

American Society of Cataract and Refractive Surgery

*6-10, May, 2016
New Orleans, Louisiana
Ernest N. Morial Convention Center*

**Course 10-303
Room 220-222**

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

Senior Instructor:
Donald Serafano MD

Instructor:

*Mounir Khalifa MD PhD
Richard Lindstrom MD
Marguerite B McDonald MD
Matteo Piovella MD
Mohamed Shafik Shaheen MD PhD*

**Tuesday, May 10, 2016
1.00 PM – 2.30 PM**

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“Refining Refractive Error Post premium IOLs”

Matteo Piovella MD



Refining Refractive Error Post Premium IOLs



*Matteo Piovella, MD & **Barbara Kusa, MD
*President of Italian Ophthalmological Society – SOI
*Medical Director
** Centro di Microchirurgia Ambulatoriale - CMA
Monza (Milan) - Italy

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Unhappy Multifocal Patient
Unhappy Surgeon!



Financial Disclosure



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

As consultant:

- Aaren Solentific
- Abbott Medical Optics
- Acufocus
- Carl Zeiss Meditec

As lectures fees:

- BVI Beaver Visitec International
- Ocular Therapeutix
- TearScience

Dr Kusa has no financial interests or relationships to disclose

piovella@piovella.com

Did You Experience That?



Is the injector technology as good as we need?



Is the injector technology as good as we need?



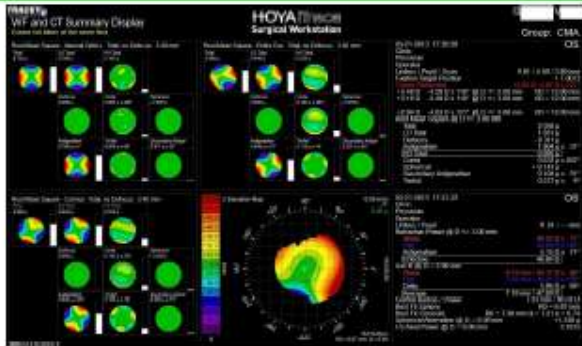
Is the injector technology as good as we need?



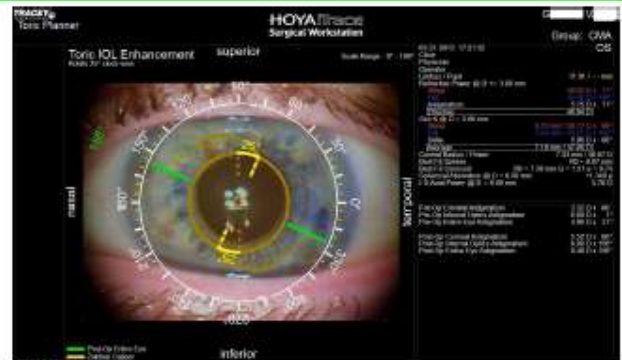
HOYA Toric IOL Surgical Workstation

Parameter	Value	Unit
Power	-10.50	D
Axis	180	°
Axis Error	0.00	°
Surround Power	-10.50	D
Surround Axis	180	°
Surround Error	0.00	°
Surround Power	-10.50	D
Surround Axis	180	°
Surround Error	0.00	°
Surround Power	-10.50	D
Surround Axis	180	°
Surround Error	0.00	°

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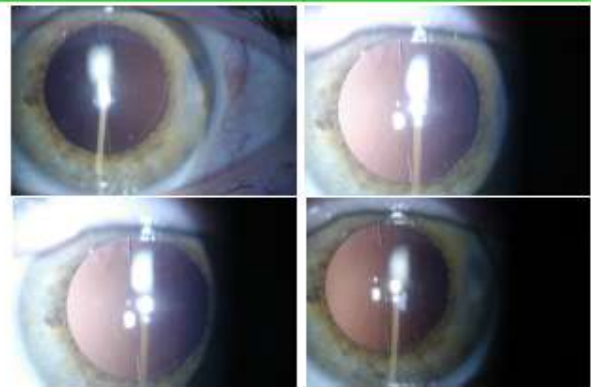


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Need IOLs Rotation After Implantation : Is It Easy to Manage?



Patient After IOL Repositioning



Multifocal IOL Repositioning
6 months p.o.



