It's NOT Cataract...How not to miss subtle causes of vision loss

Disclosures

- none

How many?

Collective Wisdom

- "Groups are remarkably intelligent and are often smarter than the smartest people in them"

Room full of Experts

Objectives

- Identify common causes of subtle vision loss that may be mistaken for cataract
- Identify causes of vision loss that may be coexist and be masked by cataract
- Develop an algorithm for preoperative evaluation that will increase the likelihood that pre-existing causes of subtle vision loss will be detected
Thought Question...

- How many of you have taken out a cataract, only to find some ocular pathology that you missed preoperatively?

Ocular Comorbidities

- 42% of patients undergoing cataract surgery had ocular comorbidities (N = 7626)
  - 11% Glaucoma
  - 17% ARMD
  - 5% DR

Initial Two Years of Experience with the AAO National Eyecare Outcomes Network (NEON) Cataract Surgery Database
Flora Lom, MD; Oliver Schachat, MD; Andrew P. Schachat, MD; Richard L. Abbott, MD; H. Dunbar Hoskins, Jr; MD; Earl P. Steinberg, MD, MPP

Other Ocular Comorbidities

- Dry Eye/External disease/Corneal disease
- Amblyopia
- Retinal Detachment
- Optic atrophy/neuropathy

Impact of ocular comorbidities

- 10,364 patients undergoing cataract surgery
- Known ocular comorbidities positively impact patient satisfaction and visual functioning after cataract surgery

Case 1: Symptoms

- 60 yo woman c/o blurred central vision declining slowly over the past 2 years
- When she closes OS, she sees “double”
- New glasses don’t really help
- OS has seen poorly for years as a result of corneal laceration age 3

Case 1: Medical History

- PMHx: DM, s/p hip replacement, arthritis
- Medications: Calcium, Indomethacin
- FHx: father on glaucoma gtt; sister is “glaucoma suspect”
Case 1: Exam

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Va cc</td>
<td>20/30 +2 PHN</td>
<td>CF</td>
</tr>
<tr>
<td>IOP</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>cornea</td>
<td>Normal</td>
<td>Central scar</td>
</tr>
<tr>
<td>Lens</td>
<td>1+ NS, 1+ cortical spokes</td>
<td>1+ NS</td>
</tr>
<tr>
<td>Refraction</td>
<td>-0.25 +175 x 170 20/25</td>
<td>-850 sph CF</td>
</tr>
</tbody>
</table>

Case 1: Ms. W

Case 1: RNFL OCT

Case 1: OCT macula OS
Case 1: OCT macula OD

Proceed with Cataract Surgery?

Case 2: Optic neuropathy
Case 5

VA cc-20/100 PH 20/60
20/100 PH 20/40
Pupils No RAPD
WRx
Right -8.25 +3.25 ±7
Left -6.75 +1.25 ±8
Auto Refraction
Right -14.25 +7.00 ±5
Left -8.50 +2.75 ±5

Case 6

VA cc-20/100 PH 20/60
20/100 PH 20/40
Pupils No RAPD
WRx
Right -8.25 +3.25 ±7
Left -6.75 +1.25 ±8
Auto Refraction
Right -14.25 +7.00 ±5
Left -8.50 +2.75 ±5

Cataract Comorbidities

- Amblyopia
- Refractive
- Corneal Disease
  - Ocular surface
  - Keratoconus
  - Dystrophies
- Drug induced
  - Antimalarials
  - Anti-tuberculin agents
- Macular Pathology
  - Diabetic retinopathy
  - ARMD
  - ERM/Pseudohole
  - Lamellar Hole
  - Macular edema
- Optic Neuropathy
  - Glaucoma
  - AION

Algorithm for Cataract Evaluation?

- History & Dilated exam
- Refraction
- Keratometry
- A Scan
- History & Dilated exam
- Refraction
- Topography
- Potential Acuity
- OCT as needed (low threshold)
- Automated visual field testing if indicated
- Optical biometry
- A Scan, B Scan as needed

Where have we been...

- Identify causes of vision loss that may be coexist and be masked by cataract
- Identify common causes of subtle vision loss that may be mistaken for cataract
- Develop an algorithm for preoperative evaluation that will increase the likelihood that pre-existing causes of subtle vision loss will be detected
Don’t Worry, Be Happy....

Thank you!
IOL Selection for Cataract Surgery

How to select an IOL
- Identify refractive needs of pt
- Measure Axial Length
- Measure corneal curvature
- Review Biometry
- Choose IOL

Recommended Reading
- Nick Astbury and Balasubramanya Ramamurthy
  *How to avoid mistakes in biometry*
- Alexander C. Lee, Mujtaba A. Qazi, Jay S. Pepose.
  *Biometry and intraocular lens power calculation*

Refractive needs
- Refractive status of other eye
  - Anisometropia
  - Presence of cataract in fellow eye
  - Other ocular disease impacting post op refraction
- ADLs
- Desire for spectacle independence
- Occupation (pilot, artist, musician)

Axial Length
- Contact Ultrasound
  - Applanation
  - Immersion
  - Measures distance from cornea to ILM
- Non contact (optical biometry)
  - Measures distance from cornea to RPE

