



Coping with COVID-19: An Italian Perspective on Corneal Surgery and Eye Banking in the Time of a Pandemic and Beyond

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As Italy became ground zero for Europe's coronavirus crisis, our practice was suddenly thrust into a new reality. Similar to most institutions in our country, we currently provide ophthalmic services strictly for urgent cases, including ocular infection, trauma, cancer, and preventable vision loss. During the nationwide lockdown, we have seen 3 to 4 patients in the clinic each day and have performed a limited number of surgeries, thus far only including these 4 procedures: Gundersen conjunctival flap for microbial keratitis refractory to medical therapy, intracameral injection of antibiotics for infection occurring after endothelial keratoplasty, trabeculectomy for uncontrolled glaucoma occurring after penetrating keratoplasty, and urgent keratoplasty such as for infection after multiple failed grafts or impending perforation. Faced with an unprecedented situation, we present our proactive approaches and their foreseeable impact.

Protecting All Stakeholders

Necessary precautions were adopted to protect patients and health care providers from nosocomial transmission, including triage and screening, routine temperature checks, limitations on accompanying visitors, physical distancing measures, reduction of medical personnel, enhanced disinfection protocols, and broadening of existing hand hygiene protocols to all individuals entering the hospital.¹ With evidence of asymptomatic viral carriage,^{2,3} all patients have been required to wear masks, whereas clinicians must don masks and gloves. Slit-lamp breath shields also have been installed. The long-term impact is that these infection control and prevention strategies will continue to be adopted and adapted through this crisis and beyond.

Creating New Channels of Communication

Telemedicine now plays a unique role in protecting our patients' well-being while maintaining continuity of care. Ophthalmic patients who call the hospital's general hotline are contacted promptly by an ophthalmologist, who remotely consults or schedules those requiring examinations. Targeted channels of communication through text and instant messaging also have been adopted. The long-term impact is that because telemedicine is proving valuable for patients who have undergone keratoplasty and who require steady reassurance and constant communication throughout

the postoperative regimen, telehealth initiatives likely will be sustained in our practice.

Managing for Sustainable Recovery

Because the hospital is contracted by the regional health system, evolving legal and advisory guidance from health authorities has been monitored closely. With direct coordination of hospital leadership and key stakeholders within the organization, regularly updated interim protocols on infectious control and standards of care, along with critical training resources, are disseminated actively to the entire staff. The long-term impact is that although it is impossible to foresee the full magnitude of the economic impact of this crisis, our financial sustainability will be managed through continued cautious optimism.

Transitioning to New Normalcy

Although much uncertainty remains, we have been planning for phased resumption of services. Because our center is home to a large cornea practice performing 500 to 600 corneal transplants annually during the last 5 years, a backlog of surgical cases and postoperative examinations certainly looms. With continuous engagement with our partner eye bank, we have set reasonable timelines for patients requiring keratoplasty and have organized schedules for the surgical team. The long-term impact is that to meet the surge in demand and minimize disruption of services, our future work schedule will include additional daily work shifts extending through weekends.

Eye Bank Response: Updating Standard Operating Procedures

Enhanced interpretation of current guidelines includes immediate exclusion of donors with pneumonia or viral disease, respiratory or flu-like symptoms, or suspected severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) exposure, as well as routine polymerase chain reaction testing for SARS-CoV-2 detection in donor nasopharyngeal specimens. The long-term impact is that these protocols will be maintained to ensure the safety and quality of corneal transplantation.

Managing Organizational Challenges

Being a private nonprofit organization managed by board of directors appointed by the regional government, the Veneto Eye Bank has faced operational challenges greater than those experienced by other Italian eye banks that are integrated into public hospitals and funded by the public health system. Operation in the former has been maintained by skeletal staff, with most currently furloughed with social safety nets.

The suspension of elective procedures has resulted in a supply–demand imbalance between a steady stream of voluntary donors and a dramatic decline in requests for corneas. From distributing more than 3000 of 5000 processed donor corneas annually, the Veneto Eye Bank has seen a 95% reduction in demand from its network of 250 local and international surgeons. Considering that the culture of donation is based on social awareness and altruism, eye banking services cannot be slowed down correspondingly to 5% because it would be impossible to resume regular procurement rates quickly to match a renewed demand for corneal tissue after the lockdown. As a compromise, the eye bank has reduced procurement temporarily to 60% of normal rates.

Because corneas preserved through hypothermic storage (United States) and organ culture (Europe) remain viable only for 2 and 4 weeks, respectively, techniques that can extend storage of the surplus of corneas have been explored. Cryopreservation has been used previously, but is cumbersome and results in relatively poor graft quality.⁴ Instead, tissue dehydration and lyophilization, albeit not suitable for endothelium preservation, has been used successfully in the past for preservation and international distribution of epikeratophakia lenticules.⁵ The Veneto Eye Bank has validated the preservation time of dehydrated corneas (6 months) and currently is storing these dehydrated corneas for research and training purposes, as well as for possible use in deep anterior lamellar keratoplasty.

Because deep anterior lamellar keratoplasty is performed in Europe in high numbers (40% of total keratoplasties at our institution), corneas procured during this outbreak could be preserved for periods long enough to avoid wastage of unused corneas, while allowing ongoing donation and procurement at levels compatible with quick resumption of normal surgical activities. The long-term impact is that this experience underscores the need to develop alternative preservation techniques to improve resilience in the face of inevitable future infectious threats.

As others only begin to experience the impact of this crisis, we hope that our practical insights on the global, shared challenges from this pandemic can guide the response of our colleagues across the world. Ultimately, what happens then and now depends on our swift and decisive response in promoting public safety, while maintaining the highest standards of patient care.

References

1. Olivia Li J-P, Shantha J, Wong TY, et al. Preparedness among ophthalmologists: during and beyond the COVID-19 pandemic. *Ophthalmology*. 2020;127(5):569–572.
2. Kimball A, Hatfield KM, Arons M, et al. Asymptomatic and presymptomatic SARS-COV-2 infections in residents of a long-term care skilled nursing facility—King County, Washington, March 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69:377–381.
3. Wei WELZ, Chiew CJ, Yong SE, et al. Presymptomatic transmission of SARS-CoV-2—Singapore, January 23–March 16, 2020. *MMWR Morb and Mortal Wkly Rep*. 2020;69(14):411–415.
4. Canals M, Costa J, Potau JM, et al. Long-term cryopreservation of human donor corneas. *Eur J Ophthalmol*. 1996;6(3):234–241.
5. Arffa RC, Busin M, Barron BA, et al. Epikeratophakia with commercially prepared tissue for the correction of aphakia in adults. *Arch Ophthalmol*. 1986;104:1467–1469.

Footnotes and Financial Disclosures

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