



## STUDY OF INCIDENCE OF POSTERIOR CAPSULE OPACIFICATION AFTER MANUAL SMALL INCISION CATARACT SURGERY WITH SQUARE EDGED VERSUS ROUND EDGED INTRAOCULAR LENS IMPLANTATION

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### ABSTRACT

**Aim:** To compare the incidence of Posterior Capsular Opacity in square edged rigid intraocular lens in Small incision cataract surgery.

**Background:** Senile Cataract is most important cause of curable blindness in developing countries. Extra capsular cataract extraction (ECCE) and primary posterior chamber (in capsular bag) intraocular lens (IOL) implantation is the best treatment for visual rehabilitation of cataract patients. PCO is a nagging complication of ECCE and primary IOL implantation. PCO is treated by Nd:YAG laser capsulotomy, but can also lead to various ocular complications. As a result, prevention of PCO is very crucial and challenging task.

**Materials & Methods:** This study was conducted in the department of Ophthalmology of Jawahar Lal Nehru Medical College and Hospital, Bhagalpur, Bihar. 150 patients between the age of 50 to 80 years, suffering from senile cataract were selected for this study and were divided into two groups- Group A and Group B. In both the groups, manual small incision cataract surgery was performed. Patients of Group A were implanted with round edged IOL and Group B with square edged IOL.

**Results:** At the end of one year postoperatively there was decrease in visual acuity of two lines or more on Snellen's chart in 15 (20%) cases of Group A and in 6 (8%) cases of Group B due to posterior capsule opacification.

**Conclusion:** Posterior capsule opacification is a nagging complication of modern-day cataract surgery. But recent advances in IOL design have greatly reduced the incidence of PCO. Square edged PMMA IOL have better efficacy compared to round edged IOL in reducing PCO.

**KEYWORDS :** Posterior capsule opacification, manual small incision cataract surgery, round edged PMMA IOL, square edged PMMA IOL.

### INTRODUCTION:

Senile Cataract is most important cause of curable blindness in developing countries. The increase in life expectancy, coupled with population growth in these countries, guarantees that cataract will continue to be a major health problem in 21st century.<sup>[1]</sup>

Extracapsular cataract extraction (ECCE) and primary posterior chamber (in capsular bag) intraocular lens (IOL) implantation is the best treatment for visual rehabilitation of cataract patients. Manual small incision cataract surgery (MSICS) is excellent and economical technique practiced in developing countries.

Posterior Capsule Opacification (PCO) is a nagging complication of ECCE and Primary IOL implantation. PCO is caused by proliferation of equatorial epithelial cells and their migration onto the posterior capsular surface. As a result, an opaque membrane develops over posterior capsular surface. PCO leads to diminution of vision by direct blockage of visual axis or by distortion of image, glare and decreased contrast sensitivity. PCO amounts for blindness of 0.9%.<sup>[2]</sup> Neodymium: Yttrium Aluminium Garnet (Nd: YAG) laser secondary posterior capsulotomy is definitive treatment of PCO. It may be associated with additional complications including IOL damage, intraocular pressure (IOP) elevation, glaucoma, cystoid macular edema or even retinal detachment.<sup>[3]</sup> Laser treatment of PCO also causes economic burden. Hence, observers have considerable interest in prevention of PCO. Because of failure of complete removal of lens epithelial cells by irrigation- aspiration or pharmacologically, interest for prevention of PCO has shifted towards I.O.L related factors like

1. Biocompatible IOL to reduce stimulation of cellular proliferation.
2. Maximal IOL optic- posterior capsule contact with angulated haptics, "adhesive" biomaterial to create a "shrink wrap" of the capsule.
3. IOL optic geometry a square, truncated edge for 360 Degrees.<sup>[4]</sup>

### MATERIALS & METHODS:

This prospective study was conducted in the department of Ophthalmology of Jawahar Lal Nehru Medical College and Hospital, Bhagalpur, Bihar between November 2017 to October 2019. 150 patients between the ages of 50 to 80, suffering from senile cataract were selected for this study.

**Inclusion Criteria:** Mature senile cataract.

**Exclusion Criteria:**

1. Systemic illness like hypertension, diabetes, cardiac pathology.

2. Complicated cataract, traumatic cataract, polar cataract, retinal pathology, glaucoma, corneal dystrophy, intraoperative complications like posterior capsular rupture, zonular dialysis and rhexis tear, primary PCO.

Detailed preoperative ocular examination was done which included slit lamp bio-microscopy, macular function test, recording of intraocular pressure. Bilateral lacrimal syringing was done in every case. A-scan biometry and keratometry were done for IOL power calculation. Randomized distribution of the patients was made into two groups on the basis of IOL implanted.

1. Group A: implanted with single piece round edged PMMA IOL, having optic diameter 6mm and overall length 12.5 mm.
2. Group B: implanted with single piece square edged PMMA IOL, having optic diameter 6mm and overall length 12.5 mm.

