
ORIGINAL ARTICLE**Subnormal Vision in Uneventful Cataract Surgery after 6 Weeks –
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Abstract:

Background: With accurate estimation of power of intraocular lens (IOL), uncomplicated cataract surgery and uneventful post operative period, the implant is capable of providing a visual acuity of 6/6 and a normal field of vision. However, post operative results are not always according to the expectations. This study is an attempt to find out causes of subnormal vision post uneventful cataract surgery with posterior chamber intraocular lens by various surgical techniques in Krishna Institute of Medical Sciences, Karad, Maharashtra, India. *Aims and Objectives:* To study the incidence of subnormal vision in patients who have undergone uneventful cataract surgery with posterior chamber IOL implant and relation between the type of surgery and IOL used and its effect on the subnormal vision post operatively, in Krishna Hospital. *Material and Methods:* 185 patients among 1230 who underwent uneventful cataract surgery were diagnosed to have sub-normal vision in our study, over the period of 18 months. All pseudophakic patients, who have undergone uneventful cataract surgery, with normal pre-operative assessment were included in the study. Diabetic and hypertensive patients without any maculopathy were also included. Patients with intra operative complications, traumatic cataract, complicated cataract and pre existing pathology were excluded. *Result:* Prevalence of sub-normal vision in our study was approximately 14.18%. Among all the causes of sub-normal vision, incidence of posterior capsular opacification (PCO) was maximum, (80.87%). Incidence of PCO was least in foldable IOLs as compared to square edge and non square edge.

Keywords: Posterior Chamber IOL, Posterior Capsular Opacification, Pseudophakic, Subnormal Vision

Introduction:

The history of Intraocular Lens (IOL) implantation has been a long saga of excitement and the ultimate outcome has been rewarding. Sir Harold Ridley performed the first IOL implant in the posterior chamber of the left eye of a 45 yrs old woman after an Extra Capsular Cataract Extraction (ECCE), on 24th November 1949 at St. Thomas Hospital, London [1]. Since then there has been a number of changes in surgical techniques, lens design, lens material, lens sterilization and placement of IOL.

Further advances in cataract surgery like phacoemulsification, micro surgery and newer IOLs like toric lens, foldable lens, multifocal lens, square edge lens, the quality of vision and post operative results have further improved. One of the most important advances in ophthalmology is phacoemulsification introduced by Charles C Kelman in 1967. ECCE requires a relatively large wound that results in a long healing process, induce astigmatism, slow visual recovery and the potential for endophthalmitis. Phacoemulsification requires a smaller surgical wound, resulting in a shorter healing process, less against-the-rule astigmatism, and more rapid visual recovery.

This study is an attempt to find out causes of subnormal vision amongst patients undergone uneventful extra capsular cataract extraction with posterior chamber intraocular lens by various surgical techniques.

Material and Methods:

185 patients among 1290 who underwent uneventful cataract surgery, were diagnosed to have sub-normal vision after uneventful surgery at Krishna Hospital over the period of 18 months and were included in the study. Out of 185, one case of TASS and one of endophthalmitis were seen. It is a retrospective cohort study.

Inclusion criteria were all pseudophakic patients who had undergone uneventful cataract surgery, with normal pre-operative assessment. "By uneventful cataract surgery we mean no intra operative complications which can affect the outcome of surgery and result in subnormal vision".

Diabetic and hypertensive patients without any maculopathy who had undergone uneventful cataract surgery were included in the study.

Patients with intra operative complications, other ocular pathology like corneal opacity, traumatic cataract, complicated cataract, trauma post operatively and any pathology on fundus and macula which can result in subnormal vision were excluded from our study.

