

Complex Cataract Surgery: *Intraoperative considerations*

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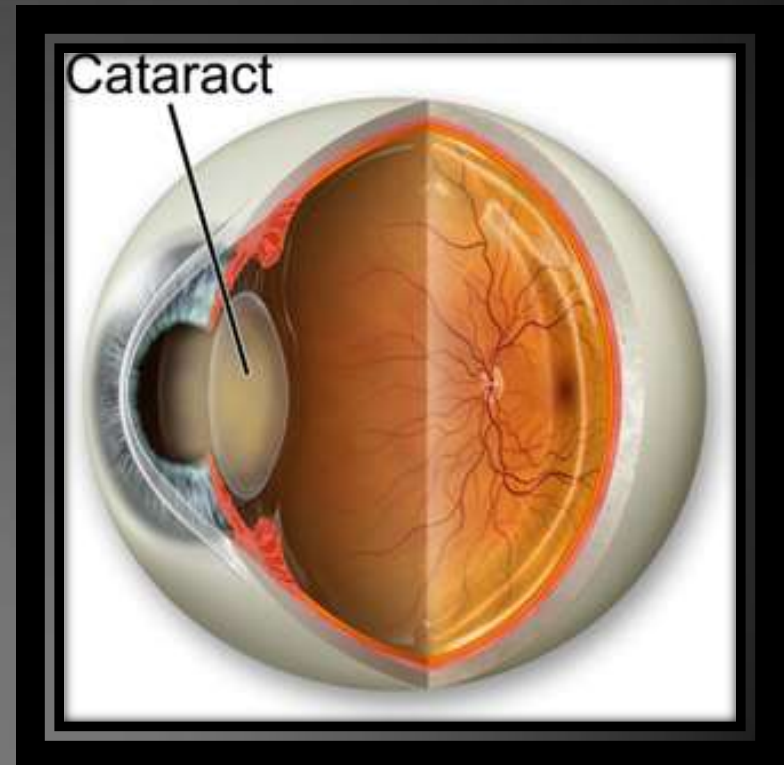
Cataract Conference

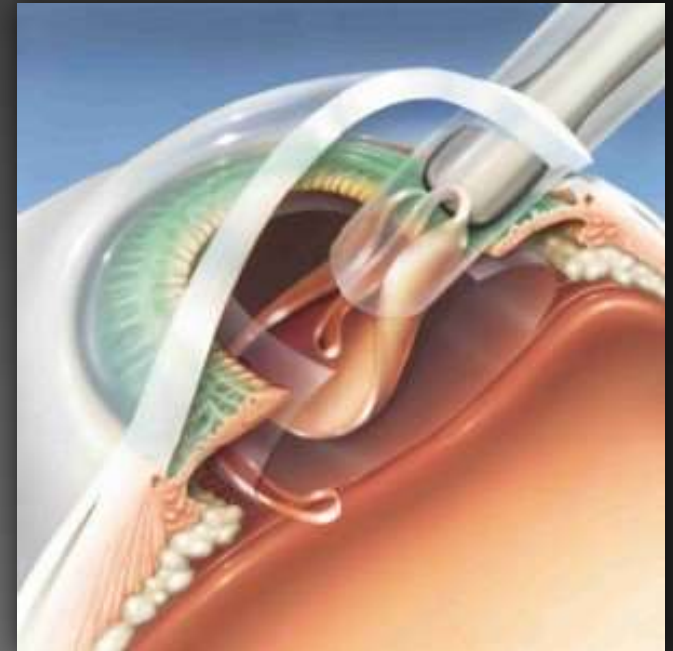
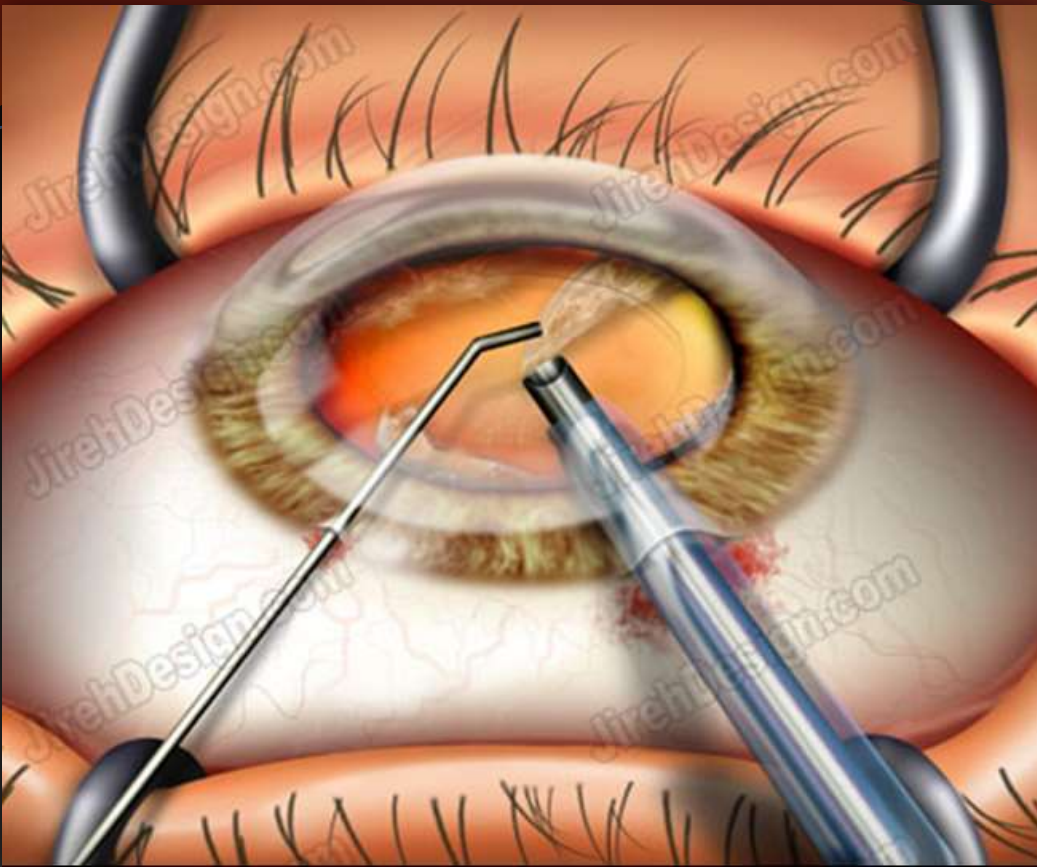
Financial Disclosure

Speaker, Shalini Johnson, M.D. has a financial interest/agreement or affiliation with Lansing Ophthalmology, where she is employed as a general ophthalmologist.

Factors that facilitate cataract surgery

- Good visualization
 - Good dilation
 - Clear media (clear cornea)
 - Nice red reflex
- Stability – reduced movement
 - Strong zonules
 - Stable pupil
- Minimal requirement for phacoemulsification energy





- Decreased visibility and stability
 - Decreased access to removing cataract components
 - Increased risk of injury to neighboring structures (posterior capsule, iris)

