"CLINICAL OUTCOME OF MANUAL SMALL INCISION CATARACT SURGERY IN SMALL PUPIL"

By

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Dissertation submitted to

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

In partial fulfilment of the requirements for the degree of

MASTER OF SURGERY

IN
OPHTHALMOLOGY

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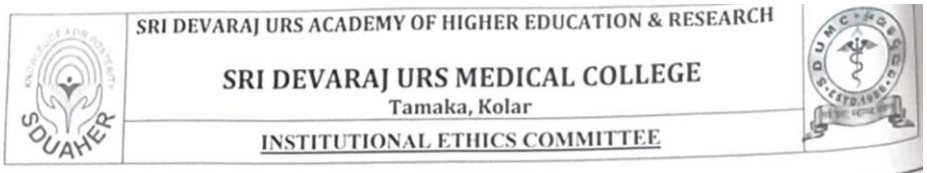

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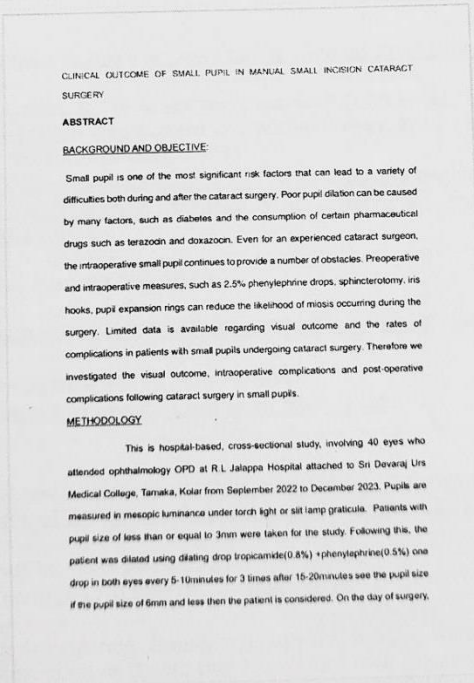

CLINICAL OUTCOME OF SMALL PUPIL IN MANUAL SMALL INCISION CATARACT SURGERY

ABSTRACT

BACKGROUND AND OBJECTIVE:

Small pupil is one of the most significant risk factors that can lead to a variety of difficulties both during and after the cataract surgery. Poor pupil dilation can be caused by many factors, such as diabetes and the consumption of certain pharmaceutical drugs such as terazocin and doxazocin. Even for an experienced cataract surgeon, the intraoperative small pupil continues to provide a number of obstacles. Preoperative and intraoperative measures, such as 2.5% phenylephrine drops, sphincterotomy, iris hooks, pupil expansion rings can reduce the likelihood of miosis occurring during the surgery. Limited data is available regarding visual outcome and the rates of complications in patients with small pupils undergoing cataract surgery. Therefore we investigated the visual outcome, intraoperative complications and post-operative complications following cataract surgery in small pupils.

METHODOLOGY

This is hospital-based, cross-sectional study, involving 40 eyes who attended ophthalmology OPD at R.L Jalappa Hospital attached to Sri Devaraj Urs Medical College, Tamaka, Kolar from September 2022 to December 2023. Pupils are measured in mesopic luminance under torch light or slit lamp graticule. Patients with pupil size of less than or equal to 3mm were taken for the study. Following this, the patient was dilated using dilating drop tropicamide(0.8%) +phenylephrine(0.5%) one drop in both eyes every 5-10minutes for 3 times after 15-20minutes see the pupil size if the pupil size of 6mm and less then the patient is considered. On the day of surgery,

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LIST OF ABBREVATIONS

ECCE- Extra Capsular Cataract Extraction	BPH-Benign prostatic hyperplasia
MSICS-Manual small incision cataract surgery	POD-Postoperative day
PCIOL- Posterior Chamber Intra Ocular Lens	VA-visual acuity
DM-Descemet's membrane	CF-counting fingers
PCR- Posterior capsular rent	PCO-Posterior capsular opacification
PXF-Pseudoexfoliation	p – Probability
SP- Small pupil	< - Less than
IFIS-Intraoperative floppy iris syndrome	> - More than
IOP- Intra Ocular Pressure	UCVA-Uncorrected visual acuity BCVA-Best corrected visual acuity
OVD-Ocular viscoelastic device	CCC- Continuous curvilinear Capsulorrhexis
SPSS-Statistical package for social sciences	ACM – Anterior chamber maintainer
HM-Hand movements	BSS- Balanced salt solution
PL-Perception of light	AC-Anterior chamber
PMMA- Polymethyl methacrylate	IOL- Intra Ocular Lens
AL - Axial length	NSAIDS- Non-steroidal anti-inflammatory drugs

ABSTRACT

Background and Objective

Small pupil is one of the most significant risk factors that can lead to a variety of difficulties both during and after the cataract surgery. Poor pupil dilation can be caused by many factors, such as diabetes and the consumption of certain pharmaceutical drugs such as terazocin and doxazocin. Even for an experienced cataract surgeon, the intraoperative small pupil continues to provide a number of obstacles. Preoperative and intraoperative measures, such as 2.5% phenylephrine drops, sphincterotomy, iris hooks, pupil expansion rings can reduce the likelihood of miosis occurring during the surgery. Limited data is available regarding visual outcome and the rates of complications in patients with small pupils undergoing cataract surgery. Therefore we investigated the visual outcome, intraoperative complications and post-operative complications following cataract surgery in small pupils.

METHODOLOGY

This is hospital-based, cross-sectional study, involving 40 eyes who attended ophthalmology OPD at R.L Jalappa Hospital attached to Sri Devaraj Urs Medical College, Tamaka, Kolar from September 2022 to December 2023. Pupils are measured in mesopic luminance under torch light or slit lamp graticule. Patients with pupil size of less than or equal to 3mm were taken for the study. Following this, the patient was dilated using dilating drop tropicamide(0.8%) +phenylephrine(0.5%) one drop in both eyes every 5-10minutes for 3 times after 15-20minutes see the pupil size if the pupil size of 6mm and less then the patient is considered. On the day of surgery, patient is dilated half an hour before the surgery. And operation is done by single surgeon intraoperative complications while operating like Posterior capsular rent, iris trauma, difficulty in delivering the nucleus are noted. If complications while delivering the nucleus to anterior chamber are anticipated

phenylephrine(2.5%)is used, if dilation is not adequate 2%viscoelastic is used even after this if pupil fails to expand sphincterotomy is done. Postoperative visual outcome is assessed on the 1st, 7th and 30th postoperative day.

RESULTS

We examined 40 patients in total who is undergoing MSICS with small pupils. Majority of patients were aged between 61-70 years, comprising 47.5% of the sample, followed by those over 71 years (35.0%), and the smallest group being those aged 50-60 years (17.5%). Gender distribution was fairly even, with 52.5% female and 47.5% male patients.

Pre-operative visual acuity varied, with the most common category being counting fingers close to face (CF CF) observed in 27.5% of patients. Other notable pre-operative visual acuities included 1/60-2/60 in 17.5% of patients and counting fingers at 2 meters (CF 2mt) in 15.0% of patients.

Regarding pupil size, before dilation, the majority of patients (77.5%) had a pupil size of 3 mm, while 22.5% had a pupil size of 2 mm. Post-dilation, the most common pupil size was 5 mm (47.5%), followed by 4 mm (32.5%), 6 mm (15.0%), and 3 mm (5.0%).

Intraoperative complications were notable, with trauma to iris (microbleeds, sphincter tears, iris chafing) occurring in 27.5% of cases and posterior capsule rupture (PC rent) in 28.0% of cases. Difficulty in delivering the nucleus was encountered in 12.5% of surgeries.

Postoperative slit lamp examinations on day 1 revealed that 42.5% of patients experienced corneal edema, while Descemet's membrane folds (DM folds) were observed in 27.5% of patients. Anterior chamber (AC) reaction was noted in 10.0%, and 7.5% of patients had clear findings.

Visual acuity outcomes showed that on postoperative day 1, the most common uncorrected visual acuity was 6/24 (22.5%), with 15.0% of patients achieving 6/60 and hand movements

(HM) vision. On postoperative day 7, 25.0% of patients achieved BCVA of 6/6 vision, followed by 20.0% with 6/12 and 17.5% with 6/18. By postoperative day 30, the most common best corrected visual acuity was 6/6 (30.0%), with 32.5% of patients achieving 6/9 and 25.0% achieving 6/12.

Statistical analysis revealed significant associations between intraoperative events, postoperative visual acuity, and pupil size after dilation. Difficulty in delivering the nucleus was significantly associated with smaller pupil sizes ($p = 0.03$). Furthermore, postoperative visual acuity on day 1 showed a statistically significant association with pupil size after dilation (Chi-Square: 56.42, P Value: 0.007).

CONCLUSION AND INTERPRETATION:

Small pupil presents significant challenges, particularly in intraoperative complications like PC rent, iris trauma, and many more. Despite these challenges study shows the importance of meticulous surgical technique and careful management which can lead to favourable visual outcomes. There was significant associations found between small pupil size and increased surgical difficulty. Through tailored approach, we were able to reach maximum visual acuity of 6/6 in most of patients.

Key words-small pupil, visual outcome, intraoperative events , MSICS

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INTRODUCTION

INTRODUCTION

The cataract is the most prevalent cause of blindness that can be reversed all over the world. As a result of cataracts, it is estimated that seventy-five percent of preventable blindness occurs.[1] Surgery to remove cataracts is one of the most popular types of ocular treatments carried out all around the world. [2] Ever since Kelman introduced the concept of phacoemulsification in 1967, cataract surgery has been on a never-ending quest of discovering new techniques and enhancing existing ones. [3] In manual small incision cataract surgery (MSICS), the size wound in surgery has decreased from 12 by intracapsular surgery to 10 millimeters by extracapsular surgery to 6–8 millimeters in MSICS[3]. The introduction of phacoemulsification resulted in a further drastic reduction, bringing the range of 2.2–2.8 mm. [4] Early wound healing, less astigmatism, faster postoperative visual recovery, and a lesser infection rates, are some of the benefits that can be gained from using smaller incision sizes. [5]

When it comes to cataract surgery, the size of the pupil is one of the most essential factors. It is easier to do cataract surgery when the pupil is fully dilated. This also reduces the probability of complications occurring during the procedure. However, it is important to keep in mind that there are a number of reasons that contribute to poor pupil dilation. These factors include, systemic disorders, Intake of certain pharmacological drugs, ocular problems (such as glaucoma, trauma, ocular surgery in past, uveitis), and these eyes are often more prone to increased permeability of the blood aqueous barrier, which ultimately results in postoperative inflammation.[6-8]

Mydriatic medicines will act on dilator muscles (adrenergic agonists) or block the sphincter muscles (cholinergic blockers) in order to cause the pupil to dilate. Increased dilator activity is a consequence of adrenergic drugs. It is possible that inadequate dilating drops, improper administration technique, or medication that has expired could be the cause of insufficient dilation in a few different situations. [9]

The intraoperative floppy iris syndrome (IFIS), and pseudoexfoliation syndrome (PXF) are examples of common comorbidities that have been documented in individuals who have small pupils (SPs). In order to treat patients with IFIS or PXF, as well as individuals with smaller pupils, procedures that involve dilatation of the pupil have been utilised. A variety of methods are included in this category, including viscomydriasis, iris hooks and retractors, Malyugin dilator rings, and topical and intracameral mydriatics. In addition to their role as sympathomimetics (phenylephrine), topical mydriatics can also perform the function of anticholinergic drugs (tropicamide or cyclopentolate). The mydriatic effect of phenylephrine and tropicamide when used together is significantly stronger than the action of either drug when used separately. [10] Intraoperatively increasing the size of the pupils can be accomplished with the use of mechanical dilation procedures such as hooks and rings, which manipulates the pupil. The diameter of the pupil can also be increased with the use of viscomydriasis, which eliminates the requirement for further pupil expansion equipment.[11]

Need for the study

In cataract surgery, a small pupil is one of the most significant risk factors that can lead to a variety of difficulties both during and after the procedure. It is possible for iris damage, loss of vitreous, tear in capsule, increased inflammation, change in shape of pupil, posterior capsular rent, and retained lens material may occur as a consequence of poor pupillary dilatation[1]. Even for the most experienced cataract surgeon, the intraoperative small pupil continues to provide a number of obstacles. In order to reduce the likelihood of miosis occurring during surgery, there are a number of measures that can be done both before and during the procedure. These include sphincterotomy, iris hooks, pupil expansion rings, visco, and 2.5 percent phenylephrine drops.[13] It is difficult to find a significant amount of information regarding visual outcomes and the rates of complications in patients with small

pupils who are undergoing cataract surgery. This study looked into the visual outcome of small pupils during and after surgery, as well as the rates of complications that occurred during and after surgery.

AIMS & OBJECTIVES

OBJECTVES OF STUDY

- To study visual outcome of small pupil in cataract surgery.
- To assess intraoperative complications during cataract surgery of patients with small pupil.
- To assess postoperative complications of patients with small pupil

REVIEW OF LITERATURE

REVIEW OF LITERATURE

MSICS is expanded as “manual small incision cataract surgery”, is an advancement of ECCE, which stands for “extracapsular cataract extraction”. In MSICS, the lens removal is done through a scleral tunnel wound which seals by itself. A scleral tunnel that has been created correctly is impermeable, does not require suturing, and is closed by the pressure that is generated within. The wound is far larger than a phacoemulsification wound, despite the fact that it is significantly smaller than the wound that occurs in ECCE. The results of clinical trials comparing MSICS to phaco in the treatment of dense cataracts did not reveal a statistically significant difference in outcomes; nevertheless, MSICS experienced much lower costs and required significantly less time to perform. Because of its ability to produce best visual outcomes with minimal surgically caused astigmatism than ECCE, as well as minimal suture-related difficulties, rapid rehabilitation, and fewer post-operative visits, MSICS is current most performed surgery in present world. In addition, it is applicable to practically all forms of cataracts, MSICS is easier to learn for budding surgeons.[14]

CATARACT EVALUATION

IOP:[15]

The intraocular pressure, often known as IOP, is an essential measurement that needs to be performed to each and every patient who is going to undergo cataract surgery. There are two primary categories that can be distinguished amongst these devices on the basis of their operating methodology: Tonometers that measure indentation and applanation are the first two types.

Indentation Tonometry

The Schiotz is the prototype of the indentation tonometers that are currently in use. A plunger that is loaded with varying weights is used to make an indentation in the cornea. Depending

on the depth of the indentation, the IOP is calculated. Each unit of measurement is represented by a protrusion of 0.05 millimeters on the plunger, which is displayed on a scale that ranges from 0 to 20 units. The results are displayed on this scale. Utilising a conversion scale, the value that is displayed on the handle needs to be converted into millimeters

It is currently believed that "applanation tonometers" are the most trustworthy tools for obtaining an accurate measurement of intraocular pressure (IOP). Hans Goldmann is credited with being the inventor of the Goldmann applanation tonometer (GAT), which was initially developed in 1948 and is today regarded as the golden standard. They make use of the Imbert–Fick law, which includes the following equation: P = F/S, where P is pressure, S is the surface of the region that is being flattened, and F is the force that is required to flatten a corneal area that is fixed.

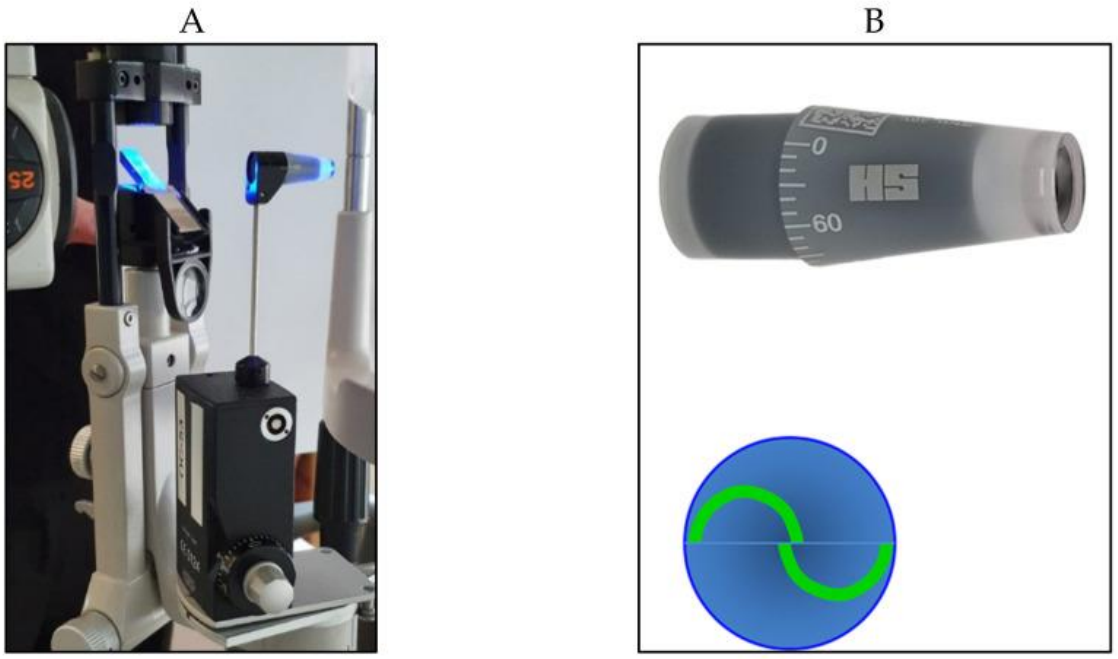


Fig 1:a.Goldmann applanation tonometer[15] b.horizontal "S" formation[15]

A blue light is used to illuminate a truncated cone that has a surface area of 7.35 mm2 and a diameter of 3.06 mm. This cone is pressed on the center of the cornea that has been surgically anesthetized. To get a precise and standardised applanation, the circular meniscus that is located on the surface of the flattened cornea is divided into two arcs by a doubling prism that

is inserted within the cone. These arcs need to be aligned in order to achieve the desired result. [15]

KERATOMETRY[16]

The Bausch and Lomb Keratometer is a very helpful instrument for measuring corneal astigmatism and diagnosing anomalies in curvature

Anterior cornea's dioptric curvature and corneal surface quality can both be assessed using a keratometer. It's crucial to keep in mind that the keratometric reflections cover only narrow region (3.0 to 3.5 milli meter) and not accurately depict corneal curvature.

