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SUMMIT

Advanced Implant Technologies to Fit Patient Goals and Their Eyes

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Financial Disclosures

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- ACE Vision – A, C
- Alchemy Vision- C
- Alcon- A, C, R
- Allergan/Abbvie- C, S
- Bausch & Lomb – C, S
- Bruder - C
- Epion – R, C
- Eyesafe- A, O
- Eyenovia- C
- Glaukos- O, C
- iOR Partners - C
- Johnson & Johnson- C
- Lensar - C, R
- Lenstec- C
- NovaBay - A
- Oculotix – A, C, O
- Ocuphire - C
- Radius XR- A, C, O
- Santen – S
- STAAR- C
- Tarsus- C
- Trefoil Therapeutics - C
- Trukera – C
- Vialase - C
- Visus Therapeutics- C

A = advisor

C = consultant

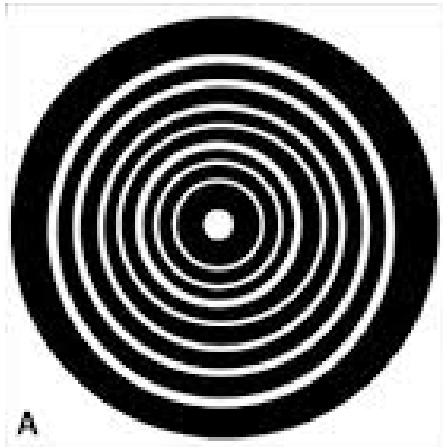
S = speaker's bureau

R = research

O = stock owner/options

*All relevant financial relationships have been mitigated.

Evolution of the “multifocal” IOL



Array
1999

Rezoom
Restor
Tecnis MF
2000’s

Symfony
(EDOF)
2016

PanOptix (trifocal) 2019
Synergy 2021
Symfony Optiblue 2021
Odyssey 2024

Presbyopia-correcting IOLs have come a long way!

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Diffractive

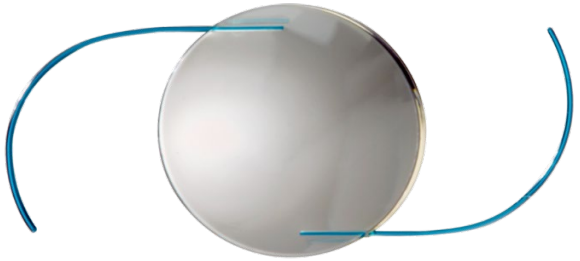
EDOF
Continuous
Bifocal
Trifocal

Non-diffractive aka “no rings”

Accommodating

EDOF

Small-aperture



Adjustable

Segmented

“Enhanced Monofocal” or “Monofocal Plus”

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Ideal for mini-mono (aim -0.75 to -1.50 in non-dom eye)

*Labeled EDOF outside U.S.

New kid(s) on the block

Can you still get “premium” vision with enhanced monofocal IOLs?

IOL	**Tecnis Eyhance** 2021	**Envista Aspire** 2023	***Rayner EMV** 2021
SA	-0.27	-0.02	+0.15
MOA	++ central power	++ central power	++SA
Consider for:	Post-myopic LASIK	Neutral aberration	Post-hyperopic LASIK

Enhanced monofocal ≠ EDOF

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ANSI EDOF Criteria

1. Depth of focus— ≥ 0.5 D greater than monofocal control at 0.2 logMAR (20/32)
2. DCIVA – superior to monofocal
3. DCIVA – Achieve 0.2 logMAR (20/32) or better in 50% of eyes
4. BCDVA – Non-inferior to monofocal

“True” EDOF IOLs on the Market

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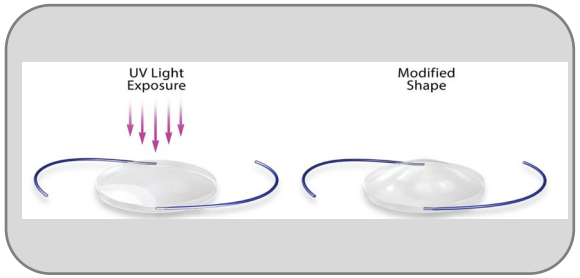
Vivity (non-diffractive)

- Optic
  - Material: UV-filtering, hydrophobic acrylic
  - Index of refraction: 1.55
  - Spherical power: +15.0 D to +25.0 D in 0.5 D increments
  - Type: Biconvex, wavefront-shaping
  - Overall diameter: 13.0 mm
  - Optic diameter: 6.0 mm
- Haptics
  - Configuration: Modified-L
  - Material: Same as optic
  - Haptic angle: 0°

Symfony OptiBlue (diffractive)

- Optic
  - Material: UV-absorbing hydrophob… acrylic
  - Index of refraction: 1.47
  - Power: +5.0 to +34.0 D in 0.5 D increments
  - Type: Biconvex, wavefront-desi… anterior aspheric surface, post… achromatic diffractive surface, … feature
  - Edge: Frosted, continuous 360° posterior square
  - Overall diameter: 13.0 mm
  - Optic diameter: 6.0 mm
- Haptics
  - Configuration: Modified C
  - Material: Same as optic

LAL/LAL+ (monofocal/EDOF?)



Optic
- …tive UV absorbing
- Index of refra…
- Power: +10 to +15.0 D and +25.0 to … D increments; +16.0 to +24.0 D in …
- Overall diameter: 13.0 …
- Optic diameter: 6.0 mm

Haptics
- Configuration: Modified C
- Material: Blue core PMMA monofilament
- Haptic angle: 10°

How do you aim your EDOF IOLs?

How do you decide on one EDOF over another?

Apthera IC-8 (pinhole)

- Optic
  - Material: UV-blocking hydrophobic acrylic
  - Index of refraction: 1.483
  - Power: +10 to +30.0 D in 0.5 D …
  - …aspheric anterior surface
  - Edge: …erior square
  - Overall diameter: 12.5 mm
  - Optic diameter: 6.0 mm
- …ied C-loop
- …PMMA monofilament
- FilterRing
  - Material: Polyvinylidene fluoride (PVDF) with carbon nanoparticles
  - Outer diameter: 3.23 mm
  - Aperture diameter: 1.36 mm
  - Thickness: 5 mm

Hydrophilic Acrylic Options

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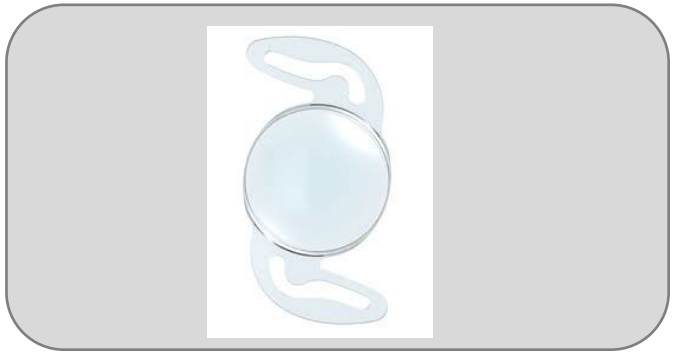
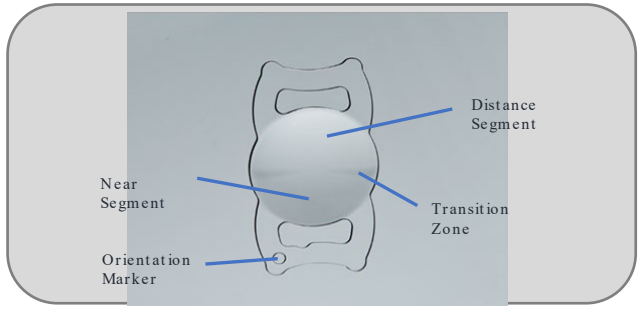
Rayner EMV (monofocal plus)



