

Impact of anterior chamber intraocular lens on vision and refractive status in eyes undergoing small incision cataract surgery

Vatsala Vats¹, Rupali Tyagi^{2*}, Manisha Gupta³, Monika Jain⁴, Shantanu Aggarwal⁵

{^{1,2}Assistant professor, ³Head of Department} {⁴Senior Resident, Department of Ophthalmology ⁵Senior Resident, Department of PSM} S.G.R.R.I.M.H.S, Dehradun, INDIA.

Email: rupalityagi73@gmail.com

Abstract

Background: With recent advances in science and technology in cataract surgery, the implantation of an intracapsular intraocular lens (IOL) remains the best result following cataract surgery. An Anterior Chamber Intra Ocular Lens (ACIOL) as the first choice for implantation is less. However, certain clinical circumstances volunteer its needs. Preoperative findings or intraoperative events which do not allow the use of Posterior Chamber Intra Ocular Lens (PCIOL) either in the bag or in the sulcus, necessitate the use of ACIOLs to prevent aphakia. Although we have a myriad of options, the use of ACIOLs comes in handy. The reasons being its relatively low cost and feasibility of implantation in the same sitting. In our hospital based prospective study of 95 eyes, we discuss the impact on vision and refractive status. Context: **Aims:** To evaluate the impact of Anterior Chamber Intraocular Lens (ACIOLs) on vision and refractive status in eyes undergoing Small Incision Cataract Surgery Settings and Design: Prospective, cross sectional Observational descriptive hospital based study **Methods and Material:** Study was conducted from 2015 – 2018. ACIOLs were implanted in 95 eyes undergoing eventful Small Incision Cataract Surgery (SICS) due to lack of adequate posterior capsular support, or having zonular dehiscence more than 180 degrees. These eyes are assessed post operatively for vision, and refractive status at 6 weeks. The power of cylinders and spheres used are calculated for each eye. Statistical analysis used: SSPS Descriptive statistics **Results:** Out of 95 eyes of 95 patients, 44(46.3%) were females, and 51(53.7%) were males. Maximum number of females that belonged to age group of more than 60 years were 20 (21.05%). Maximum number of males that belonged to age group of more than 60 years were 30 (31.57%). Out of 95 eyes, 52 (54.7%) were right (OD), 43 (45.3%) were left (OS). (98.95 %) 94 eyes of eyes either received a sphere, or a cylinder, or both. Among all eyes only 1 eye did not receive any correction. 14 (14.74%) eyes received only spherical correction. Only cylinder was prescribed to 20 (21.05%) patients. 60 (63.16%) patients received both for glass prescription. It was observed that the median values of postoperative Sphere was -1.0 dioptre and cylinder -0.75 at 90 degrees with median vision of 6/12 in 52 eyes, and 6/9 in 43 eyes. 45 out of 74 (60.8%) eyes had post operative vision in the range 6/6 to 6/18, receiving correction in the range of -1.5 to +1.5 dioptre sphere. 45 out of 80 (56.25%) eyes were prescribed cylinder in the range of -1 to + 1 dioptres with vision in the range of 6/6 to 6/18. **Conclusions:** Even though the choice of procedure in cataract surgery is an ECCE with a PCIOL implant, an anterior chamber lens implantation has its own indications in modern IOL surgery.

Key Word: Cataract, Anterior Chamber Intraocular Lens (ACIOLs),

*Address for Correspondence:

Dr. Rupali Tyagi, Assistant professor, Department of ophthalmology, S.G.R.R.I.M.H.S, Dehradun, INDIA.

Email: rupalityagi73@gmail.com

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INTRODUCTION

With recent advances in science and technology in cataract surgery, surgeons rarely plan an Anterior Chamber Intra Ocular Lens (ACIOL) as the first choice for implantation in case of cataract surgery. However, certain clinical circumstances volunteer its needs. The basic indication is lack of posterior capsule, or zonular dehiscence. In an eventful surgery, techniques like scleral fixation, angle supported, and iris fixation are used to avoid aphakia.

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ACIOLs become an easy choice when patient is poor, from remote areas, and can be lost to follow up. The surgical procedure of an angle - supported anterior chamber IOL is safe and fast. However the use of these lenses may cause endothelial cell loss, bullous keratopathy, and secondary glaucoma.¹ The complications caused by transsclerally sutured IOLs include chronic inflammation, retinal detachment, vitreous incarceration, IOL decentration, iris IOL contact, and pigment dispersion.² Trans scleral sutures can lead to conjunctival erosions, scleromalacia, and endophthalmitis.³ Likewise there remains a risk of the iris claw IOL dislocation into the vitreous cavity if the enclavation failed or there was inadequate tissue grasping with the haptic.⁴ So far there is no consensus on the indications, safety, or efficacy of these alternative techniques. However, some studies have reported implantation ACIOL is a better rehabilitation modality as compared to the scleral fixated.^{5,6,7} In this prospective hospital based study of Himalayan region, we discuss the impact on post operative vision and refractive status, thereby exploring the feasibility of ACIOLs.

