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One Infant with Pertussis in Macau

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Abstract Pertussis is one of the causes of episodic cyanosis and apnoea in infancy. Early establishment of the diagnosis is important to minimise this highly contagious infectious disease. We report an infant presented to our department with cough and apnoea and was subsequently diagnosed to have pertussis. Seventy healthcare workers were involved and received the prophylactic antibiotics. Pertussis has not been reported for years in Macau and we would like to use this index case to alert clinicians' awareness about the potential resurgence of the disease in our locality.

Key words Apnoea; Cyanosis; Infant; Pertussis

Case Report

A 47-day-old boy was admitted due to irritable cough for more than 2 weeks and episodic cyanosis for 10 days. He was the first child of a 41-year-old lady with good past health. The baby was delivered by cesarean section at term with birth weight 3.07 kg in our hospital. He was known to have G6PD deficiency. The baby developed protracted and non productive cough for 2 weeks before admission. The cough occurred in clusters mainly during daytime. Cyanosis was noted by his mother when he had strong cry and cough for about 10 days. These episodes lasted from seconds to one minute and happened several times in a day. His mother had some coryzal symptoms for a few days before the baby started to cough. On admission, he was pink and alert. Vital signs were stable. There was no eye discharge. Chest was clear and there was no heart murmur. Neurological examination was normal. Investigations included complete blood picture that showed an haemoglobin level of 9.9 g/dL, elevlated white cell count with lymphocytosis (total WCC 34500/L with 11% neutrophil and 83% lymphocytes) and presence of atypical lymphocytes. C-reactive protein was not increased. Liver and renal function tests were unremarkable. Immuloglobulin levels of Ig A, G, M and E were all within normal range. Urine for routine examination was unremarkable. Chest radiograph and echocardiogram were normal. During hospitalisation, episodes of apnoea with desaturation as documented by oxygen saturation monitor was noted after paroxysms of cough or strong cry. Episodes of apnoea with cyanosis occurred mainly when child was awake and there were about 15 episodes per day. In view of cyanotic spells after cough bouts and presence of lymphocytosis, oral erythromycin was given empirically to cover for Chlamydia or pertussis after the specimens for detection of underlying aetiological agents were saved. His condition gradually improved after commencement of oral erythromycin. Cough bouts decreased significantly and episodic cyanosis and apnoea resolved. He was discharged home with completion of 14 days of oral erythromycin. Nasopharyngeal aspirate for viruses, serum antibody titres for Chlamydia and Mycoplasma and conjunctival scrapings for Chlamydia were all negative. Pernasal swab for isolation of pertussis (performed at Department of Microbiology,

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Queen Mary Hospital, Hong Kong) showed heavy growth of Bordetella pertussis. Once the result of pertussis was confirmed, post-exposure measures were taken. Household and close contacts were traced and 70 contacts including health care workers were given oral azithromycin for chemoprophylaxis. Among these 70 contacts, pernasal swabs for pertussis were performed in 11 symptomatic, mainly healthcare workers but none of their results were positive.

Discussion

Pertussis, or whooping cough, is a highly contagious infectious disease caused by the bacterium Bordetella pertussis. In the United States, pertussis was one of the most common childhood diseases and a major cause of childhood mortality during the 20th century.[1] After the introduction of routine pertussis vaccination more than 50 years ago, the belief was that Bordetella pertussis infections would diminish greatly. Although the number of cases of pertussis did decrease initially, the incidence of newly diagnosed cases has been increasing over the last decade. With the widespread use of pertussis vaccine, the number of cases dropped from over 200,000 per year in the 1940s, to less than 3,000 cases per year in the 1980's.[2] Recently, however, pertussis has been on the rise. There is a resurgence of pertussis in many developed countries.[3] In nearby Hong Kong, about 10-20 cases of pertussis were reported each year. We have not had a single case of pertussis in Macau for many years until our index patient.

The incubation period for pertussis is 7-10 days, with a range of 4-21 days. The course of the illness typically include catarrhal, paroxysmal and convalescent stages but the first stage can be transient. It is most contagious during the first 2-3 weeks of infection, i.e. from the time the runny nose begins until 1-2 weeks after the onset of severe coughing spells. The relatively sparse population in Macau until recent few years might partly explain the seemingly rare occurrence of pertussis in the past.