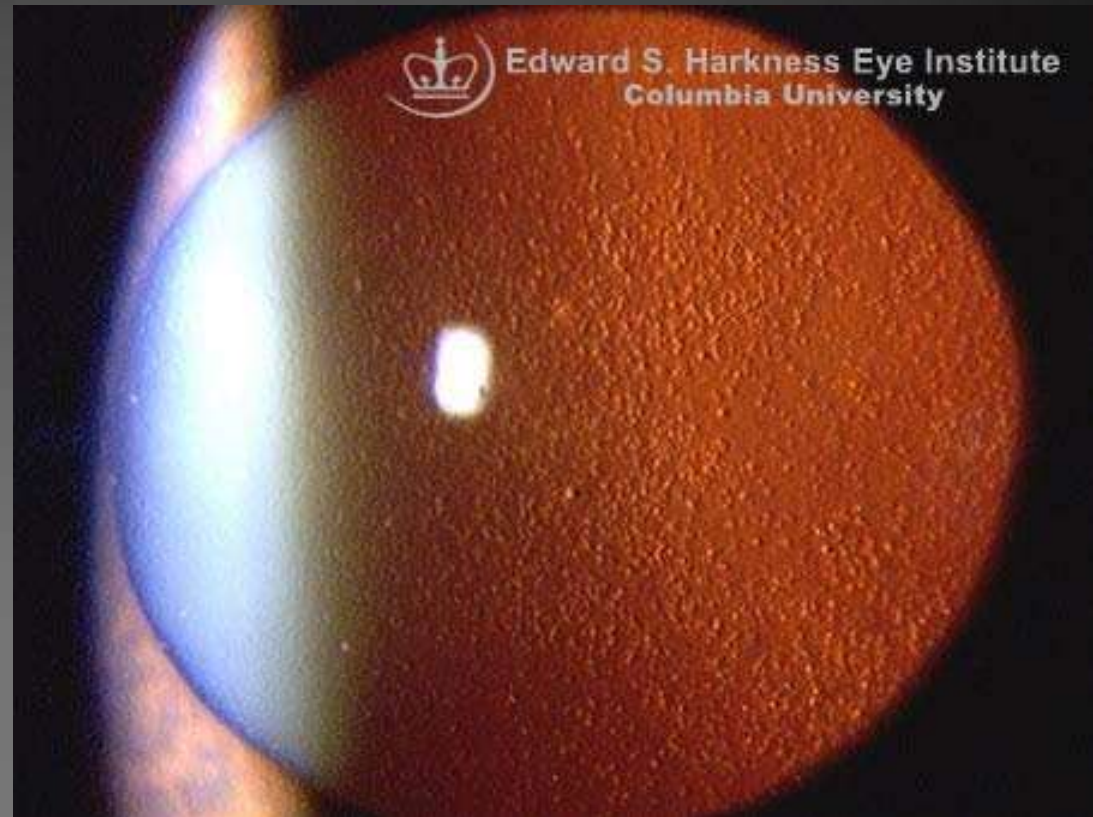
Complex cataract surgery

-risk factors-

1. Poor corneal endothelium
 2. Small pupils
 3. Intraoperative Floppy Iris syndrome (IFIS)
 4. Weak zonules
 5. Mature Cataracts
- Poor visualization
 - Poor access to tissue removal
 - Decreased stability

Poor corneal endothelium - etiology

- Fuch's dystrophy
- Glaucoma
- Older patients
- Uveitis



Poor corneal endothelium

- Risk of corneal decompensation with high phaco energy or excessive manipulation



Ophthalmic viscoelastic devices

- Purpose:
 - Coat/protect fragile surfaces
 - Maintain space and create partitions during surgery
- Composed of the following polymers:
 - sodium hyaluronate
 - chondroitin sulfate (mucopolysaccharide in the cornea)
 - hydroxypropyl methylcellulose (part of plant fibers)

Ophthalmic Viscoelastic Device

- 3 types:

- **Dispersive** (Occucoat, Viscoat)

- Short molecules
- Coats and protects surfaces

- **Cohesive** (Provisc, Amvisc, Amvisc Plus, Healon, Healon GV)

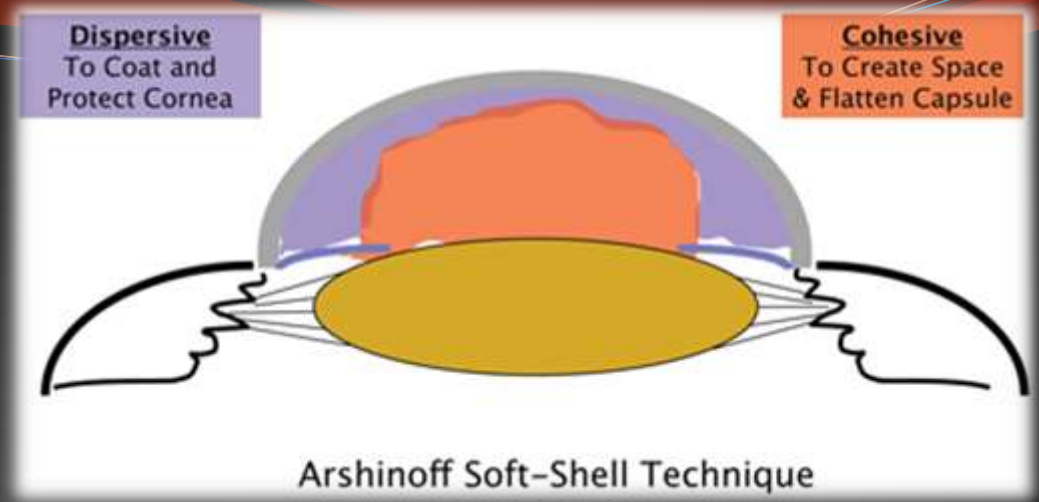
- Long molecules
- Maintains space and partitions tissues

- **Viscoadaptive** (Healon 5)

- Cohesive at low flow rate
- Dispersive at high flow rate
- Long fragile chains that break at high flow rate



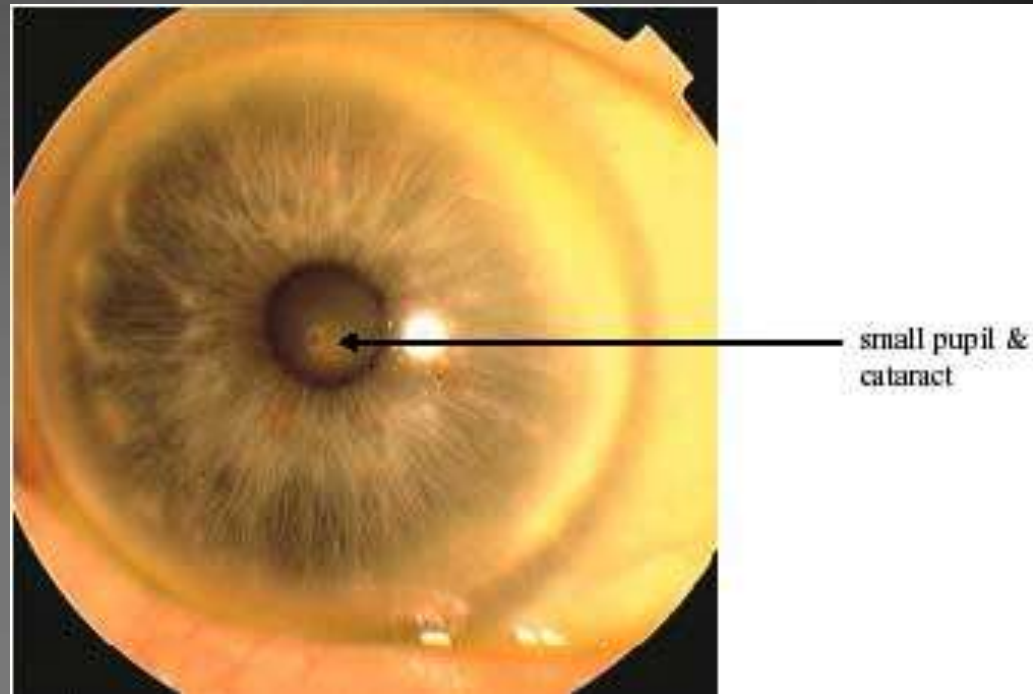
Protecting corneal endothelium



- Arshinoff shell technique:
 - Prior to capsulorhexis
 - Deposit dispersive OVD first
 - Deposit cohesive OVD next under the dispersive OVD
 - Dispersive OVD moves up and coats corneal endothelium
 - During IOL insertion
 - Deposit cohesive OVD in the capsular bag
 - Deposit dispersive OVD at wound to seal
- Possible conversion to ECCE

Small pupil - etiologies

- Diabetes
- Flomax (alpha-1 blocker)(tamsulosin)
- Pseudoexfoliation syndrome
- Pilocarpine
- uveitis



