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Research Article

INCIDENCE OF POSTERIOR CAPSULAR OPACIFICATION AFTER SMALL INCISION CATARACT SURGERY WITH PC IOL IMPLANTATION USING BICONVEX ROUND EDGE PMMA IOL AND SQUARE EDGE PMMA IOL

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ABSTRACT

Advances in microsurgical practice have transformed the outcome in cataract surgery; however posterior capsule opacification (PCO) remains one of the most common postoperative complication (15-50%) reducing postoperative visual outcome and increasing the financial burden on the patient. The study was undertaken to compare the incidence of PCO after small incision cataract surgery with posterior chamber intra ocular lens (PC IOL) implantation using biconvex round edge PMMA IOL and square edge PMMA and the relation of diabetes on the incidence of PCO. 300 patients over 50 years of age with age related cataract in one or both eye who attended the eye OPD of Dr. SMCSI Medical College for cataract extraction were included in the study. The overall incidence of PCO with round edge PMMA IOL was 24% at 6 weeks, 3l .3% at 6 months and 23.3% at 1 year compared to that with square edge PMMA IOL which was 5.4% at 6 week, l0.8% at 6 month and 7.6% at 1 year .We found no significant difference in incidence of PCO in diabetics and non diabetics. With increased post operative duration at 1 year, though not statistically significant there was higher rate of PCO 20.8% in diabetics as compared to 13.1% in non diabetics patients. Square edged PMMA IOL; which is inexpensive, resistant to laser treatment and helps to reduce PCO is a good choice as compared to round edge PMMA IOL.
Keywords: Capsulotomy, Diabetes**,** Posterior Capsule Opacification, Visual acuity

INTRODUCTION:

Advances in microsurgical practice have transformed the outcome in cataract surgery and intraocular lens implantation. However, posterior capsular opacification (PCO) remains one of the most common postoperative morbidities [1, 2]. The rate of opacification of posterior lens capsule is as high as 15-50% after extra capsular cataract extraction [3]. The financial burden of cataract surgery is high; added to that a post operative complication like PCO adds to the existing financial burden.

The current treatment of PCO; Nd: YAG capsulotomy is one of the most commonly performed surgical procedures [4], while Nd: YAG laser availability has led to an effective treatment of posterior capsular opacification, this procedure is expensive and not without risk. Lack of access to Nd: YAG Laser deprives patients in less affluent countries like India of an optimal long term visual outcome

The study of PCO formation has high clinical relevance; as yet there is no reliable treatment to prevent PCO. Experimental approaches have been assessed including refinement of surgical techniques, changes of IOL design and development of pharmacological strategies either to kill the residual epithelial cells or to prevent their postoperative proliferation [5].

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The material and design of IOL greatly influence the incidence of PCO following cataract surgery [6]. For an IOL, the biological compatibility depends on the cellular adhesiveness. The lens epithelial cell (LEC) phenotype stability is the most important determining factor for IOL biocompatibility and cellular adhesiveness. This is reflected as capsular opacification. Mechanical biocompatibility is mainly determined by the fit of the haptic in the capsular bag and the shape of the optic which also influences the migration of lens epithelial cells that contribute to the formation of the PCO [6]

This study was taken up to evaluate the influence of different designs of PMMA IOL on PCO formation by comparing the incidence of posterior capsular opacification after small incision cataract surgery with PC IOL implantation using biconvex round edge PMMA IOL and square edge PMMA IOL. PMMA was chosen as the material of choice considering its low cost, less support for LEC adhesiveness and more resistance to damage caused by laser treatment .[7].The study would also evaluate the effect of PCO on the post operative long term visual outcome and the relation of diabetes with the incidence of PCO

MATERIALS AND METHODS:

The descriptive longitudinal study was conducted on 300 patients over 50 years of age with age related cataract in one or both eye who attended the eye OPD of Dr SMCSI Medical College for cataract extraction. The included patients comprise both non diabetics and diabetics. The study was approved by the institutional Ethics Committee.

The patients having co morbid conditions such as corneal opacity, posterior segment pathology like vitreous opacity, retinal detachment, macular degeneration and with past history of uveitis or with objective signs of healed uveitis. (Iris pigment on lens surface, posterior synechiae, iris nodule, KPs on endothelium) pseudoexfoliation syndrome and glaucoma were excluded. The patients with preoperative and immediate post operative complications such as posterior capsule rent, vitreous prolapse, retained cortex, PC plaque, iris prolapse, severe post operative reaction, and severe striate keratopathy were excluded from the study.

