"STUDY OF RISK FACTORS AND MANAGEMENT OF POSTERIOR CAPSULAR RENT IN MANUAL SMALL INCISION CATARACT SURGERY"

By

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In partial fulfillment of the requirements for the degree of

MASTER OF SURGERY

IN

OPHTHALMOLOGY

Under the guidance of

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DEPARTMENT OF OPHTHALMOLOGY

SRI DEVARAJ URS MEDICAL COLLEGETAMAKA, KOLAR

April 2015

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LIST OF ABBREVATIONS

SL NO	ABBREVATIONS	FULL FORM
1	AC	Anterior chamber
2	ADP	Adenosine diphosphate
3	ATP	Adenosine triphosphate
4	BCDV	Best corrected distant vision
5	BCNV	Best corrected near vision
6	BSS	Balanced salt solution
7	CCC	Continuous curvilinear capsulorrhexis
8	CME	Cystoid macular edema
9	DM	Descemet’s membrane
10	DPN,DPNH	diphosphopyridine
11	ECCE	Extra capsular cataract extraction
12	G	Gauge
13	IOL	Intraocular lens
14	ICCE	Intra-capsular cataract extraction

15	IOP	Intraocular pressure
16	Kg	Kilogram
17	mEq	Milli equivalent
18	mm	Milli meters
19	mM	Milli moles
20	Nd Yag	Neodymium: Yttrium aluminum garnate
21	MSICS	Manual small incision cataract surgery
22	PCR	Posterior capsule rent
23	PC	Posterior capsule
24	PCO	Posterior capsule opacity
25	RD	Retinal detachment
26	SF IOL	Scleral fixated intraocular lens
27	TPN,TPH	triphosphopyridine
28	UCDA	Uncorrected distant vision
29	UCNV	Uncorrected near vision
30	VL	Vitreous loss

ABSTRACT

BACKGROUND

Posterior capsular rupture (PCR) with or without vitreous loss is one of the common intra-operative complication during cataract surgery and is widely regarded as the benchmark complication to judge surgical quality.

METHODS

It is a hospital based prospective study of 37 patients with posterior capsule rent among 1000 consecutive patients who underwent manual small incision cataract surgery in the department of Ophthalmology, R.L. Jalappa Hospital and Research centre, Tamaka, Kolar.

OBJECTIVES

1. To study the risk factors of posterior capsular rent during manual small incision cataract surgery.

2. To document the management of posterior capsule rent.

3. To estimate the post-operative visual outcome.

RESULTS

The incidence of PC rent was 3.7 %. Vitreous loss was present in 15 out of 37 of rent cases (40.5%).

Small pupil was a significant risk factor. PC rent occurred in mainly surgeries performed by inexperienced surgeons.

Irrigation and aspiration (67.5%) was the most common step followed by nucleus prolapse (16.2%).

Size of the capsule rent was significant factor in determining the steps of management. Anterior vitrectomy was done in cases of vitreous loss. Intra-ocular lens was implanted in the bag in 56.8%, in the sulcus in 13.5 %, scleral fixated intra-ocular

lens in 10.8% and iris claw lens in 13.5% of cases. Two patients were rendered aphakic (5.6%)

The most common early postoperative complications noticed were iritis in 7(18.9%) eyes, corneal edema in 5 (13.5%) and striate keratopathy in 4 (10.8%) eyes and hyphema in 2(5.40%) eyes, all of which resolved with postoperative medications over a week.

The late complications included cystoid macular edema in 5(13.8%) eyes, secondary glaucoma in 2(5.6%) and peripheral retinal detachment in 1 (2.8%) eye.

Final best corrected visual outcome was in the range of 6/6-6/18 in 88.9% of patients.

CONCLUSION

We studied the risk factors, management and visual outcome of patients with posterior capsule rent with or without vitreous loss.

Thus, we conclude with experience and skill, the incidence of this inadvertent intra-operative complication decreases and with timely management favorable visual outcome is obtained.

KEYWORDS: Posterior capsule rupture, vitreous loss, PC IOL, Iris claw lens, scleral fixated intra-ocular lens

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INTRODUCTION

Cataract, as the leading cause of blindness and visual impairment, is responsible for 50% of blindness worldwide.[1] The prevalence of cataract in different populations has been reported between 2.0% and 65%[2, 3]. In India, there are 12.5 million blind and it is estimated that 50% to 80%[4, 5] of them are blind due to cataract. In addition to the backlog, an additional 3.8 million become blind each year due to cataract as against 2.7 million cataract surgeries done every year.[6]

No method to halt the formation of a cataractous lens has been shown to be effective[7], it has no proven preventive or medical therapy. Surgery, the only option, consists of removing the cloudy natural lens and replacing it with an artificial, transparent intraocular lens (IOL).

Although phacoemulsification is considered the gold standard in cataract surgery, manual small incision cataract surgery (MSICS) has emerged as first choice alternative as it retains most of the advantages of phacoemulsification and can be delivered at a lower cost even in high volume cataract surgery programs. It is the best way of removing the large back log of cataract[8]; hence, preferred by many surgeons in the developing countries. In our tertiary care center, both the techniques are being used.

No surgical technique is exempt from complications which can occur at any step in the surgical procedure.

A breach in the integrity of the posterior capsule has various nomenclatures, such as posterior capsule tear[9], posterior capsule rupture[10], and posterior capsule rent.[11]

The posterior lens capsule is an anatomical barrier, which separates the vitreous body from the forces involved in lens fragmentation and aspiration and intraocular lens implantation. Posterior capsular rupture (PCR) with or without vitreous loss is the one of the common intra-operative complication during cataract surgery and is widely regarded as the "index complication " to judge surgical quality.[12, 13] This measure has high validity for cataract surgeons and is important as it is associated with the need for additional surgical procedures, a greater number of follow-up visits, increased frequency of postoperative complications and may adversely affect the final visual outcome.[14]

Even in the best planned and executed surgery, posterior capsular rupture may occur. There are certain predisposing factors like pseudo-exfoliation, poorly dilating pupil due to diabetes or uveitis, posterior polar cataract, trauma, post-vitrectomy cataract, eyes with long axial length (with weak bag and weak zonules), eyes with short axial length (with crowded anterior chamber). Posterior capsule tears can be preexisting (congenital or traumatic), spontaneous, or intra-surgical.[15] Pre- existing/congenital posterior capsule tears have been related to an intrauterine insult. Posterior capsule tears due to trauma may occur as a consequence of direct mechanical impact due to perforation or blunt injury. Intra-surgical posterior capsule tears are the most common and can occur during any stage of cataract surgery. Also, they may be planned in the form of primary posterior capsulorrhexis. The occurrence of posterior capsule tears during cataract surgery has been related to the surgical trauma[16] or to the presence of posterior polar cataract.[17]

The incidence of the posterior capsule rupture has declined from 4.4%[12] in UK National Survey (1997-1998) to 1.92% reported in The Cataract National Dataset electronic multi-center audit in 2009[18] which is mainly due to improvement in instrumentation and

technique and increased availability of experienced surgeons supervising the learning phase, it is reported to be as high as 5.5%[19] when surgery is performed by trainees/ residents, as opposed to 0.9%[20] when performed by experienced surgeons.

Most tears in the posterior capsule are small when they first occur. Early recognition of a posterior capsular tear and prompt prophylactic measures will prevent expansion of the tear size. Maintenance of the anterior chamber throughout the management of the posterior capsular rent is of prime importance to prevent further complications. The conventional management consists of prevention of mixture of cortical matter with vitreous, dry aspiration, and anterior vitrectomy, if required. In the presence of a posterior capsule tear, the IOL can be placed in the sulcus, if the capsular rim is available, or in the bag, if the tear is small. Scleral fixated posterior chamber lenses, anterior chamber IOLs can be implanted when the posterior capsule tear is large.[21]

A broken posterior capsule during cataract surgery puts the patient at higher risk for cystoid macular edema, endophthalmitis, retained cataract fragments, vitreous traction, retinal detachment, displaced IOL position and a host of other sight-threatening complications. However, if properly managed, an eye with a ruptured posterior capsule can also have a very good visual outcome.

Hence, the present study was undertaken to study the risk factors and management of posterior capsule rupture during manual small incision cataract surgery.

OBJECTIVES OF THE STUDY

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1. To study the risk factors of posterior capsular rent during manual small incision cataract surgery.
2. To document the management of posterior capsular rent.
3. To estimate the post-operative visual outcome.

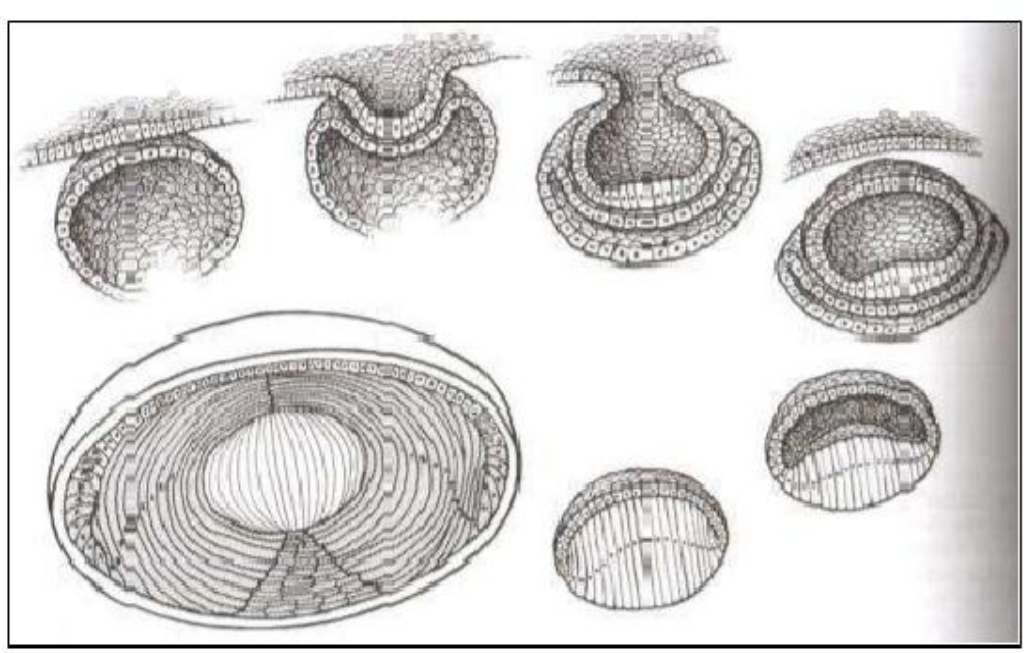
REVIEW OF LITERATURE

DEVELOPMENT OF THE LENS

The rudimentary lens is first seen as a thickening of the surface ectoderm, the lens placode at 22 days gestation; it overlies the optic vesicle. The lens placode forms the lens vesicle which consists of a single layer of cells. The cells forming the posterior wall of the lens rapidly elongate and become filled with proteins called crystallins. These densely packed elongated cells are known as the primary lens fibres. Additional fibres are formed by the mitotic division of the anterior epithelial cells at the equator known as secondary lens fibres. New secondary lens fibres are formed throughout life and persist throughout life. The end of the fibres come into apposition at sites referred to as sutures.

In the foetus, the lens grows rapidly, because it is supplied by the hyaloid artery, which forms a plexus on the posterior surface of the lens. The vascular lens capsule is formed from the mesenchyme. The true lens capsule is formed from the thickened basal lamina.[22]

Figure 1: Development of lens



ANATOMY OF THE LENS

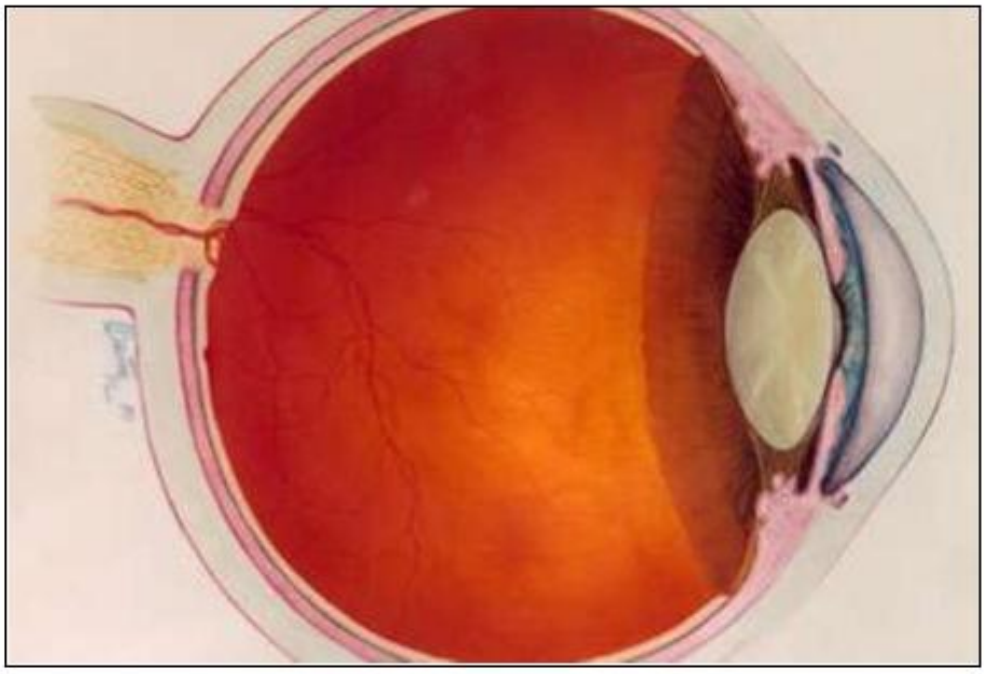
The lens is a transparent, biconvex, elliptical, semisolid, avascular body of crystalline appearance, enclosed in its capsule, situated immediately behind the iris and in front of the vitreous body in a saucer shaped depression called *patellar fossa*. It does not possess nerves, blood vessels or connective tissue[23, 24]. It is encircled by the ciliary processes, which slightly overlap its margin.

In the adult, the lens measures approximately 9-10 mm in diameter and 3-4 mm in thickness. The rim of the lens separating the anterior and posterior surfaces is called *equator*. Centre of anterior surface is known as the *anterior pole* and centre of the posterior surface is known as the *posterior pole.*

The equator of the lens forms a circle lying 0.5mm within the ciliary processes. The equator is not smooth but shows a number of dentations, which corresponds to the attachment of the zonular fibres. These dentations disappear when the zonules are loose during accommodation.[25]

The refractive index of the lens is 1.39. The dioptric contribution of the lens is about 15, out of a total of about 55 diopters (D) for the normal eye. Its accommodative power varies with age, being 14-16 D at birth; 7-8 D at 25 years of age and 1-2 D at 50 years of age.

Figure 2: Position of the lens in the eye



STRUCTURE OF THE LENS

1. **Lens Capsule** - It is a thin, homogenous, transparent, highly elastic and hyaline collagenous membrane which closely surrounds the lens. It is secreted at the embryonic stage as a basement membrane of lens epithelium (thickest basement membrane of the body). It is thicker anteriorly and at the equators than posteriorly. The thickness of the capsule is 2.8 micron at the posterior pole, which is the thinnest part of the capsule and at anterior pole is 15.5 µm. Unlike the anterior capsule, the posterior capsule does not thicken with age; however, it has a tensile strength that is greater than that of anterior capsule. Under polarized light, it is birefringent, indicating a lamellar structure with fibres arranged parallel to its surface. The capsule is produced anteriorly by the lens epithelium and posteriorly by the elongating fibre cells. The elastic capsule can be stretched to 60% of its circumference without tearing. It serves as a diffusion barrier and is freely permeable to low molecular weight compounds but restricts the movement of large colloidal particles.

2. **Lens Epithelium**: Anterior lens epithelium is a single layer of cuboidal nucleated epithelial cells which lies deep to the anterior capsule. Almost all the metabolic, synthetic and transport processes of lens occur in this layer. In *equatorial region,* cells become *columnar* and actively divide and elongate to form new lens fibres throughout life. There is no posterior epithelium, as these cells are used up in filling the central cavity of the lens vesicle during development of the lens.

The anterior lens epithelium is divided into 3 zones.

a. **Central zone**: consists of cuboidal cells, which are polygonal in flat section. It represents stable population of cells.

b. **Intermediate zone**: comparatively smaller and more cylindrical cells, located peripheral to central zone.

c. **Germinative zone**: columnar cells, most peripheral fibres and located just pre-equatorial. These cells actively divide to form the new cells which migrate posteriorly to form new lens fibres.

The lens epithelium has two different types of cells:

1. *A-cells* are located in the anterior central zone (corresponding to the central zone of anterior lens capsule). They consist of relatively quiescent epithelial cells with minimal mitotic activity. However in inflammation or trauma, an anterior sub-capsular epithelial plaque may form.

2. *E-cells* are located in the second zone, as a continuation of the anterior lens epithelial cells around the equator, forming the equatorial lens bow, with the germinal cells. These cells normally show mitotic capability, and new lens fibres are continuously produced at this site. E-cells are responsible for continuous growth in size and weight of the lens throughout life. In pathological states, the E cells tend to migrate posteriorly along the posterior capsule and are the primary source of classic secondary cataract.

3. **Lens Substance:** This is the intracellular amorphous substance in the lens. The adult lens substance consists of the nucleus and the cortex. Although the size of these two regions is age dependent, studies of lenses with an average age of 61 years indicate that the nucleus accounts for approximately 84% of the diameter and thickness and cortex for the remaining 16%. The nucleus is further subdivided into embryonic, foetal, infantile and adult nuclei. The embryonic nucleus contains the original primary lens fibre cells.

4. **Lens Fibres**: Lens fibres are elongated, prismatic bands. They are formed constantly throughout life by the elongation of lens epithelial cells at the equator. As the lens fibres elongate and new ones are form, the older ones are pushed towards the depth of the lens. Ninety percent of the mass of the lens fibres consists of proteins called crystallins.

The consistency of the lens varies; the superficial cortex is softer than the central part of the nucleus. The colour of the lens also changes with age. In the infant and young, it is quite colourless. After about 35 years the central portion develops a yellow tinge and gradually becomes darker and more extensive with age. In older persons the lens is amber coloured.

Figure 3: Gross anatomy of the adult human lens

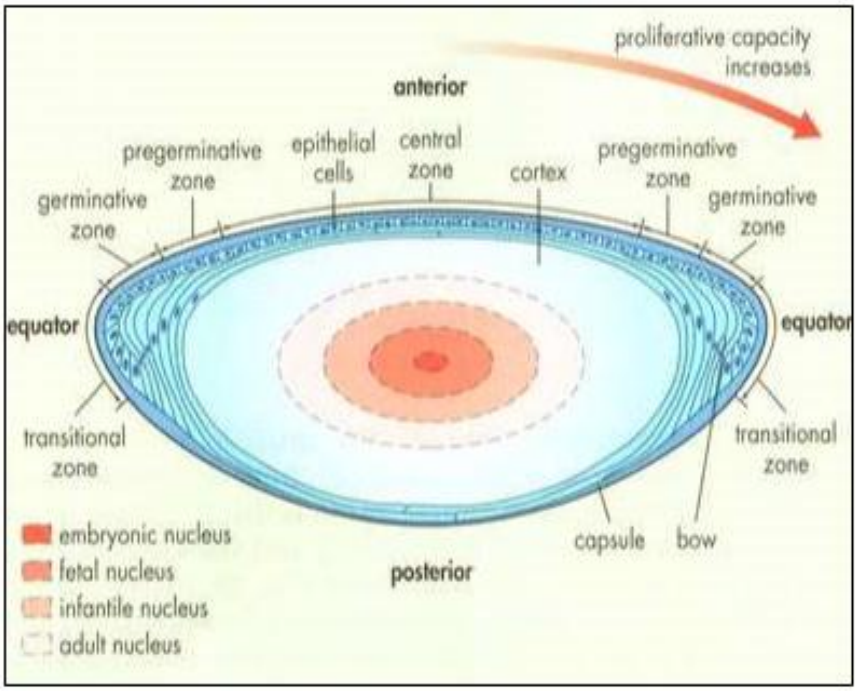
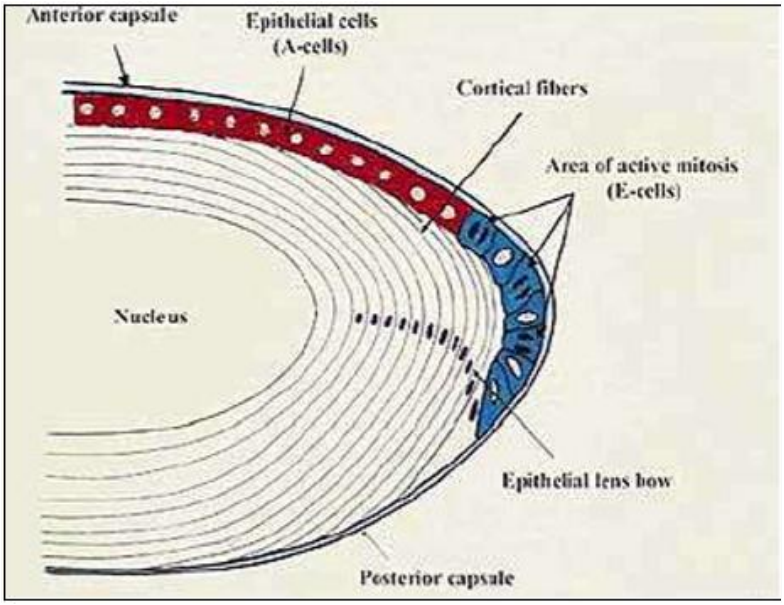


Figure 4: Epithelial A cells and E cells



PHYSIOLOGY AND BIOCHEMISTRY

The molecular makeup of the lens is unique in that it is two thirds water with one third protein; other constituents represent only about 1% of total lens weight.[26]

Composition of the Lens:

Compared to most other tissues, the lens has a particularly high protein content and a low water content. The high protein concentration is necessary for the lens to maintain a high refractive index. The adult human lens is approximately 64% of water. The lens capsule is about 80% water, and the water content of the dense nuclear region of the lens is less than that of the outer cortex.

Lens Proteins:

Protein accounts for about 35% of the net weight of the lens. Based upon their solubility in water, they are separated into two classes.

1. Water soluble *lens crystallins* – comprise 80-90% of the soluble proteins of the eye lens, therefore, considered structural proteins.

Lens Crystallins: are a heterogeneous group of structural proteins identified as:

a. Alpha crystallins: Accounts for 31.7% of total lens protein. This fraction has the highest molecular weight and greatest positive charge.

b. Beta crystallins: are the most abundant water-soluble protein, representing about 53.4%.

c. Gamma crystallins: account for 1 to 2% of the total. Gamma crystalline level is high in nucleus and low in cortex.

2. Water insoluble proteins – include albuminoids

a. Membrane proteins accounting for approximately 20 to 30% of water insoluble fraction of lens proteins like aquaporin, N-cadherin.

b. Cytoskeletal proteins like actin, tropomodulin, vimentin

Carbohydrates:

Glucose in the lens is approximately about 1.0mM. The lenticular glucose has its source in aqueous humour. The level of glucose in lens is $1/10^{th}$ of aqueous. In the lens, energy production is almost entirely dependent upon the metabolism of glucose.

Lens lipids:

Include cholesterol, phospholipids and glycosphingo-lipids. About 50 to 60% of the lens lipid is cholesterol. The major phospholipid is sphingomyelin.

Amino acids:

The concentration of amino acids in the lens generally exceeds that in the aqueous humour or vitreous humour. It contains all the amino acids present in any other tissue except tryptophan, cysteine and possibly hydroxy- proline.

Electrolytes:

Sodium: is in the range of 14 to 26 m Eq/Kg lens water and potassium is about 114-130 m Eq/Kg lens water. There is low sodium level and high potassium level in the normal lens.

Calcium: is about 0.3 m Eq/ Kg lens water. Increased concentrations are cytotoxic and thought to contribute to the development of cataract.

Anions: The main anions of the lens are chloride, bicarbonate, phosphate and sulphates.

Ascorbic acid: Might participate in the modulation of the hexose monophosphate shunt.

Choline: The level of choline is substantially lower in cataractous lenses than in normal adult human lenses perhaps due to increased membrane permeability.

Inositol: Myo-inositol, the most abundant isomer of inositol, is actively transported into the lens by sodium-dependent carrier-mediated mechanism. In several forms of cataract, particularly diabetic cataract, myo-inositol levels are significantly reduced.

Lens Metabolism:

The metabolism of the lens is entirely directed towards the maintenance of transparency. The main location of lens metabolism is in the lens epithelium. Composition and metabolism of the lens undergo significant changes as the lens changes. Certain of these changes might contribute to the development of cataract or at least render the lens more susceptible to cataractogenic stress.

Carbohydrate metabolism:

The four processes through which carbohydrate metabolism occurs are:

1. Anaerobic glycolysis

2. Krebs (oxidative) cycle

3. Hexose monophosphate shunt

4. Sorbitol pathway.

Protein Metabolism:

Protein synthesis takes place predominantly in the lens epithelium and the outer cell layers. It involves the transfer of genetic information via m-RNA to the ribosomes. The energy is supplied in the form of ATP derived from carbohydrate metabolism.

Glutathione and oxidation – reduction pathways:

Glutathione plays a central role in protecting the lens from oxidative insult, by virtue of its sulfhydryl group, perhaps in association with ascorbic acid.

Lens transparency

Normal lens is a transparent structure transmitting almost 80% of light energy. The factors that play significant role in maintaining the outstanding clarity of normal lens are-

1. Single layer of epithelial cells

2. Semipermeable character of lens capsule

3. Characteristic arrangement of lens proteins

4. Avascularity of the lens

5. Sparsely and highly packed nature of lens cells.

6. Relative dehydration of the lens

The Chemical Pathology of the Lens

Changes in the Constituents of the Lens

Proteins: With age, the protein content of the normal lens increases in all types of cataract. The insoluble protein remains comparatively stable so that its concentration is relatively increased, while the soluble proteins are markedly decreased. In the later stages of development of cataract, proteolysis occurs whereby the soluble proteins are broken down by proteolytic enzymes. Complete hydrolysis increases the osmotic pressure 400 times leading to an enormous imbibition of water with a consequent swelling followed by an almost complete disappearance of the lenticular substance.

Peptides: Glutathione tends to decrease with age and diminishes markedly in all the forms of cataract. Ascorbic acid shows a comparable diminution in age or with the development of cataract.

Nucleotides: ATP, diphosphopyridine (DPN, DPNH) and triphosphopyridine nucleotides (TPN, TPH) become deficient in age and decrease in cataract.

Lipids: The total lipids increase in age and in cataract.

Inorganic Materials: There is usually a shift in the cationic contents due to free permeability of cellular membranes which leads to rise in osmotic pressure, which in turn leads to intumescence.

The Pathological Metabolism of the Lens

Interruption of metabolism affects most acutely the actively dividing epithelial cells. Carbohydrate metabolism is retarded. Anaerobic glycolysis gradually falls with age, there is a diminution in the production of high energy phosphates, particularly ATP. The Hexose Monophosphate (HMP) shunt diminishes at an early stage. Sorbitol pathway is probably of importance in the development of sugar cataracts. The main evidence of a reduction in oxygenation is the diminution of glutathione at an early stage. The principal change in the protein metabolism in age and most types of cataract is a decrease in the synthesis of the metabolically active soluble-proteins.

CATARACT

The term cataract was introduced by **Constantinus Africanus** (AD 1018) as "cataracta" meaning to rush down, as a waterfall or portcullis. French surgeon **Pierre Brisseau** in 1705 was the first to describe cataract as a clouding of the lens.[27]

It is defined as any opacity in the crystalline lens or its capsule which obstructs or distorts light entering into the eye. According to some authors, cataract is a structural, physical, bio-chemical and optical change in the crystalline lens of the eye that interferes with the normal transmission and refraction of light rays. This interference affects the overall sharpness of definition of the retinal image.

Cataract is the chief cause of avoidable blindness in India and throughout the world. There are an estimated 9-12 million blind in India, half of which can be attributed to cataract. It is estimated that another three million develop visually disabling cataracts each year.[28]

CLASSIFICATION OF CATARACT

A) ETIOLOGICAL CLASSIFICATION

I) Congenital and Developmental Cataract

II) Acquired Cataract

1. Senile Cataract

2. Traumatic Cataract

3. Complicated Cataract

4. Metabolic Cataract

5. Electric Cataract

6. Radiation Cataract

7. Toxic Cataract

i. Corticosteroid induced

ii. Miotics induced

iii. Copper (Chalcosis) and Iron (Siderosis) induced

8. Dermatogenic Cataract

9. Cataract associated with osseous diseases

10. Cataract with miscellaneous syndromes

i. Dystrophica myotonica

ii. Down's syndrome

B) MORPHOLOGICAL CLASSIFICATION:-

1. Capsular Cataract

i. Anterior capsular

ii. Posterior capsular

2. Sub-capsular Cataract

i. Anterior sub-capsular

ii. Posterior sub-capsular

3. Cortical Cataract

4. Supra-nuclear Cataract

5. Nuclear Cataract

6. Polar Cataract

i) Anterior polar

ii) Posterior polar

HISTORICAL REVIEW

Cataract surgery is one of the oldest surgical procedures known, first documented in the fifth century BC, introduced to Europe from India by the armies of Alexander the Great. It is now the most frequently performed surgical procedure in the Western world.[29]

Prior to 1750 AD, cataract was treated by dislocation into the vitreous cavity using a lance, a process known as couching. The earliest reference to couching was found in Sanskrit manuscripts dating from the 5th century BC written by **Sushruta,** an Indian surgeon. This technique could only be performed when the lens had become completely opaque, rigid, and heavy to the point that the supporting zonules had become fragile. The eye would then be struck with a blunt object with sufficient force to cause the zonules to break so that the lens would dislocate into the vitreous cavity, restoring limited but completely unfocussed vision.

Figure 5: Couching

The first description of the cataract and its treatment in the West appeared in 29 AD in De Medicina, the work of the Latin encyclopaedist **Celsus**, which noted the practice of needling, technique that breaks up the cataract into smaller particles, thereby facilitating their absorption.

Progress in cataract surgery required a modern understanding of light which came through the work of Newton, Dalton and Young, as well as a modern understanding of the anatomy and pathology of the eye. **Jacques Daviel** described the first planned surgical extraction of cataract in 1748. **Samuel Sharp** of London introduced the concept of intra-capsular cataract surgery in 1753 by using pressure with his thumb to remove the entire lens intact through an incision.

Albrecht von Graefe (1828-1870), in Germany, established the benefit of a small linear scleral incision for extra-capsular surgery rather than a large limbal corneal incision. The use of sutures for cataract surgery was first described by **Henry Willard Williams** of Boston in 1867. **Koller** in 1884 introduced anaesthesia in the form of eye-drops (cocaine), obviating the hazards of general anaesthesia and its postoperative complications.

Stanculeanu (1912), **Knapp** (1914), **Anton** (1922), **Sinclair** (1925) developed the techniques of intra-capsular operation using various patterns of capsule forceps. Cryosurgery was introduced by **Krawitz** of Poland in 1961 to remove the lens with a tiny probe that could attach by freezing a small area on the surface of the lens.

The operating microscope was first used for eye surgery by **Ken Swann** in Portland, Oregon, in 1948. This began the era of ophthalmic microsurgery. This was closely followed by another important watershed, the invention of the intraocular lens (IOL). **Harold Ridley** implanted the first IOL in 1948.

In 1967, **Charles Kelman** introduced phacoemulsification, a technique that uses ultrasonic waves to emulsify the nucleus of the crystalline lens in order to remove the cataract without a large incision.

Richard Kratz developed the scleral pocket incision. The incision consisted of a posteriorly placed incision with a scleral tunnel and a corneal wedge. However, these incisions had to be closed with sutures. **Michael McFarland** in 1990 demonstrated the first suture-less closure of scleral tunnel wound. **Fine** in 1992 described a new concept of a planar temporal clear corneal suture less incision.

Phakonit is the latest technique of phacoemulsification first devised by **Amar Agarwal** (India). The advantage of Phakonit over conventional phacoemulsification is that here the size of incision is below 1mm.

Laser cataract surgery is a technique similar as phacoemulsification procedure. In this cataract surgery instead of ultrasound power, laser energy is used. Image-guided laser cataract surgery was first conceptualized by **D. Palanker** and **M. Blumenkranz** in 2005.The femtosecond laser procedure was used clinically in cataract surgery by Professor **Zoltan Nagy** in Budapest, Hungary in 2008.

The different methods of cataract surgery are:

1. Conventional intra-capsular cataract extraction.
2. Extra-capsular cataract extraction.

Intra-capsular cataract extraction:

a) Cryoextraction

b) Capsule forceps extraction

c) Erysiphake extraction

Extra-capsular cataract extraction (ECCE):

a) Conventional ECCE

b) ECCE by manual small incision cataract surgery (MSICS) or small incision manual nucleus fragmentation.

c) Phacoemulsification.

Phacoemulsification is the preferred technique for cataract surgery in developed countries, and also to some extent in the developing countries. Both phacoemulsification and manual small incision cataract surgery (MSICS) achieve excellent visual outcomes with low complication rates, but MSICS is less expensive and requires less technology; hence, preferred by many surgeons in the developing countries like India.

The main steps of Manual Small Incision Cataract Surgery are:

1. Adequate anaesthesia and akinesia by local anaesthesia.

2. Exposure of the operative field by lid speculum.

3. Fixation of eye with a superior rectus bridle suture.

4. Fornix based conjunctival flap and exposure of sclera.

5. A one-third to half-thickness external scleral incision is made, 2.5 to 3 mm from the surgical limbus. It may be limbus parallel, linear or frown shaped. Usually an external scleral incision of 6-6.5 mm length is made. Instruments that are commonly used are 15 number surgical knife/

crescent knife/ guarded diamond knife. The length of the external incision depends on the nucleus density.

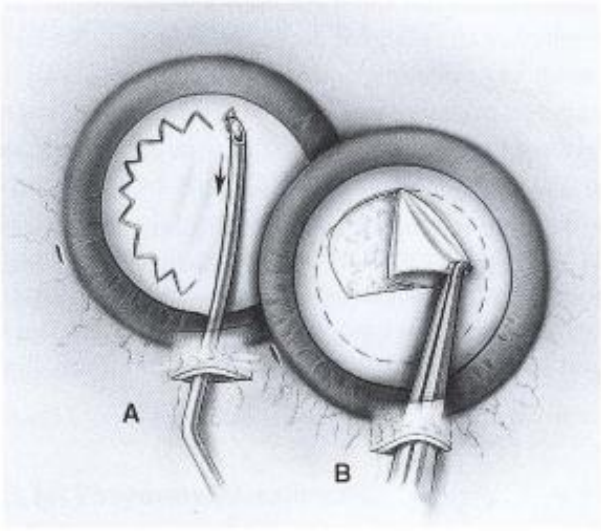
6. Sclero-Corneal Tunnel should be uniform in thickness and extended up to 1 to 1.5 mm into the clear cornea. It is done with bevel-up crescent blade. The success of small incision cataract surgery depends on efficient, smooth and functional construction of a clear sclero-corneal pocket tunnel of suitable dimension.

7. A side port entry is done at the 10 O'clock position or perpendicular to the tunnel in the clear cornea. The stab entry is made parallel to iris and is 2 mm wide- done for performing capsulorrhexis, aspiration of sub-incisional cortex, reformation of anterior chamber at the end of surgery.

8. Anterior capsulotomy with a 6-6.5 mm can-opener capsulotomy or continuous curvilinear capsulorrhexis with a bent 26 gauze needle after forming the anterior chamber with viscoelastic. Capsulotomy was developed by **Daviel, Gimbel**[70] and **Neuman** developed the technique of capsulorrhexis.

Figure 6: Anterior capsulotomy- A. Can-opener technique

B. Continuous curvilinear capsulorrhexis



9. Internal corneal incision-corneal lip acts as one-way valve[30]. When constructed properly and adequately, the scleral tunnel with internal corneal lip is a strong and safe wound for suture-less cataract surgery[31]. This is done with a sharp 3.2 mm angled keratome. Extension can be done with the same keratome or 5.2 mm keratome.

10. Hydro procedures to delineate nucleus from capsule and cortex. This comprises of hydro-dissection and hydro-delineation. In hydro-dissection, the nuclear-cortex complex is separated from the capsule bag where as in hydro-delineation the hard core nucleus is separated from the epinucleus resulting in debulking of the nucleus. The anterior capsule is elevated away from cortical matter with 26 gauze blunt cannula. Gentle, continuous irrigation creates a fluid wave that passes circumferentially in the zonules just under lens capsule. This mobilizes the nuclear-cortical complex in such a way that it can spin freely within the bag.

