

A COMPARATIVE STUDY BETWEEN LENSTAR LS 900 AND IOLMASTER 700 FOR TORIC INTRAOCULAR LENS POWER CALCULATION

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INTRODUCTION

Cataract surgery evolved dramatically from a simple procedure of removing the clouded crystalline lens to a method that additionally aims to correct all refractive errors, allowing a perfect restoration of the visual function with high levels of spectacle independence. Astigmatism is a meridian-dependent refractive error, which is found in most human eyes. A large proportion of patients with cataract have corneal astigmatism ranging from 0.75 to 2.00 diopters (D). Nowadays, implanting toric intraocular lenses (IOLs) remain the most common procedure to treat pre-existing corneal astigmatism during phacoemulsification. Ocular biometric measurements are crucial in the calculation of IOL power before cataract surgery. Optical biometry has been demonstrated to be more accurate and safer than ultrasonic biometry, which is likely accompanied by the risk of infection and indentation due to contact measurement. Among optical biometric devices, there are the Lenstar LS 900, based on optical low-coherent reflection and IOLMaster 700, based on SS-OCT. The later has an advantage of measuring the Total keratometry using SS-OCT.

AIM OF THE WORK

The aim of this work is to compare the LENSTAR LS 900 and the IOLMASTER 700 in toric intraocular lens power calculation.

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 five diopters and axial length between 19 to 24 millimeters. **METHODS:** This was conducted as a prospective interventional study on patients presenting to and operated upon in the Ophthalmology Department of Alexandria Main University Hospital (AMUH). All patients before enrollment in the study provided written informed consent. The IOLMaster 700 and the LENSTAR LS 900 were used in each patient, on the same visit, to measure different parameters and calculate the toric IOL power using the Barrett formula. For the Lenstar LS 900, the T-cone was used to measure the anterior corneal astigmatism and for the IOLMaster 700, the total corneal astigmatism was measured based on SS-OCT.

Then all patients were consecutively assigned for IOL implantation according to the biometry from the IOLMaster 700. Manifest refraction and spherical equivalent data taken at one month were compared to preoperative manifest refraction and the expected residual spherical equivalent predicted by both the LENSTAR LS 900 and the IOLMaster 700 before the surgery.

RESULTS

Table: Study patients biometric characteristics

Biometric characteristics	IOL Master 700	Lenstar LS 900	p-value
TK1 / R1 (Diopters)			
Min. – Max.	40.52 – 46.51	40.95 – 46.3	0.8144
Mean ± SD.	43.66 ± 1.5	43.57 ± 1.5	
Median	43.73	43.5	
Axis (degrees)			
Min. – Max.	13.0 – 174.0	25.0 – 177.0	0.804
Mean ± SD.	100.4 ± 35.1	102.6 ± 33.3	
Median	93.5	92.5	
TK2 / R2 (Diopters)			
Min. – Max.	43.38 – 48.01	43.36 – 47.73	0.5307
Mean ± SD.	45.66 ± 1.2	45.46 ± 1.2	
Median	45.45	45.51	
Axis (degrees)			
Min. – Max.	1.0 – 179.0	1.0 – 180.0	0.6665
Mean ± SD.	82.43 ± 72.4	90.63 ± 74.2	
Median	75.5	82.5	
TSE / R (Diopters)			
Min. – Max.	42.43 – 47.15	42.36 – 46.94	0.6713
Mean ± SD.	44.63 ± 1.3	44.49 ± 1.3	
Median	44.40	44.36	
Astigmatism Magnitude (Diopters)			
Min. – Max.	(-4.95 – -1.0	1.01 – 4.61	0.6361
Mean ± SD.	-2.0 ± 0.8	1.8 ± 0.9	
Median	-1.8	1.6	
Axis (degrees)			
Min. – Max.	13 – 174	1.0 – 180.0	0.5157
Mean ± SD.	100.4 ± 35.1	90.6 ± 74.2	
Median	93.5	82.5	

