Covid-19 Pandemia – Retina Specialist Perspective

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ABSTRACT

Ophthalmology practice has needed new precautions after COVID-19, which was emerged in Wuhan, China in December 2019 and spread to the whole world very quickly. It was known that elderly people, whose majority of retina clinics, were the most affected by this new disease. Considering that many retinal diseases are among the ophthalmological emergencies, the slowed down health service due to COVID-19 pandemic should be provided to these patients in some way. In this review, the precautions that can be taken by retina specialists to avoid the spread and transmission of the virus are summarized.

Keywords: Coronavirus, COVID-19, SARS-CoV-2, Ophthalmology, Retina.

INTRODUCTION

In December 2019, 41 patients with pneumonia linked to South China Seafood Marked emerged in Wuhan, China; however, source for these pneumonia could not be isolated at that time.[1] This novel contagious disease was first mentioned on 30 December 2019 by an ophthalmologist, Li Wenliang.[2] He posted a comment on the WeChat social media application and warned the followers about a possible epidemic. However, Dr. Li Wenliang was accused of "making false claims that violently agitates public order" by security officers. Unfortunately, he suffered from this disease and died after a period in intensive care on 7th February.[3] On 7 January 2020, the causative pathogen of outbreak was isolated as a novel type of coronavirus (CoV) by Chinese Center for Disease Control.[4] This novel coronavirus was termed as 2019-nCOV by the World Health Organization (WHO). On 11 February 2020, the virus was termed as coronavirus disease 2019 (COVID-19) by WHO and the disease was termed as severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) by th Coronavirus Study Group of the International Committee on Taxonomy of Viruses.[4] On 31 January 2020, WHO announced the outbreak as an international public health emergency and ultimately declared the outbreak as pandemics 11 March 2020.[5] The first case in Turkey was announced on 11 March 2020 and COVID-19 has spread rapidly, becoming a national health threat.

History of Pandemics

The world had been faced numerous great pandemics throughout the history. Plague was one of the worst pandemics. The plaque pandemics dates back to 2nd Century and had become evident for several times, leading millions of death all over the world.[6] Plague of Justinian, one of the worst of plague pandemics, started in 6th Century at the Eastern Roman (Byzantine) Empire and estimated that it killed 30 to 50 million people, which corresponded to half of the world's population in that period of time.[7] Black Death had relapsed originating from China in 14th Century and 25 million people died.[8]

Some of the pandemics faced include Smallpox (15th - 17th centuries, America continents, 20 million people died), Cholera (19th century, India, millions died), Spanish Flu, or H1N1 (1918 – 1919, during World War I, infected one-third of world population and 50 million people died), HIV/AIDS (1981 – present, infected 75 million so far, 32 million died), Swine Flu, Ebola and Zika.[9]

The Covid-19 pandemic does not seem as worst pandemics of the world compared to the previous pandemics. The

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mortality rate has varied from 2% to 12% across countries so far.

Human Coronaviruses

The CoV is a member of Coronavirinae subfamily of Coronaviridae family belonging to Nidovirales order.[10] It is an enveloped, single-stranded RNA virus. The term "Corona" derives form its appearance. Viral envelope structures look like crown and the Latin word corona means crown. Birds and mammals such as cats and dogs are mostly affected by CoVs.[11] Six types of CoVs other than SARS-CoV-2 are known to cause infections in humans. Of these, two had caused an outbreak recently: the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) in 2003 and the Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV) in 2012. Others are 229E, NL63, OC43 and HKU1.

CoVs are mostly present with respiratory tract infections.[12] Other common manifestations are gastrointestinal infections and conjunctivitis. Most common symptoms are fever, cough, fatigue, anosmia, dyspnea and diarrhea. Life-threatening complications include acute respiratory distress syndrome, arrhythmia, shock and acute cardiac injury.[13]

SARS-CoV-2 is known to be highly contagious and has become a pandemic very quickly. Respiratory droplets seem to be the main transmission route.[14] Others are contact the virus through nasal mucosa, mouth, fecal material and conjunctiva. Therefore, close-contact, for example during ophthalmic examination with slit-lamp, can easily cause transmission.

SARS-CoV-2 Transmission through Ocular Surface

A Chinese expert on pneumonia, Guangfa Wang, was infected by SARS-CoV-2 during the inspection in Wuhan, China.[15] Although he used a N95 mask during inspection, he did not wear any eye-protection equipment. He mentioned that conjunctival redness appeared days before his pneumonia symptoms. Therefore, he was thought to be infected through the ocular surface. Respiratory viruses can be transmitted through the conjunctival epithelium.[16] Although we have limited information about SARS-CoV-2, it seems that conjunctival transmission is also highly probable based on similarities with SARS-CoV and non-respiratory droplet transmission reports.

