

Short Commentary

Open Access, Volume 3

The ophthalmic implications of COVID-19: What we know so far

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Received: Dec 14, 2021

Accepted: Jan 31, 2022

Published: Feb 07, 2022

Archived: www.jcimcr.org

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DOI: www.doi.org/10.52768/2766-7820/1640

Keywords: COVID-19; ocular abnormalities; immunopathogenesis.

Short commentary

The current COVID-19 pandemic was caused by a new strain of coronavirus that arose in Wuhan (Hubei, China). Dr. Li Wenliang, a 33-year-old ophthalmologist from the Central Hospital of Wuhan, who has unfortunately died from the infection was one of the first to notify about the new form of viral pneumonia. He was infected by SARS-Cov-2 from an asymptomatic glaucoma patient during the ophthalmic examination. This experience clearly indicates that ophthalmologists are at risk of COVID-19 infection.

Several forms of eye disease such as hyperemia, chemosis, conjunctivitis, uveitis, optic neuropathy and increased secretion can occur in patients with COVID-19, and the clinical course of the ocular disease may be quite variable [1].

Nonetheless, there is little consensus regarding the prevalence and presentation of COVID-19-induced ocular symptoms. Variations in viral loads in different samples (such as sputum, tear, blood, etc.), timeframe of virus shedding, problems with accurate data collection (Failure to report: patients who had ocular manifestations but have not officially been reported), laboratory techniques, age, race and medical history may contribute to differences in the incidence rates of eye complications in COVID-19 patients.

Based on current data, the main route of transmission for COVID-19 is by air, via aerosols or droplets from infected patients. Nonetheless, other potential pathways such as ocular transmission (through tear and conjunctival secretions) should not be overlooked [2]. Thus, eye care providers are expected

to remain highly vigilant during eye exams because they are in close contact with patients' nose and mouth that increases the potential exposure to tear or saliva-contaminated droplets.

The possibility of SARS-Cov-2-induced vision complications is an important aspect that should be addressed. Different studies have reported an association between SARS-Cov-2 and ocular problems in human. Two scenarios about this association are described. On the one hand, SARS-Cov-2 can enter and attack the respiratory system and infect the eye later. This is the most common route of infection and provides an explanation for a high burden of pulmonary dysfunction in symptomatic patients. On the other hand, the eyes can serve as a preferred gateway for the virus entry and infecting the respiratory tract. This pathway could be interpreted in the light of an anatomical theory for ocular transmission of respiratory disease through the nasolacrimal system [3]. This theory is based on the assumption that ocular mucosal immune system clears fluid from the eye and conducts it to the inferior meatus of the nose. As a result, deposition of respiratory droplets on the surface of the eye could lead to respiratory tract infection.

Evidence such as the presence of viral particles in tears and conjunctiva of infected cases or the occurrence of conjunctivitis before the onset of pneumonia provides further support that SARS-CoV-2 can infect and be shed from the eye. Additionally, the use of feline and murine models have shown that corona viruses can cause eye problems.

Although the exact pathomechanistic link between SARS-Cov-2 infection and ocular abnormalities have not been fully cleared, the interaction between viral attachment proteins (spike protein) and host cell receptors [Angiotensin-Converting Enzyme 2 (ACE2)] which is expressed in different organs such as lungs and eye could represent an essential mechanism for cell entry of SARS-Cov-2 and the establishment of persistent infection. Therefore, ocular system acts not only as a portal of entry but also as a reservoir for person-to-person transmission of the virus [4].

These findings are of interest in light of recent findings indicating that patients with ocular abnormalities tend to have more severe systemic manifestations. Moreover, they have abnormal blood test results including elevated white blood cell count, procalcitonin, C-reactive protein, and lactate dehydrogenase that have been shown to correlate with disease severity [5].

Therefore, the recognition and quantitation of ocular manifestations provide a more comprehensive evaluation of disease severity and are important for the determination of prognosis and management of patients.

With regard to the above mentioned observations, the ability of SARS-Cov-2 to infect different structures within the eye cannot be excluded. The available data indicate that ocular symptoms may appear before the onset of COVID-19. So, ophthalmologists are especially at increased risk of exposure to SARS-Cov-2 and should thoughtfully consider recommendations for health care workers. It is also important to know that many patients do not undergo any ophthalmological manifestations.

Therefore, further studies are needed to elucidate the pathways by which SARS-Cov-2 contributes to the initiation or development of ophthalmic deficits in patients with COVID-19.

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