11. Anterior chamber is deepened with viscoelastic and nucleus is prolapsed using Sinskey hook. The nucleus may be removed by any of the following techniques- using irrigating vectis, visco-expression or sandwich technique.

12. Aspiration of residual cortical matter using Simcoe cannula. Thorough cortical clean-up minimizes the incidence of post–operative iritis, after-cataract formation and cystoid macular edema.

13. A posterior chamber intra-ocular lens implantation (IOL) is implanted in the capsular bag after filling the bag with viscoelastic substance.

14. Removal of viscoelastic material is done thoroughly from the anterior chamber and capsular bag with the help of two-way irrigation aspiration cannula**.**

15. Wound closure-after IOL implantation, the side ports are hydrated. The internal corneal lip sits back in perfect apposition to produce water tight self-sealing valvular effect only after return of normal intraocular pressure. The wound is then covered by conjunctiva.

Suturing becomes necessary in the following cases-

a. Leaky tunnel

b. Premature entry

c. Scleral tunnel incision more than 6.5 mm in length even if it is self-sealing. This is to avoid against the rule astigmatism.

With the advent of better instrumentation, microscopes and good training, cataract surgery has become a remarkably safe procedure. Nonetheless, complications can occur at any stage with any surgical procedure. It is very important to recognize them at the earliest and manage them appropriately, which will give the most satisfactory results in the end.

Complications of small incision cataract surgery can be divided broadly into the preoperative, intra-operative and postoperative complications.

A. Preoperative complications

1. Anxiety
2. Nausea and gastritis
3. Allergic conjunctivitis
4. Corneal abrasion
5. Anaesthesia related complications-
    i. Incomplete anaesthesia
    ii. Globe perforation

iii. Retrobulbar haemorrhage

iv. Sub-conjunctival haematoma and chemosis

v. Spontaneous dislocation of cataractous lens

1. **Anxiety -** Some patients may develop anxiety, on the eve of operation. Anxiolytic drugs such as diazepam 2 to 5 mg at bed time usually alleviate such symptoms.

2. **Nausea and gastritis** - A few patients may develop nausea and gastritis due to preoperative medicines such as acetazolamide and/or glycerol. Oral antacids and omission of further dose of such medicines usually relieve the symptoms.

3. **Irritative or allergic conjunctivitis -** Occur in some patients due to preoperative topical antibiotic drops. Postponing the operation for 2 days along with withdrawal of such drugs is required.

4. **Corneal abrasion -** May develop due to inadvertent injury during Schiotz tonometry. Patching with antibiotic ointment for a day and postponement of operation for 2 days is required.

5. **Anaesthesia related complications -** Risks of anaesthesia have decreased as advances in technology have improved and the need for akinesia and anaesthesia in IOL surgery have declined[32]. However, certain risks still remain.

i. Incomplete anaesthesia and akinesia - The danger is greatest from activity of the rectus muscles. This may lead to reduction of working space in the anterior chamber, bulging of ocular contents, gaping of the wound and prolapse of iris.

ii. Globe perforation - This is a rare complication as reported 1 in 12,000 cases for both peribulbar and retrobulbar anaesthesia. It occurs more frequently in myopic eyes and in deep set

eyes. Globe perforation causes hypotony, poor red reflex and marked pain at the time of perforation.[33]

Prevention: The needle should be inserted tangentially to the globe with the bevel facing the globe. If the resistance is greater than expected as the needle advances, the needle tip should be repositioned.

iii. Retrobulbar haemorrhage - This is not uncommon but vary in severity. Venous haemorrhages usually spread slowly and are often limited. An arterial haemorrhage causes a rapid and taut orbital swelling, marked proptosis with immobility of the globe and elevated intraocular pressue, inability to separate the eyelids and ecchymosis of lids and conjunctiva. The incidence is reported as 1% to 3%.[34]

Management**:** Immediate, direct orbital pressure to expedite clotting and limit the volume of blood behind the globe. Surgery can proceed if the globe is soft and easily retropulsed, the lids are loose and mobile, and proptosis is not excessive. Additionally, it may be necessary to perform a lateral canthotomy to reduce lid tightness. Intravenous mannitol can be used to decrease intraocular pressure (IOP). If the surgeon remains uncertain about safely proceeding after 30 min, it is best to reschedule the surgery.

iv. Sub-conjunctival haematoma & chemosis – Observed after excess and repeat anaesthetic solution injection.

v. Spontaneous dislocation of cataractous lens - Patient with weak & degenerated zonules, hyper-mature cataract & pseudo-exfoliation syndrome are more prone, mainly due to vigorous massaging after giving anaesthesia.

Treatment- Surgery to be postponed. Refer to vitreo-retinal surgeon.

B. Intraoperative complications

1. Superior rectus muscle laceration
2. Thermal burns
3. Wound construction related
4. Corneal complications-
    a. Stripping of Descemet's membrane
    b. Endothelial trauma
5. Haemorrhage
6. Iris injury-
    a. Iridodialysis
    b. Iris sphincter tear
    c. Iris prolapse
7. Complications related to anterior capsulotomy-
    a. Unequal capsule tags
    b. Radial tear and peripheral extension
    c. Small capsulectomy
8. Posterior capsule tears
9. Vitreous loss
10. Dropped nucleus/Lens fragments
11. Dislocated intra-ocular lens
12. Expulsive haemorrhage

1. Superior rectus muscle laceration – It is due to direct damage to the muscle while putting the bridle suture**,** very rarely causes post-operative ptosis if levator muscle complex also gets damaged.

2. Thermal burns - Due to excessive cauterization to prevent bleeding while making conjunctival flaps**,** inadvertent corneal burns might occur. Post-operative contracture of burnt tissue & excessive conjunctival cutting may hinder future glaucoma surgery.

3. Wound construction related -The goal is to achieve a well-sealed, astigmatically neutral wound. The complications that may be encountered are related to the wound placement, the length and the depth of the incision.

a. Placement - Ideally placed at a distance of 2-3 mm from the posterior border of blue line.

Anterior incision leads to poor self-sealing effect, wound leak and against the rule astigmatism.

Management: Suturing the incision.

Posterior incision causes wide tunnel, risk of bleeding, risk of premature entry and difficulty in nucleus delivery and instrument manipulation.

Management: Suturing for premature entry.

b. Incision length - Surgeon should strive for as short an incision as possible for wound stability and minimizing induced astigmatism. However, minimum length of the wound depends on the size and hardness of nucleus and size of intra-ocular lens.

Short incision leads to difficultly in nucleus delivery, endothelial damage and Iris damage.

Management: Enlarge incision with keratome.

Long incision causes poor approximation, wound leak and induced against the rule astigmatism.

Management- Suturing the incision.

c. Incision depth - Ideally half to one third of scleral depth. Due to improper incision depth there can be –

Button holing due to superficial dissection of the scleral flap.

Management: Abandoning it and making a new deeper dissection usually sufficient.

Premature entry due to improper depth.

Management: To start dissection in a new plane. Suturing the tunnel at the end.

Scleral disinsertion is due to very deep groove incision by complete separation of the inferior sclera from the sclera superior to the incision.

Management- It is necessary to use radial sutures to secure the edges of the incision.

4. Corneal complications-

a. Stripping of Descemet's membrane - Occurs while entering sharp instrument in anterior chamber like keratome, Simcoe's irrigation-aspiration cannula or during intra-ocular lens insertion through inadequate incision. May cause corneal oedema with cellular & fibrous infiltration and anterior synechiae by adhering to iris.

Management-If less than 20 percent of Descemet's membrane (DM) is detached, tamponade of air bubble is given beyond the detached inwardly curled tip of DM.

If more than 20 percent of DM is detached – full thickness 10-0 nylon suture is placed to adhere back DM to position.

For complete detachment intra-cameral injection of 20 percent hexafluoride gas (CF6) to fill half of anterior chamber is the most effective mean. Despite aggressive therapy, patients with very large tear often require corneal transplantation.[35]

b) Endothelial trauma-

Normal endothelial cell count in adults - 2400-3000 cells / mm^2

Endothelial trauma can occur by instrument injury or by direct contact with nucleus or intra-ocular lens if maneuvering in shallow anterior chamber.

Prevention is by ample use of viscoelastic material to keep anterior chamber formed & deep during surgery.

5. Haemorrhage - Impairs surgeon's view. It can arise from scleral bed vessels during scleral tunnelling and from iris vessels while performing iridectomy or if iridodialysis is produced.

Treatment: Direct wet field coagulation by point cauterization, adding epinephrine in balanced salt solution (BSS) irrigation solution, washing out of retained blood or air bubble tamponade.

6. Iris injury - Can occur due to direct injury to the iris.

a. Iridodialysis - Occurs during enlargement of incision or during intra-ocular lens implantation. Problems with large iridodialysis include small pupil, diplopia, iridodonesis and increased incidence of cystoid macular oedema.

Treatment- If the iridodialysis is small – it is left alone.

If the iridodialysis is large-- Mc-Cannel's suture applied. Suturing the border of dialyzed iris to the posterior margin of incision wound.

b. Iris sphincter damage - Most commonly caused during delivery of hard nucleus or intra-ocular lens implantation through poorly dilated pupil, resulting in iris sphincter rupture and atonic pupil

Causes of small pupil- long term use of miotic therapy

-pseudo-capsular exfoliation

-senile miosis.

It is managed by pre-operative topical anti-inflammatory viz, flurbiprofen eye drops along with dilating drops or intra-operative epinephrine in infusion flow.

Other methods used are radial iridotomy, peripheral iridectomy, multiple sphincterotomies and use of iris retractors.

c. Iris prolapse - It causes distortion of pupil, risks significant trauma to iris. It makes introduction of instruments into anterior chamber difficult. Increased intra-ocular pressure from external or internal etiologies is the cause for iris prolapse as well as incision that is too large or too posterior.

Management: Iris is gently repositioned in most cases. If it fails, small peripheral iridectomy is performed at the site of prolapse.

7. Complications related to anterior capsulotomy - Continuous tear capsulectomy provides the strongest opening and is most resistant to peripheral extension during nucleus manipulation, cortical removal and intra-ocular lens implantation. Imperfections in capsular rim greatly complicate all subsequent steps.[36]

a. Unequal capsular flaps - Most common complication encountered in can-opener technique. These flaps have a tendency to be aspirated into the irrigation/aspiration cannula leading to inadvertent tear towards the zonules. If this goes unrecognized, a large posterior capsular tear can occur rapidly or sometimes the whole capsular bag may be aspirated.

Prevention: The use of multiple fine punctures (up to 30-40 in number) to create the anterior capsulotomy eliminates capsular flaps.

b. Radial Tear & Peripheral Extension - Occurs in anterior bowing of lens iris diaphragm, shallow anterior chamber and positive posterior pressure. A similar tendency occurs in young patients. Intumescent cataracts also predispose to peripheral tearing due to high intra-capsular pressure.

Management: To avoid peripheral extensions, anterior chamber should be stabilized with viscoelastics. If anterior capsule tear extends too far peripherally, switch to a can-opener technique or a scissor capsulotomy to complete the capsulectomy. An alternative option is to create a second continuous circumferential capsulorrhexis in opposite direction of original tear.

In case of intumescent cataract, this can be avoided by decompressing lens by puncturing the anterior capsule and aspirating lens material.[37]

c. Small Capsulectomy - More common in young patient as superior portion of capsule is most difficult to enlarge. They make manipulation of nucleus and removal of sub-incisional cortex more difficult. It can additionally lead to anterior capsular contraction leading to visual disturbances.

Management: New tear is started by making an oblique cut with Vannas scissors or cystitome in desired direction and make a larger capsulorrhexis or by giving relaxation cuts at 10'o clock and 1'o clock.

8. Posterior capsular tears - One of the most significant complication for cataract surgeons and may increase the intraoperative risk of dropped or retained lens fragments, as well as the postoperative risks of cystoid macular edema and retinal detachment.[38]

Certain predisposing factors are posterior polar cataract(with a pre-existing posterior capsular dehiscence), traumatic cataract, mature cataract, hyper-mature cataract, post-vitrectomy cataract, eyes with long axial length (with weak bag and weak zonules), eyes with short axial length (with crowded anterior chamber), pseudo-exfoliation cases (with weak bag, weak zonules and poorly dilating pupil) Posterior capsular tears can occur at any stage of the surgery but most commonly

occur during removal of cortex, expression of nucleus and as a result of extension of radial tears in the anterior capsule formed during creation of capsulorrhexis.

Signs of a posterior capsule rent which should alert a surgeon are-sudden deepening of the anterior chamber, momentary dilatation of the pupil (snap sign), sudden brightening of the fundal glow. Other signs are tilting of one pole of the nucleus, nuclear fragments which were previously mobile, lose their mobility and whole of the nucleus or a part of it may suddenly sink or disappear posteriorly into the vitreous cavity.

Management: Most important guideline to minimize the risk of vitreous prolapse and descent of lens material through a posterior capsular rent is to maintain a semi-closed pressurized system.[39]The safest manner to remove the remaining cortical matter is by dry manual aspiration. A posterior chamber lens implant can be used with capsular bag fixation if the break in the capsule is relatively small or with sulcus fixation if it is larger. If the most of posterior capsule has been lost, it is best to use an anterior chamber lens. Some surgeons prefer a scleral-fixated posterior chamber lens, iris claw lenses in this situation.

9. Vitreous loss - Loss of vitreous is most serious ocular complication that occurs during cataract surgery. The complications are related to the direct contact of vitreous with other structures, incarceration of vitreous into the operative wound, fibroplasia of the residual vitreous or inflammation.

Prevention: Single most important factor is surgery on soft eye, which reduces the incidence of vitreous loss. The soft eye may be achieved by three methods: digital pressure, hyperosmotic agents and posterior sclerectomy.

Management: Vitrectomy is very effective for limiting the amount of vitreous removed. If the incision is not water tight then suturing the incision is suggested, because even a mild wound leak can cause postoperative anterior chamber shallowing and forward movement of vitreous. A meticulously performed partial anterior vitrectomy will reduce the incidence of postoperative problems associated with vitreous loss such as up-drawn pupil, iris prolapse and vitreous touch syndrome.

10. Dropped Nucleus/Lens Fragments - This intraoperative complication logically follows the discussion of rupture of lens capsule and operative loss of vitreous. It requires additional surgery by vitreo-retinal specialist and it increases the risk of cystoid macular edema, retinal detachment, and persistent ocular inflammation.[40]The key to treating a dropped nucleus is to anticipate the problem before it happens and presumptively work to prevent it.

Management: If the descent of nucleus is seen, first viscoelastic agent can be injected behind the nucleus to establish a barrier to prevent the drop. The nucleus and cortex can be removed with the help of vectis. Kelman posterior-assisted levitation technique can be used in emergency to save a dropping nucleus.[41]

Despite these efforts if the nucleus cannot be recovered then standard pars plana vitrectomy is employed to clear the central vitreous cavity from cortex and nuclear fragments. Some surgeons advocate the use of perfluorocarbon liquid to float the nuclear particles away from the retina for fragmentation.[42]

11. Dislocated Intraocular Lens - Dislocation of an intra-ocular lens implantation into the vitreous may occur in the presence of a large break in the posterior capsule. An intraocular lens resting on the retina or embedded into the vitreous base is often well tolerated. Variable options for treatment include simple observation, removal with or without exchange, and repositioning.

12. Expulsive haemorrhage - The most dreaded complication of ocular surgery is an expulsive haemorrhage. It results from choroidal haemorrhage in an open-eye with reduced intraocular pressure. Source of haemorrhage is one of the numerous arteries supplying the uveal tract, most studies have implicated short posterior ciliary arteries. Sudden hypotony secondary to surgical decompression of globe, commonly after delivery of lens leads to rupture of blood vessels. Expulsive haemorrhage may occur hours to even days after the surgery.

Many factors are important in pathogenesis such as advanced age, pre-existing uveitis, glaucoma, high myopia, systemic hypertension, generalized arteriosclerosis and diabetes.

Anterior chamber shallowing with positive pressure is the first sign. Surgeon sees gradual loss of red reflex through pupil as a dark mass steadily increases in size. Patient complains of pain despite good anaesthesia, globe suddenly becomes firm and there is spontaneous gaping of wound followed by expulsion of intra-ocular contents.

Management: The most important aspect of managing is early recognition. At the earliest notice of signs of expulsive haemorrhage, the eye is to be closed as quickly as possible. Manual tamponade can be done. Draining choroidal haemorrhage via posterior sclerotomy, 3.5-4 mm posterior to the limbus is done. Prognosis is very poor, most of the times the eye is lost and evisceration has to be done.

C. POST-OPERATIVE COMPLICATIONS

I. Early postoperative complications

II. Delayed (late) postoperative complications

III. IOL-related complications

Complications occurring within first three weeks of surgery are classified as early and those slower or delayed onset as late[43]

I. Early post-operative complications

1. Striate keratopathy and corneal oedema
2. Flat/ shallow anterior chamber
3. Iris prolapse
4. Hyphaema
5. Post- operative uveitis
6. Post- operative glaucoma
7. Retained lens matter
8. Bacterial endophthalmitis

1. Corneal complications - Includes corneal oedema from endothelial dysfunction, which may be temporary as in endothelial shock or due to permanent loss of endothelial cells.

Direct contact of nuclear fragments or instruments and prolonged irrigation with anterior chamber instability have been implicated as the cause. A preoperative corneal degenerative condition, a higher grade of the nucleus, large nucleus, and some intra-ocular lens types have been associated with endothelial loss.

Striate keratopathy is characterized by folds in the Descemet's membrane and corneal oedema. Prevention of these complications lies in exercising care during surgery to protect the endothelium with high molecular weight viscoelastics, preventing repeated shallowing of the anterior chamber and generally maintaining a distance from the endothelium – working in the iris plane or below.

Management of corneal oedema includes frequent steroid drops to reduce inflammation which may affect endothelial function, mydriatics, topical anti-glaucoma agents, and in severe cases, hypertonic solutions (5% sodium chloride). Severe corneal oedema not responding to this treatment will require penetrating keratoplasty.

2. A shallow anterior chamber - With a low intra ocular pressure encountered postoperatively may be due to a wound leak or choroidal detachment. Wound leak is a common problem seen when wound construction in phacoemulsification and small incision cataract surgery and wound closure in extra-capsular cataract extraction has not been adequate. A large incision in the clear cornea or an irregular tunnel dissection may not be self -sealing and may require suture support. Side port leakage can result in a shallow anterior chamber if it is too large.

Detached ciliochoroid presents as a convex brownish mass in the involved quadrant with shallow anterior chamber.

Pupil block due to vitreous bulge leads to formation of iris bombe and shallowing of anterior chamber. If the condition persists for 5-7 days, permanent peripheral anterior synechiae may be formed leading to secondary angle closure glaucoma.

Initial treatment includes a pressure bandage given for 24 hours. Medical treatment includes systemic steroids and local mydriatics. Rarely, drainage of the supra-choroidal space may be required, after which an air bubble is left in the anterior chamber to keep it formed. Pupil block is managed initially with mydriatic, hyperosmotic agents (e.g., 20 percent mannitol) and acetazolamide. If not relieved, then laser or surgical peripheral iridectomy should be performed to bypass the pupillary block.

3. Iris prolapse - Another important complication encountered if the wound has not been secured well. A sudden rise in intraocular pressure due to straining or coughing or blunt trauma

in the face of a compromised wound will lead to egress of anterior chamber contents – aqueous and uvea from the wound. This complication places the patient at an increased risk of endophthalmitis and glaucoma.

Treatment needs to be immediate especially if the prolapsed iris is not covered by conjunctiva. A fresh prolapse without signs of epithelisation or exudate should be reposited and the wound secured properly after forming the anterior chamber. If the prolapse appears to have been there for some length of time and has epithelisation on its surface, or is covered with exudate, the prolapsed tissue is best abscised and the wound sutured.

4. Hyphema - Common source of blood in anterior chamber includes – bleeding from wound, trauma to iris, expulsion haemorrhage. Intraoperative increase handling of iris or instrumental trauma of uveal tissue can lead to hyphema postoperatively. The chief complications of hyphema are secondary glaucoma and blood staining of the cornea.

Management: A small hyphema will resolve within 4-5 days. A severe hyphema may need to be drained. Medical management includes keeping a watch on the intra-ocular pressure and instituting topical anti-glaucoma drugs if the IOP rises. Systemic vitamin C can be beneficial.

5. Post-operative uveitis - Can be worrisome if there has been too much handling of uveal tissue during surgery or cortical material or viscoelastic has been retained or vitreous loss has not been managed appropriately.

Intensive local steroids and mydriatics supplemented in severe cases by systemic steroids are warranted.

6. Post-operative rise in intra-ocular pressure - May be due to the presence of viscoelastic or air in the anterior chamber, uveitis secondary to retained cortical matter, pupillary block glaucoma, a suprachoroidal haemorrhage, or malignant glaucoma. A transient rise in intra-ocular

pressure during first week of cataract surgery is a common occurrence. The cause is not entirely clear but it may be swelling of trabecular meshwork fibers or breakdown of blood aqueous barrier.

Treatment lies in identification of the cause and appropriate management. Local steroids, anterior chamber wash if amount of cortical matter is quite large, peripheral iridectomy, and in some cases surgical drainage of supra-choroidal blood may be required.

7. Retained lens cortical matter - Inadequate aspiration of the cortex, especially behind the iris at the 12'o clock position, is the commonest cause of retained lens material after cataract surgery. It causes decreased visual acuity, uveitis, increased incidence of posterior capsule opacification and pupillary block.

Management: In case with minimal cortical mater, the anterior segment inflammation can be treated with topical steroids and cycloplegics. In cases with significant cortical residue, surgical removal is essential.

8.Bacterial endophthalmitis - This is one of the most dreaded complications with an incidence of 0.07-0.13 percent.[44] The principal sources of infection are contaminated solutions, instruments, surgeon's hands and patient's own flora from conjunctiva, eyelids and air-borne bacteria.

Symptoms and signs of bacterial endophthalmitis are generally present between 48 and 72 hours after surgery and include: ocular pain, diminished vision, lid oedema, conjunctival chemosis and marked circum-ciliary congestion, corneal oedema, exudates in pupillary area, hypopyon and diminished or absent red pupillary glow.

Management-It is an emergency and should be managed vigorously.

A. Antibiotic therapy -1. Intra-vitreal antibiotics and diagnostic tap should be made as early as possible.

First choice: Vancomycin 1 mg in 0.1 ml plus ceftazidime 2.25 mg in 0.1 ml.

Second choice: Vancomycin 1 mg in 0.1 ml plus Amikacin 0.4 mg in 0.1 ml.

Third choice: Vancomycin 1 mg in 0.1 ml plus gentamycin 0.2 mg in 0.1 ml.

Some surgeons prefer to add dexamethasone 0.4 mg in 0.1 ml to limit post-inflammatory consequences.

If there is no improvement, a repeat intra-vitreal injection should be given after 48 hours taking into consideration the reports of bacteriological examination.

1. Sub-conjunctival injections of antibiotics should be given daily for 5-7 days to maintain therapeutic intraocular concentration.
2. Topical concentrated antibiotics should be started immediately and used frequently (every 30 minute to 1 hourly).
3. Systemic antibiotics have limited role in the management of endophthalmitis, but most of the surgeons do use them.

B. Steroid therapy- Steroids limit the tissue damage caused by inflammatory process. Most surgeons recommend their use after 24 to 48 hours of control of infection by intensive antibiotic therapy.

C. Supportive therapy- 1. Cycloplegics- preferably 1% atropine or alternatively 2% homatropine eye drops should be instilled TDS or QID.

2. Anti-glaucoma drugs

D. Vitrectomy operation should be performed if the patient does not improve with the above intensive therapy for 48 to 72 hours or when the patient presents with severe infection with

visual acuity reduced to light perception. Vitrectomy helps in removal of infecting organisms, toxins and enzymes present in the infected vitreous mass.

II. Late onset post-operative complications

1. Pseudophakic bullous keratopathy
2. Epithelial down growth
3. Fibrous ingrowth
4. Delayed chronic postoperative endophthalmitis
5. Posterior Capsular Opacification
6. Cystoid macular edema
7. Retinal detachment

1. **Pseudophakic bullous keratopathy -** Presents as long standing corneal edema not responding to medical management. It is due to corneal decompensation as a result of inadequate endothelial function. Patients are usually symptomatic, with pain, redness, foreign body sensation, tearing and diminished vision.

The ultimate treatment is a penetrating keratoplasty, though topical anti-glaucoma medication, hypertonic solutions, steroids and tear substitutes can be tried. Anterior stromal puncture with a 26 G needle under bio-microscopic control can also impart some degree of relief.

2. Epithelial down growth - It is a clinically rare occurrence. Incidence of 1.1% was reported by Theobald and Hass.[45] The condition is characterized by a sheet of epithelium growing down from the surgical incision and covering the corneal endothelium and/or iris surfaces. One possible explanation for this condition is that epithelial cells are introduced into the anterior chamber during surgery, and they adhere to intraocular structures and begin to proliferate as a

cellular membrane. The clinical signs include elevated intra ocular pressure, clumps of cells floating in the anterior chamber, a visible retro corneal membrane, an abnormal iris surface and pupillary distortion. Diagnosis of epithelial down growth is confirmed with the argon laser.

Management- Local application of cryotherapy or of 5-fluorouracil has been reported to be effective but not uniformly successful.

3. Fibrous ingrowth – It is characterized by an ingrowth of connective tissue elements into the anterior chamber, may occur very rarely when the cataract wound apposition is not perfect. It is also related to incarceration of vitreous, iris and lens matter in the wound, prolonged intra- ocular inflammation, excessive bleeding into the anterior chamber. It may cause bullous keratopathy, secondary glaucoma, retinal detachment and ultimately phthisis bulbi.

Management: A fibrous membrane covering the pupillary aperture may be incised, secondary glaucoma treated by cyclodialysis, cyclocryotherapy and retinal detachment treated by severing the fibroblastic bands and performing buckling procedures.[46]

4. Delayed chronic postoperative Endophthalmitis - is caused when an organism of low virulence (Propiono-bacterium acne or Staphylococcus epidermidis) becomes trapped within the capsular bag. It has an onset ranging from 4 weeks to years (mean 9 months) postoperatively and typically follows an uneventful cataract extraction with a posterior chamber intra-ocular implantation in the bag.

5. Posterior capsular opacification - One of the most important and vision affecting complication is the occurrence of posterior capsular opacification (PCO) after surgery. The incidence of posterior capsule opacification varies with different studies. Rates have been reported as 10-56 percent at 3 years with differing lens materials[47]. Experimental and pathologic studies indicate that posterior capsule opacification occurs as a result of the formation of opaque

secondary membranes by active lens epithelial proliferation, transformation of lens epithelial cells into fibroblasts with contractile elements and collagen deposition[48]. The anterior lens epithelial cells proliferate onto the posterior capsule at the site of apposition of the anterior capsule flaps to the posterior capsule.[49]

A good cortical clean–up, anterior capsular cleaning is more important. The anterior capsular rim should just cover the optic edge. A posterior capsulorrhexis is recommended in children where the occurrence of PCO is very high. Hydrophobic acrylic lenses with square lens edge designs have also been found to decrease posterior capsule opacification by decreasing the migration of lens epithelial cells.

The treatment of a PCO causing visual loss is a posterior capsulotomy, nowadays, Nd-YAG laser capsulotomy is the method of choice.

6. Cystoid macular edema (CME) - Collection of fluid in the form of cystic loculi in the Henle's layer of macula is a frequent complication of cataract surgery. However, in most cases it is clinically insignificant, does not produce any visual problem and undergoes spontaneous regression. In few cases, clinically significant CME typically produces visual diminution one to three months after cataract extraction. On funduscopy it gives honeycomb appearance. On fluorescein angiography it depicts typical flower petal pattern due to leakage of dye from perifoveal capillaries.

In most cases it is associated with vitreous incarceration in the wound and mild iritis. Therefore, immediate pre-operative and post-operative use of anti-prostaglandins eye drops is recommended as prophylaxis. In cases of CME with vitreous incarceration, anterior vitrectomy along with steroids and anti-prostaglandins may improve visual acuity and decrease the amount of discomfort.

7. Retinal detachment (RD) - Incidence of retinal detachment is higher in aphakic and pseudophakic patients as compared to phakics. Other risk factors for retinal detachment include vitreous loss during operation, associated myopia and lattice degeneration of the retina, blunt trauma and positive family history.

Following removal of the crystalline lens by any method, structural changes in the vitreous have been documented to occur. Loss of hyaluronic acid, increased vitreous gel mobility, and progressive vitreous syneresis together result in the development of posterior vitreous detachment, which is considered to be inciting factor. Most RDs following cataract surgery occur within one year of surgery.

Management- Laser or cryotherapy retinopexy should be performed within 24-48 hours of the identification of symptomatic retinal tears. Patients who require retinopexy for symptomatic retinal lesions need careful post treatment follow-up. As many as 22% may require additional treatment[50] and the fellow eye, whether aphakic or pseudophakic, remains at a high risk for detachment.

III. IOL related complications-

1. Lens precipitates
2. Pupil capture
3. Malposition of IOL
4. Toxic lens syndrome
5. Uveitis-Glaucoma-Hyphema syndrome

1. **Lens precipitates**- They may be seen on the IOL post operatively. These are three types- pigment deposits arising from the pigment epithelium of iris

-greyish white precipitate that are residue of lens matter

-deposits that resemble with keratic precipitates.

These lens precipitates lessen with time.

2. **Pupillary capture-** Occurs postoperatively when a part or whole of the IOL optic moves anterior to the iris to get entrapped at the pupil. It may lead to an irregular pupil, limit full dilatation and may cause inflammation.

Management-The pupil should be dilated first to allow the IOL to fall back and then the pupil must be constricted to maintain the status. IOL dialing may be required to correct the same.

3. **Malposition of IOL**- Malposition of PCIOL are seen less frequently with a reported incidence of 0.4%.These may be in the form of decentration, subluxation and dislocation. The fancy names attached to various malposition of IOL are-

a. Sun-set syndrome (Inferior subluxation of IOL).

b. Sun-rise syndrome (Superior subluxation of IOL).

c. Lost lens syndrome refers to complete dislocation of an IOL into the vitreous cavity.

d. Windshield wiper' syndrome- Occurs when the IOL is too small for the eye and the superior haptic moves with head movements. It may need fixation with a Mc Cannel suture if troublesome.

e).IOL decentration- Occur postoperatively in cases where there had been a posterior capsular tear with vitreous disturbance during surgery, or where an irregular capsulotomy has led to improper positioning of the IOL. Capsular fibrosis can also lead to IOL decentration.

Management of this situation depends on the degree of displacement and the visual complaints. Gross malposition may require repositioning by dialing the IOL and fixation if the positioning does not hold.

4. **Toxic lens syndrome** - It is the uveal inflammation excited by either the ethylene gas used for sterilizing IOLs (in early cases) or by the lens material (in late cases). The hallmark is its rapid onset, usually within 12-24 hours, patients are usually pain free. Limbus to limbus corneal edema is considered to be the classic finding, anterior chamber reaction can be moderate to severe. The intraocular pressure can be elevated secondary to trabecular meshwork damage.

Management- It often rapidly improves after topical steroids are instituted.

5. **Uveitis-Glaucoma-Hyphema Syndrome** -The syndrome was first described in the context of rigid anterior chamber and closed-loop IOLs. The classic triad or individual elements may occur as a result of inappropriate 1OL sizing, contact between the implant and vascular structures or the corneal endothelium, or defects in implant manufacturing. This can also be seen in patients with posterior chamber lenses, owing to contact between lens loops and uveal tissue in the posterior chamber.

Management-Uveitis, glaucoma, and/or hyphema may respond to treatment with topical anti-inflammatory medications or anti-glaucoma medications. If the symptoms are not alleviated sufficiently by medical therapy or if inflammation threatens either retinal or corneal function, 1OL removal must be considered.

REVIEW OF LITERATURE OF POSTERIOR CAPSULE RENT

Posterior capsular rupture (PCR) with or without vitreous loss is one of the common intra-operative complication during cataract surgery and is widely regarded as the benchmark complication to judge surgical quality. [51]

Incidence

Posterior capsule rent (PCR), reported to occur in 0.5% to 7.5% of cases depending upon a number of factors, including type, etiology and stage of the cataract, the technique of cataract surgery, and skill of the surgeon.

The first **National Cataract Surgery Survey** (1993) reported rates of PCR without vitreous loss (VL) of 4% and PCR with VL 1%[52], and the second National Cataract Surgery Survey 1997–1998 had an overall PCR with or without VL of 4.4%[12].

The First **Pilot National Electronic Cataract Surgery Survey** (2005) found an overall posterior capsular/ zonular rupture rate of 2.68% (published only in Royal College Cataract Guidelines[53]) and two more recent studies in 2006 reported a rate of 1.7% for PCR with or without VL[54] and 1.1% for PCR with VL and 0.4% for PCR alone.[51]

The incidence of posterior capsule tear following extra capsular cataract extraction (ECCE) ranges from 0.2% to 10.3%.[55, 56]

Osher and **Cionni** reported an incidence of torn capsules of approximately 1% in a retrospective analysis of 5,857 patients who had undergone ECCE. [39]

Pearson et al reported that the incidence of torn capsules with vitreous loss decreased from 10.3% to 3.2%, with increased duration of residency surgical training and an improved educational program[57].

Straatsman et al noted that faculty members encountered no posterior capsule tears in 89 cases, whereas residents encountered three cases in 139 eyes (2.2%) [58].

Natchiar et al retrospectively reviewed charts of 898 patients undergoing planned extra-capsular cataract surgery during a 6-month period. All patients received surgery as inpatients at the Aravind Eye Hospital, Madurai. He reported the frequency of posterior capsule tears to be 1.7% in ECCE procedures performed by experienced surgeons[59]

Malhotra R et al did a prospective randomized study over two years including 121 patients who underwent manual small incision cataract surgery. He reported that posterior capsular rent occurred in 3.3%.[60]

Analysis of 1820 cases by **Neekhra A et al**, operated over a period of 2 years showed an overall incidence of posterior capsular rent of 6.04%; while in ECCE incidence was 6.5%, in small incision cataract surgery and phacoemulsification it was 4% and 9.54% respectively.[61]

A retrospective analysis of patient records of 368 eyes of 368 patients operated by two high-volume surgeons was performed by **Trivedi J et al.** It showed 0.3 % had a posterior capsule tear without vitreous loss and 0.5 % posterior capsule tear with vitreous loss.[62]

In a Pune based study of 200 cases undergoing MSICS, done by **Gogate et al** in 2005 reported the incidence of PC rent as 6%[63]. Another prospective observational study done in 100 cases of white cataract by **Rengaraj Venkatesh et al**[64] at Aravind Eye Hospital, over six months reported not a single case of posterior capsule rent.

The incidence of posterior capsule tear during phacoemulsification ranges from 0.7% to 16% and has been correlated not only with the learning curve and experience, but also, apparently, with individual surgical skill.[19, 65, 66]

Prasad reported a study in which phacoemulsification was performed by two junior trainee ophthalmologists under supervision of senior surgeons; the frequency of posterior capsule tear was 5.8%.[67]

Ionides collected prospective data of 1533 cases over three years. A total of 59 (4.1%) eyes had a PC tear at surgery. Posterior capsule tear occurred in five (1.2%) of the consultant surgical cases and 54 (5.3%) of the cases performed by surgeons in training.[14]

Predisposing factors/ Risk factors

1. Cataracts associated with pseudo-exfoliation, trauma and diabetes mellitus.
2. Congenital defects like posterior lenticonus and persistent primary hyperplastic vitreous.
3. Posterior polar, Morgagnian and hyper-mature cataract.
4. Poor visibility, small and rigid pupil.
5. Inexperienced surgeons or anxious patients with inadvertent movement.

A higher incidence of posterior capsule tear with vitreous loss is associated with cataract with pseudo exfoliation, diabetes mellitus, and trauma. [68]

The incidence of posterior capsule tears in cases with posterior polar cataracts ranges from 26% to 36%.[39] Two mechanisms have been proposed by **Osher et al** [20] for the occurrence of posterior capsule tear in these cases —traction exerted on the plaque adherent to the posterior capsule, and an inherent weakness of the posterior capsule.

