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Letter to the Editor

COVID-19 and the Eye



Dear Editor,

We read with interest of the article by Huang *et al.*¹ in your journal about the nonspecific and atypical manifestations of COVID-19 patients. As the initial epicenter of the outbreak, China has gained much clinical knowledge and experience in response to the disease. Based on 13 case series and 9 case reports, we would like to share five key points of the ocular manifestations of COVID-19 patients, hoping to provide a new perspective and broader view of the disease.

First, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can cause ocular manifestations. Patients mainly present with conjunctivitis that is similar to other types of viral infection. The first large epidemiological study reported 9 cases of conjunctival congestion among 1099 patients in China². Other symptoms include conjunctival secretion, epiphora, itching, foreign body sensation, and dry eye, with the prevalence ranging from 0.5% to 32%³. However, a recent case report observed retinal lesions of microhemorrhages and cotton wool spots among four patients, suggesting potential neurological manifestations⁴.

Second, the characteristics of ocular involvements are atypical. Ocular manifestations may present as the initial and the only symptoms of infection. The first case concerns a Chinese expert, who got infected in Wuhan and presented with conjunctival congestion before the onset of pneumonia⁵. Ocular involvements are more likely to present in severe COVID-19 cases, and there is no age or gender preference. To our knowledge, the youngest case was a 34-month-old boy, who had conjunctival congestion and eyelid dermatitis as the only symptoms⁶. In addition, SARS-CoV-2 can survive on the ocular surface longer than expected. Colavita *et al.*⁷ reported a case with continuous viral replication in the conjunctiva for over 20 days, indicating longer survival time than in the nasopharynx.

Third, SARS-CoV-2 transmission through the eye should not be ignored⁸. Several properties might render the eye as a potential site for viral infection and dissemination. The nasolacrimal system has provided an anatomical linkage for SARS-CoV-2 entry from the respiratory tract to the eye. Previous studies have detected respiratory viruses like adenovirus and influenza virus in the nasolacrimal tissues and conjunctival surface, indicating the direct spread via the innate route⁹. On the other hand, the ocular surface and tear are potential sites for SARS-CoV-2 colonization. SARS-CoV-2 can bind to the angiotensin-converting enzyme 2 (ACE2) cellular receptor and interact with transmembrane protease, serine 2 (TMPRSS2) of the host cell, which are known to be expressed in the human cornea, retina, and conjunctival epithelium¹⁰.

Fourth, the sensitivity of SARS-CoV-2 detection in patients' conjunctiva is around 2–7%. The relatively low and unstable viral load

in the conjunctival sac, different detecting techniques and sampling time might affect the results substantially. Although there is no uniform standard for conjunctival SARS-CoV-2 detection, it is speculated that conjunctival swab technique has yielded higher sensitivity over Schirmer's test. However, further studies are warranted to reach a definitive conclusion.

Fifth, appropriate use of qualified personal protective equipment is necessary. No evidence has shown the protective effect of contact lenses and personal eyeglasses. Clinical workers should wear protective goggles, masks, and face shields. For ophthalmologists, specially designed slit-lamp shields are effective to avoid cross-infection.

Declaration of Competing Interest

The authors declare no conflicts of interest.

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