The informed consent was taken from all the patients included in the study. The detailed history was obtained and ocular examination including UCVA and BCVA, pupillary reaction, IOP measurement (using Goldmann applanation tonometer) was done. Slit lamp examination of anterior segment, cataract grading and posterior segment evaluation with slit lamp biomicroscopy using 90D lens and B-scan in patient with opaque media was done. IOL power was calculated by SRK II formula. Data was collected using profroma, history, clinical examination; and was analyzed with chi-square test.

Diabetics were taken up for surgery only if PPBS was less than 140 mg /d1. All patient received antibiotic and anti-inflammatory prophylaxis of 0.3% ofloxacin eye drops and 0.3% flurbiprofen eye drop every 6 hours started one day before surgery and continued on the day of surgery. Peribulbar block was used in all cases. In all the cases manual SICS was performed with incision size 6 mm, scleral tunnel was made with crescent blade and continuous curvilinear capsulorhexis done with 26G needle through side port after filling the chamber with 2% hydroxyl propyl methylcellulose. The anterior chamber was entered using 2.8 keratome and section was extended, followed by hydrodissection and nucleus delivery. Irrigation and aspiration was done

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with simcoes cannula and IOL was implanted in the bag. Half of the patient were implanted with in the bag square edge PMMA IOL (SWISS lens SQR 60125 A constant -118.2 optical diameter 6 mm and total diameter 12.5 mm)[group1] and other half were implanted with in the bag conventional bi-convex PMMA IOL (Appalens 201 mod -c step vault. A constant -118.2 optical diameter 6 mm and total diameter 12.5 mm)[group2].The choice between bi-convex PMMA IOL and square edge PMMA IOL was largely guided by the affordability of the patient.

For both groups Ringer's lactate was used as irrigating fluid. At the end of surgery AC was well formed with saline and tight closure of the wound was ensured. Subconjunctival dexamethasone and gentamycin was given in all cases before patching the eye. For all the patients the bandage was opened next day after the surgery and topical antibiotic -steroid combination (0.3% gatifloxacin and 0.1% dexamethasone) was commenced 4 hourly for 7 days and then tapered off 6 hourly for second week, subsequently 8 hourly and 12 hourly over next 4weeks, after which antibiotic-steroid combination was stopped. The patient was followed up at day l, day 7, 6weeks, 6 months and 1 year.

Parameters observed: Post operative best corrected visual acuity (BCVA); Posterior capsular opacification (PCO) grading; other possible complication

PCO analysis method: The PCO was analysed according to slit lamp finding, distant direct Ophthalmoscopy and extent of decrease in visual acuity. The PCO was graded as

Grade 0- PCO slight: Bright or good red glow and decrease in visual acuity absent

Grade I-Mild PCO: Faint red glow and VA decreased by one snellens line

Grade II- Moderate PCO: (Fibrosis or Elschning's pearl on IOL) Poor red glow and VA decreased by two snellens line

Grade III- Severe PCO: (Severe fibrosis or Elschning's pearl on IOL), White dense opacification with very poor red glow and VA decreased by more than two snellens line.

For patient who developed PCO, Nd: YAG posterior capsulotomy was done depending on its severity and patient's functional visual deterioration. After capsulotomy patients were prescribed fluorometholone eye drop QID and timolol 0.5% eye drop BD for a week.

Statistical analysis was performed using statistical package for social science (SPSS for windows, version l6). Visual acuity (BCVA) was converted into numerical numbers for statistical calculations. Univariate categorical analysis was performed using Chi-square test. The level of statistical significance was set as 0.05.

RESULTS: Study was finally concluded on 300 eyes of 291 patients after excluding 13 eyes of 9 patients as per exclusion criteria; with 150 eyes in each group .The baseline characteristics of patient in two groups were comparable as shown in table 1.

The postoperative BCVA as recorded in two groups at l week, 6 week, 6 month and l year are shown in table 2-5. The postoperative BCVA comparison in two groups at l week and 6 week was not statistically significant p: 0.941 and p: 0.692 respectively. The two groups postoperative BCVA comparison was statistically significant at 6 month ($p<0.05$) and l year (p: 0.05) (Table 4-5).

