

Standard cross-linking protocol versus accelerated and transepithelial cross-linking protocols for treatment of paediatric keratoconus: a 2-year comparative study

Purpose: To compare the efficacy, safety and stability of standard epithelium-off cross-linking (SCXL) versus accelerated epithelium-off cross-linking (ACXL) and transepithelial epithelium-on cross-linking (TCXL) in the treatment of progressive keratoconus (KC) in children.

Methods: This prospective multicenter controlled trial included 271 eyes (136 children) with grade 1–3 progressive KC who were randomized to undergo SCXL (n = 91, as a control group), ACXL (n = 92) or TCXL (n = 88). Uncorrected and corrected distance visual acuity, subjective refraction, pachymetry, keratometry and corneal topography measurements were recorded preoperatively and 6, 12 and 24 months postoperatively.

Results: At 1 year, there was no significant difference in uncorrected distance visual acuity, refractive sphere, cylinder, spherical equivalent or K-max between the ACXL and SCXL groups; however, during year 2, ACXL regressed while SCXL continued to improve. After 2 years, there were significant differences in all visual, refractive and keratometric components between SCXL and both ACXL and TCXL ($p < 0.0001$) and between ACXL and TCXL ($p < 0.0001$). KC progressed in 50.4% of patients who had ACXL and 28.4% of those who had TCXL but in none of those who had SCXL. Vernal keratoconjunctivitis was documented in 43.3% of eyes that progressed postoperatively.

Conclusion: SCXL was more effective for paediatric KC and achieved greater stability than either ACXL or TCXL, and ACXL was superior to TCXL. SCXL also achieved marked improvement in both myopia and

spherical equivalent' however, these refractive outcomes were unpredictable and uncontrollable. TCXL had a 28.4% failure rate within 2 years. SCXL is preferable for management of paediatric KC.