Resident Perspective: DSAEK postoperative positioning and graft adhesion

Descemet stripping automated endothelial keratoplasty (DSAEK) and Descemet membrane endothelial keratoplasty (DMEK) have become standard techniques to address corneal endothelial dysfunction. These endothelial keratoplasty (EK) procedures result in excellent visual recovery and outcomes. Complications can still occur, the most common being graft detachment, in which the donor graft fails to properly attach to the recipient cornea. Supine positioning is generally recommended postoperatively to promote graft attachment; however, its actual clinical importance for graft adherence remains to be proven.

In this issue of CJO, Safr and colleagues examine the effect of postoperative supine positioning on graft detachment rate in patients undergoing DSAEK. This retrospective review included patients who underwent uncomplicated DSAEK. Only eyes that had received up to one previous corneal transplant were included. The patients were observed for 24 hours postoperatively to monitor compliance with supine positioning. In total, 170 eyes of 138 patients were included in the study. This was the first corneal transplant for 126 patients (74.1%), the remaining patients had received one prior corneal transplant, and of which, 61.4% (27 of 44) had a previous DSAEK, 31.8% (14 of 44) a previous penetrating keratoplasty, and 6.8% (3 of 44) a previous DMEK. There were various indications for the transplants, the most frequent were pseudophakic bullous keratopathy (PKB) (5.6%), Fuchs’s endothelial dystrophy (FED) (20.6%), and previous graft failure (25.9%).

Twenty-seven patients (15.9%) were noncompliant with supine positioning for at least one interval of 8 hours during the first 24 postoperative hours. In total, there were 26 graft detachments (15.3%). In the compliant group, the rate of graft detachment was 13.3% (19 of 143) and in the noncompliant group, 25.9% (7 of 26), showing no significant difference between groups ($p = 0.167$). There was also no significant difference in 3-month postoperative visual acuity between compliant and noncompliant groups ($0.73 \pm 0.57$ vs. $0.79 \pm 0.55$ logMAR, respectively; $p = 0.67$). Similar to these findings, other studies have demonstrated that postoperative supine positioning did not seem to have a significant effect on graft detachment. However, there are not many other studies that have directly investigated the role of supine positioning for improved graft attachment.

The basis of supine positioning is more theoretically based, as most graft detachments occur inferiorly and this is thought to be due to the shrinking bubble failing to tamponade the inferior area when a patient is upright. On multivariate analysis examining demographic, clinical, and intraoperative characteristics among detached and non-detached grafts, only the interval between tissue harvesting and transplantation was significant. Detached grafts had longer harvest-to-implantation times ($7.73 \pm 3.0$ vs. $6.3 \pm 2.53$ days; $p = 0.031$). Safr and colleagues postulate that this is due to changes in donor graft structure over time, such as increased graft thickness and decreased endothelial cell viability.

While supine positioning did not affect graft detachment rates among the entire cohort, subgroup analysis was performed among first-time transplant patients with PKB and FED as the surgical indication. There was a significantly higher graft detachment rate among the noncompliant group in univariate and multivariate analyses ($p = 0.027$ and $p = 0.017$). These patients were 3.4 times more likely to have a graft detachment compared to the compliant group. Taken overall, the results presented by Safr and colleagues suggest that supine positioning is not crucial for the success of graft attachment in DSAEK but specific patient populations may benefit more from postoperative supine positioning. Maintaining supine positioning can be difficult for older patients, so being more selective in who to place supine may be helpful. However, there is still a paucity of research examining these associations and larger studies are needed as well.

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Article being referenced: https://www.canadianjournalofophthalmology.ca/article/S0008-4182(21)00156-3/fulltext

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4. Safir M, Dubinsky-Pertzov B, Peled A, Rozenberg A, Zadok D, Avni I, Pras E, Einaim-Lifshitz A, Goldich Y. Postoperative complications between the SCL group and the non-SCL group at 1-year or 5-year post-operative timepoints. However, age and pre-operative IOP were significantly associated with complications at 1-year postoperatively (p = 0.013, 0.040, respectively). While not statistically significant, patients with SCLs had slightly higher survival rates at 1 year (75% vs. 61%), while patients without SCLs had higher survival rates at 5 years (65% vs. 49%). There were no differences in visual acuity between the two groups at 1 year or 5 years. Most complications occurred in patients undergoing KPro for limbal stem cell deficiency, corneal edema and non-specific scarring, Stevens-Johnson syndrome, and chemical and thermal burns.

Limitations to this study include its retrospective approach and attrition bias in the SCL group (due to SCL loss over time). Further, it is possible that patients between the two groups could have been dissimilar. For instance, the non-SCL group could have proportionately had more patients with corneal irregularities, eyelid abnormalities, symblepharon, proptosis, inability to pay for SCLs, or other conditions rendering SCL use impractical — many of these potential confounders were not recorded.