The risk of SARS-CoV-2 transmission through tear fluid seems to be low. In a study from Singapore, neither viral culture nor reverse transcription polymerase chain reaction (RT-PCR) detected the virus in 64 tear samples collected from 17 COVID-19 patients, suggesting a low risk of ocular transmission.[17] However, in another study from China, 16.7% of patients were reported to have positive results for SARS-CoV-2 on RT-PCR from both conjunctival and nasopharyngeal swabs.[18] They have also reported that one-third of patients with COVID-19 had ocular abnormalities, which frequently occurred in patients with more severe COVID-19. Almost one-third of these patients have been reported to have ocular manifestations consistent with conjunctivitis, including conjunctival hyperemia, chemosis, epiphora, or increased secretions (2). Xia et al. indicated that SARS-CoV-2 was detected in the conjunctival secretions in COVID-19 patients with conjunctivitis.[4] These studies have prompted us to think that the risk of viral transmission through tear fluid may be low, but clinicians should avoid contact with ocular secretion and tears, especially in patients with symptoms of conjunctivitis.

Ocular Findings of SARS-CoV-2

A few studies have been reported on ocular findings and presence of SARS-CoV-2 in ocular structures such as tear fluid so far. The symptoms of conjunctivitis such as conjunctival hyperemia, epiphora, chemosis can be seen in patients with COVID-19.[18] The China Medical Treatment Expert Group for Covid-19 reported that conjunctival congestion was developed in only nine of 1099 patients (0.8%).[12] Wu et al. reported that 31.6% of their 38 patients with COVID-19 had ocular symptoms and that the patients with ocular manifestations had more severe disease.[18]

Precautions to be Taken in Ophthalmology Clinics

In general, elderly people present to the retina clinics more commonly. It is known that COVID-19 is more fatal in older ages. Ocular examination takes longer time considering refraction, pupil dilation and ocular imaging tests. The distance between ophthalmologist and the patients is very short during slit-lamp examination. These factors increase potential risk of viral transmission from patient-to-patient and patient-to-healthcare professionals. Healthcare professionals account for about 11% of all Covid-19 infections.

There are some precautions to be taken to decrease the risk of SARS-CoV-2 transmission during this pandemic period. Firstly, it is important to reduce the number of admissions to the hospital. Ophthalmic examinations for diseases such as standard dry eye, blepharitis, refraction errors should be postponed except urgent cases. Patient may be consulted through phone calls, e-mails and social media applications during this time. The intervals between patient appointments should be increased to prevent crowds.

Patients should be asked to answer following questions before their arrival to the appointment:

– Do you have any sign of disease: Fever, cough, shortness of breath or gastroenteritis?

– Do you have any recent contact with a coronavirus infected people?

– Have you been in a crowded place with close contact to people?

If the answer is yes in any of these questions, the patient can be rescheduled to a date after 2 weeks of quarantine if it is not an urgent case. If it is an urgent case, the patient should be examined with maximum PPE and consulted to the infectious disease specialist when necessary.

Another important point is to take all the precautions to reduce the risk of viral transmission in examination room. If high efficiency particulate air (HEPA) filter is available in the clinic, it should be used to clear particles in examination rooms and waiting areas. However, it is helpful to ventilate the room by opening windows between exams and whenever possible if HEPA filter isn't available. Equipment and rooms should be disinfected frequently. Installing protective transparent shield called "breathing shield" to the both slit lamp biomicroscopy and binocular indirect ophthalmoscopy reduces air droplet transmission in a very effective manner. The plastic shields prevents droplet contamination between the patient and clinician during the slit-lamp examination and can be produced easily by forming holes for the oculars of the slit-lamp on a standard A4 acetate paper (Figure 1). A non-talking principle should be applied during slit lamp examination and this should be explained to the patient before the examination. Non-contact tonometry could be a source for micro-aerosols; thus, it may be a better choice to use Goldmann applanation tonometry.[19] Long nails and wearing jewelry or watch should be avoided.

During ophthalmological examination, other precautions include use of appropriate personal protective equipment (PPE). Surgical masks used both by clinician and the patient may be enough if there is no sign of the disease in the patient. However, since the ophthalmologic examination has to be done in close contact with the patient, N95 masks may be more protective. Other PPEs are disposable gloves, apron, protective goggles or face shields to protect the eyes. If there is any sign of the disease or the patient is a confirmed Covid-19 patient, caps for hair, N95 masks and long-sleeved disposable gowns must be used.

