Original Research Article

Study of posterior capsule opacification in Telangana population

Sara Sultana

Senior Resident, Department of Ophthalmology, Government Medical College Nalgonda-508001 Telangana, INDIA.
Email: dr.sarasultana14@gmail.com

Abstract

Background: Posterior Capsule clarity is important to visual gain. Post operative visual acuity could be reduced due to improper intraocular lens (IOL) fixation. Hence different types of IOL made up of different materials used namely PMMA IOL, hydrophilic hydrophobic IOL, silicon IOL were implanted surgically. **Methods:** Three groups of 32 patients were selected and Group A received PMMA IOL, Group-B received foldable 3 piece silicone IOL and Group C received single piece foldable hydrophilic acrylic IOL with hydrophobic surface. All the patients had a follow up at 1 months, 3 months, 6 month, 12 months and 18 months respectively. **Results:** No PCO was observed 9(28%) in group A, 14(43.7%) in group B, 24 (75%) in group C during the follow up of 18 months. Highest PCO formation was reported in PMMA IOL than the other 2 groups. **Conclusion:** This Empirical study highlights that the hydrophilic acrylic IOL with hydrophobic surface were more ideal and useful in the patients of PCO.
Key Words: PMMA, IOL, PCO, Hydrophilic, Hydrophobic, Acrylic.

Address for Correspondence:
Dr. Sara Sultana, Senior Resident, Department of Ophthalmology, Government Medical College Nalgonda-508001 Telangana, INDIA.
Email:dr.sarasultana14@gmail.com
Received Date: 21/06/2019 Revised Date: 12/07/2019 Accepted Date: 18/08/2019
DOI: https://doi.org/10.26611/10091132

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 02 September 2019

INTRODUCTION

Posterior capsular clarity is important for long term visual gain. Post-operative visual acuity could be reduced due to posterior capsular or intra ocular lens opacification, which occurs in months or years after cataract surgery[1]. Posterior capsular opacification(PCO) is the most frequent complication of cataract surgery. Advances in surgical techniques, intraocular lens(IOL) materials and designs have reduced the PCO rate, however it remains a significant problem resulting in suboptimal outcome of cataract surgery[2].PCO is caused mainly by remnant of lens epithelial cells proliferation and migration, epithelial mesenchymal transition, collagen deposition and lens fiber degeneration. All these process are influenced by cytokines growth factors and extra cellular matrix proteins[3].It was reported that the incidence of PCO varies widely ranging from 10-50% when follow-up was more than three years [4]. It was also reported that there was a higher incidence of PCO (Secondary cataract) in myopia than in the normal population. Hence attempt was made to prevent the PCO with different IOL material and designs, so that the ideal and comfortable IOL will be promoted for future surgeries and prevention of PCO.

MATERIAL AND METHODS

96 patients aged between 58 to 65 years old, regularly visiting Sarojini Devi Eye hospital, Hyderabad were selected for study.

Methods

These patients were grouped into three by lottery method and consent was obtained by the patients or relatives.

Group A- 32 patients received single piece PMMA IOL having round edge size of 12.5 mm and optical diameter was 5.25 mm (APPA lens)

Group B- 32 patients received foldable 3 piece silicone IOL having round edge size of 13mm, optical diameter 6mm (soft 61 U, Baush and Lomb)

How to cite this article: Sara Sultana. Study of posterior capsule opacification in Telangana population. *MedPulse International Journal of Ophthalmology.* September 2019; 11(3):86-89. https://www.medpulse.in/Ophthlmology/

Group C- 32 patients received single piece foldable hydrophilic Acrylic IOL with hydrophobic surface, size 12.5mm, optic diameter was 6mm (Eye acryl plus)

Inclusion criteria

Patients having age related cataract, good general condition of health and ocular health certified by the physician and ophthalmologist.

Exclusion Methods

History of Diabetes mellitus, glaucoma, pseudo exfoliation syndrome, macular disease, immune compromised patients and patient's undergone previous ocular surgery were excluded from study.

Surgical procedure – Akinesia and anesthesia was achieved by 6-7ml peribulbar block. The eye to be operated was prepared with 10% povidine iodine lotion and draped in the usual manner. The surgery was performed through a self sealing 2.8 mm near clear corneal incision. Continuous circular capsulorrhexis approx.5.5mm was done using 26 G needle. Hydro dissection and hydrodelineation was done. Phacoemulsification was done using divide and conquer technique. Cortical lens aspiration done. For PMMA IOL in group-A incision was extended to5.25mm, for group B and C it was enlarged to 3.2mm and IOL was implanted in the bag.All the patients were observed post-surgically ,at day1,1, 3,6, 12 and 18 months with previous appointments. Examination was done through Slit lamp.

