

Background

Injury-induced ectasia is typically prevalent when a traumatic event affects the residual corneal bed thickness.¹ Although the corneal epithelium will recover using the limbal palisades of Vogt, the stroma will heal through scar tissue.^{2,3} A key factor necessary for corneal re-epithelialization and healing is lubrication.⁴ One way to provide constant lubrication is through Prosthetic Replacement of the Ocular Surface Ecosystem (PROSE) scleral lenses.⁵ This lens will vault over the corneal surface providing a smooth surface for light to be refracted in a way to minimize aberration and scattering.⁶ This case report evaluates the efficacy of scleral lenses on a patient with injury induced ectasia.

Case Description

Chief Complaint:

A 37-year old male presents to clinic for a scleral lens fit. The patient states he felt irritation towards the nose and clouding temporally with his current scleral lenses.

Occupation:

- Handyman

Previous ocular history:

- Corneal laceration OS from a tile fragment that lacerated the cornea when he was cutting a tile.
- This injury led to a micro-perforation that induced corneal ectasia.
 - Anterior segment OCT image seen in Figure 1.
 - Presenting VA without sclerals at time of injury was 20/15 OD and 20/100 OS.
 - Left eye pinholed to 20/70.
 - Pressures, pupils, EOMs, and confrontation fields were WNL.
 - Corneal ectasia from the incident was present OS.
 - Corneal tomography:
 - Central steepening with irregular astigmatism
 - Elevation on both the anterior and posterior float
 - Thinnest corneal pachymetry reading was 513 microns.
 - Corneal tomography shown in Figure 2.

Medical History:

- Noncontributory

Patient findings:

- Pressures, pupils, EOMs, and confrontation fields WNL
- BCVA with current sclerals 20/20 OU.
- Scleral findings:
 - Moderate impingement nasal and temporal
 - Mild impingement superior
- Retina and lens: WNL

Assessment and Plan:

- Scleral lens adjustments to flatten peripheral edges were made and the new lens was ordered.
- Final lens parameters:
 - See Table 1

Design	Material	BC	Power	Diam	Sag	APS-0	APS-90	APS-180	APS-270
Quadrant Specific, front toric, microvault , prolate	Boston XO	8.79	+3.25-0.75x101	16.00	4400	+8	-1	+5	0

