



Scleral Lenses Can Stabilize Visual Fluctuations in Post Radial Keratotomy Patients

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Purpose

To illustrate a clinical scenario where a scleral contact lens was able to successfully rehabilitate and stabilize fluctuating vision in a patient with previous history of radial keratotomy.

Case Report

HPI comment: Patient is a 60 year old Caucasian male who presents with complaints of long-standing fluctuating and blurry vision in both eyes. The patient had RK surgery 30+ years ago that corrected his vision so that he was glasses free for several years. However, he developed instability and subjective irregularities in his vision in the last few years. Specifically, he complained of symptoms including blurred vision (even with spectacles with 20/20 BCVA), ghosting and halos (especially in dim lighting). He was particularly bothered by his fluctuating visual acuity. The patient stated that he wears one pair of glasses in the morning and another pair in the afternoon, which is not ideal for a commercial airline pilot. He had previously worn RGP lenses prior to his RK procedures and understood the potential visual quality benefits with these lenses. Scleral lenses were introduced as an option that would provide that optical clarity while providing better comfort and stability than traditional RGP lenses. It was explained that the tear lens reservoir would allow for and compensate for the fluctuations in his cornea, correct his significant refractive astigmatism, and allow sharp, consistent vision and he elected to be fit with scleral lenses.