Pharmacologic

- Formulations of epinephrine or phenylephrine
- Mechanism: epinephrine overcomes the blockage of alpha receptors
- Epi-Shugarcaine (described by Joel Shugar)
 - Shugarcaine = 3 parts BSS, 1 part 4 % lidocaine
 - Epishugarcaine=3 parts epinephrine (1:1000) and 1 part Shugarcaine
- 1.5% phenylephrine
- **Important for epinephrine to be preservative and bisulfite free to prevent toxicity

Viscomydriasis (Healon 5)

- High viscosity ophthalmic viscoelastic device used increase pupil size
- Directed at pupil margin to expand pupil

Viscomydriasis – video clip



Mechanical - Pupil stretch

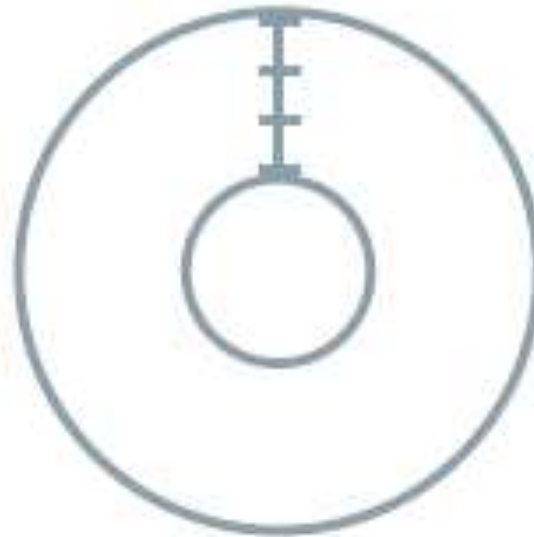
- Stretch pupil 180 degrees apart with 2 instruments (Sinsky hook) for approximately 10 seconds
- Should not be used in IFIS

Sphincterotomies

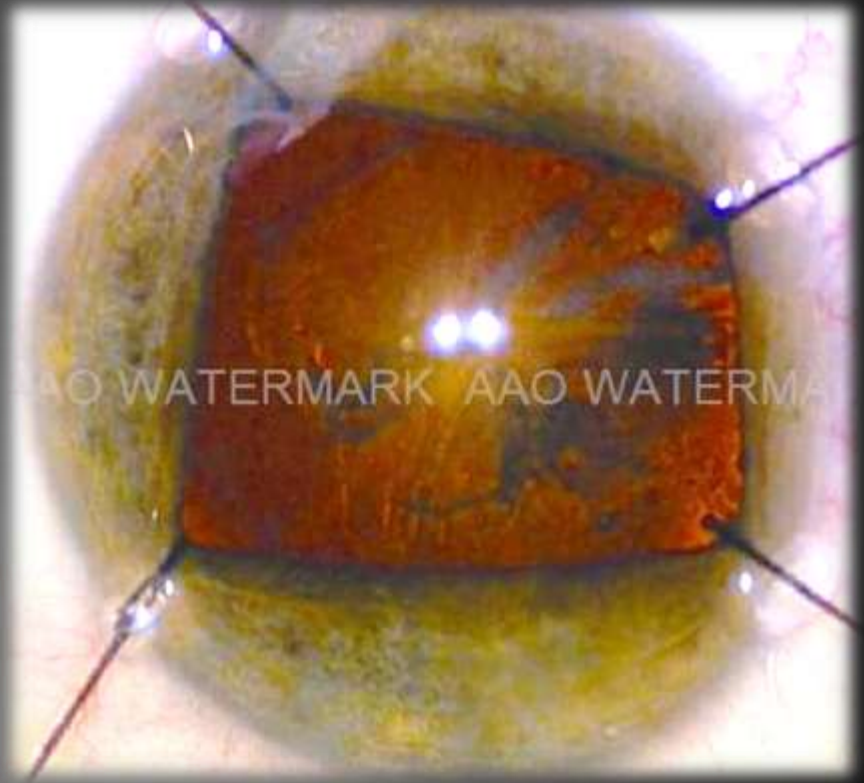
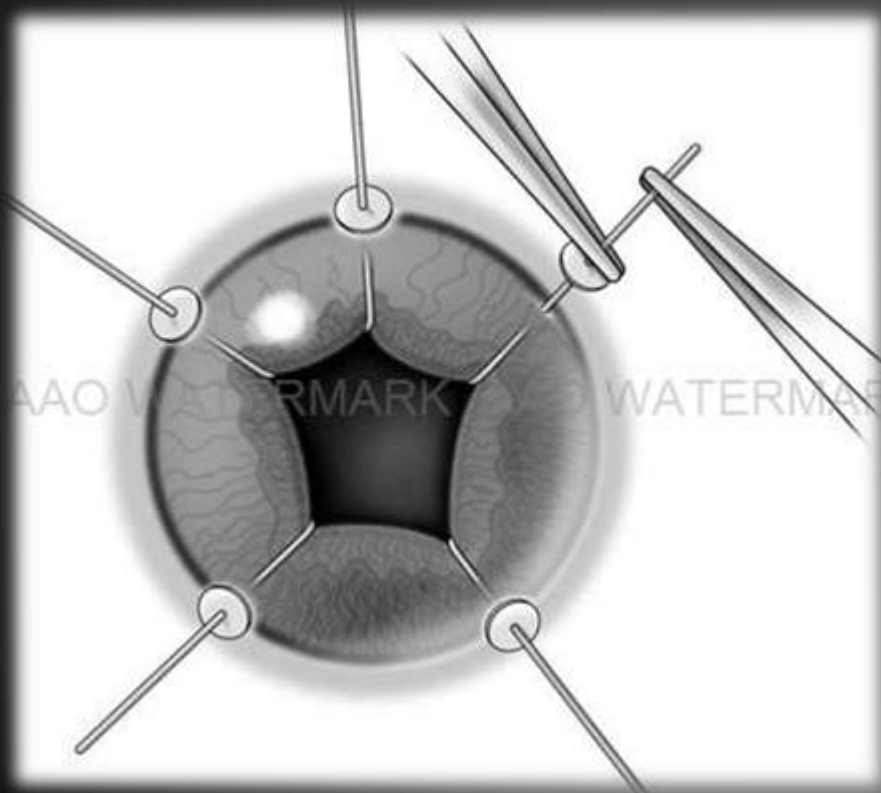
Figure 1:
Sphincterotomy for
a small, rigid pupil:
three cuts made
120° apart