Therefore, despite the fact that the keratometer only assesses a small, defined area, nearby central pathology has a considerable impact on the regularity of the mires.

The assessment of mires to be evaluated prior to each K-reading.

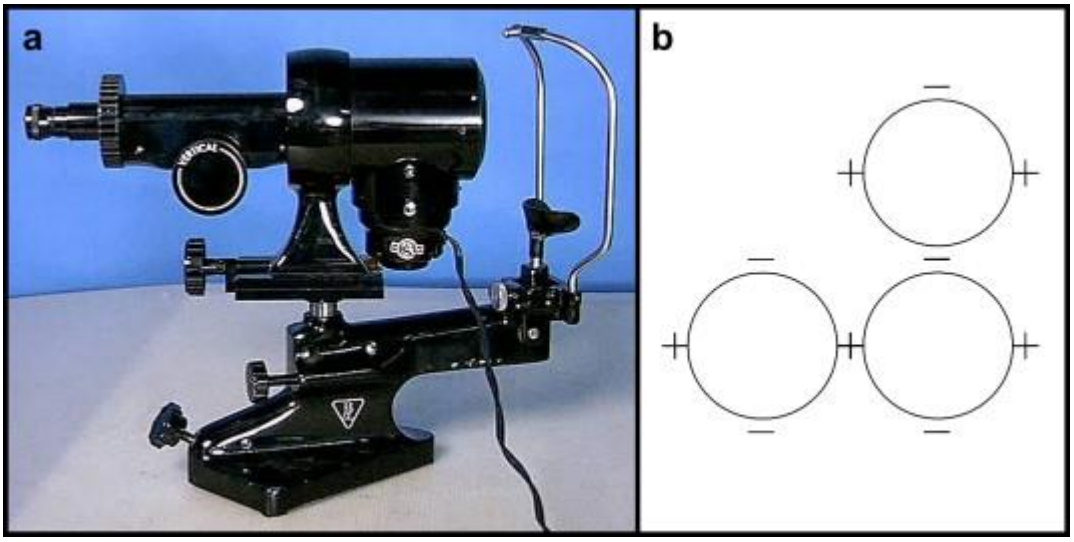


Fig 2 a.Bausch and Lomb keratometer [16] b.Mires in keratometry[16]

Keratometric measurements may be irregular for a variety of reasons, such as dry eyes, eye drops used during the examination, and irregularities on the post-tonometry surface.

20/20 or more visual acuity is compatible with perfect mires. Only 20/25 to 20/40 visual

acuity may be compatible with mild irregularity, 20/40 - 20/60 VA with irregularity(moderate), and 20/60 - 20/200 VA with severe irregularity. These criteria are arbitrary; but, with enough experience, every examiner will eventually develop their empirical classification.

A scan[16]

The amplitude scan, often known as the A-scan, is one of the methods that can be utilised for ocular examination through the use of ultrasound. The transducer emits a single sound beam while the A-scan technique is being used. According to the 4, the reverberations that are received by the transducer are transformed into a sequence of spikes, the height of which is proportional to the intensity of the noise. Due to the fact that denser objects are able to absorb more energy, the height of the retinal spike is reduced when dense cataracts are present because they prevent the signal from returning to the transducer. For example, spike height, regularity, and reflectiveness are all measurements that are generated from the A-scan.

Principle of Ultrasound Biometry[16]

Even if optical biometry has become increasingly popular, ultrasonography has continued to be the gold standard for many years. Acoustic waves are the fundamental principle upon which ultrasonography is founded. An oscillating piezoelectric crystal that is implanted within the probe is responsible for producing a high-frequency sound wave that is able to penetrate the eye. The probe is able to determine the axial length of the eye by calculating the velocity of sound and the time required to record the sound waves which have been returned. Analyzing the sound waves that are reflected by the ocular tissues. A representation of the amplitude of echoes along the path is obtained in this manner, which is one-dimensional. At a frequency of 10 megahertz, the majority of ophthalmic ultrasonic A-scan equipment are utilised.

Method[16]

Here probe touches the cornea or immersion technique here A-scan probe does not directly touch the cornea and sound attenuation are the methods that are utilized in the process of ultrasound biometry.

In order to perform an A-scan, a coupling agent is not necessary because of the ability of tear film to act as the coupling agent between the probe and the cornea. In A-scan single sound beam is transmitted from a probe to the eye while the patient maintains primary attention on the eye. During an applanation A-scan, the probe is positioned so that it is immediately over the cornea. A scleral shell that is filled with saline is utilised in the process of immersion A-scan. So, saline is located in the space between the probe and the cornea.

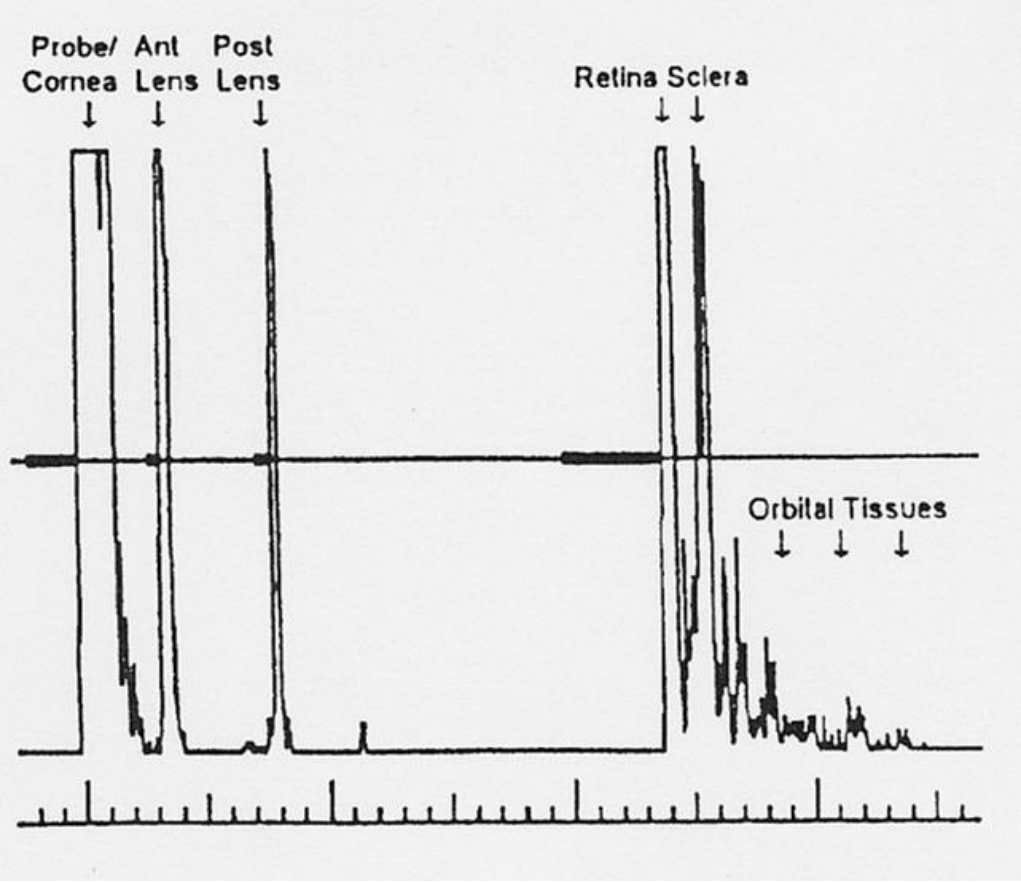


Fig 3:A scan image with spikes[16]

B SCAN[16]

In order to diagnose abnormalities that are located in the posterior portion of the eyeball, B-scan ultrasonography (USG) is a straightforward and non-invasive diagnostic method. Using this modality, it is possible to precisely evaluate a variety of common disorders, including choroidal melanoma, retinoblastoma, vitreous degeneration, retinal detachment, ocular trauma, and cataracts. In terms of cost-effectiveness, B-scan USG Immature cataracts are characterised by scattered opacities that are separated by clear zones when viewed on a B-scan. When the cataract has reached its full stage, the lens has a cortex that is entirely opaque and seems to be a highly dense structure. It is possible to observe the optic nerve traveling through the retrobulbar fat on a B-scan of a normal eyeball. Echogenicity is observed in the retrobulbar fat, and the optic nerve is observed as a hypoechoic tubular structure that extends from the posterior pole of the eyeball to the orbital apex.

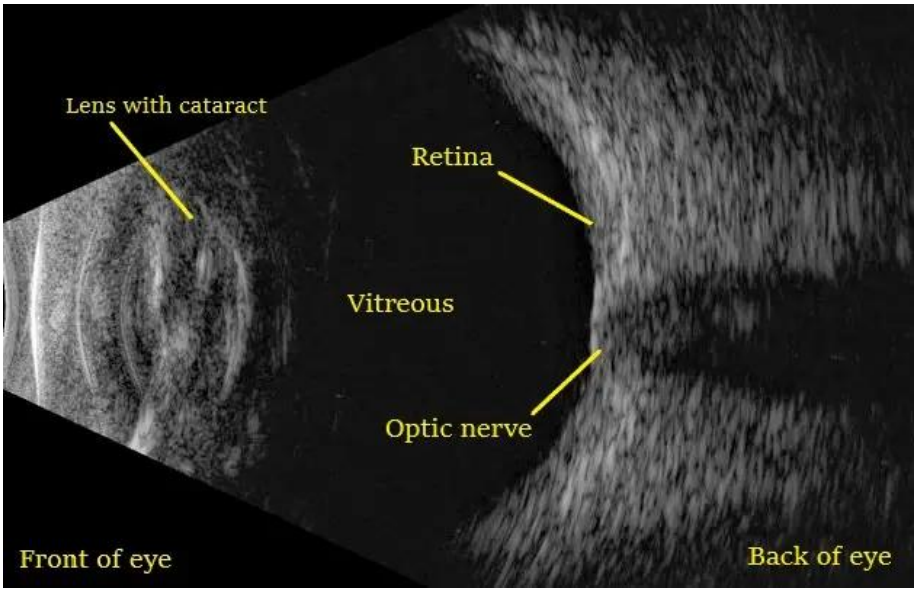


Fig 4:B scan image [16]

<u>Steps of Manual Small-Incision Cataract Surgery</u>[4]

In order to ensure that the sclera is exposed in the correct manner, a conjunctival flap is created after a superior rectus bridle suture has been placed.

Incision site and configuration

A scleral incision of one-third to half thickness is made around one to one and a half millimeters behind the limbus. In most cases, the size of the incision ranges from 5.5 to 7.5 millimetres[4], but this can change depending on the nucleus size and the degree of its hardness.

Site of incision[4]

1. Superior
2. Temporal
3. Superotemporal

Superior (12 o'clock) incision[4]

A partial thickness groove was formed in the sclera approximately 2 millimeters beyond the limbus, and then a tunnel was produced that extended anteriorly. This was the method that Colvard and colleagues used in 1980 to create the scleral pocket incision in the 12 o'clock position[4].

Temporal incision[4]

To perform the operation on the temporal side of the eye, the orientation of the microscope and the surgeon is towards the temporal side. To achieve a greater valve effect of self-sealing incision, lamellar dissection is done into the cornea when doing a temporal incision. When compared to the superior incision, the temporal incision offers a number of benefits, including a lower risk of medically caused astigmatism and improved visibility in eyes with a deep set. When compared to superior incision, higher risk of postoperative endophthalmitis as the wound is directly exposed to environment due to absence of coverage by the lid.

"Superotemporal

Some surgeons prefer superotemporal incision.

Configuration of incision

i. Straight incision

ii. Chevron or inverted V-shaped incision

iii. Frown incision

iv. Blumenthal side cuts."

Straight incision

In 1980, Colvard was the pioneer surgeon to establish the cataract incision [16]. In a straight incision, the incision is made by joining two extreme points in a straight line approximately two millimeters away from the limbus here the inferior edge that is directly close to these end points cannot sag. Preventing induced astigmatism from becoming excessive. In 1989, McFarland was the one who first presented an incision architecture that included self-sealing design elements.[17]

Chevron's inverted V-shaped incision

In the year 1990, Chervon incision was identified. The incision is made in the shape of an inverted V, apex of the incision being located close to the limbus. It produces least amount of astigmatism.[18]

Frown incision

Singer introduced the frown incision in 1991. Here incision points are more away from the limbus. It results in less astigmatism than the Chevron incision. The pocket incision was adjusted and curved in the opposite direction of the limbus. [19]

Blumenthal side cuts

Blumenthal came up with the idea for the Blumenthal side cuts in 1993. Bigger side pockets were made which produced minimal astigmatism. In addition to a straight line, the incision also has 2 cuts which are oblique in shape and are present at both ends.[20]

Sclerocorneal tunnel[4]

Sclerocorneal tunnel is created by using crescent blade after an incision and then an entry into the anterior chamber is done. A triplanar self-sealing tunnel requires no suturing. Incorrect depth of tunnel will have complications like buttonholing or premature entry. The tunnel should be between one-third to half of the width of the thickness of the sclera and should reach one to one and a half millimeters into the cornea. The creation of scleral pockets is necessary for smooth delivery of the nucleus. Capsulotomy is performed after forming AC with viscoelastic.

Capsulotomy[4]

It is one of the most crucial steps of cataract surgery.

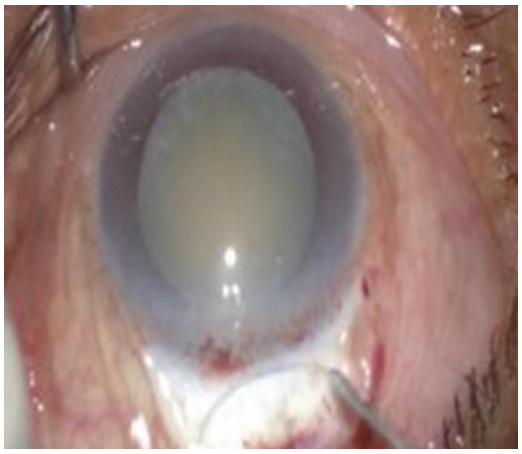


Fig 5: Frown-shaped incision

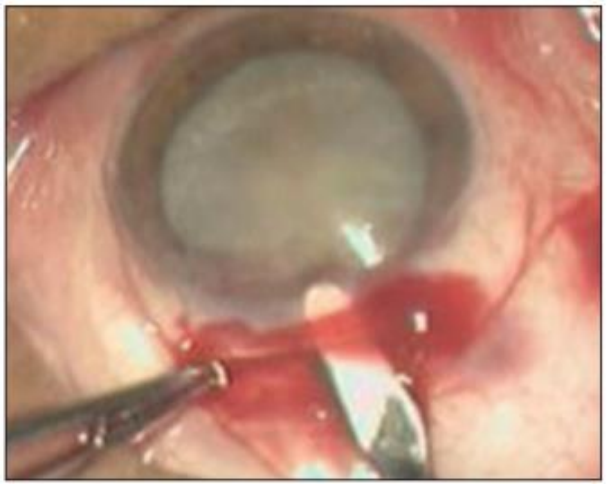


Fig 6: Tunnel formation[4]

Fig 7: Entry in to AC[4]

Trypan blue dye stains anterior capsule and improves visibility of capsule.

Typically, MSICS will make use of three types of capsular openings, which are as follows:

• Continuous curvilinear capsulorrhexis

• Can-opener capsulotomy

• Envelope (linear) capsulotomy.

