• COVID-19 and Ophthalmology •

Ophthalmic practice during COVID-19 pandemic

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Abstract

• Coronavirus disease 2019 (COVID-19) pandemic has caused significant changes in ophthalmic practice. The initial strategy of strict restriction of elective activities has been replaced with various guidelines to revitalize ophthalmic procedures considering the new safety concerns. In this manuscript, we reviewed recent recommendations for ophthalmic practice in different fields of ophthalmology during the COVID-19 pandemic.

• **KEYWORDS:** ophthalmic practice; COVID-19; pandemics; recent

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) pandemic, which was declared by World Health Organization (WHO) on March 11th 2020, had profound impact on health care system and interfered with routine practice in all fields of medicine including ophthalmology.

Because of close contact requirement in examination and treatment techniques, the risk of infection exposure is a serious challenge in ophthalmic practice during the time of pandemic. In addition, a considerable percentage of patients presented in ophthalmology clinics belong to high-risk groups who are prone to infection. Furthermore, COVID-19 can present with only eye symptoms such as conjunctivitis without other suggestive symptoms in early course of the disease, which might increase the possibility of infection transmission in ophthalmology setting[1-3]. Consequently, at the beginning of the pandemic most ophthalmologists restricted their practice to visit only urgent cases. Additionally, many patients did not come to clinics voluntarily because of the fear of getting infected. As a result, there was a 60%-80% decrease in the flow of patients and consequently an 80%-100% decrease in rate of surgeries[4].

Soon after the commence of pandemic, ophthalmologists like other health care givers realized that they should prepare themselves to face the novel pandemic for a longtime maybe years. Hence, there were concerns about providing proper care to patients who needed long time follow-up and various interventions such as glaucoma patients[5-7], patients with diabetic retinopathy[8-11] or age-related macular degeneration (AMD)[12-13] who needed multiple visits, intravitreal injections, laser and vitreoretinal surgeries, patients with uveitis[14-15] who need treatment with various immunosuppressive medications, patients suffering from ocular malignancies such as choroid melanoma[16] or retinoblastoma[17] and pediatric patients[18]. In addition, shut down of elective surgeries had profound adverse economic impact on ophthalmology practices[4]. Moreover, it caused substantial problems in training process of educational ophthalmologic centers[19-20]. Additionally, giving appropriate care to COVID-19 patients who needed emergent ophthalmologic intervention was another important concern. Accordingly, adaptability to this new era and adjusting techniques to reach a reasonable balance among safety factors, providing necessary eye health care, and economic concerns have become a concern. In this article, we review recent considerations in ophthalmic practice during COVID-19 pandemic.

This manuscript was written after a complete search in the literature regarding COVID-19 and ophthalmology practice. It was adhered to the tents of Helsinki and accused an ethical approval from Tehran University of Medical Sciences.

Reopening the Ophthalmology Clinics Although on March 18, American academy of ophthalmology (AAO) recommended ophthalmologists to stop all routine activities and restrict their treatment only to urgent and emergent cases, in recent recommendations; AAO has recommended that clinical activities could be performed with continued caution in compliance with local regulations[21]. Various factors such as local government restrictions for nonessential services, rate of local new cases of COVID-19, accessibility of protective personal equipment (PPE) and availability of COVID-19 test,

should be considered for deciding to continue routine care and elective eye surgeries[22].

In general, because of mandatory need of social distancing in waiting rooms and frequent disinfection of care areas, the clinics should consider a lower schedule volume in comparison with the time before pandemic. Similarly, the number of surgeries in each session might decrease due to consideration of strict precautions for each case to reduce the chance of infection transmission.

