Management and Surgeries for Cataract

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Management of congenital and developmental cataract

Work up:

Fig 1.visually significant cataract

- A. Clinico-investigative work up:

  A detailed clinico-investigative work up is most essential in the management of paediatric cataract.

  It should be aim at knowing the prognostic factors and indications and timing of surgery.

1.Ocular examination -

- Density and morphology of cataract
- Assessment of visual function may be made from oblique illumination examination and fundus examination. Special tests like fixation reflex, forced choice preferential looking test, visually evoked potential (VEP),optic-kinetic nystagmus.
- Associated ocular defects need to be noted like microphthalmos, glaucoma , rubella retinopathy etc.

2. Laboratory investigations to detect any-

- Intrauterine infections like TORCHS
- Galactosemia by urine test
- Lowe’s syndrome by urine chromatography foe amino acids
- Hyperglycemia
- Hypocalcemia

B. Prognostic factors need to be noted are:

- Density of cataract
- Unilateral or bilateral cataract
- Time of presentation
- Associated ocular defects
- Associated systemic defects

C. Surgical procedure:

(1) Irrigation and aspiration of lens matter

It is preferably done by corneoscleral tunnel techniques

1.Superior rectus suture

2.Conjunctival flap and exposure of sclera

3.Haemostasis

4.Sclerocorneal tunnel incision

5.Side port entry

6.Anterior capsulorrhexis

7. Hydrodissection
8. Irrigation and aspiration of lens matter
9. Posterior capsulorrhexis
10. Anterior vitrectomy
11. Implantation of IOL
12. Removal of viscoelastic material
13. Intracameral antibiotics
14. Wound closure

(2) Lensectomy :

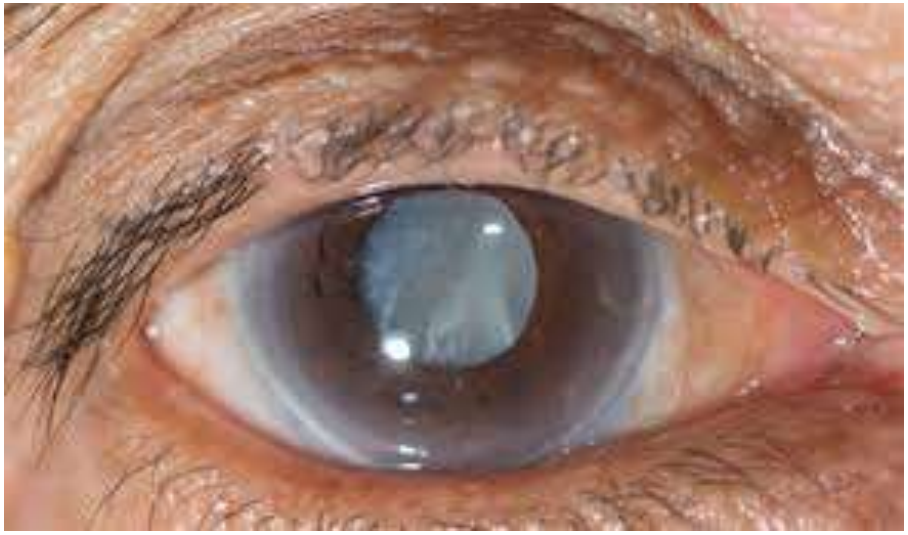
- In this operation most of lens including anterior and posterior capsule along with anterior vitreous are removed with the help of a vitreous cutter.
- Done under GA
- Childhood cataract ,being soft dealt with this especially in children > 2 yrs of age.
- Either pars plana or limbal approach adopted.
- Secondary IOL implantation can be planned at a later date.

D .Correction of paediatric aphakia:

- Children >2 yrs of age can be corrected by implantation of PCIOL during surgery.
- Children < 2 yrs of age treated by extended wear contact lens. Later on secondary IOL implantation may be considered.
- Present trend is to do primary implantation at the earliest possible specially in unilateral cataract.

MANAGEMENT AND SURGEREIS FOR CATARACT IN ADULTS

- Treatment of cataract essentially consist of its surgical removal. However, certain nonsurgical measures ay be of help, in peculiar circumstances, till surgery is taken up.



NON-SURGICAL MEASURES

1) Treatment of cause of cataract:

- Adequate control of diabetes mellitus
- Removal of cataractogenic drug such as corticoteroids, phenothiazenes and strong miotics.
- Removal of irradiation (infrared r X-rays).
- Early and adequate treatment of ocular diseases like uveitis.

2) Measures to improve vision in the presence of incipient and immature cataract :

- Prescription of glasses refractive status, should be corrected frequent intervals.
- Patients with peripheral opacities may be instructed to use brilliant illumination.
- Use of dark goggles in patients with central opacities is of great value and comfort when worn outdoors.

- Mydriatics Patients with small axial cataract, frequently may benefit from pupillary dilatation. this allows the clear paraxial lens to participate in light transmission, image formation and focusing.

SURGICAL MANAGEMENT

- Indications

1.Visual improvement

2.Medical indications- lens induced glaucoma, phacoanaphylactic endophthalmitis, diabetic retinopathy, retinal detachment.

3.Cosmetic indication.

- Preoperative evaluation and workup:

1.General medical examination of the patient to exclude any systemic disease or infection.

2.Ocular examination:

i. Visual status examination-visual acuity

-perception of light

-projection of light rays

ii. Pupils –light reaction and RAPD

-Ability of pupils to dilate adequately before surgery.

iii. Anterior segment evaluation by slit lamp examination.

iv. Intraocular pressure

v. Examination of lids, conjunctiva and lacrimal apparatus.

vi. Fundus examination.

vii. Macular function test include two-light discrimination test ,maddox rod test, color perception.

viii. Objective test for evaluating retina includes USG,electroretinogram, electrooculogram, VER(visually evoked response).

ix. Keratometry and biometry.

