airways.

Prevalence

A general practice of 2000 patients will contain approximately one hundred asthmatics who have had symptoms or received treatment in the past year; many of those with symptoms may not have had their disease recognised

Ten to 30% of subjects will give a history of wheezing at some time in response to a questionnaire. In many cases, however, the wheezing occurs after a viral infection in otherwise normal subjects: they develop temporary abnormal reactivity of the airways which causes mild transient airway narrowing and wheezing in response to non-specific stimuli. When asthma is diagnosed on the basis of sustained or recurrent symptoms then the prevalence is thought to be around 5% in the United Kingdom and the USA. Some communities have much lower rates, such as Eskimos and North American Indians, while in Australia and New Zealand prevalence is nearer 6% or 7%.

The importance of genetic factors is shown by the high rates on the island of Tristan da Cunha, which can be traced back to three asthmatic women among the original settlers. Among children boys are more often affected (by a ratio of 3:2), but later the sex incidence becomes equal.

Types of asthma

Asthma developing during childhood usually shows considerable spontaneous variability. In young people with asthma there are identifiable factors which provoke wheezing, although patients rarely have a single identifiable extrinsic cause for all their attacks. This "extrinsic" asthma is often associated with other features of atopy such as rhinitis and eczema. When asthma begins in adult life the airflow obstruction is often more persistent and most exacerbations have no obvious stimuli other than respiratory tract infections. This pattern is often labelled "intrinsic" asthma.

There are some traps to beware of in the diagnosis of asthma. In children a cough, especially nocturnal cough, may be the only presenting symptom. Two problems in adults are a complaint of tightness in the chest on exertion, which may sound like angina on superficial questioning, and breathlessness at night, which can be confused with the paroxysmal nocturnal dyspnoea of cardiac failure.

The reversible airflow obstruction of asthma needs to be distinguished from the irreversible obstruction of chronic bronchitis and emphysema. It may need vigorous treatment (including a trial of corticosteroids) to show that the airways obstruction is reversible, and asthma should not be excluded until such vigorous treatment has failed. Long term treatment regimens can then be planned according to the responses.

Recording airflow obstruction

Mini peak flow meters provide a cheap and reliable method of measuring airflow obstruction. Patients can easily use them at home to assess objectively their own control of asthma and response to treatment.

Acute attacks of asthma are usually preceded by a gradual deterioration in control, which may not be noticed until it is quite advanced. Fifteen to 20% of patients are unaware of moderate changes in airflow obstruction even when they occur acutely. These patients are at particular risk of suffering an acute exacerbation without warning. Peak flow recordings entered on simple diary cards allow them to see such trends at a glance, so they can adjust their treatment to prevent acute attacks.

Mini peak flow meters cost little more than a couple of metered dose inhalers and have an important role in educating patients about their asthma. They should be much more widely used and be seen as the equivalent in asthma to routine urine tests in diabetes.

Responsiveness to bronchodilators

Responses to bronchodilators are easy to assess in the clinic or surgery. Assessing the response can be used to establish a diagnosis of asthma and to determine the most effective bronchodilator. Responsiveness should first be assessed with a selective β_2 stimulant such as salbutamol or terbutaline. This is given as a supervised inhalation of two puffs from a standard metered dose inhaler; this dose can be given freely even to patients with ischaemic heart disease. An increase of 15% in peak flow is generally considered to be significant. If this is not produced by the standard dose the procedure can be repeated after a larger dose of β_2 stimulant or after inhalations of the anticholinergic agent ipratropium bromide. Ipratropium has a slower onset of action than salbutamol and its effect should be assessed at 40 minutes rather than 15 minutes after inhalation.

Diurnal variation

A characteristic feature of asthma is a cyclical variation in the degree of airflow obstruction throughout the day. The lowest peak flow values occur in the morning. A peak flow meter should be used to measure peak flow on going to bed and on waking. Asthmatic patients usually show a difference of at least 15% between mean morning and evening values. The cause of this diurnal variation in airway calibre is not clear but its documentation by means of a recording from a peak flow meter made at home is a simple way of confirming the diagnosis of asthma.

Challenge testing

The provocation tests commonly used in the United Kingdom are the exercise test and specific challenge tests in occupational asthma. In some countries inhaled histamine and metacholine are routinely used to provoke bronchoconstriction and hence diagnose asthma, but these tests are usually regarded as research tools in the UK. Inhalation challenge tests with specific allergens require careful supervision in laboratories experienced in the techniques, as severe asthma may be provoked many hours after the original challenge.

Exercise testing is a safe, simple procedure and may be very useful when the diagnosis of asthma is in doubt. When baseline lung function is low testing is unnecessary as reversibility can be shown by bronchodilatation. Exercise testing and recording of diurnal variation are used when the history suggests asthma but lung function is normal when the patient is seen. An exercise test may consist of baseline peak flow measurements then six minutes' vigorous exercise such as running followed by peak flow measurements for 20 minutes afterwards. The exercise is best performed outside since breathing cold dry air intensifies the response. The characteristic asthmatic response is a fall in peak flow of more than 15% several minutes after the end of exercise. Around 90% of asthmatic children will show a positive exercise response. Once peak flow has fallen by 15% the bronchoconstriction should be reversed by inhalation of a bronchodilator. Late reactions are unusual and patients do not need to be kept under observation after the initial response has been reversed. Such exercise tests are best avoided if the patient has ischaemic heart disease.

In some respiratory laboratories hyperventilation with cold air has replaced the exercise test, but for general use exercise remains a simple useful test.

Skin tests

In skin prick tests a small amount of the test substance is introduced into the superficial layers of the epidermis on the tip of a small needle. The test is painless. Most young asthmatics show a range of positive responses to common allergens such as house dust mite, pollens, and animal dander. A wheal occurring after a skin prick test suggests the presence of specific IgE antibody, and the results correlate well with those of in vitro tests for IgE such as the radioallergosorbent test, which is much more expensive.

Positive skin tests do not establish a diagnosis of asthma; they demonstrate only the tendency to produce IgE to common allergens. While around 20% of the population have positive reactions to skin tests only about a quarter of these develop asthma. The importance of allergic factors in asthma is best ascertained from a careful clinical history, taking into account seasonal factors and trials of allergen avoidance. This may be confirmed by the presence of positive skin test reactions or, on rare occasions, by inhalation challenge.

Dr John Rees, MD, MRCP, is senior lecturer and consultant physician, Guy's and Lewisham Hospitals, London.