A CLINICAL STUDY OF PRE OPERATIVE AND INTRA OPERATIVE PREDICTORS FOR POSTERIOR CAPSULAR OPACIFICATION AND THE VISUAL OUTCOME

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CERTIFICATE

This is to certify that this dissertation entitled **"A CLINICAL STUDY OF PRE OPERATIVE AND INTRA OPERATIVE PREDICTORS FOR POSTERIOR CAPSULAR OPACIFICATION AND THE VISUAL OUTCOME"** has been done by **DR. VENKATESAN. C.** under my guidance in Department of OPHTHALMOLOGY, Madurai Medical College, Madurai.

I certify regarding the authenticity of the work done to prepare this dissertation.

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DECLARATION

I, **Dr. VENKATESAN. C** solemnly declare that the dissertation titled **"A CLINICAL STUDY OF PRE OPERATIVE AND INTRA OPERATIVE PREDICTORS FOR POSTERIOR CAPSULAR OPACIFICATION AND THE VISUAL OUTCOME"** has been prepared by me.

This is submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai, in partial fulfillment of the requirement for the award of M.S.,(Ophthalmology) Branch-III degree Examination to be held in APRIL 2013.

Place : Madurai

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CONTENTS

INTRODUCTION

Posterior capsular opacification also called as after cataract or secondary cataract which develop over the clear posterior lens capsule few months to few years after an uneventful cataract surgery. Opacification of the Posterior capsule is usually caused by the postoperative proliferation of lens epithelial cells in the capsular bag. It remains the most frequent complication of cataract – intraocular lens surgery. It was particularly more common and severe in the early days of IOL surgeries in the late 1970s and early 1980s .

The incidence of posterior capsular opacification was around 25% to 50% during those days. With the advent of more recent advances in cataract surgery and modern intra ocular lenses reduced the frequency of posterior capsular opacifications but still they form the common complication after cataract surgeries.

In addition to classic posterior capsular opacification post operatively, lens epithelial cell proliferation is also involved in the pathogenesis of anterior capsular opacification and fibrosis.

Posterior capsular opacification can be of two forms- fibrous or pearl forms. Sometimes a combination of both forms may occur.

Many factors are said to be risk factors for posterior capsular formation post operatively. They include preoperative factors like

- Age of the patient. Posterior capsular opacification is a major problem in paediatric cataract surgery where the incidence almost approaches 100%. It is also found to be more common in cataract surgery done on younger individuals.

- History of long term intake of steroids or antimetabolites. Steroid induced posterior subcapsular cataract has higher risk of postoperative Posterior capsular opacification. Similarly individual exposed to ionizing radiations or long term intake of antimetabolites are more prone for post operative Posterior capsular opacification than other people.

- Cataractous lens grading plays a role in posterior capsular opacity formation. Its incidence is found to be more common in patients getting operated for dense posterior subcapsular cataracts , in dense posterior polar cataracts and especially when there is pre existing dense plaques in posterior capsule.

Intra operative factors too play a role in post operative Posterior capsular opacification formation like:

- Proper hydrodissection enhanced cortical cleanup. If there is left out cortical material., then post operative Posterior capsular opacification formation is more.

- Capsulorhexis margin, if smaller than Intraocular lens optic size, then it reduce incidence of posterior capsular opacification post operatively. Maximal optic- capsular bag touch play a role in minimisisng posterior capsular opacity formation.

- Intra ocular lens Factors like type of Intra ocular lens play a role in minimizing posterior capsular opacification post operatively. Intra ocular lenses madeup of PMMA lenses have more incidence of posterior capsular opacification compared with hydrophobic acrylic lenses. Square edged intraocular lenses are said to be superior too in reducing the posterior capsular opacification post operatively compared to the conventional round edged Intra ocular lenses. Similarly

decentered intra ocular lens results in increased incidence of posterior capsular opacification than the in bag lens placement.

Reducing the incidence of posterior capsular opacification significantly improves the visual outcome for the patient and also avoids un necessary procedure like ND-YAG laser capsulotomies which may increase the agony of undergoing extra procedure to the patient and also incur more expenditure .

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ANATOMY

HUMAN CRYSTALLINE LENS :

It’s a transparent structure which is biconvex in shape placed in between iris and vitreous in the saucer shaped depression the patellar fossa. The main functions of lens are :

- Optical function ie. Refracting the light.
- To provide accommodation and thus aid in near vision.

The lens has two surfaces. The anterior surface which is less convex than the posterior surface. These two surfaces meet at the equator which is circular and has almost an undulating appearance. The centre of anterior and posterior surfaces are called anterior and posterior pole respectively.

STRUCTURE OF THE LENS:

LENS CAPSULE :

It is a thin, transparent, hyaline collagenous membrane which surround the lens completely. It is the thickest basement membrane of the body predominantly formed by type IV collagen and 10% glycosaminoglycans. It is highly elastic and is secreted by the basal cell area of lens epithelium anteriorly and by the basal area of the elongating fibres posteriorly.

Lens capsule thickness varies according to the age and is not consistent throughout its extent. It is thicker anteriorly than at the posterior side. More thicker at the equator than at the poles. Lens capsule at the posterior capsule is the thinnest of all. Lens capsule is 2 to 4 mm thickness at the posterior capsule in an young adult whereas at the anterior capsule it may measure around 8 to 14 mm.

On light microscopy lens capsule appears homogenous and stains with PAS whereas in electron microscopy it shows lamellar appearance. Each lamella contains fine filaments. It is this superficial lamella than gets separated from deeper part and peels off in case of true exfoliation of lens capsule.

ANTERIOR LENS EPITHELIUM:

Just behind the anterior lens capsule is the lens epithelium which is single layer of cuboidal epithelial cells. It is metabolically very active, infact it has the highest metabolic rate in whole of lens as the content of ATP and enzymes in lens epithelium is highest here. These cells contain all the organelles found in the typical epithelial cells. All the metabolic, synthetic including generation of ATP for energy requirement of lens and transport process of lens takes place in this layer only.

These cells become columnar in the equatorial region and are actively dividing and forming new lens fibres throughout life. Posterior part of lens, is devoid of any lens epithelial cells because these cells are used up for filling the central cavity of lens vesicle during development. The lens epithelium can be divided into three zones.

Central zone : These are cuboidal cells. They usually doesn't divide but on some insults like in uveitis. During injury repair these cells elongate to pile up many layers under capsule. Metaplasia of these cells lead on to shield type of anterior subcapsular cataract as

in atopic dermatitis or in glaucomflecken in acute congestive glaucoma.

Intermediate zone: it consist of cells that are smaller and more cylindrical. These cells very occasionally divide.

Germinative zone : these consist of columnar cells. These cells are actively dividing cells which migrate posteriorly to form new lens fibres. This process continue throughout life. They are extremely sensitive to irradiation. Dysplasia of these cells lead on to posterior subcapsular cataract as in radiation cataract, steroid cataract, myotonic dystrophy and neuromatosis II.

LENS FIBRES:

Lens fibres are formed from the lens epithelial cells especially from the equatorial region of the anterior lens epithelium. These epithelial cells elongate and differentiate to produce long, thin regularly arranged lens fibres . New fibres are laid over the older fibres. These new fibres are nucleated with elongation of cells. The nuclei occupy more anterior position. As more new fibres are laid down the anterior shifted nuclus form a line convex forward at the

equator called lens bow. Older fibres are homogenous with devoid of nucleus and only very few organelles.

The lens fibres are arranged in zones that delineate various periods of development of lens. In adult lens fibres are arranged as nucleus and cortex of lens. Innermost part is embryonic nuclei which is surrounded by fetal nuclei which are the early formed lens fibres. Which is surrounded by infantile nuclei and adult nuclei. Adult nuclei constantly increase in life throughout. Cortex is the peripheral part of lens which lies outside adult nucleus. They comprise the youngest lens fibres.

ZONULAR FIBRES:

They arise from the basal lamina of the ciliary body from their non pigmental epithelium of pars plan a and pars plicata. These zonular fibres gets inserted in the equatorial region of lens capsule in a continuous fashion, some 1.25 mm onto the posterior capsule of lens and 1.5 mm onto the anterior capsule. These fibres have dimension of about 5-30 um diameter, and are easonophilic structures with positive periodic acid Schiff reaction. On electron microscopy these lens fibres are made up of strands and fibrils.

PHYSIOLOGY OF LENS

LENS TRANSPARENCY:

Normal lens is a transparent structure. Its transparency is mainly attributed to the low number of scattering centres. Normal lens transmit almost 80 % of light without scattering. Lens is made of mainly protein molecules which are about 10 nm in diameter. Lens particle size is sufficiently small to reduce this scatter. Lens fibres are regularly arranged and are uniformly distributed . the factors which contribute to the transparency of lens are :

- Single layer of thin epithelial cells
- Lens capsule is semi permeable
- Sparcity and highly packed nature of lens cells
- Characteristic arrangement of lens proteins
- Pump mechanism of lens fibres which regulate the water and electrolyte balance and thus maintain the lens in dehydrated state
- Lens is avascular

- High reduced glutathione concentration ensures the integrity of lens membrane pump.

PERMEABLITY AND TRANSPORT MECHANISM OF LENS:

It is essential for the maintenance of water and cation balance, for transfer of nutrients for lens metabolism, also for disposing of waste products.

Most of the Na+K+ ATP ase activity in lens is found in lens epithelium.90% of energy generated by ATP in lens by glucose metabolism is utilised for active transport mechanisms. Important products which get transposted by active process are sodium, aminoacids, potassium, taurine , inositol.

Passive transport occurs at lens capsule for water, ions and waste products of metabolism like lactic acid and carbondioxide.

The combination of active transport and this membrane permeability is called as pump leak system of the lens. By this theory electrolytes like potassium and aminoacids can be actively transported into the anterior lens via lens epithelium from the

aqueous humour. They then can diffuse out to the posterior part of lens depending upon the concentration gradient as there isn’t any active transport mechanism over here. Sodium and potassium exchange occurs only by this mechanism.

