



COMPARISON OF INCIDENCE OF POSTERIOR CAPSULAR OPACIFICATION FOLLOWING IMPLANTATION OF FOLDABLE (ACRYLIC) AND RIGID (PMMA) INTRAOCULAR LENSES (IOL) IN PHACOEMULSIFICATION SURGERY.

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ABSTRACT

The study was conducted to evaluate the incidence, the type of Posterior Capsular Opacification(PCO) and its effect on visual acuity following implantation of rigid and foldable IOLs after phacoemulsification surgery, involved 500 patients, divided in two groups (age matched), operated by phacoemulsification with IOL implantation of two different varieties (Rigid-PMMA and Foldable-Acrylic). During follow ups, detailed ophthalmic examination was done to assess the PCO and its effect on visual acuity. Out of 500 patients, 51(10.2%) patients developed PCO at the end of 6 month. Incidence of PCO is more in PMMA group(16.8%) than in Acrylic group(3.6%). Out of 51 patients with PCO, 86.3% patients had vision better than 6/12 and 13.7% patients had vision between 6/12 and 6/60.

KEYWORDS : PCO, Rigid-PMMA IOL, Foldable-Acrylic IOL.

INTRODUCTION

Cataract is opacification of crystalline lens in the eye. It typically progresses slowly to cause vision loss and is potentially blinding if untreated. Age-related cataracts are responsible for 51% of world blindness, about 20 million people¹.

The cataract surgery has evolved from couching to phacoemulsification. With the improvement in surgical techniques and development of new technology, the recovery of visual function has considerably improved². Phacoemulsification is a sophisticated technique of extracapsular cataract extraction and now is the most popular method worldwide and has virtually replaced all other techniques.

The most common late complication of cataract surgery by means of ECCE or phacoemulsification is posterior capsule opacification (PCO), usually secondary to the proliferation and migration of residual lens epithelial cells³. The reported incidence of posterior capsule opacification varies widely and seems to be diminishing with current IOL design and placement. Factors thought to influence this rate include the age of the patient, history of intraocular inflammation, size of the capsulorrhexis, quality of the cortical cleanup, capsular fixation of the implant, design of the lens implant, modification of the lens surface, and time elapsed since surgery^{4,5}. The IOL material also has a modest effect on opacification rates: hydrogel IOLs have the highest rate, followed by PMMA, then silicone and hydrophobic acrylic material with the lowest rate⁶.

The present study was conducted to evaluate the incidence, the type of Posterior Capsular Opacification (PCO) and its effect on visual acuity following implantation of rigid and foldable IOLs after phacoemulsification surgery.

MATERIALS AND METHODS

In this study 500 patients were prospectively recruited which presented to outpatient department of Tertiary level eye hospital who satisfied the criteria, after obtaining the written consent. The exclusion criteria were patients with Traumatic cataract, Complicated cataract from diseases like uveitis and other posterior segment diseases or cataract secondary to intra-ocular operations, Cataract associated with any form of glaucoma, Posterior polar cataract and Cataract in individuals below 20 years of age.

Patients were divided in two groups (age matched), operated by phacoemulsification with IOL implantation of two different varieties. Group 1- With Rigid PMMA IOL implantation and Group 2- With Foldable Acrylic IOL implantation. Follow-up was done on 1st day, 7th day, 1 month, 3 months and 6 months. During follow ups, detailed ophthalmic examination was done to assess the PCO and its effect on visual acuity. The following system was used to grade the PCO.

SELLMAN AND LINDSTROM GRADING OF PCO⁷

Grade 1- no or slight PCO without reduced red reflex, also no pearls at all or pearls not to the IOL edge.

Grade 2 – mild PCO reducing the red reflex, Elschnig pearls to the IOL edge

Grade 3 – mild fibrosis or Elschnig pearls inside the IOL edge but with a clear visual axis.

Grade 4 – severe fibrosis or Elschnig pearls covering the visual axis and severely reducing the red reflex.

OBSERVATIONS

The observations were compared statistically and tabulated as follows.

TABLE 1: AGE WISE DISTRIBUTION IN GROUPS

Age in years	Acrylic IOL group	PMMA IOL group	Number of patients
30 to 40	9 (3.6%)	7 (2.8%)	16
40+ to 50	26 (10.4%)	22 (8.8%)	48
50+ to 60	63 (25.2%)	65 (26%)	128
60+ to 70	101 (40.4%)	132 (52.8%)	233
>70	51 (20.4%)	24 (9.6%)	75
Total	250 (100%)	250 (100%)	500

In present study, maximum number of patient i.e. 233(46.6%) are present in the age group of 60+ to 70 yrs and minimum number of patient i.e. 16(3.2%) are present in the age group of 30-40 yrs. Each group consists of 250 patients. In these two groups, age matching was done as much as possible.

