

## To compare the Gonioscopic changes in the angle after conventional ECCE with PC IOL implantation and Small Incision Cataract Surgery with PCIOL

Divya. N<sup>1</sup>, Xavier Jayaseelan. C<sup>2</sup>, Bindu Bhaskaran<sup>3</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor, <sup>3</sup>Senior Resident, Dept. of Ophthalmology, Saveetha Medical College, Saveetha University, Chennai, Tamil Nadu

**\*Corresponding Author:**

Email: divya.q7@gmail.com, xavjaynir@gmail.com

### Abstract

**Introduction:** To observe and compare the Gonioscopic changes in the angle after

- Conventional ECCE with PC IOL implantation
- Manual Small incision Cataract Surgery with PCIOL implantation

An attempt has been made to note the progression of these changes and the possible effects of these changes over the Intra Ocular Pressure and Postoperative Visual acuity.

**Materials and Methods:** This clinical study was undertaken in 100 Eyes- 50 ECCE; 50 SICS consisting of 57 Males and 43 Females aged between 40 - 80yrs who were admitted and operated for Cataract at Saveetha Medical college Hospital, Thandalam. After Securing the inform consent, total number of 100 patients were enrolled for the study. Study was statistically analysed by Chi-squared Test. The filtration angle of each Eye was examined with a Goldmann two mirror Gonio Lens Pre Operative and Post Operatively in a prospective manner. Post Operative Gonioscopic examination was performed between 6 weeks and 3<sup>rd</sup> Post Operative month to observe any changes.

**Results:** Posterior chamber IOL implantation was undertaken in total 100eyes among which 57 Males and 43 Females majority aged between 50 – 60 years. 50patients underwent ECCE with PC IOL implantation. 50 patients underwent Small Incision Cataract Surgery with PCIOL Implantation. PAS formation was observed in 28 eyes of 50 cases, which underwent conventional ECCE with PC IOL implantation. No PAS was seen in eyes that underwent SICS, Superior angle PAS noted in 23 eyes. Inferior angle PAS in 5 eyes. 20 eyes showed PAS overlying the Haptics of PC IOL. Which accounts to 71.4%. Most of the lens Haptics PAS were observed early in the Post operative period (3 Months) and remain stable in size. The Scheie's method of grading TM pigmentation was followed. Large numbers represent increasing amount of pigmentation.

**Conclusion:** Conventional Extra Capsular Cataract Extraction with PC IOL implantation significantly and permanently alters the Gonio Anatomy of the Eye when compared to Small Incision Cataract Surgery. (P < 0.001). Decrease in the incision size, anterior entry into the cornea with a self-sealing Scleral tunnel incision and a Corneal lip prevents the formation of PAS. In the Bag fixation of IOL reduces Iris chafing related pigment dispersion into the AC and lowers the incidence of changes in the angle. (P <0.001). Continuous Curvilinear Capsulorhexis (CCC) is important for proper capsular bag fixation of the IOL. (P <0.001)

**Keywords:** ECCE-Extra Capsular Cataract Extraction, IOP- Intraocular Pressure, PAS- Peripheral Anterior Synechia, PCIOL - Posterior Chamber Intraocular Lens, SICS- Small Incision Cataract Surgery.

### Introduction

Cataract is the leading cause of Reversible Blindness in our country. The ultimate goal of a cataract surgery is to restore and maintain the pre cataract vision and to alleviate the other cataract related symptoms.<sup>(1)</sup> In the quest for perfection, the techniques and approaches followed by cataract surgeons have constantly changed over the years.<sup>(2)</sup>

Hence the realistic portrayal of the trends in cataract surgery can be best described as a wide spectrum, ranging from Intra Capsular Cataract Extraction (ICCE) to Phaco Emulsification. Such a diversity of trend is governed with multiple factors, most pertinent of which are economy, patients awareness, surgeon's calibre, availability of equipment's and the cataract backlog.<sup>(3,4)</sup>

The current surgical trend for the majority of surgeons in the developing world is towards ECCE with PC IOL implantation.<sup>(5)</sup> Small Incision ECCE techniques are becoming quite popular for those who have accepted the challenges of transition towards a

better technique. Perhaps about 5-10% of the cataract surgeons in India routinely perform Phaco. The advent of Phaco emulsification has minimised the size of incision and its related complications, with an added benefit of early stabilisation of refraction.<sup>(6,7)</sup>