MATERIAL AND METHOD

In our study of 95 eyes of 95 patients, only the patients undergoing Small Incision Cataract Surgery (SICS) were included. To avoid bias in the surgical technique, those patients undergoing phacoemulsification or Conventional Extra Capsular Cataract Extraction (ECCE), or Intra Capsular Cataract Extraction (ICCE) were excluded. We recorded the data of patients who were implanted ACIOLs over a period of two consecutive years in our tertiary care urban hospital that is located in the Himalayan region. The data of various surgeons including those under the training period was included. PCIOLs were planned for all cataract cases included in the study. However, due to intraoperative events like large posterior capsule rent, zonular dehiscence, ACIOLs had to be substituted. All surgeries

were performed under the supervision of one senior surgeon. In case of any unplanned event during the surgery VV that would decide the use of ACIOL, the supervising surgeon would take over.

Surgical Technique

SICS was performed in all 95 eyes included in the study. Peribulbar anaesthesia with 0.5% Bupivacaine + 2% Lignocaine was administered. Fornix based conjunctival flap was raised with scissor. Any bleeding was arrested with bipolar wet field electrocautery. Superior scleral groove of size 5.5mm after measuring with Castroveijo's calipers was made with No. 15 blade. Crescent knife was used to make a sclerocorneal tunnel. One side port at 9'o clock was made with 15 degree blade to facilitate a few steps in the technique. Trypan blue dye was injected under the cover of air to stain the anterior capsule. Continuous Curvilinear Capsulorhexis was made with No. 26 guage capsulotome. Anterior chamber entry was done with keratome and enlarged with 5.2mm broad tipped blade. Hydrodissection and hydrodilution was done in accordance with the case. Sinskey hook was used to prolapse the nucleus into anterior chamber. The nucleus was delivered with viscoexpression technique. The cortical matter was washed using Symcoe's two way cannula. Eyes with posterior capsule dehiscence and or zonular dialysis big enough to forbid implantation of PCIOL were assessed. Manual vitrectomy was done with vannas scissors. Pilocarpine 2% was given intracameral to constrict the pupil and assess the vitreous tag in anterior chamber. ACIOL Kelman Multiflex with A constant 115.0 of power 3 dioptres less than that of PCIOL for that eye was tactfully implanted. Peripheral button hole iridectomy was performed at 11'o clock in all eyes. Two 10-0 Nylon interrupted sutures were put radially over the tunnel. The chamber was formed with air, and side port was hydrated. The eye was dressed with antibiotic drop and patch was applied. Vision and refractive status was assessed at 6 weeks post operatively.

RESULTS

Table 1: Distribution of eyes according to age and sex

Age Group	Sex				Total
	Female		Male		
	No.	%	No.	%	
40 – 50yrs	6	37.5	10	62.5	16
51 – 60yrs	18	62.1	11	37.9	29
>60yrs	20	40	30	60	50
Total	44	46.3	51	53.7	95

Out of 95 patients, 44 (46.3%) were females, and 51(53.7%) were males. Maximum number of females that belonged to age group of more than 60 years were 20 (21.05%). Maximum number of males that belonged to age group of more than 60 years were 30 (31.57%). Only 6 (6.31%) females, and 10 (10.52%) males belonged to age group of 40 to 50 years.

Table 2: Distribution of eyes according to correction

Eye Operated	No. (%)	Correction Received	No. (%)
Right Eye	52 (54.7)	Sphere	10 (19.2)
		Cylinder	8 (15.4)
		Both	33 (63.5)
		None	1 (1.9)
Left Eye	43 (45.3)	Sphere	4 (9.3)
		Cylinder	12 (27.9)
		Both	27 (62.8)

Out of 95 eyes, 52 (54.7%) were right (OD), 43 (45.3%) were left (OS). Among 95 eyes only 1 eye of right side did not receive any correction. 94 eyes (98.95 %) of eyes either received a sphere, or a cylinder, or both.

Table 3: Post operative Median values of sphere for eyes

Variable	OD		OS	
	Median	Range	Median	Range
Sphere	-1.00	-4.00 – 12.00	-1.00	-2.50 - 4.00
Cylinder	-0.75	-3.75 – 3.00	-0.75	-3.25 - 3.00
Axis	90	10 – 180	90	10 -- 180
Post op vision	6/12	6/6 – 6/24	6/9	6/6 - 6/60
IOP	14.0	9.0 – 21	13.0	10.0-18.0

It was observed that the median values of post operative sphere was -1.0 dioptre and cylinder -0.75 at 90 degrees with median vision of 6/12 in 52 eyes, and 6/9 in 43 eyes.

