

Comparison of and correlation between anterior and posterior corneal elevation maps in normal eyes and keratoconus-suspect eyes

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PURPOSE: To compare the anterior and posterior corneal elevation maps between keratoconus-suspect eyes and normal eyes.

SETTING: Rothschild Foundation, AP-HP, University Paris VII, Hôpital Bichat Claude Bernard, Paris, France.

METHODS: The anterior and posterior corneal surface elevations were analyzed and compared in 60 normal myopic patients and 48 keratoconus-suspect patients. The anterior and posterior best-fit sphere radii, central and thinnest corneal pachymetries, anterior and posterior aconic shape parameters (aconic radius, aconic asphericity, aconic toricity), and anterior and posterior elevation in the 1.0 mm radius zone were analyzed. The correlations between elevation and aconic shape parameters between the anterior and posterior surfaces were compared.

RESULTS: The mean central and thinnest pachymetry values were significantly lower in keratoconus-suspect eyes ($P < .0001$). Compared with normal eyes, keratoconus-suspect eyes had significantly increased anterior toricity ($P = .0002$) and posterior toricity ($P < .0001$), more negative asphericity ($P = .042$), and higher posterior elevation ($P < .0001$). The correlation between aconic toricity and the anterior and posterior corneal surfaces was better in keratoconus-suspect eyes than in normal eyes. Aconic asphericity and apical curvature were less correlated in keratoconus-suspect eyes than in normal eyes.

CONCLUSIONS: The posterior corneal elevation and the corneal thickness values were different in keratoconus-suspect eyes. The correlation between the anterior and posterior corneal aconic shapes was between keratoconus-suspect eyes and normal eyes.

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The prevalence of keratoconus in the general population is approximately 1 per 2000,^{1,2} and it is higher among candidates for refractive surgery.^{3,4} Accurate corneal measurements and imagery are essential for selecting the best corneal refractive strategies for long-term, safe visual outcomes. Proper preoperative

recognition of forme fruste keratoconus patients is critical to eliminate this risk for ectasia after laser in situ keratomileusis (LASIK).^{5–8}

A large analysis of anterior corneal surface topographies in eyes of refractive surgery candidates raises the possibility of a pattern continuum from isolated inferior steepening to true keratoconus. This underlines the need for further studies to identify new criteria to improve the detection of at-risk patients.

After the introduction of Placido-disk videokeratography, newer systems to analyze the anterior segment of the eye were developed. These systems include the Orbscan (Bausch & Lomb), which is based on scanning slit-beam topography; the Pentacam rotating Scheimpflug camera (Oculus); and the Galilei dual Scheimpflug analyzer (Ziemer). Corneal elevation topography generates a map of the anterior and posterior corneal surfaces. The existence of early manifestations of

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