Research Paper

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Study of Posterior Capsular Opacification after cataract surgery and its association with the nature of Capsulorhexis: A clinical Study.

MEDICAL SCIENCE

KEYWORDS : posterior capsular opacification, after cataract, capsulorhexis

Dr. Devanshi Shah

Dr. Nirav M. Raimagiya

ABSTRACT

Posterior capsular opacification(PCO) has significantly impeded the delivery of successful cataract surgery with IOL implantation of 25 million blinds from cataract worldwide.1In our study, 100 eyes of patients who had undergone cataract surgery were included where we studied the incidence of PCO and its association with the type and size of capsulotomy. Incidence of clinically significant PCO was found to be 34% at the end of 1year duration, in which fibrous type of PCO was more common. PCO was found less in patients where Continous curvilinear capsulorhexis(CCC) was done compared to Canopenercapsulotomy. Also CCC which covered the optic margin of the intraocular lens(IOL) completely had less incidence of PCO compared to the CCC covering the optic margin incompletely.

INTRODUCTION:

Senile Cataract is the commonest cause of curable blindness in our country. Sushrutha the great Indian sage and surgeon (1500 BC) first described cataract surgery in his book "sushruthaSamhitha".Visually significant posterior capsular opacification (PCO) is the most common late complication of uncomplicated cataract surgery.PCO can affect the vision directly by blocking the visual axis or indirectly either by causing traction folds on PC and decentration of intraocular lens. The resultant complications are decreased vision, impaired contrast sensitivity, glare or giving rise to monocular diplopia2.

The two morphologically distinct types of PCO are fibrosis and Elschnig's pearls, which occur independently or in combination (Fig. 1, 2). Patients with pearl type PCO had worse visual acuity and contrast sensitivity than those with fibrosis type PCO.

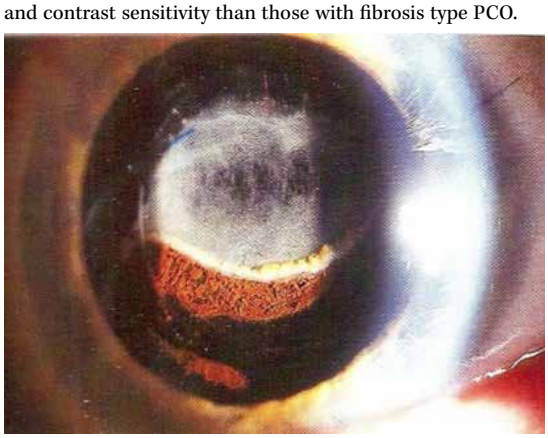


Figure 1. Capsular fibrosis

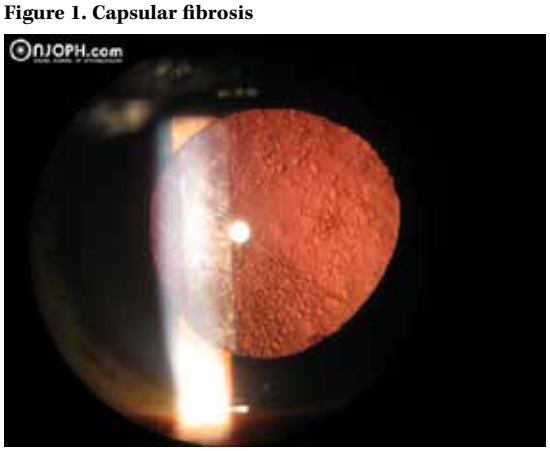


Figure 2.Elschnigs pearls

Various surgical features are proven to reduce posterior capsule opacity such as: [3,4]

- Cortical cleaving hydrodissection and careful cortical clean-up
- In-the-bag placement and fixation of the intraocular lens
- Central anterior capsulorhexis of slightly smaller diameter than the intraocular lens
- A biocompatible lens material
- Maximum contact between the posterior capsule and intraocular lens
- A square posterior truncated edge on the intraocular lens where it contacts the capsule. 3,5
- Maximum capsular bend at the posterior edge of the IOL with 360degree barrier.6,7This is called the "shrink wrap effect".
- Rotation of the hydrodissected nucleus of the lens three times before removal. 8
- A second hydrodissection before irrigation/aspiration of the cortex.6

Capsulorhexis–

Type:Continuous curvilinear capsulorhexis (CCC) is considered to be preferred type of capsulotomy for the prevention of PCO because hydrodissection is best suitable with capsulorhexis. Hydrodissection facilitates epithelial cell removal. It is also best for in-the-bag fixation of intra ocular lens implant which stretches the capsule at the equator and posterior capsule.Furthermore after continuous curvilinear capsulorhexisthere are no adhesions between anterior and posterior capsules.

Size:Large CCC is desirable because it removes the lining of anterior cuboidal cells. However, there is evidence that PCO is reduced if the capsulorhexis diameter is slightly smaller than that of the lens optic, so that the anterior edge rests on the optic. Small CCC provide a tight fit of the capsule around the optic analogous to "shrink-wrap", which has beneficial effects in maximizing the contact between the optic & posterior capsule. Another advantage may be due to sequestration of the interior compartment of the capsule containing the IOL from surrounding aqueous humor & any potentially deleterious factors within it, such as inflammatory mediators.

Incomplete anterior capsulotomy has higher rate of PCO compared with complete anterior capsulotomy.

