
Corneal Cases: Real World Pearls and New Frontiers

James Tian, MD

 Omni Eye Specialists

Part of the ICON
Network



Financial Disclosures

→ Speaker for Dompé

Outline

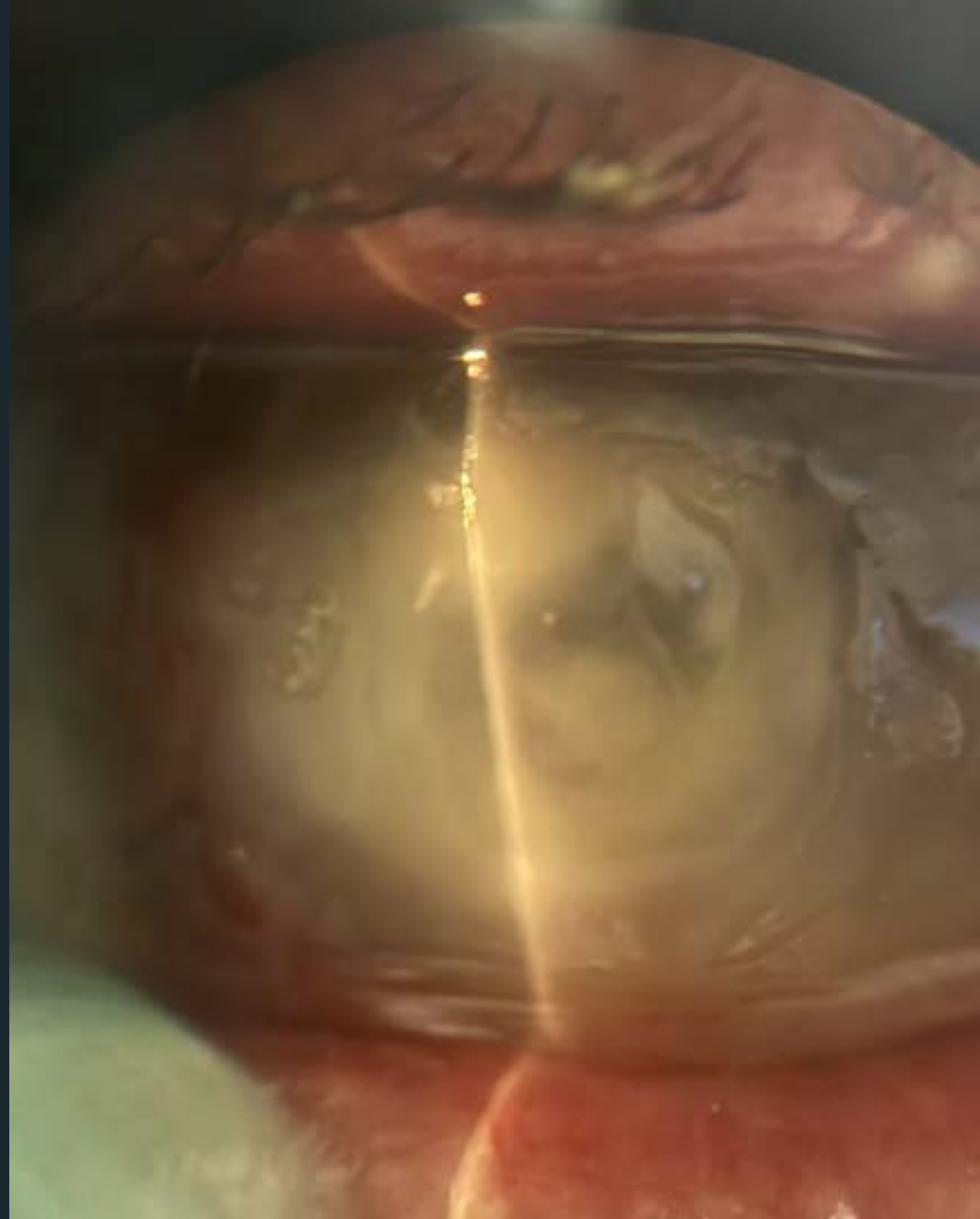
- All in one case of fungal keratitis
- Reshaping the cornea with CTAK
- Current surgical techniques in iris repair
- Future directions in corneal endothelial keratoplasty

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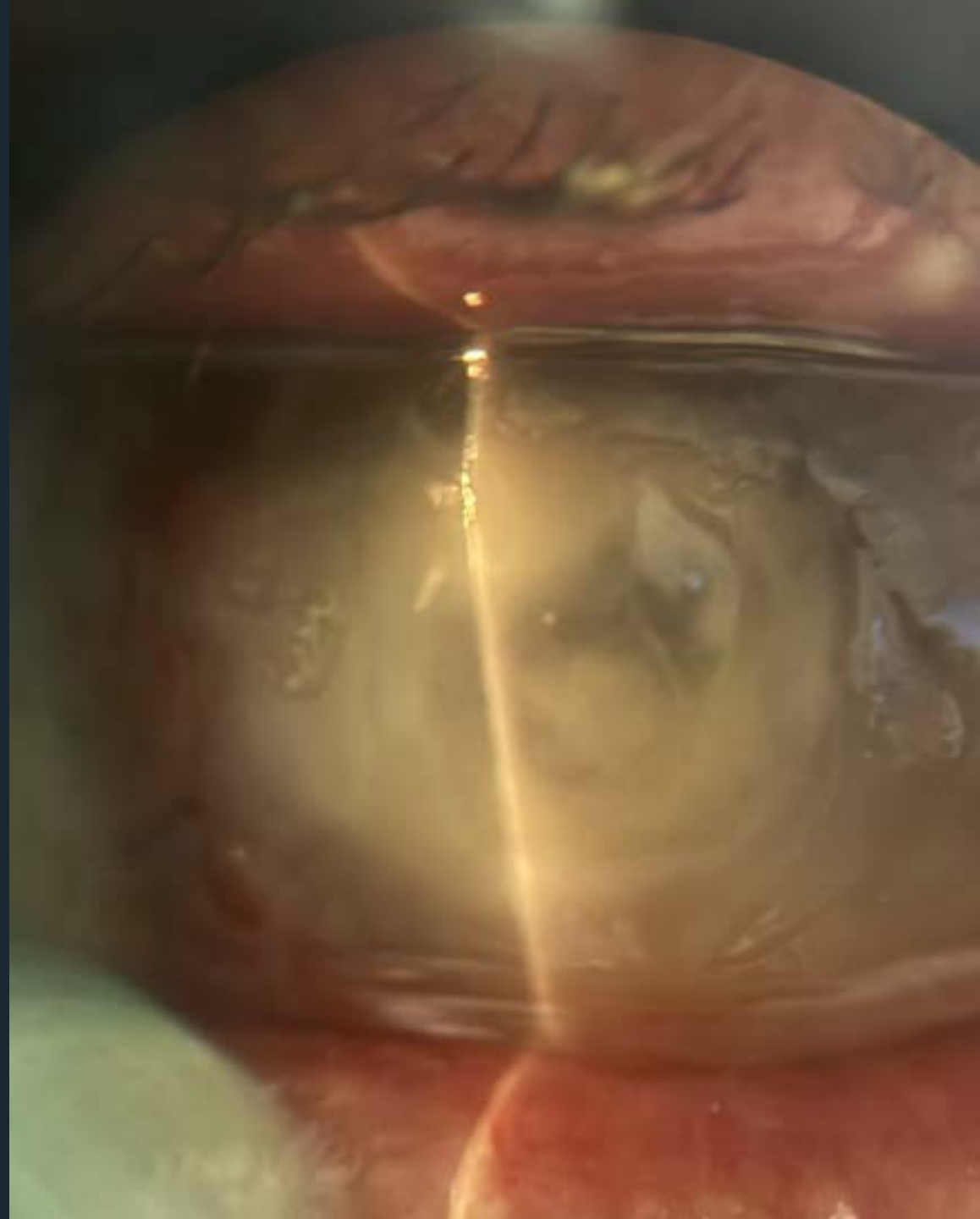
An Inflamed Fungal Ulcer

- 70 yo M, PK OD 2021 for corneal scarring, daily prednisolone
- Avid outdoor hiking and biking activities, minimal pain
- Hx of Ahmed valve, pseudophakia
- May 2025 presented with large ulcer, host cornea also opacified, central melt
- Up to 60% thinning but no descemetocoele, confirmed on OCT
- Cultured and started on Vanc/Tobra



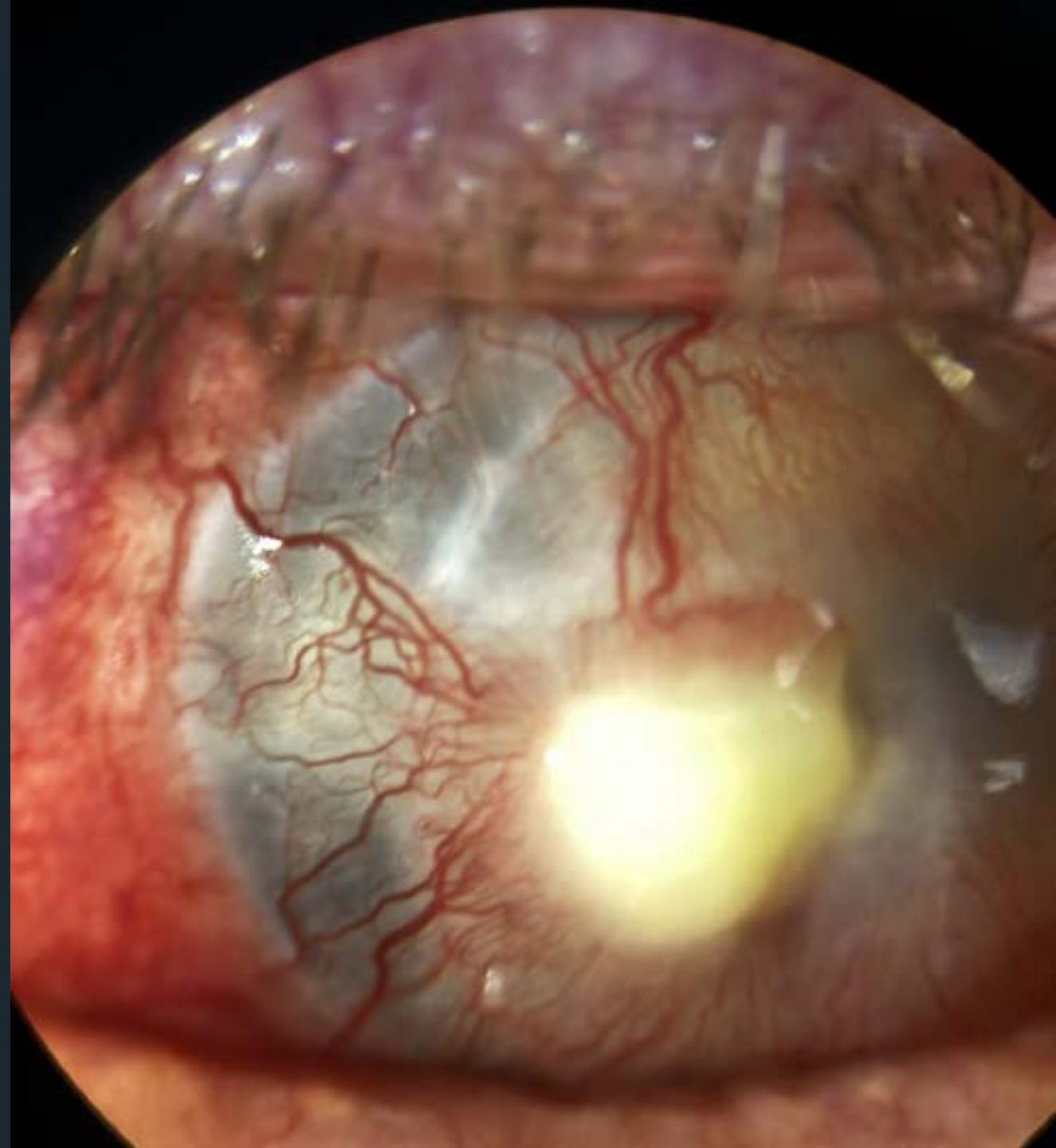
An Inflamed Fungal Ulcer

- HealthTrackx showed Fusarium
- Started voriconazole, amphotericin, natamycin, voriconazole 200 mg BID
- Doxycycline, Vit C, (medroxyprogesterone 1%) for stromal stabilization
- Regular Bscans without vitritis



Continued Inflammation

- Infiltrate improved to ~5 mm then stayed same for 3 weeks
- Significant persistent injection and infiltrate for 1.5 months
- Considered therapeutic PK



Stabilization

> Pak J Med Sci. 2024 May-Jun;40(5):974-978. doi: 10.12669/pjms.40.5.7777.

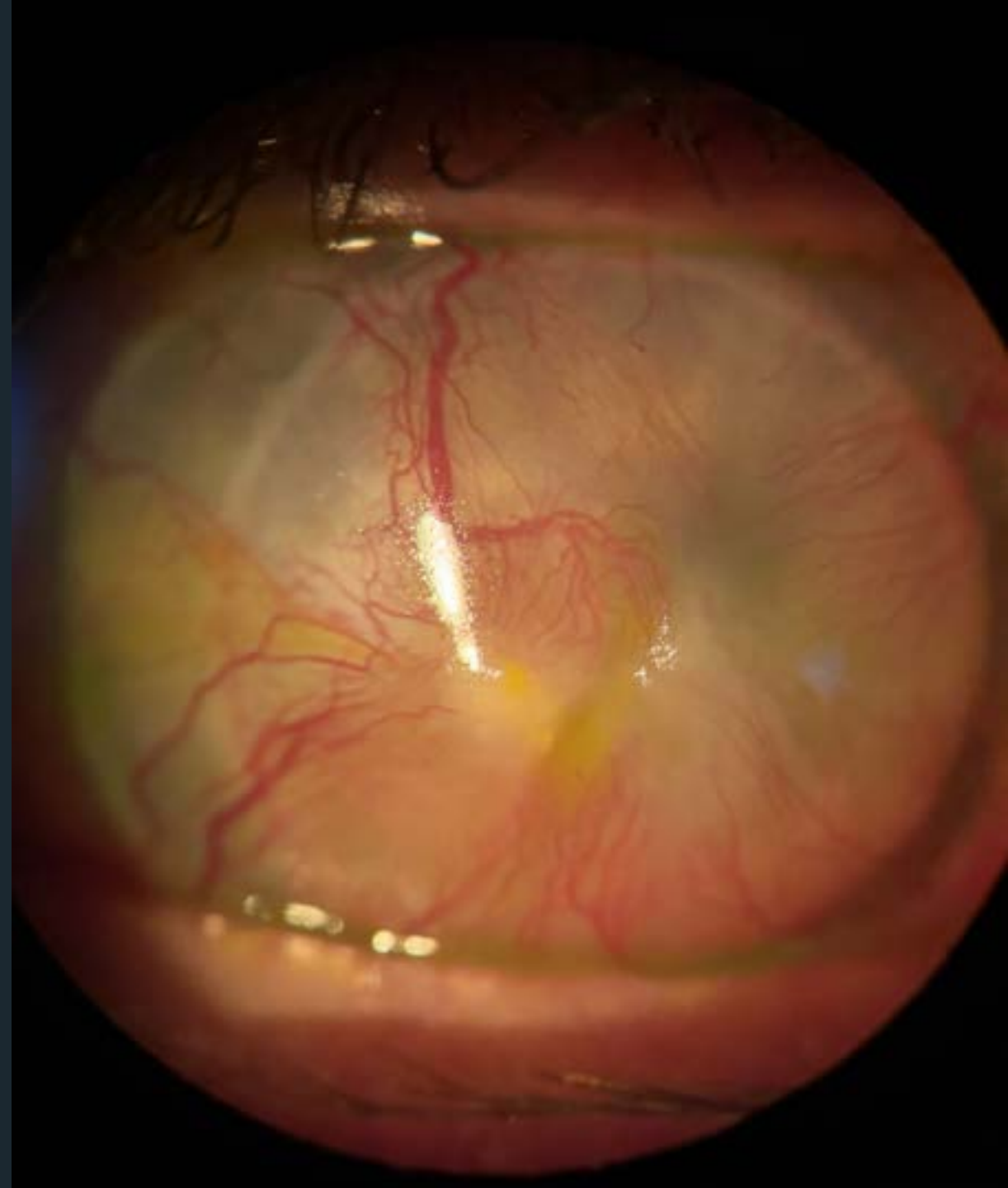
Clinical efficacy of cyclosporin and natamycin for fungal keratitis

Chengwen Yang¹, Jingjing Cai², Qiuhong Wei³, Huifang Lian⁴, Lin An⁵

Cyclosporine as Postoperative Immunomodulating Agent in Penetrating Keratoplasty for Keratomycosis

Esteban Peralta MD^{1*}, Chris Kim MD², James Tian MD¹, Syed Ali Ahmed³, Alan Carlson MD¹, Lloyd Williams MD¹

- Start cyclosporine 1% QID
- 2.5 months after presentation
- Slowly tapering antifungals
- How long to wait before you can perform a PK?