Posterior lenticonus, cataracts with persistent primary hyperplastic vitreous, and cataracts following vitreo-retinal surgery have also demonstrated increased propensity for the occurrence of the rent.[38]

A large number of Morgagnian and hypermature cataracts have wrinkled, tough, or even calcified posterior capsules without any elasticity. This, combined with the weaker zonules of hypermature cataract, contributes to greater risk of posterior capsule tear and vitreous loss. **Brazitikos** reported a 10% incidence of posterior capsule tear with a 3% incidence of vitreous loss in cases of white cataracts[69].

Poor visibility due to deep set eyes with prominent brow, fluid pooling, dense arcus, corneal scars and small pupil (as in diabetic patients, post-uveitic posterior synechiae, pseudo exfoliation and senile pupillary rigidity) can also be a major challenge during surgery.[20]

Additional risk factors for posterior capsular rent could include inexperienced surgeons; demented, disoriented or anxious patients with subsequent inadvertent patient movement; equipment malfunction; and preexisting trauma with unseen capsular rupture or zonular damage.

Intra operative risk factors

Posterior capsule tears occurring intra-operatively are crescent or irregular in shape, with thin margins and may be located anywhere; in a study done by **SK Angara et al** they were most often present superiorly, i.e., between 10 and 2 o'clock.[15] These posterior capsule tears rapidly enlarge with continuous irrigation due to over hydration of vitreous creating positive pressure.

Posterior capsule tears can occur during any stage of the surgery. They occurred most frequently during the stage of nuclear emulsification, as reported by **Mulhern et al** (49%) [38] and **Osher et al**[20] and during irrigation–aspiration, as reported by **Gimbel**[70] and **Zheng et al**.[71]

The various steps of the cataract surgery when posterior capsular rent can occur are-

1. Smaller incision size jeopardizing the manual expression of the nucleus

2. Large leaky wound

3. Trauma during capsulotomy

4. Extension of radial tears of the anterior continuous curvilinear capsulorrhexis through the capsular fornix into the posterior capsule.

5. Small pupil in the course of cortex aspiration, and high pressure from the posterior chamber.

6. Vigorous hydro dissection especially in eyes with incomplete rhexis, posterior polar cataract, traumatic cataract, pseudo-exfoliation cataracts, mature and hyper mature cataract.

7. In case of incomplete capsulorrhexis, during irrigation aspiration of cortex, tags of anterior capsule can be caught.

8. Hydro prolapse of the nucleus or hooking out of the nucleus through a small rhexis can exert undue pressure on the posterior capsule

9. Manipulation in the bag without adequately pressurizing the anterior chamber. When the anterior chamber keeps collapsing there are high chances of the lax posterior capsule coming up and getting caught.

10. Infrequently during intraocular lens placement and dialing.

11. During polishing of the posterior capsule.

Signs

Early recognition of a posterior capsule rent is pertinent to its successful management eventually resulting in good visual outcome.

Various signs[20] that should alert the surgeon are-

1. Sudden deepening of the anterior chamber
2. Momentary dilatation of the pupil (snap sign)
3. Sudden brightening of the fundal glow
4. Nucleus paradoxically moves away on aspiration, sways sideways or falters posteriorly
5. Whole of the nucleus or a part of it may suddenly sink or disappear posteriorly into the vitreous cavity.

Prevention and management

The rupture of the posterior capsule with its attending complication is one of the most feared complications of cataract surgery.

The management of PCR is dependent on –

Its immediate recognition,

Size of the tear,

Whether the anterior hyaloid face is intact,

The stage at which the surgical procedure has reached, and

The complication which have ensued prior to recognition of the PCR.

Timely recognition and planned management is required to ensure an optimal visual outcome. The major goals include-

1. To avoid posterior dislocation of nucleus, nuclear fragments, cortical matter into the vitreous cavity.
2. Prevent any damage to corneal endothelium.
3. Proper positioning of IOL.

First inject dispersive viscoelastic with the non-dominant hand through the side-port to inflate the bag properly and then withdraw. This small precaution will prevent the anterior chamber from collapsing eventually leading to enlargement of the rent, disruption of the anterior hyaloid face and prolapse of the vitreous into the anterior chamber. So maintenance of the anterior chamber throughout is of prime importance to prevent further complications.

A. Anterior Vitrectomy

It is important to confirm the presence of vitreous prolapse into the anterior chamber. It can be assessed by following simple maneuvers-

1. Sweep a sponge or swab stick along the site of incision. Vitreous if present can be seen as strands along the section. It will also cause pupillary peaking and pull on the capsule rim.

2. Insert the spatula from the side-port and sweep from the anterior chamber angle under the incision towards the rent. Vitreous if present will be seen getting dragged as it has a tendency to come towards the wound.

3. Put viscoelastic in the bag, to flatten it or keep it slightly convex to elicit the halo test. Try to look for the ring reflex by applying the pressure in the center of the capsule with the help of a

rounded repositer. If the hyaloid face is intact, a halo will be seen. This ring reflex will be broken at the site of rent.

4. Stain with preservative free triamcinolone acetonide just adjacent to the margin of the rent. Vitreous if present will get stained.

Anterior vitrectomy must be carried out meticulously to prevent a myriad of post-operative complications. Sponge vitrectomy is now obsolete because of the intense vitreo-retinal traction it might exert.

Automated vitrectomy[72] should be done. Vitrectomy should always be done through the side port incisions in order to maintain a closed chamber and prevent further vitreous prolapse. Start vitrectomy from the main incision and then proceed inwards towards the pupil and posterior capsule. Vitrectomy has to be done just beyond the posterior capsule in order to confirm absence of vitreous in anterior chamber.

Alternatively, 23 gauge or 25 gauge pars plana-vitrectomy is recommended as it does not pull the vitreous anteriorly and transects the vitreous at its base which lessens the chance of post-operative vitreo-retinal traction to a greater extent.

For confirming the completion of vitrectomy, following simple maneuvers can be used-

1. Inject air bubble and look for its fragmentation (not very reliable).

2. Inject pilocarpine and look for peaking of pupil.

3. Inject triamcinolone acetonide which will stain the vitreous.

B. Nucleus management

Next step is to decide about the management of the nucleus. The management will depend on the extent of the rent and size, position and hardness of the nucleus and surgeon experience.

If the rent is small and the nucleus fragment is small, with the help of a second instrument it can be moved away from the site of rent.

If a large brunescent nucleus is left back its better to convert to a large incision surgery. The nucleus is delivered by Bluementhal technique, irrigating wire Vectis or surgeon's preferred technique.

If the nucleus has descended partially into vitreous, it is prudent not to go chasing behind it. Alternatively "Posterior assisted levitation technique" as described by **Dr. Kellman**[41] or "Chopstick technique" as described by **Dr. Harbansh Lal**[74] can be used to bring the nucleus into the pupillary plane and anterior chamber through the pars plana route for further management. Retrieval of nucleus from deep vitreous is not recommended and should be dealt with after a suitable interval by a vitreo-retinal surgeon.

C. Cortical clean up

Residual cortex and epinucleus should be removed using low flow, low vacuum bimanual irrigation aspiration technique. Cortex remote from the rent should be stripped towards the rent site and not vice-versa. Mechanical suck and spit is a better controlled system. An alternative method is "dry aspiration" which can be done manually using the Simcoe cannula.[72]

D. IOL placement

IOL placement again depends on the site and extent of rent.

1. If the capsule tear is small and circular, capsular fixation of IOL can be attempted. The single piece foldable IOL is ideal in these situations because of the controlled unfolding and flexible haptic. While implantation a good view of the anterior capsule rim and posterior capsule is important in order to ensure the IOL goes in the bag and not into sulcus or in the vitreous cavity. Care should be taken to ensure the haptics are away from the rent.

   Many a time it is difficult to ascertain whether all the vitreous has been cleared. In such situation inflate the bag with viscoelastics especially hyaluronic acid and do not dial the IOL instead follow the technique of "Pronate and release" or "hook and release" haptic placement.

2. In the presence of a large rupture, the best option will be sulcus placement of IOL.Three piece IOL is strongly recommended in these instances as the single piece foldable IOL with its bulky haptics can cause persistent uveal irritation.
3. In case of excessive damage to capsule and zonules-
   a) Anterior chamber intra-ocular lens implantation is the easiest and most often performed procedure**.**It may cause ciliary tenderness, inflammation, glaucoma, CME and corneal complications such as decompensation, hence regular follow up is a must.
   b) Scleral fixation of IOL is a good option if there is inadequate capsular support for bag or sulcus fixation.
   c) Iris fixated IOL can be tried in case of large rents.
   d) Glued IOL is a relatively new technique for fixing a posterior chamber IOL in an eye without a capsule.

It is very important to ensure that there is no vitreous in the wound or AC before closure. At this time a small iredectomy can also be performed.

It is absolutely important to have a watertight wound in case of posterior capsule rent as the incidence of endophthalmitis is higher.

Postoperative complications

1. **Corneal edema** is the most frequent cause of reduced vision in the early post-operative period. This is generally temporary. Varying rates of corneal edema ranging from11.6-59% have been reported.[75, 69]

2. **Glaucoma** is another complication reported in 13-40%[69, 76] patients with posterior capsular rent. Viscoelastic material remaining in the anterior chamber, preoperative glaucoma, trabecular blockage by dispersed lens particle and iris pigments and mechanical damage to the trabecular meshwork may lead to this post-operative event.

3. **Retinal detachment**-The most serious complication of posterior capsule rent is retinal detachment. In pseudophakic eyes on which small-incision technique has been used for cataract extraction, the overall incidence of subsequent RD is between 1 -1.2 % with a 1.117% risk annually[77]. The risk increases to 4-16%[77] in cases of open posterior capsule with vitreous loss.

4. **Cystoid macular edema** is another complication which can cause decreased visual acuity. Its incidence varies from 7.86-16.7%[78, 79] in different studies.

5. **Endophthalmitis**-These patients have a higher risk of endophthalmitis[80] so it is advisable to use intra-cameral antibiotics intra-operatively or oral and topical antibiotics post-operatively. Long term follow up is necessary in these patients to identify and manage posterior segment and IOL complications

Visual outcome

As per the study done by **Ionides A et al**[14] the final visual outcome of 94.5% of eyes without comorbidity achieved a final spectacle corrected visual acuity of 6/12 or better, similar to the 92% reported in the **National Cataract Surgery Survey**.[18]

Final visual outcome was 6/12 or better vision post-operatively after ten weeks in 90% of cases in a study done by **Neekhra A et al.**[61]

MATERIALS AND METHODS

MATERIALS AND METHODS

TITLE OF THE STUDY

Study of the risk factors and management of posterior capsular rent in manual small incision cataract surgery.

SOURCE OF DATA

This is a prospective study. During the period of December 2012 to May 2014 , among thousand consecutive patients undergoing manual small incision cataract surgery in the department of Ophthalmology at R.L.J. HOSPITAL AND RESEARCH CENTRE,TAMAKA,KOLAR attached to SRI DEVARAJ URS MEDICAL COLLEGE, those having intra- operative posterior capsular rent were studied.

INCLUSION CRITERIA

Cases with intra-operative posterior capsule rent with or without vitreous loss.

EXCLUSION CRITERIA

Patients with-

1. Traumatic cataract.
2. Complicated cataract.
3. Cataract associated with glaucoma, corneal dystrophy and degenerations, pseudo-exfoliation.
4. Posterior segment pathologies.

PRE-OPERATIVE EXAMINATION

1. Detailed ocular and systemic history was taken to rule out cases with pathology likely to affect outcome such as cases with previous trauma.
2. General physical examination was done.
3. Best corrected visual acuity recorded.
4. Apart from pupillary reaction, the size of the pupil and the readiness of its dilatation were evaluated.
5. Detailed Slit Lamp biomicroscopy examination with special attention to the adnexa, status of cornea, powdery deposits at the pupillary margin, the type of cataract and the grade of nucleus. Emphasis given on lens abnormalities like sub-luxated lens / zonular dialysis.
6. Direct ophthalmoscopy and indirect ophthalmoscopy was done to assess the fundus and the presence of retinal breaks or detachments, apparent diabetic retinopathy/ maculopathy.
7. Gonioscopy with Goldmann three mirror lens was done.
7. Intraocular pressure measurement was done by applanation tonometry.
8. Lacrimal Syringing was done to check for patency of lacrimal passage.
9. B-scan was done to rule out posterior segment pathology in case of dense cataracts.
9. Keratometry was done for corneal curvature
10. A-scan was done for calculation of IOL power using SRK-II formula
11. Routine blood investigations, fasting blood sugar, postprandial blood sugar and urine tests were done for all patients.

Informed consent was taken from all the patients prior to the surgery. All patients received systemic and topical antibiotics one day prior to surgery. The topical antibiotics were instilled every two hours until the time of surgery.

Eye lashes were trimmed on the previous day.

SURGICAL TECHNIQUE

1. On the day of surgery, pupils were dilated adequately with tropicamide (0.8 percent) and 5 or 10 percent phenylephrine eye drops every 10 minutes, one hour before surgery. To sustain the dilatation anti–prostaglandin eye drops Flurbiprofen was instilled half hourly for two hours before surgery.

2. Operative details were recorded to access the various factors that influence surgical procedure.

3. All patients were operated under peribulbar anaesthesia using a mixture of two ml bupivacaine 0.5 percent and, three ml lignocaine 2 percent with 1:200,000 adrenaline and 75 units of hyaluronidase.

4. Eyelids, eyebrows and the entire half of the face was painted with povidone iodine (5 percent) and a sterile drape was applied, lid speculum applied.

5. The incision area was exposed by putting a superior rectus bridle suture.

6. A fornix based conjunctival flap was dissected.

7. Bipolar cautery was used to stop active bleeding and obliterate large surface vessels.

8. A straight 6 mm superior scleral incision was made using a 15 No. surgical blade 2 mm distance away from limbus.

9. A partial thickness sclero-corneal tunnel was dissected from the incision to one mm into the clear cornea, using an angled crescent knife.

10. Anterior chamber (AC) was entered with a 3.2 mm keratome and reformed with air.

11. Anterior capsule was stained with trypan blue in cases of mature cataracts which was injected under the air bubble.

12. Anterior capsulotomy was done using a 26 G bent tipped needle either by can opener or curvilinear continuous capsulorrhexis (CCC) technique. A relaxing incision in the CCC was made. Size of the opening was ensured to be adequate for nucleus prolapse.

13. The internal opening was extended with a 5.2 mm angled Keratome.

14. AC was reformed using Viscoelastic.

15. Using a 26 G hydro-dissecting cannula, hydro-dissection was performed.

16. Nucleus was prolapsed into the AC using the lens dialler.

17. Nucleus was well coated with viscoelastic, both above and below. A wire vectis was introduced under the nucleus and Sinskey hook above it. The sandwiched nucleus was then extracted out.

18. The remaining cortical matter was removed by continuous irrigation and aspiration.

19. AC was reformed with viscoelastic and capsular bag distended with it.

20. Posterior Chamber Intraocular Lens was implanted into the capsular bag and dialed into position.

21. Minimal AC wash was given to aspirate the viscoelastic and lens matter if present.

22. Tunnel integrity was assessed.

23. Sub-conjunctival injection of Gentamycin and Dexamethasone was given.

24. Eye was patched.

In cases of rent,

1. Pupillary Dilatation noted: Whether fully dilated/ semi-dilated or constricted.

2. Capsulotomy / capsulorrhexis (CCC): Note was made-

   Whether capsulotomy with flaps or not –

   Whether CCC complete or not (size ranges for 4 mm to 7 mm) with or without tear.

   Shapes ranged from circular, vertical or horizontally oval to capsulotomy with ragged edges to capsulotomy with peripheral linear extension.

3. Hydro-dissection- note was made whether hydro was achieved or not and whether there was any difficulty in nucleus rotation.

4. Intra ocular lens (IOL) implantation-what type of IOL (posterior chamber or scleral fixated/ iris claw) used, whether it was placed in the bag or in the ciliary sulcus.

5. Any other stages at which PC ruptured with or without vitreous loss occurred were noted. Observing vitreous strands adherent to cotton bud, movements or peaking of the pupil specially when iris was swept with spatula were regarded as definite signs of vitreous loss in our study.

6. Anterior vitrectomy was done as and when needed.

7. Prophylactic peripheral iridectomy done in significant rent cases.

8. Few cases with corneal oedema precluding proper visualization, secondary IOL was implanted subsequently.

Post-operatively all patients received a course of topical antibiotic and steroid eye drops hourly followed by a tapering dose for six weeks along with Flurbiprofen eye drops 0.03 percent three times in a day for four weeks. Injection Diclofenac stat was given to patients who complained of pain. Systemic antibiotics was given for five days postoperatively.

Patients with scleral fixated intraocular lens (SFIOL), Iris claw or aphakic cases received short course of oral steroids.

Postoperatively patient were evaluated on first day, first week, first, third and six months.

The total duration of follow up was six months. 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 done to specially look for any vitreous strands / IOL de-centration / inflammation.
3. Indirect ophthalmoscopic evaluation and slit lamp biomicroscopy with + 90 D lens for assessment of macula was performed.

A careful note of all the positive findings were made and the compiled pre and postoperative data were analyzed.

RESULTS

Statistical Tools

The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done with the help of computer using **Epidemiological Information Package (EPI 2010)** developed by Centre for Disease Control, Atlanta.

Using this software range, frequencies, percentages, means, standard deviations, chi square , 't' value and 'p' values were calculated. 't' test was used to test the significance of difference between quantitative variables and Yate's and Fisher's chi square tests for qualitative variables. A 'p' value less than 0.05 is taken to denote significant relationship.

Microsoft Power point was used to prepare the graphs.

RESULTS

A: PROFILE OF CASES STUDIED

Table A1: Incidence of Posterior Capsule Rent

Posterior Capsule Rent	Cases	
	No	%
Yes	37	3.7
No	963	96.3
Total	1000	100

The incidence of posterior capsule rent in our study was 3.7%.

Figure 7: Incidence of posterior capsule rent

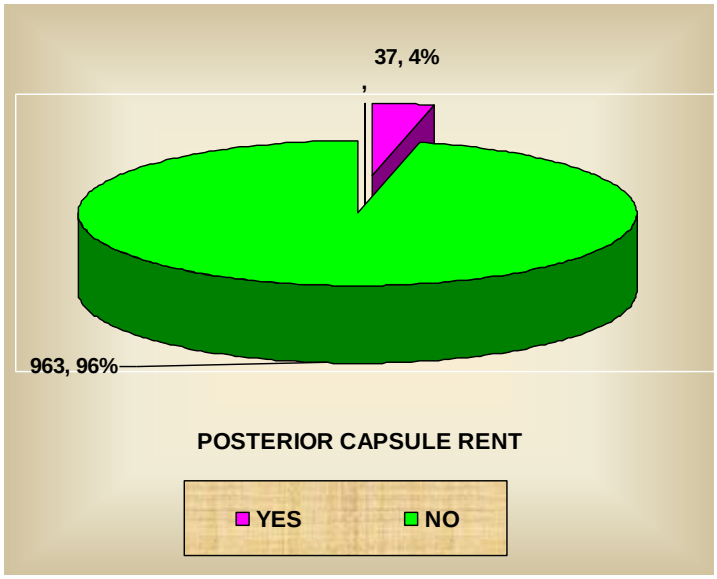


Table A2: Age distribution

Age in years	Cases(n=1000)		Cases(n=37)	
	No.	%	No.	%
Up to 40	14	-	-	-
41 – 50	76	7.6	3	8.1
51 – 60	300	30.0	12	32.4
61 – 70	464	46.4	13	35.2
>70	146	14.6	9	24.3
Total	1000	100	37	100
Range	35-90 years		50 – 88 years	
Mean	64.1 years		64.8 years	
S.D.	8.5 years		9.4 years	

In our study, 1000 patients undergoing manual small incision cataract surgery included 90 (9%) patients in age group <50 years, 300 (30%)patients in the age group 51-60 years, 464 (46.4%) patients in the age group 61-70 years and 146 (14.6%) patients in the age group 71-80 years. The average age of patients was 64.1 years.

In the posterior capsule rent cases, 8.1% patients were in the age group of 41-50 years, 32.4% in the age group of 51-60 years, 35.2% in the age group of 61-70 years and 24.3% in more than 70 years of age. The mean age noted was 64.8 years.

Figure 8: Age distribution

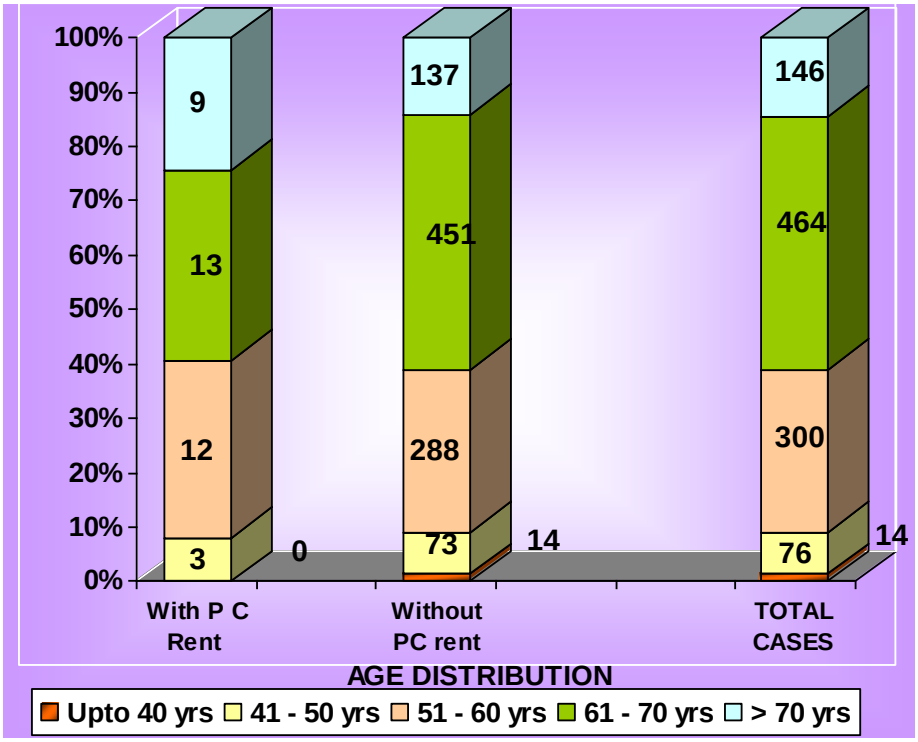


Table A3: Sex Distribution

Sex	Cases(n=1000)		Cases(n=37)	
	No	%	No	%
Male	464	46.4	20	54.1
Female	536	53.6	17	45.9
Total	1000	100	37	100

In Our study in 1000 cases 464(46.4%) were males and 536(53.6%) females. Slight female preponderance was seen.

Whereas in the group of PC rent cases, slight male preponderance was noted, 54.1% were male and 45.9% were female patients.

Figure 9: Sex distribution

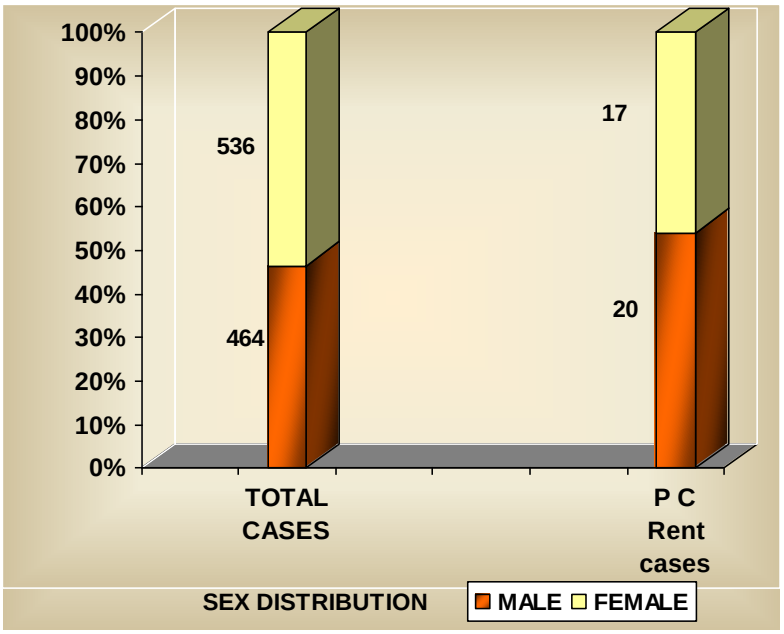


Table A4: Eye operated

Eye	Cases(n=1000)		Cases(n=37)	
	No	%	No	%
Right Eye	552	55.2	16	43.2
Left Eye	448	44.8	21	56.8
Total	1000	**100**	**37**	100

Among the 1000 patients 55.2% patients were operated in the right eye and 44.8% patients were operated in the left eye.

In our study, posterior capsule rent occurred in the left eye in 21 cases (56.8%) and in the right eye in 16 patients (43.2%).

Figure 10: Eye operated

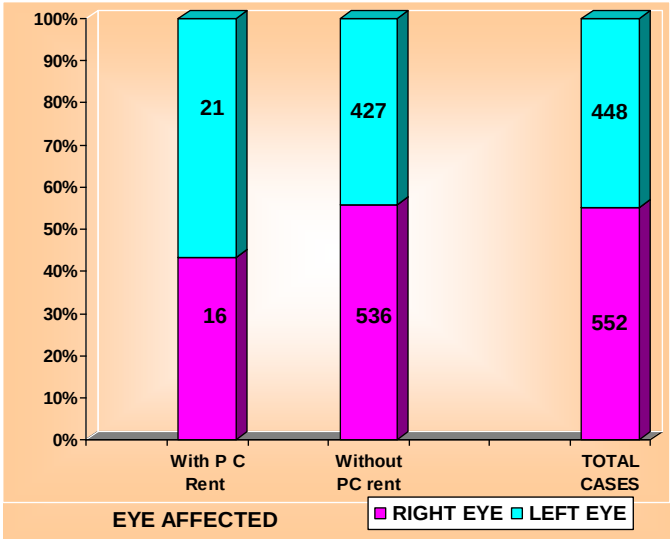


Table A5: Diagnosis

Diagnosis	Total Cases (n=1000)		PC Rent Cases (n=37)	
	No	%	%	%
Immature cataract Nuclear sclerosis	603 201	60.3 20.1 -	10 17	27.02 45.09
Mature Senile Mature cataract Hyper mature cataract Pre-Senile Mature cataract	159 30 7	15.9 3.0 0.7	6 4 -	16.21 10.8 -
Total	1000	100	37	100

Among 1000 patients, the major bulk was formed by immature cataract that is 60.3%, nuclear sclerosis constituted 20.1%, senile mature cataract formed 15.9%, hyper-mature cataract 3% and pre senile cataract constituted 0.7%. Posterior sub-capsular cataract formed the major diagnosis in immature cataract group.

In our study, among the cases where rent occurred, 45.09% was seen in cases of nuclear sclerosis grade 3 cataract, 27.02% in posterior sub-capsular cataract, 16.21% in senile mature cataract and 10.8% in cases of hyper-mature cataract.

Figure 11: Diagnosis of total cases

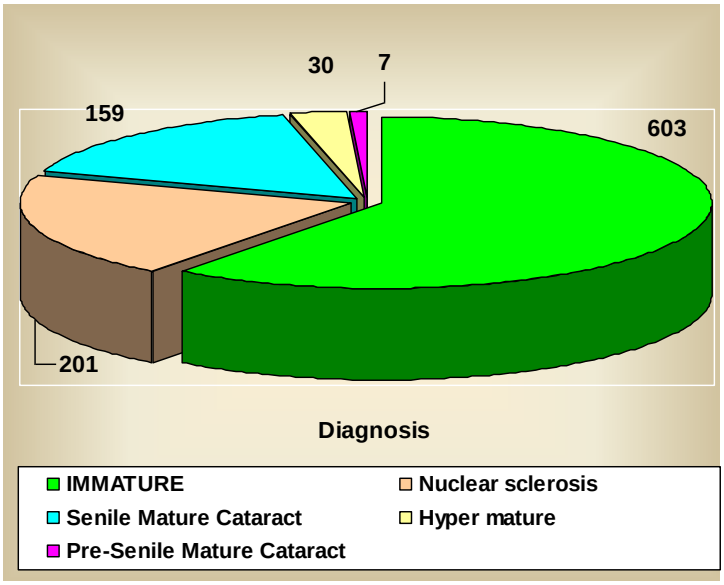


Figure 12: Diagnosis of PC rent cases

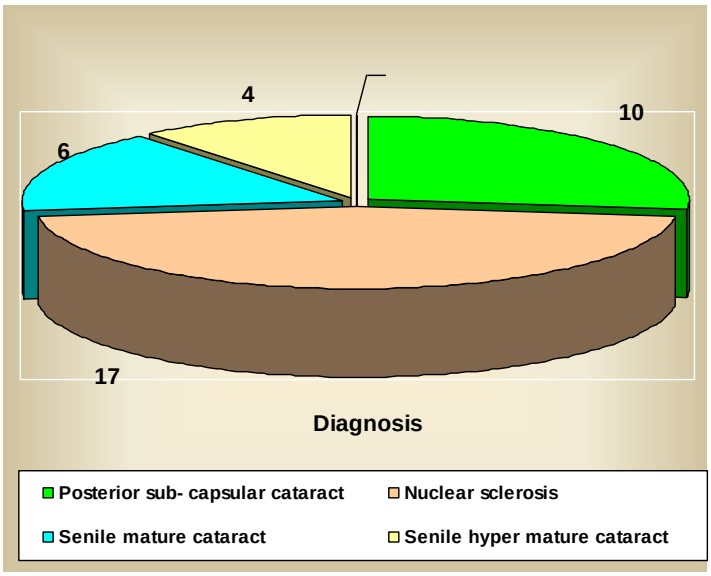


Table B1: Association between age and incidence of PC rent

Incidence of PC Rent	Age in years	
	Mean	SD
Yes	64.8	9.4
No	64.1	8.5
'p'	**0.6219 Not Significant**	

In our study, we did not find statistical significance between age of the patients and incidence of PC rent.

Table B2: Association between sex and incidence of PC rent

Sex	Incidence of PC Rent			
	Yes(n=37)		No (n=963)	
	No	%	No	%
Male	20	54.1	444	46.1
Female	17	45.9	519	53.9
'p'	**0.2765 Not Significant**			

In our study, there was no statistical significance between gender of the patient and incidence of PC rent.

Table B3: Eye and Incidence of PC Rent

Eye	Incidence of PC Rent			
	Yes(n=37)		No(n=963)	
	No	%	No	%
Right Eye	16	43.2	536	55.7
Left Eye	21	56.8	427	44.3
'p'	**0.0934 Not Significant**			

In our study there was no significant correlation found between the laterality of the eye operated and incidence of PC rent

Table C1: Risk Factors in PC rent cases

Risk Factors	Cases(n=37)	
	No	%
Size of Pupil		
Dilated(>7mm)	13	35.13
Mid Dilated(5-7mm)	6	16.21
Constricted(<5 mm)	18	48.6
Anterior Capsulotomy	30	81.1
Anterior Capsulorhexis	7	18.9
Stage of Surgery		
Hydro-procedures	5	13.5
Nucleus Prolapse	6	16.2
Irrigation	25	67.5
IOL Implantation	1	2.7

Pupil was dilated in 35.13% of cases, mid- dilated in 16.21% and constricted in 48.6% of the rent cases.

Anterior capsulotomy was done in 30 (81.1%) and capsulorhexis in 7(18.9%) of the patients.

The most common step of surgery where rent was noted in our study was during irrigation and aspiration of cortical matter (67.5%) followed by nucleus prolapse in 16.2%, hydro- procedures in 13.5% and during IOL implantation in 2.7% of cases.

Figure 13: Size of pupil and number of rent cases

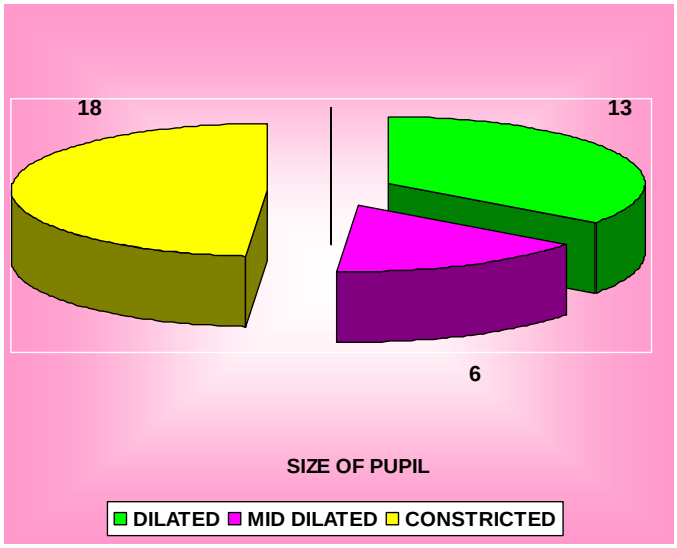


Figure 14: Stage of surgery and PC rent cases

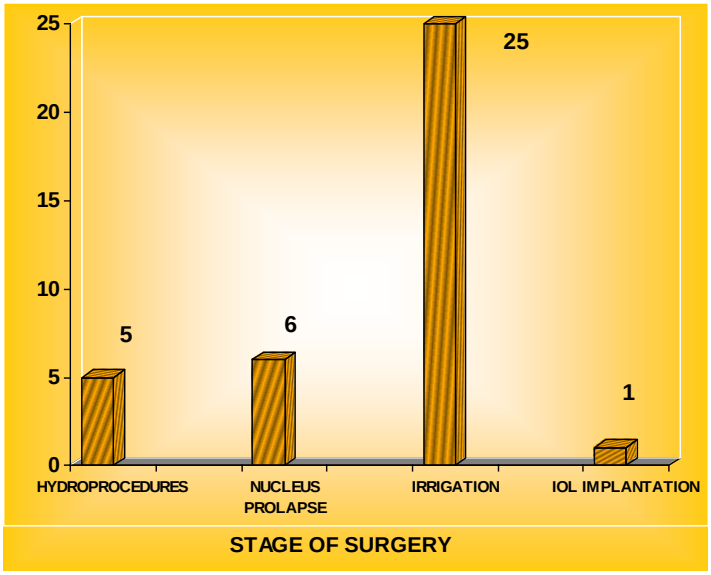


Table C2: Operating Surgeon

Operating Surgeon	Cases(n=37)	
	No	**%**
Consultant	2	0.2
Resident	35	3.5
Total	**37**	**3.7**

In our study, 35 cases of PC rent were observed in cases done by the residents whereas only 2 cases of rent were seen in surgeries done by the staff.

Figure 15: Operating surgeon

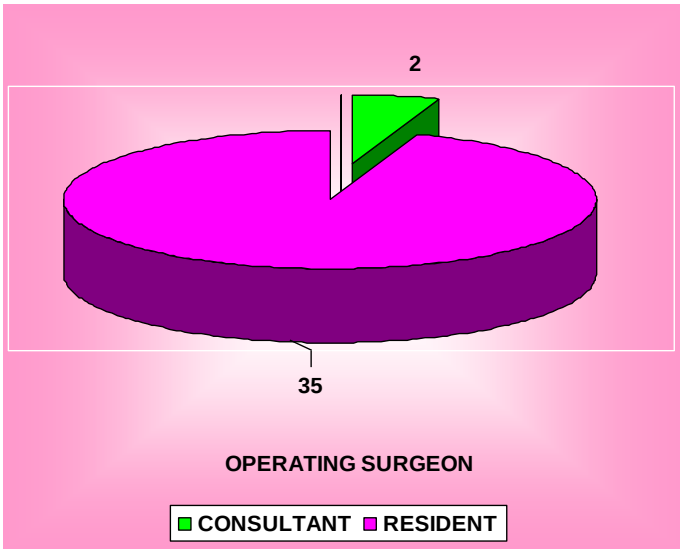


Table C3**: Size of PC rent**

Size of Rent (in mm approximately)	Cases	
	No	**%**
< 4 mm	18	48.6
4 – 6 mm	8	21.4
➢ 6mm	11	29.7
Total	**37**	**100**

Majority of the rent cases were less than 4 mm (45.9%), 24.4 % between 4-6 mm and 29.7% more than 6 mm.

