

## Nosocomial COVID-19 transmission in routine ophthalmic practice—Is there new evidence?

*“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.” - Marie Curie*

The incidence of COVID-19 infection in India is steadily on the rise. As of September 23, 2020, 66.28 million reverse transcription polymerase chain reaction (RT-PCR) tests have been conducted in India and 5.65 million people have been tested positive.<sup>[1]</sup> It is estimated that about 23% of the population is seropositive in Delhi and 33% in Mumbai, having been asymptotically infected.<sup>[2]</sup> Logically, the disease is here to stay for a yet uncertain duration, with predicted second and third waves in the offing.

### Are Medical Professionals at a Higher Risk?

Worldwide, health care workers and their families are exposed to unprecedented levels of risk of COVID-19 infection. The risk is estimated to be at least 3 times higher than for the general population.<sup>[3]</sup> In India, while the test positivity rate in the general population is about 8%, some states show a skewed high incidence among healthcare workers - 18% in Telangana, 16% in Maharashtra, 14% in Delhi and 13% in Karnataka, 12% in Puducherry, and 11% in Punjab.<sup>[4]</sup> While health care workers constitute 2-3% of the population, about 14% of COVID-19 cases reported to WHO are among health care workers. In some countries, the proportion can be as high as 35%.<sup>[5]</sup> Amnesty International estimates that over 7000 healthcare workers have succumbed to nosocomial COVID-19 infections, of whom 573 are from India.<sup>[6]</sup>

### Would Face-to-Face Contact Increase the Risk of COVID-19 Infection for Ophthalmologists?

With the phased opening up of the lockdown, most of the ophthalmologists have embraced the new normal and have returned to their practice, although to a relatively lower patient volume. Airborne respiratory droplet remains the predominant mode of disease transmission. High viral load in the nasal cavity and throat of asymptomatic and symptomatic COVID-19 patients<sup>[7]</sup> justifies the assumption that there is a significant potential for virus transmission during routine face-to-face encounters in ophthalmology, such as slit-lamp examination and other ophthalmic diagnostic tests. It is thus important to use barriers such as a breath guard, face shield, masks, and eye protection during the examination, and keep the contact time minimal. The All India Ophthalmological Society has strongly recommended entry point triaging and universal precautions as a prerequisite to the resumption of ophthalmic practice.<sup>[8,9]</sup> However, screening at entry may have suboptimal yield, with about 70% COVID-19 patients being asymptomatic in India. The Centers for Disease Control and Prevention estimates that the relative frequency of asymptomatic patients being infectious is 75%.<sup>[10]</sup> These data imply that unless meticulous universal precautions are practiced in the outpatient clinics and at surgery, ophthalmologists and their health care team stand a risk of COVID-19 infection.

### Do Tears Transmit the Virus?

Ophthalmic evaluation and surgery also involve direct contact with the patient's tears. Transmission through the tears is

a much-feared potential risk. Several recent studies have objectively examined the presence of the detectable virus in the tear film. Initial reports had absolved the tears of its infective potential. Seah *et al.* were unable to detect the virus in the tears of 17 patients with COVID-19 in Singapore.<sup>[11]</sup> In a retrospective study from Hubei, China, tears tested positive in 2 of 38 (5%) patients with COVID-19, and both had a critical illness.<sup>[12]</sup> Tears tested positive in only 3 of 121 (2%) patients from Wuhan, China.<sup>[13]</sup> In a recent study from Bangalore, India, only one out of 45 COVID-19 positive patients had detectable RNA in the tears by RT-PCR.<sup>[14]</sup> The low detection rate in these studies may be attributed to small samples and testing late in the course of the disease. Arora *et al.*, in an impressive recent study from Delhi, India, sampled the tears between days 4 and 9 after the onset of symptoms and within 48 h after the positive nasopharyngeal RT-PCR test in moderate to severe COVID-19 patients using a cotton swab and Schirmer strips.<sup>[15]</sup> RT-PCR was positive in tear samples of 18 of 75 (24%) patients. However, the cycle threshold (Ct) values were  $\leq 24$  in only 2 patients, thus indicating a relatively lower viral load in most patients with positive tear RT-PCR, and thus lower potential to transmit the infection.<sup>[15]</sup> The major drawback of RT-PCR is its inability to demonstrate infectivity. The true potential for viral transmission can be gauged only by *in vitro* studies on cell lines. It has been shown that infectivity significantly reduced with Ct > 24 and the risk for infectivity decreased by 32% for every unit increase in Ct.<sup>[16]</sup>