Precautions for Outpatient Visits According to AAO's recommendations[21] all patients should be screened before presenting in waiting room for symptoms of sore throat, fever, fatigue, loss of smell or respiratory dysfunction. In addition, they should be asked about contact with known cases of COVID-19 during the last 2 to 14d. It has been recommended that seated patients should have at least 6 feet distance from each other in the waiting room. The use of slit-lamp barriers was also encouraged. However, in case of lacking enough sterilization, these shields can be a source of contamination themselves. During examination, patients should be asked to limit any conversation to decrease the possibility of viral transmission. Using surgical masks or cloth face coverings are necessary for the patients. The examiner also should wear surgical mask and eye protection. If it is available, using N-95 masks may have additional protection. The number of persons in examining room should be limited to only one patient or the patient and one parent in case of children. Between all patients visits, all instruments and surfaces should be cleaned with virucidal solutions.

Generally, the known cases of COVID-19 should be quarantined at home and defer their ophthalmologic examination. In case of urgent patients, strict precautions should be considered to take them directly to examining room without any contact with others. Practitioners should wear N-95 mask, gowns, gloves, and eye protection. After examining a COVID-19 positive patient the examination room should be disinfected before using for other patients.

It has been recommended to use disposable single-use tonometer tips if available. However, tonometer tips can be effectively cleaned with 70% alcohol solution for virus causing COVID-19[21].

General Precautions for Surgeries According to AAO recommendations for ophthalmic surgery during the COVID-19 pandemic[23], all patients should wear surgical mask for any surgical procedure. Topical povidone-iodine is the appropriate choice for surgical prep as it is effective against corona viruses. Surgeons also should wear surgical mask and eye protection. N-95 masks might be a better protection depending on patient condition, type of surgery and the prevalence of COVID-19. Generally, asymptomatic patients without known exposure can be operated safely with standard surgical PPE. There is no consensus on doing preoperative test for all asymptomatic patients. In patients with positive test for COVID-19, the elective surgery should be deferred for 6wk. In case of urgent conditions, all staff in the operating room including the surgeon should wear N-95 masks, eye protection or face shield[23].

Cataract surgery Cataracts that interfere with ability of patients to drive, work or see their medications to use or cataracts which cause increasing risk of falling down or annoying anisometropia are not considered elective conditions but cataract surgery in this situations is considered semi-urgent and can be performed within days to weeks according to AAO recommendations[21]. Theoretically, during phacoemulsification, the risk of spreading of aerosolized virus is very low[23]. Some surgeons advocate sequential bilateral cataract surgery in pandemic era to decrease the risk of infection exposure[24].

For YAG laser capsulotomy, it is recommended to use a drop of 5% povidone-iodine after topical anesthesia before starting the procedure. Soap and warm water can be used to disinfect the capsulotomy lens[23].

Corneal transplantation It does not seem that corneal transplantation increases the risk of transmission of infection to the surgeon. However, open-sky procedures because of their potential for generating aerosols are considered as a probable risk[23].

Currently, there is no evidence indicating the transmission of respiratory viruses from tissue transplantation[25]. However, according to Eye Bank Association of America (EBAA) and the Global Alliance of Eye Bank Associations (GAEBA) recommendations, tissue from donors who have been infected recently or have a history of close contact with COVID-19 patient should be excluded for using in transplantation[26].

Refractive surgeries In general, the safety of excimer laser and femtosecond lasers are unclear. However, it seems that their risk for surgeons is low. The prophylaxis with povidone-iodine followed by borate buffered saline (BSS) irrigation is advised. In addition, it is suggested to begin the plume extractor several seconds before starting the laser[23].

Corneal topography which is usually performed as an essential part of preoperative evaluation for refractive surgery is considered a relatively low risk procedure for transmission of COVID-19 infection. Using breath shield and cleaning the device with virucidal solutions between patients can improve the safety[27].

