

Large Diameter (9.5-10mm) DALK: Astigmatism Management

Pre-operative

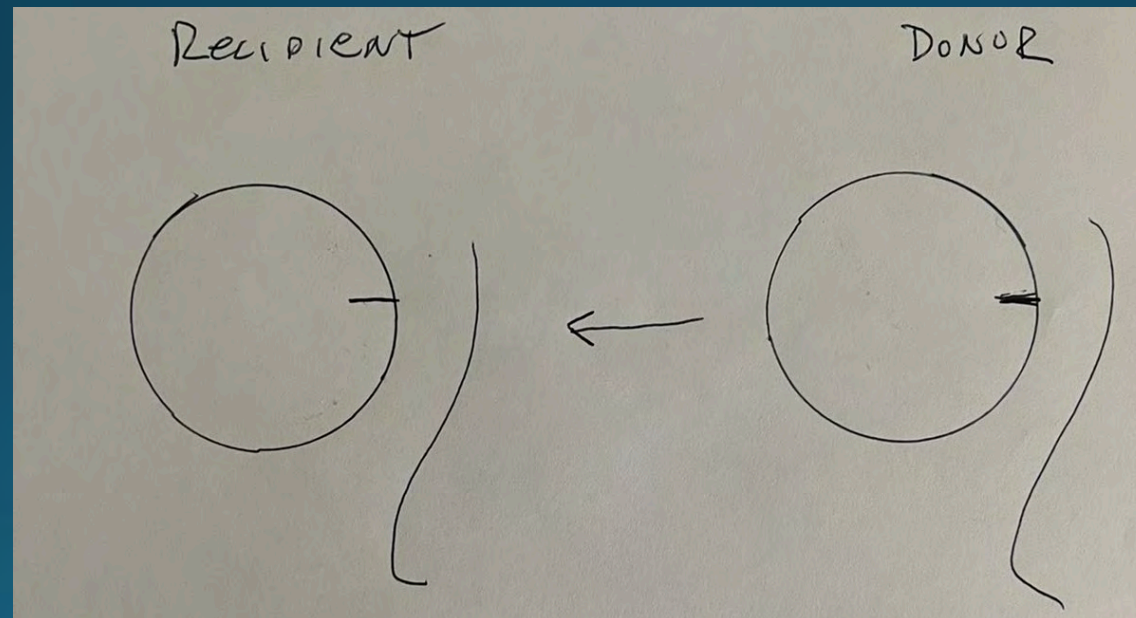
Intraoperative

Post-operative

Large diameter DALK-

Pre-operative Astigmatism considerations

- Gentian violet nasal limbal marking at donor harvesting: duplicate orientation of donor button in recipient bed.
- Laterality Match donor to recipient (ie. Right eye donor to right eye recipient)



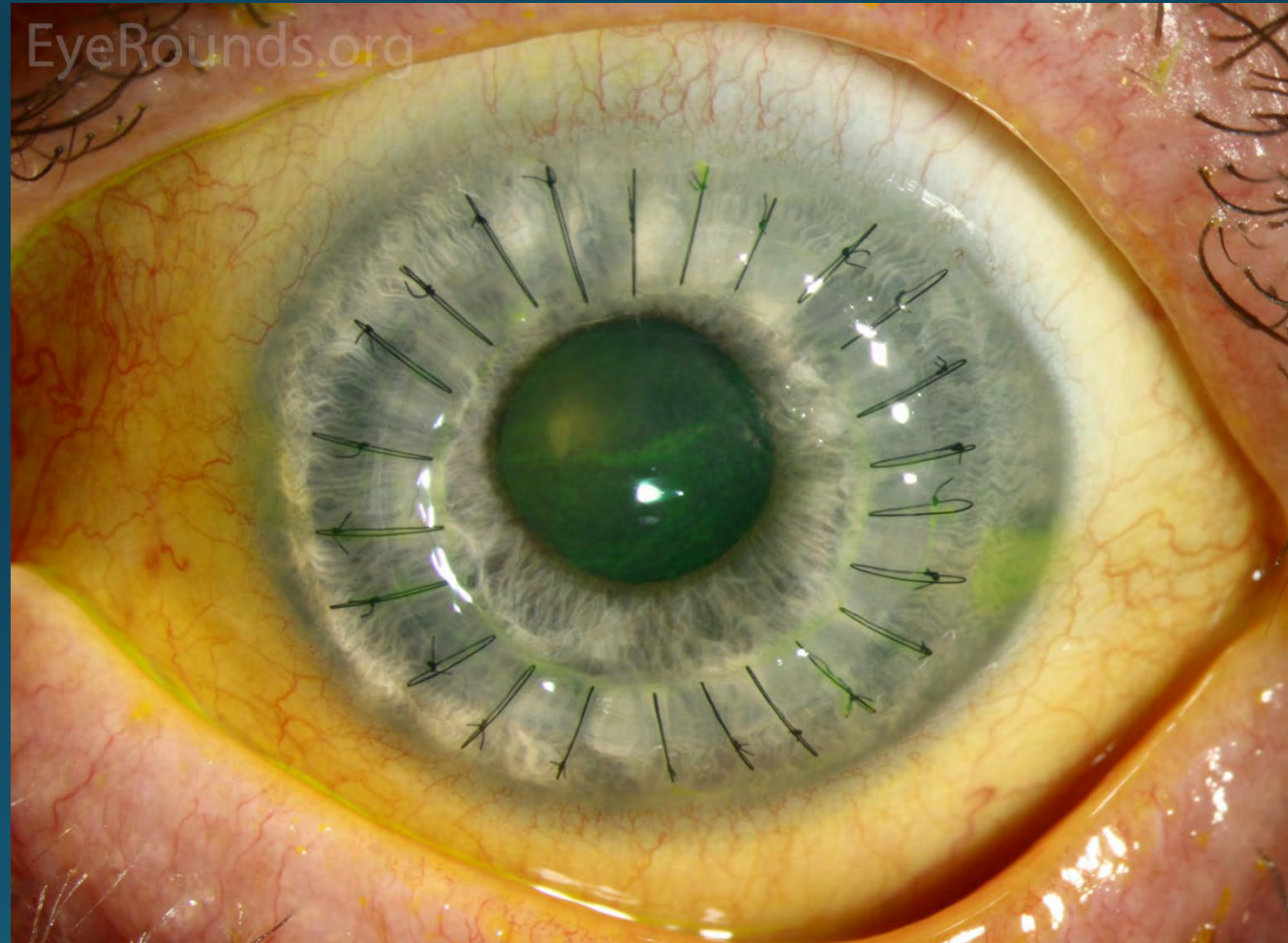
Large Diameter (9.5-10mm) DALK: Astigmatism Management

Pre-operative

Intraoperative

Post-operative

Small Dia DALK - interrupted sutures NOT adjustable



Astigmatism Management: Is large dia (9.5-10.0mm) DALK adjustable intraoperatively?

- Yes!
- Running suture adjustment under Mastel intraoperative keratometer after suture is tied, and knot rotated into the stroma at the end of case

Early Visual Rehabilitation Following Keratoplasty Utilizing Single Continuous Suture Technique

- Dr Erdey's preferred technique since 1991
- Before reliable Topographers or intraoperative keratometers were available

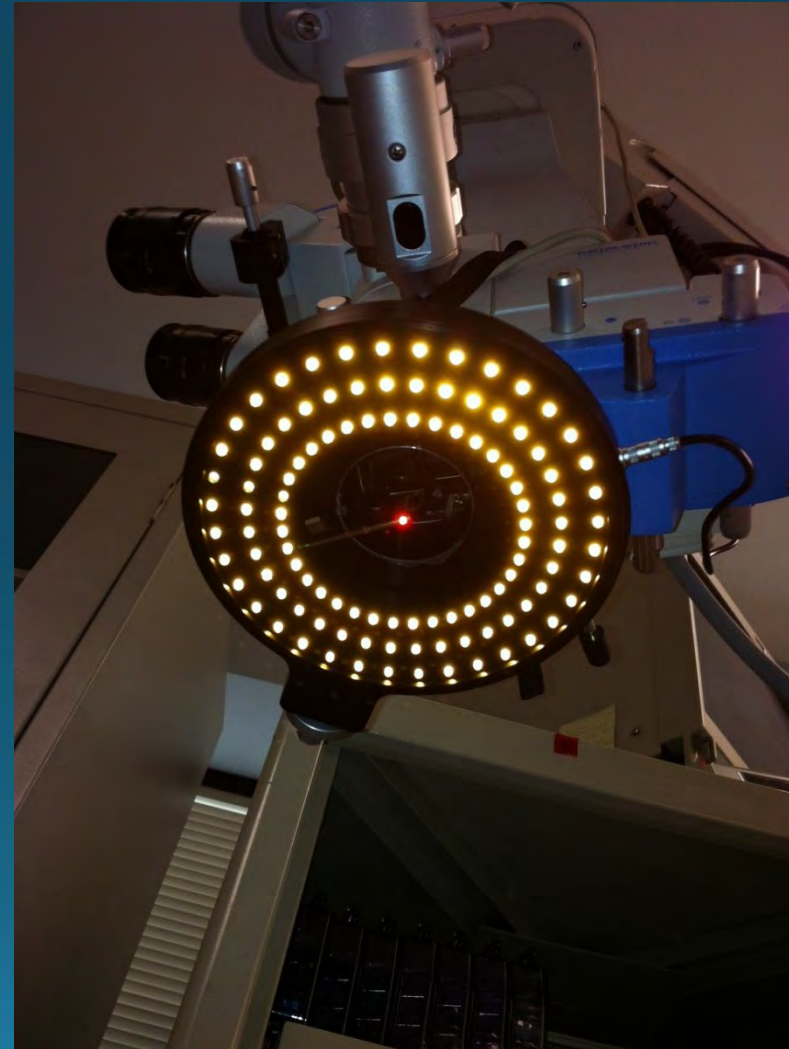
Ophthalmic Surgery 22 (4). April, 1991. Temnycky GO, Lindahl KJ, Aquavella JV, Erdey RA