- Preoperative medications and preparations.

i. Consent

ii. Scrub bath,care of hair and marking of the eye.

iii. Preoperative antibiotics and disinfectants-

topical antibiotics ,povidone-Iodine(10%)solution,povidone-Iodine(5%)eyedrop.

iv.IOP lowering agents

v. Mydriasis- Topical tropicamide1% + Phenylephrine2.5%

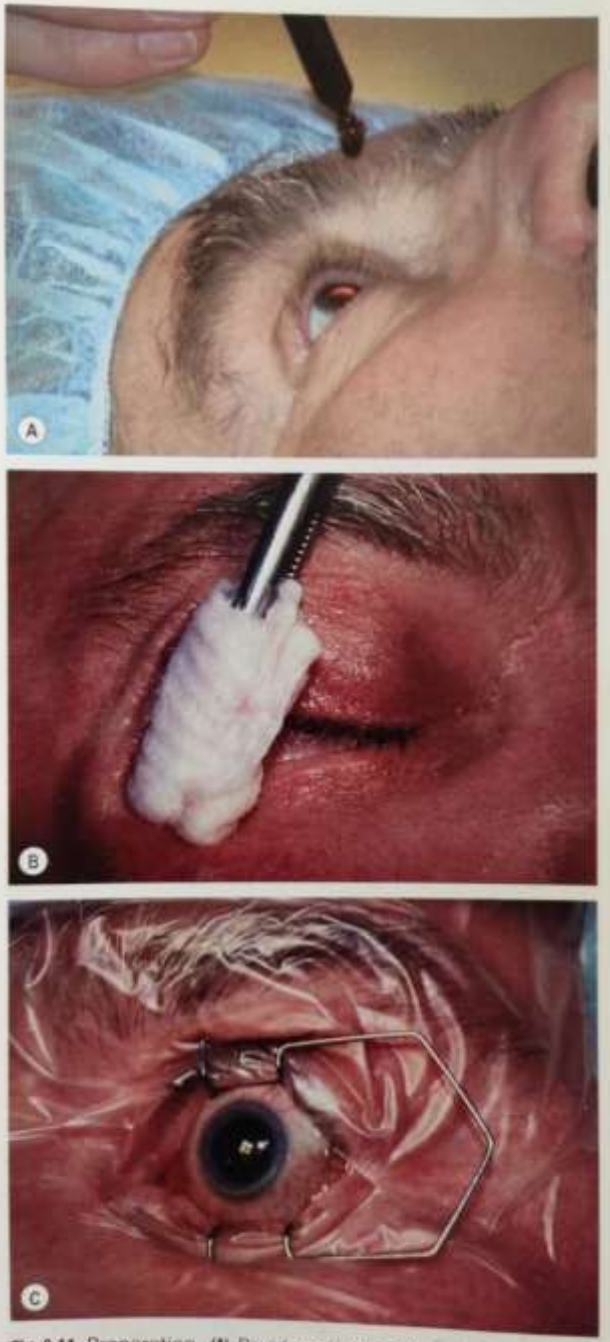


Fig. 9.11 Preparation. **(A)** Povidone-iodine 5% is instilled; **(B)** skin is painted; **(C)** drapes isolate the eyelids from the operating field with insertion of a speculum.

- Anaeshthesia

  Local anaesthesia is preferred over general.