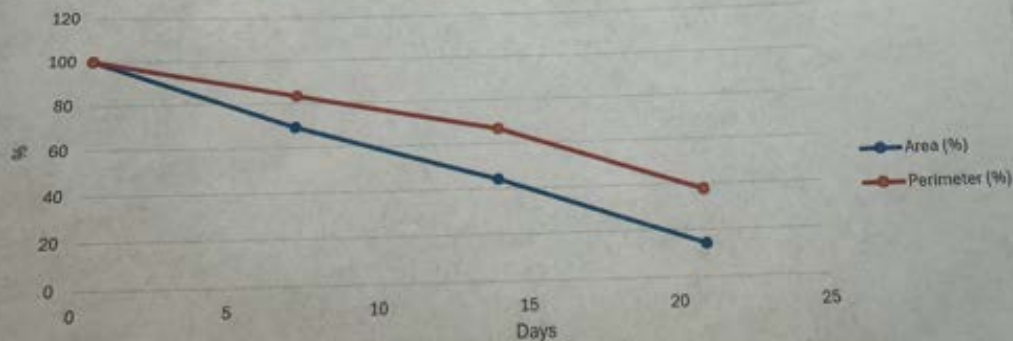


Patient experience

ULCER SIZE

Date	Days	Length	Width	Area (L ²)	Area (%)	Perimeter (L)	Perimeter (%)
23-Jun	0	3.25	2.75	8.94	100	12.0	100
30-Jun	7	2.75	2.25	6.19	69	10.0	83
7-Jul	14	2.25	1.75	3.94	44	8.0	67
14-Jul	21	1.25	1.00	1.25	14	4.5	38

Ulcer Area % and Perimeter % Versus Time



Blind Eye Drop Application Fungal Infection — Saved to my Mac

Draw Design Layout References Mailings Review View EndNote 21

Comments Editing

Aptos (Body) 14

Blind-Eye Drop Application – Fungal Infection

Self-application of eye drops into a blind eye is challenging at first. When self-administering drops, perfection cannot be achieved, but strive for a high percentage. The number and frequency of drops is daunting but take one day at a time and try to be disciplined. A missed drop is not the end of the world, but take measures to maintain the schedule, even when you have errands to run and of course eye appointments to keep. Utilize insulated bags with ice packs to take drops out of the home/office while maintaining refrigeration requirements.

First, find a comfortable place to sit or better yet; lie down. Develop a consistent approach. Always hold the plastic bottle using one hand (right-handed people probably prefer the right hand to hold the bottle) and gently spread the upper and lower eye lids of the blind eye using the thumb and index finger of the other hand. The thumb on the lower lid and the index finger on the upper lid. Slowly position the edge of the bottle, being careful not to touch the tip, against a specific spot on the thumb (e.g., crease at the knuckle). Place the drop on the inside (nose side) of the eye. If you miss the target a bit, rotate the head to let gravity move the drop onto the eye. Eye drops placed here are retained better on the eye, whereas if the drop is placed on the outside of the eye, it can quickly drain into your ear and is of limited value.

Initial Response to Infection - Each session of eye drops consisted of 2-4 drops. Always wait a minimum of 5 minutes between successive drops. Start each eye drop session with Amphotericin. This is an important drug that does not irritate the eye and so the eye is ready to receive the next drop after 5 minutes. The next drop is Voriconazole (Vory), which is also a very important drop. Vory causes a substantial tearing, and it is recommended to wait until tear flow subsides a bit before the next drop is placed. The third drop, when

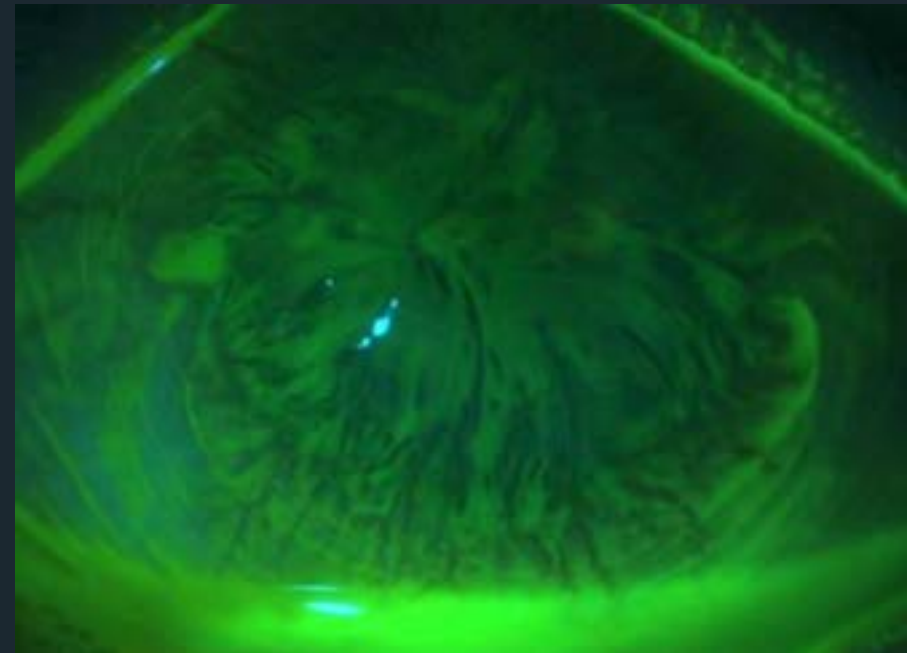
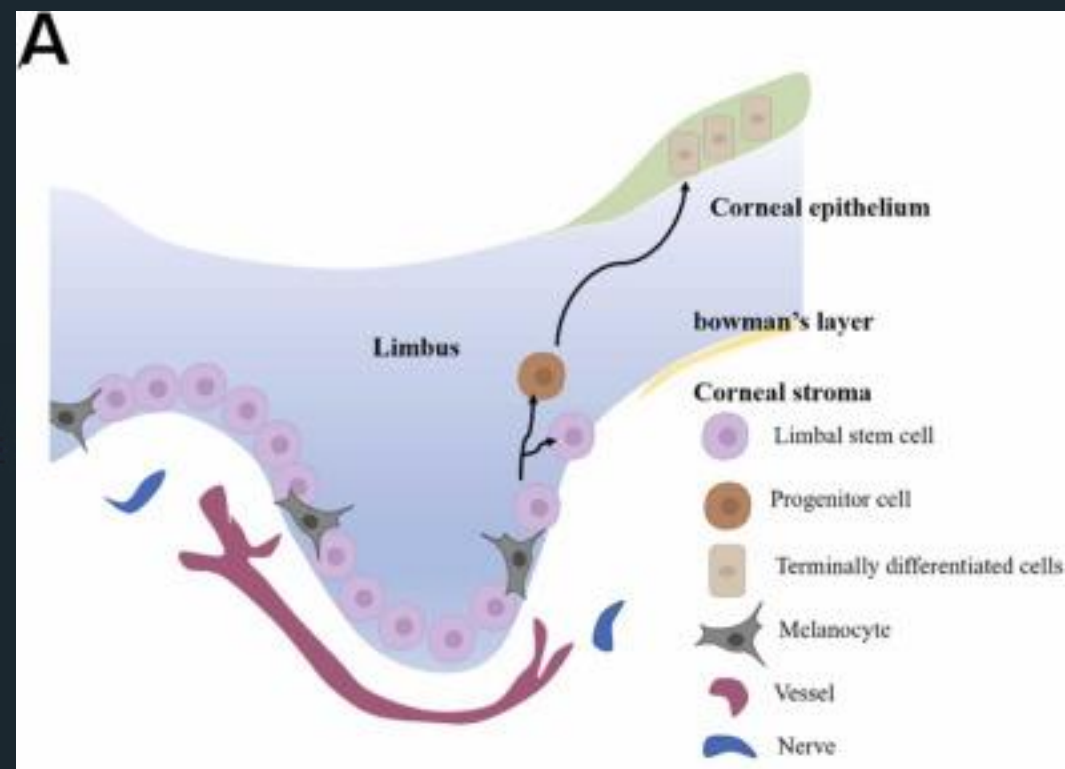
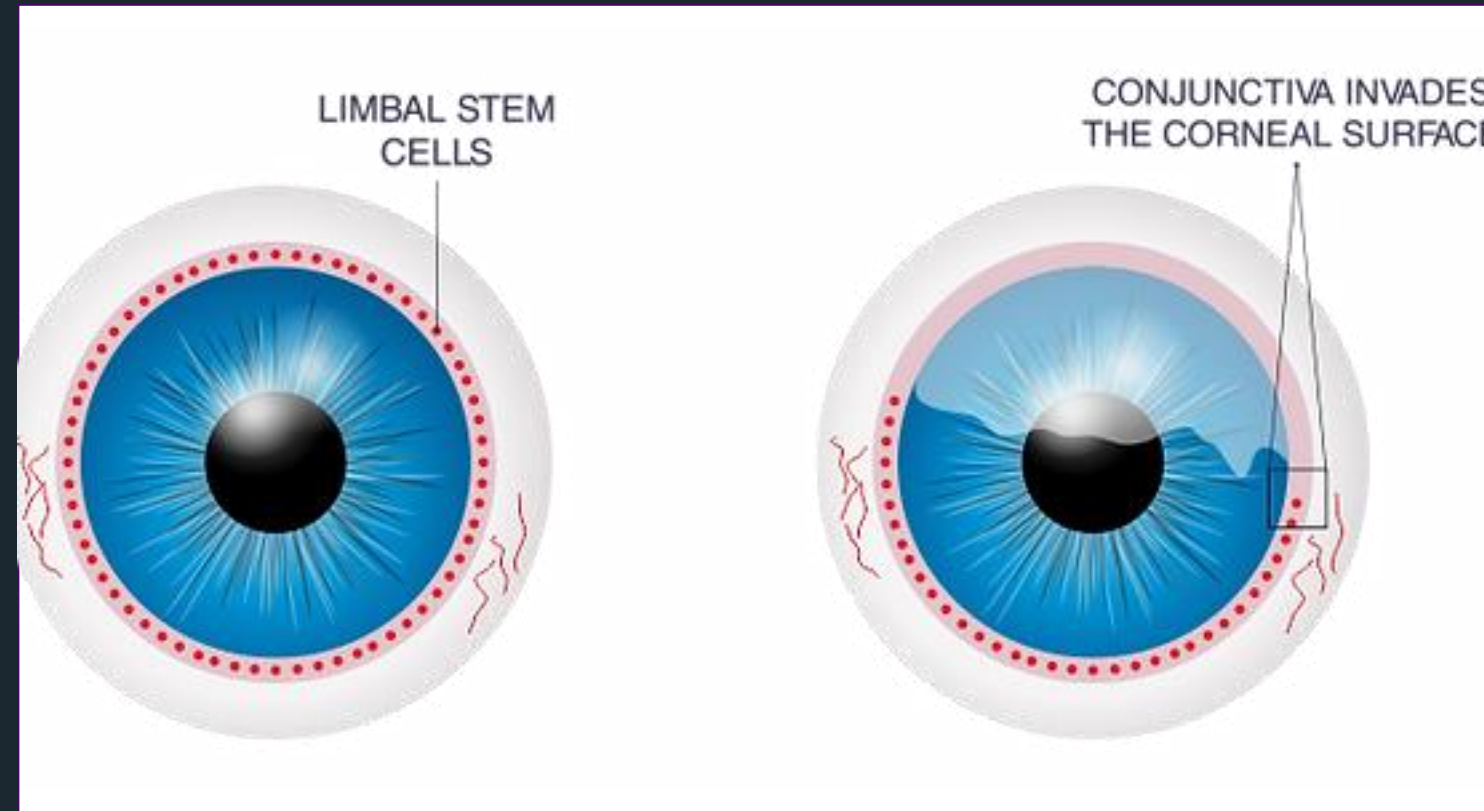
592 words English (United States) Accessibility: Good to go

Limbal Stem Cell Deficiency Case

- 36 yo male
- CL wearer for many years
- Eye is irritated and vision has dropped from 20/20 to 20/40

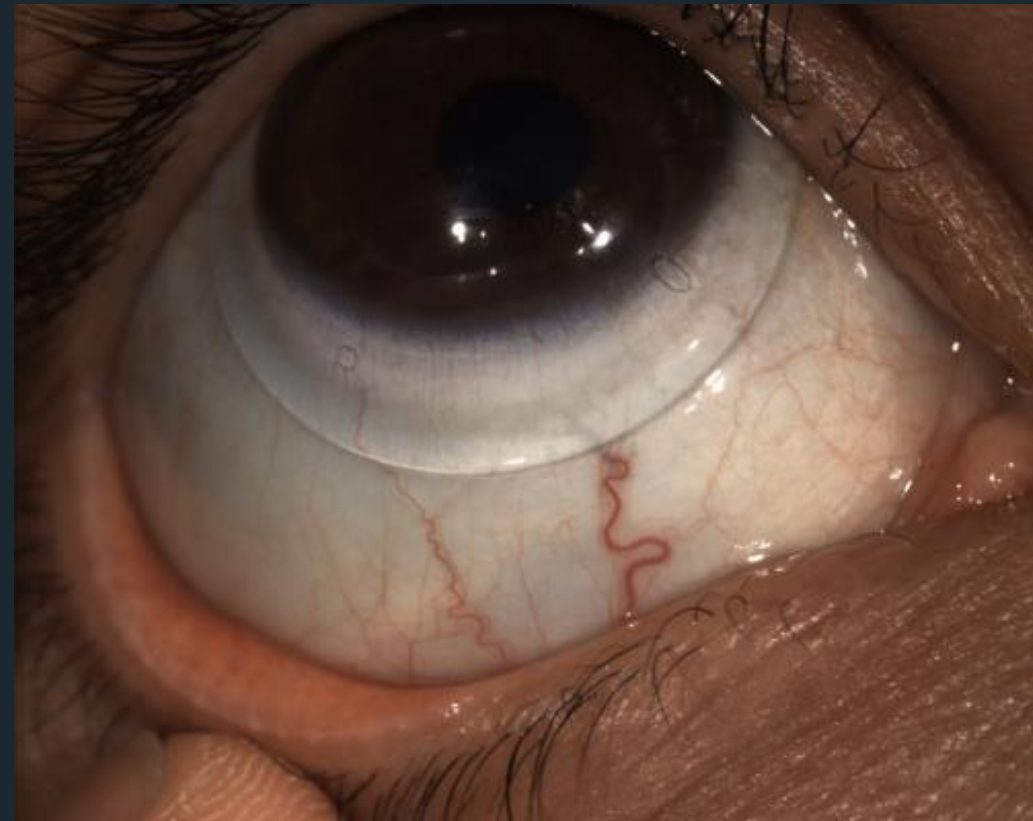


Limbal Stem Cell Deficiency

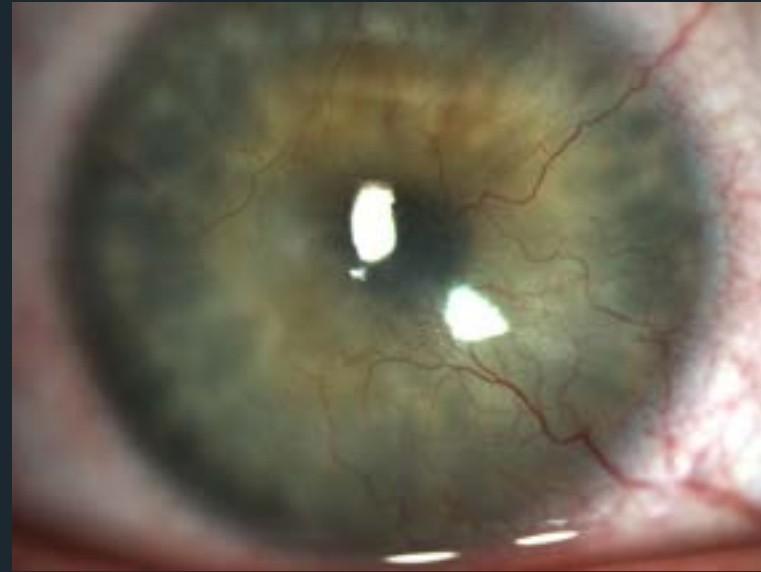


Limbal Stem Cell Deficiency

- Begin with lubrication and punctal occlusion
- Switch current drops to preservative-free versions
- Consider anti-inflammatory treatment
- Autologous serum drops
- Vitamin A ointment
- Scleral contact lens for epithelial defects
- Surgery

