

## ABSTRACT

A post radial keratotomy (RK) patient was refit with a scleral contact lens for improved comfort and visual stability.

### HISTORY

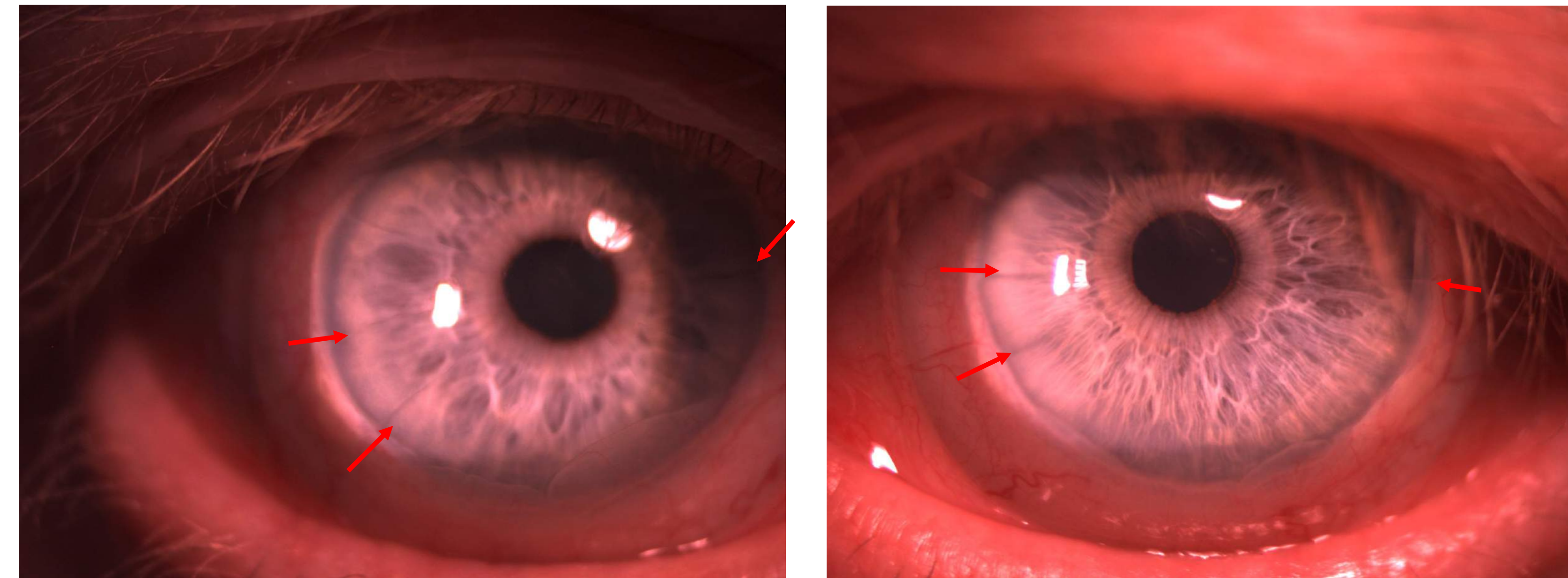
A 71 year old professional competitive skydiver presented complaining of poor comfort and visual fluctuations in his current GP lenses. Ocular history is remarkable for bilateral radial keratotomy in 1990 and retinal tear repair (OD,OS) with cryotherapy and laser. Additionally the patient suffers from long standing intermittent horizontal diplopia secondary to a mild right abduction deficit of unknown etiology. A neuro work-up was inconclusive. Systemic history is remarkable for hypertension and hyperlipidemia controlled with medication as well as sleep apnea controlled with a CPAP.

