CLINICAL PROFILE AND VISUAL OUTCOME IN PSEUDOEXFOLIATION SYNDROME UNDERGOING MANUAL SMALL INCISION CATARACT SURGERY

By

DR. SAMEEKSHA. M

DISSERTATION SUBMITTED TO

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA, KOLAR

In partial fulfillment

Of the requirements for the degree of

MASTER OF SURGERY

IN

OPHTHALMOLOGY

Under the Guidance of

DR. RASHMI. G, MBBS, M.S.

DEPARTMENT OF OPHTHALMOLOGY

SRI DEVARAJ URS MEDICAL COLLEGE

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ACKNOWLEDGMENT

It is with great reverence, a deep sense of gratitude, and respect that I would like to thank my teacher and guide, ***DR. RASHMI.G, M.S, Professor****, Department of Ophthalmology, Sri Devaraj Urs Medical College Tamaka, Kolar for her guidance, encouragement, and valuable insights during the entire period of this study and post-graduation course.*

I would like to express my appreciation and gratitude to ***Dr. SANGEETHA. T Professor and HOD****, Department of Ophthalmology, Sri Devaraj Urs Medical College Tamaka, Kolar, for her encouragement and suggestions during the entire course of this study and post-graduation course.*

I want to express my profound gratitude to ***Dr. MANJULA T.R, DR.B.O. HANUMANTHAPPA and DR. USHA.B.R*** *my Professors, Department of Ophthalmology, Sri Devaraj Urs Medical College Tamaka, Kolar whose knowledge and experience has guided me throughout my post-graduation course.*

I would like to express my heartful thanks to my Associate Professors ***Dr. Chaitra MC and Dr Inchara. N,*** *assistant professor* ***Dr.Apoorva*** *senior residents* ***Dr. Athira, Dr.Narendran and Dr. Lohithashwa*** *Department of Ophthalmology, Sri Devaraj Urs Medical College Tamaka, Kolar for their help and suggestions rendered to me during this study.*

I am immensely thankful to all my PG Colleagues, especially ***Dr.Sharadhi, Dr. Divija, Dr. Preethi, Dr. Susmitha, Dr. Lekshmy, Dr. Hasareen, Dr. Megha Varnika, and Dr. Chirag*** *for their timely support and encouragement.*

My gratitude and thanks to ***Dr.PRABHAKAR*** *M.D, (General medicine), Principal, Sri Devaraj Urs Medical College Tamaka, Kolar, for letting me use the college and hospital facilities and resources.*

My gratitude and thanks to OT sisters ***Mrs Parvathamma, Mrs Nisarga,*** *and OPD staff nurse* ***Mrs.Soumya*** *for their support and encouragement in completing my study.*

I would like to thank my parents ***Dr. Laxminarayana Maiya*** *and* ***Dr. Padma.S*** *and my sister* ***Ms. Anagha Madhan*** *for having confidence in me and standing by me in my difficult times.*

My love and special thanks to my friends ***Dr. Shantala and Dr. Sreejith*** *for their constant encouragement, help and strength.*

My heartful gratitude to all my patients who submitted themselves most gracefully and wholeheartedly participated in this study. I sincerely thank my institute ***Sri Devaraj Urs Medical College, Tamaka Kolar*** *for giving me a wonderful foundation and form of knowledge in the field of Ophthalmology which stands for the rest of my life. Last, but not the least, I would like to express my gratitude to the* ***almighty*** *for all his blessings.*

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LIST OF ABBREVIATIONS

SL NO	ABBREVIATIONS	FULL FORM
1	AGPAT1	1-acylglycerol-3-phosphate O-acyltransferase 1
2	BCVA	Best-corrected visual acuity
3	CACNA1A	Calcium voltage-gated channel subunit alpha 1 A
4	CDKN2B	Cyclin Dependent Kinase inhibitor 2B
5	GWAS	Genome-wide association study
6	IOL	Intraocular lens
7	IOP	Intraocular pressure
8	LOCS III	The Lens Opacities Classification System III
9	LOXL1	Lysyl oxidase like 1
10	PCO	Posterior capsular opacification
11	PCR	Posterior Capsular Rupture/Rent
12	PMMA	Polymethyl methacrylate
13	PEX	Pseudoexfoliation
14	PXG	Pseudoexfoliative glaucoma
15	PXM	Pseudoexfoliative material
16	PXS	Pseudoexfoliation syndrome
17	POAG	Primary Open Angle Glaucoma
18	RBMS3	RNA Binding Motif Single Stranded Interacting Protein 3
19	SICS	Small Incision Cataract Surgery
20	SNP	Single nucleotide polymorphism
21	SRK II	Sanders-Retzlaff-Kraff II
22	SEMA-6A	Semaphorin 6A
23	TMEM136-ARHGEF12	Transmembrane protein 136- Rho Guanine Nucleotide Exchange Factor 12
24	TGF-β1	Transforming growth factor beta -1
25	XFM	Exfoliative material

ABSTRACT

TITLE OF THE TOPIC- "CLINICAL PROFILE IN PSEUDOEXFOLIATION SYNDROME UNDERGOING MANUAL SMALL INCISION CATARACT SURGERY"

BACKGROUND: The accumulation of greyish-white fibro-granular extracellular material on the abnormal basement membranes of ageing epithelial cells causes pseudoexfoliation (PEX), an age-related eye condition. This study was done to evaluate the clinical profile and visual outcome in pseudoexfoliation syndrome undergoing manual small incision cataract surgery.

OBJECTIVES OF THE STUDY-

1. To study the clinical profile of patients with Pseudoexfoliation syndrome and cataract
2. To evaluate the visual outcome in patients with Pseudoexfoliation syndrome undergoing Manual Small Incision Cataract Surgery.
3. To evaluate the intraoperative and post-operative complications

MATERIAL AND METHODS: 48 patients attending the outpatient department of ophthalmology, R.L.Jalappa Hospital And Research Centre, attached to Sri Devaraj Urs Medical College, Tamaka, Kolar with pseudoexfoliation syndrome and senile cataracts fulfilling the study criteria were included in the study .

Following thorough ophthalmic valuation, manual small incision cataract surgery with rigid PMMA IOL implantation was performed .

RESULTS- . It was found that pseudoexfoliation syndrome had a slight female preponderance with unilateral involvement. The overall mean age of patients with pseudoexfoliation syndrome were- **69.25 ± 7.24 years**. PEX was found to be distributed on pupillary border anterior capsule and mostly associated with nuclear sclerosis, posterior subcapsular cataract and cortical cataract. with 5-7mm dilating pupil. A mean IOP of 13.60±2.69 was observed on day 30 of follow up. Post-operatively 26 individuals (54.2%) had developed corneal edema which could be due to difficult instrumentation through small-mid dilating pupil. On application of chi-square test for pre and post-operative visual acuity, the outcome was statistically significant.

CONCLUSION- There can be favorable outcomes in cataract patients having PXE by proper preoperative diagnosis and following appropriate intra-operative precautions.

KEYWORDS- pseudoexfoliation, cataract surgery, small pupil, zonular dehiscence, visual outcome

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INTRODUCTION

INTRODUCTION

In 1918, Alfred Vogt provided a detailed description on Pseudoexfoliation (PEX), though it was described first by Lindberg in 1917.[1]

Pseudoexfoliation syndrome a chronic, age-related disorder of the extracellular matrix results in the deposition of abnormal fibrillary (pseudoexfoliative) material within various tissues. This condition manifests primarily in the anterior segment of the eye. [2]

PEX is considered an age-related microfibillopathy that affects different systemic organs and is characterized by a progressive chronic deposition and accumulation of extracellular greyish-white material in several organs. Pseudoexfoliative glaucoma (PXG), also a secondary glaucoma is one of the cause of blindness across the world can be caused due to PEX. As a result of abnormal basement membranes of ageing epithelial cells, greyish-white fibro granular material can accumulate in many areas of the eye, including the lens, pupillary margin, iris stroma, anterior hyaloid surface, corneal endothelium, zonular fibres, and trabecular mesh work, a condition known as pseudoexfoliation (PXF).[3,4,5]

According to statistics, the prevalence of PXF in South Indian population ranges upto 3.8%, whereas that of PXF in rural central Indian population is only 0.95%. [6]

The exact etiopathogenesis of pseudoexfoliation remains unclear. Genetically, a mutation in the LOXL1 gene (locus 15q22) is responsible for the overproduction of elastic microfibrillar components such as fibrilin-1.[7] PXS has been strongly associated with single nucleotide polymorphisms (SNPs) of LOXL1 gene on chromosome 15q24.1[8]

PEX can be diagnosed on careful slit-lamp visualization of white, flaky pseudoexfoliative material on the pupillary margin of the iris and the anterior lens capsule which might go unnoticed leading to complications during cataract surgery.

An increased risk of cataract formation is commonly linked to PEX, and it is more common in adults in their 50s and 60s. Despite the lack of a cure for PEX currently, multiple studies have shown that prompt identification and therapy can halt or delay the onset of total blindness. PEX eyes dilate poorly and have unstable lens zonules, which may lead to a higher risk of complications such as capsular bag rupture, zonular dialysis, and loss of vitreous.[2]

Among other features supporting diagnosis, pigment loss from the iris sphincter (loss of pupillary ruff) and its deposition on the anterior chamber are also taken into consideration.[9]

Ocular manifestations of PXS include: - [10]

- Flaky exfoliative material deposition over corneal endothelium
- Conjunctival congestion
- Iris depigmentation leading to peripupillary transillumination defect.
- Mild trabecular meshwork hyperpigmentation.
- Secondary open-angle glaucoma
- Phacodonesis or lens subluxation caused by zonular dehiscence.

Loss of zonular support makes intraocular surgeries challenging with the potential for vitreous loss, lens subluxation, or even lens dislocation.

The presence of a three-ring sign, also known as a **Hoarfrost Ring**, on the anterior lens capsule is a common clinical indicator. This sign is characterised by a relatively homogeneous central zone, a granular cloudy peripheral zone, and a clear zone in between.[10]

For treatment, both Phacoemulsification and manual Small Incision Cataract Surgery (SICS) can be performed for cataract extraction.

Both the procedures are a high risk in the setting of PEX syndrome hence meticulous pre-operative planning and modification of intra-operative techniques along with proper skills of an ophthalmologist is required for reducing incidence of complications during surgery as well as post surgery .[11]

AIMS AND

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REVIEW OF

LITERATURE

REVIEW OF LITERATURE

Pseudoexfoliation, first described by Lindberg in 1917, is an age-related genetically inherited fibrillopathy characterized by gradual synthesis, accumulation, and deposition of abnormal fibrillar extracellular material involving the anterior segment of the eye and other organs. [12]

PEXM is deposited on the lens epithelium, iris stroma, corneal endothelium, anterior hyaloid surface, pupillary margins and zonular fibres leading to poor pupillary dilatation & zonular weakness. Deposition of PEX material alters the structure of the eyes hence cataract surgery in PEX eyes are more prone to intraoperative complications like posterior capsular rupture (PCR), zonular dialysis and vitreous loss and makes it potentially challenging for surgeons.[1]

In patients with glaucoma, greyish or bluish flaky material was observed to accumulate on the pupillary border during the fourth decade of life, later it was hypothesized that this material represented degenerative changes of the lens capsule followed by secondary desquamation and the term was proposed as senile exfoliation of the lens capsule.[13]

Though histochemically it was shown that exfoliative material differed from the lens capsule and differentiated this condition from true exfoliation of the lens capsule secondary to infrared exposure, the term advised was pseudoexfoliation of the lens capsule.[14]

The words exfoliation syndrome and pseudoexfoliation syndrome have recently become the de facto standard for describing this condition in academic writing and research. Exfoliation syndrome is being suggested as a potential name for the condition due to new ultrastructural studies showing that the material on the lens capsule is partially formed from the lens.[15,16,17]

EPIDEMIOLOGY

Prevalence for both types of PEX has spread widely. In US population, the overall prevalence of PEX was found to be 0.6% among 5th and 6th decade of individuals, rising to 5% in 8^{th} and 9^{th} decade.[18]

In India, the prevalence rates reported were approximately 2% nearly 60 years back and 7% 40 years back.[19,20] During the last ten years, the prevalence rate in Southern India was close to four percent. The actual prevalence of PEX is probably twice that which is visible on clinical examination in a given population. Many cases go undetected due to improper pupil dilatation or inadequate examination of the lens with the slit lamp after dilatation of the pupil.

An increase in age leads to an increase in the proportion of diseases, the disease most commonly manifesting during 7^{th} decade of life and gender predilection reports can be questionable.[20]

It can be considered PEX is essentially a bilateral condition.. If both eyes are not involved clinically, at least one eye will show discrepancy with aqueous humor dynamics or any other area.[6]

GENETICS OF PSEUDOEXFOLIATION

The primary genetic factor responsible for PXF is LOXL1, a lysyl oxidase gene with a well-established relationship. PXF and PXG have been linked to three specific single nucleotide polymorphisms (SNPs) of interest. These SNPs, which are missense variations in exon 1 and produce the G allele linked to PXF, are rs1048661, rs3825942 and rs2165241 (located on intron 1). [21]

The voltage-gated calcium channel subunit-encoding gene CACNA1A has been identified as the genetic cause of PXF. This result was confirmed in 17 additional countries, including one

done in India, and by the genome-wide association study (GWAS), which comprised 13,838 cases and 110,275 controls.[21]

GWAS has identified five additional genes, including *SEMA6A*, *CDKN2B-AS*, *AGPAT1*, *FLT1-POMP*, *TMEM136-ARHGEF12*, and *RBMS3* to contribute to the formation of PEX. [22]

Transforming growth factor-beta 1 (TGF-β1), a polypeptide cytokine present in significant amounts within the aqueous humor, anterior segment, and PEX deposits of eyes with pseudoexfoliation, has been associated with a higher risk of PEX due to its role in the fibrotic process. [23] TGF-β1 has been found to increase the expression of LOXL1. [24]

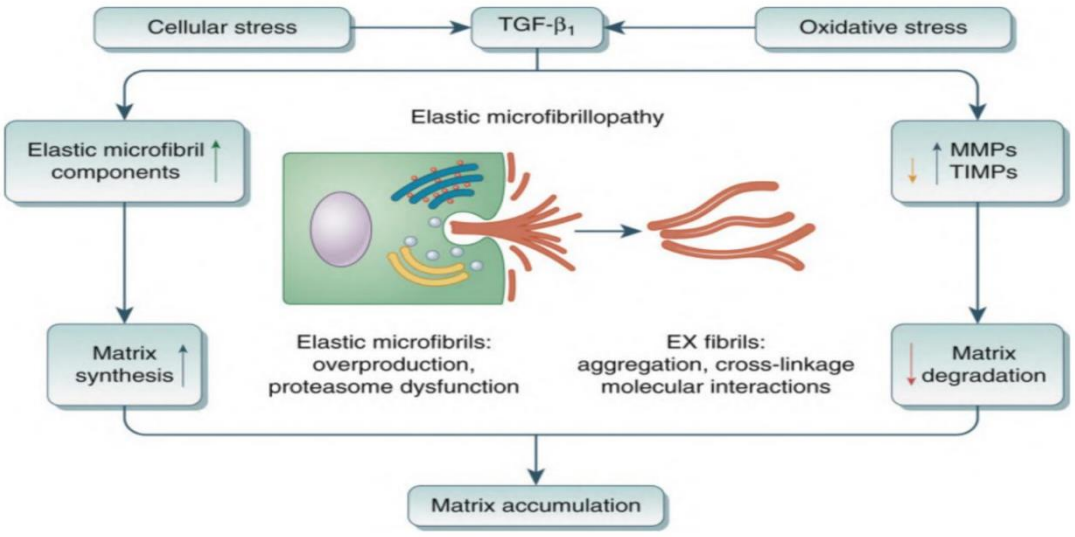


Figure-1 -Proposed pathogenesis of pseudoexfoliation syndrome [28]

Homocysteine levels are also associated with PXF and PXG. Clusterin, a ubiquitous extracellular chaperone protein, found all over the body is a component of PXF exfoliation material, and the clusterin levels are found to be upregulated in those with pseudoexfoliation, especially PEX glaucoma. TGF-β1 was found to downregulate clusterin mRNA.[25] Results by Padhy et al, reveal that rs2279590 was found to be associated with PEX in the Indian population and the risk allele mediates an allele-specific upregulation of the clusterin

mRNA. The exact mechanism by which homocysteine enhanced PEX formation remains unclear but could be due to the complex interaction between extracellular matrix and metalloproteinase regulation.[26]

TGF-β1, homocysteine, and Clusterin could be potential biomarkers for PXF and/or PXG. [25,26,27]

ENVIRONMENTAL INFLUENCE ON PSEUDOEXFOLIATION

PXF was positively associated with high altitude, more time spent outdoors, and increased sunlight exposure according to a retrospective observational study conducted with 626,901 participants in the US.[28]

ROLE OF DIET IN PSEUDOEXFOLIATION

Diet is a modifiable risk factor that has been linked with PEX.