Unexpected Complication:
Multifocal IOL Damage During Implantation



IOL Repositioning



What's Happen After 7 years



IOL removal and Artisan implantation



1 HOUR PO

1 YEAR PO



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Refinitis Pigmentosa Patient 65 y.o. and Capsular Bag
What's Happen After 15 years



Lens Opacization



Champagne Party May Be Dangerous
Male 88 y.o. BCVA 20/40
Pharmacia Seagull Wings Model



Unexpected Complication with Synchrony 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.

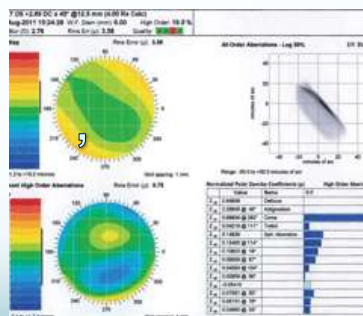
Causes of dissatisfaction post premium IOL

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 > .33. Accordingly, aberrometry is required before multifocal IOL.



Astigmatism & Multifocal IOL’s

- 0.63 D is the bench mark for multifocals.
- > 0.63 D should be corrected if multifocal IOL is planned (ASCRS study).

Astigmatism & Multifocal IOL’s

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- > 0.63 D should be corrected if multifocal IOL is planned (ASCRS study).

OPERATIVE

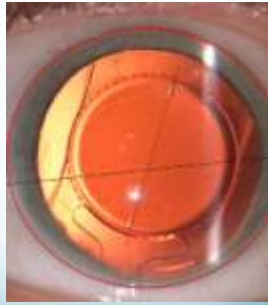
- Capsule-related:
 CCC opening should be central, medium-sized (5-5.5 mm), regular, and the edge should cover the optic edge of IOL to enhance square-edge effect of IOL to prevent or retard PCO



Operative: Misalignment of IOL axis in Toric IOL



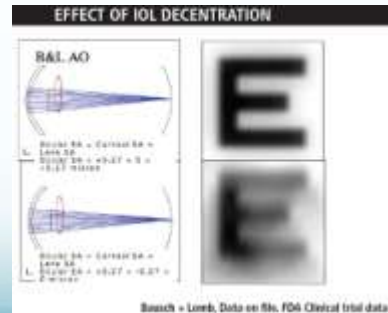
ORA system



Vision Care Research

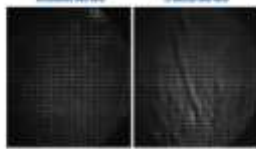
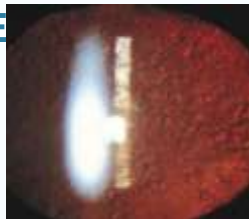
OPERATIVE

- 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.



Courtesy of Yoon Lab, University of Rochester

- While uncommon, hydrophobic acrylic IOLs can rotate significantly within the first 24 hours of surgery (Mendicute J, Irigoyen C, Aramberri J, Ondarra A, Monte 's-Mico' R. Foldable toric intraocular lens for astigmatism correction in cataract patients. *J Cataract Refract Surg* 2008; 34:601-607)
- 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 **on-demand information** which assists in intraoperative decision making
- Utilizes **Talbot Motré interferometry**
Large dynamic range -5 to +20D
- Enables real-time surgical course correction

"Get it right – right on the table" the first time

- Compatible with and attaches directly to existing surgical microscopes
- Every system connects live to WaveTec web based servers to capture every procedure and push software upgrades



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Review of Clinical Applications

Provides guidance 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

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Key Facts To Remember

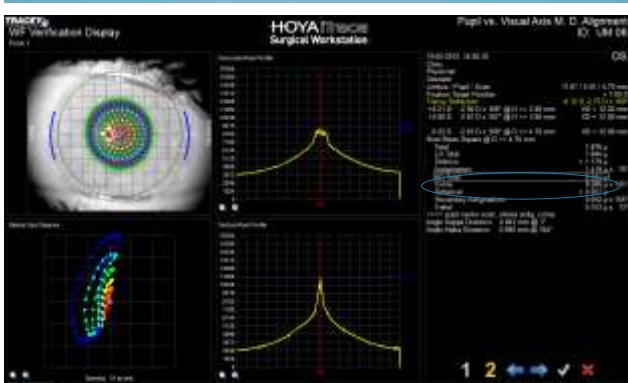
- Selecting the right patient
 - No ocular disease
 - Ability to fixate – no blocking
- Preparing the eye
 - Homogenous solution to inflate the eye
 - Either BSS or viscoelastic, but not both
 - Ensure good tear film
 - Sealed incisions and avoid excessive edema
 - Proper IOP (21 mmHg)
- Taking a measurement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