Continuous curvilinear capsulorrhexis (CCC) [4]

In the year 1984, Gimbel and Neuhann, who simultaneously devised a method of anterior capsulotomy. For the CCC procedure, either a bent 26 gauge needle or Utrata's forceps are used. After making a small cut on anterior capsule, flap is raised. Then it is directed either clockwise or other way, and the final tear is from the outside to the inside to complete the rhexis. Gimbel identified continuous tear capsulotomy technique, Neuhann came up with the capsulorrhexis technique, and Kimiya Shimizu came up with the circular capsulotomy technique in 1987. The CCC technique was derived from these previous methods.[21,22]

The can-opener capsulotomy

Can opener technique uses small tears by connecting one to other. capsulotomy technique is most effective in prolapsing nucleus in hard and big cataract such as in brown cataract and cataracta nigra. [4]

The envelope (linear) capsulotomy

In situations where CCC is difficult this technique is employed, like in Morgagnian cataracts, intumescent cataracts, or hypermature cataracts. In order to facilitate the removal of the lens substance and the implantation of the posterior chamber intraocular lens (PCIOL), a horizontal tear is done on anterior capsule first. The central anterior capsule that covers the optic zone is removed after IOL implantation.

The capsulorrhexis that is larger than 5.5–6.0 millimeters is chosen in MSICS, in contrast to phaco, where the ideal aim is 5.25 millimeters. Can opener capsulotomy is a safer option for

hypermature cataracts because it makes it simpler for the prolapse of nucleus. Since there are weak zonules in hypermature cataracts, there is a possibility that zonular dialysis during prolapse of nucleus. linear capsulotomy is alternative to be considered in hypermature cataracts. Hydrodissection is performed after the capsulotomy, after extending the entry wound. [4]

Hydroprocedures

Hydroprocedures are pioneered by Blumenthal, while terminologies were given by Faust. Through the use of hydroprocedures, the nucleus, epinucleus, and cortex of is separated from the capsule, And is able to prolapse easily. Either Ringer's lactate solution or balanced salt solution (BSS) is used. Hydroprocedures include hydrodelineation and hydrodissection, among other techniques. [4]

Hydrodissection

The term "hydrodissection" refers to the process of virtually completely separating the cortex and nuclear mass from the lens capsule. Below the margin of rhexis cannula is placed. Fluid is injected by slightly lifting anterior capsule in all four quadrants. Central tap is given to release the fluid present behind the nucleus. By this method, cortex is separated from posterior capsule. [4]

Hydrodelineation

Hydrodelineation is the method of debulking the nucleus by passing a fluid wave between nucleus and epinucleus material. A little volume of fluid is injected into the cortex through the cannula., A golden ring is observed when hydrodelineation is complete. This technique holds importance in cases of Posterior polar cataract. [4]

Nucleus Delivery/Management

The initial step is to remove the nucleus from the capsular bag. This can be done using sinskey hook or hydrodissection cannula. Delivery of nucleus with minimal damage to

endothelium is the second step. A number of different methods, including hydroexpression, viscoexpression, vectis-assisted delivery, sandwich technique, and fish hook approach, have been used.[4]

Hydroexpression

a. Technique of Blumenthal: In 1987, Blumenthal and Moisseiv for delivering the nucleus from AC with minimal endothelial cell damage used ACM.[23]
b. Brierley reported that the hydroexpression of the nucleus that was carried out while SICS was being done was successful.[24]
c. Friedburg and colleagues carried out "viscosurgically assisted hydro jet irrigation" of lens nucleus for nucleus prolapse in hundred eyes.

Viscoexpression[4]

Corydon and Thim performed hydro and viscoexpression of the nucleus after by a continuous capsular capsulorrhexis, they used a special instrument which is bent cannula designed for this procedure[25]. Thim et al. studied the various methods of nucleus delivery in cadaver eyes, including hydroexpression and viscoexpression. And concluded that viscoexpression is a more safe with less complication rates. [26]

Similarly, Bellucci and colleagues showed viscoexpression as most effective method by studying in 142 eyes they observed very few complications. [27]

Korynta used viscoexpression in 369 patients and observed very little complications.

Burton and Pickering also used viscoexpression in 87.7% of cases successfully. [28]

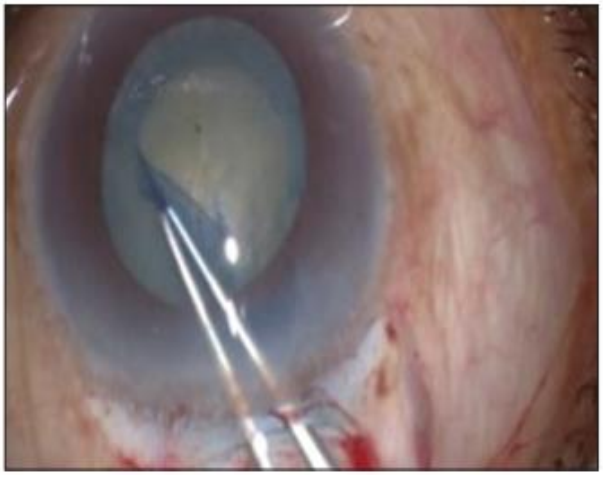
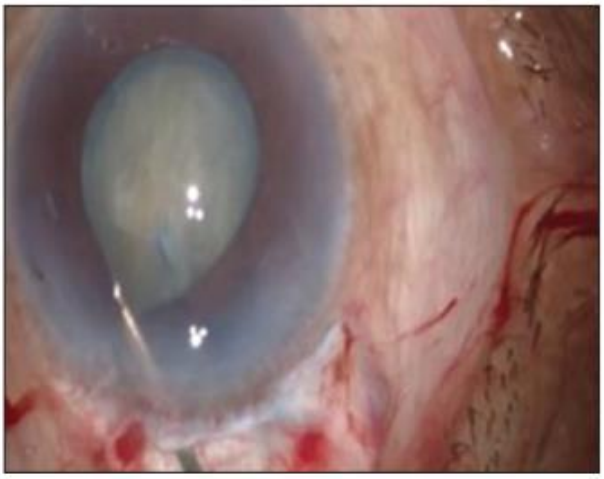


Fig 8: Capsulorrhexis[4]

Fig 9 Extension of entry into anterior chamber[4]



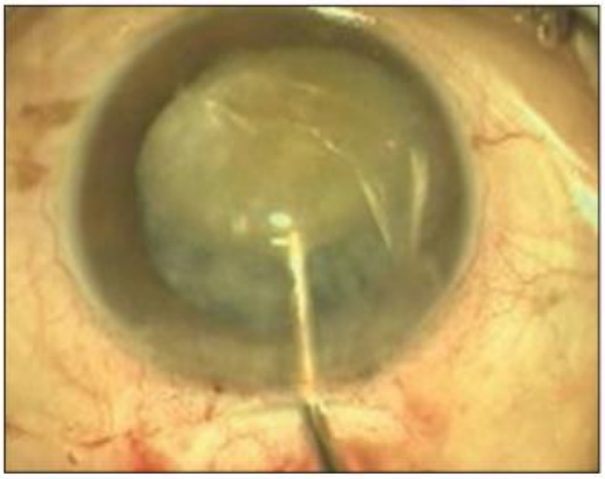


Fig 10 : Hydrodissection[4]

Fig 11 Nucleus rotation in anterior chamber[4]

Sandwich technique[4]

The method was successfully carried out by Bayramlar et al. who did a trial on 37 eyes.[29] Irrigating Vectis and wire spatula are used, nucleus is prolapsed in the AC holding it in the middle of these instruments. Complications were posterior capsule rent, loss of vitreous, and postoperative corneal edema due to touch of instrument to the endothelial cells.

Modified fish hook technique

Hennig and colleagues used of a needle tip hook, the nucleus was delivered through the fish

hook approach in 500 eyes.[30] At six weeks and one year, 6/18 or greater was the visual acuity in more than 90% of cases with higher induced astigmatism. [4]

Use of anterior chamber maintainer

ACM was used by Blumenthal he documented importance of constant positive pressure in the AC for good surgical outcome.[31] Chawla and Adams used ACM in 258 cases. They found out good surgical control, maintenance of AC depth, and position of the posterior capsule was preserved and concluded that it is safe[32].

Wright et al., performed cataract surgery in 46 eyes using ACM and without using viscoelastic. At 3 month followup most of the patients had vision of 6/12 or better. In addition, Sharma et al. also reported positive outcome using ACM in SICS procedure.[34]

Manual Phaco Fracture[4]

Bartov et al, utilised a modified version of the mininuc ECCE approach, by creating a wide scleral tunnel to accommodate larger nucleus. The portion of the nucleus that is seen in the scleral wound is manually removed. Here inverted V incision of 5mm is used. Kansas and Sax manually divided nucleus into many smaller parts with the help of Kansas trisector and Kansas Vectis, then viscoexpresssion was done through a smaller size incisions. This was novel technique sone on 59 eyes visual outcome was promising with less postoperative complications.[35-37]

Two Sinskey Method

Rao and Lam used two Sinskey hooks for the nucleus extraction from the capsular bag. [38] Different paracentesis are used to insert the two hooks. Hook which is present on the left side engages the nucleus beneath the capsulorrhexis margin and lift and right-hand side hook should be kept above the margin of the capsulorrhexis and support nucleus from falling back into the bag, later it is kept below the lifted. Nucleus delivery is followed by thorough wash of cortex.[4]

Intraocular Lens Implantation

Since the incision size is between 6 and 7 millimeters broad, hard intraocular lens (IOL) are preferred as they are cost-effective after MSICS. Foldable intraocular lenses (IOLs) can also be placed if provided patient is affordable. Before implanting an intraocular lens (IOL), the chamber is filled with viscoelastic material in the modified Blumenthal procedure.[23] The intraocular lens (IOL) is inserted into the bag, bag is then inflated using air, and lens is implanted in Ruit procedure. The size of incision used in Ruit procedure is around 6.5 mm to 7.0 mm. Dhanpal has executed a few alterations to the previous version of Ruit. He placed viscoelastic prior to IOL implantation and later visco was aspirated through Simcoe cannula. Kosakarn used twin nylon loop procedure following which IOL was implanted. [39] The procedure was risk-free with very good results and less damage to endothelial cells.

Advances in Pharmacological Pupil Expansion[6]

A wide variety of pharmacological substances are utilised in order to enlarge the pupil. In most cases, the topical procedure involves the use of a tropicamide 1% and phenylephrine 2.5% in a combined form.[40] In spite of the fact that the treatment is administered topically, it is known that the absorption of the drug might result in undesirable systemic side effects. [41,42] Additionally, it has been demonstrated that the administration of NSAID prior to surgical procedures can either encourage mydriasis or prevent miosis. [43-45] Preoperative administration of numerous daily doses of a variety of medications belonging to that class can be done with the intention of inhibiting the production of prostaglandin following cataract surgery as well as during the process itself. A number of benefits are associated with the intracameral administration of mydriatic medications in comparison to the topical route. One being less systemic side effects. [46,47] When it comes to dilation of the pupil at the beginning of the cataract surgery, it was found that the intracameral use of a mydriatic agent in conjunction with a local anesthetic was quite effective. Sugar was the first person to propose

the method of combining buffered lidocaine and epinephrine. This combination of medications is referred to as Epi Shugarcaine [48] Additionally, it was demonstrated that intracameral injection of 1.5% intracameral phenylephrine was particularly efficient in alleviating the symptoms of intravenous phenylephrine insufficiency (IFIS). [49] Now Mydrane, which is a mixture of tropicamide (0.02%), phenylephrine (0.31%), and lidocaine (1%), is in use in European nations. Continuous irrigation is more effective than a single injection. This is because the concentration of the drug is kept same throughout the procedure.[50]

Epinephrine is mixed with irrigation solution to sustain mydriasis throughout the surgery. [51] Recently A combination of 1% phenylephrine + ketorolac injection of 0.3% is approved for use in cataract surgery with a brand name omidria. The medication is mixed into the irrigation solution, it halts the pupil from constricting but has not much effect in dilating the pupil. [52,53]

Mechanical Pupil Enlargement Strategies[6]

Mechanical dilatation of the pupil is decided by surgeon during the surgery. In cases when the pupil is mid-dilated(4.5–5.0 millimeters), a surgeon who is skilled is able to conduct surgery with ease, resulting in favourable clinical outcomes.[54] SeveraI fluidic parameters are to be kept in mind when doing phaco in small pupil.

There are a variety of pupil enlargement procedures that are strongly encouraged in the event that the pupil is smaller. In circumstances involving small pupils, there is a pattern that must be followed. First, by injecting ophthalmic viscosurgical device (OVD) into the anterior chamber this causes the anterior chamber to deepen, and pupillary borders are expanded. Viscomydriasis makes use of an extremely viscous OVD, such as Healon. [55] OVDs, because of rapid wash away from AC they do not have long-lasting action. Two OVDs having different rheological qualities will help in maintaining expanded pupil. The

viscoadaptive OVD is injected at center of the eye, and lower viscous OVD is injected so that it covers the periphery of the anterior chamber and the iris.[56] OVD is to be completely removed from the eye in order to prevent intraocular pressure rises postoperatively.[57]

Four primary surgical maneuvers to be tried that should be evaluated before proceeding. These procedures include synechiolysis, stretching of the pupil, cutting of the iris, and mechanical pupil expanders. [58]. Sometimes it is possible to identify pupillary membranes that are firmly linked to the surface of the posterior iris and the pupil. The forceps are used to carefully peel the membrane away from the iris, which relieves contraction forces of the iris and pupil expand. [59]

Spatulas, Kuglen hooks, are introduced through paracentesis incisions and are placed opposite to each other & pupil stretching is done. [60,61] The primary objective of this procedure is to enlarge pupil by stretching. It may result in iris hemorrhage and pupil atony after the operation.[61]

Pupil Expansion Rings

Over the course of all these years, the concept of designing the pupil expansion ring has been highly appealing. The "Graether silicon pupil expander, Siepser's hydrogel ring, Morcher PMMA ring, and Milvella Perfect Pupil[61] are some of the devices that have been proposed and utilised in small quantities.

At the moment, the Malyugin ring, which is manufactured by Microsurgical Technology Inc., is the most widely recognised pupil expansion ring. Using polypropylene, it is a device that can be folded into a square shape. In order to remove the device from the eye, it is first injected into the anterior chamber and then extracted using the injection system.

In contrast to iris retractors, the Malyugin ring provides a circular pupillary opening. Additionally, in comparison to the iris hook, the Malyugin ring opens the pupil without unnecessarily straining or traumatising it. XpandNT iris speculum, Visitec i Ring Pupil

Expander, and Bhattacharjee Pupil Expansion Ring are some of the various devices that are utilised to use in order to widen the pupil.

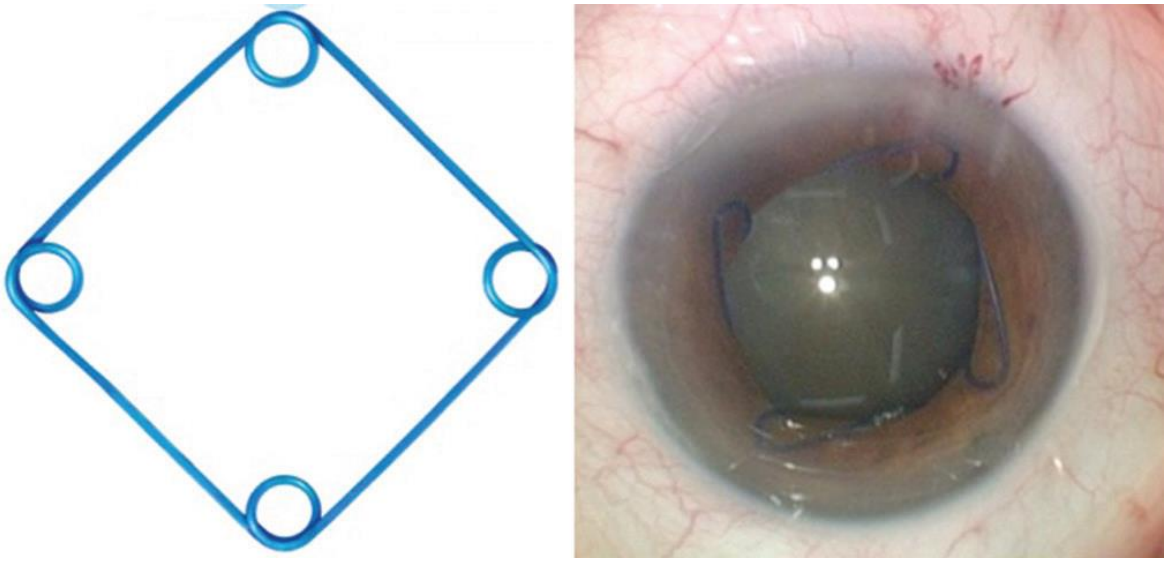


Fig 12: Malyugin ring

Common complications in small pupil cataract surgery[6]

PC rent

Nucleus drop

Corneal complications

Corneal edema and Striate Keratopathy[6]

Edema of the cornea can be caused by endothelial malfunction, and it can be either temporary or persistent. Endothelial loss is associated with preoperative corneal degeneration, a higher grade of the nucleus, and a small pupil size because these factors make it difficult to deliver the nucleus. Striated keratopathy is characterised by the presence of folds in the Descemet's

membrane as well as edema of the cornea. The most effective method for avoiding these problems is to take steps during surgery to protect the endothelium with high molecular weight viscoelastic, to avoid shallowing the AC, and to work in the iris plane or lower in order to maintain a safe distance from the endothelium.