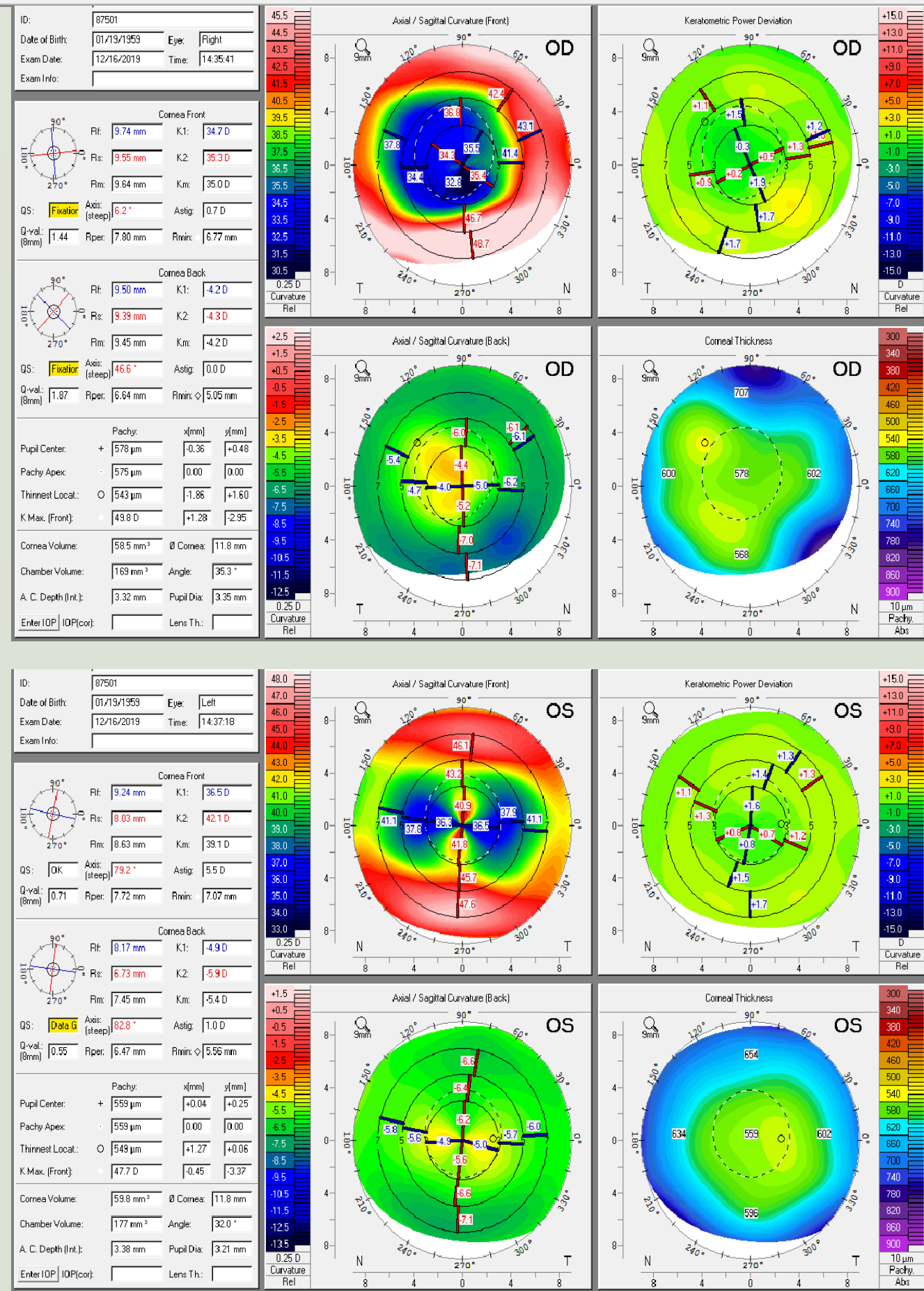
Ocular History

8 incision RK OU, 1988
cataracts: NSC 1+ OU

Medical History

hypertension
hernia

OCULUS - PENTACAM 4 Maps Topometric



Initial Zenlens Fitting

OD: Z-14
over refraction +5.50 -1.25 x 099
yielded 20/15 vision
Examination revealed central touch and heavy limbal touch, and it was decided to use a steeper lens.
The Z-14 was then changed to Z-15
over refraction +4.00 -1.25 x 099
yields 20/15 vision
Examination revealed central vault 414 with minimal nasal blanching and minimal superior limbal touch.

OS: We decided to start with the Z-15 given the results of the Z-14 on the right eye.
over refraction +4.75 -0.50 x 120
yielded 20/15 vision
Examination revealed central vault 476 with minimal nasal and temporal blanching, slight edge lift at 12 and 6 o'clock and superior limbal touch.

Commentary

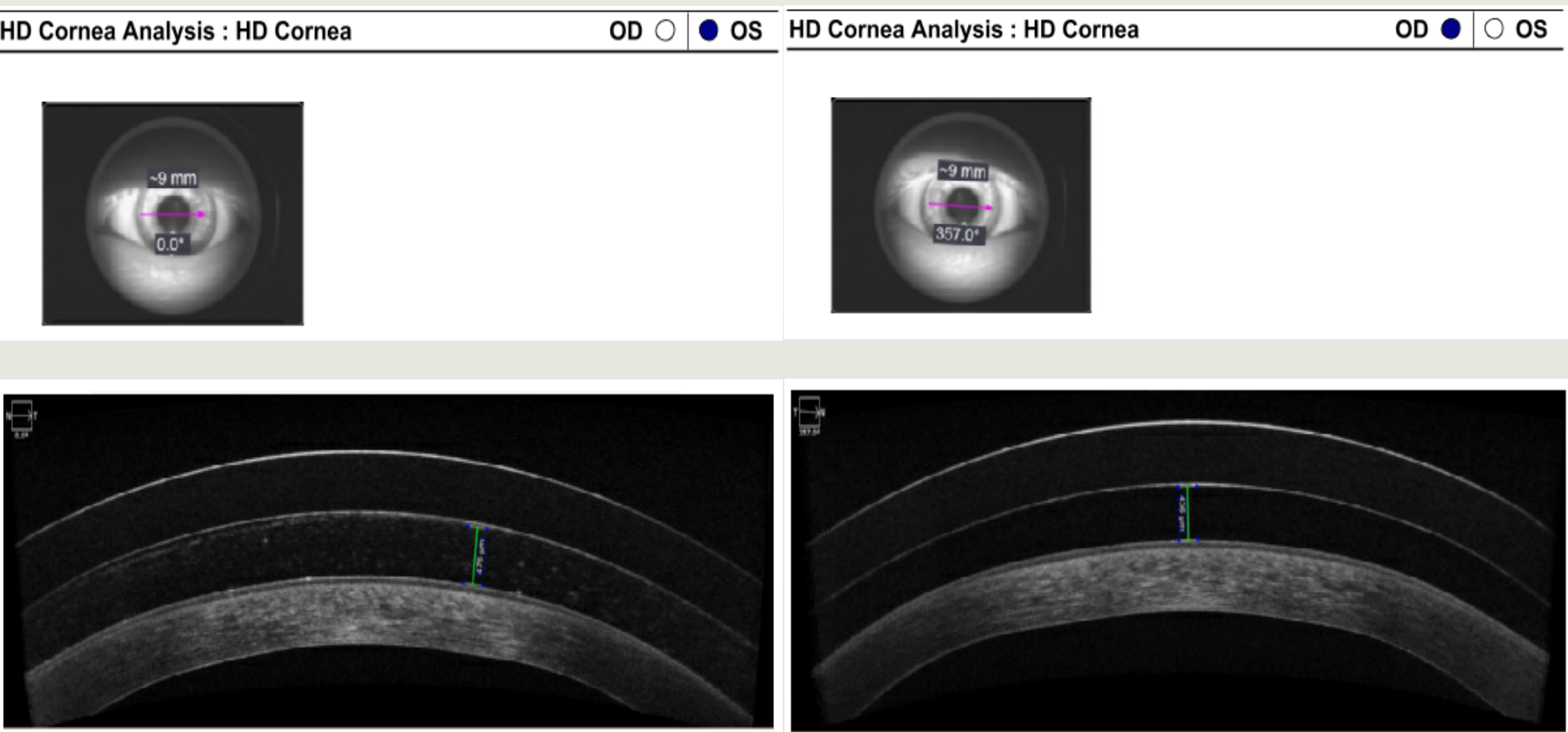
Post RK corneas are often oblate shaped, with an asymmetrically flat center and peripheral steepening. As the Zenlens also has an oblate design, this lens was chosen for the initial fitting process. The 16 mm diameter was selected based on his corneal diameter. The manufacturer recommends to start with the Z-14 lens under these circumstances. Over refractions were performed approximately 10 minutes after lens insertion, followed by OCT imaging. The lenses were then evaluated at the slit lamp. I determined that the right eye nasal blanching could be resolved by flattening the outer edge of the lens (termed APS in the Zenlens). Similarly, I concluded that the superior limbal touch in the right can be improved by increasing the limbal lift of the lens. The left lens showed blanching of the scleral vessels nasal and temporal, indicating too steep a fit. The APS was flattened significantly in the horizontal meridian to compensate. Likewise, the vertical meridian was steepened to correct the excessively loose fit superior and inferior. The limbal clearance was also raised 100 to correct for the superior limbal touch. Tangible Hydrapeg was added to the lenses in effort to combat the dryness sometimes affiliated with high altitudes and to ensure the wettest surface possible to maintain sharp vision for his vocational needs as a pilot. I opted for a clear right lens and blue left lens in an effort to eliminate confusion as to which lens goes in which eye. The patient was advised to spell the word “blue”: as the second letter is “l”, this would help him to remember to put this in the left eye.

