The First Year of Life

H B VALMAN

RESPIRATORY INFECTIONS IN THE OLDER INFANT

Infection of the respiratory tract is a common cause of illness in infants. Although pathogens are often not confined to anatomical boundaries, the infections may be classified as: (a) upper respiratory tract—common cold, tonsillitis, and otitis media; (b) middle respiratory tract—acute laryngitis and epiglottitis; (c) lower respiratory tract—bronchitis, bronchiolitis, and pneumonia.

Upper respiratory tract infection is usually the least serious condition but may completely obstruct the airway in infants who cannot breathe through their mouths. Middle respiratory tract infection may totally obstruct airflow at the narrowest part of the airway. Lower respiratory tract infection produces trivial signs initially but may be lethal within a few hours.

Viruses, which cause most respiratory tract infections, and bacterial infections produce similar clinical illness. Different viruses may produce an identical clinical picture, or the same virus may cause different clinical syndromes. Clinically it may not be possible to determine whether the infection is due to viruses, bacteria, or both. If the infection is suspected of being bacterial it is safest to prescribe an antibiotic, as the results of virus studies are often received after the acute symptoms have passed. The commonest bacterial pathogens are pneumococci, *Haemophilus influenzae*, group A β -haemolytic streptococci, and *Staphylococcus aureus*. Group B β -haemolytic streptococci, Gram-negative bacteria, and anaerobic bacteria are less common.

Common cold (coryza)

Preschool children have at least three to six colds each year. The main symptoms are sneezing, nasal discharge, and, rarely, fever. Nasal obstruction in infants who cannot breathe through their mouths may cause feeding difficulties and rarely brief periods of apnoea. Similar symptoms may occur in the early phases of infection with rotavirus and be followed by vomiting and diarrhoea. Postnasal discharge may produce coughing. The commonest complication is acute otitis media, but secondary bacterial infection of the lower respiratory tract sometimes occurs.

There is no specific treatment for the common cold, and antibiotics should be avoided. There is a danger with nasal drops that they will run down into the lower respiratory tract and carry the infection there.

Tonsillitis and pharyngitis

The commonest presenting features of tonsillitis in infants are fever and refusing feeds, but a febrile convulsion may occur. Viral and bacterial causes cannot be distinguished clinically since a purulent exudate may be present in both. Ideally a throat swab should be sent to the laboratory to determine the cause of the symptoms and indicate the pathogens currently in the community. Oral penicillin should be given if there is fever or severe systemic symptoms and continued for at least 10 days if streptococcal infection is confirmed. The few infants sensitive to penicillin can take erythromycin or co-trimoxazole. Viral infections often produce two peaks on the temperature chart.

Otitis media

Pain is the main symptom of acute otitis media and is one of the few causes of a fretful infant who cries all night. The pain is relieved if the drum ruptures. Viruses probably cause over half the cases of acute otitis media, but a viral or bacterial origin cannot be distinguished clinically. The commonest bacteria are pneumococci, group A β -haemolytic streptococci, and *H influenzae*.

Children are often fascinated by the light of the auriscope, and the auriscope speculum can be placed on a doll or the child's forearm to reassure him. Gentleness is essential and the speculum should never be pushed too far into the external meatus because this causes pain. If the pinna is pulled gently outwards to open the meatal canal the tympanic membrane is visible with the tip of the speculum in the outer end of the meatus. In early cases of otitis media there are dilated vessels over the upper and posterior part of the drum. Later the tympanic membrane becomes red, congested, and bulging and the light reflex is lost. Swelling or tenderness behind the pinna should always be sought as mastoiditis can be easily missed.

The choice of initial treatment lies between ampicillin, amoxycillin, and co-trimoxazole. If there is no improvement in the drums after two or three days another antibiotic should be substituted. Erythromycin or cephalixin may be included in the second-line drugs. Antibiotics should be given for at least 10 days and the ears examined again before the course is stopped. Ideally a hearing test should be performed a few months after each attack of acute otitis media to detect residual deafness and "glue ear."

Acute laryngitis

Acute laryngitis causes partial obstruction of the larynx and is the commonest cause of croup. It is characterised by inspiratory stridor (noisy breathing), cough, and hoarseness. The laryngeal obstruction is due to oedema, spasm, and secretions. Affected infants are aged mainly 6 months to 2 years, and the symptoms are most severe in the early hours of the morning. Recession of the intercostal spaces indicates significant obstruction, and cyanosis or drowsiness shows that total obstruction of the airway is imminent.

