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INTERNATIONAL CONGRESS OF THE
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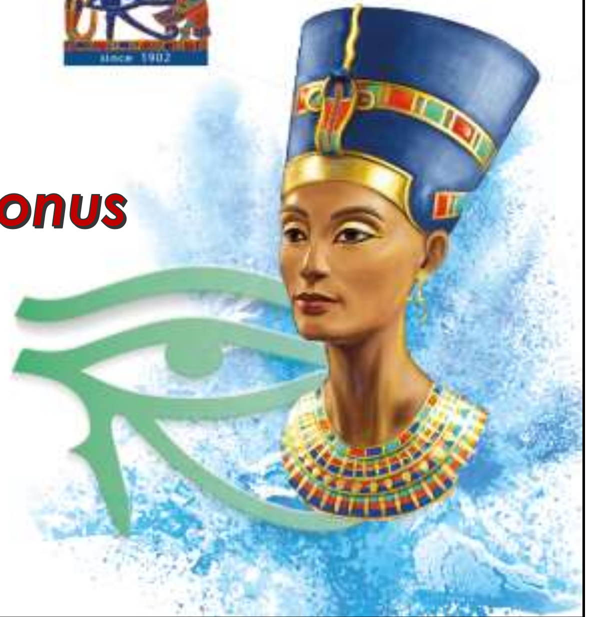
EOS 2023



Cataract with keratoconus

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No Financial Interest

Guidelines for Surgical Management of Cataract In Patients with keratoconus

- *Age.*
- *Stability.*
- *Stage of Keratoconus or Ectasia in general.*

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Main problem

IOL Calculation and Refractive Outcomes in Ectatic Corneas

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Q1: Is the Cornea stable?

Depends on the Age:

<30 year : CXL.*

> 30 year : mostly stable, no need for CXL, just follow up by pentacam every 6 months.

*Cross-linking and fluorescence changes of collagen by glyeation and oxidation,,Eiji Fujimori, Biochimica et Biophysica Acta, 998 (1989) 105-110 Elsevier,105. Research Institute, Boston, MA (U.S.A.)

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Stability is a must:

Signs of Progression of KC:*

- *Thinning of the cornea more than ten microns per year.*
- *Increase of the curvature of the cornea more than one Diopter per year.*
- *Increase the difference between the superior and inferior meridia more than one and half Diopters.*

*Corneal biomechanical changes after intracorneal ring segment implantation in keratoconus,Pinero,,Alio, Baraquer,Cornea 2012

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Q2: Is the cornea regular?

Q2: in another meaning: can we depend on the K readings for accurate biometry?

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How to make the cornea regular before cataract surgery???

ICRS (combined with CXL if there is progressive ectasia.)*

*A step wise approach for management of KC ; CRST Europe, A elmassry, O Ibrahim, Amr Saeed 2013

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So, After Corneal Stability we have 5 Scenarios

- **Scenario 1:** Mild Irregular Cornea (Kmax up to 52 D).
- **Scenario 2 :** Moderately irregular cornea (Kmax > 52D -62D).
- **Scenario 3:** ICRS not applicable .
- **Scenario 4:** Advanced KC.
- **Scenario 5:** Post PKP Cataract.

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Scenario 1:
Mild Irregular Cornea (Kmax up to 52 D)

1. **Pentacam** is mandatory. (K-readings)
2. **Optical (K readings) and Ultrasonic Biometry** are essential
3. **Third /Fourth generation Formulae** for IOL calculation:
   - **Haigis L**
   - Shammas
   - Masket
   - Holladay 2

   Barett standard, universal 2
4. All results should be **within two diopters of Haigis L** formula