According to a cross-sectional study conducted in East India on 346 participants, people with PXF were predominantly fish eaters and non-vegetarians. [28] Additionally, this study discovered that those who drank more coffee, more than three cups daily were likely to experience PEX-related problems. [29] Similar to this, a cohort research comprising 41,202 men and 78,977 women found that increased coffee intake was linked to PXF and PXG.

CLINICAL FEATURES

OCULAR SIGNS

CORNEA AND CONJUNCTIVA[28-30]:

Clinical examination reveals a normal conjunctiva. However, on fluorescein staining, areas of neovascularization and lack of typical limbal vascular pattern, as well as congestion of anterior ciliary arteries are seen. PEX material may be present on the corneal endothelial surface as scattered flakes.

Microscopically, the density of reduced endothelial cells is seen along with variable inta-ocular pressure, also histological changes can be seen in affected eyes and also fellow eye which is not involved.

The density of cells does not correlate with the severity of glaucoma though with the extent of pigment dispersion it can be relatable.

Early diagnosis along with preoperative assessment before surgery can be done based on increased corneal thickness, stating corneal dysfunction.

Even with a moderate rise of intraocular pressure or even after surgery, there are chances of early corneal decomposition.

LENS AND ZONULES [28, 31,32]

The most reliable and conclusive evidence of PEX, apart from the three distinct zones observed on the lens capsule during full dilatation, are deposits of white flaky material on the lens capsule after full dilatation are –

1) A translucent, central disc with occasional curled edges

2) Middle clear zone corresponding to probable contact with the moving iris.

3) Peripheral granular zone, which may have radial striations.

(all cases have a consistent peripheral defect, however, an absent central zone is seen in only 20% of the cases, thereby making pupillary dilatation mandatory before the examination.)

It is believed that a precursor of PEX material was first diffusely deposited on the surface of the lens. On the anterior capsular surface, it appears uniformly ground glass or "matte" in comparison to the other could be suggestive of a pre-capsular stage. Beyond the Iris, the middle third of the anterior capsule can be seen faintly radiant non-granular striae in a stage that is pre-granular.

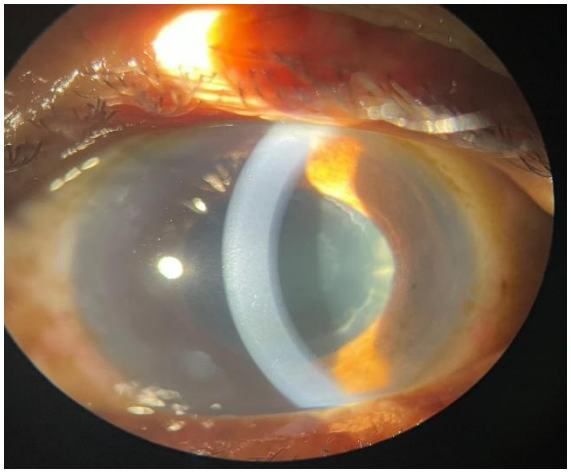


Figure 2- Hoarfrost ring showing 3 distinct zones

At this stage, ultra structurally, micro-fibrils, and underdeveloped exfoliation fibrils, make up the pre-capsular layer.

Keeping the slit beam at 45° angulation and visualizing it by reducing the light source and focusing it from the center by a required distance of the lens, highlights the subtle deposits on the lens surface.

By stroking the iris along the lens surface, an intermediate clear zone is formed during pupillary dilatation. The pre-capsular layer thickens as the iris sphincter brushes against it during normal pupillary movement. As the PEX material is worn away in the area that will subsequently be transparent, little fissures start to appear. These slits get wider and eventually merge into one. As time passes, the only signs of the prior PEX layer in the transition zone may be a few tiny bridges.

Clinical Classification of Pseudoexfoliation (PEX) Disorder

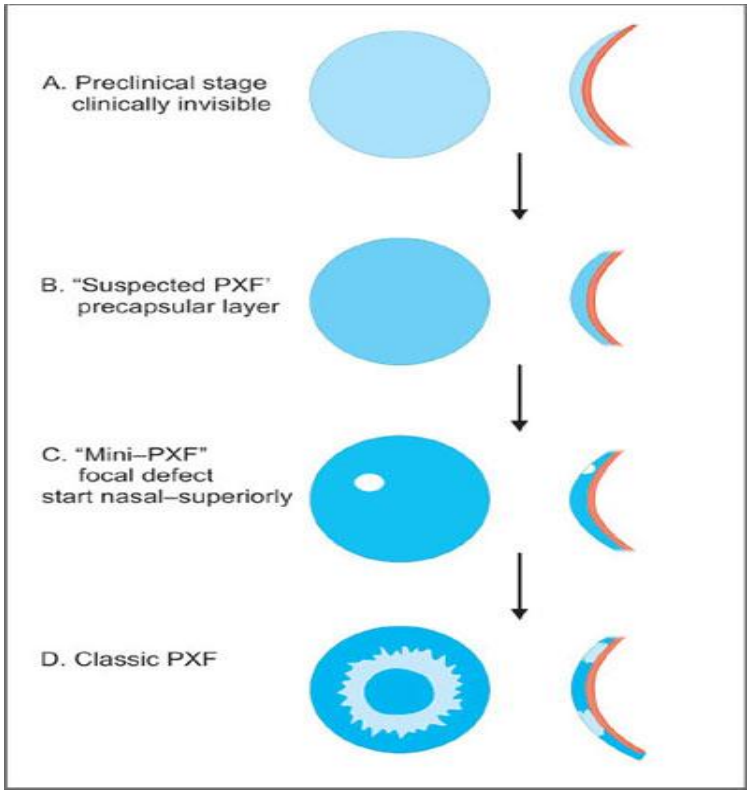


Figure 3- Clinical classification of pseudoexfoliation syndrome (PXS) based on morphologic alterations of the anterior lens capsule [28]

1. SUSPECT PSEUDOEXFOLIATION SYNDROME:

I. Early Pseudoexfoliation Syndrome (Electron Microscopy)

II. Pre-capsular layer.

III. Masked/Suspected Pseudo exfoliation Syndrome.

IV. Posterior synechiae.

2. DEFINITE PSEUDOEXFOLIATION SYNDROME:

MINI-PSEUDOEXFOLIATION SYNDROME: Focal defects in the pre-capsular layer especially superonasal.

Even while phacodonesis and iridodesis go hand in hand, they are not always related. It is possible for the lens to dislocate or subluxate on its own.

Phacodonesis is more likely to occur in PEX material with a higher density. A higher

incidence of inferior dislocation of lens is seen.

When subjected to stretching, the Zonular fibrils covered with different concentrations of PEX material finally rupture. The ciliary attachments are where the break is seen, rather than at the connection to the zonular lamellae.

In Aqueous, the waving of fibers is visible as they are broken and the fibers become shorter, and thicker appearing as irregular clumps on the lens surface. Fibers in the anterior remain intact whereas behind the equator get broken.

IRIS AND PUPIL [28-33]

Pigment loss from the iris sphincter and its deposition on the anterior chamber structures is the signature of PXS. and reflects as iris transillumination defects , loss of pupillary ruff, increased trabecular pigmentation and pigment deposition on the iris surface. Extensive depigmentation may be noted over entire sphincter, which appears as a diffuse starry sky/ moth- eaten pattern on transillumination.

There is a formation of synechiae, in between the anterior capsule lens and iris pigment epithelium. Posterior synechiae are formed between the iris and intra-ocular lens post-cataract surgery.

Patchy iris neo-vascularization is due to obliterated lumen which is abnormal iris blood vessel, along with alteration of vasculature, vessel dropout, collateral formation, and hypo perfusion. There is inflammation post-cataract surgery along with fibrinoid reaction, which may lead to the breakdown of the blood-aqueous barrier .

Mydriasis-related intra-stromal hemorrhage suggests vascular injury. Poor pupillary dilatation can be caused by hypoxia, which can cause the sphincter and dilator muscles to

atrophy, or by PEX material, which appears to weaken the muscle cells. Poor mydriasis can also be due to reduced stromal elasticity by accumulation of PEX material. Heterochromia iridium may be produced in certain circumstances.

The mechanism of melanin liberation is related to degenerative changes and cell membranes. With a special type of gonioscopy lens ciliary processes were examined. Almost all examined eyes of study participants were seen with exfoliation along with collection of materials on the zonules and ciliary body.[33]

GLAUCOMA AND PSEUDOEXFOLIATION SYNDROME [30,34]

The association between Open-angle glaucoma and PXS has been justified, even though the pattern of mechanisms is not clear. This is due to trabecular cell dysfunction, blockage of meshwork by PXS-liberated pigment, and concomitant primary open-angle glaucoma which leads to an increase in the aqueous outflow resistance.

In patients with PXS, 20% have glaucoma and increased intraocular pressure (IOP) at the time of diagnosis. Patients who have PXS but not glaucoma should be considered vulnerable to glaucoma, because 15% of such patients develop increase in IOP within 10years. This underscores the need for careful follow-up in patients who have PXS. It accounts for 15-20% of cases of open angle glaucoma.

During diagnosis, Glaucomatous damage can be more vulnerable and progression is more rapid with PXG, due to abnormal regulation of elastin synthesis resulting in elastosis of lamina cribrosa.

Multiple features predispose to the formation of angle closure glaucoma in eyes with PXS. Pupillary block may be caused by a posterior synechiae and increased iris thickness, or

movement of the anterior lens due to zonular weakness or dialysis.

ANGLE CHARACTERISTICS: [28,30,34]

Due to the abnormally rigid iris, which occurs when there is water in the posterior chamber, the iris bulges at its weakest point—the root. This causes chronic angle closure glaucoma, since the narrowed angle, is seen on gonioscopy as a pseudo-plateau iris configuration, is caused by the localised iris bombe around the iris root. Increased trabecular pigmentation is a noticeable sign that practically all people with clinically evident disease will have. In order to rule out PEX before it appears on the anterior lens capsule and pupillary margin, this diagnostic characteristic must be present. As a rule, it is thick in the affected eye and becomes worse in eyes with pseudoexfoliative glaucoma. An increased intraocular pressure (IOP) is proportional to the pigmentation. Pigmentation on the Schwalbe line can be seen as a wavy line known as the **Sampaolesi's line**, which is also an early sign of PXS.

VITREOUS: Deranged metabolism of hyalocytes leading to impaired production of hyaluronic acid and liquefaction of vitreous can happen due to fluctuation of aqueous composition in PXS.[34]

SYSTEMIC MANIFESTATIONS:[35,36]

PXS is a multi-system disorder that can be concluded after ultrastructural Studies conducted at autopsy of eyes indicate that PEX material was found in several organs, including skin, lung, gallbladder, liver, heart muscle, kidney, bladder, and meninges. The staining of the material in these organs is positive for elastin and human amyloid P protein, which is similar to the characteristic staining pattern of the material in the eye.

The below table shows Manifestations of pseudoexfoliation syndrome.[37,38]

MANIFESTATIONS OF PSEUDOEXFOLIATION SYNDROME		
TISSUE INVOLVED		**CLINICAL MANIFESTATIONS**
Ocular	Cornea	Reduced endothelial cell count. Corneal decompensation Corneal endothelial proliferation
	Zonules	Zonular instability.
	Iris	Vasculopathy, iris rigidity, posterior synechiae, poor mydriasis, asymmetric pupillary reaction, stromal /pigment epithelial atrophy.
	Trabecular meshwork	Increased resistance to aqueous outflow, elevated intra-ocular pressure.
	Lens	Phacodonesis, subluxation, nuclear Cataract.
Extra-ocular	Skin, muscles, heart, liver, lung, kidney, vasculature brain	Angina, abdominal aortic aneurysm,renal artery stenosis, cerebrovascular disease and dementia

THEORIES ON ORIGIN OF PSEUDOEXFOLIATION MATERIAL

1) **BASEMENT MEMBRANE THEORY**:

The origin of the PEX material was identified to be the basal membrane of the lens capsule, the iris, the ciliary body, and the conjunctiva after in-depth research on the material was conducted with the invention of the electron microscope. Through the use of transmission electron microscopy, the systemic involvement of the viscera by PEX material was confirmed in 1992. The term pseudoexfoliation syndrome was coined after typical PEX fibers were

found in autopsy tissue samples of vital body organs along with meninges, in addition to the typical intraocular location.

Disordered metabolism of basement membranes may be linked to the generation of the exfoliative material. In 1981, a basement membrane proteoglycan was discovered to be present in the fibrils by the use of the indirect immunoperoxidase method. Exfoliation material and anti-basement membrane proteoglycan antibodies reacted to lens material aggressively, implying lens epithelium and its synthesis.[35,39]

2)**ELASTIC MICRO-FIBRIL THEORY:**

Histochemical similarities between zonular elastic oxytalan micro-fibrils and PEX material were discovered in 1987. The idea that PEX fibers themselves may be a type of elastosis, arose from aberrant aggregation of elements associated with elastic micro-fibrils, which was prompted by the significant anatomic correlation observed between these fibers and elastosis in conjunctival specimens.[40]

3)**AMYLOID THEORY**[41]:

PEX material was linked to amyloid in 1996 and in some eyes, miosis is linked to degenerative changes in the iris's muscular layers as well as stromal tissue. A selective group of patients have reports of exfoliation and primary familial amyloidosis.

4)LYSOZOMAL THEORY:

Histochemical evidence of high acid phosphatase activity indicates that lysozymes were involved in the production of exfoliation material. A possible rupture of pigment epithelial cells could be responsible for the lysosomal involvement. [42]

Due to the increased permeability of the arteries in the anterior segment, lipoprotein was found in exfoliation debris in 1982. Its aberrant metabolism occurs before the substance forms, and it was determined that the material was a sulphated glycosaminoglycan.[43]

Immunochemical study has revealed the following components of exfoliation material:

amyloid P protein, chondroitin sulphate, heparin sulphate, proteoglycans, laminin, entactin, and fibronectin. Type IV collagen is only present in a microfibrillar layer, which is located between the capsule surface and the typical exfoliation material. PEX material contained keratan and dermatan sulphate, as demonstrated by transmission electron microscopy and high resolution scanning electron microscopy.[44] None of the histochemical or enzymatic studies have been able to elucidate the exact source of PEX.

