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BACKGROUND

Previous studies have noted long-standing uncorrected keratoconus patients having a breakdown of binocular function, often due to the asymmetry of their condition.¹⁻³ Specialty contact lenses, including hybrid and sclerals, are often used to manage patients with keratoconus and other forms of corneal ectasias. Improved visual acuity, however, can unmask the anomalous binocular function previously hidden by their reduced vision and lead to binocular symptoms. This case series explores various treatment options to transform binocular diplopia into binocularity, demonstrating the potential of specialty contact lenses as stepping stones to achieve binocularity and improve overall visual function.

CASE 1

A 33-year-old male with aphakia and irregular astigmatism status-post penetrating keratoplasty (PK) OS presents for contact lens fitting

- History of:
 - Trauma (spontaneous glass bottle explosion) yielding ruptured globe with iris prolapse OS (2017)
 - Corneal repair: foreign body (glass) removal
 - Lens extraction – “could not put an IOL in due to lack of space”
 - Penetrating keratoplasty
 - 2 interrupted sutures removed one week prior
 - Compliant with prescribed Pred Forte 1% 1gt QID OS
- Exam findings

	OD	OS
Entering VA (uncorrected)	20/20	CF @5”
Pupils	Round, 4+ brisk reaction to light	Irregular pupil with minimal reaction to light
EOM	Full	Full
Cornea	Clear	Clear graft s/p PK, (-)pigment/KP/neo 6 remaining sutures
Iris	Normal	Iris atrophy
Lens	Clear	Aphakia
Posterior segment	Unremarkable	Unremarkable

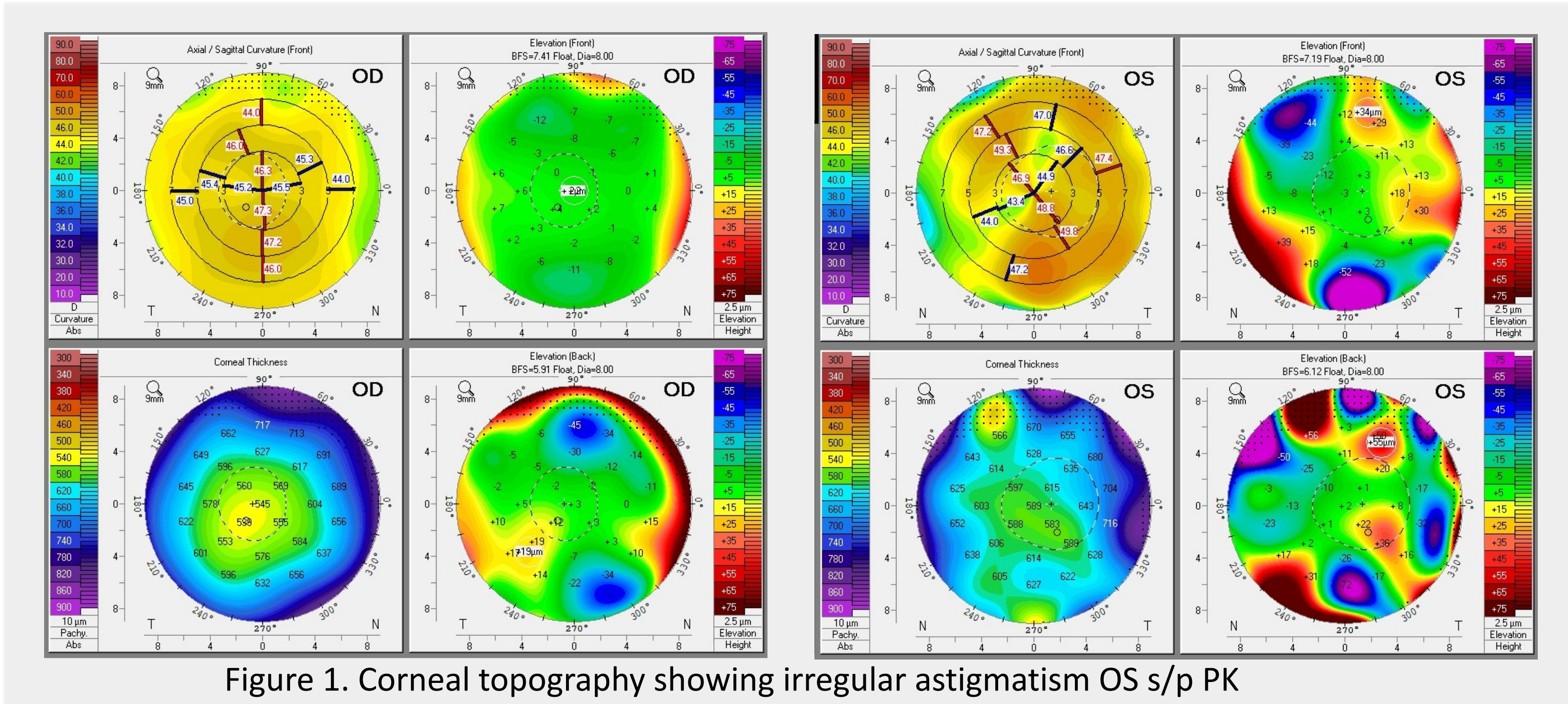


Figure 1. Corneal topography showing irregular astigmatism OS s/p PK

- To maximize oxygen transmission to the post-PK cornea, patient was initially fit with a Rose K2 rigid gas permeable (GP) lensOS. The patient could not tolerate the comfort despite an acceptable fit and visual improvement. Patient was subsequently refit into Alden Optical ZenLens with good comfort and improved visual acuity of 20/20 OS.
- However, at the follow-up, patient reported symptoms of double vision, dizziness, nausea and loss of balance during lens wear which had limited wear time to one to two hours per day.
- A binocular workup revealed large, uncompensated lateral and vertical phorias. Various prism amounts were trialed and tinted glasses with ground in prism (5 BI 2 BD OD, 5 BI 2 BU OS) were prescribed to be worn over the scleral lens.
- Patient is undergoing neuro-optometric rehabilitation therapy (NORT) to further increase binocular stability and the range of single vision through prism spectacles over contact lens.