In this issue of the Indian Journal of Ophthalmology, Goel *et al.* report two COVID-19 patients with conjunctivitis.<sup>[17]</sup> One of them had a tear RT-PCR positive test, which correlated with a low Ct value of the nasopharyngeal swab. The one who tested negative in the tears had a high Ct value for the nasopharyngeal swab. It is thus tempting to conclude that only those patients with higher viral load and lower Ct value on nasopharyngeal RT-PCR manifest virus shedding in the tears. Ophthalmologists traditionally not being frontline health care workers, direct exposure to moderate to severe COVID-19 patients is unlikely. In all, although the tears carry the virus in a significant proportion of moderate to severe COVID-19 patients, it is unlikely to result in person-to-person COVID-19 transmission. At least to date, there is no evidence of direct disease transmission by tears as such.

### Should We Perform Universal Preoperative COVID-19 Screening?

Universal preoperative COVID-19 screening of asymptomatic patients is a recommended safe strategy. The rate of test positivity, however, widely varies from 0.4% in Seattle, USA to 7.6% in Sao Paulo, Brazil to 13.7% in New York, USA.<sup>[18-20]</sup> This can probably be attributed to the demographics and seroprevalence in the general population. The recent CovidSurg data showed that postoperative mortality among COVID-19-positive patients was 19.1% following elective surgeries.<sup>[21]</sup> Identification of seropositive patients and deferring their surgery would not only minimize the risk of disease transmission to health care workers and other patients but also would minimize the risk of mortality for the infected patients themselves. Thus, universal preoperative screening is strongly recommended.

### Do Common Ophthalmic Surgeries Generate Aerosol?

There has been much discussion about the possibility of common ophthalmic surgeries generating virus-loaded bioaerosols, although there was no direct evidence to

support the hypothesis. An elegant experimental study on goat eyes published in this issue of the Indian Journal of Ophthalmology shows that fluid droplet generation does happen during phacoemulsification.<sup>[22]</sup> Smaller incision and continuous ultrasound were more prone to droplet generation. In phacotome lensectomy, fluid droplet spray was seen only when ultrasound was delivered with the phacotome tip close to the sclerotomy. Pars plana vitrectomy did not induce fluid droplet spray. The authors recommend using hydroxypropyl methylcellulose over the incision, a 2.8 mm incision with the phaco tip centered within the incision, and avoiding sleeve compression to minimize the risk.

## So, What Changes for Now?

Based on the evidence available currently, prolonged direct close face-to-face contact with an asymptomatic or a symptomatic COVID-19 patient seems to be the most predominant mode of nosocomial transmission to an ophthalmologist. Tears do carry the virus, more so in moderate to severe COVID-19 patients, although with a high Ct value, and there is no evidence yet of direct disease transmission through the tears. Uncompromised safety measures such as entry point triage, physical distancing, and appropriate personal protective equipment including barriers such as N95 masks, face shield, slit-lamp breath shield cannot be overemphasized. Daycare surgery, minimal use of general anesthesia, measures to minimize aerosol generation during phacoemulsification, and deferral of endonasal and lacrimal surgery are logical and must be followed.<sup>[8,9]</sup> With the increasing incidence of the disease in the community and most patients being asymptomatic, routine RT-PCR-based preoperative screening for COVID-19 is now recommended. This, coupled with universal precautions, may help keep ourselves and our health care workers safe during these troubled times.