For every patient, a detailed pre operative evaluation was done. Best visual correction was noted and ocular examination with slit lamp, direct and indirect ophthalmoscope was done. In cases of media opacity where details of the fundus were not clear special investigations like B Scan, Maddox rod test were done to rule out any maculopathy and other retinal pathology. Post-operatively patients were followed up till 6th week post-operative day when refraction was done. If the best corrected vision was < 6/9, patient was included in the study. Those patients who had normal vision at 6th week post-operative period but developed sub-normal vision later during the duration of the study were also included in the study.

Results:

Total number of uneventful cataract surgeries done during the study period was 1290, out of which 1154 were Small Incision Cataract Surgery (SICS) and 136 were phacoemulsification (phaco). In 18 months of study 185 patients were diagnosed with sub-normal vision, 6 weeks after uneventful cataract surgery and were investigated for the cause. Statistical analysis was done as per requirement using Chi-square test of significance. (P value less than 0.05 was considered as significant).

Table 1 showed that incidence of sub-normal vision was significantly more among SICS than phacoemulsification.

Table 2 showed that incidence of sub-normal vision was least in foldable (7.35%) followed by square edge (7.99%) and non square edge (17.32%).

Table 3 showed that highest number cases of sub-normal vision were due to PCO (80.87%) followed by CME (9.28 %), malposition of IOL (7.10%), clinically significant diabetic macular oedema (2.73 %), TASS (0.54%) and delayed endophthalmitis (0.54%).

Table 4 showed that incidence of PCO was least in acrylic foldable (2.20%) as compare to square edge (5.63%) and non square edge (15.01). Among square edge and non square edge incidence was less in square edge IOLs.

Table 5 showed that incidence of PCO, CME and DME were significantly low in phaco than SICS as the p value was <0.05. Incidence of malposition of IOL, TASS and endophthalmitis was not significant as the calculated p value came >0.05.

Table 1: Relation between Type of Surgery and Sub-Normal Vision

| Type of surgery | Sub-normal vision | Normal vision | Total | Percentage of Sub-Normal Vision | p value |
|-----------------|-------------------|---------------|-------|---------------------------------|---------|
| SICS | 173 | 981 | 1154 | 14.99 | 0.02529 |
| Phaco | 010 | 126 | 0136 | 07.35 | |
| Total | 183 | 1107 | 1290 | 14.18 | |

Table 2: Relation between Type of IOL and Sub-Normal Vision:

| Type of IOL | Sub-normal | Normal | Total | Percentage of Sub-Normal | p value |
|-----------------|------------|--------|-------|--------------------------|---------|
| Square Edge | 023 | 265 | 288 | 07.99 | 0.0001 |
| Non Square Edge | 150 | 716 | 866 | 17.32 | |
| Foldable | 010 | 126 | 136 | 07.35 | |
| Total | 183 | 1107 | 1290 | 14.18 | |

Table 3: Causes of Sub-Normal Vision

| Causes | No. of cases | Percentage |
|--------------------|--------------|------------|
| PCO | 148 | 80.00 |
| CME | 17 | 09.19 |
| Malposition of IOL | 13 | 07.03 |
| DME | 05 | 02.70 |
| TASS | 01 | 00.54 |
| Endophthalmitis | 01 | 00.54 |

PCO- Posterior Capsular Opacification, CME- Cystoid Macular Edema, IOL- Intraocular Lens, DME- Diabetic Macular Edema, TASS- Toxic Anterior Segment Syndrome

Table 4: Relation between Type of IOL and PCO

| Type of IOL | PCO | Non PCO | Total | Percentage of PCO | p value |
|-----------------|-----|---------|-------|-------------------|---------|
| Square Edge | 15 | 273 | 288 | 05.21 | 0.000 |
| Non Square Edge | 130 | 736 | 866 | 15.01 | |
| Foldable | 03 | 133 | 136 | 02.21 | |
| Total | 148 | 1142 | 1290 | 11.44 | |