STRUCTURE OF PSEUDOEXFOLIATIVE MATERIAL:

The PEX material is a network of irregularly oriented cross-banded fibrils with a diameter of approximately 30 nm, surrounded by a loose fibro-granular matrix with micro fibrils ranging in size from 6 to 10 nm. Proteins encased in polysaccharide side chains are the building blocks of fibrils, which are themselves produced by filaments aggregating laterally.[45,46]

The intermingled fibrils with normal micro-fibrils are embedded in an amorphous inter-fibrillar ground substance, mostly glycosaminoglycans. The systemic PEX material is similar except that there is more matrix and less distinct banding pattern.[46]

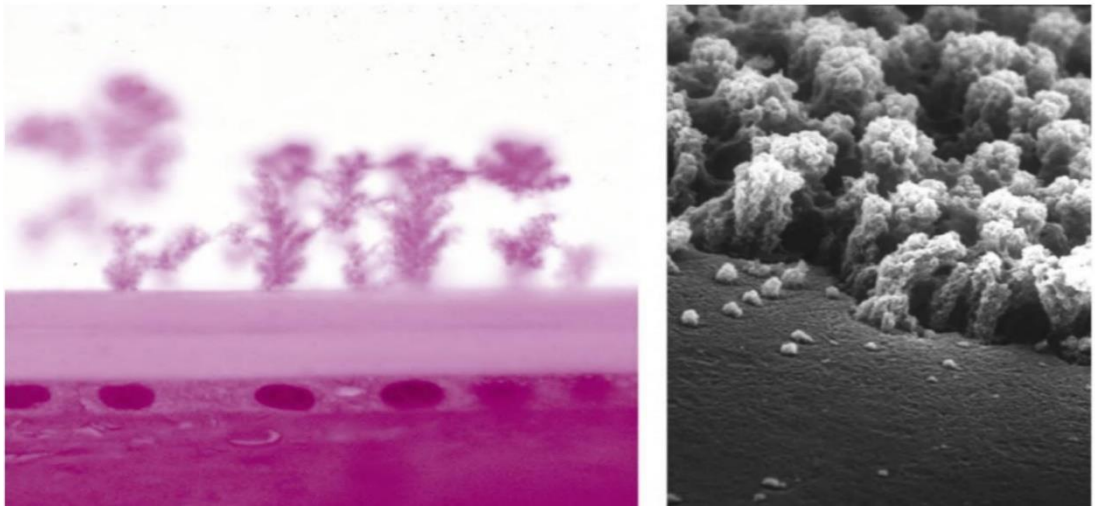


Figure 4- Light microscopy and electron microscopic images of pseudoexfoliation[28]

CATARACT SURGERY IN PSEUDOEXFOLIATION SYNDROME

Patients with PXS are much more prone to have complications at the time of cataract extraction. There is less pupillary dilatation and have higher incidence of posterior capsule rupture, zonular dehiscence and vitreous loss. Pupillary diameter and zonular fragility have been suggested as the most important risk factors for capsular rupture and vitreous loss. The presence of phaco-iridodonesis, poor mydriasis, cataract, presence of glaucoma and trabecular pigmentation, reflect the severity of involvement and possibility of posterior capsular tear and should serve a warning sign.[46] A shallow anterior chamber may indicate zonular instability. Zonular instability, which may lead to phacodonesis and lens subluxation, results from three different mechanisms:[46,47]

1.Initially, active production of PEX material by the pre-equatorial lens epithelium with proliferation through the capsular surface disrupts the zonular lamella and their insertion into the anterior lens capsule.

2.The zonules are separated from their firm origin and anchored in the basement membrane of the nonpigmented ciliary epithelium by locally produced, intercalating PEX fibers.

3.PEX material contains proteolytic enzymes facilitating zonular disintegration.

The occurrence of zonular dialysis should be suspected based on preoperative phacodonesis, anterior chamber depth asymmetry, and excessive lens movement during anterior capsulotomy.

Following surgery, posterior capsular opacification (PCO) and transitory intraocular pressure increases are more frequent. The occurrence of late postoperative decentration of the intraocular lens placed in the capsular bag is associated with zonular weakening. Because of exacerbated disintegration of the blood-aqueous barrier, secondary cataracts are more likely to occur. There was a sevenfold increase in vitreous loss in a research that comprised 72 PXS

patients undergoing cataract surgery. A laser flare cell metre was used to quantify the aqueous flare, and patients identified with PXS were subjected to specular microscopy. Eyes with PXS had much lower corneal endothelial cell densities, and this finding demonstrated an inverse link between flare and these densities.[47]

After cataract surgery, it was determined that a reduction in endothelial cells might be associated with a breakdown of the blood-aqueous barrier and a higher incidence of secondary cataracts. [48,49]

In a study by Kuchle et al, 10% of 868 patients who underwent cataract surgery, had PEX and these patients had an increased incidence of insufficient dilatation of the pupil, posterior capsular tears, vitreous loss, increase in post- operative intraocular pressure and higher posterior capsular opacification later. Poorly dilated pupil was deemed as an important feature of eyes with PEX and its management by injection of high viscosity OVDs, use of plastic or metallic iris hooks was highlighted. Performing sphincterotomy with caution was advised which resulted in persistent dilatation and postoperative chemosis. Use of capsular tension rings (CTR) was also advocated.[50]

Foldable intraocular lens (IOLs) is preferred as it could minimize the induction of blood-aqueous barrier breakdown and the risks following postoperative complications. Additionally, acrylic hydrophobic and silicone IOLs have been found to have a low rate of PCO, with hydrophobic acrylic IOL having an advantage of least capsular contraction.

MANAGEMENT OF PSEUDOEXFOLIATION SYNDROME IN CATARACT SURGERY [51-54]

1. CLINCHING THE DIAGNOSIS:

Diagnosis of PEX can be affected by insufficient dilatation of pupil. Scaly deposits on the corneal endothelium can be distinguished from true keratic precipitates by their bright white

color and flaky appearance. One to two week course of topical steroids can aid in the diagnosis, as keratic precipitates change in appearance or location or disappear with topical steroid usage but have no effect on PEX material when differentiating the two gets difficult.

Asymmetric and an unusually shallow anterior chamber depth due to zonular instability may indicate PEX. Even if PEX material is not clinically visible on the corneal endothelium, the cell count may be significantly reduced and the remaining cells may not function well, hence additional endothelial protection with a "pseudoplastic" viscoelastic such as Healon EndoCoat ^{R} (3% sodium hyaluronate) is advised.

2. FULL DILATATION OF PUPIL DURING SURGERY[55]:

Poor mydriasis, an established feature of PXS can seriously hamper the surgeon's view, additional pupillary dilatation may be required. Means of pupil dilatation are-

A) VISCO- MYDRIASIS with – chondroitin sulfate 4% + sodium hyaluronate 3% or sodium hyaluronate 2% + chondroitin sulfate 2%

B) PHARMACOLOGICAL DILATATION –

Omidria- FDA approved , a combination of 1 % phenylephrine+ 0.3% ketorolac used in irrigating solution to provide constant mydriasis.

INTRACAMERAL- EPI-SHUGARCAINE (epinephrine 0.025%+ lidocaine 0.75% in fortified BSS)

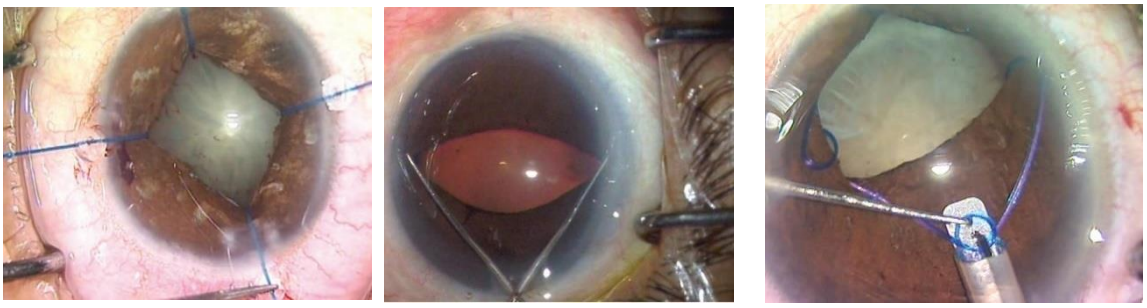
MYDRANE (phenocaine plus) – Tropicamide 0.02% + phenylephrine 0.31% + lidocaine 1%

XYLO-PHE- Xylocaine 1% + phenylephrine 10%

C) MECHANICAL DILATATION –

Maintains a steady pupillary dilatation with minimal damage to the iris tissue. Mackool self-retaining titanium mechanical hooks, De Juan Nylon/ Polypropylene iris hooks with silicon sleeve, Morcher pupil expander (type 5s), Hydroview iris protector ring, Malyugin ring, Milvella perfect pupil, Canabrava ring, B-HEX pupil expander, Assia pupil expander and iris speculum are available for use. However, they are expensive, require expertise and special instruments and prolong the surgical time. Iris is more flaccid in PEX syndrome and more likely to be inadvertently aspirated; mechanical means also augment mydriasis and keep the floppy iris margin away from the cannula.

Figure 5- Intra-operative images of iris hook, Klugen hook and Malyugin ring [51]



D) SURGICAL ALTERATION OF PUPIL-

Proximal Sphincterotomy, Inferior Sphincterotomy, and Superior mid- iris iridectomy can be performed as they are relatively easy to perform and are effective in fibrotic rigid pupils. However, they traumatize the iris causing bleeding and inflammation, require special instruments and can cause intraoperative miosis, and can leave pupil atonic post-operatively.

Excessive iris trauma should be cautiously avoided and over-inflation of the anterior chamber with viscoelastic can cause pressure on the lens and can damage the weakened zonules further.

3. ADEQUATE CAPSULORHEXIS/CAPSULOTOMY.

The countertraction during tearing of the anterior lens capsule makes capsulorhexis/capsulotomy more difficult in PEX cases. This can manifest as a star-shaped pattern of capsular folds emanating from the instrument as the anterior lens capsule is punctured, with wrinkling and looseness of the capsule. Thomas Neuhann from Germany suggested using the non-dominant hand to make a countertraction with a chopper or other second instrument over the paracentesis, while the dominant hand is used for capsulorhexis over the main incision. Due to the tendency for anterior capsular phimosis and increased zonular stress, a large capsulorhexis with a diameter of at least 5.5 mm should be performed. Staining of the capsule with indocyanine green or trypan blue would be usefull. The PEX material has a higher affinity for indocyanine green staining than the unaffected capsule

4. PHACODONESIS DURING CAPSULORHEXIS/ CAPSULOTOMY :

Weak zonules are one of the most common, serious, and well-known complications that cataract surgeons encounter. Even though it is quite variable, the degree of weakening seems to rise as deposits seem to increase. Even during regular hydro-dissection, the nucleus may dislocate into the vitreous cavity. Diffuse zonular laxity may be observed while performing capsulorhexis or capsulotomy. There is a significant chance of developing zonular dialysis after this entity is recognized. Flexible "iris" retractors can anchor the loosened capsular bag in these situations by engaging the capsulorhexis margin.

5. MANAGEMENT OF ZONULAR DIALYSIS :

To re-expand the capsular bag and distribute the mechanical load evenly among the remaining zonules, a conventional capsular tension ring can be used in cases of mild to severe zonular dehiscence. Capsular tension rings (CTRs) can be inserted using either an inserter device or by hand into the fornix of the capsular bag.

6.CHOICE OF INTRAOCULAR LENS:

A reduced zonular counterforce against the centripetal load from the remaining lens epithelial cells increases the possibility of capsular contraction. It is suggested to utilize a capsular tension ring and have a capsulorhexis margin of 5 mm or more to lower the chance of this problem. An alternative material is recommended because silicone intraocular lenses are more prone to capsular contraction. Potential bag instability may result in rotation or decentration of toric IOLs An intraocular lens with a sharp posterior edge should be used to reduce migration of lens epithelial cells and the resulting posterior capsular opacification. PXS increases the difficulty of cataract surgery. Successful cataract surgery in PXS is possible with the use of dyes, capsular retractors, implant rings and careful surgical technique.

MATERIAL AND METHODS

MATERIAL AND METHODS

TITLE OF THE STUDY-

Clinical profile and visual outcome in pseudoexfoliation syndrome undergoing manual small incision cataract surgery.

SOURCE OF DATA:

Patients visiting the outpatient department of Ophthalmology of R.L.Jalappa Hospital attached To Sri Devraj Urs Medical College, Tamaka, Kolar between August 2022 to December 2023 were prospectively analyzed. 48 cases of senile cataract with pseudoexfoliation syndrome, fulfilling the selection criteria were included in the study after taking their written informed consent.

INCLUSION CRITERIA

1) Patients above 50 years of age
2) Patients clinically diagnosed to have senile cataract and pseudoexfoliation syndrome

EXCLUSION CRITERIA

1) Patients with raised IOP and glaucomatous disc changes
2) Retinal pathologies
3) Other causes of cataract like traumatic, metabolic and other systemic diseases,
4) Iridodonesis, phacodonesis and subluxation of the lens due to any other pathology
5) Previous history of any ocular surgery

PREOPERATIVE EVALUATION

All patients underwent detailed ocular examination and pre operative cataract evaluation including-

- UCVA (uncorrected visual acuity) BCVA (Best Corrected Visual Acuity) was tested by Snellen's chart for distant vision and Near vision by Jaeger's chart.

- Anterior segment examination was performed by Slit lamp biomicroscopy.

Presence of pseudoexfoliative material on the pupillary margin and zones of PEX on the anterior capsule of lens, moth eaten appearance of the iris , altered corneal morphology, Anterior chamber depth and pigment dispersion , presence of iridodonesis and phaocdonesis or subluxation/ dislocation of lens were looked for .

- Pupillary dilatation <5mm was considered as poor dilatation.
- Anterior chamber depth assesment by Van Herick's grading.
- Fundus examination by +90D lens and indirect ophthalmoscopy. -to assess the presence of retinal breaks or detachments, apparent diabetic retinopathy/ maculopathy
- IOP by Goldmann's Applanation Tonometry
- Gonioscopy by Goldmann 3 mirror goniolens
- Lacrimal syringing
- Corneal curvature by BAUSCH& LAUMB keratometer
- Axial length by A-scan biometry- for IOL power calculation by SRK II formula.
- B scan to look for presence of any posterior segment pathology
- Cataract grading was based on LOCSIII criteria

PRE-OPERATIVE PREPARATION

Informed consent was taken from all the patients prior to surgery. All patients received systemic (Tab Ciprofloxacin 500mg) and topical antibiotics (0.5% Moxifloxacin eye drops) one day prior to surgery. On the day of surgery, pupils were dilated adequately with 0.8% tropicamide & 5% phenylephrine eye drops every 10 minutes, one hour before surgery. To sustain the dilatation 0.03% flurbiprofen was instilled half hourly for two hours before surgery. All surgeries were performed by a single experienced surgeon by manual small incision cataract surgery.

OPERATIVE PROCEDURE

Manual small incision cataract surgery was performed under peribulbar anesthesia, superior scleral incision was made after making a limbal based conjunctival flap.

Trypan blue dye was used to stain and visualize the anterior lens capsule. Ensuring adequate pupil dilatation using viscous ophthalmic visco-surgical device (OVD), capsulorhexis was performed with a bent 26 G needle cystitome and occasionally with Utrata's capsulorhexis forceps. Cortex and nucleus were separated with thorough hydrodissection and nucleus was delivered by sandwich method with sinski hook and wire Vectis. Irrigation and aspiration was completed with Simcoe's cannula. Rigid, biconvex, single piece, poly methyl methacrylate (PMMA) posterior chamber intraocular lens(PCIOL) was placed in capsular bag and dialed. Sub conjunctival dexamethasone and gentamycin injection was given. Intra operative complications such as posterior capsular rupture, iris prolapse, floppy iris and zonular dehiscence, vitreous loss, were noted during the procedure.

POSTOPERATIVE FOLLOWUP

Post operatively patients were put on 0.5% moxifloxacin eye drops and 1% prednisolone acetate eye drops hourly followed by a tapering dose for 6 weeks.

All the patients were followed up post operatively on day1, day 7 and day 30 of surgery for best corrected visual acuity and any complications such as post operative hyphema, corneal edema, anterior chamber reaction, retained lens matter, irregular pupil and IOP were noted.

The total duration of follow up was 1month. At each postoperative visit, the patients were subjected to the following examinations:

1. Best corrected visual acuity for distant and near.
2. Slit lamp evaluation.
3. Fundus examination

STATISTICAL ANALYSIS

Sample size was estimated by using the proportion of subjects achieved BCVA of 6/12 or better at 1month follow up in subjects who had Pseudoexfoliation syndrome undergoing cataract surgery was 92.3% from the study by Deepa R et al. using the formula

Sample Size = $\frac{Z_{1-\alpha/2}^{2} P (1-P)}{d^2}$

$Z_{1-\alpha/2}$ = is standard normal variate(at 5% type 1 error (P<0.05) it is 1.96 and at 1% type1 error(P<0.01) it is 2.58).As in majority of studies P values are considered significant below 0.05 hence 1.96 is used in formula.

P= Expected proportion in population based on previous studies or pilot studies

d= Absolute error or precision

P = 92.3% or 0.923

q = 7.7% or 0.077

d = 8% or 0.008

Using the above values at 95% Confidence level a sample size of 43 subjects were included in the study. Considering 10% Nonresponse a sample size of 43 +4.3 ≈ 48 subjects were included in the study.

STATISTICAL METHODS USED FOR THIS STUDY

Data was entered into a Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions.