Intraoperative Keratometers - Mastel

original

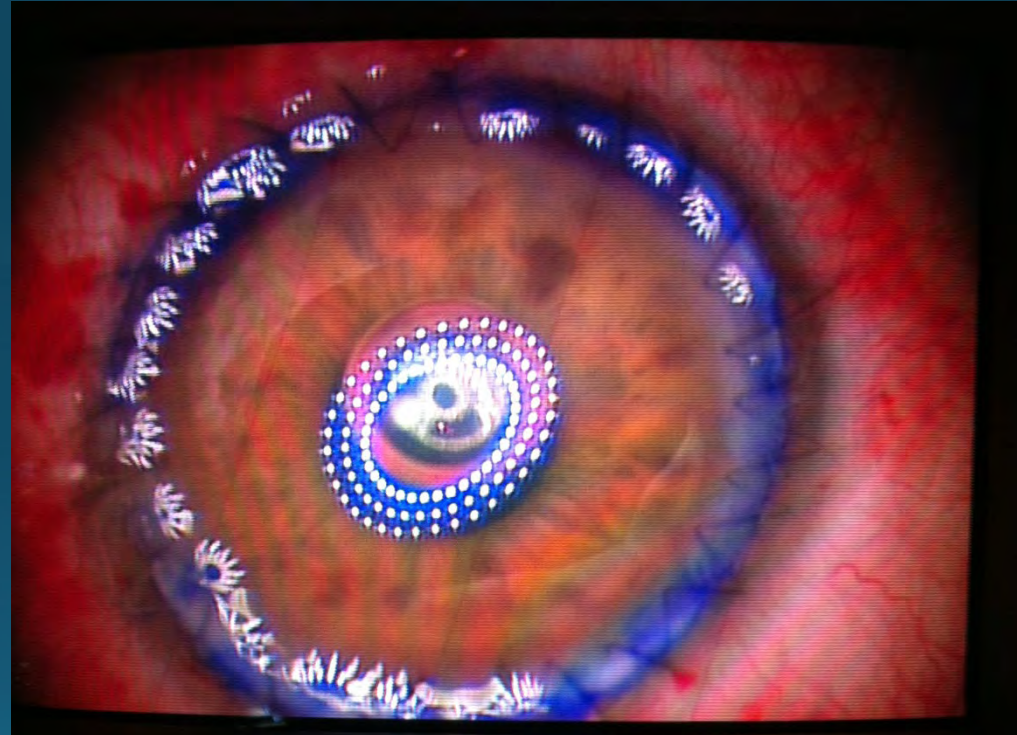


Later Generation



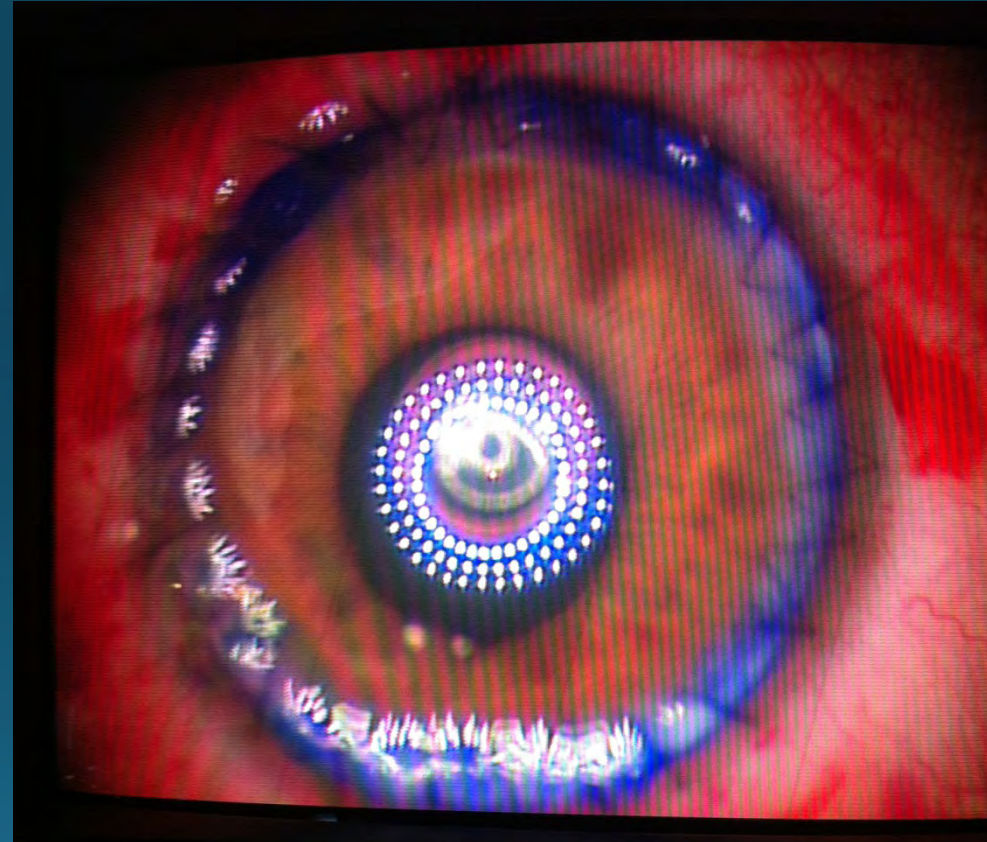
Intraoperative Keratometer

DALK – before suture adjustment

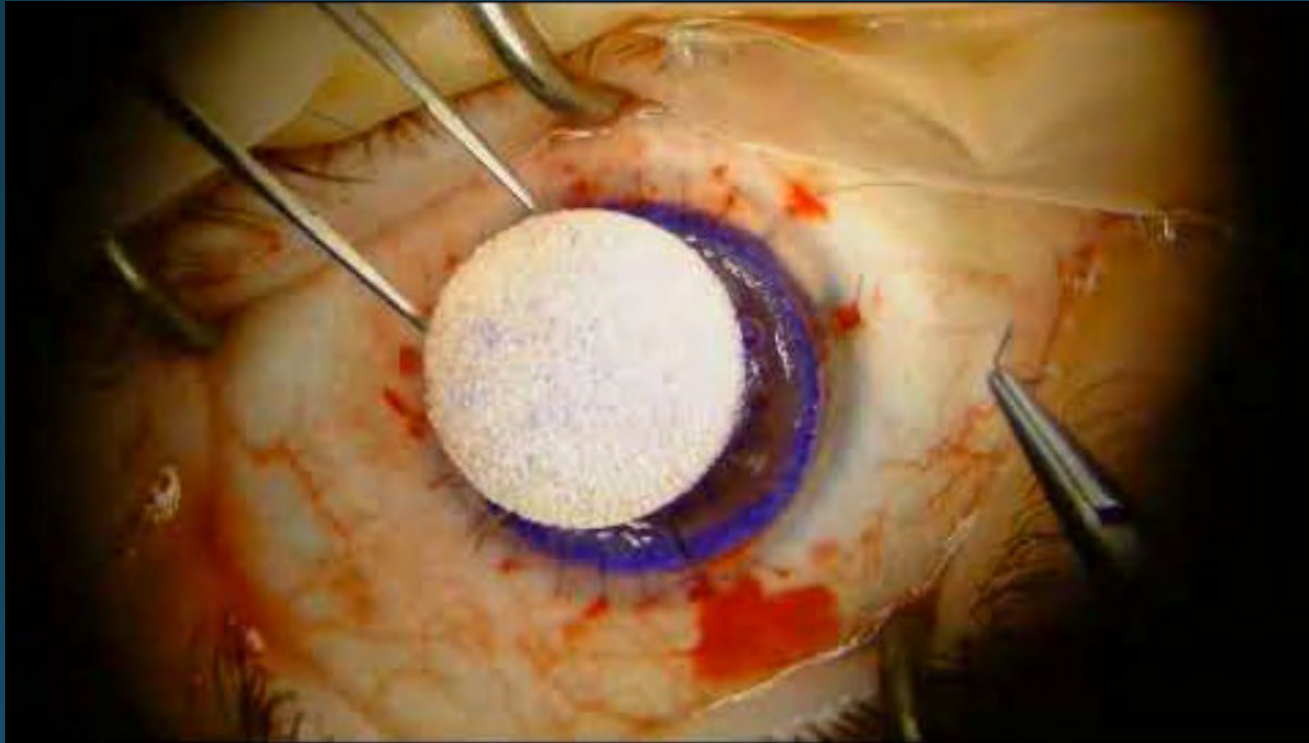


Intraoperative Keratometer

DALK – after suture adjustment:
improves early optical rehabilitation



Is large dia (9.5-10.0mm)DALK Adjustable intraoperatively at case end? (uncut video)



https://youtu.be/B_az1SPJsEo

How quickly can I start to see?

- DALK – few weeks (sometimes less!) 😊 if running suture technique used.
- PK – years (maybe) 😞

Large Diameter (9.5-10mm) DALK: Astigmatism Management

Pre-operative

Intraoperative

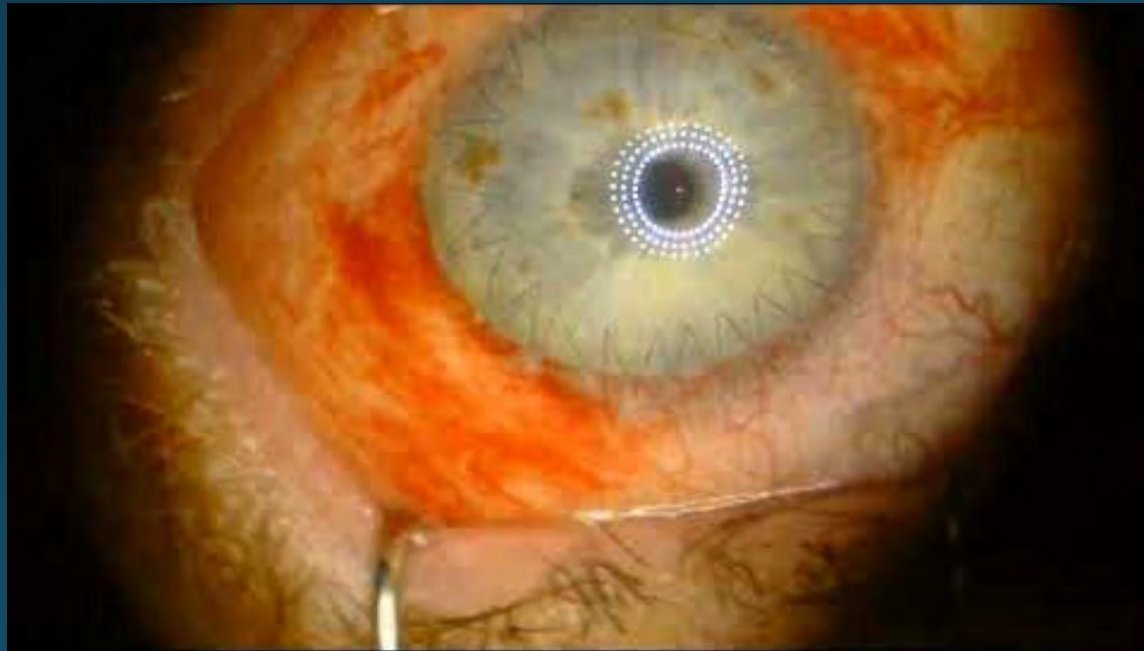
Post-operative

Is astigmatism after DALK Adjustable in the post-op period?

- Yes! Running suture adjustment can be adjusted again during the post-op period if cornea demonstrates high astigmatism after graft has deturgessed
- Patient is brought back to the operating room and the suture is again adjusted under intraoperative keratometer
- This can be repeated multiple times if required. Some pts may require up to two separate suture adjustments to achieve near sphericity.
- They can then have glasses or soft contact lens dispensed for early visual rehabilitation

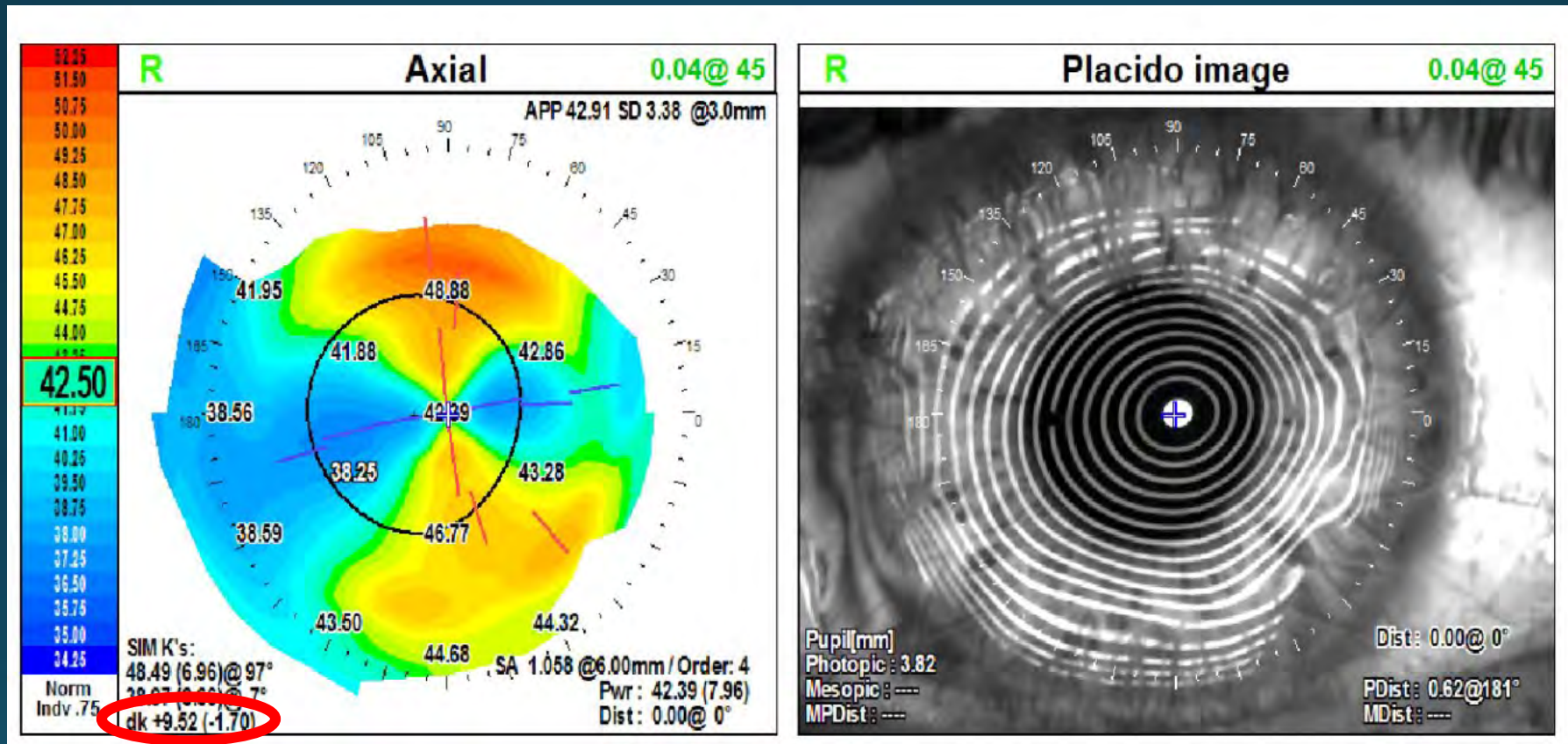
Astigmatism management: Is DALK Adjustable in early post-op period?

