A COMPARATIVE STUDY OF SMALL INCISION CATARACT SURGERY WITH TRABECULECTOMY AND EXTRA CAPSULAR CATARACT EXTRACTION WITH TRABECULECTOMY IN EFFICACY OF REDUCTION IN INTRA OCULAR PRESSURE

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DEPARTMENT OF OPHTHALMOLOGY
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MADURAI.

CERTIFICATE

This is to certify that the dissertation entitled *"**A COMPARATIVE STUDY OF SMALL INCISION CATARACT SURGERY WITH TRABECULECTOMY AND EXTRA CAPSULAR CATARACT EXTRACTION WITH TRABECULECTOMY IN EFFICACY OF REDUCTION IN INTRA OCULAR PRESSURE**"* presented herewith by **Dr. V.P SENTHILKUMAR** to the faculty of Ophthalmology, The Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of M.S. degree in Ophthalmology is a bonafide work carried out by him under my direct supervision and guidance.

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DECLARATION

I, ***DR.V.P.SENTHILKUMAR,*** solemnly declare that the dissertation titled **"A COMPARATIVE STUDY OF SMALL INCISION CATARACT SURGERY WITH TRABECULECTOMY AND EXTRA CAPSULAR CATARACT EXTRACTION WITH TRABECULECTOMY IN EFFICACY OF REDUCTION IN INTRA OCULAR PRESSURE"** has been prepared by me.

This is submitted to The Tamil Nadu Dr.M.G.R. Medical University, Chennai, in partial fulfillment of the requirements for the award of M.S Degree Examination (Branch III) Ophthalmology to be held in SEPTEMBER 2006 .

Place: Madurai.

Date :

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CONTENTS

ABBREVIATIONS

AC	-	ANTERIOR CHAMBER
ECCE	-	EXTRA CAPSULAR CATARACT EXTRACTION
HM	-	HYPER MATURE CATARACT
ICCE	-	INTRA CAPSULAR CATARACT EXTRACTION
IMC	-	IMMATURE CATARACT
IOL	-	INTRA OCULAR LENS
IOP	-	INTRA OCULAR PRESSURE
MC	-	MATURE CATARACT
PACG	-	PRIMARY ANGLE CLOSURE GLAUCOMA
PCIOL	-	POSTERIOR CHAMBER INTRA OCULAR LENS
PHACO	-	PHACOEMULSIFICATION
POAG	-	PRIMARY OPEN ANGLE GLAUCOMA
P	-	PROBABILITY
PXF	-	PSEUDO EXFOLIATION
SACG	-	SECONDARY ANGLE CLOSURE GLAUCOMA
SICS	-	SMALL INCISION CATARACT SURGERY
TN	-	TENSION
TRAB	-	TRABECULECTOMY
VN	-	VISION

INTRODUCTION

Glaucoma is a chronic progressive optic neuropathy caused by a group of ocular conditions, which lead to damage of the optic nerve with loss of visual function. Most common risk factor is raised intra ocular pressure.

Glaucoma is a group of diseases characterized by visual field changes and progressive optic neuropathy for which raised Intra ocular pressure is a risk factor.

Glaucoma is the leading cause of irreversible blindness throughout the world; glaucoma coexisting with cataract is commonly prevalent among elderly patients. The frequent coexistence has led to many ideas as to how best to control glaucoma and at the same time improve the vision. Many successful designs of combined operation have been tried in last 10 years such as ECCE, ICCE and SICS, IOL implantation combined with new filtering procedures.

Glaucoma triple procedures can provide good visual rehabilitation and IOP control in cases of co-existing cataract and primary open angle glaucoma. SICS has reduced surgical trauma and induced astigmatism to such a degree

that, when combined with trabeculectomy, one could expect visual performance and intraocular pressure control as good as that with two separate procedures.

This study is undertaken to compare the efficacy of reduction in IOP between extra capsular cataract extraction with trabeculectomy and small incision cataract surgery with trabeculectomy.

REVIEW OF LITERATURE

Literature search was performed from Medline using key words small incision cataract surgery with trabeculectomy and extra capsular cataract extraction with trabeculectomy

From the literature very few articles are seen comparing ECCE with trabeculectomy and SICS with trabeculectomy.

Neumann et al[20] used two groups, each consisting of 23 patients and performed combined procedure in group-1 without intra ocular lens and combined procedure with intra ocular lens in group-2. The pressure reduction was almost the same in both groups.

Edwards[8] studied 59 eyes that underwent combined Cataract extraction and trabeculectomy. The mean age of the patient included in the study was 69 years with a range of 23 to 87 years. The visual outcome was good and IOP reduction was achieved in 91.5% at 6 months and he stated that combined procedure is a safe and effective procedure.

Tord Jerndall[11] performed combined trabeculectomy and cataract extraction on 17 eyes of 16 patients. The mean intra ocular pressure preoperatively was 30 mm Hg and postoperative IOP was 16 mm Hg. He concluded that the combined technique is no more traumatic than an ordinary extraction.

Jhons et al[12] performed cataract extraction with trabeculectomy in 37 eyes of 29 patients with an average follow-up of 23.7 months. Average preoperative IOP was 23.5 mm Hg and postoperative IOP was 16.22 mm Hg. No greater incidence of complication was evident as compared to trabeculectomy. So it confirmed that combined procedure was a safe and valid procedure.

Bruce shields[29,30] selected 73 cases of combined cataract and glaucoma and performed cataract extraction alone in one group of patients and a two stage procedure of filtering surgery followed by cataract extraction in second group of patients and combined procedure in third group of patients. The author prefers the two-stage procedure as an effective procedure.

Doughal Thomson[6] conducted a retrospective study of 65 patients who underwent extra capsular cataract extraction, intra ocular lens implant and trabeculectomy. He concluded that because of the effective control of glaucoma

and fewer complications, combined procedure is good for coexisting glaucoma and cataract.

Mammalis et al[17] performed a retrospective study of 212 eyes of 174 patients who underwent Phacoemulsification, Intra ocular lens implantation and trabeculectomy with follow up of 26 months. The mean preoperative IOP of 23.1 mm Hg decreased postoperatively to 15.9 mm Hg. Hence he concluded phacoemulsification, intra ocular lens implant and trabeculectomy yield excellent results.

Percival[24] conducted a study of 34 glaucoma eyes by performing triple procedure and concluded that satisfactory control of glaucoma was achieved in each case and 91% of eyes improved in visual acuity to 6/12 or better and hence concluded that triple procedure is safer.

Nielson[21] performed combined surgery in 36 cases of which 10 underwent trabeculectomy by method 1 and 26 by method 2. Method 1 was conventional trabeculectomy and in method 2 incision was started over ciliary body and cleavage made forward until the scleral spur, where the anterior chamber was entered with a beveled knife behind the internal valve incision used for cataract

procedure. There was no significant difference in visual rehabilitation between the methods. The major complication was anterior chamber bleeding.

Simmons et al[31] performed ECCE with IOL with trabeculectomy in 75 cases who had preoperative mean IOP of 19.3 mm Hg and used an average of 2.3 antiglaucoma medications. Follow up was done on day 1 and 2, 6, 12 months. Postoperative average IOP was 3.8 mm Hg lower than the preoperative value, which is significant. Filtering bleb started gradually disappearing during 12 months. Hyphema was found to be more in limbal-based flap.

Wishart et al[42] conducted a prospective study of 34 eyes, which underwent phacoemulsification, intra ocular lens implant and trabeculectomy and followed for a period of one year. The results were compared with those obtained retrospectively of the previous 34 extra capsular extractions with intra ocular lens with trabeculectomy performed by the same surgical team. This study showed phacogroup had earlier visual rehabilitation, less postoperative astigmatism, improved long term control of intra ocular pressure and less postoperative complications.

P. Sathyan et al[23] conducted a study of 100 eyes that underwent combined surgery with one group by phaco technique and other with ECCE. POAG

patients (68.87%) were predominant in the study. At the end of one year the IOP control in both the group was similar (phaco group: 14.77.ECCE group: 14.04). The study concluded that phaco triple has the advantages like early post operative IOP control, early visual rehabilitation and lower astigmatic shift.

DETAILS OF ANATOMY RELEVANT TO SURGICAL PROCEDURE

Limbus is the most important transition zone at the corneoscleral junction; most glaucoma surgical incisions are placed at limbus, the success of surgery is dependent on the accuracy of the incision with relation to the limbus.

GROSS ANATOMY

The limbus is the transition zone between the cornea and sclera. On the inner surface of the limbus is an indentation, the scleral sulcus, which has a sharp posterior margin, the scleral spur and a sloping anterior wall that extends to the peripheral cornea.

The trabecular meshwork, bridges the scleral sulcus and converts it into a tube, called schlemm's canal and where the meshwork inserts into the peripheral cornea, a ridge is created, known as the schwalbe's line.

Schlemm’s canal is connected by intrascleral channels to the episcleral veins. The trabecular meshwork, schlemm’s canal and the intra scleral channels comprise the main route of aqueous humor outflow.

The ciliary body attaches to the sclera and creates a potential space, the supraciliary space between itself and the sclera.

On cross section, the ciliary body has the shape of a right angled triangle and the ciliary processes. (the actual site of aqueous production) occupy the innermost and the anterior-most portion of this structure, extending back for approximately 2mm in the region called pars plicata .The ciliary processes consists of approximately 70 radial ridges (major ciliary processes) and equal number of smaller ridges (minor ciliary processes).

The posterior 4mm of the ciliary body, the pars plana (orbicularis ciliaris) has a flattened inner surface and joins the choroid at the ora serrata.

The Iris inserts into the anterior side of the ciliary body. The lens is suspended from the ciliary body by zonules and separates the vitreous posteriorly from the aqueous anteriorly.

The Iris separates the aqueous compartment into posterior and an anterior chamber and the angle formed by the Iris and cornea is called the anterior chamber angle.

SURGICAL ANATOMY

ANTERIOR LIMBUS

On the external surface of the eye, anterior boundary of the limbus is the termination of Bowman's membrane, 0.5mm anterior to the insertion of the conjunctiva and Tenon's capsule. This is the corneolimbal junction (or) anterior limbus.

The conjunctiva inserts more anteriorly in the superior and inferior quadrants. So the limbus is wider in these quadrants, ranging between 1 and 1.5mm and gradually tapers in the nasal and temporal quadrants where the range is 0.3 to 0.5mm. Hence during performing filtering surgery surgical incisions at 12'o clock position have an advantage of wider area.

The conjunctiva and tenons capsule cover the limbus, the adhesions between the conjunctiva and tenons capsule are moderately firm and sharp dissection is required to dissect between these two structures.

The adhesion between the tenons capsule and the underlying limbus and sclera is less firm and these structures can be separated by blunt dissection.

POSTERIOR LIMBUS

This is also known as sclerolimbal junction. It is identified as the junction between opaque white sclera posteriorly and bluish grey translucent limbus anteriorly.

This helps to identify the location of deeper structure of the anterior chamber angle. The scleral spur is located just posterior to the sclero limbal junction and schlemm's canal found just anterior to this landmark.

In trabeculectomy a circumferential incision at the corneolimbal junction enters the anterior chamber just in front of the trabecular meshwork by extending the incision posteriorly to expose the anterior chamber angle structures and excised along the scleral spur.

VESSELS

Besides the large arteries and veins in the rectus muscle insertions, variable arrays of episcleral vessels are present in the perilimbal area. Most of the bleeding encountered during preparation of conjunctival flaps comes from episcleral vessels ruptured during dissection. Cautery of episcleral vessels should be minimal to avoid scleral shrinkage; Cautery of scleral flap should be

avoided to prevent shrinkage. Cautery of the conjunctival edges should also be avoided to prevent possible wound leak.

IRIS AND CHOROID

Normal iris vessels usually do not bleed after iridectomy. Bleeding from iris new vessels may be massive, often when intra ocular pressure is suddenly lowered. Bleeding from the anterior edge of the ciliary body or the posterior part of deep scleral excision may be substantial but will often stop with simple compression.

The choroid includes the choroidal capillaries immediately external to the Bruch's membrane. The arterial blood flow into the choriocapillaries is from the branches of the short posterior ciliary arteries through perpendicularly oriented arterioles. Shearing of these arterioles during surgical manipulation (or) distortion of the eye wall explains the intra operative choroidal hemorrhage.

ROUTES OF DRAINAGE OF AQUEOUS HUMOR

Following combined surgery (trabeculectomy followed by cataract surgery) the drainage of aqueous humor occurs through one (or) more of the following routes.

1. Filtration through outlet channels in scleral flap
2. Filtration through connective tissue substance of scleral flap
3. Filtration around margins of the scleral flap
4. Filtration through the cyclodialysis cleft (if tissue dissected posterior to scleral spur)
5. Through cut ends of the schlemm's canal.

Aqueous humor, which drains through any of the above channel, filters through the sub conjunctival tissue and then through the conjunctiva diffuses into the tear film. Also the vascular conjunctival tissue may absorb a portion of the aqueous.

In the absence of a well-defined filtering bleb aqueous drains through the lymphatic vessels, normal aqueous vessels and atypically incorporated aqueous vessels.

PATHOPHYSIOLOGY

After surgical trauma to the conjunctiva, episcleral and iris blood vessels, leakage of plasma proteins and blood cells occur. Subsequently on exposure to the tissue factors, a clot with fibrin fibronectin matrix is formed. Inflammatory cells, new capillaries and fibroblasts migrate into this. The inflammatory cells eventually degrade the fibrin fibronectin matrix. Later fibronectin, collagen and glycosaminoglycans form a fibrovascular granulation tissue. Gradually a dense collagenous subconjunctival scar with scattered fibroblast is formed.

EVOLUTION OF CATARACT SURGERY

From pioneer Susruta's couching to Kelmans phaco emulsification, cataract surgery has witnessed a phenomenal progress.

1000 BC – 1745 AD couching

Susruta practiced this; the sclera is pierced with a lancet and blunt instrument to depress the lens.

1745-1865AD –primitive extracapsular extraction

- Jacques Daniel first performed the procedure
- Albright Von Graefe (1828-1870) improved with development of knife that created better wound apposition.
- Samuel Sharp – Expressed cataractous lens.
- Williams (1869) first to use corneal suture.

20 th century – intra capsular cataract

Sharp and Pagen Stecher – delivered the lens in toto by pressure counter pressure method.

Barraquer(1917) - With suction apparatus and cup.

Krwawicz(1961) - With cryosurgical probe.

Intraocular lens implantation

- In 1949 Harold Ridley proved visual rehabilitation by intraocular lens.

Conventional ECCE

After IOL implantation started, ECCE techniques improved with improvement of instruments and the use of microscope.

Phacoemulsification

Kelman (1970) described this technique where ultrasonic vibrations are used to remove the lens through a 3mm corneoscleral incision.

