

## **Visual and Refractive Long-Term Outcomes Following Standard Cross-Linking in Progressive Keratoconus Management**

**Purpose:** To analyze the effectiveness and stability of the refractive, topographic and visual outcomes of the standard cross-linking (SCXL) in keratoconus (KC) management.

**Patients and methods:** This study was designed as a retrospective non-comparative study that included 28 KC patients (n=49 eyes) who performed SCXL as a single procedure to treat KC and completed five-year follow-up period. The topographic, refractive and visual data were recorded preoperatively and at 12, 24, 36 and 60 months postoperatively.

**Results:** Forty eyes (81.6%) showed achieved postoperative spherical equivalent (SE) refraction better than the attempted refraction. Ten eyes (20.4%) improved by <1 D, 23 eyes (46.9%) improved from 1 D to <2 D and 7 eyes (14.3%) improved by  $\geq 2$  D. Both uncorrected distant visual acuity (UDVA) and corrected distant visual acuity (CDVA) showed statistically significant improvement from preoperative  $1.34 \pm 0.29$  (mean $\pm$ SD) and  $0.74 \pm 0.23$  LogMAR to postoperative  $0.99 \pm 0.32$  and  $0.50 \pm 0.22$  LogMAR ( $P < 0.0001$ ) respectively. Both Kmax and SE refraction showed statistically significant and stable improvement from preoperative  $51.95 \pm 1.90$  and  $-7.90 \pm 3.14$  D to postoperative  $50.19 \pm 1.96$  and  $-6.35 \pm 2.49$  D ( $P < 0.0001$ ) respectively. Two eyes (4%) showed KC progression at the end of 5th follow-up year.

**Conclusion:** SCXL had good effectiveness and stability that halted KC progression over 5-year follow-up period. It had also unexpected improvement in the KC refractive components mainly the spherical and SE components.