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Efficacy of Posterior Chamber Intraocular Lens in High Myopic Patients-A Case Series Study

Mridula V. Amarnath[1*]

[1]*Chinmaya Mission Hospital, Bangalore, Karnataka, India.*

Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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Case Study

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ABSTRACT

Background: Myopia or near sightedness is a very common refractive error seen among children and adults. It is an eye disorder where the light focuses in front of the retina, causing distant objects to be blurred while the near objects appear normal. High myopia can be visually debilitating and affect one's day to day activities.
Aim: To analyse the efficacy and visual outcome of using posterior chamber phakic intraocular lens- refractive implantable lens (RIL) for high myopic patients.
Methods: A prospective study was conducted in a tertiary care centre. The study included 50 eyes of 34 patients. The preoperative best corrected visual acuity was compared with their post operative uncorrected visual acuity along with the IOP changes, endothelial cell loss and associated complications. The whole database was recorded and statistically analysed.
Results: Out of the 50 eyes that were taken for the study,94% of the eyes had uncorrected visual acuity equal to better than preoperative best corrected visual acuity and 34 %of the eyes had a visual acuity of 6/6. The intraocular pressure was less than 20 mmHg postoperatively in all patients. No incidence of cataract was observed in this study.
Conclusion: It is found that the visual outcome was favourable and satisfactory after RIL implantation.

Keywords: Myopia; phakic intraocular lens; refractive implantable lens.

**Corresponding author: E-mail: mridulavenugopal.88@gmail.com;*

1. INTRODUCTION

Myopia is one of the most common refractive error worldwide. Its prevalence can vary with age, gender and ethnicity. However it has been seen that high myopia can be very debilitating visually and affect one's daily activities. There are multiple treatment options to correct high myopia like photorefractive keratectomy, laser assisted subepithelial keratectomy, laser in situ keratomileuis(LASIK) and epi- LASIK. However the recent modality of treatment is with phakic intraocular lens (PIOL).

PIOL has become very popular recently. It was first introduced by Strampelli and later modified by Fyodorov. In the beginning anterior chamber (AC) PIOLs were used, later iris fixated lens were developed [1]. But recently posterior chamber PIOLs were introduced and it showed great efficacy, safety and most importantly patient satisfaction [2].

The PIOL is placed between the iris and the natural crystalline lens in the ciliary sulcus. Compared to LASIK, PIOL implantation causes less higher order aberrations and the contrast sensitivity and visual performance appears to be superior than LASIK [3]. They can also be used in the patients who are not fit for LASIK and with mild keratoconus [4].

Various PIOLs are available in the market but for our study we have used Refractive implantable lens (RIL) which is introduced by an Indian company, in order to study its efficacy and visual outcome in high myopic patients.

2. METHODS AND MATERIALS

Patients were selected from the OPD department of Ophthalmology, Chinmaya Mission Hopsital, Bangalore.

2.1 Sample Size

The study material consisted of 50 eyes of 34 patients.

2.2 Inclusion Criteria

1. Age >18 years
2. Stable refraction for one year
3. Patients having myopia >-6.00D
4. Iridocorneal angle >30°
5. AC depth>2.7 mm
6. Endothelial cell count >2500 cells/mm 2
7. Central corneal thickness > 0.400 mm

2.3 Exclusion Criteria

Patients with cataract, glaucoma, recurrent uveitis, previous ocular surgeries, anterior segment diseases, macular/ retinal pathology, and connective tissue diseases were contraindicated for the study.

2.4 Type of Study

A cross sectional descriptive study for a period of 12 months.

3. PROCEDURE

A detailed history of the selected patients, their best corrected visual acuity(BCVA) using Snellen 's chart, slit lamp examination, retinoscopy, gonioscopy, endothelial cell count with specular microscopy, central cornel thickness with pachymetry, iris diameter-horizontal and vertical with pentacam, white- white distance with a digital calliper, ,A san and B scan ultrasound and anterior segment optical coherence tomography were done.

Under local anaesthesia, a main incision of size 2.8 -3.2mm and two side port incisions are made. The cartridge is loaded with the lens and inserted through the main incision with the bevel down. The injector is placed superficially and the PIOL is injected into the AC which is filled with viscoelastic. The leading hole of the lens should be on the right. The lens is then rotated horizontally with the blunt tip of the manipulator,taking care not to damage the anterior capsule of lens or the iris. The pupil is then constricted with intracameral pilocarpine and a peripheral iridectomy is done superiorly. The viscoelastic is then removed and the AC is hydrated.

During the follow up period the distance between the PIOL and endothelium is measured using the AS –OCT, which ranges between 350 to 600 mm.

Statistical analysis was done using the Statistical Package for Social Sciences (SPSS version 12.0). Chi square test and t- student test was used to compare the variables. Significance was considered if $P<0.05$.