Complete airway obstruction may occur during examination of the throat of an infant with stridor. This examination should only be attempted in the presence of an anaesthetist and facilities for intubation.

An infant often improves considerably after inhaling steam, and mild cases can be treated successfully at home using this method but infants must be visited every few hours to determine which infants are deteriorating and need admitting. Continuous stridor or recession indicates urgent hospital admission. Oxygen with increased humidity can be given with a special humidifier by nursing the infant in a small tent (croupette), but it is difficult to observe the child and he cannot see his parents. Hypoxaemia or thirst may cause restlessness and should be corrected and sedatives avoided. Rarely the obstruction needs to be relieved by passing an endotracheal tube or performing a tracheostomy.

Acute epiglottitis and acute laryngitis may be indistinguishable clinically since stridor and progressive airway obstruction are the main features of both. Because of this some authorities prefer to give ampicillin to all infants with the characteristic symptoms. Some paediatricians give steroids as well. The dose of hydrocortisone is 100 mg intramuscularly or intravenously repeated once after two hours. No effect is seen for at least two hours. Infants with severe symptoms should be managed in the intensive care unit.

Acute epiglottitis

RADIOGRAPHIC APPEARANCES

Infants with epiglottitis are usually aged over 2 years, drooling and dysphagia are common, and the infant usually wants to sit upright. There is normally a septicaemia with *H influenzae*. The epiglottis is red and swollen.

If epiglottitis is suspected the infant should be transferred urgently to hospital. Facilities for intubation or tracheostomy must be available when the throat is examined because the examination may cause complete airway obstruction. Acute epiglottitis has a high mortality. Some units have found a lateral radiograph of the neck helpful in distinguishing between acute laryngitis and acute epiglottitis. The films must be taken with the child in the upright position by a skilled radiographer and in the presence of a doctor skilled in intubation. Intubation or tracheostomy will be needed in many cases. Since it is impossible to distinguish clinically between infection with *H influenzae* and a viral infection intravenous ampicillin or chloramphenicol should be given.

Other causes of stridor

Even if the symptoms have settled and there are no abnormal signs, a history of sudden choking and coughing can never be ignored. There may be asymmetrical chest movements, localised rhonchi, or reduced air entry as well as stridor. Radiographs of the chest should be attempted in both the expiratory and inspiratory positions as they may show unilateral or localised translucency distal to a "ball valve" foreign body. Some foreign bodies—for example, peanuts—are not radio-opaque. Even if there are no abnormal signs and the chest radiograph is normal, the child should be admitted to hospital. Choking over food, especially peanuts, or the abrupt onset of symptoms after playing alone with small objects suggests that a foreign body is present and urgent bronchoscopy is needed.

Infants with congenital laryngeal stridor, which is due to loose aryepiglottic folds, usually have inspiratory stridor only. The symptoms are present at birth and usually persist for several months, becoming more severe during episodes of upper respiratory tract infection while crying but subsiding in sleep.

Stridor in a child who has had scalds or burns or has inhaled steam from a kettle suggests that intubation or tracheostomy may be needed urgently.

Acute bronchitis

Acute bronchitis often follows a viral upper respiratory tract infection and there is always a cough which may be accompanied by wheezing. There is no fever or difficulty with feeding. The respiratory rate is normal and the symptoms resolve within a week. The only signs, which are not always present continuously, are rhonchi. Since it is usually due to a virus, antibiotics are indicated only if secondary bacterial infection is suspected.

Recurrent bronchitis

Although all concerned with children are familiar with the catarrhal child, the exact pathology of the condition is unknown, and it is called by many names—postnasal discharge, perennial rhinitis, or recurrent bronchitis. These children have an increased incidence of colds, tonsillitis, and acute otitis media. The symptoms of chronic cough without wheezing are most common during the second half of the first year of life, the first two years at nursery school, and the first two years at primary school. Recurrent viral or bacterial infections contracted from siblings or fellow pupils may be important, but the considerable differences between the behaviour of children in the same family suggest the possibility of a temporary immunological defect.

Various treatments including nasal drops and oral preparations of antihistamines are given with little effect. A chest radiograph should be performed to exclude persistent segmental or lobar collapse. A sweat test should be carried out to exclude cystic fibrosis and plasma immunoglobulin studies conducted to exclude rare syndromes.