Glucose enters the lens by a facilitated diffusion not directly linked to active transport. Waste products of lens metabolism leave by simple diffusion.

AETIOPATHOGENISIS OF POSTERIOR CAPSULAR OPACIFICATION

Posterior capsule opacification results from growth and abnormal proliferation of lens epithelial cell over the posterior capsule. These cells which are left over along with the remnant anterior capsule proliferate and migrate to the posterior capsule occupying visual axis to obscure vision. The development of posterior capsular opacity is a dynamic process and involves three basic phenomena : proliferation, migration and differentiation of residual lens epithelial cells.

- **PROLIFERATION**: The proliferation of residual lens epithelial cells after cataract surgery is highest in 3rd to 4th post operative day. The precise reason for this process in not known. Removal of lens fibres alter the local environment of the lens results in the proliferation of lens epithelial cells. Residual cortex may also proliferate the lens epithelial cells. Melanocytes released from iris during surgery and the cells released from blood due to the breakdown of blood aqueous layer may contribute to the inflammation which may trigger

the initial proliferation of the lens epithelial cells. Intra ocular lens being a foreign body may add up to the inflammatory response. The response is mediated both by autocrine and paracrine factors. Various cytokines which mediate this process are fibroblast growth factor(FGF), platelet derived growth factor (PDGF), Hepatocyte growth factor(HGF), Epidermal growth factor, insulin like growth factor (IGF), Transforming growth factor- Beta(TGF- BETA). In children higher density of LECs and increased number of mitotically active cells result in higher growth potential which maybe the cause for increased incidence of PCO.

- **MIGRATION**: Migration of the proliferated Lens epithelial cells towards posterior capsule and their attachment there is facilitated by many cell attachment molecules. They include integrin sub unit(64,65), cell adhesion molecules 66 and hyaluranon receptor CD44. Matrix metalloproteinases(MMP) are proteolytic enzymes which are all responsible for cell migration and tissue contraction.

- **DIFFERENTIATION OF RESIDUAL LECs**: LECs can differentiate into two forms- pearl form or fibrous forms. Equatorial Lens epithelial cells proliferation usually lead on to opacified epithelial pearls. These cells are called bladder cells. Sometimes they may even disappear after sometimes. They do not express gamma-SMA. In contrary mostly the anterior lens epithelial cells gets differentiated into fibrous PCO. They are gamma-SMA positive Myofibroplastic differentiation. These myofibroplast formation may cause wrinkling of posterior capsule and eventually lead on to fibrous PCO.

In some cases we can see the capsulorrhexis contraction which is called capsular phimosis. This is secondary to extreme fibrous proliferation of anterior capsule. This can be avoided by not making a too small capsulorhexis.

Equatorial lens epithelial cells are also responsible for Soemmering's ring. This is a dumbbell shaped lesion that occur following any type of rupture of anterior capsule. Due to the rupture extrusion of nuclear and some cortical matter transform into Elschnig's pearl. They form the pathogenesis behind the formation

of Soemmering’s ring. These rings are derived from the proliferation of LECs from equatorial bow. They then can migrate towards posterior capsule leading on to the formation of PCO. So they form a precursor for PCO formation.

RISK FACTORS FOR PCO FORMATION

Several systemic and ocular conditions are said to associated with increased formation of PCO. They include :

- Diabetics are associated with severe PCO formation compared to non diabetics.
- Myopic eyes were postulated to have more incidence of PCO formation.
- Patients with previous uveitis in the eye is associated with more chance of PCO formation. However usage of hydrophobic acrylic lenses in place of PMMA minimises the risk of PCO formation.
- Steroid induced cataracts are associated with high incidence of PCO formation post operatively compared to others.
- Myotonic dystrophy patients have more incidence of posterior capsular opacification and thus more need for multiple NdYAG capsulotomies.

- Patient with retinitis pigmentosa has more chance of developing PCO post operatively compared to normal population.

- Traumatic cataracts are prone for PCO formation in almost 92% percent in a three year followup study.

- As the age of the patient is less, there is more chance of getting PCO post operatively. Paediatric cataracts are more prone to develop PCO.

PCO ANALYSIS

There are various methods to analyse PCO. The common and current methods are discussed here:

CLINICAL CRITERIA:

- **VISION**: Light entering eye is scattered due to the optical imperfections like PCO. So in a case of PCO vision drop is the important symptom. Apart from that light scattered towards retina due to PCO called forward scatter may result in reduction of retinal contrast and may present as glare to the patient. So Visual acuity, glare, contrast sensitivity are investigated as an effect of PCO .

- **SLIT LAMP GRADING** : Kruger et al had used a system for PCO grading:

  Grade 0: Absent

  Grade I: Very mild

  Grade II: Moderate

  Grade III: Dense white.

Capsule behind the optic is evaluated by this grading within the central 3mm diameter, and also the periphery. Distinction was given for elschnig pearls and fibrosis.

Sellman and Lindstrom had developed a different grading system:

Grade 1: No or very slight PCO without reduced red reflex, also no pearls or pearls not upto the optic edge .

Grade 2: Mild PCO reducing the red reflex or Elschnig's pearls to the IOL edge.

Grade 3: Moderate fibrosis or Elschnig's pearl inside the IOL optic region but with a clear visual axis.

Grade 4: Severe fibrosis or elschnig's pearl covering the visual axis and this severely reducing the red reflex.

This system use slit lamp grading of PCO, relected light examination is preferred over retro illumination.

Digitally acquired retroillumination pictures after full mydriasis provides excellent picture quality for analysis of PCO. Few softwares are available for such PCO analysis they include -

EPCO (Evaluation of posterior capsular opacification) and AQUA (Automated quantification of after cataract automated PCO analysis programme.

- **FUNDUS VISIBLITY** : Legler et al had used indirect ophthalmoscopy for fundus visiblity to grade the PCO in rabit eyes.

  Madurai intraocular lens study had used fundus visblity to grade PCO into 4 different grades. It depends on the visibility of optic disc, blood vessels and nerve fibre layer using direct ophthalmoscopy.

- **INCIDENCE OF YAG CAPSULOTOMY**: Apple et al had used this method to grade PCO. But it is a very unreliable method because of subjective difference in patients complaints, surgeon's preference and opinions, and also the economic consideration attached to it.

- **LENS OPACITY METER**: Olsen and Crandall had used this as a clinical study and also as a subjective slit lamp scores.

IMAGING SYSTEMS :

Apart from clinical criteria, many imaging systems are used for PCO analysis. They include :

- Scheimflug system
- Digital photography image acquisition system
- Colour coded grid system.

PREVENTION OF POSTERIOR CAPSULAR OPACIFICATION

SURGERY RELATED FACTORS :

- **CONTINUOUS CURVILINEAR CAPSULORRHEXIS**: Fusion of the rhexis margin forms a barrier for the LECs to migrate towards posterior capsule. Thus continuous curvileinear capsulorhexis is an important modification in delaying PCO formation.

- **HYDRODISSECTION ENHANCED CORTICAL CLEAN UP**: It is otherwise called cortical cleaving hyrodissection. It creates cleavage between lens capsule and cortex. The hydraulic force exerted by cortical cleaving can remove the LECs too which may prevent future PCO formation. Usually balanced salt solution is used for hydrodissection. Recent experimental animal analysis had shown that use of preservative free 1% lidocaine during hydrodissection may diminish the amount of live LECs by facilitating cortical

cleanup, loosening the desmosomal area of cell-cell adhesion with decreased cellular adherence or by direct toxic effect . But its use can be toxic to corneal endothelium too. So care should be taken if it is used. Bimanual cortex aspiration allows complete removal of cortical matter which will substantially reduce the number of mitotically active cells which may later trigger the PCO formation.

- **IN THE BAG CAPSULAR FIXATION** : In the bag IOL fixation plays a vital role in reduction of PCO. Tan et al has noticed increase in fibrosis type PCO in the sulcus fixation method. In the bag IOL fixation is very much facilitated by proper continuous curvilinear capsulorhexis. This reduction is created by IOL optic barrier effect to that of the capsular bag. This is maximised when the lens optic stays fully in the bag and is in direct contact with the posterior capsule. If one or both haptics not in bag then potential space is created so that the LECs migrate towards posterior capsule to produce PCO.

- **ANTERIOR CAPSULE OVERLAP** : When the capsulorhexis size larger than the optic size, there is more chance of fibrous PCO because the anterior epithelium is apposed to the posterior capsule which enhances the migration.

- **IOL TYPE**: Lens material bio-compatiblity is an important factor in determining the PCO formation. It depends on the ability to inhibit stimulation of epithelial cell proliferation. Of the different types of IOL used hydrophobic acrylic lenses are found to produce like PCO formation compared to the hydrophilic PMMA lenses. Square edged IOLs are found to be associated with lesser incidence of PCO formation compared to the conventional round edged IOLs.

- **CHEMICAL AGENTS**: Many of pharmacolological agents were proposed to prevent PCO formation. They are :

-Anti- inflammatory and immunomodulating agents like diclofenac, cyclosporine,indomethacin.

-Anti proliferative agents like 5-flouro uracil, mitomycin C, duanomycin.

-Anti adhering and anti migratory compounds like ilomastat, salmosin, naphtyl urea suramin,mibefradil, EDTA.

