ABSTRACT
The outbreak of the novel coronavirus (COVID-19) has been declared a global pandemic. With a mortality rate reaching up to 5%, healthcare professionals treating patients with COVID-19 are at a significantly higher risk for exposure themselves. Given the rapidly progressing rate of COVID-19, there is an urgent need for developing guidelines within each specialty. This article discusses guidelines specifically for anesthesiologists dealing with ophthalmic surgeries with suspected or confirmed COVID-19 patients. Anesthesiologists always work in the proximity of the patient’s face while performing either ocular regional anesthesia or while managing the airway in the process of intubation/extubation. Within these guidelines, the emphasis is provided on thorough preoperative screening to identify COVID-19 patients and to prevent the exposure of healthcare staff by following standard personal protective equipment (PPE) precautions.

Key words: Anesthesia, COVID-19; ophthalmic anesthesia

Ophthalmology has had a particular role in coronavirus disease (COVID-19) pandemic. The 34-year-old Wuhan ophthalmologist Li Wenliang, MD, has been hailed in China as a hero for trying to alert authorities to the new virus and its dangers. He was accused by the local Public Security Bureau for “making false comments” that had “severely disturbed the social order” and told to stop. However, Dr. Li subsequently died of the disease. Due to the increasing need to develop guidelines on perioperative care of surgical patients during the COVID-19 outbreak, the Saudi Anesthesia Society (SAS) has thus far developed interim guidelines for airway management for suspected/confirmed COVID-19 patient.[1] There are currently no relevant publications on perioperative care of ophthalmic surgery in COVID-19 patients. Although the guidelines published by the ASA,[2] Anesthesia Patient Safety Foundation (APSF),[3] and World Federation Society of Anesthesiologists (WFSA)[4] are very useful and up to date, they are significantly lacking in instructional guidance tailored to medical professionals. Reports from China have indicated that three ophthalmologists have died from COVID-19, adding to the hundreds of medical professionals who have died from the disease, including a vice president

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of the hospital, a gastroenterology department chair, a pulmonary department chair, and many more. COVID-19 is a very contagious virus. Currently, it is unknown what number of COVID-19 carriers are among the normal population due to insufficient resources for testing. Therefore, given the current circumstances, it is integral for the ophthalmic research community to come together to address how to best protect ourselves when treating potential COVID-19 patients and minimize any potential risk of exposure.\[5\]

Objectives

The purpose of this article is to outline recommendations for the perioperative management of patients with suspected or confirmed COVID-19 who need to undergo ophthalmic surgery and anesthesia. The task force members have developed an advisory statement outlining the general regulations, organization, and preparation required when providing perioperative care to patients while minimizing the risk of exposure to medical professionals involved in the treatment.

General recommendation: available on the airway management, SAS guidelines[1]

Specific recommendations for the ophthalmic surgical patient

1. Preoperative screening service:

A report developed by the American Academy of Ophthalmology on March 9th, 2020 outlining guidelines treating patients with COVID-19 suggests that the virus can cause conjunctivitis and may be transmitted by aerosol contact with the conjunctiva. Recent reports suggest that conjunctivitis, which is rare, may be an initial presenting symptom of COVID-19, occurring even before the more commonly reported symptoms of fever and cough[6]