Chi-square was used as test of significance. Continuous data was represented as mean and standard deviation. Independent t test was used as test of significance to identify the mean difference. P value <0.05 was considered as statistically significant.

RESULTS

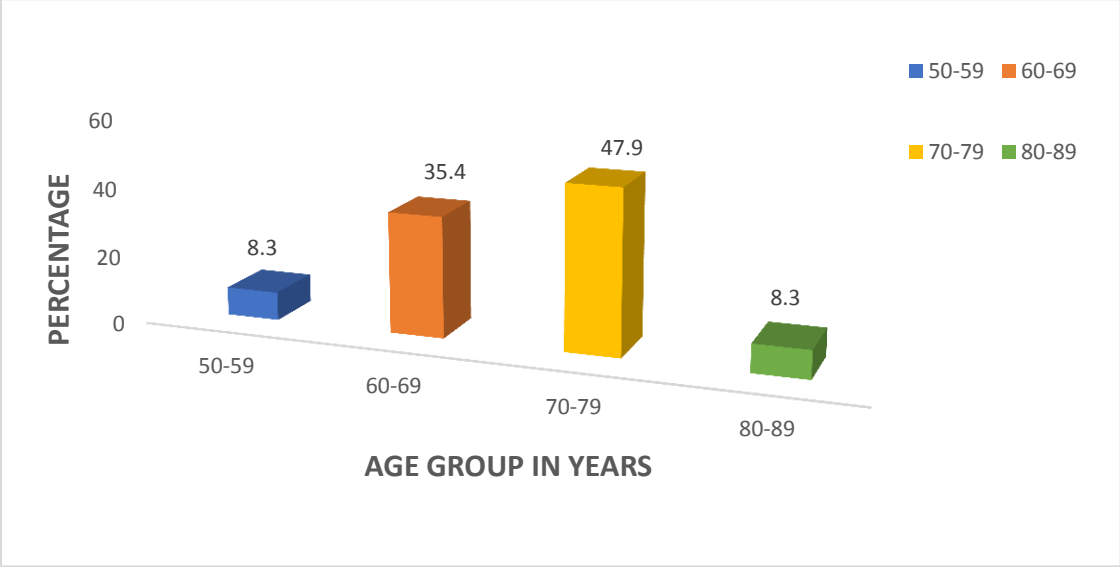
RESULTS

Fourty eight phakic patients were evaluated during this study which included 4 (8.3%) study participants from the age group 50 -59 years, 17 (35.4%) from the age group 60-69 years and 23 (47.9%) from the age group 70-79 years and included 4 (8.3%) study participants from the age group 80 -89 years, All hailed from the same district with majority of them from rural areas. Overall mean age of patients with pseudoexfoliation syndrome were- **69.25 ± 7.24 years** (The overall mean age is represented as Mean ± Standard deviation)

Age wise distribution of PEX is shown in table 1.

Table 1: Distribution of age group among the study participants.

Age group in years	Frequency (n)	Percentage (%)
50-59	4	8.3
60-69	17	35.4
70-79	23	47.9
80-89	4	8.3
Total	**48**	**100**

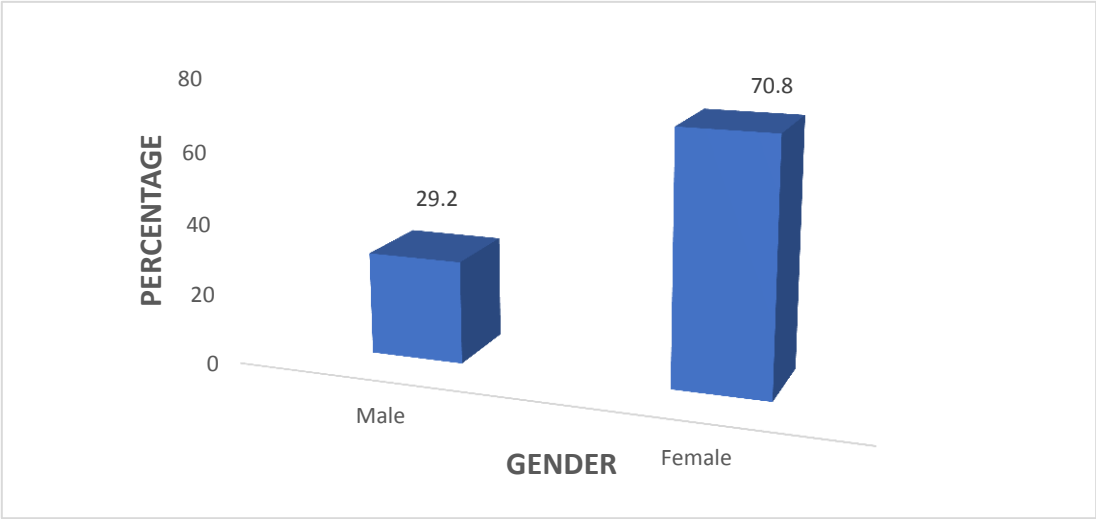


Graph 1: Distribution of age group

In the present study, 14 (29.2%) study participants were males and 34 (70.8%) were females, showing slightly higher female preponderance. (Table 2)

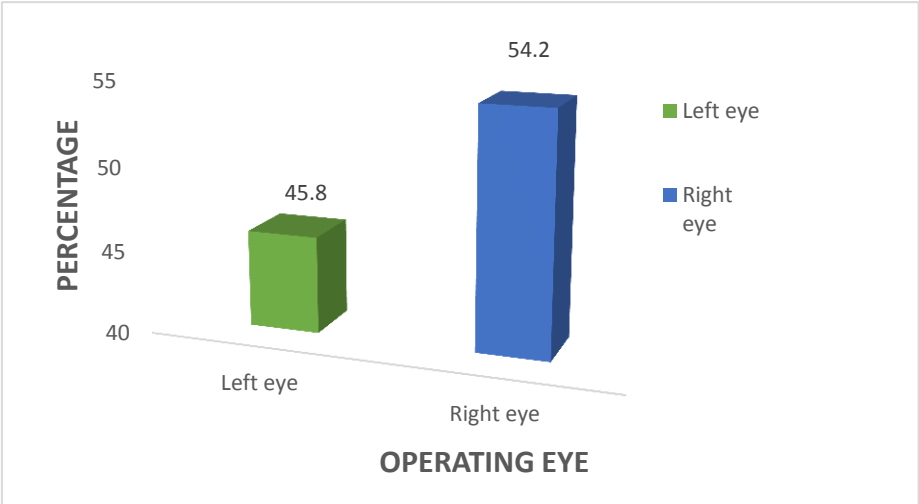
Table 2: Distribution of gender among the study participants

Gender	Frequency (n)	Percentage (%)
Male	14	29.2
Female	34	70.8
Total	**48**	**100**



Graph 2: Distribution of gender

Among 48 study participants, 22 (45.8%) patients underwent surgery in the left eye and 26 (54.2%) patients were operated in the right eye

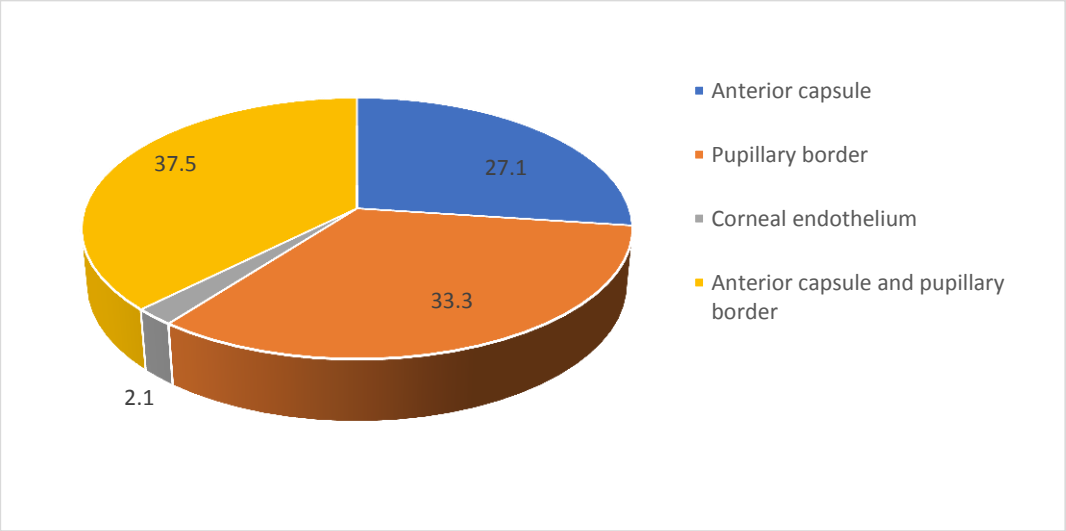


Graph 3: Operating eye

It was observed that 1(2.1%) patient had shown PEX material on the corneal endothelium, 13 (27.1%) patients had PEX on the anterior capsule only, 16 (33.3%) patients on pupillary border and 18 (37.5%) patients on both anterior capsule and pupillary border. (Table 3)

Table 3: Distribution of Pseudoexfoliative material on ocular structures

Pseudoexfoliative material on ocular structures	Frequency (n)	Percentage (%)
Anterior capsule	13	27.1
Pupillary border	16	33.3
Corneal endothelium	1	2.1
Anterior capsule and pupillary border	18	37.5
Total	**48**	**100**

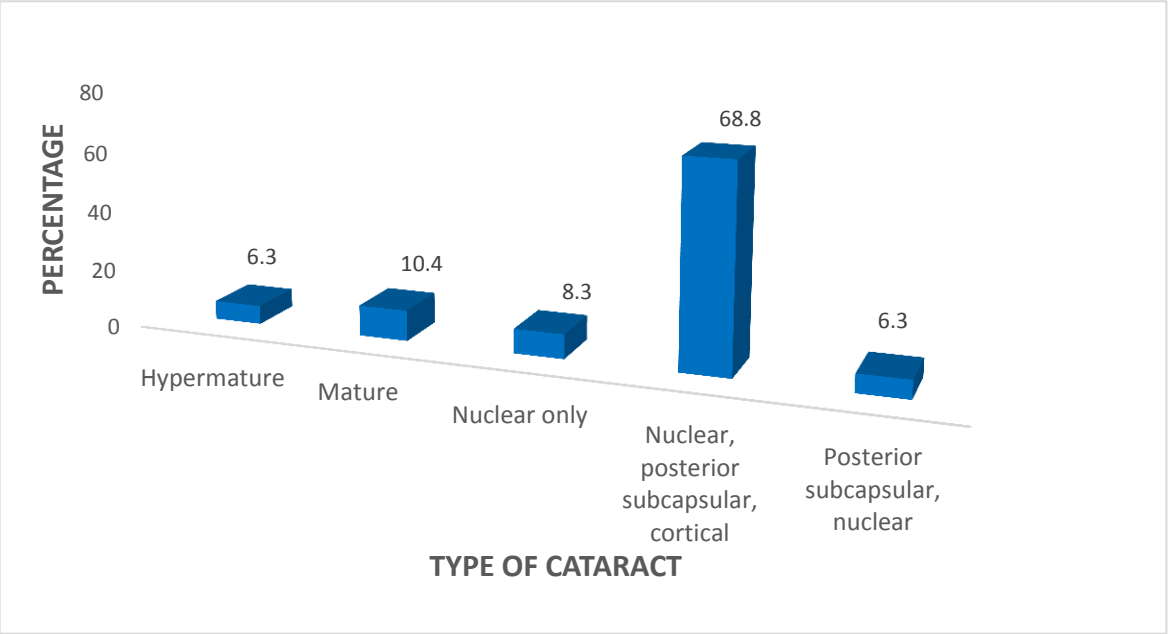


Graph 4: Distribution of Pseudoexfoliative material on ocular structures

In our study, out of 48 study participants 3 (6.3%) patients had hypermature cataract and 3 patients (6.3%) had posterior subcapsular & nuclear cataract. Mature and nuclear cataract were observed in 5(10.4%) and 4(8.3%) patients respectively. 33 (68.3%) patients showed combination of nuclear sclerosis, posterior subcapsular and cortical cataract. (Table 4)

Table 4: Morphology of cataract among the study population with pseudoexfoliation

Type of cataract	Frequency (n)	Percentage (%)
Hypermature	3	6.3
Mature	5	10.4
Nuclear sclerosis only	4	8.3
Nuclear sclerosis with posterior subcapsular with cortical cataract	33	68.8
Posterior subcapsular cataract with nuclear cataract	3	6.3
Total	**48**	**100**



Graph 5: Morphology of cataract among the study population with pseudoexfoliation

Out of 48 patients, 43 (89.6%) had pupillary dilatation of 5-7 mm and 5 (10.4%) patients had <5 mm of pupillary dilatation. The mean pupillary dilatation was 5.6±0.86 mm in the present study.

Table 5: Distribution of pupillary dilatation among the study population.

Pupillary dilatation	Frequency (n)	Percentage (%)
<5mm (poor)	5	10.4
5-7mm (fair)	43	89.6
>7mm (good)	0	0
Total	**48**	**100**

All the patients underwent pre operative and post operative visual acuity assessment. Preoperatively, 1 (2.1%) patient had visual acuity of 6.6-6/12, 2 (4.2%) patients had 6/18-6/36 visual acuity and 45 patients had visual acuity of ≤ 6/60.

On postoperative day 1, 15 (31.3%) patients had visual acuity of 6/6-6/12, 16 (33.3%) patients had visual acuity of 6/18-6/36 and 17 (35.4%) patients had visual acuity of ≤ 6/60.

On postoperative day 7, 26 (54.2%) patients had visual acuity of 6/6-6/12, 16(33%) patients had visual acuity of 6/18-6/36 and 6(54.2%) patients had visual acuity of ≤ 6/60.

On post-operative day 30, 42 (87.5%) patients had visual acuity of 6/6-6/12, 3(6.3%) patients had visual acuity of 6/18-6/36 and 3(6.3%) patients had visual acuity of ≤ 6/60 as they had posterior capsular rent and later secondary IOL implantation was performed for those patients.

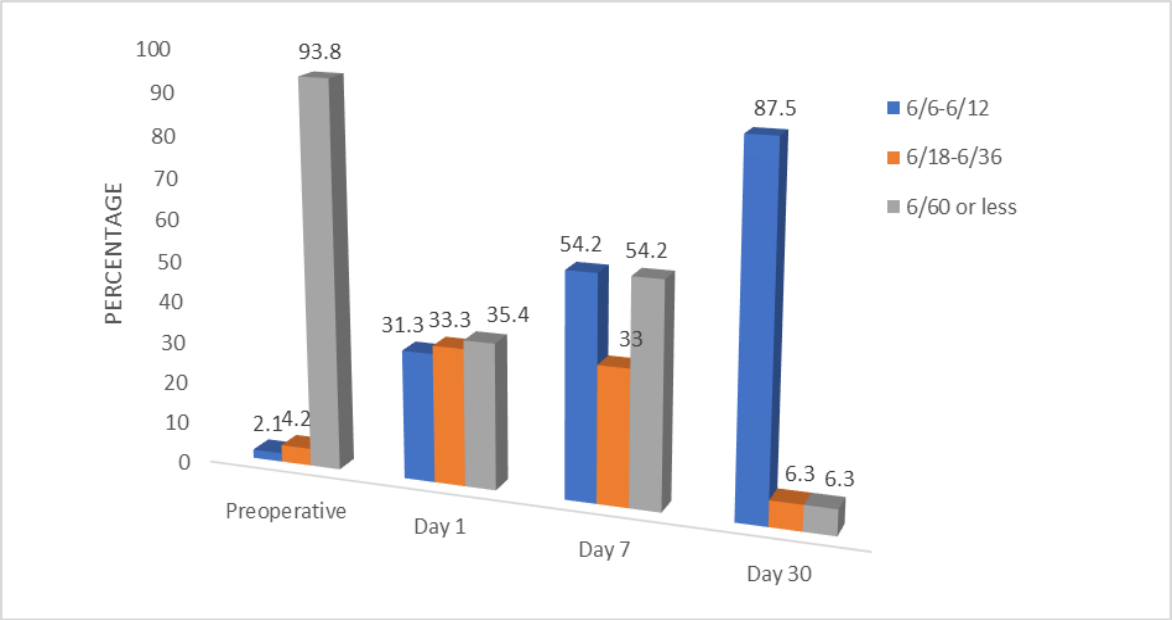
Table 6: Preoperative and post operative visual acuity.

