

It's What's On The Inside That Counts! Moving Toricity from Landing Zone to Chamber

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Abstract:

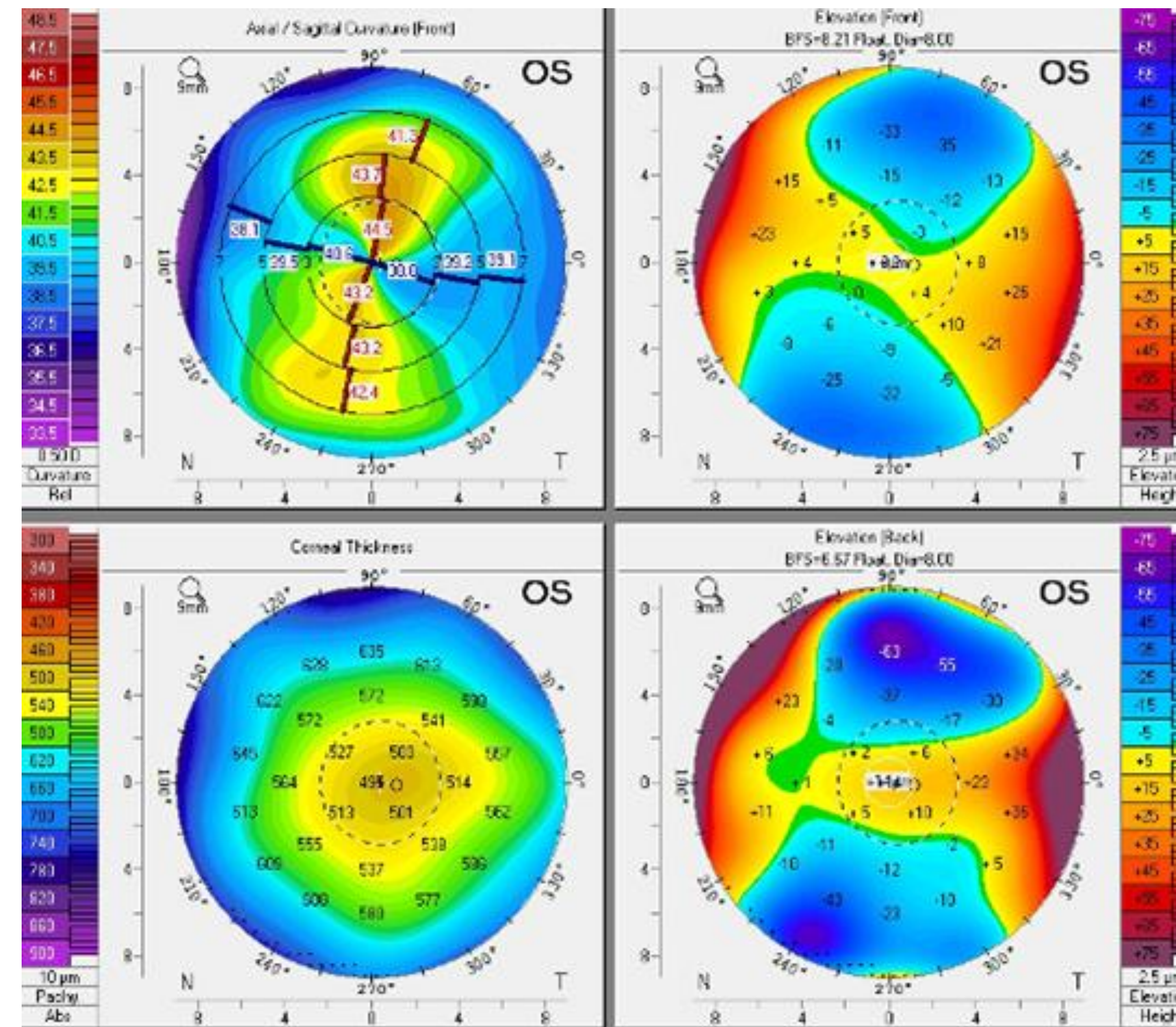
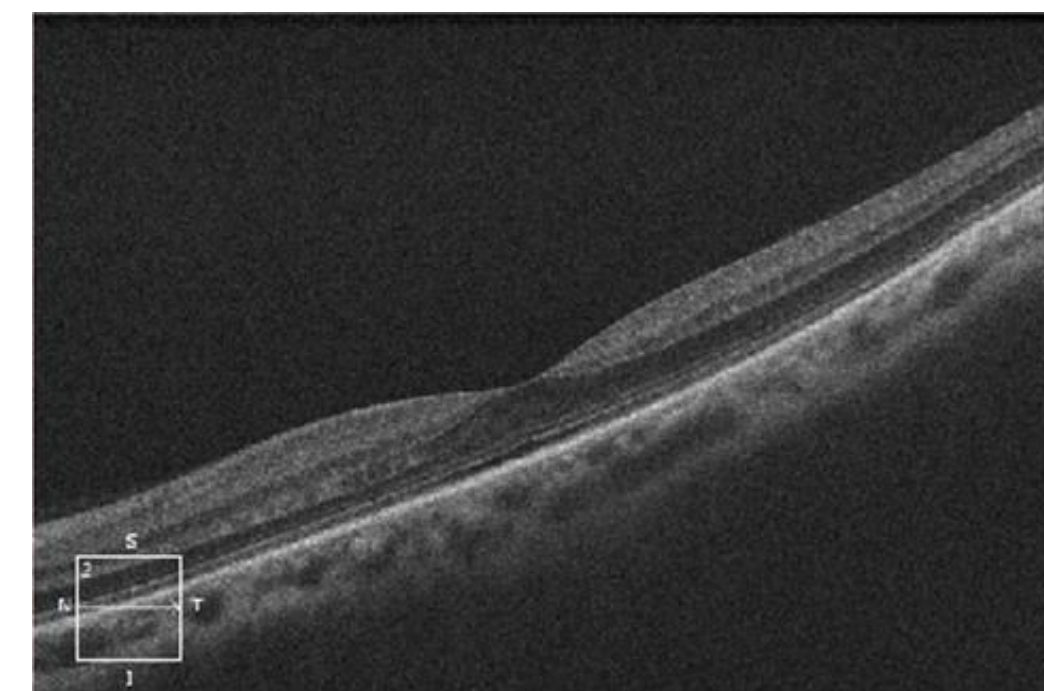
- As more research is being done on the shape and contour of the cornea, we are learning that in many cases, a large amount of the toricity of the eye comes from within the cornea. This is in contrast to how many scleral lenses correct for the toricity of the eye. In many modern lens designs, toricity is implemented by steepening and flattening the landing zone. In many cases this works without difficulty. However, if large amounts of toricity are located within the cornea, this can create problems with fit, such as inferior decentration. This can be fixed by shifting the toricity of the lens away from the edge and into the vaulting chamber.
- Proper analysis of topography and the fitting relationship of the lens on the eye can help to identify good candidates for these lens designs and enhance patient comfort while decreasing patient chair time.

