

Experience against COVID-19 Pandemic in Ophthalmology

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ABSTRACT

The 2019 novel coronavirus disease (COVID-19) pandemic has now emerged signs of stable or in control, especially in China. Several studies have been conducted to identify the possible ocular route of SARS-CoV-2 infection and the ocular symptoms in COVID-19 patients. Due to the close contact with patients when performing ophthalmologic examinations or surgeries, ophthalmologists need precautionary measures during the outbreak. Here, we summarize researches on COVID-19 related ocular characteristics and the experience against the SARS-CoV-2 infection, hoping to help ophthalmologists and patients worldwide.

Keywords: COVID-19; SARS-CoV-2; Ocular transmission; Ocular symptoms; Ophthalmology

INTRODUCTION

At present, the COVID-19 pandemic has emerged signs of stable or in control, especially in China. For ophthalmologists, it is necessary to summarize researches on COVID-19 related ocular characteristics and the experience against the SARS-CoV-2 infection.

COMMENTARY

The transmission of SARS-CoV-2 *via* the ocular surface eyes should not be overlooked. It has been proved that the entry of SARS cov-2 is mediated by angiotensin converting enzyme 2 (ACE2), a metalloproteinase expressed in many human tissues, including the cornea and conjunctiva [1,2]. Besides, a novel route of CD147 (extracellular matrix metalloproteinase inducer)-spike protein (SP) was found in promoting SARS-CoV-2 invasion into host cells [3]. CD147 was also detected in cornea, conjunctiva and retina [4]. Further study of animal model showed that macaques could be infected with SARS-CoV-2 *via* the conjunctival route and the viruses spread in both nasolacrimal system and lung [5]. These results provide a molecular basis for the transmission of SARS-CoV-2 through the eyes.

A lot of case reports and observational studies suggested that conjunctival congestion was one of the symptoms of COVID-19, and could appear as the initial symptom [6-9]. Our paper, titled "Ocular manifestations and clinical characteristics of 535 cases

of COVID-19 in Wuhan, China: A cross-sectional study", enrolled 535 patients at Mobile Cabin Hospital and Tongji Hospital with mild COVID-19. 5.0% patients had conjunctival congestion during hospitalization. Moreover, the average duration of conjunctival congestion was 5.9 ± 4.5 days (mean [SD]). We further investigated the behaviors of eye protection, showing that frequent hand-eye contact may be the risk factor for conjunctival congestion in COVID-19 patients. For these patients with conjunctivitis, the usage of ganciclovir eye drop was effective.

Except for the ocular manifestations of conjunctivitis, such as conjunctival congestion, chemosis, increased watery secretions or tearing, no symptom and lesion associated with intraocular diseases (iritis, choroiditis, and retinal disease) was found in COVID-19 patients, which suggested that the illness seemed to confine to the ocular surface [7,9,10]. Recent researches has proved that SARS-CoV-2 spike (S)-protein binds ACE2, and in concert with host proteases, principally TMPRSS2, promotes cellular entry [11]. Co-expression of ACE2 and TMPRSS2 was detected in conjunctiva and cornea but not in retina, in accordance with the clinical symptoms [12]. Thus, screening of patients with ocular surface discomforts by ophthalmologists is advocated during the outbreak of COVID-19.

In the early stage of the epidemic in Wuhan, China, most of the infected medical staffs worked not in respiratory or emergency department but in neurosurgery or ophthalmology departments.

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Due to the close contact with patients when performing ophthalmologic examinations and frequent exposure to ocular discharge, ophthalmologists should pay attention to the protections during medical practice or surgeries and the possibility of cross-infection.

For patients, online doctor visit *via* smartphone could help reducing face-to-face contact. If the preliminary treatments fail to relieve the ocular discomforts, patients are then asked to make an appointment on “Tongji hospital” application before going to the clinic. All patients are advised to wear masks everywhere in hospital and they are firstly screened through temperature measurement and symptoms at emergency department. A series of examinations, including blood routine, COVID-19 IgM/IgG detection, SARS-CoV-2 detection in nasopharyngeal swabs and chest CT are needed for patients with high temperature, respiratory symptoms, close contact with COVID-19 diagnosed patients or before ocular surgery.

For ophthalmologists, personal protective equipment (PPE), N95 mask, goggle and face mask are necessary dealing with COVID-19 patients. We recommend iCare rebound tonometer to evaluate IOP, but not non-contact tonometer which will produce local aerosol in the process [13]. Protective shields can be added to the slit lamp microscope. Proper ventilation and instrument disinfection are also very important performing ophthalmologic examinations. During the epidemic in our ward, glaucoma operation and ROP treatment are the most common emergency surgery, while eye trauma surgery is relatively rare because of the home quarantine. To reduce the risk of cross-infection, operation methods should be considered that minimized follow-up frequency and time spent in hospital. Another challenge is anaesthesia, we use local anaesthesia as often as possible for adults and laryngeal mask anaesthesia for children [14]. Ordinary goggles seriously impede microsurgery. We replace it with homemade goggles by sealing the own glasses or flat lenses around the eyes with plastic wrap and remove the plastic wrap from the centre of the lens to get clear vision.

In addition to the above managements, it is crucial to educate both patients and practitioners to understand the ocular characteristics of COVID-19 and eye protection. Our group collected the opinions of COVID-19 related eye protection among 133 medical staffs and 174 common Wuhan residents. Although 65.4% medical staffs considered conjunctival congestion as one of the symptoms of COVID-19, less than one third residents knew this. Notably, 67.1% medical staffs washed their hands before touching eyes, while only 21.1% common residents did the same. Therefore, public health education, especially hand hygiene, still needs to be enhanced.

CONCLUSION

In conclusion, conjunctival congestion is one of the COVID-19 related ocular symptoms, which could occur as the initial symptoms. Ophthalmologists should pay attention to the self-protection during examinations and surgery. It is also essential

to provide eye-care equipment and strengthen health education on hand hygiene. Hopefully, our experience, to some extent, will help ophthalmologists and patients worldwide.

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