COMPARISON OF POSTERIOR IRIS CLAW AND SCLERAL FIXATED INTRAOCULAR LENS IN TERMS OF VISUAL OUTCOME AND COMPLICATIONS IN APHAKIA.

SDUAHER

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In partial fulfillment of the requirements for the degree of

MASTER OF SURGERY

IN

OPHTHALMOLOGY

By

DR ASHWINI R MAHAJAN

UNDER THE GUIDANCE OF

DR. NARENDRA .P.DATTI, MBBS., MS

DEPARTMENT OF OPHTHALMOLOGY

SRI DEVARAJ URS MEDICAL COLLEGE

TAMAKA, KOLAR

MAY 2015

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Date:
Place **:** KOLAR

DR. NARENDRA.P.DATTI M.B.B.S., MS
Professor and Head of Department,
Department of ophthalmology,
Sri DevarajUrs Medical College,
Tamaka, Kolar.

ENDORSEMENT BY THE HEAD OF THE DEPARTMENT

This is to certify that the dissertation entitled **"COMPARISON OF POSTERIOR IRIS CLAW LENS AND SCLERAL FIXATED IOL IN TERMS OF VISUAL OUTCOME AND COMPLICATIONS IN APHAKIA"** is a bonafide research work done by **DR ASHWINI MAHAJAN** under the guidance of **DR. NARENDRA.P.DATTI**, M.B.B.S., M.S, Professor and Head of the Department of Ophthalmology, Sri Devaraj Urs Medical College, Tamaka, Kolar.

Date:

Signature of the HOD

Place: KOLAR

DR. NARENDRA. P. DATTI, MBBS, MS,
Professor and Head of Department,
Department of ophthalmology,
Sri Devaraj Urs Medical College,
Tamaka, Kolar.

ENDORSEMENT BY THE HOD, PRINCIPAL / HEAD OF THE INSTITUTION

This is to certify that the dissertation entitled **"COMPARISON OF POSTERIOR IRIS CLAW LENS AND SCLERAL FIXATED IOL IN TERMS OF VISUAL OUTCOME AND COMPLICATIONS IN APHAKIA"** is a bonafide research work done by **DR ASHWINI MAHAJAN** under the guidance of **DR.NARENDRA.P.DATTI,** M.B.B.S, M.S Professor and Head of the Department of Ophthalmology, Sri Devaraj Urs Medical College, Tamaka, Kolar.

DR. NARENDRA. P. DATTI, MBBS, MS.
Professor and HOD
Department of Ophthalmology,
Sri Devaraj Urs Medical College,
Tamaka, Kolar.

Date:

Place: KOLAR

DR. M.B.SANIKOP, MBBS, MS
Principal
Sri Devaraj Urs Medical College,
Tamaka, Kolar.

Date:

Place: KOLAR

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

ETHICAL COMMITTEE CERTIFICATE

This is to certify that the Ethics committee of Sri Devaraj Urs Medical College, Tamaka, Kolar has unanimously approved DR ASHWINI MAHAJAN, postgraduate student in the subject of ophthalmology at Sri Devaraj Urs Medical College, Kolar to take up the dissertation work entitled **"COMPARISON OF POSTERIOR IRIS CLAW LENS AND SCLERAL FIXATED IOL IN TERMS OF VISUAL OUTCOME AND COMPLICATIONS IN APHAKIA"** to be submitted to **SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH CENTRE, TAMAKA, KOLAR, KARNATAKA.**

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Sri DevarajUrs Medical College,
Kolar – 563101
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DR.ASHWINI R MAHAJAN

LIST OF ABBREVATIONS

SL NO	ABBREVATIONS	FULL FORM
1	IOL	Intraocular lens
2	AC	Anterior chamber
3	BCVA	Best corrected visual acuity
4	CF	Counting finger
5	CME	Cystoid macular edema
6	ECCE	Extra capsular cataract extraction
7	ACIOL	Anterior chamber Intraocular lens
8	ICCE	Intracapsular cataract extraction
9	PAS	Peripheral anterior synechiae
10	PC	Posterior capsule
11	PMMA	Poly methyl methaacrylate
12	PC IOL	Posterior chamber intraocular lens
13	SF IOL	Scleral fixated intraocular lens
14	ICIOL	Posterior iris claw lens
15	OVD	Ophthalmic Viscoelastic Device
16	I/A	Irrigation and aspiration
17	PI	Peripheral iridectomy

ABSTRACT

BACKGROUND

Several surgical methods of IOL implantation for eyes without sufficient capsular support have been developed. There are many surgical options like ACIOL, SFIOL & ICIOL. High complication rates were associated with ACIOL. SFIOL and ICIOL implantation techniques are still evolving so this study is focused to compare the the visual outcome and complications between the two techniques.

OBJECTIVES

1. To compare the visual outcome in posterior iris claw lens and scleral fixated posterior chamber intraocular lens implantation in aphakic eyes.

2. To study the intra-operative and postoperative complications of posterior iris claw lens and scleral fixated lens implantation in aphakic eyes.

METHODS

It is a hospital based prospective study. A minimum of 60 patients fulfilling the inclusion criteria attending R.L. Jalappa Hospital and Research centre, Tamaka, Kolar were selected for this follow up study from December 2012 to June 2014.

RESULTS

73.4% ICIOL & 63.3% SFIOL patients had final BCVA 6/18 – 6/6. 23.33% ICIOL patients and 33.33% patients were found in 6/60-6/24 group. Only 3.33% patients were in less than 6/60 group. Mean logMAR BCVA in both the groups were comparable. So in ICIOL group 80 % patients and 76.6% in SFIOL group had vision better than preoperative VA. Mean Mean IOP in both the groups was same. Surgical time in ICIOL was significantly less than SFIOL group (P=0.00).

Complications rate was high in SFIOL group than ICIOL group. Suture related complications and hyphema was common in SFIOL group but all these complications were treated. Pupil beaking was more in ICIOL group. One ICIOL was disenclavated on the 1st week visit which was re-enclavated again.

CONCLUSION

Our results suggest that both the lenses have good visual results but in terms of complications posterior iris claw lens offers favourable visual outcome and low incidence of complications, less invasive and time saving surgery. However , selection and meticulous surgical technique are critical and strongly influences the success of the procedure.

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INTRODUCTION

Aphakia (Greek a= none , phakos= lens) is the absence of the lens of the eye. Without the focusing power of the lens, the eye becomes very farsighted. Also, since the lens is responsible for adjusting the focus of vision to different lengths, patients with aphakia have a total loss of accommodation.

Options for unilateral aphakia include a unilateral aphakic spectacle (with or without contralateral patching), epikeratophakia, an anterior chamber IOL implant, an iris fixated IOL implant, or a scleral fixated (sutured) posterior chamber IOL implant[1].

Aphakic spectacles became available only 250 years ago. They gave improved vision but many problems to which many patients cannot adapt. Secondary IOL implantation is often indicated in cases of monocular aphakia with good visual acuity of the contralateral eye or intolerance to aphakic spectacles or contact lenses. It was not until 1949 that the first successful IOL operation was performed by Harold Ridley in London

The most preferred method nowadays is the implantation of PCIOL but this may not be possible in cases of weak or no capsular support[2]. In aphakic eyes with no capsular support, the surgical options for optical correction include ACIOLs, scleral fixated or iris fixated intraocular lenses.

SFIOL offers a superior optical rehabilitation when compared to ACIOL[3] but it is not free of complications which include suture erosion, IOL tilting or decentration, fibrin reaction, and vitreous prolapse into the anterior chamber and takes more time as it is technically difficult.

The first iteration of Iris Claw lens appeared in 1978 and the lens was designed by Prof. Jan G.F Worst. The technique of retro pupillary iris fixation of iris claw lens which was first reported by Andreas Mohr in 2002[3], offers several advantages it combines the benefit of posterior chamber

implants with a low-risk method of surgery and its cosmetic benefit, by hiding the IOL haptic and parts of the lens behind the iris ,less surgical time and also preserves the anatomy of the anterior segment with respect to the position of the natural crystalline lens. There are also few disadvantages like disenclavation , pupillary deformity and iris atrophy. Having diverse options to correct the aphakic vision, many studies have been carried to know cons and pros of iris fixated and scleral fixated IOL.

The results of standard techniques and current knowledge about recently adopted techniques need to be elicited and compared prospectively to know the benefits of either modality. In this regard, we will be analyzing mainly the complications and visual outcome of SFIOL and posterior iris claw lenses to find the efficacy of each lens by comparing with each other.

AIMS AND OBJECTIVES

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1. To compare the visual outcome in posterior iris claw lens and scleral fixated posterior chamber intraocular lens implantation in aphakic eyes.

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REVIEW OF LITERATURE

REVIEW OF LITERATURE

After ages of relocative procedures like couching and lens extractive procedures aphakia resighting came in trend: a new lens for the old light"

---- David Hambling

Ridley said that the cataract operation "without a replacement lens was an incomplete, half-finished operation"[1] and that he would like to be remembered as the man who cured or at least initiated the cure for aphakia . He saw aphakic vision as a highly significant but unnecessary disability.

Although we have been pushed into the new world with latest technologies for cataract surgery but still, as part of third world, we see some of the patients who were left aphakic due to the complicated surgery or trauma in which the surgeons decided to postpone the IOL implantation to a later date. Moreover, patients who have had ICCE without IOL implantation may ask for secondary IOL implantation after years of wearing contact lenses and aphakic glasses[2]. These thick aphakic lenses induce telescopic effects, aniseikonia and compromised depth perception and visual field[3].

An ethical and good solution to this problem is secondary intraocular lens implantation. It can be done in the anterior and posterior chamber depending upon the presence or absence of posterior capsular support.

Secondary intraocular lens implantation is defined as insertion of an intraocular lens into an eye which is rendered aphakic post surgically or by trauma or by an exchange intraocular lens which is a special case of secondary intraocular lens implantation.

3.1 APHAKIA [greek : a = without , phakos = lens]

Absence of natural crystalline lens from the patellar fossa

Etiology:

a. Surgical aphakia after cataract extraction

b. Post-traumatic absorption of lens

c. Posterior dislocation of lens

d. Congenital absence of the lens(very rare)

Symptoms-

1. Defective near and far vision (long sightedness) due to high hypermetropia and loss of accommodation

2. Erythropsia/cyanopsia- due to entry of infrared and ultraviolet rays in the absence of the crystalline lens.

Signs : (anterior to posterior)

1. Limbal scar in case of surgical aphakia.
2. Deep anterior chamber.
3. Iridodonesis – tremulousness of the iris due to loss of support of lens.
4. Jet black pupil.
5. Loss of 3rd and 4th Purkinje's images.
6. Fundus examination reveals a small hypermetropic disc.
7. Retinoscopy reveals high hypermetropia.

Visual rehabilitation in an aphakic patient

Ideal optical correction should meet the following requirement:

1. It should be safe

2. It should be comfortable to the patient

3. It should provide clear visual image and rapid restoration of vision

4. Long term tissue complications should be low

5. It should be economically viable to the patient.

Currently there are four modalities of aphakic correction:

1. Spectacle correction

2. Contact lens

3. Intra ocular lens implantation

4. Refractive surgery

1. SPECTACLE

Advantages

1. Safe

2. Easy

3. Inexpensive

Disadvantages

1. Increase in retinal image size by 30%.

2. Decreased field of view

3. Presence of roving ring scotoma

4. Increased spherical and chromatic aberration (pin cushion effect)

5. Cosmetic blemish

6. Cumbersome to use.

7. Problem of near vision

2. **CONTACT LENS**

Advantages

1. Less image magnification.

2. Elimination of aberrations and prismatic effect of thick glasses

3. Better field of vision

4. Cosmetically more acceptable

5. Suitable for unilateral aphakia

Disadvantages

1. Cumbersome especially in elderly or too young patients.

2. Costly

3. Dry eyes and lid margin inflammation are common.

4. Strict hygiene has to be maintained.

5. Corneal complications (neovascularization, keratitis)

3. INTRAOCULAR LENSES

Advantage

1. There is no magnification of image size.

2. Eliminates all difficulties of applying and removing of contact lens.

3. Advantageous for those working in unusual environments.

4. It eliminates all the perceptual problems.

4. It eliminates all the perceptual problems

Disadvantage

IOL implantation carries several risks associated with eye surgeries, such as infection, loosening of the lens, lens rotation, inflammation and night time halos, astigmatism

4. REFRACTIVE SURGERY – This is a newly emerging treatment for aphakia which is under trial.

a. Keratophakia : A lenticule prepared from the donor cornea is placed within the lamellae of the patient's cornea.

b. Epikeratophakia : A lenticule prepared form the donor cornea is stitched to the patients cornea after removing the epithelium.

c. Hyperopic Lasik[4]: It uses a 110- to 160-µm thick corneal flap and a wide ablation with a peripheral blend zone. The broad goals of hyperopic LASIK are to increase corneal curvature without inducing aberrations and ensure that the change remains stable over time.

Use - It has become the procedure of choice for treating hyperopia up to +6.00 diopters (D).

Complications: They include displaced flap, corneal perforation, interface debris, and diffuse lamellar keratitis.

Considering the drawbacks of aphakic correction with different modalities, IOL implantation at the time of accidental posterior capsule tear during cataract surgery or in an aphakic eye has attracted a lot of attention in recent years and is universally preferred over aphakic spectacles or contact lenses as a method for visual rehabilitation in aphakic eyes.

Advantages of primary over secondary IOL implantation include the avoidance of a secondary operation, a shorter hospital stay, and faster visual rehabilitation.

3.2. History of IOL:

History of IOL implantation is exciting, frustrating & finally rewarding. The first person who probably mentioned the possibility of lens implantation was an ophthalmologist in 18th century named Tadini. Modern lens implantation was introduced to ophthalmology by Harold Ridley of London who was inspired by a medical student in 1949 and used acrylic which was known to be inert in the eye if it was made of well polymerized material.

LENS EVOLUTION AND FIXATION:

1967 Binkhorst[5] proposed a detailed classification of fixation for each IOL type in 1985 update of this classification stated four types of IOL :

1. Anterior chamber angle supported IOL
2. Iris supported lenses
3. Capsule supported lenses
4. Posterior chamber /ciliary sulcus supported.

Table 1. Evolution of IOLs

Generation of IOL	PERIOD	DESCRIPTION
I	1949-1954	Original ridley PCIOL
II	1952-1962	Early ACIOL
III	1953-1975	Iris supported lenses
IV	1963-1990	Intermediate ACIOL
V	1975-1990	Improved PCIOL
VI	1990-present	Modern AC & Modern capsular PC lenses . foldable lenses.

IOLs : Generation lens I (Original Ridley PCIOL)

During the Second World War some members of the British Air force sustained eye injuries from airplane canopies that were made of acrylic glasses. It was noticed that these splinters inside the eye caused no irritation. The first intraocular lens was implanted in the bag following extracapsular cataract extraction in 1949 by Harold ridley[6] which was made of acrylic.

Complications: Severe iritis, thickening of the posterior capsule, iris atrophy, secondary glaucoma and dislocation of lens into the vitreous.

The Ridley lens can be described as **I generation lens.**

IOLs – generation II: (EARLY ACIOL)

IOL : Early Angle- fixated IOL were further developed

AC-IOL could be implanted after ECCE as well as ICCE. It was generally possible to complete this implantation more quickly and easily than Ridley's posterior chamber lens implantation procedure.

BARON in France is credited as the first designer and implanter of an ACIOL[7]

1953: Strampelli Tripod AC-IOL

1956 : Choyce Mark I AC-IOL

1952: Dannheim AC-IOL with closed haptics

1957-60: Ridley Tripod AC-IOL .

1959: Barraquer AC-IOL (lens with 1st open J-haptic loops . (Modified Dannheim)

The haptics were made of nylon, this lens represented an important design change which influenced both anterior as well as posterior chamber lenses throughout the following decades.

Complications: Corneal decompensation, inflammation, UGH (uveitis, glaucoma , hyphema) syndrome.

IOLs – GENERATION III: (IRIS SUPPORTED LENSES)

IOL: Iris fixated lenses—1953 1st by epstein

Collar stud lens ⟹ Maltese cross lens ⟹ Copeland lens

Complication : Iris pigment epithelial defects/atrophy, pigment dispersion glaucoma as well as corneal complications

1953: Epstein's papillary lenses

Complications : Chronic irritation and cystoid macular edema

1957: First iris clip lens by Binkhorst

Complications: Secondary glaucoma , hemorrhage from the angle, Pupillary block glaucoma may occur if the peripheral iridectomy or iridotomies are not adequate

1968: Fyodorov I & II iris clip Sputnik lens

1969s: Worsts medallion lenses

Lenses were sutured onto the iris. But the nylon was found to be biodegradable

Complications: Low degree of iritis and cystoid macular oedema was high due to constant rubbing against the iris.

Binkhorst's iridocapsular lenses: four-loop lens, Binkhorst's two-loop lens.

COMPLICATIONS : Pseudophakic bullous keratopathy & CME

It was termed as corneal –retinal inflammatory syndrome by Obstbaum and Galin.[8]

IOLs – GENERATION IV: (Intermediate ACIOL)

1963: Choyce developed the Mark VIII lens with four foot plates for fixation in and continued to improve this design until the Mark IX in 1978

The elimination of sharp optic edge is critical in ACIOL production.

Generation IVa AC-IOL: Semiflexible AC-IOL with closed haptics

(a) Azar 91Z AC-IOL (1982)

(b) ORC Inc Stableflex AC-IOL (1983)

(c) Surgidev Inc Style 10 Leiske AC-IOL (1978).

Generation IVb AC-IOL: flexible AC-IOL with open haptic loops

(a) Kelman multiflex AC-IOL (1982)

(b) Kelman flexible Tripod AC-IOL (1981)

(c) Intermedics Inc Dubroff AC-IOL (1981)

(d) Modern, one-piece, flexible PMMA AC-IOL (Kelman design) with Choyce foot plates

Capsular bag fixation of the IOL, initially introduced by Ridley and continued through Binkhorst's iridocapsular fixation, again became more popular as operating room techniques

progressed. IOLs for this use developed from a number of AC-IOLs and universal lens designs and were the impetus for the next generation of IOLs, the posterior chamber lens.

IOLs – GENERATION V: (improved PCIOL)

IOL : PCIOL

Generation Va PC-IOL: Early PC-IOL

(a) Pearce Tripod PC-IOL (1975)

(b) Shearing J-haptik PC-IOL (1977)

(c) Anis PC-IOL with closed, circular haptics

Generation Vb PC-IOL.

a**)** Design base: PC-IOL with modified J-haptics made of prolene and four positioning holes.

b) Design base: PC-IOL with modified C-haptics made of prolene and two positioning holes.

(c) Design base: PC-IOL (one-piece) with modified C-haptics made of PMMA.

IOL GENERATION VI : (modern PCIOL , rigid PMMA, soft foldable , modern ACIOL)

Surgical advances have allowed consistent secure and permanent in the bag fixation of the pseudophakos. Improved small incision surgical techniques and IOL designs have resulted in natural evolution towards foldable lenses. Most of them are saline, hydrogel, acrylic **.**

3.3 HISTORY OF SECONDARY INTRAOCULAR LENS IMPLANTATION

For years secondary intraocular lens implantation especially after intracapsular cataract extraction was considered to be very dangerous procedure, much more so than the primary procedure. Hardenbergh (1977) implanted a considerable number of Binkhorst four-loop lenses as secondary implants and developed a technique that proved to be safe and effective. Choyce (1982) had performed secondary ACIOL after a successful intracapsular cataract extraction 3 months prior to it.

Secondary IOL implant with posterior chamber lens may be performed in aphakic eyes with or without intact posterior capsule. Binkhorst and Fyodorov, have implanted several of the lens types in traumatized eyes as secondary procedures with good results.

Indications

The indications for secondary lens implantation following an intracapsular or extracapsular procedure are :

1. Aborted primary intraocular lens implantation

2. Patient who is aphakic in one eye and whose other eye is Pseudophakic

3. Inability to adjust to aphakic glasses.

4. Intolerance to contact lenses

5. Secondary implantation at the time of keratoplasty in a patient who is aphakic

Contraindications:

Absolute:

1. Uncontrolled glaucoma.

2. Acute uveitis.

Relative

1. Shallow anterior chamber

2. Peripheral anterior synechiae

3. Filtering bleb

4. Posterior synechiae

The surgeon has four alternatives for fixation of secondary intraocular lens implantation in aphakic eyes :

1. Angle fixated anterior chamber intraocular lenses (AC –IOLs)

2. Iris fixated intraocular lenses (IF- IOLs).

3. Scleral fixated intraocular lenses (SF -IOLs)

4. Capsule supported IOL/ Sulcus fixated PCIOL

2.4. Anterior chamber intraocular lenses

Since the first implantation of an anterior chamber intraocular lens (ACIOL) in 1952 by Baron, many modifications have been made. Currently most commonly used designs are flexible Open loop ACIOLs, which have a lower rate of complications than the earlier closed loop or open 'C'

loop lenses.[9] These have footplates incorporated into each haptic and provide minimal and stable areas of contact with the anterior chamber angle. [10] They affect the anterior chamber angle structures less and hence the risk of goniosynechia formation is reduced. These lenses tend to be easier to explant without undue damage to surrounding structures.

Advantages

1. Single plane allows closed chamber insertion

2. Positive centration of the haptic with no late dislocation.

4. No dislocations into the vitreous unless there is severe trauma.

5. No loops to dislocate, irritate, lacerate or traumatize the iris, cornea or ciliary body. No sutures to dissolve

7. The entire lens is visible for examination by the ophthalmologist enabling him to monitor its tolerance by the eye.

Disadvantages

1. A lens that is too big causes an oval pupil

2. A lens that is too small causes iritis and corneal damage.

3. Tenderness occurs because of the stretching of the uveal tissue.

4. There is theoretical advantage of posterior chamber lenses over anterior

chamber lenses as far as image size is concerned.

3.5. Iris claw lenses[11, 12] (Peripheral Iris Supported IOLs)

The "Iris Claw" lens (later on called the ARTISAN Aphakia lens) has been introduced by Jan Worst.[11] The lens was called Worst– Fechner lens. The design was relatively simple: one piece, one material, without additional loops. The fixation mechanism is based on the enclavation of a fold of iris tissue. The formation of two diametrically opposed iridoplastic bridges in the virtually immobile mid-periphery of the iris stroma does not interfere with the normal vascular- and nerve supply.

This lens was fixated to the mid-peripheral iris, where the iris is less vascularized and less reactive[12]. One of the latest versions of iris-claw lenses designed for aphakic eye is the Artisan Aphakia Model 205 (convex/concave) (Ophtec BV, Groningen, the Netherlands). Several studies exist that showed favorable visual outcome and low intraoperative and postoperative complications.[13, 14]

However, there remains the risk of endothelial cell loss with bullous keratopathy, if the Artisan IOL is implanted into the anterior chamber .[12] These complications have been overcome with the foldable anterior iris claw lenses.

HISTORY OF IRIS CLAW LENSES [1, 5]

Lobster claw lens evolution and development of new age iris claw lens:

Medallion IOL ⇨ Slotted medallion ⇨ claw with suture ⇨ claw loop ⇨ double claw

Epstein and Binkhorst: These are the third generation of lenses used the pupillary part of iris diaphragm for anatomical fixation. This worked but led to luxation when pupil dilated unexpectedly. The first suture fixated IOL was implanted by *Parry*. *McCannel* reported the use

of midperipheral iris fixation sutures to stabilize dislocated pupil fixated IOLs in 1976. Iris chafing and dislocation of IOL was one of the main complication of sutured lenses

Medallion lenses: It was fixed to iris by perlon sutures , due to biodegradation of suture unexpected late luxation occurred to overcome this stainless steel was used with a triangular part of haptic which was removed . Serendipitous discovery of the Iris Claw principle using the early model, the Slotted Medallion lens was made when, Jan Worst observed that sometimes some iris tissue was caught in the slot of his lens. This clasping of iris tissue proved to be a serendipitously discovered new possibility for stable fixation of the IOL.

Jan Worst implanted the first Iris Claw lens in 1978. Later it was modified by Dr Daljit Singh and came to be known as "Worst Singh" Iris Claw lens. Initially he implanted this lens only as secondary implant in traumatic cataract cases. Soon after he used it as a primary implant in ECCE as a primary implant. Nowadays iris claw aphakic lenses are used increasingly as the back-up lens of choice by many modern cataract surgeons.

IRS CLAW IOL DESIGN[11]

Material : It is a Polymethylmethacrylate (PMMA) lens available in refractive powers ranging from 2 D to 30 D in 1-D increments, and from 14.5 D to 24.5 D in 0.5-D increments.

Diameter : The iris claw IOL is available as a standard IOL (5/8.5mm) or in two smaller sizes (4.4/6.5mm and 4.4/7.5mm) for pediatric application or for eyes where a smaller size IOL is preferred & is supported by two unique flexible haptic "claws" for iris fixation.

IOL power calculation: SRK –II formula is used.

In 1997 an improved vaulted design of the iris claw lens was introduced with a number of new characteristics.

The lens configuration was made vaulted to create distance to the iris

Enclavation was made easier by using a lens with a larger and oval aperture between optic and haptics than the original circular shape.

Since the start of the original design of the Iris Claw lens (1978), the fixation concept of this lens has remained unchanged. Only the lens design has slightly changed in 1997 (vaulted design and oval aperture).

