In the trab-phaco group, the corneal ECD was 2,547 cells/mm² before surgery; then, it decreased significantly to 2,001 cells/mm² at 36 months after surgery (21.7% loss; p < 0.01) (Fig. 1). The corneal ECD loss was significantly greater in the trab-phaco group than in the trab-alone group (21.7% loss vs 2.8% loss; p < 0.01) at 36 months after surgery.

We analysed the determinants of corneal ECD loss in the trab-phaco group. Age, type of glaucoma, preoperative corneal ECD, postoperative IOP, the length of time between trabeculectomy and phacoemulsification, the surgical time of the phacoemulsification and postoperative shallow anterior chamber were considered as possible determinants of the severity of corneal ECD loss at 36 months after surgery.

The multivariate analyses using multiple linear regression models (stepwise selection) demonstrated that exfoliation glaucoma was significantly associated with the severity of corneal ECD loss (p < 0.01). The exfoliation glaucoma and lens extraction with phacoemulsification after trabeculectomy increased the rate of corneal ECD loss. The corneal ECD should be carefully assessed after trabeculectomy, especially in patients with exfoliation glaucoma and requiring cataract surgery.

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Dear Editor,

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was declared a global pandemic by the World Health Organization (WHO) on March 11, 2020. Although the main mode of SARS-CoV-2 transmission is respiratory, studies have suggested that exposure of unprotected eyes to the virus may cause infection (Lu et al. 2020; Ulhaq & Soraya 2020). Macaque’s conjunctiva inoculated with SARS-CoV-2 led to the replication of the virus in ocular and nasopharyngeal tissue with the development of a mild interstitial pneumonia (Deng et al. 2020).

Ocular manifestations, such as epiphora, conjunctival congestion or chemosis have been described to occur more frequently in patients with severe
systemic manifestations (Wu et al. 2020).

A recent meta-analysis found ocular manifestations among SARS-CoV-2 patients in 2–32%, with an overall pooled prevalence of 5.5% (Ulhaq & Soraya 2020). The specificity of ocular tissue/liquid in detecting SARS-CoV-2 was very low in comparison with standard sample collection from nasopharyngeal swabs (NPS) (Ulhaq & Soraya 2020).

Corneal donation and transplantation are disrupted by concerns of SARS-CoV-2 tissue contamination and transmission. To date, no data are available on the postmortem prevalence of virus RNA in ocular and pharyngeal tissue in SARS-CoV-2 patients.

In March 2020, the German Federal Institute for Vaccines and Biomedicines (PEI) recommended adjustments to donor screening due to SARS-CoV-2. Accordingly, in a prospective cohort study, potential corneal donors (uninfected with negative premortem NPS) in our institution had postmortem conjunctival (COS) and NPS taken starting March 17, 2020. In addition, we sampled deceased SARS-CoV-2 positive patients, with at least one positive premortem NPS (Table 1).

The institutional review board of the University Hospital Aachen (EK 098/20) approved the study. All research adhered to the tenets of the Declaration of Helsinki. Informed consent was given by next of kin. Swabs were placed immediately into a sterile transport tube containing 2–3 ml of sterile saline and analysed by reverse transcriptase–polymerase chain reaction (RT-PCR; SYNLAB, Leverkusen, Germany).

Table 1. Characteristics and conjunctival (COS) as well as nasopharyngeal (NPS) swab results of the 23 SARS-CoV-2 positive deceased.

| Case | Gender | Age (years) | Death to swab time NPS and COS (hr) | Result COS postmortem | Result NPS postmortem | Time Last NPS premortem (hr) | Result last NPS premortem |
|------|--------|-------------|----------------------------------|-----------------------|----------------------|----------------------------|----------------------------|
| 1    | W      | 75          | 21.6                             | Negative              | nd                   | 42.22                      | Negative                   |
| 2    | M      | 83          | 116.32                           | Negative              | nd                   | 163.29                     | Positive                   |
| 3    | M      | 89          | 97.92                            | Negative              | Negative             | 50.62                      | Negative                   |
| 4    | M      | 58          | 27.45                            | Negative              | Positive             | 138.00                     | Positive                   |
| 5    | M      | 76          | 24.55                            | Negative              | nd                   | 71.21                      | Positive                   |
| 6    | M      | 75          | 10.42                            | Negative              | nd                   | 36.21                      | Negative                   |
| 7    | M      | 76          | 29.92                            | Negative              | Positive             | 42.11                      | Positive                   |
| 8    | W      | 62          | 11.88                            | Negative              | nd                   | 10.36                      | Negative                   |
| 9    | W      | 75          | 14.48                            | Negative              | nd                   | 7.27                       | Negative                   |
| 10   | M      | 85          | 63.78                            | Negative              | nd                   | 17.55                      | Positive                   |
| 11   | M      | 71          | 64.92                            | Negative              | nd                   | 29.29                      | Negative                   |
| 12   | M      | 61          | 18.40                            | Negative              | Negative             | 289.02                     | Negative                   |
| 13   | M      | 66          | 16.25                            | Negative              | nd                   | 80.55                      | Negative                   |
| 14   | M      | 61          | 14.35                            | Negative              | Negative             | 218.98                     | Negative                   |
| 15   | M      | 86          | 8.20                             | Negative              | Positive             | 115.13                     | Positive                   |
| 16   | M      | 75          | 42.17                            | Negative              | Negative             | 96.40                      | Negative                   |
| 17   | W      | 50          | 70.00                            | Negative              | Negative             | 378.83                     | Positive                   |
| 18   | M      | 88          | 10.17                            | Negative              | Positive             | 89.18                      | Positive                   |
| 19   | W      | 64          | 7.58                             | Negative              | Negative             | 117.58                     | Positive                   |
| 20   | M      | 66          | 16.97                            | Negative              | Negative             | 174.10                     | Negative                   |
| 21   | M      | 73          | 68.55                            | Negative              | Negative             | 55.72                      | Negative                   |
| 22   | W      | 68          | 21.25                            | Negative              | Negative             | 242.02                     | Negative                   |
| 23   | W      | 68          | 16.75                            | Negative              | Negative             | 168.27                     | Positive                   |

All these SARS-CoV-2 patients were diagnosed by premortem positive NPS. The two columns to the right show the test results and the time before death of the last premortem NPS taken. nd = not done. Positive swab results are highlighted in bold.