Fig 13:corneal edema

Posterior capsular rent[6]

A rupture in the crystalline lens's posterior capsule that occurs following cataract surgery is known as posterior capsular rent (PCR). If not identified early on or treated effectively, posterior capsular rent—a common but dreaded consequence of cataract surgery—may result in less than ideal visual outcomes. The severity of this complication varies depending on the stage at which it appeared or was recognised, the coexisting pathologies in the eye that was operated on, the experience of the surgeon who performed the operation, and the management facilities that are available. In addition, the subsequent vitreous loss has a substantial impact on the outcomes of the post-operative procedure.

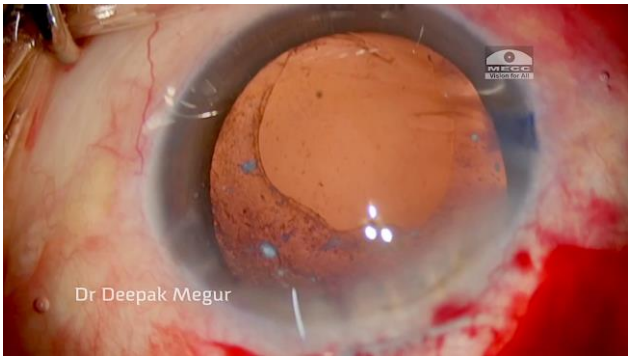


Fig 14:PC rent

Nucleus drop [6]

A paper that was published in the year 2020 examined 1.7 million cataract surgeries that were performed in Europe. The research also compiled a list of the major reasons which included a small pupil. The incidence of posterior lens dislocation that has been published varies from 0.3% to 1.1%. Small pupils, pseudoexofoliation, deep-set eyes, traumatic cataracts, hard nuclei, and intraoperative floppy iris syndrome are among the ocular risk factors. The joint efforts of an anterior and posterior segment surgeon are necessary to tackle this complication.

Fig 15:nucleus drop[6]

LITERATURE FROM PREVIOUS STUDIES:

In the year 2023, Yamini K and colleagues carried out a study for evaluating the corneal problems and visual outcomes associated with manual small incision cataract surgery. 227 patients were included in this study. Patients were evaluated for corneal problems and visual acuity postoperatively on Day 1, 1 week, and at the end of the sixth week. Out of 227

individuals took part in the research project with 138 (or 61%) of them being female and 89 (or 39%) being male. The age group of 61 to 70 years old (42.7% of the total) contains the greatest number of patients. OCTET grading was performed on patients who had corneal edema, and on the first postoperative day, a total of 62 patients who had corneal. Six patients (9.6%) had grade 1,17 patients had grade 2, and 43 patients had grade 3. There were 45 patients who had a clear cornea at the end of the sixth week after surgery. Additionally, 82.3% of patients had a VA of 6/6 to 6/9.

A study was carried out by Reshma BKS and colleagues (2022) with the purpose of determining the factors that lead to a small pupil and the difficulties that arise during SICS surgery. Total of 50 patients were evaluated. Who presented to the outpatient department with a small pupil, after maximal dilation with tropicamide (0.5%) and phenylephrine (1%) at four intervals of fifteen minutes each. The results showed 14 had PEX,16 had posterior synechiae,12 had diabetes and one patient was on treatment for benign prostatic hyperplasia (BPH). [68]

Patients with pseudoexfoliation who were undergoing manual small-incision cataract surgery (MSICS) were the subjects of a study conducted by Shivkumar C et al., (2022), visual results and complications were investigated. A prospective observational study was carried out on 152 individuals who were undergoing MSICS and had pseudoexfoliation for more than fifty years. Both intraoperative and postoperative problems were recorded, and follow-up was done on POD1, 7^{th} day, the 30^{th} day, and the third month after procedure. It was observed that 49 eyes (32.2%) had a small pupil before to surgery, and 19 eyes (12.5%) required intraoperative measures from the surgeon. As a result of intraocular problems, five patients (3.3%) experienced zonular dialysis, one patient (0.7%) experienced posterior capsular rupture, and one patient (0.7%) experienced iridodialysis. On the first postoperative day, corneal edema was the most prevalent complication, occurring in 134 patients. However,

only 23 patients (15.1%) experienced clinically severe corneal edema. At the three-month mark, postoperative complications included an abnormal pupil in seventeen cases and a decentered intraocular lens in three cases. Visual acuity improved significantly in following visits[69]

Gurnani B et al. (2022) attempted to highlight the many adjustments that have been recorded over time in MSICS, as well as the journey from an incision size of 7 mm to 2 mm. A significant amount of development has been made, and the size of the incision has been decreased from 10–12 millimeters in extracapsular cataract surgery (ECCE) to 6–8 millimeters in manual small incision cataract surgery (MSICS) and 2.2–2.8 millimeters in phacoemulsification.[70]

In a study that was carried out by Balal S. and colleagues (2021), the researchers investigated the outcomes of cataract surgery for patients with small versus large pupils by employing a variety of pupil enlargement procedures. A total of one thousand four hundred twenty-six patients were found to have a small pupil. Out of these 77.8% had undergone the procedures to widen the pupil. These interventions intracameral phenylephrine, iris hooks, and Malyugin ring. They observed visual acuity was superior in large pupil than in small pupil. Intraocular problems, such as posterior capsule rupture (PCR) with vitreous loss, were substantially more prevalent in patients with SPs. The SP group showed a considerably higher incidence of postoperative sequelae, including corneal edema and anterior uveitis, compared to the other groups. There were no significant VA improvement by use of pupil expansion techniques. [12]

Warad C et al., (2021) c studied the purpose of determining the visual acuity and result of individuals who had undergone MSICS. 105 eyes were included and the patients were monitored for one month in order to evaluate their postoperative visual prognosis and any complications that may have occurred. During this time, they were given eyedrops that

contained a combination of antibiotics and steroids, and the dosage was gradually decreased over the course of four weeks. A visual grading system in accordance with the World Health Organization's (WHO) classification system was utilised to evaluate the results. With a total of 103 patients, 98.1% of them had good vision, 1.9% of the total, had moderate vision, Not a single patient was blind or had a visual acuity of less than 3/60. Intraoperative complications included iris prolapse and posterior capsular rent in two patients, which accounted for 1.9% of the total. Postoperative complications included hyphema which occurred in one patient.[71]

A study was carried out by Khanna RC and colleagues (2012) to investigate the differences and similarities between the results of phacoemulsification and manual small incision cataract surgery (MSICS). A total of 1029 patients were subjected to cataract operations. A comparison was made between the two groups regarding the postoperative best corrected visual acuity (BCVA), as well as the frequencies and types of problems that occurred. In total, 22 resident surgeons were responsible for performing 1029 surgical procedures. Phacoemulsification was used for 507 of the procedures, while the MSICS approach was used for 522 of them. Between the two groups, the percentage of patients who had a best corrected visual acuity (BCVA) of 6/12 or higher was seen in phaco group. The MSICS group had a greater rate of complications than the other group. The presence of concomitant ocular diseases or the presence of complications were the most common risk factors for poor outcomes in both groups. [72]

MATERIALS & METHODS

MATERIALS AND METHODS:

SOURCE OF DATA: The present study was carried out in the Department of Ophthalmology, R. L Jalappa Hospital, Kolar.

STUDY POPULATION: "This study was conducted on patients with small pupil coming to R. L Jalappa Hospital after obtaining ethical clearance from Institutional Ethical Committee of Sri Devaraj Urs Medical College and written informed consent from the subjects."

STUDY DESIGN: Cross-sectional study.

SAMPLE SIZE:

"Sample size was estimated by using the proportion of intraoperative complications Iridodialysis in subjects who underwent small incision cataract surgery was 5.71% from the study by Sastry Praveen Venkatesha et al. using the formula"

"Sample Size = Z1-α /2 2 P (1-P)/ d2

Z1-α /2 = is standard normal variate (at 5% type 1 error (P<0.05) it is 1.96 and at 1% type1 error(P<0.01) it is 2.58). As in majority of studies, P values are considered significant below 0.05 hence 1.96 is used in formula.

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

d= Absolute error or precision

P = 5.71% or 0.571

q = 94.29% or 0.9429

d = 7.5% or 0.075

Using the above values at 95% Confidence level a sample size of 36 subjects were included in the study. Considering 10% Nonresponse a sample size of 36 + 3.6 ≈ 40 minimum subjects were included in the study"

TIME FRAME TO ADDRESS THE STUDY: October 2022 to December 2023

INCLUSION CRITERIA:

- All Patients > 50 years of age with small pupil.
- All cataract patients with immature/ mature/ hypermature cataract.

EXCLUSION CRITERIA

- Patients with traumatic cataract
- Glaucoma
- Patients with h/o Previous eye surgery

ETHICAL CLEARANCE:

"Prior to the commencement, the study was approved by Ethics and Research committee, Sri Devaraj Urs Medical College, Kolar"

METHODOLOGY:

- This study was done on the patients coming to R.L.Jalappa Hospital, Tamaka, Kolar.
- The patients were initially clinically assessed by taking detailed history, distant vision assessment using Snellens chart after which, other examinations like slit lamp examination, Intraocular pressure measurements by Goldmann applanation

tonometry, A scan, and B scan were done.

- Pupils are measured in mesopic luminance under torch light or slit lamp graticule Patients with a pupil size of 3mm or less were taken for the study.

- Following this, the patients were dilated using dilating drop tropicamide (0.8%) +phenylephrine (0.5%) one drop in both eyes every 5-10 minutes for 3 times after 15-20 minutes see the pupil size if the pupil size of 6mm or less then the patient is considered.

- On the day of surgery, patient was dilated half an hour before the surgery. Manual small incision cataract surgery is performed by single surgeon, intraoperative complications while operating like Posterior capsular rent, nucleus drop, hyphema, trauma to iris, difficulty in delivering the nucleus, difficulty in performing capsulotomy were noted. If complications while delivering the nucleus to anterior chamber are anticipated phenylephrine (2.5 %) was used, if dilation is not adequate 2% viscoelastic was used even after this if pupil fail to expand sphincterotomy was done. Postoperative visual outcome was assessed on day 1, day 7 and day 30.

STATISTICAL ANALYSIS:

Microsoft Excel was used to enter the data, and the statistical analysis was performed with the Statistical Package for Social Sciences (SPSS) Version 16 for Microsoft Windows using Microsoft Excel.

In order to investigate the distribution of a number of categorical and quantitative variables, a descriptive statistical analysis was carried out. The categorical variables were summarised using the percentage of the total, whereas the quantitative variables were summarised using the mean plus or minus the standard deviation. The tabular representation of all the results was used, and they are also displayed graphically using either a bar diagram or a pie diagram, depending on the circumstances. It was determined whether or not there was a statistically significant difference between the two groups, and categorical variables were examined using the chi-square test. An assumption of all the rules of statistical tests led to the conclusion that a p-value of less than 0.05 was regarded statistically significant.

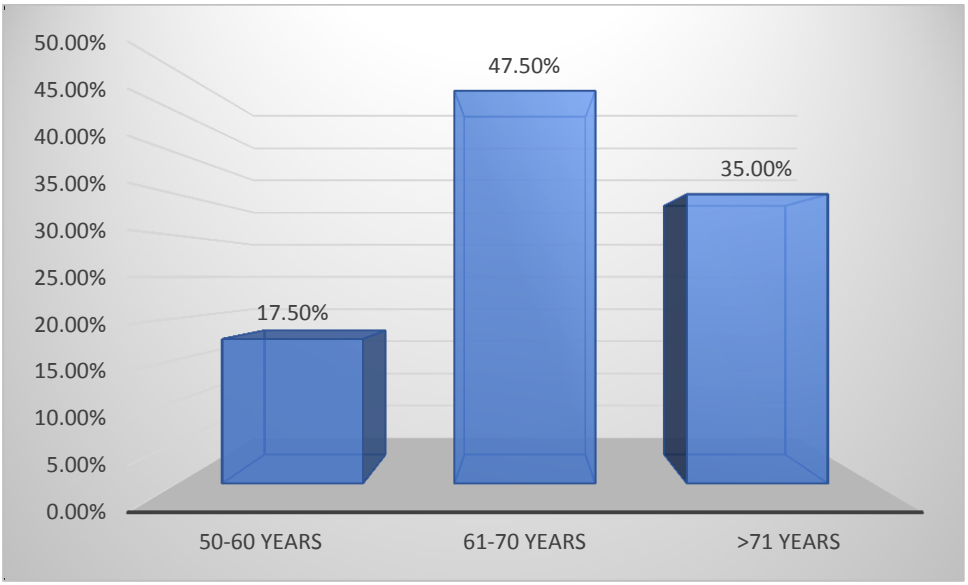
RESULTS

RESULTS

Table 1: Distribution of patients based on the age group

		Frequency	Percent
Age Group	50-60 years	7	17.5%
	61-70 years	19	47.5%
	>71 years	14	35.0%
	Total	40	100.0%

Among the total of 40 patients examined, the majority fall into the age group of 61-70 years, with 19 individuals or 47.5% of the total. This is followed by the age group of >71 years, comprising 14 patients or 35.0%. A smaller proportion of patients, 7 individuals or 17.5%, belong to the age group of 50-60 years.

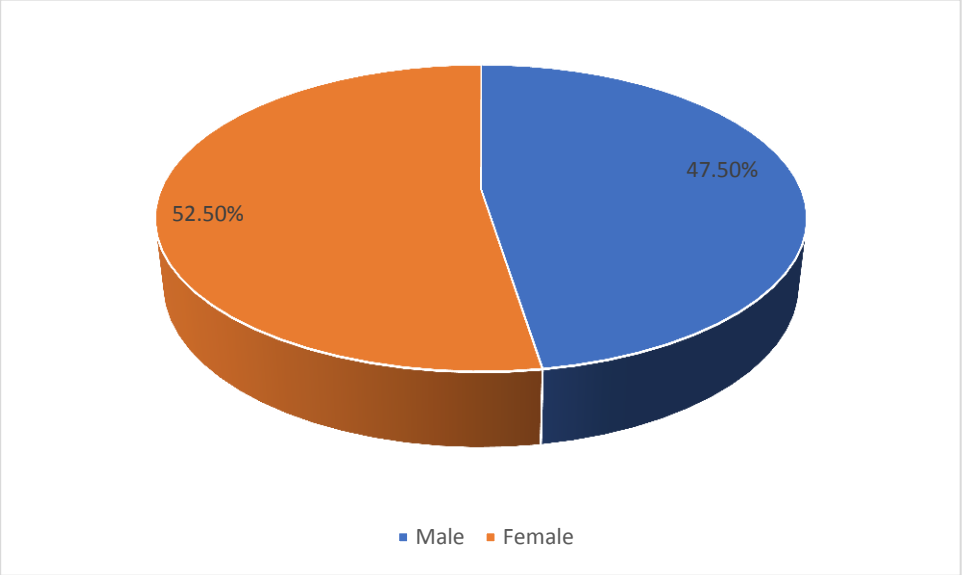


Graph 1: Distribution of patients based on the age group

Table 2: Distribution of patients based on the gender

		Frequency	Percent
SEX	Male	19	47.5%
	Female	21	52.5%
	Total	40	100.0%

Out of the total 40 patients, 19 individuals or 47.5% are male, while 21 individuals, or 52.5% are female.