- Optic
  - Material: Rayacryl hydrophilic acrylic
  - Index of refraction: 1.46
  - Power: +10 to +30.0 D in 0.5 D increments
  - Type: Biconvex, aspheric anterior surface
  - Edge: Amon-Apple 360° enhanced square edge
  - Overall diameter: 12.5 mm
  - Optic diameter: 6.0 mm
- Haptics
  - Configuration: Closed loop with vaulting haptic technology
  - Haptic angle: 0°

Clearview-3 (non-diffractive, segmented, full range IOL)



- Optic
  - Material: UV-blocking hydrophilic acrylic
  - Index of refraction: 1.456
  - Power: +15.0 to +25.0 D in 0.25 D increments and +25.0 to +30.0 D in 0.5 D increments
  - Add power: +3.0 D on anterior surface
  - Type: Refractive, equiconvex, biaspheric neutral spherical aberration
  - Edge: 360° square
  - Overall diameter: 11.0 mm
  - Optic diameter: 5.75 mm
- Haptics
  - Configuration: Closed loop/modified plate
  - Material: Same as optic
  - Haptic angle: 0°

No toric options available

Not All IOL Material is the Same

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Hydrophobic acrylic	Hydrophilic acrylic	Silicone
• Lower water content (<1% to 4%)	• Higher water content (18% to 34%)	• Very low water content (<1%)
• Most used IOL material in the US (e.g., AcrySof, TECNIS, and IC-8)	• Less common (e.g., RayONE EMV, ClearView 3)	• Not very common (e.g., Light adjustable lens)
• Lower risk of PCO	• Higher risk of PCO compared to other materials	• Risk of opacification in patients with silicone oil
• Higher refractive index (1.47 – 1.55)	• Lower refractive index (1.40-1.46)	• Lower refractive index (1.43)
• Higher risk of glistenings (fluid-filled microvacuoles within optic) due to low water content	• Risk of calcification associated with use of intraocular gases (e.g., PPV/endothelial keratoplasty)	• Risk of calcification associated with asteroid hyalosis
• Tend to be brittle, if handled inappropriately (problem eliminated with preloaded IOLs)	• Lower rates of glare	• More forgiving with pseudophakic dysphotopsia than acrylic IOLs
• Variable risk of long-term anterior capsular opacification between IOLs		• Thicker than acrylic IOLs with same refractive power (larger incision needed)

Expanded IOL Options → Expanded Patient Pool

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Focal Point	Monofocal/ Enhanced monofocal	EDOF (diffractive, non-diffractive, small-aperture, adjustable+)	Full-range (diffractive, segmented)
Distance	+++	++	+
Intermediate	-/+	+	+
Near	-	-	+

Spectacle independence

Quality of vision

How to match “best” IOL to each patient?

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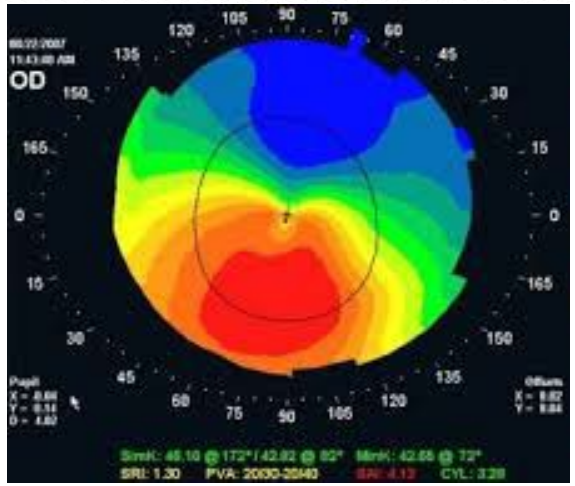


Assume every patient is a “full-range” IOL candidate

Then ask yourself:

1. Is the topography abnormal (irregular astigmatism, HOAs, OSD)?
2. Does the patient drive a lot at night?
3. Is the patient type A/perfectionist/demanding?

If the answer is “yes” to #1 #2 or #3

Think EDOF or enhanced monofocal IOL (mini-mono) → Does patient most value distance, intermediate or near?

Case: Your nighttime truck driver

Which IOL would you use?

Non-diffractive "no rings" = less nighttime visual disturbances

What about Mix-and-match?

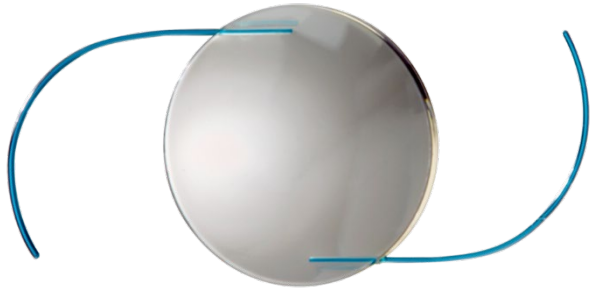
Accommodating

Beware dimness
Haloes/glare risk if mesopic
pupil >5.5 mm
Pupil dilation >6 mm for yag

EDOF

Small-aperture EDOF

Pupil dilation >6 mm
Avoid in RD risk eyes and asteroid hyalosis due to silicone
Longer postop chair time



Adjustable

Segmented

Full range
No toric
Photopic pupil >3mm
Centration is critical
Avoid Fuchs/RD risk eyes

Case 2

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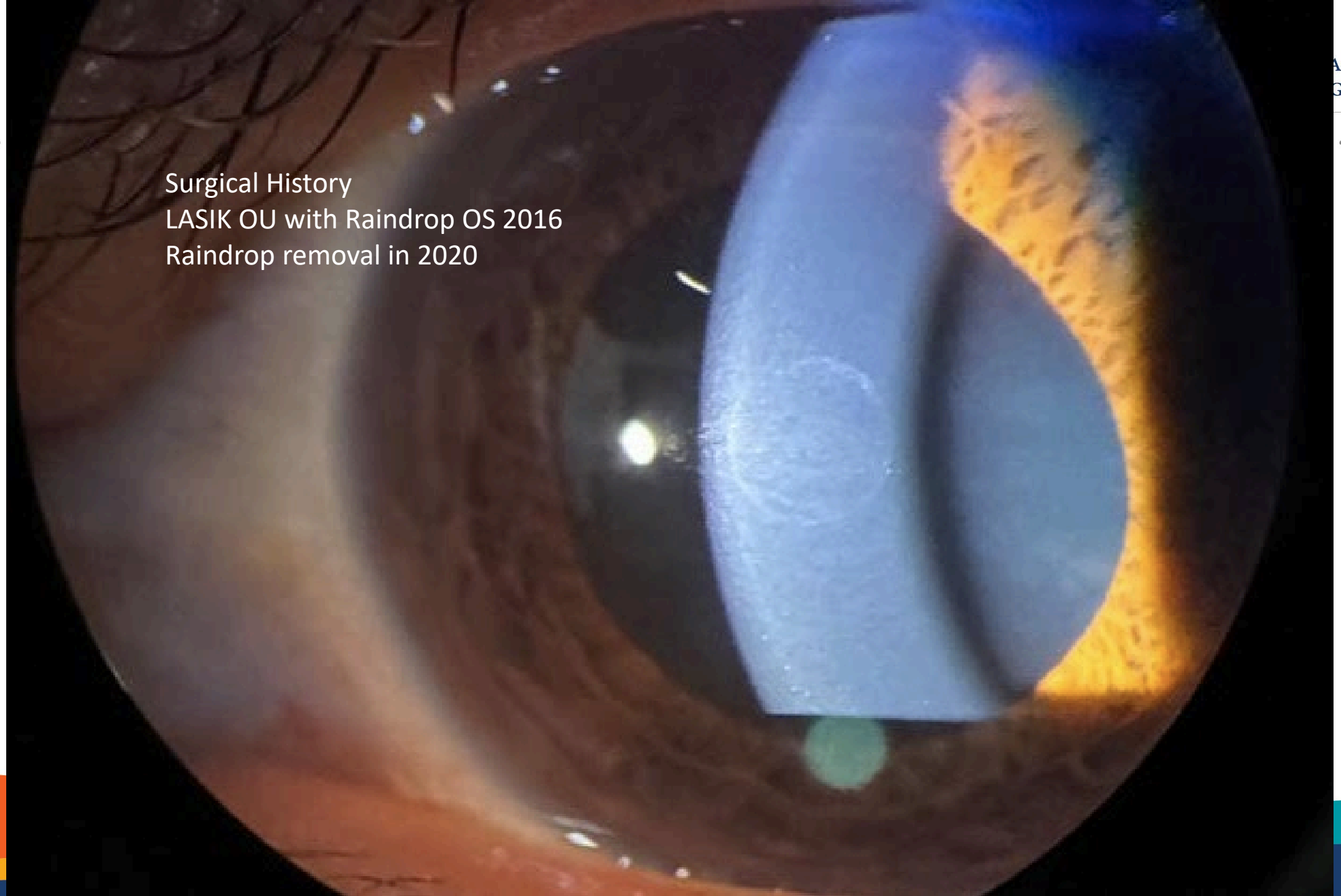
- 59 yo f veterinarian presents with cataracts, and is looking for vision correction with spectacle independence
- h/o “lasik” in the past
- MRX is