As affected patients may initially be referred to eye clinics or emergency departments, ophthalmologists could likely be the first medical professionals to evaluate these potentially infected and contagious patients. Patients with eye conditions requiring surgical procedures may also be carriers of COVID-19 and could be presented to operating rooms where the risk of exposure to surgical staff is high. Preoperative screening thus plays a very important role in the prevention of infection. Using the “Preoperative Evaluation Service” (PES) to screen all of the patients undergoing elective eye surgery is important regarding the COVID-19 outbreak. During the preoperative screening, it is highly recommended that personal protective equipment be used. Protective equipment, in this case, includes disposable medical gowns, gloves, eye protection shields, disposable surgical caps, surgical masks, or test-fit N95 masks. When entering clinics, the patient temperature is screened to identify any individual with higher than normal body temperature because fever is a commonly reported symptom of COVID-19. An individual with normal body temperature should be required to enter the clinic only at a time. Patients with higher than normal body temperature should be sent to other clinics for further screening. A detailed medical history should be obtained from all patients about the presence of fever, cough, and poor effort tolerance. Inquiries should also be made about symptoms such as generalized tiredness, body aches, runny nose, and sore throat. All patients should be asked if they have recently traveled internationally. It is possible that some patients may present with atypical symptoms and may be incorrectly excluded as carriers of COVID-19. In addition to asking about common symptoms of COVID-19 and travel history, it is important to perform a detailed physical examination of the patient with an emphasis on evaluating the pulmonary system. It is crucial for anesthesiologists involved in patient care to maintain appropriate hand hygiene after contact with each patient by using a hydrogen peroxide solution, antiseptic gel, or by washing hands thoroughly with soap and water. All relevant patient information must be recorded in the electronic medical record system before the day of surgery. It is recommended that two full-time nurses and a nurse practitioner review the patients’ medical history and call each patient to complete the pre-op evaluation process. If a patient needs more information or further workup, they will work with the surgeon’s clerk and follow the steps until all the required information is collected and reviewed. Therefore, all patients arriving on the morning of their surgery should have been evaluated concerning COVID-19 before their surgery. Given the current coronavirus pandemic, the hospital must conduct a secondary assessment by phone call and add more questions to the pre-op screening to further identify those patients with symptoms and prevent them from arriving at the hospital and infecting others. In summary, it is of utmost importance to ask the patients about developing any new fever or cough. Paying attention to the emergency warning signs of COVID-19 (e.g., trouble breathing, persistent pain or pressure in the chest, confusion or inability to arouse, drowsiness, etc.) is very important as they may require immediate medical attention.

2. Operative guidelines

Specific to ophthalmology, we now recognize that conjunctivitis may be a presenting symptom and that
slit-lamp exams (due to facial proximities) create a notable opportunity for transmission. In 2003, after the outbreak of SARS, research on the coronavirus ocular examination of SARS patients demonstrated that the virus can affect the eye and is detected in the tears. Several reports also suggest that the virus can cause mild follicular conjunctivitis which is indistinguishable from other viral causes, and may be transmitted by direct aerosol contact with the conjunctiva. Most of the patients are elderly, having multiple comorbidities with a compromised immune system, which makes them prone not only to contract the infection but also to show the clinical symptoms and complications caused by COVID-19. Many healthcare workers including ophthalmologists and anesthesiologists may be exposed and potentially infected from COVID-19 as they work close to such patients’ faces and eyes.

If the presence of COVID-19 is suspected or confirmed, nonemergency surgical procedures should be canceled or postponed. Preoperatively, patients should not be brought to holding areas of the surgical suite and should instead be taken to a designated negative pressure/airborne isolation operating room. All patients must be wearing a face mask during transport to the operating room. Immediately after the surgical procedure, patients should be recovered inside the operating room and taken directly to the isolation area.

3. Operation room (OR) setting for susceptible/infected cases

If a patient with suspected or confirmed COVID-19 is held in a room, it is recommended that a sign is placed outside the door labeled “Infectious Patient.” Having the sign will allow only direct patient care staff in the dedicated room. Within the dedicated negative pressure operating room, 12 air changes per hour are preferred including laminar flow and a functional high-efficiency filter. To protect from the aerosol-generating infection, the dedicated anesthesia machine, trolley, and medication cart including all wires and tubing/circuits should be covered with clear disposable plastic. It is recommended to install additional breathing circuit HEPA (high-efficiency particulate air) filters on each limb at the junction of the circuit and the anesthesia machine besides using routinely at the proximal end of the endotracheal tube and the distal end of the circuit. For longer procedures such as retina surgery, the filter should be replaced every 3 h. Ophthalmology equipment like the Goldmann applanation tonometer and other devices in the OR that may come in direct contact with the patient’s eyes may contribute to the possibility of transmission of infection. Thorough disinfection of eye equipment must be performed immediately after each use to prevent transmission to healthcare workers and other patients. The virus that causes COVID-19 is very likely susceptible to the same alcohol- and bleach-based disinfectants that ophthalmologists typically use to disinfect ophthalmic instruments. A standard personal protective equipment (PPE) plan must be in action while dealing with any suspected/infected COVID-19 patients. All anesthesiologists working in a dedicated room must protect their mouth, nose, and eyes by following PPE standards. It is recommended that a waterproof disposable protective covering gown be worn on top of the hospital scrubs. Using a fit-tested N95 mask with a disposable surgical cap, latex gloves, goggles/face shield, and boot covers is also recommended.