Figure 2: Radial
iridotomy
sutured with
10.0 interrupted
sutures



Pupil expansion device - Iris hooks

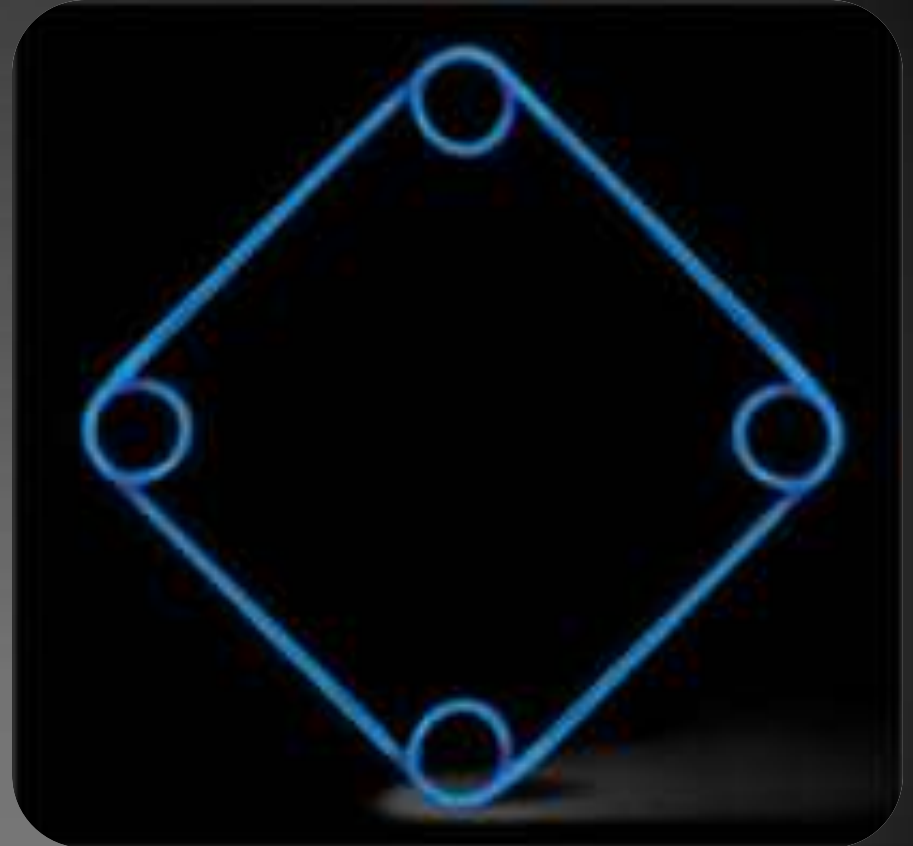
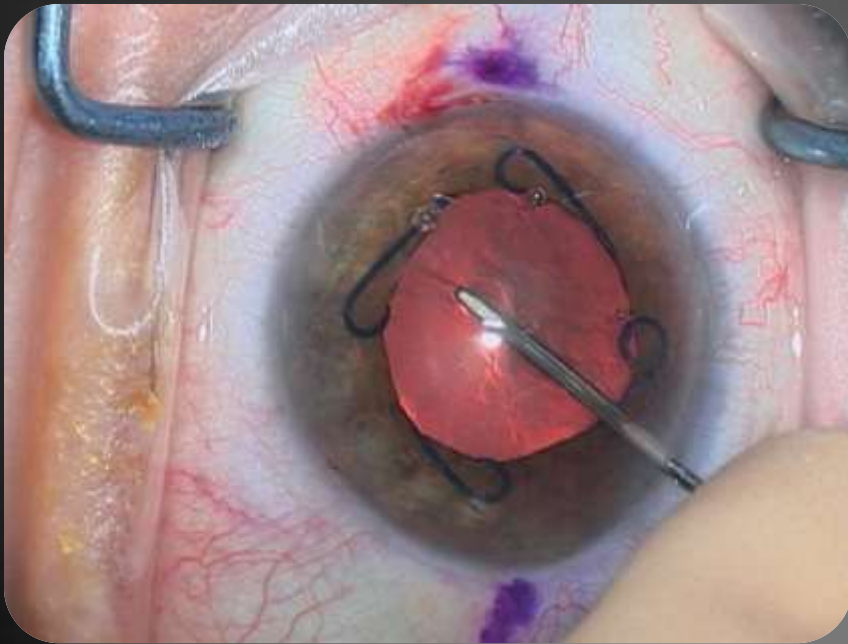


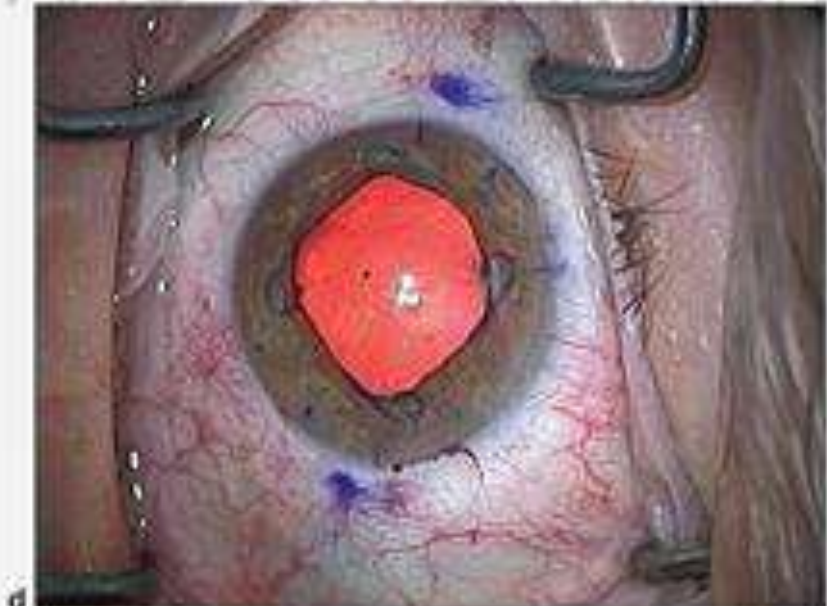
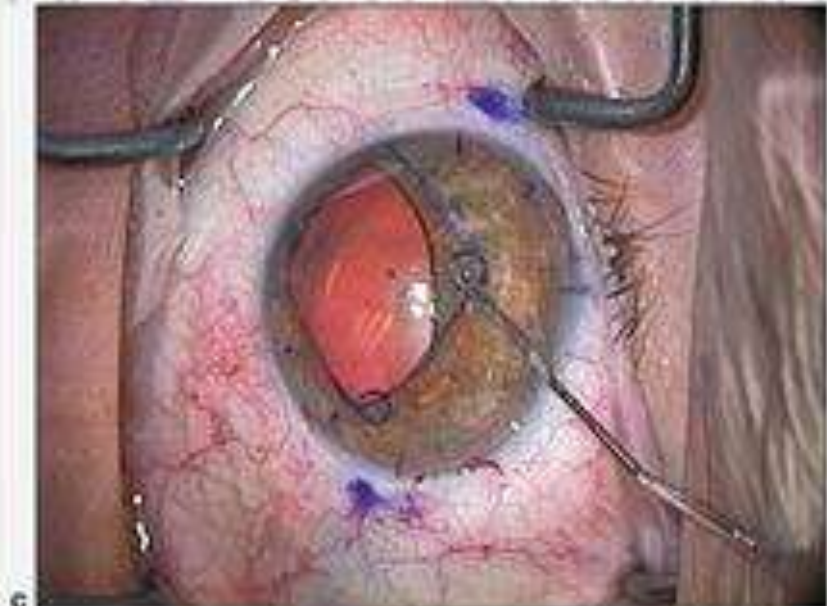
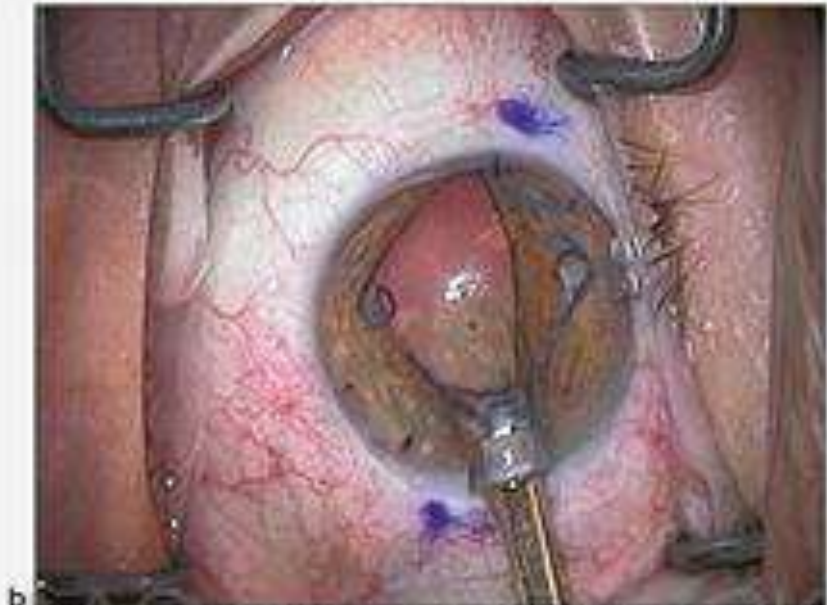
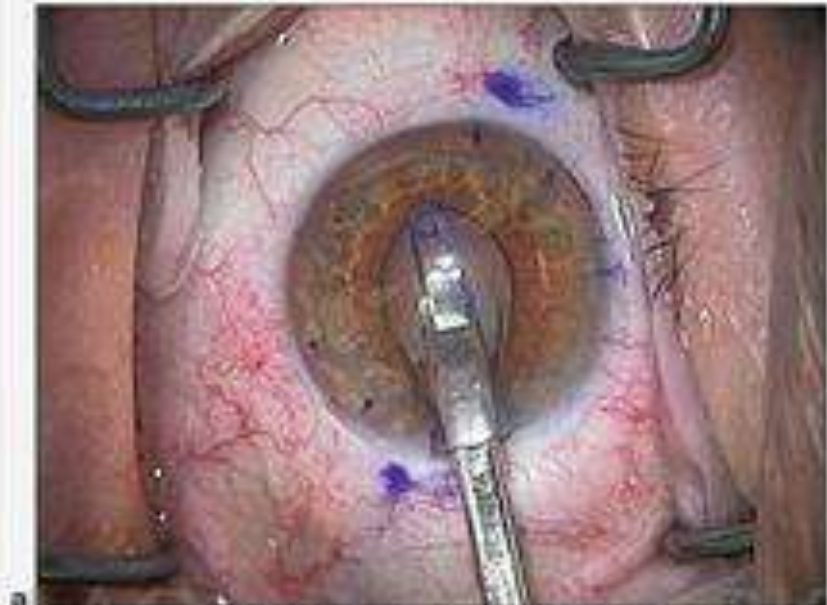
Iris hooks – video clip



