INCIDENCE OF WORK-DISABLING DECREASED-VISION WITH POSTERIOR CAPSULAR OPACITY (PCO) FOLLOWING SMALL INCISION CATARACT SURGERY WITH RIGID PMMA IOL

Gajjala R. Bharath Kumar¹, B. Manasa², P. Bhargavi³

¹Associate Professor, Department of Ophthalmology, Regional Eye Hospital/ Kakatiya Medical College, Warangal, Telangana, India.

²Assistant Professor, Department of Ophthalmology, Regional Eye Hospital/ Kakatiya Medical College, Warangal, Telangana, India.

³Postgraduate Student, Department of Ophthalmology, Regional Eye Hospital/ Kakatiya Medical College, Warangal, Telangana, India.

ABSTRACT

BACKGROUND

Cataract is the commonest cause of treatable blindness throughout the world. Cataract is treated surgically by various surgeries including intracapsular cataract to small incision cataract surgery with rigid PMMA Intraocular lens implantation and phacoemulsification with foldable Intraocular Lens (IOL) implantation.

The aim of this study is to determine the incidence of decreased vision in patients thereby affecting their daily activities due to posterior capsular opacity following SICS with rigid PMMA lens at Govt. Regional Eye Hospital, Warangal (2016 - 2018).

MATERIALS AND METHODS

This study includes 250 patients.

Inclusion Criteria- Patients attending outpatient department of REH, Warangal with posterior capsular opacity following SICS with rigid PMMA PCIOL at REH from (2016 to 2018).

Exclusion Criteria-

1. Patients below 10 years.
2. Dislocated IOL.
3. PCO associated with retinal or corneal pathologies.
4. History of trauma to the operated eye.

RESULTS

Out of 250 patients, 40 cases presented with BCVA 6/18 to 6/12; 95 cases with 6/36 - 6/24; 60 cases with 3/60 - 6/60; 20 cases with 2/60 and 35 cases with less than or equal to 1/60. After Nd-YAG laser capsulotomy, BCVA of 150 cases improved to 6/9 - 6/6, 65 cases to 6/18 - 6/12; 13 cases to 6/36 - 6/24 and 2 cases to 3/60 - 6/60. Out of these, 3 cases were complicated with increased intraocular pressure.

CONCLUSION

In Govt. Regional Eye Hospital, the incidence of PCO with rigid PMMA was 2% against the standard range of 5-50 % in other studies. So, we can do the SICS with rigid PMMA lens at peripheral centres, to treat the patients cost effectively with good outcome, as there is no reasonable decreased-vision which is affecting their daily activities. With this inference, we conclude that we can do IOL surgery cost effectively with simple rigid PMMA IOL instead of costly IOLs.

KEY WORDS

Posterior Capsular Opacity, SICS with Rigid PMMA.

HOW TO CITE THIS ARTICLE: Kumar GRB, Manasa B, Bhargavi P. Incidence of work-disabling decreased-vision with posterior capsular opacity (PCO) following small incision cataract surgery with rigid PMMA IOL. J. Evolution Med. Dent. Sci. 2018;7(42): 4580-4583, DOI: 10.14260/jemds/2018/1021

BACKGROUND

Cataract is the commonest cause of treatable blindness throughout the world. Cataract is treated surgically by various surgeries including intracapsular cataract to small incision cataract surgery with rigid PMMA intraocular lens implantation and phacoemulsification with foldable Intraocular Lens (IOL) implantation.

'Financial or Other Competing Interest': None.

Submission 14-09-2018, Peer Review 01-10-2018,

Acceptance 04-10-2018, Published 15-10-2018.

Corresponding Author:

Dr. Gajjala R. Bharath Kumar,

Associate Professor,

Department of Ophthalmology,

Regional Eye Hospital/Kakatiya Medical College,

Warangal-District-506002, Telangana, India.

E-mail: drbhasha@yahoo.com

DOI: 10.14260/jemds/2018/1021

As intracapsular cataract extraction having many complications and patient has to use high-powered convex lens outside to have vision. To overcome these problems, IOL implantation became a good treatment for cataract.

