Fundamentals of Anterior Segment Reconstruction

ASCRS 2014
Boston, MA

Thank You

American Academy of Ophthalmology
And
Vanguard Ophthalmic Society

A A O
And
V O S

Thank You

A A O
And
V O S
Course Objectives

1. Recognize the indications and learn new techniques for anterior segment surgery

2. Gain a better understanding of surgical options for anterior segment repair

3. Understand the advantages and disadvantages of different intra-ocular capsular stability devices

Course Faculty

W. Barry Lee, MD
George Waring IV, MD
John Berdahl, MD
Brandon Ayres, MD
Jeremy Kievel, MD
Elizabeth Yue, MD
Jeremy Kievel, MD

- Boston Native
- Medical school and Residency in Ophthalmology at Boston University and Boston University Medical Center
- Fellowship training in Cornea, External Disease, and Refractive Surgery at Bacom Palmer Eye Institute
- Practices at Lexington Eye Associates with offices in Lexington and Concord, MA
- Interests include corneal transplantation, presbyopic correction, and complex cataract surgery
- Serves on the clinical committee for ASCRS

**IOL Exchange**  
Fundamentals of ASR  
ASCRS 2014

John Berdahl, MD

- Specializes in advanced Cataract, Corneal and Glaucoma Surgery, in addition to Refractive Surgery
- Medical school at the Mayo Clinic in Rochester, MN
- Residency at Duke University
- Cornea and glaucoma fellowship at Minnesota Eye Consultants
- Research interests include CSF pressure in Glaucoma, Minimally Invasive Glaucoma Surgery, and Refractive Laser Assisted Cataract Surgery (ReLACS).

**Sutured IOL’s**  
Fundamentals of ASR  
ASCRS 2014

George Waring IV

- Assistant Professor of Ophthalmology and Director of Refractive Surgery at MUSC Storm Eye Institute
- Medical Director at Magill Vision Center
- Founding Member of the Vanguard Ophthalmic Society
- Too many publications to mention
- Residency at State University of NY
- Fellowship with Daniel Durrie, MD in Overland Park, KS

**Glued IOL’s**  
Fundamentals of ASR  
ASCRS 2014

Elizabeth Yeu, MD

- Residency at Rush University Medical Center in Chicago, IL
- Fellowship in Cornea, Anterior Segment and Refractive Surgery at Cullen Eye Institute, Baylor College of Medicine
- Assistant Professor of Ophthalmology at Cullen Eye Institute, Baylor College of Medicine
- Virginia Eye Consultants

**Capsular Tension Rings**  
Fundamentals of ASR  
ASCRS 2014
The Complex Cataract

W. Barry Lee, MD

Faculty
• Board of Directors and Scientific Chair of the Cornea Society
• Medical director of the Georgia Eye bank
• Partner at Eye Consultants of Atlanta
• Fellowship training at University of California, Davis in Sacramento CA in Cornea, External Eye Diseases, and Refractive Surgery

Iris Repair

Brandon Ayres, MD

Faculty
• Residency training at UMDNJ, New Jersey Medical School
• Fellowship in Cornea, External Disease, and Refractive Surgery at Wills Eye Institute, Philadelphia PA
• Cornea Service at Wills Eye Institute, Philadelphia, PA
• Private Practice at Ophthalmic Partners of Pennsylvania

Sclerally Fixated Akreos AO60

John Berdahl

Disclosures: Alcon, Allergan, Bausch & Lomb, Glaukos

Akreos AO 60

• Hydrophilic Acrylic
• Very Soft Material
• Zero Asphericity
• 4 point Fixation
• Small Incision
• No Sharp Edges

**Akreos AO 60**

- Hydrophilic Acrylic
- Very Soft Material
- Zero Asphericity
- 4 point Fixation
- Small Incision
- No Sharp Edges

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**Scleral Fixation**

**Advantages**
- Everybody has a sclera
- IOL Fixated First
- Good Stability with DSEK
- No Correctopia
- No Iris Chaffing
- No Cheesewireing

**Disadvantages**
- Long Procedure
- Avoid blebs
- Poor Reimbursement
- External Sutures could be cut

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**Steps**

1. Block
2. Take down Conj (6 to 8 and 12 to 2 Surgeons view)
3. Cauterize
4. Mark suture locations 4.5mm apart
5. Insert AC maintainer
6. Create 4mm incision at 5 o’clock
7. Remove Old IOL and Vitrectomy
8. Thread distal loops with double armed CIF 9-0 Prolene for mattress suture
9. Externally place docking 27g needle through sclera at suture locations.
10. Repeat 8 & 9 at proximal loops
11. Fold and insert IOL
12. Tighten sutures to center
13. Tie and bury knots
14. Close Conjunctiva