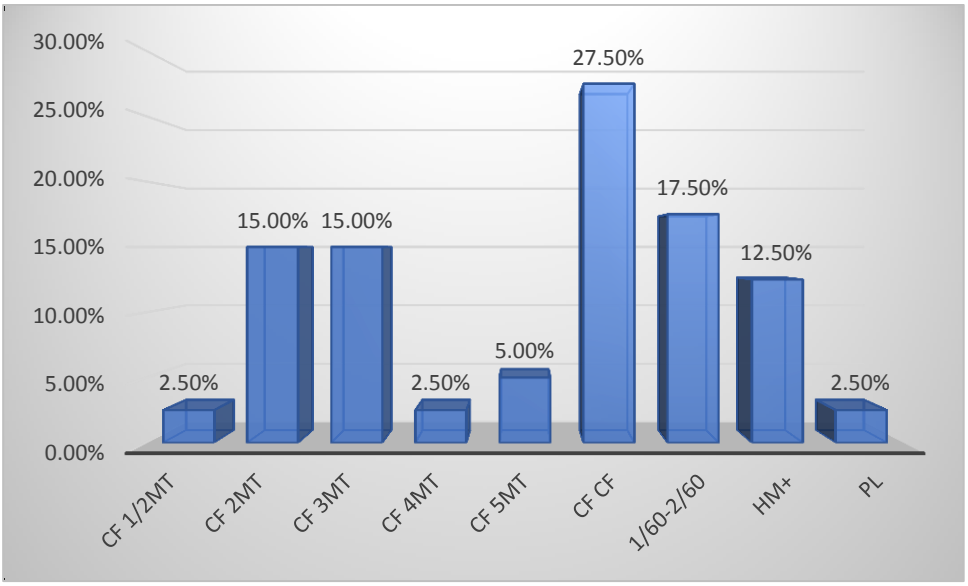


Graph 2: Distribution of patients based on the gender

Table 3: Distribution of patients based on the pre-operative visual acuity

		Frequency	Percent
PRE-OPERATIVE VISUAL ACUITY	CF 1/2mt	1	2.5%
	CF 2mt	6	15.0%
	CF 3mt	6	15.0%
	CF 4mt	1	2.5%
	CF 5mt	2	5.0%
	CF CF	11	27.5%
	1/60-2/60	7	17.5%
	HM+	5	12.5%
	PL+	1	2.5%
	Total	40	100.0%

Out of the total 40 patients surveyed, the most common pre-operative visual acuity category is "CF CF" (counting fingers close to face), with 11 individuals or 27.5%. This is followed by 1/60-2/60 and "CF 2mt" (counting fingers at 2 meters), each comprising 7 individuals or 17.5% and 6 individuals or 15.0%, respectively. Other categories include "HM+" (hand movements or better), "CF 3mt" (counting fingers at 3 meters), "CF 5mt" (counting fingers at 5 meters), "PL+" (perception of light), "CF 1/2mt" (counting fingers at 1/2 meter), and "CF 4mt" (counting fingers at 4 meters), each representing smaller proportions of the total patient population.

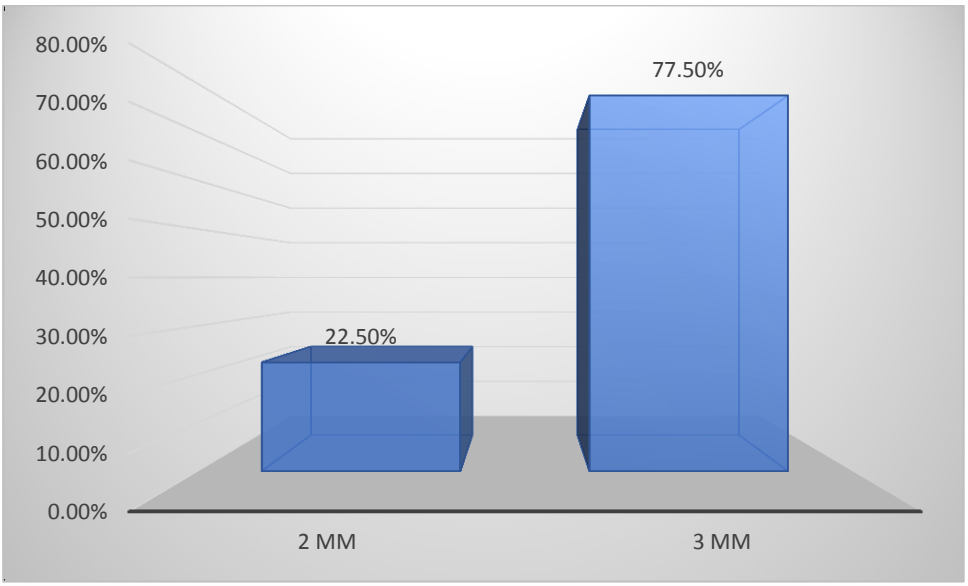


Graph 3: Distribution of patients based on the pre-operative visual acuity

Table 4: Distribution of patients based on the pupil size before dilating

		Frequency	Percent
PUPIL SIZE BEFORE DILATING (mm)	2 mm	9	22.5%
	3 mm	31	77.5%
	Total	40	100.0%

Out of the total 40 patients, the majority, comprising 31 individuals or 77.5%, had a pupil size of 3 mm before dilation, while 9 individuals, or 22.5% had a pupil size of 2 mm. This breakdown indicates that the most common pre-dilation pupil size among the patients is 3 mm.

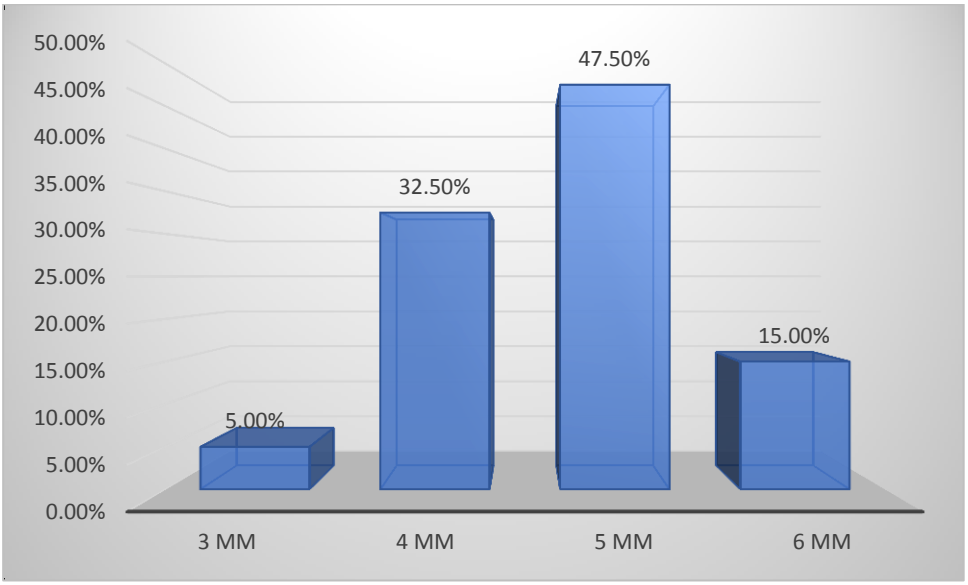


Graph 4: Distribution of patients based on the pupil size before dilating

Table 5: Distribution of patients based on the pupil size after dilating

		Frequency	Percent
PUPIL SIZE AFTER DILATING (mm)	3 mm	2	5.0%
	4 mm	13	32.5%
	5 mm	19	47.5%
	6 mm	6	15.0%
	Total	40	100.0%

Out of the total 40 patients, the most common pupil size after dilation is 5 mm, with 19 individuals or 47.5%. This is followed by a pupil size of 4 mm, observed in 13 individuals or 32.5%. Additionally, 6 individuals, or 15.0% exhibit a pupil size of 6 mm, while 2 individuals or 5.0% have a pupil size of 3 mm after dilation.

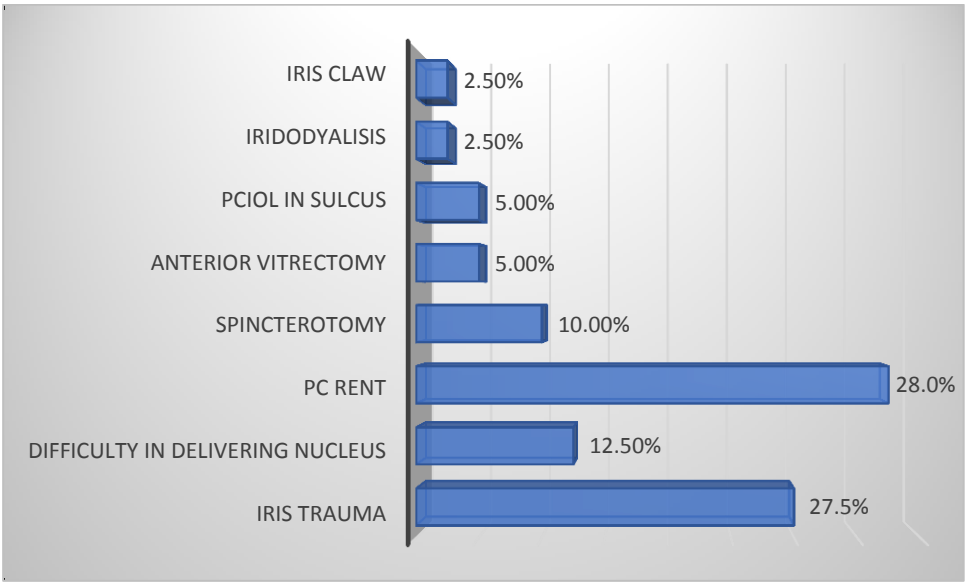


Graph 5: Distribution of patients based on the pupil size after dilating

Table 6: Distribution of patients based on the intraoperative events

INTRAOPERATIVE EVENTS		
	Frequency	Percent
Iris Trauma	9	27.5%
Difficulty in delivering nucleus	5	12.5%
PC rent	11	28.0%
Sphincterotomy	4	10.0%
Anterior vitrectomy	2	5.0%
PCIOL in sulcus	2	5.0%
Iridodialysis	1	2.5%
Iris claw	1	2.5%

Iris trauma like microbleeds, sphincter tears, iris chafing occurred in 27.5% patients. Difficulty in delivering the nucleus was noted in 12.5% of cases. Posterior capsule rupture (PC rent), occurred in 28.0% of cases. Surgical interventions were, sphincterotomy (10.0%), and anterior vitrectomy (5.0%). Other complications like intraocular lens (IOL) placement-related issues like sulcus placement (5.0%) or iris-claw fixation (2.5%)



Graph 6: Distribution of patients based on the intraoperative events

Table 7: Distribution of patients based on the Slit lamp examination conducted on postoperative day 1

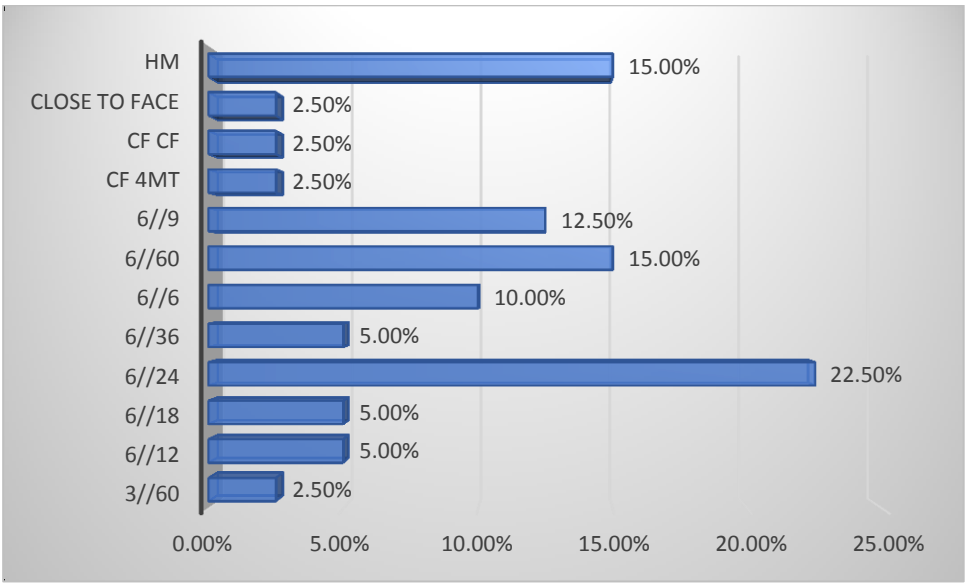
POD1 SLIT LAMP EXAMINATION		
	Frequency	Percent
Clear	3	7.5%
AC Reaction	4	10.0%
Corneal edema	17	42.5%
DM folds	11	27.5%

Slit lamp examination conducted on postoperative day 1 (POD1) among the patients reveals various ocular conditions: Descemet's membrane folds (DM folds) affecting 11 patients or 27.5%. corneal edema is reported in 17 patients or 42.5% while anterior chamber (AC) reaction was observed in 4 patients or 10.0%. A smaller proportion of patients, 3 individuals or 7.5%, had clear findings.

Table 8: Distribution of patients based on the postoperative UCVA day 1

		Frequency	Percent
POSTOPERATIVE VA DAY 1	3/60	1	2.5%
	6/12	2	5.0%
	6/18	2	5.0%
	6/24	9	22.5%
	6/36	2	5.0%
	6/6	4	10.0%
	6/60	6	15.0%
	6/9	5	12.5%
	CF 4mt	1	2.5%
	CF CF	2	5.0%
	HM	6	15.0%
	Total	40	100.0%

Visual acuity (VA) outcomes on postoperative day 1 (POD1) among the patients surveyed showed most common postoperative VA is reported as 6/24, observed in 9 patients or 22.5%. Additionally, 6 patients, or 15.0% achieve hand movements (HM) vision, while 6/60 VA is observed in 6 patients or 15.0%. Other VA outcomes include 6/6, 6/9, and 6/12, each reported in smaller proportions. A few patients exhibit lower vision outcomes, such as 3/60 and CF(counting fingers), accounting for minimal percentages.

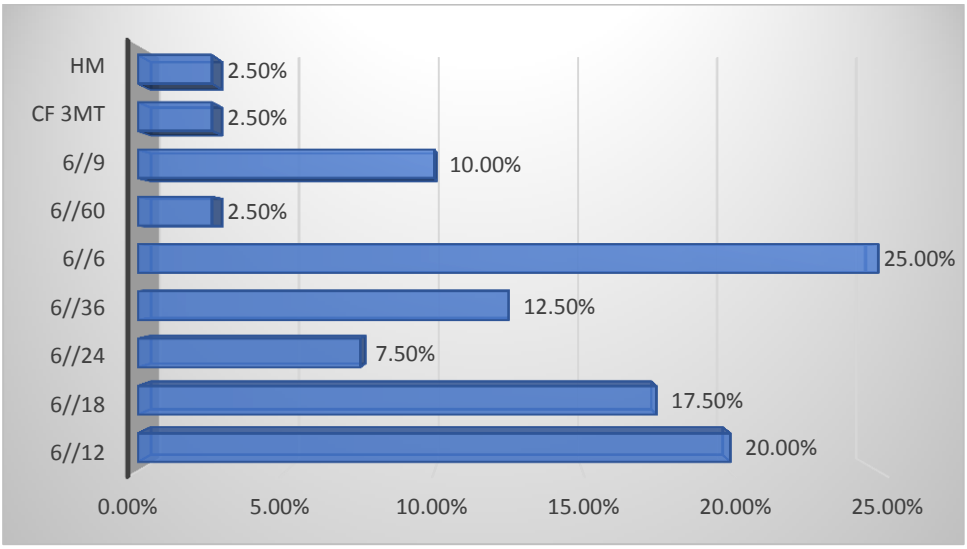


Graph 7: Distribution of patients based on the postoperative VA day 1

Table 9: Distribution of patients based on the postoperative BCVA day 7

		Frequency	Percent
POSTOPERATIVE VA DAY7	6/12	8	20.0%
	6/18	7	17.5%
	6/24	3	7.5%
	6/36	5	12.5%
	6/6	10	25.0%
	6/60	1	2.5%
	6/9	4	10.0%
	CF 3mt	1	2.5%
	HM	1	2.5%
	Total	40	100.0%

Among the total of 40 patients, the most common postoperative BCVA is reported as 6/6, observed in 10 patients or 25.0%. This is followed by 6/12 VA, reported in 8 patients or 20.0%, and 6/18 VA, observed in 7 patients or 17.5%. Additionally, 6/36 and 6/9 VA are each reported in 5 patients, or 12.5%, and 4 patients, or 10.0%, respectively. Other VA outcomes include 6/24 and 6/60, each reported in smaller proportions, along with counting fingers (CF) at 3 meters and hand movements(HM) vision, each observed in 1 patient or 2.5%.