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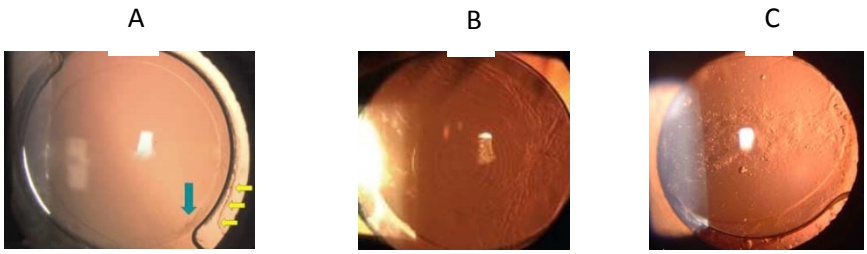

Retroillumination through slit lamp showing A: Good red glow, proliferating fibres stopping short of the margin of IOL.B: Capsular Fibrosis and C: Elschning's pearl

Table 1

Baseline Characteristicss of patients in two Groups		
	Group 1(patients with Swiss lens)	Group 2 patients with Appalens)
Age(in years)		
50-59	35(23%)	28(18.7%)
60-69	84(56%)	78(52%)
>70	31(20.7%)	44(29.3%)
Sex		
male	75(50%)	68(45.3%)
Female	75(50%)	82(54.7%)
Study Eye		
Right	90(60%)	85(56.7%)
Left	60(40%)	65(43.3%)
Diabetes		
Yes	45(30%)	34(22.7%)
No	105(70%)	116(77.3%)

Table 2

Post operative BCVA in patients of both groups at 1week				
	Group 1(%)	**Group 2(%)**	**Chi-square**	**P value**
6/6	70(46.7%)	70(46.7%)	0.397	0.941
6/9	64(42.7%)	62(41.3%)		
6/12	15(10.0%)	16(10.7%)		
6/18	1(0.7%)	2(1.3%)		

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Table 3

Post operative BCVA in patients of both groups at 6weeks				
	Group 1(%)	**Group 2(%)**	**Chi-square**	**P value**
6/6	81(54%)	74(49.3%)	0.735	0.692
6/9	61(40.7%)	66(44.3%)		
6/12	8(5.3%)	10(6.4%)		

Table 4

Post operative BCVA in patients of both groups at 6months				
	Group 1(%)	**Group 2(%)**	**Chi-square**	**P value**
6/6	72(48.3%)	51(34.5%)	16.246	0.003
6/9	60(40.3%)	56(37.8%)		
6/12	14(9.4%)	24(16.2%)		
6/18	3(2.0%)	16(10.8%)		
6/24	0(0%)	1(0.7%)		

Table 5

Post operative BCVA in patients of both groups at 1Year				
	Group 1(%)	**Group 2(%)**	**Chi-square**	**P value**
6/6	74(49.3%)	58(38.7%)	11.09	0.05
6/9	57(38.0%)	56(37.3%)		
6/12	9(6.0%)	13(8.7%)		
6/18	6(4.0%)	7(4.7%)		
6/24	4(2.7%)	11(7.3%)		
6/36	0(0.0%)	5(3.3%)		

Table 6

The PCO grading as recorded in two groups are shown in table 6-8.

Incidence of PCO in patients of both groups at 6 weeks				
	Group 1(%)	**Group 2(%)**	**Chi-square**	**P value**
Absent	142(94.7%)	114(76.0%)	20.887	< 0.05
Grade 0	7(4.7%)	31(20.7%)		
Grade 1	1(0.7%)	5(3.3%)		

Table 7

Incidence of PCO in patients of both groups at 6 months				
	Group 1(%)	**Group 2(%)**	**Chi-square**	**P value**
Absent	134(89.3%)	103(68.7%)	22.625	0.001
Grade 0	1(0.7%)	0(0.00%)		
Grade 1	10(6.7%)	23(15.3%)		
Grade 2	4(2.7%)	19(12.7%)		
Grade 3	1(0.7%)	5(3.3%)		

At 6week early PCO (grade 0 & grade l) was noted in both group and intergroup comparison was statistically significant (p<0.001). Later more dense and visually significant PCO (grade2 & grade3) were also noticed in both group and intergroup comparison was statistically significant at 6 months (p<0.001) and at l year (p<0.05) respectively. The other possible complications like transient corneal oedema, transient high IOP, pigment on IOL surface etc. was seen only in 26 patients comprising both groups and intergroup comparison was not statistically significant as shown in table 9

Table 8

Incidence of PCO in patients of both groups at 1 year				
	Group 1(%)	**Group 2(%)**	**Chi-square**	**P value**
Absent	134(92.4%)	99(76.2%)	14.895	0.002
Grade 0	0(0.00%)	3(2.3%)		
Grade 1	0(0.00%)	0(0.00%)		
Grade 2	4(2.8%)	10(7.7%)		
Grade 3	7(4.8%)	18(13.3%)		

Table 9

Rate of Post operative other complications in patients of both groups				
	Group 1(%)	**Group 2(%)**	**Chi-square**	**P value**
Transient corneal oedema	6(4%)	5(3.33%)	0.245	0.84
Transient high IOP	3(2%)	3(2%)		
Pigment on IOL surface	4(2.6%)	5(3.33%)		

The Nd: YAG posterior capsulotomy was done at 6 month and 1 year in total 63 patients from both groups i.e. in 10.6% cases from square edge PMMA IOL group and in 31.3% cases from round edge PMMA IOL group, observation is shown in table 10. The intergroup comparison was not statistically significant (p: 0.76).