4. RESULTS

The study was conducted on 50 eyes of 34 patients, the average age being 25.56 years. 52% were male and 48% were female patients.

Fig. 1 shows the preoperative best corrected visual acuity (BCVA) of the patients that were taken for our study. Preoperatively 4% eyes had Best Corrected Visual acuity(BCVA) 6/36, 6% eyes had 6/24, 32% eyes had 6/18, 18% eyes had 6/12, 24% eyes had 6/9 and 16% eyes had 6/6.

Fig. 2 shows the uncorrected visual acuity (UCVA) of the patients after the PIOL implantation. Post op34% had UCVA of 6/6, 36% had 6/9, 14% had 6/12, 10% had 6/18 and 6% had 6/24. In the 1st week- post op UCVA was less then pre op BCVA in 5% of eyes, whereas 95% of the eyes had equal or better UCVA than preoperative BCVA. At the end of 3rd month all eyes 100% showed equal or better UCVA then preoperative BCVA.

Fig. 3 shows the spherical equivalence preoperatively. Preoperatively spherical equivalence for 16% of eyes was between -6.00D to -10.00 D, 51% had between -10.25D—15.00D, 33% between -15.25D to - 20.00 D.

Fig. 4 shows the residual spherical refraction after the lens implantation. 3 months postoperatively, 84% had zero spherical error, 14% had -0.50 D and 2% had between -0.50D to -0.75D.

Preoperatively 86% of eyes had AC depth between 2.5mm to 3.2 mm and 14 % had above 3.2 mm. Post op- 95% of eyes had AC depth between 2.4mm to 2.8 mm and 5 % had above 2.8 mm.AC depth showed statistically significant reduction , but not below 2.4 mm($P<0.01$).

Preoperatively 62% of eyes had IOP between 10-15 mm Hg and 34% between 16 to 20 mmHg . Post operatively in the 1 st week 46 % had IOP between 10-15 mm Hg, 54% between 16-20mm Hg. However during the 3rd week and 3 rd month postoperatively all eyes had IOP <20 mmHg.

Postoperatively 96% of eyes had a reduction in endothelial cell count of<100 cells/mm^2- which was insignificant. In the 1st week, 3rd week and 3 rd month post operatively all patients had a vaulting ranging between 300 to 750 µ.

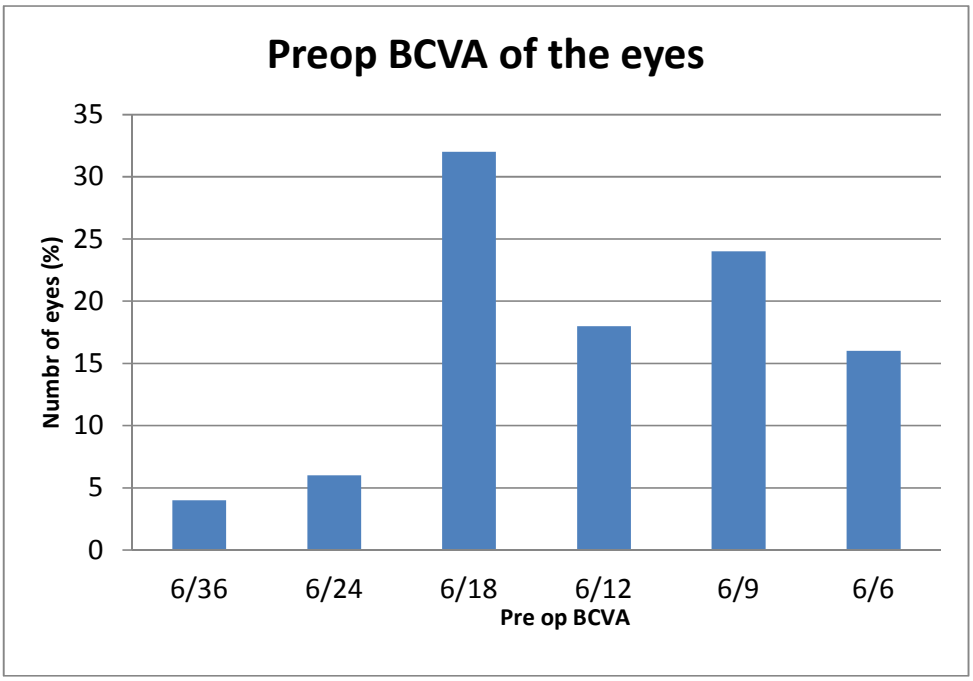

Fig. 1. Shows the preoperative Best Corrected Visual Acuity (BCVA) of patients taken for the study