Benefits :

• The "iris bridge" protects the endothelium from touching the PMMA;

• Safe clearance from vital structures (corneal endothelium);

• Unrestricted pupil dilatation and constriction (sphincter independent);

• Unique possibility to position the lens in the optical center of the eye;

• Excellent centration; once fixated the lens will not decenter;

• Maximal surgical visibility, accessibility and controllability;

• Optimal postoperative visibility of lens and lens fixation;

• Cosmetically invisible;

• Easy to reposition, reversible and exchangeable;

• No interference with vascular iris physiology (no leakage of iris vessels);

• Universal lens for ECCE and Phaco/Primary and secondary implantation;

• One size fits all.

Drawbacks

• Requires surgical skill but has a short learning curve;

• Requires an incision of 5.4 mm.

Indications for implantation of the iris claw IOL :

- Secondary implantation after aphakia.
- Ectopia lentis- Marfans syndrome, homocystinuria etc.
- Pre-op zonular dialysis
- Large zonular dialysis during surgery
- Large posterior capsular rent
- Whole bag removal
- Posterior chamber IOL dislocation

Contraindications

- Iris atrophy
- Pseudoexfoliation
- Large iridectomy, Sphincterotomy
- Uveitis
- Low corneal endothelial count, corneal dystrophies.

TYPES OF FIXATION:

1. *Anterior fixation of iris claw lens* 2. *Posterior fixation of iris claw lens*

TECHNIQUE[11,12]

1. Anterior fixation of iris claw lens

a. Incision

A 12 o'clock incision is made & calipers are used to mark the 5.5 mm incision width. Make a non-perforating half-depth central corneal or corneo-scleral incision.

b. Paracenteses:

Enclavation needle . Make two paracenteses of 1.2 mm, one beginning at 2 o'clock and one beginning at 10 o'clock. The tip of the knife should be pointed downwards, oriented toward the enclavation sites for introduction of the enclavation needle.

Enclavation Forceps

Make two paracenteses of 1.6 mm at 3 and 9 o'clock directed to the pupil. Use this technique when using the Enclavation Forceps.

c. Constrict the pupil

Inject a miotic solution into the anterior chamber to constrict the pupil. The pupil has to be very small to facilitate the centration of the IOL on the pupil.

d. Use a viscoelastic device:

Filling the AC with a high viscosity viscoelastic substance greatly facilitates the visibility of the various manoeuvres, creates space and protects the endothelium. Inject a small amount of viscoelastic through each paracentesis to maintain the anterior chamber.

The material must be injected slowly from the periphery of the eye toward the pupil, but never directly into the pupillary area. Inject just enough viscoelastic to fill the anterior chamber to a volume slightly larger than its preoperative state. Do not overfill the AC.

The iris should be flat or slightly convex. If the iris is concave, there is too much pressure caused by the viscoelastic. This may result in unwanted pupil dilation and will increase the difficulty of the enclavation and lens centering manoeuvres.

Put a layer of viscoelastic over the exterior of the cornea to enhance visualization throughout the case.

Enter the anterior chamber by completing the half-depth incision to full-depth.

e. Lens insertion & enclavation

It should be through the incision and gently apply some viscoelastic on top of lens to prevent movement of the lens during the enclavation procedure. Test whether the enclavation needle enters the paracenteses easily before introducing the IOL in the anterior chamber. Iris enclavation is done with enclavation needle.

The IOL is introduced in with the Implantation Forceps. Firmly grasping the IOL with the implantation forcep, the enclavation needle creates a “fold” of iris tissue. Perform the first enclavation with the non-dominant hand.

f. Enclavation : Insert the Iris enclavation Needle (left or right) through one of the paracenteses to fixate the lens to the iris. Insert the Implantation Forceps through the main incision, firmly grasping the lens at the optic edge, while securely holding the lens body with the implantation forceps, use the enclavation needle to create a small "knuckle" of iris tissue.

Make a 'snow-ploughing' movement at the desired fixation site. Hold the knuckle of iris with the needle while gently pressing the slotted center of the lens haptic over the knuckle, thus grasping the iris tissue.

A significant fold of iris tissue must be delivered through the haptic slot to ensure adequate lens stability. If the fold is too small, the IOL can luxate into the anterior chamber and cause damage to the cornea.

Avoid clamping the main horizontal artery within the "claws". Try to keep the artery within the "bulge" of the "Iris bridge".

Carefully retract the enclavation needle to avoid damage to the iris surface.

Transfer the instruments to the opposite hands and repeat the enclavation for the second haptic while ensuring that the lens is well centred.

Enclavate the other side with the dominant hand.

g. Peripheral iridectomy or iridotomy

Although, all aphakia IOLs are vaulted and allow some free flow of aqueous, it is highly recommended to perform an iridectomy or iridotomy. It can either be made at the start of the operation or at the end, depending on the surgical situation. The pigment layer needs to be perforated completely.

h. Removal of ovd : Carefully remove all of the viscoelastic by making a semi-circular movement from 6 o'clock towards the main incision with manual I/A using an irrigating solution. Careful removal is crucial.

Incomplete removal of the viscoelastic may cause high pressure. When a high pressure is not treated in time it may result in an Urrets- Zavalia syndrome (fixated dilated pupil).

Close the wound with 2 - 4 sutures if required. Suturing details depend on the kind of incision. Watertight wound closure is of paramount importance to prevent a shallow anterior chamber in the immediate postoperative period. Do not suture too tight to avoid surgically induced astigmatism. Administer subconjunctival gentamicin and dexamethasone. Patch the eye.

2. Posterior / Retropupillary Fixation Technique of the iris claw IOL [18] (as recommended by A. Mohr, M.D.)

The A-constant differs from the A-constant using the Standard Technique because of the position of the IOL in the eye. The recommended A-constant is 116.8 (ultrasound) or 116.9 (optical) for the retropupillary position, while the pre-pupillary position asked for an A-constant of 115.0 (ultrasound) or 115.7 (optical).

TECHNIQUE

a. Incision

A technique is recommended with a 12 o'clock frown incision (corneo-scleral 5.5mm) while some authors from Bursa-Turkey use a scleral tunnel incision to avoid the formation of postoperative astigmatism. The width of the incision should be 5.5 mm.

b. Paracentesis

Two paracenteses are used for the introduction of viscoelastic materials and the instruments needed for the retropupillary fixation of the iris claw aphakic IOL. They are positioned at 2 o'clock and 10 o'clock.

Leave the pupil at a minimum size of approximately 3mm to allow the lens to reach the retropupillary position through the pupil.

c. Use of OVDs

Inject a small amount of viscoelastic from the periphery of the eye, but never directly into the pupillary area.

d. Insertion of iol

The Iris claw aphakic IOL will be inserted into the anterior chamber with the convex side downwards (upside down) holding it in the implantation forceps. The IOL will be brought into the horizontal position from 3 o'clock to 9 o'clock.

e. Use of Miotic

The IOL will be grasped again in the centre of the optic with the forceps and inserted behind the iris through the 3 mm wide pupil, while simultaneously injecting a miotic solution to constrict the pupil. Make sure to hold the IOL firmly until it is fixated on both sides.

f. Enclavation

After the IOL has been brought behind the iris and the pupil is constricted, the IOL will be lifted and tilted slightly in order to show the contour of the "claws" through the iris stroma. A fine

spatula is inserted through the corresponding paracentesis and exerts gentle pressure on the slotted centre of the lens haptic, the “claw”. The same maneuver is now repeated on the other side. The IOL is now retropupillary fixated.

It is not absolutely essential and strictly recommended to perform an iridectomy.

Carefully remove all of the viscoelastic to avoid a high pressure.

Close the incision with sutures. Administer 1 drop each of antibiotic and NSAID. Patch the eye.

COMPLICATIONS :

INTRAOPERATIVE

a. Wound complication- The incision should be the correct size and as small as possible to avoid postoperative astigmatism

b. OVD complication- During enclavation ovd may escape from the AC so should be kept at adequate volume so as to protect the endothelium. Enough OVD is necessary to elevate the IOL to make it possible to grasp the IOL . Insufficient removal of OVD may cause postoperative angle secondary glaucoma

c. Position of IOL- In some cases it is really difficult to place the IOL at the center of the pupil causing mild decenteration if any decenteration occurs it is better to err towards nasal side because most eyes have a slight nasal displacement of the visual axis.

d. Peripheral Iridectomy-

It may happen that the PI is not patent and may lead to postoperative acute pupillary block glaucoma. If PI is too large – patient complains of glare, discomfort.

POSTOPERATIVE

a. Striate keratopathy- due to excess manipulation

b. Non patent PI - pupillary block glaucoma.

c. Postoperative iritis

d. Decenteration of IOL/ disenclavation - negative impact on visual acuity and can lead to halos , glare , monocular diplopia. Disenclavated IOL can be enclavated.

e. Unwanted astigmatism - Usually due to too tight sutures in the superior scleral tunnel.

Long term clinical experience

As opposed to previous iris clip designs that were associated with iritis, cystoid macular edema and dislocation, the Artisan IOL is fixated to the mid-peripheral iris and centered over the pupil. In this location, it does not affect mydriasis, iris vasculature or damage the delicate structures of the angle. The lenses are a safe distance from the corneal endothelium, particularly in the aphakic eye. Further, there are no sutures required to support the lens; nor is angle anatomy a concern or issue. Although sufficient iris tissue is required for support, suture pupilloplasty may be employed if needed to reform the pupil, and the IOL may be placed in any axis desired

SF IOLs implantation is technically more difficult than AC IOL and the decisive factor in choosing a secondary IOL is surgical experience[15]

Posterior iris fixation of IOLs have the advantage of retropupillary posterior chamber location. They have also been done in children[16]

Iris fixated IOLs have been there for a long time. They have attracted a lot of debates and controversies. The studies with iris fixation have been with clawing of IOL to iris and suturing of the IOLs to the iris[17, 18] . A recent report of iris fixated IOLs in the absence of capsular support had a dislocation rate of 4.3% over a mean follow up of 24 months[17]. Most of the problems and complications with iris fixated IOL were solved with improved design, manufacturing technique and surgical technique[19]. A similar study by Baykara et al found that this technique is safe and effective[20].

Of the 31 eyes, 22 achieved a final BCVA better than preoperative BCVA . A total of two eyes achieved a final BCVA equal to that measured preoperatively, and only seven ended up with poorer BCVA[21].If we consider only the patients without preoperative comorbidity, the BCVA improved in 13 of 17 patients (76%). Overall, this result agrees with the results from other studies[22, 23 ,24].

The main disadvantage of the Artisan-IOL implantation is the wound size. An incision of at least 5.4 mm is needed for the implantation because of the single-piece PMMA material of the lens. This can lead to increased astigmatism. The mean postoperative cylinder was -3.64±3.34 D in our study. The new Artiflex (Ophtec BV), which allows incisions of 2.75–3.20 mm, is able to reduce the astigmatism induced by the 5.4 mm incision[25].

Posterior iris claw lens in the same sitting is a viable option than other techniques due to less surgical time and minimal complications. Posterior iris fixated IOLs leave enough space between themselves and the endothelium to avoid injury to the endothelium. Progressive pigment dispersion glaucoma has been identified as common late complication with this form of fixation. An IOL fixated firmly to the posterior iris surface may not create as much recurrent sweeping pigment epithelial trauma as an undersized IOL floating loosely in the sulcus.

3.6. SCLERAL FIXATED PCIOL

Malbran et al first reported transscleral sulcus fixation of PCIOLs in aphakics post ICCE in 1986[26]. PCIOLs can also be sutured at the pars plana[27, 28]. Even though most PCIOLs can be sutured via their haptics to the sclera with square knots or slip knots, there are several specialized haptic designs, which facilitate this maneuver. These include haptics with an enlarged end to avoid suture slippage. Various holes or eyelets that allow passage of a suture through the haptic have also been developed to reduce potential suture movement or instability.

PCIOLs used are the Alcon CZ70BD (Alcon,Fort Worth, Texas), Bausch and Lomb 6190B(Bausch and Lomb, San Dimas, California) and the Pharmacia U152S (AMO, SantaAna, California), which have one eyelet on each haptic[29]. The Opsia (Chauvin Opsia,Labege Cedex, France) Grenat IOL has two eyelets on each haptic and has been used in a variation of Lewis' flap free technique[30] by Cordoves et al[31]. Teichmann designed an IOL with haptics which had two holes drilled 2 mm apart[32]..

Several needles are available for suturing PCIOLs. The Ethicon TG-160-2, Ethicon CIF-4, and Ethicon STC-6 (Ethicon, Somerville, New Jersey) can be used for ab interno methods. The STC-6 straight needle is also often used in ab-externo methods. Pannu designed a long curved needle with a hole at the sharp end[33].This allowed suturing the PCIOL by an ab interno method without requiring passage of the whole needle through the eye.

In general, 10-0 polypropylene has been the suture material of choice. Owing to recent concerns about the durability of this suture, however, there has been increasing use of 9-0 polypropylene and other suture material such as Gore-Tex for the transscleral fixation of PCIOLs.

Indications:

1. Primary or secondary cataract surgery with inadequate capsular support.

2. Aphakia in one eye and pseudophakia in the other eye.

3. Cases of intraocular lens exchange for a dislocated or subluxated IOL

4. Cases with peripheral anterior synechiae or insufficient iris tissue to support ACIOL

5. Inability to adjust to aphakic glasses or aphakic contact lenses

6. Intolerance to contact lenses.

7. Secondary implantation in case of keratoplasty in an aphakic patient.

Contraindications:

Absolute: 1. Uncontrolled glaucoma

2. Acute uveitis

Relative: 1. Shallow AC

2. Posterior synechiae

TECHNIQUE OF SFIOL IMPLANTATION

The aim in the most commonly used techniques is to place these lenses into the ciliary sulcus, although the final position is not entirely predictable because it is often undertaken as a blind procedure. PCIOLs implanted with transscleral fixation can be rigid or foldable.

With respect to technique, there are several stages in the procedure where significant variations have been described:

1. The method of introducing suturing needles—ab-externo or ab- interno

2. The method of securing the haptic with the fixating suture

3. The number of points of PCIOL fixation

4. The method of avoiding suture/knot erosion

Originally, suturing techniques involved passing the needle from inside to outside the eye. Although this method may be quicker and is easier when penetrating keratoplasty is performed concomitantly, it is a blind procedure[34]. More recently the lenses have been sutured via an ab externo technique as described by Lewis[35]. This is also undertaken blindly in that the intraocular exit point of the needle is unseen, but by knowing the entry point, sulcus positioning of the suture may be more predictable[36].

With the ab externo technique, the AC can and should remain closed during needle passes. This avoids collapse of the ciliary sulcus in the hypotonous eye,thus facilitating accurate suture placement[37]. It also avoids the risk of catching vitreous with the needle and incarcerating it at the fixation points[38]. In eyes with an increased tendency toward globe collapse (e.g., low scleral rigidity, small palpebral fissures, Oriental eyes) performing anterior vitrectomy via the pars plana

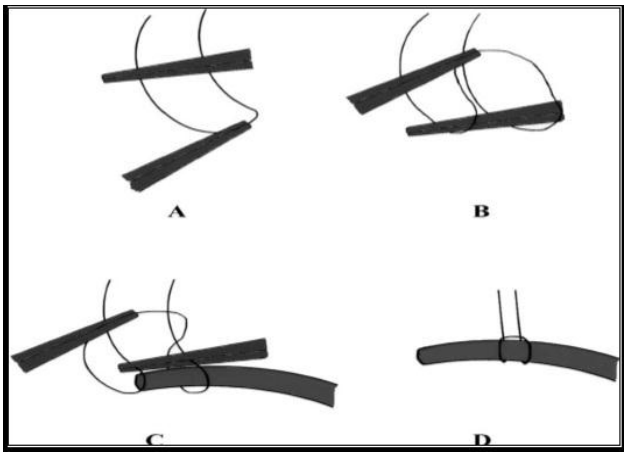
and utilizing a scleral tunnel instead of corneal incision are other measures that help preserve globe integrity during suture placement[39].

PCIOL haptics can be secured by looping a suture over the haptic and tying several square knots[40], by using a slipknot[41], or by using a girth hitch[42.43]. If a haptic eyelet is present, it could also be secured by a suture loop with the knot initially tied outside the eye, then rotated and buried in a second maneuver[30]. Asymmetrical suture placement in this method may produce a net torque on the haptics and tilting of the IOL optic[44].

Teichmann and Teichmann demonstrated in a model four perfect ways of threading a suture through the haptic eyelet for tying in this manner. To avoid suture-induced tilt, the surgeon needs to thread corresponding sutures

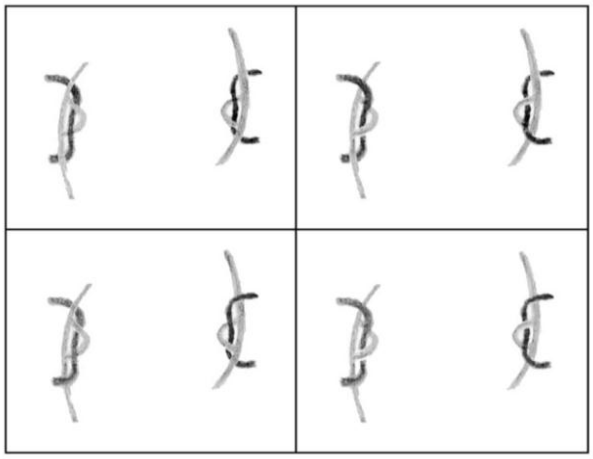
180 degree apart in a symmetrical fashion through the two eyelets, either from above down or from below up[44]

Fig 1. TYING THE GIRTH HITCH[32]



A and B: A suture loop is bent over closed forceps.

C: While holding the tip of the loop with one pair of forceps, the other forceps pulls the two proximal suture strands through the loop. This creates two other laterally disposed loops through which the PCIOL haptic is placed



f.2. Four perfect ways of threading a suture through the haptic eyelet for suture fixating a PCIOL according to Lewis' flapless technique.

Alternatively, the suture could be passed through two separate holes in the haptic before fixation as described by Teichmann[32]. In general, this method or the use of a girth hitch may provide better stability against rotation via two-point fixation of each haptic.

TECHNIQUES

Numerous techniques are available to suture an IOL in a stable position. The following techniques with variations are described below:

A. AB INTERNO TECHNIQUE

1. Classical AB Interno (one –point fixation)
2. Classical AB Interno (two –point fixation)
3. Classical AB Interno (four –point fixation)

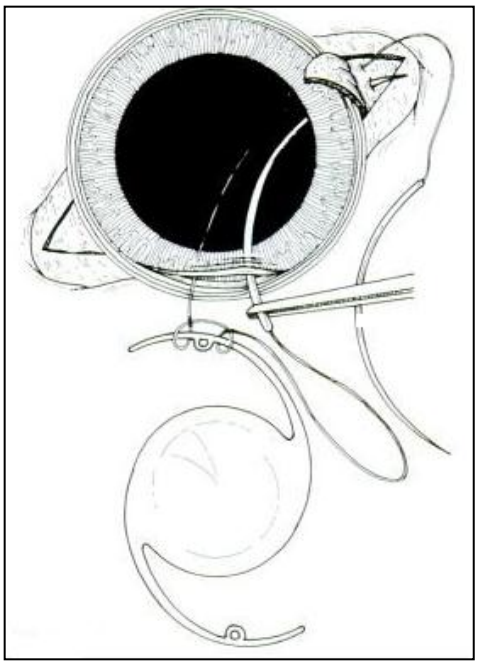
B. AB EXTERNO TECHNIQUE

1. Classic AB Externo (two –point fixation)
2. Small incision AB Externo
3. Modified AB Externo four point technique for sutured IOLs

AB INTERNO TWO-POINT FIXATION[40]

This relatively straightforward method provides good visual results but as originally described it involved suturing at the 3 and 9 o'clock meridians with the attendant risk of hemorrhage from the ciliary vessels. The steps are listed below:

Fig 3



1. A double-armed polypropylene suture is bisected and the ends tied to the haptics of a 7-mm optic lens with square knots.

2. A superior 7.5-mm two-plane incision is made at the limbus.

3. One needle is passed through the incision,behind the iris and through the sclera 1 mm behind the limbus at 3 o'clock.

5. This procedure is repeated at 9 o'clock

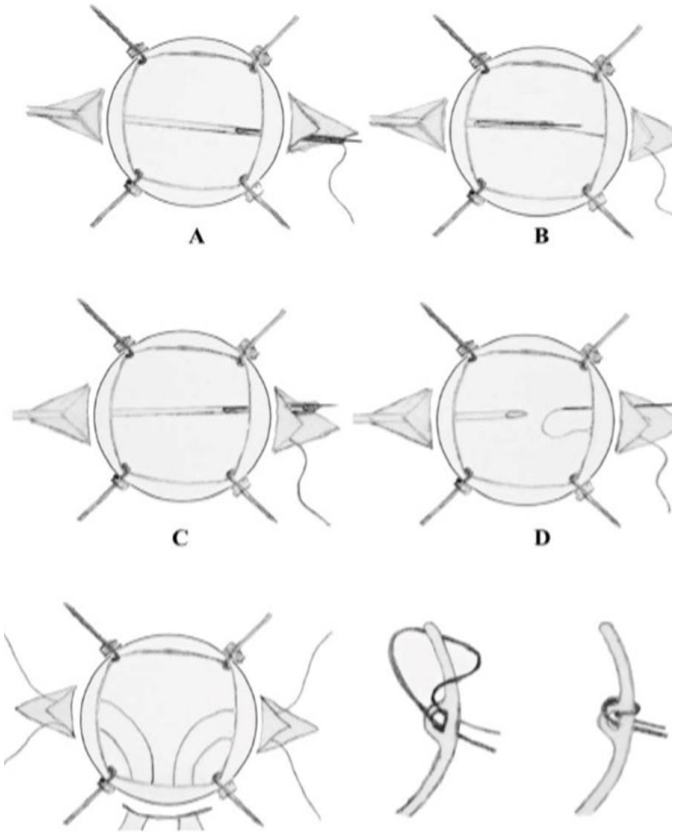
6. The IOL is inserted with forceps while an assistant adjusts suture tension externally

7. Each needle is passed through partial-thickness sclera 1 mm posterior to the exit from the sclera, and then tied to itself. The suture ends are left long (2mm) and are laid flat under conjunctiva, which is sutured with 8-0 chromic catgut

8. The limbal incision is closed

AB- INTERNO FOUR-POINT FIXATION WITH HAPTIC LOOPING [40]

This method provides a quick way of creating an intraocular loop with four-point fixation and also introduces the use of iris hooks to facilitate visualization of the ciliary sulcus region. The steps are listed below: [fig. 4]



A: A hollow needle is inserted ab externo then exits ab interno through the opposite scleral bed.

B: A straight needle is inserted into the hollow needle, which is withdrawn into the vitreous cavity.

C: The entire complex is passed out of the eye at a point adjacent to the original exit point.

D: The hollow needle is

AB-EXTERNO TWO –POINT FIXATION TECHNIQUE[54]

1. A long straight solid needle on 10-0 prolene suture is passed through sclera from one side and a 27 G hallow needle is passed from the other side. (F.1)
2. The solid needle is docked into the hollow needle and the two needles are withdrawn to the left so that the suture then traverses the AC.
3. A Sinsky hook draws the suture out of the superior corneoscleral wound (F.5)

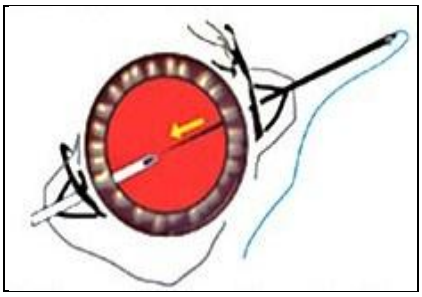


Figure: 1

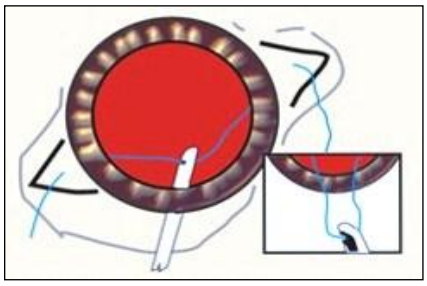


Figure: 2

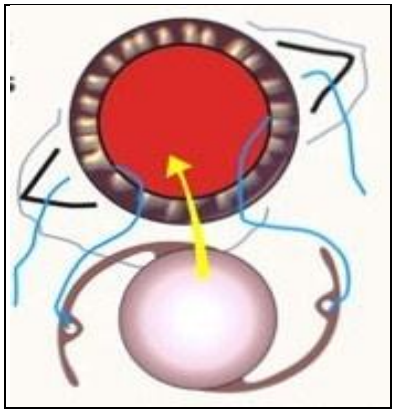


Figure: 3

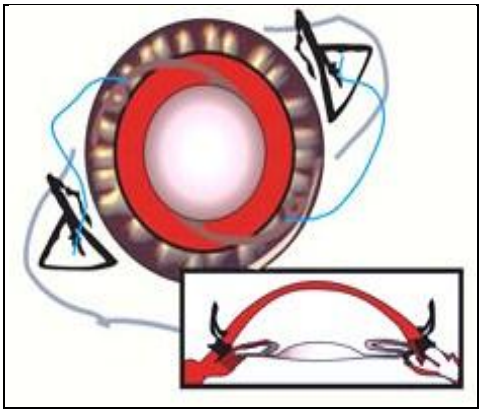
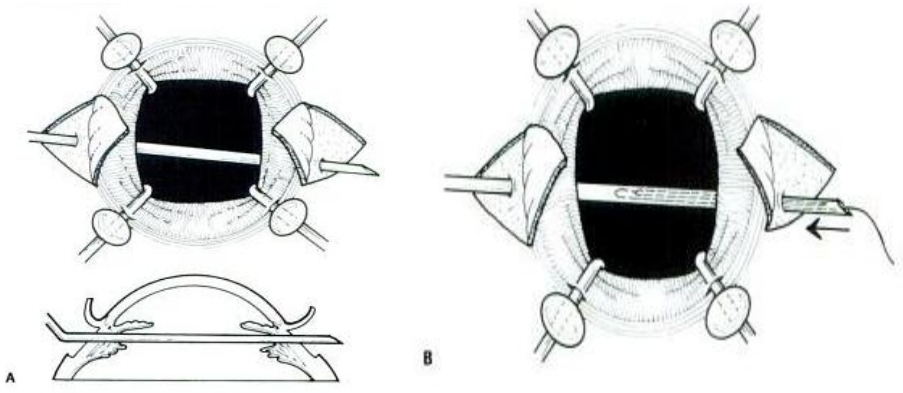


Figure: 4

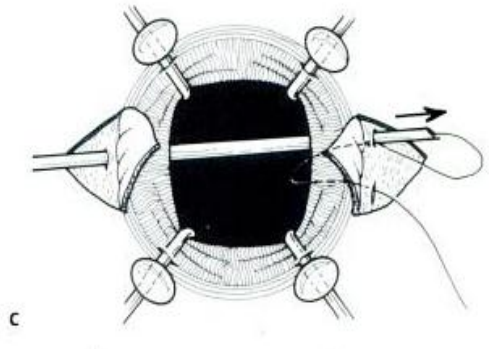
4. This loop is cut and the two ends are tied to the superior and inferior haptic.
5. The IOL is inserted into the ciliary sulcus & the sutures gently pulled to secured the position of the lens.(4)
6. Each end of the suture is secured to the sclera by making a midscleral pass then tying the suture to itself followed by closure of scleral flaps & conjunctival peritomy.