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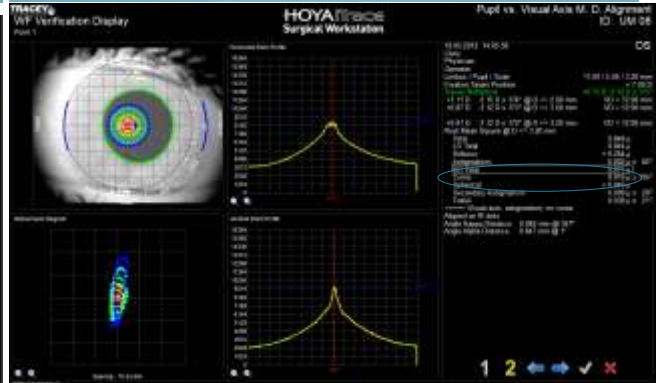
The iTrace Helps Every Cataract Patient Achieve Their Best Potential Vision

Premium lenses must provide premium vision!

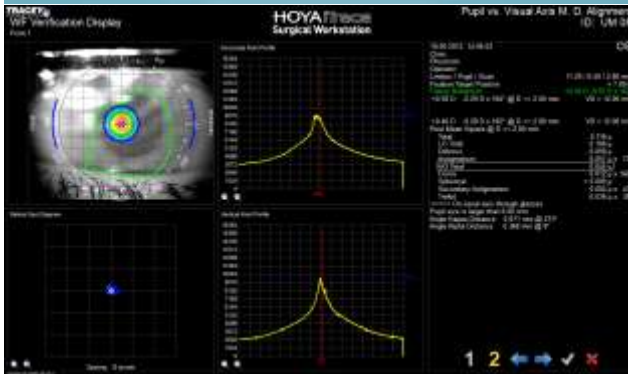
- Optical system alignment, with ray tracing
- Quantification and analysis of corneal aberrations with ray tracing
- Post-operative verification with ray tracing



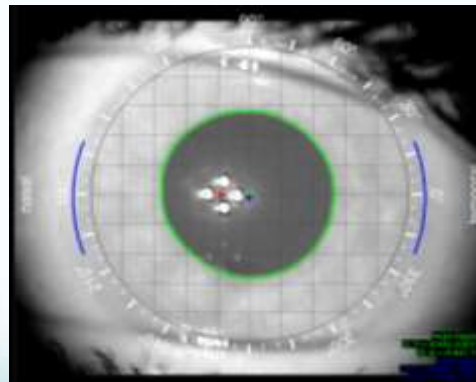
Scan on pupil centration showing coma – but this patient does not complain of double vision.



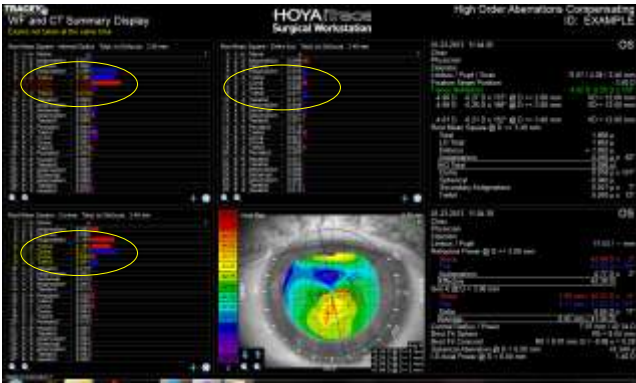
Scan on visual axis centration, showing only cylinder.



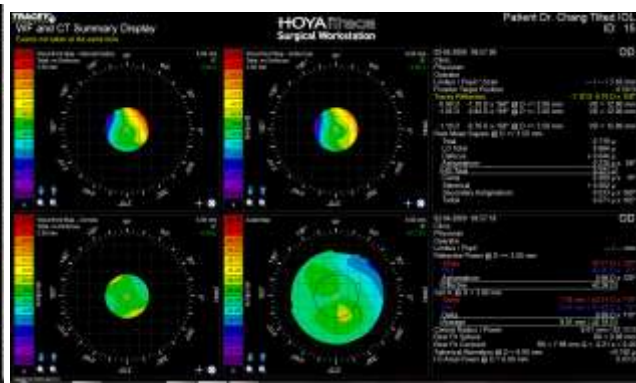
Visual axis centration through spectacles showing very good correction.



Having off-setting data (X & Y) can be transferred to laser machine for ablating on the visual axis.