Table 10

Number of patients undergone Nd:YAG posterior Capsulotomy in both Groups				
	Group 1(%)	**Group 2(%)**	**Chi-square**	**P value**
At 6 months	5(3.3%)	18(12%)	0.256	0.76
At 1 Year	11(7.3%)	29(19.3%)		

The effect of diabetes on the incidence of posterior capsular opacification was also observed as it comprises one fourth of study population and results were not statistically significant in both groups as shown in table 11-16

Incidence of PCO in Diabetics and Non Diabetics in group 1(patients with square edgedlens)at 6weeks

Table 11

	Non-diabetics (%)	**Diabetics (%)**	**Chi-square**	**P value**
Absent	98(93.3%)	44(97.8%)	1.232	0.248
Grade 0&1	7(6.7%)	1(2.2%)		

Table 12

Incidence of PCO in Diabetics and Non Diabetics in group 1 (patients with square edged lens)at 6months

	Non-diabetics (%)	**Diabetics (%)**	**Chi-square**	**P value**
Absent	94(89.5%)	40(88.9%)	3.399	0.594
Grade 0&1	6(5.7%)	5(11.1%)		
Grade 2&3	5(4.8%)	0(0.00%)		

Table 13

Incidence of PCO in Diabetics and Non Diabetics in group 1 (patients with square edged lens)at 1year

	Non-diabetics (%)	**Diabetics (%)**	**Chi-square**	**P value**
Absent	94(94%)	40(88.9%)	8.647	0.227
Grade 0&1	0(0.00%)	0(0.00%)		
Grade 2&3	6(6%)	5(11.1%)		

Table 14

Incidence of PCO in Diabetics and Non Diabetics in group 2(patients with round edged lens)at 6weeks

	Non-diabetics (%)	Diabetics (%)	Chi-square	P value
Absent	87(75.0%)	27(79.4%)	0.281	0.656
Grade 0&1	29(25.0%)	7(20.6%)		

Table 15

Incidence of PCO in Diabetics and Non Diabetics in group 2(patients with round edged lens)at 6months

	Non-diabetics (%)	Diabetics (%)	Chi-square	P value
Absent	79(68.1%)	24(70.6%0	2.231	0.426
Grade 0&1	16(13.8%)	7(20.6%)		
Grade 2&3	21(18.1%)	3(8.8%)		

Table 16

Incidence of PCO in Diabetics and Non Diabetics in group 2(patients with round edged lens)at 1 year

	Non-diabetics (%)	Diabetics (%)	Chi-square	P value
Absent	78(79.6%)	21(65.67%)	10.042	0.27
Grade 0&1	0(0.00%)	3(9.4%)		
Grade 2&3	20(20.4%)	8(25.0%)		

DISCUSSION:

PCO also called "after or secondary cataract", is the opacity that follow extra capsular cataract extraction of the lens [8]. PCO develops in up to 50 % of patients between 2 months and 5 yrs after initial surgery.

Development of PCO: After extra capsular cataract extraction the lens is composed of remaining capsule and residual epithelial cells and cortical fibers that were not removed at the time of surgery. The lens epithelial cells still posses the capacity to proliferate, differentiate and undergo fibrous metaplasia. Migration of these cells together with the synthesis of matrix components results in the opacification of the remnant capsule causing light being scattered and associated reduced visual acuity [9].

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So in an ideal world the best way to prevent PCO would be to remove all the lens epithelial cells and cortical remnants at the time of surgery. Many different approaches have been used with variable success. Yet there is no reliable treatment to prevent PCO. A patient who develops a PCO; causing significantly impaired vision needs posterior capsulotomy, which removes the central part of posterior capsule and therefore instantly improves vision. The Nd: YAG laser is used to perform the capsulotomy. This is a simple OPD procedure , but is not without risk [4] Complication include IOL damage, IOL subluxation or dislocation, retinal detachment, uveitis and secondary glaucoma[15-19] Therefore prevention of this complication is important; not only because of the risks associated with its treatment, but also because of the cost involved in the procedure.