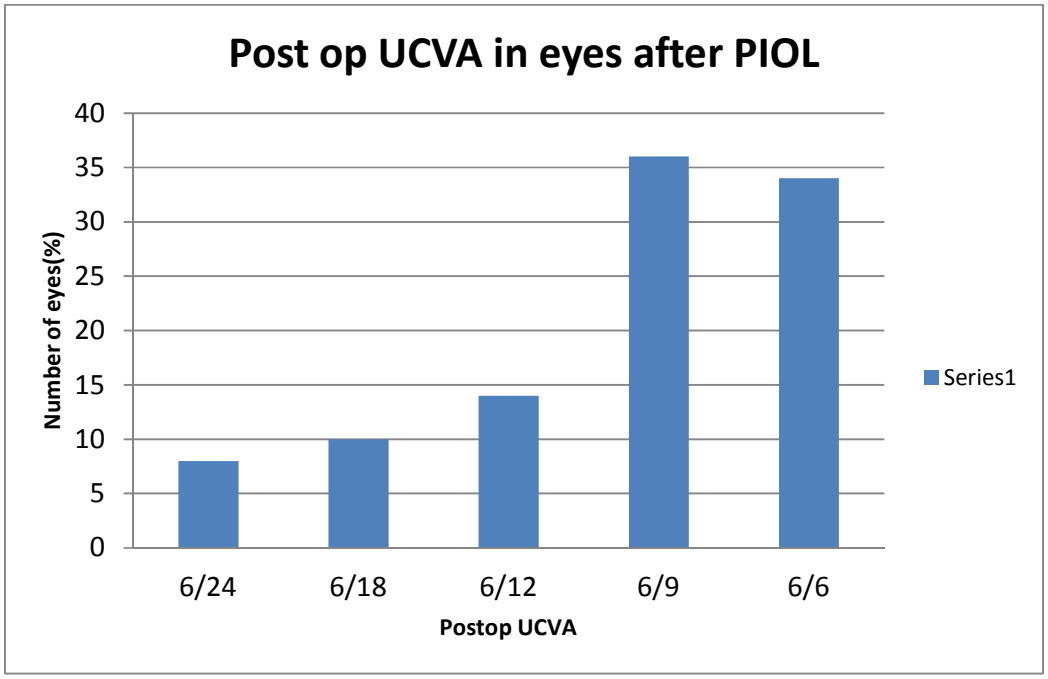

Fig. 2. Shows the post operative Uncorrected Visual Acuity (UCVA) of patients after lens implantation