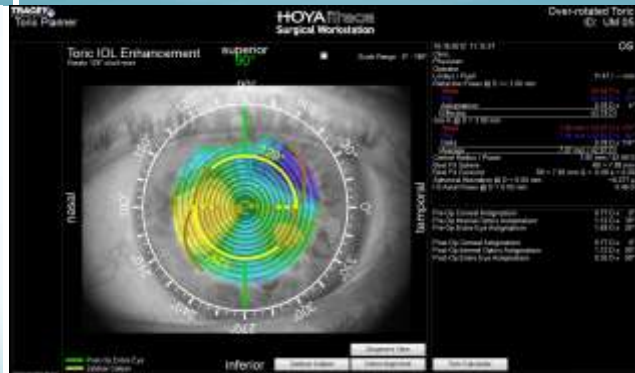
Internal aberrations compensating corneal aberrations - must consider prior to cataract surgery that corneal issues will be revealed.



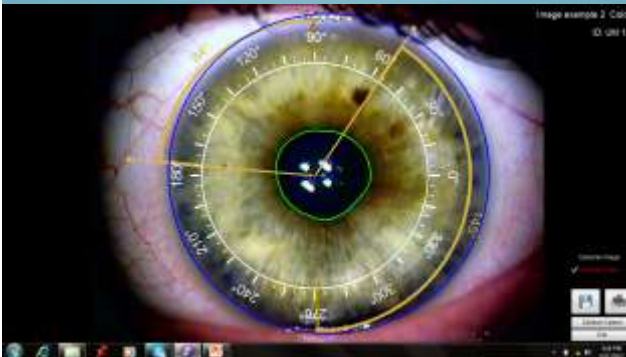
Tilted Restor IOL with normal corneal surface.



Post-op toric, unhappy patient. Checked toric axis alignment. Misplaced with 51°.



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.

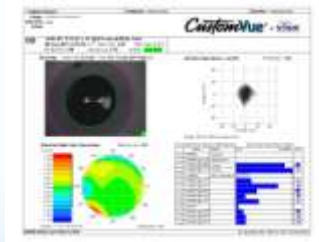
Wavefront-Guided Ablation to Correct Refractive Error Post Premium IOL

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 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.

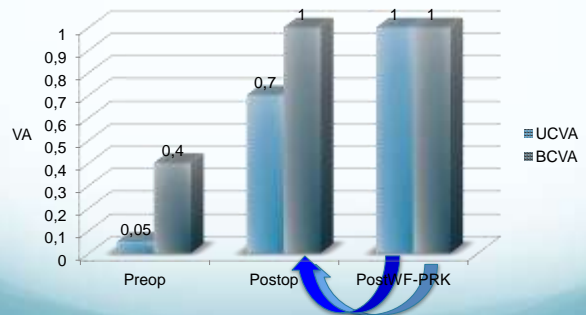


Wavefront-Guided ablation has many advantages:

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

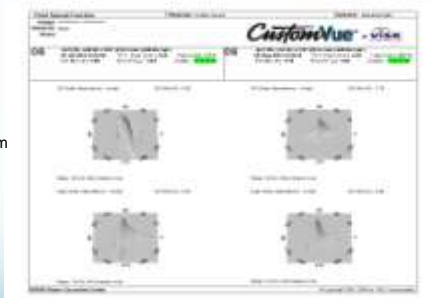
- We did a study to evaluate the efficiency of wavefront-guided PRK to correct the remaining refractive error after refractive cataract surgery with premium IOL (toric or multifocal)
- 3-6 months after surgery, cases which did not receive management for remaining refractive error had wavefront-guided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



Comparison of PSF Post-Premium IOL and postWF

Post-Premium IOL



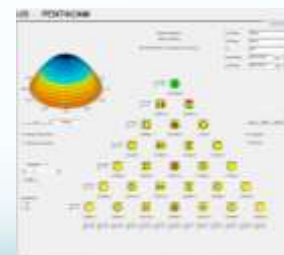
PostWFG PRK

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

Postop corneal HOA's



PostWF corneal HOA's



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 (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
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"Post Keratorefractive Surgery Corneal Irregularities"

Mohamed Shafik Shaheen MD



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

Refractive Surgery Nightmares

Dr. Mohamed Shafik
Horus Vision Correction Center (HVCC)
Alexandria, Egypt

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

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

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Various Topo-guided/Corneal WF-guided ablation pattern could be used in spite of their insufficiency!