Ab - externo four point scleral fixation technique[49]

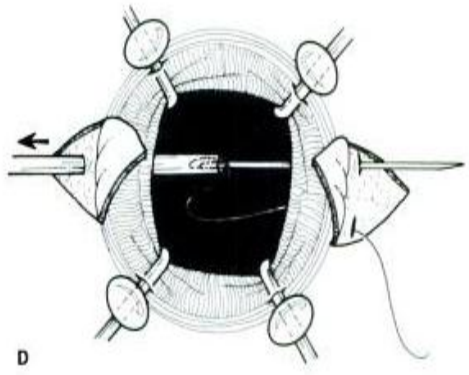
1. A long 27 gauge needle is inserted Ab externo 1mm posterior to the limbus at 3o'clock & exited at 9 o'clock in a ciliary sulcus location. (Fig. 6)



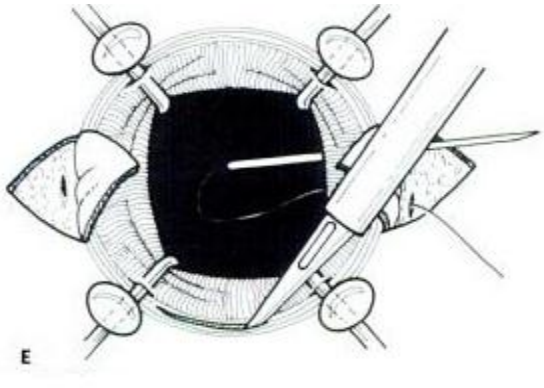
2. A straight, 16mm long needle carrying Ethicon 10-0 Prolene suture in advanced into the barrel of the 27g needle (figure B) and the entire assembly is directed out of the eye through the ciliary sulcus at 8.45 O'clock position.(figure c)



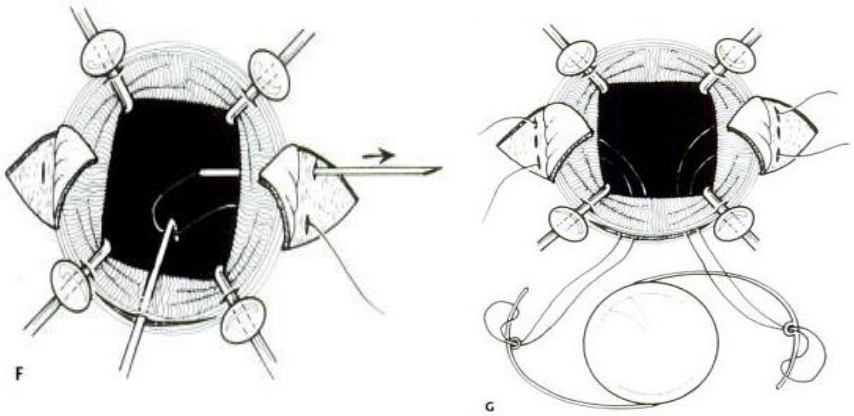
3. The 27g neeedle is withdrawn from the eye. This maneuver creates a intraocular loop of 10-0 Proline suture centered at the 9 O' clock position with two externalised sutures under the scleral flap (figure D)



4. A scleral tunnel or partial thickness beveled limbal incision for PC IOL implantation is fashioned at 12 o'clock. If a limbal incision is made, the AC is entered with a sharp blade at 12 o'clock only. (figure E)



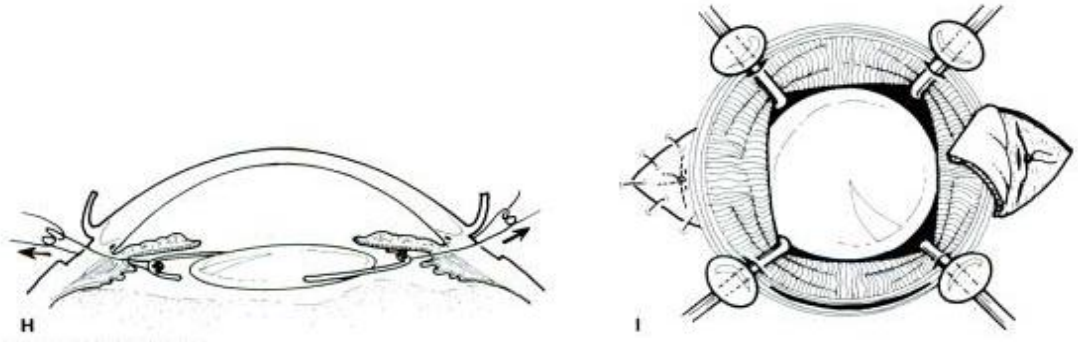
5. The loop of 10-0 Prolene is externalized through the scleral tunnel using a hook.(figure F)



6. A long 27g needle is inserted Ab externo 1mm posterior to the limbus at 9 o'clock (between the prolene sutures) and exited at 3.15 o'clock in a ciliary sulcus loction. The same steps are followed in the 3 o'clock scleral bed to create the second externalized loop of 10-0 Prolene.

7. The loop is twisted and passed through the eyelet attached to the haptic. The prolene suture is looped around the haptic without a knot.(figure G)

8. The scleral tunnel is widened as needed or the limbal incision is opened fully to accommodate the IOL.



9. The PC IOL is introduced into the eye: the haptics are seated in the ciliary sulcus, and the lens is centered in the sulcus by pulling up on the externalized sutures.(figure H)
10. The externalized sutures are tied and trimmed slightly long so that they lie flat against the sclera. The knots are buried under the flaps, which are sewn shut with 10-0 nylon suture.(figure I)
11. The scleral tunnel is closed with 10-0 nylon, sclerotomies with 7-0 vicryl & conjunctival incisions with 6-0 plain gut.

PARS PLANA FIXATION

Originally described by Girard,[27] this method of fixation has never been popular. Girard's original method used a lens with closed loops that was inserted via the pars plana and fixated within the scleral wall. Teichmann's method is significantly different and utilizes a lens with posteriorly angulated haptics.[28]

COMPLICATIONS OF SFIOL

INTRAOPERATIVE

1. Incarceration of the haptic in the wound
2. Descements membrane detachment
3. Hyphema
4. Expulsive hemorrhage
5. Vitreous loss

POSTOPERATIVE

1. Suture related- erosion , fibrin reaction, suture track endophthalmitis
2. Corneal edema
3. Corneal endothelial decompensation
4. Shallow or flat AC
5. Iris related – iritis , synechiae , iris atrophy
6. Secondary glaucoma - Pupillary block glaucoma
7. Lost lens syndromes
8. Tilted/decentered/ subluxated iol
9. Cystoid macular edema , endopthalmitis
10. Retinal detachment

INTRAOPERATIVE COMPLICATIONS

1. **Incarceration of the haptic** into the wound

2. **Descemets membrane detachment**- The more the corneal incision the more the risk of descemets detachment.

3. **Hyphaema** can be caused by blood entering the anterior chamber from the conjunctival or episcleral vessels.

4. **Expulsive haemorrhage**: It is the most dreaded complication. The signs are; sudden shallowing of anterior chamber, loss of red reflex, intraocular contents especially the iris begins to rise and prolapses into the wound, the choroid seems to swell. The most important step in this condition is the rapid closure of the anterior chamber.

5. **Vitreous loss** the consequences of vitreous loss in secondary implantation are not as serious as in primary implantation.

POSTOPERATIVE COMPLICATIONS

1. **Suture erosion**

2. **Fibrin reaction** to the suture material.

3**. Corneal oedema**

4. **Corneal endothelial decompensation**

The cornea can decompensate if large amounts of endothelial cells were lost during the surgery. It eventually leads to bullous keratopathy. Once the cornea has decompensated penetrating keratoplasty, lens exchange and anterior vitrectomy should be done.

5. **Shallow or flat anterior chamber**

A shallow or flat anterior chamber is an absolute emergency in pseudophakic since contact between IOL and the corneal endothelium is extremely damaging to the cornea. In majority of the cases it is due to wound leakage. Immediate restoration of the anterior chamber should be done.

6. **Adhesions between the iris and the lens**: It can be either adhesion to the margin of the pupil, adhesion between the iris and the optic of the flexible ACIOL, adhesions around the haptics of the lens and adhesions between the iris and the posterior chamber lenses

7. **Iris atrophy**: Is seen more commonly in flexible ACIOLS, also seen in sclera fixated PCIOLS, due to manipulation during surgery.

8. **Lost lens syndrome**: Is the dislocation of the posterior chamber lens into the vitreous.

9. **Tilted/subluxation IOL**: due to suture erosion.

10. **Secondary glaucoma**: Most secondary glaucoma are transient. It is a multi-etiologic entity. Postoperative swelling of the trabecular meshwork in corneo-scleral incision, plugging up the meshwork with cortical matter and protein, intracameral methylcellulose is all possible causes.

11. **Pupillary block glaucoma**: It is lens induced especially if adequate iridectomy is not provided during surgery. If possible laser iridotomy can be done later. Otherwise surgical intervention is needed.

12. **Cystoids macular oedema:** All though macular oedema is present in all patients during the first post operative hours, cystoids macular oedema usually begins 1-3 months post operatively. It especially more common with sclera fixated PCIOL.

13. **Endophthalmitis:** It is more common after cataract extraction and IOL implantation. The organisms detected were Pseudomonas aerguinosa commonly.

14. **Retinal detachment** more common with scleral fixated PCIOL compared to flexible ACIOL.

MATERIALS AND METHODS

MATERIALS AND METHODS

1) **SOURCE OF DATA:-** Outpatient department at R.L.J. HOSPITAL AND RESEARCH CENTRE, TAMAKA, KOLAR attached to SRI DEVARAJ URS MEDICAL COLLEGE

2) METHOD OF COLLECTION OF DATA:-

The subjects for the present study were selected from the above source using the following inclusion and exclusion criteria.

Sample size: Total 60 patients.

Inclusion Criteria :

1. Senile/pre-senile cataract patients who have intraoperative capsule rupture- for primary or secondary implantation.
2. Secondary IOL implantation in aphakic eyes.

Exclusion Criteria :

1. Any pathology of Cornea (degenerations & dystrophies) .
2. Pathology of Retina, Macula and Optic nerve.
3. Chronic Uveitis, larger iris defects, rubeosis iridis, iris atrophy.
4. Bleeding disorders.
5. Uncontrolled glaucoma.

Patients fulfilling the above criteria were selected and divided randomly into two groups on the basis of type of lens implanted.

GROUP A (30 patients) - posterior iris claw lens implantation.

GROUP B (30 patients) - scleral fixated IOL implantation

STUDY PERIOD:- A minimum of 60 patients fulfilling the inclusion criteria were selected for this follow up study from December 2012 to June 2014.

The study was reviewed by the Institutional Review Board and Ethics Committee at SRI DEVARAJ URS MEDICAL COLLEGE AND HOSPITAL.

4) PROCEDURE:-

PREOPERATIVE EVALUATION

1. Best corrected distant and near visual acuity with aphakic correction.
2. External ocular examination--- lids , extraocular muscles.
3. Slit lamp biomicroscopic examination for evidence of the following findings:
    - Corneal clarity (endothelial status)
    - Presence of synechiae
    - AC (depth, cells, flare, vitreous)
    - Iris –iridodonesis, iridectomies, posterior synechiae, atrophy

- Pupil shape , size , reaction
- Pseudoexfoliation in pupillary margins
- Lens : type of rent, position.
- Phacodonesis or frank subluxation / dislocation of lens
- Evidence of epithelialisatio n
- Posterior capsule (adequacy of support and clarity)

4. Dilated evaluation of fundus periphery and biomicroscopic evaluation of macula with a + 90 D lens- to r/o macular pathology or RD.
5. Gonioscopy with Goldmann three mirror.(PAS, recession, neovascularisation)
6. Applanation tonometry
7. Keratometery- to measure curvature of cornea and for IOL calculation
8. A-scan and IOL power calculation by SRK –2 formula.
9. B- scan was done to r/o RD , hemorrhages.
10. Lacrimal patency test
11. Routine blood investigations, fasting sugar, postprandial blood sugar and urine tests.
12. Status of the fellow eye : we should see the status of the lens.In unilateral and bilateral aphakias treatment may vary.

Preoperative patient preparation: Following regime was followed

1. All patients were on oral tab Ciprofloxacin 500mg twice daily and Ciprofloxacin 0.3% eye drops hourly one day before the surgery.
2. Preoperatively, in iris claw lens technique 2% Pilocarpine was used to constrict the pupil along with 2 drops of NSAID,
3. In SFIOL technique pupils were dilated with Tropicamide with phenylephrine 1% drops along with Flurbiprofen 0.03% drops.
4. Patients were administered Tab. Acetazolamide 250mg night before and 1hour prior to the surgery.
5. Informed consent was taken from all patients.
6. Anaesthesia : All the operations were done by single operating surgeon under peribulbar anaesthesia. All patients underwent standard secondary IOL implantation depending on the group as described later.

Group A (30): Retropupillary iris fixation of iris claw intraocular lens

Group B (30): The modified Ab-Externo 2-point scleral fixated posterior chamber intraocular lens implantation.

Anterior vitrectomy was done whenever required in both the groups

TECHNIQUE

Total 60 patients were treated and were divided in 2 groups as follows:

Group A (30 patients): Iris claw IOL

Retropupillary iris claw implantation

1. **INCISION**: A recommended technique with a 12 o'clock frown incision (corneo-scleral 5.5mm). The width of the incision should be 5.5 mm.
2. **PARACENTESIS**: Two paracenteses are used for the introduction of sinskey hook needed for the retropupillary enclavation of the iris claw Aphakia IOL. They are positioned at 2 o'clock and 10 o'clock.
3. **MIOTIC**: Intracameral Pilocarpine was injected to constrict the pupil.
4. **INSERTION OF IOL**: Iris claw iol was introduced in the anterior chamber.
5. **OVDs**: Inject a small amount of viscoelastic from the periphery of the eye, but never directly into the pupillary area.
6. **ENCLAVATION**: Holding the optic with iris claw holding forcep one haptic was tilted down and pushed under the iris with gentle manipulation simultaneously a sinsky hook was passed through the paracentesis on the same side . Once the haptic of the IOL was behind the iris the iris was

   enclavated into the haptic law with gentle push with the sinsky hook.
7. Similar maneuver was done for the other haptic .
8. **END POINT**: Noting the dimple at the site of enclavation.

9. Viscoelastic was aspirated with the simcoes cannula. AC was formed with BSS or air bubble to minimize wound leaks. Iridectomy was performed
10. Incision was closed with sutures. 0.5 cc Sunconjunctival injection of gentamycin and dexamethasone was given
11. Pad and bandage applied.

Group B (30 patients): SFIOL

Ab - externo four point scleral fixation technique described below was performed on all 30 patients under local anesthesia.

1. The eye to be operated is painted, draped and prepared for surgery under aseptic precautions.
2. Peribulbar anaesthesia with 2% xylocaine, 0.5% bupivacaine & 15000IU hylase was given.
3. Universal wire speculum is applied.
4. Superior rectus (bridle) suture is passed to fix the eye in downgaze
5. Anterior vitrectomy was done in all patients.
6. After adequate peritomy two partial thickness scleral flaps 1.5 to 2 mm posterior to the limbus was fashioned at the 3 0'clock and 9 0' clock meridians, 180^0 apart.
7. A doubled arm 10-0 prolene suture with straight needle was used.
8. The needles were rail-roaded out of the eye through the bed of the opposite scleral flap using a bent 25g needle introduced through the scleral bed.

9. A limbal section was fashioned and the sutures were drawn out of the eye, and cut into two halves.
10. Each half of the sutures were passed through the fixation eyelet on the superior and inferior haptic of the IOL at the point of maximum haptic spread.
11. A single piece, all PMMA, large optic IOL (equiconvex 6.5mm optic, 13mm overall length) was used for scleral fixation.
12. The IOL was introduced into the posterior chamber, and the sutures were tightened and tied & the suture knots were buried in the scleral bed and the scleral flap sutured.
13. The viscoelastic was cleared from the AC
14. The sclerocorneal and conjunctival peritomies were closed with 10-0 nylon sutures.
15. Subconjunctival gentamycin and dexamethasone 0.5cc was given at the end of the procedure.

Pad and bandage applied.

Important Points to remember

- Both scleral incisions should be at equal distance from limbus and should be exactly diagonally opposite.
- Distance between two sutures should be equal throughout.
- Both these sutures should be away from centre of the cornea equally on either side.
- Make sure that all sutures and haptics were away from infusion canula tip. Otherwise, on removal of infusion canula, the centration can be disturbed.
- Make sure about centration and good horizontal position of IOL before tying the knots.

Postoperative medications:

Antibiotic steroid eye drops that was used for 6 weeks in a tapering dose (2 drops)—1st week 10 times/day, 2nd week 8 times/day, 3rd week 6 times /day,

4th week qid , 5th week tid , 6th week three days BD , 5 days OD.

All patients will be followed from 1st day, 1st week, 1st month, 3rd month and 6th month, and at each visit patient will be evaluated for best corrected visual acuity and postoperative complications. The following tests will be done:

1. Visual acuity—BCVA for distant and near.

2. Slit lamp examination –

Assessment of

Wound: leaks , Sutures , exudates

Lids – Discharge , edema

Conjunctiva : Congestion

Sclera: Suture erosion , Foreign body granuloma

Cornea : Striate keratitis, iris pigments on endothelium, KPs

AC: Cells , flare , hyphema, microhyphema

Iris : Bleeding, enclavation site (dimple seen), atrophy, patency of iridectomy, neovascularization.

Pupil : Reaction , shape , size , dilatation

IOL: Location, centration, pigments , amount of iris enclavated

3. Fundus examination- cystoid macular edema, retinal detachment.

STATISTICAL METHODS USED FOR THIS STUDY

1. Comparison of preoperative and postoperative visual outcome is done using descriptive studies using proportions and difference in proportions between the two groups and Chi square test.

2. Each complication both intraoperative and postoperatively are expressed

   in percentage

RESULTS

RESULTS

Statistical analysis:

Data was compiled in Microsoft excel after coding and was analyzed using SPSS 20 version software. Qualitative data was represented by frequencies and proportions and quantitative data by mean and standard deviation. Chi-square test was used as test of significance for qualitative data. Independent t test to measure the mean difference between two groups and paired t test to measure the mean difference before and after in the same groups was used as test of significance for quantitative data. p value < 0.05 was considered as statistically significant.

Visual acuity was measured with the snellens chart but the values have been converted to LogMAR (log mean angle of resolution) for analysis and statistical purposes.

$$\text{logMAR} \quad \alpha \quad \frac{1}{\text{SNELLENS VISUAL ACUITY}}$$

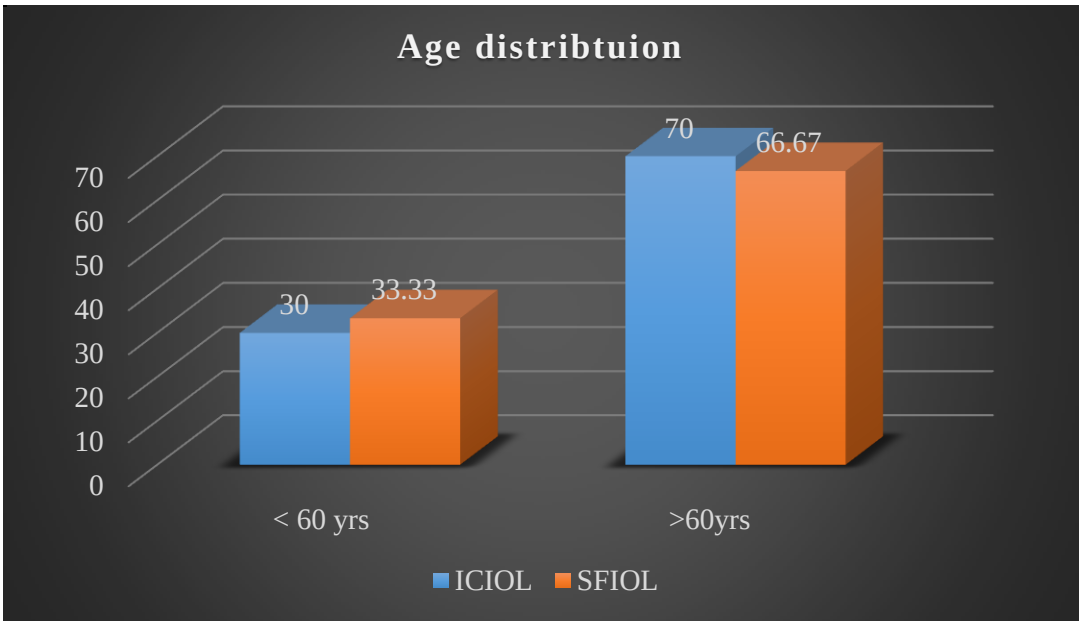
Table 1: Age distribution of subjects in both groups

		GROUPS		Total	χ 2 , df, p value
		ICIOL	SFIOL		
Age	< 60 yrs	9	10	19	0.077, 1, 0.781
	>60yrs	21	20	41	
Total		30	30	60	

Age group ranged from 37 – 75 years . Mean age of subjects in ICIOL was 64.10 ± 8.29 and in SFIOL was 63.23 ± 7.10. There was significant difference in age between the two groups. [Attributed to matching in selection of cases and controls]

Table 2: Mean Age of subjects in both groups

	Group		p value
	ICIOL	SFIOL	
Age	64.10 ± 8.29	63.23 ± 7.10	0.665

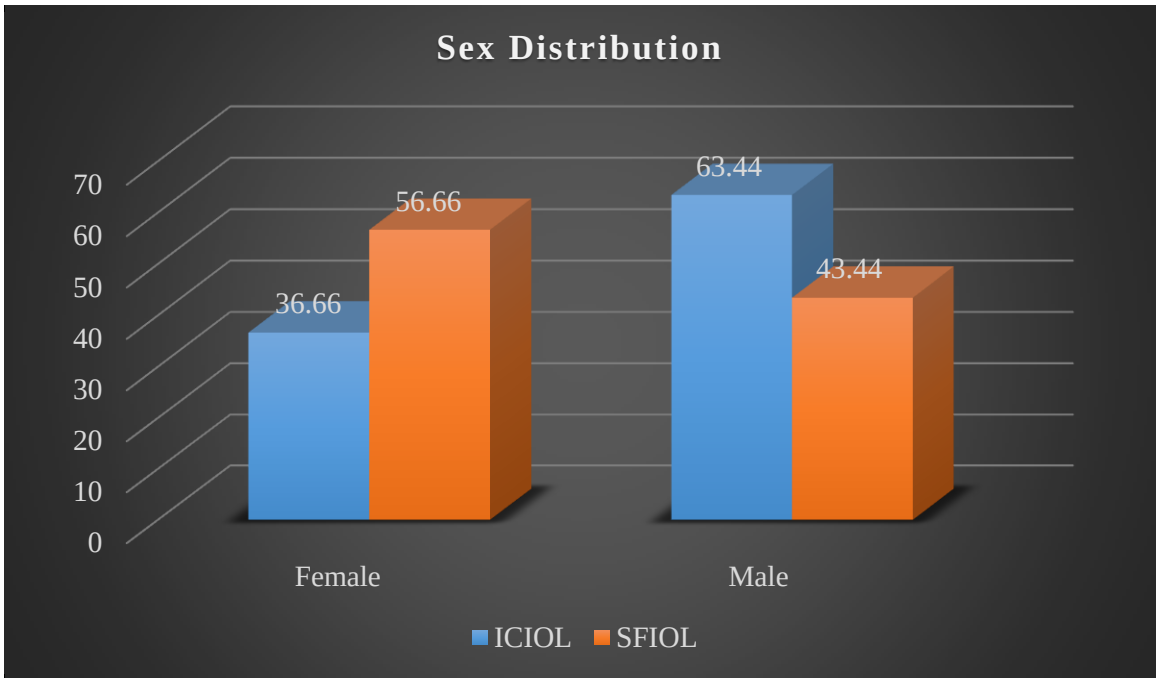


G 5.1*: Bar diagram showing distribution according to age in percentages*

Table 3: Sex distribution and association between two groups

		GROUPS		Total	χ 2 , df, p value
		ICIOL	SFIOL		
Sex	Female	11	17	28	2.411, 2, 0.121
	Male	19	13	32	
Total		30	30	60	

In the study majority were males i.e. 53.33% and 46.77% were females. There was no significant difference in sex distribution between two groups. This can be attributed to matching during selection of cases and controls**.**



G 5.2: ***Bar diagram showing sex distribution of subjects in percentage***

Table 4: Distribution of subjects and association between two groups with respect to side of operated eye.[LATERALITY]

		GROUPS		Total	χ 2 , df, p value
		ICIOL	SFIOL		
EYE	Left Eye	10	12	22	0.287, 1, 0.592
	Right Eye	20	18	38	
Total		30	30	60	

In the study majority were operated in Right eye i.e. 63.33% and 36.77% on left eye. There was no significant difference in side of eye between two groups. This can be attributed to matching during selection of cases and controls.