### VISUAL DEMANDS

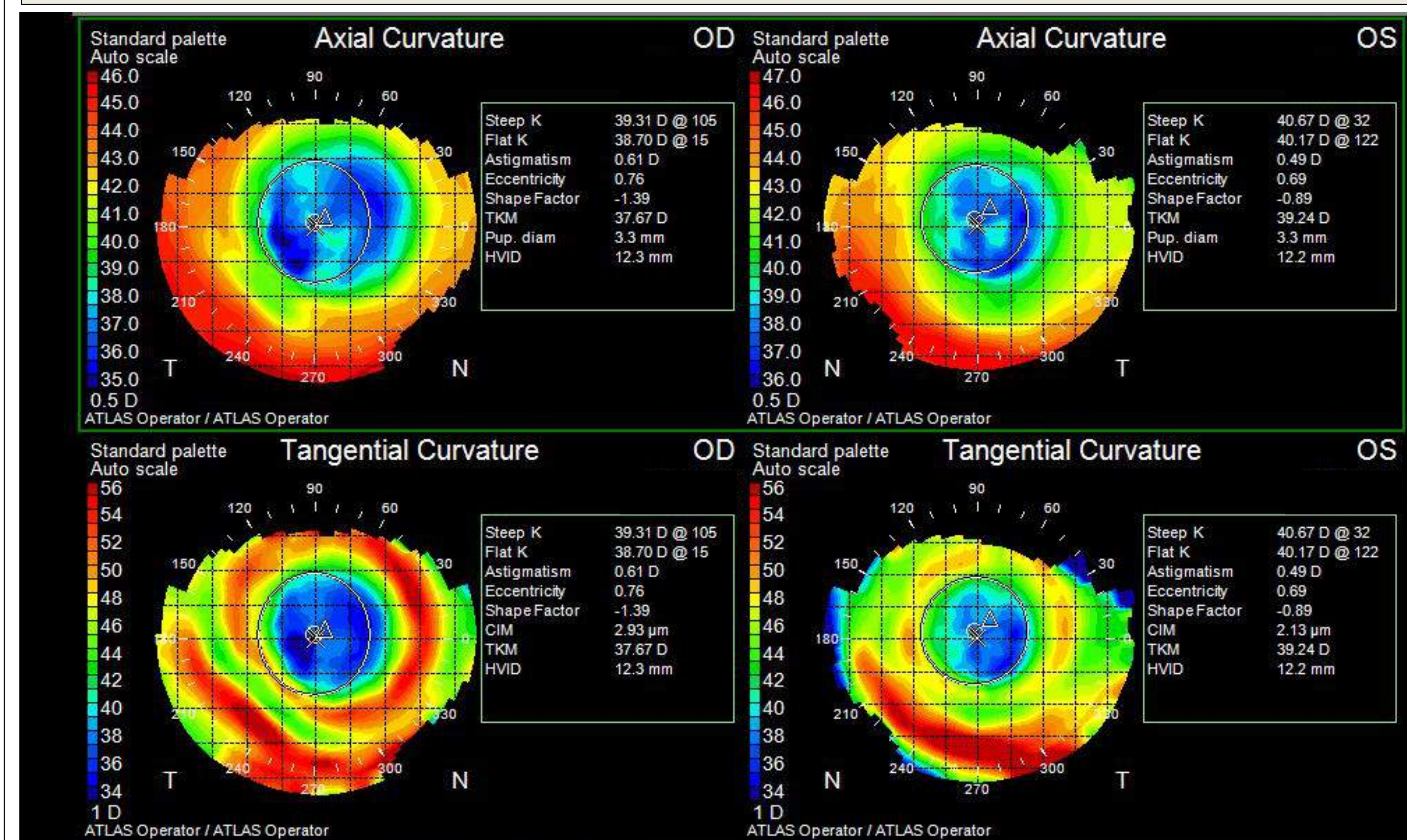
Skydiving has inherent visual demands that are present before take off until returning to solid ground. Clear binocular vision is necessary in the execution of complex formations and reading the altimeter during free fall. It also becomes important when choosing the proper path to land. When vision is compromised in this situation it can pose a threat to not only the individual, but their diving partners. In this case the corneal GP lenses would frequently dislodge leaving the patient functionally monocular. Additionally, the instability of the corneal GP lenses would cause visual fluctuations during free fall. Due to the precision and safety requirements of this profession, the patient was fit in a scleral lens which offers superior vision and stability over a corneal gas permeable lens in patients with radial keratotomy.

### EXAM FINDINGS

	OD	OS
BCVA (in current contact lenses)	20/25-	20/30
Pupils	Round, reactive, (-) APD	Round, reactive, (-) APD
Motility	Mild Abduction Deficit	Full
CVF	FTFC	FTFC
SLE	Radial RK scars 360 Clear visual axis	Radial RK scars 360 Clear visual axis
Keratometry	See topography	See topography



**FIGURE 1:** Radial RK incisions are visible 360 OU with scleral properly vaulting the cornea and providing adequate limbal clearance.



**FIGURE 2:** Topographic testing revealed irregular astigmatism and an oblate corneal surface secondary to radial keratotomy OU.



**FIGURE 3:** Complex formations like the one depicted above require precision and spatial awareness to execute successfully. The necessity for clear binocular vision is paramount for the precision and spatial awareness needed to achieve these formations.

### DIAGNOSIS AND DISCUSSION

Patients who have undergone radial keratotomy experience poor vision and visual fluctuations due to the instability and irregularity of the cornea. RK is well known to create fluctuations in vision on a daily basis with as many as 3 diopters of shift. This can affect visual performance and lens fitting and comfort throughout the day. Traditional lenses that rest on the cornea including RGP and soft lenses are ineffective due to the cornea's instability and irregularity. Thus a lens that vaults over the cornea is preferred. To accomplish this a scleral lens or hybrid ultra health lens could be utilized. Although both lenses would produce superior stability over a traditional RGP, a scleral lens modality was chosen for its ability to better accommodate the patient's demands.

### TREATMENT AND MANAGEMENT

Considering this patient's demands and visual needs a scleral lens modality was fit. A successful fit was completed with the Visionary Optics Europa scleral lenses.

The final lenses have the following parameters:

### FINAL CONTACT LENS PARAMETERS

	Visionary Optics Europa	4850 sag	7.03 mm BC	16.0mm dia	-6.50 sph 20/20
OD					
OS	Visionary Optics Europa	4950 sag	6.89 mm BC	16.0mm dia	-9.00 sph 20/20

The lenses provide adequate central and limbal clearance with no signs of blanching. Visual acuities of 20/20 are achieved in both eyes. After the initial lens dispense, the patient returned for follow-up visit. At that visit it was reported that the lenses are superior in comfort and stability over the previous RGP's. The patient is able to achieve all-day wear. A second pair of multi-focal lenses will be considered in the future.

### CONCLUSION

Scleral lenses offer a novel solution to provide improved vision and comfort over corneal GPs in an environment where lens stability is mandatory when presented with an irregular corneal surface.

### REFERENCES

- Morning-to-evening Change in Refraction, Corneal Curvature, and Visual Acuity 11 Years after Radial Keratotomy in the Prospective Evaluation of Radial Keratotomy Study. Peter J. McDonnell MD<sup>1</sup> Azhar Nizam MS<sup>2</sup> Michael J. Lynn MS<sup>2</sup> George O. Waring III MD<sup>2</sup> The PERK Study Group. *Ophthalmology*, Volume 103, Issue 2, 1996, 233-239
- Modern scleral contact lenses: A review. Van der Worp, Eef et al. *Contact Lens and Anterior Eye*, Volume 37, Issue 4, 2014, 240 - 250