Table 4: Distribution of eyes according to sphere and vision

Range of Sphere	OD					OS				
	Post Op Vision				Total	Post op vision				Total
	6/6 – 6/18		6/24 – 6/60			6/6-6/18		6/24-6/60		
No.	%	No.	%	No.	%	No.	%	No.	%	
Less than -3.5	2	100	0	0	2	0	00	0	00	
-3.5 to -2.5	0	0	0	0	0	0	00	0	00	
-2.5 to -1.5	9	100	0	0	9	6	100	0	00	6
-1.5 to -0.5	12	100	0	0	12	12	92.3	1	7.7	13
+0.5 to +1.5	13	100	0	0	13	8	100	0	00	8
More than +1.5	7	100	0	00	7	3	75	1	25	4
Total	43	100	0	00	43	29	93,5	2	6,5	31

45 out of 74 (60.8%) eyes had post operative vision in the range 6/6 to 6/18, receiving correction in the range of -1.5 to +1.5 dioptre sphere.

Table 5: Distribution of eyes according to cylinder range and vision in eyes.

Range of Cylinder	OD					OS				
	Post Op Vision				Total	Post op vision				Total
	6/6 – 6/18		6/24 – 6/60			6/6-6/18		6/24-6/60		
No.	%	No.	%	No.	%	No.	%	No.	%	
Less than -3.0	2	100	0	0	2	1	100	0	00	1
-3 to -2	3	100	0	00	3	1	100	0	00	1
-2 to -1	8	88.9	1	11.1	9	10	100	0	00	10
-1 to 0	12	100	0	00	12	15	93.8	1	6.3	16
0 to +1	11	100	0	0	11	7	100	0	00	7
+1 to +2	2	100	0	00	2	3	100	0	00	3
More than +2	2	100	0	00	2	0	00	1	100	1
Total	40	97.6	1	2.4	41	37	94.9	2	5.1	39

45 out of 80 (56.25%) eyes were prescribed cylinder in the range of -1 to +1 dioptres with vision in the range of 6/6 to 6/18.

DISCUSSION

Several studies have focused on ACIOLs. Multiflex open loop anterior chamber lenses are safe for up to 1 year of follow up when used by experienced surgeons, and the available evidence of 2–5 years of follow up suggests that the complication rate is reasonably low.⁸ The modern flexible one piece lenses have haptics of the open type with flat foot plate design. The flexibility may be the cause for the lower incidence of tissue reaction, iris tuck, uveal chafing and lens malposition.⁹ In our study we try to show the change in refractive status in eyes where ACIOLs were implanted. This study in a way refutes the redundancy of such IOLs, and favours their use to prevent aphakia. Post operative BCVA was found to be more than 6/18 in 83 eyes. Only 5 eyes had vision in the range of 6/24–6/60, of which one had corneal opacity, and another ARMD. 61 eyes were prescribed spheres in the range of -2 to + 0.5 dioptre sphere, showing the relative accuracy of implanting ACIOLs 3 dioptres less than the power of PCIOL. 46 eyes were prescribed cylinders in the range of -1 to +0.5 dioptres, thereby guiding us into the incisional quality of SICS. No sign of corneal decompensation was detected in our patients. Although there are corneal changes in all cataract surgeries.¹⁰ No case was noted for rise in IOP. The percentage of eyes with BCVA \geq 20/40 was 50% in the Acar study,¹¹ and n% in the current study. Limitations of the current study can be attributed to follow-up duration of just less than 6 months which is shorter than studies by Acar *et al* (15.58 months). Scleral fixation is a more demanding procedure technically; it requires longer operative time and is associated with complications such as retinal detachment, cystoid macular edema, and IOL dislocation and tilt.^{12,13} Degradation of the polypropylene sutures may lead to conjunctival erosion and eventually IOL malposition; this complication has been reported in 27.9% of eyes in one study with 6 years of follow-up and in 24% of cases in another study with 7 years of follow-up.^{12,13}

CONCLUSION

Even though the choice of procedure in cataract surgery is an ECCE with a PCIOL implant, an anterior chamber lens implantation has its own indications in modern IOL surgery. Given the difficult situations in which an ACIOL is used, attributing post operative complications to just the IOL and condemning its use is not justified. With the variation in the learning curve of cataract

surgery, we learn that there will always be a room for ACIOLs. By improvising on such IOLs, we hope for better results in future.

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