Wheezy bronchitis

Some infants with a family history of hay fever, asthma, or eczema suffer recurrent episodes of cough and wheeze, especially in the winter months. These episodes are often preceded by nasal discharge, and sometimes accompanied by fever. The children are not severely ill and rhonchi are present. Antibiotics and bronchodilators have little effect. The symptoms gradually subside within a few days even without treatment. Most children lose all these symptoms by the age of 4 years, though a few then show the characteristic features of bronchial asthma.

Acute bronchiolitis

Acute bronchiolitis is an acute infection which occurs in winter epidemics in infants aged under 1 year. For the first few days there may be only a rasping cough but deterioration may occur within a few hours, causing a raised respiratory rate, indrawing of the intercostal spaces, cyanosis, drowsiness, and apparent enlargement of the liver. The respiratory syncytial virus is found in over 70% of cases. During epidemics the disease may be recognised at an early stage, but at the beginning of epidemics the condition may be recognised only when the infant is moribund. Signs in the chest vary at different stages of the illness and there may be no adventitious sounds. The chest radiograph may appear normal even in severely ill infants. In units with immunofluorescence techniques for diagnosing RS virus results are available the same day, treatment can be planned, and cross-infection avoided. Oxygen is the most important aspect of treatment and is efficiently given by a headbox attached to a chair. Most infants need intragastric tube feeding or intravenous fluids for several days. Where a viral cause can be confirmed immediately antibiotics can be avoided. But they should not be withheld from severely ill infants when there is a possibility of bacterial infection. A few infants develop progressive respiratory distress and intermittent positive-pressure ventilation may have to be considered.

Pneumonia

Pneumonia is acute inflammation of the lung alveoli. The raised respiratory rate at rest in pneumonia distinguishes it from bronchitis. Cough, difficulty in feeding, fever, and flaring of the alae nasi are usually present and there may be reduced breath sounds over the affected area and crepitations. A chest radiograph, which is needed in every infant with suspected pneumonia, may show extensive changes when there are no localising signs in the chest. The radiograph may show an opacity confined to a single segment or lobe or there may be bilateral patchy changes. Bacterial cultures of throat swabs and blood should be performed, and ideally virological studies of nasopharyngeal secretions and estimations of virus antibody titres in sera collected in the acute and convalescent phases should also be done.

Infants with pneumonia are best treated in hospital as they often need oxygen treatment. Antibiotics should be prescribed for all cases of pneumonia, although later a viral cause may be discovered. Ampicillin and cloxacillin are given intravenously by bolus injection. Severely ill infants may have either staphylococcal pneumonia or a Gram-negative infection and they need an additional antibiotic. Fusidic acid is given for suspected staphylococcal infection and gentamicin for Gram-negative infection. Erythromycin can be given to patients who are sensitive to penicillins and to those whose failure to respond to the other antibiotics suggests that they have mycoplasma infection. Antibiotic treatment can be modified when the results of bacterial cultures are available. Tube feeding or intravenous fluids may be needed and oxygen therapy is best provided in a headbox.

Dr H B Valman, MD, FRCP, is consultant paediatrician, Northwick Park Hospital and Clinical Research Centre, Harrow.

Examining an ill child

The infant should be allowed to adopt whatever position he likes (usually on his mother's knee) where he can be observed. The history taken from the mother must contain enough detail to provide a differential diagnosis before the physical examination begins.

A systematic examination may prove impossible in a protesting infant so the most relevant system should be examined first; if the infant objects to being fully undressed only the part being examined need be exposed. The examiner needs warm hands and should talk to the infant continuously to soothe him. Patience and gentleness at this stage are often rewarded by the infant accepting a full examination without protest.

The baby's abdomen is best examined as he lies on his mother's knees during a feed. Abdominal breathing is normal, and the edge of the liver is easily palpable. Even the newborn will show abdominal tenderness by grimacing or crying. Rectal examination may be performed with the little finger.

Instruments such as auriscopes and stethoscopes should be shown to the infant first and rested on his forearm so he can see what they are. The auriscope must be used gently and the speculum not pushed too far into the external meatus. When the pinna is pulled gently outwards the tympanic membrane can be seen with the tip of the speculum in the outer end of the meatus.

Examination of the throat, which is the most disliked procedure, should be left until last. It should never be performed in an infant with stridor unless the examiner has the facilities to intubate the infant immediately.

The infant should be examined *again* no longer than 24 hours later, and the initiative for this review should not be left to the parents, who may not appreciate the danger of features that have developed.