(a) Visual acuity, intra ocular pressure, centralization of IOL, clarity and folds in posterior capsule were noted.
(b) Fundus examination to rule out any posterior segment abnormality.
(c) PCO was graded into I, II, III, IV

Grade I- Absent or slight opacification, clear view of the fundus and no decrease in visual acuity or decrease by one snellen line.

Grade- II- Mild Opacification, presence of fundal glow with mild haze and decrease in visual acuity by two snellen lines.

Grade-III- Moderate Opacification, faint peripheral glow seen with only disc visible, decrease in visual acuity by three snellen lines.

Grade-IV-Milky white Opacification, no funds glow seen, decrease in visual acuity by four or more snellen lines.

(a) The types of PCO observed were pearl form or Fibrous form.
(b) Observed location of PCO was central or peripheral

Post surgical findings were in different groups-

Group- A Eyes received single piece of PMMA (Poly methyl meth acrylate) IOL having round edge, size were12.5 and optic diameter was 5.25mm

Group-B- Received foldable 3 piece of silicone IOL-silicone optic and PMMA haptics had round edge, size was 13mm and optic diameter was 6mm.

Group-C- Received single piece foldable hydrophilic Acrylic IOL with hydrophobic surface and had 360 degree square edge with overall size of 12.5mm and optic diameter was 6mm.

OBSERVATION AND RESULTS

Table-1. Post –surgical study of Best corrected visual Acuity (BCVA)

Group-A- In day 1, 24(75%) patients had VA>6/9, 8(25%) had VA 6/9-6-12, after 1 month- 22 (68.7%) had VA>6/9, 6(18.7%) had 6/9-6/12, 4(12.5%)had 6/12-6/18. After 3 months- 20(62.5%) had VA>6/9, 8(25%) had 6/9-6/12, 4(12.5%) had 6/12-6/18. After 6 months -12(37.5%) had VA>6/9, 11(50%) had 6/9-6/12, 4(12.5%) had 6/12-6/18. After 12 months, 10(31.2%) had VA >6/9, 10(31.2%) had 6/9-6/12, 10(31.2%) had 6/12-6/18, 2(6.25%) had 6/18-6/24. After 18 months- 7(21.8%) had VA>6/9, 5(15.6%) had 6/9-6/ 12, 9(28.1%) had 6/12-6/18 ,3(9.37%) had 6/18-6/24 ,4(12.5%) had 6/24-6/36, 4(12.5%) had 6/36-6/60.

Group-B-In day 1, 22(68.7%) had >6/9, 10(31.2%) had 6/9-6/12, after 1st month -24(75%) had >6/9, 8(25%) had 6/9P-6/12. After-3 months-26(81.2%)had >6/9, 6(18.7%) had 6/9P-6/12. After 6 months -26(81.2%)had >6/9, 6(18.7%) had 6/9P-6/12. After 12 months 26(81.2%) had VA >6/9, 4(12.5%) had 6/9P-6/12, 2(6.25%) had 6/12P-6/18. After 18 months- 18(56.2%) had >6/9, 7(21.8%) had 6/9P-6/12, 3(9.3%) had 6/12-P-6/18, 2(6.25%) had 6/18P-6/24, 2(6.25%) had 6/24P-6/36.Group-C- 1st day-24(75%) of patients had VA>6/9, 8(25%) had VA 6/9-6/12P, after 1 month- 24(75%) had VA>6/9, 8(25%) had 6/9P-6/12. After 3 months -25 (78.1%) had VA>6/9, 7(21.8%) had 6/9P-6/12. After 6 month -25(78.1%) had VA>6/9, 7(21.8%) had 6/9P-6/12. After 12 months 24 (75%) had VA >6/9, 6(18.7%) had 6/9P-6/12, 2(6.2%) had 6/12P-6/18. After 18 months- 23(71.8%) had VA>6/9, 7(21.8%) had 6/9-6/12, 2(6.2%) had 6/12P-6/18.

Table-2. Degrees of posterior capsular opacification-In Group A, 9 (28%), 14(43.7%) in Group B, 24(75%) in Group-C had no PCO observed. 3(9.37%) in Group B and 0(zero) in Group A and C was observed in grade-I, 8(25%) in group A, 5(15.6%) in group B, 6(18.7%) in group C was observed in grade II, 10(31.2%) in group A, 8(25%) in group B, 2(6.25%) in group C were observed in grade III, 5(15.6%) in group A, 2(6.25%) in group B, 0(zero) in group C was seen in Grade IV .