The pooled prevalence of 5.5% (Ulhaq & Soraya 2020) indicates that the human conjunctiva is not a typical site of SARS-CoV-2 infection even in symptomatic eyes, as virus RNA was not detected in any premortem samples, even for positive cases (Table 1). The absence of virus RNA in our postmortem NPS was acquired. In SARS-CoV-2 positive deceased, taken at 114.5 ± 96.3 (7.3–378.8) hours before death. They were positive at 96.1 ± 41.2 (42.1–138) hr before death in all four patients, that also had a postmortem positive NPS. However, in 36% of positive premortem NPS, no postmortem NPS was acquired.

In this study, we observed that all postmortem COS were negative for SARS-CoV-2, even in cases, where the postmortem NPS was still positive. The absence of virus RNA in our postmortem swabs agrees with the literature on premortem samples, where only 3/315 COS = 0.95% (compared to NPS 604/849 = 71.1%) were positive even in symptomatic eyes, indicating that the human conjunctiva is not a typical site of SARS-CoV-2 infection. The absence of virus RNA in our postmortem NPS was acquired. In SARS-CoV-2 positive deceased, taken at 114.5 ± 96.3 (7.3–378.8) hours before death. They were positive at 96.1 ± 41.2 (42.1–138) hr before death in all four patients, that also had a postmortem positive NPS. However, in 36% of positive premortem NPS, no postmortem NPS was acquired.
replication (Lu et al. 2020; Seah et al. 2020; Ulhaq & Soraya 2020). Further studies are needed to investigate, whether other ocular structures, e.g. vitreous or iris, are more suitable to detect SARS-CoV-2 pre- and post-mortem. In summary, our data indicate, that neither postmortem COS nor NPS can reliably exclude donors with SARS-CoV-2, particularly, when the last positive premortem NPS was obtained 90 hr or more before death.

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Telementoring and remote training in the present era
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Editor,

Access to surgical teaching and expertise can be challenging at the best of times but in the era of COVID-19 and social distancing how can we ensure its delivery? This pandemic has seen a raft of innovative solutions emerge, in both the clinical and educational spaces, that may well lay the foundations for the future.

Telementoring is the use of information technology to provide real-time guidance despite different geographical locations (Huang et al 2019), and the concept dates back to the mid-1990s (El-Sabawi & Magee 2016). The effectiveness of surgical telementoring compared with on-site training has been reported in systematic reviews, where comparable safety and efficacy profiles between the two techniques were found (Bilge et al 2017; Erridge et al 2019). So why has deployment to date largely focused on remote or rural areas and been so poorly adopted?

The answer is primarily tradition. The legal, ethical and cost issues melted away within weeks of the pandemic commencing, and it has rapidly become apparent over the last few months that it is more rather than less time efficient. Lacking infrastructure has also become a somewhat redundant argument given that a plethora of technologies already existed but were poorly utilised by healthcare as whole. In the last few weeks, the authors have used a combination of tele-education and tele-medicine platforms including AttendAnyWhere (Attend Anywhere, Australia), WhatsApp (WhatsApp Inc., US), Zoom (Zoom Video Communications, Inc., US), Teams (Microsoft, US), Cisco Webex (Cisco Systems, Inc., US), Lifesize (Lifesize, Inc., US), FaceTime (Apple Inc., US), Skype (Microsoft, US), GoToMeeting (LogMeIn, Inc., US), Google Hangouts (Google, US) and these, in turn, are but a small sample of the available options.

Beyond traditional teaching using video, the last few months have seen various interactive solutions from tele-appraisal to supervision during tele-consultations (where the trainer, trainee and patient video conference from disparate respective locations). Surgical training has also adapted, with socially distanced training on the Eyesi simulator (VRmagic, Haag-Streit Diagnostics, Switzerland) and HelpMeSee (HelpMeSee, Inc, US), via a live video feed, streamed through a laptop, along with a webcam capturing the trainees hand movements and general environment. While it is clear that some enthusiasm for the ‘tele-revolution’ is clearly present, not all teaching will ultimately convert to this modality.

Telehealth does, however, have great potential for unifying differing locations and accessing specialist educators much further afield. This means that ‘dialling’ into highly specialized multi-disciplinary meetings, obtaining second opinions rapidly and better integration of primary-secondary-tertiary care through these systems may all become possible. Additionally, one of the core purported aims, that of training in remote and developing world locations, will become more attainable if this practice becomes more commonplace.

John F Kennedy once remarked that when written in Chinese, the word ‘crisis’ is composed of two characters—one representing danger and the other representing opportunity. At this juncture, there appears to be the means, the technology and the need to rapidly evolve our utilisation of remote training and telementoring. To what extent it becomes integral to our practice is yet to be determined but in all probability it will have a much greater role in the near term and more distant future.