CASE REPORT

Re-emergence of an Old Threat: Is it Time to Revise Our National Immunization Schedule?

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Abstract

Pertussis is a highly contagious, vaccine-preventable, respiratory illness caused by *Bordella pertussis*. In recent years, pertussis infections have reemerged worldwide.[1] In resource-poor countries, pertussis-associated case fatality rate is 4% and highest in infancy.[2] In 2015, the WHO reported 142,512 pertussis cases globally and 89,000 deaths.[3] In the year 2017 in India, totally 23,779 cases were reported with 7 deaths.[4]

Keywords: *Bordella pertussis*, Respiratory illness, Vaccine.

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Introduction

Pertussis is a highly contagious, vaccine-preventable, respiratory illness caused by *Bordella pertussis*. In recent years, pertussis infections have reemerged worldwide.[1] In resource-poor countries, pertussis-associated case fatality rate is 4% and highest in infancy.[2] In 2015, the WHO reported 142,512 pertussis cases globally and 89,000 deaths.[3] In the year 2017 in India, totally 23,779 cases were reported with 7 deaths.[4]

Case Description

A 45-day-old girl infant—second-born child to nonconsanguineous parents—came with complaints of cough for 10 days, bouts of cough affecting feeding associated with post-tussive vomiting, and increase in frequency and duration of cough bouts for last 2 days. The child was also lethargic and fed poorly for last 2 days. There was no history suggestive of fever/respiratory distress/noisy breathing and choking episodes. The mother was booked in local GH hospital and had regular antenatal visits. She was immunized with two doses of tetanus toxoid. The child had smooth perinatal transition with birth weight of 2.8 kg and was immunized with birth vaccines (BCG, Hep B, and OPV). The neonatal period was uneventful.

On examination, the child was alert and afebrile. There was no pallor, cyanosis, and lymphadenopathy. There was also no stridor, grunt, or increased work of breathing. Vitals: PR—132/minute, RR—46/minute, SPO_2—98% in room air. Anthropometry was normal. The child had prolonged cough bouts associated with desaturation of upto 80%. Systemic examination was unremarkable. Complete blood count showed leukocytosis (26,800 cells/mm^3) with lymphocytic predominance (75%) and thrombocytosis (790,000/mm^3). C-reactive protein (CRP) was negative. X-ray done was normal. In view of high suspicion of pertussis considering cough bouts with lymphocytic preponderance on blood counts, the child was started on oral azithromycin. On day 2 of admission, the child developed prolonged hypoxic spells with cough and recurrent apneic episodes, which required intubation. The nasopharyngeal swab for *Bordetella pertussis* PCR was positive. The child was on mechanical ventilation for 5 days, continued azithromycin for 5 days, and bouts of cough decreased. The child was extubated on day 6, observed in HDU after extubation. The child remained oxygen dependent during cough bouts postextubation. The severity of cough bouts gradually reduced over days and by day 14 of stay, the child was weaned off oxygen. The child was discharged on day 15. No significant concerns were noted on follow-up.

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Discussion

Unlike in older children, where pertussis presents with classic paroxysmal bouts of cough, young infants often present with occasional cough and progress to gasping, apneic spells, and cyanosis. Infants usually contract the disease from an adult family member with mild cough. Illness may go unnoticed as trivial illness in most of the infants but some may have serious illness resulting in life-threatening complications and even death. Several factors influence the severity of illness in infants like bacterial load, passive immunity conferred by mother, age of the child, and whether breastfed or not.[5] Pertussis in young infants is because of waning of immunity with time in adolescent and adult population, lack of protective antibodies in the mother to confer passive immunity to young infants, and infants receive the first DPT vaccine only at 45 days of life.[5] During the paroxysmal stage, infant will have apneic episode at the end of coughing, which might lead to seizures and respiratory distress that will resolve at the end of episode with normal chest examination. Pneumonia and pulmonary hypertension develops in morbid cases and the resultant multiorgan dysfunction is often recognized as the cause of death in pertussis Though apneic attacks appear as apparent life-threatening events, they never actually lead to death.[6] Diagnosis of pertussis was made

based on the history of contact, classical bouts of cough with apnea and cyanosis, lymphocytosis, and positive PCR. Factors predicting mortality are age, pulmonary hypertension, and leukocytosis.[1,5,6] Treatment includes administration of macrolide antibiotics like azithromycin or erythromycin and supportive measures like oxygen and mechanical ventilation, if necessary. Prevention of pertussis in young infants can be reasonably achieved by the following two measures. One is pertussis immunization of the mother during pregnancy, thus conferring protective antibodies to the fetus, and of the child after birth. The other relies on identification of exposed infants and timely administration of prophylactic macrolide antibiotics. Though acellular vaccines are widely acclaimed for their less reactogenic potential, they seem to offer less protection in terms of efficacy and duration compared to whole cell vaccines.[7] The routine pertussis vaccination schedule for children includes primary doses at 6, 10, and 14 weeks of birth and booster doses at 15–18 months and 5 years.[3] Variation in the vaccination schedule and use of different vaccinations may contribute to persistence of the disease even with use of vaccine since 1940. Incorporation of Tdap vaccine instead of TT vaccine in the vaccination schedule of all pregnant women, given before 36 weeks' gestation, and adolescents and compulsory vaccination of infants with whole cell pertussis vaccine, starting at 6 weeks of age, may bring down the incidence of this deadly illness among infants, at least of the fatal complications and mortality.

Conclusion

Possible reasons for the reemergence of pertussis include the increased awareness of the disease, the development of new clinical definitions, and the spread use of polymerase chain reaction assays for laboratory confirmation, improving the diagnostic ability even in cases with atypical presentation. The universal administration of Tdap instead of TT vaccine at the age of 10 and 16 years and during pregnancy would protect the young infants from pertussis to a great extent.

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