But conventional IOL surgery requires suturing to close the wound. The sutures are producing foreign body sensation and post-operative Astigmatism.

With phacoemulsification and Small Incision Cataract Surgery (SICS), we can avoid these complications. But phacoemulsification is costly and learning curve is long, so Small Incision Cataract Surgery (SICS) became a good alternative for phacoemulsification cost effectively.

With Small Incision Cataract Surgery (SICS) with rigid PMMA IOL implantation, advances in microsurgical practice have transformed the outcome in cataract surgery and intraocular lens implantation, posterior capsule opacification (PCO, secondary cataract, after cataract) is the most common

complication of modern cataract surgery occurring in upto 10-50% of patients postoperatively.^[1]

Posterior capsular opacity is caused by lens epithelial cells that remain in the capsular bag after cataract surgery. They migrate, proliferate and transform to produce Elschnig's pearls and capsular fibrosis.^[2] When posterior capsular opacity extending into the centre, it produces mild-to-severe visual loss. Visually significant posterior capsular opacity is usually managed by creating an opening within the opaque posterior capsule using the Neodymium: Yttrium Aluminium Garnet (Nd: YAG) laser. It is non-invasive, safe and can be performed as an outpatient procedure. With modern techniques and IOLs, the expected rate of PCO and subsequent Nd:YAG laser posterior capsulotomy rate is decreasing to less than 10%.^[3,4]

With the Nd: YAG laser capsulotomy there are many complications such as damage to intraocular lenses,^[5] postoperative intraocular pressure elevation,^[6] cystoid macular oedema,^[6] disruption of the anterior vitreous face,^[7] uveitis and increased incidence of retinal detachment.^[8]

This study is to know the incidence of decreased vision in patients, which is affecting their daily activities with posterior capsular opacity following SICS with rigid PMMA lens at Govt. Regional Eye Hospital, Warangal (2016 - 2018).

MATERIALS AND METHODS

A descriptive study included 250 patients with pseudophakia in one or both eyes with diminished vision came to the Regional Eye Hospital Warangal. Relevant history of patient's sex, age, occupation, socioeconomic status and best corrected visual acuity were noted.

Inclusion Criteria

Patients attending outpatient department of Regional Eye Hospital, Warangal with posterior capsular opacity following SICS with rigid PMMA PCIOL at REH from (2016 to 2018) were included.

Exclusion Criteria

1. Patients below 10 years.
2. Dislocated IOL.
3. PCO associated with vitreoretinal or corneal pathologies.
4. History of trauma to the operated eye.

Detailed anterior segment examination, intraocular pressure and fundus examination done.

Anterior Segment Examination

- Slit lamp biomicroscopy was performed to look for any anterior segment abnormalities.
- Morphology and grading of posterior capsular opacity was studied in each patient with direct illumination and retro-illumination under slit lamp.

Intraocular Pressure Measurement

- IOP was recorded by Goldmann Applanation Tonometry mounted on slit lamp.
- 4% Xylocaine was instilled followed by placing 1% fluorescein impregnated paper into the lower fornix.
- The cobalt blue light from the slit lamp was made to maximally illuminate the prism tip and the cornea.

- Then the slit lamp was slowly moved towards the eye until front surface of the prism touches the cornea.
- Two semicircles (upper and lower) were viewed through the left ocular of the slit lamp biomicroscope.
- The position of slit lamp was adjusted until the two semicircles are equal in size and then the dial on the applanation set was rotated slowly until the inner edges of the upper and lower semicircles were aligned.
- The value showed on the dial of applanation set was recorded as IOP.

Fundus Examination

- Distant direct ophthalmoscopy was performed to see for media opacities.
- Stereoscopic fundus examination was done to look for any posterior segment abnormalities.
- Visualisation of optic disc and macula was assessed to grade the posterior capsular opacification.

Evaluation of Posterior Capsular Opacification

Precise methods of evaluation are important to measure the progress of PCO. Most of the studies evaluate PCO in patients after SICS after full dilatation of the pupil using slit lamp biomicroscopy.