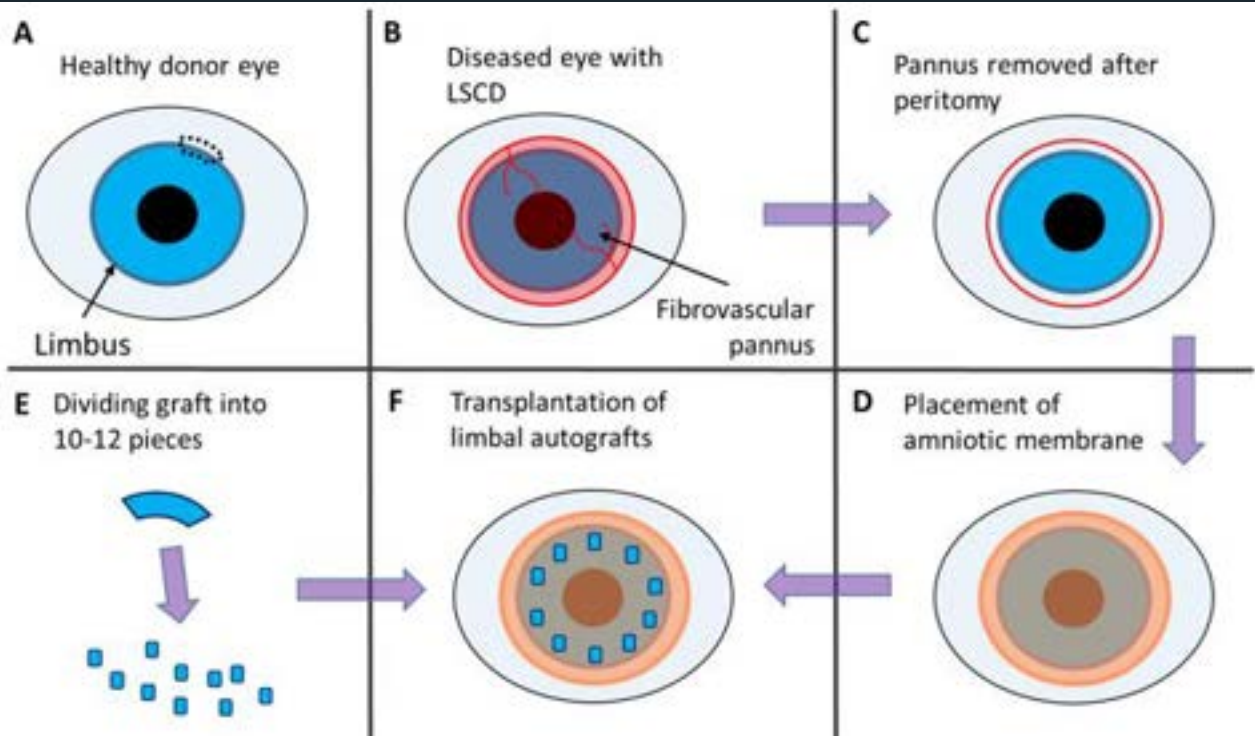
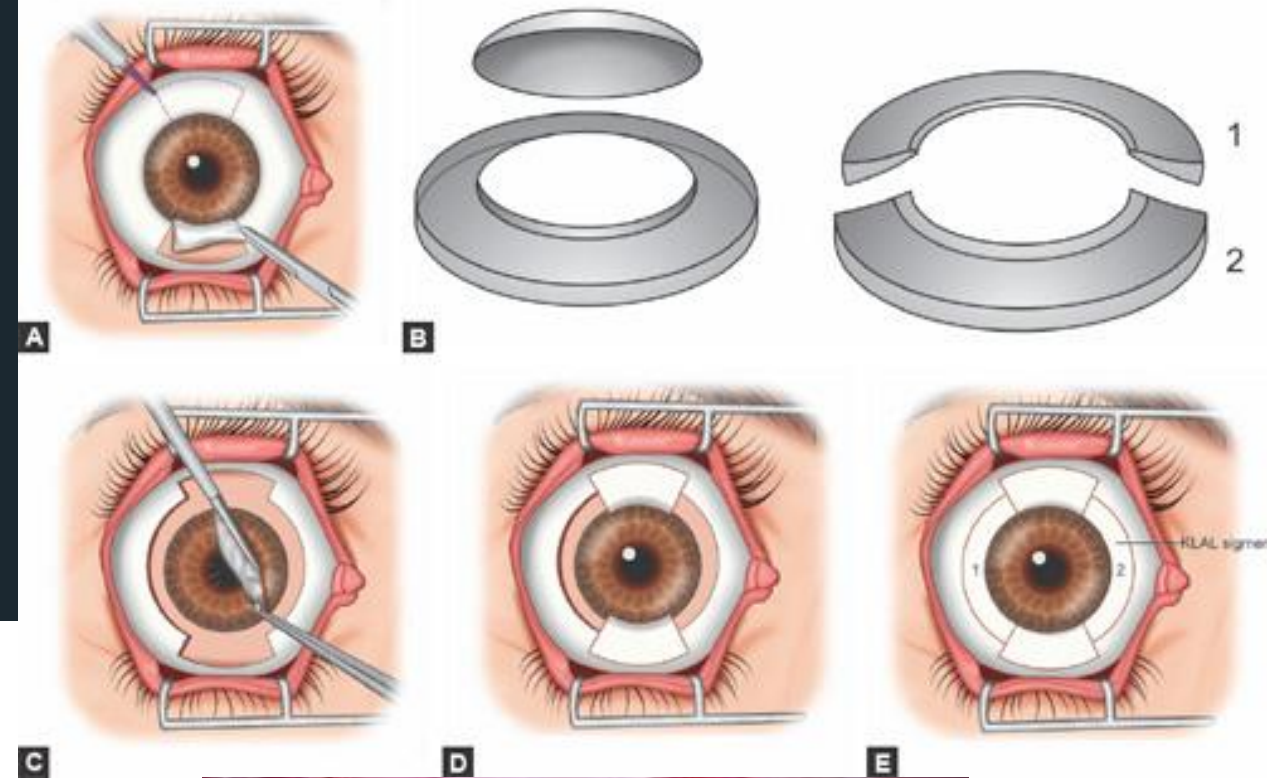


Limbal Stem Cell Deficiency

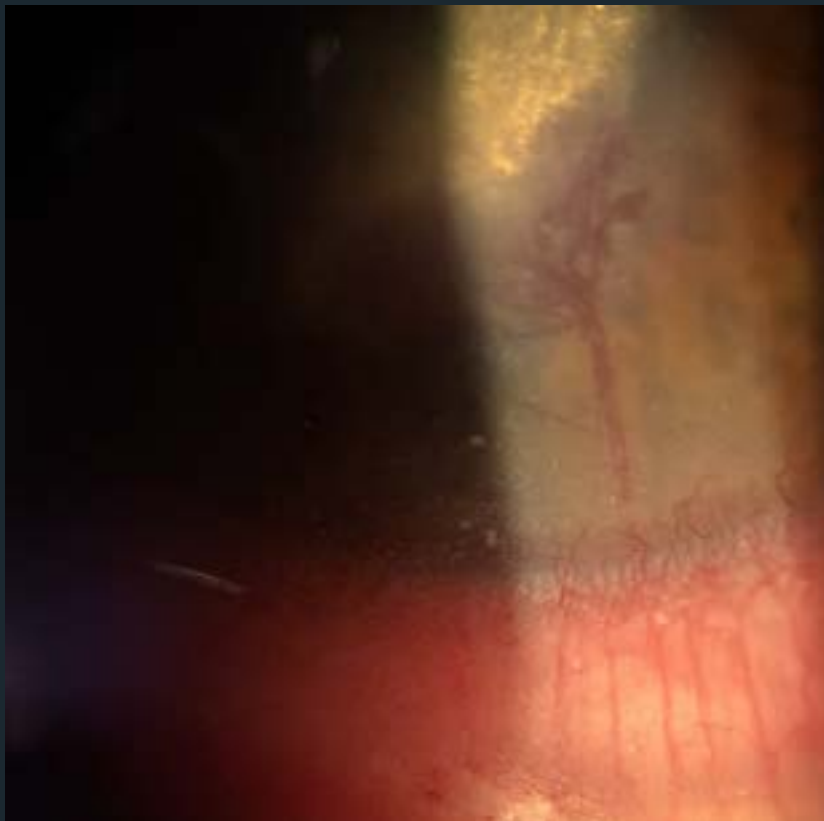
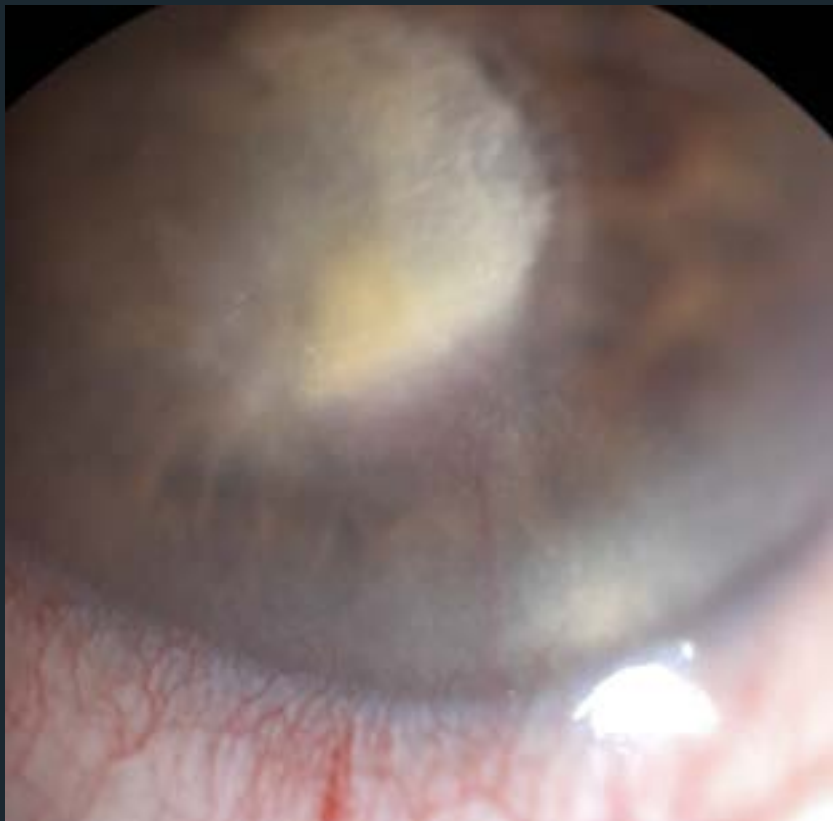


Limbal Stem Cell Transplant

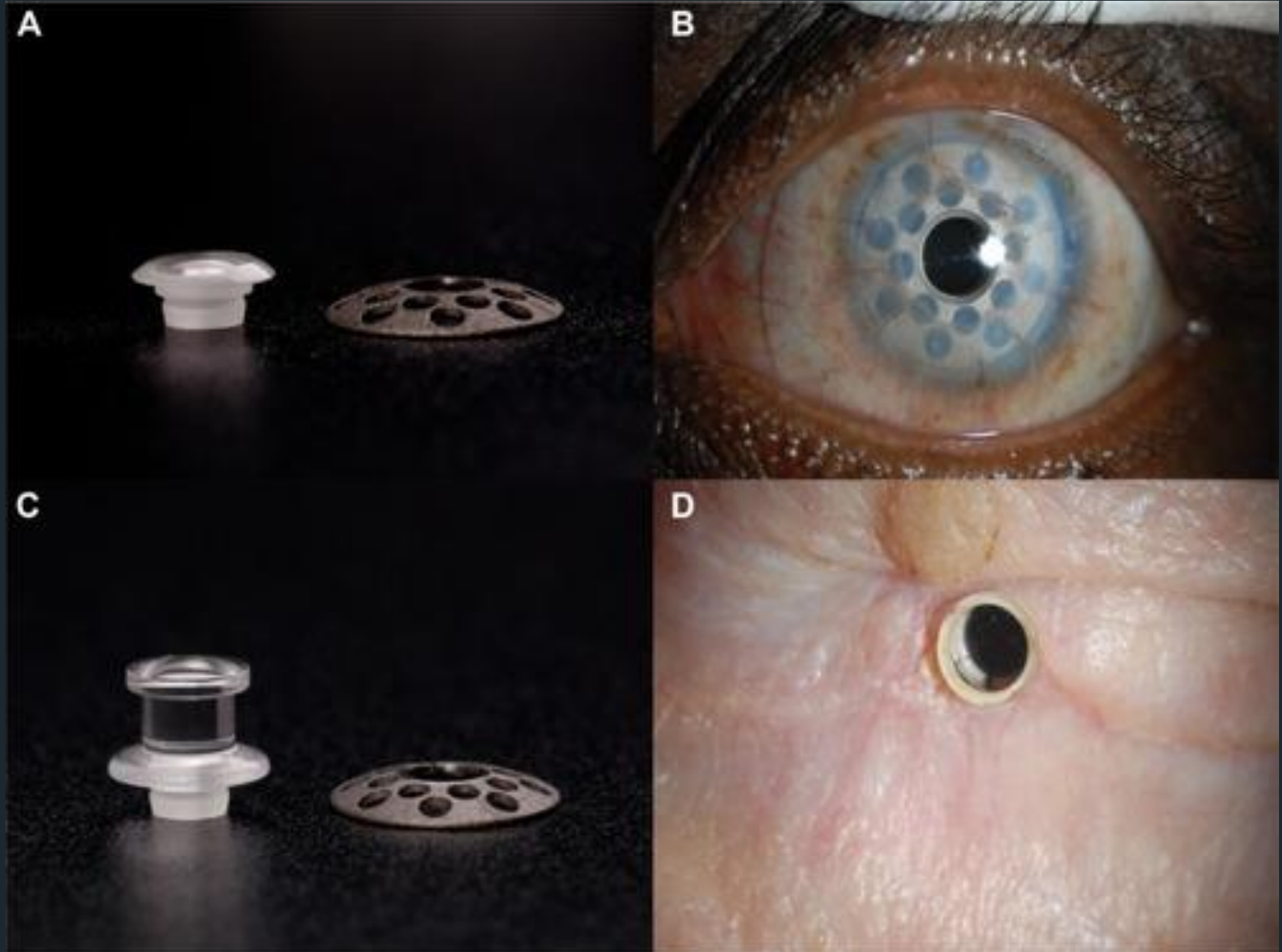
- Keratolimbal Allograft (KLAL)
- Simple Limbal Epithelial Transplantation (SLET)