Symptoms of pertussis in young infants can range from very mild cough to bronchiolitis to apnea alone. The typical whoop is often absent in young infant due to relatively weaker respiratory muscles power. Adolescents and adults can also be infected with pertussis, though with milder disease as immunity wanes over 10 to 15 years after vaccination.[4] Adult carers, whoes symptoms may not be obvious, may serve as reservoir of infection and source of transmission to infants too young to receive a full series of pertussis immunisations.[5] The presence of coryzal symptoms in the mother of our patient suggested that she might be the source of transmission. This also lent support to our speculation that pertussis has been under-diagnosed in our locality. Recently a low dose, adult-formulated diphtheria, tetanus, acellular pertussis (dTpa) vaccine has been licensed and recommended in several countries for use in adults and adolescents. There is a good evidence that parents given dTpa booster vaccine can prevent or reduce adult infection rates. In Australia, France, Germany, USA and Austria, it is recommended that all parents of newborns receive a dTpa booster shortly after delivery of their child.[6,7]

Most infants under 6 months of age require hospitalisation when they develop pertussis as they are at highest risk for pertussis-associated complications including pneumonia, seizures, encephalopathy, cerebral hypoxia, secondary bacterial infection, pulmonary hypertension, sub-conjunctival haemorrhage and rectal prolapse.[8] Most deaths from pertussis are in children under 6 months old, particularly in those under 1 month of age.[9] Severe hypoxemia is usually of rapid onset in infants with pertussis due to a combination of apnoea, usually prolonged expiratory type and ventilation-perfusion mismatch in the lung[10] and may account for some cases of sudden infant death.

A high index of suspicion is necessary for timely and correct diagnosis of pertussis as mild disease can just mimic common cold with cough. Although lymphocytosis is the hallmark of this infection, it is not present in all cases. The standard laboratory test for diagnosis of pertussis is isolation of B. pertussis by culture, which required special specimen collection by using a swab obtaining the sample from the back of the nasal passages. Some laboratories use the nasal passage swab to look for pertussis DNA fragments or antibodies to pertussis. Blood antibody tests are less reliable for the diagnosis of pertussis. Recent efforts to improve the accuracy of diagnosis include increased use of PCR and single high titer pertussis serology. However, both have significant limitation.[11] After we have suspected our case to be suffering from pertussis, we contacted the microbiologists at the Department of Microbiology, Queen Mary Hospital in Hong Kong for their expert advice. Charcoal agar which is not available in Macau was sent to us for culture of B. pertussis. In future, we should consider setting up our own diagnostic facility for pertussis to avoid any delay in the diagnosis and management of pertussis.

This is important at both individual and public health levels.

Antibiotics are most effective at relieving symptoms and shortening the course of the disease if started during the catarrhal stage of illness. Antibiotics started within 3 weeks after cough onset can decrease infectiousness and limit the spread of pertussis from the patient to others. Therefore, a course of antibiotic treatment with erythromycin, clarithromycin, or azithromycin is still warranted in cases after catarrh phase to decrease infectiousness, even though it may have little impact on symptoms.[12] Erythromycin is associated with significant adverse effects including infantile hypertrophic pyloric stenosis and cardiac arrhythmias. A recent Cochrane review recommended the use of azithromycin and clarithromycin as the first-line antimicrobial agents. The Centre of Disease Control (CDC), USA recommends that azithromycin should be used for all neonate under 1 month, with erythromycin, clarithromycin, or azithromycin acceptable for treatment of persons ≥1 month. Those with pertussis remain infectious for up to 5 days after starting antibiotic medication. Thus, patients are advised to complete the course of antibiotics as prescribed, and to avoid close contacts especially with young children, during the first 5 days of their antibiotic treatment period. Prevention of secondary cases is extremely important, particularly in households and the health care setting. People who have been within close contact of a person with pertussis can be administered macrolide therapy as prophylaxis. The CDC has defined a close contact as someone having face-to-face exposure within 3 feet of a symptomatic patient; someone who has had direct contact with respiratory, oral, or nasal secretions from a symptomatic patient; or someone who has shared the same confined space for more than 1 hour with a symptomatic person.[13] Antibiotics are effective for prevention if begun within 3 weeks of the exposure to pertussis. The use of prophylactic antibiotics is especially important in families with young children, in childcare and healthcare workers who can transmit infection to vulnerable populations such as infants, the immunocompromised, and those with chronic lung diseases. Following the recommendation, seventy health care-takers were traced and given prophylactic antibiotic of azithromycin after our case was confirmed pertussis. The resources used for contact tracing and antibiotics prophylaxis posed significant economic impact. This called for an increased alertness of the disease and implementation of diagnostic methodology in our locality.

Conclusion

Our reported case illustrated the potential under-diagnosis of pertussis in our locality; yet the full recovery of the baby highlighted the importance of awareness of the condition. We also suggest our health authority to consider establishment of diagnostic methodology in our locality.

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