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Thank you

Financial Disclosures

• No financial interests to disclose related to this talk
3-pc IOLs excellent for mild zonulopathy

Capsular Tension Devices

- Standard ring
  - Alcon ReFORM™ CTR
  - Abbott StabilEyes™ CTR (formerly Ophthec)
  - Morcher CTR
  - Henderson CTR
- Sew-in Ring
  - Cionni CTR
- Ring segment
  - Ahmed capsular tension segments

Capsular Tension Rings

- Indications
  - <3-4 clock° of zonular loss
  - Mild zonular instability
  - Injector or free hand
  - Should not be used in anterior capsular tear, a discontinuous capsulorhexis, or a p-cap tear
Capsular Tension Rings

- Dial in towards area of instability
- Free hand
  - Instrument in second hand to pull/push ring in centrally

CTR: Free hand

CTR: Watch for capsule violation!
**Sewn-in CTR**

- Sutured CTR should be considered for > 4-5 clock hours of zonular loss
- Obviously dislocated lens
- Profound zonular instability
- Should not be used in anterior capsular tear, a discontinuous capsulorhexis, or a p-cap tear

**Marfan’s: Inferior Dislocation**

**Double-armed Non-Dissolvable Suture**

- Ethicon® Double-Armed 3” 9-0 CTC-6L (curved) or STC-6L (straight)

**Cionni CTR**

- MR-1L Type 1L 11 mm
- MR - 2L Type 2L 11 mm
- MR - 2C Type 2C 11 mm
Indications
 Greater generalized zonular instability
 Single-islet just not be enough

Ahmed Capsular Tension Segments
• Wonderful newer addition
• Easier learning curve than sutured CTR
• Ant. or post. capsular tear → no problem
• No-dialing technique → minimal capsular/zonular trauma
• Often used with standard CTR
Ahmed CTS

Conclusion

- Mild zonulopathy can be managed with a 3-piece IOL in the bag
- Difficulty: CTR < CTS < sew-in CTR
- Always manage vitreous prolapse around areas zonulolysis
- Some very loose lenses should be managed by Retina surgeons
White Cataract

- Challenges
  - Difficulty with Anterior Capsule View
  - Often associated with small pupil
  - Zonular laxity, more common
  - Anterior capsule staining techniques
    - Trypan blue
    - Indocyanine green

Trypan Blue (under PK)

Traumatic Cataract

- Preoperative exam
  - History
  - Phacoemulsification?
  - Vitreous prolapse?
  - Iris sphincter damage? (Poor dilation)
  - Phaco / Extracapsular / Intracapsular technique?

Traumatic Cataract

- Intraoperative
  - Beware of loose zonules
  - Look for posterior capsule tear
  - Have anterior vitrectomy available
  - Lens type / Lens placement
  - Have capsular tension ring available
What to Avoid

Capsular Tension Devices

Pearls for CTRs

- Less than 4 clock hours of zonulolysis
- Overfill the bag with OVD before placement
- Use a 3-Piece Intraocular lens implant
- Orient the haptics in the direction of zonulolysis

Anterior Capsule Tear

- Concerns & Considerations
  - Extension to posterior capsule
  - Posterior capsule rupture / Vitreous loss
  - Lens implant stability
  - Placement of lens in bag or sulcus?
  - Lens implant (3-piece or 1-piece)?

Anterior Capsule Tear Pearls

- Refill with cohesive OVD to attempt save
- Can reverse direction of capsulorrhexis
- Can opener capsulorrhexis can help if lost peripherally
- Only gentle hydrodissection

Anterior Capsule Tear Pearls

- Fill capsule bag with OVD prior to removing irrigation (prevents chamber collapse)
- Lens in bag versus sulcus
- Do not place 1-piece lens in sulcus
- Orient haptics 90 degrees away from tear
**Intraoperative Floppy Iris Syndrome (IFIS)**

- Problems
  - Iris prolapse
  - Poor dilation/mitosis
  - Bowling of iris
  - Iris caught in ultrasound or I/A tip
  - Difficult view of peripheral cortex

**Medications**

- Alpha-1 blockers
- Beta-blocker/propranolol
- Sodium channel blockers
- Calcium channel blockers
- Prostaglandin analogues

