American Society of Cataract and Refractive Surgery

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Course 10-303
Room 220-222

“Refractive and Cataract Surgery Nightmares: Management and Prevention of Premium IOLs and Laser Vision Correction Complications”

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Tuesday, May 10, 2016
1.00 PM – 2.30 PM
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"Refining Refractive Error Post premium IOLs"
Matteo Piovella MD

Financial Disclosure

Dr. Piovella has the following financial interests or relationships to disclose:

As consultant:
- Alcon Scientific
- Abbott Medical Optics
- Allergan
- Carl Zeiss Meditec

As lectures fees:
- BVI Institute
- Telescience

Dr. Kusa has no financial interests or relationships to disclose.

Unhappy Multifocal Patient
Unhappy Surgeon!

Did You Experience That?

Is the injector technology as good as we need?
Retinitis Pigmentosa Patient 65 y.o. and Capsular Bag
What’s Happen After 15 years

Champagne Party May Be Dangerous
Male 89 y.o. BCVA 20/40
Pharmaca Seagull Wings Model

Unexpected Complication with Synphony IOL

Thank you for your attention
“How to Refine Your Refractive Error Post-Phaco with Premium IOL’s”
Mounir A. Khalifa MD

How to Refine Your Refractive Error Post-Phaco with Premium IOL’s

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 related to this presentation.

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 > 0.33. 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.
Operative: Misalignment of IOL axis in Toric IOL

**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... etc.

**POSTOPERATIVE**

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

**Review of Clinical Applications**

- Provide 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.


- Consider deliberately removing viscoelastic from behind the toric IOL optic to minimize rotational instability.

- 1° of misalignment: 3.3% loss of correction.
- 30° of misalignment: 100% loss of correction (vector analysis).

**The ORA System®**

Clinically Proven to Increase Accuracy and Improve Outcomes

- 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
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

**Premium lenses must provide premium vision!**

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

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 IOL’s 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 HOAs 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.

Comparison of PSF Post-Premium IOL and postWF

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

Efficacy of WFG PRK=1.0
Safety of WFG PRK=1.0
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 ( ITTRACY)
  - 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 ( D.Hardten)
- 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 Wavefront or topography guided PRK.
- PCO or phimosis YAG capsulotomy
- IOL decentration or tilt IOL exchange

THANK YOU
mounir.khalifa100@gmail.com
"Post Keratorefractive Surgery Corneal Irregularities"
Mohamed Shafik Shaheen MD

Management of an irregular cornea has been always a real challenge in our daily practice.

Iatrogenic "post keratorefractive" Corneal irregularities are a sort of nightmares that we face in our practice!

Attempts to obtain a reliable WF map sometimes fail with lack of enough resolution in aberrometers.

Various Topo-guided/Corneal WF-guided ablation pattern could be used in spite of their insufficiency!
Case 1
25 Ys old lady
Flap Button hole
(August 2005)
Ref: -5.25 -1.75 x 100

Decision:
Transepithelial PRK/MMC

Central triangular scar
-3.75 -4.50 x 30
(7 weeks later)

- Mean Ablation depth was 63 ± 13 \( \mu \text{m} \) (45 – 85 \( \mu \text{m} \))
- Mechanical epithelial removal (Amoils brush)
- 6 mm OZ with 1 mm transition zone
- Post-ablation MMC application (0.02\% for 20 seconds)
- Bandage CL with routine postop. regimen

Topography guided ablation;
In a decentered ablation

Before

After

Retractive Surgery nightmare

Dr. Mitra: The letter [c] is very small.
Uses the elevation topography to create an essential surgical plan to regularize the corneal surface

This is a crude concept of the Cause / Effect relation!

A Topo-guided ablation profile:

Retrieval Surgery Nightmares

WaveScan vs iDesign System comparison
- Improved spot quality
- Better detection of highly aberrated eyes
- For example, keratoconus, post incisional refractive procedure, irregular ablation profiles

Retrieval Surgery Nightmares

CASE 2: Post RK

- 62 years old woman
- Had RK in 1985 of radial cuts at 35 mm OZ with 2 cut invading optical zones. Presented with a halo, glare and ghosting
- BCVA 0.1
- Manifest Refraction +3.00 – 2.25 x 100
- ECC 0.3
- CCC 563 µm
CASE 2: Post RK
Preop: Pentacam

Refractive Surgery Nightmares

CASE 2: Post RK
Ablation Profile design over the irregular cornea

Refractive Surgery Nightmares

CASE 2: Post RK
Results: 12 months after CustomVue PRK powered by iDesign

- Ablated tissue thickness 57 μm
- Manifest Refraction: +0.50 -1.00 X 45

UCVA

CDVA

✓ Very significant improvement in Corneal irregularity
indices and Aberrations

Refractive Surgery Nightmares

AMO (Design Medical Advisory Board Meeting at MDO)
Lake Geneva - 2016
CASE 2. Post RK
Preop vs Postop Corneal Irregularity Indices

CASE 2. Post RK
Preop vs Postop Design Map

CASE 3. Post LASIK/Decentration

- 25 y/o lady
- Had LASIK in July 2019 for -11.00 D. Presented with ghosting, poor night vision
- UCVA 0.1
- Manifest Refraction: -2.50 -1.00 x 120
- BCVA 0.3
- CCC 468 μm

- Untreatable to date due to lack of capture with previous abeameter

CASE 3. Post LASIK Decentration
Preop Pentacam

Irregularity Indices

CASE 3. Post LASIK Decentration
Preop Design MAP

CASE 3. Post LASIK Decentration Ablation Profile
design over the irregular cornea
CASE 3: Post LASIK Decentration
Results 12 months after Custom LASIK performed by iDesign

Ablated tissue thickness 41 μm
Manifest Refraction: -0.75 -0.5 x 110

Pre-Op CDVA

Post-Op CDVA

CASE 3: Post LASIK Decentration - Preop vs Postop Pentacam

Retrieval of "Refractive Surgery Nightmares"

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