  Retrobulbar block

  Peribulbar block

  Subtenons block

  Facial block

  Topical anaesthesia

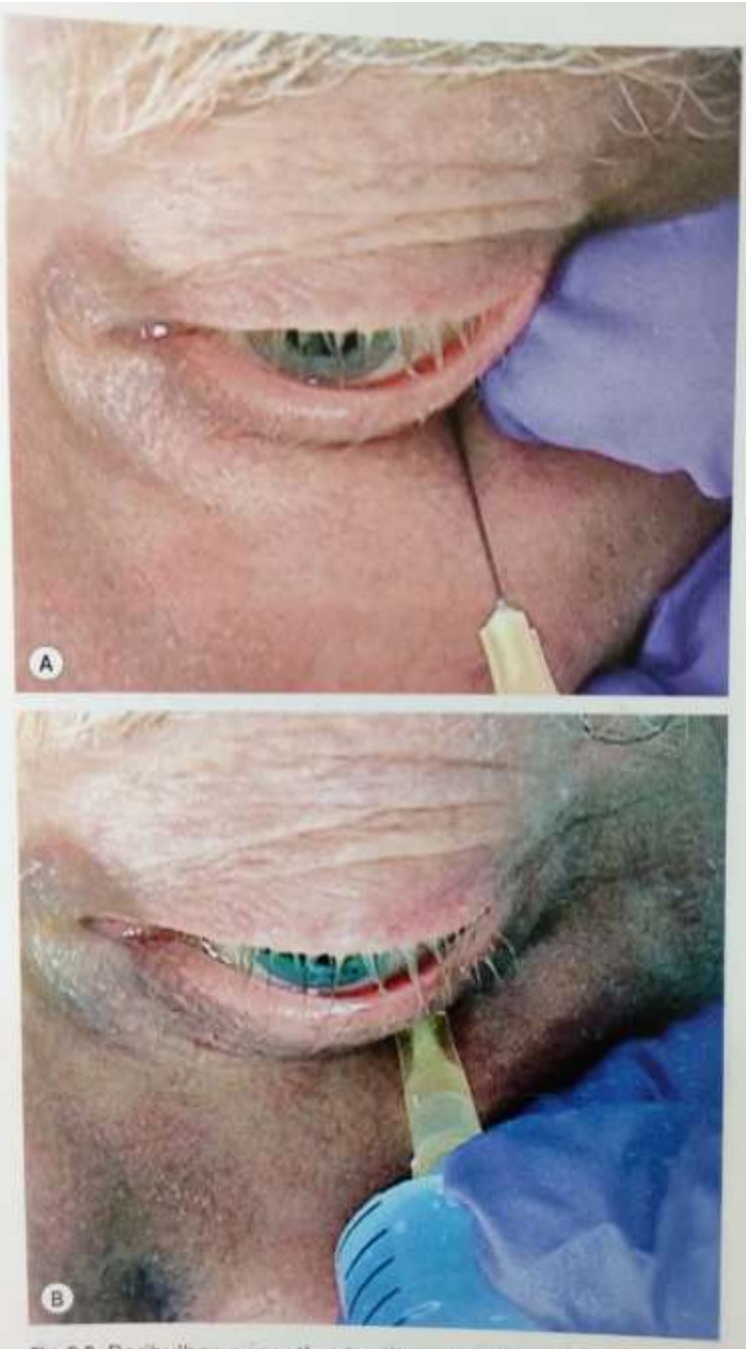


Fig. 9.9 Peribulbar anaesthesia. **(A)** Insertion of needle; **(B)** injection

SURGICAL TECHNIQUES FOR CATARACT EXTRACTION

- Intracapsular cataract extraction
- Extracapsular cataract extraction
- Small incision cataract surgrey
- Phacoemulsification
- Microincision cataract surgery
- Femtosecond laser assisted cataract surgery

INTRACAPSULAR CATARACT EXTRACTION (ICCE)

- Presently, the technique of ICCE is obselolete and sparingly performed world wide.
- However, surgical steps are described here as a mark of respect to the technique which has been widely employed for about 100 years over the world.

Surgical steps of the ICCE

1. Superior rectus (bridle) suture
2. Conjunctival flap (fornix based)
3. Partial thickness groove or gutter
4. Corneoscleral section
5. Iridectomy
6. Methods of lens delivery

- Smith Indian method- here the lens is delivered with tumbling technique by applying pressure on limbus at 6 O'clock with the lens expressor and counter pressure at 12 O'clock with the lens spatula.

- Cryoextraction-

  lens surface is dried with a swab

  tip of the cryoprobe is applied on the anterior surface of the lens in upper quadrant.

  freezing is activated(-40 degree Celsius) to create adhesions between the lens and the probe. The zonules are ruptured by gentle rotatory movements and the lens is then extracted out by sliding movements.

- Capsule forceps method-
- The Arruga’s capsule holding forceps is introduced close into the anterior chamber and the anterior capsule of the lens is caught at6 O’clock position.The lens is lifted slightly and its zonules are ruptured by gentle sideways movements.Then the lens is extracted with gentle sliding movements by the forceps assisted by a pressure at 6 O’clock position on the limbus by the lens expressor.
- Wire vectis method is employed in cases of subluxated lens or dislocated lens only

7.formation of anterior chamber.

8.Implantation of anterior chamber lens (ACIOL)

9.Closure of incision

10.Conjunctival flap

11.Subconjunctival injection of dexamethasone 0.25ml and gentamicin 0.5 ml is given.

12.Patching of eye

Fig. 9.23 *Surgical steps of intracapsular cataract extraction with anterior chamber intraocular lens implantation: A, passing of superior rectus suture; B, fornix based conjunctival flap; C, partial thickness groove; D, completion of corneo-scleral section; E, peripheral iridectomy; F, cryolens extraction; G & H, insertion of Kelman multiflex intraocular lens in anterior chamber; I, corneo-scleral suturing*

CONENTIONAL EXTRACAPSULAR CATARACT EXTRACTION (ECCE)

1. Superior rectus (bridle) suture
2. Conjunctival flap
3. Partial thickness groove or gutter
4. Entry into anterior chamber
5. Injection of viscoelastic substance in anterior chamber such as 2% methylcellulose or 1% sodium hyaluronate.
6. Anterior capsulotomy: Can-opener technique
   Linear capsulotomy &
   Continuous circular capsulorrhexis (CCC)

7. Removal of anterior capsule
8. Completion of corneoscleral section
9. Hydrodissection
10. Removal of nucleus:
    - Pressure and counterpressure method
    - Irrigating wire vectis technique
11. Aspration of the cortex
12. Implantation of IOL
13. Closure of incision