+1.00sph (20/30--)

+1.25sph (20/30+)


Surgical History
LASIK OU with Raindrop OS 2016
Raindrop removal in 2020

Topography

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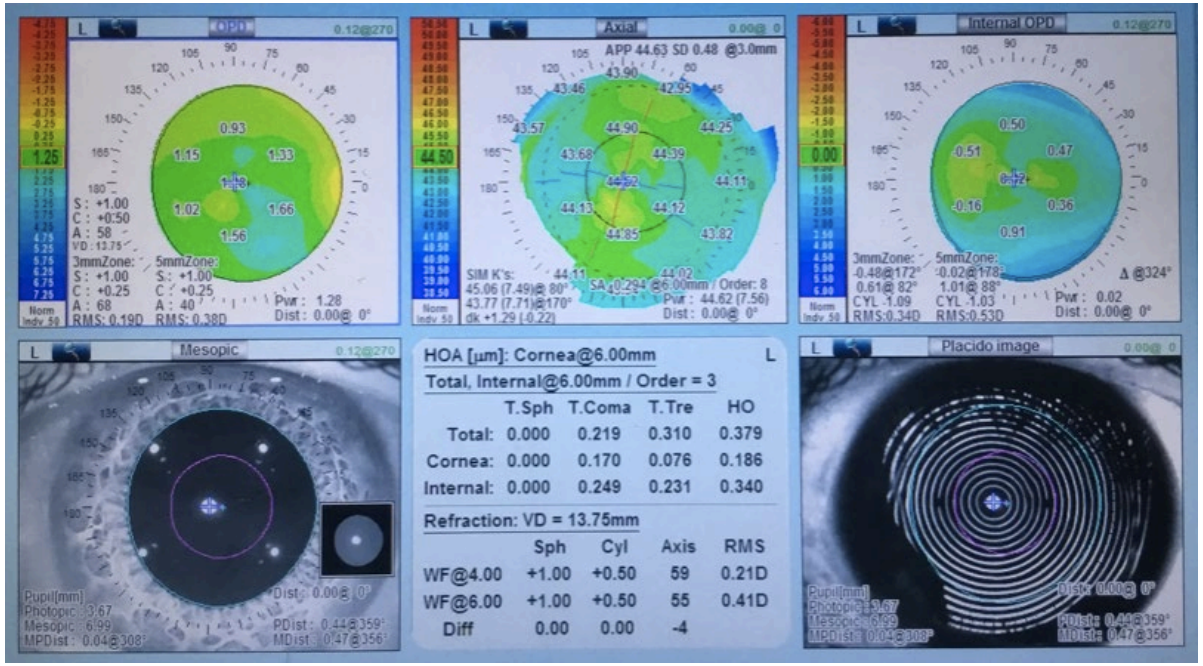

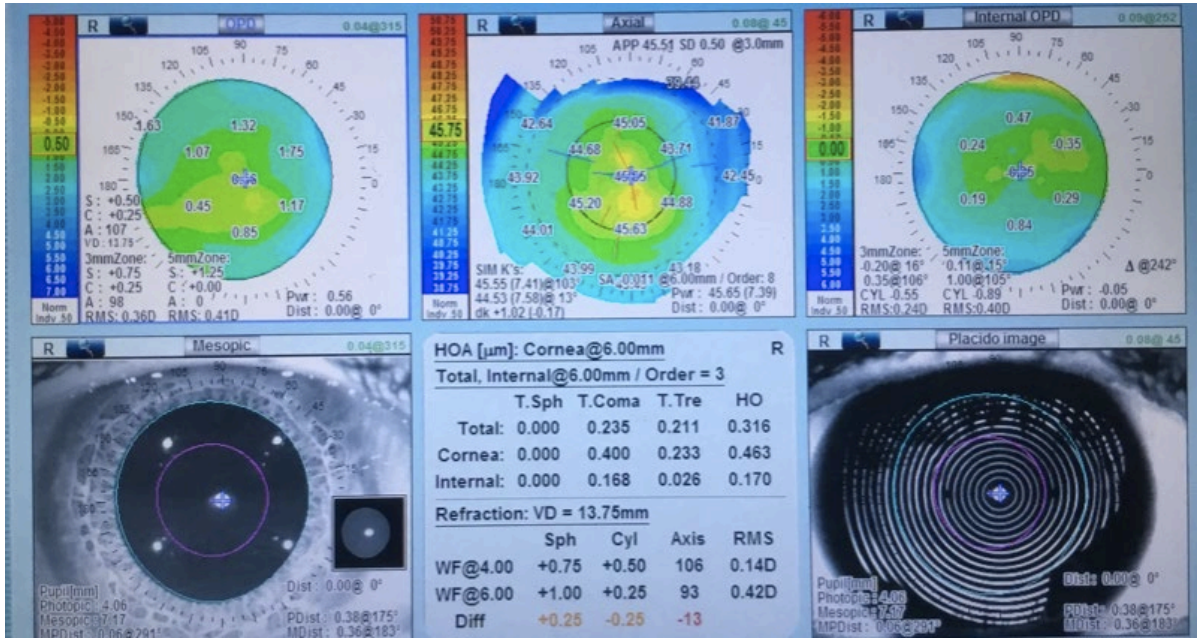

What's your approach to the post corneal inlay patient who now seeks refractive cataract surgery?

What's your plan?

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- IOL type: monofocal, trifocal, hybrid, edof, lal, ic8, segmented bifocal
- IOL target: monovision, distance, etc
- Astigmatism correction plan: toric, manual arcs, femto AKs etc.
- Surgical tools: femtosecond laser, manual, ORA, LDD, etc

What I did…

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- OD- trifocal
- OS- EDOF toric

PLANO 20/20 J2 OU!