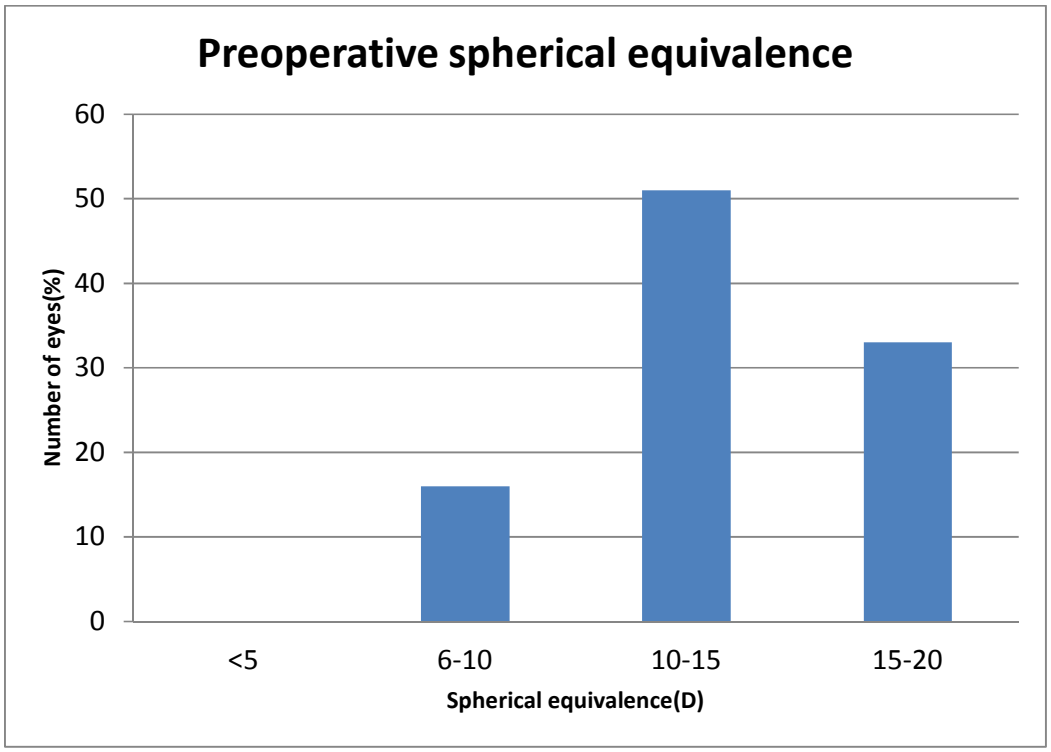

Fig. 3. Shows the spherical equivalence of the eyes preoperatively

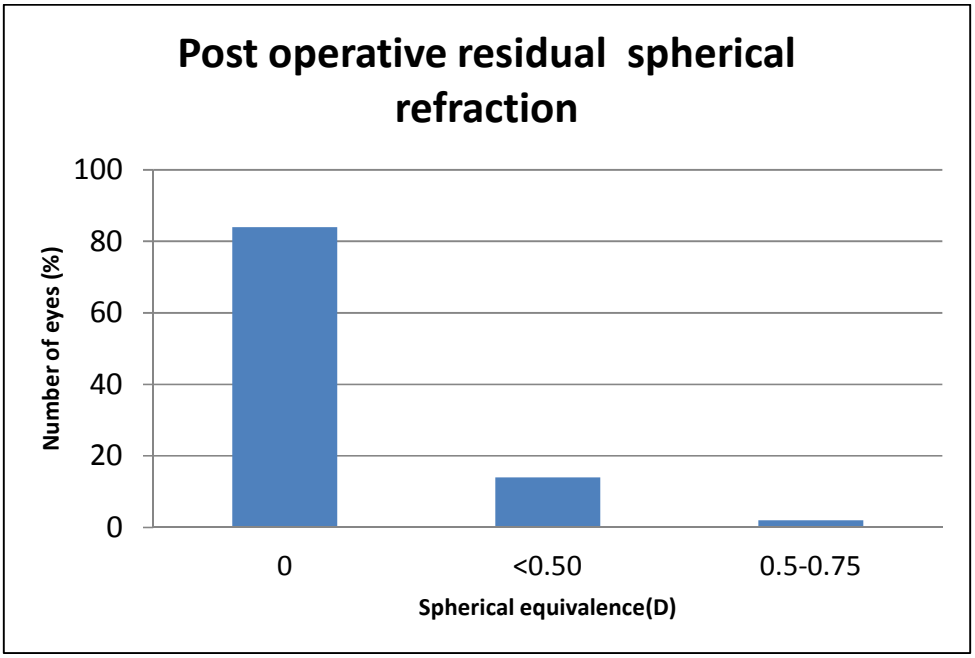

Fig. 4. Shows the residual spherical equivalence after lens implantation

5. DISCUSSION

RIL is an Indian PIOL made of hydrophilic acrylic material. They have 4 peripheral holes that help in the aqueous flow. They have a leading hole on the right and a trailing hole on the left which helps during implantation. The optic diameter ranges between 4.50 mm to 5.80 mm and the overall size ranges between 11.50 mm to 13.25mm. It has a refractive index of 1.460.

In our study 50 eyes of 34 patients were taken having a mean age of 25.56 yrs. Perzcamtrodi et al in his study had a mean postoperative spherical equivalent of -1.00D ± 0.50 D, whereas our study showed a mean postoperative SE power of -0.50D ± 1.00D.

In this study it was seen that the postoperative UCVA of 94% eyes were better than preoperative BCVA and 6% eyes were same as preoperative BCVA. In Uusitalo et al study, 71.5% had equal or better than preoperative BCVA [5] and Ju et al study showed 96% had equal or better than preoperative BCVA.

No cataract was recorded during our study period nonetheless in Lee et al study it was seen that 2% and in Uusitalo et al 2.6% and in Perzcamtrodi et al. 12% of eyes had cataract [6].

In this study there was no rise in IOP, whereas in Ju et al study it showed an increase in 8% of eyes and Le et al observed in 2% of eyes [7].

In our study there was 3.5% decrease in the endothelial cell count but in Lee et al study there was an 8% decrease in the endothelial cells. Our study showed that the mean preoperative AC depth was 3.06 mm and postoperative depth was 2.57 mm. There was a significant decrease in the AC depth but it was not <2.4 mm. Ju et al also noted a decrease in AC depth from 3.5 mm to 2.6mm.

Pupillary block was one of the complications noted in Uusitalo et al study whereas pigment dispersion was observed in 5 % of eyes in Ju et al study [8]. Other complications observed were iritis and retinal detachment which did not occur in our study [9]. Although multiple factor influence the complication profile of ICL, majority of the complications are attributed to the design and position of the ICL [10].

6. CONCLUSION

Taking everything into consideration it can be concluded that posterior chamber PIOLs (RIL) are a safe , effective and reliable option for the treatment of high refractive error in myopic

patients. The complications like cataract development, AC depth and IOP changes were not significant. It is important that these patients are regularly monitored on a long term basis.

CONSENT AND ETHICAL APPROVAL

Verbal consent was taken from the subjects. Prior to the study, ethical clearance was obtained from the Institutional Ethics Committee.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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