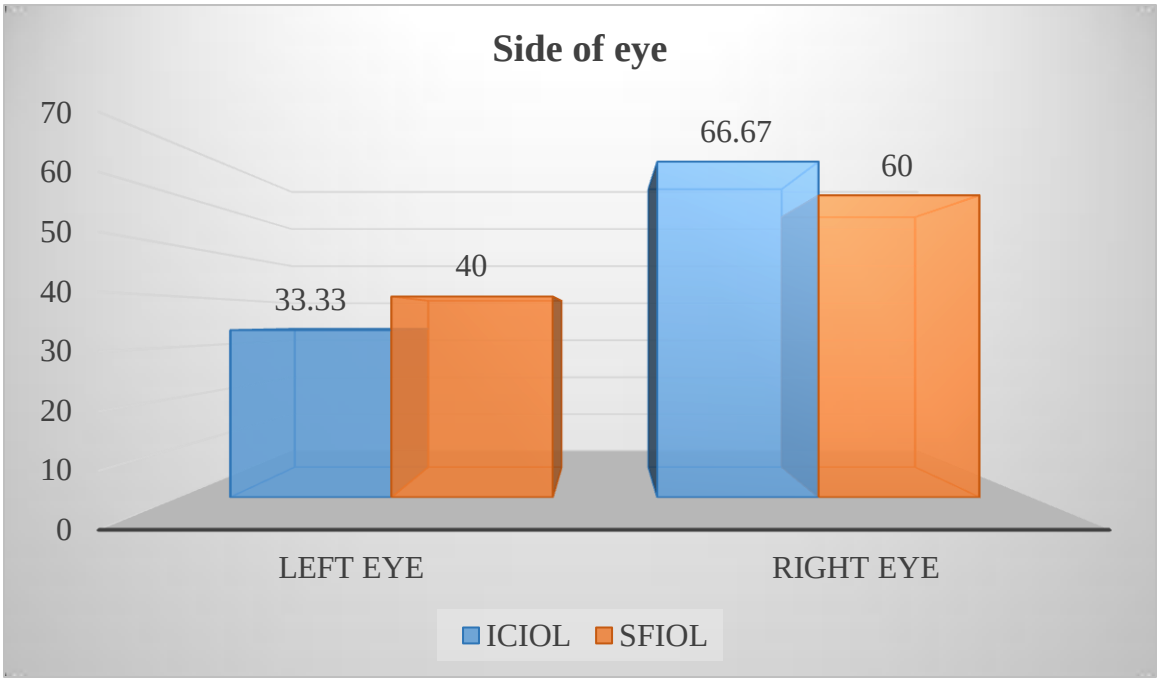
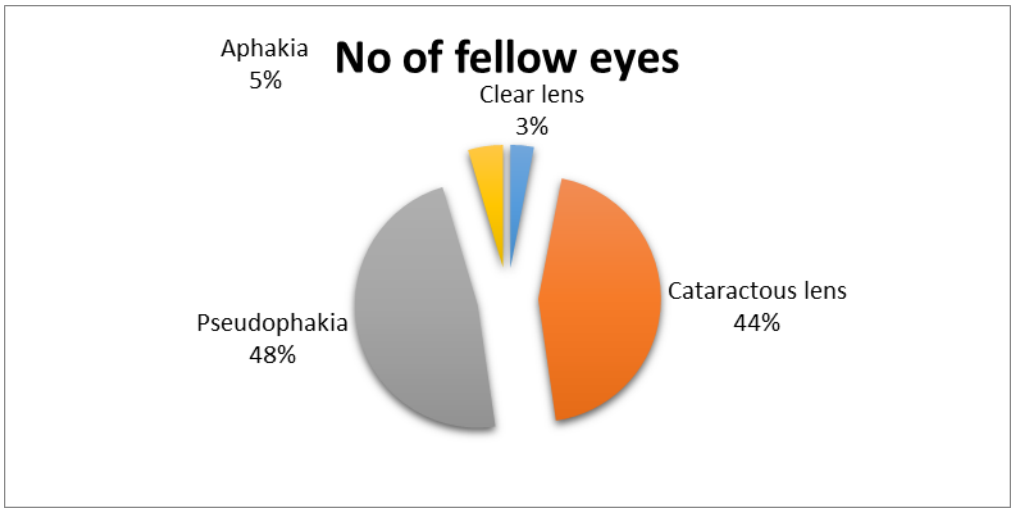


Figure 5.3: Bar diagram showing distribution according to side of eye in percentages

Table 5. Status of the fellow eye:

Ocular condition	No of fellow eyes	%
Clear lens	2	3.33%
Cataractous lens	29	48.33%
Pseudophakia	31	51.66%
Aphakia	3	5%

Maximum number of patients had uniocular aphakia with good vision in the fellow eye as an indication of secondary IOL implantation



Pie Chart 5.4: Status of the fellow eye

Table 6. The time gap before patients sought help for aphakic disability:

TIME INTERVAL	NO OF PATIENTS undergoing secondary implantation.(n=39)
0-1 yrs	51
1-2 yrs	4
2-3 yrs	2
3-5 yrs	2
>5 yrs	1

85% aphakics sought help within 0-1 years and only 9 aphakics after 1 year and out of them only 5 patients were using aphakic glasses.

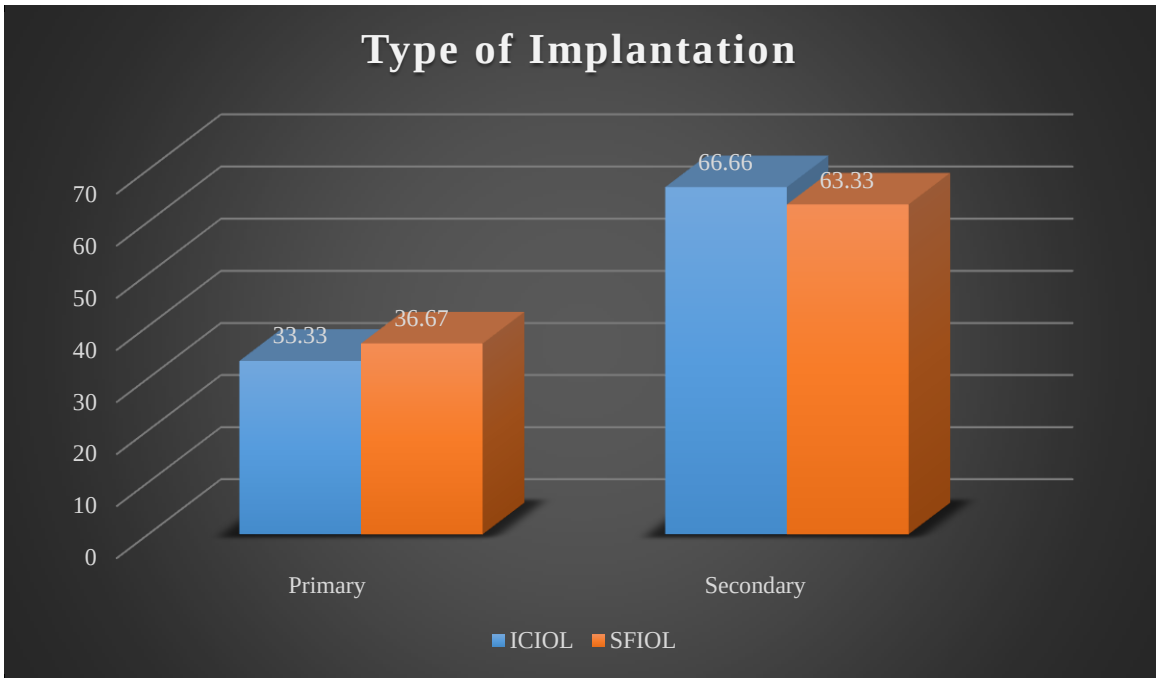
Table 7 . ETIOLOGY OF APHAKIA.

ETIOLOGY	NO OF PATIENTS
Complicated cataract surgery	18
Intraocular lens luxation	2
Secondary glaucoma after ACIOL	1
Secondary implantation	39

Table 8: Type of implantation used in the groups

		GROUPS		Total	χ 2 , df, p value
		ICIOL	SFIOL		
Type of Implantation	Primary	10	11	21	0.073, 1, 0.787
	Secondary	20	19	39	
Total		30	30	60	

In the study 21 (35%) had primary implantation and 65% had secondary implantation. There was no significant difference between the groups with respect to type of implantation. In primary implantation most common cause was complicated cataract surgery attributed to the nature of the institution .i.e teaching institution most of the complications were done by residents**.**



G 5.4: Bar diagram showing type of implantation in percentage

Table 9 .COMPARISON OF PREOPERATIVE VISUAL ACUITY.

	ICIOL	SFIOL
6/18-6/6	10 (33.33%)	12(40%)
6/60-6/24	16 (53.33%)	14(46.6%)
>6/60	4 (13.33%)	4 (13.3%)

Table 10: Preoperative Mean difference of UCDV, BCDV and IOP between two groups

	Group		p value
Vision	ICIOL	SFIOL	
Log UCDV (Uncorrected Distant Vision)	1.21 ± 0.33	1.10± 0.20	0.144
Log BCDV (Best Corrected Distant Vision)	0.63 ± 0.33	0.66 ± 0.29	0.710
IOP	14.46 ± 2.48	14.06 ± 2.39	0.528

In the study it was observed that mean log UCDV in ICIOL group was 1.21 ± 0.33 and in SFIOL was 1.10 ± 0.20. There was no significant difference between two groups preoperatively with respect to UCDC.

Similarly mean log BCDV in ICIOL group was 0.63 ± 0.33and in SFIOL was 0.59 ± 0.26. There was no significant difference between two groups preoperatively with respect to BCDV.

Mean IOP in ICIOL group was 14.46 ± 2.48 and in SFIOL was 14.06 ± 2.39. There was no significant difference between two groups preoperatively with respect to IOP preoperatively.

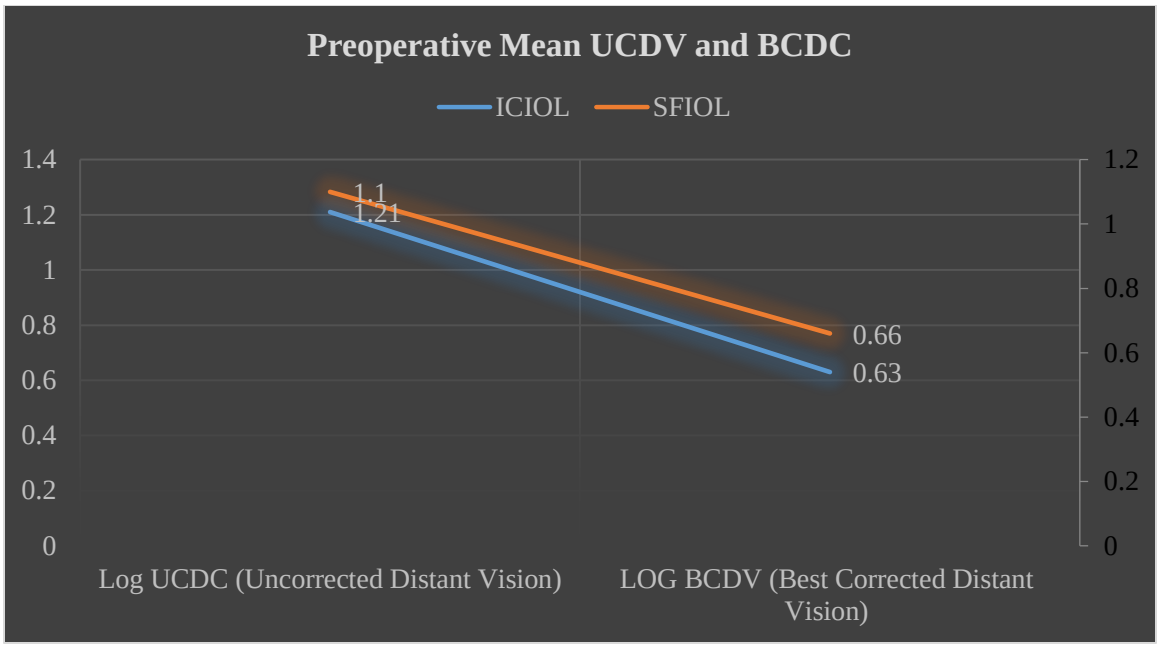
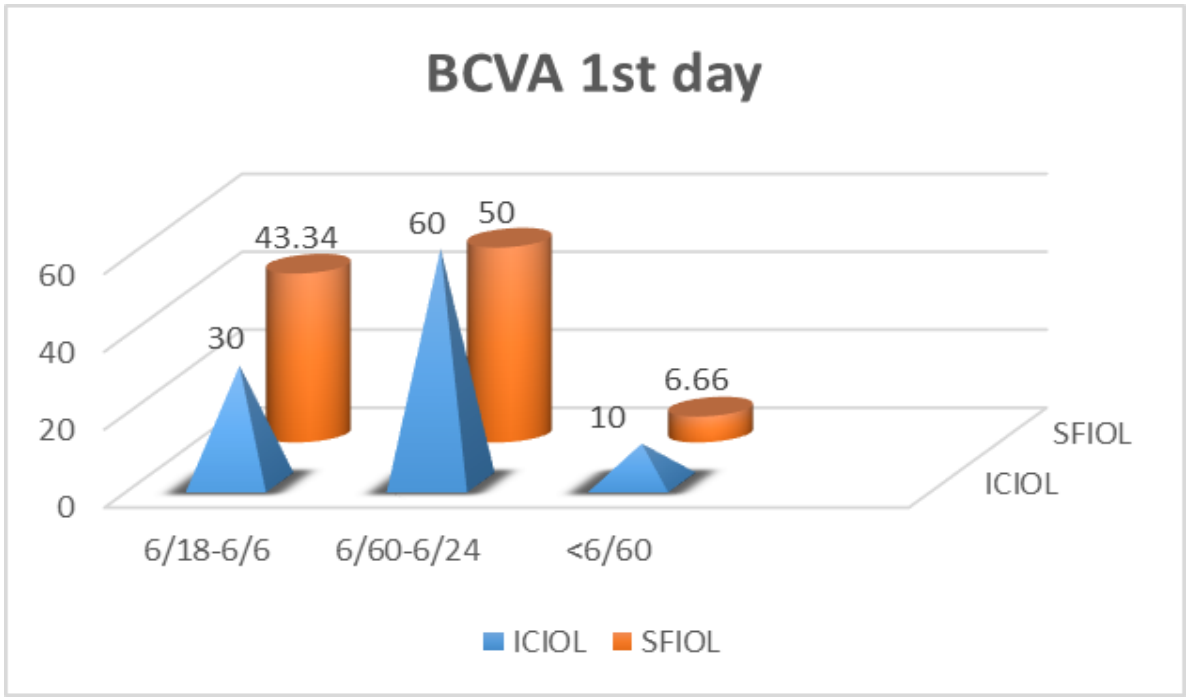


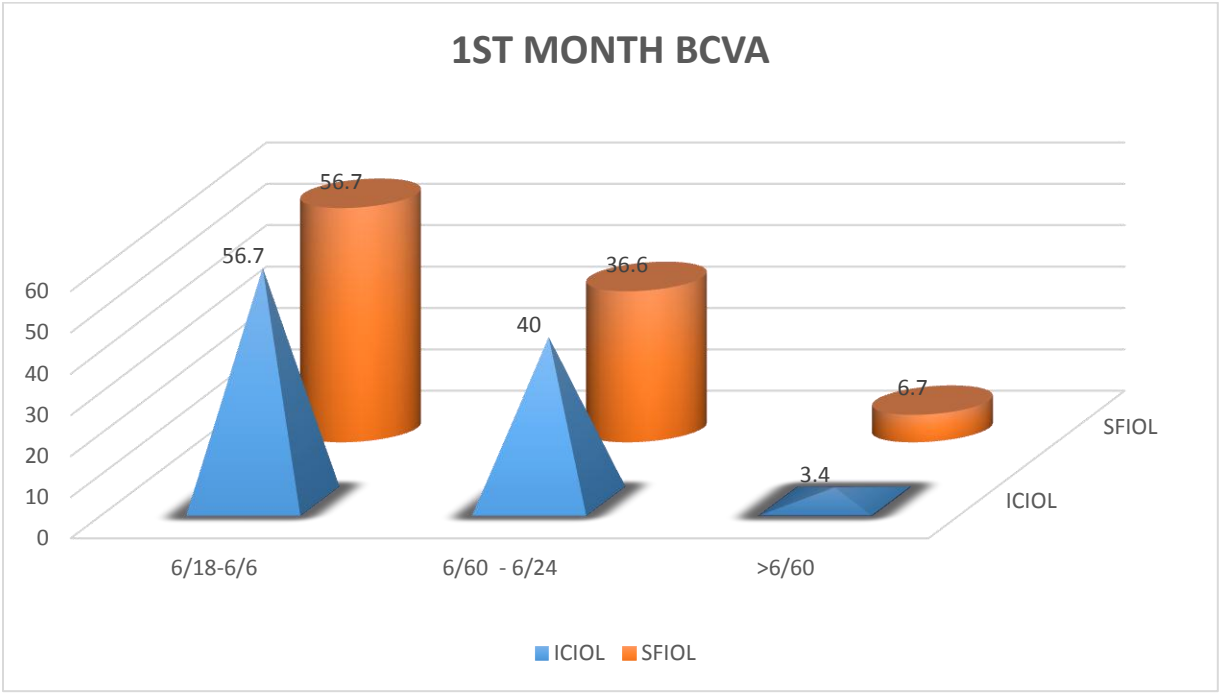
Figure 5.5: Line diagram showing preoperative UCDV and BCDV

Table 11. Comparison of postoperative visual acuity.

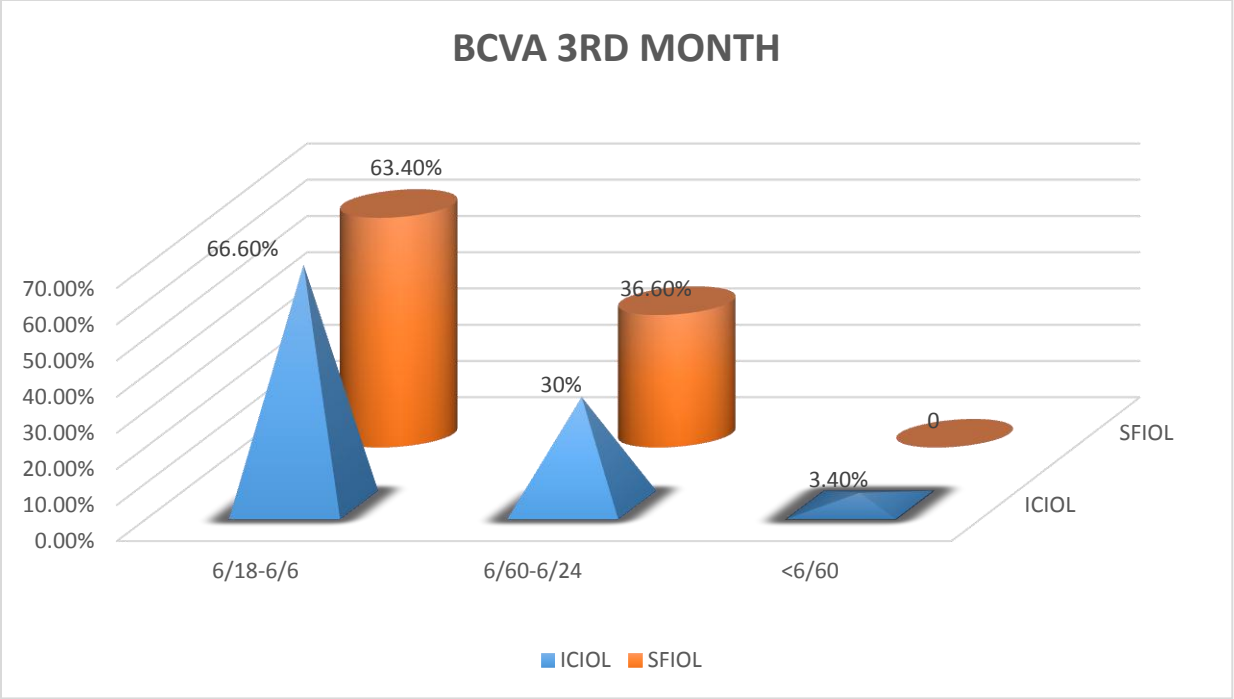
	IST DAY		1ST WEEK		1 MONTH		3RD MONTH		6TH MONTH	
VA	ICOL	SFIOL	ICIOL	SFIOL	ICIOL	SFIOL	ICIOL	SFIOL	ICIOL	SFIOL
6/18-6/6	9 30%	13 43.34%	17 56.6	17 56.7%	20 66.6%	19 63.4%	21 70%	17 56.7%	22 73.4%	19 63.3%
6/60 – 6/24	18 60%	15 50%	12 40%	11 36.6%	9 30%	11 36.6%	8 26.6%	13 43.3%	7 23.33%	10 33.3%
<6/60	3 10%	2 6.66%	1 3.4%	2 6.7%	1 3.4 %	0	1 3.4%	0	1 3.33%	1 3.4%



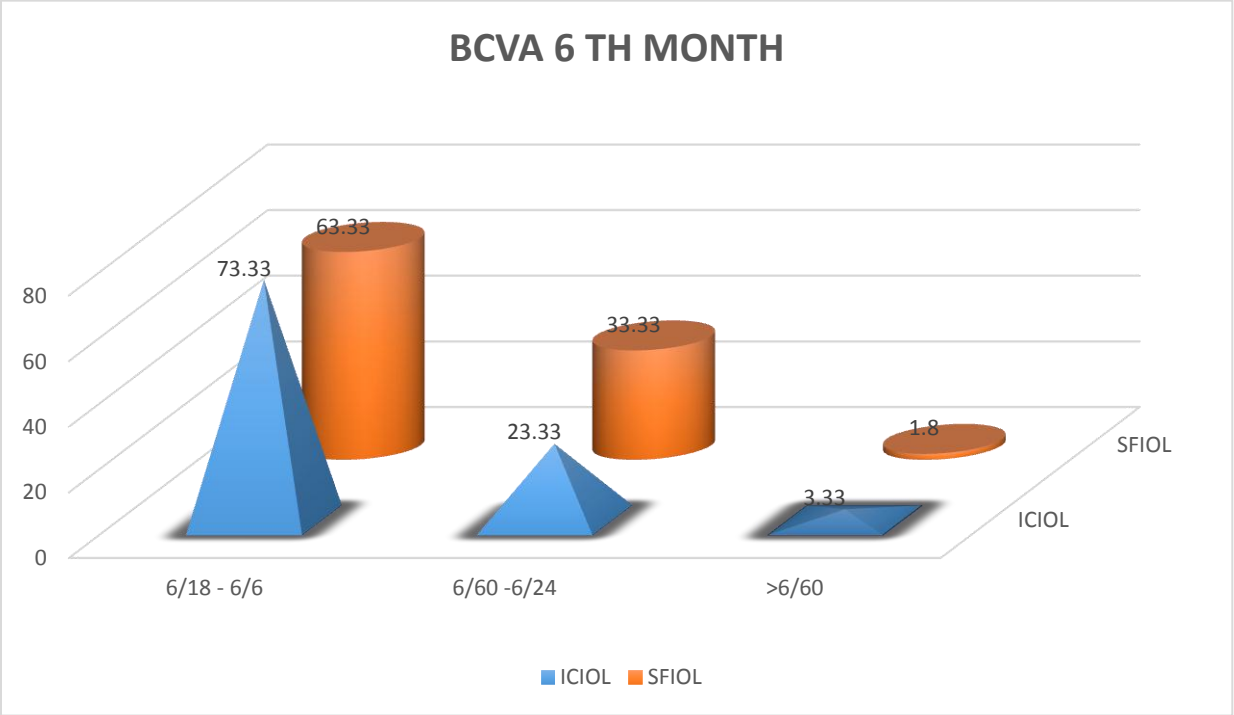
G 5.6 (a) BCVA OVER FOLLOW UP (1ST DAY)