Table 1: lens parameters



Figure 1: Anterior segment image of deep posterior stromal scarring

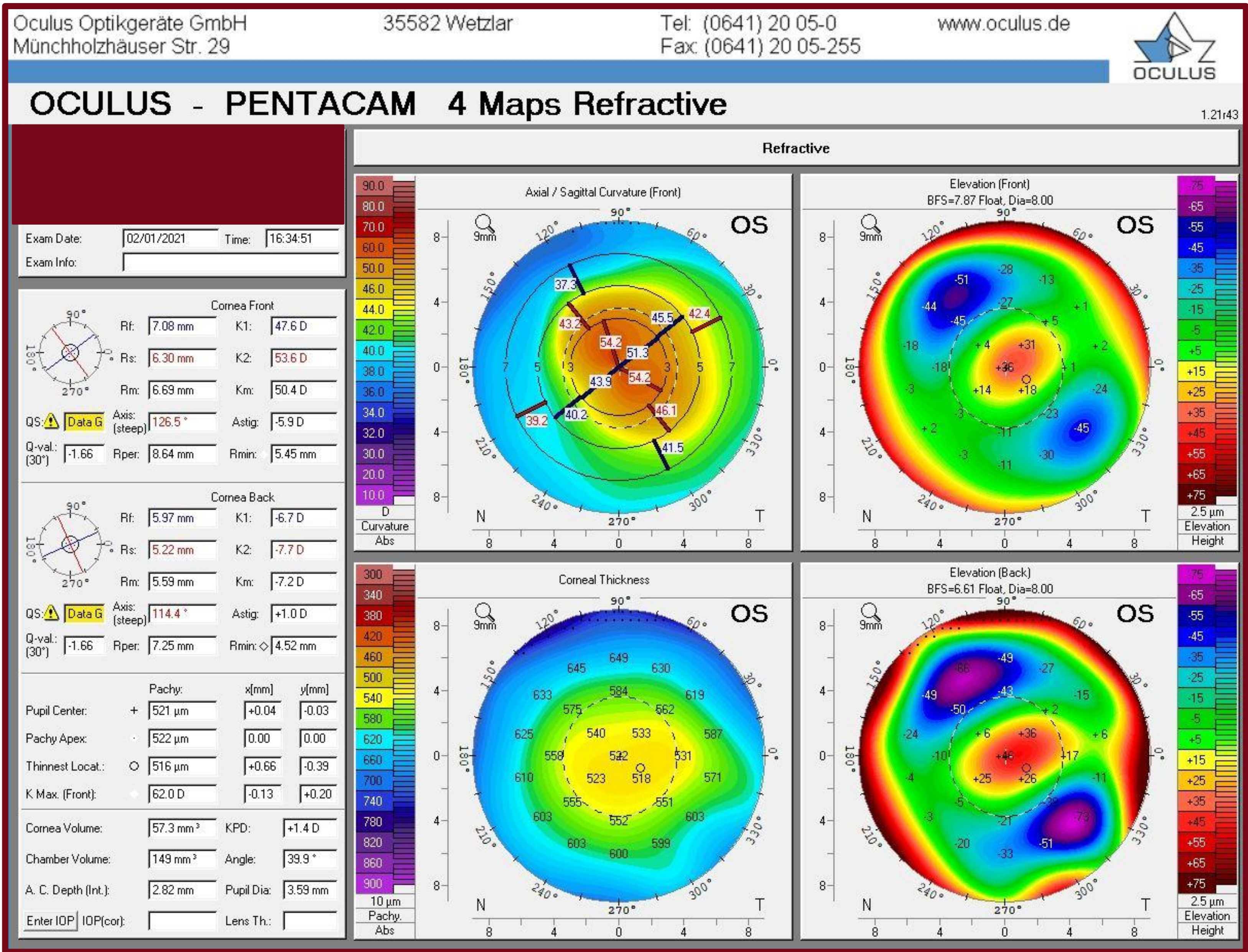


Figure 2: Corneal tomography image depicting post- trauma corneal ectasia.

Discussion

This case study evaluated the management of injury induced corneal ectasia with PROSE scleral lenses. Injuries deep enough to affect the residual corneal bed, 250 microns, have a high likelihood of causing corneal ectasia.¹ In addition, the corneal scars associated with the healed injury leads to higher order aberrations that degrade BCVA with conventional corrective wear, such as soft contact lenses and glasses.⁶

The patient had a corneal laceration with a micro-perforation leading to corneal ectasia. His symptoms included those caused by higher order aberrations as well as increased blur uncorrectable with glasses.

As there were no retinal conditions, lenticular conditions, or amblyogenic factors contributing to the ocular symptoms, it was determined that the cause of the symptoms was solely due to the corneal ectasia. Therefore, scleral lenses were fitted on this patient. The scleral lens provided a spherical surface for light to refract through as the vaulting of the lens provides a spherical tear film.⁵ With a spherical tear film the amount of light scattering and aberrations caused from diffraction of light is reduced significantly.⁶ When a scleral lens was placed OS in the patient, BCVA improved from 20/100 to 20/20 and aberrations decreased.

A scleral lens was chosen for this patient compared to hybrids and corneal gas permeable lenses, due to the size of the ectasia and for comfort. Hybrids and corneal gas permeable lenses are smaller than scleral lenses.⁵ The movement for these lenses can cause irritation to the patient, and some patients are intolerable to this wear.⁵ By putting the patient in a scleral lens that does not move on the eye, most patients find these lenses more comfortable causing more success in wear.

New improvements are being made in this field rapidly. A new product is being used to help reduce the density of scarring, which is losartan drops.⁷ It is currently not FDA approved, but it shows signs of reducing the density of the scars by blocking the myofibroblast pathway of scarring.⁷ Although this drop was not used on this patient, it is something to consider for future patients whose BCVA is reduced due to not only light aberrations but the density of the stromal scar. With this drop and scleral lenses, BCVA can be improved even more with these patients.

Expanding our use of scleral lenses from keratoconus, pellucid, dry eye, and refractive to injury induced ectasia is imperative to continue to improve the quality of life for all of our patients.

Conclusion

Injury-induced corneal ectasia is visually significant to the patient due to distortions, double vision, and other debilitating ectasia induced phenomena.¹ Not only does a PROSE scleral lens provide a constant source of hydration for the cornea in its process of healing, but it also diminishes light scattering.^{5,6} The patient is often able to achieve their best visual acuity with proper fit. The combination of improved acuity and decreased visual phenomena, leads to a patient with overall better quality of life.

References

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