Impact of nationwide COVID-19 lockdown on keratoplasty and eye banking in India: A survey of cornea surgeons and eye banks

Aravind Roy, Sunita Chaurasia¹, Merle Fernandes², Sujata Das³

Purpose: The aim of this study was to analyze the impact of COVID-19 lockdown on keratoplasty and Eye Banking in India. Methods: An e-mail survey was conducted among cornea surgeons and eye bankers of India. Participants were asked to report their practice patterns for the management of corneal perforation during lockdown, different preservative media used during and before lockdown, and waiting time and waiting time before COVID-19 lockdown. Results: Eight of 20 eye banks did not collect corneal tissue during April–June 2020; in contrast, 9 eye banks used to collect around 100 corneas per month during pre-COVID-19 time. Two-third of the surgeons (66.1%, n = 41/62) did not perform any corneal tissue transplant between April and June 2020. Cyanoacrylate tissue adhesive application was the most commonly, performed procedure (79%, n = 49/62) for tectonic purpose during this period. Glycerol was the most preferred alternative preservation method considered by both the groups. More than half of the surgeons (64.5%, n = 40/62) had an average waiting time of <1 week for scheduling patients for keratoplasty in pre-COVID-19 period. Conclusion: There is was a significant drop in both corneal tissue retrieval and utilization during during COVID-19 lockdown. There was a felt need for an alternate long term storage media.

Key words: COVID-19 lockdown, eye banking, keratoplasty, survey

Coronavirus disease 2019 (COVID-19) was declared as global pandemic on January 30, 2020 by the WHO. India’s initial response was with implementation of four continuous periods of lockdown that began on March 25, 2020 followed by a staggered exit plan from June 1, 2020. Healthcare was affected significantly due to the impact on patient movement, supply-chain disruption, and a complete cessation of all elective surgeries including corneal surgeries. The eye banking activities came to a grinding halt with almost no corneal tissue retrievals from hospitals and the community.

The nationwide lockdown was an extreme measure that was brought in to curb the spread of coronavirus in the community. The implication of this measure was to improve the safety of patients and healthcare staff, prevent inadvertent COVID-19 transmission due to medical intervention and provide time for a transitional recovery. The lockdown also led to unprecedented logistic challenges for eye banking. This involved ensuring the safety of eye bank personnel and patients, formulating safe recovery protocols for corneal tissue, processing and distribution was hampered due to disruption of the courier services. Therapeutic corneal transplantation continues to remain an important ocular emergency procedure. We attempted to collate responses from a nationwide survey among eye bankers and corneal surgeons on the challenges faced by them during the lockdown regarding retrieval and utilization of corneal tissues.

Methods
We conducted an e-mail survey amongst the corneal surgeons in India through the Cornea Society of India (CSI) and eye bankers (Eye Bank Managers/Medical Directors) from the Eye Banks registered with the Eye Bank Association of India (EBAI) to study the impact on corneal tissue retrieval and keratoplasty during the COVID-19 lockdown. Number of questions administered to each group with multiple choice answers.

Institutional Review Board approval was taken for the study. We administered an online survey by creating multiple choice questions on google survey, 10 questions were sent to cornea surgeons, and 9 questions to eye bankers [Supplementary Tables 1 and 2]. The closed survey was sent on the registered mailing lists of CSI (n = 650) and EBAI member eye banks with collection >500 per year (n = 48). Three reminders were sent by email at 1-week interval. After 3 weeks, the survey was closed. All participants were approached by email. They were explained about the context of the study. The participation was voluntary. Only one entry from each participant was allowed. There were no incentives provided for completing the survey. No personal data were collected. The data were kept confidential with one of the investigators (AR). There were no incomplete submissions. The cumulative data were analyzed using descriptive statistics.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKLHRPMedknow_reprints@wolterskluwer.com

Cite this article as: Roy A, Chaurasia S, Fernandes M, Das S. Impact of nationwide COVID-19 lockdown on keratoplasty and eye banking in India: A survey of cornea surgeons and eye banks. Indian J Ophthalmol 2021;69:706-8.
Results

The key responses from 62 (9.5%) cornea surgeons and 20 (41.6%) eye banks are summarized in Fig. 1 and 2. Eight of 20 eye banks did not collect corneal tissue during April–June 2020; in contrast, 9 eye banks used to collect around 100 corneas per month during pre-COVID-19 time. We analyzed our results into three key areas.