Case 3: Your stable keratoconus patient

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Which IOL would you use?

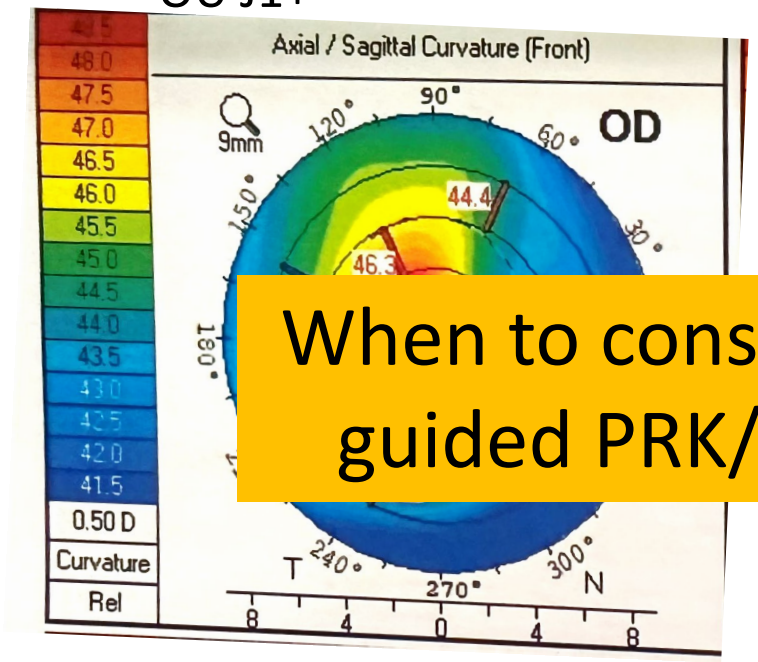
UDVA

- OD 20/70
- OS 20/50
- OU J1+

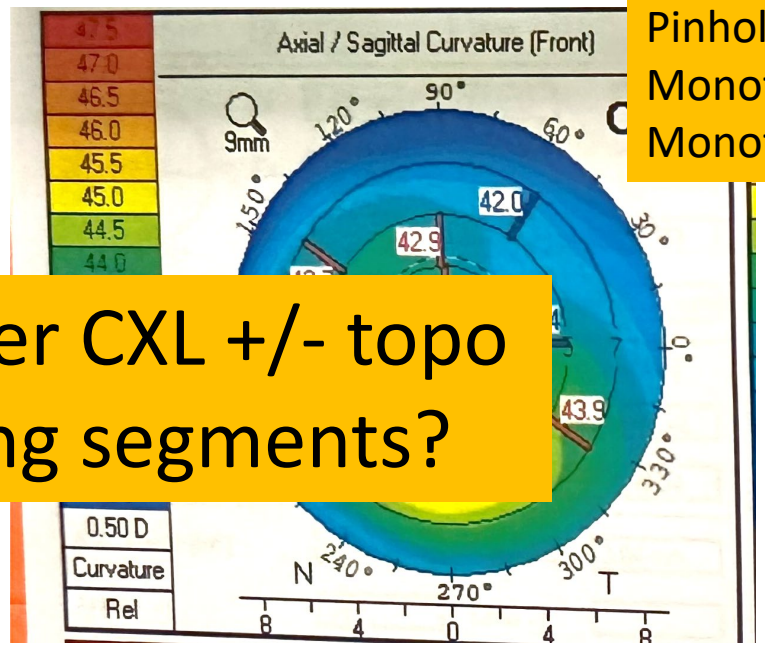
CDVA

- OD -2.00-2.50 x 010 → 20/20-
- OS -2.00 → 20/25

LAL? → adjustable
Pinhole?→ reduce HOAs
Monofocal toric?→high cyl
Monofocal (plus)?



CCT 480 microns



CCT 486 microns

When to consider CXL +/- topo guided PRK/ring segments?

What I did…

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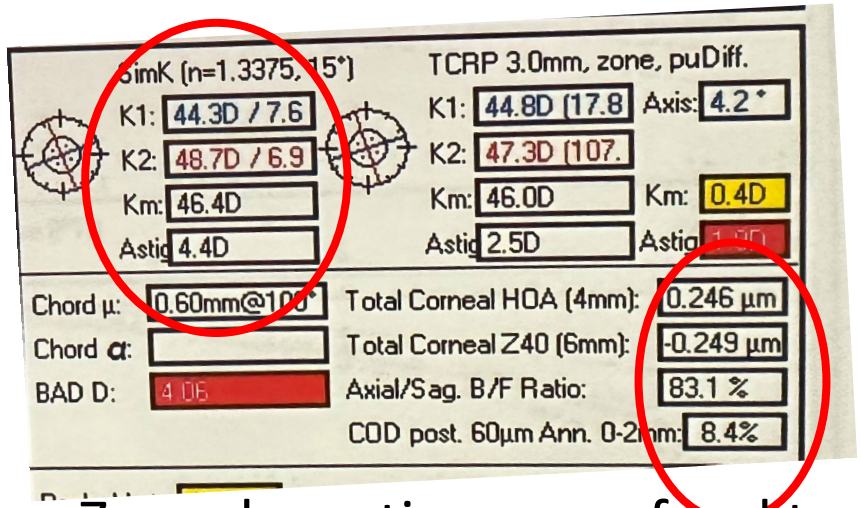
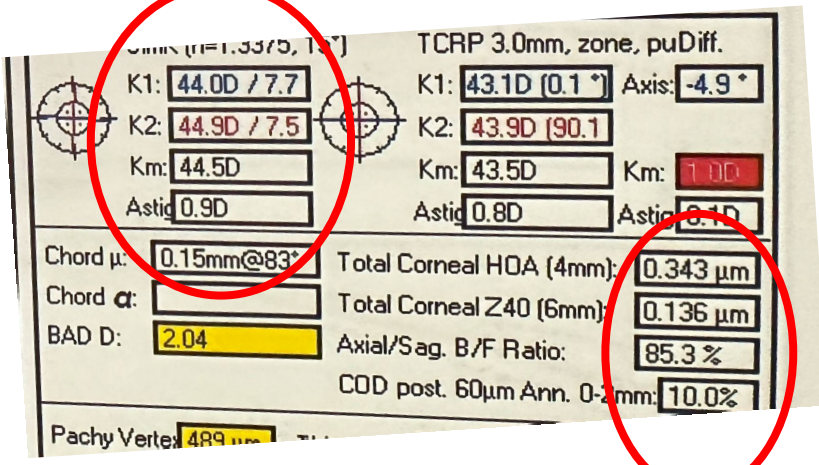
OD



OS



Zero aberration monofocal toric

Small-aperture

Used Barrett KCN and Kane KCN formulas

Aim -0.25
20/20 J3

Corrects high regular astigmatism
Avoid LAL in eyes with negative SA?

Aim -1.00
20/30 J1

Corrects up to 1.5 D cyl
Reduces HOAs

When to use a toric IOL?