Visual acuity	Preoperative N(%)	Post operative N(%)		
		Day 1	Day 7	Day 30
6/6-6/12	1(2.1%)	15(31.3%)	26(54.2%)	42(87.5%)
6/18-6/36	2(4.2%)	16(33.3%)	16(33.%)	3(6.3%)
6/60 or less	45(93.8%)	17(35.4%)	6(54.2%)	3(6.3%)

Table 7: **Preoperative and post operative visual acuity based on Pseudoexfoliative material distribution.**

Pseudoexfoliative material	Pre-operative			Post-operative								
				Day 1			Day 7			Day 30		
	6/6-6/12	6/18-6/36	6/60 or less	6/6-6/12	6/18-6/36	6/60 or less	6/6-6/12	6/18-6/36	6/60 or less	6/6-6/12	6/18-6/36	6/60 or less
Anterior capsule	0	0	13(100%)	1(7.7%)	6(46.2%)	6(46.2%)	7(53.8%)	4(30.8%)	2(15.%)	12(92.3%)	0	1(7.7%)
Pupillary border	0	1(5.6%)	17(94.4%)	6(33.3%)	6(33.3%)	6(33.3%)	9(50%)	7(38.9%)	2(11.1%)	15(83.3%)	1(5.6%')	2(11.1%)
Corneal endothelium	0	0	1(100%)	1(100)	0	0	1(100)	0	0	1(100)	0	0
Anterior capsule and pupillary border	1(6.2%)	1(6.2%)	14(87.5%)	7(43.8%)	4(25%)	5(31.2%)	9(56.2%)	5(31.2%)	2(12.5%)	14(87.5%)	2(12.5%)	0
p-value	0.81			0.33			0.97			0.70		

Test applied: Pearson Chi Square; ***p-value ≤ 0.05 statistically significant**

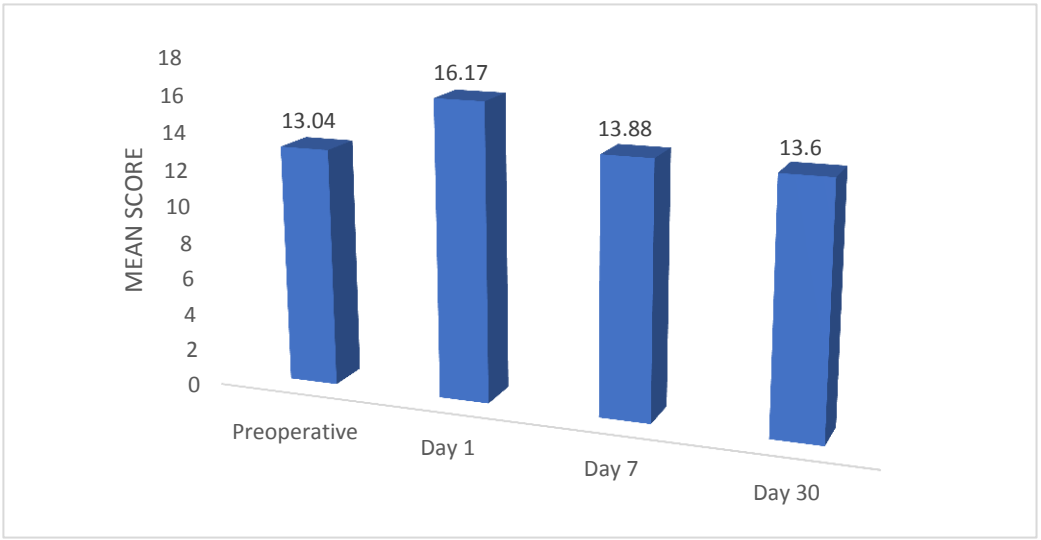


Graph 6: Preoperative and post operative visual acuity.

In our study, preoperatively IOP was 13.04 ±3.05 mm Hg, whereas on 1st postoperative day IOP was 16.17±4.42 mm Hg. On day 7 and 30 postoperatively, IOP was 13.88±2.05 mm Hg and 13.60±2.69 mm Hg respectively.

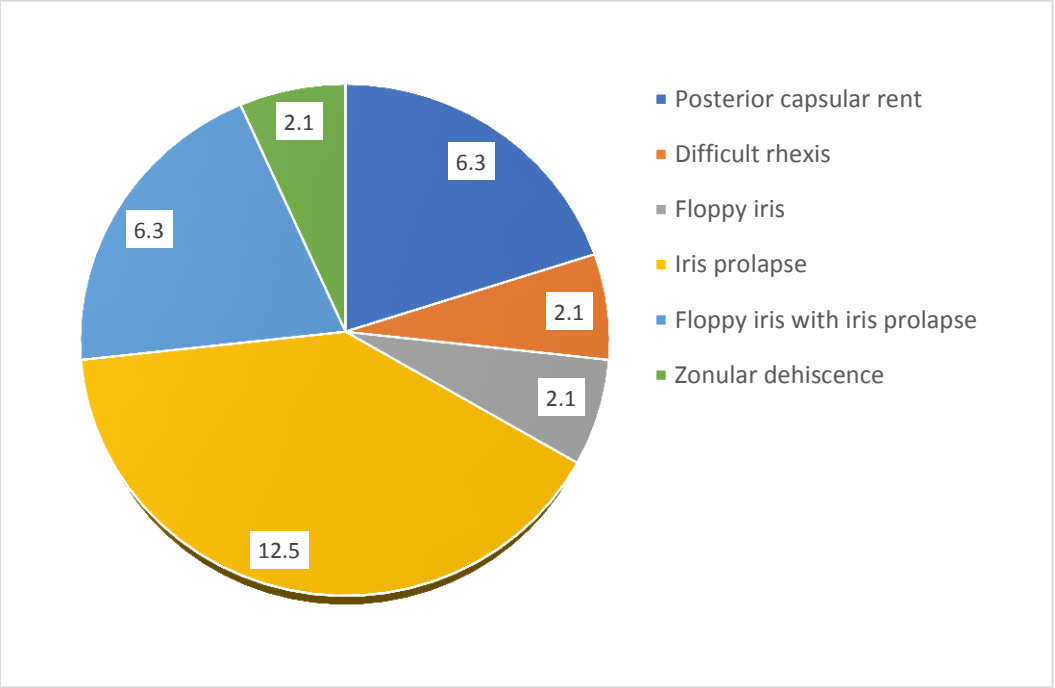
Table 8: Mean Preoperative and Post operative IOP

IOP	Preoperative Mean±SD	Post operative Mean±SD			p-value
		Day 1	Day 7	Day 30	≤ 0.001
	13.04±3.05	16.17±4.42	13.88±2.05	13.60±2.69	



Graph 7: Preoperative and post operative IOP

It was observed that intraoperative complications like iris prolapse, intra- operative floppy iris with iris prolapse and posterior capsular rent was found in 6 (12.5%), 3(6.3%) and 3(6.3%) respectively. Other intraoperative complications like difficult capsulorhexis, floppy iris, zonular dehiscence were found in 1 patient (2.1%) each.



Graph 8: Distribution of intraoperative complications

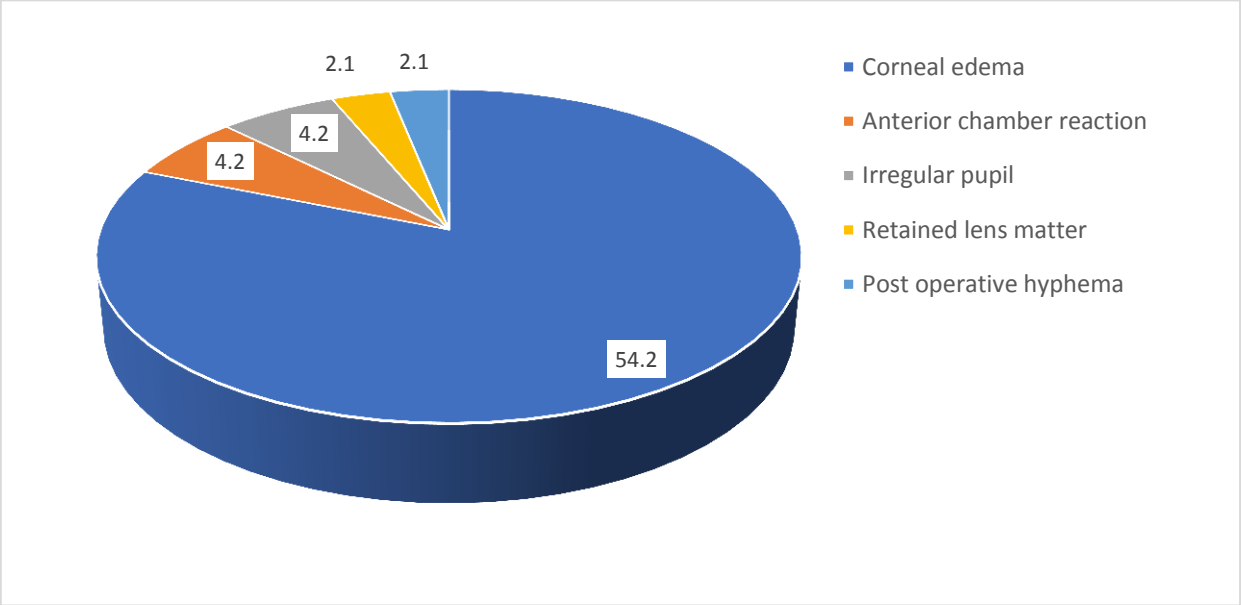
Table 9: Intraoperative complications

Intraoperative complications	**Frequency (n)**	**Percentage (%)**
Posterior capsular rent	3	6.3
Difficult rhexis	1	2.1
Floppy iris	1	2.1
Iris prolapse	6	12.5
Floppy iris with iris prolapse	3	6.3
Zonular dehiscence	1	2.1

Post operative complication like anterior chamber reaction, irregular pupil, retained lens matter, post operative hyphema were found in 2(4.2%), 2(4.2%), 1(2.1%) and 1(2.1%) respectively. Corneal edema was found in 26 (54.2%) patients. The post operative complications were due to difficulties faced intra operatively owing to small pupil or intra-operative miosis.

Table 10: Postoperative complications

Postoperative complication	Frequency (n)	Percentage (%)
Corneal edema	26	54.2
Anterior chamber reaction	2	4.2
Irregular pupil	2	4.2
Retained lens matter	1	2.1
Post operative hyphema	1	2.1



Graph 9: Distribution of postoperative complication

DISCUSSION

DISCUSSION

PXE is deposited in the lens epithelium, iris stroma, corneal endothelium, anterior hyaloid surface, pupillary margins, zonular fibres etc resulting in poor pupillary dilatation & zonular weakness. Deposition of PXE material alters the structure of the eyes hence cataract surgery in eyes with PXE syndrome are more prone for intraoperative complications like posterior capsular rupture (PCR), zonular dialysis, vitreous loss and makes it potentially challenging for surgeons.[1] Post operatively these patients are at higher risk of developing prolonged corneal edema, severe anterior chamber reaction, raised intra ocular pressure and cystoid macular edema. [1,56,57]

A population-based study by Topouzis et al. (2001) conducted in Greece reported a prevalence of 4.4% for PXS among individuals aged 60 years and older, with an increased prevalence among older age groups.[58]

Pseudoexfoliative material (PEXM) deposition, primarily composed of fibrillar glycoproteins, has been observed in various ocular tissues. In the anterior segment, its deposited on conjunctiva, corneal endothelium, iris, lens capsule, zonules, trabecular meshwork and in the posterior segment, deposition is seen in the optic nerve and retinal vessels.[59]

Abnormal extracellular matrix metabolism and increased oxidative stress have been proposed as key mechanisms underlying PEX pathogenesis, leading to structural alterations, cellular dysfunction, and tissue degeneration in the anterior segment of the eye. Cells showing exfoliation syndrome showed features of metabolic activity and progressive fibrillogenesis. The features included an enhanced vesicular transport to the cell surface along with rough endoplasmic reticulum and the PEX material production within cellular surface infoldings.

Lastly, cells producing exfoliative material displayed an aberrant gene expression, which would have contributed to the accumulation and long-term retention of PEX material. Finally, cells involved in the production of XFM displayed a gene expression pattern characterized by the upregulation of elastic components, the transient upregulation of LOXL1, and the dysregulated expression of cytoprotective gene products, matrix metalloproteinases, and their inhibitors, possibly leading to the accumulation and stable deposition of XFM.[60]

Ursula S. et al. performed a literature review to discuss upcoming challenges and tasks in the field of pseudoexfoliation (PEX) syndrome, as well as its molecular pathophysiology, clinical diagnosis and management, and systemic and ocular symptoms and complications. The results showed that PEX syndrome is a common age-related generalised fibrotic matrix process that can cause a number of other important intraocular issues, both surgical and non-surgical, and is a worldwide concern, similar to cataracts and severe chronic open-angle glaucoma. Improving clinical management through better understanding of PEX's effects on ocular tissues, diagnostic criteria, treatment regimes, and prevention of surgical complications; increasing evidence for systemic associations of PEX with cardiovascular and cerebrovascular morbidity; and new insights into molecular pathophysiology through analysis of PEX material composition, differential gene expression of affected tissues, and key factors involved in pathogenesis are all results of recent progress and advancements. The current pathogenetic notion that characterises PEX syndrome is elastic microfibrillopathy, which includes transforming growth factor-beta1, oxidative stress, and inadequate cellular defence systems. Further research into animal and in vitro models, differential protein and gene expression, potential biomarkers for PEX syndrome and glaucoma, and randomised clinical and histopathological screening trials to identify its systemic symptoms and associations are among the future tasks and challenges that will need to be addressed..[61]

Eye profiles and results of manual small incision cataract surgery(MSICS) in patients with pseudo exfoliation syndrome were examined in a 2019 study by Mrunall Arun et al. Out of 80 patients with PXF who had MSICS, 17 individuals experienced complications, according to the results. There was zonular dialysis in three eyes (17.65%) and zonular dialysis with vitreous loss in four eyes (23.53%). Two eyes (11.76%) had posterior capsule rent (PCR), while four eyes (23.53%) had PCR in conjunction with vitreous loss. Three eyes (17.65%) had sphincter tears, and one eye (5.88%) had iridodialysis. Ophthalmologists should prioritise the diagnosis of PXF due to the risks of intraoperative problems associated with it, according to this study's conclusions. When it comes to treating cataracts in these individuals, a PXF diagnosis might be crucial.[62]

In their research, BC .Hemlatha et al. had fifty eyes from fifty individuals who were diagnosed with cataracts and underwent surgery. Of those eyes, 40 (or 80%) had phacoemulsification and 10 (20%) had small incision cataract surgery. The majority of patients had corneal thinning, which is less than 535 microns. Three patients had zonular weakness before surgery. In five instances, glaucoma was associated with pseudo exfoliation. Three cases of zonular dialysis and two cases of posterior capsular tears occurred during surgery as intraoperative complications; three of these five individuals also had vitreous loss. In 17 patients, endothelium decompensated after surgery, and early posterior capsular opacification occurred in 6 cases; other postoperative complications included corneal edema. Out of 39 eyes (78%) with final best corrected visual acuity measurements, 6(12%) had vision between 6/18 and 6/36, while 5(10%) had BCVA of 6/60 or below. Cataract surgery in eyes with PEX is related with an increased risk of intraoperative and postoperative complications, according to this research. In order to optimise postoperative outcomes and minimise intraoperative problems, a thorough preoperative workup is essential.

Underdiagnosis of glaucoma may occur due to the increased prevalence of corneal thinning, which is why pre-operative pachymetry is highly recommended..[57]

In this study, preoperatively 93.8% of patients had visual acuity of 6/60 or less whereas postoperatively improvement seen. Post operative day 1, 31.3 % patients had visual acuity of 6/6-6/12 and 33.3% patients had 6/18-6/36 visual acuity. On postoperative day 7, 54.2% patients reported to have visual acuity of 6/6-6/12 which was in accordance with study results of Deepa R et al [1] and Kaushik VP et al[5]. Post operative at 1 month, 42 (87.5%) patients had improvement of visual acuity to 6/6-6/12 and 3 (6.3%) patients have shown visual acuity of 6/18-6/36 which was in accordance with the study results of Deepa R et al [1].