Figure 16: Size of PC rent

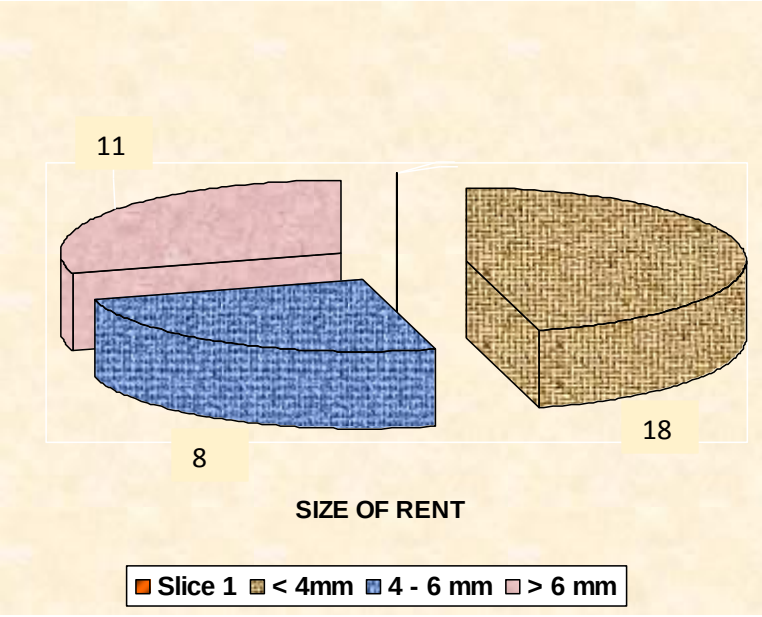


Table C 4: Size of pupil and Severity of Rent

Size of Pupil	Severity of Rent						Size of rent	
	Mild (<4mm)		Moderate (4-6 mm)		Severe > 6mm		Mean	S.D
	No	%	No	%	No	%		
Dilated (13)	11	84.6	2	15.4	-	-	**3.25**	0.58
Mid Dilated (6)	2	33.3	2	33.3	2	33.3	5.56	2.01
Constricted (18)	5	27.8	4	22.3	9	50.0	6.33	2.19
'p'	**<0.0001 Significant**							

In our study, we found a statistically significant correlation between size of pupil and severity of rent in relation to its size.

Table C5: Operating Surgeon and Severity of Rent

Surgery Performed by (n=37)	Severity of Rent(in terms of size)						Size of rent	
	Mild (<4mm)		Moderate (4-6 mm)		Sever > 6mm		Mean	S.D.
	No	%	No	%	No	%		
Consultant (2)	2	100	-	-	-	-	3.0	0.0
Resident (35)	15	45.4	9	27.3	11	33.3	4.9	2.13
'p'	0.2188 Not significant							

In our study, though most of the rent cases occurred in surgeries performed by residents, we did not find any significant correlation between surgeon and size of rent.

Table C 6**: Vitreous loss in PC rent cases**

Vitreous loss	Cases(n=37)	
	No	**%**
Present	15	40.5
Absent	22	59.5
Total	**37**	**100**

In our study, vitreous loss was observed in 40.5% of rent cases

Figure 17: Vitreous loss seen in PC rent cases

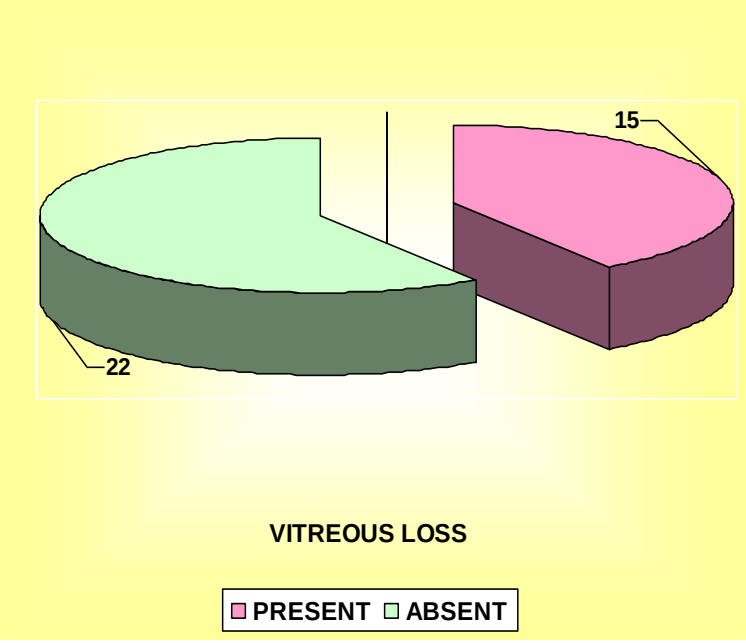


Table D 1**: Anterior Vitrectomy done in PC rent cases**

Anterior Vitrectomy	Cases(n=37)	
	No	**%**
Yes	15	40.5
No	22	59.5
Total	**37**	**100**

Meticulous anterior vitrectomy was done in all cases of vitreous loss (40.5%)

Figure 18: Anterior vitrectomy done

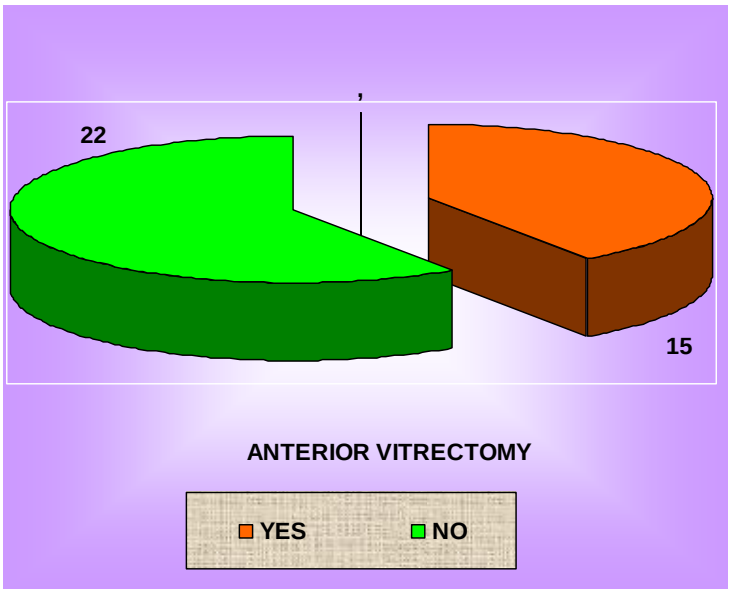


Table D 2**: Type of IOL Implantation in PC rent cases**

IOL Implantation	Cases(n=37)	
	No	**%**
Aphakia	2	5.4
PCIOL in bag	21	56.8
PCIOL in sulcus	5	13.5
SFIOL	4	10.8
Iris Claw	5	13.5
Total	**37**	**100**

In our study, in 56.8% of rent cases, PCIOL was successfully implanted in the bag, in 13.5 % cases PCIOL implanted in ciliary sulcus, secondary IOL was implanted in 24.32% cases- in 10.8% SFIOL and 13.5% cases iris claw was implanted.

Two patients were rendered aphakic as 1 patient was lost to follow up and in one case there was nucleus drop. The patient was immediately referred to vitreo-retinal surgeon.

Figure 19: Type of IOL implantation

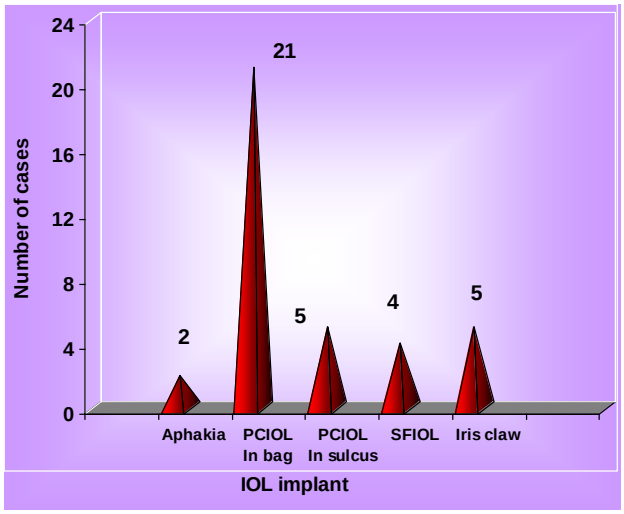


Table E 1: Pre-Operative and post- operative distant vision in PC rent cases

Vision	Pre. Op. distant vision (BCDV)		Post-operative distant vision(BCDV)(n=37)									
	No	%	1 day		1st Week		1st Month		3rd month		6th month	
			No	%	No	%	No	%	No	%	No	%
6//6 – 6/18	-	-	29	78.3	32	88.9	33	91.7	32	88.9	32	88.9
6/24 – 6/60	17	45.95%	7	18.9	4	11.1	3	8.3	4	11.1	4	11.1
<6/60	20	54.05%	1	2.8	-	-	-	-	-	-	-	-
Total	**37**	**100**	**37**	**100**	**36**	**100**	**36**	**100**	**36**	**100**	**36**	**100**

In our study, pre operatively, best corrected visual acuity was in the less than 6/60 in 54.05% of patients and in the range of 6/24-6/60 in 45.9% and none in the range of 6/6-6/18.

Post- operative, majority of the cases had favorable visual outcome at sixth month follow-up, 88.9% of patients had best corrected visual acuity in the range of 6/6-6/18, 11.1 % patients had vision in the range of 6/24-6/60. One case was lost in follow-up.

Table E1 (a): Pre-operative and post -operative near Vision in PC rent cases

Vision	BC Near Vision(n=37)											
	Pre-Operative		Post- operative									
	No	%	1 day		1 week		1 month		3rd month		6th month	
			No	%	No	%	No	%	No	%	No	%
N6 – N12	3	8.1	33	91.6	33	91.6	34	94.4	34	94.4	34	94.4
N18 – N24	14	37.8	2	5.6	2	5.6	1	2.8	1	2.8	1	2.8
N36 – N0	20	54.1	1	2.8	1	2.8	1	2.8	1	2.8	1	2.8
TOTAL	37	100	36	100	36	100	36	100	36	100	36	100

In our study, 54.1% patients had best corrected near vision in the range of N0 -N36 before surgery and majority of patients (94.4%) had best corrected near vision in the range of N6-N12 after surgery.

Figure 20: Pre-operative and post-operative distant vision

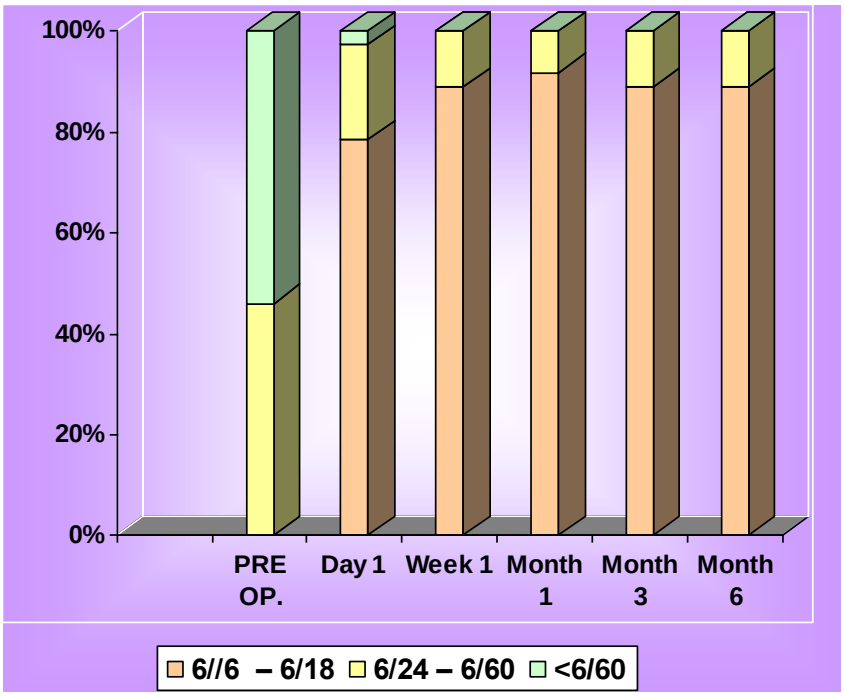


Figure 21: Pre-operative and post-operative near vision in PC rent cases

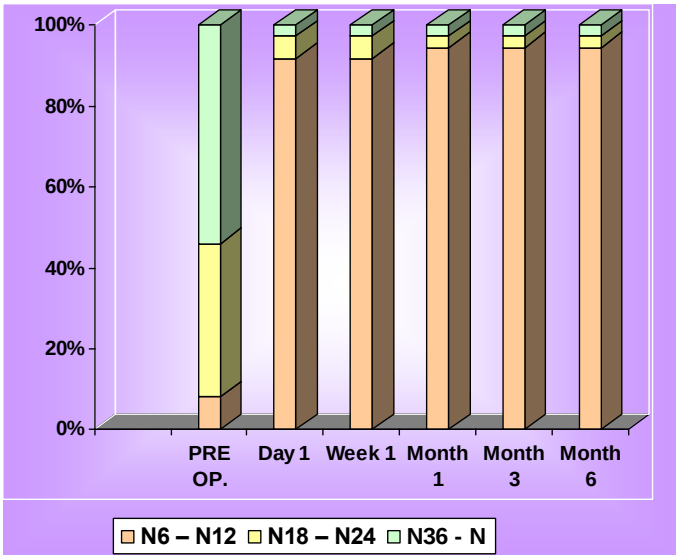


Table E 2: Size of Rent and final visual outcome

Size of Rent	Final Visual Outcome(n=36)					
	6/6 - 6/12		6/18 – 6/60		<6/60	
	No	%	No	%	No	%
<4 mm	17	56.7	-	-	-	-
4-6 mm	9	24.32	-	-	-	-
>6 mm	4	10.8	6	18.91	-	-
Mean	4.07		8.0		-	
S.D.	1.57		0.71		-	
'p'	**< 0.0001 Significant**					

In our study we found that size of rent and final visual outcome has significant correlation

Table E 3: Post -operative complications

Post-operative Complications	No of patients having complications									
	1 day		1st Week		1st Month		3rd month		6th month	
	No	%	No	%	No	%	No	%	No	%
Striate keratopathy	4	10.8	2	5.6	1	2.8	-	-	-	-
Corneal oedema	5	13.5	-	-	-	-	-	-	-	-
Hyphaema	2	5.40	-	-	-	-	-	-	-	-
Vitreous in AC	1	2.7	1	2.8	1	2.8	1	2.8	1	2.8
Iritis	7	18.9	4	11.1	1	2.8	1	2.8	1	2.8
Pupillary peaking	2	5.4	2	5.56	2	5.56	2	5.56	2	5.56
IOL Position	1	2.7	1	2.8	1	2.8	1	2.8	1	2.8
Cystoid Macular Edema	-	-	-	-	3	8.3	5	13.8	5	13.8
Secondary Glaucoma	-	-	-	-	1	2.8	2	5.6	2	5.6
Retinal Detachment	-	-	-	-	-	-	1	2.8	1	2.8
Others	2	5.4	1	2.8	1	2.8	1	2.8	1	2.8

In our study, iritis was the most frequent post -operative complication associated with PC rent cases, seen in 18.9% of cases. Persistent iritis was seen in 1 case.

Transient corneal edema was seen in 5 cases (13.8%) while striate keratopathy was seen in 4 cases on day 1 post operatively. Both resolved subsequently.

Retinal detachment not involving the macula was seen in 1 case.CME was seen in 5 patients and secondary glaucoma in 2 patients. Vitreous in AC was seen in 1 and pupillary peaking in 2 cases.

Figure 22: Post-operative complications associated with PC rent cases

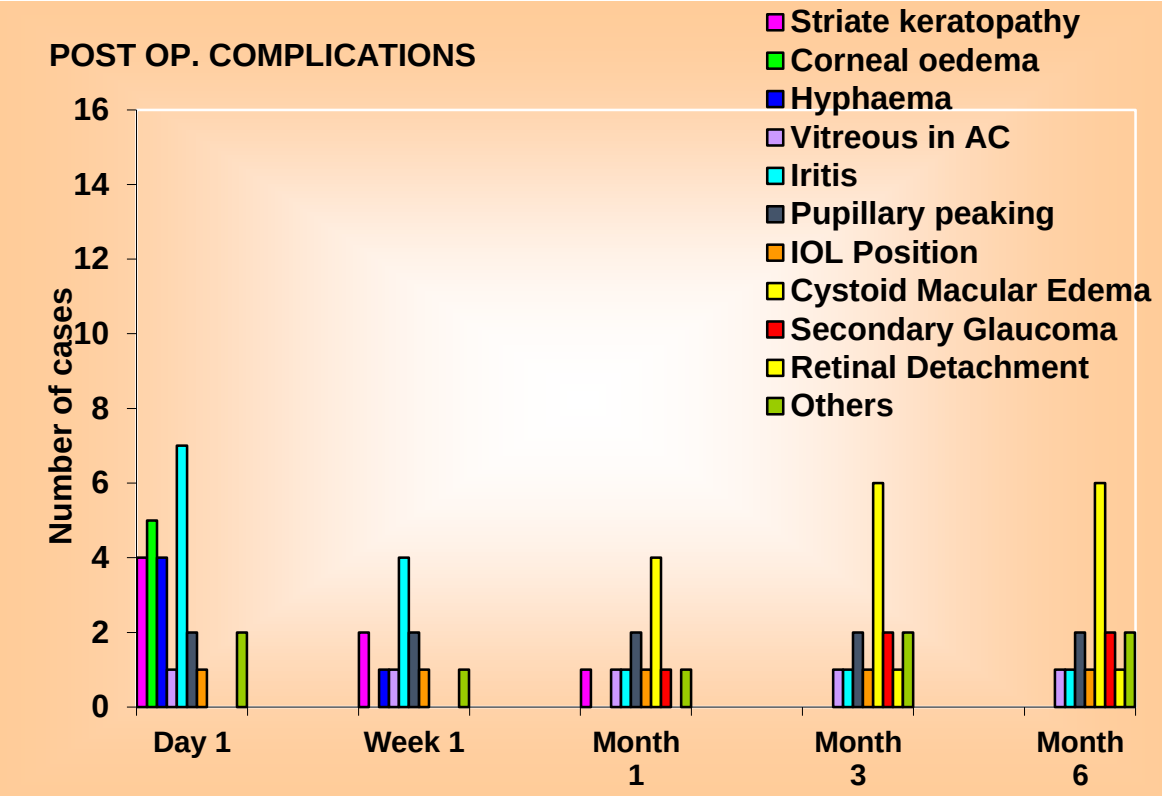


Table E 4: Vitreous loss and final outcome in PC rent cases

Vitreous loss	Final Visual Outcome(best corrected)					
	6/6 to 6/18		6/18 – 6/60		<6/60	
	No	%	No	%	No	%
Present (15)	10	71.4	4	28.5	-	-
Absent (22)	22	100	-	-	-	-

In our study, one patient was lost to follow-up. In 36 patients of intra-operative PC rent, all 22 patients without vitreous loss achieved best corrected visual acuity in the range of 6/6-6/18.

Whereas 10 out of 14 patients (one lost to follow up) with vitreous loss achieved best corrected vision in the range of 6/6-6/18 (71.4%)

Table E 5: IOL implantation and final vision (best corrected)

IOL implantation	Final Vision (n=36)					
	6/6 to 6/18		6/24 – 6/60		<6/60	
	No	%	No	%	No	%
Aphakia (1)	-	-	1	100	--	-
In bag (21)	21	100	-	-	-	-
In sulcus (5)	5	100	-	-	-	-
SFIOL (4)	3	75	1	25	-	-
Iris claw (5)	3	60	2	40	-	-
Total	32	88.89	4	11.12		

In our study, all 21 cases where PCIOL was implanted in the bag and 5 cases where PCIOL was implanted in the ciliary sulcus achieved best corrected vision in the range of 6/6-6/18.

3 out of 4 cases where SFIOL was implanted achieved best corrected vision in the range of 6/6-6/18(75%) and 3 out of 5 iris claw achieved best corrected vision in the range of 6/6-6/18(60%). Aphakic patient had 6/60 vision with spectacle correction.

DISCUSSION

DISCUSSION

In our study, we analyzed 1000 patients undergoing manual small incision cataract surgery in our department of Ophthalmology at R.L. JALAPPA HOSPITAL AND RESEARCH CENTER, TAMAKA, KOLAR attached to Sri Devaraj Urs Medical College from December 2012 to May 2014 to study the risk factors, management and visual outcome of cases with intra-operative posterior capsule rent.

We excluded in our study, cases with predisposed risk factors for posterior capsule rent such as traumatic cataract, complicated cataract, cataract associated with glaucoma, corneal dystrophy and degenerations, pseudo-exfoliation and posterior segment pathologies.

INCIDENCE AND DEMOGRAPHIC PROFILE

As shown in **table A 1**, the incidence of posterior capsule (PC) rent in our study was 3.7%.

This is similar to the study done by **Aneesh Neekhra et al**[61]**,** where they analyzed 1820 eyes operated over two years. The incidence of PC rent in their study was 4%.

In another study conducted in the Khyber Institute of Ophthalmic Medical Sciences (KIOMS), Peshawar where 150 eyes of 134 patients were included in the study, the incidence of PC rent noted was 3.3%**.**[3]

The incidence of PC rent has been reported as low as 0.64% in a large retrospective cohort study compromising 53,603 cases performed during one year at Aravind eye hospital, Madurai done by **Aravind Haripriya et al.**[85]

In a study conducted by **Chirambo MC** including 542 patients, the incidence of PC rent reported was 2%.[86]

The incidence was 3.3% in a prospective randomized single center study, conducted in the eye department of Era's Lucknow medical college in semi urban part of northern India, over a period of two years by **Rubii Malhotra et al**. [4]

In another observational study including 300 patients done over two years at a tertiary care center at Rawalpindi, the incidence of PC rent observed was 5 %.[5]

In 1445 cases operated over a year in a prospective cross sectional survey done by **Desai et al**, the reported incidence of PC rent was 3.9%.[6]

Table F 1: Incidence of PC rent (with or without vitreous loss)

STUDY	INCIDENCE
Haripriya A	0.64%
Chirambo MC	2%
Malhotra R	3.3%
Mohammad T	3.3%
Our study	**3.7%**
Desai P	3.9%
Neekhra A	4%
Yasir	5%

As shown in **table A 2**, in our study, thousand patients undergoing manual small incision cataract surgery included 90 (9%) patients in the age group of less than 50 years, 300(30%) patients in the age group of 51-60 years, 464 (46.4%) patients in the age group of 61-70 years and 146 (14.6%) patients in the age group of 71-80 years. Senile cataract being the commonest form of cataract, the average age of the subjects in this study was 64.1 years. This is

similar to studies by **Isawumi et al**[81] (62.2 years) **Olawoye et al**[82] (66.1 years) **Ashok Rangarajan et al**[83] (63.6+6.6 years)

In our study, among the posterior capsule rent cases, 8.1% patients were in the age group of 41-50 years, 32.4% in the age group of 51-60 years, 35.2% in the age group of 61-70 years and 24.3% in more than 70 years of age. The mean age noted was 64.8 years **(table A2).**

Slight female preponderance was seen. Our study included 464(46.4%) males and 536(53.6%) females. In the group of PC rent cases, slight male preponderance was noted, twenty patients (54.1%) were males and 17 patients (45.9%) were females. (**table A 3**).

Among the 1000 patients, 55.2% patients were operated in the right eye and 44.8% patients were operated in the left eye (**table A 4**). Posterior capsule rent occurred in the left eye in 21 cases (56.8%) and in the right eye in 16 patients (43.2%) (**table A 4**).

As shown in **tables B 1, B 2, B 3** there was no statistical significance between the age, sex and laterality of the eye and the incidence of PC rent.

In a large retrospective series of 79,777 patients by **Aravind et al**[85] sex (P = 0.42) and age (P = 0.21) were not significantly associated with intraoperative complications.

Fiona M Chan et al [73] retrospectively reviewed all patients who sustained a PCR during cataract surgery over three years. Of 8230 consecutive eyes which underwent cataract surgery, the overall incidence of PCR was 1.9% (155 cases). The Mann-Whitney U test confirmed that there was no significant difference in age profile and gender between those with and without PCR.

In thousand patients operated, the major bulk was formed by immature cataract that is 80.4% (posterior sub-capsular cataract formed 60.3%, nuclear sclerosis formed 20.1%), senile mature cataract formed 15.9%, hyper-mature cataract 3% while pre senile cataract formed 0.7% (**table A 5**). Overall, posterior sub-capsular cataract was the commonest diagnosis.

In the posterior rent cases, out of 37 cases, most common diagnosis was that of nuclear sclerosis grade III, seen in 17 patients(45.90%) followed by posterior sub-capsular cataract seen in 10 eyes (27.02%). Senile mature cataract was seen in 6 eyes (16.21%) and senile hyper-mature cataract was diagnosed in 4 eyes (10.8%).

This is similar to the study done by **Ajith H**[87] in Mysore. In his study, incidence of PC rent was 2.5%, where hyper-mature and hard cataracts formed three fourths of rent cases.

Our study also correlates with the study done by **Gogate P et al**[63], done in Pune comprising 358 patients. They concluded in their study that majority of rents occurred in hard and hyper-mature cataracts.

Our study is similar to the study done by **Aneesh Neekhra et al**[61], where PC rupture was more common in Grade III nuclear sclerosis (60%) followed by soft posterior sub-capsular cataract (25%). In a study done by **Ashok Rangarajan et al**[83] the grade of lenticular opacity was found to be statistically significant as per complications. Following multiple logistic regression of the association of intraoperative complications with dependent variables showed grade of nucleus (df =1, F=5.608, P = 0.02).

Higher nuclear densities are associated with bigger nuclei that often pose challenges during prolapse and delivery from the anterior chamber. Hyper-mature cataracts have thin fragile capsules that are susceptible to rents especially when a large nucleus is forced through a residual

anterior capsular tear or poorly constructed capsulorrhexis. In soft posterior sub-capsular cataract, it is in the stage of epinuclear shell removal and irrigation / aspiration that the majority of rents happened.

RISK FACTORS

Coming to the risk factors associated with intra-operative PC rent, in our study we observed **pupil** was dilated in 13 cases (35.13%) of cases, mid- dilated in 6 cases (16.2%) and constricted in 18 (48.6%) of the rent cases (**table C 1**). A small pupil can cause a myriad of problems, ranging from difficulty in capsulorrhexis, hydro procedures, nucleus prolapse and delivery, cortical clean -up and IOL implantation.

The major cause of small pupil in our study was due to intraoperative iris manipulation or senile miosis since we already excluded other pre-existing causes like pseudo-exfoliation, diabetes, old uveitis with posterior synechiae, traumatic cataract.

In our study, we found a statistically significant correlation between pupil size and severity of PC rent (**table C 4**). Cases with mid-dilated and constricted pupil resulted in more severe rent. Small pupil precludes proper visualization and makes all the subsequent steps difficult.

A large cross sectional prospective survey done by **Narendran et al**,[18] comprising total of 55,567 operations between November 2001 and July 2006 analyzed all systemic, ocular, and surgeon variables which may contribute to an increased risk of PCR or vitreous loss or both. They concluded pupil size was a statistically significant factor (chi-square value was 24.6, p value < 0.0001)

This is similar to another study done by **Chan, Mahroo** and **Spalton**[88] where small pupil size was a significant risk factor (Adjusted Odds Ratio- 1.42).

In our study**,** in PC rent cases, out of 37 cases, **anterior capsulotomy** was done by can-opener technique in 30 (81.1%) and capsulorhexis in 7(18.9%) of the patients (**table C 1**). Failing to complete the anterior capsulotomy, making a too-small CCC, and pulling residual anterior capsular tags can cause the posterior capsule to rupture.

In our study, cases where anterior capsulotomy was done, the cause for posterior capsule rent was unequal capsule flaps. These flaps having a tendency to be aspirated into the irrigation/ aspiration cannula led to posterior capsule tear.

In cases where continuous curvilinear capsulorrhexis (CCC) was done peripheral extension of the capsulorrhexis lead to tears extending to posterior capsule.

As reported by **Basti et al**[84] in a small study performed in 50 consecutive eyes, anterior capsular tears were noted in 98% of the eyes. These tears in the majority, do not extend beyond the equator. However, these tears make a capsular bag unstable. The fixation of the IOL within the bag, hence becomes uncertain. In addition, sometimes, small anterior capsule tags and flaps go unnoticed and inadvertently if aspirated or pulled, posterior capsule may rupture.

Overall, we observed cases with CCC were easier to manage as anterior capsular rim is present to support the PCIOL in the ciliary sulcus even after PC rupture. This is similar to the study done by **Aneesh Neekhra et al**[61]. In their study, they were able to put PCIOL in the ciliary sulcus in 42 cases in CCC group whereas in only 12 cases of anterior capsulotomy group after PC rupture (total rent cases-110).

The most common **step** of surgery where rent was noted in our study was during irrigation and aspiration of cortical matter (67.2%) followed by nucleus prolapse in 16.2%, hydro- procedures in 13.5% and during IOL implantation in 2.7% of cases (**table C 1)**

Our results are similar to the study done by **Aneesh Neekhra et al**[61]. In their study most cases of PC rupture (65%) occurred during irrigation/aspiration, 5% of cases occurred during nucleus delivery. Our results are comparable to the study done by **Basti et al**[84] at L.V. Prasad Eye institute done over two years, where they reported 72% of the rent cases occurred during irrigation and aspiration.

Whereas while doing phacoemulsification, it occurred most frequently during the stage of nuclear emulsification, as reported by **Mulhern et al** (49%) [38], **Osher and Cionni** (62%).[39]

As with all surgeries, MSICS also needs **experience** to be mastered, especially construction of leak-proof valvular tunnel, competent capsulorrhexis, nucleus prolapse and delivery. **Corey et al**[89] demonstrated that with appropriate training and supervision, residents could obtain an acceptably low rate of posterior capsule tears, which varied from 2.6% in the early cases to 0% in the late cases.

In our study almost 95% (35 out of 37 cases) of PC rent was done by residents in training, only 5% (2 out of 37 cases) cases were done by junior staff members with less years of experience (**table C 2).**

Large electronic multicenter audit of 55,567 cataract cases for risk stratification done by **N. Narendran et al**[18] showed surgeon's grade as statistically significant risk factor at the univariate level (Adjusted Odd Ratio -1.00).

This is similar to a large study comprising 55,603 cataract cases, done by **Haripriya Aravind et al**[85] at Madurai in 2012. They analyzed rate of PC rent decreases with increasing surgeon experience. Similar results published in 2013, were found by **Ashok Rangarajan et al**[83] done at Sankara Eye Hospital in Chennai. They observed PC rent was most prevalent in eyes operated in the first month of training. Supervisors' intervention in surgeries was highest in the first month of training and declined as training progressed. Thus, risk avoidance by trainees would be advisable and should be encouraged.

Size of rent was the determining factor in terms of the management and final visual outcome. Majority of the rent cases in our study, were less than 4 mm (48.6%), 21.4 % between 4-6 mm and 29.7% more than 6 mm (**table C 3).**

We also found statistical significance between size of rent and final visual outcome **(table E 2).** Larger rent size (>6 mm) led to greater intra-operative and post-operative complications finally affecting visual outcome of the patients.

In a major review done by **Rasik B Vajpayee et al**,[21] the choice of the IOL to be implanted and its site of implantation depends on the size of the posterior capsule tear, the visibility of the remaining capsular margins, and the surgeon's technique and experience.

In our study, vitreous loss was observed in 40.5% of rent cases and that is vitreous loss was present in 15 out of 37 cases **(table C 6).** This is similar to the study done by **Aneesh Neekhra et al**[61] where vitreous loss was seen in 40% of cases. Our study is also comparable to study done by **Gogate et al**[63] in Pune. In their study vitreous loss was present in 6 out of 18 rent cases (34%).

Our result is much lower compared to a retrospective study of the patients who underwent cataract surgery complicated by posterior capsule rupture done by **Trinavarat A** and **Neerucha V**.[90]In 525 cases that received cataract surgery complicated by posterior capsule rupture, 75.5 % of the cases required vitrectomy.

Early detection and timely intervention by experienced surgeons may be the reason behind lesser vitreous manipulation in our hospital.

MANAGEMENT

Meticulous anterior vitrectomy was done in all cases of vitreous loss **(table D 1).** One case, complicated by nucleus drop was referred to the vitreo-retinal specialist for further management and was successfully managed.

In our study, in 56.8% of rent cases (21 cases), PCIOL was successfully implanted in the bag, in 13.5 % (5 cases) PCIOL implanted in ciliary sulcus total being 70.5%. In 10.8% (4 cases) SFIOL and 13.5% (5 cases) iris claw was implanted. Two patients (5.4%) were rendered aphakic as one patient was lost to follow up and in the other case there was nucleus drop. The patient was immediately referred to vitreo-retinal surgeon and was successfully managed. Later the patient refused for secondary IOL implantation and was prescribed spectacles.

As reported by **Ashok Rangarajan et al**[83] in their study due to insufficient capsular support, 6(4.9%) eyes were left aphakic. **Trinivarat A** and **Neerucha V**[90] in a retrospective review of the patients who underwent cataract surgery complicated by posterior capsule rupture, reported that Primary intra-ocular lens insertion was performed in 87.4%, mostly in the ciliary sulcus (75.5%)

Hao et al [16]inserted PC-IOLs in 70 eyes with a defective posterior capsule and postulated the following principles-

1. Air or high-viscosity viscoelastic agent should be injected to maintain a deep anterior chamber.

2. Insertion and rotation of IOL should always be away from the area of capsule tear.

3. The long axis of the IOL should cross the meridian of the posterior capsule tear.

4. The residual anterior capsule may be utilized to support the IOL.

They recommended this technique for eyes with peripheral posterior capsule tears of less than 120 degrees or with a central tear of less than 4 mm.

Most of the PC rent occurred in surgeries performed by residents, especially in the initial phase of learning. In case of complications, the supervising surgeon took over and completed the surgery. In our study we found no statistical significance between type of IOL implantation and final visual outcome **(table E 5)** thus reemphasizing the fact that timely recognition and a planned management is required to ensure an optimal visual outcome. This complication is best managed under the supervision of an experienced surgeon.

COMPLICATIONS

As shown in **table E 3**, in our study, iritis was the most frequent post-operative complication seen in association with PC rent cases, seen in 18.9% of cases. It was mild in most of the cases and resolved with steroids within one week. Persistent iritis was seen in only 1 case. **Sudhakar et al**[91] has reported an incidence of 9% in thousand cataract surgeries. So, it was little

higher than expected in general cataract surgery outcome. Iris manipulation intra-operatively may be the cause.

Transient corneal edema was seen in 5 cases (13.8%) while striate keratopathy was seen in 4 cases on day one post operatively **(table E 3)**. Both resolved subsequently with steroid drops and hypertonic eye drops. In cases due to transient rise in IOP (3 cases), anti-glaucoma drops were added. **Gogate et al**[63] found corneal striate in 7% cases and **Venkatesh et al**[64] had 2% cases of post-operative corneal edema in uncomplicated cataract surgeries. It was little on the higher side in our study due to increased manipulation.

In our study, Hyphema was seen in two cases which resolved completely within 3-5 days. Transient post-operative rise in intra-ocular pressure was seen in three patients which was managed by oral acetazolamide and timolol (0.5%) eye drops. Vitreous in AC was seen in one and pupillary peaking in two cases. Other minor complications included- mild IOL tilt in one patient and suture erosion in one SFIOL case.

Posterior capsule rent is known to be associated with increased rate of post-operative retinal detachment, cystoid macular edema and endophthalmitis. In our study, as shown in **table E 3**, delayed complications included- Retinal detachment not involving the macula in one case following SFIOL implantation (2.8%).In a study done by **Zia ul Mazhry**,[93] incidence of retinal detachment was 4%. It has been reported to vary from 2.7 to 5.4% in various studies. The fact that whether detachment was related to scleral fixation itself, could not be established. Too posterior placement of fixation suture may increase the risk of retinal detachment. According to the study done by **Parul Desai et al**[52] "Capsule rupture and vitreous loss" during the operation increased the risk of retinal detachment or tear within 3 months of cataract extraction 10-fold (odds ratio 10.3, 95% CI 4.4 to 23.9)

In our study, cystoid macular edema was seen in five patients, this may be due to vitreous manipulation **(table E 3)**. Topical steroid and topical anti-inflammatory drops four times each day for was given 3 months which showed favorable outcome.