**Surgery Pearls for IFIS**

- Well-constructed incision
- Bipolar diathermy
- Lower fluidics
- Gentle IOL dissection
- Lower bottle for phaco
- Irrigation/aspiration

**Surgery Pearls for IFIS**

- Trypan blue may aid visualization of anterior capsule
- Viscoadaptive DSD
- Healon 5, Discomp Visc
- Iris retractors
- Pupil expansion rings

**IFIS - Preoperative Tips**

- Not Helpful
  - Discontinuation of alpha-blocker

- Helpful
  - Pre-operative topical stripe (1%) lid, (3-4 days prior): variable effect
  - Epinephrine added to I/S bottle
  - Intracameral unpreserved epinephrine (1:4000 concentration)
  - Sluggish-cane: 9cc (I/S Plus), 3 cc (4% preservative-free lidocaine), 4 cc (1:1000 preservative-free epinephrine)

**Corneal - Microscopic View**

**FECD**

- Hereditary endothelial dystrophy
- International Committee for Classification of Corneal Dystrophies (1)
  - COL15A gene (COL15A1 gene (2))
- Onset (4th - 5th decades)
- Premature aging of endothelium
- Guttata develop centrally and extend peripherally
- Epithelial and stromal edema
- Ultimate base and stromal calcification

**Cataract Surgery in FECD**

- Major Concern --
  - (Corneal Decompensation)
- Surgical Planning
  - Cataract surgery alone
  - Endothelial keratoplasty (DSK alone)
  - Triple procedure
  - (Cataract surgery + DSK)

**New Classification**

**APPENDIX 2. FECD GRADING SCALE**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Criteria (Central/Peripheral Corneal Edema)</th>
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<tbody>
<tr>
<td>0</td>
<td>No guttae</td>
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<tr>
<td>1</td>
<td>1-2 mm guttae</td>
</tr>
<tr>
<td>2</td>
<td>3-4 mm guttae</td>
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<td>5-10 mm guttae</td>
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<td>1-2 mm cornea</td>
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<td>3-5 mm cornea</td>
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<tr>
<td>6</td>
<td>&gt; 5 mm cornea with clearly apparent</td>
</tr>
<tr>
<td></td>
<td>anterior cornea</td>
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</table>

**Preoperative Considerations**

- Slit lamp exam
- Corneal guttae density
- Presence of corneal edema
- Presence of corneal scarring / stromal haze
- Specular Microscopy
- High power slit lamp view
- Endothelial cell count
- Corneal Pachymetry
- Measure of corneal thickness with ultrasound
Preoperative Considerations

- Normal Cornea Thickness
  - Average range = 525-550 microns (μ)

- Corneal Pachometry
  - > 600 μ → Triple procedure
  - > 640 μ → Triple procedure

Surgical Pearls

- Cataract Surgery alone
  - Scleral: Consider capsulotomy.
  - Use dispersive OVD to coat endothelium.
  - Use Ultrasonic Power.

- Pearls for Combined Surgery
  - Use cohesive OVD.
  - Consider triflurane:
    - Improves anterior capsule visualization.
    - Improves visualization of Descemet’s.
  - Use increased DMEK.

Keys to Success

- Appropriate patient selection & surgical decision making.
- Avoided keratoplasty within 1 year.
- Central pachometry < 600 microns
  - > 600-650 microns (μ)
  - > 600-650 microns alone
  - > 600-650 microns within last 1 year.


Refractive Outcomes of DSAEK

<table>
<thead>
<tr>
<th>Author</th>
<th>Eyes (n)</th>
<th>Refractive Change (Δ)</th>
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<td>Serra 2009</td>
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<tr>
<td>Last 2007</td>
<td>32</td>
<td>+1.3</td>
</tr>
</tbody>
</table>

Ernst Fuchs (1851-1930)

Fuchs lecturing to his students (Austria 1911)

Conclusions

- Every cataract surgery is different.
- Be prepared for special situations that add complexity to cataract surgery.
- Familiarize yourself with different devices to improve cataract surgical skill and efficiency in challenging cases.
- Difficult cases can be made routine when adjunct devices are mastered.
Intraocular Lens Exchange and Reposition

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Financial Disclosures
- Optimedica, consultant/speaker
- Alcon, consultant/speaker
- Allergan, consultant/speaker
- Abbott Medical Optics, consultant/speaker
- Lenstec, consultant