EVOLUTION OF COMBINED SURGERY

The history of the evolution of combined surgery, deals mainly with the various changes that anti glaucoma surgery underwent and also the changes that overtook cataract surgery in later times.

In 1830, Mackenzie described sclerotomy and paracentesis.

In 1847, Crichett incarcerated an Iris wick and termed it iridodesis.

In 1856, Von Graefe, believed that excision of Iris reduced aqueous secretion and performed sector iridectomy, it was followed as a standard procedure for next 10-15 years where filtering bleb was thought as an undesirable complication (in 20% of cases).

In 1869, it was De Wecker who understood the role of the filtering cicatrix and emphasized, that an artificial pathway through the wall of the eye was a way for aqueous to drain and that iridectomy could not be a cure in all cases.

In 1906, La Grange performed sclerecto iridectomy, which acted as permanent fistula for drainage of aqueous into subconjunctival space.

In 1906 again Holth developed, Iridenclesis, a processes of incarceration of pillars of Iris tissue, in the limbal wound, there by functioning as wicks.

In 1909 Elliot described limbal trephination.

In 1924 Preziosi pioneered the technique of thermal sclerostomy, which involves, thermal cautery of scleral wound edge, with gradual entry into the anterior chamber.

In 1958, Schie modified thermal sclerostomy by adding peripheral iridectomy.

Watson in 1970 modified it by suggesting only a limbal-based partial thickness scleral flap.

The advantages of partial thickness filtration surgery were that the rate of aqueous outflow was controlled, so there was less postoperative complication and the fall of intraocular pressure was controlled and predictable.

In 1962 Iliff and Hass pioneered the procedure of posterior lip sclerectomy.

All the above procedures, described so far are full thickness filtering procedures, in that the aqueous in anterior chamber is in direct contact with the sub conjunctival space without any guard. While decrease in intraocular pressure following surgery was excellent.

These procedures were often complicated by excessive aqueous filtration that leads to prolonged flat anterior chamber associated with corneal decompensation, synechiae formation, filtering blebs become very thin and are prone to rupture resulting in endophthalmitis.

HISTORY OF PARTIAL THICKNESS PROCEDURES

Sugar pioneered partial thickness flap filtration surgery in 1967. It was Cairns in 1968, who popularized the partial thickness filtration surgery. Trabeculectomy with a scleral flap that was hinged posteriorly in the sclera (or) at the limbus.

GOALS OF TREATMENT

The treatment of glaucoma traditionally has been lowering the intra ocular pressure, although the reduction (or) controlling does not normally preserve the visual field in glaucoma patients. The continued progression of glaucomatous optic neuropathy even after control of intra ocular pressure suggests that pressure independent factors do play a role in the development of glaucoma.

Further several factors, which contribute to optic nerve damage, are hypersensitive to intra ocular pressure such that even though it is within the normal range the neurons still die. The ultimate goal is not only risk factors management but also protection of optic nerve and preservation of visual fields.

The current practice is to estimate the pressure level below which further damage to optic nerve is unlikely to occur (target pressure) and then aim to keep the intra ocular pressure consistently below this level. In the average point clinician should aim for a pressure of about 20% below the initial untreated pressure. Patient having glaucoma along with cataract should be cleared of from both and should be maintained with a lower IOP and a clear vision.

INDICATIONS FOR SURGICAL MANAGEMENT

1. Documented visual loss and optic nerve head damage despite maximum tolerated medical therapy and laser treatment that threatens vision.

2. Anticipated progressive damage experienced in the same eye (or) fellow eye that indicates that the current course will lead to loss of vision (or) intolerably high intraocular pressure.

3. Medication failure due to ineffectiveness, intolerance, poor compliance.

4. Intraocular pressure that is high enough to place the future health of the optic nerve at significant risk. This pressure will differ dramatically depending on the condition of the optic nerve and patients prior history.

5. Family history of glaucoma.

6. It can be combined with cataract procedure if there is borderline intra ocular pressure control, advanced damage (or) history of postoperative IOP increase in the fellow eye.

7. Successful filtering surgery in the contra lateral eye.

DETAILS OF SURGICAL PROCEDURE

There are basically three choices in surgically dealing with coexisting cataract and glaucoma

- Cataract extraction alone
- Trabeculectomy alone with cataract surgery later and
- Combined cataract surgery and trabeculectomy

Since this study is following up results of Trabeculectomy with extracapsular cataract extraction and trabeculectomy with small incisional cataract surgery the procedure of these two will be dealt as part

I. Extra capsular cataract extraction with trabeculectomy

II. Small incision cataract surgery with trabeculectomy

ANAESTHESIA

By peribulbar anaesthesia with 5ml of 2% lignocaine with 50IU/ml hyaluronidase and 1:200000 adrenaline, given at two different sites with 23 gauge needle.

One at the lower orbital margin about lateral one third and medial two third of about 3ml and other medial to supraorbital ridge about 2ml. Ocular hypotony is achieved by steady digital pressure.

ECCE WITH TRABECULECTOMY

PROCEDURE

After separating the lids using a universal eyelid speculum a 4-0 silk superior rectus bridle suture is applied.

CONJUNCTIVAL FLAP

A Limbal (or) Fornix based conjunctival flap taken with blunt tipped scissors and conjunctiva is handled with a non toothed forceps to avoid button holing of the conjunctiva and scarring which would jeopardize a good bleb.

A Limbal based conjunctival flap is preferred over Fornix based as it helps in tighter wound closer and better retention of aqueous.

SCLERAL FLAP DISSECTION

The region of sclera, planned for preparation of flap is cauterized with a wet field cautery to reduce bleeding, the flap is 1/2 to 1/3 scleral thickness, equilateral triangle shaped and hinged at the limbus.

Depending on the end point IOP, the thickness of the flap is chosen, very thin flap if marked pressure reduction is aimed, or a thickness flap if a moderate reduction is sufficient.

The flap is extended well past the limbus into the cornea, so that at least 1mm of bluish gray zone of the limbus is exposed.

CREATION OF INNER SCLEROSTOMY

The anterior chamber is entered with a blade just behind the hinge of the scleral flap, and the incision is widened with scissors to about 4mm.

Radial incisions are then extended posteriorly on the either end of the initial incision, posteriorly parallel to the first one there by completing the rectangular sclerostomy.

This block of tissue 4mm by 1mm is reflected and excised with scissors along the scleral spur. The block of tissue removed contains brownish trabecular tissue.

PERIPHERAL IRIDECTOMY

After the inner sclerostomy has been made a peripheral iridectomy is routinely done. Care should be taken to make a broad peripheral iridectomy, to avoid obstruction of the fistula by the edges of the cut ends of the iris tissue.

EXTRACAPSULAR CATARACT EXTRACTION AND PCIOL IMPLANTATION

Partial thickness corneoscleral groove made at midlimbal line along the edge of scleral flap from 10 ‘o clock to 2’o clock position.

Through the inner sclerostomy wound using a suitably bent 26 G tipped needle, canopener anterior capsulotomy done, after protecting the corneal endothelium with sufficient amount of viscoelastic substances in the anterior chamber.

The corneoscleral incision is completed along the pre-placed groove using a corneal scissors, taking care not to injure the scleral flap. The nucleus is delivered by pressure –counter pressure technique using lens expressor and vectis.

Cortical wash out is then carried out with simcoe cannula attached to sterile ringer lactate solution. Using a lens holding forceps, IOL is implanted in the capsular bag with the help of Mc phersons forceps. Then the IOL is dialed with the help of dialer such that the haptics of the PCIOL are positioned in the horizontal plane.

WOUND CLOSURE

The triangular scleral flap is closed with 10-0 nylon suture 1 interrupted suture is applied to the apex of the triangle and 2 interrupted sutures are applied to the base of the triangular flap.

The corneoscleral wound is then closed with interrupted 10-0 nylon sutures in a radial manner, the corneoscleral bite ratio being 1:1. The conjunctival flap is closed with 10-0 silk sutures or with cautery to achieve watertight approximation.

POST OPERATIVE CARE

Topical steroids are used to reduce the scar formation of the filtering bleb for 4-6 weeks.

SMALL INCISION CATARACT SURGERY WITH TRABECULECTOMY

Small incision cataract surgery allows a dramatic reduction in the incision size compared to that for an extracapsular procedure.

The size of the incision depends on the size of the lens to be placed. In using Polymethyl Methacrylate lens the incision may be reduced to 5-7 mm, when using foldable lenses it is reduced up to 3-3.5mm.

The technique for a combined surgery is of two types.

Performing phacoemulsification through a superior scleral incision, which is later, converted to a trabeculectomy flap.

Performing two procedures at different sites with a superior trabeculectomy and temporal clear corneal cataract extraction.

The later has an advantage of decreased manipulation of the conjunctival and scleral flaps. This may decrease the level of conjunctival inflammation and episcleral fibrosis.

PROCEDURE

THE CONJUNCTIVAL FLAP

Fornix based flap is easier and useful in scarred conjunctiva. Limbal-based flap is having lesser chance of post-operative leakage and leads to a better-formed bleb in the early postoperative period. Disadvantage of it is making cataract extraction field cumbersome.

The width of the conjunctival incision should be approximately 2mm larger than the anticipated scleral incision.

Wet field cautery can be used to control bleeding. Achieving haemostasis is important because subconjuctival blood can obstruct filtration and lead to scarring.

SCLERAL INCISION

A three stage scleral tunnel is created with a straight incision approximately 2mm posterior to the limbus. The initial incision is vertical. The second stage of the incision involves tunneling in a horizontal plane into the corneal stroma. The anterior chamber is then entered with a 3.2 mm keratome.

The length of the incision should be equal to the insertion width of a Polymethyl Methacrylate IOL.

THE PUPIL MANAGEMENT

Glaucoma patients present with small pupil resulting from long-term miotic use. If the pupil measures less than 4mm after maximally dilated we can use the following methods for dilatation.

Pupils dilated with two kuglan hooks, pulling pupils 180 degrees apart by push (or) pull, holding the hooks in maximum stretch for a few seconds.

Multiple equally spaced partial thickness sphincterotomies can be made with long handle vannas scissors.

Use of high viscosity viscoelastic.

Iris retractors, which are anchored in the cornea.

THE CAPSULOTOMY

A 360-degree continuous capsulorhexis is preferable as it aids in capsular fixation of the lens.Performed with a 26 gauge bent needle (or) capsulorhexis forceps.

NUCLEUS DELIVERY AND PCIOL IMPLANTATION

- Hydro dissection of lens cortex from capsule.
- Nucleus is rotated and made out to the anterior chamber.
- Nucleus is delivered through the scleral wound with help of irrigating vectis (or) by visco expression.
- Polymethyl Methacrylate lens is implanted in the capsular bag.

THE TRABECULECTOMY[28]

After placement of the IOL, the scleral tunnel is modified into a trabeculectomy flap. One edge of the tunnel is transected with keratome creating a flap.

The Kelly's descemet punch is then used to remove clear cornea and trabecular meshwork from the posterior lip of scleral tunnel. Another option is to remove a 1-2 mm block of tissue by freehand dissection.

A portion of the basal iris is removed with the vannas scissors creating a peripheral iridectomy

SCLERAL WOUND CLOSURE

The scleral flap is closed with permanent sutures (or) with releasable sutures .10 – 0 nylon is used close the sclera.

CONJUNCTIVAL FLAP CLOSURE

The conjunctiva can be secured to episclera with one interrupted suture at each end of the conjunctival incision.8-0 (Or) 9-0 vicryl used, since it does not require removal post operatively.

POSTOPERATIVE CARE

Patient should initially be taken off all antiglaucoma medication and started on a steroid –antibiotic drop. Cycloplegics for all cases up to 4-6 weeks to maintain anterior chamber.

If pressure is high (or) if the bleb is low due to under filtration, aqueous can be released by depressing the posterior lip of the flap with a sterile cotton tip applicator, which makes the bleb elevate and reduce the intraocular pressure. This manoeuvre also aids in breaking early episcleral adhesions.

BLEB CHARACTERISTICS

PHYISIOLOGY

Filtration surgery creates a fistula between the anterior chamber and the subconjunctival space.

CHARACTERISTICS

The appearance of filtering bleb is an important factor in evaluating the outcome of glaucoma filtering surgery. The successful outcome usually demonstrates a reasonable bleb with minimal engorgement of conjunctival vessels during the first week. The bleb tends to become more localized in second and third weeks. By the end of the first month the bleb is well established and moderately diffuse, the bleb will gradually become less hyperemic and at three months will be well established with small microcysts visible on the conjunctival surface.

Blebs are divided into four types according to the Morphological features

TYPE I

Bleb has a thin and polycystic appearance resulting from trans conjunctival flow of aqueous. It is associated with good filtration.

TYPE II

Bleb is flat, thin and diffuse with a relatively avascular appearance in comparison to the surrounding conjunctiva. This is also indicative of good filtration.

TYPE III

Bleb is non-filtering due to the subconjunctival fibrosis. It is flat and not associated with microcystic spaces, contains engorged blood vessels on its surface.

TYPE IV

Encapsulated bleb (tenon’s cyst) is a localized, highly elevated dome shaped cyst like cavity of hypertrophied tenon’s capsule with engorged blood vessels.

FACTORS RELATED TO BLEB FAILURE

AGE

Vigorous healing response has been at least partly attributed to for poor success of filtering surgery.

RACE

Vigorous wound healing response in blacks account for increased rate of failure in bleb.

EXTERNAL FACTORS

Fibroblast proliferation, hence Tenon's capsule should be removed to prevent fibrosis.

INTRAOCULAR FACTORS

- Blockage of filtration site by prolapse of lens, iris, vitreous and ciliary body.
- Inadequate sclerostomy to establish communication with the anterior chamber.
- Fibrous and cellular response associated with ocular inflammation decreases the success of glaucoma filtering surgery.
- Prior ocular surgery promotes more scarring.

COMPLICATIONS

INTRAOPERATIVE

Tearing or buttonholing of conjunctival flap

The conjunctiva may be inadvertently torn during the procedure. It can be sutured with a mattress or running suture. Alternatively tissue adhesives or light bipolar cautery may be used.

Haemorrhage

Commonest cause is episcleral bleeding. Minimal cauterization along the bleeding vessel will stop it. Inadvertent cutting of ciliary body can cause severe bleeding. Alternative is sustained pressure or large air bubble in AC. A choroidal or expulsive haemorrhage is a devastating complication. Management is immediate closure of the fistula.

Choroidal Effusion

Can occur in eyes with prominent episcleral vessels as in Sturge Weber syndrome.

Indicated by sudden shallowing of AC intra operatively or rotation of ciliary process through the iridectomy into the fistula. If severe, a scleral incision is made to release the supra choroidal fluid.

Vitreous Loss

Adequate vitrectomy should be done with vitrectomy instrument

Stripping of Descemet membrane

Large air bubble can be used to reposition it.

