Clinical Case Study

Cornea after radial keratotomy and subsequent high irregular astigmatism and severe loss of visual acuity

Summary

ArcScan technology was used to scan a cornea that had undergone radial keratotomy with inferior and superior trapezoidal keratotomies, resulting 27 years later in high irregular astigmatism (+6.50 -8.00 x 101) and severe loss of corrected distance visual acuity (CDVA) to 20/50. The epithelial thickness profile was highly irregular, masking a significant proportion of the true stromal irregularity from front corneal surface topography, which would have resulted in significant inaccuracies had a topography-guided ablation been performed. The stromal ablation pattern of a transepithelial phototherapeutic keratectomy (PTK) ablation was modeled, which appeared logically to reduce the areas of abnormal stromal surface elevation and resembled a hyperopic astigmatic ablation of approximately 3.50 diopters of cylinder. ArcScan technology-assisted transepithelial PTK was performed to target the stromal irregularity masked by epithelium.

ArcScan-assisted transepithelial PTK induced a refractive change similar to that predicted (+2.24 - 3.97 x 120), demonstrating the refractive shift produced by the epithelium. The epithelial thickness profile became relatively regular and CDVA returned to 20/20-2. Two topography wavefront-guided ablations were performed to correct the remaining topographic irregularity and refractive error, resulting in a near plano refraction, significantly lower higher order aberrations and a CDVA of 20/20+2.

Take-away

A knowledge of stromal surface shape and power shift produced by epithelial thickness profile alterations after corneal surgery has the potential of improving the efficacy and safety of custom corneal ablation.

Reference:

Refractive and Topographic Errors in Topography-guided Ablation Produced by Epithelial Compensation Predicted by 3D Artemis VHF Digital Ultrasound Stromal and Epithelial Thickness Mapping

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