

- Accuracy of Power Calculations for IOLs Greater Than 40.0 D

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Purpose

To investigate the accuracy of power calculations in predicting refractive outcome in eyes requiring intraocular lenses (IOL) greater than 40 diopters (D) in power and to evaluate factors contributing to prediction errors.

Methods

Data on 20 eyes of 20 patients were retrospectively evaluated using Haigis and Hoffer Q IOL calculation formulas. The mean refractive prediction error (RPE) and median absolute error (MAE) with respective standard deviations (SD) were compared using single IOL platform of MIOL-2 (Reper). Paired correlations and multiple regression modeling were used to derive relationship between MAE and following variables: patient gender and age, preoperative spherical equivalent, average keratometry, anterior chamber depth (ACD), lens thickness, axial length. Mean IOL power was 50.5 D (range 40-59), mean axial length was 16.89 mm (range 14.79-19.69).

Results

For Haigis formula RPE averaged $+1.36 \pm 4.08$ D (range - 9.00/+ 11.63 D), MAE – 2.48 D. For Hoffer Q formula mean RPE was $+1.41 \pm 5.25$ D (range - 14.68/+ 10.56 D), MAE – 3.31 D. The difference between MAEs were significantly different by Wilcoxon signed-rank test ($p = 0.028$). Pairwise correlations were significant for ACD ($R = -0.69$, $p = 0.001$) and patient age ($R = 0.56$, $p = 0.011$). However, all of the tested variables failed to demonstrate significant association with MAE in linear regression model.

Conclusion

Refractive prediction errors for high power IOLs are quite significant and need improvement. Haigis formula appeared to provide more accurate and less variable results. Shallow anterior chamber depth and patient age significantly worsen prediction variability.

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