Pentacam Keratometric Values Unreliable for IOL Power Calculation After Refractive Surgery

To the Editor:

We read with interest the article by Gonen et al,[1] which appeared in the August 2012 issue of the *Journal of Refractive Surgery*, on their study comparing keratometric data from 200 patients evaluated for refractive surgery using four different devices—an automated keratometer (KR 8800 [Topcon, Tokyo, Japan]), two Placido-based computerized topography systems (Dicon CT 200 [Vismed Inc, San Diego, California] and Allegro Topolyzer [WaveLight Inc, Sterling, Virginia]), and a Scheimpflug analyzer (Pentacam [Oculus Optikgeräte GmbH, Wetzlar, Germany]). The study revealed that although the mean simulated keratometry (Sim K) obtained with the Pentacam did not differ significantly from the other three devices, the Pentacam gave rise to the greatest number of extreme outliers (>2.00-diopter [D] difference) on Bland-Altman plots. In addition, the 95% limits of agreement for the Pentacam Sim K value compared to the other devices was approximately 1.35 D greater. The authors concluded that that the Pentacam data should be used with caution in intraocular lens (IOL) calculations and keratorefractive surgery analysis.

The results observed by Gonen et al were echoed in our own unpublished prospective study assessing the accuracy and validity of keratometric values provided by the Pentacam for calculating IOL power following corneal refractive surgery. We prospectively evaluated patients requiring cataract surgery and, amongst other measures, assessed pre- and postoperative visual acuity, subjective refraction, automated keratometry, and Pentacam equivalent K-readings (for central 4.5-mm zone). Target refractions were calculated using surgeon-selected formulae incorporating Pentacam-calculated corneal power and were compared with postoperative manifest refraction. The Pentacam equivalent K-readings were compared with a "gold standard" K value, which was back-calculated, based on the postoperative refractive outcomes, using the Holladay 2 formula.

Our study recruited 36 eyes from 25 patients and the mean age at corneal refractive surgery was 48 years; cataract surgery was typically ~10 years later. Eighteen eyes had undergone photorefractive keratectomy (PRK) and 18 underwent LASIK. Using Pentacam refractive corneal power, mean predicted refractive outcome (spherical equivalent) following cataract surgery was -0.28 ± 0.47 D; the actual manifest postoperative refractive spherical equivalent was $+0.03\pm1.20$ D. The mean deviation from the desired postoperative cataract refractive outcome was 0.32 ± 1.09 D. However, the mean absolute error (MAE) was 0.92 ± 0.74 D, with 33% of eyes exhibiting an MAE of >1.00 D.

Other studies reflect these findings.[2-4] Interestingly, Kim et al[5] used Pentacam true net corneal power to calculate the IOL power for eyes requiring cataract surgery following keratorefractive surgery. Although postoperative refraction was ±0.50 D of intended in 70% of eyes (21/30), conversely, >25% of eyes had ⩾0.75 D MAE compared to the desired refractive outcome.

In a climate of refractive excellence, where surgeons target ±0.25 D of refractive error, the postoperative PRK and LASIK keratometric values provided by the Pentacam no longer appear acceptable in the calculation of IOL power. With increasing numbers of "baby-boomers" who have already undergone refractive surgery looking for equal excellence in cataract outcomes, surgeons must continue the search for accurate and reproducible keratometric values following corneal refractive surgery.

Jennifer C. Fan Gaskin, MBChB
Chi-Ying Chou, MBChB
Charles N.J. McGhee, PhD, FRCOphth
Auckland, New Zealand

The authors have no financial interest in the materials presented herein.

REFERENCES

1. Gonen T, Cosar CB, Sener B, Keskinbora KH. Comparison of keratometric data obtained by automated keratometer, Dicon CT 200, Allegro Topolyzer, and Pentacam. *J Refract Surg.* 2012;28(8):557-561.
2. Elbaz U, Barkana Y, Gerber Y, Avni I, Zadok D. Comparison of different techniques of anterior chamber depth and keratometric measurements. *Am J Ophthalmol.* 2007;143(1):48-53.
3. Savini G, Barboni P, Carbonelli M, Hoffer KJ. Agreement between Pentacam and videokeratography in corneal power assessment. *J Refract Surg.* 2009;25(6):534-538.
4. Savini G, Barboni P, Carbonelli M, Hoffer KJ. Accuracy of Scheimpflug corneal power measurements for intraocular lens power calculation. *J Cataract Refract Surg.* 2009;35(7):1193-1197.
5. Kim SW, Kim EK, Cho BJ, et al. Use of the Pentacam true net corneal power for intraocular lens calculation in eyes after refractive corneal surgery. *J Refract Surg.* 2009;25(3):285-289.

Reply:

We thank Gaskin et al for their comments. The results of their study echo our conclusion that Pentacam data should be used with caution in intraocular lens calculations and keratorefractive surgery analysis.

Tansu Gonen, MD
Tekirdag, Turkey
C. Banu Cosar, MD
Istanbul, Turkey

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