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Comparison of pre-operative and post-operative keratometry, spherical refractive outcome in post cataract surgery

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Abstract
Background: According to the World Health Organization, cataracts are the leading cause of blindness worldwide, affecting about 20 million people, and is responsible for 51% of blindness [1, 2] Lifestyle nowadays have become more active, which requires quality of vision. but due to cataract there quality of vision reduces the main purpose of the study is to find out pre and postoperative astigmatism measured with IOL Master to the preoperative astigmatism values and to find out postoperative refractive error in which any spherical value present or not.
Method: This study was done in Rotary Eye Institute, Navsari in time period of August 2019 to January 2020. This retrospective and prospective study have included 100 eyes. Patient have undergone detailed history, torch light, subjective refraction, objective refraction, slit lamp examination, and detailed fundus examination. Patient diagnosed with cataract had undergone preoperative cataract evaluation. IOL power have been measured with A-scan and IOL Master and final IOL power was decided. Post-operative spherical power was assessed by subjective test after two month. Pre and post-operative astigmatism was assessed by IOL Master after two month.
Result: For comparing preoperative and postoperative astigmatism and postoperative refractive errors, we used "paired T-test": Tstat 1.83<Tcritical 1.98 of K1 pre and post cataract surgery and Tstt 1.15< Tcritical 1.98 of K2 pre and post cataract surgery. (p=0.034599(k1) and p=0.126423(K2) respectively. around 18.08% of patients (no of patients-17) have spherical power, 24.46% of patients (no of patients-23) have less than 0.50D cylinder power, 29.78% of patients (no of patients-28) have less than 1.00D cylinder power, 31.91% of patients (no of patients-30) have more than 1.00D cylinder power post operatively.
Conclusion: We obtained that there was variation between pre and post-operative keratometry in phacoemulsification technique. It was also observed that spherical refractive outcome was 18% (table 9)

Keywords: world health organization, post-operative, refractive, patient diagnosed

Introduction

According to the World Health Organization, cataracts are the leading cause of blindness worldwide, affecting about 20 million people, and is responsible for 51% of blindness [1, 2] Lifestyle nowadays have become more active, which requires quality of vision. But due to cataract there quality of vision reduces. Cataract refers to the development of any opacity in the lens or it's capsule, which leads to the blurred or dim vision, difficulty in night vision, sensitivity to glare and light, halos around light, frequent change in refractive error, fading or yellowing of colors, double vision, etc. Cataract is not only the aging process, but it can even develop in younger age due to more sun exposure, UV light, steroid medication, eye injury, systemic illness like diabetes hypertension etc. at present time, cataract surgery is one of the most frequently performed and successful operations in the world. The techniques and results of cataract surgery have changed dramatically during the past three decades. The technique has moved from intracapsular cataract extraction (ICCE) to extracapsular cataract extraction (ECCE), phacoemulsification, and small incisions alone with advances in intraocular lens materials and designs, viscoelastic agents, topical anesthesia have increased safety and efficiency of cataract surgery and become the standards. Modern cataract surgery is considered a form of refractive surgery, aimed not only to restore visual clarity, but to provide excellent vision in refractive terms as well even when no intraocular lens (IOL) is implanted. There is an increasing patient demand to minimize postoperative refractive error during cataract surgery [3]. Residual astigmatism after cataract surgery may result in reduced unaided distance visual acuity, which in turn may hinder satisfactory postoperative refractive results. Spectacle independence for distance activities is unlikely unless patients achieve <=0.50 D of astigmatism after surgery [4] and the OR of needing spectacles has been found to increase significantly with each diopter of astigmatism. Currently, epidemiological evidence on the prevalence and severity of astigmatism prior to cataract surgery is mostly sourced from single-site, prospective or cross sectional studies [6, 10] In addition, there is very little epidemiological evidence on the prevalence and severity of residual astigmatism following cataract surgery [11]. Accurate calculations primarily depend on the accuracy of preoperative biometric data, this can be obtained by different techniques like, applanation, immersion A-scan and IOL masters. A-scan ultrasound is the traditional technique. It involves passing an ultrasonic beam via a transducer through the eye, and as this is returned after hitting intraocular structures a trace of ocular spikes is displayed on the monitor from the cornea to the orbital fat. Biometry values can be obtained either by contact (applanation), immersion methods. The cataract