Table-3. (a) Location of PCO after 18 months: 25(78%) were in group A, 14(43.7%) were in group B, 9(28.1%) in group-C. Among them 9 were located at peripheral, 16 at central in group-A,- In group B 8 were peripheral and 6

were centrally located. In group-C 6 were peripheral PCO and 3 were central.

Table-3. (b) Types of PCO observed- 9 fibrous, 16 pearl shaped PCO at group A, 8 Fibrous, 6 pearl shaped PCO at group B, 6 Fibrous, 3 pearl shaped PCO were observed at group C.

Table 1: Study of best corrected visual Acuity in Group-A(No of Patients -32)

BCVA	POD-1 No	1 month	3 months	6 months	12 months	18 months
VA>6/9	24(75%)	22(68.7%)	20(62.5%)	12(37.5%)	10(31.2%)	7(21.8%)
6/9-6/12	08(25%)	06(18.7%)	8(25%)	11(50%)	10(31.2%)	5(15.6%)
6/12-6/18	0	4(12.5%)	4(12.5%)	4(12.5%)	10(31.2%)	9(28.1%)
6/18-6/24	0	0	0	0	2(6.25%)	3(9.37%)
6/24-6/36	0	0	0	0	0	4(12.5%)
6/36-6/60	0	0	0	0	0	4(12.5%)
<6/60	0	0	0	0	0	0
Group-B (No of Patients -32)						
BCVA	Day-1	1 month	3 months	6 months	12 months	18 months
VA>6/9	22(68.7%)	24(75%)	26(81.2%)	26(81.2%)	26(81.2%)	18(56.2%)
6/9-6/12	10(31.2%)	08(25%)	6(18.7%)	6(18.7%)	4(12.5%)	7(21.8%)
6/12-6/18	0	0	0	0	2(6.25%)	3(9.3%)
6/18-6/24	0	0	0	0	0	2(6.25%)
6/24-6/36	0	0	0	0	0	2(6.25%)
6/36-6/60	0	0	0	0	0	0
<6/60	0	0	0	0	0	0
Group-C(No of Patients -32)						
BCVA	Day-1	1 month	3 months	6 months	12 months	18 months
VA>6/9	24(75%)	24(75%)	25(78.1%)	25(78.1%)	24(75%)	23(71.8%)
6/9-6/12	08(25%)	08(25%)	07(21.8%)	7(21.8%)	6(18.7%)	7(21.8%)
6/12-6/18	0	0	0	0	2(6.2%)	2(6.2%)
6/18-6/24	0	0	0	0	0	0
6/24-6/36	0	0	0	0	0	0
6/36-6/60	0	0	0	0	0	0
<6/60	0	0	0	0	0	0

Table 2: Degrees of posterior capsular opacification after 18 months of surgery (No of Patients -96)

PCO Follow up at 18 months	Group A	Group B	Group C
No PCO	9 (28%)	14(43.7%)	24(75%)
Grade -I	0	3(9.37%)	0
Grade -II	8(25%)	5(15.6%)	6(18.7%)
Grade -III	10 (31.2%)	8(25%)	2(6.25%)
Grade -IV	5(15.6%)	2(6.25%)	0

Table 3: (a)Location of PCO after 18 months

	Group A	Group B	Group C	Total No
No of patients having PCO	25 (78%)	14(43.7%)	9 (28.1%)	48 (50%)
Peripheral PCO	9	8	6	23
Central	16	6	3	25

Table 3: (b)Types of PCO observed after 18 months

Types of PCO	Group A 25 (78%)	Group B 14(43.7%)	Group C 9 (28.1%)	Total No 48 (50%)
Fibrous PCO	9	8	6	23
Pearl PCO	16	6	3	25