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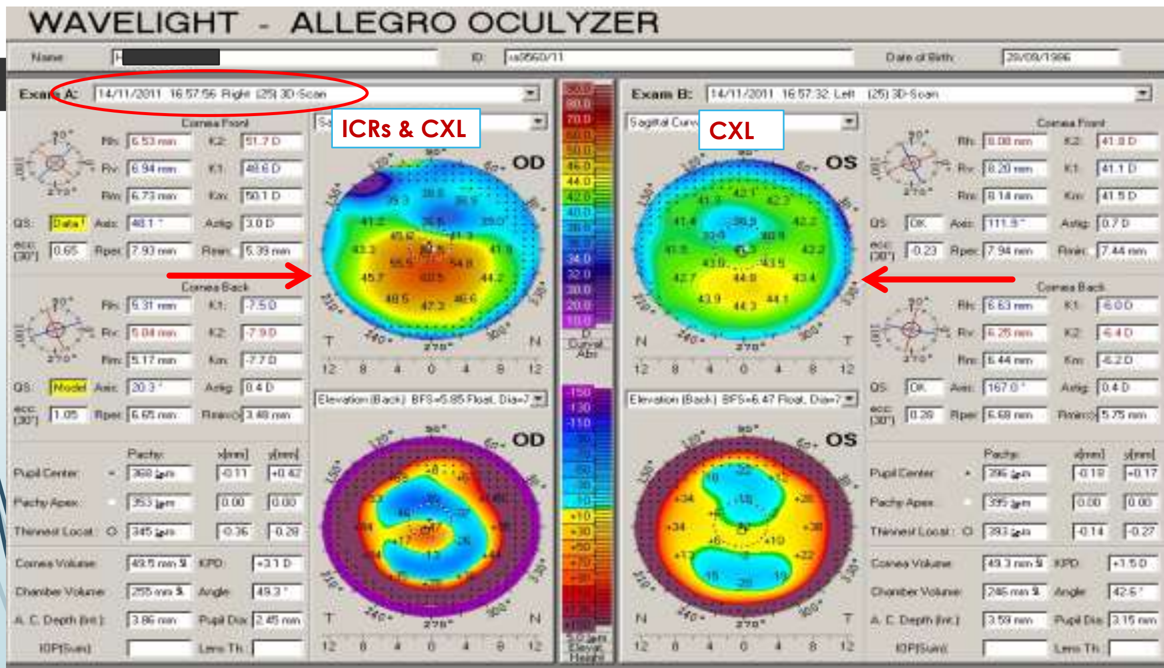
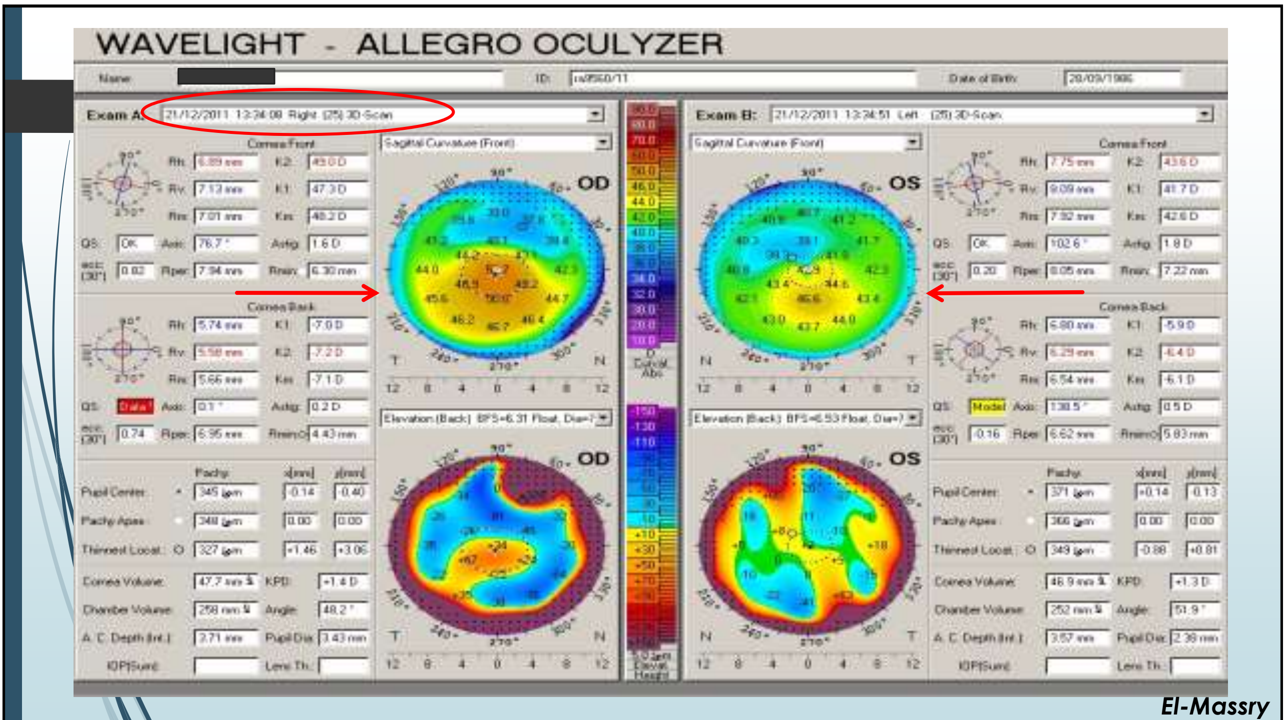
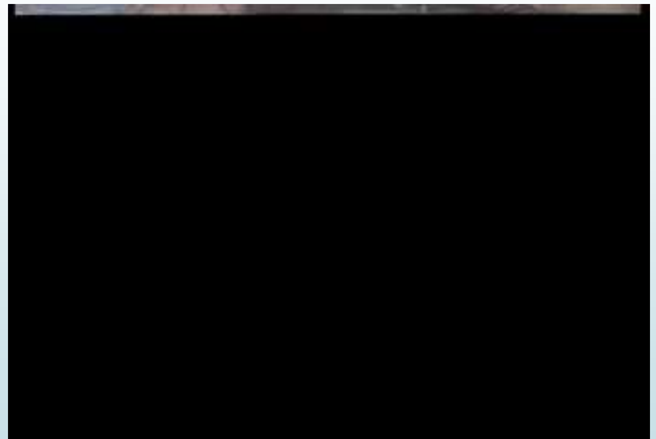




