ABC of Asthma

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PRECIPITATING FACTORS

Bronchial reactivity

Asthma is associated with abnormal reactivity of the airways to inhaled substances. Non-specific reactivity to irritants such as tobacco smoke or dusts may be a fundamental abnormality in asthma. It is investigated in the laboratory by inhalation of methacholine, histamine, or citric acid, and most patients labelled as asthmatic show bronchoconstriction with an abnormally low concentration of such agents.

The underlying cause of increased bronchial reactivity is uncertain. Viral tracheitis increases reactivity in non-asthmatic subjects, but it settles back to normal over the next six weeks. The sustained reactivity of asthmatic patients has been attributed to imbalance of autonomic control, abnormal immunological and mast cell responses, increased permeability of the airway epithelium, and intrinsic differences in the action of smooth muscle.

Exercise

Premedication with a β stimulant or sodium cromoglycate usually allows asthmatic children to participate in sports

Vigorous exercise produces narrowing of the airways in most asthmatic patients and, as described in the first article, can be used as a simple diagnostic test. Asthma occurring during or after exercise is most likely to be a clinical problem in children, where it may interfere with games at school. The type of exercise influences the response, and most asthmatics find swimming in warm indoor pools the activity least likely to induce asthma. This clinical observation has now been explained by studies showing the importance of cooling of the airways during hyperventilation and exercise. The effects of exercise can be largely mimicked by breathing cold, dry air; whereas breathing warm, humid air during exercise—as in indoor swimming pools—prevents the asthmatic response.

Exercise induced asthma can usually be prevented by prior inhalation of a β_2 stimulant or sodium cromoglycate. Such treatment will normally allow a child to take part in games at school. Exercise itself is unlikely to have any major beneficial effect on the asthma, but general fitness and activity should be encouraged. A fit individual can perform a given task with less overall ventilation than an unfit one and hence less chance of exercise induced asthma. Asthma is quite compatible with a successful sporting career, as a number of athletes have testified in manufacturers' advertisements.

House dust mites

The house dust mite, *Dermatophagoides pteronyssinus*, provides the material for the commonest positive skin prick test in the United Kingdom. The major allergen is found in the mites' faecal pellets. The mites live off human skin scales and are widely distributed in bedding, carpets, furniture, and soft toys. They thrive best in warm, damp conditions.

If patients move into environments almost free of house dust mites their symptoms may improve. This can be achieved in hospitals but is much more difficult in the home. Nevertheless, regular cleaning of bedrooms and avoiding materials particularly likely to collect dust are worthwhile measures to keep down the antigenic load. More rigorous attempts at complete removal are not justified. House dust mite desensitisation may be of some use in children but not in adults.

Pollen and spores

Seasonal asthma, often in association with rhinitis and conjunctivitis, is most usually related to grass pollens, which are commonest during June and July. Less common in the United Kingdom is precipitation by tree pollens, which are produced between February and May, and mould spores from cladosporium and alternaria, which abound in July and August. Complete avoidance of such widespread pollens is impractical.

Hyposensitisation may occasionally be considered when seasonal symptoms are predominant, but inhaled drugs usually produce perfectly adequate control and are simple to use. The strong placebo effect and occasional allergic reaction to hyposensitisation must also be taken into account.

Pets

The parents of asthmatic children often worry about household pets. Cats cause the greatest problem, with allergens in saliva, urine, and dander, but most domestic animals can trigger asthma on occasions. Patients who have major problems with their asthma should be advised not to acquire any new pets. Pets already in residence should be kept out of bedrooms and off soft furnishings. If the animal seems to be a major cause of symptoms then a trial separation should occur. Animal dander remains in the house long after the pet is removed so the pet should move out for a month or two; alternatively the patient could move out for a week or two. Unjustified removal of favourite pets without good reason may, however, provoke more problems from emotional upset.

Occupational asthma

Causes of occupational asthma
(as a recognised industrial injury)

- Platinum salts
- Isocyanates
- Epoxy resins
- Colophony fumes
- Proteolytic enzymes
- Laboratory animals and insects
- Grain or flour dust

The importance of occupational asthma has been increasingly recognised over the past few years. Some estimates suggest that over 5% of cases of adult asthma have an occupational origin. Asthmatic patients choosing a career should avoid occupations where they are likely to be exposed to large quantities of non-specific stimuli such as dust and cold air.