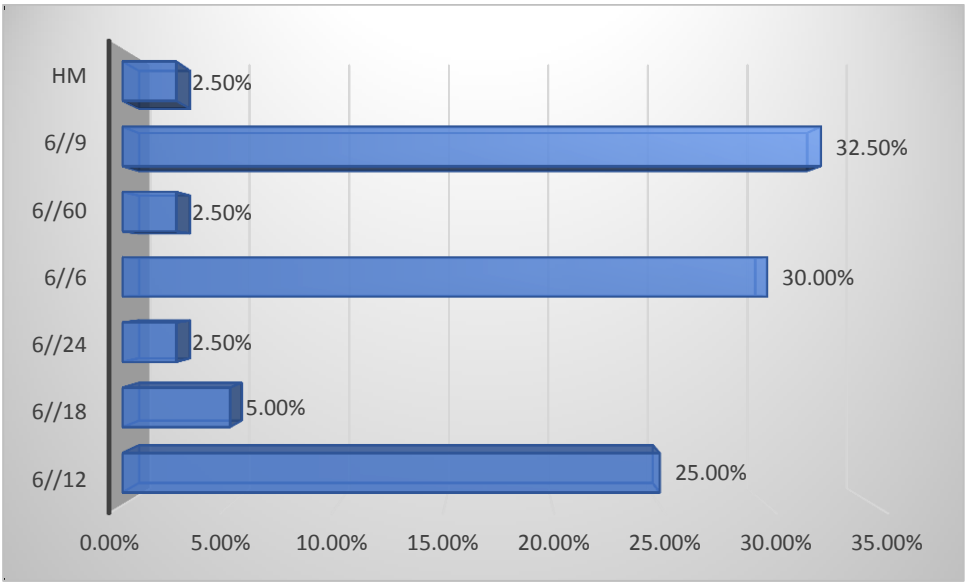


Graph 8: Distribution of patients based on the postoperative VA day 7

Table 10: Distribution of patients based on the postoperative BCVA day 30

		Frequency	Percent
POSTOPERATIVE VA DAY30	6/12	10	25.0%
	6/18	2	5.0%
	6/24	1	2.5%
	6/6	12	30.0%
	6/60	1	2.5%
	6/9	13	32.5%
	HM	1	2.5%
	Total	40	100.0%

Best corrected Visual acuity (VA) outcomes on postoperative day 30 (POD30) among the patients surveyed showed among the total of 40 patients, the most common postoperative VA is reported as 6/6, observed in 12 patients or 30.0%. This is followed by 6/12 VA, reported in 10 patients or 25.0%, and 6/9 VA, observed in 13 patients or 32.5%. Additionally, 6/18 VA is reported in 2 patients or 5.0%, and 6/24 and 6/60 VA are each observed in 1 patient or 2.5%. Furthermore, hand movements (HM) vision is reported in 1 patient or 2.5%.



Graph 9: Distribution of patients based on the postoperative VA day 30

Table 11: Distribution of patients based on the intraoperative events & pupil size after dilating

INTRAOPERATIVE events		PUPIL SIZE AFTER DILATING (mm)				Total	P Value
		3	4	5	6		
Iris trauma	n	0	4	5	0	9	0.39
	%	0.0%	44.4%	55.6%	0.0%	100.0%	
Difficulty in delivering nucleus	n	1	3	0	0	4	0.03
	%	25.0%	75.0%	0.0%	0.0%	100.0%	
Pc rent	n	1	2	8	0	11	0.12
	%	9.1%	18.2%	72.7%	0.0%	100.0%	
Sphincterotomy	n	1	2	0	0	3	0.03
	%	33.3%	66.7%	0.0%	0.0%	100.0%	
Anterior vitrectomy	n	0	0	2	0	2	0.50
	%	0.0%	0.0%	100.0%	0.0%	100.0%	
IOL in sulcus	n	0	0	1	0	1	0.76
	%	0.0%	0.0%	100.0%	0.0%	100.0%	
Iridodialysis	n	0	0	1	0	1	0.76
	%	0.0%	0.0%	100.0%	0.0%	100.0%	
Iris claw	n	0	0	1	0	1	0.76
	%	0.0%	0.0%	100.0%	0.0%	100.0%	

The table on intraoperative events observed in relation to pupil size after dilation during ocular surgeries, along with corresponding frequencies and percentages. "Iris trauma" is

observed in 9 cases, with no significant association with pupil size after dilation (p = 0.39). However, "Difficulty in delivering nucleus" is reported in 4 cases, with a statistically significant association observed (p = 0.03), indicating a higher prevalence when pupil size after dilation is 3 mm compared to other sizes. “PC rent" occurred in 11cases, showing no significant association with pupil size after dilation (p = 0.12). Other complications such as "Sphincterotomy "Anterior vitrectomy, PCIOL in sulcus," "Iridodialysis," and "Iris claw" are each reported in smaller numbers, with no significant associations observed with pupil size after dilation.

Table 12: Distribution of patients based on the POD1 slit lamp examination & pupil size after dilating

POD1 SLIT LAMP EXAMINATION		PUPIL SIZE AFTER DILATING (mm)				Total	P Value
		3	4	5	6		
Clear	n	0	1	1	1	3	0.79
	%	0.0%	33.3%	33.3%	33.3%	100.0%	
AC Reaction	n	0	2	2	0	4	0.72
	%	0.0%	50.0%	50.0%	0.0%	100.0%	
Corneal edema	n	1	7	9	0	17	0.14
	%	5.9%	41.2%	52.9%	0.0%	100.0%	
DM folds	n	0	5	5	1	11	0.59
	%	0.0%	45.5%	45.5%	9.1%	100.0%	

The table provides data on the findings of slit lamp examination conducted on postoperative day 1 (POD1) in relation to pupil size after dilation during ocular surgeries. Among the observed findings, "Clear" outcomes are reported in 3 cases, with no significant association observed with pupil size after dilation (p = 0.79). Similarly, "AC Reaction" is noted in 4 cases, showing no significant association with pupil size after dilation (p = 0.72). "Corneal

edema" is noted in 17 cases, with no significant association observed (p = 0.14). "DM folds" are reported in 11 cases, showing no significant association with pupil size after dilation (p = 0.59).

Table 13: Distribution of patients based on the postoperative VA day 1 & pupil size after dilating

			PUPIL SIZE AFTER DILATING (mm)				Total
			3	4	5	6	
POSTOPERATIVE VA DAY 1	3/60	n	0	1	0	0	1
		%	0.0%	100.0%	0.0%	0.0%	100.0%
	6/12	n	0	1	1	0	2
		%	0.0%	50.0%	50.0%	0.0%	100.0%
	6/18	n	0	2	0	0	2
		%	0.0%	100.0%	0.0%	0.0%	100.0%
	6/24	n	0	2	7	0	9
		%	0.0%	22.2%	77.8%	0.0%	100.0%
	6/36	n	0	0	1	1	2
		%	0.0%	0.0%	50.0%	50.0%	100.0%
	6/6	n	1	0	0	3	4
		%	25.0%	0.0%	0.0%	75.0%	100.0%
	6/60	n	0	3	3	0	6
		%	0.0%	50.0%	50.0%	0.0%	100.0%
	6/9	n	0	1	2	2	5
		%	0.0%	20.0%	40.0%	40.0%	100.0%
	CF4mt	n	0	0	1	0	1
		%	0.0%	0.0%	100.0%	0.0%	100.0%
	CF CF	n	2	0	0	0	2
		%	100.0%	0.0%	0.0%	0.0%	100.0%
	HM	n	0	3	3	0	6
		%	0.0%	50.0%	50.0%	0.0%	100.0%
Total		n	2	13	19	6	40
		%	5.0%	32.5%	47.5%	15.0%	100.0%

Chi-Square: 56.42, P Value: 0.007, Statistically significant

The table presents data on postoperative visual acuity (UCVA) on day 1 (POD1) in relation to pupil size after dilation during ocular surgeries. The data is tabulated based on different postoperative VA outcomes and pupil sizes after dilation. Among the observed postoperative

VA outcomes, "6/24" VA is the most common, reported in 19 cases or 47.5%, followed by "6/12" VA observed in 13 cases or 32.5%. Other VA outcomes such as "6/60," "6/9," and "6/6" are reported in smaller proportions. The distribution of postoperative VA outcomes varies across different pupil sizes after dilation, with no specific pattern observed. However, "6/6" VA is notably higher when the pupil size after dilation is 6 mm, comprising 75.0% of cases in this category. Additionally, "counting finger close to face VA outcomes are each observed in 2 cases, while "HM" VA is reported in 6 cases. The association between them was found to be statistically significant.

Table 14: Distribution of patients based on the postoperative BCVA day 7 & pupil size after dilating

			PUPIL SIZE AFTER DILATING (mm)				Total
			3	4	5	6	
POSTOPERATIVE BCVA DAY 7	6/12	n	0	2	5	1	8
		%	0.0%	25.0%	62.5%	12.5%	100.0%
	6/18	n	0	3	4	0	7
		%	0.0%	42.9%	57.1%	0.0%	100.0%
	6/24	n	0	2	1	0	3
		%	0.0%	66.7%	33.3%	0.0%	100.0%
	6/36	n	0	1	4	0	5
		%	0.0%	20.0%	80.0%	0.0%	100.0%
	6/6	n	1	2	2	5	10
		%	10.0%	20.0%	20.0%	50.0%	100.0%
	6/60	n	1	0	0	0	1
		%	100.0%	0.0%	0.0%	0.0%	100.0%
	6/9	n	0	1	3	0	4
		%	0.0%	25.0%	75.0%	0.0%	100.0%
	CF 3mt	n	0	1	0	0	1
		%	0.0%	100.0%	0.0%	0.0%	100.0%
	HM	n	0	1	0	0	1
		%	0.0%	100.0%	0.0%	0.0%	100.0%
Total		n	2	13	19	6	40
		%	5.0%	32.5%	47.5%	15.0%	100.0%

Chi-Square: 42.27, P Value: 0.01, Statistically significant

The table displays data on postoperative visual acuity (VA) on day 7 (POD7) in relation to

pupil size after dilation during ocular surgeries. Among the observed postoperative BCVA outcomes, "6/12" VA is the most prevalent, reported in 8 cases or 20.0%, followed by "6/18" VA observed in 7 cases or 17.5%. Other VA outcomes such as "6/24," "6/36," "6/6," "6/60," and "6/9" are reported in varying proportions. Notably, "6/12" VA is predominant when the pupil size after dilation is 5 mm, constituting 62.5% of cases in this category. Similarly, "6/18" VA is predominant when the pupil size after dilation is 5 mm, accounting for 57.1% of cases. "6/24" VA is primarily reported when the pupil size after dilation is 4 mm, with 66.7% of cases in this category. Furthermore, "6/36" VA is mainly observed when the pupil size after dilation is 5 mm, comprising 80.0% of cases. "6/6" VA is most prevalent when the pupil size after dilation is 6 mm, representing 50.0% of cases in this category. "6/60" VA is only reported in cases where the pupil size after dilation is 3 mm or 6 mm. Additionally, "CF 3mt" and "HM" VA outcomes are each observed in 1 case. The association between them was found to be statistically significant.

Table 15: Distribution of patients based on the postoperative BCVA day 30 & pupil size after dilating

			PUPIL SIZE AFTER DILATING (mm)				Total
			3	4	5	6	
POSTOPERATIVE BCVA DAY30	6/12	n	0	4	6	0	10
		%	0.0%	40.0%	60.0%	0.0%	100.0%
	6/18	n	0	1	1	0	2
		%	0.0%	50.0%	50.0%	0.0%	100.0%
	6/24	n	1	0	0	0	1
		%	100.0%	0.0%	0.0%	0.0%	100.0%
	6/6	n	1	2	4	5	12
		%	8.3%	16.7%	33.3%	41.7%	100.0%
	6/60	n	0	1	0	0	1
		%	0.0%	100.0%	0.0%	0.0%	100.0%
	6/9	n	0	4	8	1	13
		%	0.0%	30.8%	61.5%	7.7%	100.0%
	HM	n	0	1	0	0	1
		%	0.0%	100.0%	0.0%	0.0%	100.0%
Total		n	2	13	19	6	40
		%	5.0%	32.5%	47.5%	15.0%	100.0%

Chi-Square: 35.29, P Value: 0.009, Statistically significant

The table presents data on postoperative visual acuity (BCVA) on day 30 (POD30) in relation to pupil size after dilation during ocular surgeries. Among the observed postoperative VA outcomes, "6/12" VA is the most common, reported in 10 cases or 25.0%, followed by "6/6" VA observed in 12 cases or 30.0%. Other VA outcomes such as "6/9," "6/18," and "6/60" are reported in varying proportions. Notably, "6/12" VA is predominant when the pupil size after dilation is 5 mm, constituting 60.0% of cases in this category. Similarly, "6/6" VA is most prevalent when the pupil size after dilation is 6 mm, representing 41.7% of cases in this category. "6/9" VA is primarily reported when the pupil size after dilation is 5 mm, with 61.5% of cases in this category. Additionally, "HM" VA is observed in 1 case, where the pupil size after dilation is 4 mm. The association between them was found to be significant by statistics.

DISCUSSION

DISCUSSION

In this study, Among 40 patients, majority,19 patients fall into the age group of 61-70 years. This is followed by the age group of >71 years 14 patients of the total. A smaller proportion 7 patients belong to the age group of 50-60 years. In Reshma BKS et al[68], majority of patients belonged to the age group of 61 to 80 years. This distribution likely reflects the increased number of pseudo-exfoliation and uncontrolled diabetes, which are more common in these age groups and can lead to the development of a small pupil. In Yamini K et al[67] majority of the patients were in age group of 61-70 years.

Numerous studies have reported a higher incidence of cataracts among the elderly population. Age often correlates with the severity of cataracts. As individuals grow older, the cataracts tend to progress to denser opacities. Small pupil cases present distinct challenges during cataract surgery, irrespective of age. However, age-related factors such as decreased pupil dilation capability due to senile miosis can exacerbate these challenges in elderly patients. In a study by Fernandez et al.[73]it was observed that older patients undergoing manual small incision cataract surgery had a higher likelihood of developing postoperative complications such as posterior capsular opacification compared to younger patients.

Table 16: Comparison of most common age group in Cataract Surgery Studies

Study	**61-70 years**
Current Study	19 (47.5%)
Yamini K et al.[67]	42.7%
Khandekar et al.[74]	41.86%

Out of the total 40 patients, 19 individuals or 47.5% are male, while 21 individuals, or 52.5% are females. In Reshma BKS et al[68] Yamini K et al [67]slight female preponderance was observed. This means that there were slightly more female than male patients.

Gender-related anatomical differences, such as smaller palpebral apertures and shallower anterior chambers in females, may pose unique challenges during MSICS[75].

Table 17: Comparison of Gender Distribution in Cataract Surgery Studies

Study	Sample Size	Male Frequency (%)	Female Frequency (%)	Male to Female Ratio
Current Study	40	19 (47.5%)	21 (52.5%)	1:1.1
Reshma BKS et al.[68]	50	22 (44%)	28(56%)	1:1.2
Yamini K et al.[67]	227	89 (39%)	138 (61%)	1:1.55
Warad C et al.[71]	94	38 (40.43%)	56 (59.57%)	1:1.47

Pre-operative visual acuity serves as a predictor of surgical success and postoperative visual outcomes following MSICS. In this study, out of the total 40 patients surveyed, the most common pre-operative visual acuity category is "CF Close to Face", with 11 individuals. This is followed by 1/60-2/60 and CF 2mt, each comprising 7 individuals or 17.5% and 6 individuals or 15.0%, respectively. Other VA are in smaller proportion of the total patient population.

Patients with better pre-operative visual acuity tend to have smoother surgical procedures, lower complication rates, and higher chances of achieving optimal visual rehabilitation postoperatively.[75]

According to the majority of research, a large number of patients who present themselves to

hospitals in underdeveloped nations most of them are blind at least in one eye at presentation [76-78] on the other hand, patients in wealthy countries present earlier and have a higher visual acuity than those in developing countries. A study that was carried out in Sub-Saharan Africa found that hand movements that were close to the face were the most prominent source of visual acuity (36.9%).[76].

Table18: Comparison of Pre-operative Visual Acuity in Cataract Surgery Studies

Study	Most Common Pre-op VA	Frequency (%)	Second Most Common Pre-op VA	Frequency (%)	Other Pre-op VA Categories and Frequency (%)
Current Study	CF CF (Counting Fingers Close Face)	11 (27.5%)	1/60-2/60	7 (17.5%)	HM+ (12.5%), CF 3mt (15.0%), CF 5mt (5.0%), PL +, CF 1/2mt ,CF 4mt were 2.5% each
Warad C et al.[71]	6/6 - 6/18	103 (98.1%)	<6/18 - 3/60	2 (1.9%)	None were blind or with VA <3/60
Sub-Saharan Africa Study[76]	Hand movements close to face	184(36.9%)	PL+	158(31.3%)	Counting fingers-6/6

Out of the total 40 patients, the majority, comprising 31 individuals (77.5%), had a pupil size of 3 mm before dilation, while 9 individuals(22.5%) had a pupil size of 2 mm. Most common pupil size after dilation is 5 mm, with 19 individuals (47.5%) This is followed by a pupil size of 4 mm, observed in 13 individuals (32.5%). Additionally, 6 individuals (15.0%) exhibit a

pupil size of 6 mm, while 2 individuals (5.0%) have a pupil size of 3 mm after dilation.

Pupil size before and after dilation significantly impacts the choice of surgical technique and intraoperative maneuverability during MSICS. In cases with small pupils, pre-operative pupil size may necessitate modifications to surgical techniques like use of 2.5% phenylephrine,2% viscoelastic or to perform sphincterotomy.