/applanation technique is a widely used method which requires placing an ultrasound probe on the central cornea; this slightly indents the surface leading to various degrees of corneal compressions which may introduce errors into the values. The immersion A-scan biometry uses a saline filled sclera (Prager) shell between the probe and the eye; it is relatively observer independent. The IOL Master is a noncontact partial coherence interferometry (PCI) method. It uses infrared diode laser (λ 780 nm) of high special coherence and short coherence length (160 µm). The optical scan uses an external Michelson interferometer to split the infrared beam into coaxial dual beams allowing the technique to be intensive to longitudinal interface where the change in refractive index occurs. If the optical path length is within the coherence length interference signal is detected by a photo detector. These techniques measure axial length, anterior chamber depth which is required for the accurate calculation of intraocular lens (IOL) power necessary for attaining the desired postoperative refraction. But due to patients inappropriate sitting position, head posture, tremor, ocular disease that impairs fixation (macular degeneration or dense amblyopia), dense cataract this data can be varied, which will not lead to the targeted postoperative outcome. So the main purpose of the study is to find out pre and postoperative astigmatism measured with IOL Master to the preoperative astigmatism values and to find out postoperative refractive error in which any spherical value present or not.

Material and Methedology

Vision chart, trial set, retino scope, auto refracto meter, tonometer, slit lamp, indirect ophthalmoscope, Kerato meter, A-scan biometry, IOL Master, Intraocular Lens.

Inclusion criteria Age: gediatric group**,** Patient with cataract and whose IOL master readings were obtained.

Exclusion criteria: Ocular pathology other than cataract**,** any intra operative complication**,** LASIK**,** C_3R**.** This study was done in Rotary Eye Institute, Navsari in time period of August 2019 to January 2020.This prospective study have included 100 eyes. Patient have undergone detailed history, torch light, subjective refraction, objective refraction, slit lamp examination, and detailed fundus examination. Patient diagnosed with cataract had undergone preoperative cataract evaluation. Pre-operatively, all of subjects were examined by senior medical staff. After getting informed consent of patient, the pre-operative ocular examination was performed. The visual acuity was checked with snellen's latter chart and dot chart for illiterates. The objective refraction was done by using retinoscope, according to objective finding subjective test was performed. Anterior segment examination was performed with the use of slit lamp biomicroscopy, intra ocular pressure was measured using tonometer; posterior segment examination was performed using indirect ophthalmoscope. Intra ocular lens power was calculated on IOL Master and also using Immersion A-scan biometry with SRK.T (118.2) formula by optometrists. Keratometery was performed using IOL master. All necessary investigations i.e blood pressure, sac syringing, complete blood count, blood sugar were carried out. All surgeries were done under peribulbar anesthesia. IOL power have been measured with A-scan and IOL master and final IOL power was decided. Post-operative spherical power was assessed by subjective test after one month. Post-operative astigmatism was assessed by IOL master after one month.

Results and Observation

For comparing preoperative and postoperative astigmatism and postoperative refractive errors, we used "paired T-test": Tstat 1.83<Tcritical 1.98 of K1 pre and post cataract surgery and Tstt 1.15< Tcritical 1.98 of K2 pre and post cataract surgery. (p=0.034599(k1) and p=0.126423(K2) respectively. around 18.08% of patients (no of patients-17) have spherical power, 24.46% of patients (no of patients-23) have less than 0.50D cylinder power, 29.78% of patients (no of patients-28) have less than 1.00D cylinder power, 31.91% of patients (no of patients-30) have more than 1.00D cylinder power post operatively.