Yes! Large amounts of astigmatism can be reduced

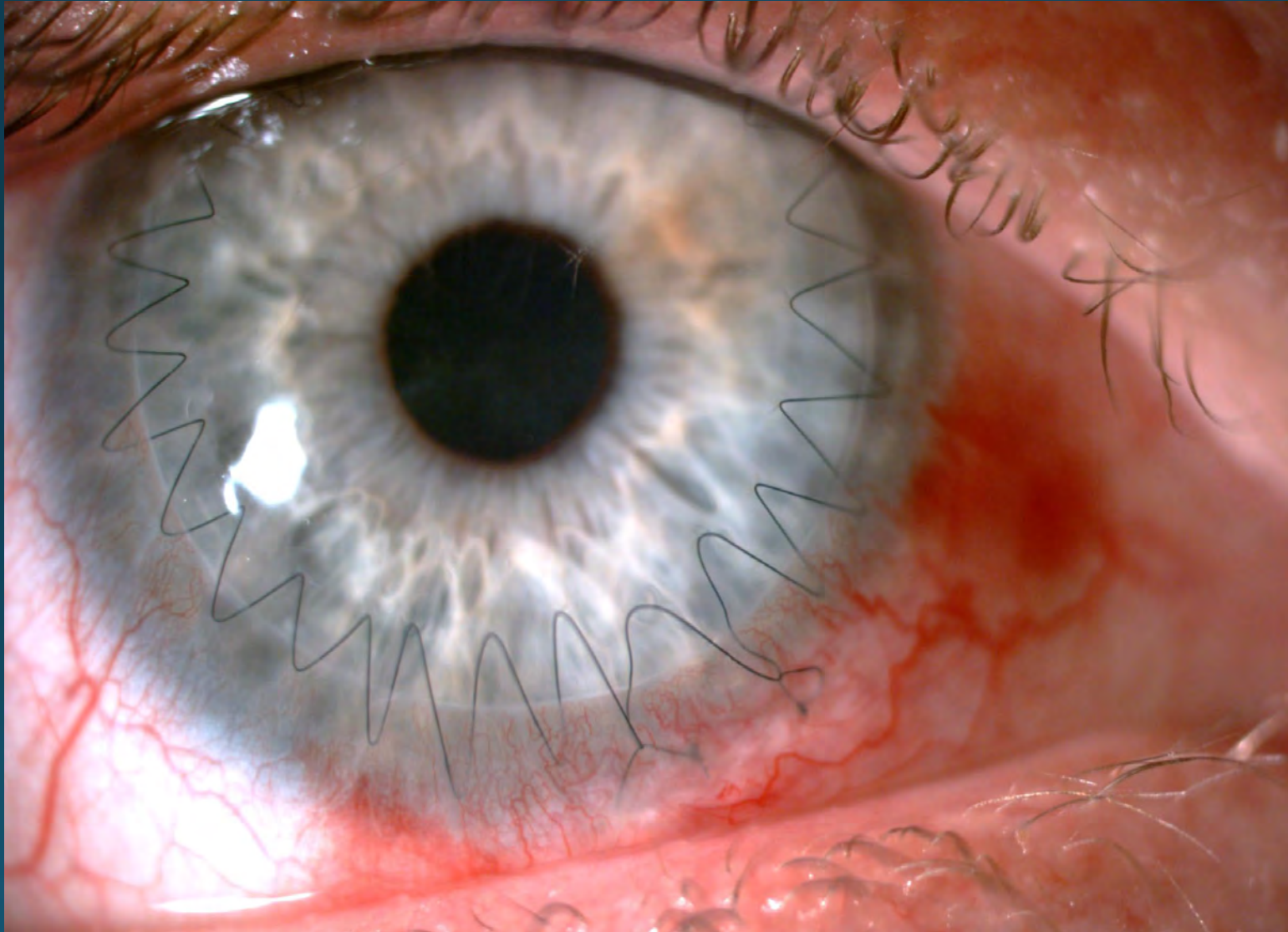


https://youtu.be/QE1uh_FtUqI

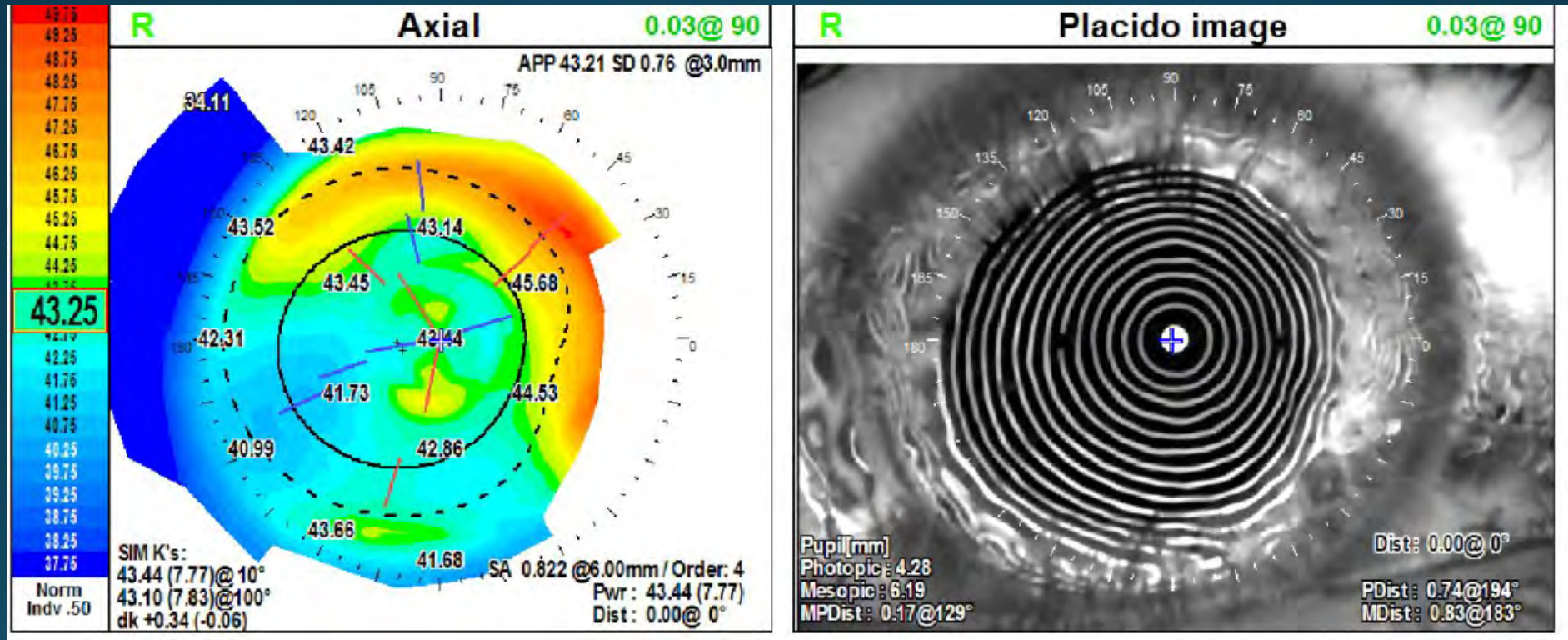
Case #1
 18yo Keratoconus 5 wks after DALK
 almost 10 D w-t-r astigmatism



Case #1: Running suture cheese-wired @ 4-5 o'clock
added 2 interrupted 10-0 nylon sutures and readjusted suture tension under
intraoperative keratometer

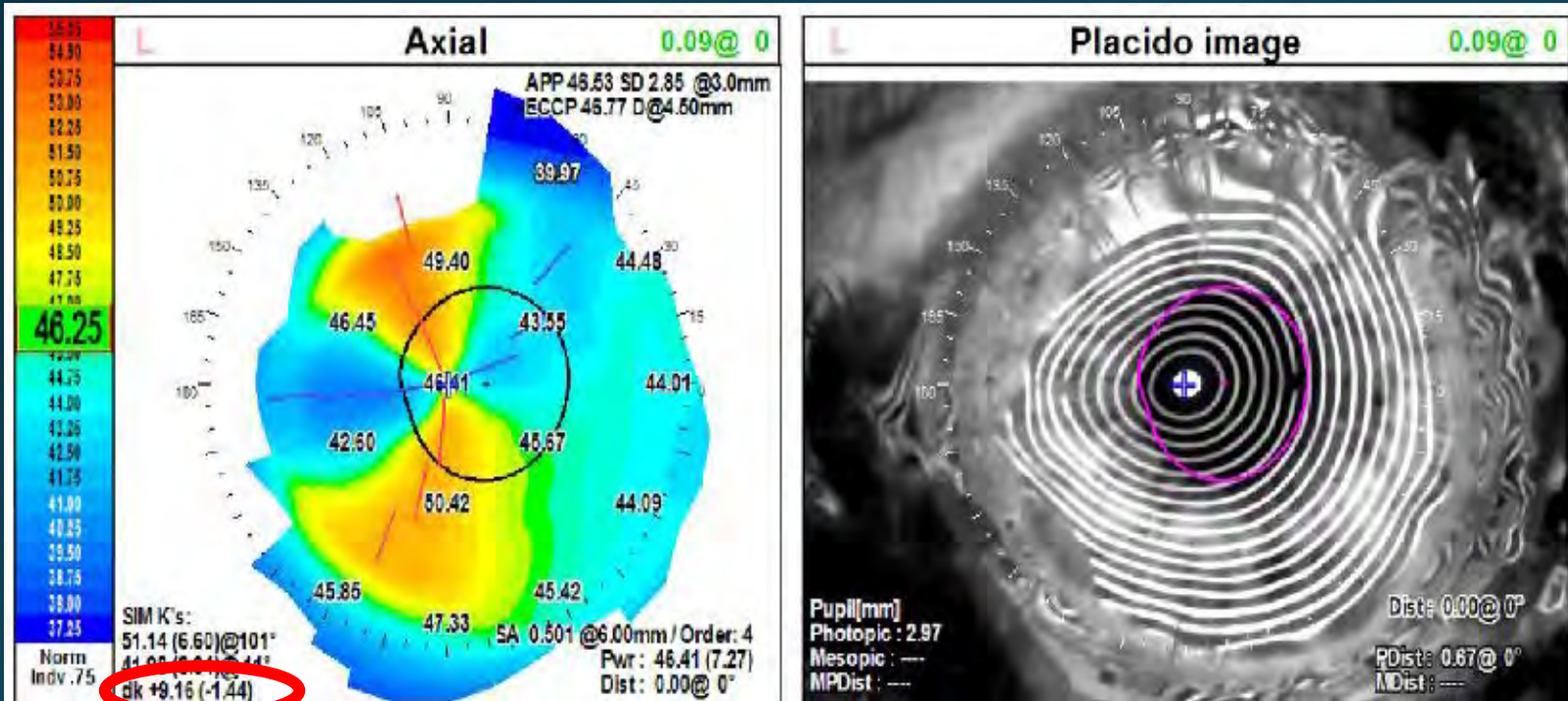


Case #1:
 2 wks after running suture adjustment:
 Uncorrected VA 20/40 +0.5+0.75x78 20/30



Case #2 : 47 yo male Severe keratoconus 2/6/2024 OS DALK 9.5mm bed/9.75mm donor Running suture

Left Eye



2/28/2024

-2.0 +5.0 x 105 20/80

Case #2: DALK: early visual rehabilitation

47 yo male Severe keratoconus

Left Eye

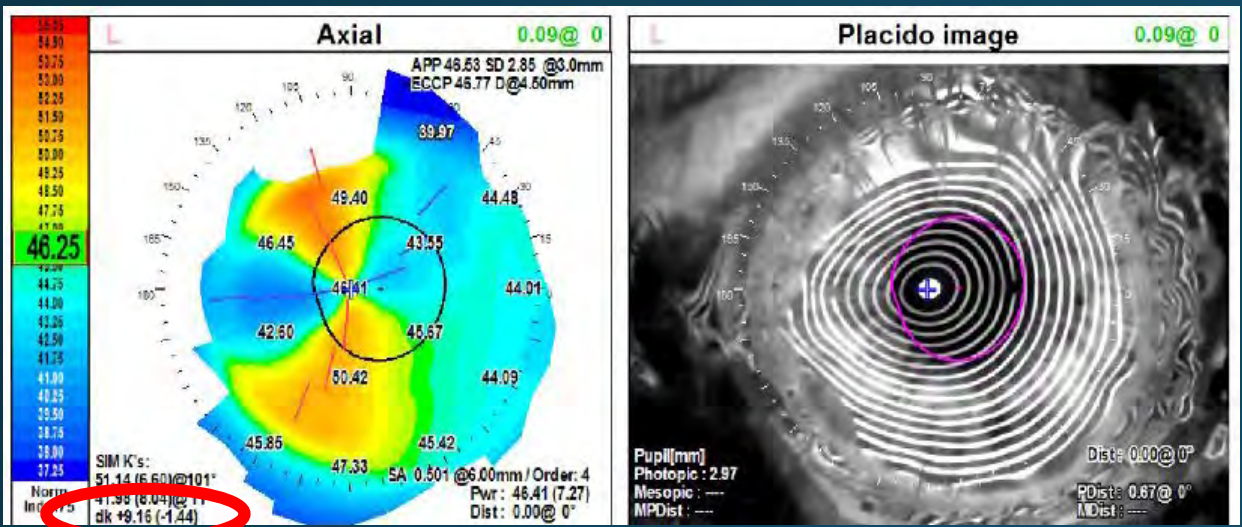
- 2/28/2024 OS donor epithelialized, deturgescenced and initial shape reveals high astigmatism - running suture adjusted again under intraoperative keratometer

2/6/2024 OS DALK 9.5mm bed/9.75mm donor 24 bite running suture adjusted under intraoperative keratometer

Case #2: 47 yo male Severe keratoconus

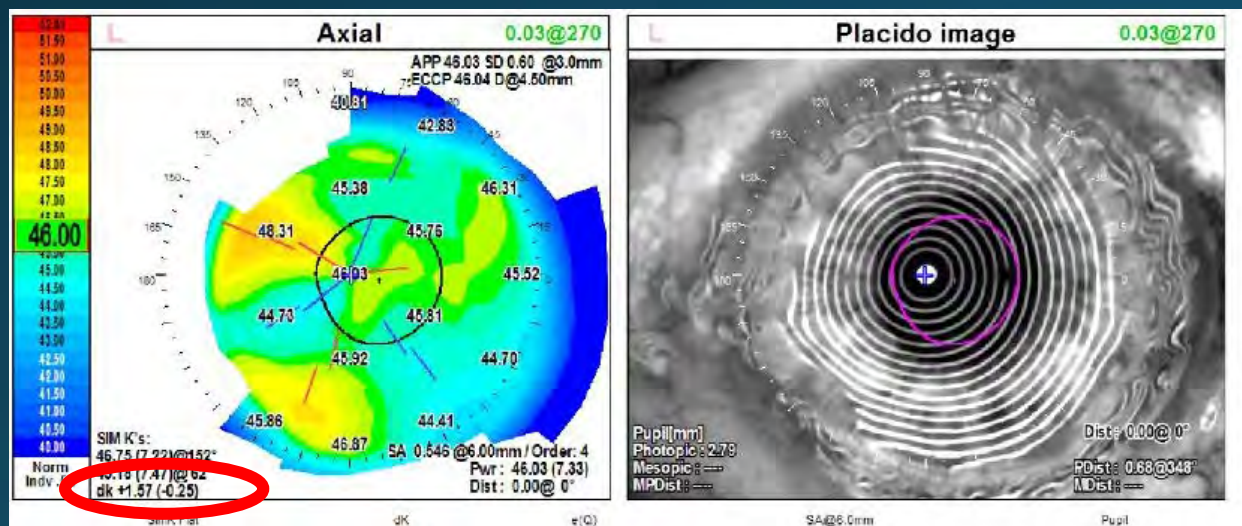
2/6/2024 OS DALK 9.5mm bed/9.75mm donor

Left Eye



2/28/2024
-2.0 +5.0 x 105 20/80

3/5/2024 running suture adjustment



3/18/2024
-4.75 +1.50 x 160 20/25

When suture out...about a year

Optical rescue:

- Glasses
- Soft CL's

Surgical rescue:

- Astigmatic Keratotomy (long non-penetrating scleral tunnel)
- LASIK/PRK
- ICL
- LAL

Suture “out” large diameter DALK

- Final corneal shape may reveal orthogonal astigmatism

Is DALK Astigmatism Adjustable after suture removal?

