ABC of 1 to 7

H B VALMAN

BRONCHIAL ASTHMA

Normal

Asthma

The symptoms of bronchial asthma are caused by narrowing of the bronchioles by mucosal swelling and contraction of the bronchiolar muscle, with viscid secretion obstructing the lumen. The muscle contraction is reversible by sympathomimetic drugs. In most children with bronchial asthma there are no symptoms or abnormal signs between acute attacks, and lung function tests, unless performed after exercise, are normal. At least half will stop having attacks when they become adults.

During the last 15 years new prophylactic drugs and better methods of administering them have resulted in many children with asthma being completely free of symptoms.

Diagnosis

Bronchial asthma causes cough, wheezing, and prolonged expiration, especially after exercise and during the night. The first attack may occur at any age, but to avoid every child with an acute lower respiratory tract infection being labelled as asthmatic it is preferable to wait until three episodes have occurred within a year before making the diagnosis. There is no clinical or laboratory method of distinguishing between an acute bronchial infection and asthma. Rhonchi may be heard in the chest during and between attacks. The length of absences from school, poor growth, and chest deformity as well as the number of hospital admissions give an indication of the severity of the problem. Details of previous drug treatment may help to avoid the repetition of failures.

Assessment

A detailed history should be taken of exposure to household pets or other animals which may belong to friends or relatives. Severe symptoms or hayfever at a particular time of the year may incriminate pollens. Skin tests tend to be negative under the age of 5 years and when the child is taking steroids. The results are occasionally useful in avoiding exposure to allergens, but the long-term effects of attempts at desensitisation are unknown.

The importance of psychological factors in inducing attacks of asthma is difficult to determine, though stresses caused by absence from school, disruption of the family, and conflicting advice are inevitable in the severely affected child. The help given by a child psychiatrist may depend on his enthusiasm. The problem of the child who has had a recent increase in attacks or who is poorly controlled despite apparently adequate treatment should be discussed by the paediatrician with a child psychiatrist. Virus infections are the most important precipitating cause of attacks of asthma in the first few years of life and antibiotics are therefore not indicated except for selected patients with severe attacks requiring hospital admission.

The single most useful test is the peak flow reading, which can be measured using the original Wright peak flow meter or the mini-model. Normal ranges are related to the height of the child. In asthma peak flow varies greatly throughout the day, being lowest in the early morning and shortly after five minutes of exercise. This exercise can be of any type.

Allergen avoidance

House dust, house dust mite, and grass pollens produce the highest incidence of positive skin tests in children with bronchial asthma. Complete avoidance of house dust is impossible but feather pillows can be replaced by foam rubber pillows and the mattress can be completely enclosed in a plastic bag. It may be helpful for damp dusters to be used for wiping surfaces and for cleaning in the child's room to take place while he is in another part of the house.

Drug treatment

A bronchodilator such as salbutamol given by mouth can abort mild attacks of asthma. It can be given when symptoms occur, continuously as a prophylactic drug, or as a second-line drug for acute episodes which have broken through other treatments.

Children with severe dyspnoea on mild exercise or recurrent attacks of asthma despite having a bronchodilator need to take another prophylactic drug continuously for at least a year. Sodium cromoglycate has been used for over 10 years and is effective in most patients. Children usually have to be over the age of 4 years before they can grasp the idea of sucking in air and powdered cromoglycate through the Spinhaler into their lungs. A common cause of failure to respond is lack of proper tuition and it is helpful if a practice nurse or health visitor takes on this task for all the children in the practice. For younger children and those who cannot manage the technique cromoglycate has recently become available as a liquid preparation which is given as an aerosol. This needs a mains pump, which costs at least £55, and the procedure takes about 15 minutes on each occasion. Hand-operated nebulisers are not effective.

Rotahaler

Long-acting oral preparations of theophylline have recently been introduced into paediatric practice. Theophylline tends to be prescribed when cromoglycate has failed but it may be an alternative to cromoglycate for long-term prophylaxis. Prescribing the exact dose is difficult as there is no liquid preparation, the tablets should not be broken, and dividing a capsule does not provide an accurate dose. Neither the tablets nor the granules in the capsules should be chewed. Blood concentrations must be monitored to avoid side effects of vomiting and headaches.

Failure to respond to cromoglycate or theophylline is an indication for a steroid to be given by inhalation. Pressurised aerosol dispensers of steroid are administered by a parent but this may be an ineffective method of treatment as the whole dose is often deposited on the hard palate rather than inhaled. The most effective method of giving steroids by inhalation is using the Rotahaler, which is similar to a Spinhaler and allows children above the age of about 4 years to be given beclomethasone dipropionate. As there have been no very long-term studies of the effect of this treatment there must be good indications before it is started.