DISCUSSION

In the present study of PCO, the best corrected visual Acuity (BCVA) and degree of PCO was quite variable in all three groups (Table-1). After 18 months of surgery 9(28%) in group A, 14(43.7%) in group B, 24(75%) in group C haD no PCO. In group A 0%, 3(9.37%) in group B, 0%in group C had grade-I. In grade II study- 8(25%) in group A, 5(15.6%)in group B, 6(18.7%) in group C was observed. In grade III- 10(31.2%) in group A, 8(25%) in group B, 2(6.25%)in group C, In grade IV- 5(15.6%) was in group A, 2(6.25%) in group B, and 0% in group C was observed (Table-2). In the study of location of PCO after 18 months of surgery, 25(78%) in group A had PCO; among them 9 were peripheral and 16 were central; 14(43.7%) PCO were observed in group-B, among them 8 were peripheral and 6 were central; 9(28%) PCO were observed in group C; among them 6 peripheral and 3 central were observed (Table-3a). Types of PCO observed in group-A was 25(78%), 9 fibrous and 16 pearl shaped; 14(43.7%) PCO observed in group B, 8fibrous and 6 pearl shaped; 9(28.1%) PCO observed in group C, 6 fibrous and 3 pearl shaped (least number) (Table-3b). These findings were more or less in agreement with previous studies.[5,6]In the present study it was observed that, PMMA IOL group had significant number of PCO, silicon had moderate number of PCO and acrylic IOL had least incidence of PCO[7]. It can be hypothesized that hydrophobic surface and hydrophilic acrylic IOL was more flexible, on the other hand more resistant to any post-surgical infections hence least number of PCO were observed in this group. It was also suggested that, cortical clean up during surgery to reduce the number of retained lens epithelial cells (LEC) and prevent the indivertibly retained LEC from migrating towards posterior capsule are the two factors that would prevent the opacification of posterior capsule.[8] Again it gives a thought that the hydrophobic peripheral margin of acrylic IOL might have prevented LEC from migration which causes opacification of posterior capsule. These factors were supported by previous studies that, sharpness of optic edge of IOL will prevent PCO[9]. In the present study Acrylic IOL lens having hydrophobic margin has sharp optic edge which has prevented opacification and PCO. Apart from hydrophobic surface, middle part is hydrophilic in acrylic IOL which has a sharp bend in the lens that induces contact inhibition of LEC which proliferates into PCO[10] Hence the PCO proliferated from LEC has to be evaluated and the factors like cytokines and growth factors including transforming growth factors β (TGF-β), fibroblast growth factor 2(FGF-2) which promote LEC to from opacification of posterior capsule has to be evaluated in lower animals, then only it can be justified that PCO is age-related secondary cataract or degeneration due to geriatric diseases or nutritional deficiencies.

SUMMARY AND CONCLUSION

The present comparative study of PCO (Secondary cataract) had least recurrences in the Acrylic single piece foldable, hydrophilic with hydrophobic surface than the other two PMMA IOL and 3 piece silicon IOL. This study demands further genetic, nutritional, cytological study at molecular level, to rule out whether this opacification due to proliferation of LEC is a degeneration process with advancement of age. Apart from fixation of different types of IOL, recurrence of opacity or PCO has to be ruled out because the factors which determine the formation of cataract are still un-clear.

REFERENCES

1- Rajesh sinha, Himanshu Shekhar, Namrata Sharma- Posterior capsular Opacification A review –Ind. J Opthamol, 2013,16(7),371-376
2- Niranjan Awashi Suqin Guo-B.J Wanger- Posterior capsular Opacification- A problem reduced but not yet eradicated. Journal of American medical Association http://jamanetwork.com viewed on 3-7-2009
3- Suresh pandey, David J. Apple Posterior capsular Opacification, A vreview of the Aetiopathogenesis experimental and clinical studies and factors and prevention – Ind J of ophthalmology vol.52(2),99-10.
4- Apple D.J, Soloman K.D- Posterior capsular Opacification following phacoemulsification, ophthalmic surg. 1980, 11(4),264-7.
5- Sheetal M Raj, Abhay R, Vasande S.R. Kaid Johar - Posterior capsular Opacification, A review – Int.J of Biomedical science 2007 3(4)237-248.
6- Shin D H, Kin Vy Ren J- Decrease of capsular opacification with adjunctive mitomycin C Cataract surgery ophthalmology 1998 1055/222-26.
7- Tetz M R, Spenkar M- Influence of type of cataract on amount of PCO ophthalmology 1996,208, 23-25.
8- Rahul Bharghav- A review of Posterior capsular Opacification, Int. J contemp. Surg. Jan- June 2014, vol,2(1),46-51.
9- Worm stone I N, liuc CS- Human lens epithelial cell proliferation in a protein free medium. Invest ophthalmology vis Sci 1997, 38, 396-409.
10- Nishi O- Posterior capsular Opacification- Part I. experiment investigation. J cataract Refract. Surg, 1999, Jan. 25(1) 106-17.

Source of Support: None Declared
Conflict of Interest: None Declared

Copyright © 2019, Medpulse Publishing Corporation, MedPulse International Journal of Ophthalmology, Volume 11, Issue 3 September 2019