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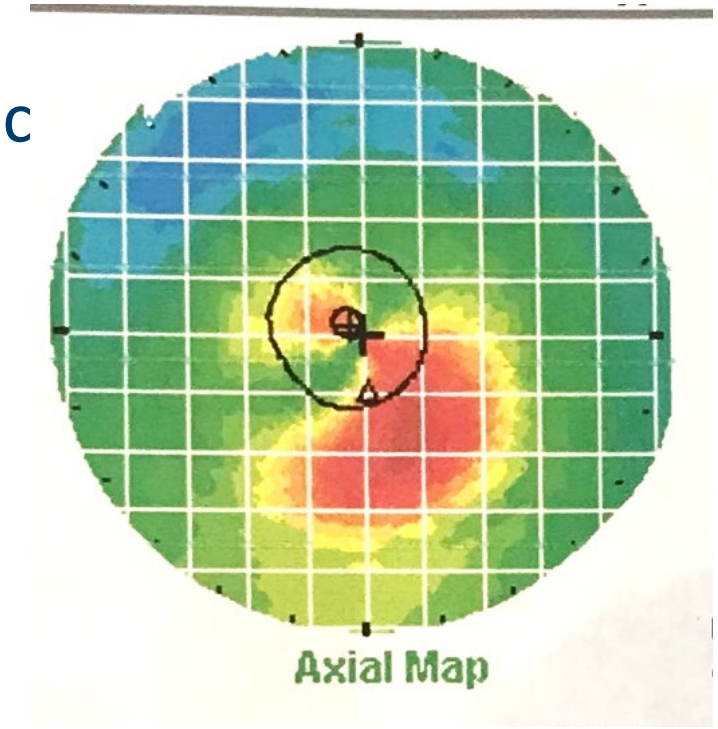
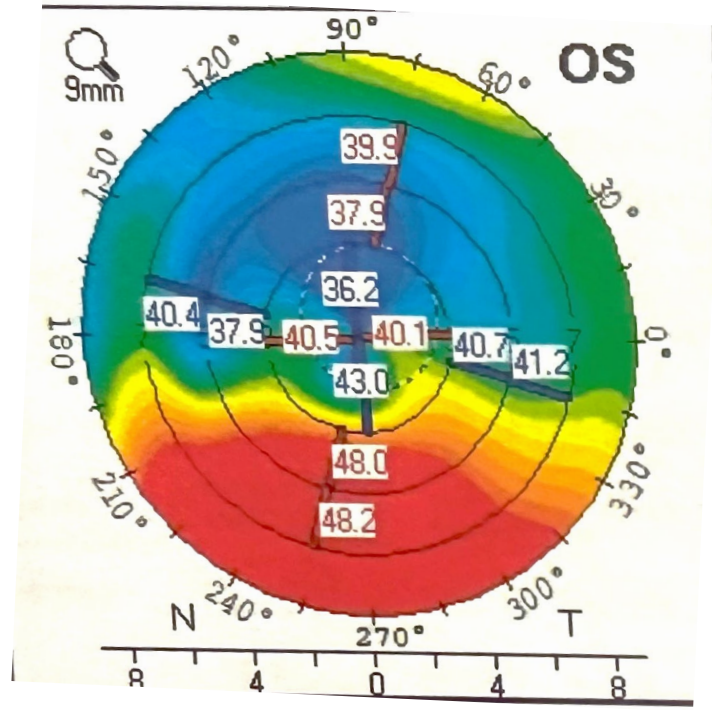
Whenver the astigmatism is symmetric and consistent