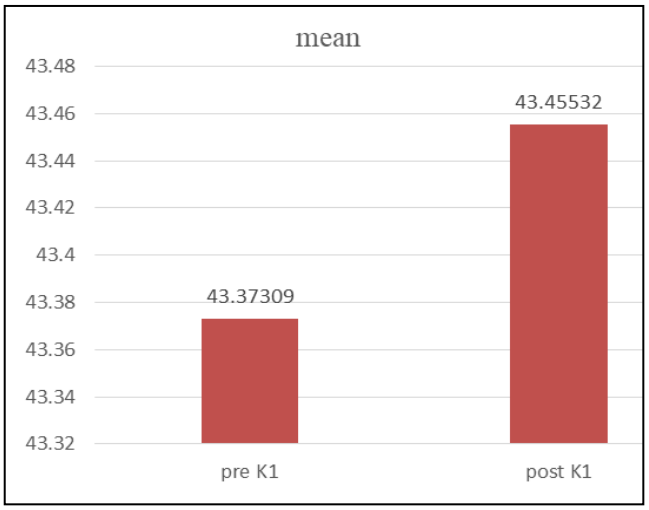

Fig 1

Table 1

Group	Mean
pre K1	43.37309
post K1	43.45532

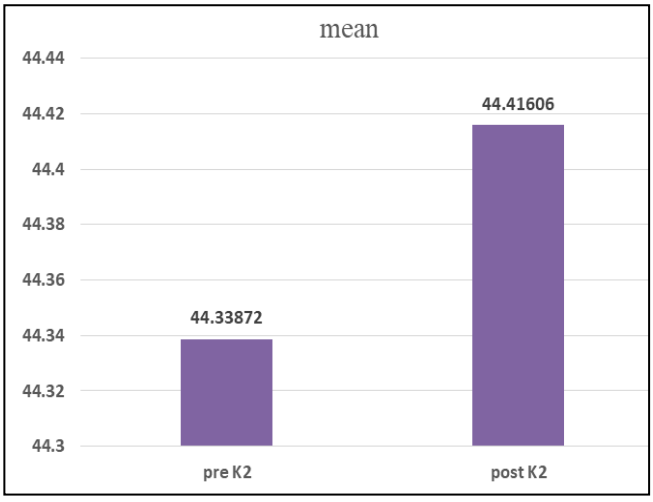

Fig 2

Table 2

Group	Mean
pre K2	44.33872
post K2	44.41606

Discussion

In our study there were 94 patients out of which 42 were female and 52 were male undergoing phacoemulsification cataract surgery. In this study we found out postoperative astigmatism measured with IOL Master to the preoperative astigmatism values and to found out postoperative refractive error in which any spherical value present or not. The similar study was done by Alexander C Day, Mukesh Dhariwal, Michael S Keith, Frank Ender, Caridad Perez Vives, Cristiana Miglio, Lu Zou, David F Anderson was conducted a study on Distribution of preoperative and postoperative astigmatism in a large population of patients undergoing cataract surgery in the UK. Eligible eyes included in the analysis were 110 468. Of these, 78% (n=85 650) had preoperative (corneal) astigmatism ≥0.5 dioptres (D), 42% (n=46 003) ≥1.0 D, 21% (n=22 899) ≥1.5 D and 11% (n=11 651) ≥2.0 D. After surgery, the refraction cylinder was available for 39 744 (36%) eyes receiving standard monofocal IOLs, of which 90% (n=35 907) had postoperative astigmatism ≥0.5 D and 58% (n=22 886) ≥1.0 D. Visual acuity tended to worsen postoperatively with increased astigmatism ($\rho=-0.44$, $P<0.01$). In previous study was done by Richard N. McNeely, Salissou Moutari, Eric Pazo and Jonathan E. Moore was conducted a study on investigating the impact of preoperative corneal astigmatism orientation on the postoperative spherical equivalent refraction following intraocular lens implantation. In eyes with axial lengths greater than 22.0 mm and less than 25.0 mm there was a significant difference between the magnitude of preoperative corneal astigmatism between groups 2 and 3 with 0.827±0.376 D in group 2, and 0.677± 0.387 D in group 3. The mean postoperative spherical equivalent (SE) prediction error was −0.132±0.475 -D in group 1, 0.026±0.497 D in group 2, and−0.130±0.477 D in group 3. There was a significant difference between groups 1 and 2. There was no significant difference in the magnitude of preoperative corneal astigmatism and postoperative SE prediction error between the anterior corneal astigmatism orientation groups in eyes with axial lengths of less than or equal to 22.0 mm and greater than or equal to 25.0 mm.In our study, we analysed Comparison of preoperative and postoperative astigmatism, Spherical refractive outcome post-surgery. Mean value of pre K1 astigmatism was (43.37) which differ significantly from post K1 astigmatism was (43.45) respectively, (p=0.034599). this data shown on table no. 3, mean value of pre K2 astigmatism was (44.33) which differ significantly from post K2 astigmatism was (44.41) respectively, (p=0.126423). This data shown table no. 4. From paired t-test we compare pre and post-operative astigmatism and observed that there was statistically significant difference between preoperative and postoperative astigmatism values Similarly, in our study we obtained the post-operative power around Spherical power: 18.08% (no of patients-17)< 0.50D cylinder: 24.46% (no of patients-23)< 1.00D cylinder: 29.78% (no of patients-28)> 1.00D cylinder: 31.91% (no of patients-30) Similarly, in our study we obtained around 28.38% (27 eyes) of IOL power were implanted according to the power calculated using IOL Master and 20.21% (17 eyes) of IOL power were implanted according to the immersion A-scan. We concluded that the IOL Master provides an accurate results in intraocular lens power calculation based on SRK/T formula. It is quick and easy to use and provides a non-contact technique with no risk of infection or corneal aberration.