14. Removal of viscoelastic substance
15. Conjunctival flap
16. Subconjunctval injection
17. Patching of eye.

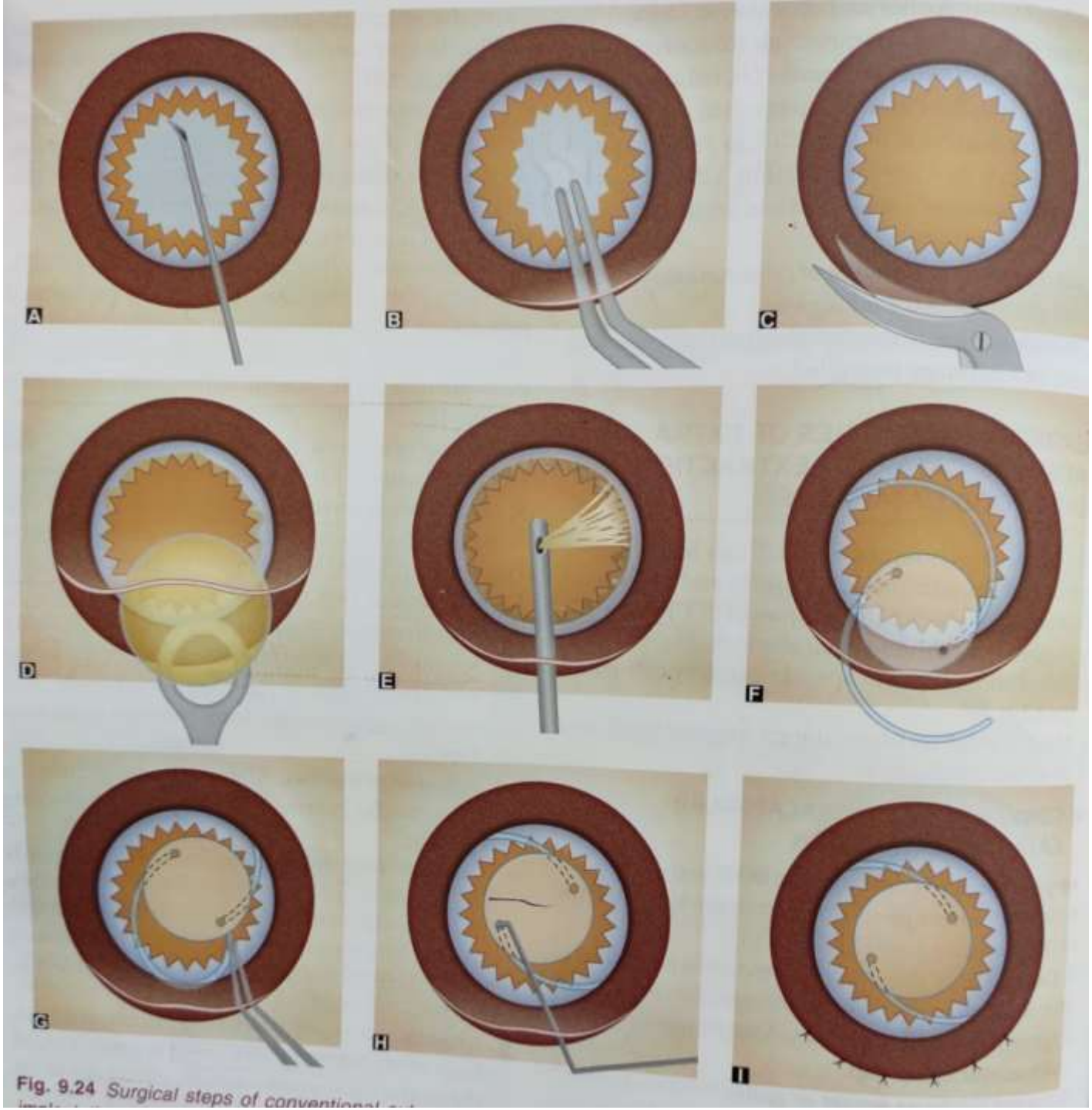


Fig. 9.24 *Surgical steps of conventional cat*

MANUAL SMALL INCISION CATARACT SURGERY (SICS)

- In this technique ECCE with intraocular lens implantation is performed through a suturless self-sealing valvular sclerocorneal tunnel incision.

1. Superior rectus (bridle) suture
2. Conjuctival flap and exposure of sclera
3. Haemostasis
4. Sclerocorneal tunnel incision:

   External scleral incison

   sclerocorneal tunnel

   internal corneal incision

- 5.Side-port entry
- 6.Anterior capsulotomy
- 7.Hydrodissection
- 8.Nucleus management:

  Prolapse of nucleus

  Delivery of the nucleus outside

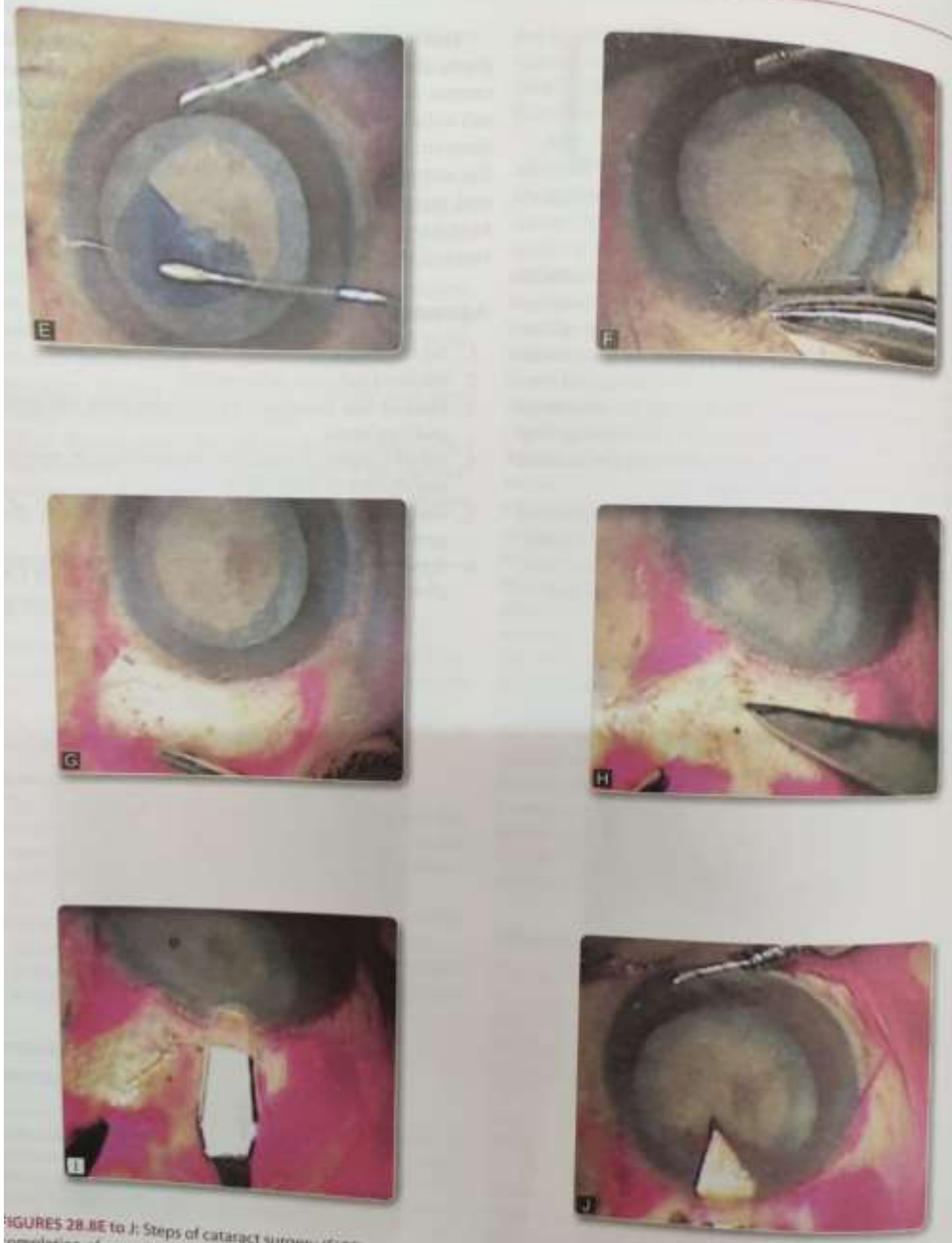
9.Aspiration of cortex

10.IOL implantation

11.Removal of viscoelastic material

12.Wound closure

URES 28.8A to D: Steps of cataract surgery (SICS). **A.** Eye exposed with speculum; **B.** Anterior chamber (AC) maintainer introduced at lower limbus; **C.** Trypan blue dye injected under air bubble through the side-port incision; **D.** Capsulorhexis started.



IGURES 28.8E to J: Steps of cataract surgery (SICS). **E.** Capsulorhexis continued; **F.** Limbus based conjunctival flap cut with scissors after completion of capsulorhexis; **G.** Cautery applied to bleeding spots; **H.** Incision put with Bard-Parker (BP) blade; **I.** Tunnel incision put up to clear cornea with crescent knife; **J.** Anterior chamber (AC) entered with keratome.

FIGURES 28.8K to P: Steps of cataract surgery (SICS). **K.** Nucleus delivered into anterior chamber (AC); **L.** Nucleus removed with two instruments; **M.** Cortex aspirated with Simcoe cannula; **N.** Posterior chamber intraocular lens (PCIOL) introduced into the eye; **O.** Intraocular lens (IOL) rotated with the dialer into place; **P.** IOL in position on posterior capsule.

PHACOEMULSIFICATION

- ECCE by phacoemulsification along with foldable posterior chamber intraocular lens implantation in the bag is the procedure of choice for cataract surgery.
- Phacoemulsificaton, differs from the conventional ECCE and manual SICS as follows:

1. Clear corneal incision
2. Continuous curvilinear capsulorrhexis (CCC)
3. Hydrodissection

- 4.Nucleus is emulsified

  Phacoemulsifier is used, it acts through a hollow 1 mm titanium needle which vibrates by piezoelectric crystal in its longitudinal axis at an ultrasonic speed of 40000 times a second and thus emulsifies the nucleus.

