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Ophthalmia neonatorum as the presenting sign of SARS-CoV-2

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The most common ocular manifestation of SARS-CoV-2 in adults and children is acute conjunctivitis. We report the case of a 4-day-old infant who presented with acute-onset mucopurulent discharge of the left eye as well as subconjunctival hemorrhage and palpebral injection, without corneal findings. A diagnosis of ophthalmia neonatorum was established, for which ocular cultures and Gram staining were performed. No bacterial growth was noted, and polymerase chain reaction (PCR) testing for *Chlamydia trachomatis*, *Neisseria gonorrhea*, and herpes simplex were negative. Nasopharyngeal and conjunctival SARS-CoV-2 PCR were positive. Given the identification of SARS-CoV-2 illness, lack of other underlying bacterial or viral etiology on testing, and the well-documented ability for SARS-CoV-2 to cause conjunctivitis, the clinical picture was supportive of ophthalmia neonatorum secondary to SARS-CoV-2. The infant was treated with ceftriaxone and azithromycin prior to culture results. During admission, no systemic findings of Covid-19 illness were observed.

The most common ocular manifestation of coronavirus disease 2019 (COVID-19), caused by the novel coronavirus variant severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), is acute conjunctivitis; cases of keratoconjunctivitis, panuveitis and optic neuritis, episcleritis, and cranial nerve palsies have also been reported.[1-3] In the pediatric population, ocular symptoms, including conjunctival discharge and injection as well as eye rubbing, are mild and self-limiting though often associated with more severe systemic illness.[4,5] We report a case of ophthalmia neonatorum as the presenting sign of COVID-19.

Case Report

A 4-day-old girl presented at Northwell Health Department of Ophthalmology for evaluation of mucopurulent discharge. She was born via spontaneous vaginal delivery at 38.6 weeks' gestational age. Pregnancy and delivery were uncomplicated, with Apgar scores of 9 and 9 at birth. Routine neonatal care included preventative erythromycin ophthalmic ointment. At birth, the eyes were without any notable findings. The mother had no past medical history, no history of sexually transmitted infections, and she received routine prenatal care. On admission to labor and delivery, both the mother and father underwent testing for COVID-19, which was negative.

On day 3 of life, the parents noticed a mucopurulent discharge of the left eye. The discharge progressively worsened, prompting the parents to seek medical treatment. On examination, the infant blinked to light with both eyes. There was crusted mucopurulent discharge evident surrounding the left eye. Mild ecchymosis of the upper eyelid was noted. Subconjunctival hemorrhage was present inferiorly, with mild chemosis (Figure 1). In addition, injection of the surrounding palpebral conjunctiva was evident, and the bulbar conjunctiva was erythematous as well, with few follicles (Figure 1). The cornea was clear, without any staining on fluorescein examination. Pressure on the lacrimal sac failed to elicit reflux. Dilated fundus examination was normal.

The patient was directed to the emergency department. Cultures of the palpebral conjunctiva showed no bacterial growth, and Gram stain demonstrated no organisms. Polymerase chain reaction (PCR) testing for *Chlamydia trachomatis*, *Neisseria gonorrhea*, and herpes simplex were negative. Immediately after culture samples were taken, the infant was started on intravenous ceftriaxone and oral azithromycin as well as erythromycin ointment. Nasopharyngeal and conjunctival SARS-CoV-2 PCR testing were positive. During admission, the vital signs remained stable, and no evidence of systemic disease was noted. The conjunctivitis resolved within 8 days. At that time, the mother tested positive for SARS-CoV-2, suggesting the possibility that the mother and infant may have been infected, either within the incubation period, prior to, or at the time of delivery.

The acute conjunctivitis was deemed secondary to COVID-19, given positive nasal PCR for the virus, concomitant positive testing from the conjunctival specimens, lack of any other identifiable pathogen on extensive testing, and the well-documented propensity for SARS-CoV-2 to affect the conjunctiva.

Discussion

The most common ocular manifestation of COVID-19 described is acute conjunctivitis, with a prevalence ranging from 0.8% to 31.6%.[1] Most adult cases present with bilateral conjunctival hyperemia, chemosis, a follicular reaction, and

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FIG 1. Clinical photograph at presentation showing erythematous palpebral conjunctiva and a subconjunctival hemorrhage of the left eye.

watery discharge.[1] The development of conjunctivitis is presumed to be secondary to an inflammatory cascade or to active viral replication.[1] Scalinci and colleagues[6] identified acute conjunctivitis as a presenting sign of COVID-19 illness in their case series. In the pediatric population, children with systemic symptoms of COVID-19 are more likely to develop ocular symptoms, the most common of which are conjunctival discharge—white mucoid (18.4%), thin watery (14.3%), or yellow-green purulent (22.4%)—eye rubbing, and conjunctival congestion.[4,5] A recent study by Pérez-Chimal and colleagues[7] examined 15 newborns with positive SARS-CoV 2 PCR test, all of whom had ocular manifestations. In their study, 11 newborns (73%) had chemosis and hemorrhagic conjunctivitis.[7] Other ocular manifestations that have been documented in association with COVID-19, include episcleritis, cranial nerve palsies, and panuveitis, and optic neuritis.[1-3]

To our knowledge, this is the first case of COVID-19 presenting as ophthalmia neonatorum, defined as conjunctival inflammation occurring within the first 30 days of life.[8] Infectious etiologies most commonly include *C. trachomatis*, *N. gonorrhea*, *S. aureus*, and herpes simplex virus, among others.[8] The ophthalmic reaction in ophthalmia neonatorum owes its severity to the absence of lymphoid tissue in the conjunctiva, a decrease in immunoglobulin IgA, and decreased lysozyme activity, which lead to diminished local immune function.[9] In most cases, infection is postulated to occur during passage through the birth canal.[8]

Several studies have examined the possibility of vertical maternal-fetal transmission of the SARS-CoV-2.[10] Three studies demonstrated no findings suggestive of COVID-19 in infants born to affected mothers, with amniotic fluid, cord blood, and breast milk all negative for the virus.[10] In a study by Zeng and colleagues,[10] 3 infants in a cohort of 33 born to mothers with COVID-19 illness tested positive on nasopharyngeal testing and exhibited symptoms, including fever, lethargy, vomiting, and pneumonia.

This case highlights the importance of considering COVID-19 infection as a cause of ophthalmia neonatorum during the current epidemiologic circumstances, particularly in the setting of no other established infectious etiology. We hypothesize that in our patient transmission of SARS-CoV-2 potentially occurred via the birth canal of the mother or by respiratory transmission after delivery. We highlight the finding of a hemorrhagic-type conjunctivits in this patient, similar to that seen by Pérez-Chimal and colleagues,[7] which may be related to the local thrombotic and vascular disruption caused by the virus. Further clinical evidence is necessary to establish a more thorough understanding of this entity.

Literature Search

PubMed was searched for the period 2019 to the present using the terms *Covid-19* and *SARS-CoV-2* in combination with *neonatal conjunctivitis*, *ophthalmia neonatorum*, *newborn*, and *infant*.

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