Accuracy in astigmatism correction

Improving outcomes when steep axis is not vertically aligned

Seeing beyond

Source

Title
Accuracy of Toric Intraocular Lens Formulas With Measured Posterior Corneal Astigmatism of Different Orientations

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Methodology

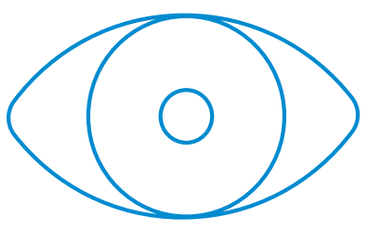
Set-up

Prediction errors (PE) for **postoperative refractive astigmatism** at 4 weeks postoperatively were determined using vector analysis and compared for the following toric intraocular lens power formulas:

- Barrett Toric with predicted posterior corneal astigmatism (PPCA)
- Barrett Toric with measured posterior corneal astigmatism (MPCA)
- EVO Toric PPCA
- EVO Toric MPCA
- Holladay I with Abulafia-Koch regression

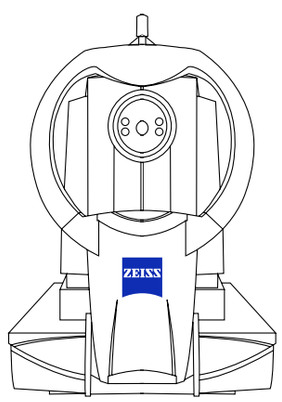
Subgroup analysis compared PEs for eyes with a vertically orientated (60° to 120°) steep axis of posterior corneal astigmatism (PCA) to those with a non-vertically orientated steep axis of PCA.

Sample Size



418 eyes of
344 patients

Used ZEISS device



ZEISS IOLMaster 700 with Total Keratometry (TK®)

Results

In cases where the steep axis of posterior corneal astigmatism is not vertically aligned, using measured posterior keratometry values, improves predictive accuracy.

- **Keratometry:** 48% of eyes had with-the-rule standard keratometry, while 91% had a steep posterior vertical axis.
- **Mean Absolute Error (MAE):** For eyes with a non-vertically oriented steep axis of PCA, the MAE was lower for formulas with MPCA but the differences were not statistically significant.
- **Centroid Error:** For eyes with a non-vertical PCA steep axis the EVO-MPCA and Barrett MPCA had the smallest centroid error ($P < .01$).
- **Distribution of the postoperative refractive astigmatism predictions:** for eyes with a non-vertical PCA steep axis, the formulas with MPCA had a higher percentage of eyes with refractive astigmatism prediction error within 0.5 D, however the differences were not statistically significant.

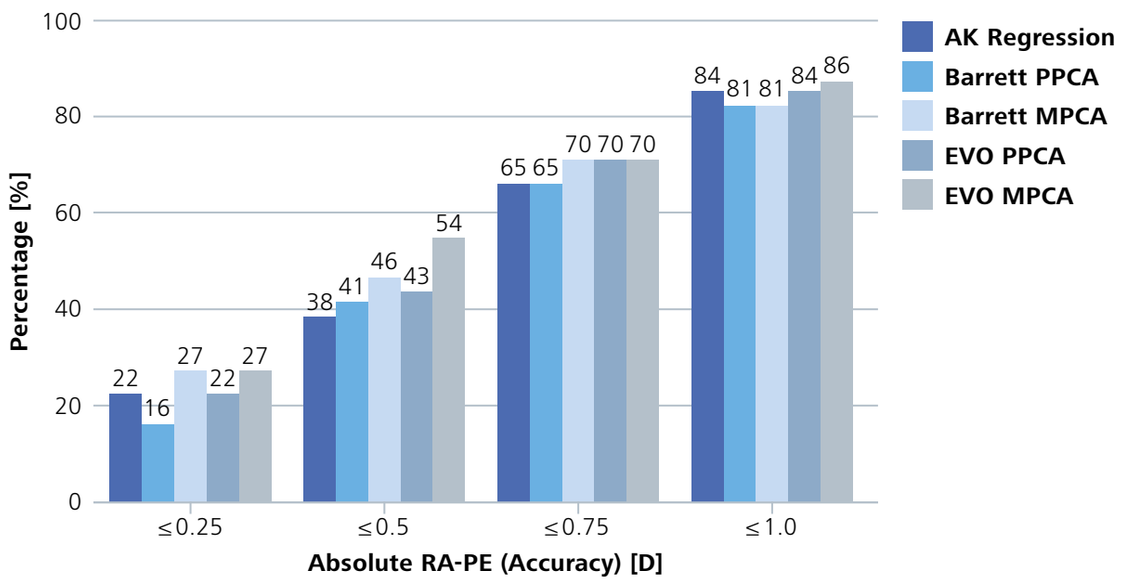


Figure 1: Percentage of eyes with absolute refractive astigmatism prediction error (RA-PE) within 0.25/0.50/0.75/1.00 D for eyes with non-vertical steep axis of PCA

For further details see publication

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