- Yes! With scleral tunnel lamellar incisions made on steep axis.
- Caveat: AVOID penetration into the anterior chamber at end of tunnel
- Why? I've experienced 2 cases where penetration into the ac caused late decemet's membrane detachment resistant to multiple attempts at air rebubbling. One required PKP, the other was reattached after 4 rebubble attempts, did well for 2 yrs then developed endothelial failure requiring DMEK.
- While you get a bit more meridional flattening with full thickness scleral tunnel penetration into the ac it is NOT worth this unnecessary risk!
- Non-penetrating incisions still work surprisingly well.

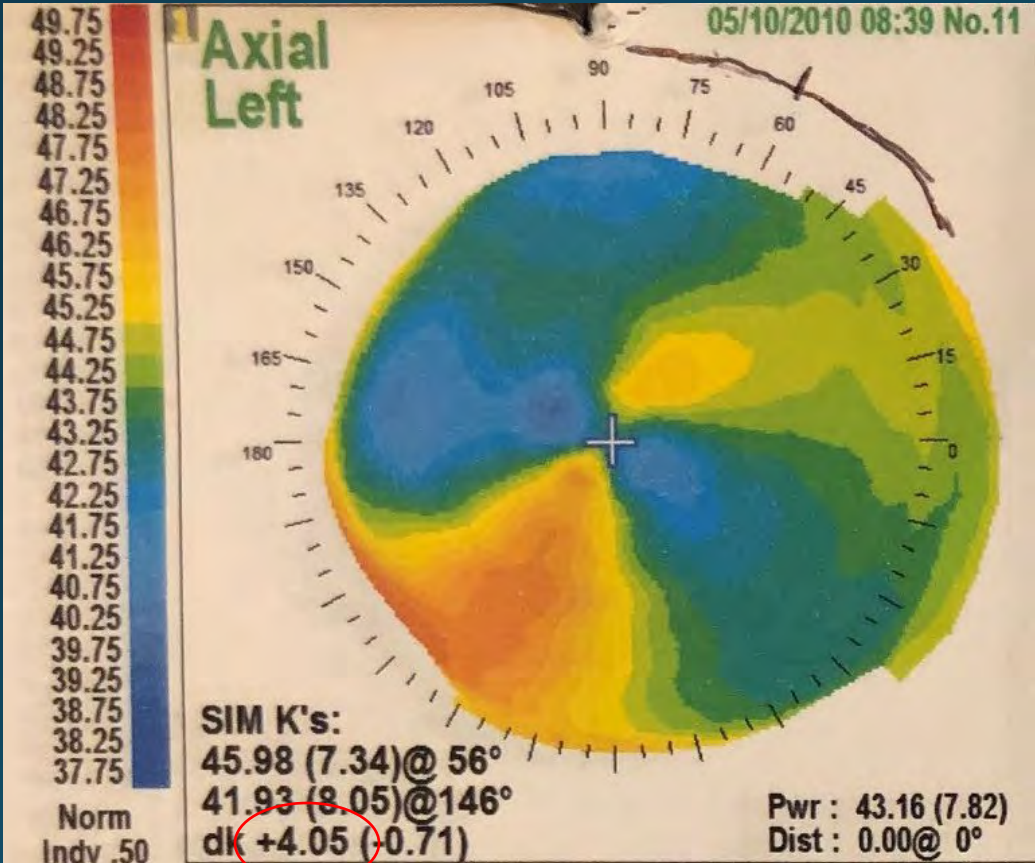
The Incision



3-7. Shelf of the incision. The shelf portion of the incision holds the iris back and helps prevent iris prolapse.

Case #1

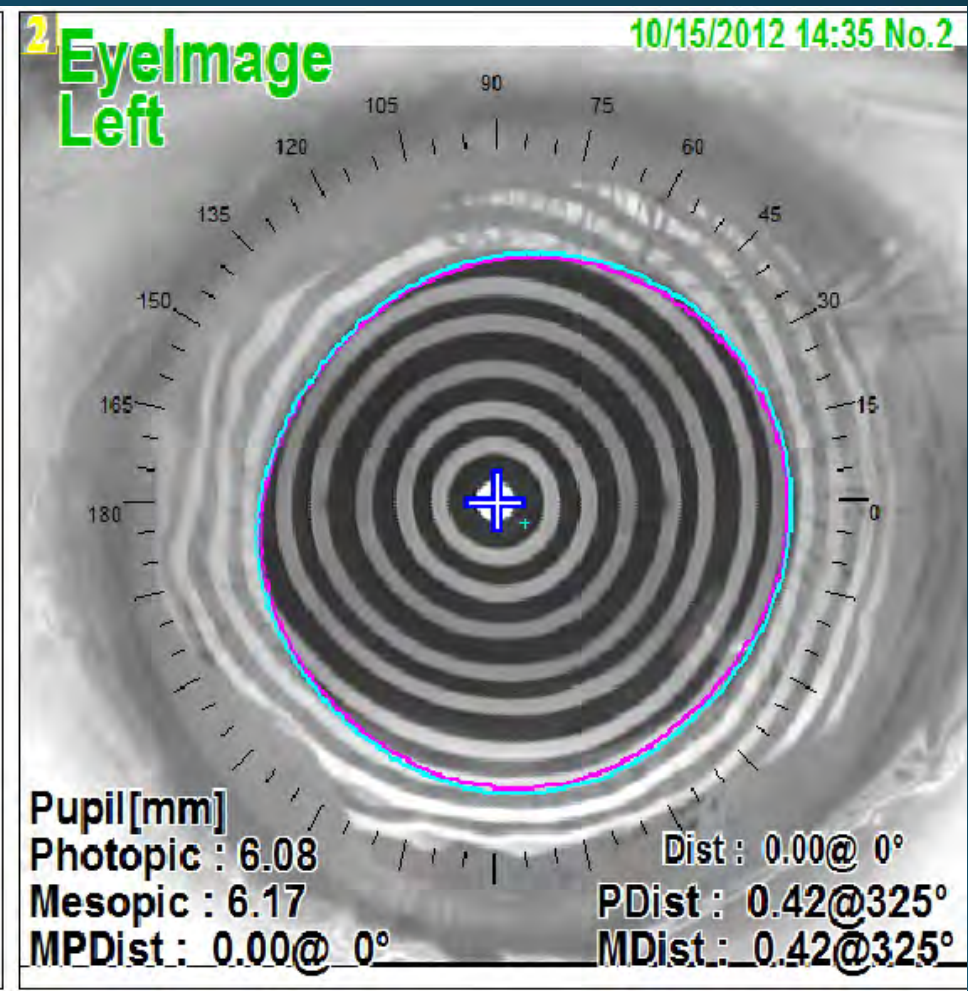
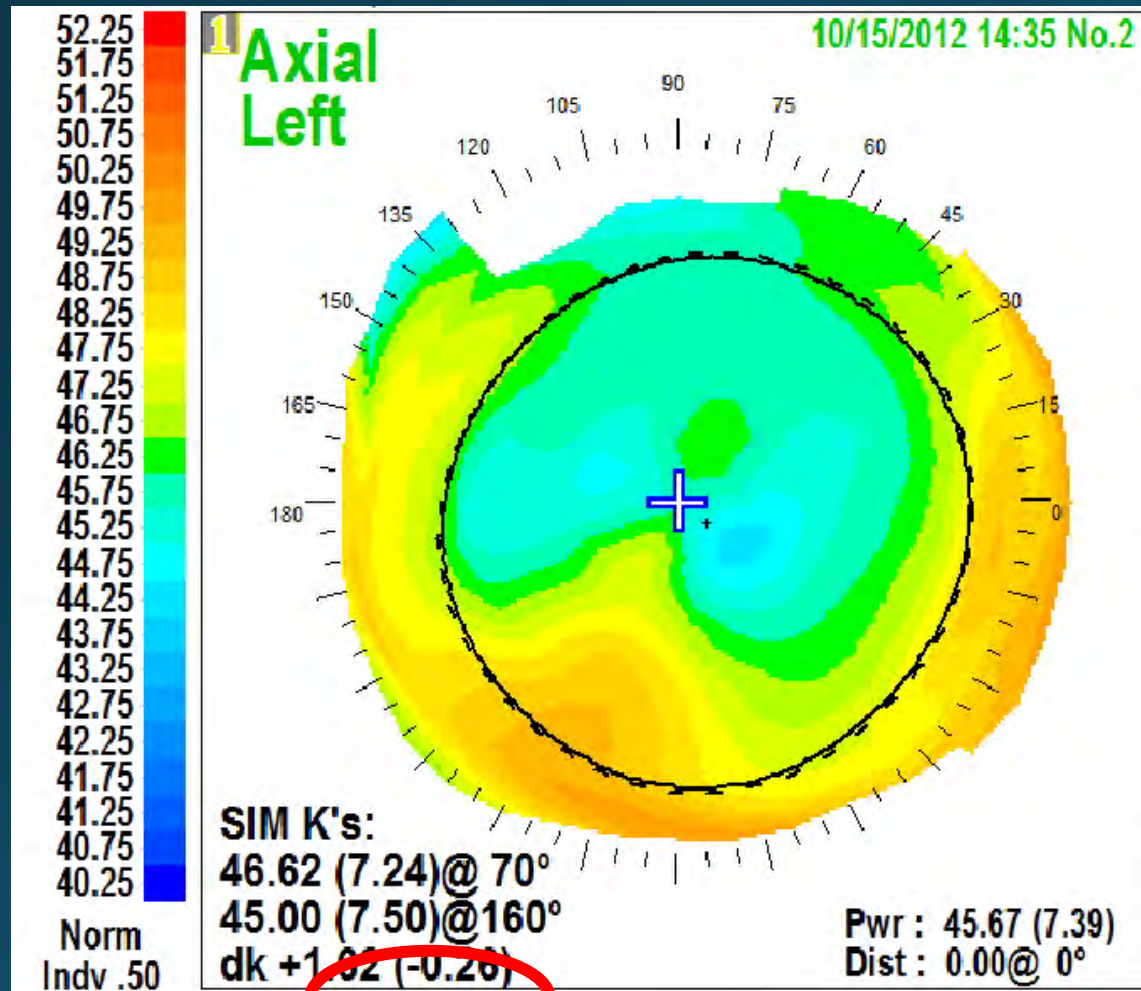
May 2010 Cataract Extraction with single long (7mm) Scleral tunnel incision x 60 (on steep axis) and Staar AQ2010V 18.5 IOL
Mar. 2010 (8mos aft DALK) Running Cornea Suture Out



Case #1

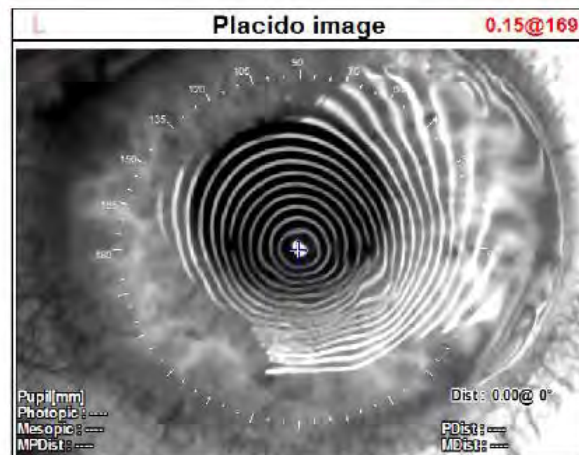
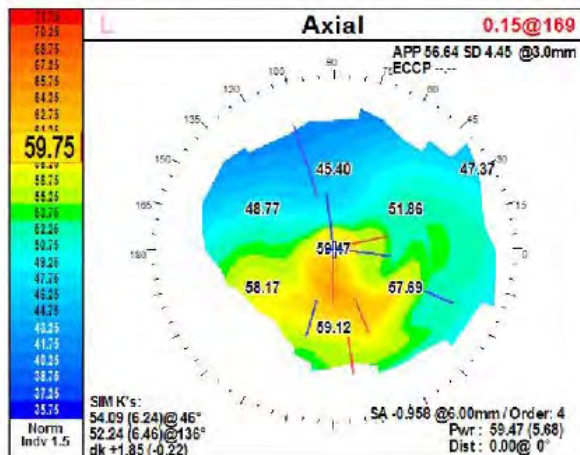
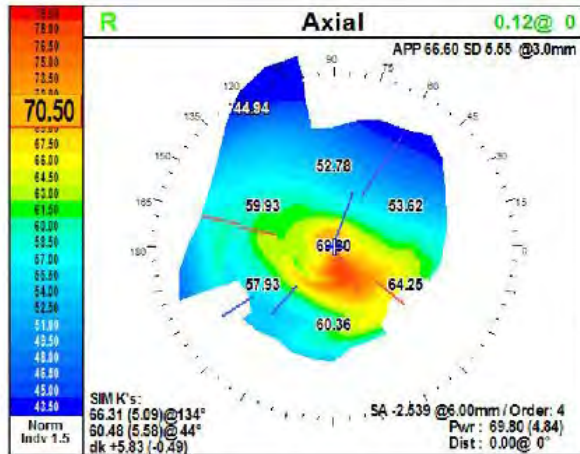
Oct. 2012

