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Effect of Pupillary Dilation on Intraocular Lens Power Calculation using SRK/T formula

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ABSTRACT
One of the most frequently performed ophthalmic surgical procedures is cataract extraction. The success of cataract surgery depends on the postoperative refractive status of the patient and for achieving emmetropia postoperatively, almost accurate power of intraocular lens to be implanted should be calculated preoperatively. This study was conducted to evaluate the effect of pupillary dilation, if any, on calculation of intraocular lens power. Present study was performed on 106 patients with cataract at the outpatient department of Santhiram Medical College and Hospital, Nandyal from November 1st to November 10th 2022. The intraocular lens power was measured before and after instillation of phenylephrine 5% w/v and tropicamide 0.8% w/ eye drops. The Sanders/Retzlaff/ Kraff Theoretical (SRK/T) formula was employed for IOL power calculation and was compared by a paired t-test prior to and after pupillary dilation. The mean age of the patients was 61.8 ± 10.5 years. No statistically significant differences in IOL power calculation was obtained post dilation. Pharmacological pupillary dilation doesn't affect the IOL power calculation.

I. INTRODUCTION

One of the most frequently performed ophthalmic surgical procedures is cataract extraction.(1) The success of cataract surgery depends on the postoperative refractive status of the patient and for achieving emmetropia postoperatively, almost accurate power of intraocular lens to be implanted should be calculated preoperatively. Calculation of Intraocular lens (IOL) power is done by using pre-operatively measured keratometric (K) value, axial length (AL), A constant of IOL and employing these values in various formulae such as Holladay 1, Hoffer Q, SRK/T, SRK II etc.(2) Latest formulae i.e. fourth generation such as Haigis formula and Holladay II formula, additionally use anterior chamber depth (ACD) for the same.(3)

In clinical settings, pupils of patients are dilated before performing biometry to save time and infrequently surgeons forget to perform biometry before dilating the pupil for fundus examination.(4) Also, in advanced cataract cases, dilation of pupil helps in IOL power calculation, which can be difficult otherwise.(5) The aim of the present study was to assess the effect of pupil dilation on the accuracy IOL power calculation.

II. MATERIALS AND METHODS

A prospective study was conducted at the outpatient department (OPD) of Santhiram Medical College and Hospital, Nandyal from November 1st to November 10th 2022 on 106 patients with cataract, selected on the basis of inclusion and exclusion criteria.

Inclusion criteria were

- Age > 18 years ,
- Otherwise healthy patients with presenile or senile cataract in one or both eyes,
- Subjects who were willing to give consent.

Exclusion criteria were

- Traumatic or uveitic cataracts,
- Previous intraocular or corneal surgery (eg: refractive surgery or glaucoma surgery),
- Shallow anterior chamber (Grade 1 and 2; vann Herick method for anterior chamber angle assessment),
- History of use of topical or systemic medication that has the effect of pupillary dilation,
- History of allergy to the mydriatic used,
- Subjects who were unable to perform ocular fixation and maintain an upright posture,
- Subjects not willing to give consent.

An informed consent was taken from all the patients. Before biometric examination a detailed ocular and systemic examination of each patient was done.IOL power was calculated using ZEISS IOL Master 500 using SRK /T formula. Following this, pupils of the patients were dilated by instilling a single drop of 0.8% Tropicamide and 5% Phenylephrine every 15 minutes for 3 times. Upon pupillary dilation, same procedure of IOL power calculation was repeated and results noted. Statistical Analysis Statistical analysis of data was done using SPSS 26 and paired t-test was applied. A p-value of < 0.05 was considered statistically

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significant. Results 106 cataract patients were included in the present study with a mean age of 61.83 ± 10.49 years. Out of these, 39 (36.8%) were males and 67 (63.2%) were females. Among the 106 eyes studied, 54 (50.9%) were right eyes and 52(49.1%) were left eyes. These demographic characteristics are summarized in Table 1. Pre and post dilation IOL power values are given in Table 2. On applying paired t-test, no statistically significant result seen in IOL power(p = 0.75).

Table 1. Demographic data

AGE mean age Std deviation	61.830 10.4967
SEX: n (%) M:F	39(36.8%) : 67(63.2%)
LATERALITY : n%	Right eye - 54(50.9) Left eye - 52(49.1)

Table 2: IOL Power Pre and Post Dilatation

	Mean	Total no	Std. Deviation	p- value
Pre Dilatation IOL Power	21.755	106	1.5770	0.75
Post Dilatation IOL Power	21.7807	106	1.47346	

III. DISCUSSION

Pharmacological dilation of pupils is a pre-requisite for the cataract surgery. (6) Most of centers, operate upon the patients same day they present and to save time, pupils are dilated first and then biometry and fundus examination is performed.(7) Present study was conducted with an aim to know if there is any effect of pupil dilation on IOL power calculation. Sadiq and McElvanney conducted a study on 64 patients and measured axial lengths of the patients before and after dilating the pupil. (8) They concluded that there was no significant change (p = 0.10) in AL before and after pupil dilation. Can et al studied 72 patients and observed that pupil dilation did not affect the IOL power measurement.(9) Heatley et al performed biometry using IOL Master and SRK/T formula both pre and post pupillary dilation and found a significant change in average keratometry readings but no significant change in IOL power.(10) Khambhiphant et al studied the effect of pupillary dilation on Haigis formula-calculated IOL power calculation using IOL Master on 373 eyes of 192 healthy individuals and observed that biometry measurements after pupillary dilation should be done in formulae that use parameters other than AL and K.(11) Similarly, Rodriguez-Raton et al observed that pupil dilation produces significant increase in anterior chamber depth (ACD) and different IOL power according to Haigis formula.(12) In our study106 patients were studied using ZEISS IOL Master 500 to calculate IOL power calculation using SRK/T formula, both before and after pupil dilation.

IV. CONCLUSION

No statistically significant differences were noted in the measurement of IOL power calculation (using SRK/T formula) before and after dilating the pupil.

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