Methods for PCO analysis: The methods for PCO analysis varies from using simple slit lamp analysis observation and subjective grading by the observer to much more complex computerized analysis of digital images obtained with specialized photographic equipment. Many authors have used simple observation to evaluate the level of PCO. Kruger et al [12] used a grading system of 0 to 3 to evaluate capsule opacification. The criteria used were 0: absent, I: very mild, 2: moderate, 3: dense white. The capsule behind the optic of the IOL was evaluated within a central area measuring 3 mm diameter, and also evaluated in the periphery. Distinction was given to grading of Elschnig pearls and fibrosis.

Sellman and Lindstrom [22] graded fibrosis and Elschnig pearl formation on a similar four point scale. The original paper contains diagrams to illustrate the various grades for both fibrosis bands and pearls. Those following grades were given; I: no or slight PCO without reduced red reflex, also no pearls at all or pearls not to the IOL edge; 2: mild PCO reducing the red reflex, Elschnig pearls to the IOL edge; 3: moderate fibrosis or Elschnig pearls inside IOL edge but with a clear visual axis; 4: severe fibrosis or Elschnig pearls covering the visual axis and severely reducing the red reflex. The same protocol or variations on it have been referred to by many other authors.

Legler et al [23] assessed level of PCO in rabbit eyes using ease of visibility of posterior segment structures with indirect ophthalmoscope. Other studies have integrated visibility of fundus into their slit lamp grading mechanism. In the Madurai intraocular lens study IV [24] a grading system was used whereby at grade II PCO was present in the central visual axis, detectable with an undilated pupil. Also, in grade II optic nerve head was clearly seen with a direct ophthalmoscope, but retinal nerve fiber layer and blood vessels are not clearly seen. At grade III even margins of optic nerve head are not visible.

Tetz et al [25] first described a photographic analysis system in December 1997. Evaluation of the photoanalysis system showed reliable and reproducible data. The POCO-MAN system (colour coded grid system) has been developed, which is a simple and cheap method for objective measurement of PCO [26]

Gagandeep et al [28] compared the incidence and severity of development of posterior capsule opacification (PCO) following implantation of square-edged polymethylmethacrylate (PMMA) or hydrophobic acrylic intraocular lenses (IOLs) following pediatric cataract surgery. It was a prospective, consecutive, interventional, comparative, randomized and cross-sectional study of 40 eyes of 32

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children aged between 4 and 12 years who underwent Phacoemulsification and posterior chamber IOL implantation.

The patients were randomized into two groups of 20 eyes each. Group 1 eyes received a square-edge hydrophobic acrylic IOL, and Group 2 eyes received a square-edge single-piece PMMA lens in the capsular bag. No eye underwent a primary posterior capsulotomy. The PCO density was evaluated on slitlamp retroillumination photographs by using POCOman software at3, 6, 9 and 12 months post surgery. Conclusion was square-edge PMMA IOLs offer a significant cost advantage over acrylic lenses at similar rates of PCO formation following paediatric cataract surgery.

Buehl W and Findle O [29] did the systematic review based on Cochrane methodology to summarize the effects of intraocular lens (IOL) geometry, including modifications of the IOL optic (especially optic edge design) and haptics, on the development of PCO. Twenty-six prospective randomized controlled trials with a follow-up of at least 12 months were included. In 5 of 7 studies, visual acuity was better in sharp-edged IOLs than in round-edged IOL. The PCO score was significantly lower with sharp-edged IOLs but did not differ significantly between 1-piece and 3-piece open-loop IOLs. Because of the significant difference in the PCO score, sharp-edged IOL optics should be preferred to round-edged IOL optics.

Findl 0 et al [30] compared the posterior capsule opacification (PCO) inhibiting effect of a 3-piece PMMA intraocular lens (IOL) with a sharp optic edge design with that of the round-edged version of the same IOL during a 5-year period in a randomized trial.32 patients with bilateral age-related cataract (64 eyes) were included and each study patient had Phacoemulsification cataract surgery in both eyes and received a sharp optic edge PMMA IOL in one eye and a round optic edge PMMA IOL in the fellow eye (both by Dr Schmidt in Germany). The sharp optic edge IOL showed significantly less regenerative and fibrotic PCO at 1 year, 3 years, and 5 years after surgery.

The study concluded that compared with the round-edge version, the sharp optic edge design of a 3-piece PMMA IOL led to significantly less PCO at 1 year,3 years, and 5 years after surgery. However, the sharp optic edge did not lead to complete PCO prevention during this follow-up period. This finding has implications for the design of PMMA IOLs used for cataract surgery, especially in the developing world.

