

Parapertussis Infection in a Neonate

Steven M. Selbst, MD, and Stanley E. Goren, MD
Philadelphia, Pennsylvania

Pertussis is a very rare infection in babies younger than one month of age. Nelson¹ reported only 11 such cases over an 18-year period; the youngest was 2½ weeks old at the onset of illness. Because pertussis is an uncommon infection, pediatricians and family physicians are likely to delay in making the diagnosis or may fail to do so entirely.

Reported here is the case of a 2-week-old infant who presented with fever and paroxysmal cough caused by infection with *Bordetella parapertussis*.

CASE REPORT

A 14-day-old infant was referred to the emergency department of the Children's Hospital of Philadelphia because of nasal congestion and cough of seven days' duration and temperature of 100.7 °F (rectal) for 12 hours. The baby had been active, eating well (breast-feeding), and had not been vomiting. The infant was the product of a full-term, uncomplicated pregnancy and labor. Meconium staining was present at birth, but the baby had no respiratory problems after delivery and was discharged to home on the second day of life.

A 3-year-old sibling had a viral syndrome (fever, cough, vomiting, rhinorrhea) at the time of this infant's birth, which resolved in a few days. The mother had a cough (nonparoxysmal) and cold for a few days before the infant presented with its symptoms. The father was in good health. The parents had been immunized against pertussis when they were children. The sibling was fully immunized against pertussis.

On examination the infant was tachypneic (60 breaths per minute) but had no other signs of respiratory distress (ie, no retractions or nasal flaring). The temperature was 37.9 °C (rectal), but the baby did not appear distressed. Nasal congestion and a paroxysmal cough were noted, but

there was no cyanosis or inspiratory whoop. The physical examination was otherwise unremarkable (normal breath sounds, no rales or rhonchi).

Findings on chest x-ray examination were normal. Because of the infant's age and temperature, a lumbar puncture was performed, which showed one white blood cell and 132 red blood cells. The cerebrospinal fluid glucose and protein levels were normal, the Gram stain was unremarkable, and the culture results were negative. A complete blood count showed white blood cells $10.7 \times 10^9/L$ ($10.7 \times 10^3/\mu L$) with .51 segmented neutrophils, .3 bands, .1 eosinophil, .1 basophil, .30 lymphocytes, .11 monocytes, and .3 atypical lymphocytes. A blood gas determination was not obtained. A blood culture was negative. Nasopharyngeal culture grew *Bordetella parapertussis*. Antibody titers were not obtained.

The infant had persistent paroxysmal coughing for seven days; however, she did not develop apnea, respiratory distress, or cyanosis, and she continued to eat well without vomiting. Close contact with her private physician was possible, so hospitalization was felt to be unnecessary.

Because the infant was not toxic, antibiotics were not started initially, but, the entire family was treated with oral erythromycin for 10 days when parapertussis was identified. The mother and infant had no respiratory symptoms after this two-week period.

DISCUSSION

Pertussis infection is often misdiagnosed initially in young infants. One study² reported that house officers failed to consider pertussis at first in 55 percent of cases. This baby was infected with *Bordetella parapertussis*, which is a less common cause of the pertussis syndrome than is *B pertussis*. *B parapertussis* is responsible for 5 to 20 percent of pertussis infections,^{3,4} and some think that they are not two separate infections, but, rather, that *B pertussis* converts to *B parapertussis*.^{5,6}

In general, *B parapertussis* infections are thought to cause a more mild illness than *B pertussis* infections. There may not be clearly defined stages (catarrhal, paroxysmal, convalescent) with *B parapertussis* infections. Still, both

Submitted, revised, December 21, 1987.

From the Emergency Department, The Children's Hospital of Philadelphia, and the University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania. Requests for reprints should be addressed to Dr. Steven M. Selbst, The Children's Hospital of Philadelphia, 34th Street and Civic Center Boulevard, Philadelphia, PA 19104.

seizures and death have been reported with this infection, so hospitalization is often warranted.⁴

Pediatricians and family physicians may not suspect pertussis infections in neonates because these infections are rare and, until recently, have declined in incidence. In neonates, other viral infections, chlamydia pneumonitis, and bronchiolitis are more likely to be the causes of cough. Infants with chlamydial infection may have a series of staccato coughs with each cough separated by an inspiration. Those with respiratory syncytial virus bronchiolitis may have cough and apnea with or without wheezing, but the cough is not usually paroxysmal. All infants with pertussis, and some with adenovirus infections, will have a paroxysmal cough.⁷ A foreign body aspiration is a possible cause of paroxysmal cough, but this event is exceedingly rare in young infants.