Further Testing:

- Corneal Tomography
 - Corneal tomography was taken and shown to the right
 - Moderate irregular astigmatism within central 3mm
 - Moderately astigmatic with the rule cornea
 - Moderately thin corneas (513/491 OD/OS)
 - No significant difference in posterior elevation vs anterior elevation
- Mac OCT
 - WNL
 - (-) signs of diabetic retinopathy/MA/DME OU

Diagnosis:

- Corneal Scarring/Opacity secondary to Ocular Trauma OS



Treatment:

- A specialty contact lens fitting was performed in order to correct for the irregular astigmatism and scarring of the left eye.
- A standard RGP was inserted with poor fit secondary to underlying irregular astigmatism.
- The patient was fit in a scleral lens to optimize comfort and vision.

Discussion:

- Conventional scleral lenses utilize the peripheral landing zone to tighten a contact lens along the steeper meridian of the eye and flatten the lens along the flatter meridian.
- This works great if the toricity of the eye is located within the few mm of the landing zone but can create unsatisfactory fits in patients with high corneal astigmatism.
- Our patient has moderate corneal astigmatism. This is best shown by the elevation map where the superior and inferior cornea are below the reference sphere and the temporal and nasal cornea are above the reference sphere.
- A toric vaulting chamber will benefit these patients by bringing the “heel” of the landing zone down to the eye. In order to compensate for this, the landing zone of the steep meridian will often need to be flattened to raise the “toe” of the landing zone and create better lens to scleral alignment.