3yrs aft DALK, 2yrs aft Cat Ext monofocal IOL long scleral tunnel steep axis
-3.5+0.50 x 22 20/25-2 (note low topo cyl 1.62 – circled in red)



Case #2: 48 yo m Severe Keratoconus OU
 2024 OD: intolerant of scleral CL OS: Scleral CL
 2013: CXL OU - repeated in Cleveland
 2012: CXL OU – in Cleveland

R	10/23/2023 14:48	Comment	R	Diagnosis	R
L	10/23/2023 14:48		L		L



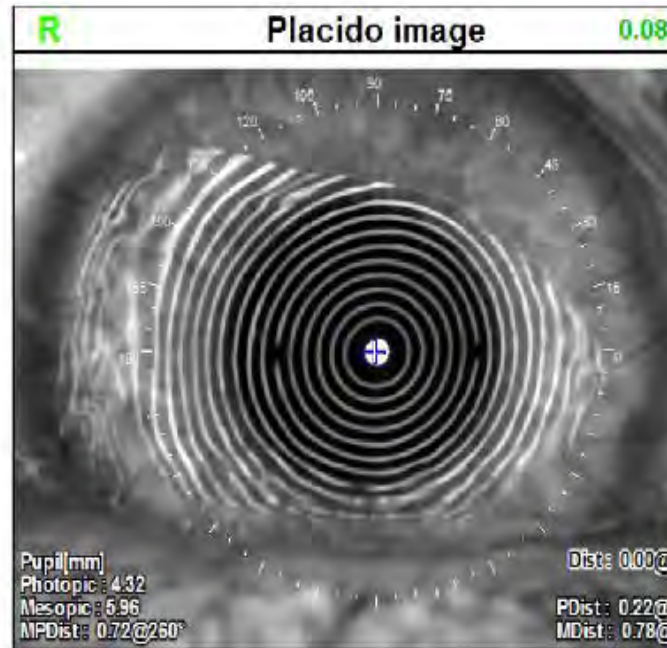
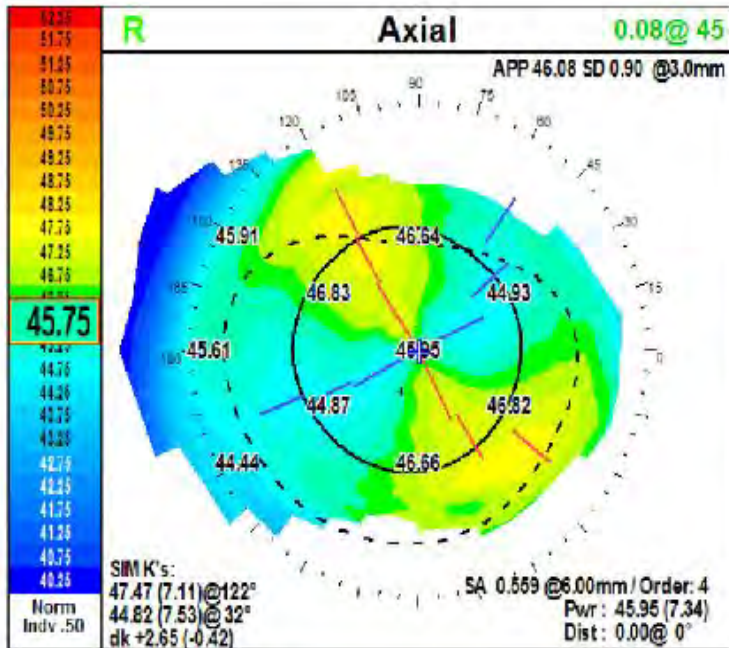
Case #2: 48 yo m Severe Keratoconus OU

6/2024 OD Topo below

3/2024 OD: DALK 10.0mm bed/10.0mm donor laterality matched, nasal marked 24 bite running suture

2012/2013: CXL OU x 2

ny		Technician			
L	09/06/2024 08:35	Comment	L	Diagnosis	L
R	09/06/2024 08:35		R		R



- -8.50 +1.25 x 84 20/20
- Wearing Soft CL for binocularity with scleral CL OS

Case #2: 48 yo m Severe Keratoconus OU

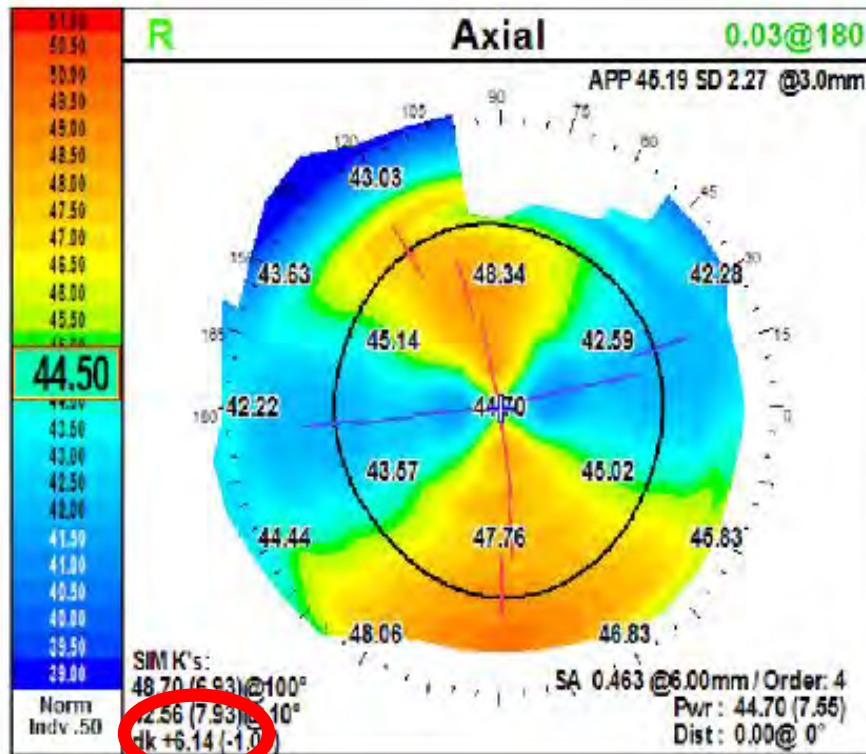
11/2024: topo below: increased astigmatism 6D

9/2024 running suture removed

3/2024 OD: DALK 10.0mm bed/10.0mm donor laterality matched, nasal marked
24 bite running suture

2012/2013: CXL OU x 2

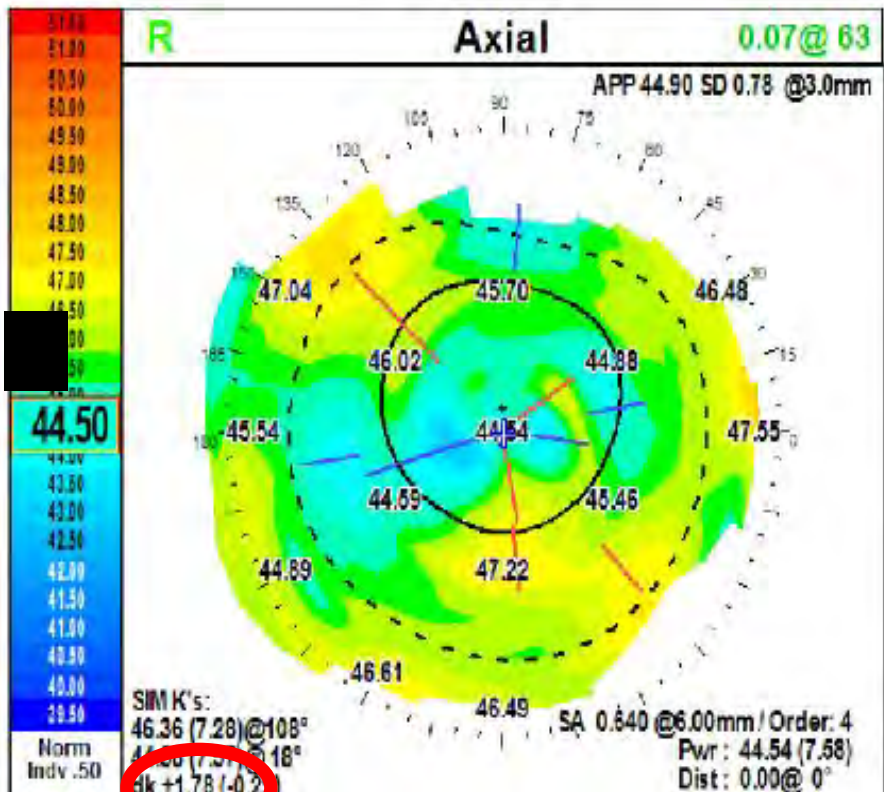
L	11/07/2024 09:00	Comment	L	Diagnosis	L
R	11/07/2024 09:00		R		R



Case #2: 48 yo m Severe Keratoconus OU

12/16/2024 OD: -8.25+0.75 x 90 dramatically reduced astigmatism!
 12/3/2024 Paired Astigmatic Keratotomy Scleral Tunnel (non-penetrating) superior/inferior
 3/2024 OD: DALK 10.0mm bed/10.0mm donor 24 bite running suture
 2012/2013: CXL OU x 2

R	12/16/2024 10:01	Comment	R	Diagnosis	R
L			L		L



Case #2: Summary

48 yo M after large Dia Dalk for severe keratoconus Right eye

- Exceptional optical result with little residual astigmatism in corneal graft following suture-out paired Astigmatic Keratotomy OD
- Short term: daily wear disposable Soft Contact Lens OD (for binocularity with other OS eye – wearing Scleral CL)
- Pt has elected to have EVO-ICL OD to eliminate high residual myopia (-8.25+0.75x90)
- He intends to proceed with Large dia DALK Left eye

Case #3: LAL For Final Optical Rehabilitation

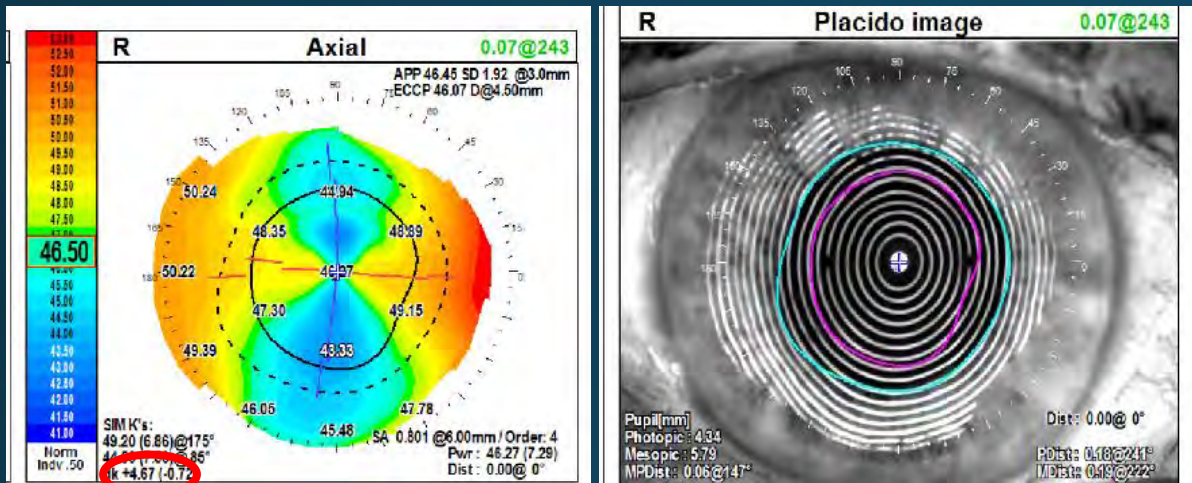
64 yo male Severe Keratoconus

8/10/23 removed running cornea graft suture

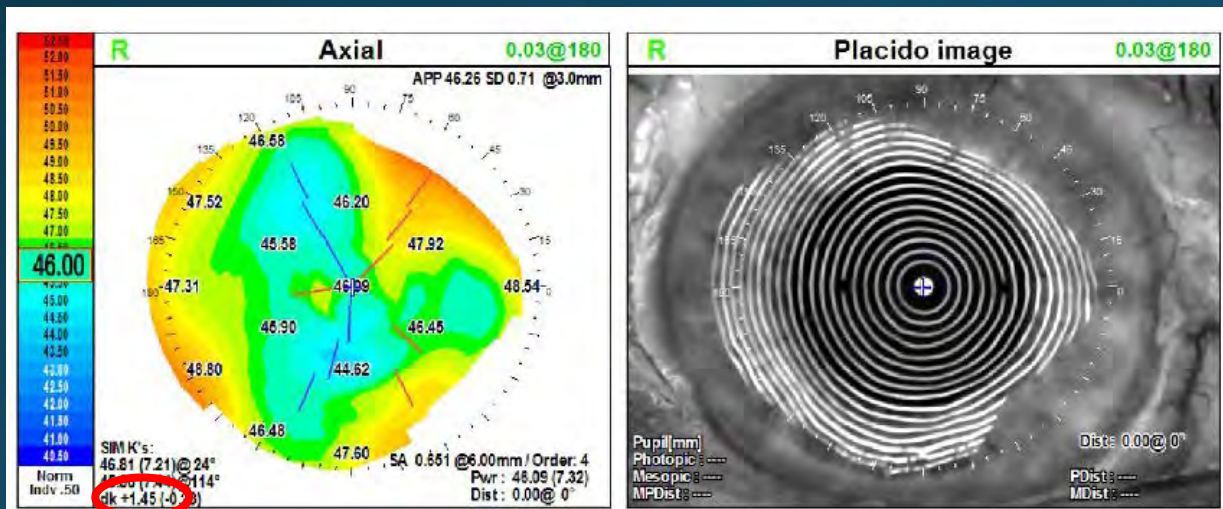
2/14/23 removed Intacs/DALK 10.0mm bed/10.5mm donor

