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Corneal tissue addition keratoplasty: new intrastromal inlay procedure for keratoconus using femtosecond laser-shaped preserved corneal tissue

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Abstract

Purpose: To report results of Corneal Tissue Addition Keratoplasty (CTAK) for keratoconus (KC) and ectasia after laser in situ keratomileusis.

Setting: Cornea and refractive surgery practice.

Design: Single center, prospective, open label clinical trial.

Methods: 21 eyes of 18 patients underwent CTAK. A tissue inlay of preserved corneal tissue was cut to customized specifications with a femtosecond laser and placed in a laser-created channel in the host cornea. Postoperative uncorrected and corrected distance visual acuity (UDVA, CDVA), manifest refraction spherical equivalent (MRSE), topographic mean keratometry (Kmean), maximum keratometry (Kmax), and the point of maximum flattening (Kmaxflat) were measured.

Results: Average UDVA improved from $1.21 \pm 0.35 \log$ MAR lines (LL) (20/327) to $0.61 \pm 0.25 LL$ (20/82) (P < .001). Average CDVA improved from $0.62 \pm 0.33 LL$ (20/82) to $0.34 \pm 0.21 LL$ (20/43) (P = .002), and average MRSE improved from -6.25 ± 5.45 diopters (D) to $-1.61 \pm 3.33 D$ (P = .002). Individually, 20 eyes (95.2%) gained more than 2 lines of UDVA, with 10 eyes (47.6%) gaining more than 6 lines, and no eyes worsening. 12 eyes (57.1%) gained at least 2 lines of CDVA, with 1 eye worsening by more than 2 lines. At 6 months, average Kmean flattened by -8.44 D (P = .002), Kmax flattened by -6.91 D (P = .096), and mean Kmaxflat was -16.03 D.

Conclusions: CTAK is a promising procedure to improve visual acuity and topography in patients with KC and ectasia.

Trial registration: ClinicalTrials.gov NCT02649738.

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