Background:

- 48 y/o Hispanic female:
- CC: Blurry vision OS
 - Onset: since 5 years old
 - +Hx of wood splinter in eye
- BCVA w/ SpRx:
 - 20/20 OD
 - 20/60 OS
- Medical History
 - T2DM
 - Controlled w/ orals and injectables
- Examination:

External Exam		
	Right	Left
External	Normal (No proptosis or rim tenderness is present)	Normal (No proptosis or rim tenderness is present)
Slit Lamp Exam		
Lids/Lashes	Normal (There is no drooping or mass)	Normal (There is no drooping or mass)
Conjunctiva/Sclera	Normal (No injection or abnormal pigmentation)	Normal (No injection or abnormal pigmentation)
Cornea	Clear	3mm deep stromal scarring with sparing of the endothelium; involving visual axis
Anterior Chamber	Normal (Deep, with no flare or cell)	Normal (Deep, with no flare or cell)
Iris	Regular (No rubeosis)	Regular (No rubeosis)
Lens	tr NSC, tr PCC	tr NSC, tr PCC, tr posterior vacuoles
Anterior Vitreous	Clear- no cell/no pigment	vitreous syneresis

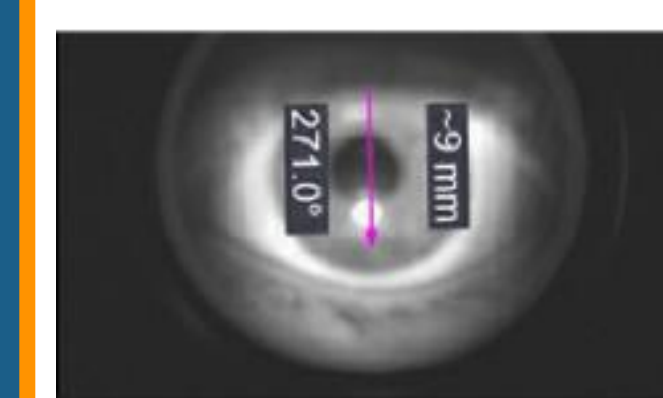
- Unremarkable posterior exam

Differential Diagnosis:

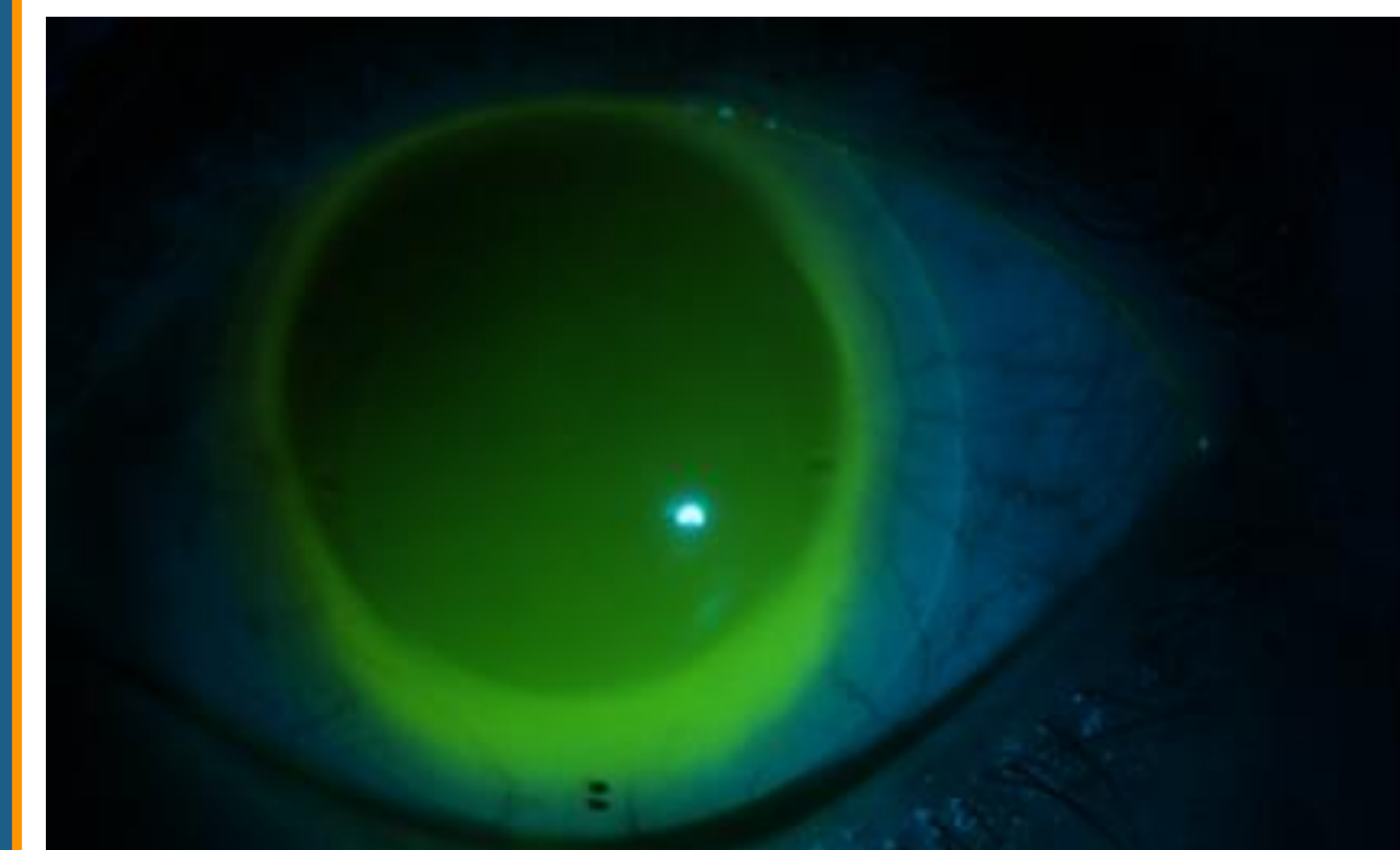
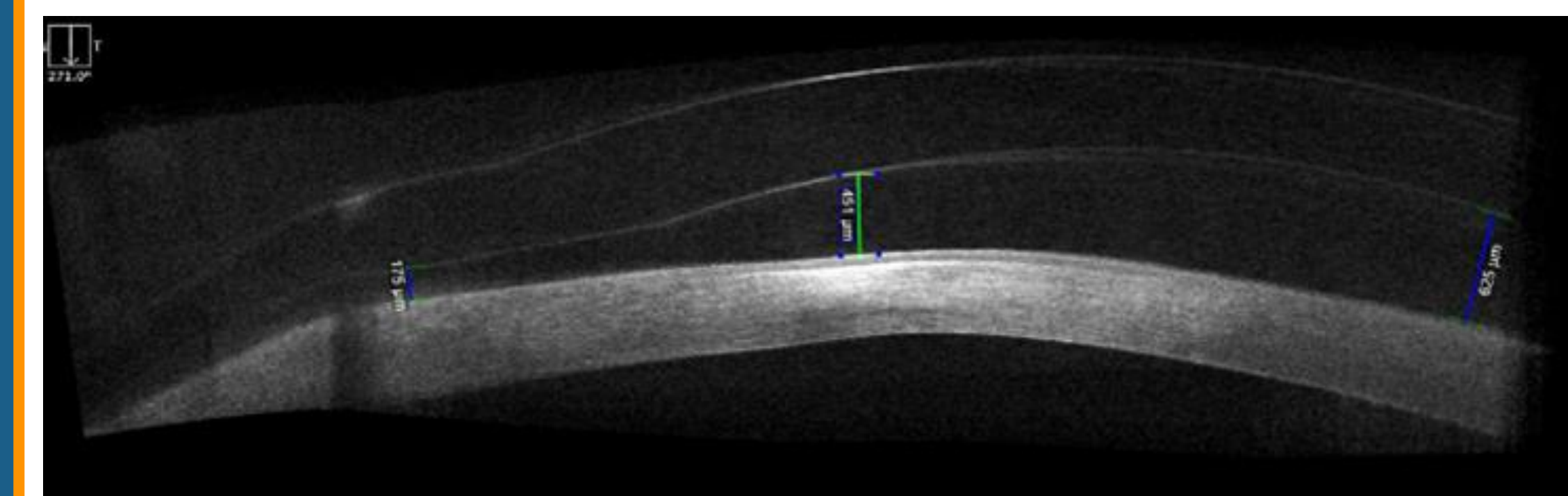
- Diabetic Retinopathy of Left Eye
- HSV/HZV
- Scarring/Opacity secondary to Ocular Trauma
- Corneal Ulcer
- Amblyopia
- Keratoconus/PMD

Standard Toric Periphery Lens:

	Dia:	BC:	SAG:	PWR:	APS:	OR:	BCVA:
Lens 1	16.0	8.2	4200	-7.00	F1 / S6	+1.75	20/30

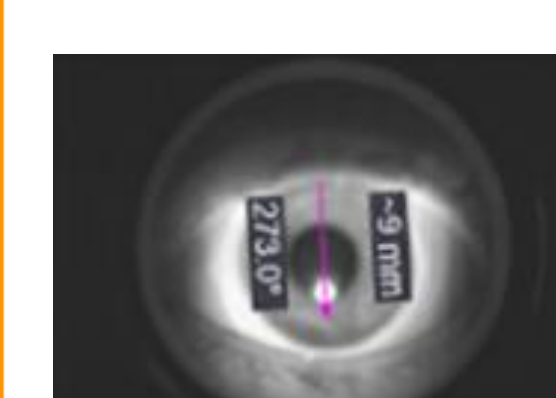


Lens 1 depicts a lens with all of the toricity within the landing zone. This lens sits inferiorly, has excessive inferior and superior limbal clearance when centered and has an oval shaped NaFl pattern

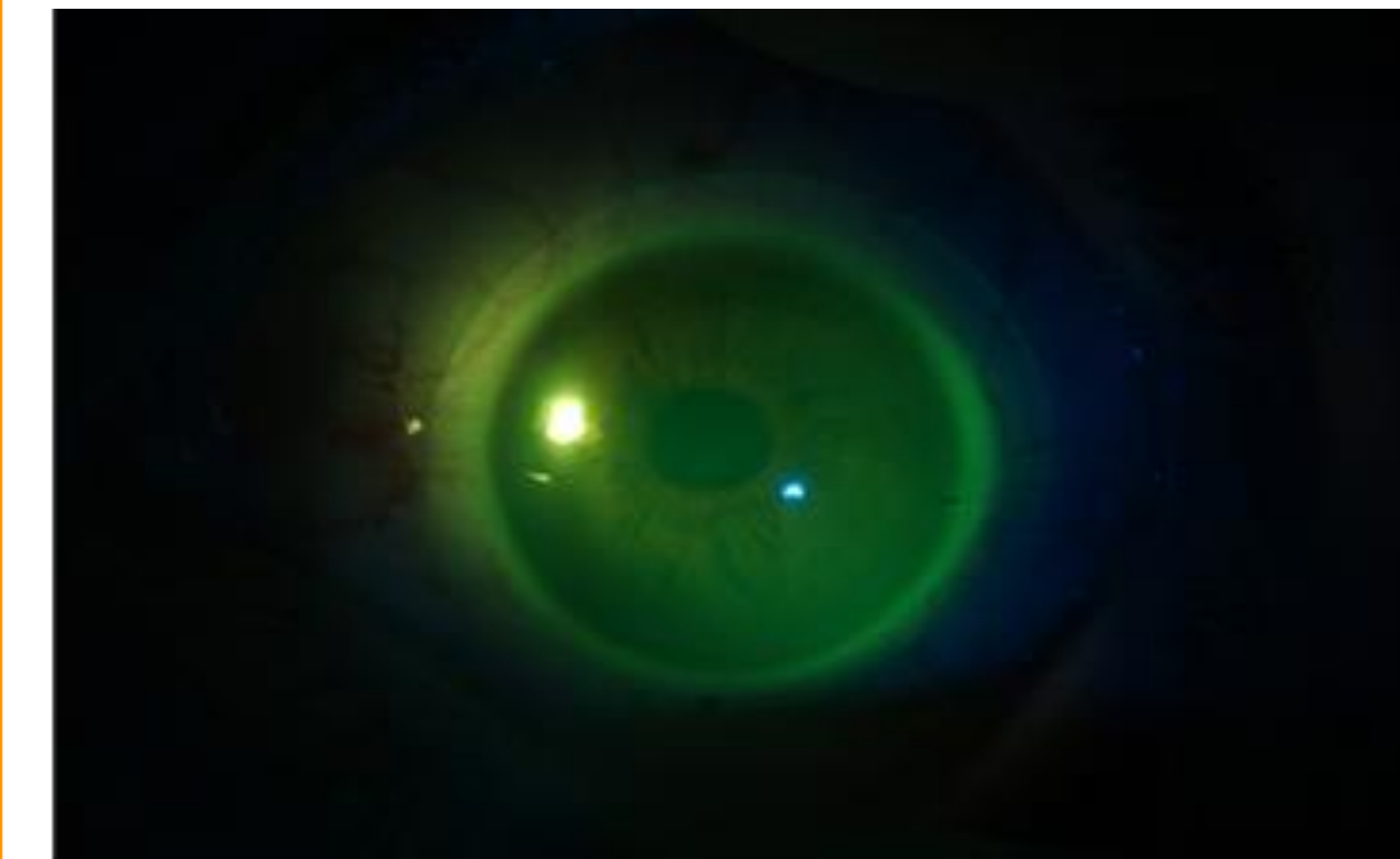
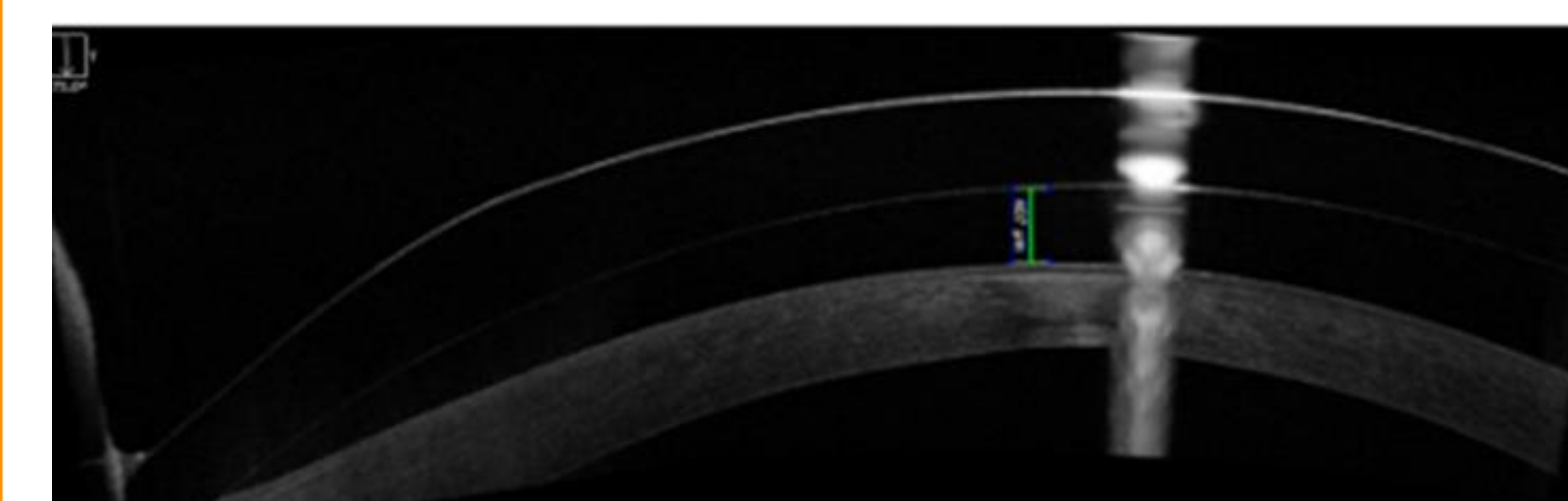


