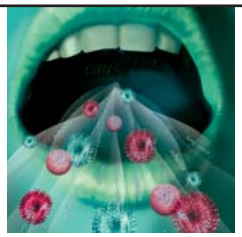

Pertussis

Presentation, investigation and management

BACKGROUND Pertussis (whooping cough) is a highly infectious, preventable disease, which causes significant morbidity and mortality.

OBJECTIVE This article discusses the presentations, investigations and management of cases and their contacts.

DISCUSSION Maternal antibody does not confer protection to the infant so babies are particularly at risk of infection and complications until they have completed the primary course of vaccinations at 2, 4 and 6 months of age. Diagnosis is primarily clinical, but can be confirmed with immunofluorescence on nasopharyngeal aspirate or nasal swab. Recent changes to the Australian Standard Vaccination Schedule include the removal of the 18 month dose of DTPa and the addition of an adult formulation booster vaccination at 15–17 years of age.

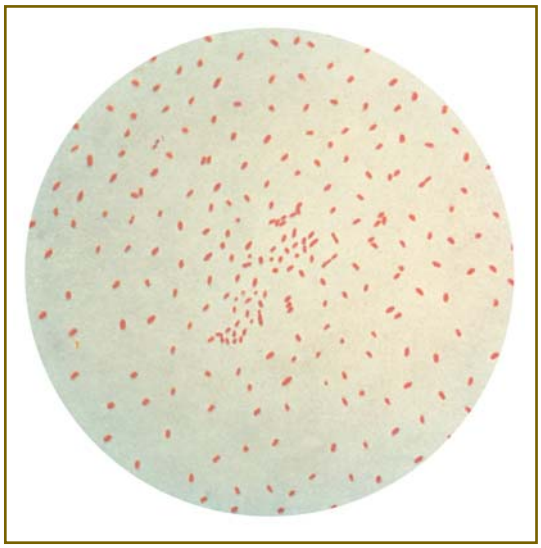

Figure 1. Photomicrograph of *B. pertussis* bacteria
Photo courtesy CDC, 1979

Pertussis (whooping cough) is a bacterial respiratory infection caused by the organism, *Bordetella pertussis (Figure 1)*, a fastidious, Gram negative bacillus. It is highly infectious and is spread by respiratory droplets to 70–100% of susceptible household contacts and 50–80% of susceptible school contacts.[1]

Pertussis infection occurs worldwide, it affects all age groups, and is most serious in young, unprotected infants. It commonly occurs in teenagers and young adults[2] who have not been immunised or with waning immunity. Pertussis-like syndrome can be caused by *Bordetella parapertussis*, *Mycoplasma pneumoniae*, *Chlamydia trachomatis*, *Chlamydia pneumoniae*, *Bordetella bronchiseptica* and certain adenoviruses.[1]

Patients are infectious just before, and for 21 days after, the onset of cough if left untreated. If treated early with antibiotics, the period of infectivity usually lasts 5 days or less after the commencement of therapy. Maternal antibody does not give adequate pro-

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Table 1. Treatment and prophylaxis of pertussis

Clarithromycin: (child 7.5 mg/kg up to) 500 mg orally 12 hourly for 7 days
OR
Erythromycin: (child 10 mg/kg up to) 250 mg orally, 6 hourly for 7 days
If an alternative is needed, recommend:
Trimethoprim + sulfamethoxazole (child 4 + 20 mg/kg up to) 160 + 800 mg orally, 12 hourly for 7 days

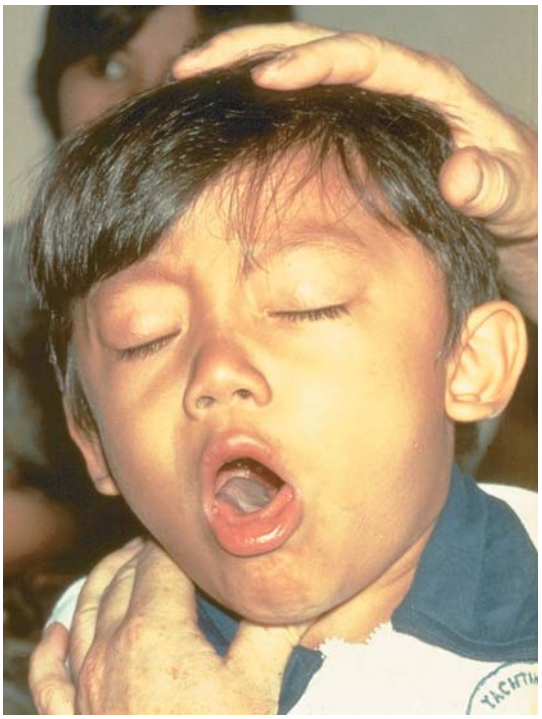

Figure 2. Older child with pertussis related cough

tection against pertussis, therefore, babies can be infected before being immunised.

