

A Surgical Protocol to Mitigate the SARS-CoV-2 Transmission Using Multifocal Povidone-Iodine Applications in Lacrimal Surgeries During Coronavirus Disease 2019 (COVID-19) Pandemic

To the Editor:

The coronavirus disease 2019 (COVID-19) pandemic is a zoonoses caused by the SARS-CoV-2 virus and is highly infectious. Presence of the virus in the shedding from the nasopharynx and oropharynx is very high,¹ and there is conflicting evidence of its presence on the ocular surface and in tears.^{2,3} The lacrimal surgery usually involves the surgeon coming in contact with the ocular surface, tears, and nasal tissues. Hence, the virus transmission risk for a lacrimal surgeon is very high among the ophthalmologists.⁴

Povidone-iodine (PVP-I) has been used in varying concentrations for surgical preparation of the skin and mucous membranes for decades. Its safety has been well established even in ophthalmology for infection prophylaxis, where it is used as eyedrops in a concentration of 1% to 5%.^{5,6} PVP-I is also available as 1% gargles and 0.45% throat spray. PVP-I has a broad spectrum of antibacterial and antiviral effects.⁷ It has been found to be very effective against coronaviruses.^{8,9} In vitro studies using 0.23% PVP-I has shown to inactivate SARS-CoV and MERS-CoV within 15 seconds of exposure.⁸ In another experiment, with 1% PVP-I, the SARS-CoV viral counts reduced from 1.17×10^6 TCID₅₀/ml to undetectable levels within 2 minutes of exposure.⁹ Clinically, the use of PVP-I has demonstrated efficacy in managing common upper respiratory tract infections like the common cold and influenza.¹⁰ This has led to growing evidence proposing the use of PVP-I on the sino-nasal and oral mucosa to disrupt the SARS-CoV-2 transmission.¹¹⁻¹³

The question to be answered is why am I proposing a specific protocol of PVP-I use in lacrimal surgeries during the COVID-19 pandemic. The lack of an absolute testing strategy, lack of vaccine, the need for operating emergency lacrimal cases during the COVID-19 pandemic combined with the high anti-coronavirus activity, low resistance, and excellent safety profile makes PVP-I a good agent for preoperative use in lacrimal surgeries. The protocol proposed in this paper has the potential to eliminate the viruses in the operating field and also reduce the viral load in aerosols and hence mitigate the SARS-CoV-2 transmission during lacrimal procedures.

Three major factors need to be considered while formulating the PVP-I lacrimal surgery protocol; the anatomical locations for PVP-I application, the concentration to be used, and safety issues. Since lacrimal surgeon is exposed to the ocular surface, tears, the lacrimal drainage system, and the nasal tissues, PVP-I should be applied to all these areas in concentrations that have been proved safe in respective anatomical regions. It would be good to err on the side of safety while using effective concentrations. In vitro studies have shown that 5% to 10% PVP-I can be ciliotoxic to the respiratory epithelium and 10% can cause iodine toxicity.¹⁴ Allergic reactions are very rare.¹⁵ The viral loads on the ocular surface can be effectively managed by 1% PVP-I eye drops,^{5,6} 0.4% reconstituted solution for nasal and lacrimal drainage tissues,¹¹ and 1% PVP-I gargles for oral mucosa.¹³ The detailed protocol and its sequence is depicted in the Table. Lacrimal and nasal irrigation should be

The proposed preoperative PVP-I protocol for lacrimal surgeries during COVID-19 pandemic

- Step 1: The patient is shifted to a dedicated preoperative area.
- Step 2: The patient gargles using commercially available PVP-I 1% mouthwash.
- Step 3: The physician freshly prepares 0.4% PVP-I reconstituted solution. (Take 10 ml of 10% commercially available PVP-I solution, dilute it with 240 ml of normal saline, and fill it up in 1- and 2-ml syringes.)
- Step 4: The patient is shifted into the lacrimal OR, and LA/GA is induced.
- Step 5: The physician dons the personal protective equipment and takes COVID-19 surgical precautions.
- Step 6: The nasal cavity is anesthetized and decongested with drug-soaked pledgets.
- Step 7: One drop of 1% PVP-I is placed in the conjunctival cul-de-sac, and a contact time of at least 3 minutes is allowed.
- Step 8: A 25- or 27-gauge straight lacrimal cannula is mounted on the 1-ml syringe filled with reconstituted 0.4% PVP-I. The lacrimal drainage system is gently irrigated with up to 0.3–0.5 ml. Most obstructed lacrimal systems would show some degree of regurgitation by this volume. Make sure that the flow is very slow and controlled to avoid any kind of regurgitation splashes.
- Step 9: The PVP-I on the ocular surface is gently wiped out.
- Step 10: A 23-gauge straight lacrimal cannula is mounted on the 2-ml syringe filled with reconstituted 0.4% PVP-I. The cannula is gently inserted into the anterior-most part of the nasal cavity just beyond the external nares. The tip of the cannula should be visible to the physician. Taking the cannula deep or touching the nasal tissue is avoided as it may induce sneeze reflex for patients under local anesthesia. PVP-I is placed drop by drop into the nasal cavity for up to 0.5–1 ml. If the patient is under GA, this can be performed under endoscopy guidance as well, and a throat gauze around the endotracheal tube can be used to absorb the excess fluid.
- Step 11: Following this, a 5-cm cellulose pledget or a neurosurgical patty is generously soaked with the reconstituted PVP-I and gently placed in the nasal cavity for 5 minutes.
- Step 12: Proceed with the planned lacrimal surgery.

COVID-19, coronavirus disease 2019; GA, general anesthesia; LA, local anesthesia; OR, operating room; PVP-I, povidone-iodine.

controlled and slow, and sprays should be avoided to minimize aerosol generation (Table).

It should be noted that the use of personal protection equipment during this protocol is necessary. However, since this would be the first step of the surgery, an additional personal protective equipment is not required. Other than the personal protective equipment, all recommended protocols from respective society guidelines for lacrimal surgery during COVID-19 pandemic needs to be followed. In conclusion, PVP-I can be one of the effective mitigation strategies to prevent SARS-CoV-2 transmission during lacrimal surgeries.

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Supported by Hyderabad Eye Research Foundation.

The author has no financial or conflicts of interest to disclose.

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