Min-Max: Minimum – maximum SD.: Standard deviation

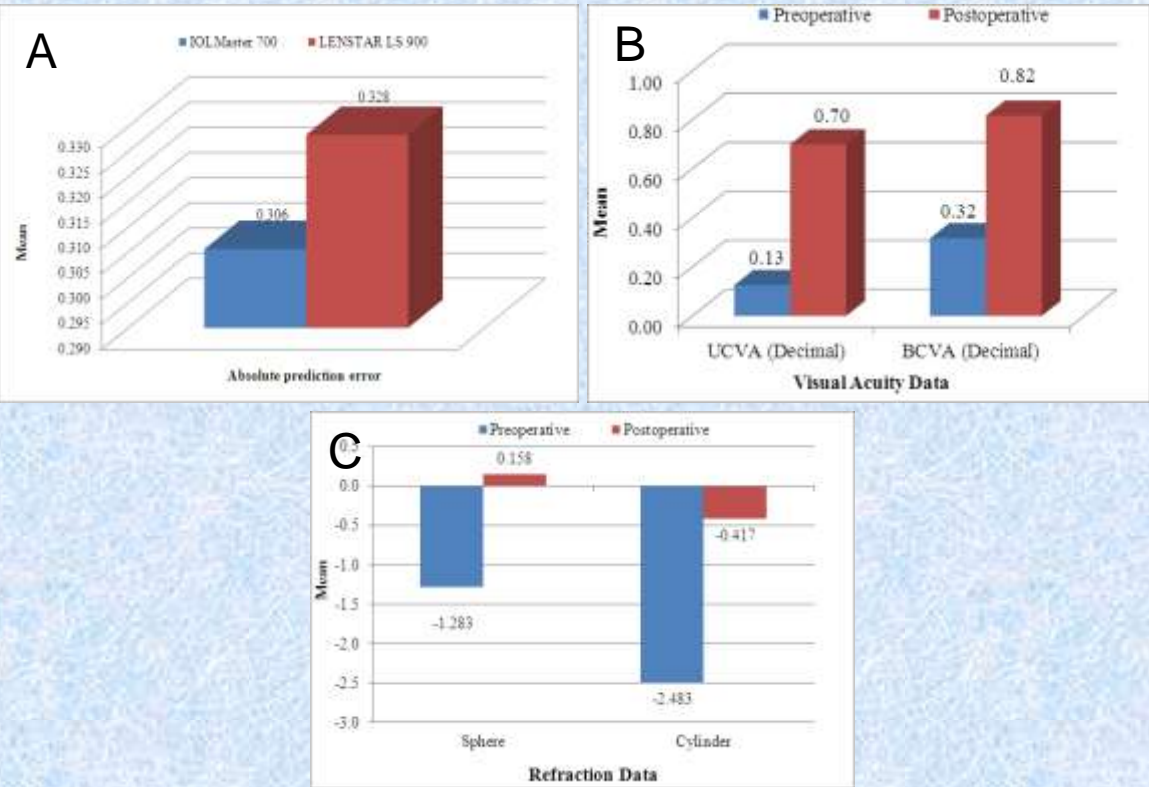


Figure (1): A) Comparison between the two machines according to Absolute Prediction Error. B) Comparison between the Preoperative and Postoperative visual acuity data C) Comparison between the Preoperative and Postoperative refraction data.

CONCLUSION

- Optical rehabilitation by toric IOL implantation after phacoemulsification of senile cataract in eyes with corneal astigmatism is highly successful in achieving minimal postoperative refractive error and optimal postoperative visual acuity in operated eyes.
- The predictability of both the IOLMaster 700 and the Lenstar LS 900 for postoperative refraction of eyes implanted with toric IOLs is high and the two machines yield closely similar results.
- There is no practical difference in the postoperative outcomes of toric IOL implantation for phacoemulsification of senile cataract in eyes with corneal astigmatism based on biometric calculations of either machines, the IOLMaster 700 and the Lenstar LS 900.