In both the groups, manual small incision cataract surgery was performed under peribulbar anesthesia by same surgeon. Sclero-corneal tunnel was made. Anterior chamber was maintained by viscoelastic. Continuous curvilinear capsulorhexis (CCC) was done through side port incision. After hydro-dissection and hydro-delineation, nucleus was rotated and brought into the anterior chamber and the chamber was maintained with viscoelastic material throughout the maneuver and the nucleus was removed with irrigating Vectis. A thorough and meticulous cortical cleaning was done using irrigation aspiration cannula. The capsular bag was filled with viscoelastic material. Patients of Group A were implanted with round edged IOL and that of Group B with square edged IOL. In both the groups, IOL were implanted in the capsular bag. Efforts were made to aspirate viscoelastic material completely from the anterior chamber and capsular bag. Air bubble was injected into anterior chamber.

A sub-conjunctival injection of dexamethasone 0.5cc and gentamicin 0.5cc was given and the eye was closed with pad and bandage. On the first postoperative day, patients were examined under slit lamp for any postoperative complication and visual acuity (V/A) was recorded with pin hole. Follow up was done for one year postoperatively at day 7, one month, three months, six months and twelve months after discharge. At each visit, visual acuity was tested both aided and unaided. The IOL transparency, capsulorhexis margin and centration of IOL and PCO were evaluated under adequate pupillary dilatation by slit lamp.

**RESULT:**

Out of 150 selected cases of mature senile cataract, 56 were males and 94 were females. Mean age of Group A was  $62.03 \pm 5.37$  and that of Group B was  $61.89 \pm 5.49$ . Visual acuity of 6/9 or better was found in 60(80%) patients in Group A and 63 (84%) patients in Group B at the end of one month postoperatively. However, at the end of one year postoperatively there was decrease in visual acuity of two lines or more on Snellen's chart. 15 (20%) cases of Group A and 6 (8%) cases of Group B.

**Table 1: Visual acuity diminution result at the end of one year postoperatively**

S. No	V/A loss	Group A	Group B
1	No loss	60(80%)	69(92%)
2	2 lines	9(12%)	4(5.33%)
3	3 lines	4(5.33%)	2(2.67%)
4	4 lines	1(1.33%)	0(0%)
5	5 lines	1(1.33%)	0(0%)

On slit lamp examination at the end of 1st month postoperatively, PCO was not detected in any patient of both the groups. At the end of 3rd month postoperatively, PCO was detected in 1(1.33%) patient of Group A only. At the end of 6 month, PCO was detected in 10(13.33%) and 3(4%) patients of Groups A and B respectively. At the end of 1 year, PCO was detected in 15(20%) patients of Group A and 6(8%) patients of Group B.

**Table 2: Incidence of posterior capsule opacification at various postoperative visits**

S. No	V/A loss	Group A	Group B
1	3 months	1(1.33%)	0(0.00%)
2	6 months	10(13.33%)	3(4%)
3	1 year	15(20%)	6(8%)

**DISCUSSION:**

The present study included patients suffering from mature senile cataract without any underlying ocular or systemic disease. Mean age of Group A was  $62.03 \pm 5.37$  and that of Group B was  $61.89 \pm 5.49$ . p-value (significance-level)  $> 0.05$  showed that there is no significant difference between the age of two groups.

At the end of one-month postoperative visual outcome was similar in both the groups. Corrected visual acuity 6/9 or better in 80% cases of Group A compared to 92% cases of Group B.

One year postoperatively, decrease in visual acuity of more than 2 lines were found in 20% cases of Group A compared to 8% cases of Group B. This loss of visual acuity is attributed to development of PCO and it shows significant difference ( $p < 0.05$ ). Naga Suresh V, Radhika R in their study of implanting square edged PMMA IOL have reported posterior capsule opacification in 6.67% patients at the end of one year postoperatively.<sup>[5]</sup> Their observation is in agreement with present study.

Schaumberg et al, by their meta-analysis, have reported incidence of PCO of 11.8% after one year follow up period.<sup>[6]</sup> Findl et al reported significantly lower PCO scores (2.5%) for sharp edge IOLS compared to round edge models although there were no clear differences between IOL materials.<sup>[7]</sup>

Shah, A. et al reported that PCO rate of 30% in eyes receiving round edged PMMA IOL and 20% in contralateral eyes receiving a square edged PMMA IOL after a follow up period of one year in cases of traditional ECCE.<sup>[8]</sup> Higher rate of PCO formation can be explained by failure to achieve in the bag fixation of IOL in ECCE cases.

Regardless of IOL material, the importance of IOL edge design is widely accepted and there is considerable agreement among medical communities in favor of square posterior optic edge for reducing PCO rate and Nd:YAG procedure needs. Some authors consider optic edge as main factor preventing PCO. It has been shown that sharp edge leads to lower PCO formation than round ones, thanks to barrier that is created which hinders lens epithelial cells (LEC) migration.<sup>[9]</sup>

In the present study, a complete CCC was done and capsular margin was overlapping in all patients. The limitation of this study is that small number of patients were examined in a shorter postoperative duration of one year.

**CONCLUSION:**

Posterior capsule opacification is a nagging complication of modern-day cataract surgery. But recent advances in IOL design have greatly reduced the incidence of PCO. Square edged PMMA IOL have better efficacy compared to round edged IOL in reducing PCO.

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