In conclusion, this study did not clearly demonstrate any protective effect of SCLs against long-term post-operative complications after KPro surgery. More studies are needed to enhance evidence surrounding long-term SCL use after KPro surgery.

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Resident Perspective: Effectiveness of custom 3D-printed mask fitter during COVID-19

During the coronavirus disease 2019 (COVID-19) pandemic, N95 respirators were recommended to limit the airborne transmission of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). However, these were in high demand and low supply, and understandably prioritized for healthcare workers performing aerosol-generating procedures or working with high-risk patient groups. Therefore, regular surgical face masks were used where N95 masks were unavailable. However, with a suboptimal seal, regular masks cannot adequately protect against aerosolized particles that may contain the SARS-CoV-2 virus. Given this limitation, many groups turned to 3D-printing limited equipment including face shields, masks, and mask frames.1

In this issue, Liu and colleagues report on their proof-of-concept study and questionnaire evaluating the effectiveness of a 3D-printed custom mask fitter as an alternative to the N95 respirator.3 A total of 20 participants were recruited to wear these custom mask fitters over an American Society for Testing and Materials Level 3 face mask from a tertiary ophthalmology centre in Ontario. Participants then underwent a standardized N95 Qualitative Fit Test (QLFT). A pass on either the first or second try was considered an overall pass of the QLFT. Pass rates were compared between the custom mask fitter and with a Level 3 regular mask alone. Of the 20 participants, 90% passed on the QLFT overall, with 60% passing on their first try with the custom mask fitter. An additional 25% passed on their second try following adjustments to the mask seal. This pass rate is consistent with that of N95 respirators showing 44.2% and 30.2% pass rates on the first and second attempts respectively.5 Only 1 participant (5%) passed the QLFT with a regular face mask alone.

A confidential Likert-scale questionnaire was also administered surveying participants on comfort, ease of use, and feasibility of everyday wear of the custom mask fitter. The mask fitter scores were 3.5, 4.5, and 3, respectively, compared to a median comfort score of 8.5 for a regular face mask alone. It is unclear how the regular mask scores for easy of use and feasibility in comparison. There was no significant difference on sex or age in the pass rates and questionnaire responses.

There are several strengths to the mask fitter including its customizability adjusted for each person’s facial contours and importantly, allowing more participants to pass the QLFT without the use of N95 respirators. Feedback from participants suggested points of possible improvement; future designs could include a thinner frame underneath the eyes and a stronger hold around the chin to prevent masks from slipping up. Despite the 5-point difference in median comfort scores, it received a 10/10 feasibility score from 2 participants who had already been wearing the mask fitter daily for several months. This suggests potential for higher scores after a longer period of regular use. Future longitudinal studies can help illustrate this.

There are also a few limitations to this study. As the authors mentioned, a direct comparison of the custom mask fitter to the N95 respirator would be valuable. Furthermore, Level 1 and 2 masks, which can be more accessible and less costly, could also undergo similar testing. Finally, future directions include investigation of the effectiveness through quantitative means, particularly with the suggested updates in design.

In summary, Liu and colleagues performed a proof-of-concept study to investigate the effectiveness of a 3D-printed custom mask fitter against N95 respirator standards using the QLFT and compared its comfort, ease-of-use, and feasibility against a regular mask. The use of a custom mask fitter had 90% QLFT pass rates, which was a substantial improvement over the regular mask alone. The authors conclude that this could be a potential alternative to N95 respirators when supplies are scarce. Further studies with longitudinal and quantitative data, direct comparison to the N95 respirator, and updates in design are required.

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Resident Perspective: Attitudes toward parental leave and breastfeeding during ophthalmology residency

Residency coincides with the life stage during which trainees may consider having children. The resident experience with parental leave has been explored in other surgical disciplines. In this issue, Reilly and colleagues report resident and program director (PD) behaviours and attitudes towards parental leave during ophthalmology residency in the US.

The authors distributed separate electronic surveys to ophthalmology residents and PDs. Survey items pertained to the prevalence and duration of parental leave during residency, impact on training, and the nature of policies for parental leave and breastfeeding.

The authors obtained responses from 70 of 1421 US ophthalmology residents (5%). Nearly 30% of respondents had taken parental leave during residency, and half of parental leaves were 8 weeks or shorter. Leave required use of vacation time for 75%, and 15% of residents took unpaid leave. Common impacts of parental leave included missed surgical training and impacted research (37% each); fewer than 5% of residents extended training. Half of respondents indicated parental leave has a negative impact on coreidents. Forty percent of residents breastfed or pumped upon return to work, with most doing so for more than 10 weeks after returning.

