Diagnosis, Treatment and a 3-year Follow-up of Keratoconus Patients

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Introduction. Keratoconus is a progressive degenerative disorder of the cornea causing changes in the normal curvature into a more conical shape, resulting in a gradual thinning and degeneration. Keratoconus commonly presents during puberty or early adulthood and this has been reflected in the patient cohort. This retrospective nonrandomized study comprised patients with progressive keratoconus.

Aim. The main goal of this study was to carefully diagnose patients suffering from KC, to stop further progression of it and monitor the condition for a period of 3 years; post Corneal Collagen CrossLinking (CXL) with riboflavin and ultraviolet.

Material and Methods. The study enrolled 25 patients (32 eyes). The mean age of the 17 men and 8 women was 28.4 years ± 6.1 (SD) and the mean follow-up 36.4 ± 4.1 (SD) months. Corneal CXL was indicated in all patients based on the progression rate of the condition. All patients provided written informed consent. Preoperative and 3-year postoperative examinations included measurement for Corneal Thickness (Pachette ultra-sonic pachymeter, Technomed GmbH, and Pentacam HR, Oculus Optikgergate GmbH, respectively); corneal curvature (maximum K, minimum K, apical K); corneal astigmatism from the topography in the central 3.0 mm zone (C-Scan videokeratoscope, Technomed GmbH, and Pentacam HR, respectively); and logMAR corrected distance visual acuity (CDVA) with glasses. In addition, a slit lamp examination and an endothelial cell count (ECC) were performed (EM-1200 endothelial cell microscope, Tomey Corp., and specular microscope CEM-530, Nidek Co., Ltd., respectively). Retreatment of an ectatic cornea was indicated if the apical K value increased by at least 1.0 D over 2 consecutive follow-up visits compared with its value during the steady-state period after the first treatment.

Results. The mean apical keratometry (K) value was 61.5 diopters (D) preoperatively and 55.3 D 3 years postoperatively; the decrease was statistically significant ($p < 0.001$). The mean values for maximum K (53.2 D and 49.56 D, respectively) and minimum K (47.5 D and 45.5 D, respectively) were also significantly lower ($p < 0.001$). The preoperative and postoperative CDVA were statistically significantly different ($p = 0.002$). Mean CDVA improved by 0.14 logMAR preoperatively; the change was statistically significant ($p = 0.002$). ECC was unchanged. Relevant complications, such as prolonged re-epithelialization, infection, limbal stem cell insufficiency, and endothelial decompensation, were not observed during the 3-year follow-up. However, 1 eye developed a permanent stromal corneal scar that limited visual acuity postoperatively. Predisposing factors, such as very high preoperative K values and a thinner cornea, were not present in this patient. In addition, the anterior stroma in 9 eyes showed a persistent haze at the 3-year follow-up, although this did not affect the CDVA.

Conclusions. Corneal CXL was effective in treating progressive keratoconus, achieving long-term stabilization of the condition. It was easy to perform, had a good safety profile, and reduced the need for corneal transplantation.