5.Remaining cortical lens matter is aspirated

6.IOL implantation

7.Removal of viscoelastic substance

8.Wound closure

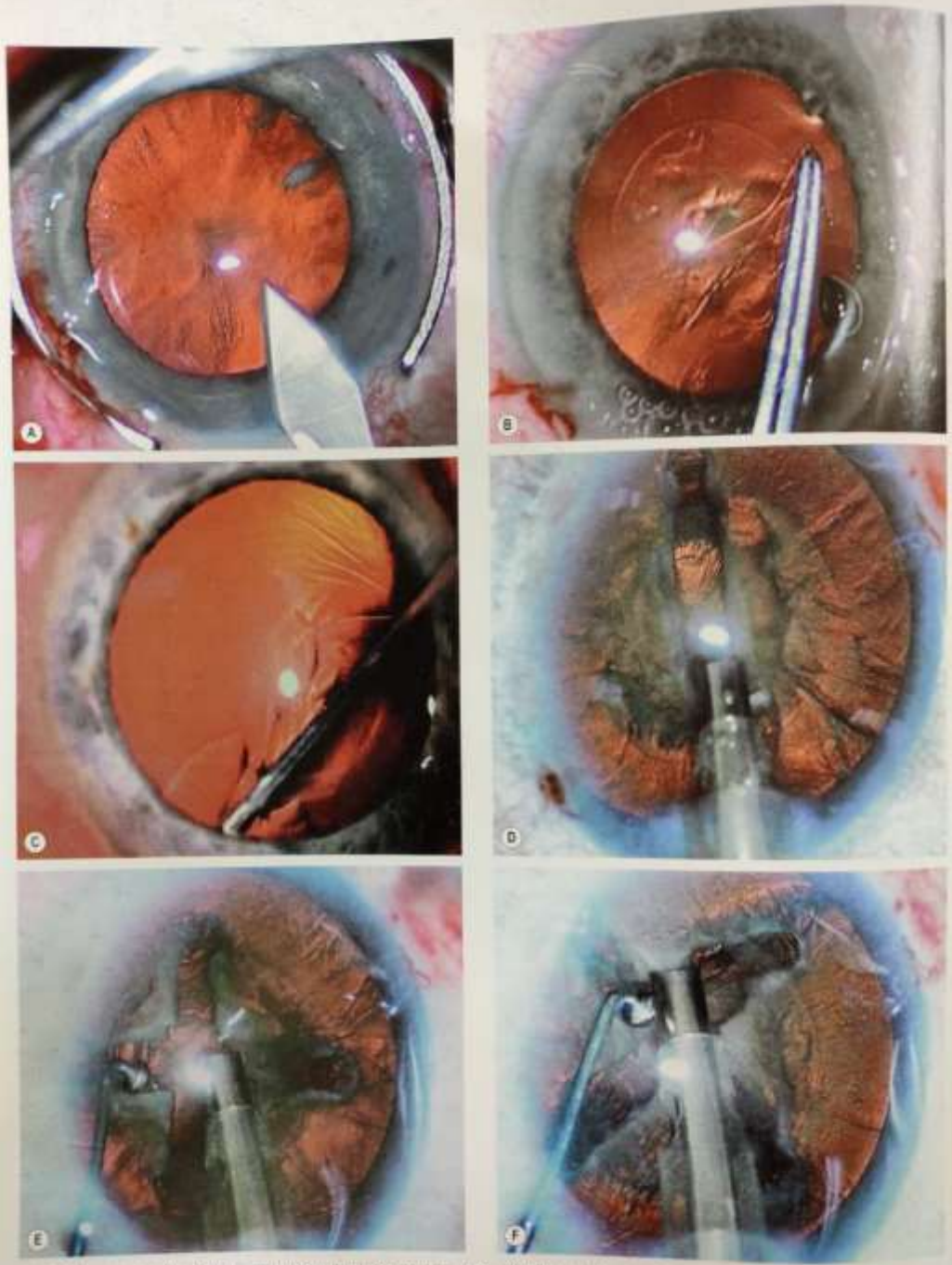


Fig. 9.12 Four quadrant ('divide and conquer') phacoemulsification. **(A)** Corneal incision; **(B)** capsulorhexis; **(C)** hydrodissection; **(D)** nucleus is grooved; **(E)** nucleus is cracked; **(F)** each nuclear quadrant is emulsified and aspirated

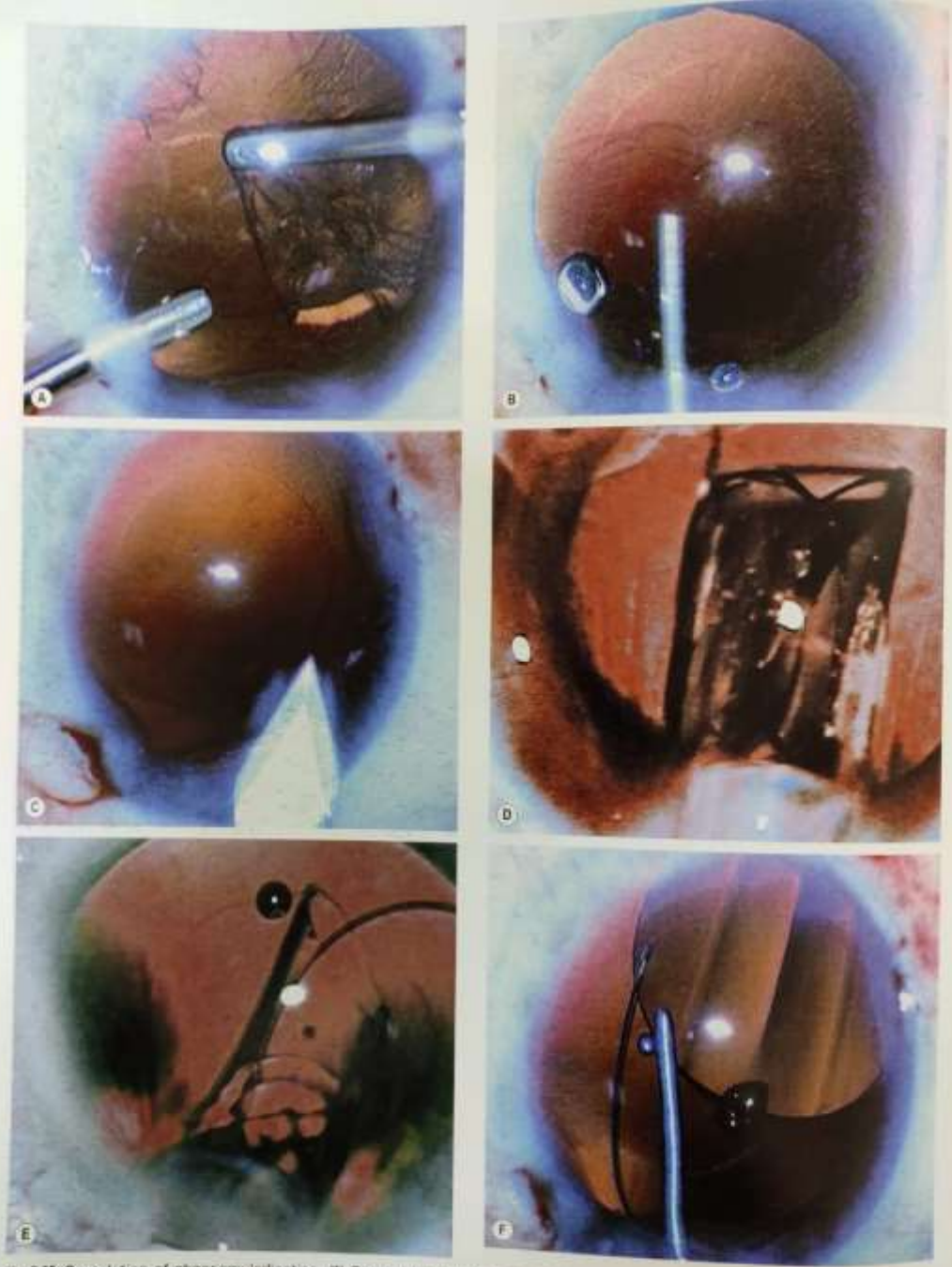


Fig. 9.13 Completion of phacoemulsification. **(A)** Cortical lens matter is pulled centrally and aspirated; **(B)** injection of viscoelastic into the capsular bag; **(C)** incision is enlarged; **(D)** cartridge nozzle with IOL is introduced through the incision; **(E)** IOL is slowly injected into the eye; **(F)** IOL is dialled into position if necessary.

