Color LED Reflection Topography: Validation of Equivalent Keratometry Reading (EKR) for IOL Power Calculation in Post-Myopic Excimer Surgery Eyes

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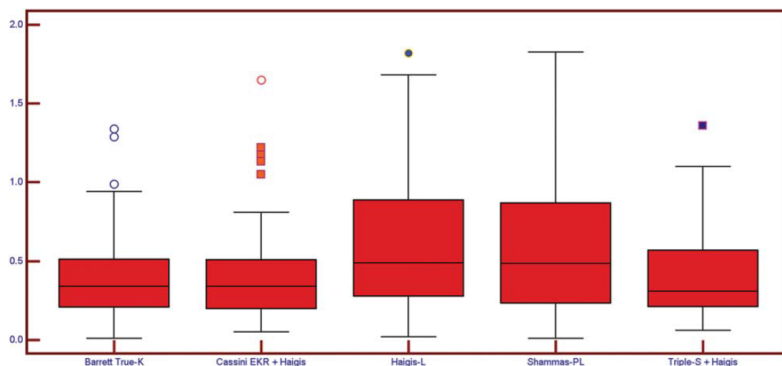*Cassini Topographer user*

PURPOSE

To evaluate the accuracy of the equivalent keratometry reading (EKR) derived from Cassini color LED topography, combined with the standard Haigis formula, for intraocular lens power calculation in eyes with previous myopic excimer laser surgery, and to compare its performance with established no-history methods (Barrett True-K, Haigis-L, Shammas-PL, and Triple-S).

METHOD

Retrospective case series of 37 eyes with prior myopic LASIK/PRK that later underwent cataract surgery. All eyes had optical biometry and good postoperative visual acuity (≥ 20/40). IOL power was calculated using: (1) Cassini EKR + standard Haigis formula (with constants optimized for virgin eyes), (2) Barrett True-K (no-history), (3) Haigis-L, (4) Shammas-PL, and (5) Triple-S combined with Haigis.

RESULTS

Haigis-L, Shammas-PL, and Barrett True-K produced significantly myopic mean PEs (different from zero, P < .01), whereas Cassini EKR + Haigis and Triple-S + Haigis yielded mean PEs not significantly different from zero, indicating reduced systematic bias. The MedAE values were approximately 0.34 D for Cassini EKR + Haigis and Barrett True-K, ~0.49 D for Haigis-L, ~0.48 D for Shammas-PL, and ~0.31 D for Triple-S + Haigis. Overall, repeated-measures ANOVA showed significant differences among the PEs of all methods (P < .0001).

Box-and-whisker plot showing the distribution of the absolute prediction errors from the 5 IOL power calculation methods analyzed (left to right) Barrett True-K, Cassini EKR + Haigis, Haigis-L, Shammas-PL, Triple-S + Haigis. The central box shows the values from the 25th to the 75th percentile (lower to upper quartile), and the middle line is the median value.

CONCLUSION

The combination of Cassini EKR with the standard Haigis formula provides refractive outcomes comparable to leading no-history formulas for IOL power calculation after myopic laser surgery, with minimal systematic bias. Cassini EKR offers a practical, device-based solution for post-refractive IOL planning that can integrate into existing workflows without recalibrating lens constants for altered corneal geometry.