Argon Laser Cautery



Keratoprosthesis



Potential KPro Complications

- At 10 years, anatomic retention rate 89%, but functional success (<20/400) only 44%
- Retroprosthetic membrane (>50%)
- Keratitis/Endophthalmitis (17%/12%)
- Cornea melt
- Glaucoma

- Regular vancomycin + fluoroquinolone vs polymyxin
- BCL at all times

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Long-term Outcomes of Boston Type I Keratoprosthesis, and Efficacy of Amphotericin B and Povidone-Iodine in Infection Prophylaxis

[Pinnita Prabhasawat](#) · [Suksri Chotikavanich](#) · [Panotsom Ngowyutagon](#)   · [Warinyupa Pinitpuwadol](#)

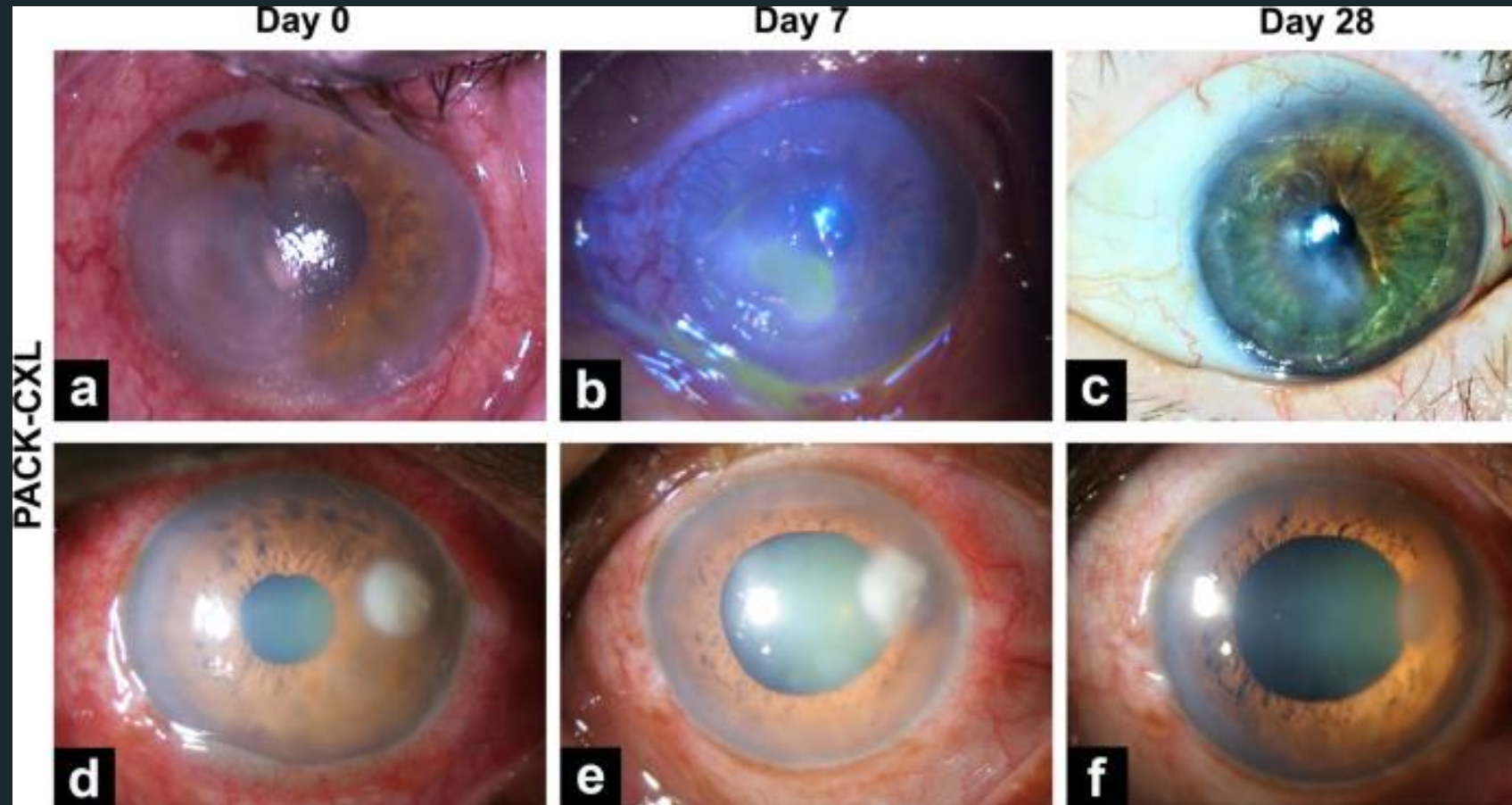
Treating Corneal Ulcers with Cross-linking

- Imagine the situation:
- Cultures negative
- Failed moxi/vanc/tobra fortified
- Confocal indeterminate
- Also tried anti-acanth, anti-herpetic, and anti-fungal
- Still melting and worsening



Photo-Activated Chromophore for Infectious Keratitis Cross-linking (PACK-CXL)

- Generated ROS kills pathogen
- Cross-linking procedure stabilizes corneal melt
- Herpetic disease is a contraindication
- Too thin of cornea can cause endothelial damage



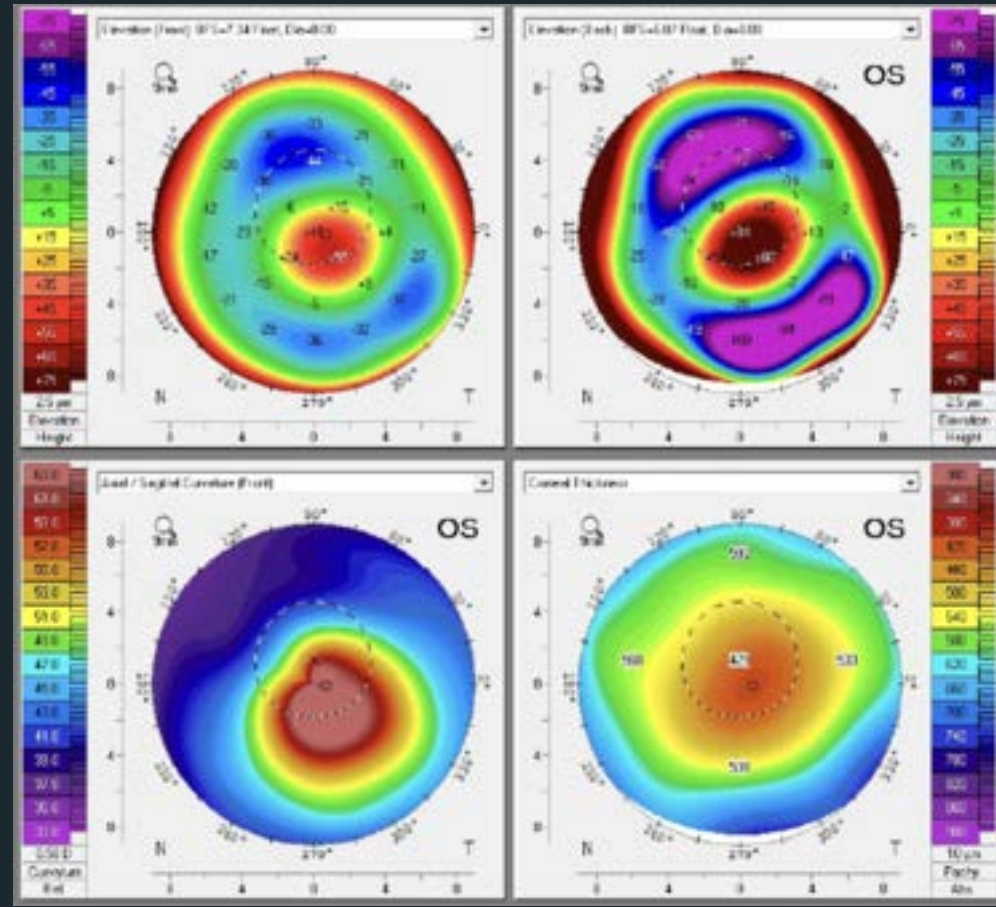
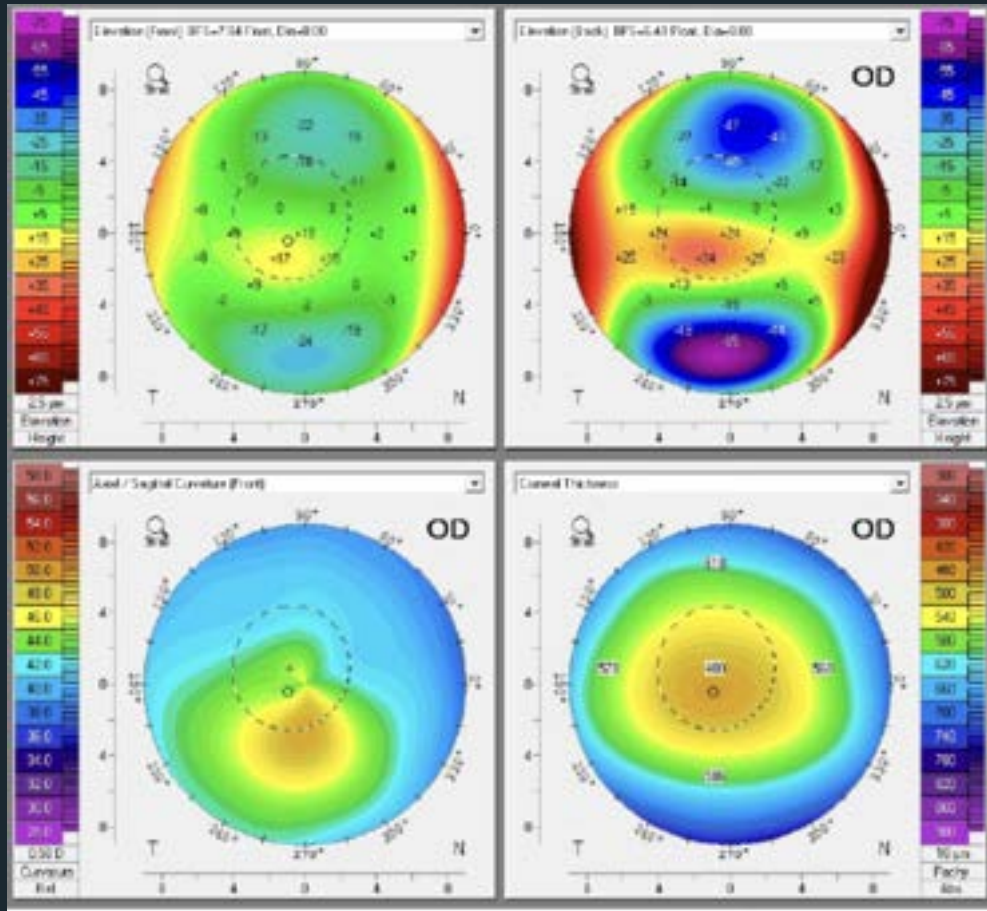
Treatment was effective in blocking corneal melting overall at 85% (95%; CI 0.77 to 0.91). Treatment was effective in the following order: in Gram-negative bacteria (13/14; 92%), in Gram-positive bacteria (37/44; 84%), Acanthamoeba (5/7; 71%) and lastly fungus (8/13; 61%). – Alio et al.

Outline

- All in one case of fungal keratitis
- Reshaping the cornea with CTAK
- Current surgical techniques in iris repair
- Future directions in corneal endothelial keratoplasty

Keratoconus Case

- 22 yo male
- OD VA sc 20/40 -1.00 -0.75x110: 20/20-2
- OS VA sc 20/200, -2.00 -1.50x108: 20/50



When to Refer for Cross-Linking Evaluation

- Over at most a 12 month period:
 - 0.5 D increase in myopia
 - 1.0 D increase in astigmatism
 - 1.0 D increase in Kmax
 - 10 μ m decrease in thinnest cornea
- On initial evaluation, refractive history is very important!
- Not just young patients, 24% in 40 or older
- Women with keratoconus who are planning on becoming pregnant



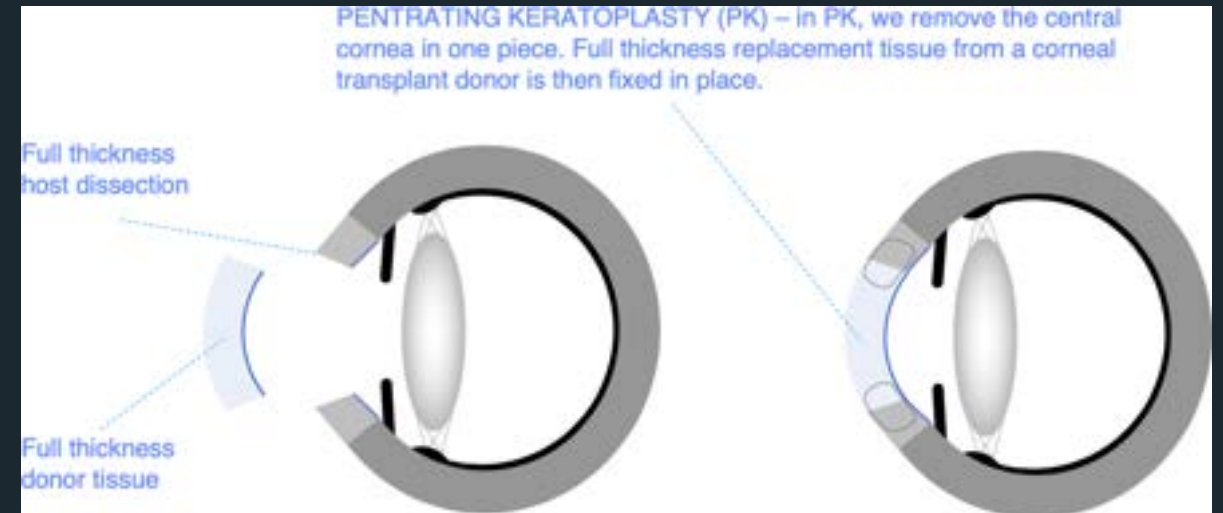
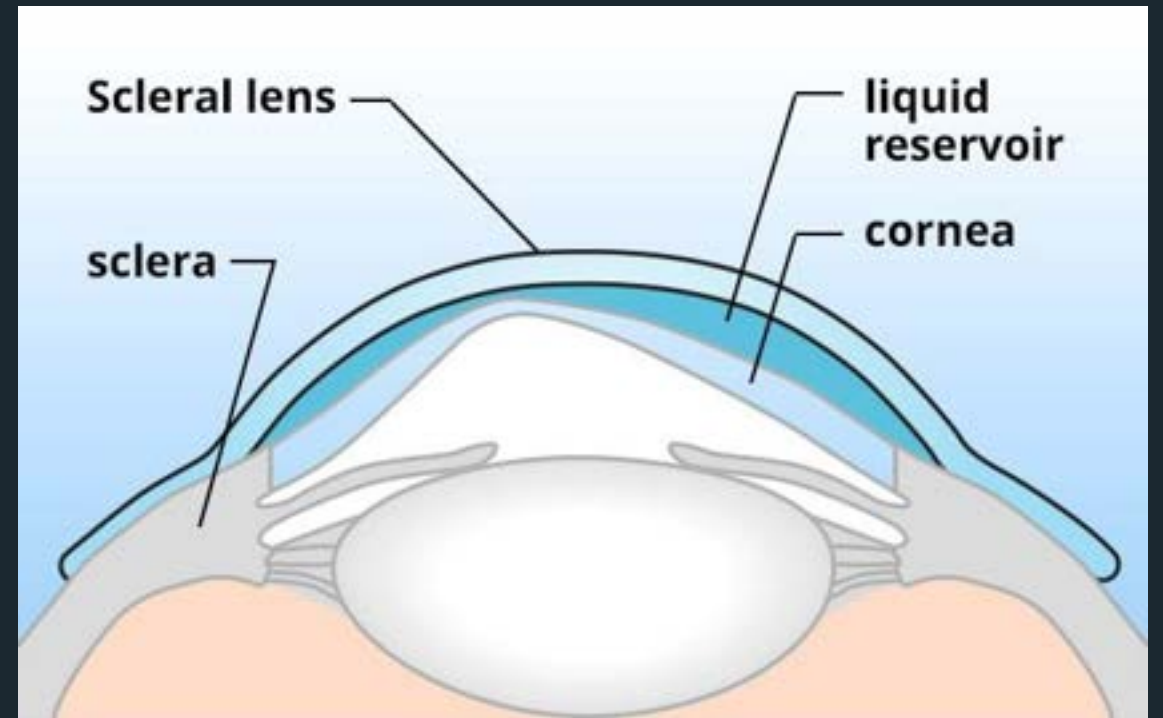
> Acta Ophthalmol. 2017 Jun;95(4):e291-e296. doi: 10.1111/aos.13296. Epub 2016 Oct 26.