MICROINCISION CATARACT SURGERY (MICS)

- MICS refers to the phacoemulsification techniques which can be performed through a microincision (<2mm).
- These techniques offer almost no surgically induced astigmatism.
- Various techniques-

  Microincision coaxial phacoemulsification

  Bimanual microphacoemulsification

  Phaconit

FEMTOSECOND LASER ASSISTED CATARACT SURGERY (FLACS)

- FLACS is the best available procedure presently, it is basically a microincision cataract surgery or microphaco in which femtosecond laser is used.

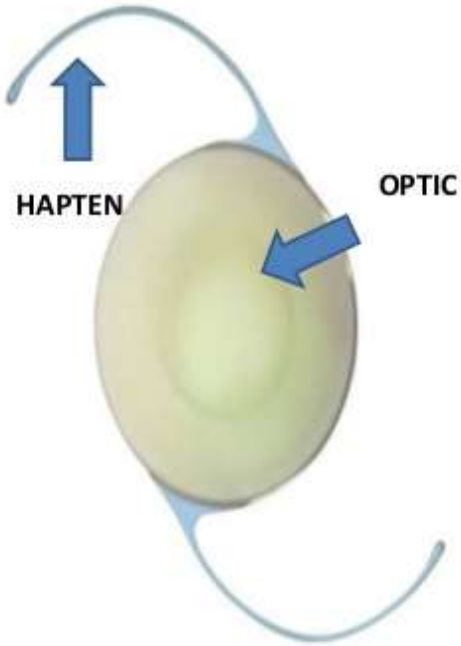
INTRAOCULAR LENS IMPLANTATION

- Types of intraocular lenses:
- Anterior chamber IOL
- Posterior chamber lenses
- Iris-supported lenses
- Rigid IOL
- Foldable IOL
- Rollable IOL
- Unifocal IOL
- Multifocal IOL
- Accomodative IOL

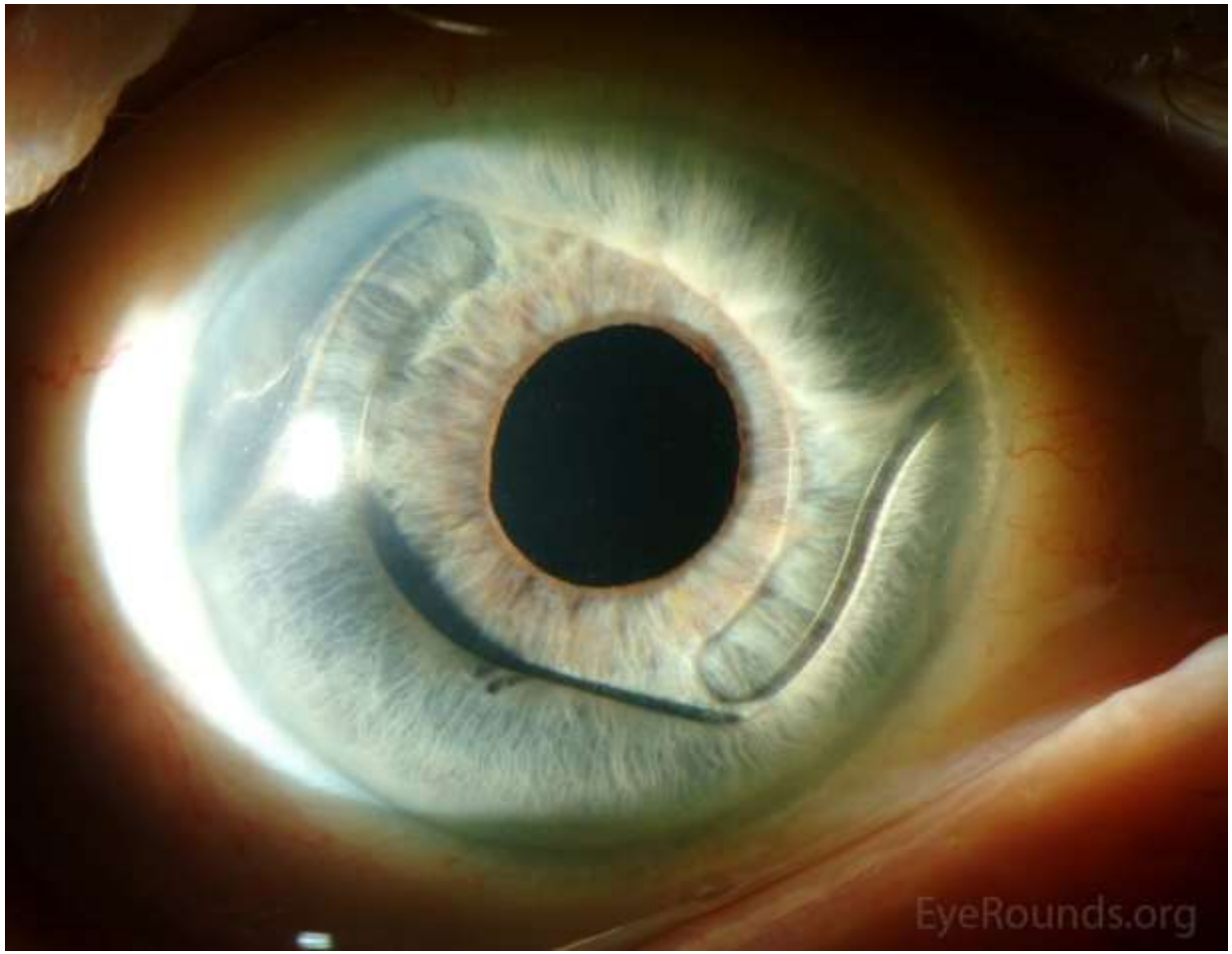
Parts of an IOL

- **OPTIC**
  Part of the lens that focuses light on the retina.