Not less than six months post CXL for corneal stabilization (more or less)

Post CXL

- Cataract is hard although patient is 30-year-old !!!!!!



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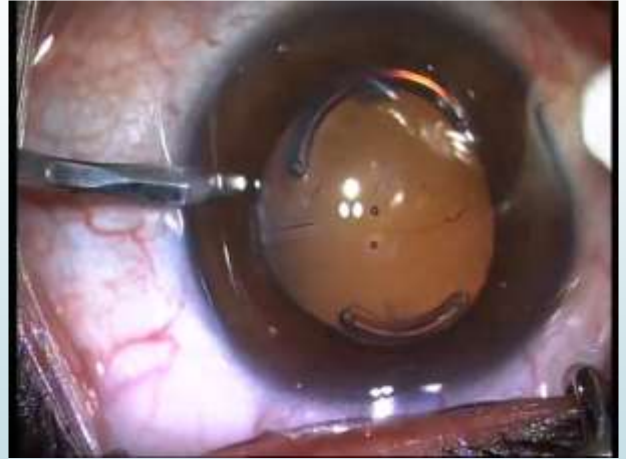
Scenario 2 :
Moderately irregular cornea (K max > 52-62D)

"As you can't depend on the irregular Ks"

- ICRS and wait for three months then

  - Pentacam
  - Optical Biometry: Barett

Haigis L Masket Shammas
Olson Dr.Hill ASCRS on line



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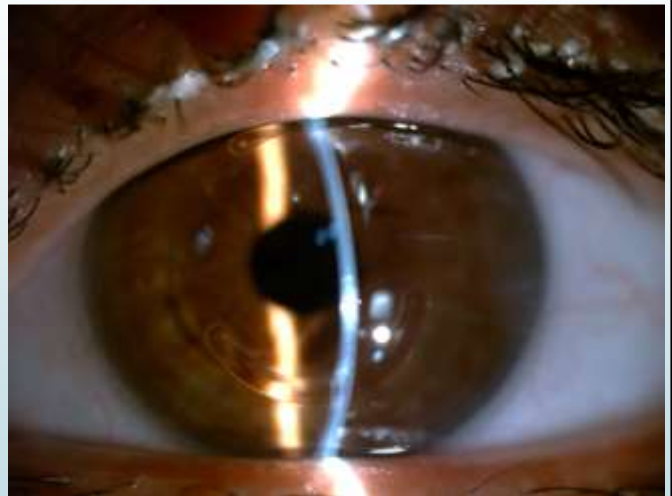
Post-operatively