Pupil expansion device - Malyugin ring

- Pupil expanding ring





Malyugin Ring - video

Malyugin Ring
Easy In, Easy Out

Christopher Teng, MD

IFIS (Intraoperative Floppy Iris Syndrome)

- Occurs in patients with previous or current use of tamsulosin (Flomax) or other alpha-1A blockers (Terazosin, Doxazosin, Afluzosin and Saw Palmetto)
- Mechanism of alpha -1 blockers
 - Relax smooth muscles in prostate tissue to facilitate urination in prostate disease
 - Concurrently affect the iris dilator muscle tissue in the eye (which also has alpha-1 receptors)

IFIS – intraoperative floppy iris syndrome

- Syndrome occurs during cataract surgery
- Symptoms:
 - Inadequate dilation or pupil & progressive miosis
 - billowing and flapping of iris
 - Iris prolapse through corneal incisions
- Different grades: mild, mod or severe
- Preop assessment: Pupil size < 7mm → higher incidence of IFIS

IFIS - video

IFIS Introduction & Background

David F. Chang MD

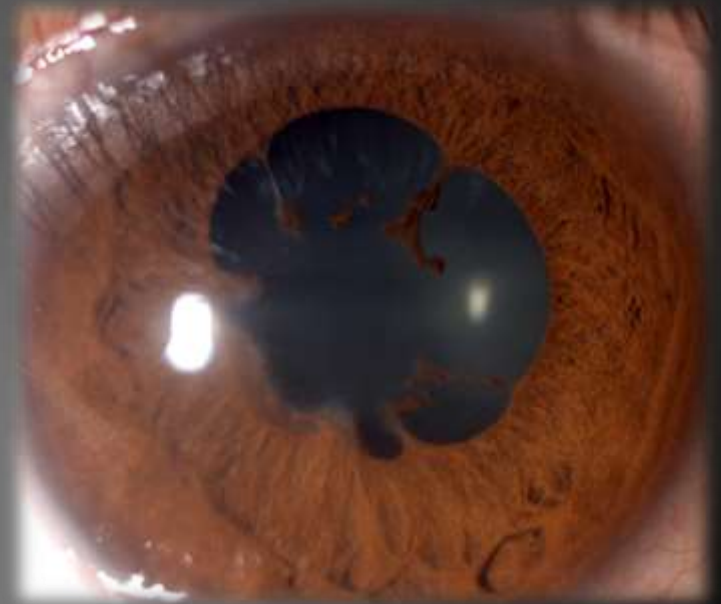


IFIS

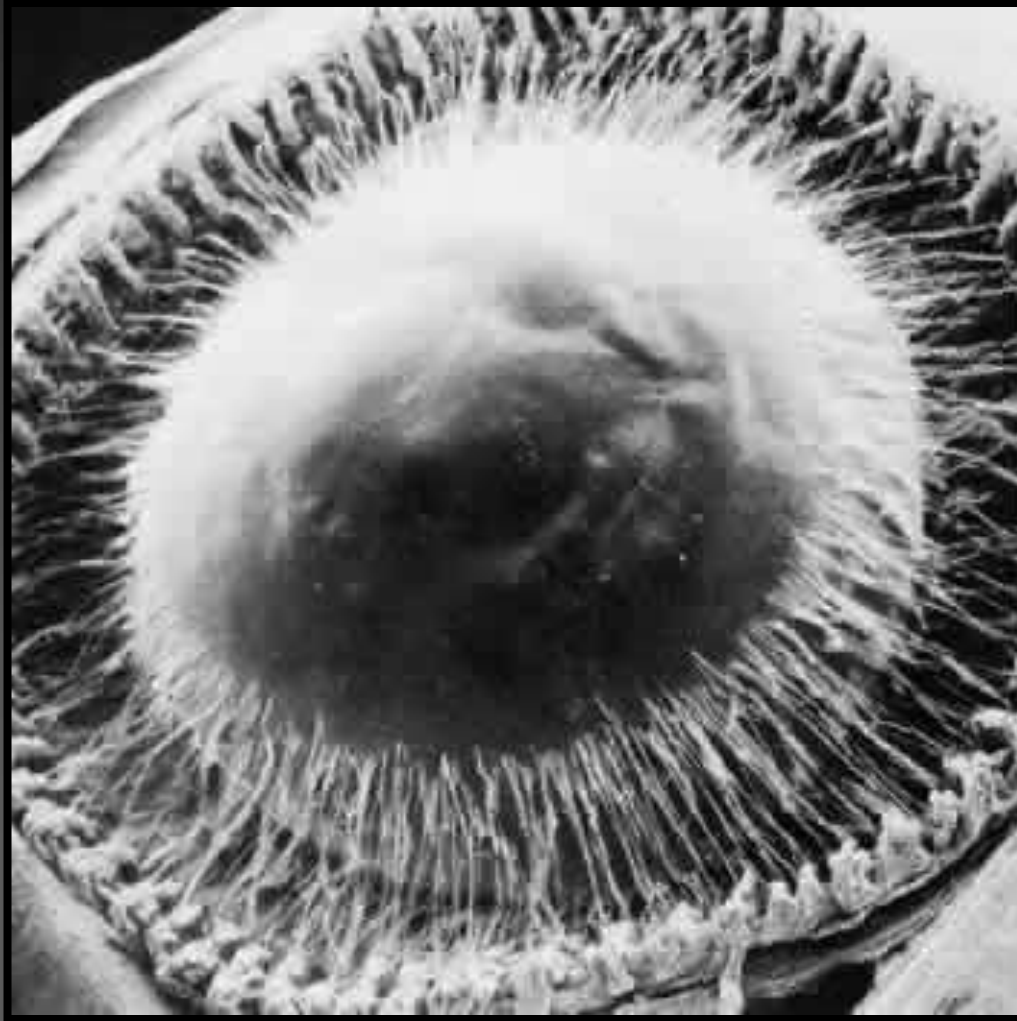
- Challenges caused by IFIS:
 - Poor visualization → posterior capsular tear/vitreous loss
 - Iris damage
- Options to address IFIS
 - Viscomydriasis
 - Malyugin ring
 - Iris hooks

Small pupil – special considerations

- Uveitic – posterior synechiae
- Viscodissection
- Use of oral & topical steroids pre-op few days