Tearing of scleral flap

It can be sutured with 10-0 nylon mattress sutures or if the flap is very thin it can be replaced by a donor sclera

Lens Injury

Very rare.

EARLY POST OPERATIVE COMPLICATIONS

Shallow and Flat Anterior Chamber

This can lead to peripheral anterior synechiae, corneal endothelial damage, cataract & hypotony associated maculopathy if it is not resolved soon. Divided into 3 grades depending on severity.

Grade 1: Peripherally flat AC with iridocorneal touch but preservation of anterior chamber in pupillary space.

Grade 2: Greater apposition between mid iris and cornea but some space retained in AC between anterior surface of lens and cornea in pupillary region.

Grade 3: AC flat with complete contact of iris and pupillary space with posterior surface of cornea.

Gr: 1& 2 almost always resolve with time and cycloplegia.

Gr 3 is a medical emergency and usually requires surgical intervention; if not resolved in 1-2 days.

Flat Anterior Chamber with Hypotony

A Seidel test should be performed with 2% fluorescein over the bleb. If there is aqueous leak, fluorescein will be diluted by the escaping aqueous, which will be seen as bright green with cobalt blue filter.

Sometimes multiple punctate staining areas (sweating) may be seen which later forms hole and show positive test.

Scleral Flap Leakage

Signs: Well formed bleb, low IOP, negative Seidel test.

Can be avoided by tight suturing of the flap with releasing sutures or argon laser suture lysis, if option is available. Ineffective if suture manipulation is done after 2 weeks.

Bleb Leakage.

Signs: Flat bleb, low IOP & positive Seidel test.

Most common cause is inadequate suturing of conjunctiva. or inadvertent button hole. Management includes atropine cycloplegia and topical & systemic aqueous suppressants, pressure patching, large soft contact lens, collagen shield, Simmons shell, compression sutures etc.

Full thickness hole may require conjunctival advancement to hood existing bleb or free conjunctival patch autograft with removal of existing bleb. Post operative hypotony is often associated with choroidal effusions or detachments.

Indications for surgery are persistent kissing choroids or Grade 3 flat AC damaging corneal endothelium.

AC is maintained with balanced salt solution or viscoelastic and supra choroidal fluid is drained.

FLAT ANTERIOR CHAMBER IN NORMOTENSIVE AND HYPERTENSIVE EYES

Pupillary Block

Signs are high IOP, flat bleb, negative Seidel test & iris bombe with incomplete or non patent iridectomy.

Patency of peripheral iridectomy is confirmed. Laser or incisional iridectomy should be done if necessary.

Ciliary Block Glaucoma (Malignant glaucoma)

Rare, but serious complication. Aqueous is blocked at the pars plicata of ciliary body & is misdirected to circulate into or behind vitreous. Presents with Shallow AC, high IOP, absent bleb & negative Seidel test.

Initially topical mydriatics, steroids, topical and systemic antiglaucoma medications are used to reduce IOP.

Verify or create patent iridectomy or posterior capsulotomy in pseudophakia using laser. If not improving needle aspiration of vitreous through pars plana or pars plana vitrectomy should be done.

Suprachoroidal haemorrhage

Rare. More often seen in aphakia, vitrectomised eyes, large eyes with pathologic myopia or congenital glaucoma. Characterized by sudden severe pain with loss of vision in first week.

If aqueous suppressants and hyperosmotics fail to lower IOP in 5 days, sclerostomy and drainage is indicated.

Rarely intra operative expulsive supra choroidal haemorrhage can occur. Then limbal incision should be closed immediately and posterior sclerostomy should be performed over the presumed site of bleeding and blood should be let out from the supra choroidal space.

Hyphema

Bleeding may be from iris, anterior ciliary body, or corneoscleral wound. Usually subsides without intervention. Activities must be restricted. Protective eye shield should be worn.

Intraocular infection

Can occur any day after glaucoma surgery.

Risk factors include use of antimetabolites, myopia, thin bleb with leak, presence of releasable sutures, concurrent upper respiratory tract infection and blebs located in the inferior limbus.

Can be differentiated into

Blebitis: infection does not involve vitreous

Bleb will be milky white (stage 1) along with anterior uveitis (stage 2) and normal red reflex.

Endophthalmitis: infection penetrating to the vitreous with impaired red reflex.

Blebitis respond to intensive antibiotic therapy with good visual outcome. Smears and cultures have to be made from lids, conjunctiva and filtering blebs. Staphylococcus and Streptococcus account for half of the culture positive organisms. When hypopyon is present fluid for culture should be obtained from AC and vitreous.

Endophthalmitis should be managed with vitreous biopsy and intra vitreal antibiotics.

Sympathetic ophthalmia

Rare. Only 0.08% following glaucoma surgeries

Filtration failure

It can occur at any time from weeks to years after surgery. Management depends on the cause.

- ❖ Subconjunctival fibrosis is the most common cause.
- ❖ Iris, vitreous, clot, ciliary process or lens plugging sclerostomy site.
- ❖ Retained visco elastic substance
- ❖ Imperforate Descemet membrane
- ❖ Scleral flap too tightly sutured
- ❖ Ciliary or pupillary block

MANAGEMENT OPTIONS.

- Digital compression through lower lid for 5-10 seconds.
- Focal compression under topical anesthesia with a moist sterile cotton bud at the edge of the scleral flap.
- Suture manipulation with releasable sutures or argon laser suture lysis within 2 weeks.
- Needling in an encapsulated bleb
- Subconjunctival injection of 5-fluorouracil, 5mg,10mm away from the bleb.
- Resurgery

LATE POST OPERATIVE COMPLICATIONS

Overhanging Filtering Blebs

Reduced by argon laser or excision and suturing

Spontaneous hyphema

Hypotony and ciliochoroidal detachment

Others

Corneal astigmatism. Usually meridian passing through the trabeculectomised site has the strongest curvature. Making scleral flap at 12'O clock can reduce this.

Corneal epithelial toxicity is usually mild and can be managed conservatively.

AIM OF THE STUDY

To compare the efficacy of reduction in IOP between small incision cataract extraction and posterior chamber intra ocular lens implantation with trabeculectomy and extra capsular cataract extraction and posterior chamber intra ocular lens implantation with trabeculectomy in cases of glaucoma associated with cataract.

MATERIALS AND METHODS

Prospective, randomized and comparative type of study involving 50 eyes of 50 patients with glaucoma and cataract undergoing small incision cataract surgery and posterior chamber intraocular lens implantation with trabeculectomy and extra capsular cataract extraction and posterior chamber intraocular lens with trabeculectomy in Government Rajaji Hospital, Madurai Medical College, Madurai.

Duration of study

This study was done for a period of 1 year from January 2004 to January 2005, The follow up of the patients was done for a period of 12 months with follow ups on 2^{nd} week, 4^{th} week, 6^{th} week, 3^{rd} month, 6^{th} month and 12^{th} month.

Inclusion criteria

All cases of primary open angle glaucoma, primary angle closure glaucoma and secondary angle closure glaucoma where in IOP was not controlled by maximum medical therapy to less than 21 mm Hg having visually significant cataract with best corrected visual acuity 6\12 and less, were selected for the study.

Exclusion criteria

Eyes with other types of glaucoma

Traumatic cataract

Complicated cataract

Subluxation of lens

Fundus pathology affecting visual acuity

Patients with corneal opacity

Eyes with prior filtering surgery

Methodology

Among the patients who were seen during the recruitment period in the ophthalmology department of Government Rajaji Hospital, we selected 50 eyes of 50 patients who satisfied our criteria to undergo surgery.

All the patients enrolled in our study received a standard ophthalmological examination which included recording of best-corrected visual acuity, which was determined by subjective and objective refraction with standardized snellen’s chart.

Evaluation of anterior segment of both eyes was done using slit lamp biomicroscopy to evaluate the extent of cataract and glaucoma and special attention was taken to note any abnormalities like corneal edema ,scarring or opacity .

Preoperative baseline IOP and in all follow-up visits IOP were recorded for all eyes with Schiotz indentation tonometer.

IOP ideally has to be below 25 mm Hg before surgery with antiglaucoma medication and pilocarpine was stopped 1 week before surgery. If pre-operative IOP was above 30 mm Hg. Surgery was planned after IV mannitol.

The status of angle was determined by performing gonioscopy with goldmann 3 mirror gonio lens. Angle grading was done by Shaffers grading system. Other features of angle like PXF, hyperpigmentation of trabecular meshwork and Sampoelesi line were also noted.

The nature of anti glaucoma medication preoperatively was noted carefully. All patients were taken up for surgery under good coverage of antibiotics and anti glaucoma medications. All preoperative complications were noted

with special emphasis on zonular dialysis, posterior capsular rent, vitreous loss and inability to implant IOL.

Postoperative examination was done after 24 hours and the status of bleb, corneal edema, iritis, anterior chamber depth, hypotony and other complications like IOL instability were noted.

The standard post operative medication given were ciprofloxacin (0.3 %) and dexamethasone (0.1%) topically administered 6 times a day for one week and then tapered over a period of 6 to 8 weeks.1% cyclopentolate is given twice daily for 15 days.

After 48 hours vision with pinhole was recorded and IOP was recorded after 15 days.

Detailed slit lamp examination was done on day one, 3 weeks, 6 weeks, 3 months, 6 months and 12 months post operative period. During each visit visual acuity, IOP by schiotz tonometer and bleb characteristics were noted and recorded carefully. Objective and subjective refraction done at the end of six weeks postoperatively.

Computer analysis of data was done utilizing the software - Epidemiological Information Package 2002 developed by the Centers for Disease Control and Prevention-Atlanta for World Health Organization.

Percentage, mean, standard deviation and ‘p’ values were calculated using this package.

Chi Square test was done to find out significance of relationship between both groups. Since the variances were not homogenous, kruskul-wallys test was used to find out the significance of difference.

RESULTS AND OBSERVATION

AGE DISTRIBUTION

Table 1

Age Group	Type of Surgery				Total	
	ECCE with TRAB Group – I		SICS with TRAB Group – II		No.	**%**
	No.	**%**	**No.**	**%**		
< 50	1	4	2	8	3	6
50-59	7	28	5	20	12	24
60-69	13	52	15	60	28	56
70 & above	4	16	3	12	7	14
Total	25	100	25	100	50	100
Mean	61.76 yrs		61.48 yrs		61.62 yrs	

The mean age of the patients in the study was 61.62 years, group I (ECCE) mean age is 61.76 years and group II (SICS) mean age is 61.48 years (p=0.9456) there is no statistically significant difference in the age composition of the patients undergoing the two types of surgeries. Of the 50 patients included in the surgery 18 were male and 32 were female.

SEX DISTRIBUTION

Table 2

Sex	Type of Surgery				Total	
	ECCE with TRAB Group – I		SICS with TRAB Group – II		No.	%
	No.	%	No.	%		
Male	10	40	8	32	18	36
Female	15	60	17	68	32	64
Total	25	100	25	100	50	100

In group I (ECCE) 10 males & 15 Females and in Group II (SICS) 8 males & 17 Females which was statistically not significant (P=0.7683).

LATERALITY

Table 3

Operated eye	Type of Surgery				Total	
	ECCE with TRAB Group – I		SICS with TRAB Group - II		No.	%
	No.	%	No.	%		
Left	10	40	11	44	21	42
Right	15	60	14	56	29	58

The group I (ECCE) had 10 left eyes and 15 right eyes and group II (SICS) had 11 left eyes and 14 right eyes and (P=1.000) there is no significant difference statistically.

DIAGNOSIS

Table 4

Diagnosis	Type of Surgery				Total	
	ECCE with TRAB Group – I		SICS with TRAB Group - II		No.	%
	No.	%	No.	%		
PACG	2	8	2	8	4	8
POAG	16	64	15	60	31	62
POAG+PXF	2	8	3	12	5	10
SACG	5	20	5	20	10	20
Total	25	100	25	100	50	100

We included 31 (62%) patients with POAG, 5 (10%) patients with POAG with PXF, 4 (8%) patients with PACG and 10 (20%) patients with SACG in the study.25 patients underwent SICS with trabeculectomy and 25 patients underwent ECCE with trabeculectomy.

PRE OPERATIVE IOP

Table 5

Pre operative IOP	Type of Surgery	
	ECCE with TRAB Group - I	SICS with TRAB Group - II
Mean	33.58	29.24

The mean preoperative IOP of the 25 patients in the group (I) was 33.58 and group (II) was 29.24. There was (P=0.1095) no statistically significant difference between the two groups regarding IOP distribution in the preoperative period.

PRE OPERATIVE VISION

Table 6

Pre operative vision	Type of Surgery				Total	
	ECCE with TRAB Group – I		SICS with TRAB Group - II		No.	%
	No.	%	No.	%		
6/12-6/24	-	-	-	-	-	-
6/24-5/60	10	40	10	40	20	40
5/60-3/60	9	36	10	40	19	38
<3/60	6	24	5	20	11	22
Total	25	100	25	100	50	100

In our patients 10 (40%) of them in both groups were having preoperative vision of 6/24 – 5/60, 9 (36%) of them in Group I (ECCE) and 10 (40%) of them in Group II (SICS) having vision of 5/60 – 3/60, while 6 of them in Group I and 5 of them in Group II (SICS) had vision of < 3/60.

PREOPERATIVE ASTIGMATISM

Table – 7

TYPE OF ASTIGMATISM	**ECCE** with TRAB **(Group – I)**		**SICS** with TRAB **(Group II)**	
	No	**%**	**No**	**%**
AGAINST THE RULE				
<0.5D	7	28	8	32
0.5D-1.00D	5	20	5	20
1.00D-2.00D	4	16	3	12
>2.00D	2	8	1	4
Total	18	72	17	68
WITH THE RULE				
<0.5D	4	16	4	16
0.5D-1.00D	1	4	2	8
1.00D-2.00D	1	4	1	4
>2.00D	0	0	0	0
Total	6	24	7	28
NIL	1	4	1	4
Total	1	4	1	4

In our study preoperative astigmatism of against the rule was found in 18 (72%) patients of ECCE group and 17 (68%) patients of SICS group, of which <0.5D, 0.50D-1.00D, 1.00D-2.00D, >2.00D distribution between ECCE and SICS group were (7,5,4,2) patients and (8,5,3,1) patients respectively with the rule astigmatism were about 6 (24%) patients of ECCE group and 7 (28%) patients of SICS group, of which <0.5D, 0.50D-1.00D, 1.00D-2.00D, >2.00D distribution between ECCE and SICS group were (4,1,1,0) patients and (4,2,1,0) patients respectively. In both the groups 1(4%) patient had nil astigmatism.