The Degree of Opacification is assessed using following Parameters-

1. Distant and near visual acuity, unaided and aided.
2. Slit lamp biomicroscopy for evaluation of posterior capsular opacity.
3. Direct and indirect ophthalmoscopy to assess media clarity and retinal pathology.
4. Posterior capsular opacity was determined by calculating the area of opacity from a retro-illumination image.

Visually significant posterior capsular opacification is defined as a decrease in the best corrected post-operative vision by 2 Snellen's lines.

Grading of Posterior Capsular Opacification

Most commonly performed method of posterior capsular opacity assessment in practice is the slit lamp grading. Many such slit lamp grading systems exist, but none have been proven to be gold standard in terms of clinical utility.

Slit Lamp Grading of Posterior Capsular Opacity^[9-16]

Grade 0: No opacity.

Grade 1: Opacity present periphery to IOL edge.

Grade 2: At IOL edge.

Grade 3: Well inside IOL edge, but visual axis clear.

Grade 4: Across visual axis.

Visualisation of the posterior pole can be assessed by examining the optic disc and macula using a +90D lens. Posterior capsular opacity can be subjectively graded according to the following scale:

Visualisation of Optic Disc can be Subjectively Graded according to following Scale 50^[17]

Grade 0: Clear view of optic disc margin, blood vessels at optic disc and Nerve Fibre Layer (NFL examined using red-

free filter).

Grade 1: Clear view of optic disc margin was seen, but disc blood vessels and/ or nerve fibre layer are not clearly seen.

Grade 2: The optic disc, disc blood vessels and nerve fibre layer are not clearly seen.

Visualisation of the Macula can be Subjectively Graded as following-

Grade 0: Clear view of foveal reflex, perifoveal blood vessels and nerve fibre layer.

Grade 1: Diminished foveal reflex, but clear view of perifoveal blood vessels and nerve fibre layer.

Grade 2: Blurred foveal reflex, perifoveal blood vessels and nerve fibre layer.

The total of visualisations of the optic disc and macula should be combined to produce a total Posterior Pole Visualisation Score (PoVS), ranging from 0 to 4 in order of decreasing visualisation.

YAG Laser Posterior Capsulotomy/ Procedure^[18]

After performing pre-laser assessment, the patients were subjected to laser treatment.

Patients were detailed about purpose, duration, painless nature and importance of steady fixation during the procedure. And that he/ she may hear a small clicking noise produced by the acoustic waves generated.

- Before treatment, 1% tropicamide eye drops were instilled to dilate the pupil and the cornea was anaesthetised with topical application of 4% Xylocaine eye drops.
- Q-Switched Nd: YAG Laser (TOPCON laser system) was used to make an opening of 2 – 3 mm in the posterior capsule using 1.5 to 5 mJ per pulse.
- The energy and pulses were increased gradually according to thickness of capsule until an opening is achieved.

Post Laser Treatment^[18]

- Topical NSAIDs like Flurbiprofen eye drops and systemic NSAIDs like Ibuprofen were prescribed.
- Antibiotic-steroid combination like Ciprofloxacin-Dexamethasone eye drops were given prophylactically to control any post-procedure inflammation.
- IOP measurement and Slit Lamp Examination was done in 1st and 4th hourly after capsulotomy.
- Anti-glaucoma drugs- Timolol maleate 0.5% eye drops and Tab. Acetazolamide 250 mg twice daily were given for 1 week if post procedure rise of intraocular pressure was noted.
- Follow-up was scheduled at day 1, day 7 and day 14 and at 1 month.
- At each follow-up visual acuity testing, IOP measurement, Slit Lamp Examination and fundoscopy were done.

RESULTS

Age Group [Years]	Number of Patients [n]	Percentage [%]
10-20	5	2
21-30	10	4
31-40	20	8
41-50	30	12
51-60	60	24
>61	125	50
Total	250	100

Table 1. Age Distribution (n= 100)

Table 1 shows fifty percent (50%) of the patients are aged above 60 years, 24% are aged 51 - 60, 12% are aged 41 - 50, 8% are aged 31 - 40, 4% are aged 21 - 30 and 2% are aged 10-20 years.

