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A Prospective Observational Study to Assess the Efficacy of Image Guided System - Verion as a Predictor of Post Operative Refractive Outcome in Cataract Surgery

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Abstract: ***Title: "A Prospective Observational Study To Assess The Efficacy Of Image Guided System – Verion As a Predictor Of Post Operative Refractive Outcome In Cataract Surgery" Methods: A Hospital based, prospective observational study on patients who presented with diminution vision due to cataract with sample size of 100 eyes carried out from December 2019 to May 2021 at Rotary Eye Institute, Navsari. After complete history taking , complete ophthalmic examination was done, blood Investigations were done. IOL was implanted according to Verion calculations. The post-operative final refractive error was assessed by objective refraction on Topcon autokeratorefractometer along with subjective testing and was compared with Verion predicted post-operative refractive error.Results: In our study, IOL Master and the VERION systems have a place in the prediction of postoperative spherical cylinder and cylinder axis outcomes compared with Autokeretorefractometer (Topcon KR 800) readings (objectively) after cataract surgery, as post- operatively there is no statistical difference between VERION expected spherical cylinder, cylinder axis and Post-operative Autokeratorefractometer (Topcon KR 800) spherical cylinder and cylinder axis. Conclusions- The Verion is thenew technology to give reliable expected refractive outcome. The Verion and IOL Master together can be used for achieving near emmetropia post operatively, and for better suggestion of IOL power. In addition to its role in astigmatism management, the VERION may be used to help refine postoperative spherical refractive predictions from the IOLMaster. The VERION system has high repeatability and agreement with the IOLMaster, making it suitable as an alternative tool in clinical practice.***

Keywords: Catarcat, Verion, IOL Master

1. Introduction

Cataract is the cause of nearly half of all cases of blindness and 33% of visual impairment worldwide.[(1)]

The VERION Image Guided System is the unique imaging, planning, and surgical guidance component of new Cataract Refractive Suite. The goal of the VERION Image Guided System is to help surgeons reduce the possibility of human calculation, input, and surgical error throughout the diagnostic, planning, and execution stages of cataract surgery. By automating certain steps of the cataract surgery process, the VERION Image Guided System creates the possibility for improved cataract refractive outcomes and engenders greater confidence in surgeon.

The aim of the study is to assess the efficacy of image guided system – verion as a predictor of post operative refractive outcome in cataract surgery .

2. Materials and Methodology

Patients with different grades of cataract who were operated in *Rotary Eye Institute, Navsari* were taken for study. Duration of study was June 2019 to June 2021 . Sample size was 100 eyes with cataract .Hospital based, observational, prospective study was done in Rotary Eye Institute, Navsari, Gujarat . Convenient method of sampling has been done.

Inclusion Criteria: Patients ≥ 22 years of age at the time of surgery diagnosed with cataract and to undergo cataract surgery and implantation of FOLDABLE IOL. Clear intraocular media other than cataract in study eye. Willing and able tocomplete all required postoperative visits. Able to comprehend and sign a statement of informed consent.

Exclusion Criteria: Significant irregular corneal astigmatism as assessed by the index relevant to the corneal topographer and investigator judgement of the topography maps. History of or current severe dry eyes. Retinal/uveal pathology or concurrent ocular disease. Previous corneal transplant. Previous retinal detachment. Recurrent severe anterior or posterior segment inflammation of unknown aetiology. Any other ocular condition or systemic co-morbidity that the Investigator determines would confound the results of this study or would prohibit completion of the study assessments.

The following evaluation was done in each case pre-operatively.

Best corrected Visual acuit,Detailed anterior segment examination on slit lamp, Intra-ocular tension, Endothelial Count, Posterior segment examination using +78D and +90D,Keratometry, Ascan, IOL Master, Verion image guided system, Blood Investigations like CBC, RBS, HIV and HBSAg were done.

The patients were examined with both IOL MASTER 500 AND VERION IMAGE GUIDED SYSTEM the same examiner and then followed-up approximately 60 days post-operatively by the same examiner on the VERION image guided system, as well as the Topcon KR-800S auto refractometer. Calculations for the predictive spherical

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outcome values for both the IOLMaster and VERION systems were made using the BARRETT and SRK/T formula.

3. Results and Observations

A prospective, observational, non-randomized study conducted on 100 eyes, who underwent cataract surgery, and IOL was implanted according to Verion image guided system.

Table 1: Distribution of patients by gender

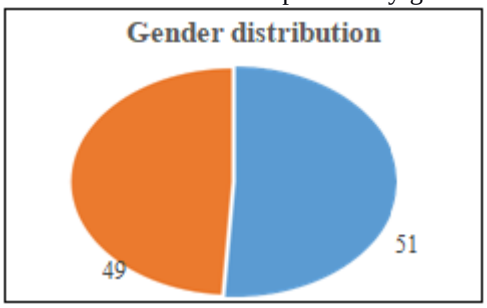

Table 2: Comparison of mean IOL power calculation by IOL MASTER 500 and Verion

Operator	N	Mean	p- value
Verion	100	22.36±2.15	0.76
IOL Master	100	22.34±2.07	

Table 3: Comparison of mean value of Verion expected spherical andpost-operative spherical power according to AR

Operator	N	Mean ±SD	p- Value
Verion ExpectedSpherical Power	100	-0.17±0.40	0.3
Post Op ArSpherical	100	0.81±9.52	

Table 4: Comparison of mean value of V er ion expected cylinder and post-operative cylindrical power according to AR

Operator	N	Mean ±SD	p- Value
Verion	100	-0.72±0.52	0.33
ExpectedCylinder			
Post	100	-1.2±4.95	
Operative AR Cylinder			