4. Premedication: Prescribing standard premedication varies overall preoperative assessment and ASA grading. Known COVID-19 patients are possibly getting medications such as antiviral, chloroquine, or azithromycin, etc. When prescribing premedication, it is important to keep in mind the possibility of drug interactions and the risk vs. benefits for its use.

5. Ocular regional anesthesia: Anesthesiologists may need to perform ophthalmic regional blocks for surgical procedures in an awake COVID-19 patient. Any unexpected coughing, sneezing or close verbal communication may cause the distribution of virus-containing droplets onto or near the anesthesiologist face leading to contagious infection. Anesthesiologists and ophthalmologists may also get the infection as they come in direct contact with the patient’s tears while giving local anesthetic block or surgery, respectively. To prevent the spread of droplets, patients with suspected/confirmed COVID-19 must wear a regular face mask over nasal prong used for oxygen delivery, with adhesive tape across the upper edge of the mask to prevent the exhalation of aerosols to the surgical field. The patient then can have usual surgical drape with an adhesive sealing tape around the space left for the operated eye exposure for surgery. In the operating room, unexpected patient coughing or verbal communication and contaminated surgical drapes may harbor droplets over anesthesia work-related surfaces thus serving as reservoirs for the virus for anesthesia personnel if proper droplet precautions or proper decontamination processes are not followed. It is recommended that intravenous conscious sedation will keep the patient calm to facilitate the procedure faster. However, deep sedation should be avoided due to the suspected underlying pulmonary pathology caused by COVID-19.
6. **General anesthesia:** General anesthesia carrying a high risk of airborne or droplet infections to the medical staff in suspected/confirmed COVID-19 patients. Therefore, adherence to PPE of the medical staff should be maintained. Anesthesia for ophthalmic surgery demands sharing of the airway with the surgeon, therefore, most of the ophthalmic patients require endotracheal intubation. Intubation and extubation periods represent the highest risk of exposure with direct contact of respiratory secretions and droplets during airway management.

A significant number of the pediatric population is often presented in the operating room for examination under general anesthesia and Botox injections to treat strabismus. It is recommended to avoid using laryngeal mask airway (LMA) and face masks which are commonly used for short duration ophthalmic procedures. As such, endotracheal intubation is the favored method in such a situation. It is also recommended that rapid sequence induction (RSI) be used and appropriate preparation for RSI should be similar to that of an ordinary patient.

Preoxygenation may be done by covering the patient’s nose and mouth with two layers of wet gauze to block some of the patient’s secretions or by covering the face mask under a clear plastic covering. Caution should be taken to ensure that this process does not obstruct the patient’s airway. Direct laryngoscopy for intubation should be avoided if possible. Using a video laryngoscope is preferred for intubation because it may significantly increase the distance between the patient’s airway and that of the anesthesiologist who performs the intubation. During the entirety of the induction and intubation process, extra attention is needed to reduce patients’ coughing and/or bucking. During induction and emergence from anesthesia, using a closed airway suction system to reduce viral aerosol production is recommended. All suspected or confirmed COVID-19 patients should be recovered inside the OR before being transferred directly back to the isolation ward.\(^{[8]}\)

**Summary**

COVID-19 pandemic has grasped the whole world. The clinical presentation is variable. The elderly population has been hit hard due to their lower level of immunity. They have the highest mortality with COVID-19. Eye hospitals, therefore, must be fully equipped with all preventive strategies of cross-infection. Adherence to PPE must be maintained by those who are involved in direct patient care. Frequent hand washing, droplet and contact precautions, and eye protection should be carried out from admission until the discharge of the patient. Ophthalmologists and anesthesiologists must strictly follow their local infection prevention guidelines developed by local authorities. Prior risk assessment is important to prevent cross-infection before any procedure. An infection control awareness program must be provided to the medical staff.

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