Visual Acuity	Pre-Laser n (%)	Post-Laser n (%)
6/9-6/6	0 (0)	150(68)
6/18-6/12	40(16)	65(26)
6/36-6/24	95(38)	13(5)
3/60-6/60	60(24)	2(1)
2/60	20(8)	0(0)
<1/60	35(14)	0(0)
Total	250	250

Table 2. Comparison of Visual Acuity between Pre- and Post-Laser

Table 2 shows out of 250 patients 40 cases presented with BCVA 6/18 to 6/12; 95 cases with 6/36 - 6/24; 60 cases with 3/60 - 6/60; 20 cases with 2/60 and 35 cases with less than or equal to 1/60. After Nd-YAG laser capsulotomy, BCVA of 150 cases improved to 6/9 - 6/6; 65 cases to 6/18 - 6/12; 13 cases to 6/36 - 6/24 and 2 cases to 3/60 to 6/60.

Age Group (Years)	Grade 1	Grade 2	Grade 3	Grade 4	Total
10-20	-	-	-	-	0
21-30	-	5	3	2	10
31-40	5	5	6	4	20
41-50	12	6	6	6	30
51-60	12	24	15	9	60
>60	31	50	40	14	125
Total	60	90	70	35	250
Percentage	24	36	28	14	100

Table 4. Grade of PCO in different Age Groups (n= 100)

Table 4 shows 60 cases (24%) that showed grade 1; 90 cases (36%) showed grade 2; 70 cases (28%) showed grade 3 and 35 cases (14%) showed grade 4 PCO.

Complications	No. of Patients	%
IOL pitting		
Hyphema		
Uveitis	5	2
Rupture of anterior hyaloid face		
Transient rise in IOP	30	12
Corneal damage		
Cystoid macular oedema	5	2
Total	40	16

Table 5. Complications after Nd-YAG Laser Capsulotomy

Table 5 shows 5 cases (2%) of uveitis, 5 cases (2%) of cystoid macular oedema and 30 cases (12%) of transient rise in IOP and they were treated conservatively.

Among 250 Patients included in the Study-

- 125 cases (50%) were in the age group of > 60 years.
- 90 cases (36%) showed grade 2 PCO and 35 cases (14%) showed grade 4 PCO.
- Patients presenting within 1 year of cataract surgery had grade 1 or grade 2 PCO and those presenting late i.e. after 1 year had thicker PCO.
- After treatment 40 cases presented with BCVA 6/18 to 6/12; 95 cases with 6/36 - 6/24; 60 cases with 3/60 - 6/60; 20 cases with 2/60 and 35 cases with less than or equal to 1/60. After Nd-YAG laser capsulotomy, BCVA of 150 cases.
- All patients included in the study had IOP within normal range before capsulotomy.
- Complications were noted in 16% of patients.
- After 1 hour, 30 cases (12%) patients had rise in IOP. They were put on timolol maleate 0.5% eye drops twice daily. At 4th week follow-up, their IOP was within normal limits.
- Anterior uveitis was noted in 5 (2%) patients, who responded to steroids.

DISCUSSION

The study was carried out in 250 eyes of 250 patients, which was a hospital-based study on outpatient basis who underwent small incision cataract surgery with PCIOL implantation in Regional Eye Hospital, Warangal, diagnosed PCO.

These patients followed up for a period of 6 months. Chief complaints of all the cases are diminished vision, which varied from hand movements to 6/18. Before undergoing laser capsulotomy, each patient was evaluated to confirm that the vision loss is only after cataract surgery.

Advantages of Nd-YAG laser capsulotomy are non-invasive, effective and safe technique can be performed as outpatient department.

The number of surgeries performed at REH Warangal is 6000 per year and the patients presented in outpatient with PCO during study period are only 250 cases.

The incidence of vision disabling PCO is only 2% against the incidence according to standard statistics are 5 to 50%.

Rest of the patients may not have PCO or may have mild PCO with good visual acuity, which is not affecting their daily activities and having comfortable lives.