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Horus Vision Correction Center (HVCC)
Alexandria, Egypt

The Egyptian Journal of Cataract and Refractive Surgery

October 2005 Volume 11, No. 1

Transepithelial PTK/PRK with Adjunctive Mitomycin-C using VISX Star S4 for Complicated Cases following Keratorefractive Procedures

Refractive Surgery Nightmares

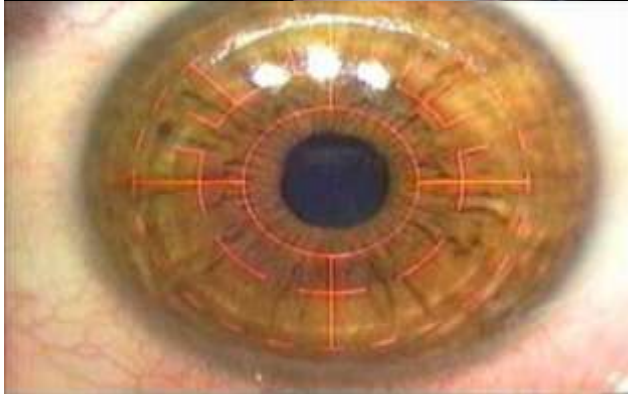
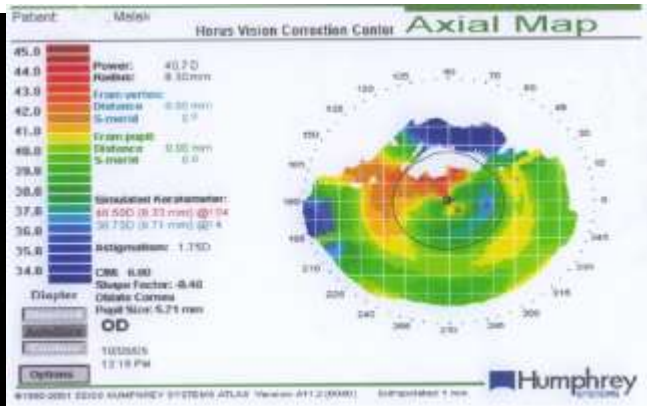
Dr. Mohamed Shafik
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Alexandria, Egypt

Case 1
 25 Ys old lady
 Flap Button hole
 (August 2005)
 Ref: -5.25 -1.75 X 100



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

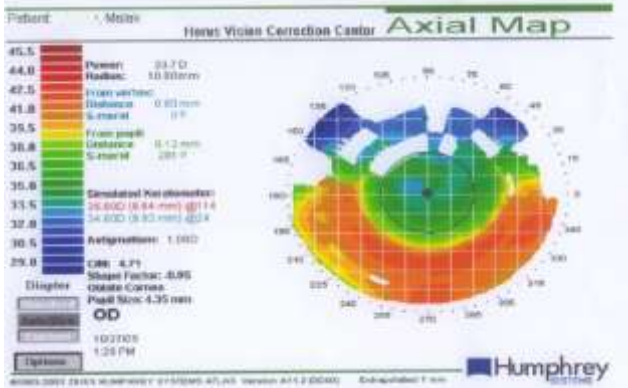
Decision:
 Transepithelial PRK/MMC



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



m.shafik@ink.net



Topography guided ablation
 in a decentered ablation

Before



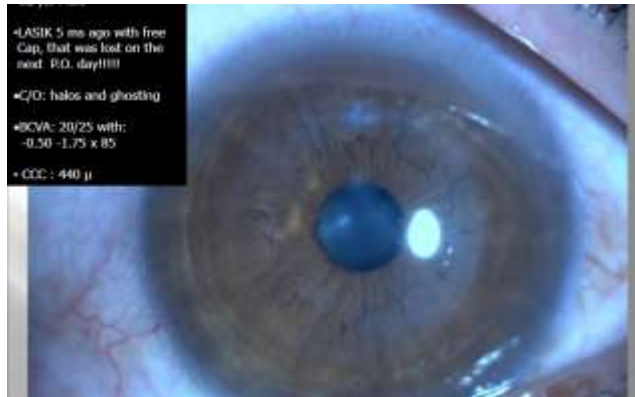
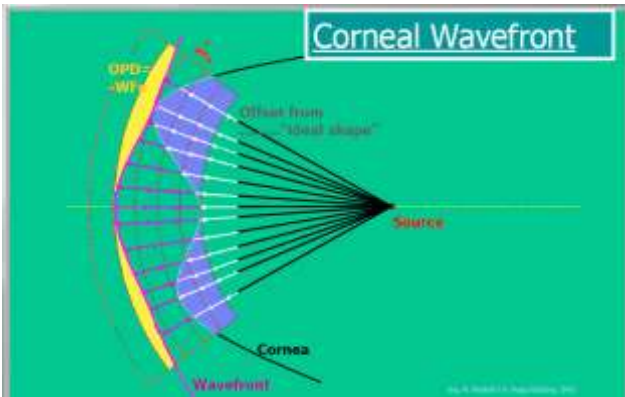
After