G 5.6 (b)


BCVA 3RD MONTH
63.40%
66.60%
36.60%
30%
0
3.40%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
SFIOL
ICIOL
6/18-6/6
6/60-6/24
<6/60
ICIOL SFIOL

G 5.6 (c)


BCVA 6 TH MONTH
63.33
73.33
33.33
23.33
1.8
3.33
80
60
40
20
0
SFIOL
ICIOL
6/18 - 6/6
6/60 -6/24
>6/60
ICIOL SFIOL

G 5.6 (d)

Table 12: ICIOL comparison between Pre-operative VA and Post-operative VA at different intervals of follow up

BCDV	Mean	Std. Deviation	p value
PREOP LOG BCDV	0.63	0.33	
LOG BCDV at 1 day	0.68	0.33	0.198
LOGMAR BCDV at 1 week	0.54	0.30	0.050
LOGMAR BCDV at 1month	0.47	0.33	0.001**
LOGMAR BCDV at 3 months	0.42	0.32	0.0001**
LOGMAR BCDV at 6 months	0.41	0.32	0.0001**

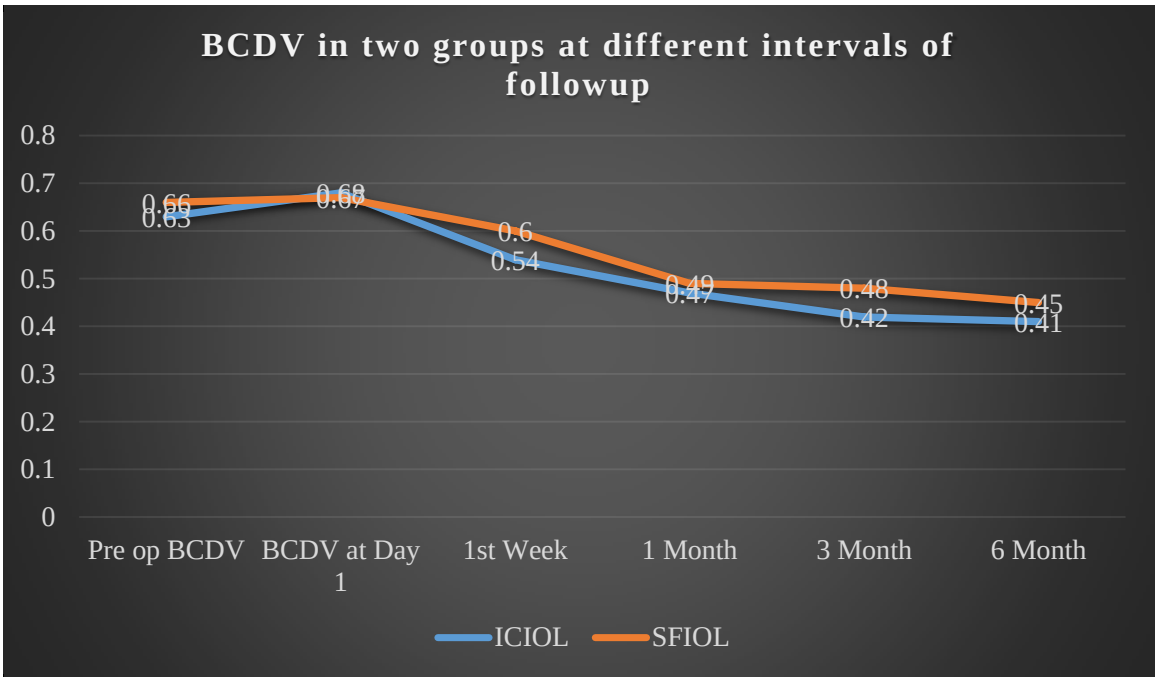
In the study it was observed that there was decrease in log mar values of BCDV from the preoperative value. Significant post operative decrease in VA was seen at 1 month onwards in ICIOL group. ***

**logMAR $\alpha \frac{1}{\text{SNELLENS VISUAL ACUITY}}$

Table 13: SFIOL comparison between Pre-operative VA and Post-operative VA at different intervals of follow up

	Mean	Std. Deviation	p value
LOG BCDV	0.66	0.29	
LOG BCDV at 1 day	0.67	0.33	0.436
LOGMAR BCDV at 1 week	0.60	0.36	0.480
LOGMAR BCDV at 1month	0.49	0.32	0.036**
LOGMAR BCDV at 3 months	0.48	0.32	0.027**
LOGMAR BCDV at 6 months	0.45	0.37	0.018***

In the study among SFIOL group it was observed that there was increase in Log MAR values of BCDV from the preoperative value on day 1 follow up post operatively. There after there was decrease in BCDV till 6 months. Significant decrease in VA was observed in VA after 1 month .



G 5.7: BCDV comparison between two groups at various intervals of follow-up

Table 14: Comparison of Post-operative findings of BCDV between two Groups

Postoperative Findings	Group		p value
	ICIOL	SFIOL	
Log BCDV (Best Corrected Distant Vision) at Day 1	0.68 ± 0.33	0.67± 0. 33	0.867
LOG BCDV at Week 1	0.54± 0.30	0.60± 0.36	0.465
LOG BCDV at One Month	0.47 ± 0.33	0.49 ± 0.32	0.795
LOG BCDV at Three Month	0.42 ± 0.32	0.48 ± 0.32	0.504
LOG BCDV at Six Months	0.41 ± 0.32	0.45 ± 0.37	0.656

In the study it was observed that mean log mar value of BCDV reduced in both the groups. There reduction was higher in ICIOL group than SFIOL group at all the intervals of follow up. There was no significant difference between two groups.

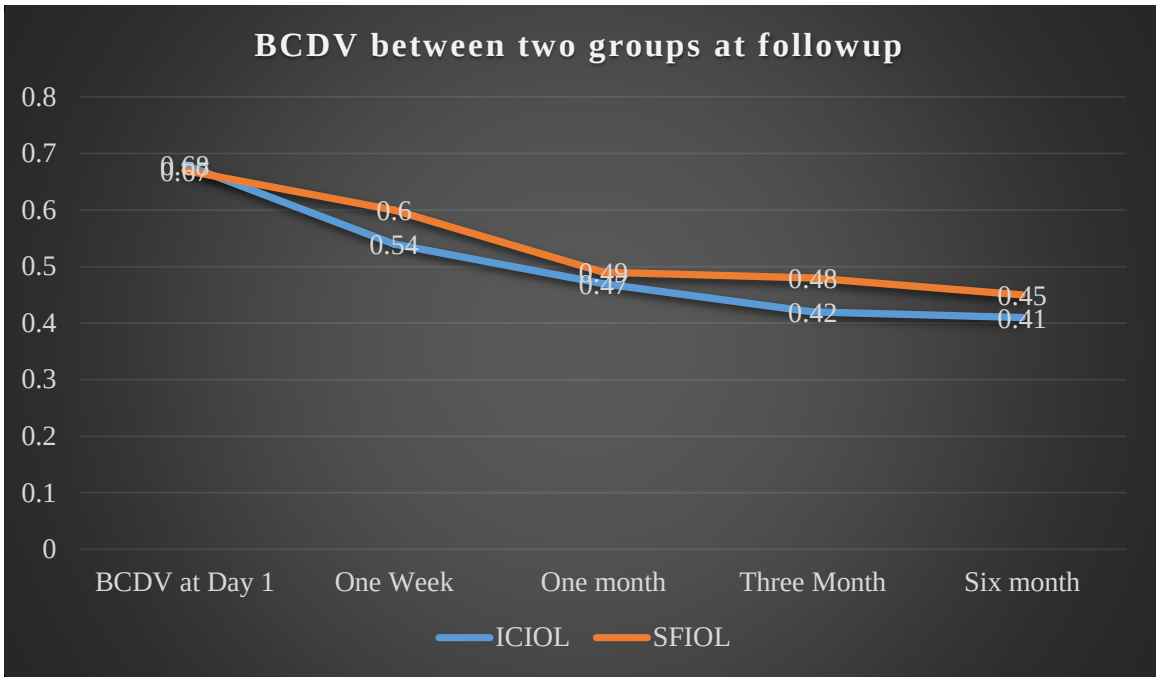
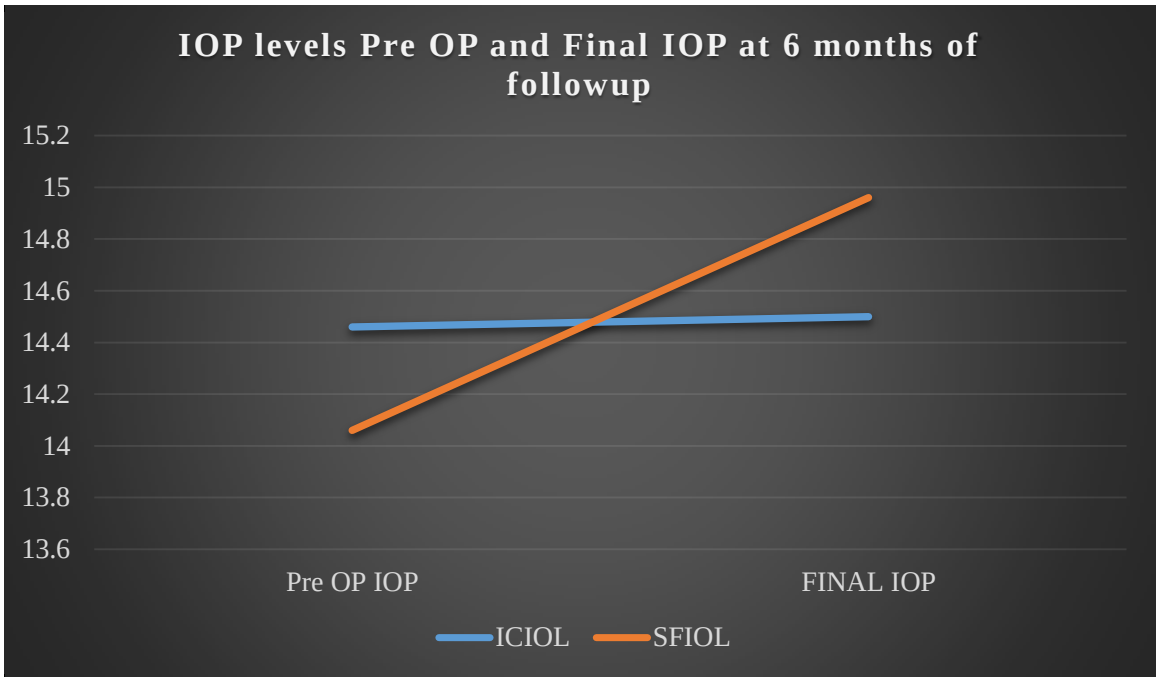


Figure 5.8: Line diagram showing BCDV between the groups during follow-up

Table 15. Postop visual acuity and IOP :

Visual acuity	ICIOL		SFIOL	
	No of pts	%	No of pts	%
Better than preop VA	24	80%	23	76.66%
Equal to preop VA	5	16.66%	4	13.33%
Worse than VA	1	3.33%	3	10%
time	preop	final	preop	final
Mean IOP	14.46 ± 2.48	14.50 ± 2.80	14.06 ± 2.39	14.37 ± 2.76

In the study it was observed that there was slight increase in Mean IOP in both the groups. Increase was higher in SFIOL group than ICIOL group. But there was no significant mean difference in IOP with respect to Pre OP IOL levels in both the groups.



G5.9: Line diagram showing IOP levels in both the groups before and after surgery

Table 16: Surgery duration between two procedures

	Group		df , f , p value
	ICIOL	SFIOL	
Surgery Time	12 ± 4.21	28 ± 8.55	1, 84.55 , 0.00**

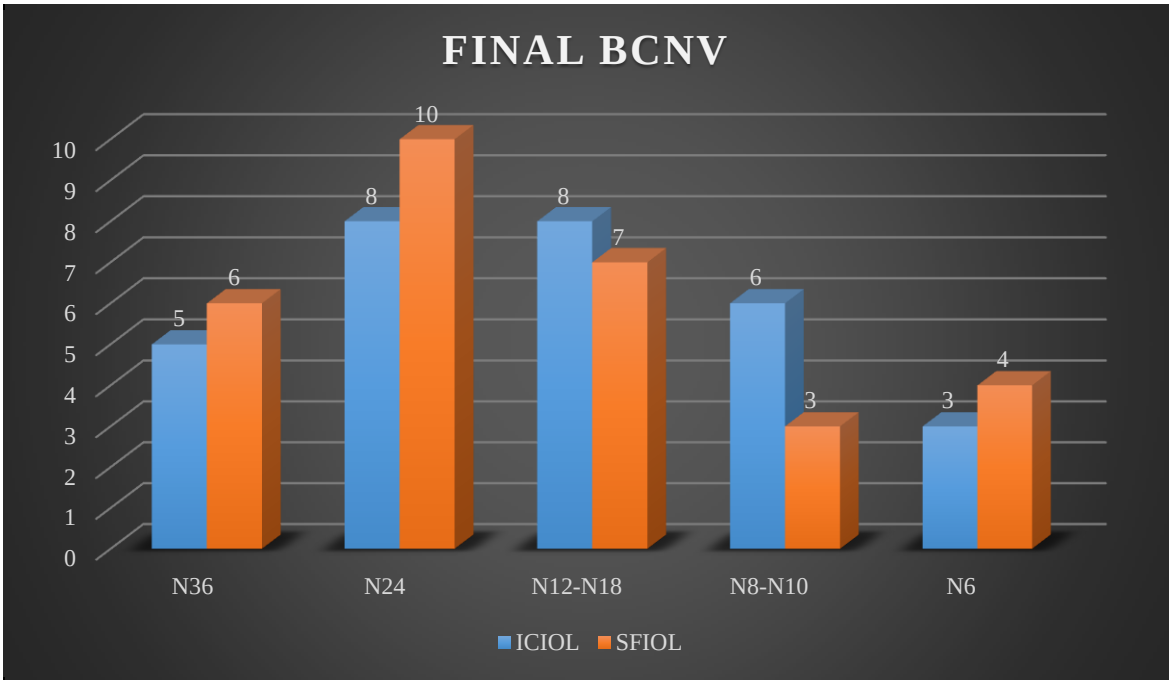
In the study the mean duration of surgery in ICIOL group was 8.80 ± 2.31 and in SFIOL 21.93 ± 5.81. This observation was statistically significant. I.e. the duration of surgery was less in ICIOL than SFIOL.

Post-Operative Findings

Table 17: BCNV between ICIOL and SFIOL group at 6th month after surgery

		GROUPS		Total	χ 2 , df, p value
		ICIOL	SFIOL		
BCNV	N36	5	6	11	1.523, 4, 0.823
	N24	8	10	18	
	N12-N18	8	7	15	
	N8-N10	6	3	9	
	N6	3	4	7	
Total		30	30	60	

There was no significant association in final BCNV after surgery between two groups.



G 5. 10: Bar diagram showing BCNV on 6th MONTH

TABLE 18 : COMPLICATIONS OBSERVED IN THE FOLLOW UP PERIOD.

	DAY 1		1ST WEEK		1ST MONTH		3RD MONTH		6th MONTH	
COMPLICATIONS	ICIOL	SFIOL	ICIOL	SFIOL	ICIOL	SFIOL	ICIOL	SFIOL	ICIOL	SFIOL
Striate keratopathy	4 (13.33%)	5 (16.7%)	2 (6.6%)	3 (10%)	1 (3.3%)	1 (3.3%)	1 (3.3%)	-	1 (3.33%)	-
Hyphema	-	4 (13.33%)	-	3 (10%)	-	1 (3.3%)	-	-	-	-
Vitreous in AC	-	-	-	-	-	-	-	-	-	-
Iritis	4 (13.33%)	6 (20%)	3 (10%)	4 (13.33%)	1 (3.3%)	2 (6.6%)	1 (3.3%)	-	1 (3.33%)	-
Secondary glaucoma	-	-	-	-	-	-	-	1(3.3%)	-	1(3.33%)
CME	-	-	-	-	-	-	-	2 (6.6%)	-	-
Tilted IOL/ decentration	1 (3.33%)	3 (10%)	1 (3.3%)	3 (10%)	1 (3.3%)	3 (10%)	1 (3.3%)	3 (10%)	1 (3.3%)	2 (6.6%)
Disenclavation/ Suluxated IOL	1 (3.33%)	1 (3.33%)	1 (3.3%)	1 (3.3%)	1 (3.3%)	1 (3.3%)	-	-	-	1 (3.33%)
Suture related	-	-	-	1 (3.3%)	-	1 (3.3%)	-	1 (3.3%)	-	1 (3.33%)
RD	-	-	-	-	-	-	-	-	-	-
Pupil ovalization	5 (16.7%)	1 (3.33%)	5 (16.7%)	1 (3.3%)	5 (16.7%)	1 (3.3%)	5 (16.7%)	1 (3.3%)	5 (16.7%)	1(3.33%)
Others	0	1 (3.33%)	2 (6.6%)	1 (3.3%)	2 (6.6%)	1 (3.3%)	2 (6.6%)	1 (3.3%)	2 (6.6%)	1 (3.33%)

Complications rate was high in SFIOL group than ICIOL group. Suture related complications were common in SFIOL group but all these complications were treated. Pupil beaking was more in ICIOL group. One ICIOL was disenclavated on the 1st week visit which was re-enclavated again. There was no significant difference in complications between two groups on 1st day post-surgery.

DISCUSSION

DISCUSSION

A large number of patients seek remedy for their aphakic disability in a developing country like India. The surgical correction of aphakic eyes without capsular support is still challenging. There has to be a careful consideration of the different treatment options.

ACIOL and SFIOLs have been the most popular type of IOLs used in implantation in the absence of adequate capsule support,[3] and they avoid the need for aphakic spectacles or contact lenses. However, there is much discussion on the best method for secondary IOL implantation that offers the lowest complication rate and best possible visual rehabilitation over several years.[18, 19]. SFIOLs offer potential advantages by moving the site of fixation from the anterior to posterior chamber. SF-PCIOL implantation is technically difficult, it requires considerable operative time and is associated with complications such as IOL tilt, decentration, and displacement into the vitreous cavity, choroidal hemorrhage, retinal detachment, CME and conjunctival erosion secondary to use of trans-scleral sutures.

Retropupillary fixation of an iris-claw IOL has the advantages of true posterior chamber implantation, which results in a deeper anterior chamber and greater distance to the corneal endothelium and has a lower intraoperative and postoperative risk profile and complications than ACIOL and SFIOL [24].

5.1.PATIENTS , SURGERY , FOLLOW UP

60 patients which were selected and included in this study which were selected according to the inclusion and exclusion criteria and were divided in ICIOL and SFIOL group.

In **Table no 1, 2**. **Age-** ranged from 37- 75 years in both the groups. In ICIOL 9 patients were found in >60 yrs. as opposed to 10 in SFIOL whereas in > 60 years group 21 patients were found in ICIOL and 20 in SFIOL group. Mean age was 64.10+/- 8.29 years and 63.23+/-7.10 years in ICIOL and SFIOL groups respectively there was no significant difference in age between the two groups.

In a study by Menezo[12] et al mean age was 54.7+/-20.6 in ICIOL patients and 62.0+/- 12.8 same as in our study.

In **Table no 3**: **Sex distribution-** There were 28 (46.77%) females and 32 (53.3%) males included in the study . ICIOL group consisted of 11 females and 19 males whereas SFIOL group had 17 females and 13 males. In the study majority were males but no significant difference (p = 0.121) in sex distribution was found between these two groups. Males were more than females in both groups in study by Menezo[12] et al which was insignificant statistically same as in our study.

In **Table 4. Laterality-** In the study majority were operated on the right eye i. e 63.33% and 36.77% on left eye. There was no significant difference in side of the eyes in between both the groups. The two groups were matched in terms of the involved eye (P = (0.592).

In **Table no 7**. **Etiology** of aphakia is documented which shows that in our study majority of patients i.e 65% patients were of secondary implantation taken few weeks after complicated cataract surgery. 30% patients were taken for primary IOL implantation post complicated surgery. 3.3% patients had lens subluxation and one patient (1.6%) had secondary glaucoma due to ACIOL. In a study it was found that most common etiology was complicated cataract surgery same as in our study[15].

In **Table no 5**. **Status of the fellow eye** was observed maximum number of patients had uniocular aphakia with good vision i.e 95% amongst which 51.66% patient were pseudophakic , 48.33% people had cataract and 3.3% patients had clear lens. Only 5% patient had aphakia in the fellow eye.

In **Table no 6**. **Time gap** before aphakic patients sought help was observed which showed that majority 85% patients were in 0- 1 year group and in these patients majority were treated within 4- 10 weeks of aphakia. Only one patient sought help after 5 years of aphakia.

In **Table no 8**. **Type of implantation** - It was found that 21 (35%) patients had primary IOL implantation amongst which 10 were in ICIOL group and 11 in SFIOL group. In primary implantation most common cause was complicated cataract surgery. 39 (65%) patients had secondary implantation. There was no significant difference between the groups with respect to the type of implantation. (P= 0.07). A study states that secondary implantation was more common (73%) than primary in hteir study which was consistent with our finding. [56] Follow up in both the groups was minimum 6 months.

Table 16. Mean Surgical time taken by each group compared with other studies.

Surgical mean time for each group	Our study (minutes)	Hara et al[56] (minutes)	Teng et al[57] (minutes)
ICIOL	12 ± 4.21	20+/- 8.9 min	11.23+/-1.54
SFIOL	28 ± 8.55	49.7+/- 18.9 min	31.68+/-3.15

- Mean time required for ICIOL group was 12+/- 4.21 minutes compared to other studies which was around 11.23+/-1.54 [57] minutes and 20+/-8.9 [56] min.
- Mean time required for SFIOL group in our study was 30.9 +/- 5.81 minutes which was comparable to other study in which it was 31.68+/-3.15[57] less than study by Hara et al.[56]

Scleral fixation is a more demanding procedure technically; it requires longer operative time than ICIOL as observed, moreover ICIOL has a shorter learning curve.

5.2. Visual acuity

In Table 9. We have compared **preoperative visual acuity** of both the groups

Vision was categorized according to the WHO classification of vision (ICD -9).

ICIOL had 10 (33.3%) patient SFIOL had 12 (40%) patients in 6/18-6/6 group.

In 6/60 – 6/24, 16 (53.3%) and 14 (46.6%) patients were found in ICIOL and SFIOL group respectively.

In <6/60 group 4 (13.3%) patients were found in both the groups.

Preoperative visual acuity in our study in both the groups were almost similar and statistically insignificant.

In table 10. In the study it was observed that **preoperative mean log UCDV** in ICIOL group was 1.21 ± 0.33 and in SFIOL was 1.10 ± 0.20. There was no significant difference between two groups preoperatively with respect to UCDC.

Similarly **mean log BCDV** in ICIOL group was 0.63 ± 0.33and in SFIOL was 0.59 ± 0.26. There was no significant difference between two groups preoperatively with respect to BCDV.

Mean IOP in ICIOL group was 14.46 ± 2.48 and in SFIOL was 14.06 ± 2.39. There was no significant difference between two groups preoperatively with respect to IOP preoperatively.

In Table 12, 13. We have compared **postoperative visual acuity** in both the groups over follow up period.

In **6/18- 6/6** group at the 1st day in ICIOL group 30 % patients and in SFIOL group 43.4% patients were seen. At the 1st week the number of patients increased equally in both the groups i.e 17 (56.6%) patients Over the 1st month the number of patients in ICIOL was 20 (66.6%) and SFIOL 19 (63.4%) . In the 3rd month ICIOL had 21 (70%) patients in this group while SFIOL had 17 patients (56.7%) patients . In SFIOL the number reduced as 2 patients at this month were diagnosed CME and treated. At the final 6th month 22 (73.4%) from ICIOL and 19 (63.3%) patients were in this group.

In **6/60 – 6/24** group 60% patients and 50% patients were seen in ICIOL & SFIOL group respectively at 1st day which at the 1st week reduced to 40% and 36.6%. At

the 1st month 30% and 36.6% patients were seen in ICIOL& SFIOL respectively.

At the 3rd month 26.6% ICIOL patients and 43.3% SFIOL patients were seen in this category which at 6th month was 23.3% and 33.3% in ICIOL & SFIOL group.

In **less than 6/60** category at the 1st day 10 % ICIOL patients & 6.66% SFIOL patients were seen which was 3.4% in ICIOL and 6.7% in SFIOL group at 1st week . At the subsequent follow-up 3.4% (one) patient was found in ICIOL group in this category due to persistent ovalization and in SFIOL group one patient was found in this category due to CME.

