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Ocular Biometry Changes in Axial Length and Keratometry over Time

Surendra Basti MD, Nicholas Chan MD, Reeti Gulati BS

Northwestern University Feinberg School of Medicine

SB is a consultant of Johnson & Johnson Corporation.

Purpose

- Repeating biometry before cataract surgery in second eye is typically done when second eye surgery is more than a year after first eye.

- Research question: How much do biometry parameters axial length (AL) and average keratometry (KER) change in adults?

Methods

- Retrospective review of biometry data between 2016-2020.
- All measurements taken with IOL Master 700 at Northwestern Memorial Hospital
- Excluded eyes with prior ocular surgery
- Linear mixed model used to compare AL and Ker measurements between timepoints

Results

- Total of 201 patients (402 eyes)
- Mean age 73.3, 59.3% female
- Mean time between biometry measurements 21.5 months

Results continued

- Mean change in AL 0.04 mm (95% CI 0.03-0.05, p=0.1)
- Change in Axial length1-2 yrs (0.05 mm, n=201), 2-3 yrs (0.03 mm, n=87), 3-4 yrs (0.04 mm, n=38)
- Mean change in K 0.10 diopters (95% CI -0.10-0.30, p=0.5)
- No correlation between time and change in AL (p=0.7) and time and keratometry (p=0.98)

Time b/t biometry	n	Δ AL (mean, 95% CI), mm	p-value
Total	402	0.04 (0.03 to 0.05)	0.10
6 – 12 months	73	0.04 (0.02 to 0.05)	0.40
1 – 2 years	204	0.05 (0.03 to 0.06)	0.26
2 – 3 years	87	0.03 (0 to 0.05)	0.39
3 – 4 years	38	0.04 (-0.02 to 0.09)	0.70

Table 1. Mean change in AL by interval time. The table above depicts the mean change in axial length for groups of individuals separated by specific time interval groups. The overall mean change in AL was 0.04 mm (95% CI: 0.03 to 0.05).

Axial length (mm)	n	Δ AL (mean, 95% CI), mm	p-value
<22 ‘hyperopia’	19	0.04 (-0.02 to 0.10)	0.10
22 – 24.5 ‘average’	189	0.04 (0.02 to 0.10)	0.17
24.5 – 26.5 ‘mild myopia’	171	0.04 (0.02 to 0.05)	0.30
>26.5 ‘high myopia’	23	0.07 (0 to 0.15)	0.06

Table 2. Mean change in AL by degree of myopia. The table above depicts the mean change in axial length for groups of individuals separated by degree of myopia.

Time b/t biometry	n	Δ KER (mean, 95% CI), diopters	p-value
Total	402	0.01 (-0.03 to 0.04)	0.50
6 – 12 months	73	0.01 (-0.05 to 0.08)	0.27
1 – 2 years	204	-0.03 (-0.08 to 0.02)	0.16
2 – 3 years	87	0.01 (-0.07 to 0.10)	0.48
3 – 4 years	38	-0.01 (-0.10 to 0.08)	0.54

Table 3. Mean change in KER by interval time. The table above depicts the mean change in keratometry for groups of individuals separated by specific time interval groups. The overall mean change in KER was 0.01 mm (95% CI: -0.03 to 0.04).

Literature Review: Changes in biometry parameters in adults

- Prospective 5 year study of 5190 patients
- No significant changes in axial length or keratometry over 5 year period
- Greatest change noted in myopic individuals (mean 0.046 mm over 5 years)

Hashemi et al: Five year change in refraction and its ocular components in 40-64 year old patients of Shahroud eye cohort study. Clin Exp Ophthalmol 2016; 44**:6**69-77

Literature Review: Changes in biometry parameters in adults

- Prospective 6 year study of 1300 patients
- Increase in axial length & keratometry over 6 year period
- Two measurements were taken with different devices and a conversion factor was used.

Han et al; PLoS One 2017 e0183364

Conclusions

- Repeating biometry when second eye surgery is within 4 years may not be necessary in most eyes.
- Repeating biometry annually may be relevant in premium IOL patients.
- Repeating biometry likely meaningful in high myopia.

- **Limitations:**
  - Small sample size (201 patients)
  - Relatively short interval between measurements (majority of eyes within 3 years)
  - Data from paired eyes used

Thank You!

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