*"In the face of adversity, we have a choice. We can be bitter, or we can be better. Those words are my North Star."* —Caryn Sullivan

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## References

- Available from: <https://www.mygov.in/covid-19>. [Last accessed on 2020 Sep 23].
- Available from: <https://frontline.thehindu.com/the-nation/far-from-herdimmunity/article32303481.ece>. [Last accessed on 2020 Sep 23].
- Nguyen LH, Drew DA, Graham MS, Joshi AD, Guo C-G, Ma W, *et al*. Risk of COVID-19 among front-line health-care workers and the general community: A prospective cohort study. *Lancet Public Health*. Published online July 31, 2020. doi: 10.1016/2468-2667(20)30179-1.
- Available from: <https://scroll.in/latest/972196>. [Last accessed on 2020 Sep 23].
- Available from: <https://www.who.int/news-room/detail/17-09-2020-keep-health-workers-safe-to-keep-patients-safe-who>. [Last accessed on 2020 Sep 23].
- Available from: <https://www.amnesty.org/en/latest/news/2020/09/amnesty-analysis-7000-health-workers-have-died-from-covid19>. [Last accessed on 2020 Sep 23].
- Zou L, Ruan F, Huang M. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *N Engl J Med* 2020;382:1177-9.
- Honavar SG. Prepare or perish - Readiness is the key to reopen for routine eye care. *Indian J Ophthalmol* 2020;68:677-8.
- Sengupta S, Honavar SG, Sachdev MS, Sharma N, Kumar A, Ram J, *et al*. All India Ophthalmological Society-Indian Journal of Ophthalmology consensus statement on preferred practices during the COVID-19 pandemic. *Indian J Ophthalmol* 2020;68:711-24.
- Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/planning-scenarios.html>. [Last accessed on 2020 Sep 23].
- Seah IY, Anderson DE, Kang AEZ. Assessing viral shedding and infectivity of tears in coronavirus disease 2019 (COVID-19) patients. *Ophthalmology* 2020;127:977-9.
- 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;138:575-8.
- Zhou Y, Duan C, Zeng Y, Tong Y, Nie Y, Yang Y, *et al*. Ocular findings and proportion with conjunctival SARS-CoV-2 in COVID-19 patients. *Ophthalmology* 2020;127:982-3.
- Kumar K, Prakash AA, Gangasagara SB, Rathod SB, Ravi K, Rangaiah A, *et al*. Presence of viral RNA of SARS-CoV-2 in conjunctival swab specimens of COVID-19 patients. *Indian J Ophthalmol* 2020;68:1015-7.
- Arora R, Goel R, Kumar S, Chhabra M, Saxena S, Manchanda V, *et al*. Evaluation of SARS-CoV-2 in tears of moderate to severe COVID-19 patients. *Ophthalmology*. 2020 Aug 31;S0161-6420(20)30847-2. doi: 10.1016/j.ophtha.2020.08.029. Epub ahead of print.
- Bullard J, Dust K, Funk D, Strong JE, Alexander D, Garnett L, *et al*. Predicting infectious SARS-CoV-2 from diagnostic samples [published online ahead of print, 2020 May 22]. *Clin Infect Dis* 2020;ciaa638. doi: 10.1093/cid/ciaa638.
- Goel R, Arora R, Chhabra M, Kumar S. Viral shedding in tears of COVID-19 cases presenting as conjunctivitis. *Indian J Ophthalmol* 2020;68:2308.
- Ferenczi BA, Baliga C, Akl P, Bradywood A, Blackmore C, Glenn M, *et al*. Pre-procedural COVID-19 screening of asymptomatic patients: A model for protecting patients, community and staff during expansion of surgical care. *NEJM Catal* 2020. <https://catalyst.nejm.org/doi/full/10.1056/CAT>.
- Aguiar S, Baiocchi G, Duprat JP, Coimbra FJF, Makdissi FB, Vartanian JG, *et al*. Value of preoperative testing for SARS-CoV-2 for elective surgeries in a cancer center during the peak of pandemic in Brazil. *J Surg Oncol* 2020. doi: 10.1002/jso.26146.
- Sutton D, Fuchs K, D'Alton M, Goffman D. Universal screening for SARS-CoV-2 in women admitted for delivery. *N Engl J Med* 2020;382:2163-4.
- COVIDSurg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: An International Cohort Study. *Lancet* 2020. doi: 10.1016/S0140-6736(20)31182-X.
- Srivastava S, Kothari A, Vasavada V, Vasavada AR, Vasavada S, Vasavada V, *et al*. Decoding fluid droplet generation during phacoemulsification and pars plana procedures in the COVID-19 era — An experimental study. *Indian J Ophthalmol* 2020;68:2103-6.

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