The Lens is loose….

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The crystalline lens

The Management of the Lens with Sub-Optimal Zonular Support:

Recognize that the problem exists……

pre-operatively

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The History:

- Previous blunt or penetrating trauma

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The History:

- Previous ocular surgery
  - Vitrectomy
  - Filtration
  - Silicone oil

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Inherited Disorders Associated With Lens Dislocation :

Marfan's syndrome	Alpert syndrome	Ascariasis
Aniridia	Coloboma	Congenital glaucoma
Ectopia lentis	Goltz Syndrome	High myopia
Isolated lens dislocation	Megalocornea	Microcornea
Microspherophakia	Pseudoxanthoma	Capsular exfoliation
Cryptophthalmia synd.	Dwarfism	Ehlers-Danlos
Gillum-Anderson synd.	Gronblad-Strandberg synd.	Ectodermal dysplasia
Homocystinuria	Franceschetti synd.	Marchesani synd.
Molybdenum cofactor deficiency		Peters synd.
Retinal disinsertion synd.	Rieger synd.	Spherophakia
Degenerative	Sulfite oxidase deficiency	Syphilis
	Treacher-Collins synd.	Wildervanck synd.

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The Evaluation of Zonular Support: Refraction

- Refractive sequelae of loss of zonular support:
  - Increased sphericity of the lens
  - Lenticular myopia
  - Loss of accommodation
  - Unusual retinoscopic reflex
    - Uneven lens curvature

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The Evaluation of Zonular Support: Examination

- The slit lamp exam
  - Tap on the lid and observe the lens
- Iris examination
  - Regional elevation of the periph. iris

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Phacodonesis:

- Goal
  - Estimate the amount and location of zonular weakness
  - ≤ 3 clock hours – pretty straightforward

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Phacodonesis:

- Goal
  - Estimate the amount and location of zonular weakness
  - 3 -6 clock hours – tricky but 'do-able'

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Phacodonesis:

- Goal
  - Estimate the amount and location of zonular weakness
  - ≥ 7 clock hours…….iffy for anterior approach

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Phacodonesis:

- Technical suggestions:
  - Plan to operate early – when most cataracts are (relatively) soft
  - Try to prolapse the nucleus out of the bag
    - Minimize lens rotation
    - Less traction on the capsule during phaco
    - Easier phaco

= Less tension on the zonules

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Phacodonesis:

- Technical suggestions:

If the lens edge is visible…..

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Check for vitreous

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Support Vitreous face with Viscoat™ + Healon ™

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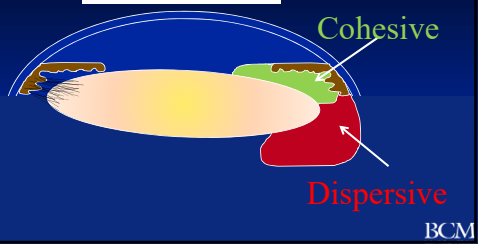
Phacodonesis:



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Phacodonesis:

- Supporting the free lens edge with dispersive viscoelastic:
  - Holds the vitreous posteriorly
  - Provides some lens support

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Phacodonesis:

- Technical suggestions:

If vitreous strands can't be walled off…..

↓

Do a limited vitrectomy

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Phacodonesis:

- Technical suggestions:
  - Watch the capsulorrhexis -
    - The behavior may indicate unsuspected zonule weakness

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Phacodonesis:

- Technical suggestions:
  - Check the lens movement during the capsulorhexsis
    - Provides an indication as to how loose the support *really* is

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Phacodonesis:

- Technical suggestions:
  - If zonular loss is less than "minimal"

OR

  - Significant phacodonesis

Consider a capsular support device

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Phacodonesis:

- Capsular support devices
  - **Iris hooks** to hold the capsule edge
  - **Capsular tension ring** (CTR)
    - Cionni ring
  - **Capsular ring segments** (CTS)

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Capsular Tension rings:

- Ring stretches the capsule
- Distributes forces to *all* the remaining zonules
- Reduces force concentration
- Prevents "Unzippering"

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CTR:

- Capsular tension rings
  - 10 - 12 mm dia. PMMA ring

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CTR Insertion:

- May be inserted at any time
- *My* preference – with ***mild*** zonule loss:
  - After I&A - *But: may aspirate bag with the I&A and worsen zonule loss*
  - Strip cortex toward the area of zonular loss

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CTR Insertion:

- Insert toward the area of maximum zonular loss
- A second instrument is helpful
- May also collapse the ring with a 10/0 through the eyelet

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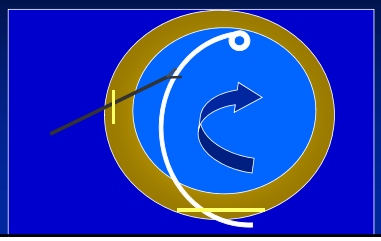
CTR Insertion:



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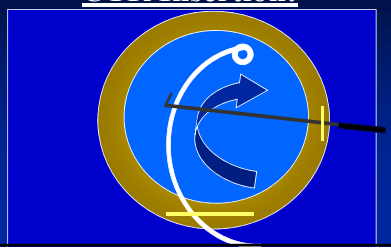
CTR Insertion:



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CTR Insertion - when:

- With ***significant*** zonule loss:
  - After 'rhexsis / before hydrodissection
  - Maximize stabilization
    - ***But:*** may trap cortical fibers

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CTR Insertion:

- Elevate anterior capsule with viscoelastic
- Via best incision: (Injector or freehand)-
  - Insert ring eyelet under capsular edge
  - Feed ring into bag toward area of zonular loss

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CTR Insertion:

- With *major* zonule loss
  - With capsule/Iris hooks in place to support the bag
  - After phaco / before I&A
    - *But:* may trap cortical fibers

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Cionni Ring:

- A tensioning ring with attached eyelet(s)
  - Allows attachment of the ring to the eye wall
- Cases of major zonule loss
- Knot can be difficult to bury – may need flap

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Capsular Tension Ring Segments (CTR(s))

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CTRs

Design:

- Partial Cionni ring
  - Suture fixation eyelet
    - Elevated
  - Rounded ends

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CTRs

So…..what's it good for?