Anatomy of Zonules and Capsular Bag



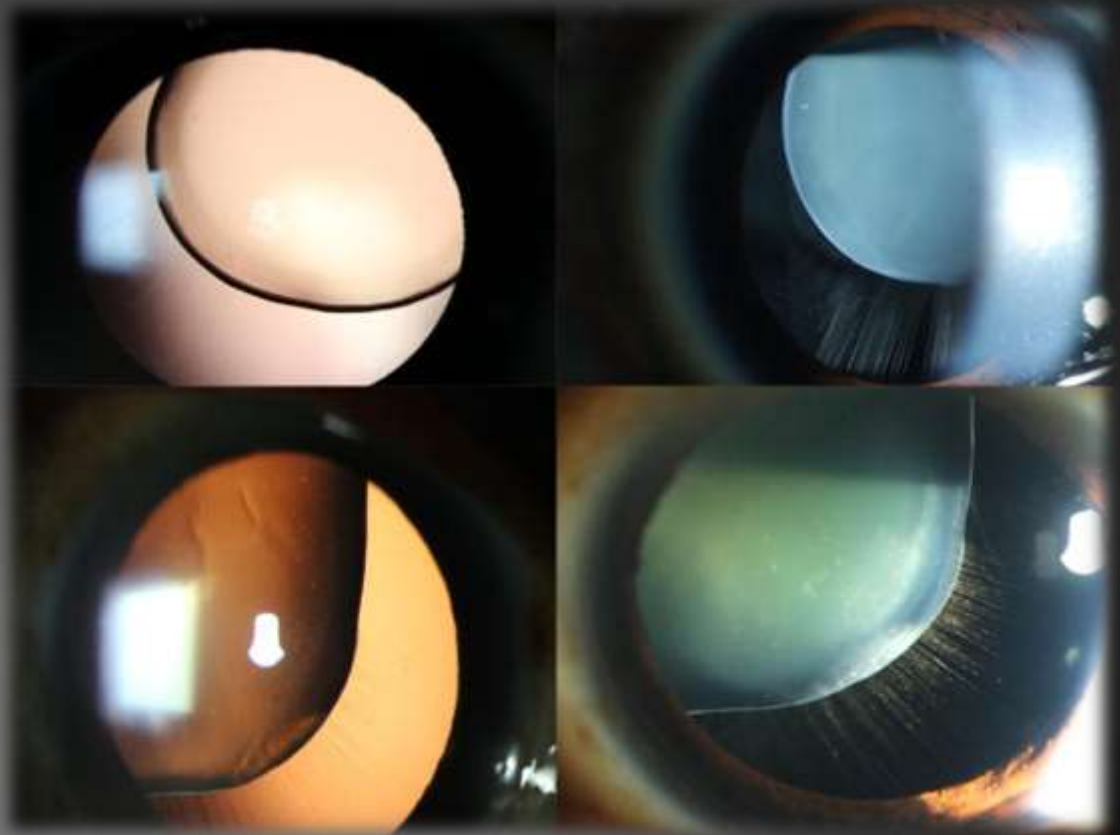
Scanning electromicrograph of anterior lens with zonular insertions

Loose zonules

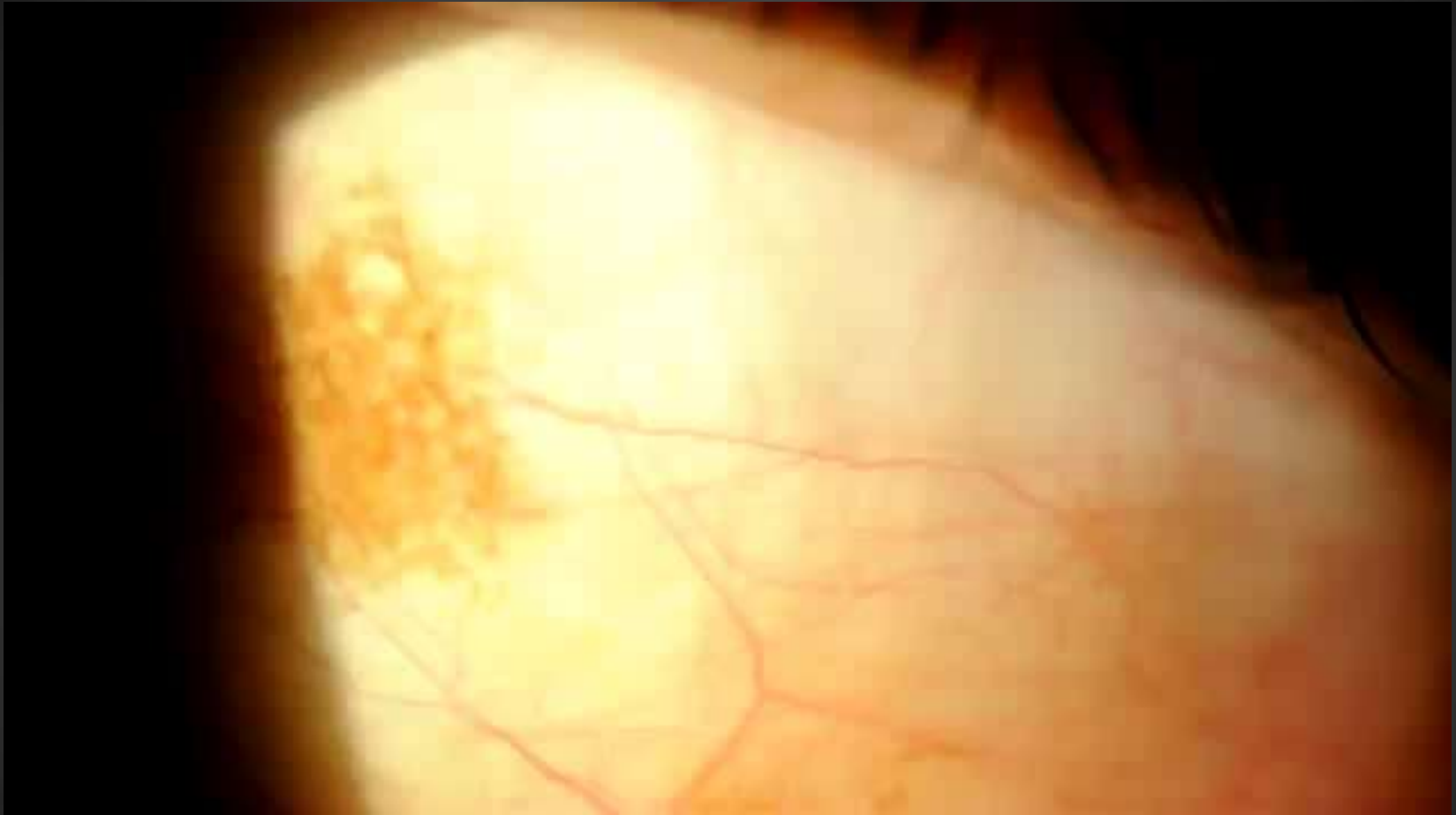
- Etiologies:
 - Pseudoexfoliation
 - Trauma
 - Hereditary (Marfan's syndrome)
 - Mature cataract
 - manipulation of more dense lens may loosen the zonules
 - Other causes (Weil-Marchesani, homocystinuria, syphillis)