LENS PATTERN

Table 8

Lens	Type of Surgery				Total	
	ECCE with TRAB Group – I		SICS with TRAB Group - II		No.	%
	No.	%	No.	%		
MC	8	32	7	28	15	30
IMC	14	56	16	64	30	60
HM	3	12	2	8	5	10

In our patients the lens pattern of immature cataract, mature cataract and hypermature cataract in Group I (ECCE) and Group II (SICS) were (14, 8, 3) and (16, 7, 2) patients respectively.

BLEB TYPE

Table 9

BLEB Type	Type of Surgery				Total	
	ECCE with TRAB Group – I		SICS with TRAB Group - II		No.	%
	No.	%	No.	%		
1	7	28	16	64	23	46
2	16	64	9	36	25	50
3	2	8	-	-	2	4
Total	25	100	25	100	50	100

The types of bleb in group I was 28% of type I, 64% of type II and 8% of type III bleb, in group II was 64% of type I, 36% are of type II, (p=0.0232) there is significant difference in the bleb types of the group I and II.

POST OPERATIVE VISION

Table 10

Post operative vision	Type of Surgery				Total	
	ECCE with TRAB Group – I		SICS with TRAB Group - II		No.	%
	No.	%	No.	%		
6/6-6/12	7	28	12	48	19	38
6/12-6/24	8	32	8	32	16	32
6/24-6/60	6	24	3	12	9	18
>6/60	4	16	2	8	6	12
Total	25	100	25	100	50	100

The postoperative vision was presented as 6/6 –6/12 in group I was 28% and group II was 48% ,6/12-6/24 was 32% and 32% respectively, 6/24-6/60 was 24% and 12% respectively, > 6/60 was 16% and 8% respectively.

POST OPERATIVE ASTIGMATISM

Table - 11

TYPE OF ASTIGMATISM	**ECCE** with TRAB **(Group – I)**		**SICS** with TRAB **(Group – II)**	
	No	**%**	**No**	**%**
AGAINST THE RULE				
<0.5D	2	8	3	12
0.5D-1.00D	8	32	12	48
1.00D-2.00D	6	24	4	16
>2.00D	2	8	1	4
Total	18	72	20	80
WITH THE RULE				
<0.5D	2	8	1	4
0.5D-1.00D	3	12	3	12
1.00D-2.00D	2	8	1	4
>2.00D	0	0	0	0
Total	7	28	5	20

In our study the post operative astigmatism of against the rule was found in 38 (76%) patients, of which ECCE had 18 (72%) and SICS had 20 (80%) patients respectively. The respective <0.5D, 0.50D-1.00D, 1.00D-2.00D, >2.00D distribution in ECCE group and SICS group were (2,8,6,2) and (3,12,4,1) patients respectively in our patients the astigmatism of with the rule in ECCE group and SICS group in the post operative period were 28% and 20% respectively.

Our study shows against the rule astigmatism was more frequent than with the rule astigmatism. In our patients the astigmatism of <1.00 D in ECCE and SICS group were 15(60%) and 19 (76%), which shows SICS group had better astigmatic stabilization than ECCE group.

POST OPERATIVE IOP

Table 12

Post operative IOP	Type of Surgery				P - Value
	ECCE with TRAB		SICS with TRAB		
	Mean	Standard Deviation	Mean	Standard Deviation	
2 weeks	17.01	4.6	12.51	2.42	0.0001
4 weeks	17.06	4.55	12.82	2.46	0.0001
6 weeks	17.48	4.77	13.53	2.39	0.0002
3 months	18.39	4.97	16.14	2.15	0.1314
6 months	18.77	4.99	17.02	2.31	0.4161
12 months	18.89	4.95	17.07	2.29	0.4279

The mean postoperative IOP in group I (ECCE) and group II (SICS) in 2 weeks follow-up was 17.01 and 12.51 (p=0.001), 4 weeks follow-up was 17.06 and 12.82 (p=0.0001), 6 weeks follow up was 17.48 and 13.53 (p=0.0002), 3rd month was 18.39 and 16.14 (p=0.1314), 6th month was 18.77 and 17.02(p=0.4161) and 12th month was 18.89 and 17.07(p=0.4279).

The post operative tension is lower in group II (SICS) than in group I (ECCE) at all periods of followup (from 2 weeks to 12 months) but the difference is significant only upto 6 weeks. After 6 weeks there is no statistically significant difference in the post-operative tension between group I (ECCE) and group II (SICS).

POSTOPERATIVE COMPLICATIONS

Table 13

Complications	Type of Surgery			
	ECCE with TRAB (Group – I)		SICS with TRAB (Group – II)	
	No.	%	No.	%
1. Post operative hyphema	1	4	-	-
2. Posterior Capsular Rent	1	4	1	4
3. Iritis, Shallow AC	1	4	-	-
4. Bleb Leak, Shallow AC	-	-	1	4
Total	3	12	2	8

In post operative period the complications in group I was 12% of which postoperative hyphema in 1 patient, posterior capsule rent in one patient and iritis with shallow anterior chamber in one patient . In group II the complication was 8% of which posterior capsule rent in one patient and bleb leak with shallow anterior chamber in one patient.

ASSOCIATED SYSTEMIC DISEASES

Table – 14

Systemic Diseases	ECCE with TRAB (Group – I)		SICS with TRAB (Group – II)	
	No.	%	No.	%
1.Diabetes	2	8	1	4
2.Hypertension	1	4	1	4
3. Asthma	1	4	2	8
Total	4	16	4	16

The associated systemic diseases were equal in both groups (16%),2 diabetics, 1 hypertensive, 1 Asthmatic in Group I (ECCE) and 1 diabetic, 1 hypertensive, 2 asthmatics in Group II (SICS).

DISCUSSION

Glaucoma triple procedure was controversial in the past because of their greater surgical trauma and success rate. With respect to IOP control was less than what could be expected when cataract extraction and trabeculectomy were performed separately.

SICS offers greater possibility of performing a simultaneous trabeculectomy with better IOP control, less surgical trauma and achieving good success rate.

In our study the mean age of patients was 61.76 in group I and 61.48 in group II (p=0.9451) shows no statistically significant difference.

Also in our study the sex distribution was not statistically significant (p=0.7685), the male and female distribution was 10, 15 in group I (ECCE) and 8, 17 in group II (SICS) respectively.

The laterality was also not statistically significant (p=1.000), with group I (ECCE) had 15 right eyes and 10 left eyes, while group II (SICS) had 14 right eyes and 11 left eyes.

In our study we included the patients with POAG, PACG, POAG+PXF AND SACG, of which POAG predominates with 72%, of which group I (ECCE) had 18 (72%) patients and group II (SICS) had 18 (72%) patients and SACG comes next with 20% of which group I (ECCE) had 5 (20%) patients and group II (SICS) had 5 (20%) patients , and PACG comes next with 8% of which group I (ECCE) had 2 (8%) patients and group II (SICS) had 2 (8%) patients respectively, the distribution of the type of glaucoma was almost similar in both the groups.

The lens pattern also shows similarity in both the groups, the distribution of lens pattern of IMC, MC, HM in group I (ECCE) and group II (SICS) were (56%, 32%, 12%)and (64%, 28%, 8%).

In our study the average pre operative IOP was 33.58 in group I (ECCE) and 29.24 in group II (SICS), which shows (p=0.1095) no statistically significant difference between the two groups.

Hence in our study both the groups are having almost similar distribution of age, sex, laterality, lens pattern and the type of glaucoma .

In this study, the follow up in the 2nd week shows there was a significant IOP control (p=0.0001) in SICS group (12.51) as compared to ECCE group (17.01).

Also significant IOP control in the 4th week (p=0.0001) and 6th week (p=0.0002) follow up in SICS group (12.82,13.53) than ECCE group (17.06,17.48) respectively.

In our study the postoperative IOP control in the two groups (ECCE and SICS) at 3rd month, 6th month and 12th month were (18.39, 16.14, [p=0.1314]) ; (18.77, 17.02, [p=0.4161]) ; (18.89, 17.07, [p=0.4279]) respectively, there was no statistically significant difference between the two groups at 3rd month, 6th month and 12th month respectively. These results were similar to the results of the study of P. Sathyan et al[23].

In study conducted by Wishart et al[42] shows phaco group had improved long-term control of IOP than ECCE group, which is same with our study but our study shows that no statistically significant difference exists between the two groups in late postoperative period.

In our study the type 1 bleb is about 28% in ECCE group and 64% in SICS group. While type 2 bleb is 64 % in ECCE, 36% in SICS group. Only 2 cases showed non filtering bleb and it belongs to ECCE group. Our study shows statistically significant difference in bleb type (p=0.0232) between SICS and ECCE group.

In our study out of 25 eyes of SICS group 19 eyes (76%) had < 1.00 D astigmatism, while 16 eyes (60%) in ECCE group had < 1.00 D astigmatism, which shows SICS group had better astigmatic stabilization.

Also our study shows against the rule astigmatism is more common in postoperative patients (76%).

In this study there is a better visual rehabilitation in SICS group than ECCE group as in the study of Wishart et al[42] and study by Percival et al[24].

In this study the postoperative complications are minimal, SICS group (8%) shows lesser than ECCE (16%).

CONCLUSION

Our study shows small incision cataract surgery with trabeculectomy has better efficacy in reduction of IOP than extra capsular cataract extraction with trabeculectomy.

Also small incision cataract surgery with trabeculectomy gives better IOP control, better visual results and early visual rehabilitation, good filtering bleb and lesser postoperative complications than extra capsular cataract extraction with trabeculectomy.

Since our study is a short term of one year follow up only, further studies are needed for long-term results.

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COMPARISON OF ECCE WITH TRABECULECTOMY AND SICS WITH TRABECULECTOMY IN EFFICACY OF REDUCTION IN IOP

PROFORMA

Name Age Sex

Address

OP NO: IP NO:

DOA DOS DOD

PRESENTING COMPLAINTS

DURATION

- Defective Vision
- Pain
- Redness
- Field Defects
- Watering
- Blurring
- Haloes
- Others

HISTORY OF PAST ILLNESS

DURATION

- Hypertension
- Diabetes Type 1/ Type 2
- Myopia
- Ocular Trauma

TREATMENT HISTORY

DURATION

- Ocular Antiglaucoma Drugs
- Others Hypertension

  Diabetes

PREVIOUS OCULAR SURGERY

- Cataract
- Others

FAMILY HISTORY

OCULAR EXAMINATION

R **L**

Lids
Conjunctiva
Cornea
Ac
- Shallow
- Normal
- Deep

Iris

Pupil
- Reacting
- Not reacting
- Rapd
- Pxf

Lens

- Normal

- IMC/MC/NS/HMC

IOP

Pre Operative Best Corected Visual Acuity

Gonioscopy Grade

Fundus Examination

Visual Field Examination

Diagnosis

Dental and ENT Evaluation
Fasting Blood Sugar and Post Prandial Blood Sugar
Blood Pressure

PRE OPERATIVE MANAGEMENT

TYPE OF SURGERY

1. ECCE with Trabeculectomy
2. SICS with Trabeculectomy

Intraoperative Complications

Postoperative Complications

TREATMENT :