There were 27 responses to the PD survey. Almost half indicated parental leaves occurred in their program at least biennially, whereas one in five respondents had never had a resident take leave. Most PDs reported the average duration of parental leave was 4 or fewer weeks for male residents, and 5-6 weeks for females. One third of PDs felt there would be a negative surgical impact for female residents taking parental leave versus 8% for male residents. Roughly 30% felt scholarly activities would be negatively impacted by parental leave. Half of directors felt parental leave has a negative effect on coreidents. Written parental leave policies were in place in 95% of departments; however, the content varied considerably and only half of policies addressed breastfeeding.

An important limitation recognized by the authors is the poor response rate. Nevertheless, important issues are identified, including duration of leave, perceived lack of support among colleagues, negative impacts on training, and lack of universal parental leave policy. These findings align closely with previous reports, including a 2020 survey of US ophthalmology PDs, and a 2019 study of more than 2100 surgical residents in the US.

In all Canadian provinces, a paid parental leave of at least 35 weeks is available to residents. The mean length of parental leave for Canadian residents in one study was 9 months for women and 6 weeks for men. This is noteworthy as parental leave correlates favourably with resident wellness. Other issues identified by Reilly and coauthors are relevant to Canadian trainees and PDs; for example, there is considerable variation in parental leave policies between regions.

A growing family presents additional challenges for residents. By identifying important issues faced by ophthalmology trainees relating to parental leave, the authors have taken a step towards improving the well-being of residents who have children during residency.

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Article being referenced: https://www.canadianjournalofophthalmology.ca/article/S0008-4182(21)00088-0/fulltext

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2. Reilly G, Tipton C, Liberman P, Berkenstock M. Attitudes toward parental leave and breastfeeding during...
Although the mean H-index was statistically insignificant between men and women, men were more likely to have a higher faculty appointment than women (p = 0.0073). The three subspecialties with the greatest representation of women were uveitis (55%), low vision (50%), and neuro-ophthalmology (46%). The three subspecialties with the least representation of women were surgical retina (7%), medical retina (21%), and oculoplastics (24%). The top three subspecialties for research productivity were ocular oncology, surgical retina, and neuro-ophthalmology, respectively.

Their findings of research productivity impact on faculty appointment echoes similar studies from the United States. Although several studies on American academic ophthalmologists have shown a significant association between higher H-index and researchers who identify as men, the current Canadian study shows a non-statistically significant trend between gender and H-index. This non-significant trend might attest to the positive impact of current measures to resolve gender disparities in research. Although representation of women in academic ophthalmology has been increasing in the last few decades (3.1% in 1970 to 27% in 2021) this study highlighted the gender gap in academic ophthalmology with a wider disparity in academic surgical retina as well as senior faculty positions. It is hypothesized that the slow rate at which ophthalmology is progressing towards resolving the gender disparity may be attributed to systemic, societal, and domestic barriers to career progression. Interestingly, a more recent Canadian study that included 686 academic ophthalmologists showed no significant difference in H-indices between male and female ophthalmologists when controlled for academic appointment and career stage (p > 0.05).

Regardless of how multifaceted the etiology of the gender gap in ophthalmology, rectifying the disparity by recruitment and retention of underrepresented individuals must be undertaken jointly by the ophthalmology and medical education communities. Furthermore, the value of academic ophthalmologists extends beyond research productivity. A quantitative metric that does not capture an individual’s value as a scientific thinker, innovator, educator, or community engager should not be given too much weight.

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Resident Perspective: Impact of ocular dominance on circumpapillary and macular RNFL thickness

Ocular dominance refers to the visual system’s preference for one eye, but not necessarily the better-seeing eye. Identification is important for refractive interventions such as monovision contact lens prescriptions and cataract surgery. Retinal ganglion cells in the macula account for the majority of output to the lateral geniculate nucleus in the midbrain where ocular dominance columns exist.1

In this issue, Jiménez-Santos and colleagues set out to evaluate the differences in segmented macular layers and circumpapillary retinal nerve fibre layer (cpRNFL) between dominant and non-dominant eyes.2 A pediatric population was selected given that healthy children demonstrate strong ocular dominance and are less likely to have confounding ocular factors.3

The authors conducted a cross-sectional study of children between 5 and 16 years old attending the general pediatric clinics at a tertiary care hospital in Spain from August 2017 to January 2018. Participants were required to have logMAR corrected visual acuity of <0.1 in both eyes, orthophoria, stereacuity <60 arcsec, and strong ocular dominance. Refraction was also measured. Two sighting ocular dominance tests were employed and if both identified the same eye, this was considered strong ocular dominance.2 The first test is the hole-in-the-card test: the participant holds a card with a hole in the middle at arm’s length to view a target 6 meters away, they move the card toward their face without losing alignment until the hole is over one eye (dominant eye).2 4 The second test is the convergence near point test, which identifies the eye that breaks convergence first (non-dominant eye).4 A blinded technician performed ocular biometry and Heidelberg Spectralis spectral-domain optical coherence tomography (SD-OCT) looking at 9 subfields, as demarcated by the Early Treatment Diabetic Retinopathy Study (ETDRS).

