

Effectiveness of Corneal Cross-Linking in Stabilizing Corneal Topography and Visual Outcomes in Corneal Ectasia: A Retrospective Chart Review



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PURPOSE

To evaluate the long-term effectiveness of corneal collagen cross-linking (CXL) in stabilizing corneal topographic indices and visual outcomes in patients with corneal ectasia.

BACKGROUND

Corneal collagen cross-linking (CXL) is a minimally invasive treatment that strengthens corneal tissue by inducing cross-links between collagen fibers using riboflavin and ultraviolet-A light. It is the only proven intervention to halt the progression of corneal ectasia.

METHODS

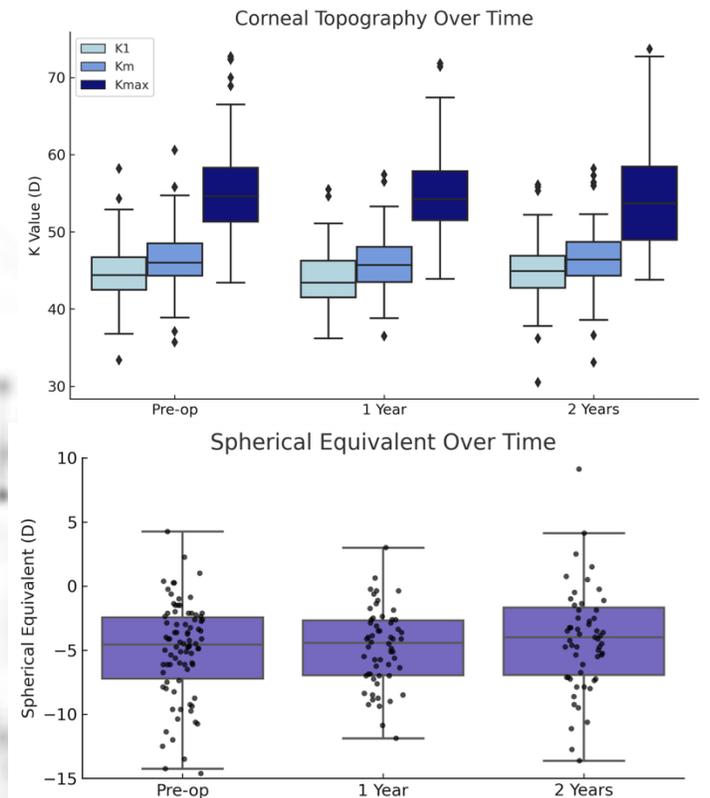
A retrospective chart review was conducted on 87 eyes of patients with corneal ectasia who underwent corneal cross-linking at a private ophthalmology clinic in Calgary between 2018 and 2021. Timepoints included a pre-operative visit, and post-operative follow ups at 3 months, 1-year, and 2-years. Data extracted included demographics, autorefractometry, visual acuity, IOP, corneal topography indices, and epithelial thickness. The primary outcomes were change in topography and epithelial thickness, with secondary outcomes of complication rates such as delayed epithelial healing, repeat CXL or corneal transplantation, and subepithelial fibrosis.

RESULTS

The present cohort is composed of 87 eyes with keratoconus, pellucid marginal degeneration, or post-refractive ectasia. Spherical equivalent trended towards improvement at 2 years, although it did not reach statistical significance (+3.33D, $p=0.072$). Similarly, uncorrected or best corrected visual acuity remained stable at 2 years (-0.058D, $p=0.34$). There was a statistically significant flattening of corneal topography at 1 year in mean K1 (-0.36D, $p=0.006$), Km (-0.23D, $p=0.039$), and at 2 years in Kmax (-0.92D, $p=0.005$). Central corneal thickness was also found to decrease at 1 year (-10.65 μm , $p=0.001$). No statistically significant changes were observed in central densitometry or central epithelial thickness. Complications were infrequent, with delayed healing noted in 7% of eyes, subepithelial fibrosis in 1%, and need for repeat CXL in 1%. No patients subsequently underwent corneal transplantation following CXL. No differences in treatment outcomes according to type of ectasia were found.

Table 1. Baseline characteristics

Age (SD)	34.7 (10.5)
Gender (%)	
Female	25 (28.7)
Male	62 (71.2)
Type of Ectasia (n, %)	
Keratoconus	65 (74.7)
PMD	9 (10.3)
Post-refractive ectasia	14 (16.1)



CONCLUSIONS

CXL was effective in stabilizing corneal topography in this cohort. The procedure was associated with improvements in topographic indices, with no adverse changes and a low complication rate. Limitations include small sample size as well as challenges with loss to follow up and missing data.