Table 19 .Comparison of Postop final LOG mean BCVA in our study versus other studies in ICIOL & SFIOL

IOL	ICIOL					SFIOL		
Studies	Our study	Farrahi[59] et al	Schallenberg[21] et al	Guell[13] et al	Gonnerman[58] J et al.	Our study	Farrahi[59] et al	Mazhri[60] et al
Final Mean logMAR BCVA	0.41+/- 0.32	0.44+/- 0.24	0.64+/- 0.62	0.44± 0.24	0.38 ± 0.31	0.45+/- 0.32	0.61± 0.25	0.54+/- 0.45

Schallenberg[21] et al conducted a long term study on "Aphakia correction with retropupillary fixated iris-claw lens" on 31 patients in which the mean preoperative BCVA was 0.85±0.42 logarithm of the minimum angle of resolution (logMAR).The mean postoperative BCVA was 0.64+- 0.62 logMAR . Of the 31 eyes 22 (70%) achieved a final BCVA better than preoperative BCVA A total of two eyes achieved a final BCVA equal to that measured preoperatively, and only seven ended up with poorer BCVA. One of these patients had Korsakoff's syndrome and developed an unnoticed retinal detachment. This result agrees with the results from our and the other studies[23, 24].

In our study ICIOL group mean preoperative BCVA was 0.63 +- 0.33 logMAR. The mean Postop BCVA was 0.41+-0.32 and SFIOL group mean postop BCVA was 0.45 +/- 0.37 which was comparable to Schallenberg[21] et al. Out of 30 eyes in ICIOL group 24 (80%) patients achieved a final BCVA better than preoperative BCVA which was comparable with Schallenberg[21] and better than Mohr A[18] and Gonnerman[58] . In our study 22 (73.33%)[21] eyes with ICIOL and 21 (70%) eyes with SFIOL achieved BCDV of > 6/18. This is comparable to previous studies of PC IOLs and SFIOL.

Farrahi [59] et al compared ICIOL vs SFIOL in which mean postop BCVA in ICIOL group was 0.44+/-0.24 which was comparable to our study i.e 0.45+/-0.32 and for SFIOL was 0.61±0.25 logMAR wherein in our study it was 0.45+/- 0.32 . for SFIOL our results were better than Farrahi [59] et al but statistical difference was not found in both the studies regarding postoperative BCVA which was almost the same with Farrahi [59] et al**.**

In Table 12. We have compared mean preoperative and postoperative BCVA of ICIOL group at different intervals of follow up & we observed that there was decrease in log mar values of BCDV (i.e better visual acuity in snellens) from the preoperative value. Significant post operative decrease in logMAR VA (6^{th} month 0.0001) was seen at 1 month onwards in ICIOL group.

In table no 13. SFIOL comparison between Pre-operative VA and Post-operative VA at different intervals of follow up. In the study among SFIOL group it was observed that there was increase in LogMAR values of BCDV from the preoperative value on day 1 and at 1 week follow up post operatively. There after there was decrease in BCDV till 6 months. Significant Increase in VA was observed on day 1 and 1^{st} week of follow up.

In Table no 14. In the study it was observed that mean logMAR value of BCDV reduced in both the groups. There reduction was higher in ICIOL group than SFIOL group at all the intervals of follow up. There was no significant difference between two groups (P= 0.6)

Table 20. **Comparison of number of patients in each group having normal vision with other studies. Normal vision is according to WHO classification of vision ICD-9**

Table 20a. ICIOL

VA	OUR STUDY n=30	Mohr et [18] al	Rao et [51] al	Bhandari [61] et al	De silva[62] et al	Gonnerman et al[58] n=137
6/18- 6/6 Normal	22 (73.33%)	16 (80%)	75%	70%	68.9 %	85(3.5%)

Table 20b. SFIOL

VA	OUR STUDY N=30	Mazhry [60] et al (2010)	Deshmukh M N=30	Chakrabati [68] A et al	Lee et al	Kreschner RM n =30
6/18- 6/6 Normal	21 (70%)	72 %	20 (67%)	88%	58.6%	21 (70%)

Table no 17. BCNV between ICIOL and SFIOL group at 6th month after surgery was compared. There was no significant association in final BCNV after surgery between two groups. (P= 0.8)

Table 21. Comparison of complications of ICIOL with other studies

Complications	Our study (n=60)		Gonnerman [58] et al	Baykara [20] et al	Farrahi [59] N=31	Bhandari [61] et al (n=30)	De silva [62] (n=50)
	ICIOL n=30	SFIOL n=30	Iciol	ICIOL			
Striae keratopathy	4 (13.33%) Mild	5 (16.66%)	-	-	-	-	1.7% corneal decompensation
Hyphaema	0	4 (13.33%)	6 (2.1%)	-	-	2 (6.7%)	-
Vitreous in AC	0	0	-	-	-	-	-
Iritis	4 (13.33%)	6(18%)	1 (0.7) Chronic	-	-	5(16.7%)	11(22%)
Secondary glaucoma	0	4 (13.33%)	-		2	-	0.8%
CME	0	3 (10%)	12 (8.7%)		-	3 (10%)	7.7% 0.8% chronic
Tilted/decentred IOL	1	3 (10%)	-	-	-	2	-
Subluxation of IOL/dislocation	1	1 (2%)	12 (8.7%)	-	-	-	6.0%
Suture related	-	4 (13.33%)	-		1 (3%)	2 (6.7%)	-
RD		-	-	-	1	-	0.8%
PUPIL OVALIZATION	5 (16.66%)	1(2%)	12(13.9.%)	12.7%	10 (32.2%)	10%	-
Others	2 (6.66)	1 (2%)	7 (hypotony		4 iris atrophy	-	2.6% wound leak

Pupil ovalization: it was the most common complication in our study, 5 patients **(16.6**%), 3(10%) patients had permanent ovalization. It can occur due to asymmetrical fixation of haptic or tight fixation which was less than a study done by Gonnerman [58] on posterior ICIOL in which it was found as most common complication (34 eyes, 24.8%) and permanent ovalization was found in 19 eyes (13.9%). Baykara et al.[20] found persistent pupil ovalization after posterior iris claw IOL implantation in 12.7% of eyes which was comparable to our study. Postoperative pupillary dilatation was also unaffected and no significant symptom was noticed same as in Baykara et al

IOP and secondary Glaucoma: In our study there was no significant difference in mean preoperative IOP (14.46+/- 2.28) and mean postoperative IOP (14.50+/-2.80) in ICIOL group. Despite elevated IOP in first few weeks in few patients no eye had clinically significant secondary glaucoma as seen in a study by Gonnerman [58] and Baykara[20] et al therefore, primary open angle and secondary glaucoma are not contraindications to posterior iris-claw IOL implantation.

Secondary glaucoma or pupillary block are more frequently observed with AC IOLs than with PC IOLs due to changes in the iridocorneal angle [63.] Frequent secondary glaucoma development and damage to the ciliary choroidal body after secondary implantation of scleral-sutured IOLs has also been reported [64]

In a study by Guell[13] et al elevated IOP which was steroid induced was seen in 3 eyes (18.75%) during 1st 6 weeks.

IOL dislocation: In our study one patient had subluxation due to disenclavation of a single haptic but it was re-enclavated. One patient in our study has slightly decenterd IOL which was

insignificant. Similar citing was seen by Gonnerman [58] who found dislocation rate upto 8.7%. Other studies of posterior-fixated iris-claw IOLs[18, 65, and 66] report a similar dislocation rate (0% to 10%).

In our study complication such dislocation of iol in vitreous was not observed. Inadequate tissue grasping may cause the iris-claw haptics to become detached, especially over the long term. According to De Silva [62] et al dislocation rate is 6%.

Retinal detachment: We have not observed any such complication over the follow up period which is in agreement to other studies [18, 56].

CME: In our study we did not observe any CME in the ICIOL group. According to Gonnerman [58] incidence of postoperative macular edema was 8.7% after 6 to 7 months which was higher than 4.1% to 4.8% on other Studies [18, 66.]In a study done by De Silva [62] on ICIOL two patients had CME of which one had chronic CME.

Postoperative iritis: In our study 4 (13.33%) patients had iritis on the postoperative day 1 which which was treated by topical steroid instillation and it eventually disappeared which was incomparable with **Guell** [13] et al they found flare in 6 eyes (60%) responding to steroid due to extensive iris manipulation in our study we found it in 13.3% eyes which reduced with topical steroid use. In a study by **De Silva** postoperative iritis was found in 22% patients .

Iris atrophy: Our study there were no patients with iris atrophy. **Farrahi [59]** et al showed four patients with iris atrophy**.**

In our study two patients had pigment dispersion but it was clinically insignificant same as in study by Gonnerman [58]

TABLE 21.b. Comparison of complications of SFIOL with other studies

COMPLICATIONS	Our study (N=60)		Farrahi[59] et al	Deshmukh[73] et al (N=30)	Azizur R[74] et al (N= 30)	Mazhry[60] et al (N=50
	ICIOL n=30	SFIOL n=30	SFIOL			
Striae keratopathy	4 transient mild (13.33%)	5 (16.66%)	-	-	-	2 (4%)
Hyphaema	0	4 (13.33%)	-	-	2 (6.7%)	5 (10%)
Vitreous in AC/ Vitreous hemorrhage vitritis	0	0	-	-	-	8 (16%) 2 (4%)
Iritis	4 (13.33%) transient	6 (18%)	-	3 (10%)	5(16.7%)	11(22%)
Secondary glaucoma	1 (3.33%)	1 (3.33%)	2	3 (10%)	-	3 (6%)
CME	0	3 (10%)	1	6 (20%)	3 (10%)	2 (4%)
Tilted/decentred IOL	1	3 (10%)	-	1 (3%)	1 (3.3%)	1(2%)
Subluxation of IOL	1	1 (2%)	-	-	-	2(4%)
Suture related	-	4 (13.33%)	1	1 (3%)	2 (6.7%)	3 (6%)
Retinal detachment	-	-	-	-	-	2 (4%)+ 1 suture abcess
Beaked pupil	5 (16.66%)	1(2%)	-	-	-	-
Others	2 (6.66)	1 (2%)		1 (3%)	-	4 (8%)

Gabric[67] N (1996) compared the ab-externo and ab-interno techniques of scleral fixation and documented that complication rates were more common in ab-interno method. Also post-operative BCVA was significantly better in ab-externo technique.

Chakrabati A[68] et al (1999) evaluated the ab-externo 4-point scleral fixation technique and found tha there was no intra- operative complication related to scleral fixation. There was no IOL tilt or decentration and 88% of patients got BCVA of 6/18 or better at final follow-up of 8 months. In our study also there were no intra-operative complications related to scleral fixation.

1. Vitreous haemorrhage and hyphema- In our study four cases had hyphema it was cleared within 1 month, similar findings was cited by **Mazhri [60]** et al 50 cases were studied and it was found in 8 eyes (16%) which cleared in all the patients within 1-3 weeks with no residual complications but this complication was not found in our patients . In the same study hyphaema was seen in five eyes (10%) which was comparable to our study (10%) but the hyphema was treated completely and no significant complication was found .

2. GLAUCOMA: In our study 1 (3.3%) patient had secondary glaucoma which was observed on 6th month which was less than that of found in the study by **Mazhri[60] et al** and **Deshmukh[73] et al.** Incidence of glaucoma was on lower side 3.3% as compared to other studies by **Arkins [29] and Steinert[29]** and **Holland and co-workers[69]** . This decrease may be related to better selection of the patients as most of the patients were planned as primary or secondary scleral fixation combined with anterior vitrectomy.

3. CME: In our study 3 patients were diagnosed with CME 1 patient at 1st month and other 2 at 6th month with FFA but these patients were treated which was comparable to a study done by Azizur [74] et al . Incidence of CME is reported 9-36% as reported by Arkins [29]and Steinert [29] It was 6.6 % in our study which was in agreement with 6% reported by McCluskey [70] and

Harrisburg[70] in their 32 patients. In a study by Deshmukh [73] et al CME was found to be more than in our study i.e 6 (20%) patients.

4. IOL tilt: Delayed subluxation of IOL occurred in one patient (2%) which was found in 3.3 % (1) patient in our study this patient had received blunt trauma at 5 months postoperatively. 5-10% incidence of IOL tilt or decentration has been reported in the literature[29]. In our study it was 10% it was clinically significant only in one eye which occurred due to loose sutures. It was reported as 8% in a study by Mazhri **[60]**.

5. IRITIS: In our study 1 patient who had a complicated cataract surgery suffered with persistent uveitis iritis was found in 18% specially 1st day and 1st week postoperatively but reduced in further follow up due to the steroid drops which was less than the study done by Mazhry et [60] al.

6. SUTURE TRACK ENDOPHTHALMITIS: In our study we had no patient with endophthalmitis which was comparable with the study of Mazhri **[60]** et al. This is one of the most fearsome complications after suture erosion as reported in various studies[70, 71,72] .

7. SUTURE EROSION :In our study two patients had suture erosion and one patient had loose sutures due to which he had tilted IOL and significant glare which was resutured again. It was seen in 3/17 patients in a study [60].

8. OTHERS: In our study no patients had RD but it has been reported to vary from 2.7 to 5.4% in various studies[29, 69] which according to Mazhry[60] was 4%. In our study no vitritis was found whereas **Mazhri [60]** et al found 2 patients (4%) to have aseptic vitritis in their study which resolved with topical steroids. In our study 5 (16.6 %) patients had striate keratopathy which was transient in nature. No corneal decompensation was noted.

Mazhri et al [60] found striate keratopathy, retinal detachment, and aseptic vitritis occurred in two eyes each i.e 4%.

Deshmukh [73] M et al performed a prospective clinical study and found that the advantages of scleral-fixated PCIOL implantation are that it preserves the cornea endothelial cells, reduces the risk of injury to the iris and ciliary body and produces stable, long term fixation. In addition, it is implanted in the same plane as the crystalline lens and does not interfere with the pupillary function, or anterior chamber anatomy and therefore it is optically physiological. The limitation of this technique is that the accuracy of needle placement cannot be guaranteed as the needle cannot be visualized behind the iris, it is time consuming procedure, requires surgical skill with aggressive intraocular manipulations, the suturing is difficult to perform and have their own problems like suture erosion and degradation, ocular hypertension and IOL tilt or decentration.

However, long term follow up is required for both the groups to note suture related complications, IOL position and enclavation .

Iris fixated IOL were there for a long time, nearly for 4 decades with mixed results. They attracted a lot of debates and controversies. Most of the problems and complications with iris fixated IOL were solved with improved design, manufacturing techniques and surgical technique.

Retropupillary iris claw fixation at the posterior chamber can be performed less invasively and in a shorter surgical time period .The simplicity of the procedure compared with transcleral sutures techniques , reversible adjustable fixation and centration characteristics and relatively low rate of complications compared with ACIOL make the ICIOL a better alternative.

CONCLUSION

CONCLUSION

After comparing visual outcome and complications within ICIOL and SFIOL groups we conclude that:-

- ICIOL and SFIOL have statistically comparable results as far as post-operative BCVA is concerned but ICIOL has slightly higher percentage of patients with better visual acuity.
- ICIOL has lesser rate of complications most common was pupil ovalization which was harmless and others were also treatable. SFIOL group complications were slightly on a higher side specially suture related complications, were quite cumbersome to treat.Moreover , SFIOL group required a longer operation time and in addition to early complications, such as vitreous bleeding, choroidal hemorrhage, and initial intraocular pressure fluctuation, the main risks are retinal detachment and chronic macular edema which might be caused by vitreous traction.
- The implantation of a retropupilary iris-claw lens in the absence of sufficient capsular support is a good alternative. The easy implantation process with this technique and short surgical time can replace the scleral fixated IOL as the method of choice.

SUMMARY

SUMMARY

This is a hospital based prospective hospital based study. 60 aphakics were included in this study out of which 30 underwent iris claw lens and another 30 scleral fixated IOL implantation after anterior vitrectomy.

The patients were matched in terms of age , sex, laterality. Age group in both the groups ranged from 37-75 years. The majority of patients in both the groups were in the 60-75 years age group. In the study majority were males i.e. 53.33% and 46.77% were females. In ICIOL group males were more than females and in SFIOL group females were more but the difference was insignificant. In both the groups majority were operated on the right eye (63.33%) .

Most common etiology of aphakia in our study was post complicated cataract surgery and in that secondary implantation (65%) was more common than primary.

Majority patients in our study were treated within 0-1 years of aphakia. Maximium number of patients had uniocular aphakia with good vision in the fellow eye.

Mean surgical time for ICIOL was 12+/- 4.21 minutes which was significantly less than time required for SFIOL implantation (28+/- 8.55) minutes (P= 0.00). Preoperative visual acuity was comparable in both the groups which was statistically insignificant. Follow up was done at day 1, 1^{st} week , 1^{st} month, 3^{rd} month, 6^{th} month . On 6^{th} month of follow up this category had 73.4% in ICIOL group & 63.3% in SFIOL group. 24 (80%) ICIOL patients had postoperative visual acuity better than preoperative VA as compared to 23(76.6%) patients. In the study it was observed that mean log MAR value of BCDV reduced in both the groups. There reduction was higher in ICIOL group than SFIOL group at all the intervals of follow up. There was no significant

difference between two groups. There was no significant mean difference in IOP with respect to Pre OP IOL levels in both the groups.

Complications seen in ICIOL group were mainly pupil ovalization (16.7%). One ICIOL patient had disenclavation which was re-enclavated. In SFIOL group hyphema was seen in 13.3% patients which disappeared after 1st month. Suture related complications was seen in one (3.3%) patient which was treated. Striate keratitis and iritis was seen in both the groups but was transient in nature . these patients were treated with appropriate treatment.

In conclusion the retropupillary iris claw fixation at the posterior chamber can be performed less invasively and in a shorter surgical time period as compared to SFIOL. ICIOL has a low incidence of intra & postoperative complications and are easier to remove if necessary. We believe thato implantation of this lens type should be considered in cases of inadequate or absent capsular support.

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BIBLIOGRAPHY

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ANNEXURES

ANNEXURE

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:

Name and signature of parent /guardian Date:

Name and signature of person obtaining consent Date:

PROFORMA

NAME: **IP NO:**

AGE/SEX:

DOA:

ADDRESS:

DOS:

DOD:

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:

	OD	OS
EYE LIDS:		
CONJUNCTIVA:		
CORNEA:		
SCLERA:		
ANTERIOR CHAMBER:		
IRIS: Color-		
Pattern-		
PUPIL: Size –		
Shape –		
Reaction –		
LENS:		

VISUAL ACUITY:

DISTANT:

PIN HOLE:

NEAR:

OPHTHALMOSCOPY:

1. **DIRECT:**
2. **INDIRECT:**

SLIT LAMP BIOMICROSCOPY:

INTRAOCULAR PRESSURE:

LACRIMAL SYRINGING:

KERATOMETRY:

Horizontal:

Vertical:

Axial length:

IOL POWER:

LAB INVESTIGATIONS:

BLOOD SUGAR:

URINE SUGAR:

INTRAOPERATIVE NOTES

TYPE OF LENS: **POWER:**

TECHNIQUE: **SUTURE MATERIAL USED:**

POST OPERATIVE MEDICATIONS

POST OPERATIVE FOLLOW UP

VISUAL ACUITY:

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

POST OPERATIVE COMPLICATIONS:

	1st day	1st week	1st month	3rdmonth	6thmonth
Corneal edema					
Striae keratopathy					
Hyphaema					
Vitreous in AC					
Iritis					
Secondary glaucoma					
CME					
Tilted/decentred IOL					
Subluxation of IOL					
Disenclavation of IOL					
Suture erosion					
Retinal detachment					
Others					

KEY TO MASTER CHART

1. SI No: Serial number
2. IP No: In patient number
3. RE and LE: Right eye , Left eye
4. SIMC: Senile immature cataract
5. SMC: Senile mature cataract
6. PPC: Posterior polar cataract
7. SHMC: Senile hypermature cataract
8. PSP: Pseudophakia
9. DV: Distant vision
10. NV: Near vision
11. BCVA: Best corrected visual acuity
12. CE: Corneal edema
13. SK: Striaekeratopathy
14. H: Hyphaema
15. SG: Secondary glaucoma
16. CME: Cystoid macular edema
17. RD: Retinal detachment
18. SE: Suture erosion
19. S-IOL: Subluxated intraocular lens
20. T-IOL: Tilted intraocular lens
21. UCVA: Uncorrected visual acuity
22. V in AC: Vitreous in anterior chamber
23. NV – near vision
24. Type- implantation type

COLOUR PLATES

HISTORY OF IOL

Figure 1. RIDLEY LENS

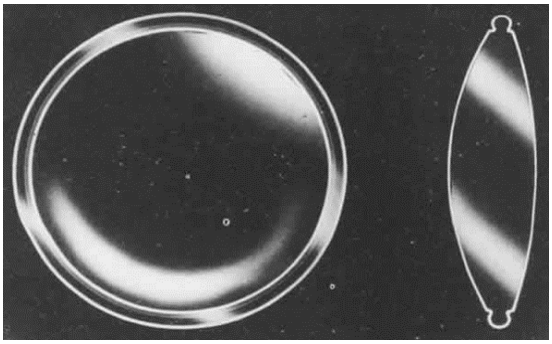
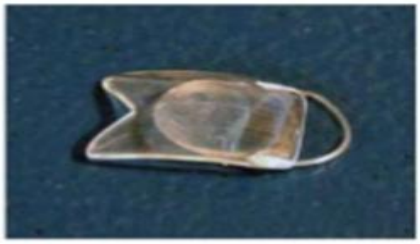
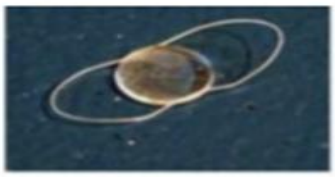


Figure 2,3. GENERATION II LENS



Barraquer AC lens with one rigid and one flexible loop

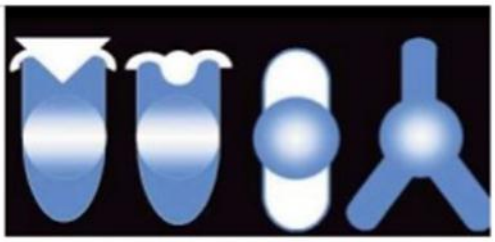


Dannheim AC Lens

4. GENERATION III LENS

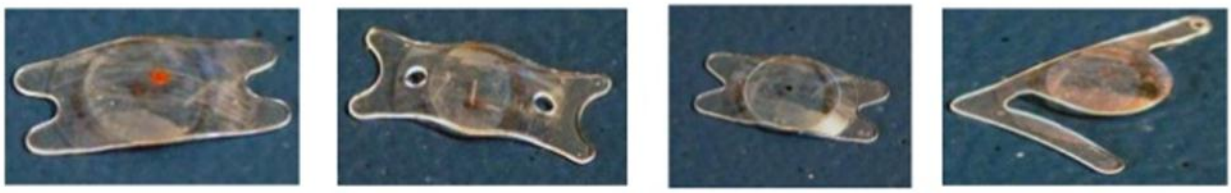
Little Arnott Rayner Maltese Cross 2 Planes

5. GENERATION IV LENS

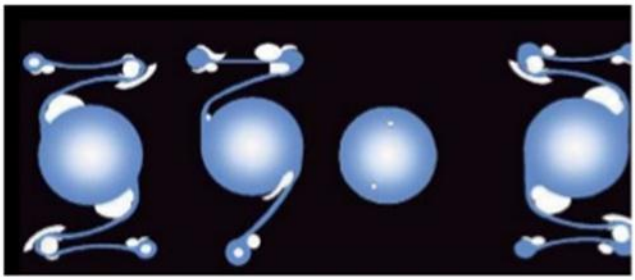


Strampelli Tripod AC-IOL (1953)
Choyce Mark I AC-IOL(1956)
Dannheim AC-IOL with closed haptics (1952)
Ridley Tripod AC-IOL (1957–60)

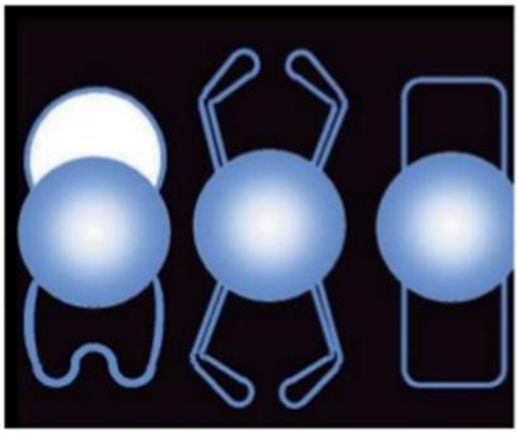
6 . GENERATION V LENS



Mark VIII, Mark IX, flexible ACIOL, Kelman, Kelman flexible tripod, Kelman quadraflex, Kelman multiplex 4 point fixation



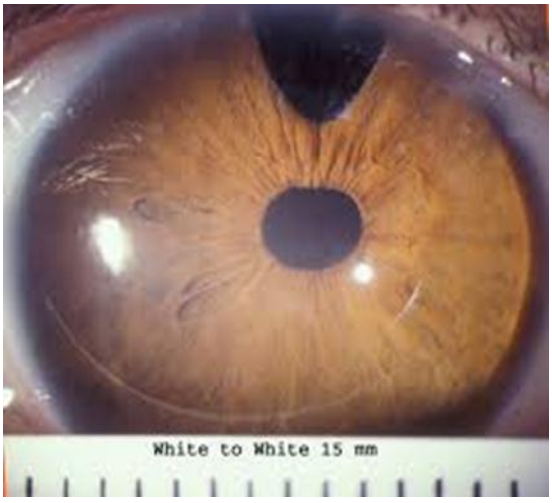
Kelman multiflex AC-IOL (1982)
Kelman flexible Tripod AC-IOL (1981),
Intermedics Inc Dubroff AC-IOL (1981),
Modern, one-piece, flexible PMMA AC-IOL (Kelman design) with Choyce foot plates (various manufacturers).