Post-cataract or Pseudophakic CME was initially described by **Irvine** SR in 1953 and **Gass** and **Norton** [95] in 1966. Other authors have also shown the relationship between posterior capsule rapture and postoperative CME .The same positive correlation with postoperative CME has been reported by several authors for vitreous loss (**Ah-Fat et al).**[96] In a 2000 review by **Rosetti and Autelitano** [39] vitreous loss was correlated with an overall increase in CME by 10-20%. The use of iris supported IOLs is also associated with increased incidence and late onset of CME, which has been attributed to the chronic irritation of the iris. Iris is a tissue that responds to injury with secretion of inflammatory mediators

Secondary glaucoma in 2 patients (5.6%) in our study. It was managed with topical anti-glaucoma medications. Surgical intervention was not required. Mild IOL tilt was observed in one SFIOL patient but it was not significant (2.8%). This is similar to study done by **Zia ul Mazhry**[90] where 2% case had IOL tilt.

VISUAL OUTCOME

As in **table E 1**, pre operatively, best corrected visual acuity in our study was less than 6/60 in 54.05% of patients and in the range of 6/24-6/60 in 45.9% and none in the range of 6/6-6/18. Majority of the patients had uncorrected visual acuity in the range of counting fingers.

At first day post-operatively, 29 out of 37 patients had best corrected distant vision in the range of 6/6-6/18 (78.3%). Seven patients had vision in the range of 6/24-6/60 and one patient had vision counting fingers at 3 meters. Evaluating patients at first week, there was

improvement in the vision, 32 out of 36 patients had vision in the range of 6/6-6/18 (88.9%) and four patients had vision in the range of 6/24-6/60. One patient was lost to follow up.

As seen in **table E 1**, at first month follow up 33 patients achieved vision in the range of 6/6-6/18. Three patients had vision in the range of 6/24-6/60. At three month follow up, vision of one patient deteriorated as he developed peripheral retinal detachment. Fortunately, the tear did not involve the macula so fairly good vision was still maintained.

In our study, majority of the cases had favorable visual outcome at the sixth month follow-up. In our study, 88.9% of patients had best corrected visual acuity in the range of 6/6-6/18 (32 patients), 11.1 % patients (4 patients) had vision in the range of 6/24-6/60. One case was lost in follow-up.

54.1% patients had best corrected near vision in the range of N0 -N36 before surgery and majority of patients (91.6%) had best corrected near vision in the range of N6-N12 after surgery on first day and first week. This gradually improved to 94.4% in the range of N6-N12 while only one patient each had near vision in the range of N18-N24 and N36-N0 at third and sixth month follow-up. (**table E 1**)

According to the **WHO criteria**[83] post-operative outcome of cataract surgery with IOL is considered good if best corrected visual acuity is 6/6-6/18 is 90%, as borderline if 6/18-6/60 is less than 5% and poor if less than 6/60 is less than 5%. Our study is comparable to the good visual outcome.

Our study result is fairly comparable to other studies regarding visual outcome in cases complicated by PC rent.

Table F 2: final visual outcome

Study	**BCVA(6/6-6/18)**
Narsinga Rao et al[94]	87.32%
Our study	88.9%
Aneesha Neekhra et al[61]	90%
Ashok Rangarajan[83]	91.7%
Traianidis P et al[90]	93.45%

CONCLUSION

CONCLUSION

In our study, the incidence of PC rent was 3.7%. We observed inadequate mydriasis was a significant risk factor because it limits visibility making capsulorrhexis/ capsulotomy, prolapse of nucleus and irrigation/aspiration difficult. Unequal anterior capsule flaps was another risk factor. The use of multiple fine punctures (up to 30-40 in number) eliminates this problem. Cases with continuous curvilinear capsulorrhexis are easier to manage as anterior capsular rim is present to support the PCIOL in the ciliary sulcus even after PC rupture.

Hydro-procedures should be carried out gently, with the minimum fluid possible and with gentle pressure on the posterior lip of the wound to prevent sudden rise in AC pressure. Irrigation and aspiration was the most common stage where PC rent occurred. In cases of difficulty, it is better to avoid blind aspiration and to use a 'water jetting' technique with irrigation only. We observed, size of rent was a significant indicator for further management and final visual outcome. Early diagnosis is the key to management. Maintenance of the anterior chamber throughout the management of the posterior capsular rent is of prime importance to prevent further complications like disruption of the anterior hyaloid face and prolapse of the vitreous into the anterior chamber. Meticulous anterior vitrectomy in cases of vitreous loss is of prime importance.

Finally, skill and experience of the operating surgeon is also an important factor. Risk avoidance by trainees would be advisable and should be encouraged. Once this complication occurs, it is best managed under the supervision of an experienced surgeon. One notable finding

of our study was that final visual outcome was good according to WHO guidelines. This can be attributed to the careful supervision that the residents had received during the surgery and post-operative time. Thus, if capsular rupture is diagnosed early and proper management is carried out, the results of the surgery can be very good.

SUMMARY

SUMMARY

In the present study, 37 patients with posterior capsule rent among thousand consecutive patients undergoing manual small incision cataract surgery in the department of Ophthalmology, R.L. JALAPPA hospital and research center, attached to Sri Devraj Urs medical college, Tamaka, Kolar were included following the inclusion and exclusion criteria.

The incidence of PC rent in our study was 3.7 %. The mean age noted was 64.8 years, slight male pre-ponderence was noted (54.1%).

In our study, we found a statistically significant correlation between pupil size and severity of rent where small pupil was associated with larger rents.

Continuous curvilinear capsulorrhexis cases were easier to manage than can opener technique as anterior capsule rim was present to support the PCIOL in the ciliary sulcus even after PC rent.

In our study, irrigation and aspiration was the most common stage of surgery were PC rent occurred (67.2%).

Vitreous loss was seen in 15 out of 37 rent cases (40.3%). Anterior vitrectomy was done in all such cases.

Most of the rent cases in our study, 35 out of 37 cases occurred while residents were performing the surgery. Thus emphasizing the fact that PC rent decreases as the skill and experience of the surgeon is enhanced.

In our study, posterior chamber intraocular lens was implanted in the bag in 21 cases (56.8%), in ciliary sulcus in 5 cases (13.5%), in 4 cases scleral fixated IOL was implanted (10.8%) and in 5 cases iris claw lens was implanted (13.5%). Two patients were rendered aphakic (5.4%) as one patient was lost to follow up and one patient refused re surgery post

nucleus drop. She was referred to vitreo-retinal specialist and later given aphakic spectacle correction.

Iritis (18.9%) was the most common post-operative complication which was mild and transient.

Transient corneal edema was seen in five cases (13.8%) and striate keratopathy in four cases (10.8%). Hyphema was seen in two cases (5.40%).The complications were transient and resolved within one week.

Vitreous in AC was seen in one case and pupillary peaking was seen in two cases.

Delayed post-operative complications included cystoid macula edema in 5 patients (13.8%), secondary glaucoma in two patients (5.6%) and retinal detachment in one patient (2.8%).

In our study, final visual outcome in the range of 6/6-6/18 was achieved in 32 patients 88.9%. The vision in other four patients were in the range of 6/24-6/60 while one patient was lost to follow-up. The reason for less vision in four patients were retinal detachment (not involving the macula) in one patient, aphakic glass correction was given to one patient post nucleus drop management, secondary glaucoma in one and cystoid macular edema in one patient.

In conclusion though PC rent patients require greater number of follow up visits and are at higher risk for posterior segment complications like cystoid macular edema, retinal detachment and endophthalmitis, if the steps of management and post-operative care are executed methodically and properly, the odds are extremely high that the surgeon can successfully manage inadvertent posterior capsular tear without any significant problems and the patient will enjoy good vision and ocular health throughout his or her life.

BIBLIOGRAPHY

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1. Gunnlaugsdottir E, Arnarsson A, Jonasson F. Prevalence and causes of visual impairment and blindness in Icelanders aged 50 years and older: the Reykjavik Eye Study. Acta Ophthalmol 2008; 86(7):778-85.
2. Sapkota YD, Pokharel GP, Nirmalan PK. Prevalence of blindness and cataract surgery in Gandaki Zone, Nepal. Br J Ophthalmol 2006; 90(4):411-6.
3. Bojarskiene F, Paunksnis A. Prevalence of cataract in 35-64 years old Kaunas city population. Medicina 2005; 41(9):774-8
4. Dandona L, Dandona R, Naduvilath T, McCarty CA, Nanda A, Srinivas M, et al. Is the current eye–care policy focus almost exclusively on cataract adequate to deal with blindness in India? The Lancet 1998; 74:341-43.
5. Jose R. National Programme for control of blindness. Indian J Community Health 1997; 3:5-9.
6. Minassian D, Mehra V. 3.8Million blinded by cataract each year: Projections from the first epidemiological study of incidence of cataract blindness in India. Br J Ophthalmol 1990; 74:341-3
7. Asbell A, Dualan, Mindel, Brocks, Ahmad M, Epstein Seth. Age related cataract. The Lancet 2005 Feb; 365(9459): 599-609
8. Garg A, Sahu A, Gutierrez C, Infantes C, Mehta K, Dhull CS et al. Clinical significance and relevance of MSICS in 21st century era. Master's Guide to MSICS. 1st ed. New Delhi: Jaypee; 2009; P. 3-6

9. Mackool RJ, Sirota MA. Intracapsular foldable posterior chamber lens implantation in eyes with posterior capsule tears or zonular fiber instability. J Cataract Refract Surg 1998; 24:739–40
10. Wang HS. Management of a posterior capsule rupture in planned extracapsular cataract extraction and posterior chamber lens implantation. J Cataract Refract Surg 1986; 12:73–6
11. Bas AM, Bulacio JL, Carrizo R. Monoscleral fixation for posterior chamber intraocular lenses in cases of posterior capsule rupture. Ann Ophthalmol 1990; 22:341–5
12. Desai P, Minassian DC, Reidy A. National cataract surgery survey 1997–8: a report of the results of the clinical outcomes. Br J Ophthalmol 1999; 83: 1336–40.
13. Jaycock P, Johnston RL, Taylor H, Adams M, Tole DM, Galloway P et al. The Cataract National Dataset electronic multi-center audit of 55 567 operations: updating benchmark standards of care in the United Kingdom and internationally. Eye 2009; 23: 38–49
14. Ionides A, Minassian D, Tuft S. Visual outcome following posterior capsule rupture during cataract surgery. Br J Ophthalmol 2001; 85:222–24
15. Angara SK, Vajpayee RB, Titiyal JS. Types of posterior capsular breaks and their surgical implications. Ophthalmic Surg 1991; 22:388–91
16. Hao YS, Hui YN, Li JG. Primary implantation of posterior chamber intraocular lenses in eyes with defective posterior capsule. Chung Hua Yen Ko Tsa Chih 1994; 30:25–37
17. Osher RH, Yu BC-Y, Koch DD. Posterior polar cataract: a predisposition to intraoperative posterior capsular rupture. J Cataract Refract Surg 1990; 16:157–62

18. Narendran N, Jaycock P, Johnston RL, Taylor H, Adams m, Tole DM. The Cataract National Dataset electronic multicenter audit of 55,567 operations: risk stratification for posterior capsule rupture and vitreous loss. Eye 2009; 23:32-7
19. Allinson RW, Metrikin DC, Fante RG. Incidence of vitreous loss among third year residents performing phacoemulsification. Ophthalmology 1992; 99:726-30
20. Osher RH, Cionni RJ. The torn posterior capsule: its intraoperative behaviour, surgical management and long term consequences. J Cataract Refract Surg 1990; 16:490-4.
21. Vajpayee RB, Sharma N, Dada T, Gupta V. Management of posterior capsule tears. Survey of Ophthalmol 2001; 45(6):473-87
22. Snell R S, Lemp M A. Clinical anatomy of the eye. 2nd ed. Boston: Blackwell Science Inc.; 1998; P.197-204
23. Bron AJ, Tripathi RC, Tripathi BJ. Wolff‘s Anatomy of the Eye and Orbit. 8th ed. London: Chapman and Hall; 1997:P. 411-442
24. Kuszak JR, Brown HG: Embryology and anatomy of the lens. In: Albert D.M., Jakobiec F.A., ed. Principles and practice of ophthalmology. Basic sciences. Philadelphia: WB Saunders; 1994:P.82-96.
25. Yanoff M, Duker S. Ophthalmology. Mosby Ltd; 2004: (1): P. 241-5
26. Patterson CA, Delamere NA. The lens In: Hart WM Eds. Adler’s Physiology of the Eye. St Louis: Mosby; 1992:P.348-83
27. Albert DM, Henkind P. Men of Vision. Lives of Notable Figures in Ophthalmology. WB Saunders; 1993
28. Thylefors B, Negrel AD, Pararajasegram R. Global data on blindness. Bull World Health Organ 1996; 74:319-24

29. Spalton D, Koch D. The constant evolution of cataract. British J of Ophthalmology 2000; 321(7272): 1304

30. Ernest PH. Corneal lip tunnel incision. J Cataract Refract Surg 1994 Mar; 20(2):154-7

31. Ernest PH, Lavery KT, Kiessling. Relative strength of scleral tunnel incision with internal corneal lips construction in cadaver eyes. J Cataract Refract Surg 1993 July; 19(4):457-61

32. Naveleza JS, Pendse SJ, Blecher MH. Choosing anesthesia for cataract surgery. Ophthalmol Clin North Am 2006; 19:233-237

33. Reddy MK. Complications of cataract surgery. Indian J Ophthalmol 1995; 43:201-9

34. Ram J. Reducing cataract surgery related complication. Indian J Ophthalmol 1999; 47:153-4

35. Gokhale NS. Visco-expression technique in manual small incision cataract surgery. Indian J Ophthalmol 2009; 57:39-40

36. Assai EI, Apple DJ, Tsai JC, Castaneda VE, Hoggatt JS. An experimental study comparing various anterior capsulectomy technique. Arch Ophthalmol 1991 May; 109(5):642-7

37. Bhattacharjee K, Bhattacharjee H, Goswami BJ, Sharma P. Capsulorhexis in intumescent cataract. J Cataract Refract Surg 1999 Aug; 25(8):1045-7

38. Mulhern M, Kelly G, Barry P. Effects of posterior capsule disruption on the outcome of phacoemulsification surgery. British J of Ophthalmol 1995; 79:1133-7

39. Rossetti L. & Autelitano A. Cystoid macular edema following cataract surgery. Curr Opin Ophthalmol 2000; 11:65–72

40. Asuri MK, Kompella VB, Majji AB. Risk factors for and management of dropped nucleus during phacoemulsification. J Cataract Refract Surg 2001 Sept; 27(9):1428-32

41. Chang DF, Packard RB. Posterior assisted levitation for nucleus retrieval using viscoat after posterior capsule rupture. J Cataract Refract Surg 2003 Oct; 29(10):1860-5

42. Abrisser LB, Charles S, Howcraft M, Wernes l. Management of vitreous loss and dropped nucleus during cataract surgery. Ophthalmol Clin North Am 2006 Dec; 19(4):495-506

43. Sihota R, Tandon R. Parson's diseases of the Eye. 19th ed. Oxford: Butterworth-Heinemann; 2003: P.273-298

44. Javitt JC, Vitale S, Canner JK. National outcomes of cataract extraction. Endophthalmitis after inpatient surgery. Arch Ophthalmol 1991; 109:1085-89

45. Theobald GD, Hass JS. Epithelial invasion of the anterior chamber following cataract extraction. Trans Am Acad Opthalmol Otolaryngol 1948; 52:470-482

46. Jaffe NS, Jaffe MS, Jaffe GF. Cataract surgery and its complications, 6th ed. St Louise: Mosby, 1999

47. Hollick EJ, Spalton DJ, Ursell PG. The effect of polymethylmethacrylate, silicone, and polyacrylic intraocular lenses on posterior capsular opacification 3 years after cataract surgery. Ophthalmology 1999; 106:49-54.

48. Roy FH. After-cataract: clinical and pathologic evaluation. Ann Ophthalmol 1971; 3:1364.

49. Werner L, Mamalis N, Pandey SK. Posterior capsule opacification in rabbit eyes implanted with hydrophilic acrylic intraocular lenses with enhanced square edge. J Cataract Refract Surg 2004; 30:2403-2409.

50. Smiddy WE, Flynn HW, Nicholson DH. Results and complications in treated retinal breaks. Am J Ophthalmol 1991; 112:623-31

51. Zaidi FH, Corbett MC, Burton BJ, Bloom PA. Raising the benchmark for the 21st century. The 1000 cataract operations audit and survey: outcomes, consultant- supervised training and sourcing NHS choice. Br J Ophthalmol 2006; 91:731-6.

52. Desai P. The National Cataract Surgery Survey: II. Clinical outcomes. Eye 1993; 7(4): 489–94.

53. The Royal College of Ophthalmologists. Cataract surgery guidelines. 2004. http://www.rcophth.ac.uk/docs/ publications/FINAL_VERSION_GUIDELINES_-_April_ 2007_-_updated_-_PDF_version.pdf.

54. Ang GS, Whyte IF. Effect and outcomes of posterior capsule rupture in a district general hospital setting. J Cataract Refract Surg 2006; 32:623–7.

55. Courtney P. The National Cataract Surgery Survey I: Methods and descriptive features. Eye 1992 6:487–92

56. Chambless WS. Incidence of anterior and posterior segment complications in over 3000 cases of extracapsular cataract extraction; intact and open capsules. J Am Intraocul Implant Soc 1985; 11:146–8

57. Pearson PA, Owen DG, VanMeter WS, Smith TJ. Vitreous loss rates in extracapsular cataract surgery by residents. Ophthalmology 1990; 96:1225–33

58. Straatsman BR, Meyer KT, Bestek JV, Lightfoot DO. Posterior chamber lens implantation by ophthalmology residents: a prospective study of cataract surgery. Ophthalmology 1983; 90:327–35

59. Natchiar G, Robin AL, Nalgirkar AR, Krishnadas R: Posterior capsule tears during extracapsular cataract surgery in India. Arch Ophthalmol 1993; 111:706–8

60. Malhotra R, Garg P, Singh L, Chawla S. Comparison of small incision cataract surgery with conventional extra capsular cataract surgery: an evaluation from resource poor setting in India. Int J Clin Trials 2014 May; 1(1):10-13

61. Neekhra A, Trivedi HL, Todkar H. Comparative study of posterior rent in cases of routine extra-capsular, small incision non phaco and phacoemulsification. J of the Bombay Ophthalmologists' Association 2002 Mar; 12(1):12-15.

62. Trivedy J .Outcomes of high volume cataract surgeries at a Lions Sight First Eye Hospital in Kenyaye Hospital. Nepal J Ophthalmol 2011; 3(5): 31-38

63. Gogate M, Kulkarni S, Krishnaiah S, Joshi S, Deshpande R, Palmikar A et al. Safety and efficacy of phacoemulsification compared with manual small incision cataract surgery by a randomized controlled clinical trial. Ophthalmology 2005; 112:869-74

64. Venkatesh R, Das M, Prashanth S, Muralikrishnan R. Manual small incision cataract surgery in eyes with white cataracts. Indian J Ophthalmol 2005; 53:173-6.

65. Cruz OA, Wallace GW, Gay CA. Visual results and complications of phacoemulsification with IOL performed by ophthalmology residents. Ophthalmology 1992; 99:448–52

66. Ng DT, Rowe NA, Francis IC. Intraoperative complications of 1000 phacoemulsification procedures: a prospective study. J Cataract Refract Surg 1998; 24:1390–5

67. Prasad S. Phacoemulsification learning curve: experience of two junior trainee ophthalmologists. J Cataract Refract Surg 1998; 20:73–7

68. Browning DJ, Cobo LM. Early experience in extra-capsular cataract surgery by residents. Ophthalmology 1985; 92:1647–53

69. Brazitikos PD, Tsinopoulos IT, Papadopoulos NT. Ultrasonographic classification and phacoemulsification of white senile cataracts. Ophthalmology 1999; 106:2178–83

70. Gimbel HV. Posterior capsular tears during phacoemulsification—causes, prevention and management. Eur J Refract Surg 1990; 2:63–9

71. Zheng D, Lin Z. Reason and management of posterior capsular breaks during cataract extraction and lens implantation. Yen Ko Hsueh Pao 1995; 11:95–7

72. Thomas R, Kuriakose T, George, R. Towards Achieving Small Incision Cataract Surgery 99.8% of the Time. Indian J of Ophthalmology 2000; 48:145-151

73. Chan F, Mathur R, Ku J, Chen C, Yong V, Eong K. Rates of posterior capsule rupture during cataract surgery among different races in Singapore. Ann Acad Med Singapore 2006; 35:698-700

74. Lal H, Sethi A, Bageja S, Popli J. Chopstick technique for nucleus removal in an impending dropped nucleus. J Cataract Refract Surg 2004 Sep; 30 (9):1835–9.

75. Taskpili M, Engin G, Kaya G. Single piece foldable acrylic intraocular lens implantation in the sulcus in eyes with posterior capsule tear during phacoemulsification. J cataract refract surg 2005; 31: 1593-7.

76. Yap-E-Y, Heng W J. Visual outcome and complication after posterior capsule rupture during

77. Phacoemulsification surgery .Int. Ophthalmol 2000; 23:57-60.

78. Collins JF, Krol WF, Kirk GF, Gaster RN. The effect of vitreous presentation during extra-capsular cataract surgery on the postoperative visual acuity at one year. Am J Ophthalmol 2004; 138:536-542

79. Nikica G, Ljerka HP, Jelena P, Metez-Soldo K, Mladen B. Cystoid macular edema in anterior chamber lens implantation following posterior capsule rupture. Doc Ophthalmol 1992; 81:309–15

80. Basti S, Garg P, Reddy MK. Posterior capsular dehiscence during phacoemulsification and manual extra-capsular extraction: comparison of outcomes. J Cataract refract Surg 2003; 29:532-6

81. Driebe Jr WT, Mandelbaum S, Forster RK. Pseudophakic endophthalmitis, Diagnosis and management. Ophthalmology 1986; 93:442-48.

82. Isawumi MA, Soetan EO, Adeoye AO, Adeoti CO. Evaluation of Cataract Surgery Outcome in Western Nigeria. Ghana Med J 2009; 43(4):169–74.

83. Olawoye OO, Ashaye AO, Bekibele CO, Ajayi BGK. Visual Outcome after Small Incision Cataract Surgery in Southwestern Nigeria. Nig J Ophthalmol 2011; 18(2):40-44.

84. Megbelayin E, Rangarajan A, Pindikura S. Learning curve of a trainee ophthalmologist in manual small incision cataract surgery: A self- appraisal. J of Surg 2013; 1(5):63-9

85. Basti S, Vasavada AR, Thomas R, Padhmanabhan P. Extra-capsular cataract extraction: Surgical techniques. Indian J Ophthalmol 1993; 41:195-210

86. Aravind H, Chang D, Shekhar M. Complication rates of phacoemulsification and manual small-incision cataract surgery at Aravind Eye Hospital. J Cat Refract Surg 2012; 38:1360-69

87. Chiramboo MC. Country-wide monitoring of Cataract Surgery Outcomes. Community Eye Health 2002; 15(44):58-9

88. Ajith H, Shetty S, Venkategowda H. Intra-operative comparison of manual small incision cataract surgery and its visual outcome. J of Int Acad Research for Multidisciplinary 2014 July; 2(6):411-15

89. Chan E, Mahroo O, Spalton D. Complications of cataract surgery. Clin Exp Optom 2010: 43:6:374-89

90. Corey RP, Olson RJ. Surgical outcomes of cataract extractions performed by residents using phacoemulsification. J Cataract Refract Surg 1998; 24:66–72

91. Trinavarat A, Neerucha V. Visual outcome after cataract surgery complicated by posterior capsule rupture. J Med Assoc Thai 2012 April; 95(4):530-5

92. Sudhakar J, Ravindra R, Natchiar G. Analysis of complications in 1000 cases of posterior capsule intra-ocular implantation. Indian J Ophthalmol 1989; 37(2):78-79

93. Zia UM, Wasif MK**.** Classification and Evaluation of Secondary Posterior Chamber IOL Implantation Scleral Fixation of IOL. Pak J Ophthalmol 2010; 26 (3): 148-153.

94. Rao N, Pakalpati P, Velagapudi T. Visual outcome after posterior capsule rupture during cataract surgery: comparative study between manual small incision cataract surgery and phacoemulsification. Indian J of applied Research 2013 Nov; 3(11):349-51

95. Gass J.D., Norton E.W. Cystoid macular edema and papilledema following cataract extraction. A fluorescein fundoscopic and angiographic study. Arch Ophthalmol 1966; 76:646–661

96. Ah-Fat F.G., Sharma M.K., Majid M.A.,Yang Y.C. Vitreous loss during conversion from conventional extracapsular cataract extraction to phacoemulsification. J Cataract Refract Surg, 1998; 24:801–05

PROFORMA

PROFORMA

STUDY OF RISK FACTORS AND MANAGEMENT OF POSTERIOR CAPSULAR RENT IN MANUAL SMALL INCISION CATARACT SURGERY

NAME: H. NO:

AGE/SEX: DOA:

ADDRESS DOS:

DOD:

EYE TO BE OPERATED:

CHIEF COMPLAINTS:

H/O PRESENTING ILLNESS:

PAST HISTORY:

FAMILY HISTORY:

PERSONAL HISTORY:

GENERAL PHYSICAL EXAMINATION:

VITALS

BP: PULSE: RR: TEMP:

SYSTEMIC EXAMINATION

CARDIOVASCULAR SYSTEM:

RESPIRATORY SYSTEM:

PER ABDOMEN:

CENTRAL NERVOUS SYSTEM:

OCULAR EXAMINATION

HEAD POSTURE:

OCULAR POSTURE:

	RE	**LE**
EYE LIDS:		
CONJUNCTIVA:		
CORNEA:		
SCLERA:		
ANTERIOR CHAMBER:		
IRIS:		

PUPIL: Size –

Shape –

Reaction –

POWDERING AT PUPILLARY MARGIN- YES/ NO

RIGID SMALL -

LENS:

VISUAL ACUITY:

DISTANT

PIN HOLE

NEAR

OPHTHALMOSCOPY:

1. DIRECT:

2. INDIRECT:

SLIT LAMP BIOMICROSCOPY:

RE **LE**

GONIOSCOPY:

INTRAOCULAR PRESSURE:

LACRIMAL SYRINGING:

DIAGNOSIS:

KERATOMETRY:

Horizontal:

Vertical:

Axial length:

ESTIMATED IOL POWER:

LAB INVESTIGATIONS:

BLOOD SUGAR:

URINE SUGAR:

PERI-OPERATIVE

PUPILS: fully dilated/ semidilated/ constricted

STAGE OF SURGERY During Which Posterior Capsular Rent Occurred:

1) Anterior capsulotomy/ capsulorrhexis
2) Hydrodissection
3) Hudrodelineation
4) Nucleus delivery
5) Irrigation and Aspiration of cortical matter
6) IOL implantation

SIZE of posterior capsular rent:

Whether associated with VITREOUS LOSS : Yes/ No

MANAGEMENT

1) Anterior Vitrectomy

2) Use of Viscoelastic substance

3) Intraocular Lens Implantation

A) Capsular bag

B) Ciliary sulcus

C) Sutured posterior chamber – scleral fixated

D) Anterior chamber

E) Posterior iris claw fixated

POST OPERATIVE EVALUATION

Post-operative / Slit lamp findings	1st day	1st week	1st month	3rd month	6th month
Cornea					
Anterior chamber					
Iris					
Lens position					
Fundus					

VISUAL ACUITY:

	1st day		1st week		1st month		3rd month		6th month	
	UCVA	BCVA	UCVA	BCVA	UCVA	BCVA	UCVA	BCVA	UCVA	BCVA
DISTANT										
PIN HOLE										
NEAR										
Refraction										

CONSENT TO PARTICIPATE

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

I have read or had read to me and understand the purpose of this study, the procedures that will be used, the risks and benefits associated with my involvement in the study and the confidential nature of the information that will be collected and disclosed during the study.

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 this study at any time and this will not change my future care.

Subject's name and signature /thumb impression Date:

PHOTOGRAPHS

PRE-OPERATIVE

PHOTOGRAPH 1 – SLIT LAMP EXAMINATION

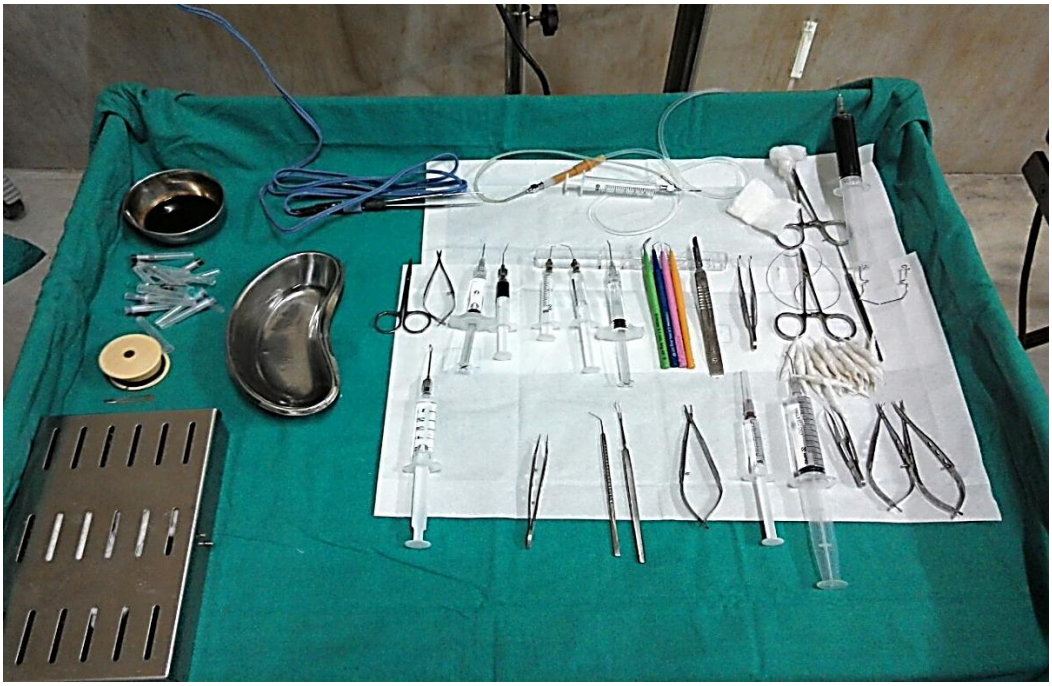
PHOTOGRAPH 2 – A SCAN

PHOTOGRAPH 3- B-SCAN

INTRA-OPERATIVE

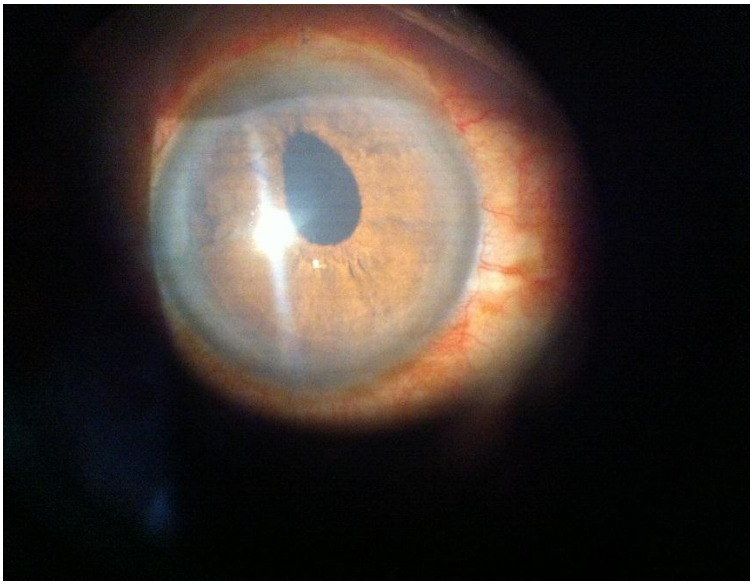
PHOTOGRAPH 4- WHILE DOING MSICS

PHOTOGRAPH 5- SURGICAL INSTRUMENTS

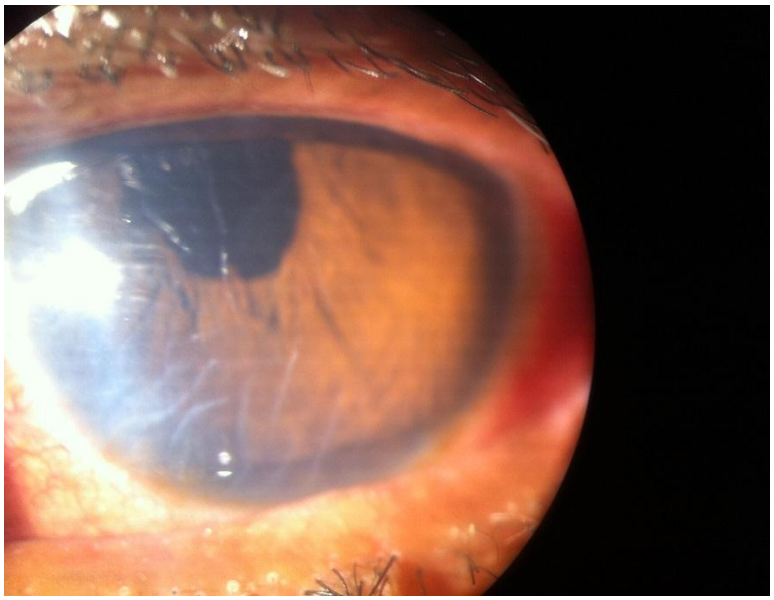


POST-OPERATIVE

PHOTOGRAPH 6 – PEAKED PUPIL



PHOTOGRAPH 7 – STRIATE KERATOPATHY



PHOTOGRAPH 8-CYSTOID MACULAR EDEMA

KEY TO MASTER CHART

1. SI No: Serial number
2. IP No: In patient number
3. RE: Right eye
4. LE: Left eye
5. SIMC: Senile immature cataract
6. SMC: Senile mature cataract
7. PPC: Posterior polar cataract
8. SHMC: Senile hypermature cataract
9. PSP: Pseudophakia
10. DV: Distant vision
11. NV: Near vision
12. BCDV: Best corrected distant vision
13. CE: Corneal edema
14. SK: Striaekeratopathy
15. H: Hyphaema
16. SG: Secondary glaucoma
17. CME: Cystoid macular edema
18. RD: Retinal detachment
19. SE: Suture erosion
20. T-IOL: Tilted intraocular lens
21. UCDV: Uncorrected distant vision