Hayashi and Hayashui [31] compared the degree of posterior capsule opacification (PCO) and visual function in eyes implanted with an acrylic intraocular lens (IOL) with a sharp posterior optic edge with that in eyes implanted with an IOL with a rounded optic edge (randomized clinical trial) 75 consecutive patients scheduled for bilateral Phacoemulsification were assigned randomly to 1 of 2 groups. One group received an acrylic IOL with a sharp edge (Sensar AR40e, AMO, Santa Ana, CA) in the left eye and an acrylic IOL of the same optic material and loops but with a rounded-edge optic (Sensar AR40) in the right eye. The other group received the sharp-edged IOL in the right eye and the rounded-edge IOL in the left eye.

The PCO value of these patients was measured using the Scheimpflug video photography system at 1,3, 6, 12, 1 8, and 24 months after surgery. The mean PCO value in the sharp-edge IOL group was significantly less than that in the rounded-edge IOL group throughout the follow-up period. The incidence of Nd: YAG

capsulotomy also was significantly less in the sharp-edge group than in the rounded-edge group (P: 0.0095). No significant difference was found in mean visual acuity during the 24 months of follow-up. However, contrast visual acuity with and without glare was significantly better in the sharp-edge group than in the rounded edge group at 24 months after surgery.

Although many surgeons believe that PCO is more common and severe in diabetic patients, the matter still remains controversial. Using retro-illumination images, Zaczek and Zetterstrom [33] demonstrated less PCO in diabetic patients than in non-diabetic controls.

New diagnostic systems have facilitated the evaluation of PCO. Hayashi et al [34] quantitatively measured PCO density using a Scheimpflug slit image analysis system and found no significant difference between diabetic and non-diabetic patients upto 12 months after cataract surgery. However, at 18 months and later, PCO increased significantly in diabetic groups. Their result also demonstrated that diabetic patients were significantly more likely to require Nd-YAG laser capsulotomy than controls.

Ebihara et al [35] using POCO system (a software for semi objective assessment of PCO) also found that diabetic patients had significantly more severe PCO after cataract surgery than non-diabetic patient.

Knorz MC et al [36] evaluated the rate of PCO in diabetes patient with clinically manifest type I or type II diabetes. Their results shows rate of PCO in diabetes as 2l.8% compared to patient with no other disease in which rate of PCO was 33.4%. Difference was statistically significant (p: 0.05). In diabetic patients the lens epithelial cell show accumulation of sorbitol and fructose which is proposed to contribution to cataract formation by disturbing cellular metabolism. This mechanism may explain their finding of lower incidence of PCO possibly caused by reduced proliferation of lens epithelial cells.

It is now mandatory to implant an IOL following cataract surgery as per the directives of Vision 2O20.It was felt that the contribution of an IOL towards PCO formation should be studied further to establish low cost effective IOL for prevention of PCO for the benefit of millions of beneficiaries of cataract surgery in developing countries.

In our study the overall incidence of PCO with round edge PMMA IOL is 24% at 6 week, 3l .3% at 6 month and 23.3% at 1 year compared to that with square edge PMMA IOL which is 5.4% at 6 week, l0.8% at 6 month and 7.6% at 1 year, but at 6 week mainly grade 0 PCO was noticed in both groups.

The slight decrease in incidence of PCO at 1 year in both groups could be resulted due to YAG capsulotomy which was done in some patient at 6 month.

Thus our results shows that the square edged IOL had significantly lower PCO than the round edged IOL. Many other studies have also revealed that the design of the IOL contributed significantly to the PCO formation [29-32] Nishi et al [37] compared sharp edged hydrophobic acrylic (AcrySof) IOL with round optic edge PMMA IOL, there was inhibition of LEC migration in the sharp edged optic whereas in the round optic edge LECs could freely migrate into the posterior capsule centre [38] Sharp optic edge manufactured from different materials showed similar prevention for PCO [38, 39].

This study shows no significant difference in postoperative best corrected visual acuity with both type of IOLs in early post operative period but as duration increases

the rate of good BCVA(6/6,6/9) is 88.6% at 6 month and 88.3% at 1 year with square edge PMMA IOL compared to 72.3% at 6 month and 76% at 1 year with round edge PMMA IOL.This could be because of higher incidence of dense and visually significant PCO(grade II and III) in patient with round edge PMMA IOL in later duration which in turn affected the vision in these patients.