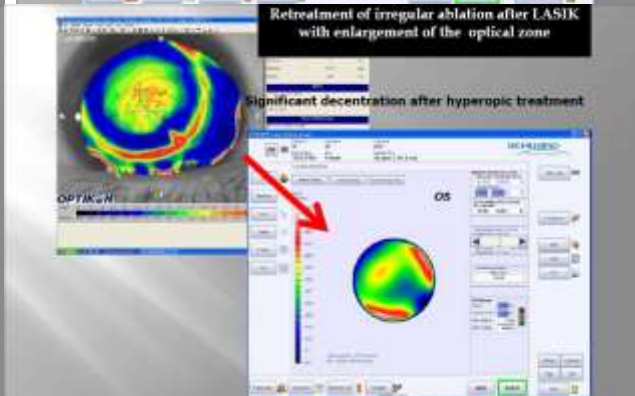
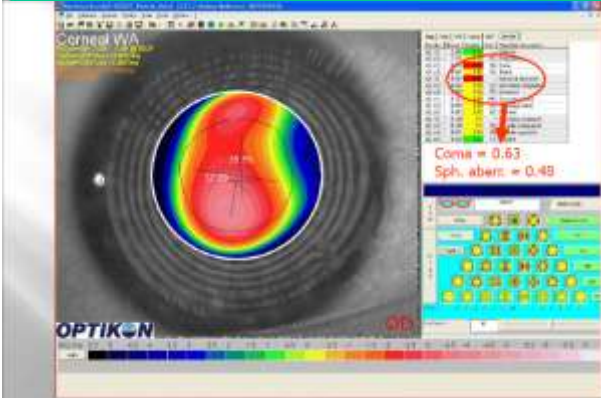
Correction of the refractive error (DAP method)

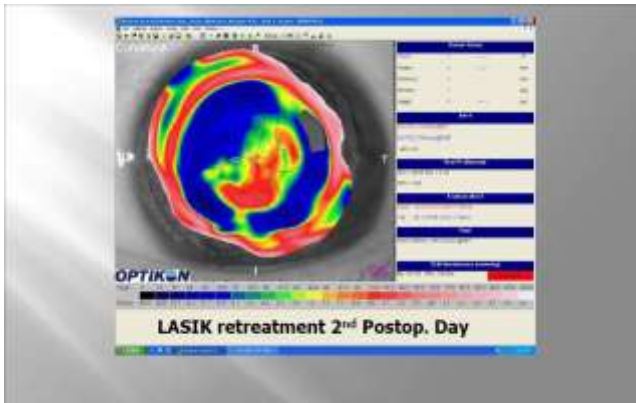
Refractive Surgery Nightmares

Dr. Mohamed Habib
 Heras Vision Correction Center (HVC3)
 Heras, Egypt



-LASIK 5 ms ago with free Cap, that was lost on the next P.O. day!!!!
 -C/D: halos and ghosting
 -BCVA: 20/25 with: -0.50 -1.75 x 85
 -CCC: 440 μ





A Topo-guided ablation profile

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!

Tamayo G, Barona M. Early clinical experience using custom ectatic laser ablation to treat irregular astigmatism. J Cataract Refract Surg 2010;36(11):1942-50

Refractive Surgery Nightmares

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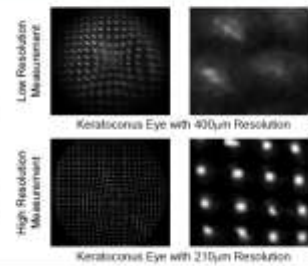
WFG Laser Vision Correction using the iDesign System

- High-resolution sensor maximizes capture rates
 - High-resolution Hartman-Shack wavefront higher than WaveScan
 - Fourier reconstruction algorithms using up to 10000 rays over a 7 mm diameter aperture
 - Outstanding accuracy, and ability to measure wavefronts on highly aberrated eyes for less
- Increasing resolution provides
 - Ability to capture more patients
 - Improved spot quality, reduces spot size over effect
 - Detection of HCLs
 - Better reconstruction