2007 Intacs

Right Eye



1/16/24 AK paired scleral tunnel x 180



3/20/24 topography (left): note reduced astigmatism

7/2/24 cataract ext with LAL for optical rescue

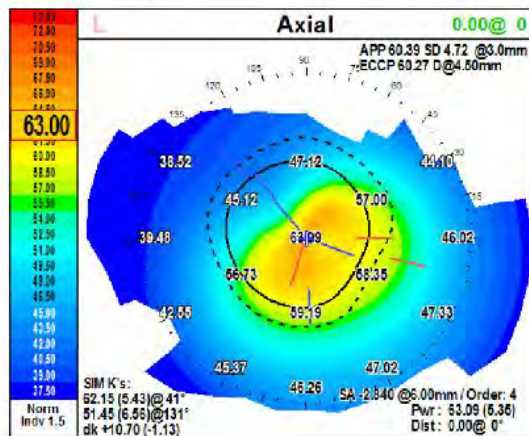
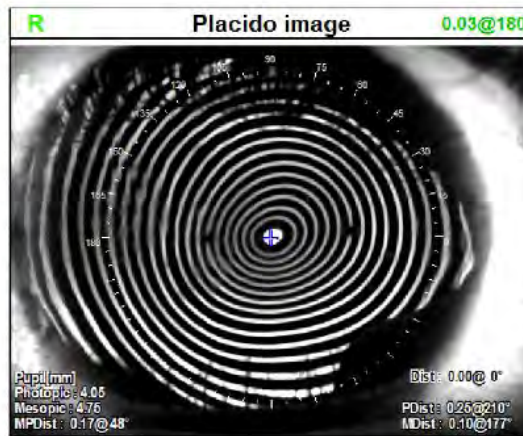
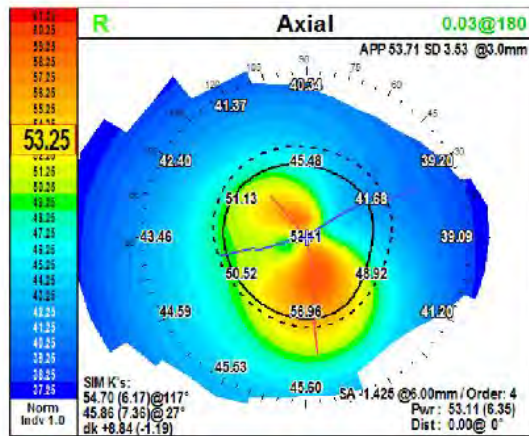


12/4/24 **near plano, Uncorrected VA 20/25!!**

(after all Light Delivery Device treatments completed)

Case #4: 30 yo female with Severe Keratoconus OU intolerant of glasses and Scleral CL's

L	09/11/2023 13:06	Comment	L	Diagnosis	L
R	09/11/2023 13:06		R		R



Uncorrected VA

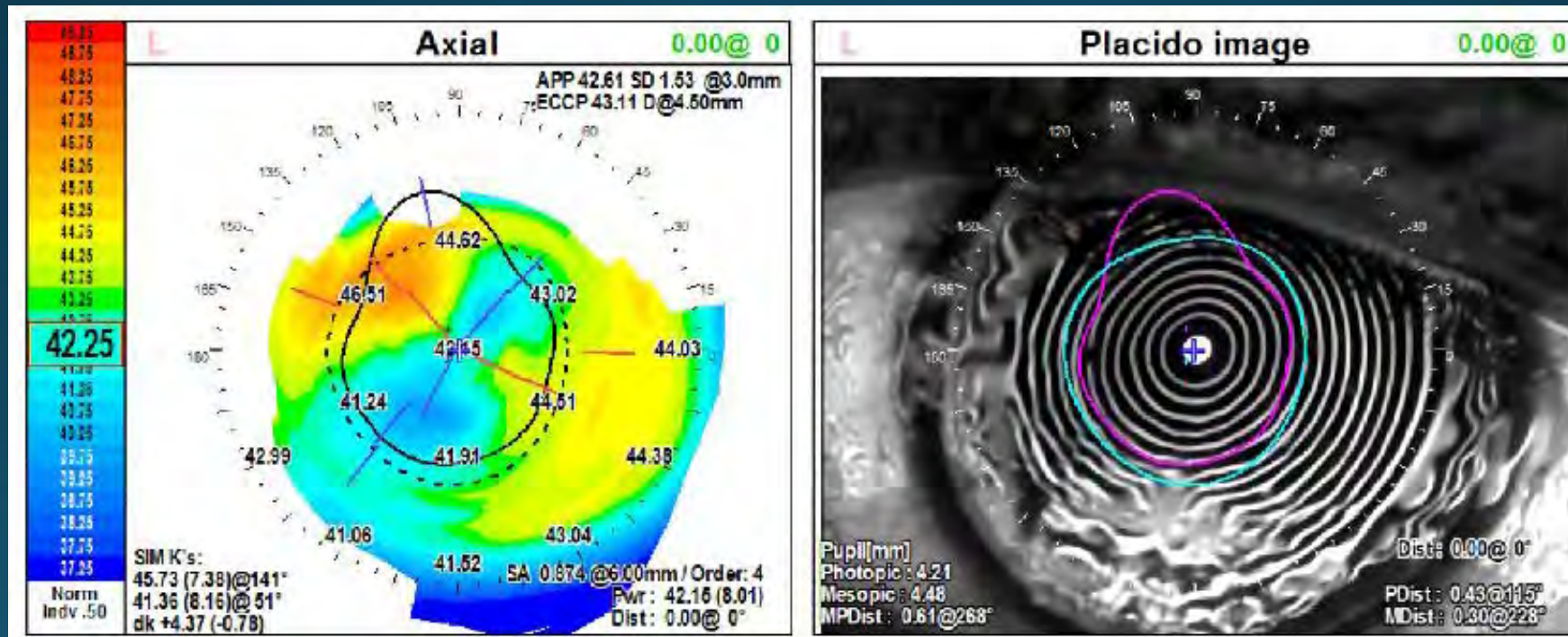
- OD: 20/80

- OS: CF 3 ft

Case #4: 30 yo fm Severe Keratoconus OU

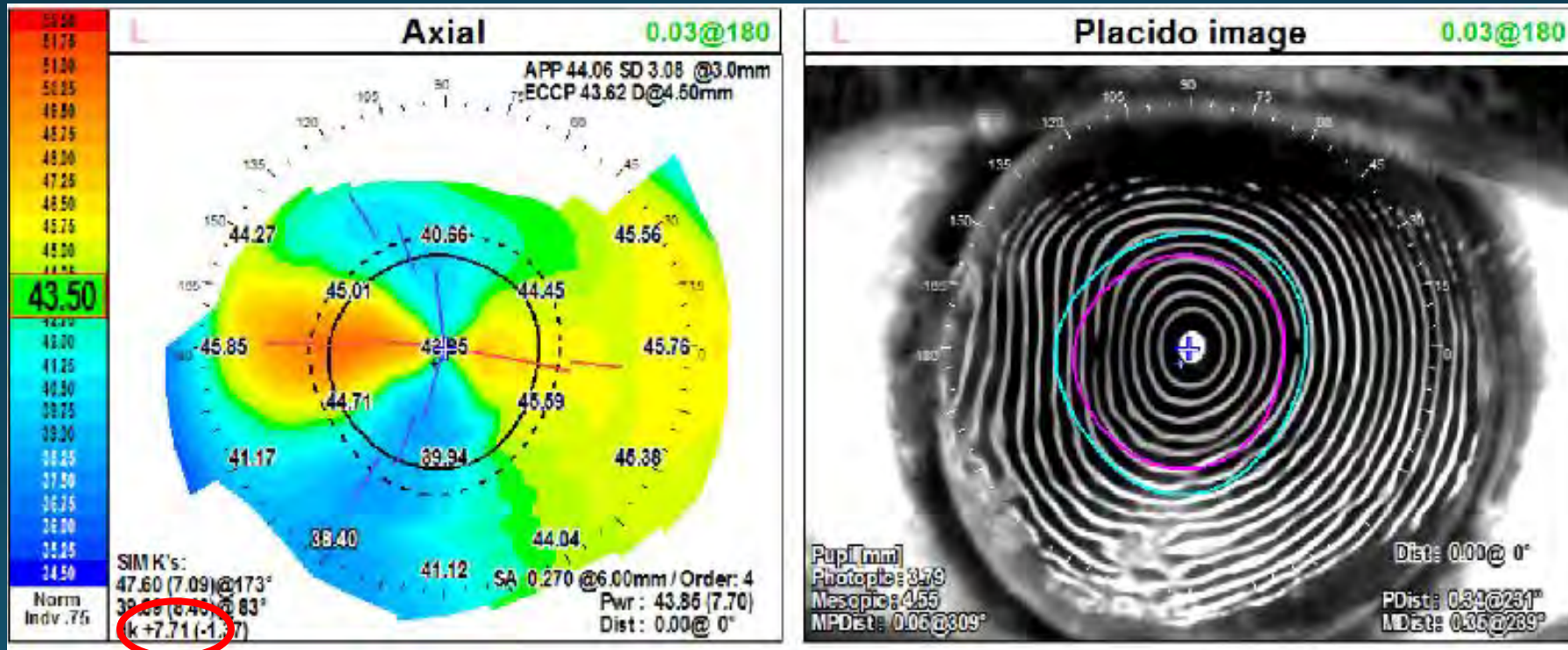
9/2024 OS: Topography below **-2.5+3.5 x 145 20/40** running suture "in"

12/2023 DALK OS: 9.5mm bed/9.75mm donor laterality matched, nasal marked, big bubble dissection



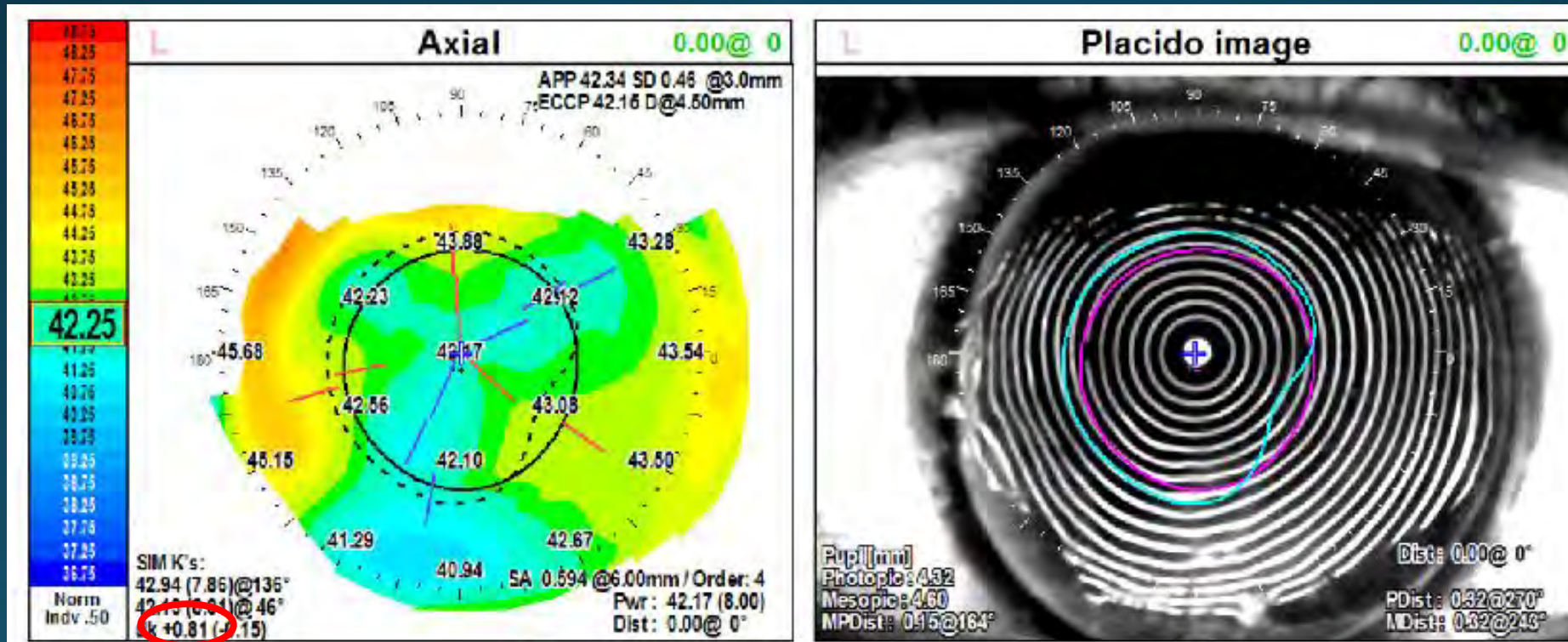
Case #4: 30 yo fm Severe Keratoconus OU

- 10/2024 **-5.5 +7.25 x 177 20/30** suture "out"
- 12/2023 DALK OS



Case #4: 31 yo fm Severe Keratoconus OU

- 1/20/2025 uncorrected VA 20/25-3 !!
- 1/6/2025 Astigmatic Keratotomy: nasal scleral tunnel w interrupted 10– nylon sutures superior/inferior
- 12/2023 DALK OS