Lens with Toric Vaulting Chamber:

	Dia:	BC:	SAG:	PWR:	APS:	OR:	BCVA:
Lens 2	16.0	8.2	4050/4500	-5.25	F1 / F1	Plano	20/20-2



Lens 2 depicts a lens with 450 microns of toricity within the vaulting chamber and a spherical landing zone. Lens 2 is better centered, has acceptable limbal clearance 360 and has improved patient comfort



Conclusion:

- Implementing corneal toricity within the lens vaulting chamber may improve lens centration and comfort in difficult to fit patients and decrease incidence of lens complications like conjunctival prolapse.
- Signs to look for include:
 - Oval shaped NaFl pattern under lens
 - Inferiorly decentered lens
 - Excessive limbal clearance along one meridian
 - Excessive lens movement greatest in one meridian
- Corneal tomography may be utilized for early identification of when these lenses are necessary.
- Implementing trial lenses with internal toricity may allow better first fit success and ultimately save chair time by allowing a quicker fit.

- References:
- Daddi Fadel, The influence of limbal and scleral shape on scleral lens design, Contact Lens and Anterior Eye, Volume 41, Issue 4, 2018, Pages 321-328
 - Damien Fisher, Michael J. Collins, Stephen J. Vincent, Conjunctival prolapse during open eye scleral lens wear, Contact Lens and Anterior Eye, Volume 44, Issue 1, 2021, Pages 115-119, ISSN 1367-0484
 - Torres, Patricia, director. *Bi-Elevation 360*, Bausch and Lomb, 17 Oct. 2023.