In this study Nd: YAG capsulotomy was done sooner or later in patients of both groups who developed PCO, resulting in no significant difference in frequency of Nd: YAG capsulotomy in patients with both type of IOL (table 10)

As the number of people with diabetes mellitus is increasing exponentially, and diabetics have not always shared the same favourable outcome after cataract surgery as their non diabetic counterparts, we expected to see a relationship between diabetes and the incidence of PCO.

But in our study we found no significant difference in incidence of PCO in diabetics and non diabetics. But with increased post operative duration i.e. at 1 year, though not statistically significant there was higher rate of PCO 20.8% in diabetics as compared to 13.1% in non diabetic patients.

Thus our results support the finding of Hayashi et al [29] who quantitatively measured PCO density using a Scheimpflug slit image analysis system and found no significant difference between diabetic and non-diabetic patients upto 12 months after cataract surgery. However, at 18 months and later, PCO increased significantly in diabetic groups. There are other studies reporting the opposite [31]. Zaczek reported the incidence of PCO was lower in diabetic patient [28]

The drawback of our work is that we have not included the modern IOL materials like acrylic in our study, the reason being its high price which would be a financial burden for our patients for cataract surgery in developing countries. Besides the surgeries were not done by single surgeon and the patients were followed for a year only; while the PCO can develop and progress in later years too.

Diabetic patients in our study are much less compared to non diabetics. To establish better understanding of relationship between diabetes and the incidence of PCO comparable group is needed.

CONCLUSION:

Presently our results corroborate with the vast body of literature which clearly state that the design of the IOL may significantly contribute to PCO reduction, we suggest that square edged PMMA IOL may be a good choice for IOL, which would be inexpensive, resistant to laser treatment, and may reduce the incidence of PCO increasing the long term visual outcome.

We conclude that PMMA Square edged has its advantages. However, the sharp optic edge did not lead to complete PCO prevention during this follow-up period. This finding has implication for the design of PMMA IOLs used for cataract surgery, but still it could be a good option for providing low cost IOL implantation following cataract surgery.

We expected to see a significant relationship between diabetes and the incidence of PCO; however we found no relationship between PCO and diabetes in our study.

References:

[1]. Spalten D J. Posterior capsular opacification after cataract surgery. Eye 1999 13(Pt 3b) 489-92

[2].Bertelmann E, Kojetensky C. Posterior capsular opacification and anterior capsular opacification. Current opin. Ophthalmol 2001; 12:35-40

[3] Scward HC, Dovan RM. Posterior Capsulotomy and RD following extra capsular lens surgery. Br. Jo Ophthalmol 1984; 68:379-82

[4]. Anon. Posterior capsular opacification (Secondary Cataract). Surr Ophthalmol 2000;45

[5].Yanoff.M, Duker.J.S. Yanoff & Duker: Ophthalmology, 2nd edition, Elsvier publication 2004:267 Secondary Cataract

[6].Saika S. Relationship between posterior capsule opacification and intraocular lens biocompatibility. Progress in Retinal and Eye Research 2004; 23:283-305

[7]. Awasthi N, Guo S, Wagner BJ. Posterior Capsular Opacification: A Problem Reduced but Not Yet Eradicated. Arch Ophthalmol 2009;127(4):555-562

[8]. Sihota R, Tondon R. Parson's Disease of the eye 21st Ed, Elsvier publication 2011:278 Posterior capsular opacification

[9]. Apple DJ, Solomon KD, Tetz MR et al. Posterior capsular opacification. Surv Ophthalmol 1992:73 - 116.

[10]. Kappelhof JP, Vrensen GFJM. The pathology of after cataract. Acta ophthalmol 1992;70(suppl205) : 13 -24

[11]. Sveinson O. The ultrastructure of Elschnig's pearl in a pseudophakic eye. Acta ophthalmol 1993 ;7 1 : 95 -98

[12]. Kappelhof JP, Vrensen GFsJM, De Jong PTVM et al. An ultrastructural study of Elschnig's. Am J Ophthalmol 1986; 10l: 58-67

13. Kappelhof JP, Vrensen GFJM, De Jong PTMV et al. The ring of Soemmerring's in man: an ultrastructural study. Grafes Arch Klin Exp Ophthalmol 1988;70: 165-17 4

[14]. Ficker LA, Steele AD. Complication of Nd: YAG laser capsulotomy. Trans Ophthalmol 1985 ; 104:529-532

[15]. Clayman HM, Kronburg FG, Parel JM. Intraocular lens damage from Nd: YAG laser. Am J Ophthalmol 1984;16:551-553,556