22. V in AC: Vitreous in anterior chamber

23. UCNV: Uncorrected near vision

24. BCNV: Best corrected near vision

25. NS: Nuclear sclerosis

26. CORT: cortical cataract

27. Pup peak- pupillary peaking

28. PSC- posterior sub-capsular cataract

MASTER CHART

serial no.	Name	Age	Sex	IP no.	Diagnosis	Eye	PC rent
1	Ramappa	65	M	864990	PSP(RE)cortical(LE)	LE	No
2	Sunandamma	60	F	864989	cortical (LE>RE)	LE	No
3	Munivenkatamma	67	F	864998	PSP(RE)PPC(LE)	LE	No
4	Venkatamma	70	F	864996	NS4(RE)PSP(LE)	RE	No
5	Muniyamma	56	F	865000	PSC (LE>RE)	LE	No
6	Sonamma	68	F	864987	NS2+cortical(RE<LE)	LE	No
7	Ananth Ram	75	M	865003	PSP(RE)PSC(LE)	LE	No
8	Muniyamma	75	F	865005	PSC (LE>RE)	LE	No
9	Nanjundappa	55	M	865006	PSC (RE)SHMC(LE)	LE	No
10	Venkatamma	65	F	865002	PSP(RE)PSC(LE)	LE	No
11	M.S.Prasad	70	M	866320	PSC+cortical(RE>LE)	RE	No
12	Venkataramma	65	F	866324	SHMC(RE)PSC(LE)	RE	No
13	Hanumappa	50	M	866297	PSC(RE)	RE	No
13	Desamma	60	F	866322	PSC(RE)PSC+cort(LE)	LE	No
14	Muniyamma	70	F	866316	SMC(RE)sx lens(LE)	RE	No
15	Narayanamma	70	F	866317	SMC(RE>(LE)	RE	No
16	Munivenkatappa	75	M	866296	PSC+cortical(LE>RE)	LE	Yes
17	Munivenkatamma	55	F	866312	PSP(RE)SHMC(LE)	LE	No
18	Saraswathamma	60	F	866326	PSC+cortical(RE>LE)	RE	No
19	Gangappa	62	M	866321	PSC(RE>LE)	RE	No
20	Gangamma	80	F	866300	PSC+cortical(LE>RE)	LE	No
21	Natappa	60	M	866990	PSC(RE)SMC(LE)	LE	No
22	Adamma	55	F	866958	PSC+cort(RE)PSP(LE)	RE	No
23	Krishnappa	35	M	866985	PSP(RE)SMCLE)	LE	No
24	Nagappa	75	M	866987	PSP(RE)PSC+cort(LE)	LE	No
25	Lakshamma	60	F	866980	Cortical (RE>LE)	RE	No
26	Chikka Reddy	75	M	866986	PSP(RE)PSC(LE)	LE	No
27	Lakshmidevamma	60	F	866966	PSC+cortical(RE>LE)	RE	No
28	Narasamma	65	F	866957	Cortical(RE>LE)	RE	No
29	Gangappa	60	M	866970	PPC+Cortical(RE>LE)	RE	No
30	Narasimhappa	71	M	866976	PSC+cortical(RE>LE)	RE	Yes
31	Gangappa	70	M	866989	PSC+cortical(LE>RE)	LE	Yes
32	Gangamma	65	F	866956	PSP(RE)PSC(LE)	LE	No
33	Govindappa	70	M	866992	Cortical(RE>LE)	RE	No
34	Gangamma	45	F	866991	PPC(RE)clear(LE)	RE	No
35	Srinivasiah	68	M	866978	Cortical (LE>RE)	LE	No
36	Sabu sab	78	M	866979	PSC+Cort(RE)NS4(LE)	LE	No
37	Nanjamma	65	F	866974	PSC+Cort(LE)PSP(RE	LE	No
38	Venkatrayappa	65	M	866975	PSP(RE)PSC(LE)	LE	No
39	Papamma	67	F	866973	PSC+Cort(RE>LE)	RE	No
40	Rajamma	72	F	866982	PSC(RE)PSP(LE)	RE	No
41	Alvelamma	62	F	866962	NS4(RE)Cortical(LE)	RE	No
42	JH Ramkrishnappa	60	M	868309	PSC(LE>RE)	LE	No
43	Venkatlakshamma	60	F	868318	PSC+cortical(LE>RE)	LE	No
44	Mangamma	58	F	868317	SMC(RE)PSC+Cort(LE)	RE	No
45	Gowramma	55	F	868312	PSC(RE)PSC+cort(LE)	LE	No
46	Hanumakka	60	F	868307	Cort(RE)PSP(LE)	RE	No
47	Lakshamma	60	F	868322	SMC(RE)PSC+Cort(LE)	RE	No
48	Shahnaz bibi	55	F	868301	SMC(RE)PSP(LE)	RE	No
49	Rathnamma	65	F	868305	PSC+Cort(LE>RE)	LE	No
50	Padmavathamma	60	F	868320	PSC+Cort(LE>RE)	LE	No
51	Ramkrishnappa	60	M	868303	PSC(LE>RE)	LE	No
52	khader Pasha	55	F	868315	PSC+Cort(RE>LE)	RE	No
53	Narayan Swamy	60	M	868298	PSC+Cort(RE>LE)	RE	No
54	Venkatachalapathi	60	M	868302	PSP(RE)PSC+Cort(LE)	LE	No
55	chikka Muniyamma	50	F	868968	SMC(RE)PSP(LE)	RE	No
56	Papamma	70	F	868966	PSC+NS2(RE)PSP(LE)	RE	No
57	Kadiramma	65	F	868961	PSC+Cort(RE)Pthysis(LE)	LE	No

58	Munivenkatappa	65	M	868969	NS1+cort(RE)NS2(LE)	LE	No
59	Narasamma	60	F	868994	PSC+Cort(RE)PSP(LE)	RE	No
60	Nagamma	60	F	868999	PSC+Cort(RE>LE)	RE	Yes
61	Nanjamma	75	F	868971	SMC(RE)PSP(LE)	RE	No
63	Venkatrayappa	65	M	868976	PSC+Cort(LE>RE)	LE	No
64	Chikkanaddamma	53	F	868985	PSP(RE)PSC+Cort(LE)	LE	No
65	Narasimhappa	70	M	868960	SMC(BE)	RE	No
66	Venkatrayappa	65	M	868975	PSC+Cort(LE>RE)	RE	No
67	Gangamma	65	F	868959	SMC(LE)PSP(RE)	LE	No
68	Byarappa	64	M	869001	PSC+Cort(LE>RE)	LE	No
69	Chinnarayappa	60	M	868964	PSC+Cort(LE>RE)	LE	No
70	Chinnappa	70	M	868967	SHMC(RE)PSP(LE)	RE	No
71	Gowramma	65	F	868970	PSC+Cort(RE>LE)	RE	No
72	Pyari Jan	60	F	868981	Cortical(RE>LE)	RE	No
73	Venkatamma	65	F	868990	NS3(RE)NS3+Cort(LE)	RE	No
74	Eshwaramma	50	F	868984	PSP(LE)PSC(RE)	RE	Yes
75	Madappa	75	M	868956	PSP(RE)PSC+cort(LE)	LE	No
76	Narasamma	75	F	868973	PSC+Cort(RE>LE)	RE	No
77	Narasimhappa	75	M	868963	PSC+Cort+NS2(RE>LE)	RE	No
78	Krishnappa	65	M	868979	PSC+Cort(LE)PSP(RE	LE	No
79	Chinmayya	60	F	868997	SMC(BE)	RE	No
80	Khatoon bee	70	F	868977	PSC+Cort+NS2(RE>LE)	RE	No
81	Kharoon bee	65	F	868986	PSP(RE)PSC+NS2(LE)	LE	No
82	Narasamma	65	F	868988	PSC+Cort(LE>RE)	LE	No
83	Muniyappa	70	M	868996	SMC(LE)PSP(RE)	LE	No
84	Gargi Reddy	70	M	868987	PSP(RE)PSC(LE)	LE	No
85	Muniswamy	70	M	868958	NS3+Cort(RE>LE)	RE	No
86	Chowda Reddy	60	M	868965	PSC+Cort(RE>LE)	RE	No
87	Chowdamma	70	M	868993	NS3+Cort(LE)PSC(RE)	LE	No
88	Mariyappa	80	M	868989	PSC+Cort(RE)PSP(LE)	RE	No
89	Yarappa	70	M	868982	PSC+Cort(RE>LE)	RE	No
90	Bibi Jaan	52	F	868983	PSC+Cort(RE>LE)	RE	No
91	Lakshamma	60	F	872852	PSC+NS3(LE)PSP(RE)	LE	No
92	Gangappa	60	M	872871	PSC(LE>RE)	LE	No
93	Pramila	56	F	872866	PSC+Cort(LE>RE)	LE	No
94	Venkatappa	50	M	872870	PSC+Cort(RE>LE)	RE	No
95	Thimakka	60	M	872853	NS3+PSC(LE)PSP(RE)	LE	No
96	Shardamma	55	F	872851	PSC+Cort(RE>LE)	RE	No
97	Ganganna	70	M	872863	NS4(RE)NS3(LE)	RE	No
98	Kadirappa	60	M	872861	NS3(RE)SMC(LE)	LE	No
99	Kadirappa Gowda	60	M	872861	PSC+Cort(RE>LE)	RE	No
100	Mariyamma	50	F	925824	PSC+Cort(RE)PSP(LE)	RE	No
101	Mari Rao	70	M	872862	PSC+NS2(RE)PSP(LE)	RE	No
102	Thimmarayappa	65	M	873775	PSC+Cort(RE)PSC(LE)	RE	No
103	Anjamma	60	F	873776	PSC+cort(RE)PSP(LE)	RE	No
104	Munikrishnappa	55	M	873782 PSC+PPC(RE)			No
105	Thirumalappa	60	F	873781 PSC(RE)Cort(LE)			No
106	Seethamma	55	F	873739 PSC+PPC(LE)			No
107	Gurumurthy	65	M	874239 Cortical(LE>RE)		LE	No
108	Seenappa	75	M	874272	PSC+Cort(RE>LE)	RE	No
109	Muniyamma	70	F	874264	PSC(RE)PPC(LE)	LE	No
110	Hudus Saab	67	M	874243	PSC+Cort(RE)PSC(LE)	LE	No
111	Ankamma	70	F	874276	PSC+Cort(RE>LE)	RE	No
112	Narsimhappa	60	M	874265	PPC(RE)PSP(LE)	RE	No
113	Mehrun Bee	60	F	874913	PSC+Cort(LE>RE)	LE	No
114	Narayanaapa	75	M	874921	PSC+Cort(RE)SMC(LE)	LE	No
115	Venkataramappa	70	M	874922	PSC(RE>LE)	RE	No
116	Muniyappa	65	M	874908	PSC+Cort(LE>RE)	LE	No
117	Prakash	45	M	874909	Pre-senile PSC(RE>LE)	RE	No
118	Hussainamma	75	F	874915	SMC(RE)PSP(LE)	RE	No
119	Alvelamma	62	F	874930	PSC+Cort(RE>LE)	RE	No
120	Chowdamma	60	F	874919	PSC+Cort(RE>LE)	RE	No
121	Peer Saab	83	M	874923	SMC(LE)PSP(RE)	LE	No

121	Venkatalakshmamma	68	F	874927	PSC+Cort(RE)SMC(LE)	LE	No
122	Venkatasha Reddy	55	M	874912	PSC+Cort(LE)PSP(RE	LE	No
123	Hanumaiah	76	M	874920	Phthisis(RE)PSC+Cort(LE	LE	No
124	Narasimhappa	65	M	874916	PSC+Cort(RE)SMC(LE)	LE	No
125	Yamakka	62	F	874925	PSP(RE)PSC+Cort(LE)	LE	No
126	Ram Das	68	M	874907	PSC+Cort(LE>RE)	LE	No
127	Ashwathappa	60	M	874918	SMC(RE)PSC+Cort(LE)	RE	No
128	Munilakshamma	65	F	874931	PSC+Cort(RE>LE)	RE	No
129	Alvelamma	60	F	876798	NS3+Cort(LE)PSC(RE)	LE	No
130	Changal Rayappa	55	M	876800	PSC+Cort(LE)PSP(RE	LE	Yes
131	Gangamma	60	F	876804	NS2+cortical(RE>LE)	RE	No
132	Subamma	62	F	876790	PSC+Cort(LE>RE)	LE	Yes
133	Venkataswamy	65	M	876807	PSP(RE)PSC+Cort(LE)	LE	No
134	Muniyamma	68	F	876805	PSC+Cort(LE>RE)	LE	No
135	Ballappa	72	M	879279	NS4(LE)PSP(RE)	LE	No
136	Eramma	60	F	879288	PSC+Cort(RE>LE)	RE	Yes
137	Narayanappa	76	M	879291	PPC(RE)SMC(LE)	LE	No
138	Maramma	65	F	879289	PSC(RE>LE)	RE	No
139	Parvathamma	45	F	879284	PPC(RE)PSP(LE)	LE	No
140	Venkatrayappa	76	M	879277	PSC(RE)PSP(LE)	RE	No
141	Venkatesh	50	M	879272	PPC(RE)NS2+PSC(LE)	LE	No
142	Venkataramappa	70	M	879278	PSC(LE)PSP(RE)	LE	Yes
143	Devamma	53	F	879290	PSC(RE)PSC+cort(LE)	LE	No
144	Narasamma	46	F	879597	PSC(RE)PSP(LE)	RE	No
145	Narayanamma	50	F	879592	PSC(RE>LE)	RE	No
146	Chowdamma	80	F	880314	PSC+Cort(RE>LE)	RE	No
147	Lingamma	60	F	880295	NS3+Cort+PSC(LE>RE)	LE	No
148	Abdul Rashid	85	M	880324	PSC+NS2(RE)PSP(LE)	RE	No
149	Ramappa	71	M	880320	SMC(RE)PSC+Cort(LE)	LE	No
150	Venkatramappa	75	M	880288	PSC+NS2(LE)NS3(RE)	LE	No
151	Narayanamma	70	F	880317	PSC+Cort(LE)PSP(RE	LE	No
152	Ramchandra Reddy	83	M	880319	PSC+Cort(RE>LE)	RE	No
153	Shakunthala	60	F	880312	PSC+Cort(RE)PSC(LE)	LE	No
154	Narasimhappa	75	M	880299	PSC+Cort(LE>RE)	LE	No
155	Munikadirappa	68	M	880328	PSC+Cort+NS2(RE>LE)	RE	No
156	Bisamma	65	F	880296	PSC+Cort+NS2(RE>LE)	RE	No
157	Hanumanthappa	78	M	880311	PSC(LE>RE)	LE	No
158	Muniyamma	60	F	880332	PSC+Cort(RE>LE)	RE	No
159	Muniswamappa	70	M	880327	PSC(RE)NS4(LE)	LE	No
160	Krishnappa	75	M	880305	PSC+Cort(RE>LE)	RE	No
161	Krishnappa	65	M	880289	PSC+Cort(LE)PSP(RE	LE	No
162	Subamma	75	F	880306	PSC+Cort(LE>RE)	LE	No
163	Venkatappa	70	M	880138	PSC+Cort(RE>LE)	RE	No
164	Narayanappa	70	M	880333	PSC+Cort(RE>LE)	RE	No
165	Rathnamma	60	F	880293	NS3(RE)PSP(LE)	RE	No
166	Muniyamma	68	F	880331	PSC+Cort(RE)Cort(LE)	RE	No
167	Papamma	70	F	882893	PSC+Cort(LE>RE)	LE	No
168	Akiamma	60	F	882896	PSC+Cort(RE)PSP(LE)	RE	No
169	Shamshad	55	F	882894	PSC+Cort(RE>LE)	RE	No
170	Achamma	60	F	882886	PSC+Cort(LE)PSP(RE	LE	No
171	Basha Saab	65	M	882885	PSC+Cort(RE)Traumatic(LE)	RE	No
172	Lakshmamma	70	F	862853	PSC+Cort(LE>RE)	LE	No
173	Imamji	70	M	885013	PSC+Cort(RE)PSP(LE)	RE	No
174	Leela bai	70	F	885016	PSC(RE)PSP(LE)	RE	No
175	Lakshmamma	70	F	909554	SMC(RE>LE)	RE	No
176	Beeramma	75	F	885020	PSC(RE>LE)	RE	No
177	Nanjamma	40	F	885003	PSC+Cort(RE)PSP(LE)	RE	No
178	Narasamma	70	F	885005	Cortical(LE>RE)	LE	No
179	Gangubai	45	F	885006	PSC(LE>RE)	LE	No
180	Doddanarasimhappa	70	M	885008	PSC(RE>LE)	RE	No
181	Sidappa	75	M	885009	Cortical(LE)PSP(RE)	LE	No
182	Anjanappa	60	M	885011	PSC(RE>LE)	RE	No
183	Gangamma	65	F	885012	PSC+Cort(RE>LE)	RE	No

184	Muniyamma	70	F	885022	PSC(RE>LE)	RE	No
186	Shamulla	68	M	886361	PSP(RE)PSC(LE)	LE	No
187	Dhanalakshmi	60	F	886363	SMC(RE)PSC+Cort(LE)	RE	No
188	Chinnapaiah	76	M	886381	Cortical(RE)SMC(LE)	LE	No
189	Papiah	72	M	886396	PSC+NS3(RE)SHMC(LE)	LE	No
190	Rajamma	60	F	886465	PSC(LE>RE)	LE	No
191	Muniyappa	57	M	886358	PSC+Cort(LE>RE)	LE	No
192	Anjanappa	70	M	886371	PSC+Cort(LE)PSP(RE	LE	No
193	Venkataramanappa	55	M	886399	PSC(RE)PSP(LE)	RE	No
194	Sarojamma	60	F	886376	PSC+Cort(RE>LE)	RE	No
195	Venkataramappa	62	M	886402	PSC+Cort(LE>RE)	LE	No
196	Gowramma	60	F	886395	PSC+Cort(LE>RE)	LE	No
197	Ramchandrappa	65	M	886375	PSC+Cort(RE)PSP(LE)	RE	No
198	Ramalla	70	M	882162	NS3(RE)NS2(LE)	RE	No
199	Mehboob Pasha	70	M	886369	PSC+Cort(RE)PSC(LE)	RE	No
200	Muniyamma	60	F	886355	PSC+Cort(LE>RE)	LE	No
201	Munivenkatamma	55	F	886379	PSC+Cort(RE)PSC(LE)	RE	No
202	Papamma	75	F	888359	SMC(RE)PSC+Cort(LE)	RE	No
203	Zamran	50	F	888354	PSC+NS1(RE)Cort(LE)	RE	No
204	Narayanappa	70	M	888365	NS4(RE>LE)	RE	No
205	Sarojamma	65	F	888367	SMC(RE)PSC+Cort(LE)	RE	No
206	Lakshamma	69	F	888379	NS3(RE)PSC(LE)	RE	No
207	Muniyappa	65	M	888352	Cort(RE)PSC(LE)	RE	No
208	Muniyamma	60	F	888359	PPC(RE)Cort(LE)	RE	No
209	Lakshamma	58	F	888362	Cort(RE)PSC(LE)	LE	No
210	Anjanappa	75	M	888345	PSC+Cort(LE)PSP(RE	LE	No
211	Narayan Swamy	60	M	888342	PSC+Cort(RE>LE)	RE	No
212	Mangamma	60	F	888353	PSP(RE)SMC(LE)	LE	No
213	Muniramakka	60	M	888337	PSP(RE)PSC(LE)	LE	No
214	Venkatappa	65	M	888338	PSC(RE)SMC(LE)	LE	No
215	Parvathamma	68	F	888350	Cort(RE)SMC(LE)	LE	No
216	Chowdamma	78	F	888351	SMC((RE>LE)	RE	No
217	Narayanamma	50	F	888341	Cort(RE)SMC(LE)	LE	No
218	Muniyappa	65	M	888352	PSC+Cort(RE)PSP(LE)	RE	No
219	Nandamma	70	F	890512	PSP(RE)PSC+Cort(LE)	LE	No
220	Narayanappa	70	M	888355	NS5(RE)NS4(LE)	RE	No
221	Gowramma	45	F	888344	Pre-senile PSC(RE)ClearLE)	LE	No
222	Ramakka	82	F	890125	SHMC(RE)SMC(LE)	RE	No
223	Venkat Krishnappa	57	M	890491	PPC(RE)PSC+Cort(LE)	RE	No
224	Muniyamma	60	F	890503	SHMC(RE)PSC(LE)	RE	No
225	Sri Ram	70	M	890488	PSC+Cort(RE)Cort(LE)	RE	No
226	Amaravathamma	48	F	890507	PSC(RE)Cort(LE)	RE	No
227	Panurappa	70	M	890494	Cort(RE)PSC+Cort(LE)	LE	No
228	Muniyamma	70	F	890495	SMC(RE)PSC(LE)	RE	No
229	Nanjundappa	75	M	890506	PSC(LE>RE)	LE	No
230	Venkatamma	75	F	890498	PSC+Cort(RE>LE)	RE	No
231	Bedamma	75	F	890498	SMC(RE)PSC(LE)	RE	No
232	Jayamma	60	F	831148	PSC(RE>LE)	RE	No
233	Venkatamma	65	F	891158	SMC(RE)PSC+Cort(LE)	RE	No
234	Venkatamma	75	F	890501	PSC(RE>LE)	RE	No
235	Ramkrishna	70	M	890516	PPC(RE)PSC+Cort(LE)	LE	No
236	Krishnappa	65	M	890513	PSP(RE)PSC+Cort(LE)	LE	No
237	Thippamma	70	F	890511	PSC+Cort(RE)PSP(LE)	RE	No
238	Doddapayya	70	M	909561	NS2+Cort(RE)NS3(LE)	LE	No
239	Narayanappa	72	M	892954	PSC(RE>LE)	RE	No
240	Yellamma	62	F	892951	Cortical(LE>RE)	LE	No
241	Venkatamma	70	F	892959	PSC(RE>LE)	RE	No
242	Muniyamma	65	F	892931	PPC(RE>LE)	RE	No
243	Munirathnamma	65	F	892934	PSP(RE)PSC+Cort(LE)	LE	No
244	Chikkavenkat	68	M	892936	PSC(RE)SMC(LE)	LE	No
245	Matramma	68	F	892938	NS4(RE>LE)	RE	No
246	Sri Narayanappa	68	M	892939	PSC(RE)PSP(LE)	RE	No
247	Swarnamma	69	F	892942	PSC+Cort(LE>RE)	LE	No

248	Kankamma	69	F	892943	SMC(RE)PSP(LE)	RE	No
249	Rathnamma	65	F	892946	PSC(RE>LE)	RE	No
250	Venkatappa	70	M	892949	PSC(RE)PSP(LE)	RE	No
251	Muniyappa	70	M	892951	PSP(RE)SMC(LE)	LE	No
252	Chinnasubba	70	M	894374	PSP(RE)SMC(LE)	LE	No
253	Devi	55	F	894379	PSC(RE)SMC(LE)	LE	No
254	Subramappa	65	M	894386	SMC(RE)PSC+Cort(LE)	RE	No
255	Gangalamma	65	F	894393	PSC(RE>LE)	RE	No
256	Muniyamma	60	F	894389	PSC(RE>LE)	RE	No
257	Muniswamy	65	M	894390	SMC(RE)PSC(LE)	RE	No
258	Lakshmamma	72	F	894396	PSP(RE)PSC(LE)	LE	No
259	Anwar	36	M	894375	Pre senile PSC(RE<LE)	LE	No
260	Narayanamma	70	F	894401	PSC+Cort(RE)SMC(LE)	LE	No
261	Narayanappa	73	M	894400	SHMC(RE)Aphakia(LE)	RE	No
262	Krishnachari	70	M	894394	SMC(RE)PSP(LE)	RE	No
263	khader Pasha	50	M	894378	PSC+Cort(RE>LE)	RE	No
264	Imam Saab	45	M	894376	PSMC(RE)PSC(LE)	RE	No
265	Narasamma	68	F	894391	PSC+Cort(RE)PSP(LE)	RE	No
266	Jayamma	75	F	894397	PSP(RE)PSC(LE)	LE	No
267	Ashwathamma	65	F	895042	PSC(RE)SMC(LE)	LE	No
268	Dodda Venkat	70	M	895040	PSC+Cort(RE)NS2(LE)	LE	No
269	Chikkapaya	80	M	895037	PSC(RE)NS3(LE)	LE	No
270	Muniyamma	60	F	895043	PSC+Cort(RE)PSP(LE)	RE	No
271	Jayamma	58	F	895111	SMC(RE)PSC(LE)	RE	No
272	Venkatrayappa	75	M	895053	PSC+NS2(RE)PSC(LE)	RE	No
273	Akiamma	75	F	895054	PSC+Cort(LE>RE)	LE	No
274	Narayanamma	58	F	895051	PPC(RE)Cort(LE)	LE	No
275	Ashwathamma	65	F	895046	Cortical(LE>RE)	LE	No
276	Gangappa	70	M	895049	PSC+Cort(RE>LE)	RE	No
277	Konappa	65	M	895048	PSC+Cort(RE)NS2(LE)	LE	No
278	Eramma	70	F	895047	SMC(LE)PSP(RE)	LE	No
279	Mahesh	40	M	895050	PSMC(RE)PSC(LE)	RE	No
280	Kempamma	80	F	896351	PSP(RE)PSC(LE)	LE	No
281	Kenchappa	76	M	896359	SMC(RE)PSC(LE)	RE	No
282	Yelase Gowda	80	M	896357	PSP(RE)NS3(LE)	LE	No
283	Chinnamma	70	F	896353	PSC(RE>LE)	RE	No
284	Beeramma	80	F	896352	PSC+Cort(RE>LE)	RE	No
285	Thimakka	70	F	896358	PSP(RE)PSC(LE)	LE	No
286	Muniyamma	60	F	896348	PSP(RE)SMC(LE)	LE	No
287	Thirumalappa	60	M	896355	NS3(RE)PSP(LE)	RE	No
288	Venkatarayappa	80	M	896362	PSP(RE)PSC+Cort(LE)	LE	No
289	Samiullah	70	M	896350	PSP(RE)SMC(LE)	LE	No
290	Avelamma	60	F	896347	SMC(RE)PSP(LE)	RE	No
291	Katappa	60	M	896346	PSC(RE)PSC+cort(LE)	LE	No
292	Gowramma	70	F	896361	NS2(RE)PSP(LE)	RE	No
293	Pedavirappa	60	M	896955	SMC(RE)Cortical(LE)	RE	No
294	Narayanappa	70	M	896949	SMC(RE)Cortical(LE)	RE	No
295	Rama Reddy	60	M	896949	SMC(RE)SHMC(LE)	LE	No
296	Muniswamy	70	M	896941	PSC+Cort(RE)PSP(LE)	RE	No
297	Vijayamma	60	F	896956	PSC+Cort(RE)Cort(LE)	RE	No
298	Muniswamy	70	M	896945	PSC(LE>RE)	LE	No
299	Thirumalakka	70	F	896948	NS3(RE)NS4(LE)	LE	No
300	Chowdamma	50	F	896958	PSC+Cort(RE)Cort(LE)	RE	No
301	Seethamma	80	F	896943	PSC+NS1(RE)PPC(LE)	RE	No
302	Lakshmamma	70	F	898918	PSC+Cort(RE)PSC(LE)	RE	No
303	Bharathi	54	F	898392	PSC+Cort(RE>LE)	RE	No
304	Yelloji Rao	70	M	898997	NS2(RE)PSC(LE)	RE	No
305	Jayachandrappa	55	F	898703	PSC(RE)SMC(LE)	LE	No
306	Narayanappa	70	M	898919	PSC(RE)PSP(LE)	RE	No
307	Devamma	70	F	898921	PSC+NS2(LE>RE)	LE	Yes
308	Srinivasappa	70	M	898920	PSP(RE)PSC+Cort(LE)	LE	No
309	Chengappa	75	M	898923	PSP(RE)PSC+Cort(LE)	LE	No
310	Chhotima	60	F	901933	PSC+Cort(RE)PSC(LE)	RE	No

311	Mehboob	60	M	901947	PSC(RE)PSC+cort(LE)	LE	No
312	Mohammad	70	M	901937	PSC+Cort(RE>LE)	RE	No
313	Karim Sab	60	M	901955	PSC+Cort(RE)SMC(LE)	LE	No
314	Jayamma	40	F	901969	PSP(RE)PSMC(LE)	LE	No
315	Kanthamma	65	F	901934	PSC+Cort(LE>RE)	LE	No
316	Vardhappa	65	M	901937	PSC(RE)PSP(LE)	RE	No
317	Rukmani	60	F	901960	PSP(RE)SHMC(LE)	LE	No
318	Bichamma	60	F	901971	PSC+Cort(RE>LE)	RE	No
319	Kadiramma	60	F	901967	PSP(RE)PSC+Cort(LE)	LE	Yes
320	Syed Mir	60	M	901948	PSC+Cort(LE>RE)	LE	No
321	Venkatarama Rddy	56	M	901973	PSC+Cort(LE>RE)	LE	No
322	Narayanappa	75	M	901962	SMC(RE)NS4(LE)	RE	No
323	Seethamma	60	F	901942	PSC+Cort(RE)PSC(LE)	RE	No
324	Lalitha	40	F	901943	Pre-PSC+Cort(RE)Cort(LE)	RE	No
325	Chand Pasha	46	M	901950	Pre senile PSC(RE<LE)	LE	No
326	Kamalamma	67	F	901936	NS3(RE)PSP(LE)	RE	No
327	Rathnamma	60	F	894999	PSP(RE)SMC(LE)	LE	No
328	Narsamma	50	F	918918	PSC+Cort(RE)PSC(LE)	RE	No
329	Lakshmappa	60	M	916958	PSC+Cort(RE>LE)	RE	No
330	Gangammma	60	F	918913	Cortical(LE>RE)	LE	No
331	Munikamma	65	F	918906	SHMC(RE)PSP(LE)	RE	No
332	Rafiq	60	M	920222	PSP(RE)SMC(LE)	LE	No
333	Chikkappa	63	M	920218	PSC+Cort(RE>LE)	RE	No
334	Hanumanthappa	68	M	920217	PSC+Cort(LE>RE)	LE	No
335	Chikkamuniyappa	70	M	920212	SMC(RE)PSC+Cort(LE)	RE	No
336	Narayanamma	65	F	920211	SMC(LE>RE)	LE	No
337	Narayan Shetty	70	M	920864	PSC+Cort(RE>LE)	RE	No
338	Gangalamma	65	F	920859	PSC+NS3(RE)PSP(RE)	RE	No
339	Narayan Swamy	60	M	920861	PSC+Cort(RE)+Cort(LE)	RE	No
340	Redamma	60	F	920863	PSP(RE)PSC+Cort(LE)	LE	No
341	Muniyamma	65	F	920865	PSC+Cort(LE>RE)	LE	No
342	Pedavenkatrayappa	75	M	920858	PSC(RE)PSP(LE)	RE	No
343	Jabar Saheb	85	M	920867	PSC+Cort(RE)PSC(LE)	RE	No
344	Subamma	75	F	920868	PSC+NS2(RE)PSP(LE)	RE	No
345	Venkatamma	65	F	920862	Cortical(RE>LE)	RE	No
346	Sarojamma	75	F	914885	PSC+Cort+NS2(LE>RE)	LE	No
347	Gangalamma	65	F	920859	PSC+NS1(RE)PSP(LE)	RE	No
348	Lakshmamma	70	F	920886	PSC+Cort(LE>RE)	LE	No
349	Ramlakshmamma	60	F	920879	PSC(LE>RE)	LE	Yes
350	Mariyamma	65	F	922204	PSC+Cort(LE)PSP(RE	LE	No
351	Rathnamma	58	F	921403	PSC+Cort(RE>LE)	RE	No
352	Munishamappa	65	M	921879	PSC+Cort(RE)SMC(LE)	LE	No
353	Nallurappa	65	M	922207	PSC+Cort(RE>LE)	RE	No
354	Padmamma	50	F	922199	PSC(RE>LE)	RE	No
355	Ramachandra	55	M	922197	PSC+Cort(LE>RE)	LE	No
356	Akkayamma	70	F	922194	PSC+NS2(RE>LE)	RE	No
357	Kenchamuniyappa	65	M	922192	PSC+Cort(RE>LE)	RE	Yes
358	Krishnappa	65	M	922196	PSC+Cort(RE>LE)	RE	No
359	Narayanswamy	50	F	922200	SMC(RE)PSC(LE)	RE	No
360	Nagarathna	65	F	922874	PSP(RE)PSC+NS3(LE)	LE	No
361	Venkatamma	50	F	922873	PSP(RE)PSC+Cort(LE)	LE	No
362	Ashwthappa	60	M	922878	PSP(RE)SHMC(LE)	LE	No
363	Gangamma	70	F	922882	SMC(RE)Cortical(LE)	RE	No
364	Anand Raj	55	M	925810	SMC(RE)PSP(LE)	RE	No
365	Devaraj	67	M	925810	PSC+NS2(RE)PSC+NS1(LE)	RE	No
366	Tulasamma	60	F	925829	PSC+Cort(RE>LE)	RE	No
367	Venkatarama Reddy	85	M	925815	PSC+Cort(LE>RE)	LE	Yes
368	Mariyappa	70	M	925811	SMC(LE>RE)	LE	No
369	Munichowdappa	70	M	906007	PSP(RE)NS3(LE)	LE	No
370	Munivenkatamma	60	F	906010	PSC(RE)NS3(LE)	LE	No
371	Sarawamma	60	F	905984	PSC(RE)Cort(LE)	RE	No
372	Muniyappa	70	M	909581	PSC+Cort(RE>LE)	RE	No
373	Narayanappa	80	M	909627	PSC+Cort(LE>RE)	LE	No

374	Chinakka	70	F	909610	PSC+Cort(RE>LE)	RE	No
375	Lakshmamma	40	F	909591	Pre-senile PSC(LE>RE)	LE	No
376	Venkataswamy	40	M	909566	PSP(RE)PSMC(LE)	LE	No
377	Venkatamma	65	F	909594	PSC+Cort(LE>RE)	LE	No
378	Anjali	60	F	909935	PSP(RE)SMC(LE)	LE	No
379	Ramchandrappa	65	M	909913	PSC+Cort(RE>LE)	RE	No
380	Venkatamma	70	F	909910	SMC(RE)PSP(LE)	RE	No
381	Mangamma	60	F	909909	SMC(RE)PSC+Cort(LE)	RE	No
382	Papanna	70	M	909908	PSC+Cort+NS1(RE>LE)	RE	No
383	Zehra be	68	F	909907	PSC(LE>RE)	LE	No
384	Rathnamma	58	F	909906	PSC+Cort(RE<LE)	LE	No
385	Govindamma	55	F	909953	PSC(LE>RE)	LE	No
386	Nanjamma	70	F	910268	SHMC(RE)Aphakia(LE)	RE	No
387	Narayanamma	60	F	912319	PSC+Cort(RE)PSP(LE)	RE	No
388	Papachamma	60	F	912305	PSP(RE)PPC(LE)	LE	No
389	Muniyamma	60	F	912317	PSP(RE)PSC+Cort(LE)	LE	No
390	Hanumakka	70	F	912326	SMC(RE)PSC(LE)	RE	No
391	Venkatamma	65	F	912303	PSC(RE)SMC(LE)	LE	No
392	Anusyamma	60	F	912331	SMC(RE)PSC(LE)	RE	No
393	Padmavathamma	60	F	913011	PSC(RE>LE)	RE	No
394	Anjanappa	60	M	913009	PSC+Cort(RE>LE)	RE	No
395	Marakka	80	F	912992	PSC+Cort(RE)Cort(LE)	RE	No
396	Narayanappa	64	M	912998	SMC(RE)PSP(LE)	RE	No
397	Ashwathnarayanappa	80	M	913002	SMC(RE>(LE)	RE	No
398	Venkatswamy	65	M	913001	SHMC(RE)PSC+Cort(LE)	RE	No
399	Narasimhappa	85	M	913006	SMC(RE)PSC(LE)	RE	No
400	K P Raja Rao	50	M	913003	PSP(RE)PSC+Cort(LE)	LE	No
401	Julak bai	50	F	914998	PSC(RE>LE)	RE	Yes
402	Venkatamma	70	F	915002	PSC+Cort(RE>LE)	RE	No
403	Jayamma	65	F	914989	PSC(RE>LE)	RE	No
404	Gandhimadhi	59	F	914988	PSC(RE>LE)	RE	No
405	Jayalakshmi	58	F	913585	PSC(RE)PSP(LE)	RE	No
406	Munirathnamma	68	F	914995	PSC+Cort(RE>LE)	RE	No
407	Buddaha	70	M	914993	SMC(RE)PSC+Cort(LE)	RE	No
408	Gangalamma	60	F	914987	PSP(RE)SMC(LE)	LE	No
409	Somasundara Prasad	67	M	914712	PSC+NS1(RE>LE	RE	No
410	Ramappa	60	M	918917	PSC+Cort(LE>RE)	LE	No
411	Adamma	60	F	918925	PSC+NS2(LE)NS2(RE)	LE	No
412	Venkatamma	65	F	918921	SHMC(LE)PSP(RE)	LE	No
413	Gowramma	69	F	918914	PSC+Cort(LE>RE)	LE	No
414	Mohsin Bai	60	F	918924	PSC+NS3(RE)PSC(LE)	RE	No
415	Pilamma	65	F	918928	SHMC(RE)PSC(LE)	RE	
416	Lakshamma	70	F	918905	PSC(LE>RE)	LE	No
417	Mohammad	65	M	918919	SMC(RE)PSP(LE)	RE	No
418	Alvelamma	55	F	918911	PSC+Cort(LE>RE)	LE	No
419	Byra Reddy	65	M	918926	NS2+Cort(LE)PSP(RE)	LE	No
420	Venkatamma	65	F	920221	PSC+Cort(LE>RE)	LE	No
421	Muniyappa	70	M	920219	SMC(RE)PSP(LE)	RE	No
422	Muniyamma	60	F	920210	PSC+Cort(LE>RE)	LE	No
423	Muni akyama	75	F	922195	PSC+Cort+NS2(RE>LE)	RE	No
424	Pila Muniyamma	60	F	922193	PSC+Cort(RE)PSC(LE)	RE	No
425	Gowramma	60	F	922208	SHMC(RE)PSP(LE)	RE	No
426	Venkatrayappa	70	M	922201	SMC(RE)PSP(LE)	RE	No
427	Narayanappa	70	M	922191	NS3+Cort(LE)PSP(RE)	LE	No
428	Parvathamma	65	F	920098	SMC(RE)PSP(LE)	RE	No
429	Narayanappa	70	M	922894	NS2(RE)PSC+Cort(LE)	LE	No
430	Venkatlakshamma	70	F	922884	PSC+Cort+NS2(RE>LE)	RE	No
431	Thimakka	90	F	922892	PSP(RE)PSC+Cort(LE)	LE	No
432	Shivanna	65	F	922881	PSP(RE)PSC+Cort(LE)	LE	No
433	Gangamma	65	F	922889	PSC+Cort(RE)Cort(LE)	RE	No
434	Narasamma	80	F	922893	PSC+Cort(RE>LE)	RE	No
435	Gangamma	65	F	922890	PSC+Cort(RE)SHMC(LE)	LE	No
436	Kanappa	76	M	901966	PSP(RE)PSC+Cort(LE)	LE	No