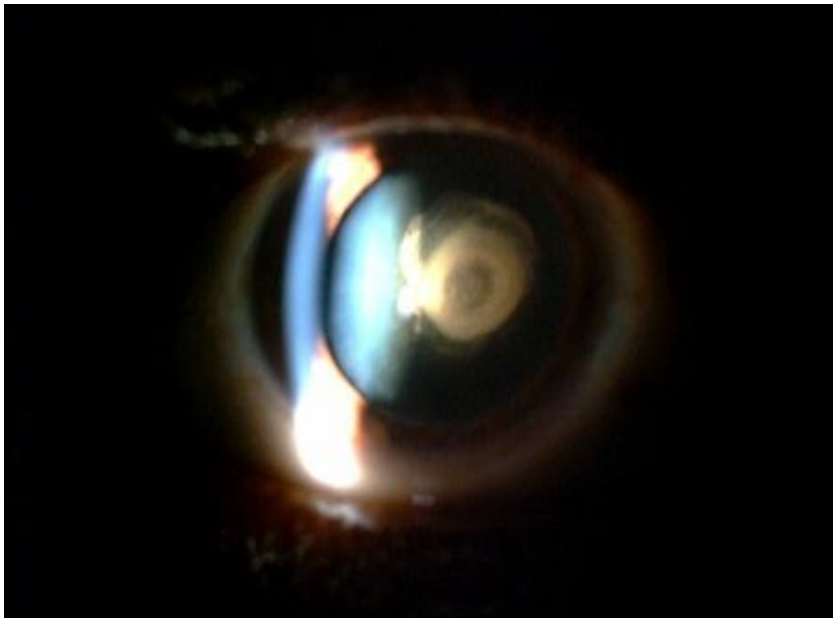
-Cell death inducing agents like minoxidil,bactereochlorin A, 1% preservative free lidocaine.

-Heparin coated irrigating solution is found to reduce fibrin and pigment deposit over the IOL.

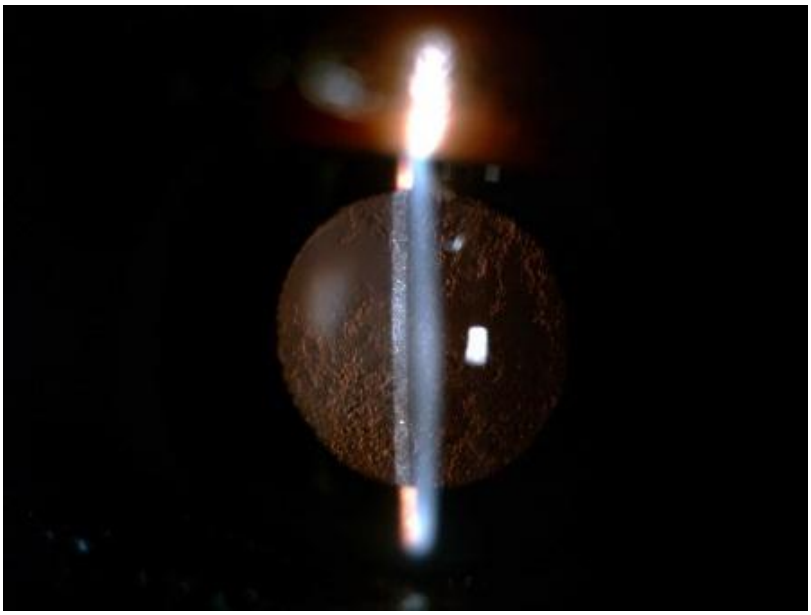
TREATMENT :

In younger children, visual obscuration due to PCO is treated with pars plana vitrectomy and membranectomy. In adults NdYAG Capsulotomy is the preferred mean to treat PCO.

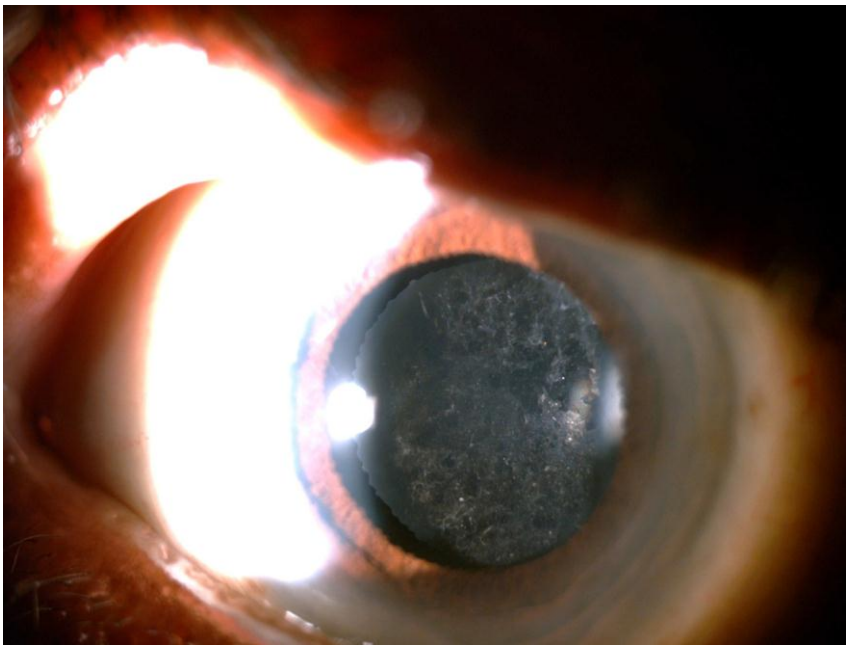
SLIT LAMP PICTURE OF DENSE POSTERIOR SUBCAPSULAR CATARACT



SLIT LAMP IMAGES OF PCO- RETRO ILLUMINATION



SLIT LAMP IMAGE OF PCO



Nd YAG LASER CAPSULOTOMY:

It is used to make opening over the opacified Posterior capsule to remove the opacity in the visual media. It is of Neodymium, Yttrium, Aluminium, Garnet. It acts by photodisruption.

After making opening, patient is put on acetazolamide tablets 250 mg 3 times daily, timolol 0.5% drops 2 times daily and prednisolone eye drops four times daily for a week.

Raised intraocular pressure, iritis, bleeding during laser burn application, pitting of IOL, Corneal burns are some of the complications of YAG Capsulotomy.

AIM OF THE STUDY

The aim of the study is to analyse and determine the preoperative and intra operative risk factors associated with posterior capsular opacification.

To study the different factors involved in PCO formation like :

Age

History of long standing steroid intake

Cataractous Lens Grading

Type of surgery.

Type of IOL and IOL position in relation to capsule.

To analyse the visual outcome.

MATERIALS AND METHODS

This study 'A Clinical Study of Preoperative and Intra operative predictors for Posterior Capsular Opacification and the visual outcome' was a prospective study done at 'The department of Ophthalmology, Government Rajaji Hospital, Madurai' during the months of July 2011 to October 2012. 60 cases were operated on between July 2011 to September 2011. These cases were followed up for 1 year from September 2011 to 0ctober 2012.

SELECTION CRITERIA:

Patients attending the Ophthalmology department out patient clinic, Government Rajaji Hospital, Madurai with complaints of defective vision and who were noted to have cataractous lens changes. A total of 60 patients were recruited for the study.

INCLUSION CRITERIA:

- Patients with history of defective vision due to cataract.
- All age groups.

- Minimum follow up of 1 year.
- Cataracts in patients with long standing steroid intake.
- Paediatric cataracts.
- Patients with subcapsular cataracts.

EXCLUSION CRITERIA:

- Patients with poor follow up/ poor cooperation for tests.
- Pre existing corneal opacities.
- Pre existing posterior segment pathologies.
- Mature cataract in which posterior capsule details cannot be studied.
- Cataracts in chronic uveitis who were on long term topical steroids.

CLINICAL METHODS:

PREOPERATIVE EVALUATION:

- Estimation of Visual acuity using snellen's chart – Uncorrected visual acuity and Best corrected visual acuity and also with pin hole.
- Intra ocular pressure recording using Schiotz tonometer.
- Duct patency.
- Thorough Slit Lamp Examination of anterior segment- Especially the details of Posterior capsule, Cataractous Lens grading.
- Fundus examination on dilatation.
- IOL power calculation using SRK II formula.

SURGICAL TECHNIQUE:

ANAESTHESIA:

In adult patients, surgery was performed under local anaesthesia. Peribulbar block was given. This involved administering 5 ml of anaesthetic mixture consisting of 2% lignocaine with adrenaline 1:200000 and Hyaluronidase 75 units. It was given at 2 sites. 3ml injected over junction between medial two third and lateral one third of the lower lid at a depth of 2.5cm. Remaining 2 ml was injected inferomedial to the supra orbital notch at a depth of 2.5 cm . Minimal digital massage was given after the block.

In paediatric age group patients, General anaesthesia was given after evaluating and getting fitness from anaesthesiologist. Inhalational anaesthesia was preferred.

PRE OPERATIVE MYDRIASIS:

For pupillary dilatation, Phenylephrine (5%) +Tropicamide (1%) eye drops was used. Along with it, Flurbiprofen (0.03%) eye drop was used for all cases.

SURGERY:

All surgeries were performed by single surgeon only.

Under sterile condition, the eye was draped. Topical betadine eye drops (5%) was applied. Bridles knot was applied to superior rectus. Surgeries were predominantly performed with two techniques. 1.Small incision cataract surgery with PC IOL implantation

2. Phacoemulsification with PC IOL implantation.

1. SMALL INCISION CATARACT SURGERY TECHNIQUE:

Fornix based conjunctival flap was raised superiorly. A frown shaped scleral incision was made using 11 no blade. The size of incision was around 5 to 6mm. Anterior end of the incision was made around 2 mm away from the limbus. Corneo scleral tunnel was made and defined using Crescent blade.

Anterior chamber entry was made using Keratome. A side entry was made at 7 o clock position using keratome. The main entry wound was entended using Keratome.

Capsulotomy in all the cases were done using bent 26 G needle by Continuous curvilinear Capsulorhexis technique.

Hydrodissection was done using balanced salt solution by injecting them beneath the anterior lens capsule at one or two places. This procedure separate nucleus and the cortex. Then the nucleus was prolapsed into AC using Sinsky's hook and gently rotated into the Anterior Chamber.

The nucleus then was removed by hydro expression using irrigating vectis or by using visco expression. Through cortex wash was then given using 21 G Simcoe cannula. AC formed with visco elastics and then PCIOL was placed in the bag. If in bag implantation was not possible due to some complications, then PCIOL was placed in the sulcus. Visco elastics were washed and then AC formed with balanced salt solution. 20 mg of Gentamycin and 2 mg of Dexamethasone injection was applied sub conjunctivally after the procedure was done.

