Experience against COVID-19 Pandemic in Ophthalmology

Liwen Chen, Xuhui Chen, Hao Du, Chaohua Deng, Xian Zhang, Bo Chen, Xufang Sun

Department of Ophthalmology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

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 metallopeptidase 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.

Correspondence to: Xufang Sun, Department of Ophthalmology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China, E-mail: sunxufang2016@163.com

Received: May 04, 2020; Accepted: May 18, 2020; Published: May 25, 2020

Citation: Chen L, Chen X, Du H, Deng C, Zhang X, Chen B, et al. (2020) Experience against COVID-19 Pandemic in Ophthalmology. J Clin Exp Ophthalmol. 11:841. DOI: 10.35248/2155-9570.20.11.841

Copyrights: © 2020 Chen L, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
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 both patients and practitioners to understand the ocular protections during medical practice or surgeries and the possibility of cross-infection. 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.

REFERENCES
1. Wan Y, Shang J, Graham R, Baric RS, Li F. Receptor Recognition by the Novel Coronavirus from Wuhan: an Analysis Based on Decade-Long Structural Studies of SARS Coronavirus. J Virol. 2020;94:e00127-20.
2. Yan S, Xin P, Lin L, Canrong N. Expression of SARS coronavirus S protein functional receptor ACE2 in human and rabbit cornea and conjunctiva. Rec Adv Ophthalmol. 2004;24:332-336.
3. Wang K, Chen W, Zhou YS, Lian JQ, Zhang Z, Du P, et al. (2020) SARS-CoV-2 invades host cells via a novel route: CD147-spine protein. BioRxiv. 2020:03(14):988345.
4. Maatta M, Tervahartiala T, Kaarniranta K, Tang Y, Yan L, et al. Immunolocalization of EMMPRIN (CD147) in the human eye and detection of soluble form of EMMPRIN in ocular fluids. Curr Eye Res. 2006;31:917-24.
5. Deng W, Bao L, Gao H, Xiang Z, Qu Y, Song Z, et al. (2020) Rhesus macaques can be effectively infected with SARS-CoV-2 via ocular conjunctival route. BioRxiv. 2020:03.13.990036.
6. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 2020;382:1708–1720.
7. Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L, Wu K. Characteristics of ocular findings of patients with coronavirus disease 2019 (COVID-19) in Hubei Province, China. JAMA Ophthalmol. 2020;138(5):575-578.
8. Zhang X, Chen X, Chen L, Deng C, Zou X, et al. The evidence of SARS-CoV-2 infection on ocular surface. Ocul Surf. 2020;18:360-362.
9. Cheema M, Aghazadeh H, Nazarali S, Ting A, Hodges J, McFarlane A, Kanji JN, Zelyas N, Damji KF, Solarte C. Keratoconjunctivitis as the initial medical presentation of the novel coronavirus disease 2019 (COVID-19): A case report. Canadian J Ophthalmol. 2020;138(3):575-578.
10. Chen L, Liu M, Zhang Q, Qiao K, Huang T, Chen M, et al. Ocular manifestations of a hospitalised patient with confirmed 2019 novel coronavirus disease. British Journal of Ophthalmology. 2020;104(6):748-751.
11. Ziegler CG, Allon SJ, Nequist SK, Mbano JM, Miao VN, TouzanaCSN, et al. (2020) SARS-CoV-2 receptor ACE2 is an interferon-stimulated gene in human airway epithelial cells and is detected in specific cell subsets across tissues. Cell.2020; S0092-8674(20)30500-6.
12. Sungnak W, Huang N, Bécavin C, Berg M, Queen R, Litvinukova M, et al. SARS-CoV-2 entry factors are highly expressed in nasal epithelial cells together with innate immune genes. Nat Med. 2020:1-7.
13. Britt JM, Clifton BC, Barneby HS, Mills RP. Microaerosol formation in noncontact‘air-puff’tonometry. Arch Ophthalmol. 1991;109(2):225-8.
14. Du H, Zhang M, Zhang H, Sun X. Practical experience on emergency ophthalmic surgery during the prevalence of COVID-19. Graefe’s Archive for Clinical and Experimental Ophthalmology.2020;1-3.