The standard treatment for PCO is neodymium:YAG (Nd:YAG) laser capsulotomy, but it is not enitirely risk free. It has been associated with complications such as retinal detachment, increase of intraocular pressure, cystoid macular edema, and damage to the intraocular lens (IOL).In developing countries,

patient follow-up is difficult and the Nd:YAG laser is not always available. Posterior capsule opacification often disturbs fundus examination and optimal treatment by photocoagulation or vitrectomy in eyes with vitreo-retinal disorders. Socio-economic consequences are also enormous.

AIMS AND OBJECTIVES:

- To study the incidence of posterior capsular opacification.
- To study the nature and severity of posterior capsular opacification.
- To study the association of incidence of PCO with various surgical technique such as type and size of capsulotomy.

MATERIALS AND METHODOLOGY:

The study was conducted in the Ophthalmology Department, Guru Gobindsingh Hospital, Jamnagar and 100 patients(eyes) who had undergone cataract surgery were studied for a duration of 1 year.

Exclusion Criteria:

Patients less than 18 years of age or those not willing to give consent, uncooperative patients, congenital & developmental cataract, traumatic cataract, vitreo-retinal diseases, previous history of other intraocular surgery.

PCO was graded as follows—

With reference to the IOL (specially for pearls and fibrosis by Sellman and Lindstrom) 9,10

0	None or slight PCO
1	Visible but not reaching the IOL edge (no or slight PCO without reduced red reflex, also no pearls at all or pearls not to the IOL edge)
2	At IOL edge (mild PCO reducing the red reflex, Elschnig pearls to the IOL edge)
3	Well inside the IOL edge but visual axis clear (moderate fibrosis or Elschnig pearls inside IOL edge but with a clear visual axis)
4	Across visual axis (severe fibrosis or Elschnig pearls covering the visual axis and severely reducing the red reflex.)

Grade 3-4 were considered clinically significant PCO

OBSERVATIONS:

Incidence of PCO:

In our study 78% patients showed presence of posterior capsule opacification.However not all PCO were visually significant. In our study Grade 3 and Grade 4 PCO, which we considered as clinically significant was seen in 34%.

Types of PCO:

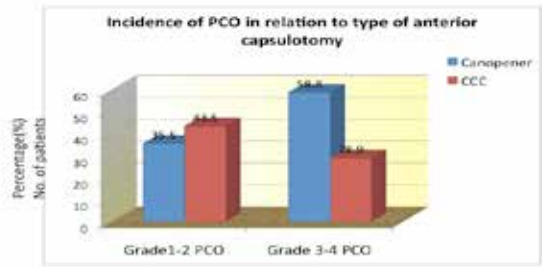
Fibrous PCO was the commonest type found in our study (53.8%). Mixed type (Fibrous with Elschnig's pearls) was seen in 28.3% patients. 17.9% patients had Elschnig's pearls type PCO. Fibrous PCO usually appears 2 months to 6 months after surgery while theElschnig's pearls somewhat later.

Incidence of PCO in relation to type of anterior capsulotomy:

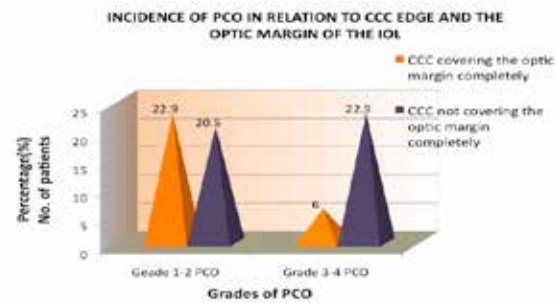
In our study, we found that overall PCO occurrence was more common with Canopenercapsulotomy than Continuous Curvilinear Capsulorhexiscapsulotomy. Grade 3-4 PCO was observed in 58.8% of the patients with Canopenercapsulotomy and 28.9% of the patients with CCC capsulotomy. (Graph 1)

Amongst the patients with CCC, Grade 3-4 PCO was seen more in patients when CCC not covering the optic margin 360 degree (22.9%) compared to CCC was covering the optic margin 360 degree completely(6%). (Graph 2)

PCO was more common when the cortical clean up was incomplete.



Graph 1



Graph 2

DISCUSSION:

Posterior capsular opacity is a major complication of cataract surgery with or without intraocular lens implantation.In a study by **Tarik M Aslam**et al[11] observed that fibrosis type was more common than pearl type of PCO. However they also noticed that pearls could be detrimental even in para-axial location affecting quality of vision.

The higher incidence in our study was related to can opener anterior capsulotomy technique, which might allow one or both haptics to come out of the bag, loosing the barrier effect of sharp optic edge. **Ram J et al** 12 in their study found 42.45% PCO with envelope capsulotomy technique, which is similar to canopener technique in terms of in-the-bag fixation of IOL. Ravalico et al reported that capsulorhexis with slightly smaller diameter than the IOL optic decreased PCO incidence when compared to large capsulorhexis13. This may be explained by LEC mechanical blockade into the effect of the anterior lens capsule adhesion to the IOL, which is especially strong when there is complete anterior capsule overlap on the IOL optic in 360°.

If excessive masses of retained cortex remain after surgery, no matter what the geometry of the optical component is, it cannot always block massive levels of cells. So complete cortical clean up is essential.

CONCLUSION:

The modern cataract-intraocular lens surgery has given good visual results, but this effect could be short term with the development of posterior capsule opacification, the most common cause of visual loss after cataract surgery.Surgical tools and techniques are now available to bring these rates down to single digits. Careful application and use of these tools can genuinely lead us in the direction of virtual eradication of secondary cataract.

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