PHACOEMULSIFICATION TECHNIQUE:

Here mostly clear corneal incision was made. 2.8 mm incision was made in cornea using keratome. 2 side ports were made.

Anterior Capsulotomy was done using bent 26 G needle by Continuous Curvilinear Capsulorhexis method only.

Hydro dissection and Hydro delineation was done. Then nucleus trenching was done using phaco probe. Phaco emulsification was finally done by Chop and Stop method. Extreme care was taken not to disturb the anterior hyaloid phase.

Through cortex was was given using irrigation and aspiration. After filling the AC with visco elastics, foldable PCIOL was place in the capsular bag. Thorough wash of the left over visco elastics was made. AC formed with balanced salt solution.

Sub conjunctival injection of 20mg of Gentamycin and 2mg of dexamethasone was given.

POST OPERATIVE ANALYSIS:

All patients were examined on the first post operative period . Visual acuity recording was done using Snellen's chart . Both UCVA and with pin hole were recorded.

A detailed Slit Lamp examination was done to look for striate keratopathy, signs of iridocyclitis. Then dilated Slit Lamp Examination was done to study the details of Posterior capsule and also about the Position of IOL. This was repeated daily throughout the patients stay at hospital.

All patients received topical antibiotic- steroid drops 6 times a day and systemic antibiotics and anti inflammatory drugs for 4 days. Antibiotic – steroid drops were tapered gradually and stopped after 45 days.

FOLLOW UP:

All patients were followed every week for the first 1 month and then every month for the 1 year of study period. During every

visit both UCVA and BCVA was recorded. A detailed Slit Lamp Examination was done with dilated pupil to look for signs or iridocyclitis, IOL position and also for detailed study of posterior capsule. If any signs of PCO was present , it was graded and recorded. Detailed fundus examination was made.

Antibiotic steroid drops were given for 45 days with tapering dosage.

PCO GRADING :

This was done using Sellman and Lindstrom grading system :

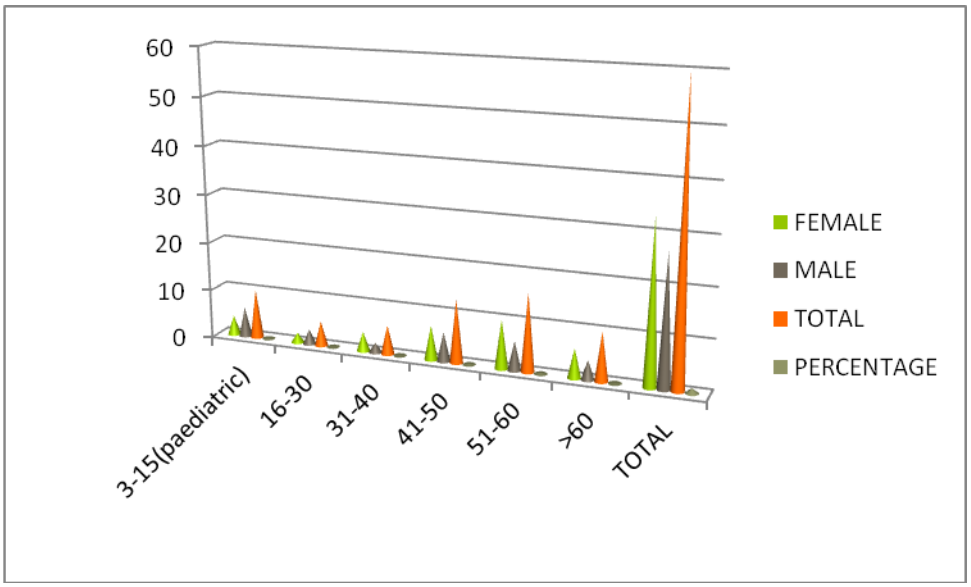
Grade 1	No or slight PCO not reducing the red reflex, no pearls or pearls not upto the IOL edge.
Grade 2	Mild PCO reducing red reflex, Elschnig's pearl upto the IOL edge.
Grade 3	Moderate fibrosis or Elschnig's pearl inside the IOL edge but with clear visual axis.
Grade 4	Severe fibrosis or Elschnig's pearl inside the visual axis and markedly reduced red reflex.

ANALYSIS OF RESULTS

1. **AGE AND GENDER WISE DISTRIBUTION**:

AGE	FEMALE	MALE	TOTAL	PERCENTAGE
3-15 (paediatric)	4	6	10	16.5%
16-30	2	3	5	8.5%
31-40	4	2	6	10%
41-50	7	6	13	22%
51-60	10	6	16	26.5%
>60	6	4	10	16.5%
TOTAL	33	27	60	100%

AGE DISTRIBUTION



Over all 60 patients were taken for the study and followed.The distribution by age and genderwise has majority fall in the age group 51 to 60 years of age (26.%).

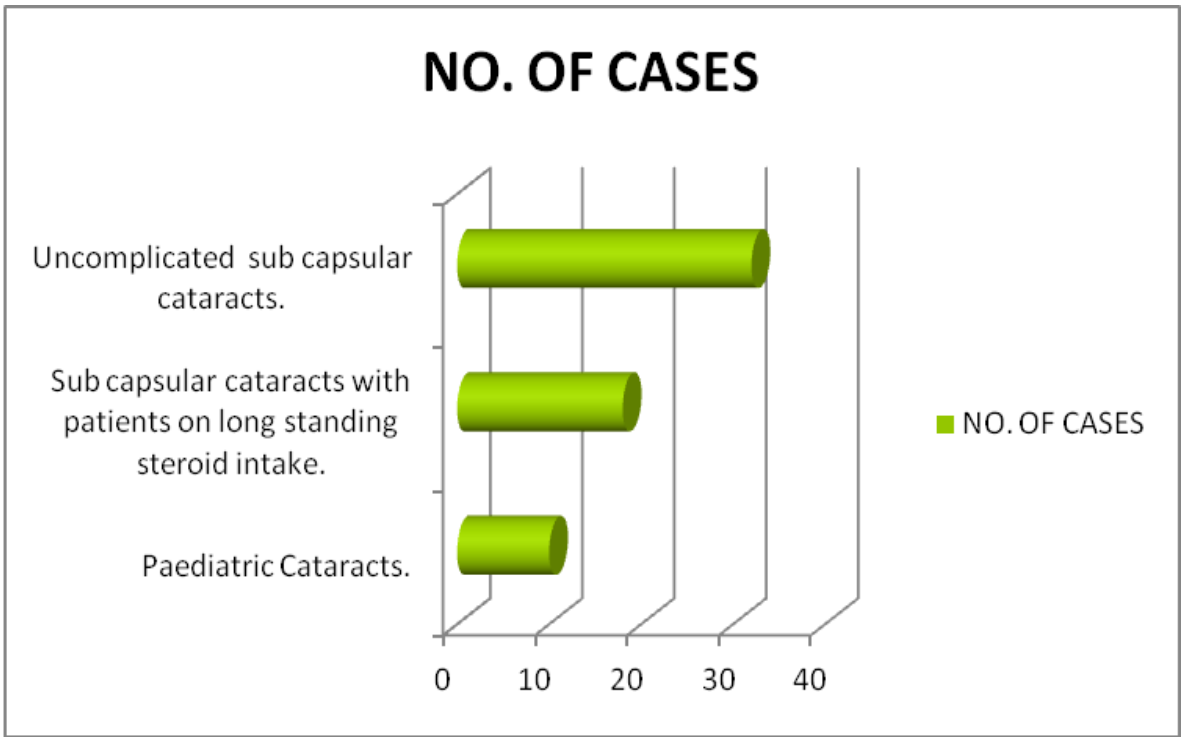
All age group was taken. So the age of patients under study ranged from 3 to 70. In this, paediatric cataract patient were 10 in numbers (16.5%).

Considering the gender wise distribution, there were 33 female patients(55%) and 27 male patients (45%).

2. **RISK FACTORS STUDIED**:

All the cases selected were based on the known risk factor for PCO formation post operatively .

RISK FACTOR	NO. OF CASES	PERCENTAGE
Paediatric Cataracts.	10	16.5%
Sub capsular cataracts with patients on long standing steroid intake.	18	30%
Uncomplicated sub capsular cataracts.	32	53.5%
TOTAL	60	100%


NO. OF CASES
Uncomplicated sub capsular cataracts.
Sub capsular cataracts with patients on long standing steroid intake.
Paediatric Cataracts.
0
10
20
30
40
NO. OF CASES

3. **PRE- OPERATIVE VISUAL ACUITY**:

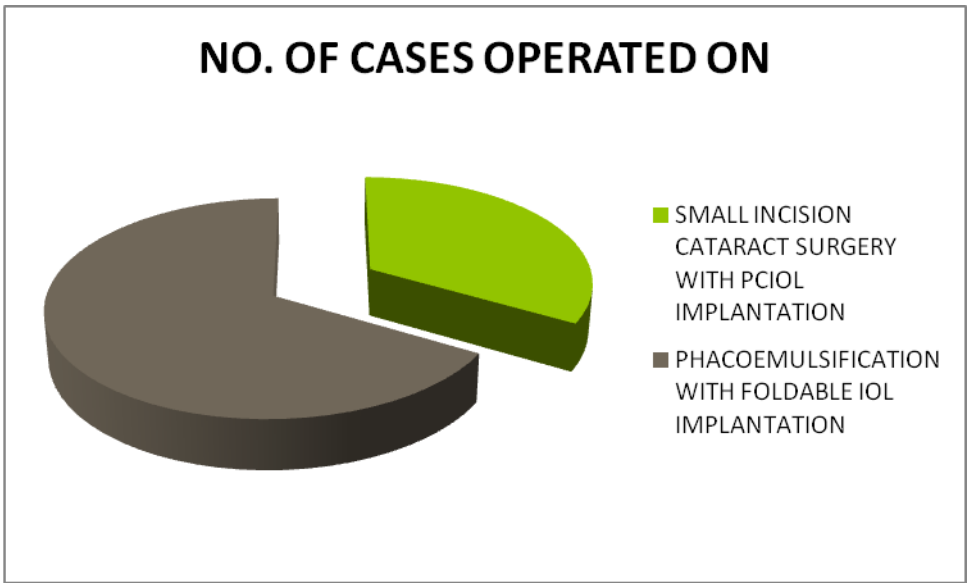
PRE OP VISION – BCVA DISTANCE (Snellen's Chart)	TOTAL NO OF EYES	PERCENTAGE
6/24 TO 6/60	12	20%
6/60 TO 3/60	23	38.5%
3/60 TO 1/60	14	23.5%
<1/60	11	18%

Using snellen's chart the distant visual acuity was recorded. Best corrected visual acuity was ascertained. The pre- operative visual acuity in these patients was mostly between 6/60 to 3/60 . ie. 38.5 %.