- Provides bag stabilization
  - *Without the need for:*
    - Rotation
    - Complete bag opening
    - Intact capsule

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CTRs

When do you use it?

- Anytime during the case
  - During *or* after capsulotomy
  - Before *or* after phaco
  - Before *or* after IOL implantation
  - Can *add* a CTR with a CTRS

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Phacodonesis:

- Take home message:
  - When you see phacodonesis…….

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… the loose IOL

Dislocated IOL - Scenarios:

- In the bag
- Sulcus supported
- Trans scleral sutured (TSS)
- Iris sutured

Dislocated IOL - Causes:

- Trauma
- Spontaneous

Dislocated IOL - Causes:

- Suture breakage
  - Trans scleral fixed
  - Iris Fixed

Dislocated IOL - Causes:

- Lens rotation
  - Iris fixed

Dislocated IOL - Causes:

- *Started out dislocated*
- Malpositioned IOL
  - 1 in – 1 out (3 piece IOL)

Dislocated IOL - Causes:

- *Started out dislocated*
- Malpositioned IOL
  - Sulcus positioned (1 piece acrylic)

Dislocated IOL

Approach:

- Questions
  - What is the lens design?
  - What support is left?
  - What is the best access?
  - Vitreous present?

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Dislocated IOL

General Rule for Foldable 1 Piece IOL :

Avoid suture fixation*

- If bag support is inadequate…..

Or

- If unable to open the bag…..
  - Explant and replace with 3 piece lens

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* NB: Akreos IOL

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Dislocated IOL

General Rule - IOL Suture:

- Use non-degradable suture
  - Iris fixation: 9/0 prolene
  - Scleral fixation: 8/0 GoreTex ® *

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Note: GoreTex® is an off label use for ophthalmologic applications

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Dislocated IOL

In the bag IOL -- dislocated:

- *1 piece*
  - Elevate IOL in the bag
    - Iris hooks to maintain position

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Dislocated IOL

In the bag IOL -- dislocated:

- *1 piece*
  - Elevate IOL and the bag
    - Iris hooks to maintain position
  - Cionni ring or CTS
  - Consider IOL exchange
    - Iris fixed or TSS

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Dislocated IOL

In the bag IOL -- dislocated:

- *3 piece*
  - Elevate IOL in the bag
    - Iris hooks to maintain position
  - Use CTS / Cionni
  - Sew haptic to iris or eye wall

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Sulcus IOL dislocated:

- Fell through zonule "gap"

Sulcus IOL dislocated:

- Fell through zonule "gap"
  - If bag is stable
    - Put in the bag if able to open

    Or

    - Optic capture in anterior capsulotomy

Sulcus IOL dislocated:

- Fell through zonule "gap"
  - If bag is stable
    - Capture optic in posterior capsulotomy
      - Posterior capsulorhexis
      - Vitrector capsulotomy

Dislocated IOL

Sulcus Sutured IOL dislocated:

- Generally, suture fracture
  - Iris suture loose haptic (easiest)
  - Re-TSS loose haptic

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Dislocated IOL

Sulcus Sutured IOL dislocated:

- Generally, suture fracture
  - Iris suture loose haptic (easiest)
  - Re-TSS loose haptic
    - Single loop
    - Cow hitch

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Dislocated IOL

Sulcus Sutured IOL dislocated:

- Generally suture fracture
  - Iris suture loose haptic (easiest)
  - Re-TSS loose haptic
    - Single loop
    - Cow hitch

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Dislocated IOL

Sulcus Sutured IOL dislocated:

- Cow hitch –operative technique
  - Form loop
  - Pass over the end of the haptic
    - Intra-ocular forceps
  - Tie under scleral flap - NB: NOT Goretex!

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Dislocated IOL

Iris Sutured IOL dislocated:

- Suture fracture
- IOL rotation

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Dislocated IOL

Iris Sutured IOL dislocated:

- Suture fracture
- IOL rotation
  - Re-suture to the iris

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Dislocated IOL

Half and half *or* 1 piece in sulcus:

- Try to open the bag
  - Hydraulic viscoelastic separation
    - Up to 4 years post op
    - Make sure bag is open completely in any 180^0 meridian for haptics
  - Put IOL in bag

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Dislocated IOL

Half and half *or* 1 piece in sulcus:

- Try to open the bag

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Dislocated IOL

Half and half *or* 1 piece in sulcus:

- *Unable* to open the bag:
  - 1 piece
    - Explant / replace

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Half and half *or* 1 piece in sulcus:

- ***Unable*** **to open the bag:**
  - **3 piece**
    - **Manage as dislocated sulcus IOL**

Thank you for your attention