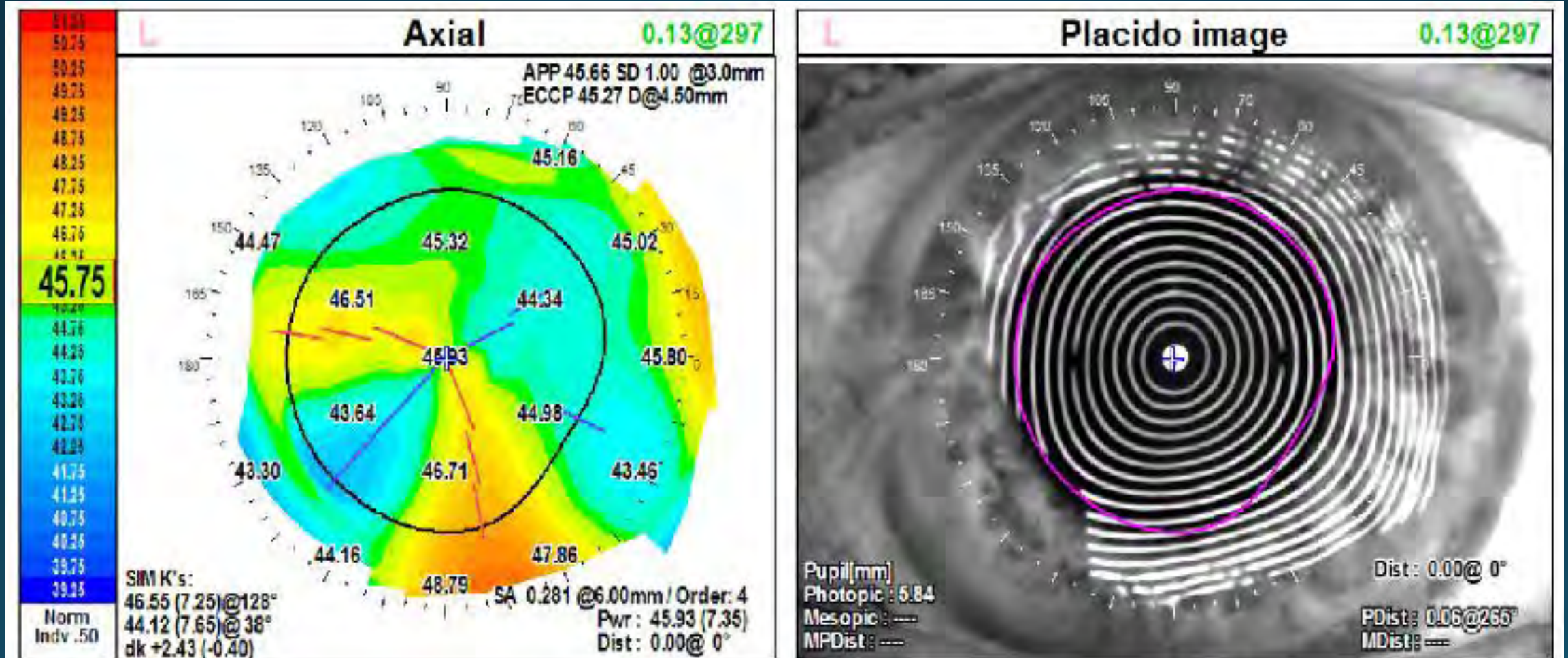


Case #5: Left eye

9/2022 -4.25+1.0 x 150 20/50 (cataract) topo below: non-orthogonal astigmatism

5/2021 removed running suture

9/2021 DALK 10.0mm/10.5mm dia donor laterality matched, nasal marked/oriented



Case #5: Left EYE

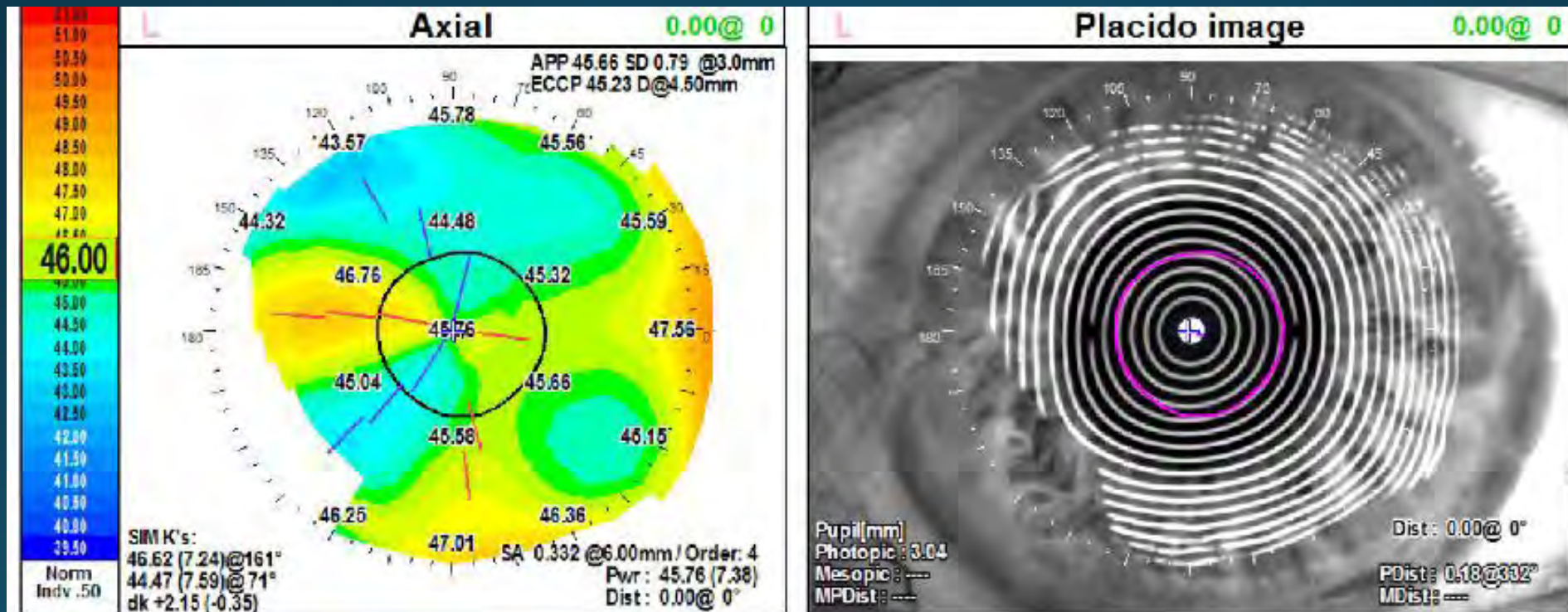
1/9/2023 Uncorrected VA 20/25 -1.0+0.5x36 20/20 "EXTREMELY HAPPY!"

(topo below: note debulked cylinder and improved placido image)

12/20/2022 cataract ext w B&L MX60T 12.5D 3.50 x 160

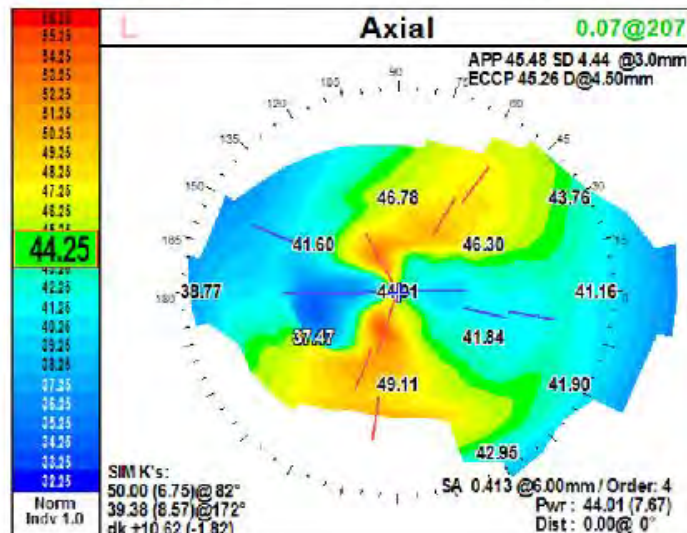
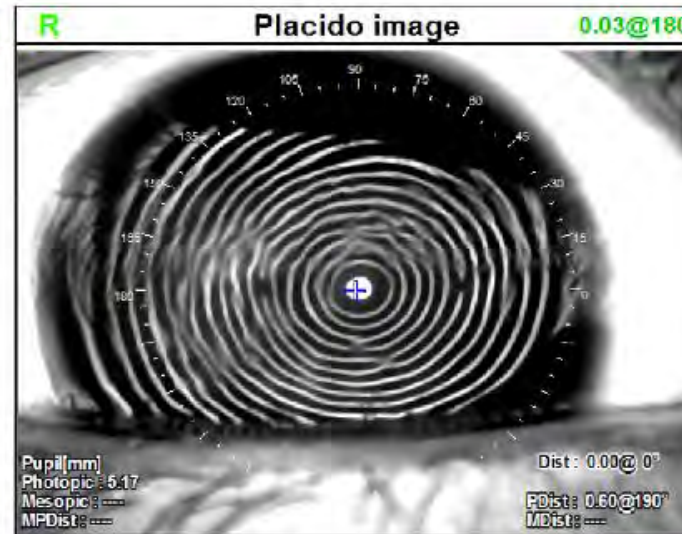
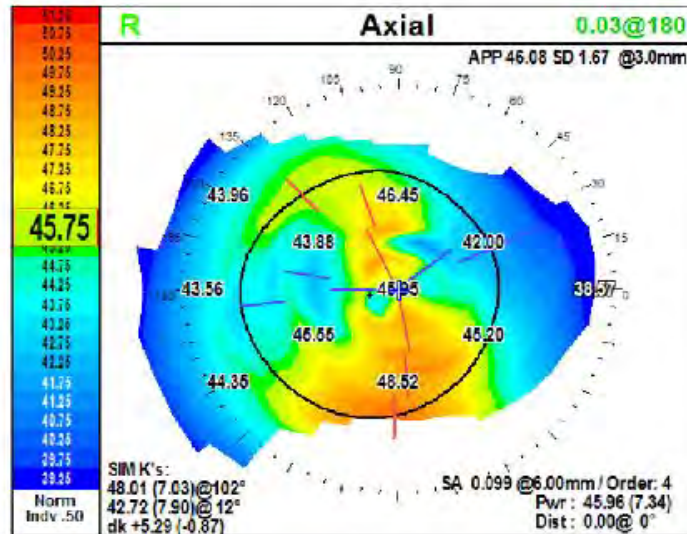
9/2022 AK - inferior scleral pocket lamellar incision 1mm posterior to limbus, 7mm arc length centered on x 280 deg 2mm into graft but NOT penetrating into anterior chamber to avoid possible late descemets membrane detachment

9/2021 DALK 10.0mm/10.5mm dia donor laterality matched, nasal marked/oriented



Case #6: 22 yo w Macular Stromal Dystrophy OU
 "Very poor night vision – cannot drive"
 OD -5.0+2.50x90 20/40 OS: -5.0+3.0x95 20/40

L	04/04/2024 08:07	Comment	L	Diagnosis	L
R	04/04/2024 08:07		R		R



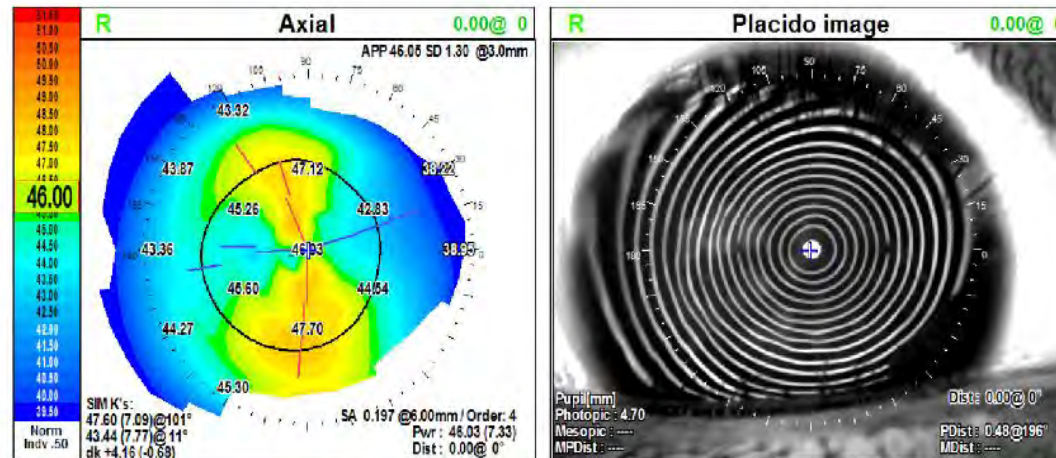
Case #6: 22 yo Macular Stromal Corneal Dystrophy