High-Definition Hartman-Shack Sensor

- **WaveScan vs. iDesign system comparison**
 - Improved spot quality
 - Better detection of highly aberrated eyes!
 - For example: keratoconus, post incisional refractive procedures, irregular ablation profiles



Refractive Surgery Nightmares

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Refractive Surgery Nightmares

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JRS – June, 2015

CASE 2. Post RK

- 52 years old woman
- Had RK in 1995 (8 radial cuts at 3.5 mm OZ with 2 cuts invading optical zone). Presented with a halo, glare and ghosting
- UCVA 0.1
- Manifest Refraction + 3.00 - 3.25 x 105
- BCVA 0.3
- CCC 563 µm



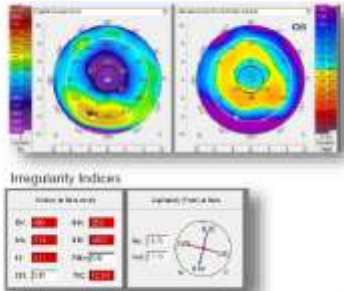
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CASE 2 Post RK
Preop Pentacam

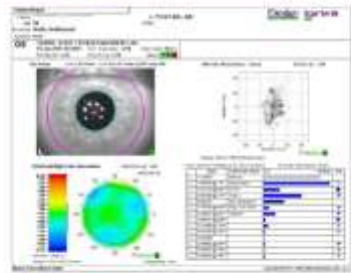


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Alexandria, Egypt



CASE 2 Post RK
Preop iDesign MAP

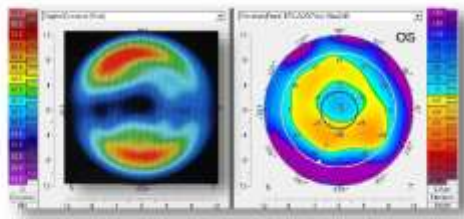


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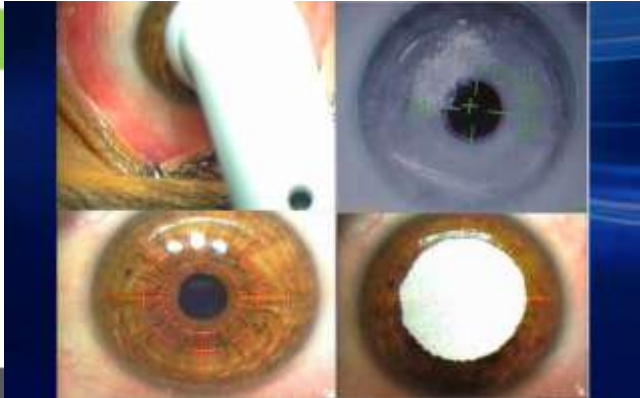


CASE 2 Post RK
Ablation Profile design over the irregular cornea



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Alexandria, Egypt



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

- Ablated tissue thickness 57 μ m
- Manifest Refraction +0.50 -1.00 X 45



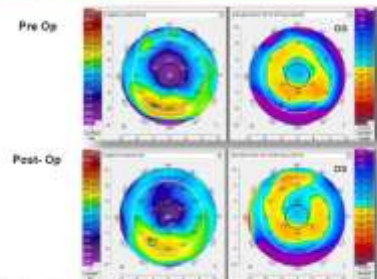
- ✓ Very significant improvement in Corneal Irregularity indices and Aberrations

Refractive Surgery Nightmares

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Alexandria, Egypt



CASE 2 Post RK
Preop vs Postop Pentacam



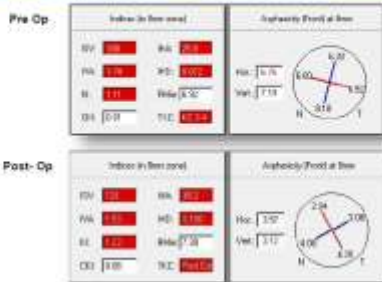
Treatment:
CustomVue PRK

AMO iDesign Medical Advisory Board Meeting at AAO
Las Vegas, 2016

Dr. Mohamed Elshah
Henry Walter Corneal Center (WCC)
Alexandria, Egypt



CASE 2 Post RK Preop vs Postop Corneal Irregularity Indices

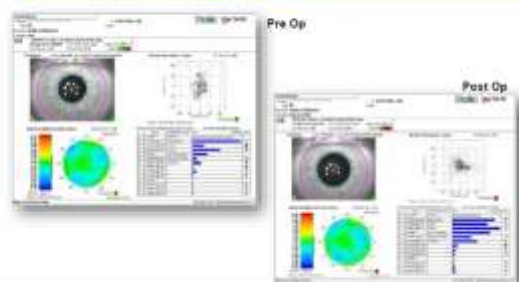


Refractive Surgery Nightmares

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Refractive Surgery Correction Center (RSCCC)
Alexandria, Egypt