Table 5: Relation between Type of Surgery and Causes of Sub-Normal Vision

| Type of surgery | PCO | CME | DME | Mal position | TASS | Endoph | Total |
|-----------------|-------|------|-------|--------------|-------|--------|-------|
| SICS | 145 | 11 | 3 | 13 | 1 | 1 | 174 |
| Phaco | 003 | 06 | 2 | 00 | 0 | 0 | 011 |
| Total | 148 | 17 | 5 | 13 | 1 | 1 | 185 |
| p value | 0.048 | 0.00 | 0.001 | 0.364 | 0.801 | 0.801 | |

Discussion:

Incidence of sub-normal vision has been higher in SICS (14.99%) as compared to phacoemulsification (7.35%). The most important cause of subnormal vision was PCO, However has been treated with the help of Neodymium-Yttrium-Aluminum Garnet (Nd:YAG) laser and normal vision has been reestablished.

Incidence of subnormal vision after 6th week post operative day, was highest in cases of patients with non square edge IOLs and followed by square edge and foldable lenses.

The high incidence of subnormal vision in our study due to non square edge PMMA (polymethylmethacrylate) lenses can be contributed to the fact that non square edge lenses are associated with high rate of PCO.

The commonest cause of sub normal vision post uneventful cataract surgery, in our study was PCO (80.87%). This is because of high number of non square edge lenses used in cataract surgery in our study. Non square edge lenses are still used in great number in developing countries because of their low cost.

The second commonest cause of sub normal vision after uneventful cataract surgery has been cystoid macular edema (9.28%). This result is similar to other study done by Hiranmoyee *et al* [2]. In their study the rate of CME has been 6.67 %.

The third commonest cause is the malposition of IOL. Out of 13 cases of malposition of IOL,

haptics of 8 IOLs had been in sulcus, in 4 cases one haptic had been in the bag and the other in the sulcus. And in 1 case, both haptics were in the bag but there was zonular weakness. It has been seen that one haptic in sulcus and another in the bag causes tilting of IOL which causes high astigmatism [3].

Total number of diabetic patients with sub-normal vision have been 44, of which 5 patients have shown clinically significant diabetic macular edema post cataract surgery. These diabetic patients have shown increase in thickness at the macular area on Optical Coherence Tomography (OCT) post cataract surgery. Studies have shown that there occurs increase in severity of diabetic retinopathy post cataract surgery due to intraocular inflammation [4].

Rate of toxic anterior segment syndrome and delayed Endophthalmitis has been 0.54% each. TASS occurs most commonly following cataract surgery, but may occur following anterior-segment surgeries of any kind including glaucoma or cornea transplant surgeries. The etiology of TASS is relatively broad and may include problems involving irrigating solutions such as balanced saline solution (BSS) and any additives included [5-9].

Highest number of cases of PCO has been in patients with non-square edge lenses as compared to square edge lens and foldable lens. The reason for low incidence of PCO in square edge and

foldable lenses is because of the unique IOL design. Square edge design acts as a barrier, preventing the migration of lens epithelial cells from the equatorial region onto the posterior capsule [10].

In our study, incidence of PCO is least with foldable lenses. This is similar to one study done by Hassan Hashemi *et al*, which has suggested that rate of PCO is more with PMMA lenses as compared with foldable lenses [11]. There is another study which shows that there has been no significant difference in the PCO between the square edged PMMA and square edged foldable lens [12].

Incidence of PCO, CME and DME are significantly low in phacoemulsification than SICS and

the incidence of malposition of IOL, TAS and endophthalmitis is not significant.

In developing countries like India, where cost of treatment is a major factor in the choice of surgical procedure, SICS appears to be the choice of many patients. The cost of treatment of PCO is affordable to common man. Use of square edge lens should be preferred to non square edge lens.

Conclusion:

This study has reached on conclusions that phacoemulsification proves to be a better option of cataract extraction, square edge design IOLs helps in preventing early PCO and Foldable IOLs implantation is preferable to PMMA non foldable IOLs. Confirmation of IOL in the bag is mandatory intra-operatively to prevent subluxation of IOL.

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