STANDARD KERATOMETRY COMPARED TO TOTAL KERATOMETRY IN TORIC INTRAOCULAR LENS CALCULATION BY A SWEPT SOURCE OPTICAL COHERENCE TOMOGRAPHY BIOMETER

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INTRODUCTION

Cataract surgery has progressed from a basic operation to correcting all refractive problems in addition to removing the clouded crystalline lens. allowing for a complete restoration of vision with high degrees of spectacle independence.

Astigmatism is a meridian-dependent refractive defect that affects the majority of people's eyes. Some studies have shown that 30%, 22% and 8% of patients with cataract have more than 0.75 diopters (D), 1.50 D and 2.00 D of corneal astigmatism, respectively.

In the current phacoemulsification era, the most frequent approach for treating pre-existing corneal astigmatism is to implant toric intraocular lenses (IOLs).

Optical biometry has shown to be more accurate and safer than ultrasonic biometry for biometric measurement of the eye. As a result, optical biometry has grown increasingly popular. Among them, is IOL Master 700 based on SS-OCT which has of measuring the Total Keratometry (the anterior and posterior surfaces of the cornea).

AIM OF THE WORK

The aim of the work was to compare the standard keratometry to total keratometry in toric intraocular lens calculation by a swept source optical coherence tomography biometer.

SUBJECTS AND METHODS

Subjects: This study included 30 eyes of 30 patients who underwent uneventful phacoemulsification surgery with implantation of toric IOL and with the following criteria: Patients with visually significant senile cataract, regular corneal astigmatism ranging from one to four diopters and axial length between 19 to 24 millimeters.

Methods: This study was conducted as a prospective interventional study on patients presenting to and operated upon in the Ophthalmology Department of Alexandria Main University Hospital. The procedure was explained to eligible subjects and written informed consent was provided by all patients before enrollment in the study

The IOL Master 700 was used, to measure different parameters and calculate the toric intraocular lens (IOL) power using the Barrett formula.

In IOL Master 700 standard k group, the anterior keratometry was used.

In IOL Master 700 total k group, the total keratometry was used taking into consideration the posterior corneal astigmatism .

Then all patients were consecutively assigned for IOL implantation according to the biometry from the IOL Master 700 with toricity calculated using the online Tecnis Toric IOL Calculator as follows; In the total keratometry group, IOL Master 700 total k measurements were used.

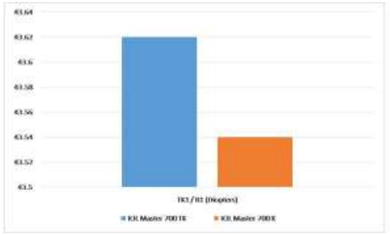
Manifest refraction and spherical equivalent data was collected and compared to preoperative manifest refraction and the expected residual spherical equivalent predicted by both the IOL Master 700 standard k and the IOL Master 700 before the surgery.

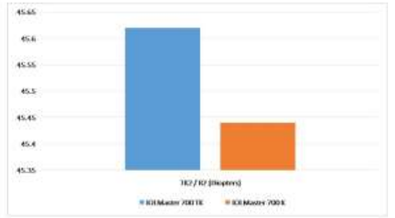
RESULTS

Table: Study patients' biometric characteristics

Biometric characteristics	IOLMaster 700 TK	IOLMaster 700 K	p-value
TK1 /R1(Diopters) Min.–Max.	40.51–46.52	40.94–46.2	
Mean±SD.	43.62±1.4	43.54±1.4	
Median	43.61	43.4	0.852
Axis (degrees) Min.–Max.	13.0–173.0	25.0–173.0	
Mean±SD.	100.2±34.1	102.5±33.4	
Median	94.4	93.5	0.784
TK2 /R2(Diopters) Min.–Max.	43.32–47.01	43.32–47.24	
Mean±SD.	45.62±1.3	45.44±1.2	
Median	45.44	45.55	0.583
Axis (degrees) Min.–Max.	1.0–174.0	1.0–181.0	
Mean±SD.	82.43±74.4	90.62±73.2	
Median	75.4	82.4	0.637
TSE/R(Diopters) Min.–Max.	42.44–47.14	42.35– 46.96	
Mean±SD.	44.65±1.4	44.48±1.3	
Median	44.41	44.34	0.682
Astigmatism Magnitude (Diopters)			
Min.–Max.	1.0 – 4.97	1.01–4.63	
Mean±SD.	-2.0 ±0.7	1.7±0.8	
Median	-1.7	1.7	0.627
Axis (degrees) Min.–Max.	13– 175	1.0–180.1	
Mean±SD.	100.5±35.1	90.5±74.3	
Median	93.4	82.4	0.538

- Min-Max: Minimum–maximum
- SD.: Standard deviation
- TK: Total keratometry
- TSE: Total spherical equivalent





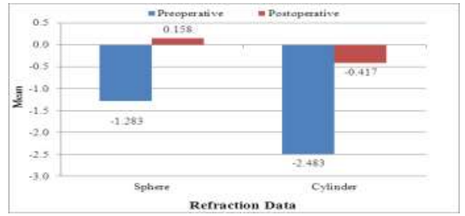


Figure 1: Comparison between the two techniques according to Curvature power of the flat meridian of the cornea.

Figure 2: Comparison between the two techniques according to Curvature power of the steep meridian of the cornea.

Figure 3: Comparison between the Preoperative and Postoperative refraction data

CONCLUSION

-After phacoemulsification of senile cataract in eyes with corneal astigmatism, optical rehabilitation with toric IOL implantation is extremely safe, effective, predictable, and stable in attaining low postoperative refractive error and excellent postoperative visual acuity in operated eyes.

-For phacoemulsification of senile cataracts in eyes with corneal astigmatism, the Barret formula is excellent for calculating toric IOL power.

-Based on biometric calculations, the IOL Master 700 total keratometry and standard keratometry, there is no practical difference in the postoperative results of toric IOL implantation for phacoemulsification of senile cataract in eyes with corneal astigmatism.