Conclusion

This study included 94 eyes have cataract and were undergoing cataract extraction with phacoemulsification technique. In this study statistically significance difference was found between pre and post keratometry reading. In our study we concluded that there was variation between pre and post-operative keratometry in phacoemulsification technique.

References

1. Alexander C Day, Mukesh Dhariwal, Michael S Keith, Frank Ender, Caridad Perez Vives, Cristiana Miglio, *et al*. Anderson; Distribution of preoperative and postoperative astigmatism in a large population of patients undergoing cataract surgery in the UK. Br J Ophthalmol. 2019; 103:993-1000.
2. Elin Rydstr€om, Oscar Westin, Timo Koskela, Anders Behndig. Posterior corneal astigmatism in refractive lens exchange surgery. Acta Ophthalmol. 2016; 94:295-300.
3. Richard N, Mc Neely, Salissou Moutari, Eric Pazo, Jonathan E. Moore; Investigating the impact of preoperative corneal astigmatism orientation on the postoperative spherical equivalent refraction following intraocular lens implantation. McNeely *et al*. Eye and Vision. 2018; 5:7.
4. Basic and Clinical Science Course, Section 3: Clinical Optics (2011-2012 ed). American Academy of Ophthalmology, 2011, 211-223.
5. Roger F. Steinert; David F. Chang. Cataract surgery (3rd ed). Saunders, 2010.
6. Lee AC, Qazi MA, Pepose JS. "Biometry and intraocular lens power calculation". Current Opinion in Ophthalmology. 2008; 19(1):13-7.
7. Myron Yanoff; Jay S. Duker Ophthalmology (3rd ed). Mosby Elsevier, 2009, 416-419.
8. Holladay JT. Standardizing constants for ultrasonic biometry, keratometry, and intraocular lens power calculations. J Cataract Refract Surg. 1997; 23(9):1356-1370.
9. Khurana AK. Intraocular Lenses: Optical aspects and Power calculation: Chapter 9, Theory and Practice of Optics and Refraction, 2nd edition A. K. Khurana
10. Bruce James Larry Benjamin Ophthalmology Investigation and Examination Techniques (IOL Master Page no 158 chapter 13)
11. Nema Diagnostic Procedures in Ophthalmology (Immersion A Scan Page no. 232 Chapter 14)
12. Khurana AK. Optics and refraction (3rd addition), chapter 3, errors of refraction and binocular optical defects, 2014, 77-81.