Pertussis in the neonate is also misdiagnosed because there is often no history of exposure to the infection. Scattered reports exist of maternal transmission of pertussis to neonates after birth,⁷ because most pregnant women have few antibodies to pertussis unless they are immunized late in their pregnancy.⁸ Most young infants get the infection from older siblings or adults who may have been immunized previously and now have waning immunity. These older carriers almost always have some respiratory symptoms but may not have a paroxysmal cough.^{1,6,7,9} Some children who carry B parapertussis may be completely asymptomatic.⁴

In the infant reported here, the index case was not confirmed. In addition to the family members, it is possible that the infection was transmitted by a member of the hospital staff just after delivery. Others^{10,11} have reported such spread of infection, but the nursery where this infant was born reported no other pertussis infections.

Finally, initial laboratory studies make it difficult to diagnose pertussis in young infants. Findings on chest radiographs may be normal or show only peribronchial thickening or hyperaeration.³ Also, complete blood counts may not show the classical elevation of the white blood cell count with lymphocytosis in young infants with pertussis.^{2,3,12} Lymphocytosis is even less likely with parapertussis infection, and was not found in the case reported here.^{4,6} Fluorescent antibody staining may yield many false-positive results and culture of B pertussis is difficult, so some suspected cases may not be confirmed.¹³

The consistent finding in pertussis infections in neonates and older infants is a paroxysmal cough. An inspiratory whoop is rare in young infants with this infection, and fever is low grade or absent. An evaluation for pertussis is justified despite a negative history for exposure and a nor-

mal complete blood count or x-ray examination if a paroxysmal cough is noted. It is also reasonable to obtain a rapid slide test for respiratory syncytial virus infection and cultures for chlamydial infection.

It is important to try to confirm the diagnosis of pertussis in neonates with fluorescent antibody testing and culture because this illness is life threatening. If pertussis is confirmed, or strongly suspected, the treating physician might predict that the infant's symptoms will worsen in the next few days. Hospital admission is usually needed for careful monitoring and intravenous hydration. Erythromycin, 40 mg/kg/d, should be started to help reduce the spread of pertussis infection to others. Family members who may have the infection should also be treated with erythromycin to prevent further spread of the infection. Ideally nasopharyngeal cultures should be obtained prior to initiating antibiotic therapy. If a mother is suspected of having pertussis and the infant is not yet ill, isolating the mother should be considered. Immunizing the baby against pertussis, however, is not recommended in the first few weeks of life.⁷

References

1. Nelson JD: The changing epidemiology of pertussis in young infants: The role of adults as reservoirs of infection. *Am J Dis Child* 1978; 132:371-373
2. Sotomayor J, Weiner LB, McMillan JA: Inaccurate diagnosis in infants with pertussis: An eight-year experience. *Am J Dis Child* 1985; 139:724-727
3. Gilligan PH, Fisher MC: Importance of culture in laboratory diagnosis of *Bordetella pertussis* infections. *J Clin Microbiol* 1984; 20:891-893
4. Linnemann CC, Perry EB: *Bordetella parapertussis*. Recent experience and a review of the literature. *Am J Dis Child* 1977; 131:560-563
5. Granstrom M, Askelof P: Parapertussis: An abortive pertussis infection? *Lancet* 1982; 2:1249-1250
6. Geller RJ: The pertussis syndrome: A persistent problem. *Pediatr Infect Dis* 1984; 3:182-186
7. McGregor J, Ogle JW, Curry-Kane J: Perinatal pertussis. *Obstet Gynecol* 1986; 68:582-585
8. Finland M: Pertussis: With notes on the maternal transmission of antibacterial antibodies. In Charles D, Finland M (eds): *Obstetric and Perinatal Infections*. Philadelphia, Lea & Febiger, 1973
9. Mertsola J, Ruuskanen O, Eerola E, Viljanen MK: Intrafamilial spread of pertussis. *J Pediatr* 1983; 103:359-363
10. Linnemann CC, Ramundo N, Perlstein PH, et al: Use of pertussis vaccine in an epidemic involving hospital staff. *Lancet* 1975; 2:540-543
11. Kurt TL, Yeager AS, Guenette S, et al: Spread of pertussis by hospital staff. *JAMA* 1972; 221:264-267
12. Trollfors B: Clinical course of whooping cough in children younger than six months. *Acta Paediatr Scand* 1979; 68:323-328
13. Broome CV, Fraser DW: Pertussis in the United States, 1979: A look at vaccine efficiency. *J Infect Dis* 1981; 144:187-190