Table 5: Comparison of mean value of Verion expected cylinder axis and post-operative cylinder axis according to AR

Operator	N	Mean±SD	p- Value
Verion	100	88.24±36.75	0.015
Expected			
Cylinder 'S			
Axis			
Post	100	74.60±44.55	
Operativear Clylinder's			
Axis			

Table 6: Comparison of mean value of verion expected spherical and post-operative spherical power according to ST

Operator	N	Mean ±SD	p- Value
Verion	100	0.17±0.40	0.05
Expected			
Spherical			
Post	100	0.04±0.21	
Operative			
ST Spherical			

Table 7: Comparison of mean value of Version expected cylinder and post operative cylindrical power according to ST

Operator	N	Mean ±SD	p- Value
Version	100	-0.72±0.52	0.05
Expected			
Cylinder			
Post	100	-0.50±0.50	
Operative			
ST			
Cylinder			

Table 8: Comparison of mean value of Version expected cylinder's axis and post-operative cylindrical's axis according to ST

Operator	N	Mean ±SD	p- Value
Verion	100	88.24±36.75	0.05
Expected			
Cylinder's Axis			
Post	100	52.24±45.89	
Operative			
ST			
Cylinder's Axis			

4. Discussion

IOL power calculation in cataract surgery requires accurate biometric measurement, and currently, various platforms are available to achieve the goal. Keratometry values often vary with different measurement platforms, and effective correction of corneal astigmatism depends on accuracy of the preoperative keratometry measurements; thus, the agreement among biometers is key to optimize our results. Assessing the suitability of the new device in cataract surgery relies upon high repeatability ofmeasurements and post-operative outcomes, which has been well established for the IOL Master500, with several papers within the literature demonstrating high repeatability of keratometric measurements.

In our study, excellent repeatability and reproducibility were found for all variables measured by the Verion - Image-guided system. These findings are in concordance with data reported recently by Mueller et al. [33] in terms of high repeatability. Similarly, Nemeth et al reported a high repeatability and agreement with the IOL Master 500, which is consider the gold standard for preoperative biometric measurements [30].

In a recent study, the VERION system was shown high repeatability of keratometric measurements and white-to-white distance measurements with high correlations of these measurements compared to those from the IOL Master. A few outliers within this study highlighted the fact that the IOL Master and VERION sometimes measured different keratometric parameters. The reason why Verion could throw difference in keratometry values in comparison with other platforms like IOL MASTER 500 probably lies in the diameter analysed; Verion measures a smaller central area (0.8–1.2 mm) and IOL Master 500 (2.5 mm). Therefore revealed the need for further studies to determine a potential preference for systems to be used in cataract surgery by assessing post-operative results. [30]

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Our study out of 100 patient‘s eyes, 51(51%) were female‘s eye & 49(49%) were male‘s eye. Results shows that both the IOLMaster and the VERION systems have a good place in the prediction of postoperative spherical, cylinder and cylinder axis outcomes compared with post operative Autokeretorefractometer readings (objectively) , as post-operatively there is no statistical difference between VERION expected spherical, cylinder and Post operative Autokeratorefractometer. spherical, cylinder and cylinder axis.

Verion expected spherical power (M= -0.17,SD=.0.40)and post operative AR spherical power (M=0.81, SD=9.52), VERION cylinder power (M= -0.17,SD = 0.52) and post operative cylindrical power according to Autokeretorefractometer (M= -1.22,SD = 4.95).

Where as a significant difference In Verion expected cylinder axis (M=88.24,SD=36.75)and post operative AR cylinder’s axis (M= 74.60,SD= 44.55).

Where as in comparison of VERION prediction with subjective testing , there was significant difference in spherical power (M= -0.17, SD= 0.40)(M= -0.04,SD= 0.21) ,cylindrical power (M= - 0.72,SD= 0.52) (M= -0.50,SD=0.50) and axis of cylinder (M= 88.24, SD= 36.75), (M=52.24,SD=45.89).

Given that both the VERION and the IOL Master are accurate, we intended to look at both predictions when planning for cataract surgery. It was found that sometimes having two machines allows for further refinement of spherical outcome .The VERION system still requires axial length values to be inputted from another device, the IOLMaster being used in this study. Thus, for the same A constant, any differences in postoperative expected outcomes must be explained by differences in the actual measurements of the keratometry.

Therefore, Verion has demonstrated a clinically acceptable repeatability in keratometry measurements, making it suitable as an alternative biometric tool in clinical practice.

5. Conclusions

The VERION is the new technology to give reliable expected refractive outcome. The VERION IMAGE GUIDED SYSTEM and IOL Master 500 together can be used for achieving near emmetropia post operatively, and for better suggestion of IOL‘s.

In our study, IOLMaster 500 and the VERION have a place in the prediction of postoperative spherical cylinder and cylinder axis outcomes compared with Autokeretorefractometer (Topcon KR 800) readings after cataract surgery, as post- operatively there is no statistical difference between VERION expected spherical cylinder, cylinder axis and post operative Autokeratorefractometer (Topcon KR 800) spherical cylinder and cylinder axis.

There is a strong correlation between the IOL Master 500 and the VERION keretometric readings. There was no significant difference in accuracy between the two systems. In addition to its role in astigmatism management, the VERION may be used to help refine postoperative spherical refractive predictions from the IOLMaster 500.

The VERION system has high repeatability and agreement with the IOLMaster 500, making it suitable as an alternative tool in clinical practice. We can rely on new devices that can effectively measure the corneal power and axis, but also assess the surgical planning process to obtain a better visual outcome.

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