Occupational asthma is now officially recognised as an industrial disease and subject to compensation. It is defined as “asthma which develops after a variable period of symptomless exposure to a sensitising agent at work.” The agents currently recognised for compensation are shown in the table, and this list will be kept under regular review. Agents such as proteolytic enzymes and laboratory animals are particularly likely to produce problems in atopic subjects, whereas isocyanate asthma is not related to atopic status. In some studies platinum salts have produced asthma in up to half of those exposed.

Increased bronchial reactivity provoked by occupational agents may persist long after removal from exposure. Regular peak flow recordings are once again an important diagnostic tool and usually show a distinct relation to time at work. Reactions may occur soon after arriving at work, be delayed until later in the day, or come on slowly over several days. In some cases even a weekend away from work may not be long enough for lung function to return to normal. After initial investigation of peak flow patterns at and away from work, further investigation may require specific challenge testing at an experienced laboratory.

The first approach to management should be to try to adjust the conditions at work that produced the sensitisation. If this is not possible the patient may be able to continue working with a mask to provide filtered air. If these measures fail and simple inhaled treatment is inadequate then a change of job will be necessary.

Food allergy

Food intolerance is usually evident from a careful history. Elaborate exclusion diets are rarely justifiable

Food allergy causes eczema and gastrointestinal upsets more commonly than asthma. Immediate skin prick tests and radioallergosorbent tests often give negative results. Most serious cases of asthma induced by food intolerance are evident from a carefully taken history, so elaborate exclusion diets are not warranted. When there is doubt suspicions can be confirmed by excluding the agent from the diet or by controlled exposure.

Intolerance to food may be related to pharmacological mediators such as histamine or tyramine in the food. It may be produced by food additives such as the yellow dye tartrazine, which is added to a wide range of foods and medications including some antihistamine tablets. When there is a specific allergy to foodstuffs, milk, eggs, nuts, and wheat are most likely to be implicated.

Drug induced asthma

Two main groups of drugs are responsible for most cases of drug induced asthma: β blocking agents and prostaglandin synthetase inhibitors such as aspirin. β blocking agents usually induce bronchoconstriction when given to asthmatics and this may happen even when they are administered as eye drops. Relatively selective β blockers such as atenolol and metoprolol are less likely to give severe irreversible asthma, but the whole group of β blocking drugs should be avoided in patients known to have asthma. Calcium antagonists such as nifedipine and verapamil are suitable alternatives for the treatment of angina and hypertension and may even be beneficial in blocking exercise induced asthma. When asthma is produced by β blockade very large doses of β stimulants are necessary to reverse it. Fortunately any cardiac side effects of the therapy are also inhibited by the β blockade.

Salicylates provoke severe airway narrowing in a small group of adult asthmatics. Once such a reaction has been noted these patients should avoid all further contact with aspirin and with the newer non-steroidal anti-inflammatory agents, which usually produce the same effects. The mechanism is related to changes in arachidonic acid metabolism.

Occasionally drugs used to treat asthma can themselves be responsible for provoking bronchoconstriction. Such paradoxical effects have been described with aminophylline, ipratropium bromide, sodium cromoglycate, and propellants or contaminants from the valve apparatus in metered dose inhalers. When nebuliser solutions are mixed with water rather than saline the resulting hypotonic solution can provoke asthma.

Emotional factors

Psychological factors on their own do not produce asthma in subjects without underlying susceptibility. Emotional factors may, however, influence both the bronchoconstrictor responses to various specific and non-specific stimuli and the bronchodilator responses to treatment. Stress and emotional disturbance are just further factors which need to be taken into account in the overall management of asthmatic patients. In children the position is complicated by the emotional responses of the parents. Emotional problems are much more likely to occur when control of asthma is poor, and these problems are best managed by increasing the confidence of patients and relatives with adequate explanation and control of the asthma. It is particularly important that patients know exactly what to do during an acute exacerbation. More specific measures such as hypnotherapy and acupuncture have proved disappointing.

Asthma associated with emotional outbursts such as laughing and crying may be related to the response of the hyperreactive airways to deep inspirations or to inhalation of cold, dry air rather than to the emotion itself.

Manipulative patients may, of course, use a disease such as asthma for their own purposes just as they would use any other chronic disease.

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