Glaucoma The most important concern about chronic diseases needing frequent follow ups such as glaucoma is the difficulty for patients to access proper care. To solve this problem the application of virtual ophthalmology visits and telemedicine using emerging digital technologies like smart phone-

based apps and artificial intelligence in managing glaucoma patients is strongly advocated[6]. As mentioned, using single-use disposable tips for tonometry and cleaning of tonometer tips with 70% alcohol should be considered. For disinfecting diagnostic devices such visual field analyzers manufacturers' guidelines should be followed[21]. Glaucoma filtration surgeries (trabeculectomy, glaucoma drainage valve implantation) and minimally invasive glaucoma surgeries (MIGS) have a low risk of transmission to the surgeon. Prep with povidone-iodine should be applied for all patients and cautery should be used minimally after performing prep with povidone-iodine and vigorous irrigation[23]. Because of unknown risk of generating aerosol during laser iridotomy, it is recommended to use a drop of 5% povidone-iodine after administration of topical anesthesia and before starting the laser procedure. In addition, topical povidone-iodine can be applied before starting or during the procedure in cyclophotoablation procedures[23].

Vitreoretinal procedures Although pars plana vitrectomy (PPV) theoretically can generate aerosols, closed surgical systems limit generated aerosols within the eye due to the use of valved trocar cannulas. Therefore, it seems that PPV has a low risk of infection transmission. So, standard surgical PPE is considered sufficient for safety for surgeons. The external cautery should be used minimally with vigorous irrigation[23]. Combined surgery consisting of phacoemulsification and PPV instead of sequential surgeries in different sessions is recommended to reduce the chance of exposure[28]. Additionally, using emerging digital visualization technologies such as three-dimensional (3D) heads-up display systems can have additional preventive advantage by increasing the distance between surgeon and the patient[28].

Using N-95 masks is recommended for surgeons performing intravitreal injections due to close contact during the injection. However, in general, intravitreal injection is considered a safe procedure with low risk of transmission by using povidone-iodine for surgical prep before starting the procedure[23]. It is recommended to perform bilateral injections at the same day if possible[11]. Administration of topical povidone-iodine before the procedure is recommended for performing panretinal photocoagulation (PRP) with argon laser. In case of a long time procedure, administration of additional doses of povidone-iodine may be considered[23].

Oculofacial plastic procedures All procedures in this field including nasolacrimal duct surgeries (probing of nasolacrimal duct, dacryocystorhinostomy, canalicular laceration repair), eyelid and facial tissue repair, orbital tumors and orbital wall fracture surgeries are considered high-risk for generating aerosols and transmission of infection unless documented negative reverse transcription-polymerase chain reaction (RT-PCR) test results for patients is present. Hence, it is advised to use N-95 masks and face shields by surgeons and all operating room staff of during these procedures[23].

Some propose that all cases needing general anesthesia are considered high risk[29]. But the procedures might be divided into two groups: the procedures which do not need cautery, powered surgical instrument, laser and bone manipulation, and the procedures which do. The first group procedures without nasolacrimal system involvement such as chalazion excision or simple eyelid biopsies are considered low risk. The procedures in the first group with nasolacrimal system involvement such as lacrimal irrigation, lacrimal stent removal and lacrimal sac abscess excision, or the second group's procedures without nasolacrimal system involvement such as most eyelid procedures and anterior orbital surgeries are considered moderate risk. Finally, the second group procedures with nasolacrimal system involvement including dacryocystorhinostomy, exenteration and sino-orbital procedures are considered high risk. In low-risk procedures, surgical mask, face shield and/or goggles are strongly advised. In moderate risk procedures, surgical mask should be worn, N-95 mask is optional and face shield and/or goggles are mandatory. In high risk surgeries, surgical mask, face shield and/or goggles are mandatory. N-95 masks are also recommended in high risk patients.

Strabismus surgeries Strabismus surgery is considered as a procedure which can generate aerosol because of frequent using of cautery. The use of povidone-iodine for surgical prep and topical povidone-iodine before performing the cautery are advisable preventive interventions[23].

CONCLUSION

In conclusion, COVID-19 pandemic has modified ophthalmic practice profoundly in all fields of ophthalmology. Different guidelines and recommendations have been designed for adaptation with this new era to make a reasonable balance between providing essential eye health care and the safety of patients and ophthalmologists.

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