Azar 91Z AC-IOL (1982)
ORC Inc Stableflex AC-IOL (1983)
Surgidev Inc Style 10 Leiske ACIOL (1978)

APHAKIA & treatment modalities

7. APHAKIC EYE WITH PI



APHAKIC SPECTACLES

Figure 8 . ACIOL

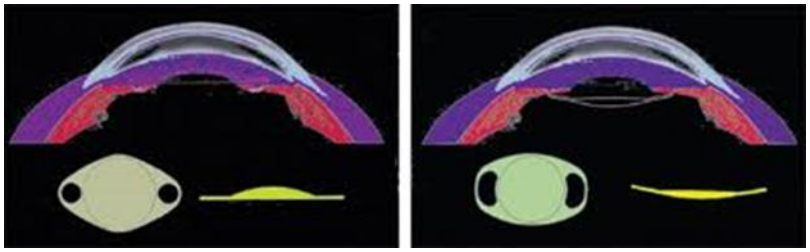


Figure 9. AC- ICIOL

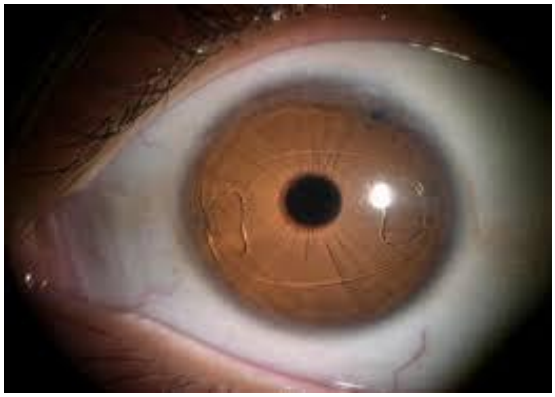


Figure 10 TECHNIQUE OF PC-ICIOL

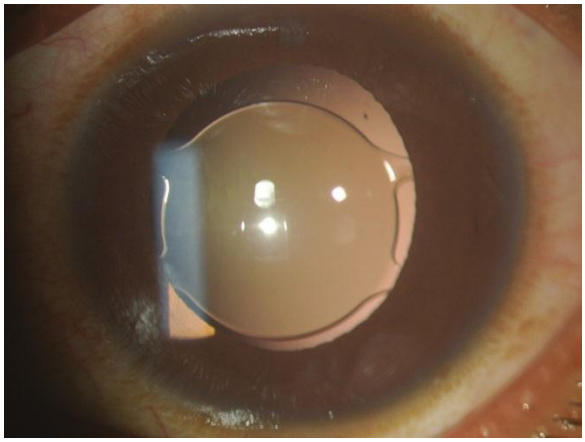


Figure 11 DIMPLING ON IRIS SEEN AFTER ENCLAVATION

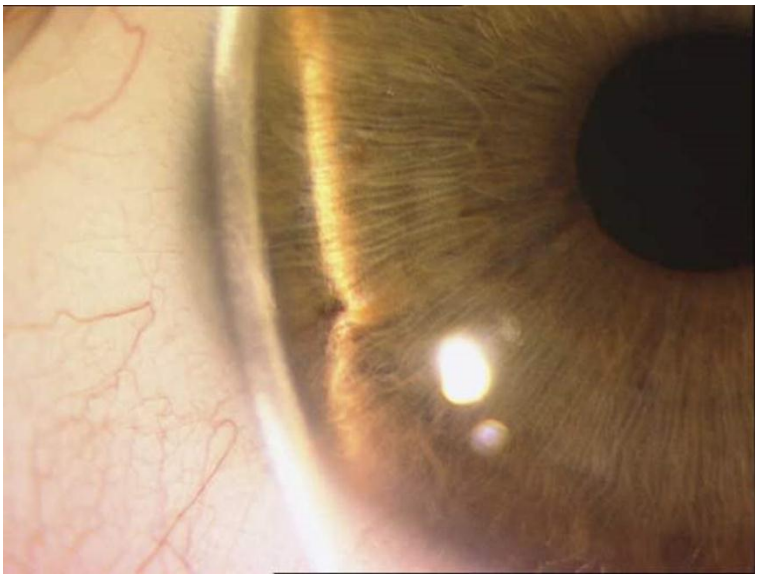
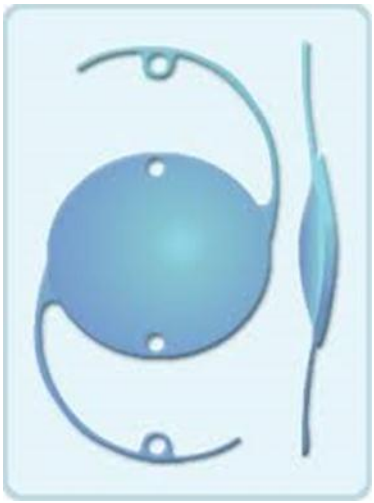
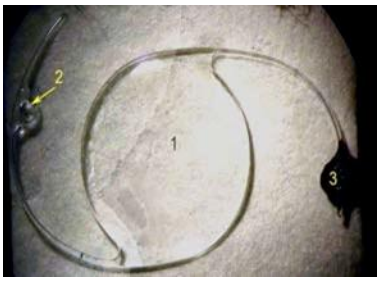
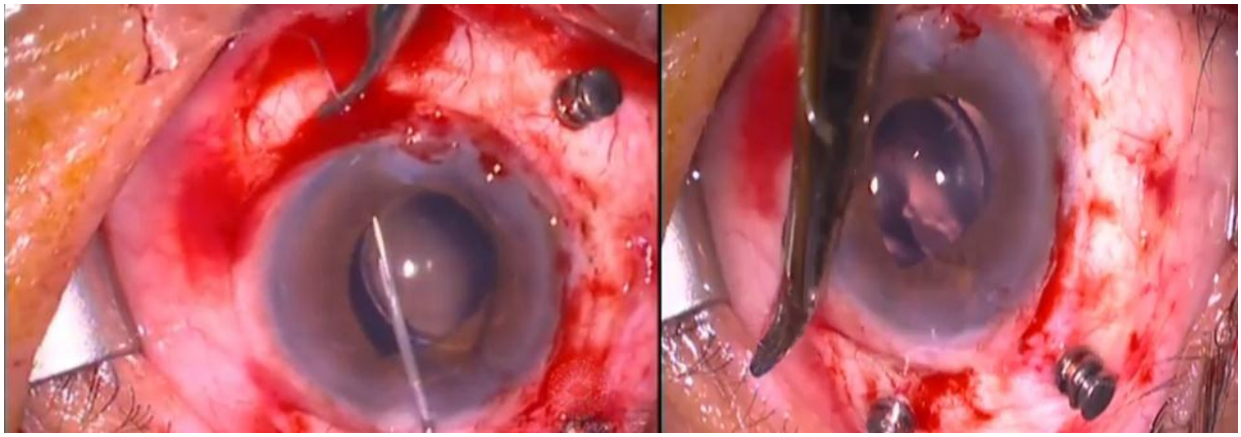


Figure 12. SFIOL





SFIOL IMPLANTATION



A DOUBLED ARM 10-0 PROLENE SUTURE IS PASSED INTO STRAIGHT NEEDLE.

TIGHTENING OF SUTURES

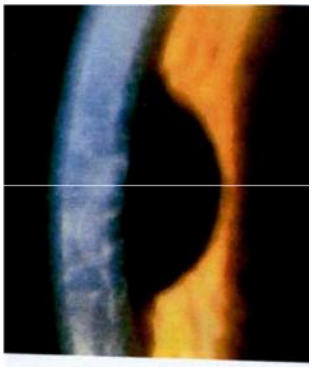
INVESTIGATTIONS

Figure 13. KERATOMETRY & A-SCAN

Figure 14. B-SCAN

COMPLICATIONS

Figure15. CORNEAL EDEMA , PUPIL OVALIZATION



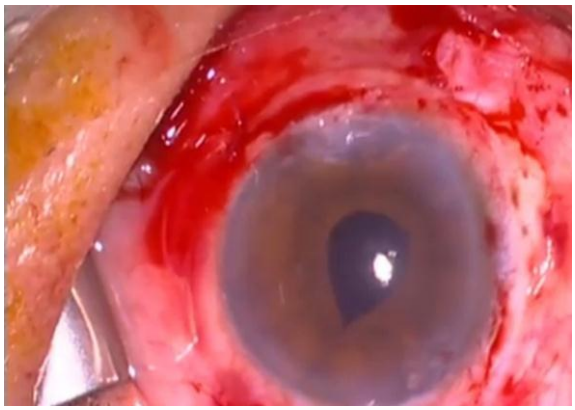
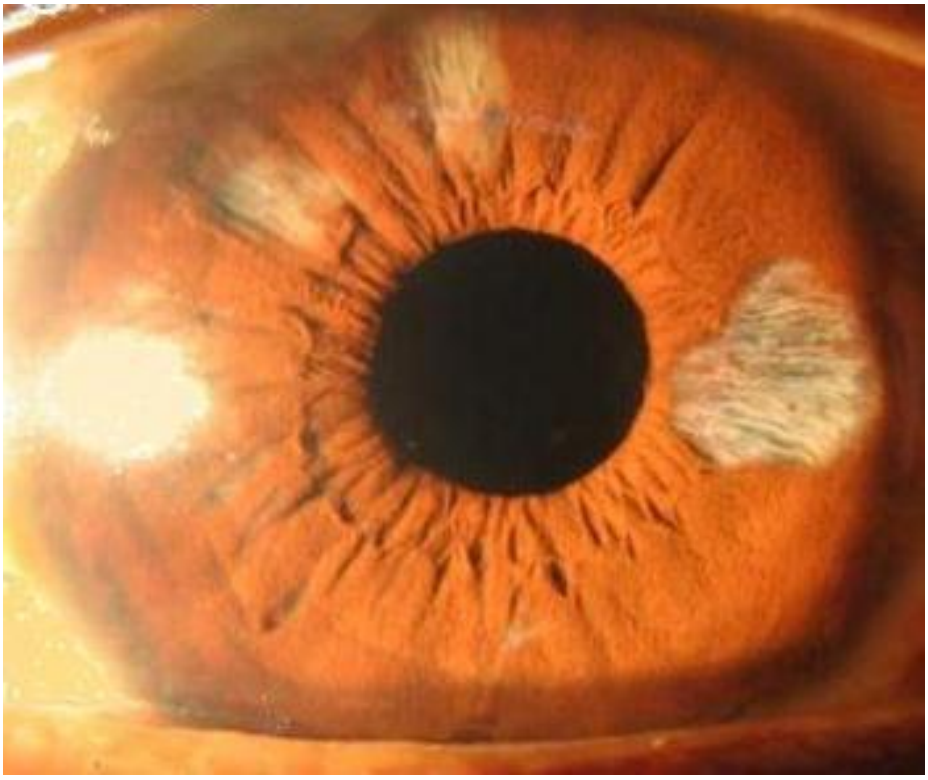
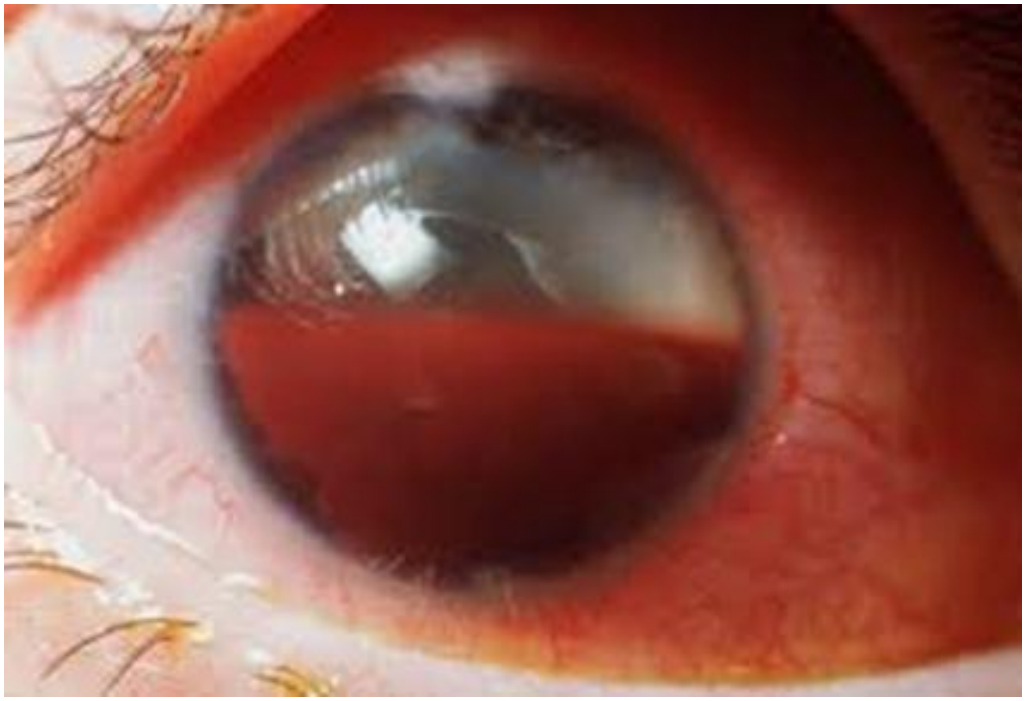


Figure 16. CYSTOID MACULAR EDEMA

Figure 17 IRIS ATROPHY , HYPHEMA





MASTER CHART

GR A - IRIS CLAW IOL **PREOPERATIVE DATA**

							LOGMAR		**LOGMAR**				
SL NO	**NAMES**	**AGE**	**SEX**	**IP NO**	**EYE**	**UCDV**	**UCDV**	**BCDV**	**BCDV**	**UCNV**	**BCNV**	**IOP**	TYPE
7	ABDUL SHARIF	60	M	13451	LE	6/60	+1.0	6/24	+0.6	N60	N9	16	2
30	AMEER JAAN	77	M	994112	LE	HM+	+1.0	6/18	+0.5	N-	N12	16	1
24	BASAMMA	63	F	1006052	LE	CF3M	1.	6/60	+1.0	N-	N36	15	2
19	CHENAPPAREDDY	67	M	983522	RE	CF1M	+1.7	6/12	+0.3	N36	N12	13	2
20	CHINAMMA	67	F	972737	RE	CF2M	+1.7	CF2M	+1.3	N-	N36	12	2
21	CHINAMMA	67	F	990112	RE	CF2M	+1.7	CF5M	+1.07	N36	N24	17	2
6	ERAMMA	60	F	966692	RE	6/60	+1.00	6/18	+0.5	N36	N12	15	2
8	GOBIRAMMA	65	M	964698	RE	6/60	+1.0	6/12	+0.3	N36	N12	13	1
12	GOPALAPPA	34	M	982824	LE	CF 4M	+1.07	6/9	+0.1	N18	N12	18	1
9	GOPALAPPA.T	69	M	1002983	LE	6/60	+1.0	6/60	+1	N12	N6	11	2
2	JULUK BAI	60	F	932073	RE	6/60	+1.00	6/36	+0.7	N36	N12	12	2
25	KRISHNAMMA	65	F	50938	RE	CF4M	+1.07	6/60	+1.0	N-	N36	15	2
27	KRISHNAMMA	65	F	50938	RE	CF5M	+1.07	6/24	+0.6	N36	N24	16	2
22	M.VENKATESHAPPA	63	M	997707	LE	CF2M	+1.7	6/60	+1.0	N-	N60	11	2
1	MUNIYAMMA	50	M	932073	RE	6/36	+0.77	6/12	+0.3	N18	N12	15	1
11	MUNIYAMMA	57	F	982824	RE	CF 2M	+1.7	6/9	+0.1	N-	N36	17	1
17	NANJUNDAPPA	63	M	890506	RE	CF1M	+1.5	6/36	+0.7	N-	N9	12	2
18	PILAPPA	75	M	1002995	LE	CF1M	+1.7	6/36	+0.7	N-	N24	13	2
13	R.VENKATAPPA	75	M	943421	RE	CF 5M	+1.07	6/24	+0.6	N36	N24	13	1
26	RAMANNA	70	M	990095	RE	CF4M	+1.07	CF5M	+1.07	N-	N36	12	1
14	RAYAKKA	60	F	967439	RE	CF 5M	+1.07	6/24	+0.6	N36	N24	11	2
23	SANJEEVAPPA	59	M	990108	RE	CF3M	+1.3	6/24	+0.6	N-	N36	18	1
29	SIDAPPA	70	M	994265	LE	HM+	+1.7	6/36	+0.7	N-	N60	18	2
5	SRINIVASAPPA	65	M	949459	RE	6/60	+1.00	6/24	+0.6	N36	N60	14	2
15	SUBANNA	55	M	994255	RE	CF 5M	+1.07	6/12	+0.3	N60	N12	19	2
3	SUBRAMANI	70	M	934701	LE	6/60	+1.00	6/18	+0.5	N24	N9	11	2
28	SYED BASHA	65	M	1015152	RE	HM	+1.7	CF5M	+1.07	N-	N60	15	2
10	VENKATAMMA	70	F	973365	RE	6/18	+0.5	6/18	+0.5	N12	N9	17	1
16	VENKATAMMA	65	F	978589	RE	CF1M	+1.07	6/36	+0.7	N-	N36	12	2
4	VENKOBA RAO	72	M	947377	LE	6/60	+1.00	6/24	+0.6	N36	N24	17	1

MASTER CHART

GR B - SF IOL

PREOPERATIVE DATA

Sl no	Names	Age	Sex	IP NO	Eye	UCDV	LOGMAR UCDV	BCDV	LOGMAR BCDV	UCNV	BCNV	IOP	TYPE
1	ABDUL RASHID	55	M	721625	RE	CF 5m	1.07	6/12	+0.3	N36	N36	18	2
2	NAGARATNAMMA	50	F	759560	RE	CF 5m	1.07	6/12	+0.3	N36	N36	15	1
3	JAYAMMA	60	F	769184	LE	CF 5m	1.07	6/12	+0.3	N36	N36	16	2
4	CHINNAPPA	70	M	778346	RE	CF 5m	1.07	6/12	+0.3	N24	N24	15	2
5	KRISHNAPPA	70	M	801805	LE	CF 5m	1.07	6/12	+0.3	N24	N24	14	1
6	SHANTHA BAI	65	F	822171	LE	CF 3m	1.3	6/18	+0.5	N-	N24	13	2
7	APPANNA	68	M	772305	RE	6/36	+0.7	6/18	+0.5	N-	N18	15	2
8	SIDDAGANGAMMA	70	F	779024	LE	CF 2m	1.4	6/18	+0.5	N-	N24	18	2
9	MOHAN	66	M	771010	LE	CF 3m	1.3	6/18	+0.5	N24	N24	11	2
10	GURAPPA	70	M	778340	RE	CF 5m	1.07	6/18	+0.5	N36	N36	11	1
11	VENKATASWAMY	65	M	778340	RE	CF 5m	1.07	6/18	+0.5	N-	N18	17	2
12	LAKSHMAMMA	65	F	797109	RE	CF 5m	1.07	=H31	+0.5	N-	N18	13	1
13	SHARADAMMA	65	F	782146	RE	6/60	+1.0	6/24	+0.6	N-	N12	18	1
14	CHINNAPAPAMMA	37	F	819286	RE	6/60	+1.0	6/24	+0.6	N24	N24	12	2
15	DODDAMUNIYAPPA	70	M	819299	RE	6/60	+1.0	6/24	+0.6	N-	N24	13	2
16	RAMAKKA	60	F	821112	RE	CF 5m	1.07	6/24	+0.6	N36	N36	18	1
17	SHANTHA BAI	65	F	822171	LE	6/60	+1.0	6/24	+0.6	N-	N36	13	1
18	KRISHNAMMA	65	F	821116	LE	CF 2m	1.4	6/24	+0.6	N-	N24	11	2
19	NARAYANAMMA	60	F	828415	RE	6/60	+1.0	6/24	+0.6	N24	N24	12	2
20	LAKSHMAMMA	60	F	760846	LE	6/60	+1.0	6/36	+0.7	N-	N36	14	2
21	SEETHAMMA	60	F	832797	LE	CF 1m	1.7	6/36	+0.7	N-	N18	12	2
22	MUNIYAPPA	68	M	839908	RE	6/60	+1.0	6/60	+1	N36	N36	11	1
23	SUBRAMANI	55	M	843698	LE	CF 5m	1.07	6/60	+1	N36	N36	12	1
24	MUNISWAMY	70	M	769163	RE	CF 5m	1.07	6/60	+1	N-	N18	17	2
25	NARAYANAMMA	65	F	771023	LE	CF 3m	1.3	6/60	+1	N36	N36	16	2
26	MUNIVENKATAMMA	60	F	782118	RE	CF 2m	1.4	6/60	+1	N-	N36	12	1
27	RAMAKKA	70	F	824153	RE	6/60	+1.0	CF5M	+1.1	N36	N36	12	2
28	MUTHAMMA	65	F	832805	RE	CF 5m	1.07	CF 5M	1.1	N24	N24	15	1
29	GOPALAPPA	65	M	829911	LE	6/36	+0.7	CF 4M	+1.2	N24	N24	16	2
30	VENKATESHAPPA	63	M	836720	RE	6/60	+1.0	CF 2M	+1.3	N24	N24	12	2

MASTER CHART

		IRIS CLAW IOL						POST OPERATIVE DATA											
SL NO	NAMES	BCDV	LOGMAR	BCNV	BCDV		BCNV	BCDV		BCNV	BCDV		BCNV	BCDV	BCDV	BCNV	IOP	TIME	implantation
	FOLLOW UP	1ST DAY			1ST WEEK			1ST MONTH	log	3RD MONTH		log			log			minutes	
1	ABDUL SHARIF	6/60	+1.00	N18	6/36	+0.77	N12	6/12	+0.3	N12	6/9	+0.1	N8	6/9	+0.1	N10	15	26	2
2	AMEER JAAN	6/24	+0.6	N8	6/24	+0.6	N8	6/9	+0.1	N8	6/9	+0.1	N10	6/9	+0.1	N10	12	12	1
3	BASAMMA	CF 5M	+1.07	N12	6/60	+1.00	N12	6/60	+1.00	N12	6/60	+1.00	N12	6/60	+1.00	N10	12	13	1
4	CHENAPPAREDDY	6/60	+1.00	N12	6/60	+1.00	N12	6/60	+1.00	N12	6/36	+0.77	N18	6/24	+0.6	N12	17	10	2
5	CHINAMMA	6/36	+0.77	N18	6/18	+0.5	N12	6/12	+0.3	N8	6/12	+0.3	N12	6/12	+0.3	N10	12	10	2
6	CHINAMMA	6/12	+0.3	N24	6/12	+0.3	N24	6/9	+0.1	N24	6/9	+0.1	N10	6/9	+0.1	N6	17	10	2
7	ERAMMA	6/12	+0.3	N10	6/12	+0.3	N10	6/9	+0.1	N12	6/9	+0.1	N8	6/9	+0.1	N8	13	12	2
8	GOBIRAMMA	6/24	+0.6	N18	6/18	+0.5	N18	6/18	+0.5	N18	6/12	+0.3	N8	6/12	+0.3	N8	12	10	2
9	GOPALAPPA	6/24	+0.6	N12	6/24	+0.6	N10	6/18	+0.5	N10	6/18	+0.5	N8	6/12	+0.3	N18	14	12	2
10	GOPALAPPA	CF 5M	+1.07	N18	6/60	+1.00	N10	6/60	+1.00	N10	6/60	+1.0	N12	6/36	+0.77	N10	23	9	1
11	JULUK BAI	6/36	+0.77	N12	6/18	+0.5	N10	6/18	+0.5	N10	6/12	+0.3	N12	6/12	+0.3	N12	15	11	1
12	KRISHNAMMA	6/12	+0.3	N8	6/9	+0.1	N8	6/9	+0.1	N8	6/9	+0.1	N10	6/6	0	N8	15	10	2
13	KRISHNAMMA	6/60	+1.00	N24	6/36	+0.77	N18	6/36	+0.77	N18	6/36	+0.77	N12	6/36	+0.77	N8	13	8	1
14	M.VENKATESHAPPA	6/36	+0.77	N10	6/12	+0.3	N10	6/12	+0.3	N10	6/18	+0.5	N24	6/12	+0.3	N24	12	16	1
15	MUNIYAMMA	6/36	+0.77	N18	6/24	+0.6	N12	6/24	+0.6	N10	6/24	+0.6	N12	6/12	+0.3	N10	13	10	2
16	MUNIYAMMA	6/18	+0.5	N12	6/18	+0.5	N12	6/18	+0.5	N12	6/18	+0.5	N10	6/18	+0.5	N8	14	10	2
17	NANJUNDAPPA	6/60	+1.00	N12	6/18	+0.5	N12	6/18	+0.5	N12	6/12	+0.3	N12	6/12	+0.3	N10	14	16	2
18	PILAPPA	6/60	+1.00	N18	6/36	+0.77	N18	6/36	+0.77	N18	6/24	+0.6	N12	6/18	+0.5	N12	12	21	2
19	R.VENKATAPPA	CF5M	+1.07	N8	CF5M	+1.07	N10	CF5M	+1.07	N10	CF5M	+1.07	N18	6/60	+1.00	N10	12	10	1
20	RAMANNA	6/36	+0.77	N18	6/18	+0.5	N12	6/18	+0.5	N10	6/18	+0.5	N12	6/18	+0.5	N10	20	20	2
21	RAYAKKA	6/60	+1.00	N24	6/60	+1.00	N24	6/60	+1.00	N24	6/60	+1.00	N10	6/60	+1.00	N18	16	9	2
22	SANJEEVAPPA	6/36	+0.77	N18	6/24	+0.6	N10	6/24	+0.6	N10	6/12	+0.3	N24	6/9	+0.1	N12	17	8	2
23	SIDAPPA	6/9	+0.1	N12	6/6	0	N8	6/6	0	N8	6/6	0	N8	6/6	0	N8	15	11	2
24	SRINIVASAPPA	6/6	0	N10	6/6	0	N8	6/6	0	N10	6/6	0	N10	6/12	+0.3	N10	16	9	2
25	SUBANNA	6/60	+1.00	N24	6/18	+0.5	N18	6/12	+0.3	N10	6/12	+0.3	N10	6/18	+0.5	N10	19	13	2
26	SUBRAMANI	6/18	+0.5	N12	6/18	+0.5	N18	6/18	+0.5	N18	6/18	+0.5	N10	6/18	+0.5	N10	13	9	2
27	SYED BASHA	6/36	+0.77	N24	6/36	+0.77	N18	6/36	+0.77	N18	6/24	+0.6	N8	6/9	+0.1	N8	14	15	2
28	VENKATAMMA	6/9	+0.1	N10	6/9	+0.1	N10	6/9	+0.1	N12	6/9	+0.1	N8	6/24	+0.6	N6	11	10	1
29	VENKATAMMA	6/60	+1.00	N24	6/18	+0.5	N18	6/18	+0.5	N12	6/18	+0.5	N10	6/6	0	N6	16	15	2
30	VENKOBA RAO	6/9	+0.17	N10	6/9	+0.1	N10	6/6	0	N8	6/6	0	N8	6/6	0	n6	11	15	1