Topographic, tomographic and biomechanical corneal changes during pregnancy in patients with keratoconus: a cohort study

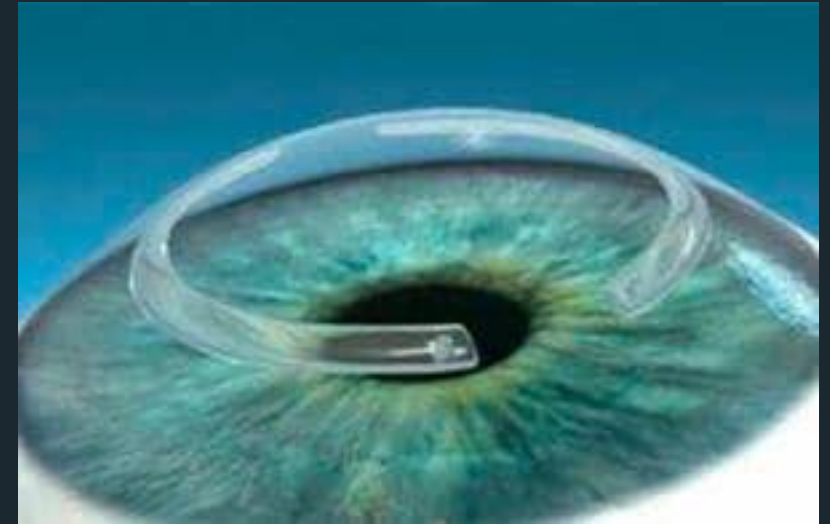
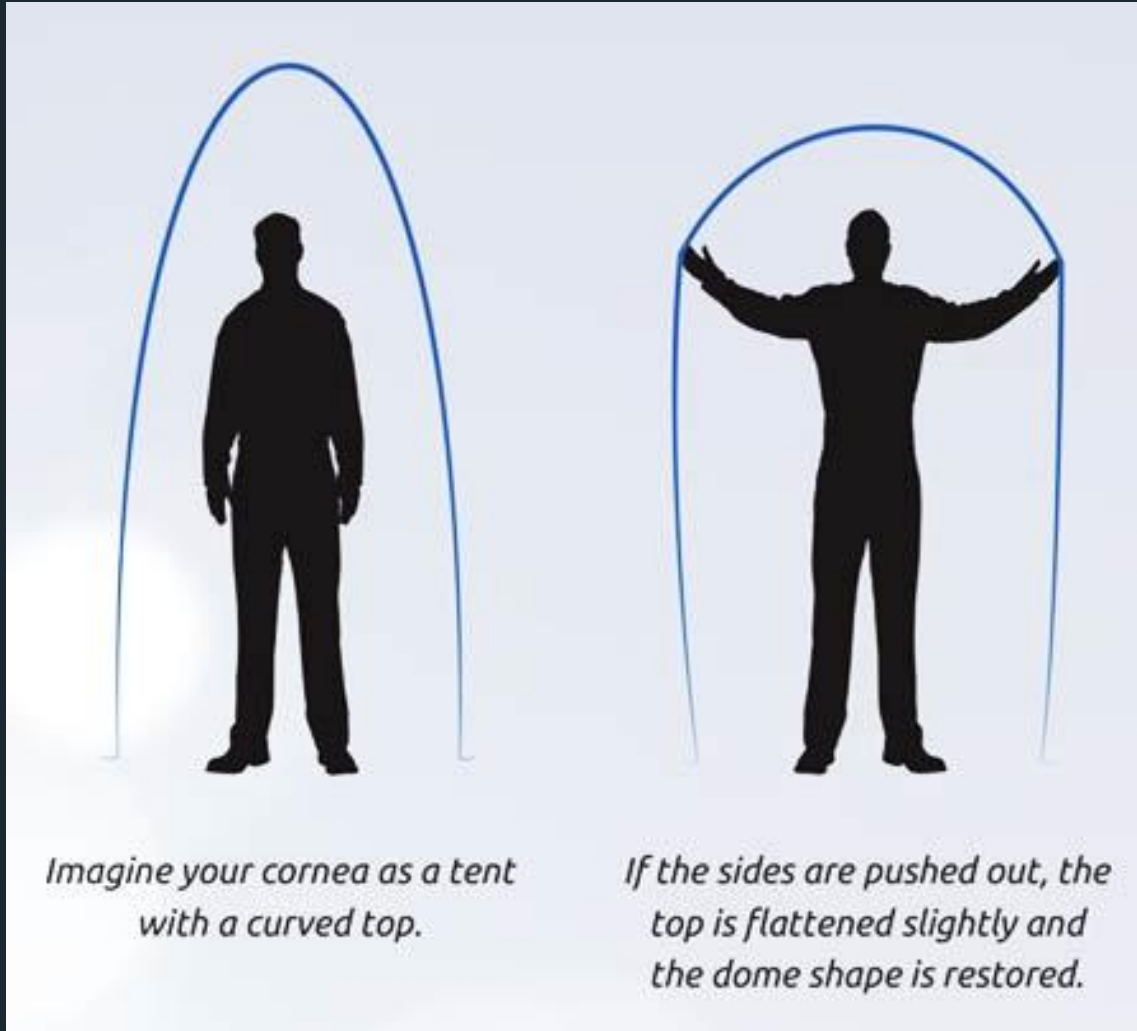
Mohammad Naderan ¹, Ali Jahanrad ²

Keratoconus Management

- Avoid eye rubbing (tears and topical anti-histamines)
- Cross-linking
- Copper sulfate drop (just started Phase 3)
- Scleral contact lenses
- Corneal transplant
- Intracorneal Ring Segments (INTAC/CTAK)
- ICL



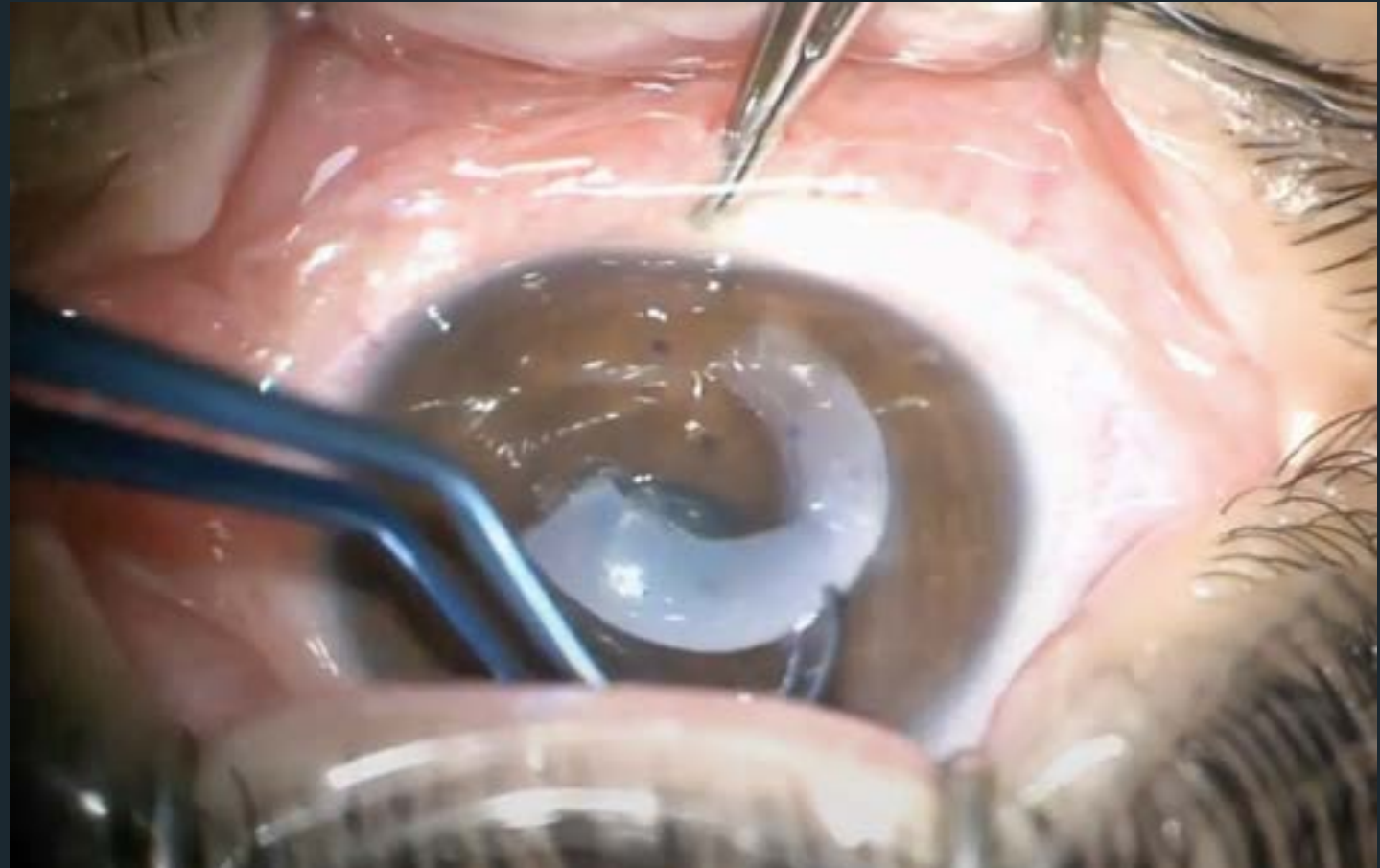
Intracorneal Ring Segments



Average 50D to 46-47D flattening
Uncorrected vision improved from ~20/80 to ~20/40

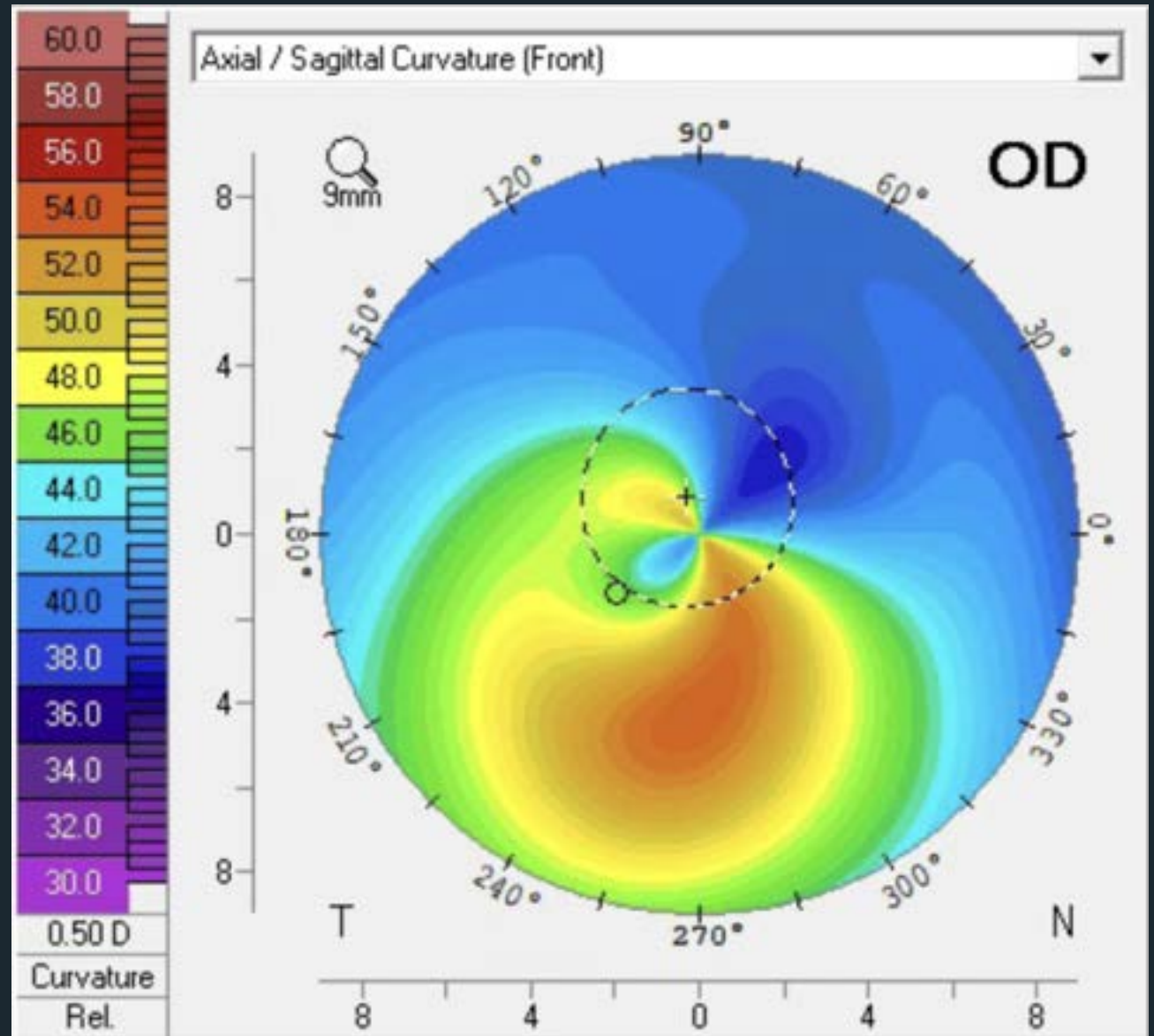
Corneal Tissue Additional Keratoplasty (CTAK)

- Acellular, irradiated, femto cut corneal tissue segments
- No reported cases of rejection
- Allows for implantation into thinner corneas (300 um instead of 450 um)
- Reportedly easier to fit SCL afterwards
- Most change in 1 week, full stability at 6 months