The main objective of this study is to observe and to compare the Gonioscopic changes in the angle after conventional ECCE with PC IOL implantation and Small Incision Cataract Surgery with PCIOL. An attempt has been made to note any progression of these changes and the possible effects of these changes over the Intra Ocular Pressure and Visual Acuity.<sup>(8,9)</sup>

### Materials and Methods

This clinical study was undertaken in 100 Eyes- 50 ECCE;50 SICS consisting of 57 Males and 43 Females aged between 40 - 80yrs who were admitted and operated for Cataract at Saveetha Medical college Hospital, Thandalam. After Securing the inform consent, total number of 100 patients were enrolled for the study. Institutional Ethical clearance has been

obtain from the standard ethical committee in one of their sittings before initiating the study. Study was statistically analysed by Chi-squared Test.

Patients were enrolled who had

1. Met with the standard criteria for Cataract Surgery.
2. No Pre existing Disease predisposing to PAS.
3. No Inflammation in the Eye
4. Normal AC depth.
5. Normal Intraocular Pressure.
6. Underwent an Uncomplicated Cataract Surgery

The filtration angle of each Eye was examined with a Goldmann two mirror Gonio Lens Pre Operative and Post Operatively in a prospective manner.

Post Operative Gonioscopic examination was performed between 6 weeks and 3<sup>rd</sup> Post Operative month to observe any changes.

#### Exclusion Criteria:

- Patients were excluded from the study
- Synechial angle closure was noted in Pre Operative Gonioscopy
- Shallow AC Depth
- Raised IOP
- Primary open angle Glaucoma
- Pigment Dispersion
- Neovascularisation
- Traumatic Cataracts
- Phacomorphic Glaucoma
- History of Pre Operative Inflammation

#### Data Analysis and Observations

The clinical study for Gonioscopy evaluation of the angle after Posterior chamber IOL implantation was undertaken in total 100eyes operated for Cataract at Meenakshi Medical College & Research institute consisting of 57 Males and 43 Females aged between 40 – 80 years.

50patients underwent ECCE with PC IOL implantation.50 patients underwent Small Incision Cataract Surgery with PCIOL Implantation.

**Table 1: Age-sex wise group distribution**

Age Group in Years	Males	Females	Total
45-50	11	6	17
50-60	24	18	42
60-70	17	17	34
> 70	5	2	7

Majority of the Patients were between 50-60 years of age.

**Incidence of Peripheral Anterior Synechiae:** PAS formation was observed in 28 eyes of 50 cases, which underwent conventional ECCE with PC IOL implantation. No PAS was seen in eyes that underwent SICS. Superior angle PAS noted in 23 eyes. Inferior angle PAS in 5 eyes.

**Table 2**

Angle Structures Seen	ECCE	SICS	Total
Normal	22	0	22
PAS / SUP	23	50	73
PAS/ INF	5	0	5
Total	50	50	100

P value < 0.001

**PAS Overlying the Lens Haptics:** 20 eyes showed PAS overlying the Haptics of PC IOL. Which accounts to 71.4%. Most of the lens Haptics PAS were observed early in the Post operative period (3 Months) and remain stable in size.

**Table 3**

Position of PAS	No. of Eyes	Overlying the Haptics	Not Overlying the Haptics
Superior Angle	23	16	7
Inferior Angle	5	4	1
Overall	28	20	8

The Scheie's method of grading TM pigmentation was followed. Large numbers represent increasing amount of pigmentation.

**Table 4: Incidence of pigment dispersion**

Grade	ECCE	SICS	Total
Grade 2	0	20	20
Grade 3	31	30	61
Grade 4	19	0	19
Inferior Angle pigment clumping	30	10	40

P value < 0.0001

#### Discussion

1. Incidence of PAS in the present study was 56% which is comparable to 54% observed by Lis, Liao R, Liu. Y, et al in "Gonioscopic observation after posterior chamber IOL implantation" and 41.8% observed by Maden A, Gunenc U, Erkin E et al<sup>(10)</sup> "Gonioscopic changes in eyes with PC IOL"
2. No PAS was seen in eyes in which SICS was performed a (Capsular Bag Fixation of IOL).<sup>(10,11)</sup>