Corneal surgery for tectonic purposes

More than one-third of surgeons (38.7%, n = 34), who responded, were performing at least 5 or more therapeutic keratoplasties a month before COVID-19 Lockdown. In contrast, the survey showed that 2/3rd of surgeons (66.1%, n = 41) did not perform any corneal tissue transplant between April and June 2020. Cyanoacrylate tissue adhesive application was the most performed procedure for corneal perforations/thinning/corneal melt during this period (79%, n = 49). Alternative procedures for management of perforations were amniotic membrane graft, conjunctival flap or tenonplasty.

Donor cornea preservation method

Majority of surgeons (91.9%) and eye bankers (78.9%) felt the need for an alternative mode of corneal preservation facilitating a longer shelf life. Glycerol was the most preferred alternative preservation method considered by both the groups. Cryopreservation/lyophilization method was the second alternative for surgeons, while eye bankers preferred organ culture. Gamma irradiation was the least preferred method by both the groups. Usage of glycerol as preservative medium has increased significantly in the current situation (15.8% pre-COVID-19 vs 52.6% during COVID-19).

Waiting time for keratoplasty pre-COVID-19 lockdown period

Interestingly, more than half of the surgeons (64.5%) had an average waiting time of <1 week for scheduling patients for keratoplasty in pre-COVID-19 period. The remaining 33.9%
had waiting time between 7 and <90 days and 1.6% between 90 to 180 days. None of the surgeons or eye banks had a waiting time of more than 180 days.

Discussion
The COVID-19 pandemic-related lockdown led to cessation of elective surgeries in all specialities of medicine including in ophthalmology. Eye banking that is largely depended on HCRP (Hospital Cornea Retrieval Program) and is an integral part of eye care delivery was affected to protect the eye bank staff and the patient from inadvertent transmission of COVID-19. National protocols were formulated to address safe tissue retrieval of corneal tissues and performance of corneal transplantation. Transitioning to the new normal were thought of in order to address potential surgical backlogs. While each country had its own unique method of addressing this crisis, we collate experiences from corneal surgeons and eye bankers in India in order to seek experiences in handling corneal emergency surgeries and proposals for addressing tissue shortage.

We analyzed our experience in handling corneal emergencies in times of minimal supply of donor corneal tissues. We performed 31 transplants during the lockdown from March to May 2020 under the emergency and urgent category comprising primarily of therapeutic and tectonic PKP (Penetrating Keratoplasty). In comparison our group had performed 442 transplants including 94 therapeutic PKP in the same quarter of the previous year. Current survey among corneal surgeons, who responded, revealed 66.1% did not perform emergency transplant and 74.2% did not receive corneal tissues between April to June 2020.

Glycerol preservation of corneal tissues is a simple and easy to adopt technique for storing corneal tissue. It renders corneal tissues to be stored for indefinite period of time and are suited to developing nations where corneal transplants are performed primarily for therapeutic purposes, supply of corneal tissues are inadequate and post-transplant compliance is suboptimal. In a comparative analysis of therapeutic success using fresh corneas (81.6%) versus glycerol preserved corneas (91.2%) Gupta et al. have reported comparative success. In our experience of PKP performed during the COVID-19 lockdown, we utilized 12/31 glycerol preserved corneas and all the grafts were tectonically stable at a follow-up of 3 months. The survey clearly highlights a need for eye banks and surgeons to adopt alternate long-term preservation of cornea to ensure continued availability for emergency transplants. This is probably because, among the alternate long-term preservation methods, glycerol preservation is the least expensive and does not need specialized equipment for preparation. The outcomes of corneal transplants with glycerol preserved corneas will need further evaluation. Organ culture is commonly used as preservative media in Europe and Australia. Gamma irradiation and cryopreservation are not used routinely in India as well as other countries.