Intraoperative events during manual small incision cataract surgery (MSICS) can significantly impact surgical success, visual outcomes, and patient safety, especially in cases involving small pupils.

Complications in this study were, trauma to iris occurred with a frequency of 27.5%. Difficulty in delivering the nucleus, noted in 12.5% of cases. Posterior capsular rent occurred in 28.0% of cases. Surgical interventions were sphincterotomy (10.0%), and anterior vitrectomy (5.0%) was done. Other complications were intraocular lens (IOL) placement-related issues like sulcus placement (5.0%) or iris-claw fixation (2.5%). In this study, among the complications reported, "trauma to iris " is observed in 9 cases, with no significant association with pupil size after dilation ($p = 0.39$). However, "Difficulty in delivering nucleus" is reported in 4 cases, with a statistically significant association observed ($p = 0.03$), indicating a higher prevalence when pupil size after dilation is 3 mm compared to other sizes. "PC rent" occurs in 11 cases, showing no significant association with pupil size after dilation ($p = 0.12$). Other complications such as, "Iridodialysis," is reported in smaller numbers, with no significant associations observed with pupil size after dilation.

In Reshma BKS et al[68], Difficulty in nucleus delivery, Iridodialysis, Posterior capsule rent. These complications were observed among the cases studied during Small Incision Cataract Surgery when dealing with small pupils. In Warad C et al[71] noticed iris prolapse and posterior capsular rent.

According to Venkatesh et al., the incidence of PCR in cases with SICS was 1.4%, however,

Ruit et al. claimed that there was no frequency of PCR in MSICS cases. [79-80] Venkatesh et al. found PCR in 2% of instances of MSICS in brown and black cataract, while Gogate encountered PCR in 6% of MSICS patients. Both of these findings were observed in MSICS surgery. [81-82]

According to the findings of the study, intraoperative problems were rather high in cases of cataract surgery that involved manual small incision cataract surgery methods and involved a small pupil. In order to reduce the likelihood of intraoperative miosis, there are a few procedures that can be performed prior to the operation. In the event that a small pupil is present during cataract surgery, complications like floppy iris syndrome, trauma to the iris, difficulty in delivering the nucleus, rupture of the posterior capsule, and problems associated with the implantation and fixation of the intraocular lens may rise. There is a possibility that the existence of a small pupil during cataract surgery could result in more complications occurring during the procedure.[6]

Table 19:Comparison of Intraoperative Events in Manual Small Incision Cataract Surgery (MSICS) Studies

Study	Iris trauma	PC Rent	Difficulty in Delivering Nucleus	Anterior Vitrectomy	Sphincterotomy	Other events/Findings
Current Study	27.5% (09)	28.0% (11)	12.5% (5)	5.0% (2)	10.0% (4)	PCIOL in sulcus (5.0%), Iris claw (2.5%), Iridodialysis (2.5%)
Reshma BKS et al.[68]	16% (8)	12% (6)	32% (16)	-	4% (2)	Iridodialysis 2% (1)

In this study, Slit lamp examination conducted on postoperative day 1 (POD1) among the patients reveals various ocular conditions: DM folds affecting 11 (27.5%). Additionally, corneal edema is reported in 17, and AC reaction was observed in 4 patients(10.0%). A smaller proportion of patients, 3 individuals(7.5%), exhibit clear cornea.

Venkatesh conducted a study where he examined 100 eyes that had undergone MSICS for white cataract. He found that 6% of the eyes had corneal edema with more than 10 Descemet's folds, whereas 7% of the cases had corneal edema with less than 10 Descemet and his folds. In six of the cases, the iritis was mild, and in three of the cases, it was significant.[109]

In the group of patients who underwent phacofracture, Vajpayee et al. documented a loss of endothelial cells of 17.66% ±3.6%. Additionally, seven out of sixty cases showed central corneal edema.[87]

In this study, UCVA on POD1 among the patients surveyed showed most common postoperative UCVA is reported as 6/24, observed in 9 patients, 6 patients had HM vision, while 6/60 UCVA is observed in 6 patients. Other VA outcomes include 6/6, 6/9, and 6/12, each reported in smaller proportions. A few patients exhibit lower vision outcomes, such as 3/60 and CF, accounting for minimal percentages. This is due to post-op corneal complications.

On day 7, the most common postoperative BCVA reported as 6/6, observed in 10 patients. This is followed by 6/12 BCVA, reported in 8 patients, and 6/18 BCVA, observed in 7 patients Additionally, 6/36 and 6/9 BCVA are each reported in 5 patients and 4 patients respectively. Other BCVA outcomes include 6/24 and 6/60, each reported in smaller proportions, along with CF 3 meters and hand movements vision, each observed in 1 patient

Best corrected Visual acuity outcomes on postoperative day 30 (POD30), the most common postoperative BCVA is reported as 6/6, observed in 12 patients This is followed by 6/12, 6/9

BCVA, observed in 13 patients (32.5%). Additionally, 6/18 BCVA is reported in 2 patients or 5.0%, and 6/24 and 6/60 BCVA are each observed in 1 patient (2.5%). Furthermore, HM vision is reported in 1 patient (2.5%).

A postoperative best corrected visual acuity of 6/18 or more was seen in 96% of the participants in a study by Yamini K et al. [67]

103 individuals, or 98.1%, had good eyesight, as measured by a visual acuity of 6/6 to 6/18, according to a study that was carried out by Warad C et al[71]. Best visual outcomes of 87% observed in a study by Khandekar et al.[74], and 88% and 99% in studies conducted by Venkatesh et al[88,89] have also found positive results. In comparison to studies carried out in Southwestern Nigeria[90] and Kenya[91], our research has demonstrated superior outcomes, with 54.1% and 77.1%-89.4% of patients, respectively, showing satisfactory vision after undergoing small incision cataract surgery.

Table 20: Comparison of Postoperative Visual Acuity in Cataract Surgery Studies

Study	Post-op Day	Most Common Post-op VA	Frequency (%)	Second Most Common Post-op VA	Frequency (%)
Current Study	Day 1	6/24	9 (22.5%)	Hand Movements (HM)	6 (15.0%)
	Day 7	6/613	10 (25.0%)	6/12	8 (20.0%)
	Day 30	6/6	12 (30.0%)	6/9	13 (32.5%)
Yamini K et al.[67]	Day 1	6/24 to 6/36	96%	6/12-6/18	74
Warad C et al.[71]	Day 30	6/6 - 6/18	103 (98.1%)	<6/18-3/30	2 (1.9%)
Khandekar et al.[74]	At 6 weeks	6/6 - 6/18	12,552 (87%)	6/24-6/60	1473 (10%)
Venkatesh et al.[88,89]	Day 40	>6/24-6/60	265 (51%)	>6/18	228 (43.9)

POSTOPERATIVE VA & PUPIL SIZE AFTER DILATING

In this study, On POD1 among the observed postoperative VA outcomes, "6/24" VA is the most common, reported in 19 (47.5), followed by "6/12" UCVA observed in 13 cases (32.5%). Other VA are reported in smaller proportions. The distribution of postoperative VA outcomes varies across different pupil sizes after dilation, with no specific pattern observed. However, "6/6" UCVA is notably higher when the pupil size after dilation is 6 mm, Additionally, "counting finger close to face " was observed in 1 case while "hand movements" VA is reported in 6 cases. The association between them was found to be statistically significant

On day 7 "6/12" BCVA is predominant when the pupil size after dilation is 5 mm, "6/24" BCVA is primarily reported when the pupil size after dilation is 4 mm, "6/6" BCVA is most prevalent when the pupil size after dilation is 6 mm, representing 50.0% of cases in this category. The association between them was found to be statistically significant.

At day 30 "6/6" BCVA is most prevalent when the pupil size after dilation is 6 mm, "6/9" VA is primarily reported when the pupil size after dilation is 5 mm, Additionally, "HM" VA is observed in 1 case, where the pupil size after dilation is 4 mm. The association between them was found to be statistically significant.

CONCLUSION

CONCLUSION

"Manual small incision cataract surgery" in patients with small pupils presents significant challenges, particularly regarding intraoperative complications such as trauma to iris and posterior capsule rent. Despite these challenges, the study shows that with meticulous surgical technique and careful management, favourable visual outcomes can be achieved. The majority of patients experienced progressive improvement in visual acuity from postoperative day 1 to day 30, with many reaching 6/6 vision. Significant associations were found between smaller pupil sizes and increased surgical difficulty, emphasizing the need for tailored approaches in these cases. Overall, the study underscores the efficacy of this surgical method in improving visual outcomes for patients with small pupils.

SUMMARY

SUMMARY

This was a cross-sectional study conducted in R.L. Jalappa hospital, Kolar during study period September 2022 to December 2023.Forty patients were included who underwent manual small incision cataract surgery with small pupils by single surgeon. The majority of patients were aged between 61-70 years, comprising 47.5% of the sample, followed by those over 71 years (35.0%), and the smallest group being those aged 50-60 years (17.5%). Gender distribution was fairly even, with 52.5% female and 47.5% male patients.

Pre-operative visual acuity varied, with the most common category being counting finger close to face (CF CF) observed in 27.5% of patients. Other notable pre-operative visual acuities included 1/60-2/60 in 17.5% of patients and counting fingers at 2 meters (CF 2mt) in 15.0% of patients.

Regarding pupil size, before dilation, the majority of patients (77.5%) had 3mm as a pupil size, while 22.5% had 2 mm size pupil. Post-dilation, the most common pupil size was 5 mm (47.5%), followed by 4 mm (32.5%), 6 mm (15.0%), and 3 mm (5.0%).

Intraoperative complications were notable, with trauma to iris(microbleeds, sphincter tears, iris chafing)was seen in 27.5% of total cases and PC rent in 28.0%. Difficulty in delivering the nucleus was encountered in 12.5% of surgeries.

Postoperative slit lamp examinations on day 1 revealed that 42.5% of patients experienced corneal edema, while Descemet's membrane folds (DM folds) were observed in 27.5% of patients. Anterior chamber (AC) reaction was noted in 10.0%, and 7.5% of patients had clear findings.

Uncorrected Visual acuity outcomes showed that on day 1 post surgery, the visual acuity of

6/24 (22.5%) was more common, with 15.0% of patients achieving 6/60 and hand movements (HM) vision. On postoperative day 7, 25.0% of patients achieved 6/6 vision, followed by 20.0% with 6/12 and 17.5% with 6/18. By postoperative day 30, the most common visual acuity was 6/6 (30.0%), with 32.5% of patients achieving 6/9 and 25.0% achieving 6/12.

Statistical analysis revealed significant associations between intraoperative events, postoperative visual acuity, and pupil size after dilation. Difficulty in delivering the nucleus was significantly associated with smaller pupil sizes ($p = 0.03$). Furthermore, visual acuity on day 1 post surgery showed a statistically significant association with pupil size after dilation (Chi-Square: 56.42, P Value: 0.007)

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ANNEXURE

ANNEXURE

ANNEXURE-I

CASE PROFORMA	
Group:	Case no:
Name:	Date:
Age:	IP no:
Sex:	Date of examination:
Occupation:	

Address:

Chief complaints:

History of Presenting illness:

Past history:

DM/HTN/BA/Epilepsy Family history:

Personal history:

Appetite – Sleep – Bowel –

Diet – Habits – Bladder –

GPE:

Pallor / Edema /Icterus / Cyanosis / Clubbing / Lymphadenopathy Vital signs:

- Pulse – c) RR –
- BP – d) Temp –

Systemic examination:

- CVS – c. RS –
- PA – d. CNS –

OCULAR EXAMINATION		
	RE	**LE**
- Head posture - Ocular posture - Facial symmetry		
4. Ocular movements		
5. Visual Acuity Distant		
➢ Anterior Segment		
7. Fundus (Slit Lamp +90D)		

VISUAL ACUITY	PREOPERATIVE	POD1	POD7	POD30

INTRAOPERATIVE COMPLICATIONS	

	DAY1	DAY7	DAY30
POSTOPERATIVE COMPLICATIONS			

ANNEXURE-II

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA, KOLAR - 563101.

INFORMED CONSENT FORM

Group:

Case no:

IP no:

TITLE: "CLINICAL OUTCOME OF MANUAL SMALL INCISION CATARACT SURGERY IN SMALL PUPIL"

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 understand the purpose of this study, the risks and benefits of the technique and the confidential nature of the information that will be collected and disclosed during the study.

The information collected will be used only for research.
I have had the opportunity to ask questions regarding the various aspects of this study and my questions have been answered to my satisfaction.

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

Participation in this research project does not involve any financial burden to me.

Name	Signature	Date	Time
Patient:			
Witness1:			
Witness 2:			
Primary Investigator/ Doctor:			

ತಿಳುವಳಿಕೆ ಸಮ್ಮತಿ ಸೂಚನೆ

ಶೀರ್ಷಿಕೆ: ಚಿಕ್ಕ ಪಾಪೆ ಹಸ್ತಚಾಲಿತ ಸಣ್ಣ ಛೇದನದ ಕಣ್ಣಿನ ಪೊರೆ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ಕ್ಲಿನಿಕಲ್ ಫಲಿತಾಂಶದ ಅಧ್ಯಯನ

ಐಪಿ ಸಂಖ್ಯೆ:

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

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

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

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

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ ನನಗೆ ಯಾವುದೇ ಹೆಚ್ಚುವರಿ ವೆಚ್ಚ ಒಳಗೊಳ್ಳುವುದಿಲ್ಲ.

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

ANNEXURE-III

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA, KOLAR - 563101.

PATIENT INFORMATION SHEET

TITLE "CLINICAL OUTCOME OF MANUAL SMALL INCISION CATARACT SURGERY IN SMALL PUPIL"

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

1. What is the purpose of this study?

This study is to know the clinical outcome of patients with small pupil following manual small incision cataract surgery and preoperative and intraoperative complications are noted.

2. What are the various investigations being used? Are there any associated risks? Absolutely no risks are associated with the various investigations to be done which are assessing for distant vision using Snellens chart, Slit lamp examination,keratometry,A scan and B scan

After A scan and B scan patient might develop watering and redness of eyes.

3. What is the benefit for me as a participant?

As your pupils are assessed before the surgery many complications associated with small pupil will be avoided and that helps us to give you best postoperative visual acuity

Such observation may also be of importance in interpreting and/or planning treatement for protection of vision in patients having small pupil due to some or the other cause.

Participation in this research study may not change the final outcome of your eye condition. However, patients in the future may benefit as a result of knowledge

from this study. You will not be charged extra for any of the procedures performed during the research study. Your taking part in this study is entirely voluntary.

You may refuse to take part in the study or you may stop your participation in the study at any time, without any penalty or loss of any benefits to which you were otherwise entitled

before taking part in this study.

CONFIDENTIALITY

Your medical information will be kept confidential by the study doctor and staff and will not be made publicly available. Your original records may be reviewed by your doctor or ethics review board. For further information, /clarification please contact DR.SHARADHI S PETKAR SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA, KOLAR – 563101

DOCTOR'S DETAILS:

DR. SHARADHI S PETKAR **PHONE NO. 8660117456**

JUNIOR RESIDENT

DEPARTMENT OF OPHTHALMOLOGY, SDUMC, KOLAR – 563101

ಶ್ರೀ ದೇವರಾಜ್ ಅರಸ್ ಉನ್ನತ ಶಿಕ್ಷಣ ಮತ್ತು ಸಂಶೋಧನಾ ಸಂಸ್ಥೆ,

ಟಮಕ, ಕೋಲಾರ - 563101.

ರೋಗಿಯ ಮಾಹಿತಿ ಪತ್ರ

ಈ ಮಾಹಿತಿಯು "ಚಿಕ್ಕ ಪಾಪೆ ಹಸ್ತಚಾಲಿತ ಸಣ್ಣ ಛೇದನದ ಕಣ್ಣಿನ ಪೊರೆ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ಕ್ಲಿನಿಕಲ್ ಫಲಿತಾಂಶದ ಅಧ್ಯಯನ

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

- ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶವೇನು?

ಈ ಅಧ್ಯಯನವು ಹಸ್ತಚಾಲಿತ ಸಣ್ಣ ಛೇದನದ ಕಣ್ಣಿನ ಪೊರೆ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರ ಸಣ್ಣ ಪಾಪೆ ಹೊಂದಿರುವ ರೋಗಿಗಳ ದೃಷ್ಟಿಗೋಚರ ಫಲಿತಾಂಶವನ್ನು ತಿಳಿಯಲು ಮತ್ತು ಪೂರ್ವಭಾವಿ ಮತ್ತು ಇಂಟ್ರಾಆಪರೇಟಿವ್ ತೊಡಕುಗಳನ್ನು ಗುರುತಿಸಲಾಗಿದೆ

2. ಯಾವ ತನಿಖೆ ಗಳನ್ನು ಬಳಸಲಾಗುತ್ತದೆ?