The incidence of PAS in a series of eyes, which underwent ECCE with PC IOL implantation studied post-mortem, is as high as 23% and displacement of the

peripheral Iris by the underlying Haptics was believed to be an important mechanism in their development.<sup>(13)</sup>

### Clinical significance of PAS

Entrapment of Iris tissue into the Corneal Wound, which occurs, with PAS contributes to poor wound healing and inadvertent filtering bleb formation with consequent dangers of:

1. Prolonged Hypotony
2. FB Sensation
3. Late infection
4. sympathetic ophthalmitis

Further more PAS compromises aqueous outflow from underlying angle structures and increases the likelihood of Secondary Glaucoma.<sup>(14,15)</sup>

PAS formation may lead to following complications

1. Progressive Endothelial cell loss
2. Fibrous Metaplasia of the Endothelium
3. Angle cicatrization with secondary Glaucoma
4. Involvement of the Superior angle is prominent as suggested by 46% of PAS in the Superior angle due to malpositioning of the Superior Haptics (in the ciliary Sulcus).<sup>(16,17)</sup>
5. PAS were seen more frequently with Lens Haptics at vertical position than in Eyes with horizontally oriented Lens Haptics.
6. PAS overlying the Haptics of PC IOL was observed in 20 eyes (71.4%) in this study is comparable to 80% observed by R Blair Evans "PAS overlying the Haptics of PC Lenses". The lens haptics PAS possessed a distinct morphology characterised by marked anterior displacement of peripheral iris with broad iris apposition to the trabecular meshwork and more anterior angle structures.

Most of the lens haptic PAS were observed early in the Postoperative period (3 months). However progression in size was not noted.<sup>(18,19,20)</sup>

1. No changes in the postoperative Visual acuity were observed secondary to these Gonioscopic changes.
2. No Postoperative rise in IOP attributable to Gonioscopic changes.
3. Pigment dispersion is explained by the Continuous chafing effect of the lens Haptics over the posterior aspect of iris and also due to Surgical manipulation.

Interestingly it's also noted there is marked and well limited clumping of pigment in the angle at 6 O'clock in 40 eyes (40%) comparable to 57.2% observed by Maden A, Gunenc<sup>(10)</sup> "Gonioscopic changes in eyes with PC IOL".

Inferior angle pigment clumping is seen due to gravitational settling and aqueous circulation.

4. 28 eyes with PAS had Pupillary deformation which is related to position of IOL Haptics 71.4% compared to 88% of eyes with PAS in Liao R; Lis, Liu Y. Guoy & Pan H:<sup>(23)</sup> "The relation of the

location of Haptics in PC IOL & PAS" – 1995 March; 11 (1): 37-40.

5. After three months, postoperatively the Residual Cortex still existed in some cases of ECCE with PCIOL.
6. No significant complication noted in the Post Operative period.
7. The Posterior lens capsule remained intact in all cases.

With reference to the available Literature and studies it is evident that Extra Capsular Cataract Extraction with the implantation of PC IOL significantly and permanently alters the Gonio anatomy of the Eye whose consequences have been followed by carefully, as was noted by R.B. Evans<sup>(5)</sup> and EM Van Buskirk<sup>(13)</sup> in their study, "Late onset, progressive, peripheral anterior synechiae with posterior chamber intraocular lenses".

Van Buskirk<sup>(13)</sup> has observed progressive angle closure originating over the lens Haptics suggestive of Anterior displacement of Iris by the haptic can be a source of progressive PAS formation.

This study was undertaken in response to the suggestion that routine Postoperative Gonioscopy should be performed after implantation of PCIOLs.

Though such a correlation could not be established with this Present Study.

### Conclusion

1. Conventional Extra Capsular Cataract Extraction with PC IOL implantation significantly and permanently alters the Gonio Anatomy of the Eye when compared to Small Incision Cataract Surgery. (P< 0.001)
2. Decrease in the incision size, anterior entry into the cornea with a self-sealing Scleral tunnel incision and a Corneal lip prevents the formation of PAS.
3. In the Bag fixation of IOL reduces Iris chafing related pigment dispersion into the AC and lowers the incidence of changes in the angle. (P <0.001)

Continuous Curvilinear Capsulorhexis (CCC) is important for proper capsular bag fixation of the IOL. (P <0.001)

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