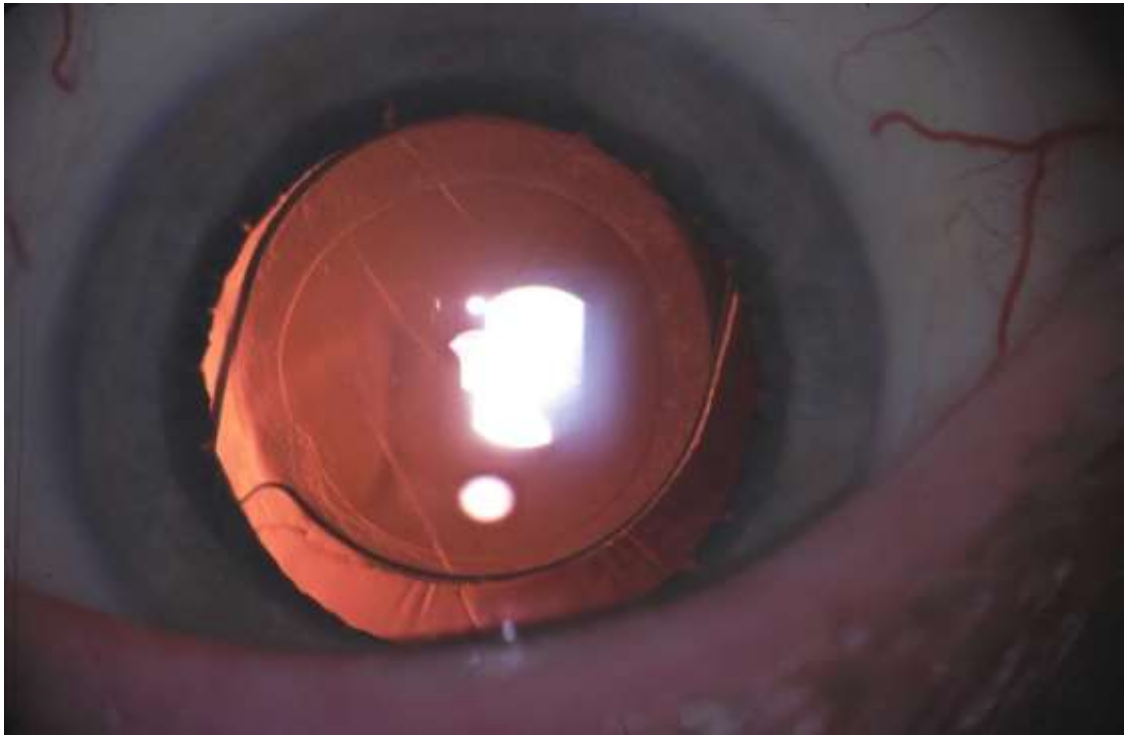
- **HAPTIC**
  Small filaments connected to the optic that hold the lens in place in the eye



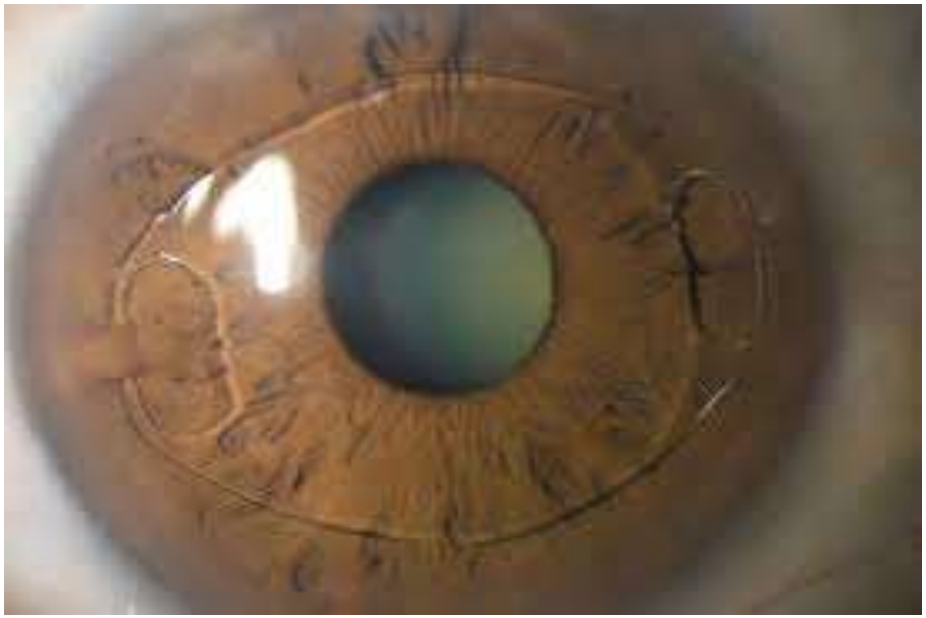
ACIOL



PCIOL



IRIS SUPPORTED IOL



POSTOPERATIVE MANAGEMENT AFTER CATARACT OPERATION

- Patient is asked to lie quietly upon the back for 2-3 hours and advised to take nil orally.
- Diclofenac sodium may be given for mild to moderate postoperative pain injection.
- Next morning bandage/eye patch is removed and eye is inspected for any postoperative complication.
- Antibiotic eye drops are used for four times,10-14 days.
- Topical steroid (prednisolone) eye drops 3 to 4 times a day are used for 6-8 weeks.

- Topical ketorolac or any other NSAIDS eye drops 2 or 3 times/ day are used for 4 weeks.
- Topical timolol (0.5%) eye drops twice daily are used for 7-10 days.
- Topical cycloplegic-mydriatic, e.g., homatropine eye drops mau be used OD for 10-14 days.

- Final spectacle are prescribed after about 8 weeks of SICS operation and 3-4 weeks of phacoemulsification.

THANK YOU