

Photorefractive keratectomy after DMEK for corneal decompensation by phakic IOL

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Abstract

Purpose: To provide the first description of photorefractive keratectomy (PRK) for the correction of mild residual refractive error after Descemet membrane endothelial keratoplasty (DMEK).

Methods: Case report.

Results: A 45 year-old woman presenting with phakic intraocular lens (PIOL)-related corneal decompensation underwent staged DMEK surgery following PIOL explantation and cataract surgery. Eighteen months after DMEK, uncorrected distance visual acuity (UDVA) was 20/60 and best-corrected visual acuity (BCVA) was 20/22, with a stable refraction. The patient requested refractive surgery to decrease spectacle dependence, and wavefront-optimized PRK was performed. At last follow-up observation thirty-three months after PRK (54 months after DMEK surgery), UDVA was 20/20, the cornea remained clear without signs of rejection or endothelial failure, and the endothelial cell loss rate was not accelerated after PRK.

Conclusion: Since long-term visual and refractive stability can be expected after DMEK, PRK may be a particular safe and effective approach for the correction of mild residual refractive errors after DMEK. However, we consider that surgeons must exercise caution when considering keratorefractive surgery in these eyes due to postoperative changes in corneal curvature and thickness, and further studies are encouraged.

Keywords

Photorefractive keratectomy, keratorefractive surgery, Descemet membrane endothelial keratoplasty

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Introduction

Phakic intraocular lens (PIOL)-related corneal decompensation is an increasingly frequent indication for Descemet's membrane endothelial keratoplasty (DMEK). These are patients who have high visual demands and high expectation of spectacle independence; this is also true in patients who undergo DMEK after refractive crystalline lens surgery. Although DMEK has been considered a refractive neutral procedure, endothelial keratoplasty is associated with mild hyperopic shift, with an overall mean change in spherical equivalent of +0.31 D and a mean change in astigmatism ranging from −0.60 to +1.11 D after DMEK.¹ Of note, DMEK may induce a refractive change ≥ 1.00 D in up to 35% of patients,² and up to 32% of patients experience a change in astigmatism higher than 1.00 D after DMEK, related to the

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Figure 1. (A) Corneal topography before wavefront-optimized photorefractive keratectomy (PRK). (B) Corneal topography 33 months after PRK (54 months after DMEK), showing keratometric stability.

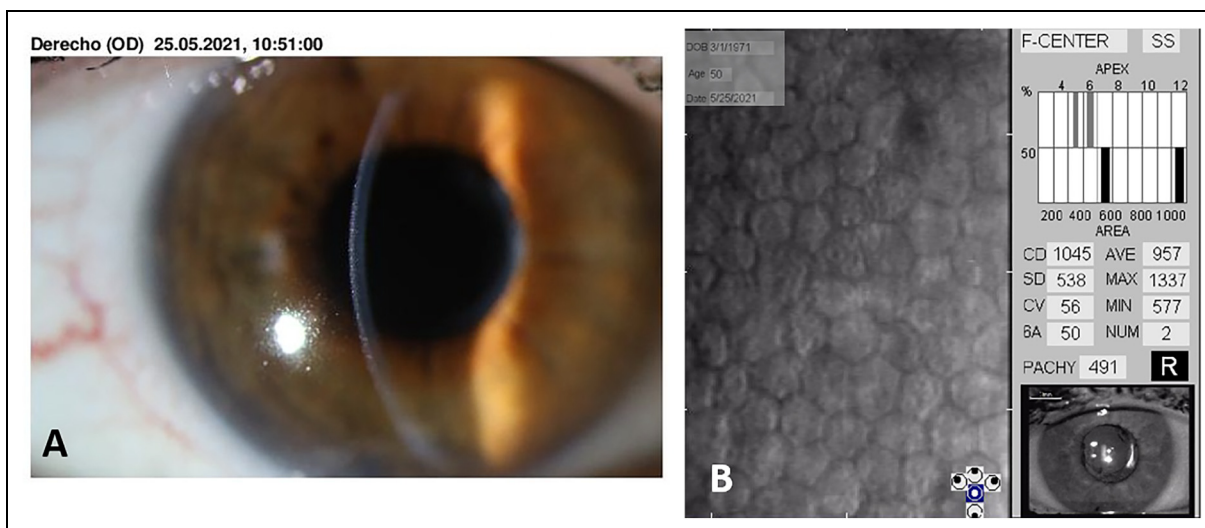


Figure 2. (A) Slit-lamp photograph showing corneal transparency maintained at last follow-up (54 months after DMEK). (B) Specular microscopy at last follow-up 33 months after photorefractive keratectomy, showing stable postoperative endothelial cell density.

Conclusions

Since the introduction of endothelial keratoplasty techniques, there has been an increasing interest in its refractive outcomes.⁷ This is especially true in cases where DMEK is combined with refractive correction or cataract surgery, where the refractive target may be adjusted to account for the anticipated refractive shifts following DMEK. However, the literature is very limited regarding the treatment of post-DMEK refractive errors by means of laser refractive surgery. Price et al. reported the first case of laser-assisted in situ keratomileusis (LASIK) after DMEK, and raised doubt regarding the safety of excimer laser surgery in these eyes.⁸ Since then, only one small case series reported the outcomes of femtosecond-assisted LASIK after DMEK in eyes with Fuchs' corneal endothelial dystrophy.⁹ In that study, LASIK was found to be safe and effective.⁹

In our case, we have observed good midterm visual, refractive, and keratometric stability following PRK. To the best of our knowledge, this is the first published report of PRK for the correction of post-DMEK refractive error. Importantly, the DMEK graft ECD loss was not accelerated after PRK, in line with previous studies that donor graft ECD after DSAEK or DMEK is unlikely to be affected by excimer laser treatment.^{4,9}

In eyes with refractive changes > 1.00 D following DMEK, the magnitude of refractive "surprise" reported in previous publications has ranged from 1.25 to 2.50 D in astigmatism, and nearly 90% of patients will be within 2.00 D of emmetropia. We believe that this amount of residual refractive error may be amenable to PRK in many cases. However, PRK may not be effective in all cases, and we still consider that surgeons must exercise

caution when considering keratorefractive surgery in DMEK eyes. After DMEK, changes in both the anterior and posterior corneal curvatures can occur.¹ Resolution of corneal edema after DMEK may be associated with a thinner-than-normal central cornea, steeper pachymetric progression from the thinnest point to the periphery, and higher posterior elevation values.¹⁰ Further long-term prospective studies are encouraged to adequately assess the stability of this surgery as well as the safety of the procedure.

Declaration of conflicting interests

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Authorship

Nuno Moura-Coelho: conceptualization, methodology, data collection, writing original draft, writing review and editing. Felicidad Manero: data collection, writing original draft, supervision, validation. Renato Papa: writing review and editing; Nicolas Amich: writing original draft; João P Cunha: writing review and editing, supervision, validation; José L Güell: conceptualization, methodology, project administration, writing review and editing, supervision, validation. All authors attest that they meet the current ICMJE criteria for authorship.

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