Corneal crosslinking in pediatric patients

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Although not yet approved by the Food and Drug Administration in the United States, corneal collagen cross-linking (CXL) has changed the management of keratoconus. Since 1999, several studies have demonstrated CXL to be a safe and effective procedure to slow or halt the progression of keratoconus in adults.1-4 While many patients are first diagnosed with keratoconus as young adults, the classical onset is at puberty, with progression through the fourth decade of life.5,6 Diagnosis during adolescence often means faster progression and increased risk for corneal transplantation.7 With this in mind, are pediatric patients candidates for CXL?

Several European studies investigated CXL in patients less than 18 years of age using standard epithelium-off CXL treatment protocol. This involves debridement of the corneal epithelium before applying riboflavin 0.1 percent and UV irradiation.1 The largest pediatric study to date investigated 152 patients aged 10-18 in Siena, Italy for 36 months following standard CXL.8 The results yielded significant improvement in visual function (visual acuity, higher order aberrations), and topographical indices (maximum k readings, corneal asymmetry), with minimal complications (corneal edema, haze).8 Several smaller studies have demonstrated similar improvements in visual function and corneal stability for follow up periods of up to two years.9-11 However, one study following patients up to three years found that the keratometric reduction post CXL lost statistical significance after 36 months, suggesting that long-term stability might be less than in adults.12

More recently, trans-epithelial (TE-CXL) or epithelium-on CXL has been utilized with similar efficacy to standard CXL in adults.13 For pediatric patients, one study comparing TE-CXL to standard CXL reported similar improvements in topographical indices between methods, but noted post-operative pain and initial corneal edema and glare were reduced in the TE-CXL group.14 Additionally, other studies involving pediatric patients indicate instability in topographical indices after TE-CXL.15,16

In many countries, including Canada and most of Europe, CXL is considered the standard of care for progressive keratoconus. The only debate is when to initiate treatment. Although further studies in pediatric patients are warranted, the evidence available indicates CXL is safe for patients of all ages, with standard CXL being preferable to TE-CXL. Unfortunately, until FDA approval is obtained, CXL remains off-label and available only at investigational sites.

References


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