MASTER CHART

	SFIOL PATIENTS				POST OPERATIVE VISUAL ACUITY													surgical	
		Ist DAY			Ist WEEK			I st MONTH			3 rd MONTH			6th MONTH			IOP	TIME REQ	TYPE
SL NO	NAMES	BC DV	LOGMAR	BCNV	BCDV	LOGMAR	BCNV	BCDV	LOG	BCNV	BCDV	LOG	BCNV	BCDV	LOG	BCNV	21	26	1
1	ABDUL RASHID	6/60	1.00	N12	6/60	1.00	N12	6/60	1.00	N12	6/60	1.00	N24	6/24	+0.6	N8	12	21	2
2	APPANNA	6/12	+0.3	N12	6/12	+0.3	N12	6/12	+0.3	N12	6/12	+0.3	N10	6/12	+0.3	N12	14	28	1
3	CHINNAPAPAMMA	CF5M	+1.07	N12	CF5M	+1.07	N12	6/60	+1.0	N12	6/60	+1.0	N8	6/60	+1.0	N10	11	60	2
4	CHINNAPPA	6/36	+0.77	N10	6/36	+0.77	N10	6/36	+0.77	N10	6/24	+0.6	N12	6/12	+0.3	N24	13	23	2
5	DODDAMUNIYAPPA	6/12	+0.3	N10	6/9	+0.1	N10	6/9	+0.1	N10	6/9	+0.1	N18	6/9	+0.1	N12	12	25	1
6	GOPALAPPA	6/18	+0.5	N24	6/12	+0.3	N24	6/12	+0.3	N24	6/36	+0.77	N12	6/12	+0.3	N18	13	30	1
7	GURAPPA	6/60	+1.0	N12	6/36	+0.77	N12	6/36	+0.77	N12	6/36	+0.77	N12	6/36	+0.77	N8	14	17	2
8	JAYAMMA	6/36	+0.77	N12	6/24	+0.6	N12	6/18	+0.5	N12	6/9	+0.17	N10	6/9	+0.17	N12	14	24	2
9	KRISHNAMMA	6/24	+0.6	N10	6/18	+0.5	N10	6/9	+0.1	N10	6/9	+0.1	N24	6/9	+0.1	N10	18	20	2
10	KRISHNAPPA	CF1M	+1.77	N10	CF1M	+1.77	N10	6/60	1.00	N18	6/60	1.0	N24	6/60	1.0	N24	25	20	2
11	LAKSHMAMMA	6/18	+0.5	N10	6/18	+0.5	N10	6/18	+0.5	N10	6/6	0	N10	6/6	0	N18	15	35	2
12	LAKSHMAMMA	6/36	+0.77	N18	6/36	+0.77	N18	6/36	+0.77	N24	6/24	0.6	N10	6/24	+0.6	N18	15	27	2
13	MOHAN	6/18	+0.5	N18	6/18	+0.5	N18	6/6	0	N24	6/6	0	N18	6/6	0	N10	10	28	2
14	MUNISWAMY	6/12	+0.3	N12	6/12	+0.3	N12	6/9	+0.17	N12	6/9	+0.17	N10	6/6	0	N18	18	26	2
15	MUNIVENKATAMMA	6/9	+0.17	N12	6/9	+0.17	N12	6/9	+0.17	N12	6/9	+0.17	N18	6/6	0	N12	16	40	2
16	MUNIYAPPA	6/18	+0.5	N10	6/12	+0.3	N10	6/12	+0.3	N10	6/12	+0.3	N8	6/12	+0.3	N8	13	28	1
17	MUTHAMMA	6/60	+1.0	N8	6/60	+1.0	N10	6/24	+0.6	N10	6/24	+0.6	N12	CF2M	1.47	N12	16	21	1
18	NAGARATNAMMA	6/12	+0.3	N8	6/12	+0.3	N8	6/12	+0.3	N8	6/12	+0.3	N24	6/12	+0.3	N10	15	36	1
19	NARAYANAMMA	6/24	+0.6	N8	6/12	+0.3	N8	6/12	+0.3	N8	6/18	+0.5	N18	6/12	+0.3	N10	13	26	1
20	NARAYANAMMA	6/60	+1.0	N24	6/60	+1.0	N24	6/60	+1.0	N24	6/60	+1.0	N18	6/36	+0.77	N10	14	27	2
21	RAMAKKA	6/12	+0.3	N18	6/18	+0.5	N18	6/12	+0.3	N18	6/12	+0.3	N10	6/12	+0.3	N24	14	18	1
22	RAMAKKA	6/18	+0.5	N18	6/18	+0.5	N18	6/18	+0.5	N18	6/18	+0.5	N12	6/18	+0.5	N24	16	40	2
23	SEETHAMMA	6/60	+1.0	N12	6/60	+1.0	N12	6/60	+1.0	N12	6/12	+0.3	N24	6/12	+0.3	N24	14	24	2
24	SHANTHA BAI	6/24	+0.6	N18	6/18	+0.5	N18	6/18	+0.5	N18	6/36	+0.77	N12	6/60	+1.0	N10	15	35	1
25	SHANTHA BAI	6/60	+1.0	N12	6/60	+1.0	N12	6/60	+1.0	N12	6/60	+1.0	N24	6/60	+1.0	N18	17	35	2
26	SHARADAMMA	6/36	+0.77	N18	6/24	+0.6	N18	6/24	+0.6	N18	6/24	+0.6	N24	6/24	+0.6	N24	14	30	2
27	SIDDAGANGAMMA	6/36	+0.77	N8	6/36	+0.77	N8	6/12	+0.3	N8	6/12	+0.3	N18	6/24	+0.6	N18	12	22	2
28	SUBRAMANI	6/12	+0.3	N24	6/9	+0.17	N24	6/6	0	N24	6/9	+0.17	N24	6/9	+0.17	N12	13	23	2
29	VENKATASWAMY	6/36	+0.77	N18	6/12	+0.3	N18	6/12	+0.3	N18	6/24	+0.6	N24	6/9	+0.17	N12	13	30	1
30	VENKATESHAPPA	6/18	+0.5	N12	6/18	+0.5	N12	6/18	+0.5	N12	6/18	+0.5	N18	6/18	+0.5	N12	12	30	1

MASTER CHART

SL NO	GR A NAMES	AGE	SEX	IP NO	BCDV	BCNV	SK	H	V in AC	Iritis	SG	CME	T- IOL	S-IOL/DE	SE	RD	Others
					FIRST DAY A COMPLICATIONS												
1	JULUK BAI	60	F	932073	6/12	N10	-	-	-	-	-	-	-	-	-	-	-
2	SUBRAMANI	70	M	934701	CF 5M	N12	-	-	-	-	-	-	-	-	-	-	-
3	R.VENKATAPPA	75	M	943421	6/36	N18	-	-	-	Y	-	-	-	-	-	-	-
4	VENKOBA RAO	72	M	947377	6/60	N24	-	-	-	-	-	-	-	-	-	-	-
5	SRINIVASAPPA	65	M	949459	CF 5M	N18	-	-	-	-	-	-	-	-	-	-	-
6	MUNIYAMMA	50	M	846758	6/60	N24	Y	-	-	+	-	-	-	-	-	-	-
7	ERAMMA	60	F	966692	6/9	N10	-	-	-	-	-	-	-	-	-	-	-
8	CHINAMMA	67	F	972737	6/9	N10	-	-	-	-	-	-	-	-	-	-	-
9	RAYAKKA	60	F	967439	6/9	N12	-	-	-	-	-	-	-	-	-	-	-
10	VENKATAMMA	65	F	973365	6/12	N24	-	-	-	-	-	-	-	-	-	-	-
11	GOPALAPPA	34	M	982824	6/60	N12	Y	-	-	-	-	-	-	-	-	-	-
12	CHINAMMA	67	F	990112	6/36	N12	-	-	-	-	-	-	-		-	-	-
13	ABDUL SHARIF	60	M	13451	6/18	N12	-	-	-	-	-	-	-	-	-	-	-
14	KRISHNAMMA	65	F	50938	6/60	N12	-	-	-	-	-	-	-	-	-	-	-
15	GOBIRAMMA	65	M	964698	6/12	N8	Y	-	-	-	--	-	-	-	-	-	-
16	NANJUNDAPPA	63	M	890506	6/6	N10	-	-	-	-	-	-	-	-	-	-	-
17	SIDAPPA	70	M	994265	6/60	N18	Y	-	-	Y	-	-	-	-	-	-	-
18	SUBANNA	55	M	994255	6/36	N10	Y	-	-	-	-	-	-	-	-	-	-
19	MUNIYAMMA	57	F	774285	6/24	N12	-	-	-	-	-	-	-	-	-	-	-
20	M.VENKATESHAPPA	63	M	997707	6/36	N18	-	-	-	-	-	-	-	-	-	-	-
21	PILAPPA	75	M	1002995	6/36	N24	-	-	-	Y	-	-	-	-	-	-	-
22	GOPALAPPA	60	M	1002983	6/36	N18	-	-	-	-	-	-	-	-	-	-	-
23	AMEER JAAN	77	M	994112	6/60	N24	-	-	-	Y	-	-	-	-	-	-	-
24	SYED BASHA	65	M	1015152	6/18	N12	-	-	-	-	-	-	-	-	-	-	-
25	RAMANNA	70	M	990095	6/24	N8	Y	-	-	-	-	-	-	-	-	-	-
26	SANJEEVAPPA	59	M	990108	6/36	N18	Y	-	-	-	-	-	-	-	-	-	-
27	VENKATAMMA	70	F	978589	6/60	N24	-	-	-	-	-	-	-	-	-	-	-
28	CHENAPPAREDDY	67	M	983522	6/60	N18	-	-	Y	Y	-	-	Y	Y	-	-	-
29	KRISHNAMMA	65	F	50938	CF5M	N10	Y	-	-	Y	-	-	-	-	-	-	-
30	BASAMMA	63	F	1006052	6/24	N18	-	-	-	-	-	-	-	-	-	-	-

SL NO	BCDV	BCNV	BCDV	BCNV	SK	H	V in AC	Iritis	SG	CME	T- IOL	S-IOL	SE	RD	Others	BCDV	BCNV	SK	H	V IN AC	IRITIS	SG	CME	T-IOL	SIOL	SR	RD	OTHERS
			FIRST WEEK																		FIRST MONTH							
1	6/12	N10	-	-	-	-	-	-	-	-	-	-	-	-		6/9	N12	-	-	-	-	-	-	-	-	-	-	-
2	6/60	N12	-	-	-	-	-	-	-	-	-	-	-	-		6/60	N12	-	-	-	-	-	-	-	-	-	-	-
3	6/18	N12	-	-	-	+	-	+	-	-	-	-	-	-		6/12	N8	-	-	-	-	-	-	-	-	-	-	-
4	6/18	N18	-	-	-	-	-	-	-	-	-	-	-	-		6/12	N10	-	-	-	-	-	-	-	-	-	-	-
5	6/60	N10	-	-	-	-	-	-	-	-	-	-	-	-		6/60	N10	-	-	-	-	-	-	-	Y	-	-	-
6	6/18	N18	Y	-	-	-	-	-	-	-	-	-	-	-		6/18	N12	-	-	-	-	-	-	-	-	-	-	-
7	6/9	N10	-	-	-	-	-	-	-	-	-	-	-	-		6/9	N12	-	-	-	-	-	-	-	-	-	-	-
8	6/9	N10	-	-	-	-	-	-	-	-	-	-	-	-		6/6	N8	-	-	-	-	-	-	-	-	-	-	-
9	6/6	N8	-	-	-	-	-	-	-	-	-	-	-	-		6/6	N8	-	-	-	-	-	-	-	-	-	-	-
10	6/12	N24	-	-	-	-	-	-	-	-	-	-	-	-		6/9	N24	-	-	-	-	-	-	-	-	-	-	-
11	6/60	N12	Y	-	-	-	-	-	-	-	-	-	-	-		6/36	N12	-	-	-	-	-	-	-	-	-	-	-
12	6/18	N10	-	-	-	-	-	-	-	-	-	-	-	-		6/18	N10	-	-	-	-	-	-	-	-	-	-	-
13	6/18	N18	-	-	-	-	-	-	-	-	-	-	-	-		6/18	N18	-	-	-	-	-	-	-	-	-	-	-
14	6/18	N12	-	-	-	-	-	-	-	-	-	-	-	-		6/18	N12	-	-	-	-	-	-	-	-	-	-	-
15	6/9	N8	Y	-	-	-	--	-	-	-	-	-	-	-		6/9	N8	-	-	-	-	--	-	-	-	-	-	-
16	6/6	N8	-	-	-	-	-	-	-	-	-	-	-	-		6/6	N10	-	-	-	-	-	-	-	-	-	-	-
17	6/36	N12	Y	-	-	Y	-	-	-	-	-	-	-	-		6/36	N12	Y	-	-	YY	-	-	-	-	-	-	-
18	6/12	N10	-	-	-	-	-	-	-	-	-	-	-	-		6/12	N10	-	-	-	-	-	-	-	-	-	-	-
19	6/24	N10	-	-	-	-	-	-	-	-	-	-	-	-		6/18	N10	-	-	-	-	-	-	-	-	-	-	-
20	6/24	N12	-	-	-	-	+	-	-	-	-	-	-	-		6/24	N10	-	-	-	-	-	-	-	-	-	-	-
21	6/36	N18	-	-	-	-	-	-	-	-	-	-	-	-		6/36	N18	-	-	-	-	-	-	-	-	-	-	-
22	6/18	N12	-	-	-	-	-	-	-	-	-	-	-	-		6/18	N10	-	-	-	-	-	-	-	-	-	-	-
23	6/36	N18	-	-	-	Y	-			-	-	-	-	-		6/36	N18	-	-	-	-	-	-	-	-	-	-	-
24	6/18	N12	-	-	-	-	-	-	-	-	-	-	-	-		6/18	N12	-	-	-	-	-	-	-	-	-	-	-
25	6/24	N8	Y	-	-	-	-	-	-	-	-	-	-	-		6/9	N8	-	-	-	-	-	-	-	-	-	-	-
26	6/24	N10	Y	+	-	-	-	-	-	-	-	-	-	-		6/24	N10	-	-	-	-	-	-	-	-	-	-	-
27	6/60	N24	-	+	-	-	-	-	-	-	-	-	-	-		6/60	N24	-	-	-	-	-	-	-	-	-	-	-
28	6/36	N18	Y	-	-	Y	-	-	-	-	-	-	-	-		6/36	N18	-	-	-	-	-	-	-	-	-	-	-
29	CF5M	N10	-	-	-	-	-	-	-	-	-	-	-	-		CF5M	N10	Y	-	-	-	Y	-	-	-	-	-	-
30	6/18	N18	-	-	-	-	-	-	-	-	-	-	-	-		6/18	N18	-	-	-	-	-	-	-	-	-	-	-

SL NO	BCDV	BCNV	SK	H	V IN AC	IRITIS	SG	CME	TIOL	SIOL	SR	RD	OTHERS	BCDV	BCNV	SK	H	V IN AC	IRITIS	SG	CME	TIOL	SIOL	SR	RD
						THIRD MONTH														SIXTH MONTH					
1	6/9	N8	-	-	-	-	-	-	-	-	-	-	-	6/9	N10	-	-	-	-	-	-	-	-	-	-
2	6/60	N10	-	-	-	-	-	-	-	-	-	-	-	6/60	N18	-	-	-	-	-	-	-	-	-	-
3	6/12	N8	-	-	-	-	-	-	-	-	-	-	-	6/12	N18	-	-	-	-	-	-	-	-	-	-
4	6/12	N12	-	-	-	-	-	-	-	-	-	-	-	6/12	N10	-	-	-	-	-	-	-	-	-	-
5	6/60	N12	-	-	-	-	-	-	-	-	-	-	-	6/60	N10	-	-	-	-	-	-	-	-	-	-
6	6/18	N18	-	-	-	-	-	-	-	-	-	-	-	6/24	N12	-	-	-	-	-	-	-	-	-	-
7	6/9	N8	-	-	-	-	-	-	-	-	-	-	-	6/9	N8	-	-	-	-	-	-	-	-	-	-
8	6/6	N8	-	-	-	-	-	-	-	-	-	-	-	6/6	N8	-	-	-	-	-	-	-	-	-	-
9	6/6	N10	-	-	-	-	-	-	-	-	-	-	-	6/6	N6	-	-	-	-	-	-	-	-	-	-
10	6/9	N24	-	-	-	-	-	-	-	-	-	-	-	6/9	N12	-	-	-	-	-	-	-	-	-	-
11	6/36	N12	-	-	-	-	-	-	-	-	-	-	-	6/36	N8	-	-	-	-	-	-	-	-	-	-
12	6/12	N12	-	-	-	-	-	-	-	-	-	-	-	6/12	N10	-	-	-	-	-	-	-	-	-	-
13	6/18	N10	-	-	-	-	-	-	-	-	-	-	-	6/18	N10	-	-	-	-	-	-	-	-	-	-
14	6/12	N24	-	-	-	-	-	-	-	-	-	-	-	6/12	N24	-	-	-	-	-	-	-	-	-	-
15	6/9	N8	-	-	-	-	--	-	-	-	-	-	-	6/9	N8	-	-	-	--	-	-	-	-	-	-
16	6/6	N10	-	-	-	-	-	-	-	-	-	-	-	6/6	N8	-	-	-	-	-	-	-	-	-	-
17	6/9	N10	Y	-	-	YY	-	-	-	-	-	-	-	6/9	N10	Y	-	-	YY	-	-	-	-	-	-
18	6/18	N12	-	-	-	-	-	-	-	-	-	-	-	6/12	N10	-	-	-	-	-	-	-	-	-	-
19	6/18	N10	-	-	-	-	-	-	-	-	-	-	-	6/18	N8	-	-	-	-	-	-	-	-	-	-
20	6/24	N10	-	-	-	-	-	-	-	-	-	-	-	6/12	N10	-	-	-	-	-	-	-	-	-	-
21	6/24	N8	-	-	-	-	-	-	-	-	-	-	-	6/24	N6	-	-	-	-	-	-	-	-	-	-
22	6/18	N10	-	-	-	-	-	-	-	-	-	-	-	6/18	N10	-	-	-	-	-	-	-	-	-	-
23	6/36	N12	-	-	-	-	-	-	-	-	-	-	-	6/36	N10	-	-	-	-	-	-	-	-	-	-
24	6/18	N12	-	-	-	-	-	-	-	-	-	-	-	6/18	N12	-	-	-	-	-	-	-	-	-	-
25	6/9	N10	-	-	-	-	-	-	-	-	-	-	-	6/9	N6	-	-	-	-	-	-	-	-	-	-
26	6/12	N8	-	-	-	-	-	-	-	-	-	-	-	6/12	N8	-	-	-	-	-	-	-	-	-	-
27	6/60	N18	-	-	-	-	-	-	-	-	-	-	-	6/60	N10	-	-	-	-	-	-	-	-	-	-
28	6/24	N12	-	-	-	-	-	-	-	-	-	-	-	6/18	N10	-	-	-	YY	-	-	-	-	-	-
29	CF5M	N10	Y	-	-	-	Y	-	-	-	-	-	-	CF5M	N6	Y	-	-	-	Y	-	-	-	-	-
30	6/12	N12	-	-	-	-	-	-	-	-	-	-	-	6/12	N12	-	-	-	-	-	-	-	-	-	-

MASTER CHART

POSTOPERATIVE COMPLICATIONS

					1ST POSTOP DAY				1ST POSTOP DAY								1 Wk 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	H	V in AC	Iritis	SG	CME	T-IOL	S-IOL	SE	RD	others	SK	H	V in AC	Iritis	SG	CME	T- IOL	S-IOL	SR	RD	Others	SK	H	V in AC	Iritis	SG	CME	T- IOL	S-IOL	SR	RD	Others	SK	H	V in AC	Iritis	SG	CME	T- IOL	S-IOL	SR	RD	Others	SK	H	V in AC	Iritis	SG	CME	T- IOL	S-IOL/DE	SR	RD	Others
1	ABDUL RASHID	55	M	721625	-	-	–	Y	–	–	–	–	–	–	–	Y	–	–	Y	–	–	–	–	–	–	–	Y	–	–		Y	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7	APPANNA	68	M	772305	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
14	CHINNAPAPAMMA	37	F	819286	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4	CHINNAPPA	70	M	778346	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
15	DODDAMUNIYAPPA	70	M	819299	–	Y	–	–	–	-	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
29	GOPALAPPA	65	M	829911	Y	–	–	Y	-	–	–	–	–	–	–	–	–	–	Y	-	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
10	GURAPPA	70	M	778340	–	–	–	Y	–	–	-	Y	Y	–	–	–	–	–	Y	–	–	-	Y	Y	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	-	–	-	–	–	–	–
3	JAYAMMA	60	F	769184	–	-	–	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
18	KRISHNAMMA	65	F	821116	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5	KRISHNAPPA	70	M	801805	Y	Y	–	–	–	–	–	–	–	–	–	Y	Y	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
12	LAKSHMAMMA	65	F	797109	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
20	LAKSHMAMMA	60	F	760846	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
9	MOHAN	66	M	771010	Y	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
24	MUNISWAMY	70	M	769163	–	-	–	Y	–	–	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
26	MUNIVENKATAMMA	60	F	782118	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
22	MUNIYAPPA	68	M	839908	–	–	–	–	-	-	–	–	–	–	–	–	–	–	–	-	-	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
28	MUTHAMMA	65	F	832805	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	NAGARATNAMMA	50	F	759560	–	–	–	–	–	–	-	–	-	–	–	–	–	–	–	–	–	Y	–		–	–	–	–	–	–	Y	–		–	–	–	–	–	–	–	–	+	–	–	–	–		–	Y	–	–	–	–
19	NARAYANAMMA	60	F	828415	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
25	NARAYANAMMA	65	F	771023	Y	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
16	RAMAKKA	60	F	821112	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
27	RAMAKKA	70	F	824153	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
21	SEETHAMMA	60	F	832797	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6	SHANTHA BAI	65	F	822171	–	–	–	–	-		–	–	–	–	–	–	–	–	–	-	-	–	–	–	–	–	–	–	–	–	Y	-	–	–	–	–	–	–	–	–	–	Y	Y	–	–	–	–	–	–	–	–	Y	–	–	–	–	Y
17	SHANTHA BAI	65	F	822171	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
13	SHARADAMMA	65	F	782146	Y	–	–	Y	–	–	–	–	–	–	–	Y	–	–	-	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Y	–	-
8	SIDDAGANGAMMA	70	F	779024	Y	-	–	Y	–	-	–	–	–	–	–	Y	–	–	Y	–	-	–	–	–	–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Y	–	-
23	SUBRAMANI	55	M	843698	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
11	VENKATASWAMY	65	M	778340	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	-	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
30	VENKATESHAPPA	63	M	836720	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–