My minimum:
WTR 1.25
ATR 0.75

Use toric



Use monofocal or consider pinhole IOL

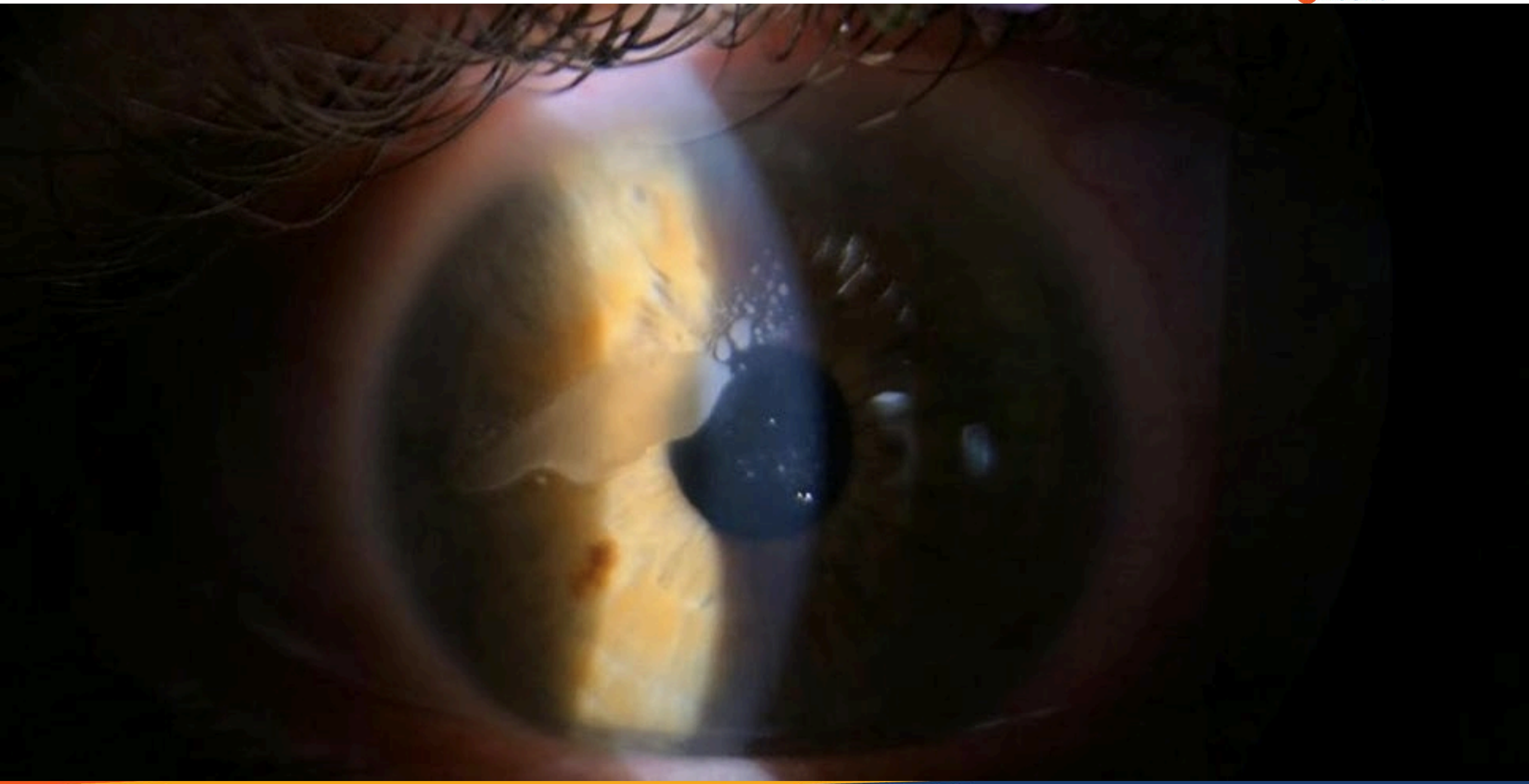


Case 4

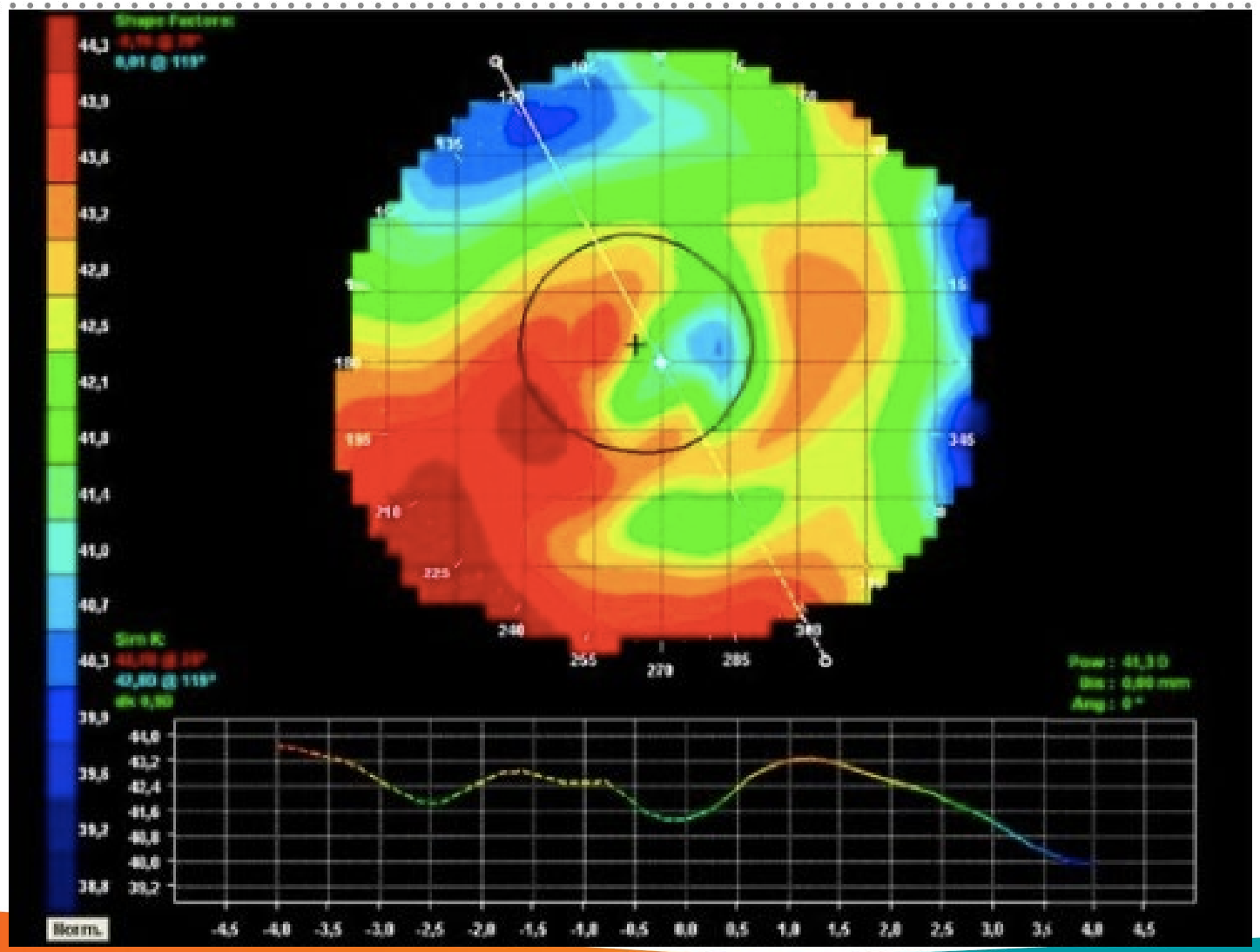
- 58yom retired boxer who is a boxing coach underwent LASIK 22 years ago. Reports “having some kind of issue with the flap in left eye, needed further surgery”. Now presents with cataract OU, possibly traumatic, seeking continued spectacle freedom
- MRX

-0.50 +0.25 x116 20/20

+0.25 +1.25 x050 20/40--



Topography



What's your philosophy on post LASIK with long standing epi ingrowth patients who develop cataracts and still want spectacle freedom? What lenses will you consider? Do you use femto? Are your plans effected by the fact that the fellow eye has normal flap appearance?

What's your plan?

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- IOL type: monofocal, trifocal, hybrid, edof, lal, ic8, segmented bifocal
- IOL target: monovision, distance, etc
- Astigmatism correction plan: toric, manual arcs, femto AKs etc.
- Surgical tools: femtosecond laser, manual, ORA, LDD, etc

What I did…

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- Epi ingrowth had been stable for years, did not remove
- monofocal IOL with plano distance target OS
- trifocal OD

- Patient is 20/30+ OS with some fluctuating cyl and is 20/20 J2 OD

Case 5: Your post-RK patient

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Which IOL would you use?

52 yo F h/o 8-cut RK OU 18 yrs ago s/p CEIOL elsewhere OD and cataract OS

UDVA

OD 20/80

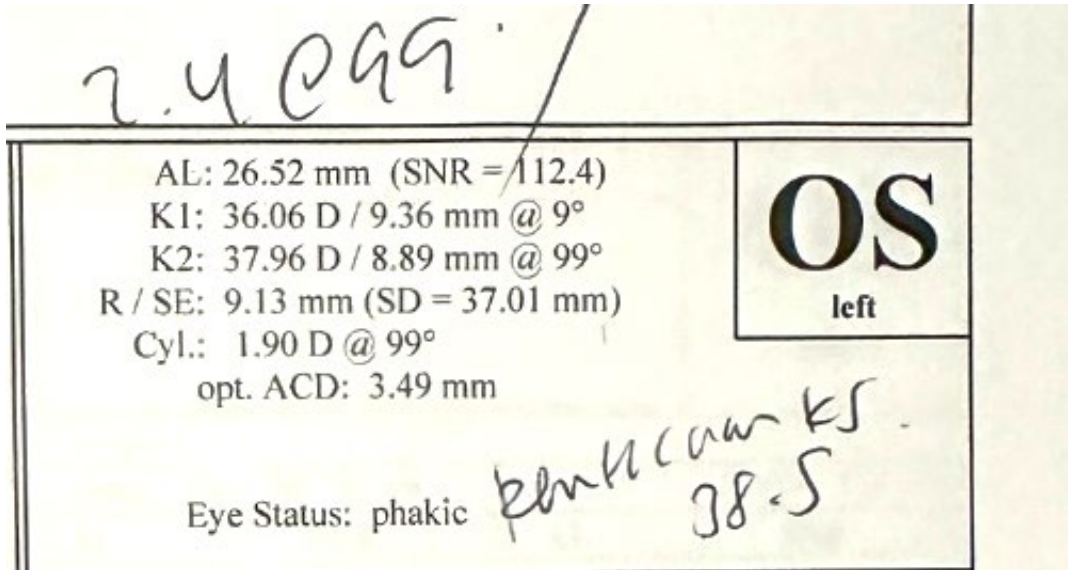
OS 20/100

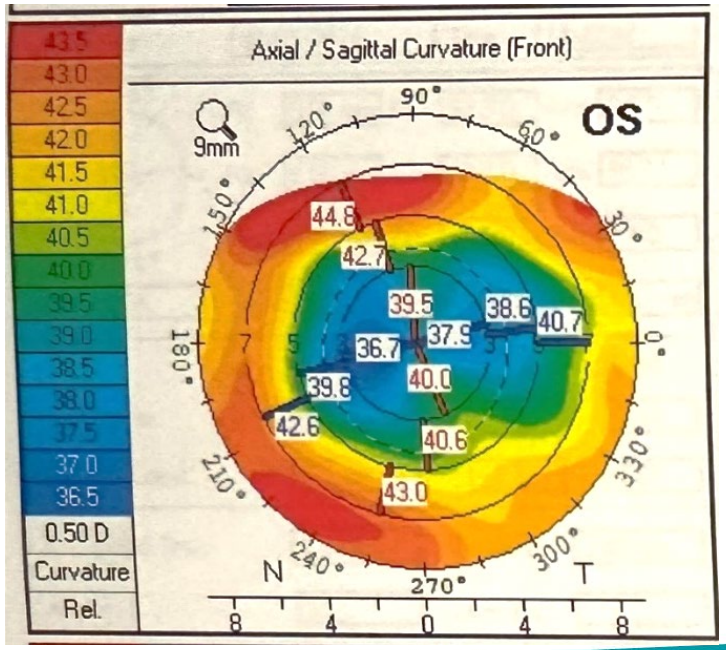
J1

MRx

OD -0.75 – 1.50 x 043 20/25 (surgeon aimed plano)

OS -0.75 – 1.75 x 170 20/40





What I did…

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Use Barrett True K (Radial Keratotomy) formula

Operated on steep axis (99 degrees) between cuts

Implanted LAL (aim -0.25)

POD#1 20/40 happy!