The mean IOP in our study was 13.04±3.05 preoperatively which was in accordance with the study results of Desinayak et al[8] and Hemalatha BC[3]. On 1st day postoperatively our study results showed IOP of 16.17±4.42 which then gradually decreased on post op day 7 and post op 30th day(1 month) with respective mean score of 13.88 and 13.60 which was consistent with the study results of Desinayak et al. [63]

In a study conducted by H Arvind et al in 2003 with 2850 consecutive subjects aged 40 years or older from a population based survey and found 108 subjects had pseudoexfoliation syndrome (3.8 %). There was a significant increase in prevalence with age but no sex predilection. The condition was unilateral in 53 cases (49.1%) and bilateral in 55 cases (50.9%). 18 cases with pseudoexfoliation (16.7%) had high intraocular pressure (.21 mm Hg), 16 cases (14.8%) had occludable angles, and 14 cases (13%) had pseudoexfoliation glaucoma. There was a significantly higher prevalence of cataract among people with pseudoexfoliation compared to those without pseudoexfoliation ($p = 0.014$) which concludes prevalence of pseudoexfoliation syndrome in the rural population of south India was 3.8%.[6]

In 2022, Chandrashekhar Shivkumar et al conducted a study where intraoperative and postoperative complications were documented with follow-up on postoperative day 1, 1

week, 1 month, and on 3rd month. Results showed preoperative small pupil was noted in 49 eyes (32.2%), and 19 (12.5%) required intraoperative measures. Intraocular complications noted were zonular dialysis in five (3.3%), posterior capsular rupture in one (0.7%), and iridodialysis in one (0.7%). On postoperative day 1, the most common complication was corneal edema in 134 patients but clinically significant in only 23 (15.1%). Postoperative complications at 3 months were irregular pupil in 17 cases and decentered IOL in three cases. Intraocular pressure decreased with each visit [preoperative mean: 14.39 (±3.4) and 13.37 (±2.0) 12.53 (±1.4) mm Hg at 1 and 3 months, respectively]. There was a significant improvement in vision from the first day mean pinhole vision of 0.26 (±0.24) to mean best corrected visual acuity (BCVA) of 0.09 (±0.22) and 0.07 (±0.22) at 1 and 3 months, respectively. Mean endothelial cell loss was 193.16 (7.79%) and 266.01 (10.68%) at 1 and 3 months, respectively. Thus, it was concluded that pseudo-exfoliation has an increased risk of complications during cataract surgery.[12]

Naresh Desinayak et al in 2023 conducted a study which aimed to analyze the surgical outcome of manual small incision cataract surgery (MSICS) in patients with pseudoexfoliation syndrome (PXF) and pseudoexfoliative glaucoma (PXG) and compare them with those of controls. Results showed Lines of improvement in BCVA were significantly better in the control group (8.7 ± 1.7) than that in the PXF (7.5 ± 2.1) and PXG groups (6.4 ± 2.7). IOP significantly decreased from baseline to 1 month postoperatively in the PXG group than in the PXF and control groups (mean difference: 3.8 ± 7.5 mm Hg). Intraoperative iridodialysis and zonular dialysis were significantly high in the PXG group with a proportion of 4 and 20%, respectively and concluded that BCVA improvement was less and the complications were high in patients with pseudoexfoliation, especially those with PXG, the reduction in IOP was significant. MSICS can be considered favorably in patients with PXF and PXG, with adequate precautions to manage anticipated complications.[63]

In our study, intra operative complications like posterior capsular rent and Zonular dehiscence were found to be 6.3% and 2.1% respectively which was consistent with the study results of Turalba A et al[16].Other intaroperative complication like iris prolapse was also reported in our study which were similar to studies done by Desinayak et al[63] and Deepa R et a1[1].

Late postoperative complications mainly include progressive weakness of the zonules, decentration and dislocation of the IOL, and decompensation of the corneal endothelium. Miyake et al.[17]observed a decrease in the hexagonality and an increased coefficient of variation in the corneal endothelial cells in patients with PXF. It has been assumed that these changes represent an abnormal and unstable endothelium, predisposing it to endotheliopathy. As reported by Shastri et al[64] there could be good outcomes and fewer complications in patients with pseudoexfoliation undergoing phacoemulsification by experienced surgeons.

Post operatively, pseudoexfoliation syndrome patients have been reported to have greater risk of developing complications like corneal edema which was consistant in our study results (54.2%). Other post operative complications like anterior chamber reaction, irregular pupil, retained lens matter and post operative hyphema were also reported which was as per the study results of Deepa R et al and Naik AU et al[11] .

In a study done by Mathew et al, endothelial cell loss and change in central corneal thickness (CCT) after manual small incision cataract surgery (SICS) in patients with diabetes versus age-matched patients without diabetes was assessed and compared. There was a steady drop in the endothelial density in both the groups postoperatively, with the percentage of endothelial loss at 6 weeks and 3 months being 9.26 ± 9.55 and 19.24 ± 11.57, respectively, in patients with diabetes and 7.67 ± 9.2 and 16.58 ± 12.9, respectively, in controls. The percentage of loss between 6 weeks and 3 months was found to be of significant difference ($P < 0.023$). In both the groups, an initial increase in CCT till the second postoperative week

was followed by a reduction of CCT in the subsequent follow-up (sixth week) and a further reduction in the last follow-up (3 months). The change in CCT between the second and sixth weeks was significantly higher in the diabetic group ($P = 0.045$) and it was concluded that the diabetic endothelium was found to be under greater metabolic stress and had less functional reserve after manual SICS than the normal corneal endothelium.[65]

Studies also showed, patients with PXF operated on by trainees for cataract had a relatively higher risk of developing PCR with VL and had poorer visual outcomes than those operated on by consultants, where Posterior capsule rupture (PCR) with vitreous loss occurred in significantly fewer eyes operated on by consultants ($n = 8$, 1.9%) than those operated on by trainees ($p = 0.002$). Eyes that underwent small incision cataract surgery ($n = 100$, 21.2%) had a significantly greater number of complications than those that underwent phacoemulsification ($p = 0.00001$).[66]

LIMITATIONS OF THE STUDY

1. Endothelial cell count was not calculated by specular microscopy
2. Shorter duration of follow up
3. Small sample size.

CONCLUSION

CONCLUSION

This study findings suggest that thorough preoperative evaluation and appropriate intra-operative precautions can lead to favorable outcomes in individuals with cataract with pseudoexfoliation syndrome.

Ophthalmologists must prioritize the early detection of pseudoexfoliation syndrome (PXF) through thorough and comprehensive pre- operative evaluation, due to the heightened risk of intraoperative and post operative complications of PXF .

The operating surgeon must be vigilant and should tackle inadequate mydriasis with judicious use of visco-elastic substances, pupil dilators and sphincterotomy should be performed carefully.

Additionally, the diagnosis of PXF plays a pivotal role in the overall management of cataracts in patients with this syndrome and studies with larger sample size are needed to substantiate these findings.

SUMMARY

SUMMARY

This study was done to evaluate clinical profile and visual outcome in pseudoexfoilation syndrome undergoing manual small incision cataract surgery. This study assessed the intra and post-operative complications in individuals above 50 years of age.

Forty eight patients attending to outpatient department of ophthalmology, R.L.JALAPPA HOSPITAL AND RESEARCH CENTRE, attached to SRI DEVARAJ URS MEDICAL COLLEGE, TAMAKA, KOLAR with cataracts with pseudoexfoliation syndrome fulfilling the inclusion criteria framed were selected for the study between August 2022 to December 2023

After detailed pre-operative evaluation, manual small incision cataract surgery(MSICS) with PMMA IOL implantation was performed.

It was found that pseudoexfoliation syndrome had a slight female preponderance with unilateral involvement. PEX material was found distributed over pupillary border and anterior capsule (37.5%). 72.9% of patients had a poor pupillary dilatation of 5-7 mm. Nuclear sclerosis with posterior subcapsular cataract with cortical cataract was found in 68.8% of subjects. 33 (68.8%) patients had no intra operative complications while 3 had posterior capsular rent, 3 had floppy iris with iris prolapse and 1 each had difficult rhexis, zonular dehiscence and floppy iris.

A mean IOP of 13.60±2.69 was observed on day 30 of follow up. Post-operatively 26 individuals(54.2%) had developed corneal edema which could be due to difficult instrumentation through small- mid dilating pupil.

A pre operative BCVA of 6/60 or less in 45 patients (93.8%) improved to 42(87.5%) patients having a BCVA of 6/6- 6/12 which suggested that in the hands of an experienced surgeon, pseudoexfoliation cataract cases can lead to good visual outcome postoperatively.

Post operatively, 2 patients had anterior chamber reaction and 1 each had retained lens matter and post operative hyphema. Thus, we conclude that timely diagnosis and ensuring safe removal of crystalline lens and stable placement of the IOL during manual small incision cataract surgery of eyes with pseudoexfoliation syndrome, prevents the risk of intraoperative & postoperative complications & enhances patient outcomes.

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ANNEXURES

ANNEXURE 1 - CASE PROFORMA

CASE PROFORMA

Name: IP No:
Age: Group:
Sex: Case No:
Occupation: DOS:
Address:

Chief complaints:

Past history:

DM / HTN / BA / Epilepsy

Family history:

Personal history:
Appetite – Sleep – Bowel –
Diet – Habits – Bladder –

GPE:

Pallor / Edema /Icterus / Cyanosis / Clubbing / Lymphadenopathy

Vital signs:
a. Pulse – c) RR –

b. BP – d) Temp –

Systemic examination:
a. CVS – c. RS –

b. PA – d. CNS –

OCULAR EXAMINATION		
TESTS	**RE**	**LE**
HEAD POSTURE **OCULAR POSTURE** **FACIAL SYMMETRY**		
EXTRAOCULAR **MOVEMENTS** Ductions Versions		
(PRE OP)VISUAL ACUITY: Distant Near		
ANTERIOR SEGMENT **Distribution of PEX material -** Corneal endothelium- Pupillary margin – Iris- Lens- **Pupillary dilatation** <5 mm(poor)- 5-7mm (fair)- >7 mm (good)-		
TYPE OF CATARACT		
ANTERIOR CHAMBER DEPTH (Van Herick's grading)		
FUNDUS Indirect ophthalmoscopy and		

+90D lens			
PRE OP IOP			
GONIOSCOPY			
INVESTIGATIONS 1. CBC 2. RBS 3. RFT (blood.urea, serum creatinine) 4. SEROLOGY 5. ECG			
Intra operative complications- Iridodialysis- Difficulty/ extension of capsulorrhexis- Posterior capsular rupture(PCR) Zonular Dialysis-			
	POD1	POD7	POD30
POST OPERATIVE VISUAL ACUITY			
POST OPERATIVE IOP			
	POD1	POD7	POD30

POST OPERATIVE FINDINGS **Corneal edema –** **AC reaction –** **Post op hyphema-** **Irregular pupil-** **Retained lens matter –**			

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INFORMED CONSENT FORM

Case no: **Name:**

IP no: **Age/Gender:**

TITLE- CLINICAL PROFILE AND VISUAL OUTCOME IN PSEUDOEXFOLIATION SYNDROME UNDERGOING MANUAL SMALL INCISION CATARACT SURGERY

I, the undersigned, agree to participate in this study and authorize the collection and disclosure of personal information as outlined in this consent form. I was told in the language I understand.

I understand the purpose of this study, the risks and benefits of the technique and the confidential nature of the information that will be collected and disclosed during the study. The information collected will be used only for research.

I have had the opportunity to ask questions regarding the various aspects of this study and my questions have been answered to my satisfaction.

I understand that I remain free to withdraw from participation in this study at any time and this will not change the future care.

Participation in this study does not involve any extra cost to me.

Name	Signature	Date	Time
Patient:			
Witness:			
Primary Investigator/ Doctor:			

ತಿಳಿವಳಿಕೆಯ ಸಮ್ಮತಿ ನಮೂನೆ

ಕೇಸ್ ಸಂಖ್ಯೆಜ

ಐಪಿ ಸಂಖ್ಯೆಜ

ಶೀರ್ಷಿಕೆ: ಸೂಡೋ ಎಕ್ಸ್ ಫೋಲಿಯೇಷನ್ ಸಿಂಡ್ರೋಮ್ ನಲ್ಲಿ ಹಸ್ತಚಾಲಿತ ಸಣ್ಣ ಛೇದನ ಕಣ್ಣಿನ ಪೊರೆ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರ ಇಂಟ್ರಾಆಪರೇಟೀವ್ ಮತ್ತು ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರದ ತೊಡಕುಗಳು ಮತ್ತು ದೃಶ್ಯ ಫಲಿತಾಂಶದ ವಿಶ್ಲೇಷಣೆ

ನಾನು, ಅಂಗೀಕರಿಸಿದ, ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ಮತ್ತು ಈ ಸಮ್ಮತಿಯ ರೂಪದಲ್ಲಿ ವಿವರಿಸಿರುವಂತೆ ವೈಯಕ್ತಿಕ ಮಾಹಿತಿಯ ಸಂಗ್ರಹ ಮತ್ತು ಬಹಿರಂಗಪಡಿಸುವಿಕೆಯನ್ನು ಅನುಮೋದಿಸಲು ಒಪ್ಪುತ್ತೇನೆ.

ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶ, ತಂತ್ರದ ಅಪಾಯಗಳು ಮತ್ತು ಪ್ರಯೋಜನಗಳನ್ನು ಮತ್ತು ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ಸಂಗ್ರಹಿಸಲ್ಪಟ್ಟಿರುವ ಮತ್ತು ಬಹಿರಂಗಪಡಿಸುವ ಮಾಹಿತಿಯ ಗೌಪ್ಯತೆ ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ. ಸಂಗ್ರಹಿಸಿದ ಮಾಹಿತಿಯನ್ನು ಸಂಶೋಧನೆಗೆ ಮಾತ್ರ ಬಳಸಲಾಗುತ್ತದೆ.

ಈ ಅಧ್ಯಯನದ ವಿವಿಧ ಅಂಶಗಳನ್ನು ಕುರಿತು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು ನನಗೆ ಅವಕಾಶವಿದೆ ಮತ್ತು ನನ್ನ ತೃಪ್ತಿಗೆ ನನ್ನ ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರ ನೀಡಲಾಗಿದೆ.

ಈ ಅಧ್ಯಯನದಿಂದ ಭಾಗವಹಿಸುವಿಕೆಯನ್ನು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ನಾನು ಹಿಂಪಡೆಯಲು ಮುಕ್ತವಾಗಿರುತ್ತೇನೆ ಮತ್ತು ಇದು ಭವಿಷ್ಯದ ಕಾಳಜಿಯನ್ನು ಬದಲಿಸುವುದಿಲ್ಲ ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ ನನಗೆ ಯಾವುದೇ ಹೆಚ್ಚುವರಿ ವೆಚ್ಚ ಒಳಗೊಳ್ಳುವುದಿಲ್ಲ.

ಹೆಸರು	ಸಹಿ/ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು	ದಿನಾಂಕ	ಸಮಯ
ರೋಗಿಯ ಹೆಸರು			
ಸಾಕ್ಷಿಗಳ ಹೆಸರು			
ಪ್ರಾಥಮಿಕ ಸಂಶೋಧಕರು/ ವೈದ್ಯರು			

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TAMAKA, KOLAR - 563101.

PATIENT INFORMATION SHEET

This information is to help you understand the purpose of the study **CLINICAL PROFILE AND VISUAL OUTCOME IN PSEUDOEXFOLIATION SYNDROME UNDERGOING MANUAL SMALL INCISION CATARACT SURGERY**

You are invited to take part voluntarily in this research study.It is important that you read and understand the purpose, procedure, benefits and discomforts of the study.

1) What is the purpose of this study ?
    1) To study the clinical profile of patients with pseudoexfoliation syndrome and cataract.
    2) To evaluate the intra operative complications during manual small incision cataract surgery .
    3) To evalauate the post operative visual outcome and post operative complications.

2)What are the various tests/clinical evaluation/ investigations used? Are there any associated risks?

The clinical evaluation involves:

1). Visual acuity by Snellens chart for distant vision.

2) Near vision by Jaeger's chart

3) Slit lamp biomicroscopy.