7/1/2024 OS: TOPOGRAPHY below. High astigmatism

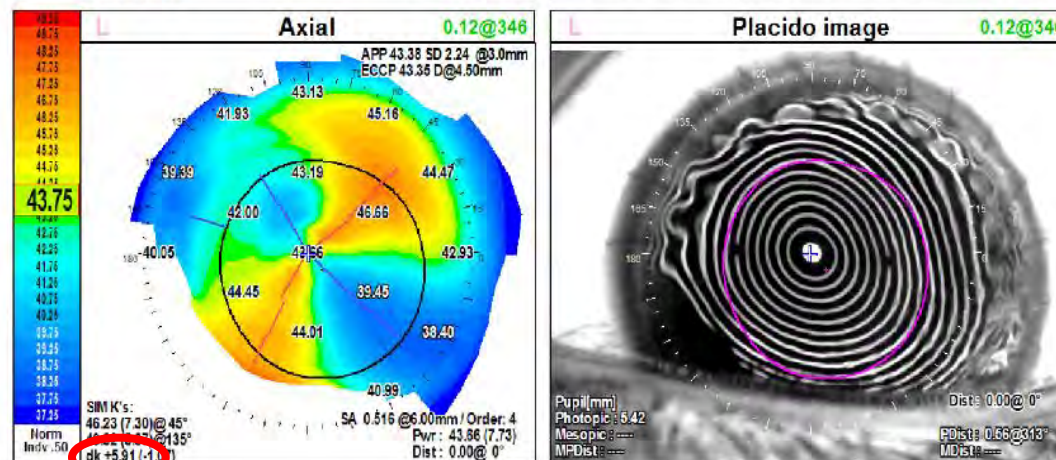
4/16/2024 OS: DALK 9.5mm donor/9.5 mm bed laterality matched nasal marked 24 bite running suture

07/01/2024 09:28		L		Diagnosis	L
07/01/2024 09:28	Comment	R			R

7/1/2024



• OD: UCVA 20/50
• Corneal opacities



• OS: UCVA 20/40!
• -1.75+4.25x45 20/20
• Running Suture "in"

Case #7: 22 yo Macular Stromal Corneal Dystrophy

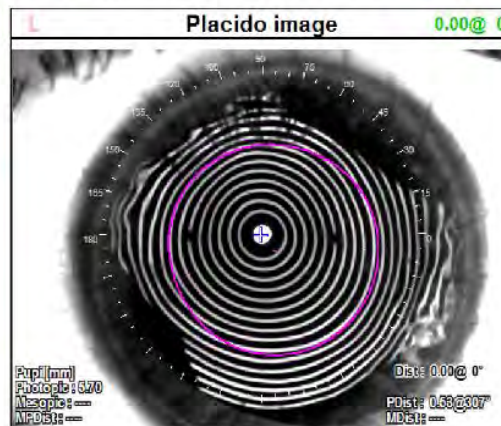
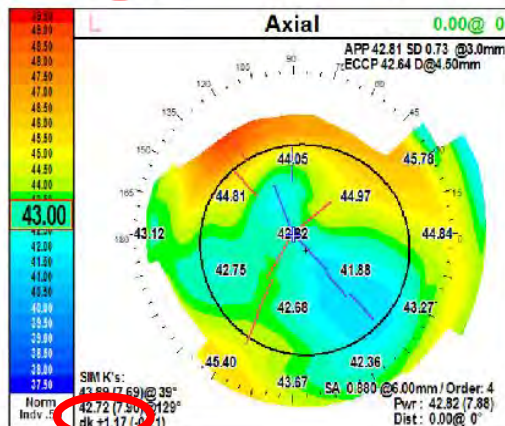
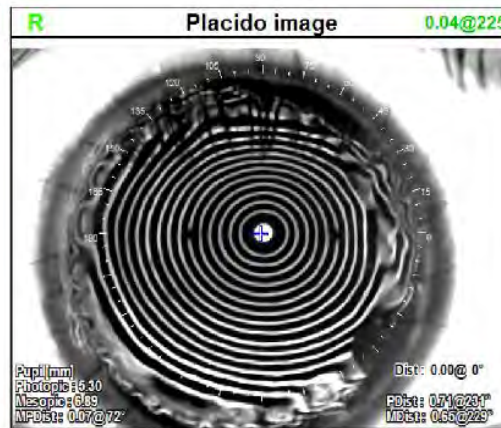
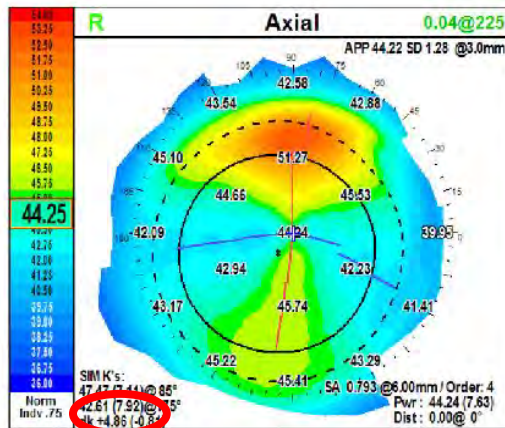
12/3/2024 OD: DALK 9.5mm bed/9.5mm donor laterality matched nasal marked 24 bite running suture

7/2024 OS: Adjust running suture under intraoperative keratometer

4/16/2024 OS: DALK 9.5mm donor/9.5 mm bed laterality matched nasal marked 24 bite running suture

L	01/13/2025 12:29	Comment	L	Diagnosis	L
R	01/13/2025 12:29		R		R

1/13/2025



- OD: UCVA 20/50
- -3.5+4.5x83 20/25
- Running Suture "in"

- OS: UCVA 20/20!
- -1.0+1.50x19 20/20
- Running Suture "in"

Case #7: 22 yo Macular Stromal Corneal Dystrophy

THRILLED!!

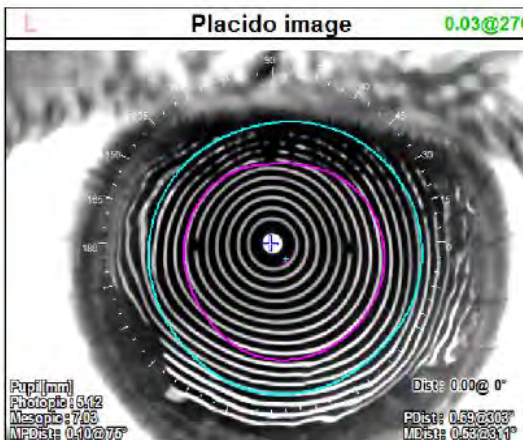
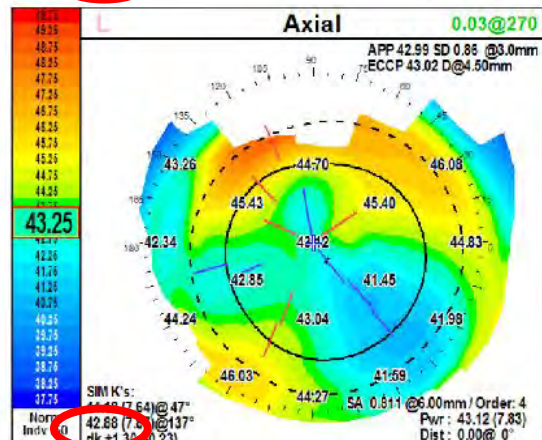
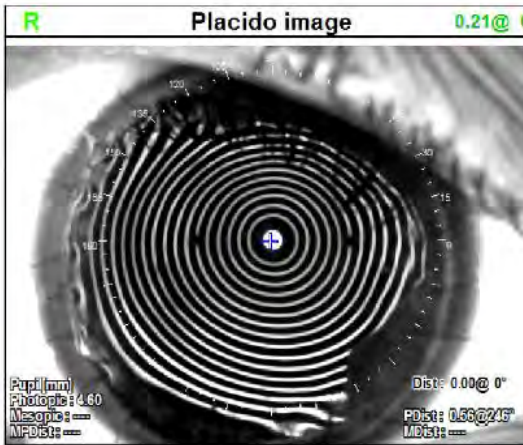
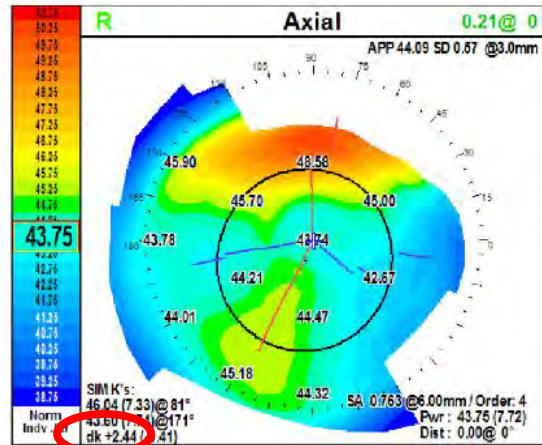
1/28/25 OD: Adjust running suture under intraoperative keratometer

12/3/2024 OD: DALK 9.5mm bed/9.5mm donor 24 bite running suture

7/2024 OS: Adjust running suture under intraoperative keratometer

4/16/2024 OS: DALK 9.5mm donor/9.5 mm bed 24 bite running suture

Date	L	R	Comment	L	R	Diagnosis	L	R
02/10/2025 14:17								
02/10/2025 14:17								



2/10/2025

OD: UCVA 20/30

Running Suture "in"

OS: UCVA 20/20!

-1.0+1.50x19 20/20

Running Suture "in"

Richard Erdey MD

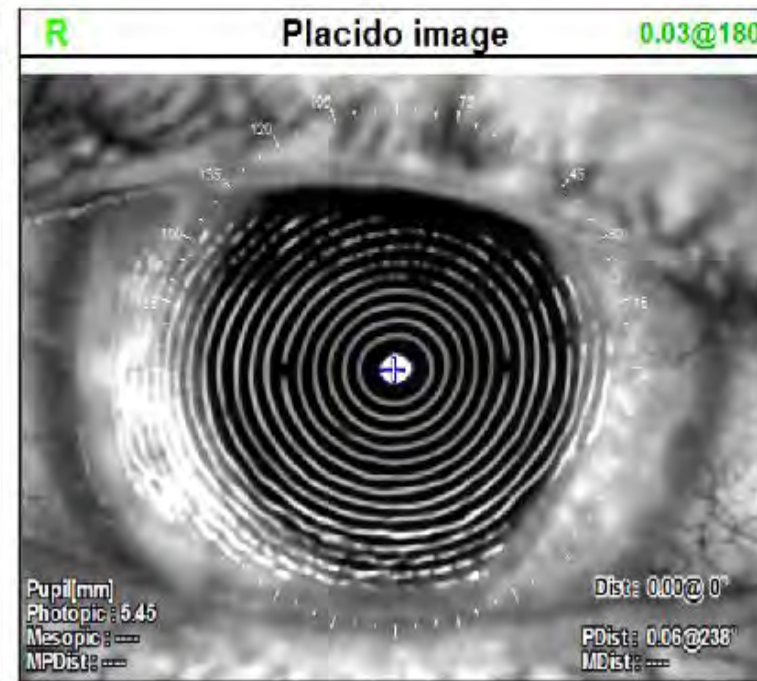
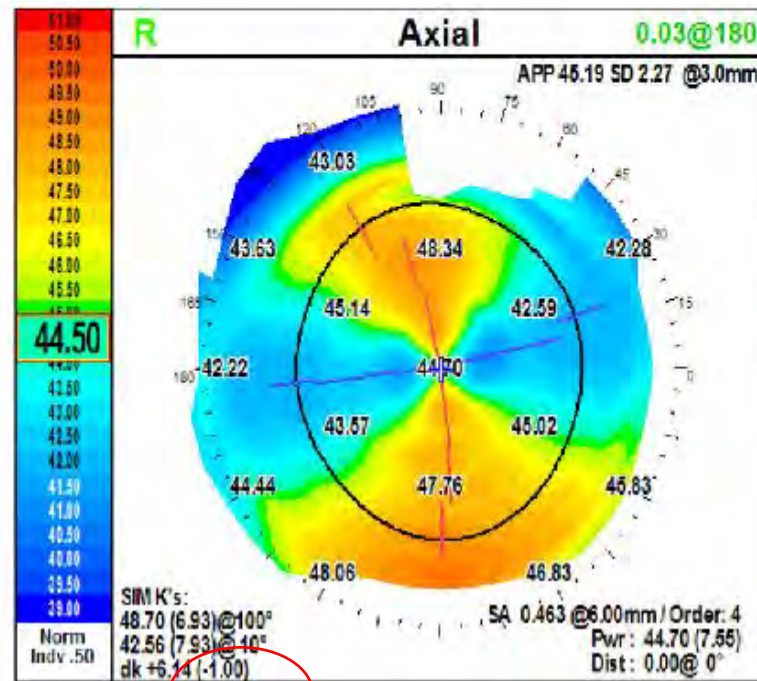
Case #7 - Summary

- Very early visual rehabilitation (excellent Uncorrected Visual Acuity (UCVA) only 3 days after DALK in both eyes.
- Dramatically improved UCVA both eyes after running suture adjustment in each eye.
<https://www.youtube.com/shorts/Oo5QLhLHNCU>
- Running suture will be left "in" both eyes. Since DALK grafts spherical and near emmetropic, intend to leave in place indefinitely or until it spontaneously breaks (about 3-5 yrs). The longer left in place, greater change graft maintains its shape after eventual removal.

Case #8: 48 yo m Severe Keratoconus OU
 11/2024: topo below: increased astigmatism 6D
 9/2024 running suture removed

3/2024 OD: DALK 10.0mm bed/10.0mm donor laterality matched, nasal marked
 24 bite running suture
 2012/2013: CXL OU x 2

ny		Technician			
L	11/07/2024 09:00	Comment	L	Diagnosis	L
R	11/07/2024 09:00		R		R



Case #8: 48 yo m Severe Keratoconus OU

12/16/2024 OD: -8.25+0.75 x 90 dramatically reduced astigmatism!

12/3/2024 Astigmatic Keratotomy Scleral Tunnel (non-penetrating) superior/inferior added interrupted sutures x 180 adjusted under intraoperative keratometer

3/2024 OD: DALK 10.0mm bed/10.0mm donor laterality matched, nasal marked 24 bite running suture

2012/2013: CXL OU x 2

R	12/16/2024 10:01	Comment	R	Diagnosis	R
L			L		L