Pre-Op

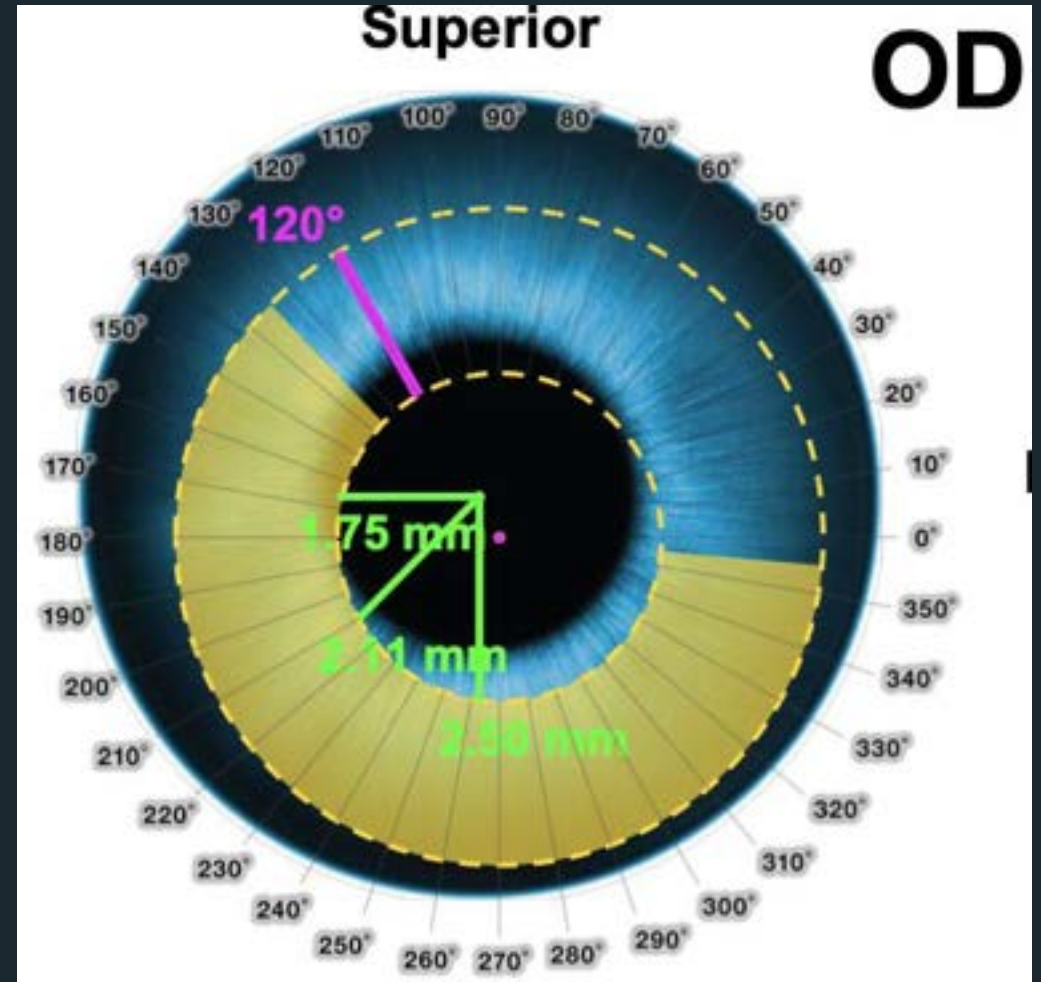
VA (sc)	20/200
BCVA	20/50
MRx	Plano -6.00x48
K1	48.2 D
K2	41.7 D
Astigmatism	6.5 D
Kmax	53.6 D



***Could not tolerate scleral contact lenses

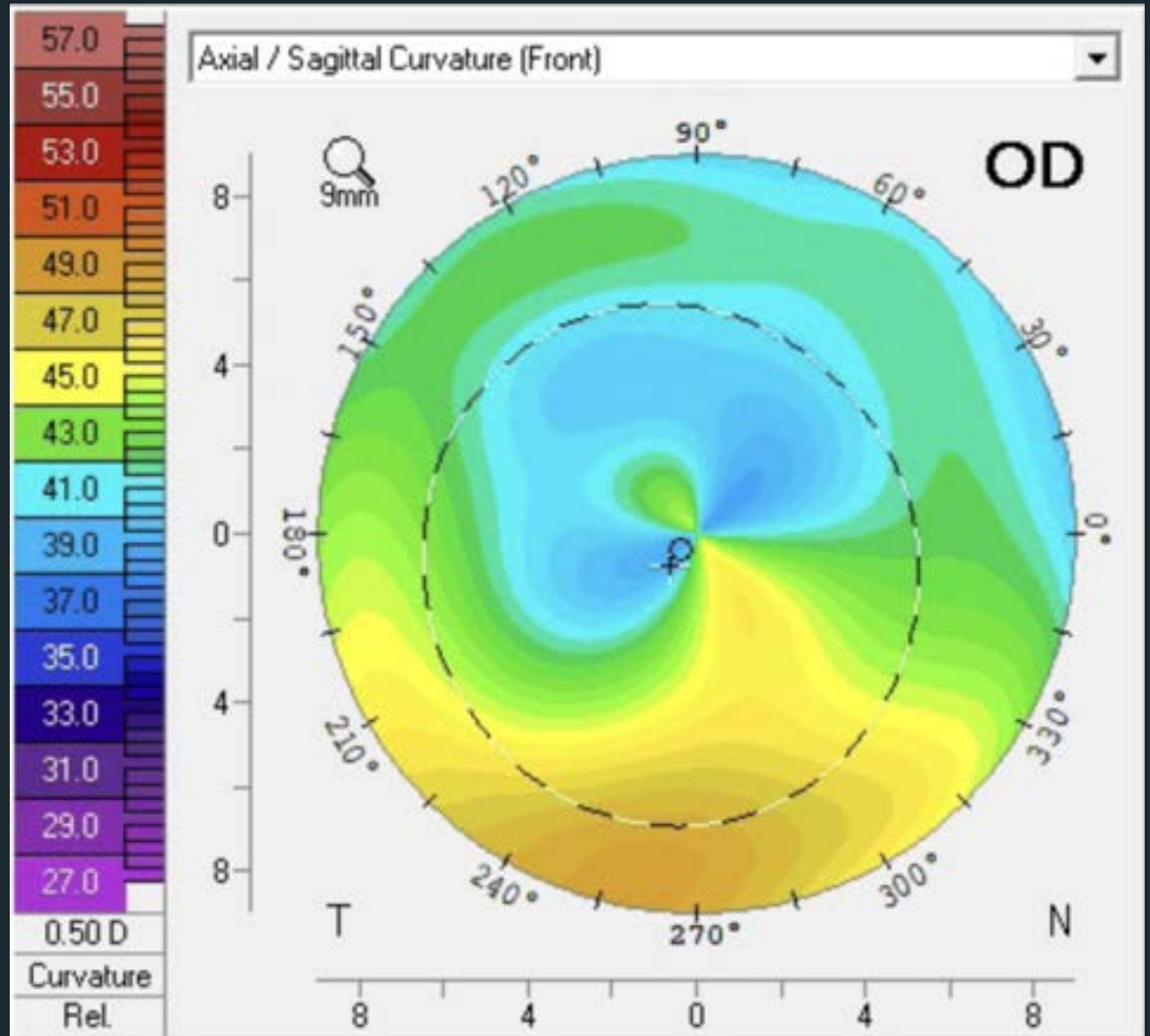
Corneal Tissue Additional Keratoplasty (CTAK)

- Inner diameter: 4 mm
- Outer diameter 8 mm
- Depth: 200 μm
- Video

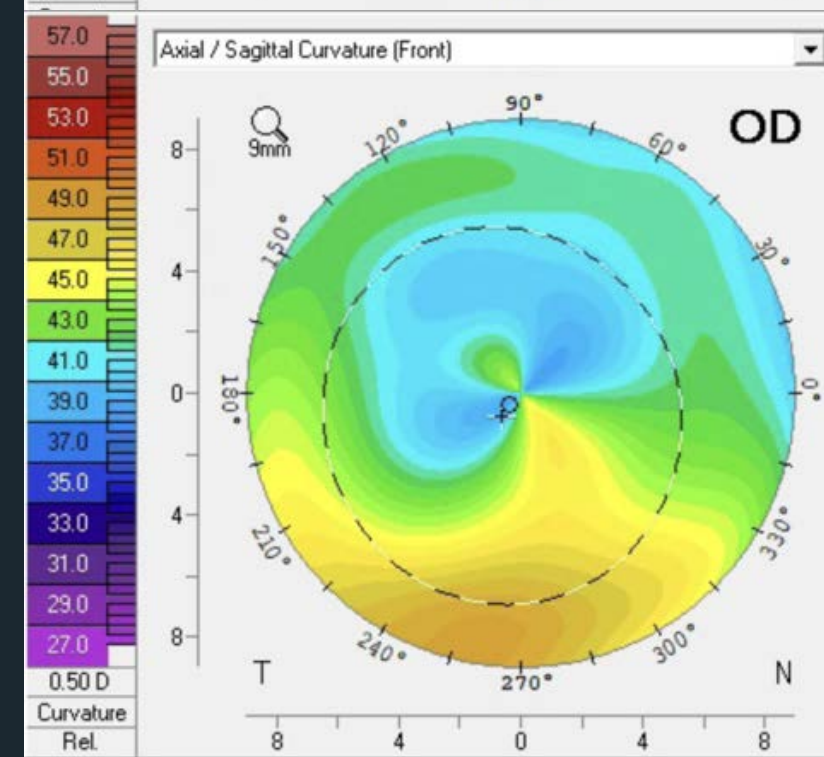
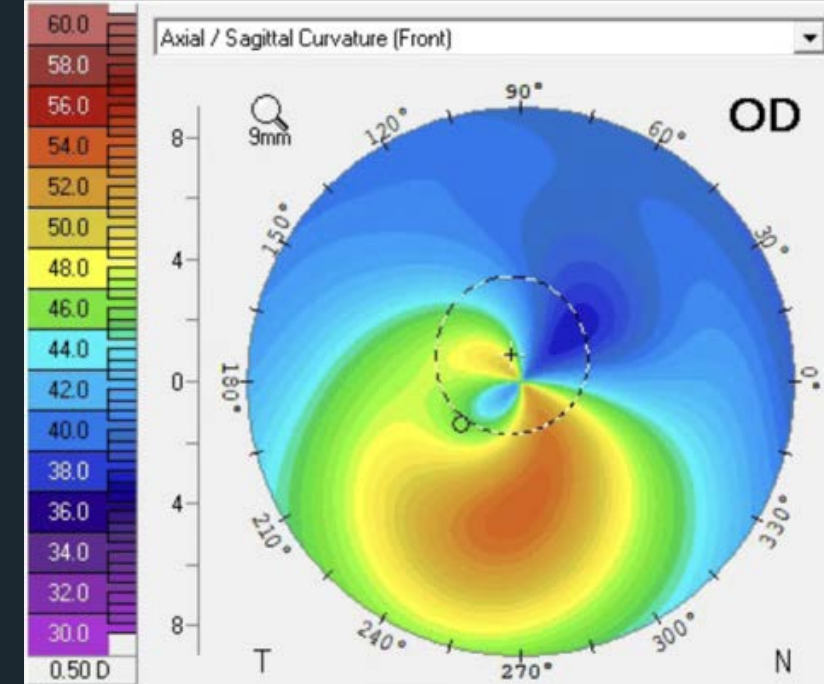


POD1

VA (sc)	20/50
BCVA	20/3
MRx	TBD
K1	43.1 D
K2	39.7 D
Astigmatism	3.4 D
Kmax	48.5 D

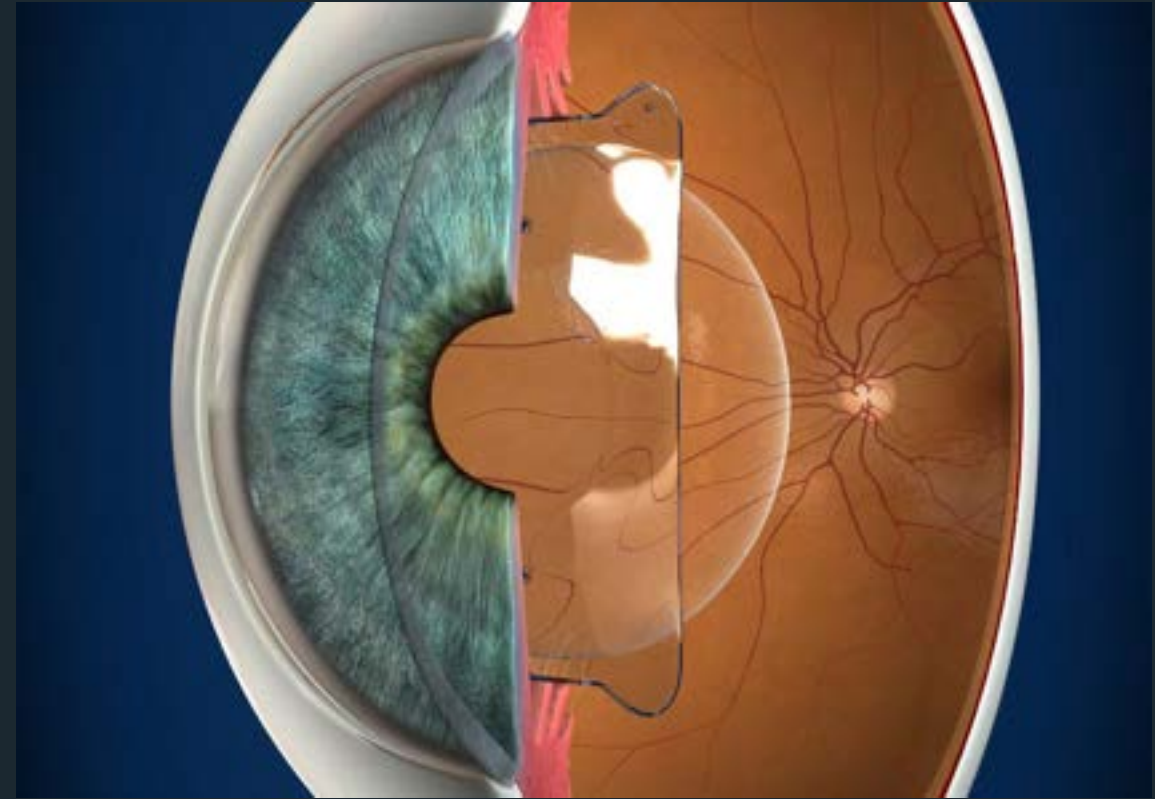


	Pre-Op	POD1
VA (sc)	20/200	20/50
BCVA	20/50	20/30
MRx	Plano - 6.00x48	TBD
K1	48.2 D	43.1 D
K2	41.7 D	39.7 D
Astigmatism	6.5 D	3.4 D
Kmax	53.6 D	48.5 D



Implantable Collamer Lenses

- Improve uncorrected vision when you cannot ablate the cornea
- Pre-op average of -6D and 3.5D cylinder
- 87% within 0.5D of target refraction
- Uncorrected 73% reached 20/25 or better, 97% reached 20/40 or better



> [Int Ophthalmol.](#) 2021 Jul;41(7):2609-2618. doi: 10.1007/s10792-021-01820-2. Epub 2021 Mar 27.