FOLLOW UP

Slit Lamp Examination
Bleb, Siedel Test
Cornea
Ac depth, reaction

Visual Field

IOP

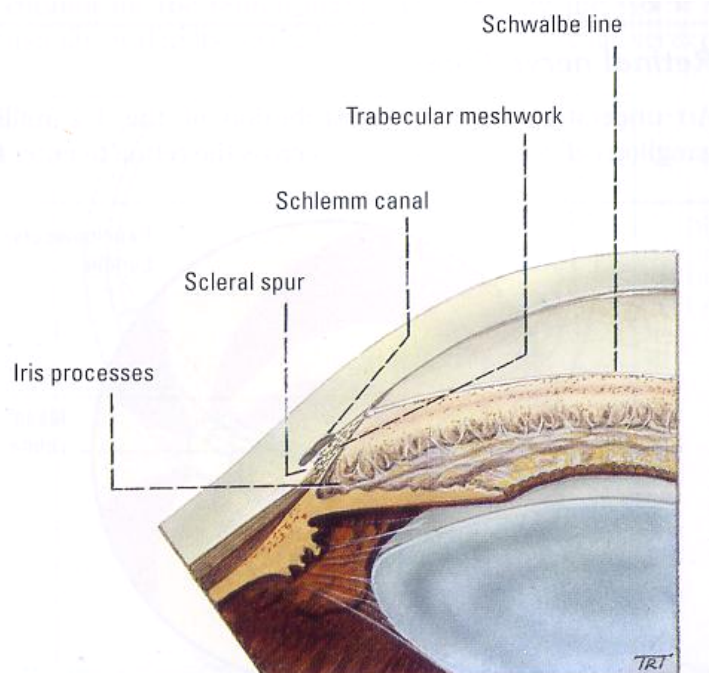
Refraction

Fundus
Examination

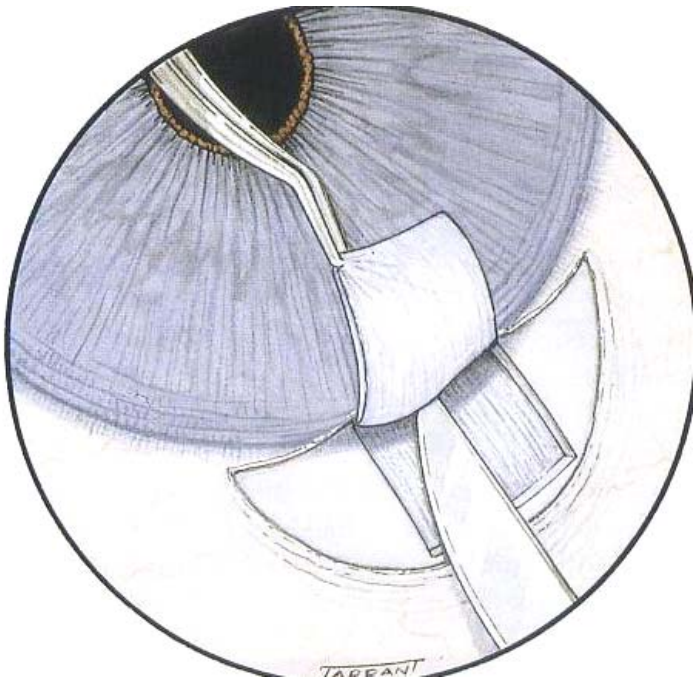
Condition On Discharge
Drugs

	2nd week	4th week	6th week	3rd month	6th month	12th month
VISION						
IOP						

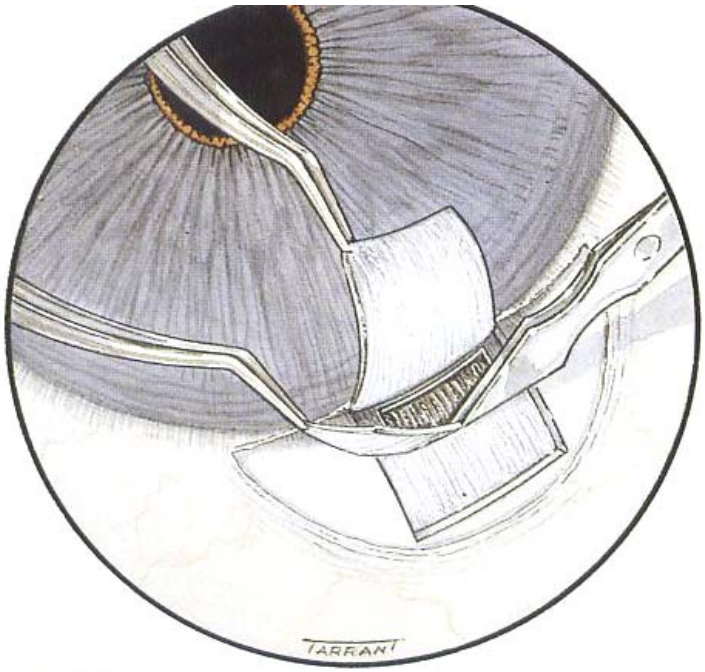
ELECTRON MICROGRAM OF THE TRABECULAR MESHWORK



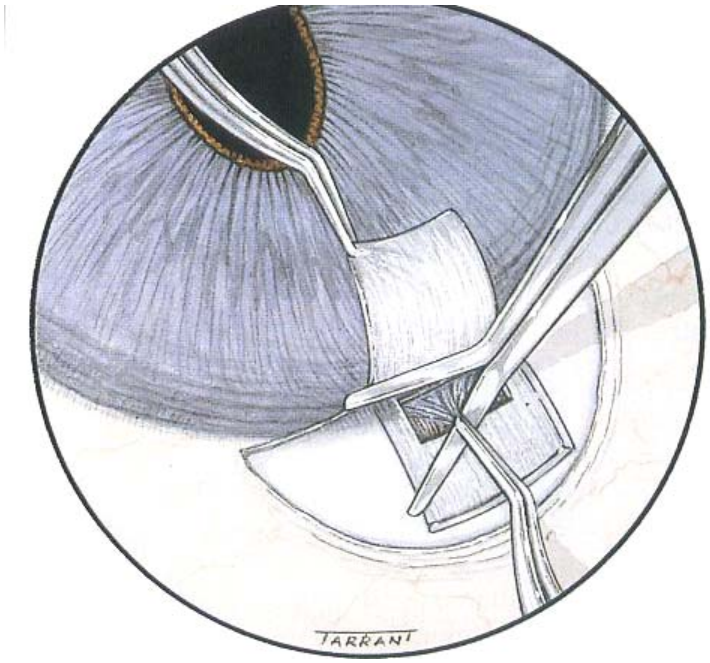
ANATOMY OF THE ANGLE STRUCTURES



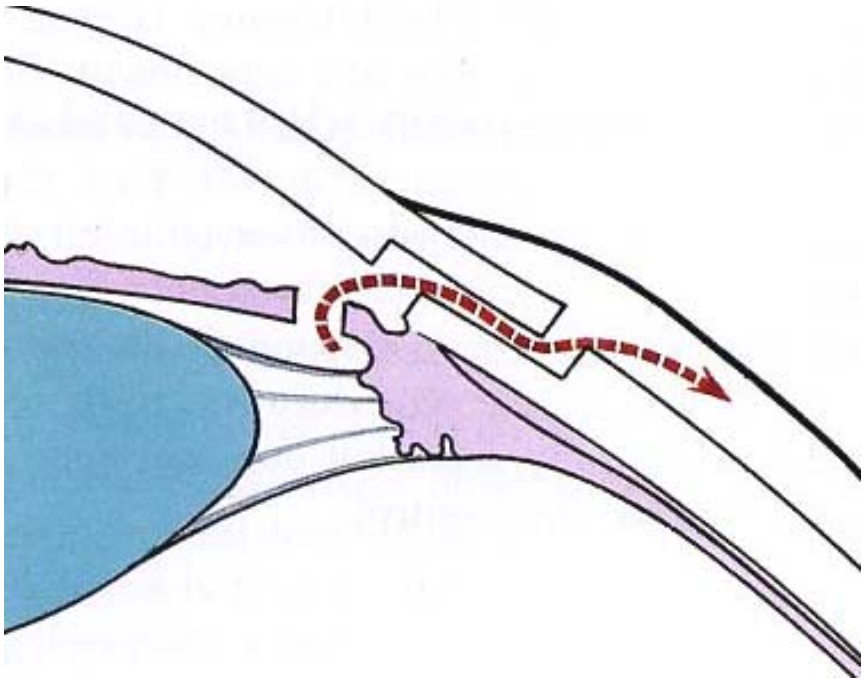
DISSECTION OF THE SUPERFICIAL SCLERAL FLAP



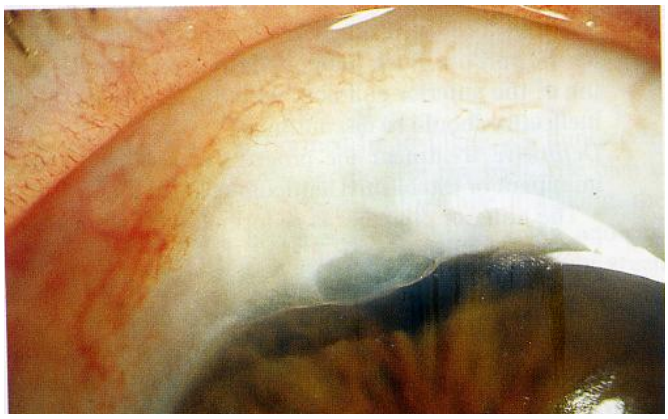
EXCISION OF THE DEEP SCLERAL BLOCK



