Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2016/329

Original Article

Retrospective Study to Find Reliability of A-scan Biometry in Tertiary Care Center

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Abstract

Introduction: The refractive power of pseudophakos is final, and the patient must live with any mistake committed or be subjected to replacement of intraocular lens (IOL).

Aim: To study the reliability of A-scan biometry in tertiary institution where measurements were taken by multiple persons.

Materials and Methods: A retrospective series of 110 cases of cataract extraction and in the bag fixation of IOL done from December 2015 to April 2016 in Government Theni Medical College Hospital, Theni, were investigated.

Results: The keratometry, axial length, and IOL powers were measured. The number of patients who had uncorrected visual acuity of 6/9 or better was 20 post-operative refractive errors were listed. All cylindrical errors were due to surgical incisions. Hence, a spherical equivalent is not calculated, and only spherical errors are taken into discussion.

Conclusion: This study has shown that in institution where multiple persons perform biometry chances of post-operative refractive error can be minimized if precise and proper technique is followed and it is possible to have prediction errors below 1.00 D on the average.

Key words: Astigmatism, Intraocular lens, Pseudophakia, Spherical equivalent

INTRODUCTION

The refractive power of pseudophakos is final, and the patient must live with any mistake committed or be subjected to replacement of intraocular lens (IOL).[1] To ensure that our patient will have an optimal correction, the power of the lens to be implanted must be determined precisely and perfectly in every case.

MATERIALS AND METHODS

A retrospective series of 110 cases of cataract extraction and in the bag IOL fixation done in GTMCH, Theni, were investigated. Cataract extraction done by small incision cataract surgery and phacoemulsification were included in the study.

Keratometry was performed with Bausch and Lomb Keratometer which uses fictitious index of 1.3375.[2] In the presence of corneal astigmatism, the median value reading was taken as the working figure. The axial length was measured with a biomedix A-scanner using an applanation type 10 MHz transducer.[3]

Single piece, biconvex, Mod C step vault, PMMA, UV absorbing IOL with optic size 6.5 mm and length 13.5 mm A constant - 118.2. The pseudophakic refraction was predicted according to SRK - II formula.

All refractions were spherical equivalents recorded 4 to 6 weeks after surgery. Only cases with the final visual acuity of 6/9 or better were included because of minimal intended refractive error due to the difference between calculated IOL power and implanted IOL power.

Access this article online

www.ijss-sn.com

Month of Submission : 04-2016
Month of Peer Review : 05-2016
Month of Acceptance : 05-2016
Month of Publishing : 06-2016

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Inclusion Criteria

All uncomplicated cases of cataract surgery.

Exclusion Criteria

1. Congenital and developmental cataract
2. Cases with post-operative complications
3. Patients for whom IOL was not fully in the bag.

RESULTS

The keratometry, axial length, and IOL powers are shown in Table 1.

The number of patients who had uncorrected visual acuity (UCVA) of 6/9 or better is shown in Tables 2 and 3.

All the cylindrical errors are due to surgical incisions. Hence, spherical equivalence is not calculated, and only spherical errors are taken into discussion (Table 4).

DISCUSSION

The visual results are expressed as the percentage of eyes that achieved UCVA and best corrected visual acuity of 6/9 or better.

Table 1: Parameters

Keratometry	Mean	44.57
	Range	41-47.52
Axial length	Mean	22.52
	Range	20.17-25.2
IOL power	Range	17-27

IOL: Intraocular lens

Table 2: Cylindrical errors

Cylindrical power	Number of patients
<−1.00 D Cylinder	56
1.00-−2.00 D cylinder	28
−3.00 D cylinder	6

Table 3: Spherical errors

Spherical error	Number of patients
<−1.00 D	9
1.00-−2.00 D	3
−2.00 D	3

Table 4: The variance of outcome of spherical equivalence in percentage

<−1.00D	94.5%
1.00-−2.00D	2.5%
2.00-−3.00D	3%

The refractive results are given as percentage of patients with biometry prediction errors of <1, 2 and 3 D. 94.5% of patients had post-operative refractive error < −1.00 D of sphere. 97% of patients had post-operative refractive error < −2.00 D. The remaining patients had post-operative spherical equivalent up to −3.00 D. This could be explained by the defective measurements made preoperatively.

IOL power prediction errors can be divided intotwo as follows:

1. Measurement errors
2. Formula errors.

Formula errors can arise as a result of inadequate mathematical representation of the optics of the pseudophakic eye or as a result of errors in the prediction of surgical effect.[4]

In this study, 97% of patients had post-operative refractive error of < 2.00 D which when compared to other studies using same formula is slightly lower.

Most of the reference studies used partial coherence interferometry for measuring axial length.[5] Measurements were taken by a trained optometrist. Whereas in our study, it was done by ultrasound biometry and were taken by various persons including trained optometrist, students and ophthalmologists.

The difference in axial length measured between ultrasound biometry and partial coherence interferometry was up to 0.47 m longer which corresponds to around 1.5 D.[6] Reasons for difference in length are:

1. Pressure exerted by USG probe
2. In partial coherence interferometry, light is reflected at the retinal pigment epithelium, whereas ultrasound is mainly reflected at the internal limiting membrane, this resulting in difference that corresponds to the thickness of the fovea, which is about 130 μm.

CONCLUSION

With the evolution of small incision techniques that minimize surgically induced astigmatism, IOL power selection becomes a crucial step for the refractive outcome of cataract surgery. This study has shown that in institution where multiple persons perform biometry chances of post-operative refractive error can be minimized if precise and proper technique is followed and it is possible to have prediction errors below 1.00 D on the average.

The chance of post-operative refractive error could be further reduced if SRK T formula is used for IOL power calculation.

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How to cite this article: Rajesh SG. Kavitha K, Sharmila N, Kumar CS. Retrospective Study to Find Reliability of A-scan Biometry in Tertiary Care Center. Int J Sci Stud 2016;4(3):108-110.

Source of Support: Nil, **Conflict of Interest:** None declared.