437	Lalithamma	55	F	870515	PSC+Cort(RE)SMC(LE)	LE	No
438	Khairunnisa	60	F	901944	SMC(RE)SHMC(LE)	LE	No
439	Byamma	60	F	902662	PSC+Cort(RE)PSC(LE)	RE	No
440	Venkateshappa	60	M	902663	PSC+Cort(RE)PSC+NS2(LE)	LE	No
441	Guramma	60	F	902659	NS3(RE)NS4(LE)	LE	No
442	Chengappa	80	M	901965	SMC(RE)PSP(LE)	RE	No
443	Mehboob	62	M	901946	PSC+Cort(LE>RE)	LE	No
444	Narayanappa	68	M	901952	PSC+Cort(LE>RE)	LE	No
445	Nanjundappa	70	M	901957	PSC+Cort(LE>RE)	LE	No
446	Kulamma	50	F	901935	PSC+Cort(RE>LE)	RE	No
447	Meenamma	65	F	901964	PSC+Cort(LE>RE)	LE	No
448	Azeena	55	F	901940	PSP(RE)PSC+Cort(LE)	LE	No
449	Venkat muni	65	M	902667	PSC+Cort(LE>RE)	LE	No
450	Chinappa	65	M	902668	PSC+Cort(LE>RE)	LE	No
451	Hameer Sab	60	M	902669	PSC+Cort(RE>LE)	RE	No
452	Venkat swamy	60	M	902670	PSC+Cort(RE>LE)	RE	No
453	Muniyamma	50	F	902671	SMC(RE)PSP(LE)	RE	No
454	Parvathamma	61	F	902673	PSC(RE)PPC(LE)	RE	No
455	Venkatramappa	60	M	902674	PSC+Cort(LE>RE)	LE	No
456	Muniyamma	60	F	902676	PSC+Cort(LE>RE)	LE	No
457	Sidappa	65	M	902660	Cortical(RE>LE)	RE	No
458	Subanna	65	M	902658	NS3(RE>LE)	RE	No
459	Munivenkatamma	70	F	902656	PSC+Cort(LE>RE)	LE	No
460	Ajappa	68	M	903998	PSC(RE)PSC+cort(LE)	LE	No
461	seethama	46	F	903988	PSP(RE)PSMC(LE)	LE	No
462	Rama devi	55	F	904006	SMC(RE)PSC(LE)	RE	No
463	Azhmed	46	F	903989	Pre-senile-PSC(LE>RE	LE	No
464	Muniyamma	58	F	903992	PSC(LE>RE)	LE	No
465	Ramappa	52	M	903987	PSC(RE>LE)	RE	No
466	Nagappa	75	M	904000	PSP(RE)SMC(LE)	LE	No
467	Narasimhalu	64	M	904004	PSP(RE)PSC+Cort(LE)	LE	No
468	Rathnamma	65	F	903999	PSC+Cort(LE>RE)	LE	No
469	Rangappa	60	M	904648	PSC+Cort(RE>LE)	RE	No
470	Shivappa	60	M	904646	PSC+Cort(RE)PSPLE)	RE	No
471	Ganga Reddy	70	M	904647	NS4(RE)NS3(LE)	RE	No
472	Venkatarama Reddy	65	M	904645	PSC+Cort(LE>RE)	LE	No
473	Narasimhappa	65	M	904651	Cortical(LE>RE)	LE	No
474	Lakshamma	68	F	904656	SHMC(RE)PSC+Cort(LE)	RE	No
475	Venkatamma	65	F	904643	Cortical(LE>RE)	LE	No
476	Lakshamma	68	F	904654	SMC(RE)PSC+Cort(LE)	RE	No
477	Muniyappa	60	M	906023	PSC(RE>LE)	RE	No
478	Muninarayanappa	65	M	905992	PSP(RE)SMC(LE)	LE	No
479	Narasimaiah	70	M	905985	PSC+Cort(RE)PSP(LE)	RE	No
480	Krishnamma	65	F	905997	SHMC(RE)PSP(LE)	RE	No
481	Rangamma	58	F	906001	PSP(RE)PSC+Cort(LE)	LE	No
482	Veer thimakka	70	F	906017	PSC(RE>LE)	RE	No
483	Narayanamma	65	F	906016	SMC(LE)PSP(RE)	LE	No
484	Parvathamma	65	F	905989	PPC(RE)PSC(LE)	RE	No
485	Srinivasappa	50	M	905982	PSC+Cort+NS2(LE)PSP(RE)	LE	No
486	Narayanamma	70	F	905999	PSC(RE)Cort(LE)	RE	No
487	Rahim	70	M	906013	PSC+Cort(LE>RE)	LE	No
488	Rathnamma	58	F	906009	PSC+Cort(RE>LE)	RE	No
489	Lakshamma	55	F	906020	PSC(RE)Cort(LE)	RE	No
490	Jayamma	65	F	906021	PSC(LE)PSP(RE)	LE	No
491	Munirathnamma	65	F	909571	SMC(RE)PSP(LE)	RE	No
492	Kamalamma	40	F	909574	PSMC(RE)PSC(LE)	RE	No
493	Pilappa	60	M	909577	PSC+Cort(RE)PSP(LE)	RE	No
494	Munivenkatappa	65	M	909581	PSC+Cort(RE>LE)	RE	No
495	Chowdamma	80	F	909590	SMC(RE)Cortical(LE)	RE	No
496	Venkatamma	65	F	909591	PSC(RE>LE)	RE	No
497	Mariama	50	F	925824	PSC+Cort(RE)PSP(LE)	RE	No
498	Srinivasa	60	M	909599	SMC(RE)PSP(LE)	RE	No
499	Muniyappa	70	M	909602	NS3(RE)NS2(LE)	RE	No

500	Chinakka	70	F	909610	PSC+Cort(RE>LE)	RE	No
501	Ramakka	60	F	909624	SMC(RE)PSC(LE)	RE	No
502	Narayanappa	80	M	909628	PSC(RE)PSC+cort(LE)	LE	No
503	Thimme Gowda	70	M	909635	PSC+Cort(RE>LE)	RE	No
504	Saraswathi	60	F	925817	SMC(RE)PSP(LE)	RE	No
505	Srinivas	60	M	925820	PSC+Cort(RE)PSP(LE)	RE	No
506	Selvam	67	M	925826	PSC+Cort(RE>LE)	RE	No
507	Rukmani	65	F	925813	PSC+Cort(LE>RE)	LE	No
508	Kalina	67	F	925828	SMC(RE)PSC+Cort(LE)	RE	No
509	Narayanappa	75	M	926150	SMC(RE)PSP(LE)	RE	No
510	Jyoyhama	40	F	926147	PSMC(RE)clear(LE)	RE	No
511	Seethama	60	F	926143	SMC(RE)PSP(LE)	RE	Yes
512	Narayanswamy	55	M	926154	PPC(RE)SMC(LE)	LE	No
513	Venkatlakshamma	55	F	926835	PSC(RE)PSC+cort(LE)	LE	No
514	Gatappa	70	M	926826	PSP(RE)SMC(LE)	LE	No
515	Nagehaiah	64	M	926842	PSC+NS1(LE>RE)	LE	No
516	Chowdamma	75	F	926827	PSC+NS3(LE>RE)	LE	No
517	Radhamma	55	F	926846	NS3(RE)Cort(LE)	RE	Yes
518	Sri Ramappa	65	M	928224	PSC(RE)PSP(LE)	RE	No
519	Thankappa	83	M	928230	PSP(RE)PSC(LE)	LE	No
520	Laksmidevamma	65	F	928227	PSP(RE)PSC+Cort+NS2(LE)	LE	No
521	Krishnamma	65	F	928231	PSC(LE>RE)	LE	No
522	Lakshamma	60	F	928884	PSC+Cort(RE>LE)	RE	No
523	Ramakka	80	F	930764	PSP(RE)PSC+Cort(LE)	LE	No
524	Muniyappa	65	M	930763	PSC+Cort+NS2(RE)PSP(LE)	RE	No
525	Balamma	70	F	930761	PSC+Cort(RE>LE)	RE	No
526	Seethamma	65	F	930758	PSC+Cort(LE>RE)	LE	No
527	Venkatamma	65	F	930769	PSC(LE>RE)	LE	No
528	Pedanna	60	M	932063	PSP(RE)PSC+Cort(LE)	LE	No
529	Sethappa	70	M	934042	SMC(RE)PSC+Cort(LE)	RE	No
530	Venkatrajamma	55	F	934045	PPC(RE)PSC+Cort(LE)	LE	No
531	Putappa	75	M	934704	PSC+Cort(RE)SMC(LE)	LE	No
532	Krishnappa	65	M	922039	PSC(LE)Aphakia(RE)	LE	No
533	Vijayamma	60	F	899087	PSP(RE)PSC+Cort(LE)	LE	No
534	Saroja	60	F	925827	PSP(RE)PSC+Cort(LE)	LE	No
535	Rajamma	60	F	925814	PPC(RE)PSP(LE)	RE	No
536	Kasthuri	60	F	926816	PSC(RE)PSP(LE)	RE	No
537	Radhamani	45	F	925819	PSMC(RE)clear(LE)	RE	No
538	Ramappa	70	M	926162	Aphakia(RE)SMC(LE)	LE	No
539	Narayanappa	82	M	926168	PSC(RE)PSC+NS2(LE)	LE	No
540	Narayanamma	70	F	926160	PSC+NS3(RE)PSP(LE)	RE	No
541	Yashodamma	65	F	926163	SMC(RE)PSC+Cort(LE)	RE	No
542	K Narayanppa	83	M	926170	PSC+Cort+NS1(RE)PSP(LE)	RE	No
543	Venkatswamy	72	M	926145	PSC(RE)SMC(LE)	LE	Yes
544	Venkatamma	65	F	926167	PSC(RE)PSP(LE)	RE	No
545	Venkatesh	72	M	926153	PSC+Cort(LE>RE)	LE	No
546	Venkateshappa	75	M	926148	PSC(LE>RE)	LE	No
547	Venkateshappa	72	M	926168	SMC(RE)PSC(LE)	RE	No
548	Janardhana	72	M	926830	PSC(RE>LE)	RE	No
549	Fathima	50	F	926841	PSC+Cort(LE>RE)	LE	No
550	Baba Jan	60	M	926836	PSC+Cort(RE)SMC(LE)	LE	No
551	Manjula	50	F	926843	SMC(RE)Clear(LE)	RE	No
552	Narayanappa	68	M	928225	PSC(RE)PSC+cort(LE)	LE	No
553	Ramanna	80	M	928232	Cort(RE)PSC+Cort(LE)	RE	Yes
554	Sonappa	68	M	928234	PSC+Cort(RE)PSP(LE)	RE	No
555	Salma	60	F	928233	PSC+Cort(RE)PSC(LE)	RE	No
556	Venkatamma	60	F	928228	SMC(RE)PSP(LE)	RE	No
557	Putamma	66	F	928865	PSC+Cort(LE>RE)	LE	No
558	Golappa	70	M	928852	PSP(RE)SMC(LE)	LE	No
559	Yelappa	64	M	928845	PSC+Cort(LE>RE)	LE	No
560	Venkatamma	62	F	928866	PSC+Cort+NS1(LE>RE)	LE	No
561	Sharadhamma	65	F	928859	PSC+Cort(LE>RE)	LE	No
562	Narayanappa	60	M	930776	PSC+Cort(RE)PSP(LE)	RE	No

563	Venkatesh	52	M	930775	PSC(RE)PSP(LE)	RE	No
564	Amaravathamma	50	F	930772	PSP(RE)PSC+Cort(LE)	LE	Yes
565	Venkatamma	68	F	930780	SMC(LE>RE)	LE	No
566	Belamma	70	F	930767	SMC(RE)PSP(LE)	RE	No
567	Muniswamy	60	M	930757	SMC(RE)Clear(LE)	RE	No
568	Manjunath	40	M	932061	Pre senile PSC(RE)clear(LE)	RE	No
569	Yelappa	63	M	932058	PSC+Cort(RE>LE)	RE	No
570	Muniyappa	60	M	930680	SHMC(RE)PSP(LE)	RE	No
571	Gangadharamma	62	F	932071	Aphakia(RE)SMC(LE)	LE	No
572	Sonappa	70	M	932054	PPC(LE>RE)	LE	No
573	Malaramma	60	F	934046	PSC+Cort(LE)PSP(RE	LE	No
574	Venkob Rao	75	M	930770	NS3(RE)NS2(LE)	RE	Yes
575	Muniyamma	60	F	934699	Cortical(LE>RE)	LE	No
576	Thangamma	68	F	934716	PSC+Cort+NS3(RE>LE)	RE	No
577	Munivenkatamma	70	M	934711	NS2+Cort(RE)PSP(LE)	RE	No
578	Rajamma	70	F	934708	NS2+Cort(RE)SMC(LE)	LE	No
579	Achamma	70	F	936064	Aphakia(RE)PSC+Cort(LE)	LE	No
580	Chikkavenkatappa	70	M	936050	PSC+Cort(RE>LE)	RE	No
581	Rayar Ali	67	M	938853	SMC(RE)PSP(LE)	RE	No
582	Siddanangappa	75	M	938858	NS3(RE)NS2(LE)	RE	No
583	Putappa	60	M	938854	SMC(RE)PSP(LE)	RE	No
584	Gowramma	65	F	938859	PSC+Cort(RE>LE)	RE	No
585	Lakshamma	60	F	938857	SMC(RE)PSP(LE)	RE	No
586	Srinivas	50	M	938847	SMC(RE)PSP(LE)	RE	No
587	Nasappa	62	M	938848	PSC+Cort(RE)SMC(LE)	LE	No
588	Vanjamma	43	F	940526	PSMC(LE)PSC(RE)	LE	No
589	Chikkavenkatappa	60	M	941220	PSC+NS2(RE)PSP(LE)	RE	No
590	Lakshmidevamma	60	F	941222	SMC(RE)Cortical(LE)	RE	No
591	Parimala	50	F	940531	PSP(RE)SMC(LE)	LE	No
592	Venkateshappa	75	M	943406	PSP(RE)NS4(LE)	LE	No
593	Bhadramma	70	M	943405	NS3(RE)NS3+PSC(LE)	LE	No
594	Anusuyamma	50	F	943411	PSC(RE)SMC(LE)	LE	No
595	Krishnappa	66	M	946691	SMC(RE)PSP(LE)	RE	No
596	Muniyamma	70	F	946690	PSC+Cort(LE>RE)	LE	No
597	Rathnamma	58	F	929104	PSC+NS2(LE>RE)	LE	No
598	Sriram Reddy	63	M	947380	NS3(RE>LE)	RE	No
599	Muniswamy	75	M	947386	PSC+NS1(RE>LE)	RE	No
600	Subbarayappa	65	M	947374	PSC+Cort(RE>LE)	RE	No
601	Venkatswamy	60	M	934052	PSC+Cort(RE)SMC(LE)	LE	No
602	Hallappa	68	M	934696	PSC+Cort(RE>LE)	RE	No
603	Govindappa	55	M	934709	Cortical(RE)SMC(LE)	LE	No
604	Venkatappa	70	M	934710	NS3(RE)Aphakia(LE)	RE	No
605	Venkatamma	75	F	934707	SMC(RE)PSC+Cort(LE)	LE	No
606	Jayalakshma	65	F	936045	NS2+PSC(RE)PSC+Cort(LE)	RE	No
607	Krishna G	66	M	936062	NS3+Cort(RE)Cort(LE)	RE	No
608	Munivenkatappa	70	M	936052	PSC+Cort(RE>LE)	RE	No
609	Venkateshappa	68	M	936055	PSP(RE)PSC(LE)	LE	No
610	Geethamma	38	F	938845	PSP(RE)PSMC(LE)	LE	No
611	Sakkubai	50	F	938849	PSP(RE)PSC+Cort(LE)	LE	No
612	K.C.Nanjundappa	59	M	938867	PSC+Cort(LE)PSP(RE	RE	No
613	Siddamma	65	F	938879	SMC(RE)PSC+Cort(LE)	RE	No
614	Sharadhamma	50	F	938870	PPC(LE)PSP(RE)	LE	No
615	Chenamma	58	F	938872	PSC(RE>LE)	RE	No
616	Bhabhobi	52	F	938869	PSC+NS1(RE)PSC+Cort(LE)	LE	No
617	Venkatappa	50	M	938851	PSP(RE)PSC+Cort(LE)	LE	No
618	Sunkamma	55	F	938878	PSC(RE)PSC+cort(LE)	LE	No
619	Narasimhappa	55	M	938877	PPC(RE)PSC(LE)	LE	No
620	Munivenkatamma	60	F	938855	PSC+Cort(RE>LE)	RE	No
621	Ramkrishnappa	68	M	938846	PSC+Cort(LE>RE)	LE	No
622	Ashwathamma	70	F	938862	NS3(RE)PSP(LE)	RE	No
623	Kyathappa	60	M	938852	PSC+NS1+Cort(RE>LE)	RE	No
624	Rawanamma	55	F	940532	PSC+Cort+NS1(RE)PSP(LE)	RE	No
625	Bhagyamma	52	F	940539	PSC(RE)PSC+NS1(LE)	LE	No

626	Sami khan	83	M	940528	PSC+NS2(LE>RE)	LE	No
627	Rani	65	F	940538	PSC+Cort(RE)SMC(LE)	LE	No
628	M Ravi	50	M	940536	SMC(RE)PSC+Cort(LE)	RE	No
629	Byramma	45	F	941219	PSC+Cort(RE)Cort(LE)	RE	No
630	Narayanamma	75	F	941215	SMC(RE)PSC+Cort(LE)	RE	No
631	Venkateshappa	70	M	941224	PSC+Cort(RE>LE)	RE	No
632	Ramappa	75	M	941227	NS3(RE>LE)	RE	No
633	Sarasamma	60	F	941229	SMC(RE)Cortical(LE)	RE	No
634	Pushpavathi	40	F	943422	PSC+Cort(RE)PSP(LE)	RE	No
635	Subbanna	47	M	943414	SMC(RE)PSP(LE)	RE	No
636	Krishnappa	65	M	943444	PSP(RE)PSC+Cort(LE)	LE	Yes
637	Nanjamma	56	F	943410	PSC(RE>LE)	RE	No
638	Ramkrishnappa	66	M	946687	PSC(RE)PSP(LE)	RE	No
639	Sana ulla khan	59	F	946694	PSC+NS2(RE)PSC(LE)	LE	No
640	Venkateshappa	71	M	946693	SHMC(RE)NS2+Cort(LE)	RE	No
641	Venkatamma	70	F	946692	SMC(RE)PSC+Cort(LE)	RE	No
642	Chowdappa	66	M	946689	PSC+Cort(RE>LE)	RE	No
643	Narayanamma	65	F	947371	PSC+NS1(RE>LE)	RE	No
644	Lakshamma	75	F	947388	Cortical(RE)PSC+Cort(LE)	RE	No
645	Ashwathamma	75	F	947385	PSC+Cort(RE>LE)	RE	Yes
646	Muniyamma	72	F	947384	PSP(RE)PSC+Cort(LE)	LE	No
647	V.Y.Lakshamma	45	F	947381	PSP(RE)PSC(LE)	LE	No
648	Krishnappa	55	M	947375	SMC(RE)PSC+Cort(LE)	RE	No
649	Chinamma	60	F	947376	PSC(RE>LE)	RE	No
650	Venkatrayappa	70	M	947383	PSC(RE>LE)	RE	No
651	Subbanna	62	M	947082	PSC+Cort(RE>LE)	RE	No
652	Ramakka	70	F	948769	PSP(RE)cortical(LE)	RE	No
653	Muniyappa	75	M	948770	PSP(RE)SMC(LE)	LE	No
654	Jagadish	60	M	948759	PSP(RE)PSC(LE)	LE	No
655	Munikrishnappa	69	M	948764	PSC+Cort(LE)PSP(RE	LE	No
656	Sharfunissa	60	F	948762	Cortical(LE>RE)	LE	No
657	Parvathamma	62	F	948765	PSP(RE)PSC+Cort(LE)	LE	Yes
658	G.V.Narayanswamy	55	M	949479	PSC+Cort(RE)PSC(LE)	RE	No
659	Yamanna	85	M	949460	SMC(RE)NS2+Cort(LE)	RE	No
660	Chowdamma	50	F	949457	PSP(RE)SHMC(LE)	LE	No
661	Byamma	65	F	949451	SMC(LE)PSP(RE)	LE	No
662	Konamma	80	F	949466	PSC3(LE>RE)	LE	No
663	Gowramma	65	F	949469	SHMC(LE)PSP(RE)	LE	No
664	Venkatamma	66	F	949449	PSP(RE)NS2+PSC(LE)	LE	No
665	Kadiramma	65	F	949480	SHMC(RE)PSP(LE)	RE	No
666	Imam Sab	50	M	949453	NS3(LE>RE)	LE	No
667	Ramalakshmamma	60	F	949452	Cort+NS2(RE)PSC+NS2(LE)	LE	No
668	Lakshamma	60	F	949477	Cort(RE)PSC+Cort(LE)	LE	No
669	Sarojamma	70	F	953531	PSC+Cort(RE)PSC(LE)	RE	No
670	Nagappa	65	M	953534	PSC+Cort+NS1(RE>LE)	RE	No
671	Venkatesh	58	M	953552	Cort+NS2(LE>RE)	LE	No
672	Narayanappa	65	M	956917	SMC(RE)PSP(LE)	RE	No
673	Gatappa	70	M	956910	PSC(RE>LE)	RE	No
674	Munivenkatappa	80	M	956912	NS3(RE)Aphakia(LE)	RE	No
675	Venkatrayappa	70	M	947383	PSC(RE>LE)	RE	No
676	Rathnamma	50	F	947382	PSC+Cort(RE)PSC(LE)	RE	No
677	Krishnamma	65	F	947628	PSC+NS1(RE)Cort(LE)	LE	No
678	Chowdamma	65	F	948756	PSC+Cort(RE)PSP(LE)	RE	No
679	Ubedullah	62	M	948761	SHMC(RE)PSC+Cort(LE)	RE	No
680	Xavier	54	M	949507	SHMC(RE)PSP(LE)	RE	No
681	John	75	M	949506	PSC+Cort(RE)PSP(LE)	RE	No
682	Mahalakshmi	55	F	949775	PSP(RE)PSC+Cort(LE)	LE	No
683	Anthony	74	M	949503	PSC+Cort(RE)PSP(LE)	RE	Yes
684	Dora swamy	65	M	949505	SMC(RE)PSP(LE)	RE	No
685	Muniyamma	75	F	949502	NS3(RE>LE)	RE	No
686	Raghu	70	M	873229	PSC+NS3(RE)PSP(LE)	RE	No
687	Lakshamma	60	F	949447	SMC(RE)PSC(LE)	RE	No
688	Ashraff	60	M	949494	SMC(RE)PSC(LE)	RE	No

689	Shanumugam	63	M	949462	PSC+Cort(RE>LE)	RE	No
690	Chikkanarayanappa	72	M	943680	SMC(RE)NS2(LE)	RE	No
691	Gangaramiah	60	M	953547	PSC+NS2(RE)PSC+NS3(LE)	LE	No
692	Putamma	80	F	953546	SMC(RE)Cortical(LE)	RE	No
693	Rathnamma	65	F	953568	PSP(RE)SHMC(LE)	LE	No
694	Rathnamma	68	F	953563	PSC+NS3(RE)PSC+NS2(LE)	RE	No
695	Munivenkatappa	68	M	953568	PSC+Cort+NS2(RE)PSC+NS1(LE)	RE	Yes
696	Venkateshappa	58	M	953552	NS2+Cort(LE>RE)	LE	No
697	Lakshamma	56	F	954003	PSC+Cort(LE>RE)	LE	No
698	Kamalamma	55	F	956915	PSC(RE>LE)	RE	No
699	Sidappa	70	M	956916	PSC(RE>LE)	RE	No
700	Kanamma	68	F	956914	PSC+Cort(RE)PSP(LE)	RE	No
701	Murgesh	59	M	956913	SMC(RE)PSC+Cort(LE)	RE	No
702	M.V.Venkatramappa	55	M	956939	PSC+Cort(RE)PSC+NS2(LE)	LE	No
703	Govind	60	M	957545	SMC(RE)PSC+Cort(LE)	RE	No
704	Papaiah	63	M	957550	PSC(RE)PSC+cort(LE)	RE	No
705	Muniyamma	68	F	957541	PSC+Cort(LE>RE)	LE	No
706	Chowdamma	68	F	958888	PSP(RE)PSC+Cort(LE)	LE	No
707	Thipamma	50	M	958893	PSP(RE)PSC(LE)	LE	No
708	Cheluvamma	50	F	958885	PSC+Cort(RE)SMC(LE)	LE	No
709	Narasimappa	72	M	959520	PSC+Cort(RE)PSC(LE)	RE	No
710	Mallika	50	F	959532	PSP(RE)SMC(LE)	LE	No
711	Syed mohammad	60	M	959521	PSC(RE>LE)	RE	No
712	Hanumakka	62	F	959525	SMC(RE)PSC(LE)	RE	No
713	Ramappa	60	M	962672	SMC(LE)PSP(RE)	RE	No
714	Pandiyamma	55	F	962668	SMC(RE)PSP(LE)	RE	No
715	Muniyappa	70	M	962662	SMC(LE>RE)	LE	No
716	Gangamma	70	F	962658	PSC+Cort(LE>RE)	LE	No
717	Lakshamma	70	F	962656	PSC+Cort+NS2(RE>LE)	RE	No
718	Ramakka	75	F	956908	PSC(RE>LE)	RE	No
719	Nagappa	61	M	956905	SMC(RE)PSC+Cort(LE)	RE	No
720	kenchamma	64	F	957549	PSP(RE)PSC(LE)	LE	No
721	Lakshmibai	63	F	957546	PSP(RE)PSC+Cort+NS2(LE)	LE	No
722	Saraswathamma	70	F	957543	NS1+PSC(RE)PSP(LE)	RE	No
723	Muniyamma	61	F	957552	PSC+NS1(RE>LE)	RE	No
724	Mariyamma	70	F	958881	PSC(RE)SMC(LE)	LE	No
725	Adinarayana	70	M	958882	PSC+Cort(RE)PSP(LE)	RE	No
726	Yellappa	70	M	958883	PSC(RE)NS2(LE)	LE	No
727	Muniyamma	70	F	958886	PSC+NS2(RE)PSP(LE)	RE	No
728	Krishnappa	60	M	958895	Phthisis(RE)PSC+Cort(LE	LE	No
729	Ashwathappa	65	M	959523	PSC(RE)SMC(LE)	LE	Yes
730	Muniyamma	60	F	953569	PSP(RE)PSC+Cort(LE)	LE	Yes
731	Fazunisa	65	F	959531	PSC(LE>RE)	LE	No
732	Nyamabh	72	F	959526	PSP(RE)PSC+Cort(LE)	LE	No
733	Anjamma	60	F	959527	PSC(LE>RE)	LE	No
734	Venkateshappa	45	M	959524	Cort(RE)PSMC(LE)	LE	No
735	Gatamma	50	F	959529	PSC(LE>RE)	LE	No
736	Ramanna	78	M	962680	SMC(RE>LE)	LE	No
737	Maqbool	70	M	962679	SHMC(RE>LE)	RE	No
738	Suresh	50	M	962676	PSC(LE>RE)	LE	No
739	Padmavathamma	66	F	962675	PSC+Cort(RE>LE)	RE	No
740	Venkatappa	65	M	962673	PSC+Cort+NS2(RE)PSP(LE)	LE	No
741	Lakshmakka	65	F	962671	NS3+Cort(RE)PSC(LE)	RE	No
742	Lankappa	75	M	962669	PSC(RE>LE)	RE	No
743	Prema	55	F	962665	PSC(LE>RE)	LE	No
744	Haseena	60	F	962664	PSC+Cort(RE>LE)	RE	No
745	Venkatamma	70	F	962663	PSC+Cort(RE>LE)	RE	No
746	Narayanappa	75	M	963309	PSC+Cort(RE)PSP(LE)	RE	No
747	Krishnappa	70	M	963308	PSC+Cort(RE)Cort(LE)	RE	No
748	Thimappa	75	M	963326	PSP(RE)PSC+Cort(LE)	LE	No
749	Muniyappa	88	M	963323	NS3+Cort(RE)PSP(LE)	RE	Yes
750	Chalapathy	65	M	963322	PSC+Cort(RE>LE)	RE	No
751	Eramma	65	F	963318	PSC(RE)PSC+NS2(LE)	LE	No

752	Jayamma	70	F	963317	SHMC(RE)PSC+Cort(LE)	RE	No
753	Kader Pasha	65	M	963321	PSP(RE)PSC(LE)	LE	No
754	Gangamma	68	F	963319	SMC(RE>LE)	RE	No
755	Venkatramappa	70	M	963320	PSC+Cort(RE)SMC(LE)	LE	No
756	Narayan Swamy	65	M	963313	Cort(RE)SMC(LE)	LE	No
757	Parvathamma	55	F	964677	PSC+Cort(RE>LE)	RE	No
758	Kitappa	48	M	964679	PSP(RE)SMC(LE)	LE	No
759	Ramakka	65	F	964678	PSC+Cort(RE)Cort+NS2(LE)	LE	No
760	Lakshamma	60	F	964684	NS2(RE)NS1(LE)	RE	No
761	Suryanarayan	87	M	964688	PSP(RE)NS3(LE)	LE	No
762	Munivenkatamma	60	F	964687	PSP(RE)NS3+Cort(LE)	LE	No
763	Gangamma	68	F	965667	PSC(RE>LE)	RE	No
764	Thiruvengalamma	50	F	965679	SMC(RE)PSC(LE)	RE	No
765	Papakka	62	F	965675	PSC+Cort(RE>LE)	RE	No
766	Narayanamma	55	F	965670	PSC(RE)SMC(LE)	LE	No
767	Rafiq	53	M	965664	PSP(RE)SMC(LE)	LE	No
768	Gangappa	63	M	965671	PSC(RE)PSP(LE)	RE	No
769	Analappa	72	M	965672	PSC+Cort(RE)PSP(LE)	RE	No
770	Kadiramma	55	F	965668	PSC+Cort(RE>LE)	RE	No
771	Krishna Reddy	56	M	965677	PSC+Cort(RE>LE)	RE	No
772	Gowramma	50	F	965680	PSP(RE)NS4(LE)	LE	No
773	Krishnappa	52	M	966689	PSP(RE)PSC(LE)	LE	No
774	Venkatarayappa	65	M	966691	PSP(RE)PSC+Cort(LE)	LE	No
775	Lakshamma	65	F	966703	Cort+NS3(LE)	LE	No
776	Venkatraman	65	M	966697	PSP(RE)cortical(LE)	LE	No
777	Narsamma	65	F	966693	PSC(RE)PSC+NS1(LE)	LE	No
778	Sri Ramappa	52	M	966698	SMC(RE)PSC+NS2(LE)	RE	No
779	Savithramma	48	F	966688	PSC(RE>LE)	RE	No
780	Subbarayappa	60	M	966690	PSC+Cort(RE)Cort(LE)	RE	No
781	Nagappa	55	M	966700	PSC(LE>RE)	LE	No
782	Venkatamma	65	F	966701	SMC(RE)NS1+Cort(LE)	RE	No
783	Kempana	66	M	967442	PSC(RE)Clear(LE)	RE	No
784	Anjamma	65	F	967444	PSC+Cort(RE>LE)	RE	No
785	Lakshmakka	80	F	967447	SMC(RE)PSP(LE)	RE	No
786	Lakshamma	80	F	977443	PSC+Cort(RE>LE)	RE	No
787	Ram Singh	70	M	967446	PSP(RE)PSC+Cort(LE)	LE	No
788	Rangili	60	F	967448	PSC(RE>LE)	RE	No
789	Khadirappa	55	M	969457	PSC(LE>RE)	LE	No
790	Muniyamma	65	F	969461	PSP(RE)PSC+Cort(LE)	LE	No
791	Venkatarama Reddy	52	M	969459	PSP(RE)PSC(LE)	LE	Yes
792	Munivenkatappa	67	M	970792	SMC(RE)PSP(LE)	RE	No
793	Subbachari	73	M	970791	PSC+Cort(RE>LE)	RE	No
794	Venkatamma	50	F	970790	SMC(RE)PSC(LE)	RE	Yes
795	Venkatanna	55	M	972742	Cort(RE)PSC+Cort(LE)	LE	No
796	Gantalapa	80	M	972743	PSC(RE>LE)	RE	No
797	Narayan Gowda	80	M	972740	SMC(RE)Cortical(LE)	RE	No
798	Gowramma	60	F	972741	PSC(RE>LE)	RE	No
799	Muniyamma	58	F	972739	PSC(RE)SMC(LE)	LE	No
800	Adilakshamma	65	F	962668	PSC+Cort(RE>LE)	RE	No
801	Byamma	60	F	962660	PSC+NS3(RE)PSC+NS2(LE)	RE	No
802	Venkatamma	78	F	962680	SMC(RE)PSP(LE)	RE	No
803	Rathnamma	66	F	962675	PSC+Cort(RE>LE)	RE	No
804	Chikkamunivenkatappa	65	M	962673	PSC+Cort(LE>RE)	LE	No
805	Venkatamma	78	F	962680	SMC(RE)PSP(LE)	RE	No
806	Lakshmaiah	50	F	962676	PSC+Cort(RE)Cort(LE)	RE	No
807	Venkatramappa	67	M	964683	NS2+Cort(LE>RE)	LE	No
808	Chowdamma	65	F	965665	PSC+Cort(LE>RE)	LE	No
809	Narsamma	80	F	965669	SMC(LE>RE)	LE	No
810	Narsamma	55	F	965666	PSC+Cort(RE)Cort(LE)	RE	No
811	V.Ramappa	56	M	965673	PSC+Cort+NS2(LE>RE)	LE	No
812	Gangadhar	65	M	967453	Cort(RE)PSC+NS2(LE)	LE	Yes
813	Kanthamma	70	F	967452	PSC+Cort(RE)PSP(LE)	RE	No
814	Kondamma	60	F	967499	PSP(RE)PSC+Cort(LE)	LE	No

