ORIGINAL ARTICLE

Algorithm for Correcting the Keratometric Estimation Error in Normal Eyes

Vicente J. Camps*, David P. Piñero Llorens*, Dolores de Fez*, Pilar Coloma†, María Teresa Caballero*,
Celia García*, and Juan J. Miret*

ABSTRACT

Purpose. To obtain an accurate algorithm for calculating the keratometric index that minimizes the errors in the calculation of corneal power assuming only a single corneal surface in the range of corneal curvatures of the normal population.

Methods. Corneal power was calculated by using the classical keratometric index and also by using the Gaussian equation. Differences between types of calculation of corneal power were determined and modeled by regression analysis.

Results. We proposed two options for the selection of the most appropriate keratometric index (n_k) value for each specific case. First was the use of specific linear equations (depending on the ratio of the anterior to the posterior curvature, k ratio) according to the value of the central radius of curvature of the anterior corneal surface (r_{1c}) in 0.1 mm steps and the theoretical eye model considered. The second was the use of a general simplified equation only requiring r_{1c} (Gullstrand eye model, $n_k = -0.0064286r_{1c} + 1.37688$; Le Grand eye model, $n_k = -0.0063804r_{1c} + 1.37806$).

Conclusions. The generalization of the keratometric index (n_k) value is not an appropriate approximation for the estimation of the corneal power and it can lead to significant errors. We proposed a new algorithm depending on r_{1c} , with a maximal associated error in the calculation of the corneal power of 0.5 D and without requiring knowledge of the posterior corneal curvature.

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Key Words: corneal power, keratometry, keratometric refractive index, Gaussian corneal power