20 % of patients had best corrected visual acuity more than 6/60 but less than 6/24. 23. 5 % of patients had BCVA in the range of 3/60 to 1/60. 18 percentage of patients had BCVA less than 1/60.

4. **SURGICAL PROCEDURE**:

TYPE	NO. OF CASES OPERATED ON	PERCENTAGE
SMALL INCISION CATARACT SURGERY WITH PCIOL IMPLANTATION	20	33.5%
PHACOEMULSIFICATION WITH FOLDABLE IOL IMPLANTATION	40	66.5%
TOTAL	60	100%



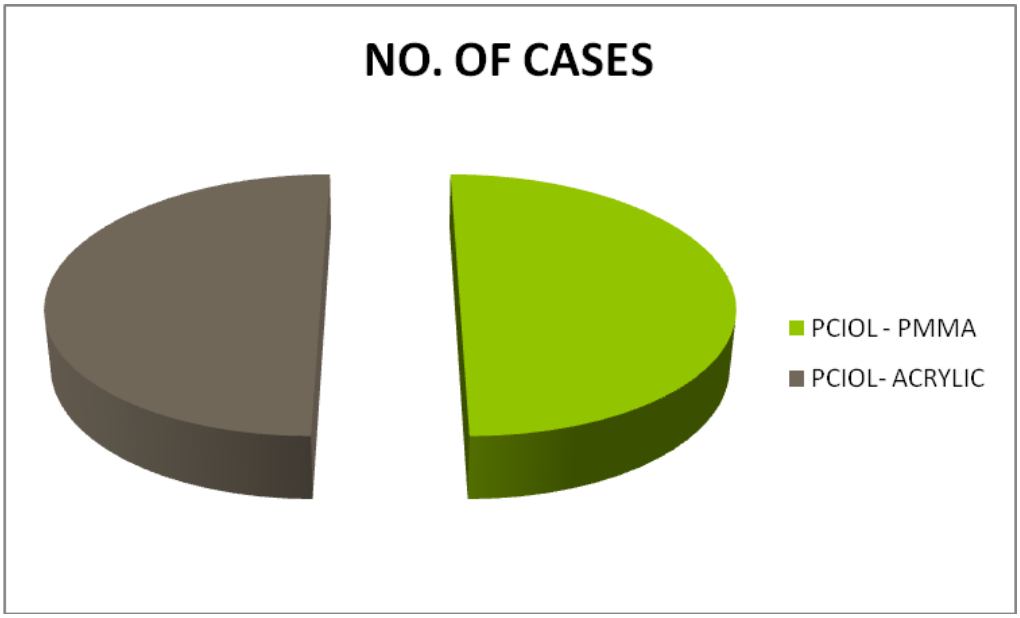
66.5 % of cases were operated using Phaco emulsification technique and foldable IOL were implanted whereas 33.5% were operated by Small incision cataract surgery technique and Posterior chamber IOL were implanted in all cases.

5. **TYPES OF IOL USED** :

TYPE OF IOL USED	NO. OF CASES	PERCENTAGE
PCIOL - PMMA	30	50%
PCIOL- ACRYLIC	30	50%
TOTAL	60	100%

All cases were implanted with Posterior chamber IOLs only . Among them Equal number of cases (each 30 cases) were implanted with acrylic IOLs and PMMA IOLs. Among the paediatric cataracts and steroid cataracts equal number of PMMA IOLs and hydrophobic acrylic IOLs were used for implantation. 5 cases of paediatric cataracts and 8 cases of cataract in which long term steroid usage

was present were implanted with PMMA IOLs and equal number with hydrophobic acrylic IOLs.



6. STUDY OF POSTERIOR CAPSULAR OPACIFICATION

AFTER 1 **YR** :

PRE OP RISK FACTOR	NO. OF CASES OPERATED	NO. OF CASES WITH PCO	PERCENTAGE
Paediatric cataract	10	9	90%
Steroid induced cataract	18	6	30%
Posterior subcapsular cataract	32	6	18%
TOTAL	60	21	35%

Clinically significant PCO was studied and graded using Slit lamp bio- microscopy and recorded.

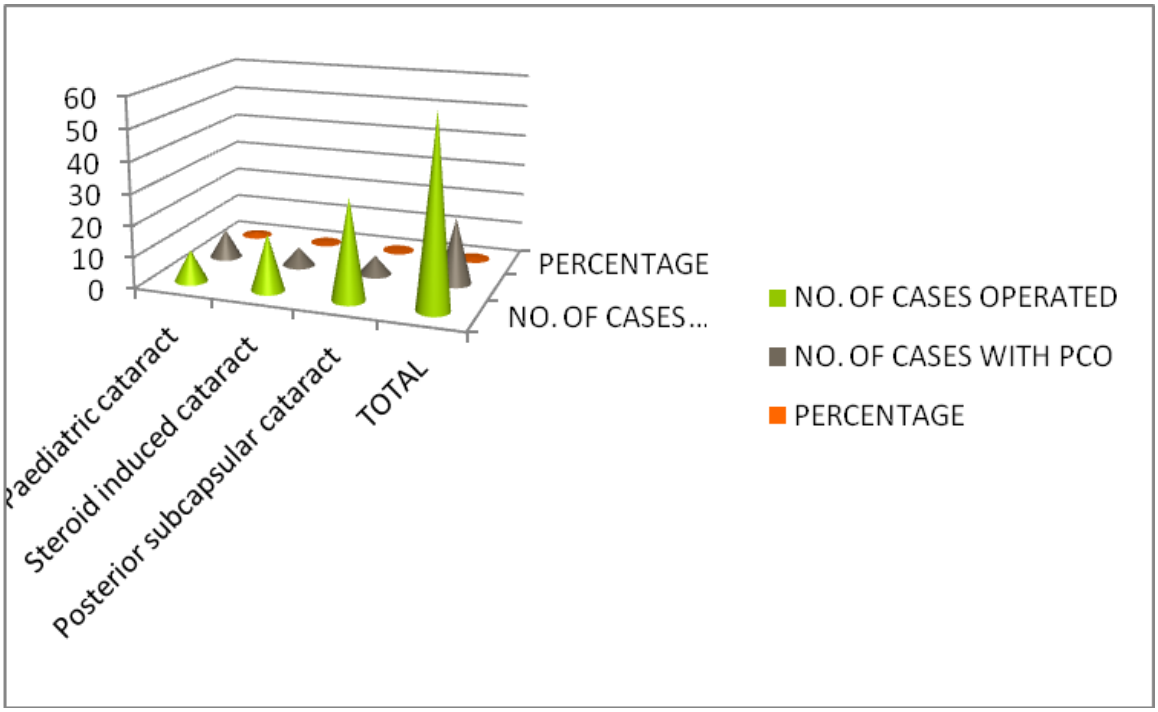
By this study 9 patients out of 10(90%)of paediatric cataract operated had PCO formation after 1 year of follow up post operatively. Of which most patients had grade 3 or more .

6 out of 18 cases of steroid induced cataract cases which were operated had PCO formation after 1 year of follow up. It accounts for 30%.

Of the 32 cases of posterior subcapsular cataract cases operated on, 6 cases developed PCO in 1 year duration. It accounts for 18%.

Overall 21 out of 60 patients operated and studied developed PCO in a year of follow up. It accounts for 35 %.

DISTRIBUTION OF PCO



7. **PCO IN DIFFERENT TYPES OF IOL IN UNCOMPLICATED ADULT CASES**:

TYPE OF IOL	NO. OF CASES OPERATED	NO. OF CASES WITH PCO IN 1 YR	PERCENTAGE
PMMA- PCIOL	16	4	25%
HYDROPHOBIC ACRYLIC PC IOLs	16	2	12.5%

Leaving beside, paediatric cataract cases and steroid induced cataract cases, the uncomplicated posterior subcapsular cataracts of adults were studied.

Out of the 32 cases, 16 were implanted with PMMA IOLs and 16 were implanted with hydrophobic Acrylic IOLs. After 1 year of follow up, it showed 4 out of 16 patients (25%) developed PCO .

Of the 16 cases implanted with hydrophobic acrylic IOLs in capsular bag, 2 cases developed PCO IN A year duration. It accounts for 12.5%.

8. **POST OP VISUAL ACUITY**:

All cases operated on improved in vision post operatively in the first one month of post operative period. On regular follow up, the eyes which developed PCO gradually starts to decline. By around 1 year of the follow up all the 21 cases which developed clinically significant PCO had marked reduction in visual acuity. The visual acuity for the patients who had developed PCO was ranging between 6/36 to 2/60.

DISCUSSION

This is a prospective study of 60 cases of cataract to study and determine the preoperative and intraoperative risk factors associated with Posterior capsular opacification, done at Government Rajaji Hospital, Madurai medical college, Madurai.

Cataract is opacification of the lens proteins. With modern advances in ophthalmic surgery practise, cataractous lens removal and IOL implantation has become so refined. This has helped patients to regain good quality of vision after surgery. But still post operatively, posterior capsule getting opacified after few months to years of surgery has become a big obstacle in the visual rehabilitation of the patients.