815	Ramanayak	70	M	967450	PSC+NS1(LE>RE)	LE	No
816	Khursheed	65	F	967451	PSC(RE>LE)	RE	No
817	Jayamma	64	F	969458	PSC+Cort(RE>LE)	RE	No
818	Venkateshappa	72	M	847554	PSC(RE>LE)	RE	No
819	Shardamma	70	F	972735	SMC(RE>LE)	RE	No
820	Munivenkatappa	75	M	972736	PSP(RE)cortical(LE)	LE	No
821	Syed Ibrahim	65	M	972750	PSP(RE)PSC+Cort(LE)	LE	No
822	Narayan swamy	65	M	973366	PSC(RE>LE)	RE	No
823	Krishnamma	62	F	973373	PSC+NS2(RE)NS1(LE)	RE	No
824	Krishnamma	50	F	973370	PSC(LE>RE)	LE	No
825	Muniyappa	60	M	974692	PSC+Cort(RE>LE)	RE	No
826	Karga Reddy	65	M	974682	PSC+Cort(RE>LE)	RE	No
827	Ramakrishnappa	55	M	976536	PSC+Cort+NS1(RE>LE)	RE	No
828	Ramamurthy	50	M	976534	PSC(LE)PSP(RE)	LE	No
829	Sarojamma	70	F	976652	SMC(RE)PSP(LE)	RE	No
830	Indrani	60	F	976564	NS3(RE)NS4(LE)	LE	No
831	Vishwanathan	52	M	976550	SMC(RE)PSP(LE)	RE	No
832	Nagrathnamma	58	F	972738	Cortical(LE>RE)	LE	No
833	Ramakka	55	F	973367	PSC(RE>LE)	RE	No
834	Venkatamma	65	F	972744	PSC+NS1(RE)PSC+Cort(LE)	RE	No
835	Sidamma	65	F	972745	SMC(RE)PSP(LE)	RE	No
836	Chinamma	67	F	972737	NS3+Cort(RE)NS2+Cort(LE)	RE	Yes
837	Gangamma	70	F	973363	PSC+Cort(RE)PSP(LE)	RE	No
838	Venkatesh	68	M	969579	SMC(RE)PSC(LE)	RE	No
839	Narsimhappa	68	M	974690	PSC(LE>RE)	LE	No
840	Krishnamma	65	F	974688	PSC(RE>LE)	RE	No
841	Wahib Khan	55	M	974681	PSP(RE)PSC(LE)	LE	No
842	Muniyamma	65	F	974691	PSC+NS2(RE)PSC+NS2(LE)	RE	No
843	Jayaramappa	55	M	974684	PSC+Cort(RE)PSP(LE)	RE	No
844	Shankarappa	63	M	976530	SMC(RE)PSC(LE)	RE	No
845	Babu Reddy	50	M	976533	PSC(RE)PSP(LE)	RE	No
846	Shri Narasiah	65	M	976537	SMC(RE)PSC+Cort(LE)	RE	No
847	Mohan Kumar	54	M	976540	SMC(RE)PSC+Cort(LE)	RE	No
848	Vasanth Rao	66	M	976535	PSC+NS2(RE>LE)	RE	No
849	Guna Sheelan	60	M	976538	PSC(RE)PSC+Cort(LE)	LE	Yes
850	Swelavan	68	M	976532	NS2+PSC(RE>LE)	RE	No
851	Dilshad	38	F	978591	PSMC(LE)Clear(RE)	LE	No
852	Gopalappa	65	M	978594	PSP(RE)PSC+Cort(LE)	LE	No
853	Thipamma	70	F	978896	NS4(RE)NS3(LE)	RE	No
854	Vanayanamma	65	F	978597	NS4(RE)NS3(LE)	RE	No
855	Jayamma	45	F	978599	PSC(RE>LE)	RE	No
856	K.N.Gopalappa	60	M	978573	PSC+Cort(LE>RE)	LE	Yes
857	Rangamma	65	F	979300	PSP(RE)PSC(LE)	LE	No
858	Eshwaramma	60	F	979296	SHMC(RE)PSP(LE)	RE	No
859	Munivenkatamma	85	F	982833	PSC(RE)SMC(LE)	LE	No
860	Premanna	60	F	982837	PSC+NS3(RE>LE)	RE	No
861	Jayamma	80	F	983110	Cort+NS3(RE>LE)	RE	No
862	Gangappa	75	M	983533	NS4(RE)PSC(LE)	RE	No
863	G.V.Rathna	55	F	983525	PSC(RE)PSC+NS2(LE)	LE	No
864	Ashwathnamma	58	F	983524	PSC+Cort(LE>RE)	LE	No
865	Gangamma	60	F	983534	PSP(RE)SMC(LE)	LE	No
866	Babakka	60	F	983536	PSP(RE)SMC(LE)	LE	No
867	Khansu bee	85	F	983535	NS2(RE)PSC+NS3(LE)	LE	No
868	Doddapaya	60	M	983523	PSC+Cort(RE)PSC(LE)	RE	No
869	Narayanamma	80	F	983526	SHMC(RE>LE)	RE	No
870	Hanumanthappa	65	M	983520	PSC+Cort(LE>RE)	LE	No
871	Sidamma	70	F	983532	PSC(LE>RE)	LE	No
872	Chowdamma	65	F	984988	Cort(RE)SMC(LE)	LE	No
873	Venkatlakshamma	70	F	985035	PSC+Cort(RE>LE)	RE	No
874	Gulab Jan	50	F	984978	PSC+Cort(RE)PSP(LE)	RE	No
875	Rathnamma	60	F	984994	PSC+Cort(RE)PSC(LE)	LE	No
876	Gangamma	70	F	984983	NS3(RE>LE)	RE	No
877	Shivappa	50	M	984986	PSC(RE>LE)	RE	No

878	Saraswathamma	60	F	984995	PSC(RE)PSC+Cort(LE)	LE	No
879	Lakshamma	65	F	985733	Cort+PSC(RE)SMC(LE)	LE	No
880	Sakira	75	F	985732	PSC+NS3(RE)PSC+NS1(LE)	RE	No
881	Subamma	60	F	985779	NS1+Cort(RE)PSC(LE)	RE	No
882	Nana Sab	65	M	985777	PSC+NS2(RE)NS1(LE)	RE	No
883	Gangalamma	70	F	985778	PSC+Cort(RE)PSC+Cort(LE)	RE	No
884	Venkatamma	45	F	985762	PSC+Cort(RE>LE)	RE	No
885	Gopalkrishna	65	M	985753	NS2(LE>RE)	LE	No
886	Nanjamma	58	F	986747	PSC(LE>RE)	LE	No
887	Venkatamma	64	F	986748	PSC+Cort(RE)PSC(LE)	RE	No
888	Muniyappa	74	M	986749	PSC(RE>LE)	RE	No
889	Muniyamma	64	F	987217	PSC+Cort(RE)Cort(LE)	RE	No
890	Muniyamma	68	F	987219	PSC+Cort(RE>LE)	RE	No
891	Lakshamma	59	F	987218	SMC(RE)PSC+Cort(LE)	RE	No
892	Nagrathnamma	70	F	987199	Cort(RE)PSC+Cort(LE)	RE	No
893	Gangalamma	72	F	989391	Early Cortical(RE>LE)	RE	No
894	Rajanna	70	F	989393	PSC(RE>LE)	RE	No
895	Rathnamma	50	F	989382	PSC+Cort(RE>LE)	RE	No
896	Krishnappa	65	M	989383	PSP(RE)PSC+Cort(LE)	LE	No
897	Muniswamy	70	M	989384	PSC+Cort(RE>LE)	RE	No
898	Venkatramma	70	F	989392	PSC+Cort(RE>LE)	RE	No
899	Abraham	60	M	989386	PSC(RE>LE)	RE	No
900	Gangamma	64	F	990100	PSP(RE)SHMC(LE)	LE	No
901	Narasimha Murthy	55	F	990118	NS1+PSC(RE>LE)	RE	No
902	Ramakka	60	F	992293	PSC+Cort(RE>LE)	RE	No
903	Parvathamma	70	F	990103	PSC+NS3(RE)PSP(LE)	RE	No
904	Gangamma	65	F	992296	PSC+Cort(RE>LE)	RE	No
905	Govindappa	65	M	992295	PSC(RE>LE)	RE	No
906	Venkat	60	M	992297	NS3(LE)PSP(RE)	LE	No
907	Chinamma	60	F	992280	PSP(RE)PSC+NS3(LE)	LE	No
908	Chanamma	64	F	992274	Cort(RE)PSP(LE)	RE	No
909	Lakshmappa	68	M	992284	PSC(RE)Cort(LE)	RE	No
910	Venkatramappa	65	M	992281	PSC+Cort(RE)Cort(LE)	RE	No
911	Laxmipathi	65	M	992285	PSP(RE)NS3(LE)	LE	No
912	Prasanna	50	M	992276	PSC(RE>LE)	RE	No
913	Venkatchalapathy	65	M	992264	PSC+Cort(LE>RE)	LE	No
914	Nanjundappa	65	M	992291	NS3(RE)PSP(LE)	RE	No
915	Narsimhappa	70	M	992292	SMC(LE>RE)	LE	No
916	Ananthnarayan	50	M	992282	PSC+Cort(LE>RE)	LE	No
917	Eshwaramma	50	F	979233	SHMC(RE)PSC(LE)	RE	No
918	Syed Khadar	59	M	992348	PSC(LE)PSP(RE)	LE	No
919	Savithramma	65	F	994248	PSC+Cort(RE>LE)	RE	No
920	Channappa	67	M	994247	SMC(LE)PSP(RE)	LE	No
921	Sri Ramappa	68	M	994253	PSC(RE)Cort(LE)	RE	No
922	Chinakka	65	F	994262	PSP(RE)PSC+NS2(LE)	LE	No
923	Chinamaiah	60	M	994254	PSC(RE>LE)	RE	No
924	Venkatarama Gowda	65	M	994261	PSP(RE)SHMC(LE)	LE	No
925	Narappa	67	M	994251	PSC(RE>LE)	RE	No
926	Muniswamy	70	M	994249	PSC+NS2(RE)PSP(LE)	RE	No
927	Ramaiah	68	M	994286	PSC(LE>RE)	LE	No
928	Venkateshappa	60	M	994288	NS2(RE>LE)	RE	No
929	Amavasya	60	M	992683	PSC+Cort(RE)PSC(LE)	RE	No
930	Shakuntalamma	80	F	992364	NS2(LE>RE)	LE	No
931	Rajendra	54	M	967015	NS3+PSC(RE)PSC(LE)	RE	No
932	Narasamma	56	F	996824	PSC+NS1(RE>LE)	RE	No
933	Akayama	62	F	996846	PSC(RE)NS2(LE)	RE	No
934	Bacha Reddy	75	M	978583	Cort(RE)PSC+Cort(LE)	LE	No
935	Papama	70	F	978587	PSC+Cort(LE>RE)	LE	No
936	Munivenkatappa	70	M	978586	PSC+NS2(LE>RE)	LE	No
937	Sharfunissa	60	F	978578	SMC(RE)PSC+Cort(LE)	RE	No
938	Parvathamma	65	F	978581	PSP((RE)NS1+PSC(LE)	LE	No
939	B muniyappa	50	M	978584	PSC+Cort(RE>LE)	RE	No
940	Munivenkatamma	60	F	978580	PSP(RE)NS1+Cort(LE)	LE	No

941	Gopal	58	M	978576	NS1+PSC(LE>RE)	LE	No
942	Aruna	55	F	976597	PSC(RE>LE)	RE	No
943	Eramma	65	F	979302	NS3+Cort(RE>LE)	RE	No
944	Krishnappa	62	M	982822	PSP(RE)PSC+NS2(LE)	LE	No
945	Krishnappa	65	M	982830	PSC+Cort(LE>RE)	LE	Yes
946	Venkateshappa	60	M	982826	PSC+NS2(RE)PSP(LE)	RE	No
947	Dhanalakshmi	65	F	982825	PSP(RE)PSC+NS3(LE)	LE	No
948	Chowdamma	60	F	983530	PSC+Cort(LE>RE)	LE	No
949	Chikkalakshma	70	F	983548	PSC+Cort+NS2(RE>LE)	RE	No
950	Lakshminarasama	65	F	983546	PSC(RE>LE)	RE	No
951	Venkatamma	65	F	983545	NS3(RE)NS2(LE)	LE	No
952	Avalappa	70	M	983543	NS3+PSC(LE>RE)	LE	No
953	Gangamma	60	F	983541	PSC+Cort(LE>RE)	LE	No
954	Sathyamma	65	M	983540	PSC+Cort(LE>RE)	LE	No
955	Narasimhappa	70	M	983539	PSC(RE>LE)	RE	No
956	Gangamma	55	F	983537	PSP(RE)SMC(LE)	LE	No
957	Ameer	63	M	985001	PSC+Cort(RE)PSC(LE)	RE	No
958	Adimanthappa	85	M	984993	PSP(RE)PSC(LE)	LE	No
959	Chowdappa	69	M	984988	PSP(RE)PSC+NS2(LE)	LE	No
960	Hanumanthappa	50	M	984999	PSC+Cort(RE)PSC(LE)	RE	No
961	Gangamma	62	F	984990	PSP(RE)NS2(LE)	LE	No
962	Nanjamma	85	F	984989	PSP(RE)NS3(LE)	LE	No
963	Subbamma	85	F	9845000	Cort(RE)PSC(LE)	LE	No
964	Papama	75	F	985739	SMC(RE)Cortical(LE)	RE	No
965	Lakshmamma	57	F	985746	NS2+Cort(RE)NS4(LE)	LE	No
966	Lakshamma	55	F	985749	SMC(RE)PSP(LE)	RE	No
967	Lawrence	55	M	985751	PSC+NS1(RE)PSC(LE)	RE	No
968	Lakshamma	70	F	985752	SMC(RE)PSP(LE)	RE	No
969	Venkatamma	60	F	985027	PSC+Cort(RE>LE)	RE	No
970	Narasimhappa	56	M	987199	PSC+Cort(RE)PSC(LE)	LE	No
971	Venkatrayappa	59	M	987220	PSC+Cort(LE>RE)	LE	No
972	Krishnappa	70	M	987204	NS3(RE)PSC(LE)	RE	No
973	Sanjeevappa	68	M	987211	SMC(RE)PSC(LE)	RE	No
974	Gulab	74	M	987203	SMC(LE>RE)	LE	No
975	Muniyappa	69	M	987210	PSC(RE>LE)	RE	No
976	Muniyamma	68	F	989370	PSC+Cort(RE)Cort(LE)	RE	No
977	Shankarappa	69	M	989373	PSC+Cort(RE)Cort(LE)	RE	No
978	Venkatswamy	68	M	989377	SMC(RE)PSC(LE)	RE	No
979	John	65	M	989395	PSC+NS2(RE>LE)	RE	No
980	Krishnappa	65	M	989397	PSC(RE>LE)	RE	No
981	Sonappa	86	M	989398	PSC+Cort(RE>LE)	RE	No
982	Gulab Jan	60	F	983442	PSC+Cort(RE)Cort(LE)	RE	No
983	Chowdamma	60	F	990117	NS3(RE)PSP(LE)	RE	No
984	Mahalingappa	54	M	990097	PSC+NS1(LE>RE)	LE	No
985	Hanumanthappa	62	M	990119	PSC+NS1(RE>LE)	RE	No
986	Mallama	60	F	990093	PSC+NS2(RE)NS3(LE)	LE	No
987	Lakkama	64	F	990104	PSC+NS2(LE>RE)	LE	No
988	Sanjeevappa	66	M	990108	PSC+Cort+NS2(RE>LE)	RE	Yes
989	Ashwathnamma	60	F	992268	NS3+PSC(RE>LE)	RE	No
990	Ashwathnamma	64	F	992275	PSC+Cort(LE>RE)	LE	No
991	Narayanamma	60	F	992273	PSC+Cort(RE>LE)	RE	No
992	Govindappa	70	M	992272	PSC+NS2(RE>LE)	RE	No
993	Laxmi	55	F	992286	PSP(RE)SMC(LE)	LE	No
994	Gopalappa	70	M	992269	PSC(RE>LE)	RE	No
995	Gangamma	58	F	992278	PSC+NS2(RE)PSP(LE)	RE	No
996	Venkatrayappa	67	M	992288	NS2+Cort(RE>LE)	RE	No
997	Subanna	50	M	994225	PSC(RE<LE)	LE	No
998	Papana	65	F	994263	PSC+Cort(RE>LE)	RE	No
999	Maligeyamma	68	F	994266	PSC+Cort(RE>LE)	RE	No
1000	Chinakka	80	F	994258	PSP(RE)NS4(LE)	LE	No

MASTER CHART

					PRE - OPRATIVE EVALUATION		preop vision				risk factors												
Sl no	Names	Age	Sex	I.P.no	Diagnosis	Eye	UCDV	BCDV	UCNV	BCNV	pupil	anterior capsulotomy	anterior capsulorexis	hydroprocedures	nucleus delivery	irrigation and aspiration	iol implantation	operating surgeon	size of rent	VL	AV	IOL IMPLANTATION
1	NARASIMHAPPA	71	M	866976	PSC+CORT(RE>LE)	RE	HM +	NIPH	N-	N-	DILATED	+	-	-	-		+	resident	3mm	-	-	in bag
2	MUNIVENKATAPPA	75	M	866296	PSC WTH CORTICAL(LE>RE)	LE	CF 5MT	NIPH	N36	N36	CONSTRICTED	+	-	-	-	+	-	resident	8MM	+	+	APHAKIA
3	GANGAPPA	60	M	866989	PSC WTH CORTICAL,LE>RE	LE	CF 5m	NIPH	N36	N36	CONSTRICTED	+	-	-	+	-	-	resident	7MM	+	+	SFIOL
4	NAGAMMA	60	F	868999	NS3 (RE)PSC(LE)	RE	CF 4m	NIPH	N36	N36	DILATED	+	-	-	-	+	-	resident	4MM	-	-	in bag
5	ESHWARAMMA	50	F	868984	PSC(RE)PSP(LE)	LE	CF 5m	6/36	N36	N36	CONSTRICTED	-	+	-	-	+	-	CONSULTANT	3MM	-	-	in bag
6	CHANGAL RAYAPPA	55	M	876800	PSC WTH CORTICAL(RE),PSP(RE)	LE	CF 5MT	NIPH	N24	N24	DILATED	+	-	-	-	+	-	resident	3mm	+	+	IN SULCUS
7	SUBAMMA	62	F	876790	PSC WTH CORTICAL(LE>RE)	LE	CF 4m	6/60	N24	N24	DILATED	+	-	-	-	+	-	resident	4MM	-	-	in bag
8	VENKATARAMAPPA	70	M	879278	PSC(LE)PSP(RE)	LE	CF 5MT	6/36	N24	N24	CONSTRICTED	+	-	-	-	+	-	resident	8MM	+	+	SFIOL
9	ERAMMA	60	F	879288	ISC WTH CORT(RE>LE)	RE	CF 4m	6/60	N24	N24	DILATED	+	-	-	-	+	-	resident	3mm	-	-	in bag
10	DEVAMMA	70	F	898921	NS 3(LE>RE)	LE	CF 4m	6/36	N18	N12	CONSTRICTED	+	-	-	-	+	-	resident	5MM	+	+	in bag
11	KADIRAMMA	65	F	901971	PSP(RE)PSC WITH CORT(LE)	LE	CF 3m	NIPH	N36	N36	DILATED	+	-	-	-	+	-	resident	3mm	-	-	in bag
12	RAMLAKSHMAMMA	60	F	920879	SMC (LE>RE)	LE	CF 5MT	6/60	N24	N24	mid dilated	+	-	-	+	-	+	resident	3mm	-	-	in bag
13	KENCHAMUNIYAPPA	65	M	922192	NS3 +CORT(RE>LE)	RE	CF1MT	NIPH	N-	N-	CONSTRICTED	+	-	-	-	+	-	resident	4MM	-	-	in bag
14	VENKATARAMA RED	85	M	925815	NS3 WTH CORTICAL(LE>RE)	LE	CF 4m	6/60	N36	N36	DILATED	+	-	+	-	-	-	resident	3mm	-	-	in bag
15	JULAK BAI	50	F	914998	NS3(RE>LE)	RE	CF 2m	CF 5M	N36	N36	CONSTRICTED	+	-	-	+	+	-	resident	8MM	+	+	IRIS CLAW
16	SEETHAMMA	60	F	926143	SMC(RE)PSP(LE)	RE	HM +	-	N-	N-	mid dilated	+	-	-	+	-	-	resident	5MM	+	+	IN SULCUS
17	RADHAMMA	55	F	926846	NS3(RE)CORTICAL (LE)	RE	CF 2m	NIPH	N18	N12	CONSTRICTED	+	-	-	+	-	-	resident	3mm	-	-	in bag
18	VENKATSWAMY	72	M	926145	PSC(RE)SMC(LE)	LE	HM +	NIPH	N-	N-	mid dilated	+	-	+	-	-	-	resident	5MM	+	+	IN SULCUS
19	RAMANNA	80	M	928232	NS3(RE)PSC WITH CORT(LE)	RE	CF 5m	6/24	N24	N18	CONSTRICTED	+	-	-	-	+	-	resident	8MM	+	+	SFIOL
20	AMARVATHAMMA	50	F	930772	PSP(RE)NS3 WITH CORT(LE)	LE	CF 4m	6/60	N36	N24	DILATED	+	-	-	-	+	-	resident	3mm	-	-	in bag
21	KRISHNAPPA	65	F	943444	PSP(RE)NS2-3 WITH CORT(LE)	LE	CF 5MT	NIPH	N36	N24	DILATED	-	+	-	+	-	-	resident	3mm	-	-	in bag
22	ASHWATHAMMA	75	F	947385	psc with cortical (LE)SHMC(RE)	RE	CF 4m	6/60	N36	N36	CONSTRICTED	+	-	-	-	+	-	resident	4MM	-	-	in bag
23	PARVATHAMMA	62	F	948765	PSP(RE)PSC WITH NS3(LE)	LE	CF 5m	6/36	N24	N18	CONSTRICTED	+	-	-	-	+	-	resident	5MM	+	+	IN SULCUS
24	MUNIVENKATAPPA	68	M	953568	NS3+CORTICAL (RE)PSC WITH NS1 (LE)	RE	CF 4m	6/24	N18	N12	DILATED	+	-	+	-	-	-	resident	3mm	-	-	in bag
25	MUNIYAMMA	60	F	953569	PSP(RE)PSC WITH NS3T(LE)	LE	CF 2m	NIPH	N-	N-	mid dilated	+	-	-	-	+	-	resident	8MM	+	+	IRIS CLAW
26	MUNIYAPPA	88	M	963323	NS3+CORTICAL (RE)PSP (LE)	RE	CF 3m	NIPH	N36	N24	CONSTRICTED	-	+	-	-	+	-	CONSULTANT	3mm	-	-	in bag
27	VENKATARAMA RED	52	M	969459	PSP(RE)NS3 (LE)	RE	CF 5m	6/60	N36	N24	DILATED	-	+	-	-	+	-	resident	3mm	-	-	IN SULCUS
28	VENKATAMMA	55	F	970790	SMC(RE)PSC(LE)	RE	HM +	NIPH	N-	N-	CONSTRICTED	+	-	-	-	+	-	resident	8MM	+	+	IRIS CLAW
29	GANGADHAR	65	M	967953	CORT(RE)PSC WITH NS2(LE)	LE	CF 5m	6/60	N24	N24	DILATED	+	-	-	-	+	-	resident	3mm	-	-	in bag
30	CHINAMMA	67	F	972737	SMC(RE)NS2 WITH CORT(LE)	RE	HM +	-	N-	N-	CONSTRICTED	+	-	-	-	+	-	resident	9MM	+	+	APHAKIA(LENS DROP)
31	GUNA SHEELAN	60	M	976538	PSC(RE)SHMC (LE)	LE	CF 5m	6/60	N36	N36	DILATED	-	+	-	-	+	-	resident	3mm	-	-	in bag
32	K.N.GOPALLAPPA	60	M	978573	PSC+CORT+NS3(LE>RE)	LE	CF 2m	NIPH	N36	N36	Mid dilated	-	+	-	-	+	-	resident	7 mm	+	+	IRIS CLAW
33	KRISHNAPPA	65	M	982830	PSC+CORT(RE)SHMC(LE)	LE	CF 4m	6/60	N24	N24	CONSTRICTED	+	-	+	-	-	-	resident	3mm	-	-	in bag
34	ASHWATHAPPA	65	M	959523	PSC(RE)SMC(LE)	LE	HM +	-	N-	N-	CONSTRICTED	+	+	-	-	+	-	resident	3mm	-	-	in bag
35	VENKOB RAO	75	M	930770	NS3(RE)NS2 (LE)	RE	CF 4m	NIPH	N18	N18	mid dilated	+	-	+	-	-	-	resident	8mm	+	+	SFIOL
36	SANJEEVAPPA	66	M	990108	SHMC(RE>LE)	RE	CF 2m	NIPH	N-	N-	CONSTRICTED	+	-	-	-	+	-	resident	7mm	+	+	IRIS CLAW
37	ANTHONY	74	M	949503	SMC(RE)PSP(LE)	LE	CF 5m	6/36	N36	N36	CONSTRICTED	-	+	-	-	+	-	resident	3mm	-	-	in bag

POST OPERATIVE VISUAL ACUITY											
		Ist DAY		Ist WEEK		I st MONTH		3 rd MONTH		6th MONTH	
SL NO	NAMES	BC DV	BCNV	BCDV	BCNV	BCDV	BCNV	BCDV	BCNV	BCDV	BCNV
1	NARASIMHAPPA	6/12	N10	6/9	N6	6/6	N6	6/6	N6	6/6	N6
2	MUNIVENKATAPPA	6/60	N36	LOST TO FOLLOW UP							
3	GANGAPPA	6/24	N24	6/18	N12	6/18	N10	6/12	N8	6/12	N8
4	NAGAMMA	6/12	N10	6/9	N8	6/6	N8	6/6	N6	6/6	N6
5	ESHWARAMMA	6/9	N10	6/6	N6	6/6	N6	6/6	N6	6/6	N6
6	CHANGAL RAYAPPA	6/18	N12	6/12	N8	6/9	N6	6/6	N6	6/6	N6
7	SUBAMMA	6/9	N10	6/6	N6	6/6	N6	6/6	N6	6/6	N6
8	VENKATARAMAPPA	6/12	N12	6/12	N18	6/18	N18	6/36	N24	6/36	N24
9	ERAMMA	6/9	N10	6/6	N6	6/6	N6	6/6	N6	6/6	N6
10	DEVAMMA	6/12	N8	6/9	N8	6/9	N8	6/9	N8	6/9	N8
11	KADIRAMMA	6/6	N8	6/6	N6	6/6	N6	6/6	N6	6/6	N6
12	RAMLAKSHMAMMA	6/6	N8	6/6	N6	6/6	N6	6/6	N6	6/6	N6
13	KENCHAMUNIYAPPA	6/9	N8	6/6	N6	6/6	N6	6/6	N6	6/6	N6
14	VENKATARAMA REDDY	6/6	N6	6/6	N6	6/6	N6	6/6	N6	6/6	N6
15	JULAK BAI	6/24	N8	6/12	N8	6/12	N8	6/12	N8	6/12	N8
16	SEETHAMMA	6/12	N10	6/9	N6	6/6	N6	6/6	N6	6/6	N6
17	RADHAMMA	6/6	N8	6/6	N6	6/6	N6	6/6	N6	6/6	N6
18	VENKATSWAMY	6/12	N10	6/9	N10	6/9	N10	6/9	N10	6/9	N10
19	RAMANNA	6/24	N10	6/24	N10	6/24	N10	6/24	N10	6/24	N10
20	AMARVATHAMMA	6/6	N6	6/6	N6	6/6	N6	6/6	N6	6/6	N6
21	KRISHNAPPA	6/6	N6	6/6	N6	6/6	N6	6/6	N6	6/6	N6
22	ASHWATHAMMA	6/6	N6	6/6	N6	6/6	N6	6/6	N6	6/6	N6
23	PARVATHAMMA	6/12	N8	6/9	N8	6/9	N6	6/9	N6	6/9	N6
24	MUNIVENKATAPPA	6/6	N8	6/6	N6	6/6	N6	6/6	N6	6/6	N6
25	MUNIYAMMA	6/18	N12	6/18	N12	6/18	N12	6/18	N12	6/18	N8
26	MUNIYAPPA	6/9	N8	6/9	N8	6/6	N6	6/6	N6	6/6	N6
27	VENKATARAMA REDDY	6/9	N8	6/9	N8	6/6	N6	6/6	N6	6/6	N6
28	VENKATAMMA	6/24	N18	6/24	N18	6/12	N8	6/12	N8	6/12	N8
29	GANGADHAR	6/9	N8	6/6	N6	6/6	N6	6/6	N6	6/6	N6
30	CHINAMMA	CF 5 mt	N36	CF 5 mt	N36	6/60	N36	6/60	N36	6/60	N36
31	GUNA SHEELAN	6/6	N6	6/6	N6	6/6	N6	6/6	N6	6/6	N6
32	K.N.GOPALAPPA	6/60	N12	6/24	N12	6/24	N12	6/24	N12	6/24	N12
33	KRISHNAPPA	6/6	N6	6/6	N6	6/6	N6	6/6	N6	6/6	N6
34	ASHWATHAPPA	6/6	N6	6/6	N6	6/6	N6	6/6	N6	6/6	N6
35	VENKOB RAO	6/24	N12	6/18	N12	6/18	N12	6/18	N10	6/18	N10
36	SANJEEVAPPA	6/18	N12	618	N10	6/12	N10	6/12	N12	6/12	N10
37	ANTHONY	6/6	N6	6/6	N6	6/6	N6	6/6	N6	6/6	N6

MASTER CHART

																													POSTOPERATIVE COMPLICATIONS																														
								POST OP DAY 1 RESULTS									1 Week POST OP RESULTS		WEEK	POST OP RESULTS						1 MONTH POST OP RESULTS																3 MONTH POST OP RESULTS																6 MONTH POST OP RESULTS							
SL NO	Names	Age	Sex	I.P.no	SK	co	H	V in AC	Iritis	pu peaking	iol positi	SG	CME	RD	Others	SK	co	H	V in AC	Iritis	pu peaking	iol position	SG	CME	RD	Others	SK	co	H	V in AC	Iritis	pu peaking	iol positi	SG	CME	RD	Others	SK	co	H	V in AC	Iritis	pu peaki	iol positi	SG	CME	RD	Others	SK	co	H	V in AC	Iritis	pu peaki	iol pos	SG	CME	RD	Others
1	narasimhappa	71	M	866976	-	+	-	-	-	-	n	–	–	–	–	-	-	-	–	-	-	n	–	–	–	–	–	-	–	–	–	-	n	–	–	–	–	–	-	–	–	–	-	n	–	–	–	–	–	-	–	–	–	-	n	–	–	–	–
2	MUNIVENKATAPPA	75	M	866296	-	+	–	-	+	-	-	–	–	–	–	LOST		LOST	LOST	LOST	LOST							-				-							-				-							-				-					
3	GANGAPPA	60	M	866989	+	-	–	_	+	-	N	–	–	–	–	+	-	–	_	-	-	N	–	–	–	–	–	-	–	–	–	-	-	–	+	–	–	–	-	–	–	–	-		–	+	–	–	–	-	–	–	–	-	-	–	+	–	–
4	NAGAMMA	60	F	868999	-	-	–	–	–	-	-	–	–	–	–	-	-	–	–	–	-		–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-		–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
5	ESHWARAMMA	50	F	868984	-	-	-	–	-	-	-	–	–	–	–	-	-	-	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-		–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
6	CHENGALRAYAPPA	55	M	876800	+	-	+	–	-	-	N	–	–	–	–	-	-	–	–	–	-	N	–	–	–	–	–	-	–	–	–	-	-	–	-	–	–	–	-	–	–	–	-		–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
7	SUBAMMA	62	F	876790	–	-	–	–	–	-	-	–	–	–	–	-	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-		–	-	–	–	–	-	–	–	–	-	-	–	+	–	–
8	VENKATARAMAPPA	70	M	879278	+	-	–	–	+	-	TILTED	–	-	-	–	-	-	–	–	-	-	TILTED	–	-	-	–	–	-	–	–	-	-	TILTED	–	-	–	–	–	-	–	–	-	-	TILTED	–	–	+	–	–	-	–	–	–	-	TILTED	–	–	+	–
9	ERAMMA	60	F	879288	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
10	DEVAMMA	70	F	898921	-	-	–	–	+	-	-	–	-	–	–	-	-	–	–	+	-	-	–	-	–	–	-	-	–	–	-	-	-	–	+	–	–	–	-	–	–	–	-	-	–	+	–	–	–	-	–	–	–	-	-	–	+	–	–
11	KADIRAMMA	65	F	901971	–	-	–	–	–	-	-	-	–	–	–	–	-	–	–	–	-	-	-	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
12	RAMLAKSHMAMMA	60	F	797109	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
13	KENCHAMUNIYAPPA	65	M	922192	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
14	VENKATARAMA REDDY	85	M	925815	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
15	JULAK BAI	50	F	914998	+	-	+	–	+	+	-	–	-	–	–	+	-	-	–	+	+	-	–	-	–	–	+	-	–	–	–	+	-	–	+	–	–	–	-	–	–	–	+	-	–	+	–	–	–	-	–	–	–	+	-	–	+	–	–
16	SEETHAMMA	60	F	926143	-	+	–	–	-	-	-	–	–	–	–	-	-	–	–	-	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
17	RADHAMMA	55	F	926846	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
18	VENKATSWAMY	72	M	926145	-	-	-	+	–	+	_	–	–	–	–	–	-	–	+	–	+	-	–	–	–	–	–	-	–	–	–	+	-	–	–	–	–	–	-	–	–	–	+	-	–	–	–	–	–	-	–	–	–	+	-	–	–	–	–
19	RAMANNA	80	M	928232	-	+	-	–	+	-	-	–	–	–	+	–	-	–	–	+	-	-	–	–	–	+	–	-	–	–	-	-	-	–	-	–	+	–	-	–	–	–	-	-	+	–	–	–	–	-	–	–	–	-	-	+	–	–	–
20	AMARVATHAMMA	50	F	930772	–	-	–	–	-	-	-	–	–	–	–	–	-	–	–	-	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
21	KRISHNAPPA	65	F	943444	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
22	ASHWATHAMMA	75	F	947385	–	-	–	–	–	-		-	-	–	–	–	-	–	–	–	-	-	-	-	–	–	–	-	–	–	–	-	-	–	-	–	–	–	-	–	–	–	-'	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
23	PARVATHAMMA	62	F	948765	-	-	–	–	+	-	-	–	–	–	–	-	-	–	–	–	-	-	–	_	–	–	-	-	–	–	–	-	-	–	-	–	–	–	-	–	–	–	-	-	–	-	–	–	–	-	–	–	–	-	-	–	–	–	–
24	MUNIVENKATAPPA	68	M	953568	–	-	–	–	-	-	-	–	–	–	–	–	-	–	–	-	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
25	MUNIYAMMA	60	F	953569	–	-	-	–	-	-	-	–	–	–	–	–	-	-	–	-	-	-	–	–	–	–	–	-	–	–	-	-	-	–	–	–	–	–	-	–	–	-	-	-	–	+	–	–	–	-	–	–	-	-	-	–	–	–	–
26	MUNIYAPPA	88	M	963323	-	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
27	VENKATARAMA REDDY	52	M	969459	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	-	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
28	VENKATAMMA	55	F	970790	-	-	_	–	-	-	-	–	–	–	–	–	-	–	–	–	-	-	–	-	–	–	–	-	–	–	–	-	-	–	-	–	–	–	-	–	–	–	-	-	–	+	–	+	–	-	–	–	–	-	-	–	+	–	+
29	GANGADHAR	65	M	967953	–	-	–	–	-	-	-	-	–	–	–	–		–	–	-	-	-	-	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
30	CHINAMMA	67	F	972737	–	-	–	–	–	-	-	–	–	–	LENS DRO	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
31	GUNA SHEELAN	60	M	976538	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
32	K.N.GOPALAPPA	60	M	978573	–	-	–	–	-	-	-	–	–	–	–	–	-	–	–	-	-	-	–	–	–	–	–	-	–	–	+	-	-	–	–	–	–	–	-	–	–	–	-	-	+	–	–	–	–	-	–	–	–	-	-	+	–	–	–
33	KRISHNAPPA	65	M	982830	–	-	-	–	–	-	-	-	–	–	–	–	-	-	–	–	-	-	-	–	–	–	–	-	–	–	–	-		–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–
34	ASHWATHAPPA	65	M	959523	–	-	–	–	–	-	-	–	–	–	–	–		–	–	–	-	-	–	-	–	–	–	-	–	–	–	-		–	-	–	–	–	-	–	–	–	-	-	–	-	–	–	–	-	–	–	–	-	-	–	–	–	–
35	VENKOB RAO	75	M	930770	-	+	–	–	–	-	-	–	-	–	+	–	-	–	–	–	-	-	–	–	–	-	–	-	–	–	–	-		–	–	–	-	–	-	–	–	–	-	-	–	+	–	+	–	-	–	–	–	-	-	–	+	–	–
36	SANJEEVAPPA	66	M	990108	–	-	–	–	-	-	-	–	–	–	–	–	-	–	–	+	-	-	–	–	–	–	–		–	–	-			–	–	–	–	–	-	–	–	+	-	-	–	–	–	–	–	-	–	–	+	-	-	–	–	–	–
37	ANTHONY	74	M	949503	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–			–	–	–	–	–	-	–	–	–	-	-	–	–	–	–	–	-	–	–	–	-	-	–	–	–	–