In total, 178 eyes of 89 children were included in the analysis. Of these, 67.4% showed right eye dominance. There was no statistically significant difference in average axial length or mean manifest spherical equivalent refraction between the dominant and nondominant eyes (p > 0.05). The macular ganglion cell layer thickness within the central 1 mm ETDRS area was statistically thinner in the dominant eyes (16.56 ± 6.02 µm versus 17.58 ± 8.32 µm in the nondominant eye, p = 0.02). However, after Bonferroni correction, statistical significance was lost. Measurement of cpRNFL thickness did not demonstrate a consistent difference between dominant and nondominant eyes. All scans were of good quality.

In accordance with previous studies, Jiménez-Santos and colleagues found right eye dominance to be more common. Results suggest that ocular dominance is not associated with differences in segmented retinal layers or cpRNFL. One previous study using Cirrus SD-OCT found some differences in cpRNFL and macular ganglion cell inner plexiform layer distribution between dominant and nondominant eyes; however, testing conditions were different.5 This study has several limitations. It can only draw conclusions regarding a Hispanic pediatric population and its results are dependent on the ocular dominance assessment tool (can be controversial). Further studies in different ethnic and age groups, using different SD-OCT devices, should be conducted to draw more broad conclusions. Ophthalmology residents should be aware of ocular dominance, and the subjective and objective methods available for determining the dominant eye.

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Resident Perspective: Clinical outcome in occlusive retinal vasculitis

Retinal vasculitis is a sight threatening disease caused by inflammation of retinal vessels. It can occur either in isolation as an idiopathic disease or associated with infection, and systemic immune-mediated diseases. The clinical features include perivascular sheathing, vessel leakage, and vessel occlusion. Occlusive retinal vasculitis (ORV) poses a serious concern for significant vision loss due to macular ischemia followed by complications of neovascularization (NV), vitreous hemorrhage, and tractional retinal detachment. Overall, the etiology of ORV is a heterogeneous and the prevalence varies with geographic location. There are limited number of large-scale epidemiological studies characterizing ORV in North America. Importantly, prognostic factors associated with poor visual outcomes are not well defined.

In this issue, Lin and colleagues performed a retrospective case series to describe the clinical features and treatment of ORV with key focus on identifying factors associated with poor visual outcomes. The studies enrolled 52 patients with ORV and the most common etiology was non-infectious (80.8%), followed by infectious (17.3%) and one case of masquerade uveitis. Large portion of the non-infectious cases (35.7%) were idiopathic whereas, systemic diseases included sarcoidosis, multiple sclerosis, systemic lupus erythematosus, antiphospholipid syndrome, and Behcet’s disease. Interestingly, systemic necrotizing vasculitis was only responsible for a small number of ORV cases. However, this is consistent with prior studies which also demonstrated that ORV is an uncommon manifestation of systemic necrotizing vasculitis. Retinal hemorrhage was the most common finding (50.6% of patients) and other complications included neovascularization (NV), optic atrophy, cystic macular edema (CME), epiretinal membrane, and tractional retinal detachment. In this report, the rates of retinal hemorrhage and NV were lower compared to other studies. The authors postulated that this may be due to more aggressive use of anti-inflammatory therapy which ameliorated complications associated with inflammation.

The treatment of ORV varied depending on the etiology. Patient with infectious etiology received antimicrobials while noninfectious cases received corticosteroids early in treatment followed by immunomodulatory therapy (IMT) of which 87.5% achieved steroid-free remission. Multivariable analysis demonstrated that macular ischemia, optic nerve atrophy, and poor visual acuity at initial presentation were associated with poor visual outcomes. Interestingly, despite being a sight threatening disease, 66.7% of eyes had good visual outcomes. The authors proposed that this might be due to the resolution of CME from anti-inflammatory therapy and perhaps why CME did not present as an independent risk factor for poor visual outcome.

Limitations of this study include retrospective design, unblinded nature causing selection bias, and not using standardized ETDRS chart for measuring visual acuity. Also, the results from this study may not be applicable across North America as it was limited to northwestern US population. Nonetheless, this study highlights the heterogenous etiology of ORV and described important prognostic factors associated with poor vision. It also showed that majority of patients can achieve good visual outcome if inflammation is well controlled using IMT (or biologics). However, prospective studies will be required to determine the role of IMT (or biologics) in preventing ORV complications and vision loss.

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