PCO formation significantly reduce the visual quality and contrast sensitivity of the patient which makes patients quality of life go down. It significantly reduce the patients ability to drive and go

around in twilight and dim light. These posterior capsular opacification can be treated with Nd YAG capsulotomy. For the patient to undergo laser procedure after cataract surgery dents the patients confidence and also incur more financial burden to the patients.

Nowadays the importance is given to reduce the incidence of posterior capsular opacification. Many known risk factors were found for PCO formation. They include age , cataract in patients on long standing steroid intake, dense posterior subcapsular cataracts. PCO formation is a very common complication in paediatric cataracts. Intra operatively size of rhexis, type of IOL placed, centration of IOL all play a role in PCO formation post operatively. Rhexis size more than the optic size increase the incidence of PCO compared to rhexis size less than that of optic size. But it has an increased risk of another complication called capsular phimosis. So an ideal capsulorhexis size should be around 5 mm. PMMA IOLs have more incidence of PCO formation compared to hydrophobic acrylic IOLs.

This study was done on all age group from 3 years to 70 years as cataract is prevelant in all age groups. The age and sex wise analysis of this study

	AHMET TAYLAN YAZICI et al 2012	OUR STUDY 2012
SAMPLE SIZE	91	60
MEAN AGE in years	56.8	42.6
RANGE	19yrs to 94 yrs	3yrs to 70 yrs
GENDER RATIO (M:F)	56:44	45:55

In our study the age range of patients studies were between 3 to 70 years. Mean age of the patients studied was 42.6 years. Of the 60 patients studied, 33 were female and 27 were male. So the male to female ratio was 55: 45.

Ahmet Taylan Yazici et al , in their study had a sample size of 91. Their mean age for study 56.8. their patients age ranged from 19 to 94 yrs. Their male to female ratio was 56:44.

ANALYSIS OF PCO IN PAEDIATRIC CATARACTS:

	KOCH DD et al 1997	LUO Y et al 2004-2005	OUR STUDY 2012
NO. OF CASES OPERATED	5	26	10
NO. OF CASES WITH VISUALLY SIGNIFICANT PCO	5	20	9
PERCENTAGE	100%	76.9%	90%

In our study analysis of incidence of PCO after 1 year of follow up in paediatric cataract showed : 9 out of 10 patients had

visually significant PCO graded by Sellman and Lindstrom grading using slit lamp biomicroscope. It was a staggering 90%.

Koch DD et al , in their study of 5 cases operated on paediatric cataract showed 100 % risk of PCO formation. All the 5 cases operated on developed PCO post operatively.

Luo Y et all, in their study had operated on 26 cases of paediatric cataracts in which 20 children (76.9%) developed PCO post operatively.

ANALYSIS OF PCO IN CATARACTS IN PATIENTS ON LONG TERM STEROID INTAKE:

	OUR STUDY 2012
NO OF CASES OPERATED	18
NO OF CASES WITH PCO	6
PERCENTAGE	30%

In our study PCO developed post operatively on 6 eyes out of 18 eyes operated for steroid induced cataracts.

Praveen MR et al in their study using EPCO score had concluded that steroid induced PSCC had increased risk or PCO formation post operatively.

ANALYSIS OF PCO IN CATARACTS WITHOUT RISK FACTORS :

	CONGDON N et al 2008	OUR STUDY 2012
NO OF CASES OPERATED	204	32
NO OF CASES WITH PCO	34	6
PERCENTAGE	16.7%	18%

In our study, among the 32 cases operated on without any pre-operative risk factors, 6 patients developed PCO post operatively in a year's follow up. It corresponds to 18%

Congdon N et al , in a study in china, had observed 34 patients with PCO post operatively among the 204 cases operated on. This corresponds to 16.7% of total cases operated.

ANALYSIS OF PCO IN PMMA IOL IMPLANTATION :

	MUHAMMED MOIN et al 2009	HOLLICK EJ et al 1999	OUR STUDY 2012
NO. OF CASES OPERATED ON	166	23	16
NO. OF CASES WITH PCO	39	13	4
PERCENTAGE	23.4%	56%	25%

In our study, among the 13 cases which were operated on with PMMA IOLs on the eyes without any pre-operative risk factors, 4 eyes developed PCO in a year's follow up post operatively. This accounts for 25%

In Hollick EJ et al study, among the 23 cases operated on with PMMA IOLs, 13 patients developed PCO post operatively. It corresponds to 56%

Muhamed Moin et al reported 23.4 % incidence of PCO formation. Ie. Of the 166 cases operated on with PMMA IOLs, 39 cases developed PCO post operatively.

PCO IN ACRYLIC IOL IMPLANTATION:

	HOLLICK EJ et al 1999	K HAYASHI et al 2004	OUR STUDY 2012
No. of cases operated	19	95	16
No. of cases with PCO	2	2	2
PERCENTAGE	10%	2%	12.5%

In our study, hydrophobic acrylic IOLs were placed in 16 cases of uncomplicated subcapsular cataracts. Among them 2 cases developed PCO in a year post operative. It accounts for 12.5%.

Hollick EJ et al in a similar study had operated on 19 cases with acrylic IOLs. In their study 2 cases developed PCO post operatively. It corresponds to 10%.

K Hayashi et al, in their study had found that only 2% (2 nos)of the 95 patients operated on hydrophobic acrylic IOLs developed PCO post operatively.

ANALYSIS OF POSTOPERATIVE VISUAL ACUITY:

Visual acuity of all the cataract cases improved after surgery with IOL implantation. Cases which subsequently developed PCO started showing reduction in visual acuity. All those cases which didn't develop PCO had BCVA ranging from 6/6 to 6/12. Those 21 cases which had significant PCO after a year's follow up showed a visual acuity ranging between 6/36 to 2/60.

SUMMARY

- 60 patients who had cataract were selected for study.
- Mean age of the patient was 42.6 years. The age of the patients ranged from 3 to 70 years. Out of this 27(45%) patients were males and 33 (55%) patients were females.
- Among the patients selected 10(16.5%) patients were below the age of 15 years. 18 (30%) patients had long standing intake of steroids and 32 patients had uncomplicated subcapsular cataracts.
- The pre-op best corrected visual acuity in 23(38.5%) of patients was ranging between 6/60 to 3/60. 14(23.5%) patients were having BCVA in the range of 3/60 to 1/60. 12 patients were having BCVA from 6/24 TO 6/60. It

corresponds to20% of patients on study. The remaining 11(18%) patients were having BCVA less than 1/60.

- Among the 60 patients, 20 patients were operated by small incision cataract surgery with PCIOL implantation and 40 patients underwent Phacoemulsification and PCIOL implantation. In all the patients lens were placed in the bag.

- 30(50%) of patients from the study group were implanted with PMMA IOLs. Of this 5 patients were in paediatric age group, 9 patients had steroid induced subcapsular cataracts and 16 patients were having uncomplicated subcapsular cataracts.

- The remaining 30(50%) of patients were operated on and implanted with Acrylic IOLs. Of this 5 patients had paediatric cataracts, 9 patients were having steroid cataracts and 16 patients with subcapsular cataracts without any complication.

- These patients were followed every month for 1 year duration. During which visual acuity recording and slit lamp examination recording were done.

- After 1 year of follow up out of 10 paediatric cataract cases operated 9 eyes (90%) developed visually significant PCO.

- Out of 18 eyes with subcapsular cataract in patients with long standing steroid intake, 6 (30%) eyes developed PCO 1 year after the surgery.

- In the 32 eyes with uncomplicated subcapsular cataract, 6(18%) eyes developed PCO in 1 year follow up.

- Among the 16 eyes with with uncomplicated PSCC, where PMMA IOLs were implanted, 4 (25%)eyes developed significant PCO in the 1 yer follow up. In case of the 16 eyes with uncomplicated PSCC, where Acrylic IOLs were implanted, 2(12.5%) eyes developed PCO in that time period of 1 year.

- Post operative visual acuity recorded on every followup. Visual acuity readings after 1 year of follow up shows visual acuity ranging from 6/12 to 6/6 in all cases which had no PCO. The 21 cases which had developed PCO had visual acuity ranging from 6/36 to 2/60.

CONCLUSION

The aim of our study was to analyse and determine the preoperative and intraoperative risk factors associated with Posterior capsular opacification.

By analysing the results after 1 year of follow up after the surgery following conclusions are drawn:

- Paediatric cataracts has a very high incidence of PCO formation which may severely affect the development of the child and may lead on to visual deprivation amblyopia later. This complication could be avoided by planning extra measures like primary posterior capsulorhexis with or without anterior vitrectomy during cataract surgery and IOL implantation.

- Steroid induced subcapsular cataracts has more incidence of PCO formation post operatively when compared to uncomplicated subcapsular cataract.

- Implantation of PMMA posterior chamber IOLs has more incidence of PCO formation when compared with Acrylic posterior chamber IOLs.

METHODS TO REDUCE PCO FORMATION :

- In paediatric cataracts, planning primary posterior capsulorhexis can reduce PCO incidence.
- Performing CCC as a method of anterior capsulotomy reduce PCO formation.
- Size of CCC not bigger than optic edge reduce PCO formation.
- Cortical cleaving hydrodissection, complete cortical wash vital in reducing incidence of PCO.
- Choice of IOL plays a role in reducing PCO post operatively. Hydrophobic acrylic IOLs produce lesser incidence of PCO compared to PMMA lenses.