- *No extra surgical skills*
- *Clear cornea*

Refraction -2.00/-2.00



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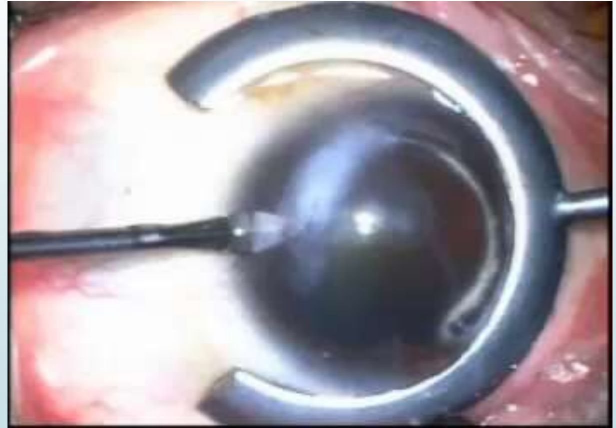
Post Intacs

- Challenging k readings.
- Difficult visualization.
- Long time of surgery.



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Scenario 3: ICRS not applicable : Due to:

1. Advanced Cataract (Can't depend on subjective refraction for ICRs design) .

2. Can't afford.

Make the surgery on steps:

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Scenario 3: ICRS not applicable (cont.)

- *First :* *Remove the cataract then assess the need of the IOL especially when the powers of IOLs are out of range…*

  (-17.00 D , - 15.00 D IOL) due to steep irregular cornea
- *Second:* *Do subjective refraction (patient is aphakic).*
- *Third:* *Hard contact lens and assess IOL need after hard contact lens.*
- *Or Fourth:* *Regulate the cornea by ICRs if affordable.*
- *Lastly :* *Secondary IOL (bag or sulcus)*

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Toric IOLS

Toric IOLs do not have good results in very irregular cornea, nor do "opposite CCI", or femto-arcuate incisions. (Debatable)*

Cataract Surgery and Keratoconus-Discovery eye foundation; discovery.org,cataract surgery-Keratoconus Jan 2015

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Considerations FOR Toric IOLs in irregular Corneas:

Only in selected patients with:

- ***Stable mild to moderate KC.***
- ***With good vision.***
- ***Without corneal scar.***
- ***Axes of cylinder on topography, keratometry, IoL Master, lenstar and refraction must be within few degrees.***

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Scenario 4: Advanced KC

Signs of advancement:

- Pachymetry **less than 400** microns in the center .
- K max more than **62 D**
- **Endothelial folds**
- History of **Hydrops.**
- **Opaque apex.**

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Scenario 4: Advanced KC (Cont.)

- **Triple procedure :**

  DALK, Phaco, and IOL.

- **Hydrops:**

  PKP and Cataract extraction and IOL.

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Scenario 5: Post PKP Cataract

- *Wait one year after PKP (dependable Ks).*
- *Specular Microscopy!! (IS A MUST)*
- *Full explanation of rejection chance (depends on endothelium).*
- *Soft shell technique for endothelial protection.*

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Conclusions

- Counselling and Complete **explanation** to the patient.
- **Adequate preoperative investigations .**
- All plans and **tools to protect, stabilize and regulate** the cornea.
- Least **U/S power.**
- Enough **time** for the compromised cornea to heal.

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Summary

- Stabilize: CXl or natural.
- Regulate: ICRs or hard contact lenses.
- May postpone IOL implantation to a second session.
- Always Target low myopia.
- Advanced KC: triple procedures.
- Toric IOLs?

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THANK YOU

See you next year

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