4) Fundus examination by + 90D lens and indirect ophthalmoscopy

5)Anterior chamber depth by van Herick's grading

6) Lacrimal syringing

6)Applanation tonometry

7)Gonioscopy by four mirror goniolens

8) Posterior segment examination by indirect ophthalmoscopy

9) A scan

10) B scan ultrasound

You will not be charged for any of the tests. All the tests are routine tests and absolutely no risks are associated with various investigations.
If during the procedure, any unexpected event occurs like redness of eyes, itching, blurring, Doctor will take care of it.

3)What is the benefit for me as a participant?
If you participate in the study, the generated data might be helpful for further treatment protocol or to avoid complications. The collected data will be used for presentation in medical conferences and identity will not be revealed. Your medical information will be kept confidential by the study doctor and staff and will not be made publicly available. Your original records may be reviewed by your doctor or ethics review board.
You may refuse to take part in the study or you may stop your participation in the study at any time, without a penalty or loss of any benefits to which you were otherwise entitled before taking part in this study.
Extra monetary benefits or money will not be paid for taking part in the study.

CONFIDENTIALITY
Your medical information will be kept confidential by the doctor and the staff conducting the study and will not be made publicly available. Your original records may be reviewed by your doctoror ethics review board.
For further information/ clarification please contact

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<u>ಶ್ರೀ ದೇವರಾಜ್ ಅರಸ್ ಉನ್ನತ ಶಿಕ್ಷಣ ಮತ್ತು ಸಂಶೋಧನಾ ಸಂಸ್ಥೆ,</u>
<u>ಟಮಕ, ಕೋಲಾರ - 563101.</u>

ರೋಗಿಯ ಮಾಹಿತಿ ಪತ್ರ

ಈ ಮಾಹಿತಿಯು ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶವನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು ಸಹಾಯ ಮಾಡುವುದು. ಈ ಸಂಶೋಧನಾ ಅಧ್ಯಯನದಲ್ಲಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿ ಪಾಲ್ಗೊಳ್ಳಲು ನಿಮ್ಮನ್ನು ಆಹ್ವಾನಿಸಲಾಗಿದೆ, ಅಧ್ಯಯನದ ಉದ್ದೇಶ, ಕಾರ್ಯವಿಧಾನ, ಪ್ರಯೋಜನಗಳು ಮತ್ತು ಅಸ್ವಸ್ಥತೆಗಳನ್ನು ನೀವು ಓದುವುದು ಮತ್ತು ಅರ್ಥಮಾಡಿಕೊಳ್ಳುವುದು ಮುಖ್ಯವಾಗಿದೆ.

ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶವೇನು?

1. ಹಸ್ತಚಾಲಿತ ಸಣ್ಣ ಸೀಳುವಿಕೆ ಕಣ್ಣಿನ ಪೊರೆ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆ ಗೆ ಒಳಪಡುವ ಸ್ಯೂಡೋ ಎಕ್ಸ್ ಫೋಲಿಯೇಶನ್ ಸಿಂಡ್ರೋಮ್ ಹೊಂದಿರುವ ರೋಗಿಗಳ ವೈದ್ಯಕೀಯ ಪ್ರಸ್ತುತಿಯನ್ನು ಅಧ್ಯಯನ ಮಾಡಲು.
2.ಆಂಟಿರಿಯರ್ ಚೇಂಬರ್ ಡೆಪ್ತ್, ಪಲ್ಪಿಲ್ಲರಿ ಡೈಲಟೇಶನ್, ಮಸೂರದ ಸ್ಥಿತಿ ಮತ್ತು ಆಂಟಿರಿಯರ್ ಚೇಂಬರ್ ನ ಕೋನವನ್ನು ಒಳಗೊಂಡಂತೆ ಸ್ಯೂಡೋ ಎಕ್ಸ್ ಫೋಲಿಯೇಶನ್ ಸಿಂಡ್ರೋಮ್ ನೊಂದಿಗೆ ಕಣ್ಣಿನಲ್ಲಿ ಆಂಟಿರಿಯರ್ ಸೆಗ್ಮೆಂಟ್ ಬದಲಾವಣೆಗಳನ್ನು ಮೌಲ್ಯಮಾಪನ ಮಾಡುವುದು.
3.ಅಂತರ್ ಮತ್ತು ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರದ ತೊಡಕುಗಳ ದೃಶ್ಯ ಫಲಿತಾಂಶವನ್ನು ಮೌಲ್ಯಮಾಪನ ಮಾಡಲು.

2. ವಿವಿಧ ತನಿಖೆಗಳನ್ನು ಬಳಸಲಾಗುತ್ತಿದೆ, ಯಾವುದೇ ಸಂಬಂಧಿತ ಅಪಾಯಗಳಿವೆಯೇ?

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ದೂರ ಮತ್ತು ಸನಿಹದ ದೃಷ್ಟಿ ಪರೀಕ್ಷೆ, ಸ್ಲಿಟ್ ಲಾಂಪ್ ಪರೀಕ್ಷೆ, ಫನ್ಡಸ್ ಪರೀಕ್ಷೆ, ಗೋನಿಯೋಸ್ಕೋಪಿ, ರಿಲವಾಂಟ್ ರಕ್ತ ತಪಾಸಣೆಗಳು ಮಾಡುತ್ತೇವೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಡೆಸಲಾಗುವ ವಿವಿಧ ಪರೀಕ್ಷೆಗಳಿಂದ ನಿಮಗೆ ಯಾವುದೇ ಅಪಾಯಗಳಿರುವುದಿಲ್ಲ.

3. ಭಾಗವಹಿಸುವವನಾಗಿ ನನಗೆ ಏನು ಪ್ರಯೋಜನ?

ಈ ಸಂಶೋಧನಾ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆಯು ನಿಮ್ಮ ಕಣ್ಣಿನ ಸ್ಥಿತಿಯ ಅಂತಿಮ ಫಲಿತಾಂಶ **ಬದಲಾಗುತ್ತದೆ** . ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ಯಾವುದೇ ಕಡ್ಡಾಯವಿಲ್ಲ, ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನೀವು ಬಯಸ ದಿದ್ದರೆ ನಿಮಗಾಗಿ ಯಾವುದೇ ರೀತಿಯಲ್ಲಿ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.

ಆದಾಗ್ಯೂ, ಭವಿಷ್ಯದಲ್ಲಿ ರೋಗಿಗಳು ಈ ಅಧ್ಯಯನದಿಂದ ಪಡೆದ ಜ್ಞಾನದ ಫಲಿತಾಂಶವಾಗಿ ಪ್ರಯೋಜನ ಪಡೆಯಬಹುದು. ಸಂಶೋಧನಾ ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ನಡೆಸಿದ ಯಾವುದೇ ಪ್ರಕ್ರಿಯೆಗಳಿಗೆ ನಿಮಗೆ ಹೆಚ್ಚುವರಿ ಶುಲ್ಕ ವಿಧಿಸಲಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮ್ಮ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆಯು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ. ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನೀವು ನಿರಾಕರಿಸಬಹುದು ಅಥವಾ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವುದಕ್ಕೆ ಮುಂಚಿತವಾಗಿ
ನೀವು ಯಾವುದೇ ಅರ್ಹತೆಯಿಂದ ಯಾವುದೇ ದಂಡ ಅಥವಾ ನಷ್ಟವಿಲ್ಲದೆಯೇ ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ನೀವು ಭಾಗವಹಿಸುವಿಕೆಯನ್ನು ನಿಲ್ಲಿಸಬಹುದು.

ಗೌಪ್ಯತೆ

ನಿಮ್ಮ ವೈದ್ಯಕೀಯ ಮಾಹಿತಿಯನ್ನು ಅಧ್ಯಯನದ ವೈದ್ಯರು ಮತ್ತು ಸಿಬ್ಬಂದಿ ಗೌಪ್ಯವಾಗಿಡಲಾಗುವುದು ಮತ್ತು ಸಾರ್ವಜನಿಕವಾಗಿ ಲಭ್ಯವಿರುವುದಿಲ್ಲ. ನಿಮ್ಮ ಮೂಲ ದಾಖಲೆಗಳನ್ನು ನಿಮ್ಮ ವೈದ್ಯರು ಅಥವಾ ನೈತಿಕ ವಿಮರ್ಶೆ ಮಂಡಳಿ ಪರಿಶೀಲಿಸಬಹುದು. ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ದೊರತ ಫಲಿತಾಂಶಗಳು ವೈದ್ಯಕೀಯ ನಿಯತಕಾಲಿಕಗಳಲ್ಲಿ ಪ್ರಕಟಿಸಲಾಗುವುದು.

ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ ಸಂಪರ್ಕಿಸಿ:

ಡಾ. ಸಮೀಕ್ಷಾ . M
1 ನೇ ವರ್ಷದ ಕಿರಿಯ ನಿವಾಸಿ
ನೇತ್ರಶಾಸ್ತ್ರ ವಿಭಾಗ
ಎಸ್ ಡಿ ಯು ಎಂ ಸಿ
ಟಮಕ, ಕೋಲಾರ
ಸಂಪರ್ಕ ಸಂಖ್ಯೆ: 8197871513

ಡಾ. ರಶ್ಮಿ ಜಿ.
ಪ್ರೊಫೆಸರ್
ನೇತ್ರಶಾಸ್ತ್ರ ವಿಭಾಗ
ಎಸ್ ಡಿ ಯು ಎಮ್ ಸಿ.
ಟಮಕ, ಕೋಲಾರ

ಆದಾಗ್ಯೂ, ಭವಿಷ್ಯದಲ್ಲಿ ರೋಗಿಗಳು ಈ ಅಧ್ಯಯನದಿಂದ ಪಡೆದ ಜ್ಞಾನದ ಫಲಿತಾಂಶವಾಗಿ ಪ್ರಯೋಜನ ಪಡೆಯಬಹುದು. ಸಂಶೋಧನಾ ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ನಡೆಸಿದ ಯಾವುದೇ ಪ್ರಕ್ರಿಯೆಗಳಿಗೆ ನಿಮಗೆ ಹೆಚ್ಚುವರಿ ಶುಲ್ಕ ವಿಧಿಸಲಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮ್ಮ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆಯು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ. ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನೀವು ನಿರಾಕರಿಸಬಹುದು ಅಥವಾ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವುದಕ್ಕೆ ಮುಂಚಿತವಾಗಿ
ನೀವು ಯಾವುದೇ ಅರ್ಹತೆಯಿಂದ ಯಾವುದೇ ದಂಡ ಅಥವಾ ನಷ್ಟವಿಲ್ಲದೆಯೇ ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ನೀವು ಭಾಗವಹಿಸುವಿಕೆಯನ್ನು ನಿಲ್ಲಿಸಬಹುದು.

ಗೌಪ್ಯತೆ

ನಿಮ್ಮ ವೈದ್ಯಕೀಯ ಮಾಹಿತಿಯನ್ನು ಅಧ್ಯಯನದ ವೈದ್ಯರು ಮತ್ತು ಸಿಬ್ಬಂದಿ ಗೌಪ್ಯವಾಗಿಡಲಾಗುವುದು ಮತ್ತು ಸಾರ್ವಜನಿಕವಾಗಿ ಲಭ್ಯವಿರುವುದಿಲ್ಲ. ನಿಮ್ಮ ಮೂಲ ದಾಖಲೆಗಳನ್ನು ನಿಮ್ಮ ವೈದ್ಯರು ಅಥವಾ ನೈತಿಕ ವಿಮರ್ಶೆ ಮಂಡಳಿ ಪರಿಶೀಲಿಸಬಹುದು. ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ದೊರತ ಫಲಿತಾಂಶಗಳು ವೈದ್ಯಕೀಯ ನಿಯತಕಾಲಿಕಗಳಲ್ಲಿ ಪ್ರಕಟಿಸಲಾಗುವುದು.

ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ ಸಂಪರ್ಕಿಸಿ:

ಡಾ. ಸಮೀಕ್ಷಾ . M
1 ನೇ ವರ್ಷದ ಕಿರಿಯ ನಿವಾಸಿ
ನೇತ್ರಶಾಸ್ತ್ರ ವಿಭಾಗ
ಎಸ್ ಡಿ ಯು ಎಂ ಸಿ
ಟಮಕ, ಕೋಲಾರ
ಸಂಪರ್ಕ ಸಂಖ್ಯೆ: 8197871513

