Introduction

- Glaucoma and Cataract
- Not merely a cataract patient with VF and ON defects
- Unique functional and structural differences that affect the pre, intra, and post operative scenarios
- Need to keep this in mind when selecting IOL
Premium IOLs and Glaucoma

- Multifocal IOL
  - Goal is spectacle independence for near and distance
- Toric IOL
  - K astigmatism of > 1.5 D
  - Goal is reduced visual aberation from correction of K astigmatism
- Glaucoma
  - Goal is to prevent further vision loss

Multifocal IOL

- Simultaneous near and distance images
- Superposition of focused and unfocused images
- Perception of halos or glare
- Worse in poor light conditions
- IOL must be centered
Toric IOL

- Astigmatic correction is built into the optic
- The axis of the IOL is critical
- Centration is not as much an issue
  - But, aspheric optics are affected
- Pupil size not an issue

Premium IOLs and Glaucoma

- Reduced contrast sensitivity
- Scotopic and mesopic vision
- Perception of halos or glare
- Visual field testing
- Glaucoma imaging
- Anatomical considerations
Multifocal IOLs and Glaucoma

Reduced contrast sensitivity
- May occur in early glaucoma (pre-perimetric)
- Photopic vision: high light levels; cones
- Scotopic vision: very low light levels; rods
- Mesopic vision: low but not dark light; combination of photopic and scotopic
  - Both glaucoma and MFIOL affect contrast sensitivity the most here

Multifocal IOLs and Glaucoma

- Perception of halos or glare
- Slower dark adaptation
**Premium IOLs and Glaucoma**

Visual field testing
- Post Cataract Extraction
  - Improved Visual Acuity
  - Increased Foveal and overall sensitivity
  - Decreased Mean Deviation
  - Increased PSD?
- Multifocal IOL
  - Reduced contrast sensitivity may depress raw values, grey scale and MD
  - PSD, GHT likely unaffected
  - Increased glare may decrease sensitivity
- FDT testing may be less affected
  - Larger target, less dependent on refraction

**Multifocal IOL and Perimetry**


- Effect of Restor IOL on FDT in glaucoma
- 25 eyes of 13 patients
  - 3 glaucoma; 3 glaucoma suspects; 7 normal
- FDT 24-2 testing before and after CE
- Results
  - VA: Preop = -.36 Postop = -.08 logMAR
  - MD:FDT Preop = -2.25±2.60 Postop = -2.39±2.39 [p=0.81]
  - PSD:FDT Preop = 4.17±2.05 Postop = 4.06±1.69 [p=0.69]
  - IOP Preop = 14.47±3.55 Postop = 14.58±5.61
- Reduced contrast sensitivity?
Premium IOLs and Glaucoma

Glaucoma imaging

- Some evidence that diffractive MFIOL can cause wavy horizontal artifacts on OCT images
- Does not seem to be an issue with HRT

Premium IOLs and Glaucoma
Glaucoma imaging

SLO image with MFIOL diffractive

OCT image with MFIOL diffractive

Premium IOLs and Glaucoma

Anatomical considerations

- Pupil size
  - Small pupil associated with XFG, medication use
  - Adversely affects the near accommodative ability of MFIOL
  - Large pupil associated with prior surgical manipulation
  - May result in greater photopic symptoms, even in daylight

- Pupil shape
  - Irregular pupil shape
  - Results in greater photopic symptoms
Premium IOLs and Glaucoma

Anatomical considerations

- Zonule issues
  - Decentration of MFIOL
  - Rotation of Toric IOL
- Capsule issues
  - Anterior capsular phimosis affects accommodative IOL
- Peripheral iridectomy
  - Increased photopic symptoms
  - Blurred vision, ghost imaging

Axial length

- Can decrease with surgical IOP lowering
- AL decrease of -0.16 mm at 3 months after trab or tube
- AL decrease of -0.39 mm in hypotonous eyes

### Premium IOLs and Glaucoma

**Anatomical considerations**

- **Corneal astigmatism**
  - Greater with trabeculectomy than other glaucoma surgeries
  - 0.44 (0.83) to 1.92 (1.87) diopters
  - With the rule or “with the wound”


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### Premium IOLs and Glaucoma

- Reduced contrast sensitivity
- Scotopic and mesopic vision
- Perception of halos or glare
- Visual field testing
- Glaucoma imaging
- Anatomical considerations
Conclusion

- Multifocal IOLs, especially diffractive, exacerbate symptoms seen in even mild glaucoma
- Glaucoma conditions may make MFIOLs less effective or lead to greater visual problems
- Toric IOLs tend to improve visual function in glaucoma patients