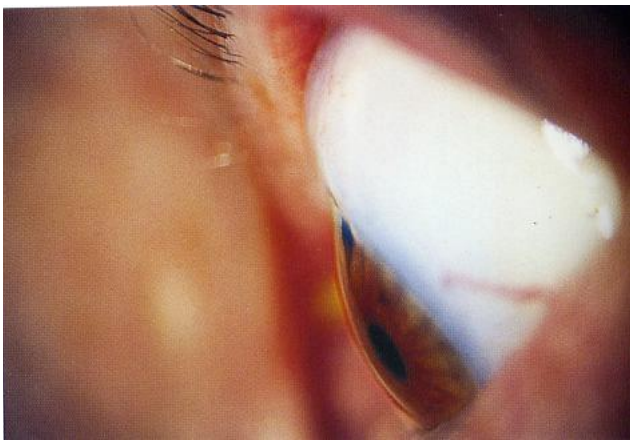
PERIPHERAL IRIDECTOMY



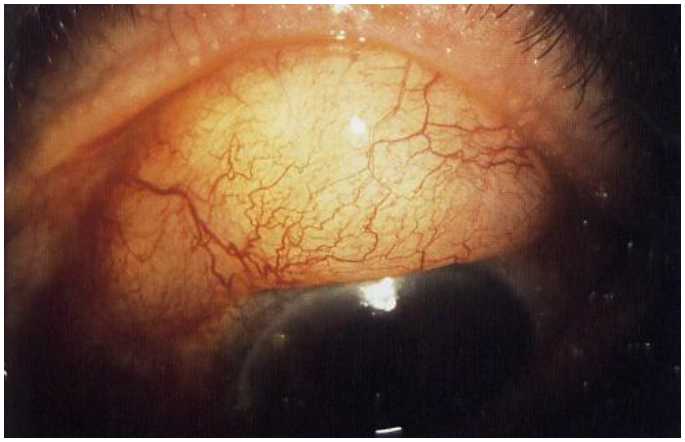
PATHWAY OF AQUEOUS FOLLOWING TRABECULECTOMY



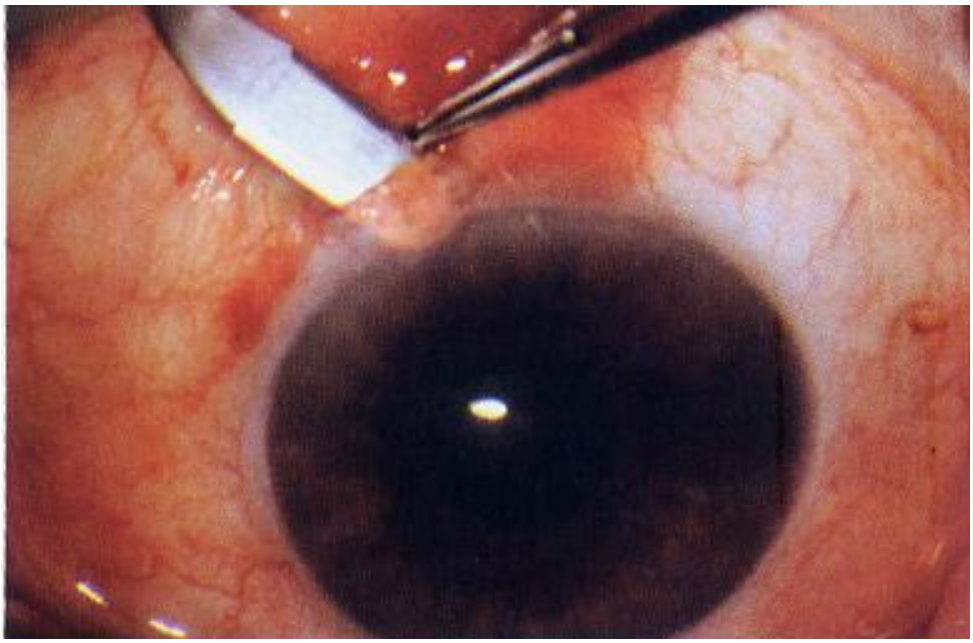
THIN POLYCYSTIC BLEB



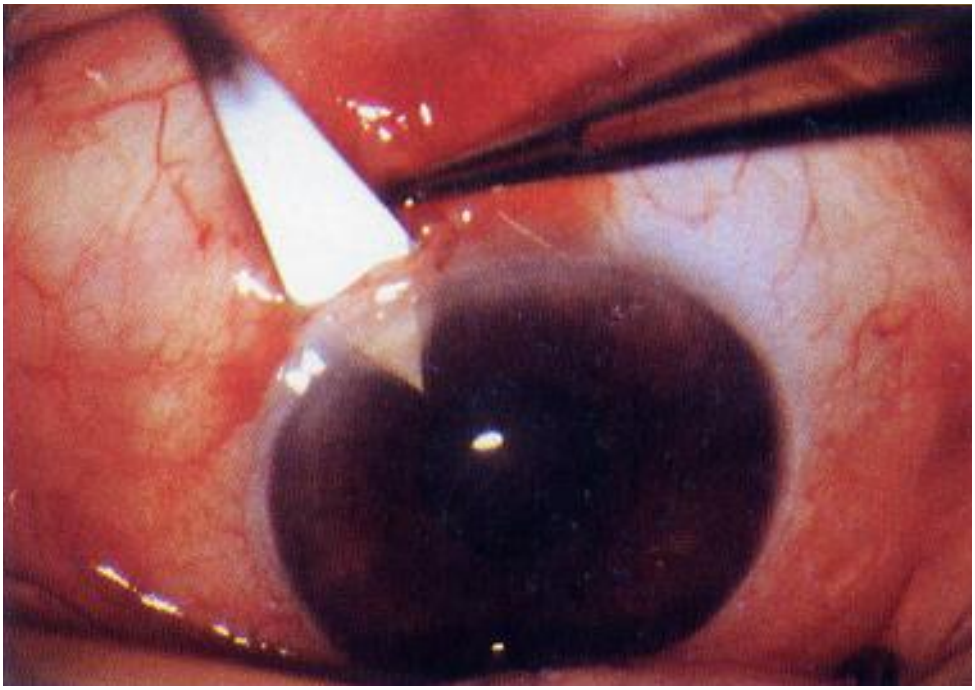
SHALLOW DIFFUSE BLEB



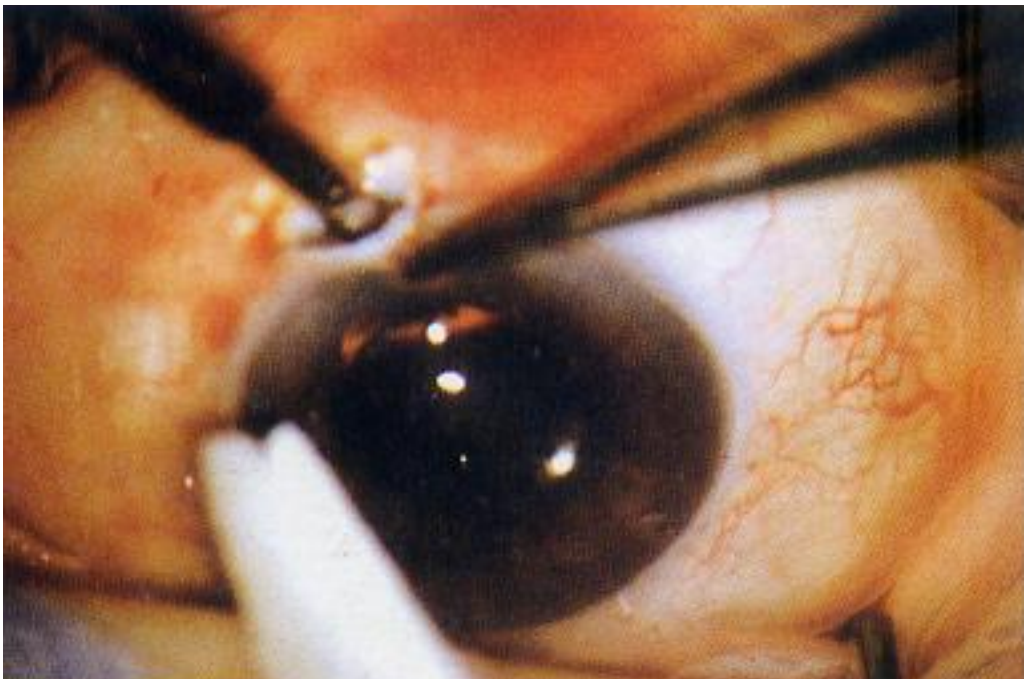
ENCAPSULATED BLEB



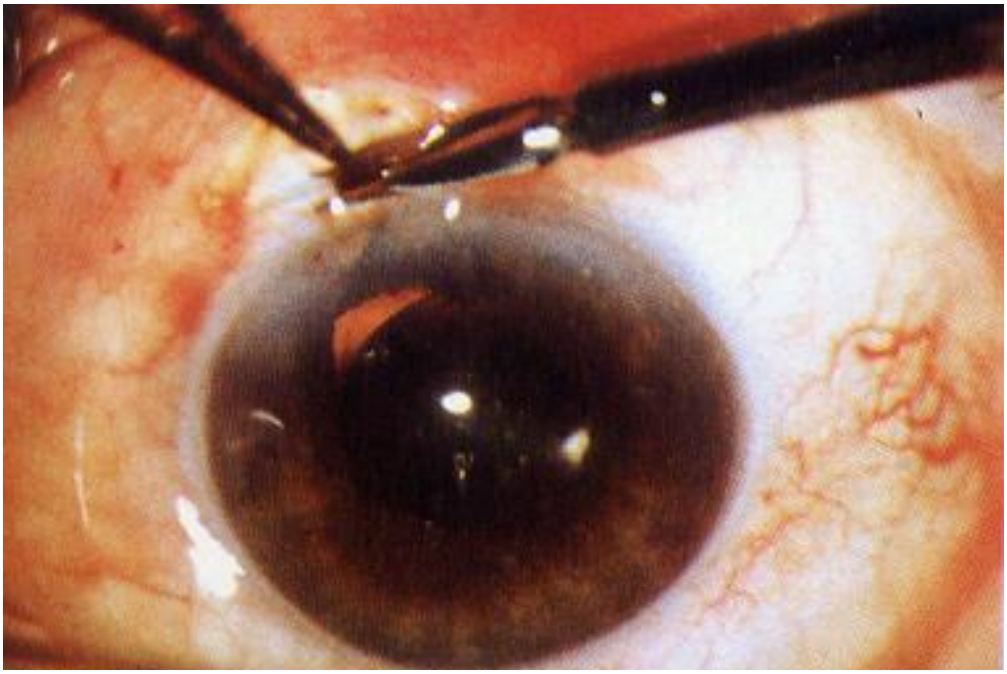
TUNNEL CREATION WITH CRESCENT BLADE



ANTERIOR CHAMBER ENTRY WITH KERATOME



CORNEOSCLERAL TISSUE EXCISION WITH THE KELLY DESCEMET PUNCH



PERIPHERAL IRIDECTOMY

FIGURE - 1

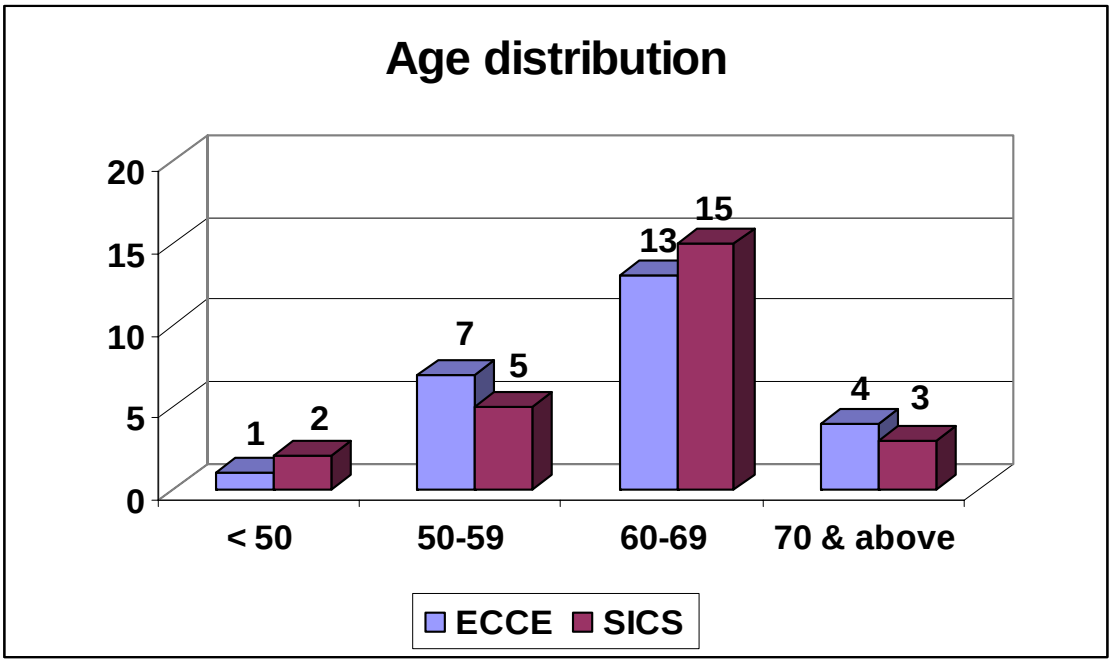


FIGURE - 2

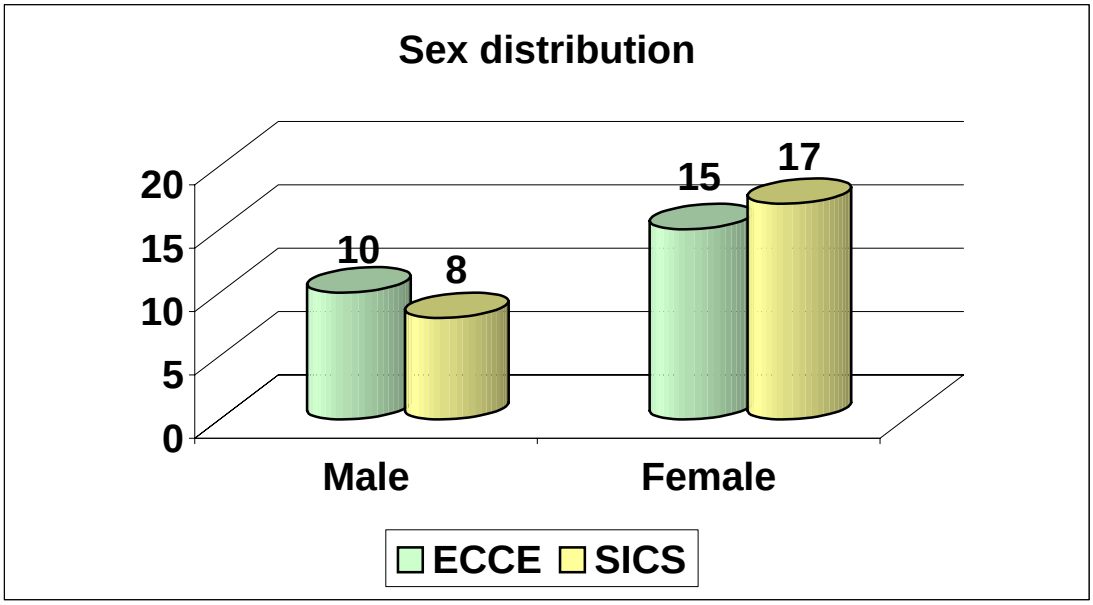


FIGURE – 3

