Anterior Surface Descriptors, Posterior Elevation and Pachymetric Progression in Normal and Subclinical Keratoconic Corneas as Assessed by Pentacam

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Abstract

Purpose: To compare corneal shape descriptors of the Pentacam Scheimpflug tomograph in healthy and subclinical keratoconus eyes to assess their diagnostic capacity. Methods: 22 eyes from 22 healthy subjects in group 1 and 26 eyes from 26 unilateral manifest keratoconus patients in group 2 were evaluated with corneal topography and Pentacam tomography. The eye with the lowest average corneal power (ACP) was recruited in group 2. Pentacam reported indices for the anterior corneal surface (ISV, IVA, I, CKI, IHA, IHD and Rmin), relative pachymetric progression from thinnest point at 1, 2, 3, 4 and 5-mm (RelProg1-5), maximum posterior elevation (PElev) and Belin’s adjusted posterior elevation (PElevBelin) and normalized Belin-Ambrosio indices (Df, Db, Dp, Dt, Dy and overall D) were compared between groups. Diagnostic capacity was determined by receiver-operating characteristic (ROC) analysis. Results: The two groups were not different in mean age (years, 32.8±13.0 vs 31.5±12.3), central corneal thickness (µm, 510.1±26.9 vs 498.8±34.8) or ACP (diopters, 44.02±1.82 vs 44.58±2.21). All but one anterior corneal surface indices were significantly different (p<0.05, Student’s t) in group 2 eyes. Relative pachymetric progression was significantly greater in group 2 eyes up to 4 mm from the thinnest point (p<0.05, Student’s t). PElev and PElevBelin, Df, Db, Dp and overall D, but not Dt and Dy, were significantly higher in group 2 eyes (p<0.05, Student’s t). The highest areas under the ROC curve were those of D (0.851, Se), ElevPMax (0.842), Dp (0.836), ElevPMaxBelin (0.830) and Db (0.806). Optimum cutoff values for ElevPMax and ElevPMaxBelin were >9 µm and >12 µm, respectively, with 81% sensitivity and 82% specificity in both cases. Conclusions: Pentacam indices describing posterior corneal elevation and pachymetric progression can correctly identify a high proportion (about 80%) of subclinical keratoconus eyes with insufficient anterior topography findings.