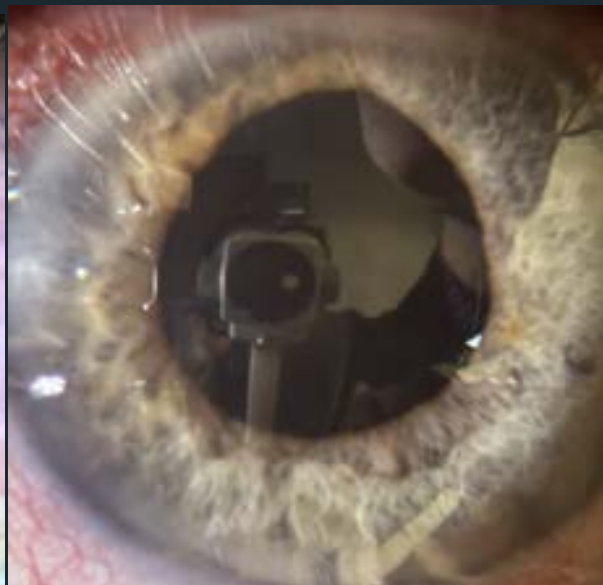
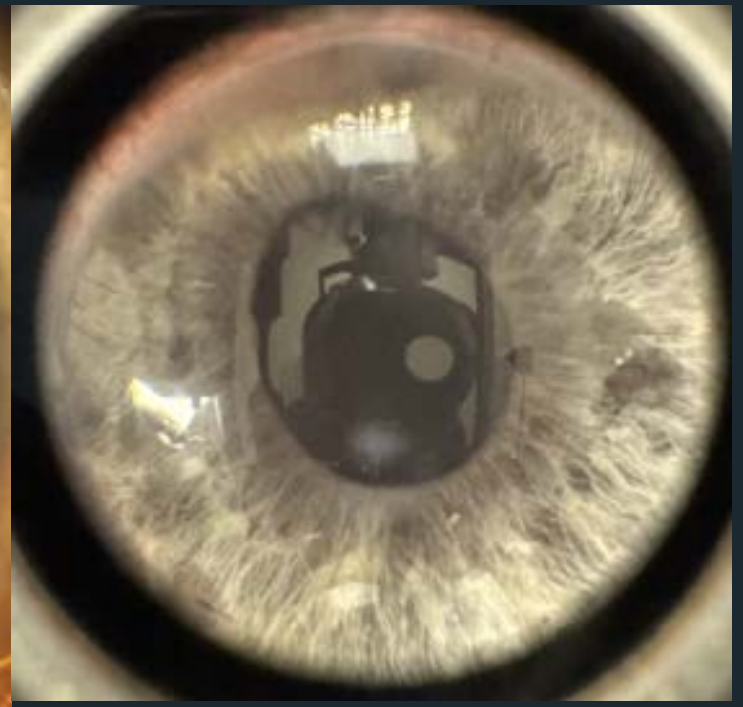
Outcomes and complications of implantable collamer lens for mild to advance keratoconus

Rafah Fairaq ^{1 2}, Mohammed Almutlak ², Enmar Almazayad ², Abdulrahman H Badawi ²,
Muhammad Ali Ahad ³

Outline

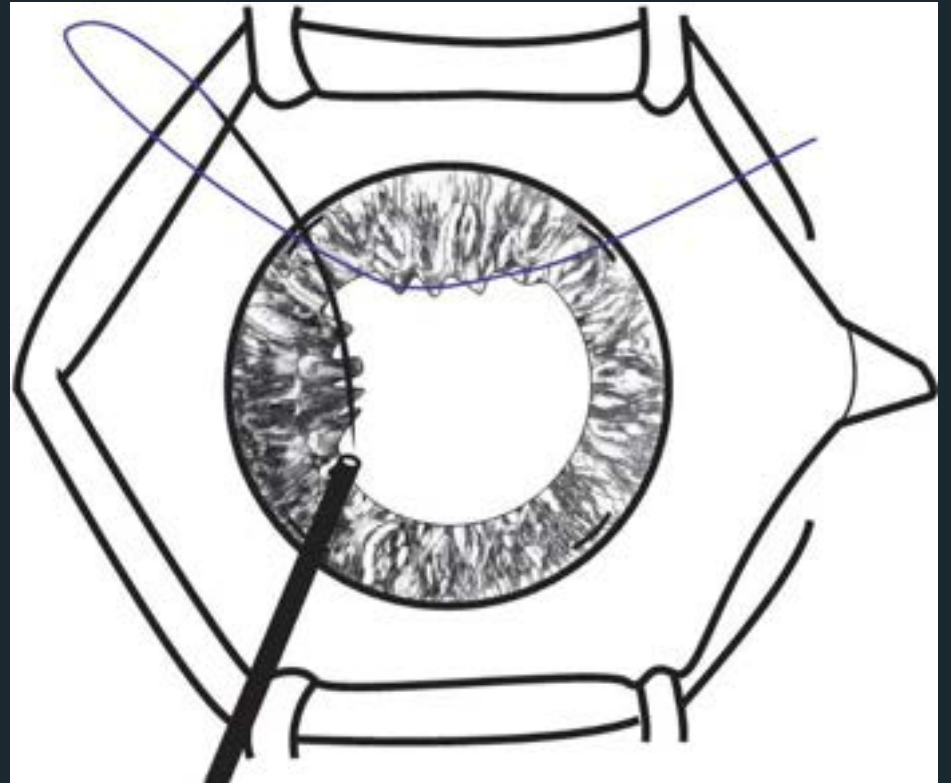
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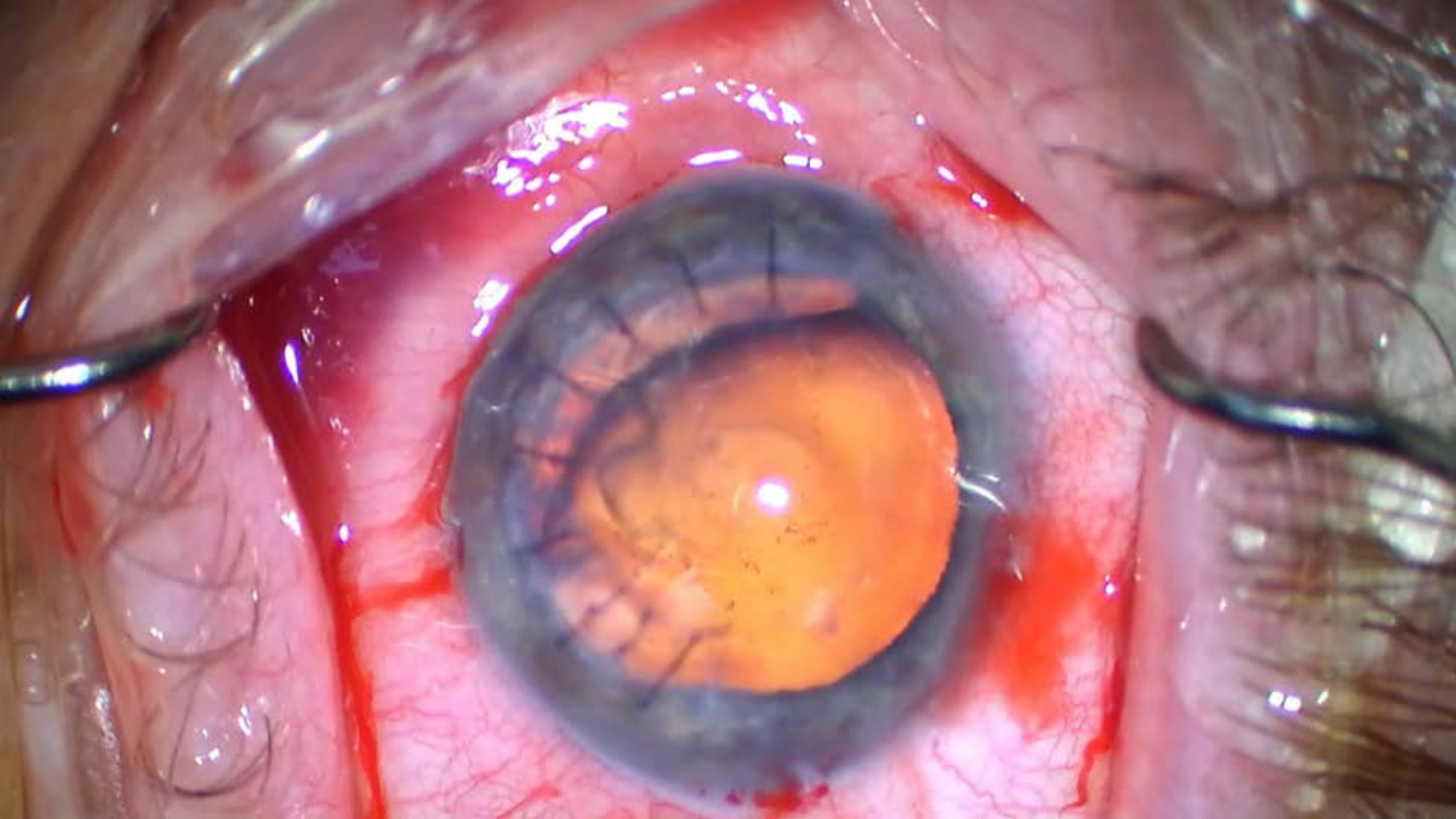
Iris Defect Repair



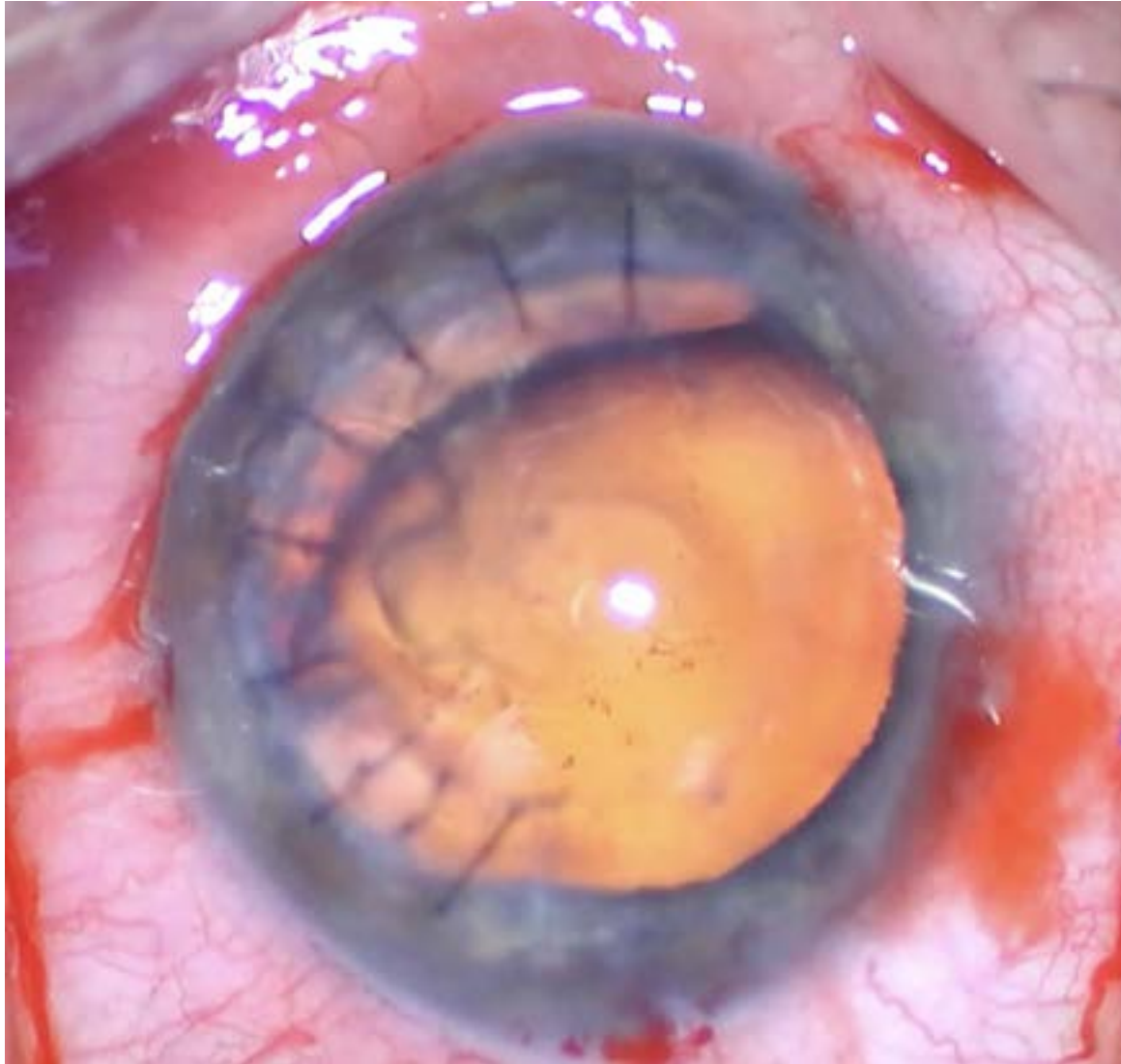
Iris Cerclage

- Extremely difficult
- No break between passes
- Optimal final pupil size 3-4 mm

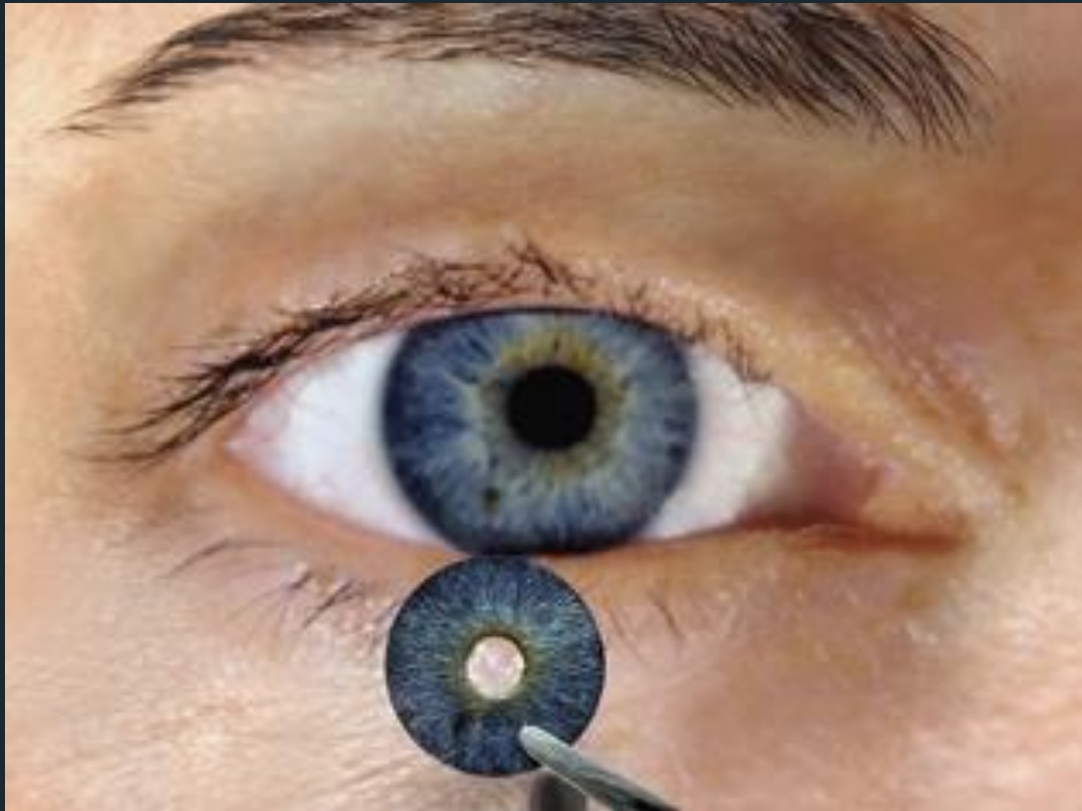




Iris Cerclage



Artificial Iris



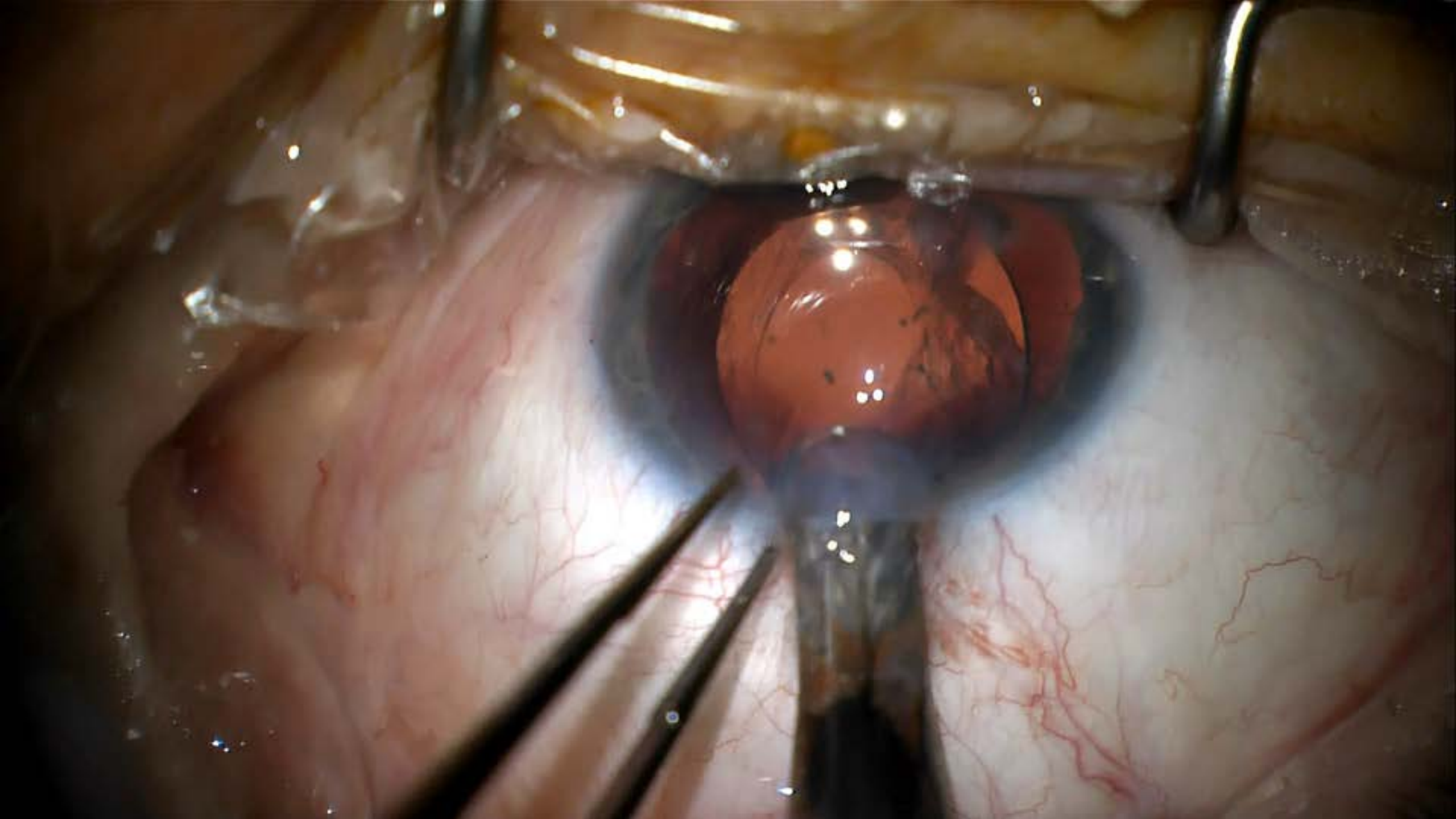
Retina's Perspective

> [Retina](#). 2016 Aug;36(8):1474-9. doi: 10.1097/IAE.0000000000000959.