A few patients who are well controlled with prophylactic drugs need two or three courses of daily oral steroids each year. Each course should last less than a week and be confined to the known vulnerable seasons for that child.

Children who have symptoms after exercise should have an extra dose of cromoglycate or salbutamol half an hour before exercise.

Oral steroids given on alternate mornings are still needed for a few children who fail to respond to all other forms of treatment.

Acute attack of asthma

If a severe attack of asthma does occur the child needs to be admitted to hospital urgently. Drowsiness, cyanosis of the lips, and shortness of breath during speaking are signs of a severe attack. The duration of the episode of asthma and the details of the drugs taken previously should be noted, especially those taken during the preceding 24 hours. Tachycardia is often a side effect of sympathomimetic drugs, such as salbutamol.

Initial treatment

Salbutamol (Ventolin) or a similar sympathomimetic drug can be given by aerosol using a face mask and nebuliser attached to an air pump. Even the smallest child can take this treatment well, especially if the mask is held by the mother and she talks to the child during the treatment. The mother's presence often calms the child. The dose usually takes about 15 minutes to be given. The child has usually improved considerably before the dose is finished and he is then observed for two to four hours. If he is completely well after that time he can be sent home and be reviewed by the family doctor or paediatrician.

Treatment on admission

If a child does not respond fully to the salbutamol aerosol he should be admitted to the children's ward. On the way he should be encouraged to sit upright in the position that makes him most comfortable; this is usually with his elbows forward. If three or four hours have elapsed since the previous dose of nebulised salbutamol a further dose may be given. If he is deteriorating the following are given.

(1) Intravenous fluids are started with sodium chloride 0.18% with glucose 4%. In addition to the maintenance volume extra fluid may be needed as the child may be dehydrated.

(2) If an aminophylline preparation has not been given during the previous 24 hours a single intravenous dose of 3 to 5 mg/kg body weight can be given. It must be given slowly by adding it to the burette of the giving set and allowing it to run in over at least half an hour. This is followed by an infusion of aminophylline at a lower dose of 1 mg/kg/hour for a further eight hours. If aminophylline has been given during the previous 24 hours the initial large dose is omitted and the slow infusion given.

(3) Hydrocortisone is given in a dose of 100 mg intravenously every three hours for three doses and then every six hours for a total of 24 hours. The dose is not related to body weight.

(4) Prednisolone 2 mg/kg/24 hours by mouth should replace the intravenous hydrocortisone as soon as the child can swallow. This is gradually reduced and stopped within a week.

(5) Humidified oxygen at a concentration of 100% is given by face mask or other method acceptable to the child.

(6) If the child is drowsy or becoming exhausted he should be admitted to the intensive care unit, where arterial blood needs to be taken for urgent estimation of PaO_2 , PaCO_2 , pH, and plasma sodium and potassium concentrations. The most suitable site for obtaining arterial blood is the radial artery, and the femoral artery should be avoided. Deterioration may occur rapidly and the same observer should see the patient at least every half hour. These investigations need to be repeated every two hours or whenever the child's condition becomes worse. Artificial ventilation is indicated if the PaCO_2 is rising rapidly or is above 9 kPa (67 mm Hg). Steroids do not have a maximal effect before six to eight hours.

If the attack is severe and does not respond quickly to treatment a chest radiograph should be performed and a course of antibiotics considered.

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The peak flow chart was reproduced by permission of the *British Journal of Chest Diseases* (Godfrey S, et al. *Br J Chest Dis* 1970;64:15).

Acute herpetic gingivostomatitis

Primary infection of the mucous membranes of the mouth is the commonest infection with herpes simplex in childhood. It usually occurs at 1 to 4 years. A high fever and refusal to eat are accompanied by red swollen gums which bleed easily. There are white plaques about 3 mm in diameter or painful shallow ulcers with a red rim on the buccal mucosa, tongue, palate, and fauces, and the regional lymph nodes are enlarged and tender. This is a self-limiting disease which resolves in about 10 days.

Treatment consists of keeping the mouth clean and maintaining hydration. The child might have to be admitted to hospital to prevent dehydration from refusal to drink. Regular doses of paracetamol elixir and frequent small volumes of a glucose solution or milk should be given. Fluids may cause less pain if a drinking straw is used, and jelly and ice cream may be taken easily, but citrus juices should be avoided because they increase the pain. Antiviral agents have no place in treatment because it is impracticable to paint the lesions in children of this age. Gentian violet solution should not be used.