Causes of dissatisfaction post premium IOL

Preop:
- Patient selection and consultation about the limitations and advantages of premium IOLs.
- Dry eye.
- Inaccurate marking of astigmatic axis.
- Inaccurate MR in RLE.
- Inaccurate biometry: high hyperopia, post LVC or RK
- Pupil Size: Too large > 7mm, or too small <2.5 mm
- Topography: to exclude irregular cornea, and to address corneal astigmatism.

Aberrometry: High order aberrations (coma).

Coma & Multifocal IOL
- Mis-evaluation of HOA: significant coma does not match with multifocal IOL (Aly, MA, ASCRS 2011, San Diego). Recommended cut off: Consider in coma 0.25-0.33, contraindicated if coma > .33. Accordingly, aberrometry is required before multifocal IOL.

Astigmatism & Multifocal IOL’s
- 0.63 D is the benchmark for multifocals.
- > 0.63 D should be corrected if multifocal IOL is planned (ASCRS study).

OPERATIVE
- Capsule-related:
  CCC opening should be central, medium-sized (5-5.5 mm), regular, and the edge should cover the optic edge of IOL to enhance square-edge effect of IOL to prevent or retard PCO

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

Hoffmann & Hutz
JCRS 2010;36:1479
Operative: Misalignment of IOL axis in Toric IOL

ORA System

Operative:

- Decentered IOL: When IOLs are decentered 1.0 mm, there is far more image degradation with an IOL with negative spherical aberration (Tecnis) compared to zero spherical aberration (AO).
- Corneal wound: burning, dehiscence, too corneal...

Postoperative:

- Dry eye.
- PCO, capsular phimosis.
- IOL decentration.
- Toric IOL rotation.
- Macular dysfunction: DME, CME, AMD.

The ORA System®

Clinically Proven to Increase Accuracy and Improve Outcomes

- Provides on demand information which assists in intraoperative decision making.
- Utilizes Talbot Moiré interferometry: Large dynamic range -5 to +20D
- Enables real-time surgical course correction.
- “Got it right – right on the table” the first time.
- Compatible with and attaches directly to existing surgical microscopes.
- Every system connects live to Wave Tec web based servers to capture every procedure and push software upgrades.

Review of Clinical Applications

Provides information to improve accuracy in IOL power calculations:
- Intraoperative Aphakic Refraction: IOL power calculation.
  - Standard IOL cases
  - Premium IOLs
  - Post-refractive surgery patients

Provides information to ensure more precise toric IOL outcomes:
- Intraoperative Aphakic Refraction:
  - Spherical power of IOL
  - Aphakic refractive cylinder power and axis
- Intraoperative Pseudophakic Refraction:
  - Guidance for refining toric IOL orientation
  - Placement at the proper axis

Provides information for more accurate and consistent results when performing LRIs.
Key Facts To Remember

- Selecting the right patient
- No ocular disease
- Ability to fixate – no blocking
- Preparing the eye
  - Homogenous solution to inflate the eye
  - Either BSS or viscoelastic, but not both
  - Ensure good tear film
  - Sealed incisions and avoid excessive edema
  - Proper IOP (21 mmHg)
- Taking a measurement
  - Microscope light turned off during capture
  - Patient fixating on the slowly blinking red
  - Maintain Z focus and XY alignment

The iTrace Helps Every Cataract Patient Achieve Their Best Potential Vision

- Optical system alignment, with ray tracing
- Quantification and analysis of corneal aberrations with ray tracing
- Post-operative verification with ray tracing

Premium lenses must provide premium vision!

Scan on pupil centration showing coma – but this patient does not complain of double vision.

Scan on visual axis centration, showing only cylinder.

Visual axis centration through spectacles showing very good correction.

Having off-setting data (X & Y) can be transferred to laser machine for ablating on the visual axis.
Internal aberrations compensating corneal aberrations - must consider prior to cataract surgery that corneal issues will be revealed.

Tilted Restor IOL with normal corneal surface.


Rotate lens 129° clock-wise as shown in the diagram.

Digital color photo with iTrace can be used to mark limbal vessels or iris marks to guide axis rotation perfectly.

Wavefront-Guided Ablation to Correct Refractive Error Post Premium IOL

Mounir Khalifa, MD, PhD
Prof of Ophthalmology, Tanta University
President of Egyptian Refractive Club
Chairman of Horus Vision Correction Center
Alexandria, Egypt

I have no financial interest.
• Refractive surprises after refractive cataract surgery with premium IOLs are common problem.
• Accuracy of wavefront-guided ablation using the high definition aberrometer (iDesign) which is able to measure the fine details of the optical system of the human eye including regular & irregular astigmatism in addition to HOA’s encouraged us to use WFG ablation to correct refractive surprises after premium IOL’s. Also, accurate registration of WF-guided ablation, either axial or torsional, helped significantly in correcting these surprises.

Wavefront-Guided ablation has many advantages:

i) Wavefront measurements are 25 times more precise than a manifest refraction
ii) Objective measurement of the patient’s entire optical system.
iii) Help reduce or maintain higher order aberrations
iv) Iris Registration and pupil centroid shift (Star S4IR) which ensures accurate axial and torsional registration.

• We did a study to evaluate the efficiency of wavefront-guided PRK to correct the remaining refractive error after refractive cataract surgery with premium IOL (toric or multifocal)
• 3-6 months after surgery, cases which did not receive management for remaining refractive error had wavefront-guided PRK to correct the remaining refractive error using Visx Star S4 with IR.

Efficacy of WFG PRK=1.0
Safety of WFG PRK=1.0

Corneal HOA’s showed no significant change after WFG ablation.

Comparison of PSF Post-Premium IOL and postWF
**Conclusion**

- WFG- ablation using high definition aberrometer was efficient in correcting the refractive surprises after refractive cataract surgery with premium IOL's.
- There was no significant change either in ocular or corneal HOA’s after WFG-PRK.

**Decision Tree**

**Many Options at time of Cataract Surgery:**
- Accurate Biometry and Topography (ITRACY)
- Intraoperative aberrometry (ORA)
- Circular central CCC which overlaps 360 of IOL optic (Femto cataract FLACS)
- Astigmatism management:
  - Corneal Relaxing Incisions – Blade vs. Femtosecond
  - Toric IOL with accurate marking & alignment (Verion & ORA)

**Timing of Secondary Intervention**

*Astigmatism Correction after IOLs*
- Enhance large corrections earlier
- Small corrections – wait longer
- Wait 1-2 months to do IOL rotation or IOL exchange for large corrections
- Wait 3-6 months to do laser vision correction.

*Capsule considerations – contraction or PCO Yag first in many patients

**Residual Astigmatism after Toric IOL**
- Decide whether astigmatism is mostly regular or irregular, corneal or intraocular (IOL related)
- Spherical Error also?
- Calculate if enough correction by rotating IOL
- [www.astigmatismfix.com](http://www.astigmatismfix.com) (D. Harden)
- Consider IOL rotation or exchange for lower or higher powered IOL
- PRK is the best option if rotating IOL will not be enough.

**Postoperative**

- Regular refractive error Wavefront-guided PRK, if there is reliable wavefront map.
- Irregular refractive error guided PRK.
- PCO or phimosis YAG capsulotomy
- IOL decentration or tilt IOL exchange

**THANK YOU**

mounir.khalifa100@gmail.com