PARS PLANA VITRECTOMY THROUGH A CUSTOM FLEXIBLE IRIS PROSTHESIS

[Okan Toygar](#)¹, [Michael E Snyder](#), [Christopher D Riemann](#)

- 24 eye case series of vitrectomy through artificial iris
- 3.35 mm pupil is larger on exam due to plus lens of cornea



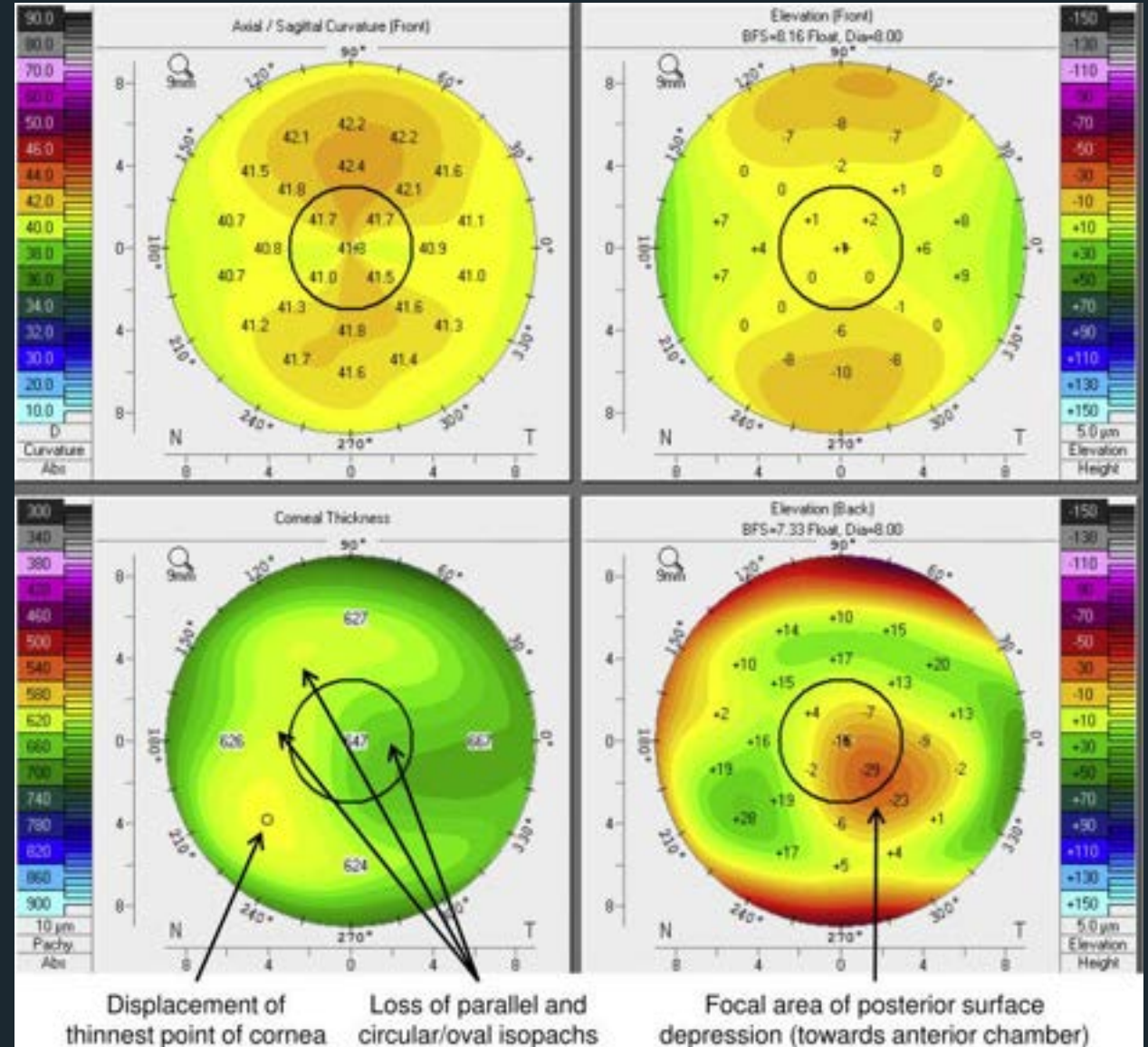


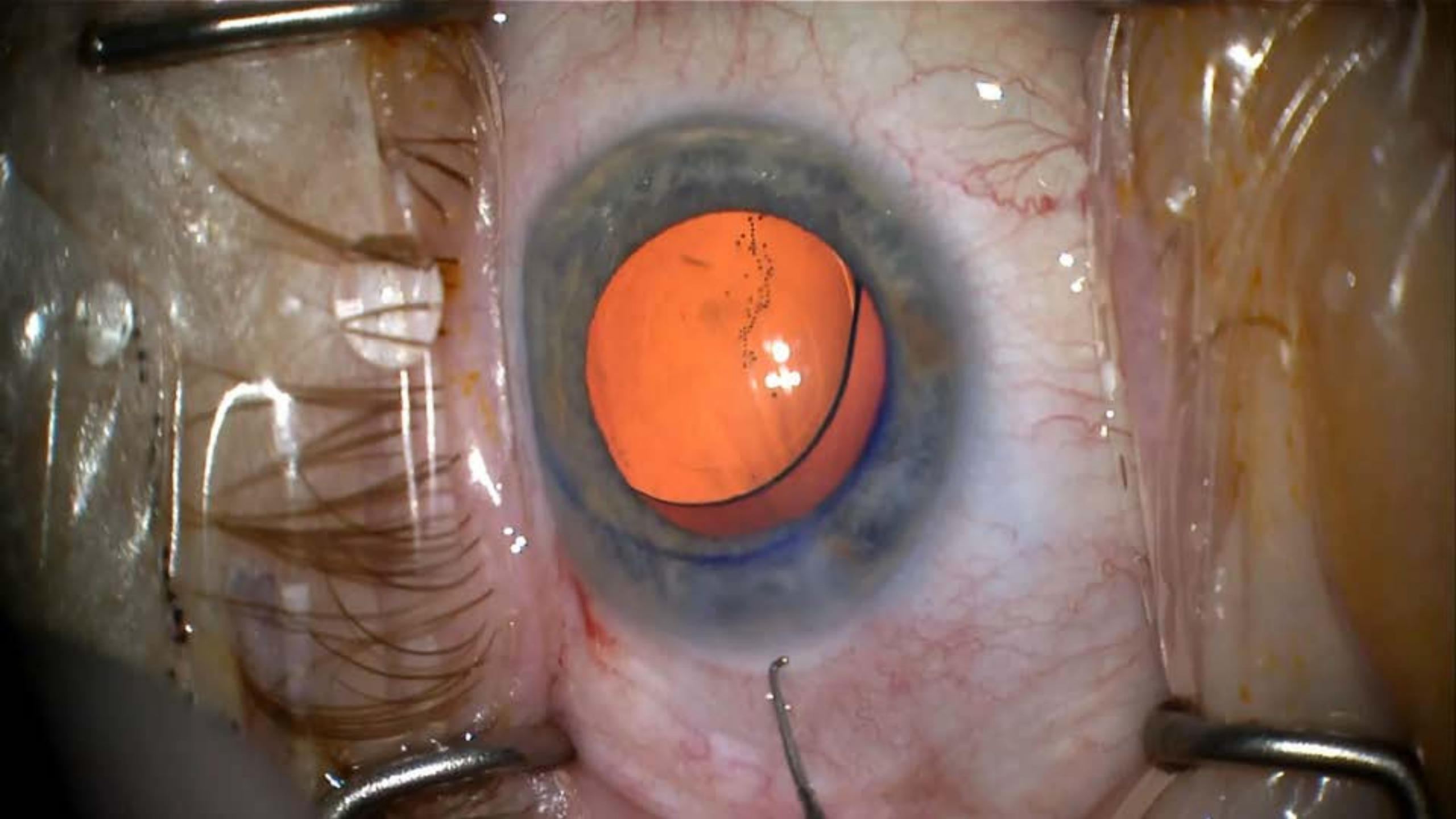
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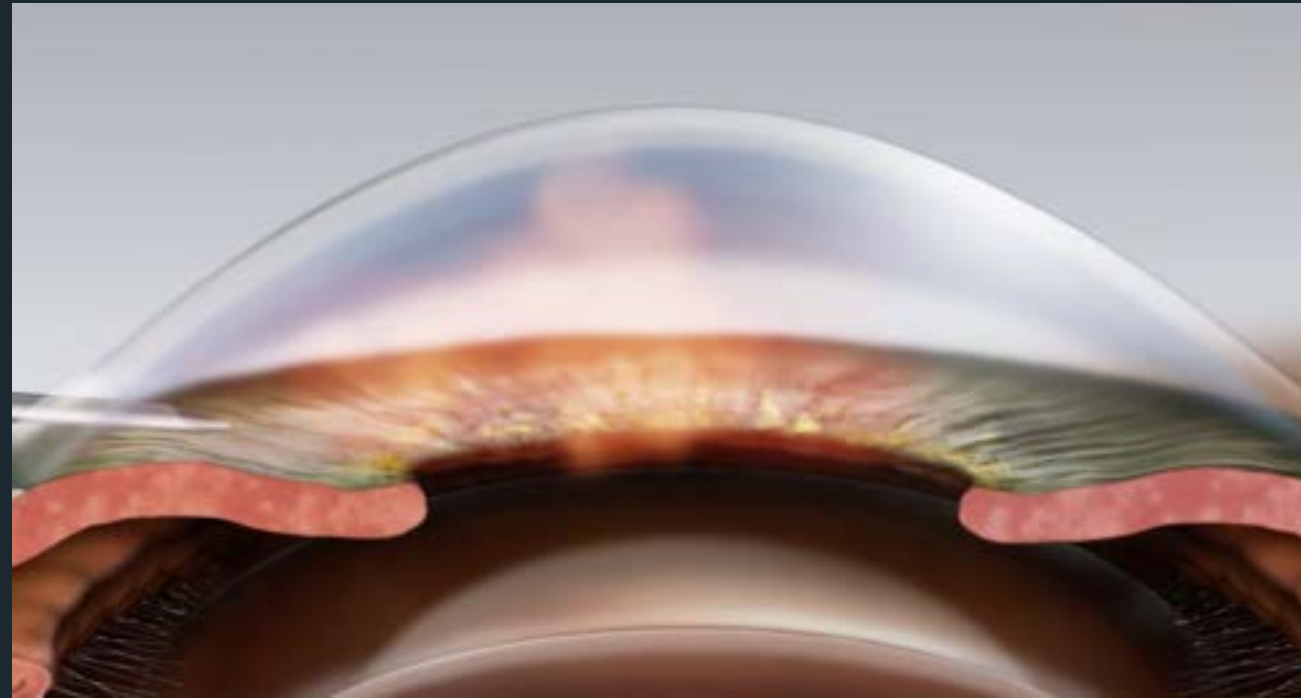
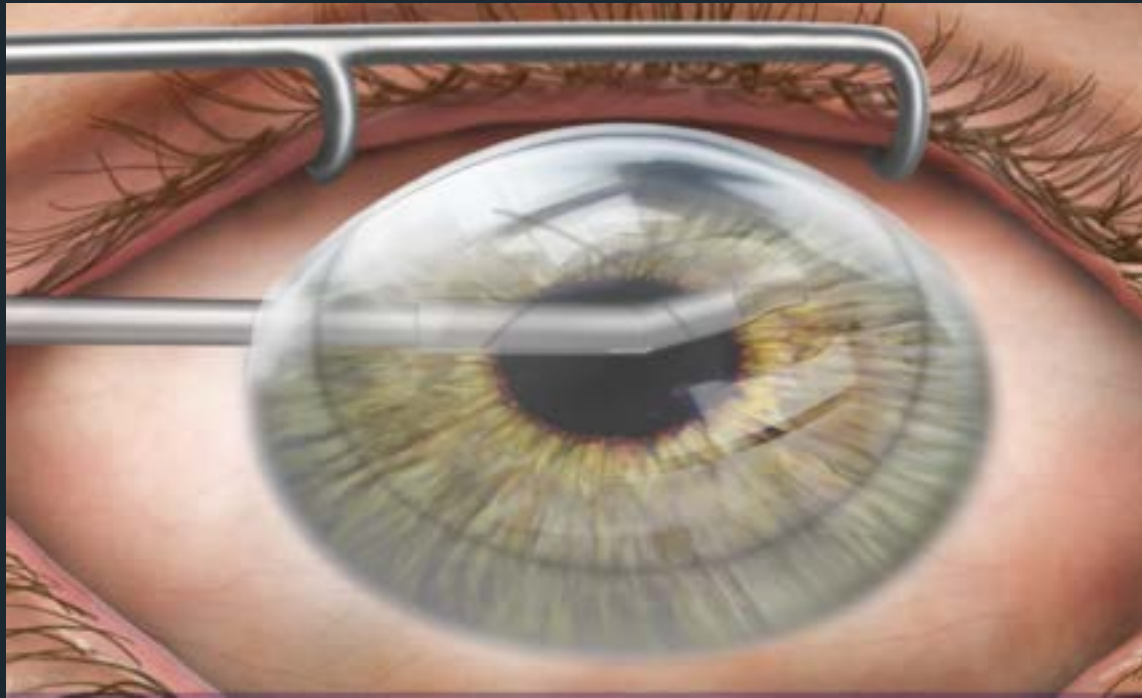
Latest Advances in Endothelial Dystrophy

- Do people need cornea endothelium addressed before cataract surgery?
- Morning blurriness
- Significant cornea guttae on exam
- Cornea edema (Pentacam criteria)
- Don't want to take muro every day





Endothelial Cell Therapy Procedure



→ At 5 years after surgery, normal corneal endothelial function was restored in 10 of the 11 eyes, the mean increase central corneal ECD was 1257 ± 467 cells/mm², BCVA improved significantly in 10 treated eyes, the mean visual acuity changed from 0.876 logMAR (20/150) before surgery to 0.046 logMAR (20/25) after surgery.



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Thank You!

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→ Personal cell: 727-239-6808



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ELEVATED EYE EDUCATION