TABLE 2: PCO IN RELATION TO TYPE OF IOL

PCO	ACRYLIC IOL	PMMA IOL	Number of patients
PRESENT	9 (3.6%)	42 (16.8%)	51 (10.2%)
ABSENT	241 (96.4%)	208 (83.2%)	449 (89.8%)
TOTAL	250 (100%)	250 (100%)	500 (100%)
CHI SQUARE:	22.497		
X ²			
Df	1		
P value	< 0.001		

In present study, after phacoemulsification surgery, 51(10.2%) patients developed PCO at the end of 6 month, while 449(89.8%) patients did not develop PCO. Incidence of PCO is more i.e. 16.8% in PMMA group of IOL, while it is less i.e. 3.6% in Acrylic group of IOL.

Hence In this study, Incidence of PCO is comparatively higher in PMMA group of IOL than Acrylic group which is statistically significant.

TABLE 3: INCIDENCE OF PCO-AGE WISE:

Age in years	Number of patients	PCO Present	Incidence of PCO %
30 to 40	16	4	25%
40+ to 50	48	11	22.9%
50+ to 60	128	10	7.8%
60+ to 70	233	19	8.15%
>70	75	7	9.33%
Total	500	51	10.2%

In the present study incidence of PCO is higher (25%) in younger age group of 30 to 40yrs as compared to the age groups which are 40+. It suggests that Incidence of PCO is higher in younger age groups compared to the older age groups.

In the present study, out of 51 cases of PCO developed, 35 are of Elschning's pearl type and 16 are of Fibrous type. Sommering's ring is not found in any patient in this study.

Grading of PCO was done by Sellman and Lindstrom grading system of PCO. Incidence of PCO increased (2.8% to 10.2%) as the postoperative duration increased from 3 months to 6 months. Maximum cases are conformed to grade 2 PCO.

TABLE 4: VISUAL ACUITY IN RELATION TO GRADES OF PCO:

PCO	BCVA at 6 month F/U			Total
	< 6/60	6/18 -6/60	6/6 to 6/12	
Grade 1	0	0	4	4
Grade 2	0	0	30	30
Grade 3	0	4	10	14
Grade 4	0	3	0	3
Total	0	7 (13.7%)	44(86.3%)	51(100%)

In the present study, out of 51 cases with PCO, 44 patients (86.3%) had vision \geq 6/12 and 7(13.7%) patients had vision $<$ 6/12 but \geq 6/60. No patient in this study, who developed PCO had vision $<$ 6/60. It suggests that out of 51, only 7 patients developed visually significant PCO and affecting visual acuity significantly.

DISCUSSION

The modern surgical techniques employed for cataract surgery are safe with few complications. The most common late complication of cataract surgery by means of ECCE or phacoemulsification is posterior capsule opacification (PCO). Capsular opacification stems from the continued viability of lens epithelial cells that remain after removal of the nucleus and cortex. Opaque secondary membranes are formed by proliferating lens epithelial cells, fibroblastic metaplasia, and collagen deposition. If the epithelial cells migrate across the anterior or posterior capsule, they may cause capsular wrinkling and opacification. Significantly, the lens epithelial cells are capable of undergoing metaplasia with conversion to myofibroblasts. These cells can produce a matrix of fibrous and basement membrane collagen. Contraction of this collagen matrix will cause wrinkles in the posterior capsule, with resultant distortion of vision and glare⁸.

In this study, incidence of PCO after phacoemulsification in 6 month follow up is 10.2%. According to a study by Col.Moulik et al⁹, PCO rate 9.1% reported after phacoemulsification at 6 month follow up, which is almost comparable with the present study. In the present study, incidence of PCO was found more in PMMA group i.e.16.8% and comparatively less i.e.3.6% in acrylic group. In 2 different studies by Muhammad moin et al¹⁰ (PMMA-23.4%, Acrylic-6.2%) and Oner FH¹¹ (PMMA-24.7%, Acrylic-8.7%) show a higher incidence of PCO in PMMA group compared to acrylic group and the incidence is more in both the groups as compared to present study, this might be because of longer duration of follow up i.e.2 years and 18 months respectively. In the present study, Elschning's pearl type of PCO was found significantly more as compared to the fibrous type, which is comparable to the results of a study by Muhammad moin et al¹⁰.

The present study shows that the incidence of PCO is higher (27.08%) in younger age group of 30+ to 40yrs as compared to the age groups which are 40+. It suggests that Incidence of PCO is higher in younger age groups compared to the older age groups. The study by Prajna et

al¹² shows that the 4-year incidence of grade II or III posterior capsule opacification, was 13.1%. Each passing year in the patient's life was associated with a decreased risk of posterior capsule opacification. Result of the present study also agrees to this finding.

In this study, visual acuity is less than 6/60 in 0%, between 6/18 to 6/60 in 13.7% and better than 6/12 in 86.3% patients. The study by Col.Moulik et al⁹ shows the results (less than 6/60: 0, between 6/18-6/60: 11.4%, better than 6/12: 88.6%) which are comparable to the present study.

CONCLUSION

Thus the present study has highlighted the fact that post phacoemulsification cataract surgery PCO incidence can be reduced though not totally avoided. An intraocular lens material is an important variable in the development of posterior capsule opacification. There is more incidence of PCO with PMMA IOLs than Acrylic IOLs, so judicious selection of IOL material (Acrylic over PMMA) goes a long way in minimising the incidence of postoperative PCO.

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