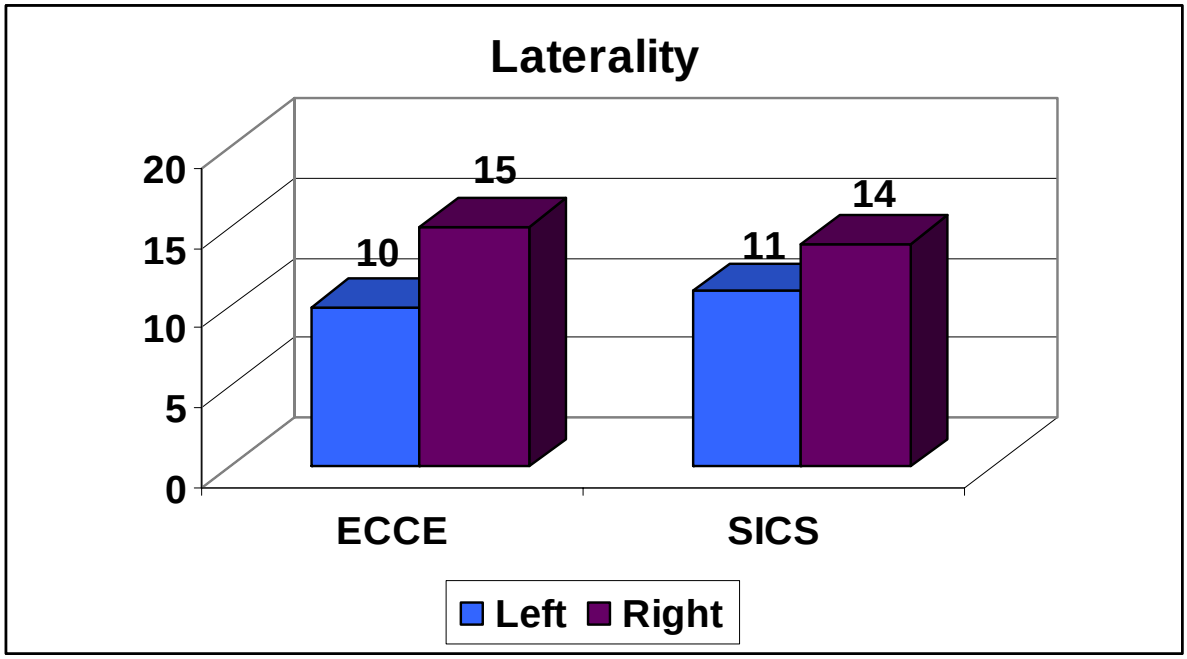


FIGURE – 4

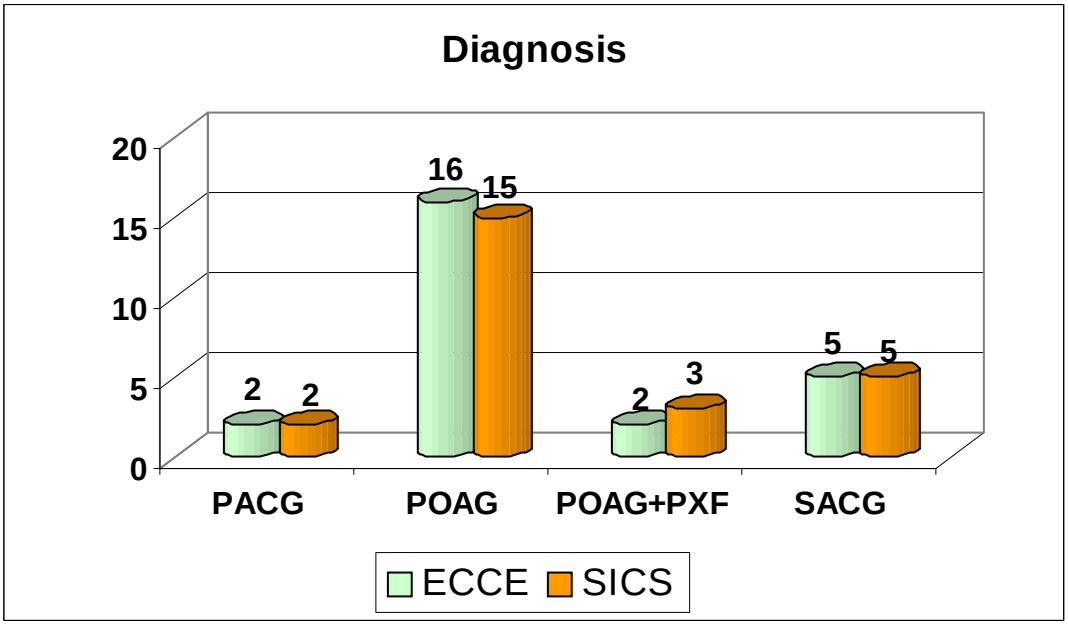


FIGURE – 5

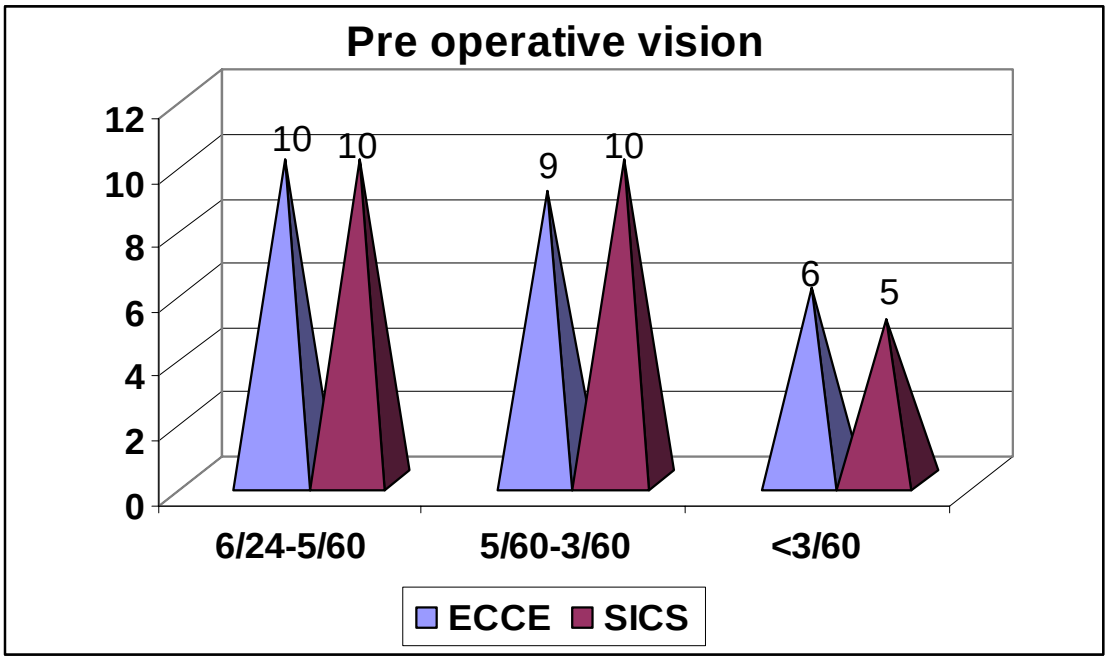


FIGURE – 6

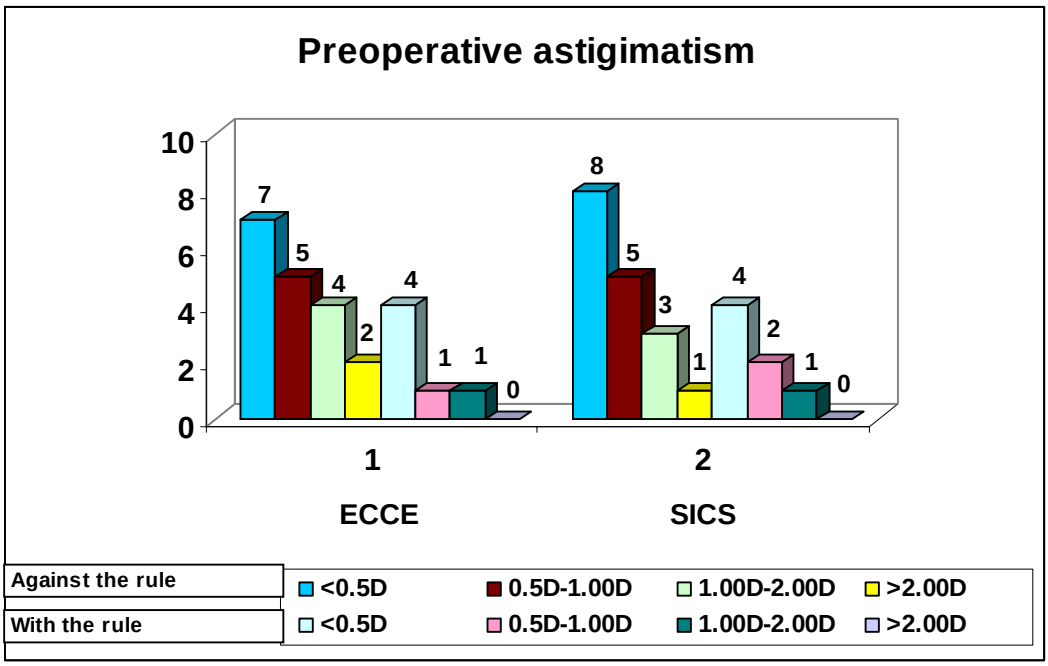
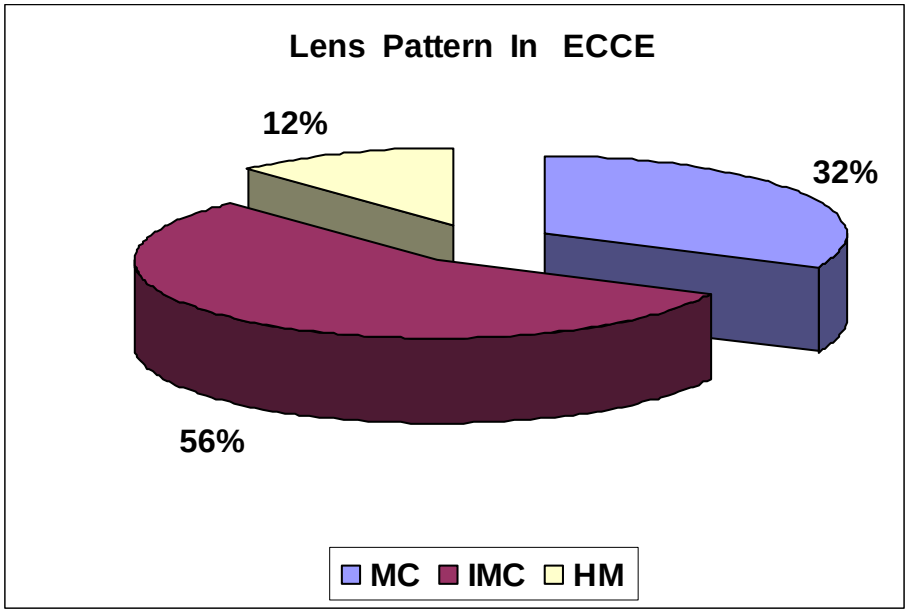


FIGURE – 7

LENS PATTERN



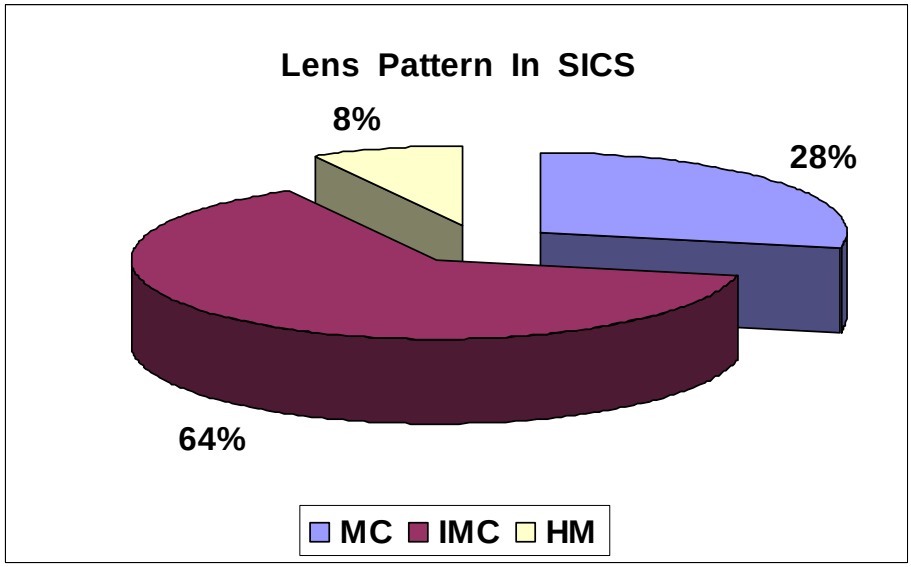
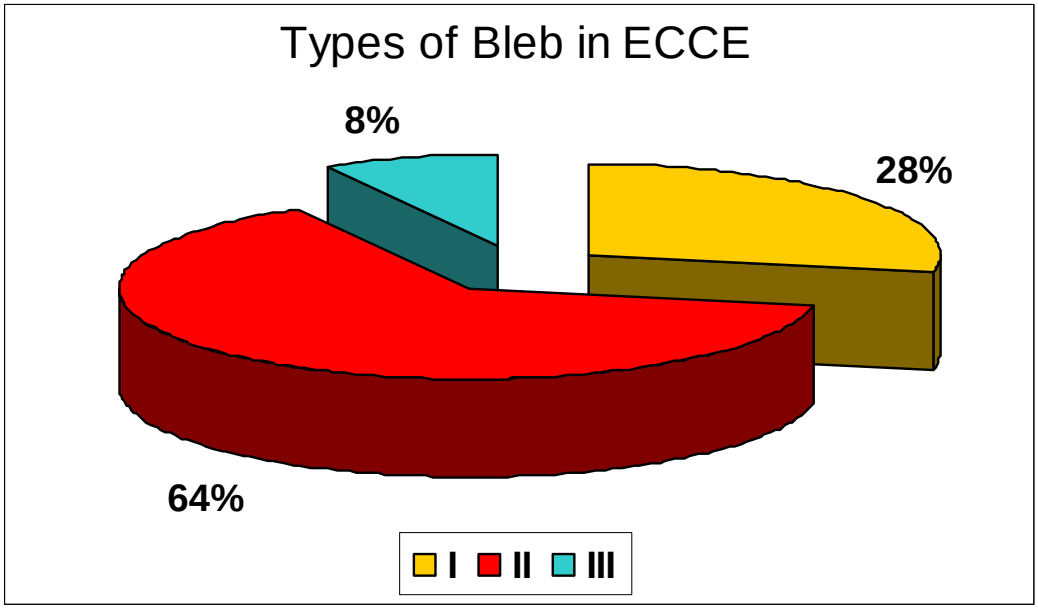


FIGURE – 8

TYPES OF BLEB



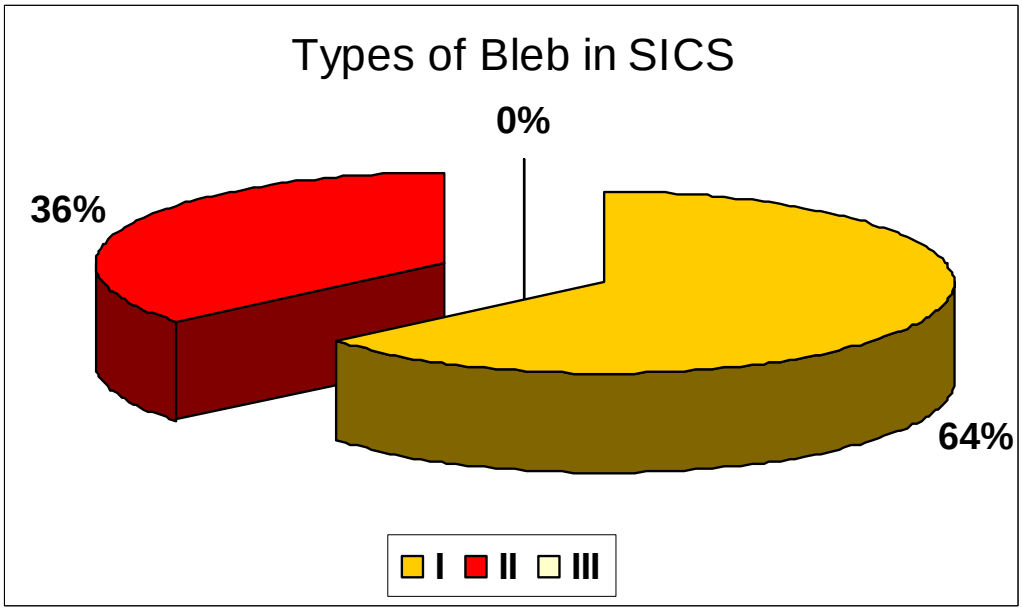


FIGURE - 9

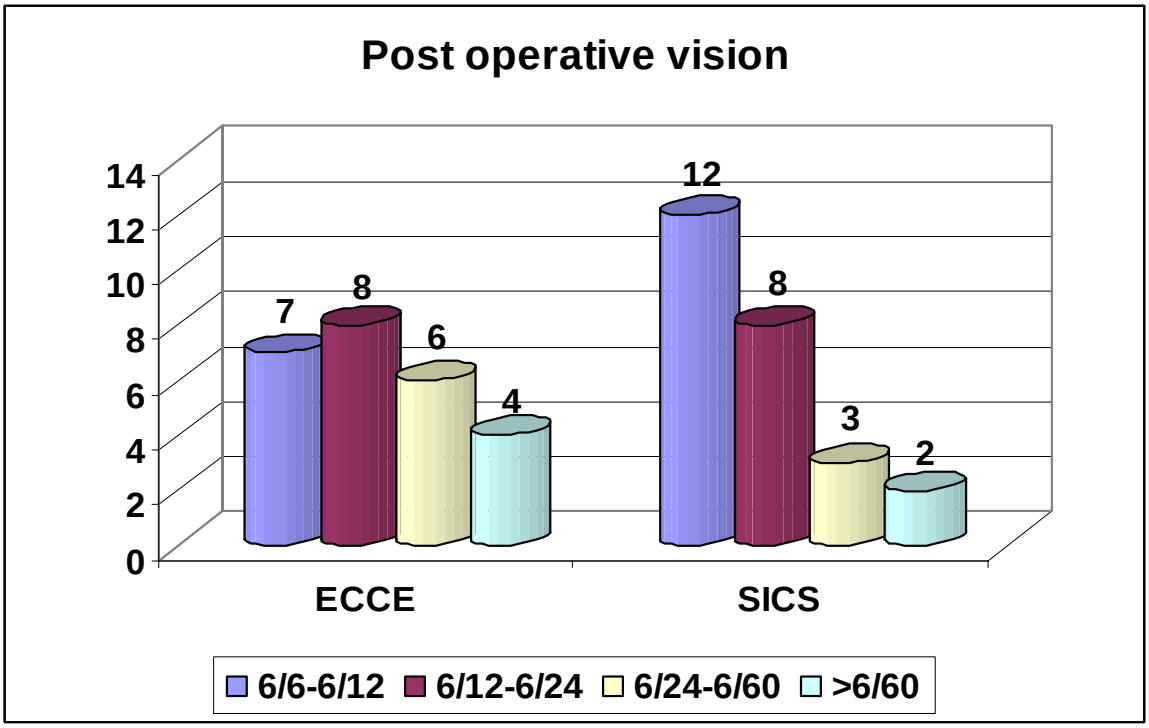

Post operative vision
14
12
10
8
6
4
2
0
7
8
6
4
12
8
3
2
ECCE
SICS
6/6-6/12
6/12-6/24
6/24-6/60
>6/60

FIGURE – 10

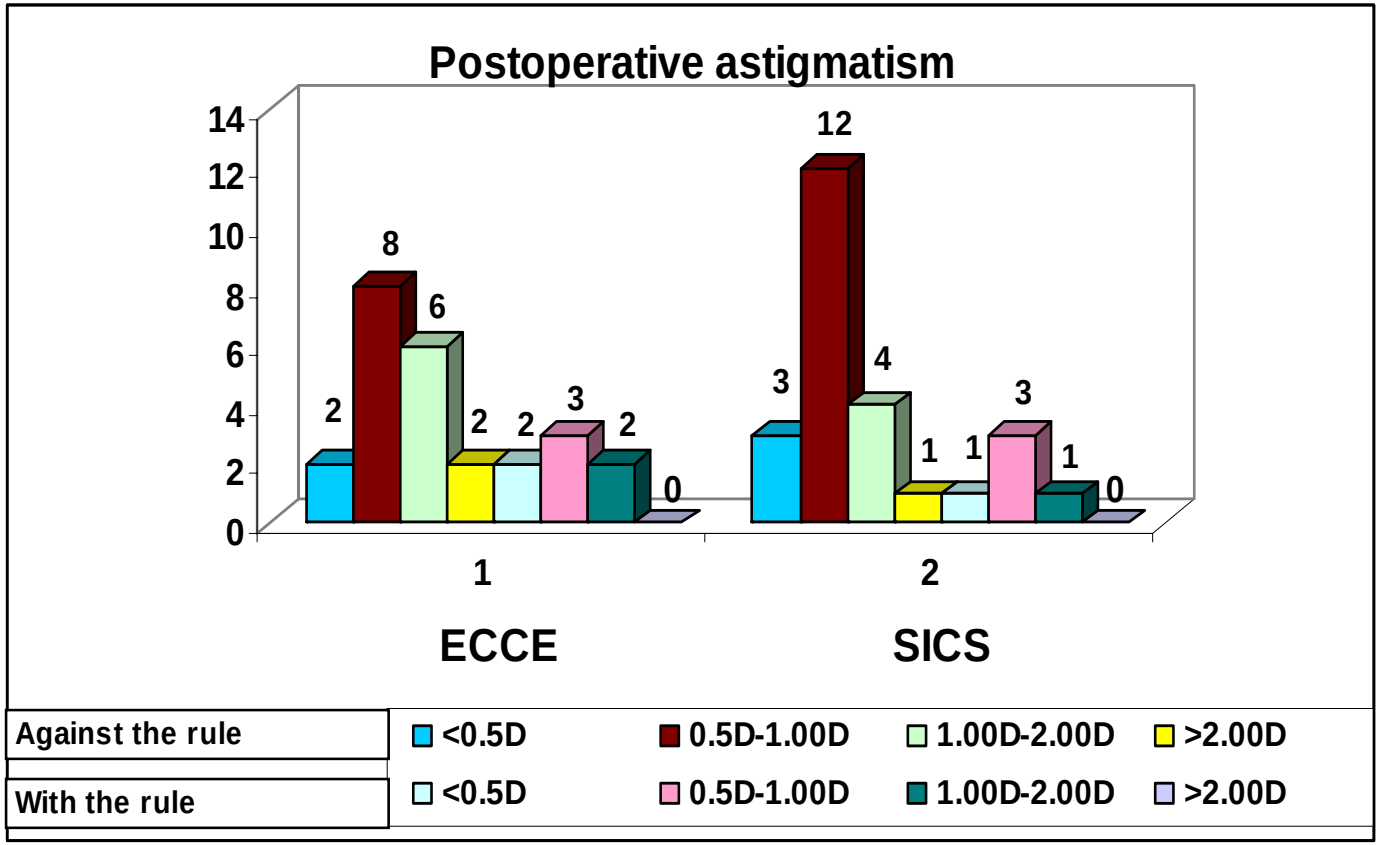
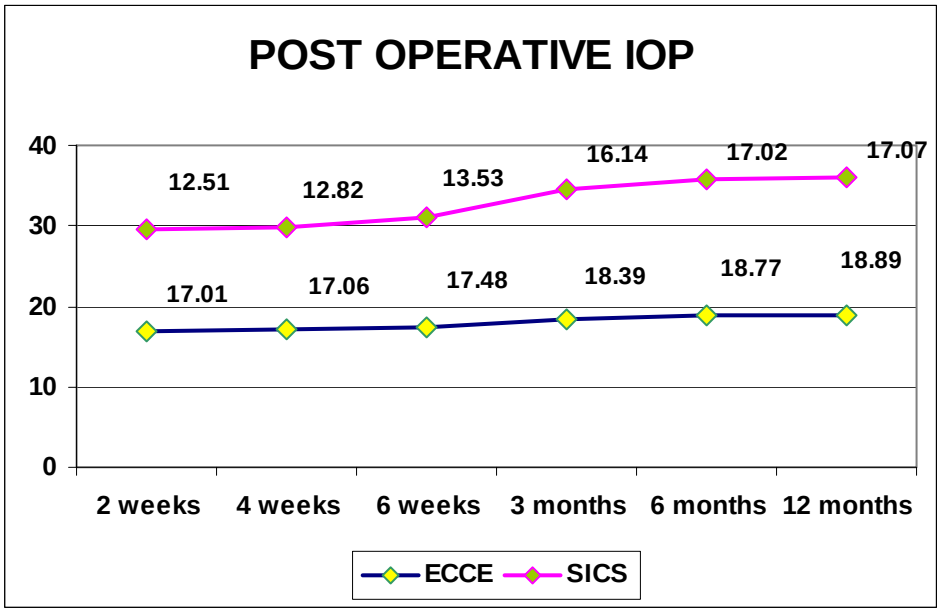