[16].Winslow RL, Taylor BC. Retinal complication following YAG laser capsulotomy. Ophthalmol 1985 ;92:785 -789

[17]. Ranta P,Tommila P, Kirela T. Retinal breaks and detachment after Neodymium YAG laser posterior capsulotomy: five year incidence in prospective cohort. J Cat Ref Surg 2004;30:58-66

[18]. Awan KJ. Acute iritis following Nd:YAG posterior capsulotomy. Ophthalmol 1995;11(3):9

[19]. Arya S.K, Sonika, Kochhar S, Kumar S, Kong M, Sood S. Malignant glaucoma as a complication of Nd:YAG laser posterior capsulotomy. ophthalmic surg. Laser Imaging 2004 may-june;35:248-250

[20].AslamT.M, Dhillon.B. System of analysis of posterior capsular opacification. Br J of ophthalmology (BJO) 86(10) 1l81-1l86 Oct2 002.

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

[22]. Sellman TR, Lindstrom RL. Effect of a plano-convex posterior chamber lens on capsular opacification from Elschnig pearl formation. J Cataract Refract Surg 1988;14:68-72

[23]. 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 :462-7 0.

[24]. Prajna NV, Ellwein LB, Selvaraj S, et al. The Madurai intraocular lens study IV: posterior capsule opacification. Am J Ophthalmol 2000; 130:304-309

[25]. Tetz M.R, Auflbrth G.U, Sperker M, et al. Photographic image analysis system of posterior capsule opacification. J Cataract Refract Surg 1997;23:1515-20

[26].Bender.L, Spalton.D.J, Boyce.J, Khan.J. POCO man: New system for quantifying posterior capsule opacification. J Cataract Refract Surg 2004;30:2058-63

[27]. Hazra S, Himongshu Palui,Vemuganti.G.K Comparision of design of IOL verses the material for PCO prevention. International J Ophthalmol.2012; 5(l):59-63 .

[28]. Gagandeep SB, Grewal DS, Jagat R, Singl& M, Pal S, Grewal S. Square-edge polymethylmethacrylate intraocular lens design for reducing posterior capsule opacification following paediatric cataract surgery: initial experience.

Clinical & Experimental Ophthalmolo gy. 2008 ;36(7): 625 -63 0

[29]. Buehl W and Findle O. Effect of IOL design on PCO. J Cataract Refract Surg. 2008(nov);34(l1): I976-85

[30]. Findle O, Buehl W, Menryace R, Sacu S, Georgopoul M, Raener G. Long term effect of sharp optic edge PMMA IOL: a randomized trial. Ophthalmology 2005 (nov) ; 112(l l):2004-8.

[31]. Hayashi K, Hayashi H. Posterior capsule opacification in presence of an intraocular lens with sharp verses round optic edge. Ophthalmology 2005 (sep);112(9):1550-9

[32]. Shah A, Spalton DJ, Gelhent C, Vasavada A, Boyce JF, Minarsian Dat al. J Cataract Refract Surg. 2007 (july) ; 33 (7) :1259 - 66 .

[33]. Zaczek A, Zetterstrom C. Posterior capsule opacification after Phacoemulsification in patient with diabetes mellitus . J Catract Refract Surg 1999:.25:233-237

[34].Hayashi K, Hayashi H, Nakao F, Hayshi F. Posterior capsule opacification after cataract surgery in patient with diabetes mellitus. Am J ophthalmol 2002;134:10-16.

[35]. Ebihara Y, Kato S, Oshika T, Yoshizaki M, Sugita G. . Posterior capsule opacification after cataract surgery in patient with diabetes mellitus. J Catract Refract Surg 2006;32: I 184-1 187.

[36]. Knorz MC, Soltau JB, Seiberth V, Lorger C. Incidence of PCO after ECCE in Diabetics patient. Metab Pediatr Syst Ophthalmol 1991;l4(3-4):57-8.

[37]. Nishi O, Nishi K, Sakanishi K. Inhibition of migrating lens epithelial cells at the capsular bend created by the rectangular optic edge of a posterior chamber intraocular lens. Ophthalmic Surg Lasers. 1998;29:587 -594.

[38]. Nishi O, Nishi K. Preventing posterior capsule opacification by creating a discontinuous sharp bend in the capsule. J Cataract Refract Surg.1999;25:521-526.

[39]. Nishi O, Nishi K, Wickstrdm K. Preventing lens epithelial cell migration using intraocular lenses with sharp rectangular edges. J Cataract Refract Surg. 2000; 26:1543-1549