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PROFORMA

PREDICTORS OF POSTERIOR CAPSULAR OPACIFICATION

NAME: I.P/O.P NO:

Age: Sex:

Occupation:

Past Medical history

Prior treatment history if any:

RE

LE

V/A (unaided) at the time of examination:

BCVA

PRE-OPERATIVE EXAMINATION:

LIDS:

CONJUNCTIVA:

CORNEA:

ANTERIOR CHAMBER:

IRIS:

PUPIL

LENS:

FUNDUS ON DILATATION:

RE

LE

DILATED SLIT LAMP EXAMINATION:

DUCT SYRINGING:

LAB INVESTIGATIONS:

Random blood sugar:

Fasting blood sugar:

Post prandial blood sugar:

SURGERY NOTES:

Anaesthesia :

Anterior capsulotomy:

Type:

Size

Tryphan blue usage:

IOL PLACEMENT:

COMPLICATIONS IF ANY:

IMMEDIATE POST- OP EXAMINATION:

VISUAL ACUITY:

SLIT LAMP MICROSCOPY:

EXAMNATION AFTER 6 WEEKS:

VISUAL ACUITY:

SLIT LAMP EXAMINATION:

FOLLOW UP:

INTERVENTION NEEDED:

ABBRIEVATIONS

PCO	- Posterior Capsular opacification
BVCA	- Best corrected visual acuity
LEC	- Lens epithelial cell

PSCC	- Posterior sub capsular cataract
UCVA	- Uncorrected visual acuity
NdYAG	-Neodymium Ytrium Aluminium Garnet
PMMA	-Poly Methyl Methacrylate
IOL	- Intra ocular Lens
PCIOL	- Posterior chamber intra ocular lens
SICS	- Small incision cataract surgery
CCC	- Continuous curvilinear capsulo rhexis
V/A	- Visual acuity
ACRL	- Acrylic
RE/RT	- Right eye
LE/LT	- Left eye

Ref. No. 3104/E4/3/2012

Govt.Rajaji Hospital,Madurai.20.
Dated: .03.2012

Institutional Review Board / Independent Ethics Committee.
Dr. A. Edwin Joe, M.D (FM), BL.,
Dean, Madurai Medical College & 2521021 (Secy)
Govt Rajaji Hospital, Madurai 625020.
Convenor
grhethicssecy @gmail.com.

Sub: Establishment-Govt. Rajaji Hospital, aMadurai-20-
Ethics committee-Meeting Agenda-communicated-regarding.

The Ethics Committee meeting of the Govt. Rajaji Hospital, Madurai was held at 11.00 Am to 1.00Pm on 29.03.2012 at the Dean Chamber, Govt. Rajaji Hospital, Madurai. The following members of the committee have been attended the meeting.

1. Dr.N.Vijayasankaran,M.ch(Uro.) 094-430-58793 0452-2584397	Sr.Consultant Urologist Madurai Kidney Centre, Sivagangai Road,Madurai	Chairman
2. Dr.P.K. Muthu Kumarasamy, M.D., 9843050911	Professor & H.O.D of Medical, Oncology(Retired)	Member Secretary
3. Dr.T.Meena,MD 094-437-74875	Professor of Physiology, Madurai Medical College	Member
4. Dr. S. Thamilarasi, M.D (Pharmacol)	Professor of pharmacology	
5. Dr.Moses K.Daniel MD(Gen.Medicine) 098-421-56066	Professor of Medicine Madurai Medical College	Member
6. Dr.M.Gobinath,MS(Gen.Surgery)	Professor of Surgery Madurai Medical College	Member
7. Dr.S. Dilshadh, MD(O&G) 9894053516	Professor of OP&Gyn Madurai Medical College	Member
8. Dr.S.Vadivel Murugan., M.D, 097-871-50040	Professor of Medicine Madurai Medical College	Member
9. Shri.M.Sridher,B.sc.B.L. 099-949-07400	Advocate, 2, Deputy collectors colony 4th street KK Nagar, Madurai-20.	Member
10. Shri.O.B.D.Bharat,B.sc., 094-437-14162	Businessman Plot No.588, K.K.Nagar,Madurai.20.	Member
11.Shri. S.sivakumar,M.A(Social) Mphil 093-444-84990	Sociologist, Plot No.51 F.F, K.K Nagar, Madurai.	Member

Following Projects were approved by the committee

19.	Vankata subramanian. A	PG, M.S (gen surg)	Study of laparoscopic cholecystectomy converted to an 'open' procedure	Approved
20.	Mohan,	PG, M.S (gen surg)	Clinical study of breast masses, including mammography, FNAC and ultrasound	Approved
21.	Hema. D	PG, M.S (Ophthal)	Clinical study of central retinal vein occlusion in non-diabetics	Approved
22.	Nithya. R	PG, M.S (Ophthal)	Clinical study of the Management of orbital fractures	Approved
23.	Vijayalakshmi. A	PG, M.S (Ophthal)	Clinical study of cystoid macular edema following cataract surgeries.	Approved
24.	Govindaraj. B	PG, M.S (Ophthal)	Primary intraocular lens implantation in traumatic cataracts	Approved
25.	Venkatesan .C	PG, M.S (Ophthal)	Predictors for posterior capsular opacification following cataract surgery	Approved
26.	Juliana R Stephen	PG, M.S (Ophthal)	Clinical study of penetrating eye injuries	Approved
27.	Pallavi Kamath,	PG, M.S (Ophthal)	Gonioscopy vs. ultrasonic bio-microscopy for measurig angle of anterior chambers	Approved
28.	Andal. P	(Ph.D)	Sacred Hearts Nursing College: Effectiveness of cardiac rehabilitation program.	Approved

Please note that the investigator should adhere the following: She/He should get a detailed informed consent from the patients/participants and maintain Confidentially.

1. She/He should carry out the work without detrimental to regular activities as well as without extra expenditure to the institution to Government.
2. She/He should inform the institution Ethical Committee in case of any change of study procedure site and investigation or guide.
3. She/He should not deviate for the area of the work for which applied for Ethical clearance.

She/He should inform the IEC immediately, in case of any adverse events pr Serious adverse reactions.

4. She/he should abide to the rules and regulations of the institution.
5. She/He should complete the work within the specific period and apply for if any Extension of time is required She should apply for permission again and do the work.
6. She/He should submit the summary of the work to the Ethical Committee on Completion of the work.
7. She/He should not claim any funds from the institution while doing the word or on completion.
8. She/He should understand that the members of IEC have the right to monitor the work with prior intimation.

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To
All the above members and Head of the Departments concerned.
All the Applicants.

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INTRODUCTION Posterior capsular opacification also called as after cataract or secondary cataract
which develop over the clear posterior lens capsule few months to few years after an uneventful
cataract surgery. Opacification of the Posterior capsule is usually caused by the postoperative
proliferation of lens epithelial cells in the capsular bag. It remains the most frequent complication of
cataract – intraocular lens surgery. It was particularly more common and severe in the early days of
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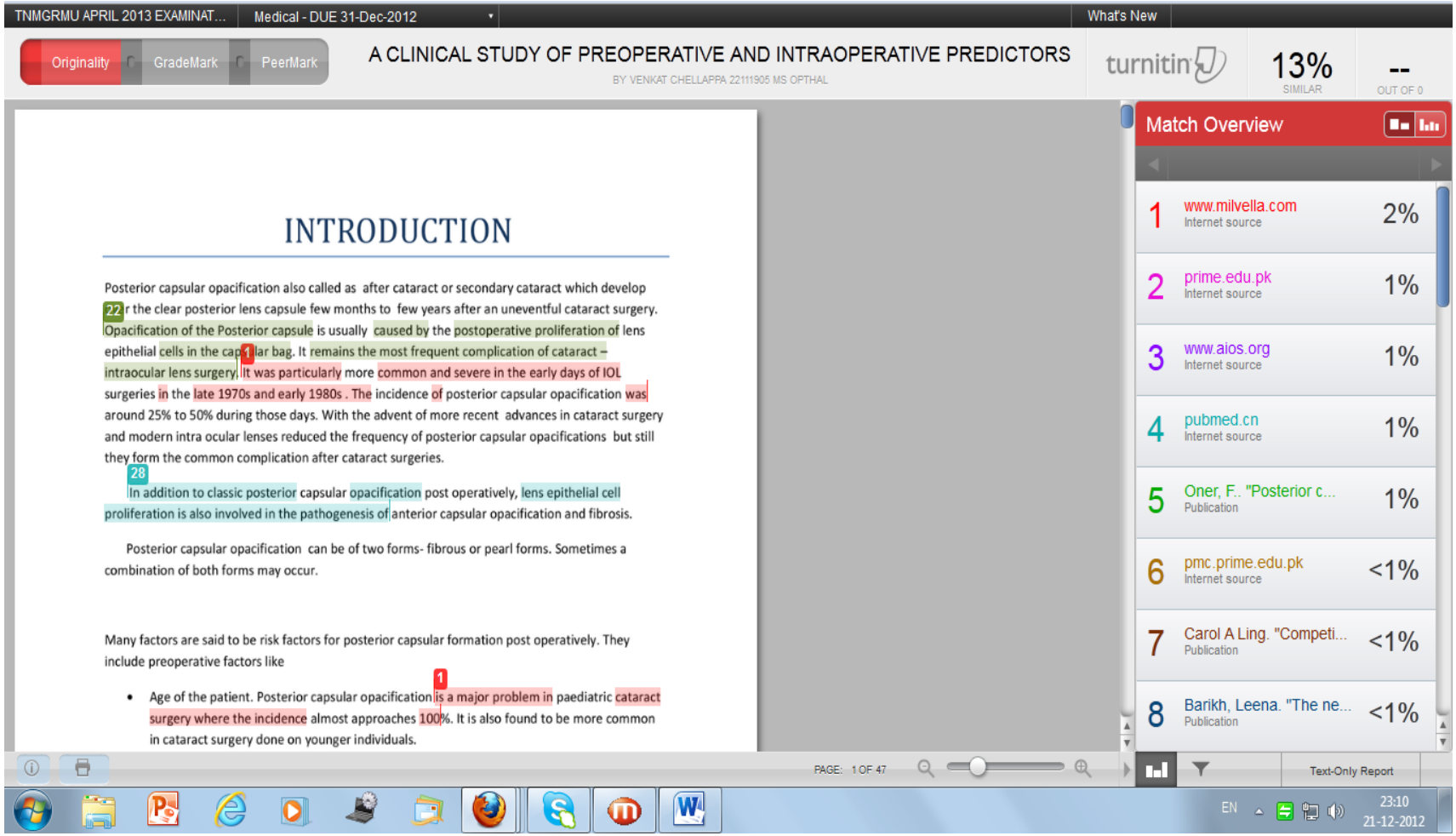
was around 25% to 50% during those days. With the advent of more recent advances in cataract
surgery and...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INTRODUCTION
Posterior capsular opacification also called as after cataract or secondary cataract which develop r the clear posterior lens capsule few months to few years after an uneventful cataract surgery. Opacification of the Posterior capsule is usually caused by the postoperative proliferation of lens epithelial cells in the cap lar bag. It remains the most frequent complication of cataract – intraocular lens surgery. It was particularly more common and severe in the early days of IOL surgeries in the late 1970s and early 1980s . The incidence of posterior capsular opacification was around 25% to 50% during those days. With the advent of more recent advances in cataract surgery and modern intra ocular lenses reduced the frequency of posterior capsular opacifications but still they form the common complication after cataract surgeries.
In addition to classic posterior capsular opacification post operatively, lens epithelial cell proliferation is also involved in the pathogenesis of anterior capsular opacification and fibrosis.
Posterior capsular opacification can be of two forms- fibrous or pearl forms. Sometimes a combination of both forms may occur.
Many factors are said to be risk factors for posterior capsular formation post operatively. They include preoperative factors like
Age of the patient. Posterior capsular opacification is a major problem in paediatric cataract surgery where the incidence almost approaches 100%. It is also found to be more common in cataract surgery done on younger individuals.
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MASTER CHART