ಸ್ನೆಲೆನ್ಸ್ ಚಾರ್ಟ್, ಸ್ಲಿಟ್ ಲ್ಯಾಂಪ್ ಪರೀಕ್ಷೆ, ಬಳಸಿಕೊಂಡು ದೂರದ ದೃಷ್ಟಿಯನ್ನು ನಿರ್ಣಯಿಸುವ ವಿವಿಧ ತನಿಖೆಗಳೊಂದಿಗೆ ಸಂಪೂರ್ಣವಾಗಿ ಯಾವುದೇ ಅಪಾಯಗಳು ಸಂಬಂಧಿಸಿಲ್ಲ. ಎ ಸ್ಕ್ಯಾನ್ ಮತ್ತು ಬಿ ಸ್ಕ್ಯಾನ್ ನಂತರ ರೋಗಿಯು ನೀರು ಮತ್ತು ಕಣ್ಣುಗಳು ಕೆಂಪಾಗುವಿಕೆ ಆಗಬಹುದು.

3. ಭಾಗವಹಿಸುವವನಾಗಿ ನನಗೆ ಏನು ಪ್ರಯೋಜನ?

ನಿಮ್ಮ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ಮೊದಲು ಮೌಲ್ಯಮಾಪನ ಮಾಡುವುದರಿಂದ ಸಣ್ಣ ಪಾಪೆ ಸಂಬಂಧಿಸಿದ ಅನೇಕ ತೊಡಕುಗಳನ್ನು ತಪ್ಪಿಸಲಾಗುತ್ತದೆ ಮತ್ತು ಇದು ನಿಮಗೆ ಉತ್ತಮ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರದ ದೃಷ್ಟಿ ತೀಕ್ಷ್ಣತೆಯನ್ನು ನೀಡಲು ನಮಗೆ ಸಹಾಯ ಮಾಡುತ್ತದೆ.

ಕೆಲವು ಅಥವಾ ಇತರ ಕಾರಣಗಳಿಂದ ಸಣ್ಣ ಪಾಪೆ ಹೊಂದಿರುವ ರೋಗಿಗಳಲ್ಲಿ ದೃಷ್ಟಿಯ ರಕ್ಷಣೆಗಾಗಿ ಚಿಕಿತ್ಸೆಯನ್ನು ಅರ್ಥೈಸುವಲ್ಲಿ ಮತ್ತು/ಅಥವಾ ಯೋಜಿಸುವಲ್ಲಿ ಅಂತಹ ವೀಕ್ಷಣೆಯು ಪ್ರಾಮುಖ್ಯತೆಯನ್ನು ಹೊಂದಿರಬಹುದು.

ಈ ಸಂಶೋಧನಾ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆಯು ನಿಮ್ಮ ಕಣ್ಣಿನ ಸ್ಥಿತಿಯ ಅಂತಿಮ ಫಲಿತಾಂಶವನ್ನು ಬದಲಾಯಿಸುವುದಿಲ್ಲ. ಆದಾಗ್ಯೂ, ಪಡೆದ ಜ್ಞಾನದ ಪರಿಣಾಮವಾಗಿ ಭವಿಷ್ಯದಲ್ಲಿ ರೋಗಿಗಳು ಪ್ರಯೋಜನ

ಪಡೆಯಬಹುದು

ಈ ಅಧ್ಯಯನದಿಂದ. ಸಂಶೋಧನಾ ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ನಡೆಸಿದ ಯಾವುದೇ ಕಾರ್ಯವಿಧಾನಗಳಿಗೆ ನಿಮಗೆ ಹೆಚ್ಚುವರಿ ಶುಲ್ಕ ವಿಧಿಸಲಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನೀವು ಭಾಗವಹಿಸುವುದು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ.

ನೀವು ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನಿರಾಕರಿಸಬಹುದು ಅಥವಾ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವ ಮೊದಲು ನೀವು ಅರ್ಹರಾಗಿದ್ದ ಯಾವುದೇ ಪ್ರಯೋಜನಗಳ ಯಾವುದೇ ದಂಡ ಅಥವಾ ನಷ್ಟವಿಲ್ಲದೆಯೇ ನೀವು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವುದನ್ನು ನಿಲ್ಲಿಸಬಹುದು.

ಗೌಪ್ಯತೆ

ನಿಮ್ಮ ವೈದ್ಯಕೀಯ ಮಾಹಿತಿಯನ್ನು ಅಧ್ಯಯನದ ವೈದ್ಯರು ಮತ್ತು ಸಿಬ್ಬಂದಿ ಗೌಪ್ಯವಾಗಿಡಲಾಗುವುದು ಮತ್ತು ಸಾರ್ವಜನಿಕವಾಗಿ ಲಭ್ಯವಿರುವುದಿಲ್ಲ. ನಿಮ್ಮ ಮೂಲ ದಾಖಲೆಗಳನ್ನು ನಿಮ್ಮ ವೈದ್ಯರು ಅಥವಾ ನೈತಿಕ ವಿಮರ್ಶೆ ಮಂಡಳಿ ಪರಿಶೀಲಿಸಬಹುದು. ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ ಸಂಪರ್ಕಿಸಿ

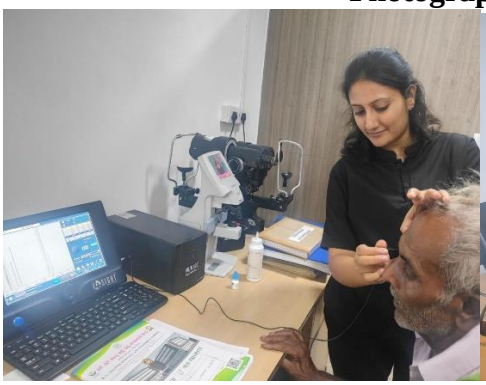
DR. SHARADHI SPETKAR **PHONE NO. 8660117456**

JUNIOR RESIDENT

DEPARTMENT OF OPHTHALMOLOGY, SDUMC, KOLAR – 563101

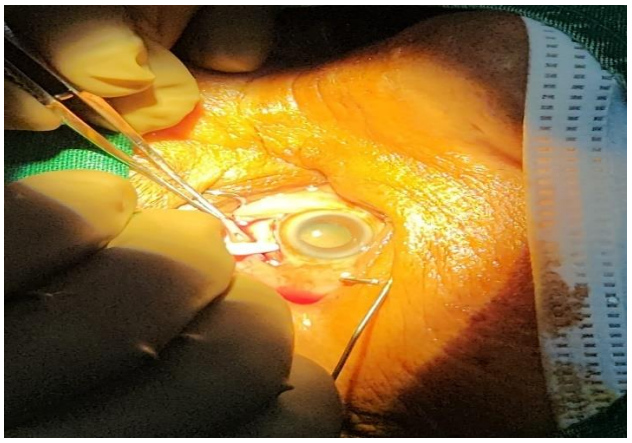
ANNEXURE-IV

Photograph 1: GAT

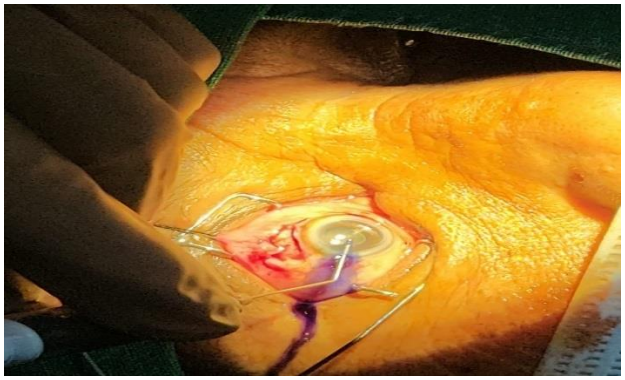


Photograph 2: A scan being done **Photogragh 3:B scan**

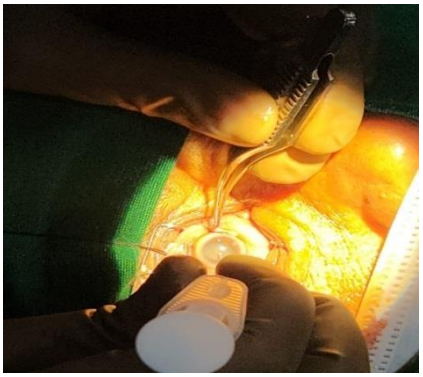
MSICS Procedure



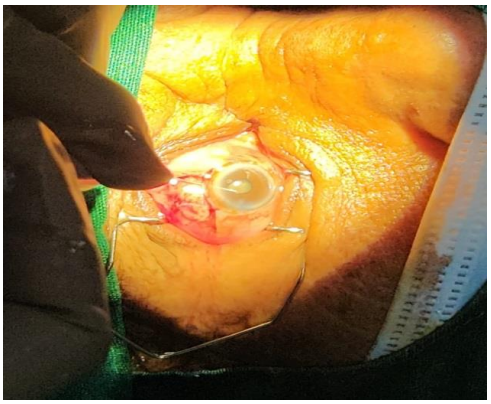
Photograph 4:sclerocorneal tunnel



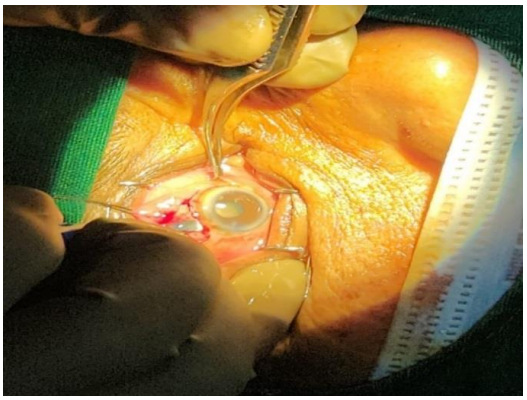
Photogragh 5:staining of anterior capsule with tryblue



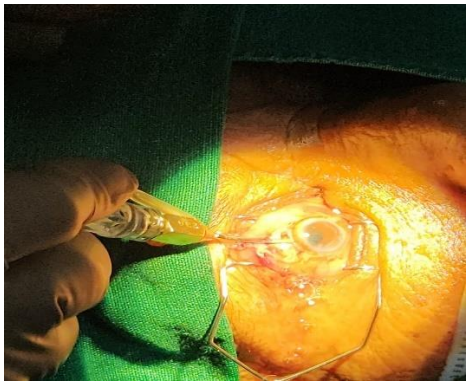
Photograph 6:viscodilatation of pupil



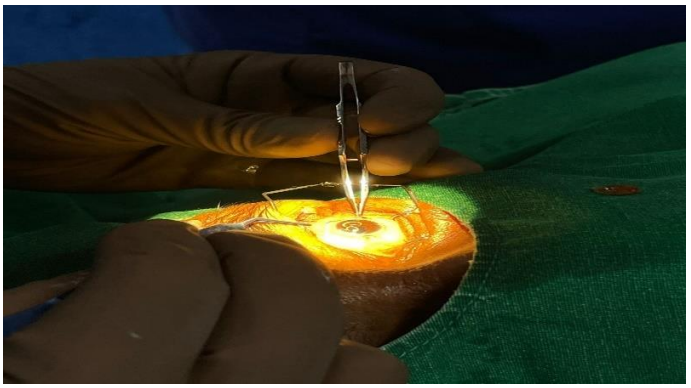
Photograph 7:Capsulorrhexis



Photograph 8:extension of wound



Photograph 9:cortical wash



Photograph 10 :PCIOL implantation

MASTER CHART

KEY TO MASTER CHART

M- Male

F-Female

POD-post operative day

HM-hand movements

CFCF-counting finger close to face

CF-counting finger

DM folds-Descemet's membrane

PC-posterior capsule

AC-anterior chamber

PCIOL-posterior chamber intraocular lens

SL NO.	UHID	AGE	SEX	PRE OP VA	PUPIL SIZE BEFORE DILATING	PUPIL SIZE AFTER DILATING	INTRAOPERATIVE EVENTS	POD1 SLIT LAMP EXAMINATON	POSTOPERATIVE UCVA DAY 1	BCVADAY7	BCVADAY30
1	221614	71	M	HM+	3mm	6mm	nil	dm folds	6/36	6/12	6/9
2	259200	62	M	CF 2MT	3mm	6mm	nil	clear	6/6	6/6	6/6
3	248241	70	f	CF CF	2mm	5mm	trauma to iris	microcystic edema	6/24	6/12	6/9
4	259217	76	m	cf 5mt	2mm	5mm	pc rent,trauma to iris,	ac reaction	close to face	6/24	6/12
5	260120	68	F	HM+	3mm	4mm	floppy iris,iris trauma,pc rent	dm folds	HM	6/36	6/9
6	259194	68	f	cf half mt	3mm	5mm	trauma to iris	clear	HM	6/36	6/12
7	259225	74	m	cf cf	3mm	5mm	pc rent,pciol in sulcus,anterior vitrectomy	dm folds,stromal edema	6/60	6/18	6/12
8	257201	80	f	cf 4mt	3mm	5mm	iridodyalisis,	stromal edema	HM	6/18	6/9
9	259197	57	f	cf 5mt	3mm	4mm	floppy iris,pc rent ,pciol in sulcus	microcystic edema	6/12	6/6	6/6
10	195725	75	f	cfcf	3mm	5mm	floppy iris	dm folds	6/60	6/9	6/9
11	221608	50	m	cf cf	3mm	5mm	pc rent iris claw ant vitrectomy	stromal edema	HM	6/36	6/12
12	238081	60	M	CF CF	3mm	4mm	PC RENT ,trauma to iris	stromal edema	HM	HM	HM

13	238078	70	m	cf 1m	2mm	4mm	trauma to iris,difficuty in delivering nucleus	stromal edema	6/60	6/12	6/12
14	230759	67	m	cfcf	3mm	4mm	trauma to iris,difficuty in delivering nucleus	dm folds	3/60	6/9	6/9
15	200803	57	m	HM+	2mm	5mm	PC rent	dm folds	6/24	6/9	6/6
16	201149	63	m	cf 3mt	3mm	4mm	nil	clear	6/18	6/12	6/9
17	311482	61	f	cf 1mt	3mm	5mm	pc rent,	dm folds	6/24	6/18	6/9
18	200774	79	f	cf2mt	2mm	3mm	pc rent,trauma to iris,	microcystic edema	cf cf	6/60	6/24
19	215313	60	f	HM+	3mm	4mm	spinchterotomy done	dm folds,stromal edema	hm	cf 3mt	6/60
20	202393	70	m	cf 3mt	3mm	5mm	nil	nil	6/24	6/12	6/9
21	270097	67	f	pl	3mm	5mm	trauma to iris	corneal edema	6/24	6/18	6/6
22	257180	70	m	cfcf	2mm	4mm	spinchterotomy,difficulty in delivering nucleus	corneal edema	6/60	6/24	6/18
23	271849	79	m	cf 3mt	3mm	5mm	nil	nil	6/9	6/6	6/6
24	271829	79	f	cf2mt	2mm	4mm	nil	corneal edema	6/24	6/18	6/12
25	271202	68	f	cf1mt	3mm	5mm	trauma to iris	corneal edema	6/24	6/12	6/9
26	271837	74	m	cf1mt	3mm	5mm	pc rent	stomal edema	6/60	6/36	6/18
27	2711	68	f	cf3mt	2mm	5mm	trauma to iris	dm folds	6/24	6/12	6/12

	38										
28	124817	62	f	cfcf	3mm	6mm	nil	nil	6/9	6/6	6/6
29	164720	66	f	cfcf	3mm	4mm	trauma to iris	dm folds	6/9	6/6	6/6
30	194102	85	m	cfcf	2mm	3mm	spincterotomy, difficulty in delivering nucleus	nil	6/6	6/6	6/6
31	157201	55	f	cfcf	3mm	6mm	nil	nil	6/6	6/6	6/6
32	163320	61	f	CF 2MT	3mm	5mm	trauma to iris,	corneal edema	6/36	6/12	6/9
33	305339	64	m	cf 3mt	3mm	4mm	trauma to iris ,pc rent	ac reaction	6/18	6/18	6/12
34	238071	54	f	cf 1mt	3mm	6mm	nil	nil	6/6	6/6	6/6
35	238076	63	m	CF 2MT	3mm	5mm	pc rent	ac reaction,stromal edema	cf 4mt	6/36	6/12
36	246362	74	f	cf 3mt	3mm	4mm	pc rent	ac reaction,stromal edema	6/60	6/24	6/9
37	242496	81	f	cf 1mt	3mm	5mm	nil	nil	6/9	6/9	6/9
38	242500	76	m	CF 2MT	3mm	6mm	nil	nil	6/9	6/6	6/6
39	246364	74	f	cf1mt	3mm	4mm	difficulty in delivering nucleus,spinchetrotomy	dm folds	6/24	6/18	6/12
40	125164	64	m	HM+	3mm	5mm	nil	nil	6/12	6/6	6/6