CASE 2

A 34-year-old male with post-LASIK corneal ectasia OS had a self-declared “lazy eye” OS that aligned cosmetically immediately after LASIK. 13 years after LASIK, patient was experiencing monocular ghosting in the left eye only.

- Pertinent history:
 - LASIK OU in 2003
 - Left eye turn “since childhood”. No history of strabismus surgery
- Exam findings

	OD	OS
Entering VA (spectacles)	20/20	20/50
Cover Test		20-25^ Constant left extropia
Pupils		PERRL (-) APD
EOM	Full	Full
Cornea	s/p LASIK with temporal hinge	s/p LASIK with temporal hinge and inferior corneal thinning
Iris	Normal	Normal
Lens	Clear	Clear
Posterior segment	Unremarkable	Unremarkable

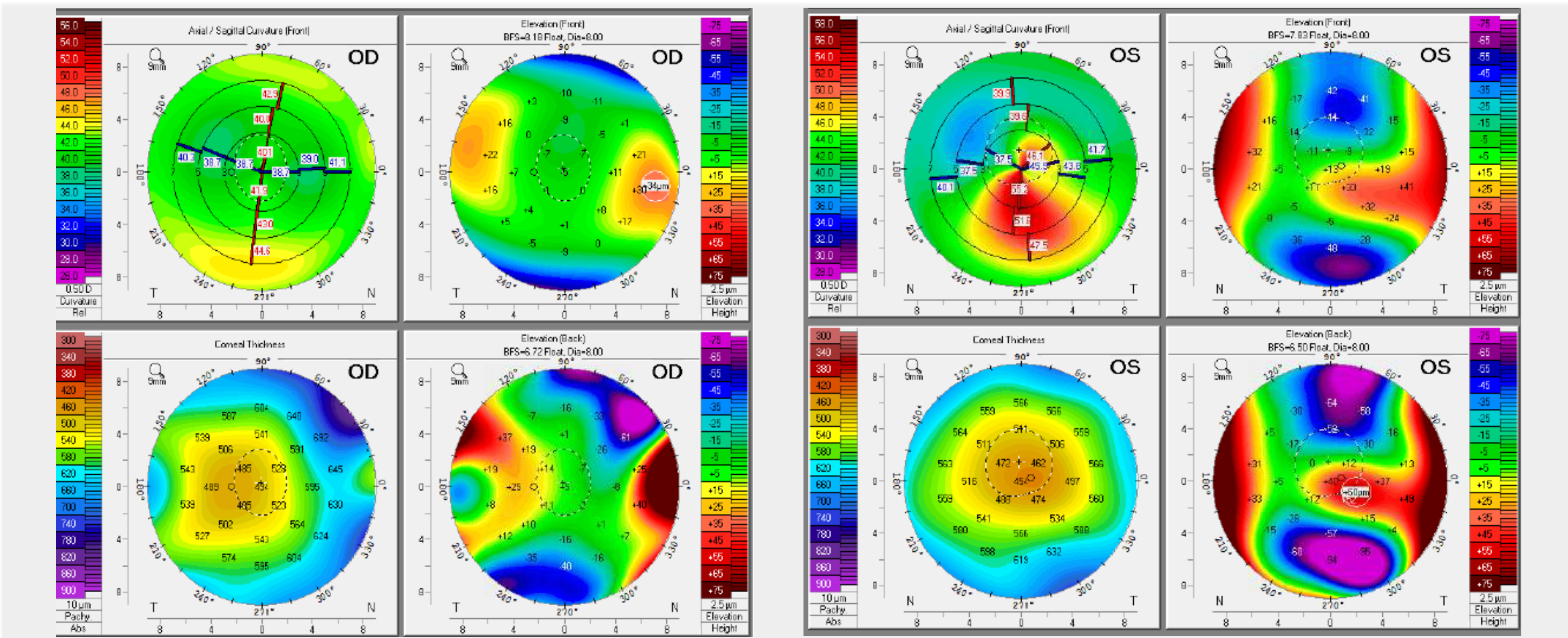


Figure 2. Corneal topography showing corneal ectasia OS s/p LASIK OU

- Patient was fit into Synergeyes UltraHealth® contact lens OS yielding 20/25 OS with good fit and comfort
- However, due to the patient’s underlying constant left exotropia, he became symptomatic for diplopia, reporting two clear images side by side while wearing the contact lens OS.
- 35 prism diopters prism over the left eye restored single vision
- Patient was referred to Vision Therapy (VT) clinic for a strabismus consult. Upon the completion of a structured VT regimen, patient demonstrated sensory fusion on Worth 4 Dot and stereopsis on Randot Stereotest.

CONCLUSION

With constant innovation in specialty contact lenses and their growing popularity, diplopia following vision restoration may become increasingly common in the future. However, the multitude of tools that can be employed to transform biocular images into binocularity, including vision therapy, prism spectacles, and prism grounded into scleral lens, demonstrates that specialty contact lenses can not only provide optimal vision for patients with irregular corneas, but also serve as vehicles to enhance their binocularity and visual performance.

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