We routinely use N95 masks, protective goggles and protective face-shields during examination. We more frequently prefer binocular indirect ophthalmoscopy, in which a protective, transparent shield was implanted to the anterior part of the head band (Figure 2), to avoid slit lamp examination when needed since it ensures to maintain distance between the doctor and the patient.

Figure 1: *Two protective shields during slit lamp examination: one is attached to the ocular part of the slit lamp (made of standard A4 acetate paper) and the second one on the forehead of the ophthalmologist.*

On-going Clinical Tasks

Ophthalmologic examination has to be continued in cases with acute visual loss, painful eye during pandemic. Patients requiring intravitreal injections comprise the majority of workload in retina clinics. There are three major indications for which intravitreal injections: cystoid macular edema (CME) due to retinal vein occlusion (RVO), center involved diabetic macular edema (DME) and neovascular age-related macular degeneration (nAMD). The patients with RVO or DME can be contacted via phone interview in order to gather knowledge about their visual status in general. If they do not complain about the deterioration in vision since the last visit, they can be counseled that missing one or 2 injections would not cause any permanent harm and deferring follow-up would be safe during this time. Timing of deferred follow-up could vary according to the monocularity of the patient and the region due to differential severity of COVID-19. nAMD patients who have been under regular injection schedule such as initial monthly loading doses or treat and extend (T&E) should visit the hospital and meet the clinician for their opinion/injection. These eyes may not tolerate missed injections and it may cause permanent harm to the sight. We try to use a “no touch technique” by assessing only visual acuity, optical coherence tomography (OCT) and undilated quick colored fundus pictures to decide about injection and the timing of the next visit. T&E regime is the preferred choice especially during pandemic period to

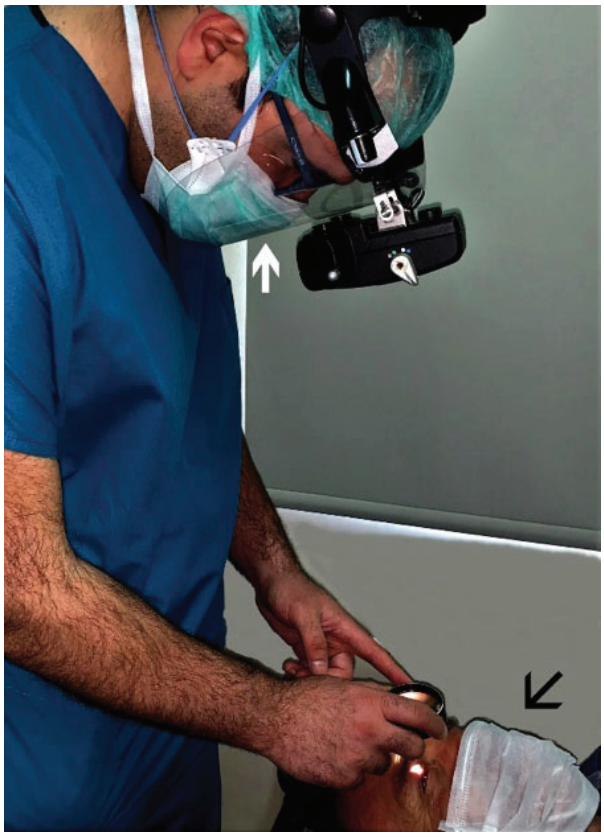

Figure 2: *The picture showing patient examination with binocular indirect ophthalmoscope which was equipped with a protective face shield to the anterior side of the head band (white arrow). The picture also shows that the patient wears a surgical mask (black arrow) and ophthalmologist wears 2 masks; one is N95 mask and the other is surgical mask during examination for maximum protection. Binocular indirect ophthalmoscopy provides a longer distance between the doctor's and the patient's face as compared to slit lamp indirect ophthalmoscopy.*

decrease the number of visits and to increase the interval between visits for such patients.

Who to Operate? Emergent-Urgent Vitreoretinal Surgical Indications

Open globe injury, acute endophthalmitis with severe vision loss, retinopathy of prematurity (ROP), acute retinal detachment, retained lens fragments, expulsive choroidal hemorrhage, dense vitreous hemorrhage in monocular patient, vitreous hemorrhage in which a retinal tear or detachment is suspected are those presenting with urgent condition. Similar lists have been announced by some societies like American Academy of Ophthalmology, American Society of Retina Specialists and Turkish Ophthalmological Association and can be made longer depending on the patient's monocularity and social conditions.[20, 21]

Macular hole, dislocated intraocular implant lens, diabetic vitreous hemorrhage with no macula-threatening inferior retinal detachment (if not monocular), retained silicone oil, macular epiretinal membrane and vitreomacular traction are non-urgent, non-elective surgical indications and can be postponed.