Postoperative astigmatism
14
12
10
8
6
4
2
0
2
8
6
2
2
3
2
0
3
12
4
1
1
3
1
0
1
2
ECCE
SICS
Against the rule
<0.5D
0.5D-1.00D
1.00D-2.00D
>2.00D
With the rule
<0.5D
0.5D-1.00D
1.00D-2.00D
>2.00D

FIGURE – 11


POST OPERATIVE IOP
40
30
20
10
0
12.51
12.82
13.53
16.14
17.02
17.07
17.01
17.06
17.48
18.39
18.77
18.89
2 weeks
4 weeks
6 weeks
3 months
6 months
12 months
ECCE
SICS

MASTER CHART

S.NO	NAME	AGE	SEX	IP.NO	EYE	DIAGNOSIS	PRE OPERATIVE IOP	PRE OPERATIVE VISION	PRE OPERATIVE ASTIGMATISM	LENS	TYPE OF SURGERY	POST OPERATIVE VISION	POST OPERATIVE ASTIGMATISM	BLEB TYPE	POST OPERATIVE IOP						COMPLICATIONS	REMARKS
															2 weeks	4week	6 weeks	3 month	6 month	12 month		
1	RAMAYEE	56	F	130482	R	SACG	45.8	HM	4-ATR	MC	ECCE	6/36	4-ATR	2	20.6	22.4	22.4	24.4	24.4	24.4		
2	PITCHAMMAL	45	F	130474	L	PACG	33	3/60	2-ATR	MC	SICS	6/18	2-ATR	2	12.2	12.2	12.2	14.6	15.9	15.9		DIABETIC
3	NARMADA	70	F	130492	R	PACG	30.4	6/60	3-ATR	IMC	SICS	6/12	3-ATR	1	12.2	13.4	13.4	15.9	15.9	15.9		
4	RAMALAKSHMI	57	F	130476	R	POAG	25.8	6/36	2-ATR	IMC	SICS	6/9	2-ATR	1	8.5	9.4	10.2	12.2	14.6	14.6		
5	JAIN BEEVI	65	F	130516	R	SACG	33	CFCF	3-ATR	HM	SICS	6/60	3-ATR	2	12.2	12.2	12.2	17.3	17.3	17.3		
6	THANGAVEL	64	M	130420	R	SACG	30.4	5/60	2-WTR	MC	SICS	6/12	2-WTR	2	11.2	12.2	12.2	14.6	15.9	15.9		
7	VASANTHA	45	F	130611	R	POAG	31.6	4/60	1-ATR	IMC	SICS	6/9	1-WTR	1	13.4	13.4	13.4	15.9	17.3	17.3		
8	RAJA	43	M	130620	L	SACG	45.8	.5/60	3-WTR	HM	ECCE	6/36	2-ATR	2	18.9	18.9	20.6	20.6	24.4	24.4		DIABETIC
9	PANCHAVARNAM	55	F	130845	L	POAG	24.4	6/24	2-ATR	IMC	ECCE	6/6	1-ATR	1	13.3	13.3	13.3	14.6	14.6	14.6		
10	SEENITHAI	60	F	130978	L	POAG	31.6	3/60	3-ATR	MC	ECCE	6/60	4-ATR	2	18.9	18.9	18.9	20.6	20.6	20.6		
11	SUKUMARAN	69	M	131070	R	POAG	29	6/60	1-WTR	IMC	ECCE	6/9	2-WTR	2	14.6	14.6	15.9	17.3	17.3	17.3		
12	KALIAMMAL	65	F	131062	L	POAG	24.4	5/60	2-WTR	IMC	SICS	6/6	2-WTR	1	12.2	12.2	13.4	14.6	15.9	15.9		
13	AYYASAMY	60	M	131023	L	SACG	34.5	CFCF	3-ATR	HM	SICS	6/36	3-ATR	2	18.9	18.9	18.9	20.6	20.6	20.6		HYPERTENSIVE
14	PERIYABOOMI	60	F	131185	R	POAG	25.8	3/60	2-ATR	IMC	ECCE	6/9	2-ATR	2	14.6	14.6	14.6	15.9	15.9	15.9		
15	SURIYAPRABHA	64	F	131262	R	POAG	33	3/60	1-WTR	MC	SICS	6/6	1-ATR	1	11.2	11.2	12.2	14.6	15.9	15.9		
16	ALAGU	60	F	131198	R	POAG+PXF	26.6	6/60	2-ATR	IMC	SICS	6/6	2-ATR	1	11.2	11.2	13.4	15.9	15.9	15.9		
17	POTHUMANI	59	F	131291	L	POAG	24.4	5/60	1-WTR	IMC	SICS	6/6	1-ATR	2	9.4	9.4	10.2	14.6	14.6	14.6		
18	RAJAMMAL	61	F	131362	L	POAG	34.5	6/36	1-ATR	IMC	SICS	6/12	2-ATR	2	13.4	13.4	14.6	17.3	17.3	17.3		
19	VELLAI	63	F	131357	R	POAG	28	6/36	2-WTR	IMC	ECCE	6/9	2-WTR	1	15.9	15.9	17.3	17.3	17.3	17.3		HYPERTENSIVE
20	RAJAMANI	68	F	131575	L	POAG+PXF	25.8	5/60	2-ATR	IMC	SICS	6/9	2-ATR	1	13.4	13.4	13.4	17.3	17.3	17.3	PC RENT	
21	GHANDHI	62	M	137654	L	SACG	54.2	1/60	1-ATR	HM	ECCE	6/60	2-ATR	2	25.8	25.8	28	30.4	30.4	30.4		
22	BALAKRISHNAN	67	M	131730	R	POAG	24.4	6/60	1-ATR	IMC	SICS	6/9	2-ATR	1	11.2	11.2	12.2	17.3	17.3	17.3		
23	JEYALAKSMI	58	F	131791	L	POAG	42.1	2/60	1-WTR	MC	SICS	6/24	2-WTR	2	18.9	18.9	20.6	20.6	25.8	25.8		
24	PETACHI	55	F	131836	R	POAG+PXF	29	6/60	2-ATR	IMC	ECCE	6/24	3-ATR	1	13.4	13.4	13.4	14.6	14.6	14.6		ASTHMA
25	SASIKUMAR	60	M	131850	R	PACG	33	5/60	2-ATR	IMC	ECCE	6/12	3-ATR	2	12.2	12.2	13.3	14.6	14.6	14.6		
26	ABDUL RAJAK	62	M	131737	L	SACG	34.2	1/60	3-ATR	MC	ECCE	5/60	2-ATR	2	28	28	30.4	30.4	30.4	30.4	IRITIS,SHALLOW AC	
27	MARUTHAI	52	F	131885	L	POAG	25.8	6/60	1-ATR	IMC	ECCE	6/18	2-ATR	2	14.6	17.3	17.3	17.3	18.9	20.6		
28	AMARAVATHI	60	F	131981	R	POAG	30.4	5/60	4-ATR	IMC	SICS	6/18	4-ATR	2	14.6	14.6	14.6	18.9	18.9	18.9		ASTHMA
29	RAMASAMY	71	F	130896	L	POAG	29	6/36	1-ATR	IMC	SICS	6/6	1-ATR	1	12.2	13.4	13.4	17.3	17.3	17.3		
30	MOCKAMMAL	62	F	131983	R	POAG	33	6/60	1-ATR	IMC	ECCE	6/9	1-WTR	1	14.6	14.6	14.6	15.9	15.9	15.9		

S.NO	NAME	AGE	SEX	IP.NO	EYE	DIAGNOSIS	PRE OPERATIVE IOP	PRE OPERATIVE VISION	PRE OPERATIVE ASTIGMATISM	LENS	TYPE OF SURGERY	POST OPERATIVE VISION	POST OPERATIVE ASTIGMATISM	BLEB TYPE	POST OPERATIVE IOP						COMPLICATIONS	REMARKS
															2 weeks	4week	6 weeks	3 month	6 month	12 month		
31	AMMAPILLAI	71	F	131991	R	POAG	24.4	6/60	3-WTR	IMC	SICS	6/12	3-WTR	1	12.2	12.2	13.4	15.9	17.3	17.3		
32	GOMATHY	75	F	132347	R	POAG+PXF	30.4	5/60	2-ATR	IMC	ECCE	6/18	2-ATR	2	17.3	17.3	17.3	18.9	18.9	18.9	PC RENT	
33	KADHAR BEEVI	58	F	132264	R	POAG	45.2	1/60	1-ATR	MC	ECCE	6.18	3-ATR	2	20.6	17.3	17.3	17.3	18.9	18.9		
34	MAHALAKSHMI	68	F	132360	R	POAG	25.8	5/60	NIL	IMC	SICS	6/1`2	2-ATR	1	12.2	12.2	14.6	17.3	17.3	17.3		ASTHMA
35	UDDIYAPPAN	70	M	261719	R	POAG	24.4	6/60	1-WTR	IMC	ECCE	6/12	1-WTR	2	12.2	12.2	12.2	12.2	13.4	14.6		
36	KARUPATHEVAR	73	M	132646	R	POAG	28	6/36	3-ATR	IMC	ECCE	6/9	3-ATR	2	14.6	14.6	14.6	15.9	15.9	15.9		
37	MAHESWARAN	57	M	132882	L	POAG	26.6	6/36	1-ATR	IMC	SICS	6/9	2-ATR	2	13.4	13.4	13.4	14.6	15.9	17.3		
38	PERIYAKARUPPAN	60	M	133119	L	SACG	29	6/60	2-ATR	MC	SICS	6/12	2-ATR	1	11.2	11.2	13.4	13.4	15.9	15.9		
39	KOMUTHAYEE	65	F	133169	L	SACG	41.5	HM	4-ATR	HM	ECCE	6/60	2-ATR	1	20.6	20.6	18.9	18.9	18.9	18.9		DIABETIC
40	VEDAMANICKAM	68	M	133235	R	POAG	24.4	3/60	3-ATR	IMC	ECCE	6/24	3-ATR	2	14.6	14.6	14.6	14.6	15.9	15.9		
41	RAJAKOPAL	67	M	133308	L	POAG	45.2	1/60	1-ATR	MC	ECCE	6/36	1-ATR	3	25.8	25.8	25.8	28	28	28	POST OP HYPHEMA	
42	PONNIYAN	61	M	133410	R	POAG	29	6/60	1-WTR	MC	SICS	6/12	2-ATR	1	9.4	10.2	12.2	13.4	14.6	14.6		
43	KAMATCHI	64	F	133349	R	SACG	34.2	5/60	1-ATR	IMC	SICS	6/12	2-ATR	1	14.6	17.3	17.3	18.9	18.9	18.9		
44	VEERAPERUMAL	58	M	133229	L	POAG	42.1	2/60	1-WTR	MC	ECCE	6/24	3-WTR	3	20.6	20.6	18.9	18.9	18.9	18.9		
45	PEYADI	60	M	133697	L	POAG	24.4	6/60	1-ATR	IMC	SICS	6/9	2-ATR	1	12.2	12.2	12.2	15.9	15.9	15.9		
46	PAPPAMMAL	59	F	133765	R	POAG	29	4/60	1-ATR	MC	ECCE	6/18	2-ATR	1	13.4	13.4	14.6	14.6	14.6	14.6		
47	IRULAYEE	60	F	133736	L	PACG	34.2	3/60	1-ATR	MC	ECCE	6/18	3-ATR	2	14.6	14.6	15.9	15.9	15.9	15.9		
48	PERIYAKKAL	70	F	133852	R	POAG	29	4/60	NIL	IMC	ECCE	6/9	2-WTR	2	13.4	13.4	13.4	17.3	17.3	17.3		
49	PERIYASAMY	57	M	135125	R	POAG + PXF	24.4	4/60	1-ATR	MC	SICS	6/9	3-ATR	1	11.2	11.2	11.2	14.6	15.9	15.9	BLEB LEAK,SHALLOW AC	
50	ALAGAMMAL	62	F	136027	R	POAG	26.6	6/60	1-WTR	IMC	ECCE	6/12	3-WTR	1	12.2	12.2	13.4	13.4	13.4	13.4		

LEGEND	
Surgically Induced astigmatism in Diopters	Numerical Code
< 0.5D	1
0.5D - 1.00D	2
1.00D - 2.00D	3
> 2.00 D	4
ATR - Against the rule astigmatism	
WTR - With the Rule Astigmatism	