Applanation
Advantages
- Accurate (immersion more than applanation)
- Inexpensive

Disadvantages
- Does not incorporate fixation so axis may be off
- Potential for infection
- May not work as well with silicone oil
- Can underestimate axial length (applanation)
  ▪ Error has greater impact in shorter eyes
**Successful Contact Axial Length**

- Calibrate and set for the correct velocity setting (e.g. cataract, aphakia, pseudophakia)
- Look for good echo spikes
- Lower the gain as much as possible
- Take care with axial alignment
- Don't push too hard
- Average the 5–10 most consistent results
- Avoid insufficient or greasy corneal meniscus

**Corneal Curvature**

**Keratometry**

- What you see when you start
- Step one: focus and align crosshairs

**Keratometry**

- Step 2: rotate axis to align the circles
- Step 3: Adjust power to find magnitude

**Manual Keratometry**

- Calibrate the keratometer
- No prior corneal touching, good tear film
- Occlude the fellow eye
- Take an average of three readings, including the axes
- Recheck high or low results (< 40.00 or > 48.00)
- For scarred cornea, use the fellow eye

**Optical Biometry**

- Advantages
  - Minimal pt cooperation and measures visual axis
  - Combines keratometry and axial length
  - Non contact
  - Enables multiple different formulae
  - Works well for some conditions
    - Very short
    - Very long eyes (post staphylomata)
    - Silicone oil
    - Pseudophakic
**Optical Biometry**

- **Disadvantages**
  - Inaccurate in some patients where light penetrates poorly
  - Tear film abnormalities
  - Corneal pathology
  - Dense cataract
  - Axial cataract
  - Significant astigmatism

**Which Formula?**

<table>
<thead>
<tr>
<th>Axial length (mm)</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20 mm</td>
<td>Holladay II</td>
</tr>
<tr>
<td>20–22 mm</td>
<td>Hoffer Q</td>
</tr>
<tr>
<td>22–24.5 mm</td>
<td>SRK/T, Hoffer Q, Holladay (average)</td>
</tr>
<tr>
<td>&gt;24.5–26 mm</td>
<td>Holladay I</td>
</tr>
<tr>
<td>&gt;26 mm</td>
<td>SRK/T</td>
</tr>
</tbody>
</table>

**Cases**

**Case RS**

- **Current Vision**
  - OD: +4.25 + 0.50 × 165  20/30 +1
  - OS: +2.50 + 0.50 × 065  20/50 +1

- Pachy 494/480
- 3+ NS OU
- Impairment of ADLs (can't read)
Case MF

- Current spectacles
  - OD +1.00 +2.50 +1.00 +2.75 20/60
  - OS +1.00 +2.75 +0.80 +2.75 20/40
- Pachy 556 / 565
- 3+ NS OU
- AMD OU, macular scar OS

Surgery: Phaco IOL OU
- SA60AT
- 25.5 D OD
- 26.0 D OS
- UCVA 20/30 at post op 1 day each eye
**Surgery**

- Phaco IOL OU
  - 23.0 SN6A6T OD
  - Phaco sIOL ant vit OS
  - 22.0 MA60AC in sulcus

**Post op 1 week after OD**

- Autorefractioan
  - OD 20/70 PH 20/40
  - OS 20/70 PH 20/25

- Manifest refraction
  - OD -1.75 +0.50 x 020 20/40

- OCT WNL OU
Case RS: Post monovision LASIK

- VA cc 20/50 OD 20/20 OS
- Current Spectacles
  - OD: -0.50 +0.75 x 003
  - OS: -1.75 +0.25 x 062
- Manifest
  - OD: -4.50 +1.00 x 165
  - OS: -2.25 +0.50 x 070
- 2+ NS OU, 3+PSC OD

Post Refractive IOL Calculator

- www.iolcalc.org
Post op Data
- SA60AT 20.0 D
- 20/25 POD 1
- POD 5 wk
  - UCDVa 20/20
  - UCNVa 20/40
  - OD  -1.25 +1.25 175
  - OS  -1.00 sph

Sources of error
- Wrong A-constant selected
- Wrong formula used
- Wrong K-readings (or, 90° away)
- Wrong patient chart
- Incorrectly labelled IOL
- Wrong patient in OR
- Reversed IOL optic
- Wrong IOL implanted
- Incomplete hx: pt had refractive surgery

Learn from others
- Slow down
- Don't rely on others
- Train and certify your biometry staff
- Don't skip any steps
- Anticipate the unexpected
- Learn from mistakes, particularly any eyes with error greater than 2 diopter difference
- Audit your outcomes

Have a system
- Do all steps in advance
- Reconcile pt demographics
- Review refractive status OU
- Review ocular comorbidities in so far as it impacts post surgical vision
- Review discussion of pt expectations/wishes
- Set target refraction
- Review topography
- Review biometry

Review Biometry
- Demographic data
- Compare axial lengths
- Compare keratometry (factor in topo)
- Identify ideal lens type to use
- Identify ideal location and factors
- Identify ideal formula and power calculator
- Choose lens implant power
- Choose a backup if complication requires a different location