CASE 2 Post RK Preop vs Postop iDesign Map



Refractive Surgery Nightmares

Dr. Mohamed Elshah
Refractive Surgery Correction Center (RSCCC)
Alexandria, Egypt



CASE 3 Post LASIK Decentration

- 25 y lady
- Had LASIK in July 2010 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

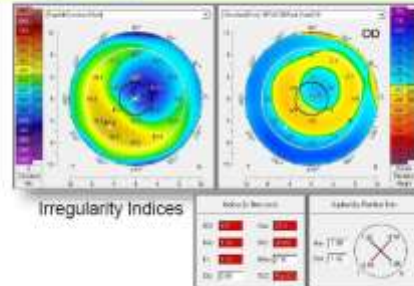
• Untreatable to date due to lack of capture with previous aberrometer

Refractive Surgery Nightmares

Dr. Mohamed Elshah
Refractive Surgery Correction Center (RSCCC)
Alexandria, Egypt



CASE 3 Post LASIK Decentration Preop Pentacam

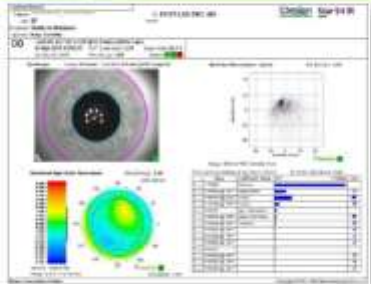


Refractive Surgery Nightmares

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CASE 3 Post LASIK Decentration Preop iDesign MAP

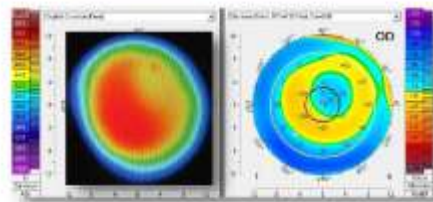


Refractive Surgery Nightmares

Dr. Mohamed Elshah
Refractive Surgery Correction Center (RSCCC)
Alexandria, Egypt



CASE 3 Post LASIK Decentration Ablation Profile design over the irregular cornea



Refractive Surgery Nightmares

Dr. Mohamed Elshah
Refractive Surgery Correction Center (RSCCC)
Alexandria, Egypt



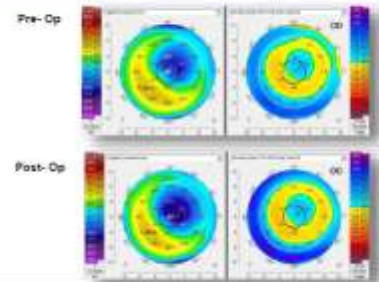
CASE 3 Post LASIK Decentration
Results 12 months after CustomVue LASIK powered by iDesign

Ablated tissue thickness 41 µm

Manifest Refraction -0.75 -0.5 X180



CASE 3 Post LASIK Decentration
Preop vs Postop Pentacam



Refractive Surgery Nightmares

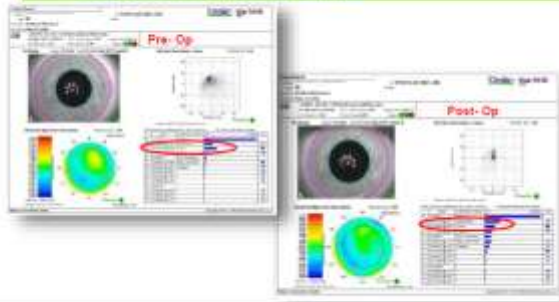
Dr. William D. Jones
Miami Vision Correction Center (MVCC)
Miami, FL, USA

Refractive Surgery Nightmares

Dr. William D. Jones
Miami Vision Correction Center (MVCC)
Miami, FL, USA



CASE 3 Post LASIK Decentration
Preop vs Postop iDesign Map



Refractive Surgery Nightmares

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