Awaiting adjustments (targeting plano)

<u>LAL Pearls</u>

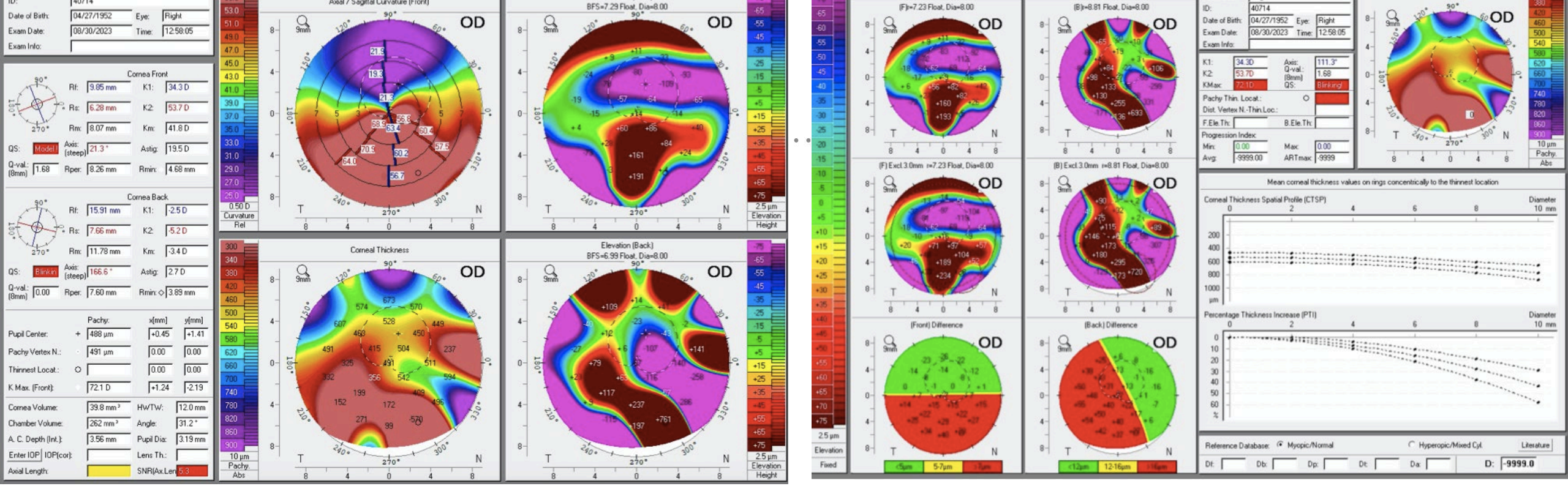
- Wait at least 8 weeks for refractive stability before adjustments
- Maximum adjustment 4 D (sphere + cylinder)
- Get “bonus” EDOF with 1st adjustment (target and move -0.5 D or more in minus direction)
- High minus SA → great for plus SA eyes (post-RK, post-myopic LASIK)

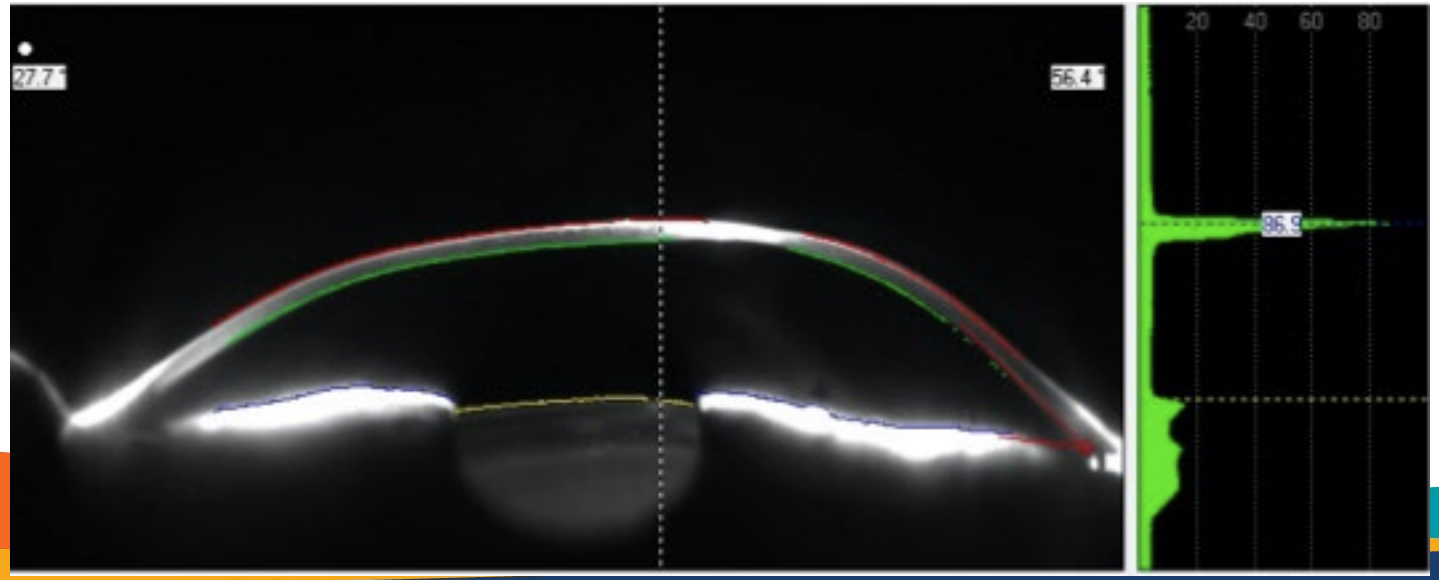
Case 6

- 71 yom with history of 8 cut RK with T cuts 25 years ago, now with corneal ectasia and 3+ NSC OD. Left eye had phaco 10 years ago. Patient is desiring the best possible distance vision, says “it would be nice not to have to wear glasses all the time”. Doesn’t mind readers, but has built in monovision.
- MRX

-4.00 +1.50 x010 (20/200)

-3.50sph (20/30)


Cornea Front
Cornea Back
Corneal Thickness
Elevation (Back)
Mean corneal thickness values on rings concentrically to the thinnest location
Corneal Thickness Spatial Profile (CTSP)
Percentage Thickness Increase (PTI)
OD



Discussion

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- What's your approach to post RK ectasia patients wanting good uncorrected distance vision?
- Do you have any criteria for when you'll attempt a small aperture IOL and when you won't?

What would you do?

