Management of Residual Astigmatism after Toric IOL Placement

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Have done research, consulting, or speaking for:
- Allergan, AMO, Calhoun Vision, CXL, IOL, EDI, Neometrics, D Fiber, Click, TLCV

Some of the information may represent off-label uses of approved drugs or devices.

Astigmatic Correction

Many Options at time of Cataract Surgery
- Corneal Relaxing Incisions – Blade vs. Femtosecond
- Toric IOLs – increasing acceptance
- Preoperative laser vision correction
  - LASIK
  - PRK
- Postoperative laser vision correction
  - LASIK
  - PRK

Custom Cataract Surgery

>70% of patients have > 0.5 D of pre-op astigmatism

Critical to Address
For Good Uncorrected Vision

Hoffmann & Hutz
JCRS 2010;36:1479
Timing of Secondary Intervention

Astigmatism Correction after IOLs
- Enhance large corrections earlier
- Small corrections – wait longer
- Typically I wait 1-2 months to do IOL Rotation or IOL exchange for large corrections
- Typically I wait 3-6 months to do laser vision correction
  Capsule considerations – contraction or PCO
  Yag first in many patients

Residual Astigmatism after Toric IOL

Questions to Ask
1. Is it Regular or Irregular?
2. Is the Spherical Equivalent where you want?
3. Is it correctable by rotation of the IOL?

Example: SN6AT5 at 150 degrees
WSR: -2.69 + 4.05 x 90
MR: -2.00 + 3.00 x 95 = 20/40-2
HOA: 0.46 μ @ 4.75mm pupil
Humphrey Astig 4.12 D at 80 degrees

Irregular Astigmatism

SN6AT5 at 150 degrees
Pentacam Astig 2.3 D at 54 degrees
MR: -2.00 + 3.00 x 95 = 20/40-2
WSR: -2.69 + 4.05 x 90
Humphrey Astig 4.12 D at 80 degrees
## Options – Irregular Astigmatism

**Toric after RK – Options?**

- Rotate Toric based on Refraction
  - (to $115^\circ = 0.94 \times 115$)
  - www.astigmatismfix.com
- Rotate Toric based on Wavescan
  - (to $105^\circ = 1.45 \times 106$)
  - Easier to rotate based on change of position
  - Change from 150 to 115 is 35 degrees clockwise
- Perform totally based on intraoperative analysis for best accuracy
  - Remove toric IOL? (baseline astig of eye likely 3.5 to 4 D)
  - PRK? (only 4.75 mm capture) – Might be useful for irregular component
  - Exchange IOL for higher powered toric?

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## Occasionally Confusion on Preop Axis

**Preop Steep Axis OD**

- K’s = 101°
- Pentacam = 113°
- Humphrey Topography = 101°
- IOL Calculator suggests
  - 10° based on K and topo
  - 113° based on Pentacam
- Placed at 108°
- Postop at 108°
- Residual refraction: $-1.75 + 1.75 \times 150$
- Residual Wavescan: $-1.64 + 1.75 \times 133$
Options – Regular Astigmatism

Residual Astigmatism after Toric – Options?
- Rotate Toric based on Refraction
  (Ab 120° = 0.4 D x 112)
- Rotate Toric based on Wavefront
  (Ab 115° = 1.3 D x 116)
- Easier to rotate based on change of position
  - Change from 108° to 120° (12 degrees counterclockwise)
  - Perform totally based on intraoperative analysis for best accuracy
- Remove toric IOL? (baseline astig of eye likely 4.5 to 5.4 D)
- PRK? Refraction based results suggests rotation likely to be useful.
- Exchange IOL for higher powered toric? – not available here

Toric IOL Rotation Procedure

Moving from Axis 108° to 120°
- Rotate
  - 12° Counterclockwise
  - 16° Clockwise
- UCVA = 20/20
- -0.50 + 0.50 x 116

Illuminating Surgical Keratoscope
Helpful for axis identification
Residual Sphere and Cylinder

After Toric IOL
  - PRK or LASIK
  - Wavefront usually possible

Summary

Residual Astigmatism after Toric IOL
  - Decide whether astigmatism is mostly regular or significantly irregular
  - Spherical Error also?
  - Calculate if enough correction by rotating IOL
  - www.astigmatismfix.com
  - Consider IOL rotation or exchange for lower or higher powered IOL
  - PRK or LASIK in some cases is best option
  - High expectations of patients will require occasional enhancements