CONCLUSION

- At Govt. set-up like Regional Eye Hospital, Warangal, SICS with rigid PMMA PCIOL is easily available and is free of cost.
- It can be done with lower incidence of visually significant PCO and the patients presented with PCO can be treated with Nd:YAG laser capsulotomy without many complications and with good visual outcome.
- With this inference, we conclude that we can do IOL surgery cost effectively with simple rigid PMMA IOL instead of costly IOLs.

REFERENCES

[1] Apple DJ, Solomon KD, Tetz MR, et al. Posterior capsule opacification. *Surv Ophthalmol* 1992;37(2):73-116.

[2] Apple DJ, Peng Q, Visessook N, et al. Eradication of posterior capsule opacification: documentation of a marked decrease in Nd: YAG laser capsulotomy rates noted in an analysis of 5416 pseudophakic human eyes obtained post-mortem. *Ophthalmology* 2001;108(3):505-18.

[3] Apple DJ, Peng Q, Visessook N, et al. Surgical prevention of posterior capsule opacification. Part I. Progress in eliminating this complication of cataract surgery. *J Cataract Refract Surg* 2000;26(2):180-7.

[4] Moulick PS, Rodrigues FEA, Shyamsundar K. Evaluation of posterior capsular opacification following phacoemulsification, extracapsular and small incision cataract surgery. *Med J Armed Forces India* 2009;65(3):225-8.

[5] Bath PE, Fankhauser F. Long-term results of Nd: YAG laser posterior capsulotomy with the Swiss laser. *Journal of Cataract & Refractive Surgery* 1986;12(2):150-3.

[6] Framme C, Hoerauf H, Roeder J, et al. Delayed intraocular lens dislocation after neodymium: YAG capsulotomy. *Journal of Cataract & Refractive Surgery* 1998;24(11):1541-3.

[7] Ranta P, Tommila P, Immonen I, et al. Retinal breaks before and after neodymium: YAG posterior capsulotomy. *Journal of Cataract & Refractive Surgery* 2000;26(8):1190-7.

[8] Spalton DJ. Posterior capsular opacification after cataract surgery. *Eye (Lond)* 1999;13(Pt 3b):489-92.

[9] Kucuksumer Y, Bayraktar S, Sahin S, et al. Posterior capsule opacification 3 years after implantation of an AcrySof and a MemoryLens in fellow eyes. *J Cataract Refract Surg* 2000;26(8):1176-82.

[10] Ober MD, Lemon LC, Shin DH, et al. Posterior capsular opacification in phacotrabeculectomy: a long-term comparative study of silicone versus acrylic intraocular lens. *Ophthalmology* 2000;107(10):1868-73.

[11] Westling AK, Calissendorff BM. Factors influencing the formation of posterior capsular opacities after extracapsular cataract extraction with posterior chamber lens implant. *Acta Ophthalmologica (Copenh)* 1991;69(3):315-20.

[12] Legler UF, Apple DJ, Assia EI, et al. Inhibition of posterior capsule opacification: the effect of colchicine in a sustained drug delivery system. *J Cataract Refract Surg* 1993;19(4):462-70.

[13] Malecaze F, Couderc B, de Neuville S, et al. Adenovirus-mediated suicide gene transduction: feasibility in lens epithelium and in prevention of posterior capsule opacification in rabbits. *Hum Gene Ther* 1999;10(14):2365-72.

[14] Hepsen IF, Bayramlar H, Gultek A, et al. Caffeic acid phenethyl ester to inhibit posterior capsule opacification in rabbits. *J Cataract Refract Surg* 1997;23(10):1572-6.

[15] Odrich MG, Hall SJ, Worgul BV, et al. Posterior capsule opacification: experimental analyses. *Ophthalmic Res* 1985;17(2):75-84.

[16] Kruger AJ, Schauersberger J, Abela C, et al. Two year results: sharp versus rounded optic edges on silicone lenses. *J Cataract Refract Surg* 2000;26(4):566-70.

[17] Prajna NV, Ellwein LB, Selvaraj S, et al. The madurai intraocular lens study IV: posterior capsule

opacification. American Journal of Ophthalmology 2000;130(3):304-9.

- [18] Steinert RF. Cataract surgery: technique, complications and management. United States of America: WB Saunders Company, 1995: p. 378-87.