The global survey on keratoplasty and eye banking of 2012, highlighted India as an ‘almost sufficient’ country and studies have projected that in order to tackle corneal blindness of 1.2 million there is a need to harvest 200,000 corneas for performing 100,000 transplants annually at a modest utilization at a modest utilization rate of 50%. Current transplant numbers across the country fall four times short of this number. Lack of availability of cornea would translate to longer waiting times for surgery, but our survey in fact revealed interesting data on waiting time for corneal transplantation prior to the COVID-19 lockdown; 60% of eye bankers and 64.5% of corneal surgeons reported a waiting time of less than 1 week for tissue availability. This probably indicates a decreasing gap of demand versus supply of donor corneas and a reflection of an upward trend in eye banking in India over the last several years. Due to lack of recent statistics on burden of corneal blindness requiring keratoplasty and comprehensive data on corneal utilization and discard, it would be worthwhile to study current epidemiological trends in India.

Limitations of our survey were: while we had responses from corneal surgeons from most parts of India, not all of them could be reached. Hence, there is a likelihood of variability in individual practice patterns or preferences. The survey was sent on “Cornea-Net”, a mailing service of CSI, on which not all members or their email IDs may have been active.

Conclusion
Our survey summarizes the experience of cornea surgeons and eye bank managers with a good volume of transplants and corneal retrievals prior to COVID-19 and highlights the significant drop post-COVID 19 in both corneal tissue retrieval and utilization. As our understanding of COVID-19 improves so also will our efforts continue to define the new ‘normal’ in eye donation and corneal transplantation.

Financial support and sponsorship
Hyderabad Eye Research Foundation.

Conflicts of interest
There are no conflicts of interest.

References
1. Khanna RC, Cicinelli MV, Gilbert SS, Honavar SG, Murthy GSV. COVID-19 pandemic: Lessons learned and future directions. Indian J Ophthalmol 2020;68:703-10.
2. Chaurasia S, Sharma N, Das S. COVID-19 and eye banking. Indian J Ophthalmol 2020;68:1215-6.
3. Basin M, Yu AC, Ponzin D. Coping with COVID-19: An Italian perspective on corneal surgery and eye banking in the time of a pandemic and beyond. Ophthalmology 2020;127:e68-9.
4. Roy A, Das S, Chaurasia S, Fernandes M, Murthy S. Corneal transplantation and eye banking practices during COVID lockdown period in India from a network of tertiary eye care centers. Indian J Ophthalmol 2020;68:2368-71.
5. Chaurasia S, Das S, Roy A. A review of long-term corneal preservation techniques: Relevance and renewed interests in the COVID-19 era. Indian J Ophthalmol 2020;68:1357-63.
6. Feilmeier MR, Tabin GC, Williams L, Oliva M. The use of glycerol-preserved corneas in the developing world. Middle East Afr J Ophthalmol 2010;17:38-43.
7. Gupta N, Dhasmana R, Mahtreya A, Badahur H. Glycerol-preserved corneal tissue in emergency corneal transplantation: An alternative for fresh corneal tissue in COVID-19 crisis. Indian J Ophthalmol 2020;68:1412-6.
8. Gain P, Jullienne R, He Z, Aldossary M, Acquart S, Cognasse F, et al. Global survey of corneal transplantation and eye banking. JAMA Ophthalmol 2016;134:167-73.
9. Chaurasia S, Mohamed A, Garg P, Balasubramanian D, Rao GN. Thirty years of eye bank experience at a single centre in India. Int Ophthalmol 2020;40:81-8.
10. Honavar SG. The Barcelona principles: Relevance to eye banking in India and the way ahead. Indian J Ophthalmol 2016;66:1055-7.
11. Rao GN. Eye banking—are we really up to it in India? Indian J Ophthalmol 2004;52:183-4.