Case Report

Ocular Manifestation of Whooping Cough in a Vaccinated Child

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Abstract

Pertussis is an infection of the respiratory tract caused by *Bordetella pertussis* commonly affecting the infants and the young children. Diphtheria-pertussis-tetanus vaccine is available for the prevention of the disease. However, pertussis has been reported in vaccinated individuals. It is characterized by paroxysms of cough, leading to various ocular manifestations such as subconjunctival hemorrhage, lid ecchymosis, and retinal hemorrhage. We report a case of a vaccinated boy who presented with ocular complaints and later diagnosed to be suffering from pertussis and treated successfully for the same.

Keywords: Pertussis, subconjunctival hemorrhage, vaccination, whooping cough

Introduction

Pertussis or "whooping cough" is an acute respiratory illness that commonly affects the infants and the young children. Its first outbreaks were described in the 16th century, and the bacteria were first isolated in 1906.[1] It is an important cause of infant mortality worldwide and continues to be a public health issue even in countries with high vaccination coverage. The World Health Organization estimates show that in 2008, about 16 million cases of pertussis occurred worldwide and 95% of which occurred in developing countries.[2] In 2016, 37,274 cases of pertussis were reported in India.[3] Even though the diphtheria-pertussis-tetanus (DPT) vaccine is available for the disease, occurrence of infection even after vaccination has been reported.[4] Herein, we report a case who presented with ophthalmic complaints and based on these he was later diagnosed to be suffering from whooping cough.

Case Report

An 11-year-old boy was referred by his consulting pediatrician for evaluation of progressive, painless, recurrent subconjunctival hemorrhage (SCH), and upper and lower lid ecchymosis of both eyes for the past 15 days. He gave a history of coughing paroxysms associated with vomiting and mild-grade fever. There was no history of trauma, coagulopathy, blood dyscrasias, or any other systemic disease. The recommended five doses of DPT vaccine had been received as per the vaccination schedule. His last DPT vaccine was given at the age of 5 years. On examination, his visual acuity was 6/6 in both eyes. External examination showed upper and lower eyelid ecchymosis in both eyes [Figure 1]. Slit lamp examination showed SCH both eyes [Figure 2a and b]. His rest of the anterior segment examination was unremarkable. The dilated fundus examination was within normal limits. He had a normal chest X-ray. Complete blood cell count revealed an elevated total white blood cell count with a normal platelet count. In consultation with the pediatrician, a probable diagnosis of pertussis was made based on the clinical history of a cough with paroxysms for more than 2 weeks and posttussive vomiting. The diagnosis was confirmed by positive nasopharyngeal swab polymerase chain reaction (PCR) test. He was successfully treated in consultation with the pediatrician with oral azithromycin with a resolution of cough, lid ecchymoses, and SCH.

Discussion

Pertussis, or "whooping cough," is an infection of the respiratory tract. It is caused by a Gram-negative coccobacillus,

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Figure 1: Photograph of the patient showing the presence of lid ecchymosis

Bordetella pertussis. In the recent years, there has been a resurgence of the disease in the vaccinated individuals as a result of waning of the vaccine-induced immunity.[5,6] The increase in incidence could be attributed to multiple factors such as heightened awareness, increased public health reporting, and the introduction of PCR testing.[6]

Pertussis causes an acute airway infection that is localized and rarely disseminates through the circulatory system. *B. pertussis* secretes multiple toxins including pertussis toxin, adenylate cyclase toxin, and tracheal toxin. These toxins affect the respiratory cilia and initiate the host immune response, resulting in irritation, and subsequent coughing spells.[7]

Infection caused by *B. pertussis* can be divided into three phases: catarrhal, paroxysmal, and convalescent [Table 1].[8,9] The first phase is the catarrhal phase. It starts 1–2 weeks after exposure and lasts for 7–14 days. It is indistinguishable from an acute viral upper respiratory tract infection and presents with rhinorrhea, mild cough, malaise, and low-grade fever.[6] The second phase is the paroxysmal phase. It is characterized by paroxysms or a series of coughs during a single expiration, leading to low lung volumes. A paroxysmal cough is followed by vigorous inspiration, which in infants and children with a smaller caliber trachea, is associated by whoop sound which is characteristic of "whooping cough."[10] Coughing paroxysms are often associated with posttussive emesis and exhaustion. The third phase is the convalescent phase. It occurs after 2–3 months, and in this phase, the severity of the cough gradually declines.[6]

The Centers for Disease Control and Prevention has given the definition of a case for pertussis surveillance, and it is defined as a patient with a cough of at least 14 days duration and at least one of the following: A paroxysmal cough, inspiratory whoop, or posttussive vomiting.[6] Confirmation to be done using laboratory test, either culture or PCR assay. The antibiotic regimens effective are azithromycin, clarithromycin, erythromycin, and trimethoprim/sulfamethoxazole.

Various complications are associated with the severe paroxysms of coughing such as SCH, lid ecchymosis, syncope, hernias, intracranial hemorrhage, rib fractures, urinary incontinence, and stroke from vertebral artery dissection.[11]

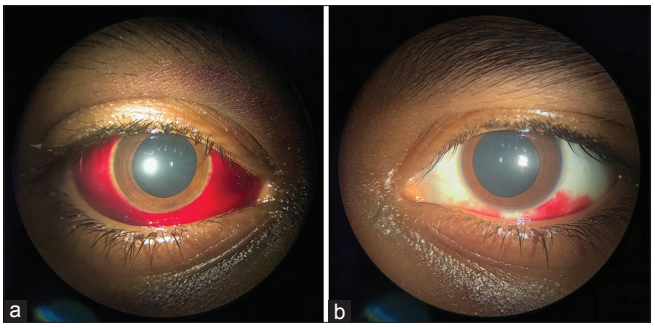

Figure 2: Slit-lamp photograph of the (a) right eye showing 360° subconjunctival hemorrhage and (b) the left eye showing subconjunctival hemorrhage inferiorly

Table 1: Clinical stages of pertussis and recommended test of choice

Clinical stage	Symptoms (duration of phase)	Time since onset of illness	Test of choice
Catarrhal	Malaise, rhinorrhea, mild cough, excessive lacrimation, conjunctival injection	1-2 weeks	PCR and culture
Paroxysmal	Paroxysmal coughing, whooping with cough, posttussive emesis, posttussive syncope	2 weeks-2 months	PCR[a] and serology
Convalescent	Persistent cough of decreasing severity	>2 months	Serology

[a]PCR sensitivity declines after 1 month of infection. PCR: Polymerase chain reaction

Conclusion

This case report emphasizes on the fact that in cases of SCH and lid ecchymosis with a cough, the diagnosis whooping cough should be kept in mind even if the cases are vaccinated. Thus, early detection and prompt treatment can prevent life-threatening complications.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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