Loose zonules - signs

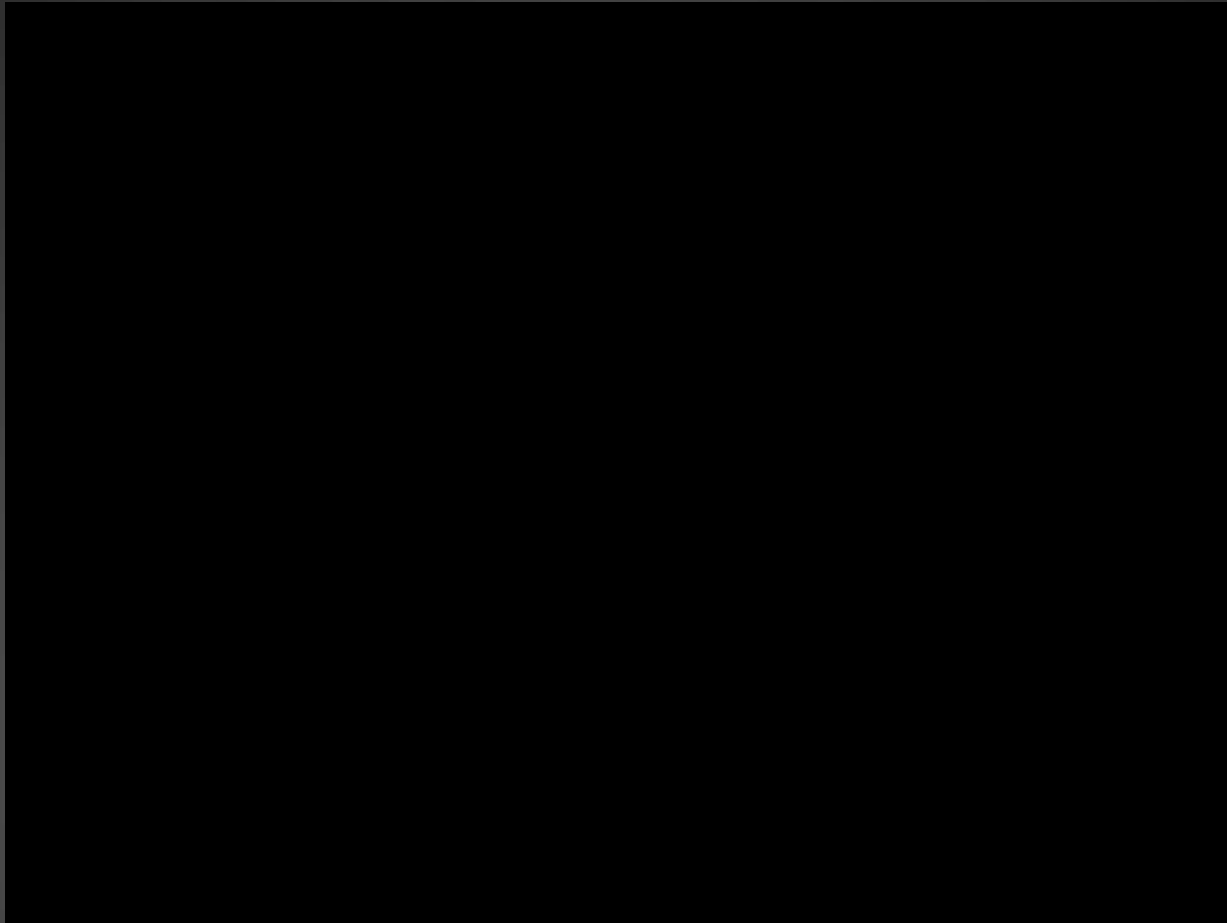
- Phacodinesis
- iridodinesis
- Lens subluxation
- Lens dislocation



Phacodinesis – video clip

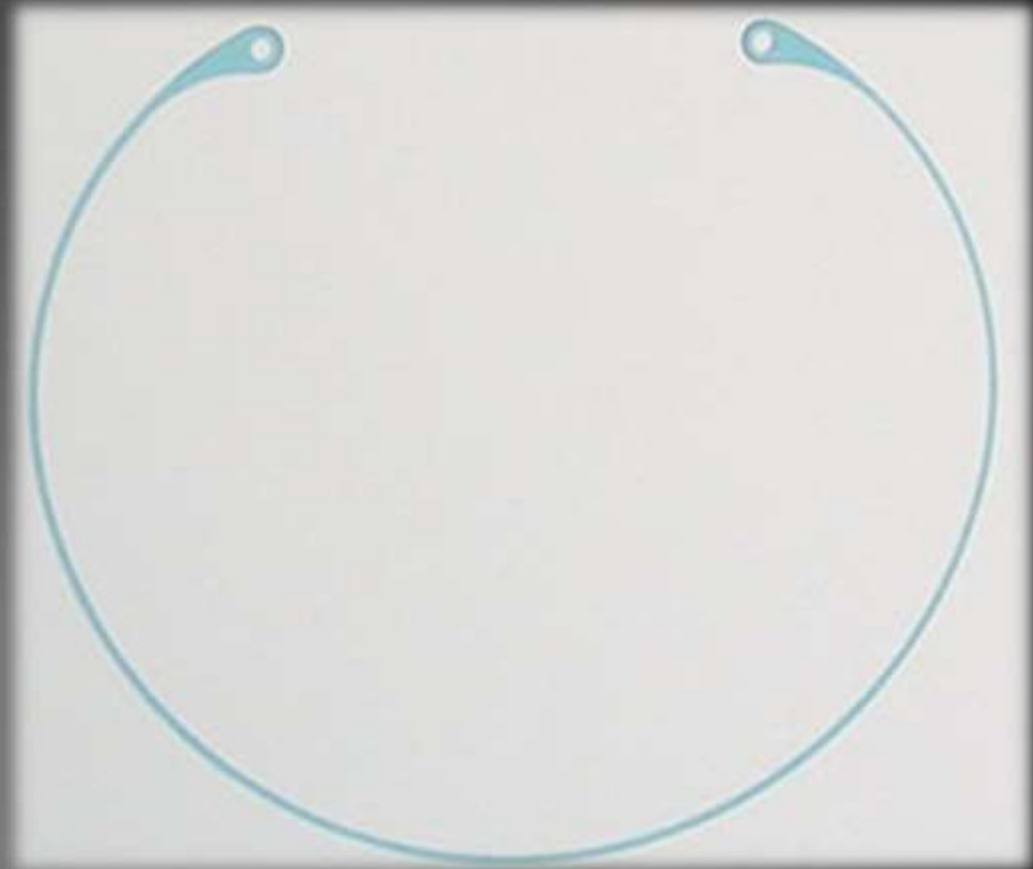


Iridodinesis - videoclip



Capsular tension rings (CTRs)

- Indications for use:
 - Damaged or missing zonules
 - Pseudoexfoliation
 - Lens subluxation
 - Soft lens
 - Marfan's syndrome