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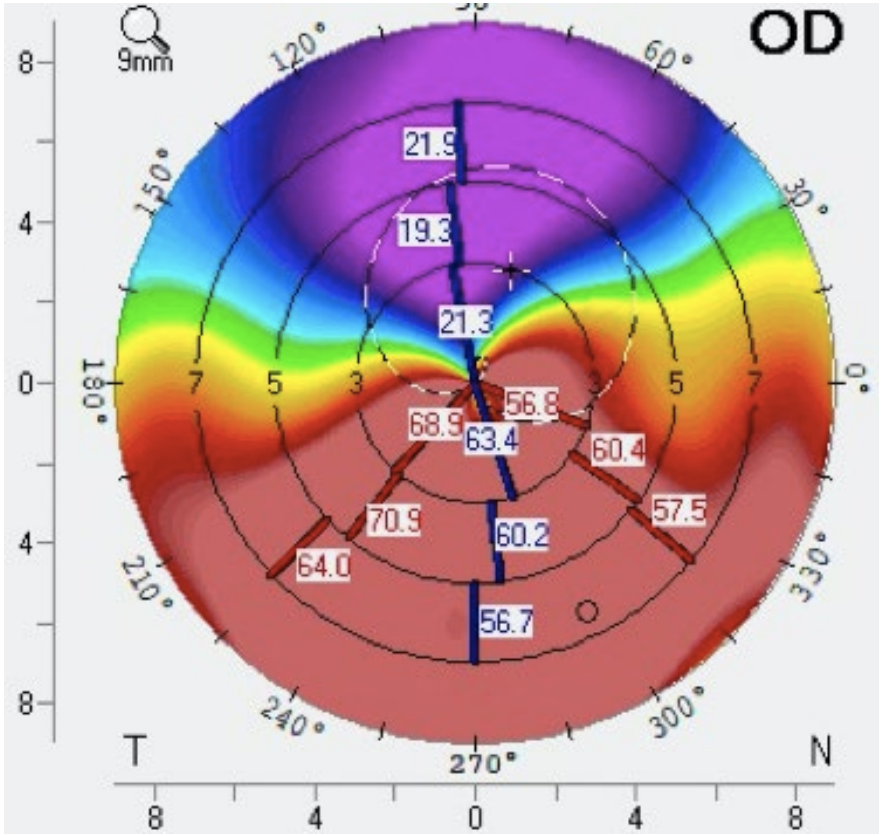
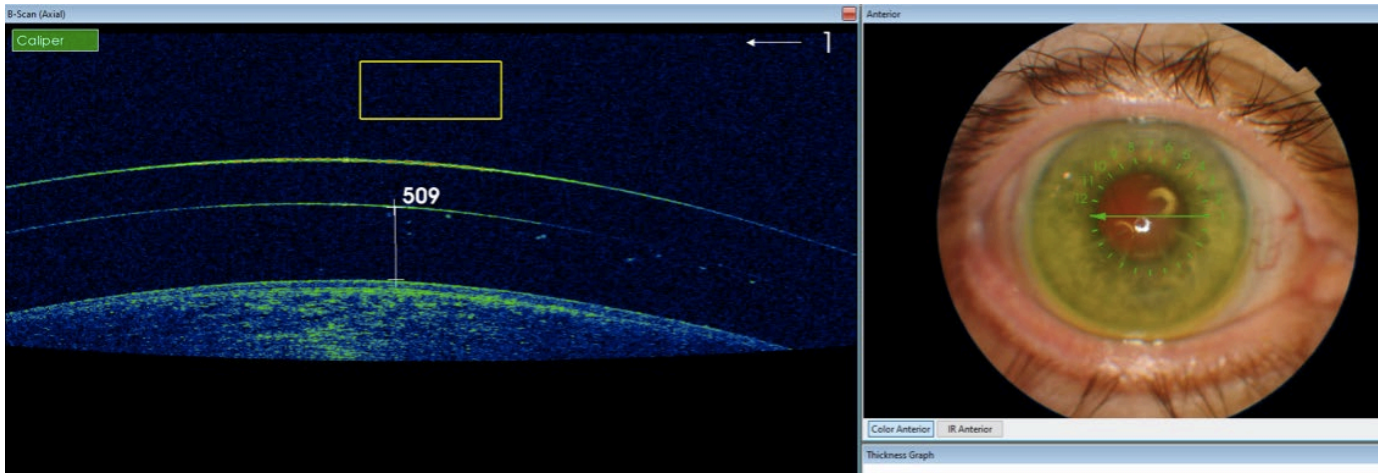
- IOL type: monofocal, mono toric, trifocal, hybrid, edof, lal, ic8, segmented bifocal, scleral
- IOL target: monovision, distance, etc
- Astigmatism correction plan: toric, manual arcs, femto AKs etc.
- Surgical tools: femtosecond laser, manual, ORA, LDD, etc

What I did…

- Due to 40D swing in central cornea I was hesitant to place small aperture lens. Chose a simple 3 piece monofocal and placed in sulcus after speaking to cornea surgeon who felt this patient may need PKP. Would be easier to exchange post PKP.
- I find no IOL gives better quality of vision in patients like this than a monofocal with a well fit scleral lens.





Case 7: Your Post-Hyperopic LASIK Patient

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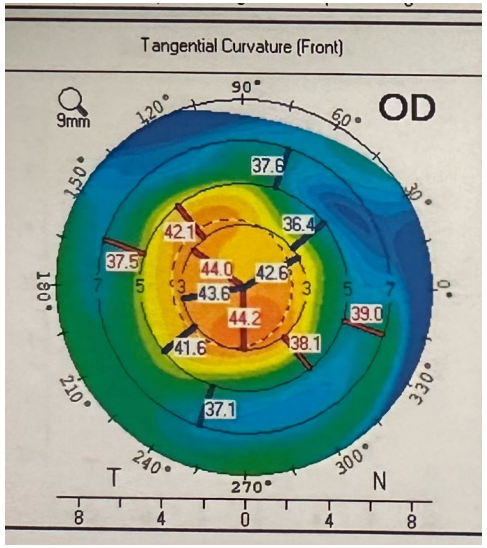
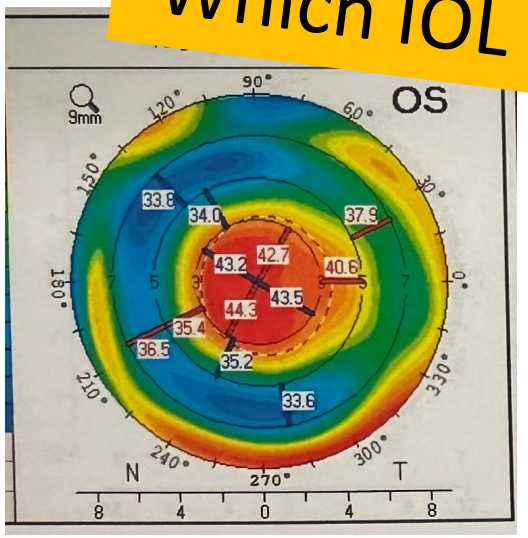
Which IOL would you use?

REALLY wants to be glasses free!!! Does not like idea of monovision

Implanted trifocal IOL

20/20 J1+





Implanted monofocal plus (+++ SA)

20/20 J1 slow

Total Corneal HOA (4mm):	0.199 µm
Total Corneal Z40 (6mm):	-0.087 µm
Axial/Sag. B/F Ratio:	84.5%
COD post. 60µm Ann. 0-2mm:	9.5%

Total Corneal HOA (4mm):	0.203 µm
Total Corneal Z40 (6mm):	-0.603 µm
Axial/Sag. B/F Ratio:	86.8%
COD post. 60µm Ann. 0-2mm:	9.0%

- Fine to use in post-refractive eyes if regular and centered ablation

- No toric option
- Great for negative SA eyes

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