ಡಾ. ರಶ್ಮಿ ಜಿ.
ಪ್ರೊಫೆಸರ್
ನೇತ್ರಶಾಸ್ತ್ರ ವಿಭಾಗ
ಎಸ್ ಡಿ ಯು ಎಮ್ ಸಿ.
ಟಮಕ, ಕೋಲಾರ

ANNEXURE 4 - PHOTOGRAPHS

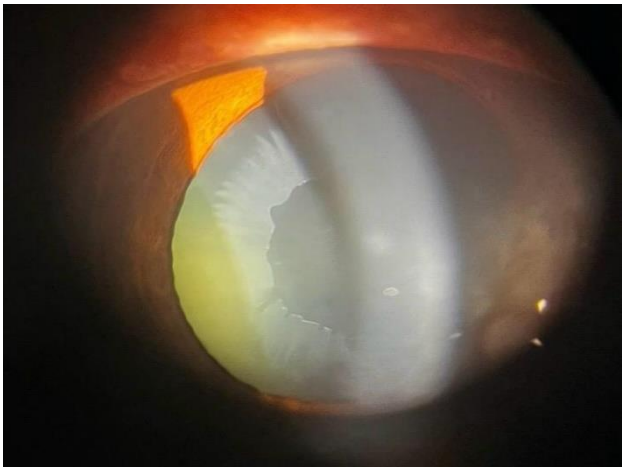

Image1-**Pseudoexfoliative material over anterior capsule**

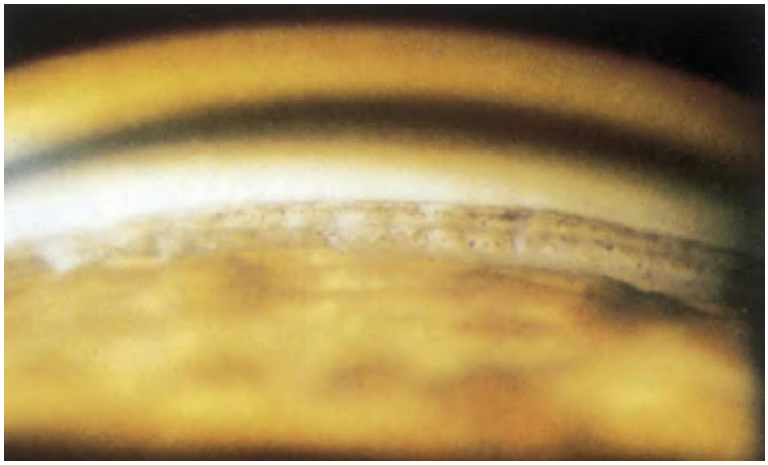

Image 2- Sampolesi's line on gonioscopy

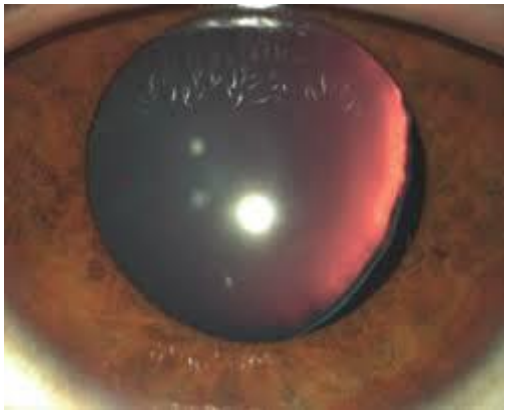

Image 3- Zonular dialysis

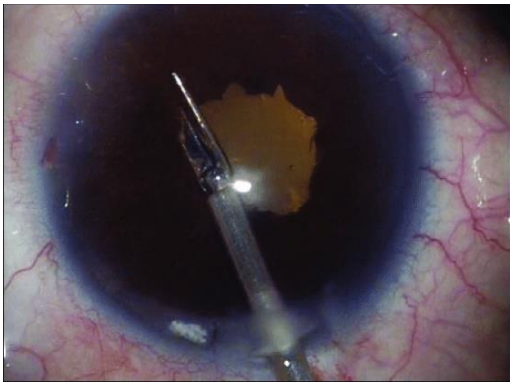

Image 4 – Intra-operative sphincterotomy

CATARACT EVALUATION

Image 5- Slit lamp examination

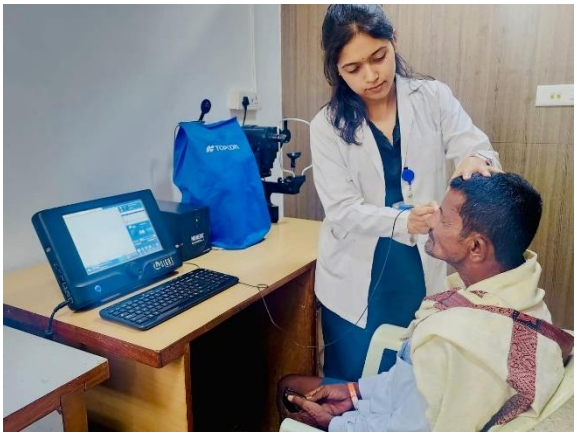

Image 6- A scan

Image 7 – B Scan

MASTER CHART

KEY TO MASTER CHART

M- MALE

F- FEMALE

LE- LEFT EYE

RE- RIGHT EYE

UHID NUMBER- UNIQUE HEALTH IDENTIFICATION NUMBER

NS- NUCLEAR SCLEROSIS

PSC- POSTERIOR SUBCAPSULAR CATARACT

PRE-OP – PREOPERATIVE

POST-OP- POSTOPERATIVE

INTRA- OP- INTRA OPERATIVE

VA- VISUAL ACUITY

IOP- INTRAOCULAR PRESSURE

AC - ANTERIOR CHAMBER

DM- DESCEMET'S MEMBRANE

POD- POST-OPERATIVE DAY

HM- HAND MOVEMENTS

CF- COUNTING FINGER

PL+VE- PERCEPTION OF LIGHT PRESENT

UHID NUMBER	AGE (AGE RANGE)	SEX	OPERATING EYE
275209	50 (50-59)	M	LE
257206	62 (60-69)	M	LE
256148	65 (60-69)	M	RE
242505	66 (60-69)	M	LE
237697	68 (60-69)	F	RE
225774	68 (60-69)	F	RE
243477	70 (70-79)	F	LE
216118	70 (70-79)	M	RE
232668	71 (70-79)	M	RE
242496	71 (70-79)	M	RE
236700	72 (70-79)	F	RE
216124	73 (70-79)	M	RE
242194	74 (70-79)	M	LE
225774	74 (70-79)	M	RE
256137	76 (70-79)	M	LE
237695	80 (80-89)	F	RE
242999	80 (80-89)	M	LE
259215	80 (80-89)	M	RE
225772	64 (60-69)	F	LE
243479	60 (60-69)	F	LE
223193	71 (70-79)	M	LE
234561	73 (70-73)	F	LE
225805	79 (70-79)	F	RE
254871	70 (70-79)	M	LE
237701	71 (70-79)	M	RE
225765	65 (60-69)	M	LE
256909	68 (60-69)	M	RE
242491	63 (60-69)	M	LE
245008	83 (80-89)	M	LE
237695	53 (50-59)	F	RE

225767	57 (50-59)	F	RE
237699	65 (60-69)	M	LE
256143	73 (70-79)	M	LE
237777	64 (60-69)	F	RE
216121	76 (70-79)	F	LE
259222	79 (70-79)	M	RE
242493	75 (70-79)	M	LE
236693	75 (70-79)	M	RE
236715	65 (60-69)	M	RE
243482	59 (50-59)	M	RE
236595	60 (60-69)	M	RE
223244	70 (70-79)	M	RE
215296	75 (70-79)	M	LE
225765	65 (60-69)	M	LE
251327	76 (70-79)	M	RE
236698	67 (60-69)	F	LE
233577	61 (60-69)	M	RE
216125	72 (70-79)	M	RE

UHID NUMBER	TYPE OF CATARACT	PEX DISTRIBUTION	PUPILLARY DILATATION
275209	SENILE MATURE CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	4MM
257206	NS3+ PSC+CORTICAL CATARACT	PUPILLARY BORDER	6MM
256148	NS2+ PSC + CORTICAL CATARACT	ANTERIOR CAPSULE	7MM
242505	NS2+ CENTRAL PSC+ CORTICAL CATARACT	ANTERIOR CAPSULE	6MM
237697	NS 4+CENTRAL DENSE PSC+CORTICAL	PUPILLARY BORDER	5MM
225774	NS2-3 +PSC+CORTICAL CATARACT	CORNEAL ENDOTHELIUM,PUPILLARY BORDER	5MM
243477	NS3-4+PSC+ CORTICAL CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	5MM
216118	NS3+ PSC	PUPILLARY BORDER	5MM
232668	SENILE MATURE CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	4MM
242496	NS3-4	PUPILLARY BORDER	5MM
236700	NS2+ CENTRAL DENSE PSC	PUPILLARY BORDER	5MM
216124	NS1-2 +PSC+ CORTICAL CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	5MM
242194	NS3+CENTRAL PSC+CORTICAL CATARACT	PUPILLARY BORDER	5MM
225774	SENILE HYPER MATURE CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	6MM
256137	NS1-2 +PSC+ CORTICAL CATARACT	PUPILLARY BORDER	4MM
237695	NS2+ PSC+ CORTICAL CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	6MM
242999	SENILE HYPER MATURE CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	5MM
259215	NS-4	ANTERIOR CAPSULE, PUPILLARY BORDER	5MM
225772	NS2+ PSC+ CORTICAL CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	6MM
243479	NS2 + PSC+ CORTICAL CATARACT	ANTERIOR CAPSULE	7MM
223193	NS-4	ANTERIOR CAPSULE, PUPILLARY BORDER	5MM
234561	SENILE MATURE CATARACT	ANTERIOR CAPSULE	6MM
225805	NS2+ PSC+ CORTICAL CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	4MM
254871	NS2 -3 +PSC +CORTICAL	ANTERIOR CAPSULE,	5MM

	CATARACT	PUPILLARY BORDER	
237701	NS2-3 +PSC +CORTICAL CATARACT	PUPILLARY BORDER	6MM
225765	NS1-2 +PSC+ CORTICAL CATARACT	ANTERIOR CAPSULE	6MM
256909	NS2-3 +PSC +CORTICAL CATARACT	PUPILLARY BORDER	6MM
242491	NS2 +PSC +CORTICAL CATARACT	ANTERIOR CAPSULE	6MM
245008	NS1 +PSC +CORTICAL CATARACT	PUPILLARY BORDER	6MM
237695	NS2 +PSC +CORTICAL CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	7 MM
225767	SENILE MATURE CATARACT	PUPILLARY BORDER	7MM
237699	NS-3 +PSC +CORTICAL CATARACT	ANTERIOR CAPSULE	5MM
256143	NS1-2 +PSC +CORTICAL	ANTERIOR CAPSULE	5MM
237777	NS2 +PSC +CORTICAL CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	6MM
216121	NS2+ PSC+ CORTICAL CATARACT	PUPILLARY BORDER	7MM
259222	NS1-2+ DENSE PSC	ANTERIOR CAPSULE , PUPILLARY BORDER	5MM
242493	NS1+PSC+ CORTICAL	ANTRIOR CAPSULE	6MM
236693	SENILE MATURE CATARACT	ANTERIOR CAPSULE	7MM
236715	NS2-3 PSC+ CORTICAL	PUPILLARY BORDER	6MM
243482	NS1-2 PSC+CORTICAL	ANTERIOR CAPSULE	7MM
236595	NS1-2 +DENSE PSC+CORTICAL	ANTERIOR CAPSULE	6MM
223244	NS 3	PUPILLARY BORDER	4MM
215296	NS-2+ PSC + CORTICAL CATARACT	ANTERIOR CAPSULE, PUPILLARY BORDER	6MM
225765	NS2 +PSC +CORTICAL CATARACT	PUPILLARY BORDER	6MM
251327	NS1+PSC+ CORTICAL	PUPILLARY BORDER	7MM
236698	SENILE HYPER MATURE CATARACT	ANTRIOR CAPSULE, PUPILLARY BORDER	5MM
233577	NS1-2 PSC+CORTICAL	ANTERIOR CAPSULE , PUPILLARY BORDER	6MM
216125	NS 2 PSC+CORTICAL	ANTERIOR CAPSULE	6MM

UHID NUMBER	PRE OP VA	PRE OP IOP(mmHg)
275209	CF CF	12
257206	CF 2MT	18
256148	CF 1MT	11
242505	CF 3MT	14
237697	HM+VE	18
225774	CF 1/2 MT	11
243477	CF CF	6
216118	CF 4MT	12
232668	HM+VE	15
242496	CF 1/2MT	14
236700	CF 3MT	9
216124	CF 2MT	13
242194	CF CF	16
225774	PL +VE	9
256137	CF 2MT	12
237695	CF 4MT	12
242999	PL +VE	11
259215	PL +VE	15
225772	CF 1MT	11
243479	CF 1MT	16
223193	HM+VE	17
234561	PL+VE PR ACC	8
225805	CF 2MT	12
254871	CF 3MT	15
237701	CF 1/2 MT	12
225765	6/60	11
256909	CF 1MT	12
242491	CF 1MT	12
245008	6/36	12
237695	CF2MT	10

225767	HM+VE	11
237699	CF CF	13
256143	CF 4MT	15
237777	CF 2MT	17
216121	CF 1MT	13
259222	CF 3 MT	8
242493	6/12	17
236693	HM+VE	13
236715	CF CF	17
243482	CF 1MT	18
236595	CF 3MT	9
223244	CF CF	10
215296	CF 3MT	14
225765	CF 3MT	15
251327	6/60	16
236698	PL +VE	12
233577	6/24	12
216125	CF 3MT	20

UHID NUMBER	INTRA OP COMPLICATIONS	POST OP COMPLICATIONS
275209	POSTERIOR CAPSULAR RENT , IRIS CLAW, ANT. VITRECTOMY	CORNEAL EDEMA, AC REACTION, IRREGULAR PUPIL
257206	NIL	CORNEAL EDEMA (mild stromal edema)
256148	NIL	CORNEAL EDEMA (mild stromal edema)
242505	DIFFICULT RRHEXIS	CORNEAL EDEMA (stromal edema)
237697	FLOPPY IRIS, IRIS PROLAPSE	CORNEAL EDEMA (microcystic edema)
225774	IRIS PROLAPSE	CORNEAL EDEMA (stromal edema)
243477	IRIS PROLAPSE	CORNEAL EDEMA (stromal edema, DM folds)
216118	NIL	CORNEAL EDEMA (Dmfolds, stromal edema)
232668	NIL	CORNEAL EDEMA (DM folds)
242496	NIL	CORNEAL EDEMA (central DM folds)
236700	NIL	CORNEAL EDEMA (DM folds, stromal edema)
216124	NIL	RETAINED CORTICAL MATTER
242194	IRIS PROLAPSE	CORNEAL EDEMA (DM folds, stromal edema)
225774	IRIS PROLAPSE	CORNEAL EDEMA, AC REACTION
256137	FLOPPY IRIS, IRIS PROLAPSE	CORNEAL EDEMA (DM folds, stromal edema)
237695	ZONULAR DEHISCENCE	CORNEAL EDEMA, HYPHEMA
242999	NIL	CORNEAL EDEMA (central DM folds)
259215	POSTERIOR CAPSULAR RENT , APHAKIA	CORNEAL EDEMA, AC REACTION, IRREGULAR PUPIL
225772	NIL	NIL
243479	NIL	NIL
223193	NIL	CORNEAL EDEMA, AC REACTION
234561	NIL	CORNEAL EDEMA(DM folds)
225805	NIL	CORNEAL EDEMA
254871	NIL	CORNEAL EDEMA(DM folds, mild stromal edema)
237701	NIL	NIL
225765	NIL	NIL

256909	NIL	CORNEAL EDEMA (mild stromal edema)
242491	NIL	NIL
245008	POSTRIOR CAPSULAR RENT, APHAKIA	CORNEAL EDEMA, AC REACTION, IRREGULAR PUPIL
237695	NIL	NIL
225767	NIL	NIL
237699	NIL	NIL
256143	NIL	NIL
237777	NIL	CORNEAL EDEMA(DM FOLDS, STROMAL EDEMA)
216121	NIL	NIL
259222	NIL	NIL
242493	FLOPPY IRIS, IRIS PROLAPSE	CORNEAL EDEMA (DM FOLDS, Stromal edema)
236693	NIL	NIL
236715	NIL	CORNEAL EDEMA (DM FOLDS, MICROCYSTIC edema)
243482	NIL	NIL
236595	NIL	NIL
223244	NIL	NIL
215296	IRIS PROLAPSE	CORNEAL EDEMA (DM FOLDS, MICROCYSTIC edema)
225765	NIL	CORNEAL EDEMA (DM FOLDS MICROCYSTIC edema)
251327	NIL	CORNEAL EDEMA (DM FOLDS MICROCYSTIC edema)
236698	FLOPPY IRIS	CORNEAL EDEMA (mild stromal edema)
233577	IRIS PROLAPSE	CORNEAL EDEMA (DM FOLDS MICROCYSTIC edema)
216125	NIL	NIL

UHID NUMBER	POD1 VA	POD7 VA	POD30 VA
275209	HM+	HM+	HM+
257206	6/9	6/6	6/6
256148	6/18	6/12	6/6
242505	6/60	6/12	6/6
237697	HM+	6/60	6/12
225774	6/60	6/36	6/6
243477	6/24	6/12	6/9
216118	6/24	6/18	6/9
232668	6/24	6/12	6/9
242496	6/36	6/9	6/6
236700	CF close to face	6/24	6/12
216124	6/24	6/12	6/6
242194	CF close to face	6/18	6/9
225774	6/36	6/24	6/9
256137	HM+	6/36	6/9
237695	CF close to face	6/18	6/12
242999	6/24	6/9	6/6
259215	HM+	HM+	CF2MT
225772	6/18	6/12	6/9
243479	6/9	6/6	6/6
223193	CF close to face	6/24	6/18
234561	6/18(p)	6/18	6/12
225805	6/24	6/18	6/12
254871	6/60	6/24	6/12
237701	6/6(p)	6/6	6/6
225765	6/12(P)	6/12	6/9
256909	6/18	6/12	6/12
242491	6/9	6/6	6/6
245008	HM+VE	HM+VE	HM+ve
237695	6/6(p)	6/6	6/6

225767	6/6	6/6	6/6
237699	6/9	6/6	6/6
256143	6/9	6/6	6/6
237777	PL+VE	6/60	6/36
216121	6/9	6/9	6/9
259222	6/9 (p)	6/6	6/6
242493	6/24	6/18	6/12
236693	6/9	6/6	6/6
236715	HM+VE	6/24	6/12
243482	6/18	6/12	6/6
236595	6/60	6/24	6/12
223244	6/9(P)	6/6	6/6
215296	CF 1MT	6/60	6/24
225765	6/24	6/12	6/9
251327	6/24	6/18	6/6
236698	6/12	6/9	6/9
233577	CF 2MT	6/36	6/12
216125	6/12	6/9	6/6

UHID NUMBER	POD1 IOP (mmHg)	POD7 IOP(mmHg)	POD30 IOP (mmHg)
275209	23	16	18
257206	14	11	9
256148	17	11	13
242505	15	11	10
237697	24	14	17
225774	17	16	12
243477	18	10	11
216118	12	13	10
232668	12	14	14
242496	14	12	11
236700	13	14	12
216124	12	14	9
242194	19	14	13
225774	11	14	12
256137	21	17	13
237695	20	16	13
242999	16	14	11
259215	16	13	12
225772	14	12	15
243479	18	14	17
223193	19	16	15
234561	12	16	17
225805	15	15	16
254871	14	16	13
237701	11	15	17
225765	12	14	13
256909	20	18	15
242491	17	17	15
245008	16	13	15
237695	18	17	14

225767	16	15	19
237699	15	12	14
256143	14	13	18
237777	15	16	12
216121	13	11	16
259222	14	13	11
242493	12	14	9
236693	17	11	12
236715	35	19	15
243482	12	14	11
236595	15	13	16
223244	15	12	17
215296	20	13	11
225765	21	11	14
251327	19	14	16
236698	10	12	14
233577	22	14	17
216125	11	12	9