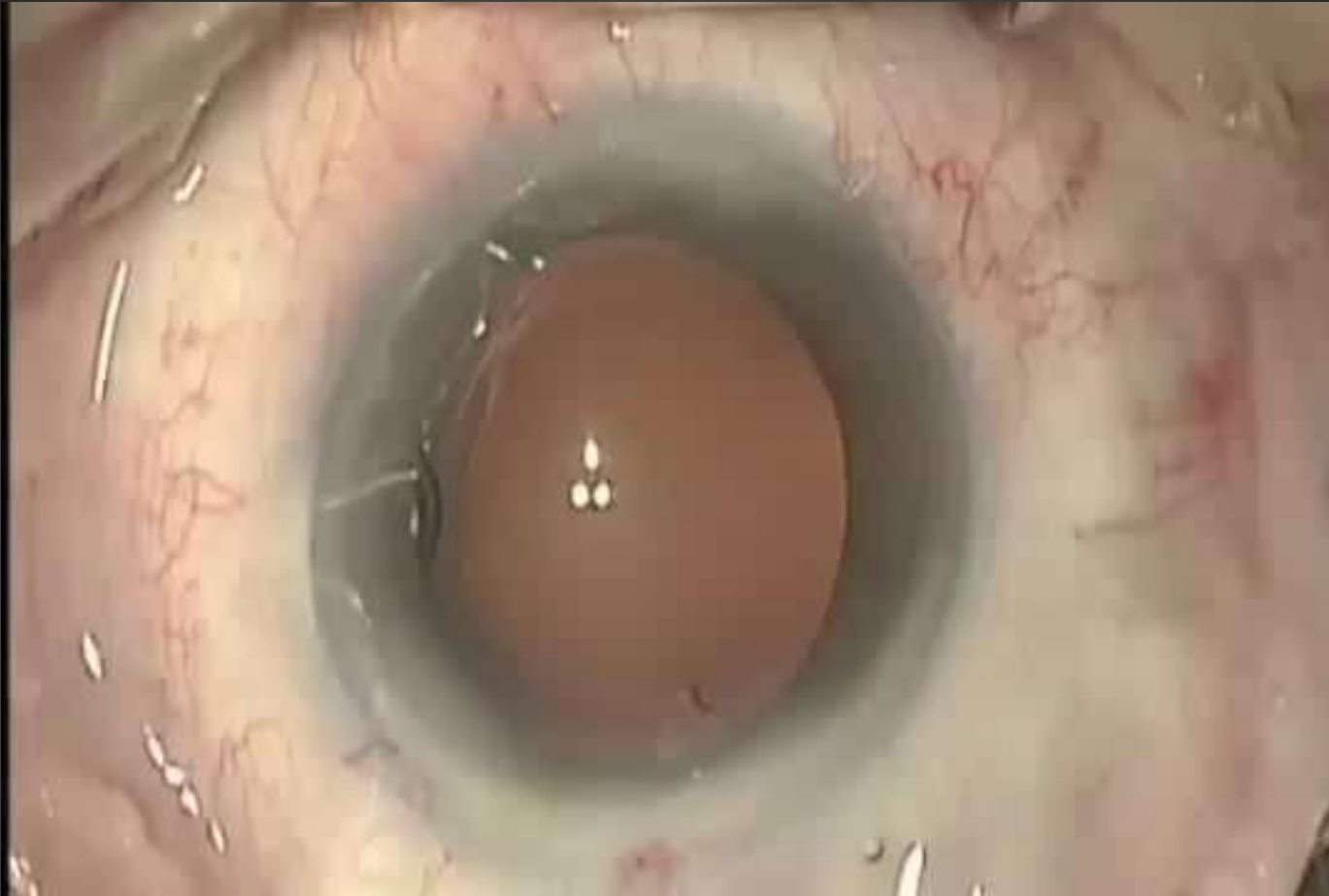


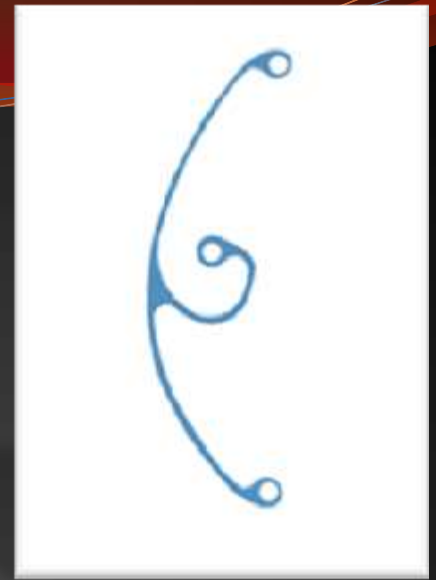


Capsular Tension
Ring *Injector*



Implantation of CTR

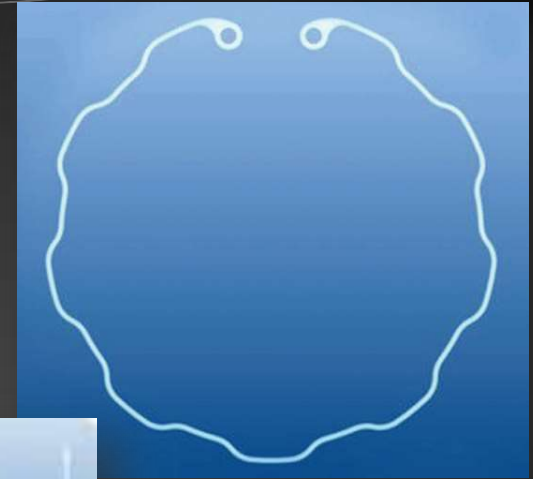




Capsular tension rings
-variants-

CTR variants

- Henderson CTR
 - grooves allows easier removal of cortex
- Cionni CTRs
 - eyelets allow for additional support w/ scleral fixation
 - Used if zonular dehiscence is severe (>4 clock hrs of dehiscence, Marfan's syndrome, lens subluxation)



CTR variants

- CTR segment
 - Used for focal area of support
 - covers 1 quadrant
 - advantage: easy placement



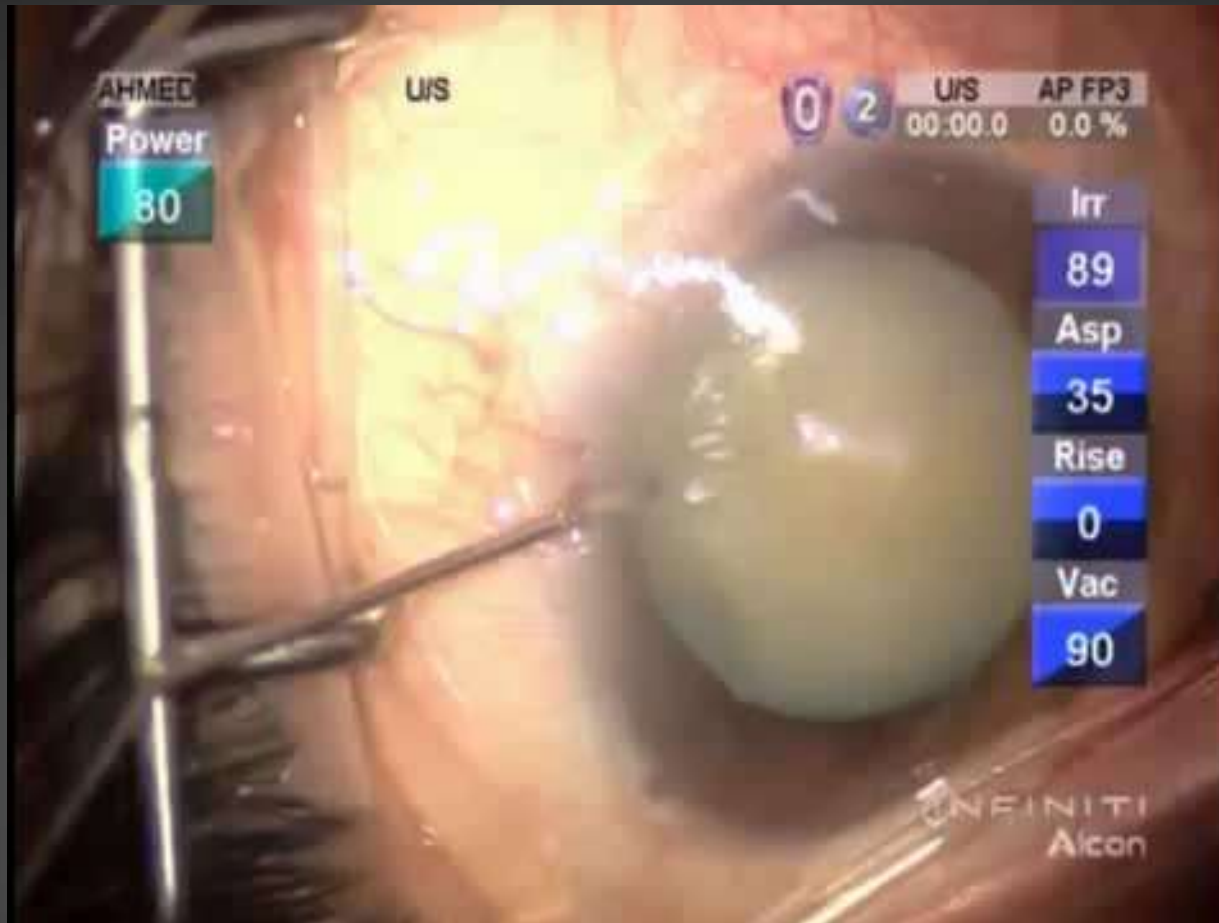
Subluxated or Dislocated lens

- Remove lens material
- Remove capsular bag
- Place secondary IOL (ACIOL or scleral sutured IOL)

Mature Cataract

- Present multiple challenges:
 1. Poor red reflex
 - Need Trypan Blue (stains anterior lens capsule and facilitates capsulorhexis)
 2. Weak zonules
 - Manipulation of such a hard lens may weaken the zonules
 - May need CTR
 3. Need for high phaco energy
 - Risk of compromising corneal endothelium
 - May need to do ECCE or convert to ECCE

Trypan Blue in mature cataract -video clip-



Argentinian flag sign



ECCE – video clip



Conclusion

- Factors that compromise visibility and stability during surgery make cataract surgery more complex
- However, there are several techniques and devices available to address these challenges to make cataract surgery safer in these patients



Questions?

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