Indications for IOL exchange
- Refractive error
- Anisometropia
- Refractive surprises/post excimer laser vision correction
- Toric errors
- Visual symptoms
  - Positive dysphotopsia
  - Negative dysphotopsia
  - Inadequate visual function
- Malpositioned IOL
  - Zonulopathy- PXF, trauma, uveitis, RP, long AL
  - Iatrogenic causes
  - Therapeutic indication
- UGH syndrome
- IOL deposits
  - Calcifications
  - ?Glistenings

Prepare for surgery!
- Know the history
- Slit lamp exam:
  - Capsule/capsulotomy status
  - Zonular status
  - Endothelial cell status
  - Incision locations/astigmatism
  - IOL type
  - Position of the haptics
- Exchange vs. Reposition
- Pars plana vs. limbal approach
- Pt expectations, CME, capsular compromise, open capsules
**Surgical procedure**
- Retro/peribulbar block
- Instrumentation
  - Viscoelastics
  - Viscodisection: 27g needle vs cannula vs. bimanual
  - Iris hooks
  - Capsular retractors
  - Lens manipulators
  - Microsurgical forceps and scissors
  - Vitrector
  - Triesence®
- Suture

**Out with the old...**
- Removing the IOL from the bag
  - Entirely
  - Amputate haptics
- Removing the IOL from the eye
  - Cut
  - Fold
  - Dial
  - Pull

**In with the new...**
- Where to put it:
  - In the bag
  - In the sulcus
  - Optic capture
  - ACIOL
- Inject new IOL before taking out old
- Iris fixation
  - McCannell suture
  - Seipser knot
- Scleral fixation
Financial Disclosure

- Alcon
- Allergan
- Bausch and Lomb
- Merck
- Bio-Tissue
- AMO
- Tear Science

Why Repair the Iris

- Not all iris defects need repair
- Small traumatic iris defects
- Peripheral iridotomy
- Iris capture after large incision cataract surgery
- Symptomatic iris defects need repair
- To assist with another anterior segment procedure
- Cosmesis

Major Categories

- Iridodialysis (usually from trauma)
- Sphincter tears leading to irregular pupil
- Loss of tissue from trauma
- Atonic pupil
- Aniridia

Iridodialysis

- Commonly seen in ocular trauma
- Can be surgically induced
- Watch for zonular loss in area of dialysis, makes cataract surgery more challenging
- Timing is important
- Wait long enough for inflammation to clear
- Waiting too long may make the repair very difficult
Technique

- Create peritomy in area of iris defect
- Use 9 or 10-O prolene suture
- 25G needle can be used as a guide through peritomy
- Sutures passed through cataract wound or paracentesis
- Rotate knots to bury or leave long ends to prevent exposure

Brandon D. Ayres, MD
Cornea Service

Technique

Iridodialysis
Repair

40 year old man s/p paintball injury
62 Year old man s/p blunt trauma to eye with severe glare

**Technique**

Iridodialysis Repair

64 Year old woman s/p shovel injury to eye leaving her with corneal scar, aphakia, and with iridodialysis

**Technique**

Iridodialysis Repair

Open Sky

64 Year old woman s/p shovel injury to eye leaving her with corneal scar, aphakia, and with iridodialysis
Iris Tears or Loss of Tissue

- Often due to floppy iris and phaco or IA tip grabbing the iris or trauma
- Often seen in the setting of trauma
- Defects can be asymptomatic or allow edge glare
- May be cosmetically unappealing in light colored eyes

Technique

- Use 9 or 10-0 prolene suture on curved needle
- Sutures passed through cataract wound or paracentesis
- Can use a sliding knot or McCanell suture technique to close defect
- Sphincterotomy may be necessary to re-shape or move pupil
**Technique**

Sphincter Tear Repair

48 Year old man s/p traumatic cataract removal

Brandon D. Ayres, MD
Cornea Service WEI

**Atonic Pupil**

- Large dilated pupil can be difficult to close
- Large pupil can cause glare in phakic and pseudophakic patients
- Can be helpful to use prosthetic contact lens to see if symptoms resolve prior to surgical intervention

**Etiology**

- Idiopathic
- Orbital trauma
- Herpes Zoster Infection
- Diabetes
- Autonomic neuropahties (Riley Day)
- Guillain Barre syndrome
- Narrow angle glaucoma
Technique

- Pupillary cerclage surgery is tedious
- Easiest if patient is pseudophakic or becoming pseudophakic.
- Multiple techniques described (4 bite, 8 bite, etc)
- Don’t get suture stuck in fibril of cornea
- Good practice for the weak hand

Thank You
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