CONCLUSION

This new disease, COVID-19, has spread very shockingly all over the world and has caused many deaths, including healthcare workers.

It is very important to protect all healthcare workers and to stop the spread of infection by better recognition of the disease, improved understanding on routes of transmission and taking the necessary precautions. In particular, ophthalmologists are in close contact with the patient and should take all the precautions such as use of PPE and avoiding slit-lamp examinations if possible. It is also important to determine the urgent and emergent cases and to manage the clinics in order to decrease the number of unnecessary admissions by elderly people who are at greater risk for infection to retina clinics. One last word; this pandemic reminded us something else: to slow down all the work, spare more time for ourselves and for lovely ones, to put aside the little problems, to stop wasting the world and depleting it, to feel the value of freedom and hugging the lovely ones… we suppose the life will never be the same afterwards…

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REFERENCES

1- Lu H, Stratton CW, Tang YW. Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle. J Med Virol 2020;92:401-2.

2- Petersen E, Hui D, Hamer DH, Blumberg L, Madoff LC, Pollack M, et al. Li Wenliang, a face to the frontline healthcare worker. The first doctor to notify the emergence of the SARS-CoV-2, (COVID-19), outbreak. Int J Infect Dis 2020;93:205-7.

3- Lai THT, Tang EWH, Chau SKY, Fung KSC, Li KKW. Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. Graefes Arch Clin Exp Ophthalmol 2020;258:1049-55.

4- Xia J, Tong J, Liu M, Shen Y, Guo D. Evaluation of coronavirus in tears and conjunctival secretions of patients with SARS-CoV-2 infection. J Med Virol 2020. [Epub ahead of print]

5- World Health Organization. Coronavirus disease 2019 (COVID-19) Situation Report – 51 March 11, 2020 [Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200311-sitrep-51-covid-19.pdf?sfvrsn=1ba62e57_10. (accessed April 20, 2020).

6- Wong TW, Fung KP. The plague pandemics and the discovery of the plague bacillus. Asia Pac J Public Health. 1988;2:144-9.

7- Wagner DM, Klunk J, Harbeck M, Devault A, Waglechner N, Sahl JW, et al. Yersinia pestis and the plague of Justinian 541-543 AD: a genomic analysis. Lancet Infect Dis 2014;14:319-26.

8- Cohn SK, Jr. Epidemiology of the Black Death and successive waves of plague. Med Hist Suppl 2008:74-100.

9- Tognotti E. Lessons from the history of quarantine, from plague to influenza A. Emerg Infect Dis 2013;19:254-9.

10- Madhugiri R, Fricke M, Marz M, Ziebuhr J. Coronavirus cis-Acting RNA Elements. Adv Virus Res 2016;96:127-63.

11- Seah I, Agrawal R. Can the Coronavirus Disease 2019 (COVID-19) Affect the Eyes? A Review of Coronaviruses and Ocular Implications in Humans and Animals. Ocul Immunol Inflamm 2020;28:391-5.

12- Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med 2020. [Epub ahead of print]

13- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497-506.

14- Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci 2020;12:9.

15- Lu CW, Liu XF, Jia ZF. 2019-nCoV transmission through the ocular surface must not be ignored. Lancet 2020;395:e39.

16- Belser JA, Rota PA, Tumpey TM. Ocular tropism of respiratory viruses. Microbiol Mol Biol Rev 2013;77:144-56.

17- Seah IYJ, Anderson DE, Kang AEZ, Wang L, Rao P, Young BE, et al. Assessing Viral Shedding and Infectivity of Tears in Coronavirus Disease 2019 (COVID-19) Patients. Ophthalmology 2020. [Epub ahead of print]

18- Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L, et al. Characteristics of Ocular Findings of Patients With Coronavirus Disease 2019 (COVID-19) in Hubei Province, China. JAMA Ophthalmol 2020. [Epub ahead of print]

19- Britt JM, Clifton BC, Barnebey HS, Mills RP. Microaerosol formation in noncontact 'air-puff' tonometry. Arch Ophthalmol 1991;109:225-8.

20- American Society of Retina Specialits. COVID-19: Updates and Resources March 24, 2020 [Available from: https://www.asrs.org/practice/asrs-member-alert-regarding-covid-19-pandemic. (accessed April 20, 2020).

21- Turkish Ophthalmological Association. Pandemi Nedeni ile Acil Kabul Edilen Göz Ameliyatları March 26, 2020 [Available from: https://koronavirus.todnet.org/pandemi-nedeni-ile-acil-kabul-edilen-gz-ameliyatlar. (accessed April 20, 2020).