SL.NO	NAME	AGE	SEX	LATERALITY	STEROID INTAKE	PREOP V/A	LENS GRADING	SURGERY TECHNIQUE	ANTERIOR CAPSULOTOMY	LENS TYPE	PCO	FINAL V/A
1	MANI	60	M	RT	NIL	**6\60**	GD2\PSCC	PHACO	CCC	PMMA	NEG	6\12
2	PANDIARAJ	8	M	RT	NIL	HM	DENSE IMC	SICS	CCC	PMMA	POS	5\60
3	PODHUMPONNU	62	F	RT	NIL	4\60	GD 3\PSCC	SICS	CCC	PMMA	NEG	6\9
4	PETCHIAMMAL	43	F	LT	YES	6\36	GD 1\PSCC	PHACO	CCC	PMMA	NEG	6\6
5	ANTHONIAMMAL	51	F	LT	NIL	5\60	GD 3\PSCC	PHACO	CCC	PMMA	NEG	6\9
6	SAKTHIVEL	36	M	RT	YES	6\60	GD2\PSCC	PHACO	CCC	PMMA	POS	6\60
7	INDIRA	58	F	LT	NIL	2\60	GD3\PSCC	SICS	CCC	PMMA	NEG	6\9P
8	KRISHNAN	48	M	RT	NIL	4\60	GD2\PSCC	PHACO	CCC	PMMA	POS	5\50
9	NADHIYA	6	F	RT	NIL	CFCF	IMC	SICS	CCC	PMMA	POS	6\36
10	KALAISELVI47	47	F	LT	NIL	6\60	GD2\PSCC	PHACO	CCC	PMMA	POS	6\36
11	KARUPAIYA THEVAR	55	M	LT	NIL	3\60	GD3\PSCC	PHACO	CCC	PMMA	NEG	6\6
12	SONAI	63	M	LT	NIL	3\60	GD3\PSCC	SICS	CCC	PMMA	NEG	6\6P
13	MUTHAIYYA	48	M	LT	NIL	5\60	GD1\PSCC	PHACO	CCC	PMMA	NEG	6\9
14	RANIAMMAL	47	F	RT	YES	6\24	PSCC	PHACO	CCC	PMMA	NEG	6\6P
15	ADAIKAMMAI	70	F	RT	NIL	2\60	GD3\PSCC	SICS	CCC	PMMA	NEG	6\9

16	BEGAM	52	F	LT	NIL	2\60	GD3\PSCC	SICS	CCC	PMMA	POS	6\60
17	ROSALIN	13	F	RT	YES	1\60	IMC	PHACO	CCC	PMMA	POS	4\60
18	KALIMUTHU	36	M	RT	YES	5\60	GD3\PSCC	SICS	CCC	ACRL	POS	6\60
19	AADHAVAN	13	M	LT	NIL	CFCF	IMC	SICS	CCC	PMMA	POS	2\60
20	BOSE	52	M	RT	NIL	3\60	GD3\PSCC	SICS	CCC	PMMA	NEG	6\12
21	RAJANGAM	52	M	RT	NIL	6\60	GD2\PSCC	PHACO	CCC	PMMA	NEG	6\12
22	MANICKAM	46	M	LT	YES	4\60	GD2\PSCC	PHACO	CCC	ACRL	POS	6\60
23	VENDA	61	F	RT	NIL	4\60	GD2\PSCC	PHACO	CCC	PMMA	NEG	6\9
24	RAJAMANNAR	50	M	RT	NIL	2\60	GD3\PSCC	PHACO	CCC	PMMA	NEG	6\9P
25	RAYAZ FATIMA	3	F	LT	NIL	PL+	IMC	SICS	CCC	PMMA	POS	2\60
26	IMTIAZ	28	M	LT	YES	6\24	PSCC	PHACO	CCC	ACRL	NEG	6\6
27	KUMARADEVAN	53	M	RT	NIL	4\60	GD2\PSCC	PHACO	CCC	PMMA	NEG	6\9
28	VENNILA	14	F	RT	NIL	1\60	IMC	SICS	CCC	ACRL	POS	6\36
29	GOVINDAMMAL	39	F	RT	YES	6\60	GD1\PSCC	PHACO	CCC	ACRL	NEG	6\9P
30	MEERA	28	F	LT	YES	2\60	GD3\PSCC	PHACO	CCC	ACRL	NEG	6\6
31	RAMARAJAN	44	M	LT	YES	4\60	GD2\PSCC	PHACO	CCC	ACRL	POS	6\36
32	AMMAYEE	63	F	LT	NIL	2\60	GD3\PSCC	PHACO	CCC	ACRL	NEG	6\9
33	SAVITHIRI	58	F	LT	NIL	2\60	GD3\PSCC	PHACO	CCC	ACRL	NEG	6\12
34	KAMALA	51	F	LT	NIL	4\60	GD2\PSCC	PHACO	CCC	ACRL	NEG	6\6
35	SEVATHAIYA	61	M	RT	NIL	4\60	GD2\PSCC	PHACO	CCC	ACRL	NEG	6\9
36	KAALAI	61	M	RT	NIL	2\60	GD3\PSCC	SICS	CCC	ACRL	NEG	6\6
37	RANGAMMAL	52	F	RT	NIL	2\60	GD3\PSCC	PHACO	CCC	ACRL	NEG	6\9
38	KAATUMANNARSAMY	54	M	RT	NIL	6\36	PSCC	PHACO	CCC	ACRL	NEG	6\6
39	RAMYAPRIYA	19	F	RT	YES	6\24	PSCC	PHACO	CCC	PMMA	POS	6\60
40	ALAMELU	61	F	RT	NIL	1/2\60	GD3\PSCC	SICS	CCC	ACRL	NEG	6\9
41	DEVAKI	62	F	LT	NIL	5\60	GD3\PSCC	SICS	CCC	ACRL	NEG	6\6

42	PERUMAL	68	M	RT	NIL	5\60	GD3PSCC	PHACO	CCC	ACRL	NEG	6\6
43	SARALA	36	F	RT	YES	6\24	PSCC	PHACO	CCC	PMMA	NEG	6\6
44	SOWNDHARAM	54	F	LT	NIL	2\60	GD3\PSCC	SICS	CCC	ACRL	NEG	6\12
45	VALLI	59	F	LT	NIL	2\60	GD3\PSCC	PHACO	CCC	ACRL	NEG	6\9
46	SALLAMMAL	51	F	RT	NIL	2\60	GD3\PSCC	PHACO	CCC	ACRL	NEG	6\12P
47	KENNEDY	6	M	RT	NIL	CFCF	IMC	SICS	CCC	ACRL	POS	6\36P
48	RAVI RANJAN	26	M	LT	YES	6\36	PSCC	PHACO	CCC	PMMA	NEG	6\9
49	UNNAMALAIMAAL	53	F	RT	NIL	5\60	GD2\PSCC	PHACO	CCC	ACRL	NEG	6\6P
50	SEKAR	42	M	RT	YES	6\36	PSCC	PHACO	CCC	ACRL	NEG	6\6
51	RAMUTHAI	50	F	LT	NIL	2\60	GD3\PSCC	PHACO	CCC	ACRL	NEG	6\12
52	ILLAKIYAN	7	M	RT	NIL	1/2\60	IMC	SICS	CCC	ACRL	POS	5\60
53	JAYABAL	10	M	RT	NIL	HM	IMC	SICS	CCC	ACRL	POS	3\60
54	RASATHI	39	F	LT	YES	6\36	PSCC	PHACO	CCC	PMMA	POS	6\36
55	GOWRI	43	F	LT	YES	4\60	GD2\PSCC	PHACO	CCC	ACRL	NEG	6\6P
56	GOVINDAN	15	M	LT	NIL	1\60	GD3\PSCC	PHACO	CCC	ACRL	NEG	6\12
57	VEDACHI	50	F	RT	NIL	5\60	GD3\PSCC	PHACO	CCC	ACRL	POS	6\60
58	DROUPATHI	40	F	RT	YES	5\60	GD2\PSCC	PHACO	CCC	ACRL	NEG	6\6
59	VIJAY	29	M	RT	YES	6\60	GD1\PSCC	PHACO	CCC	ACRL	NEG	6\6
60	RATNA	50	F	RT	NIL	4\60	GD2\PSCC	PHACO	CCC	ACRL	POS	6\36