Presentation

Pertussis presents with mild upper respiratory tract symptoms (catarrhal stage) and can progress to severe paroxysms of cough (paroxysmal stage) (*Figure 2*), often with a characteristic inspiratory whoop, followed by vomiting. Fever is usually absent or minimal. Symptoms gradually resolve (convalescent stage). The paroxysmal cough and inspiratory whoop may be absent, particularly in infants less than 6 months of age and in adults. Mild illness is common, particularly in immunised individuals.[3] The cough may persist for up to 3 months. Pertussis does not cause permanent pulmonary sequelae.[4]

Infants less than 6 months of age are at increased risk of complications, including:

- pneumonia
- severe apnoea
- seizures
- encephalopathy, and
- death.

Mortality in hospitalised infants less than 6 months of age is 3.5% compared to 0.03% in the general population.[5] Often there are no clinical signs of pertussis and children are usually well between coughing spasms.

Investigation

Diagnosis can be made on clinical grounds. If the case is atypical, a nasopharyngeal aspirate (in children) and a nasopharyngeal swab (in adults) for immunofluorescence and culture is the investigation of choice. The organism is usually undetectable after 21 days or if antibiotic therapy against *B. pertussis* has been commenced.

Polymerase chain reaction analysis is more sensitive than culture[6] but is not generally indicated in clinical practice. Serology can be performed but rarely affects the clinical management. Raised *B. pertussis* specific IgA indicates recent infection, while raised IgG reflects previous infection or prior immunisation.

Management

Infants less than 6 months of age and any child or adult who is unwell require admission to hospital for supportive care to manage coughing paroxysms, apnoea, cyanosis, feeding difficulties and other complications. Antibiotic therapy can alter the course of the disease if given in the catarrhal or early paroxysmal phase. In most cases, it is given to limit the spread of the organisms to others. Treatment and prophylaxis options are shown in *Table 1*.[7]

A course of prophylactic antibiotics is recommended for all household and close contacts of patients with pertussis. Prophylaxis should be given as soon as possible, regardless of the immunisation status of the contact, and may be commenced up to 3 weeks after identification of the index case.

Multiple remedies to treat the cough in pertussis have been used including dexamethasone, salbutamol, diphenhydramine and pertussis immunoglobulin. None of these have shown a significant benefit.[8]

Immunisation

Any unimmunised or partially immunised child or adult who has been in contact with pertussis infection should receive a 'catch up' vaccination. Immunity conferred by pertussis infection is not long lived.

Therefore, children who have had pertussis should still receive pertussis containing vaccines according to the Australian Standard Vaccination Schedule (ASVS).

The ASVS has recently been changed with respect to pertussis vaccine. The fourth dose of DTPa, which was previously given at 18 months of age, is now removed from the schedule. It is now considered unnecessary because of the high levels of immunity from the primary course of vaccinations at 2, 4 and 6 months of age. An adult formulation pertussis containing booster vaccine, dTpa (Boostrix®) for adolescents and adults is now available. It is recommended and funded as a single dose at 15–17 years of age. (This replaces the diphtheria-tetanus only vaccine at 15–17 years of age). The aim is to reduce the significant number of cases of whooping cough in teenagers, and protect children too young to be immunised against whooping cough who are exposed to infected older siblings and adults. Passive immunisation with normal human immunoglobulin has not been shown to be effective for the prevention of pertussis.

Acellular pertussis vaccines have now replaced whole cell pertussis vaccines in Australia (since 1999). Acellular vaccines are significantly less reactogenic than whole cell pertussis vaccines, causing fewer local reactions and less fever and other systemic reactions. Although serious adverse reactions such as hypotonic-hyporesponsive episodes can still occur, they are much less common.[9,10]

Current research is looking at whether maternal immunisation will provide early protection of the newborn to try and prevent neonatal and infantile pertussis.[11]

Control of case

Suspected cases should be excluded from the presence of others outside the home until they have received at least 5 days of antibiotic treatment, or until 3 weeks after the onset of paroxysms if appropriate antibiotic treatment is not given.[12]

Control of contacts

Inadequately immunised household contacts under 8 years of age should be excluded from school and child care centres until case and contact have received at least 5 days of antibiotic treatment. They should also be given a pertussis containing vaccine as soon after exposure as possible. (A child who has received less than 3 doses of a pertussis containing vaccine should be considered unimmunised). Pertussis is a notifiable disease.

Summary of important points

- Pertussis is a highly infectious, preventable disease.
- Diagnosis is primarily clinical and can be confirmed with immunofluorescence and culture performed on nasal swab or NPA.
- Pertussis vaccine should be given to all children according to the Australian Standard Vaccination Schedule.
- Recent changes to the schedule include the omission of the 18 month booster, and the addition of a new adolescent/adult formulation booster, to be given at 15–17 years of age.

Conflict of interest: none declared.

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