

## Commentary: Potential transmissibility of SARS-CoV-2 infection via donor corneal tissue

The coronavirus disease 2019 (COVID-19) pandemic caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has had far-reaching impacts on various aspects of health care, including eye banking and corneal transplantation.

At the peak of the pandemic, the majority of the affected nations delayed elective surgical procedures, and a temporary suspension of donor cornea retrieval and corneal transplantation surgeries was advised. As our understanding of the disease continues to evolve, there has been a simultaneous restructuring of our health care services and modification of the existing treatment guidelines. Donor cornea retrieval and corneal transplant surgeries have gradually resumed in a majority of centers; however, there is a lack of consensus regarding the guidelines for donor retrieval and testing. The pertinent questions surrounding the restoration of eye-banking services include addressing the potential for donor-tissue-related transmission of COVID-19, revision of the donor eligibility criteria as well as the utility and feasibility of routine COVID-19 testing of the donor as well as the recipient.

### Transmission of COVID-19

The main mode of transmission of the virus is via respiratory droplets. The ACE-2 (angiotensin-converting enzyme 2) receptors that have been identified as the entry receptors for SARS-CoV-2 have been documented on the conjunctival cell membranes in addition to the mucosa of the respiratory tract. In addition, the mucosa of the conjunctiva and upper respiratory tract is connected by the nasolacrimal duct, making it likely for the ocular surface to be involved in the transmission of SARS-CoV-2 infection.<sup>[1,2]</sup> The conjunctiva may harbor the SARS-CoV-2 and play a direct or indirect role in the transmission of the virus. The conjunctival mucosa is directly exposed to the infectious droplets expelled by the patients during close contact and fomites when the eye is touched with contaminated hands.<sup>[3]</sup>

Various studies have highlighted the potential of ocular surface, conjunctiva, and tear film as a reservoir of SARS-CoV-2 infection.<sup>[3-5]</sup> SARS-CoV-2 RNA (ribonucleic acid) fragments have been detected using RT-PCR (reverse transcription polymerase chain reaction) in patients with conjunctivitis.<sup>[3]</sup> An experimental study inoculated the conjunctiva of rhesus macaques with SARS-CoV-2 and observed the development of mild interstitial pneumonia in the animals.<sup>[4]</sup> In addition, the viral load was detectable in the conjunctival swabs at 1 day postinoculation. Xia *et al.*<sup>[5]</sup> detected SARS-CoV-2 in the tears and conjunctival secretions in COVID-19-positive patients with pneumonia and conjunctivitis.

### Guidelines for donor tissue retrieval

Various international and national eye bank associations recommend not retrieving donor corneal tissues from cases with confirmed or suspected coronavirus infection or in cases in contact with a confirmed or suspected case of coronavirus infection.<sup>[6]</sup> Approximately 80% of patients infected with SARS-CoV-2 are asymptomatic.<sup>[7]</sup> Screening criteria based on

classical signs and symptoms of COVID-19 or contact history may not be sufficient to exclude all cases with COVID-19 infection while harvesting donor corneas.

### Donor testing for SARS-CoV-2

This brings us to the question of mandating preretrieval COVID-19 serology of the deceased. We, at the National Eye Bank, RP Centre, AIIMS, New Delhi, have mandated preretrieval COVID-19 RT-PCR testing of the deceased donor during donor tissue retrieval. The donor cornea is then quarantined for 48 hours, during which time the RT-PCR report is available. We collected 86 pairs of donor corneas over 4 months after the restoration of the eye-banking services. We adhered to the guidelines of excluding the cases with confirmed or suspected COVID-19 as well as high-risk contacts. Despite the stringent inclusion criteria, five deceased donors were COVID-19 positive, and a decision was taken not to utilize the corneal tissue for transplant purposes. In addition, one of these COVID-19-positive donors had previously recovered from the disease, with a documented negative COVID-19 RT-PCR 2 months prior to death. Our initial experience points toward the inadequacy of relying on symptoms and history alone and validates the need for preretrieval testing. With recurrent waves of surging COVID-19 infections, an increasing proportion of the population will be affected with a simultaneous increase in asymptomatic infections as well. In addition, reinfections in patients previously recovered from COVID-19 cannot be ruled out.

In this issue, Salz *et al.*<sup>[8]</sup> have examined the current evidence regarding donor cornea-related transmission of COVID-19 infection. They observed an extremely low likelihood for transmission of SARS-CoV-2 through corneal tissue, although the possibility may not be completely eliminated in view of contradictory studies.

At present, there are no consistent guidelines recommending routine testing of deceased donors and donor corneal tissue for organ transplantation.<sup>[6]</sup> There is also the added concern of burdening health care resources. In our experience, COVID-19 RT-PCR of the deceased donor should be mandatory in view of contradictory evidence. The limited number of COVID-19 tests required is unlikely to significantly add to the cost of eye banking or burden the infrastructure. Health care personnel should maintain universal precautions while retrieving donor tissues, and personal protective equipment including N-95 masks with face shields should be the minimum standard of care while retrieval. Simple measures such as double disinfection of donor ocular surface with povidone-iodine prior to retrieval along with polyvinylpyrrolidone solution just before storage may be useful in mitigating the potential transmission of SARS-CoV-2.<sup>[6]</sup>

To paraphrase John F. Kennedy, "There are risks and costs to action, but they are far less than the long-range risks of comfortable inaction." At present, there is no conclusive evidence to support donor tissue transmission of COVID-19; however, there is no definitive evidence to the contrary as well. As long as the potential likelihood of donor tissue transmission cannot be ruled out, preretrieval donor testing should be mandatory. Also, the eye-banking guidelines need to be periodically reassessed and revised as our learning regarding this novel disease evolves.

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