After Modifications

Zenlens Order# BD8330 Material: Boston XO2 with Tangible Hydrapeg	
OD	OS
Base Curve: 9.0	Base Curve: 9.0
Power: +4.00 -0.75 x 037	Power: +4.25 -1.50 x 011
Diameter: 16.0 oblate design	Diameter: 16.0 oblate design
Saggita: 4.540	Saggita: 4.550
APS: horizontal flat 2 vertical steep 1	APS: horizontal flat 6 vertical steep 9
Limbal increase: 100	Limbal increase: 100
Center thickness: 0.50	Center thickness: 0.50
Evaluation: central vault 242 Vision 20/20	Evaluation: central vault 277 Vision 20/15
APS looks good, no blanch, no leak 360 little superior limbal touch dot rotation: 20 degrees left	APS looks good, no blanch, no leak 360 little superior limbal touch dot rotation: 5 degrees left

Commentary

I noted that the visual acuity had significantly improved at this visit. OCT imaging showed almost ideal central corneal clearance. The APS evaluation also showed no blanching nor edge lift. The superior limbal touch that was present in previous lenses was not observed. I concluded that these lenses are suitable for dispensing.



Initial Dispensing

OD	OS
Base Curve: 9.0	Base Curve: 9.0
Power: +2.25 -1.25 x 99	Power: +3.00 -0.50 x 120
Diameter: 16.0 oblate design	Diameter: 16.0 oblate design
Saggita: 4.540	Saggita: 4.475
APS: flat 2	APS: horizontal flat 6 vertical steep 6
Limbal increase: 100	Limbal increase: 100
Center thickness: 0.44	Center thickness: 0.47
Evaluation: central vault 211 Vision 20/50	Evaluation: central vault 146 Vision 20/50
Over refraction: +1.00 +1.75 x 90 yields 20/20 vision	Over refraction: -0.25 +2.00 x 100 yields 20/20 vision
APS looks good, no blanch, no leak 360 little superior limbal touch dot rotation: 20 degrees left	APS looks good, no blanch, no leak 360 little superior limbal touch dot rotation: 5 degrees left

Commentary

The initial visual acuity was a disappointing 20/50 in each eye. Over refraction was able to correct to 20/20 in each eye. The central vaulting was an acceptable 211 in the right but was a low 146 in the left. The SAG value needs to be raised about 75 to achieve optimal clearance. Slit lamp evaluation showed no blanching nor edge lift on the outer edges of the right lens but did indicate superior limbal touch still present. Since raising the limbal lift did not alleviate the touch, steepening the vertical meridian should tighten the lens and lift it superiorly and relieve the touch. The left lens evaluation showed comparable findings. The vertical meridian should be steepened as well.

Final Lens Parameters

Zenlens Order# BE5452 Material: Boston XO2 with Tangible Hydrapeg	
OD	OS
Base Curve: 9.0	Base Curve: 9.0
Power: +4.00 -0.75 x 037	Power: +4.25 -1.50 x 011
Diameter: 16.0 oblate design	Diameter: 16.0 oblate design
Saggita: 4.565	Saggita: 4.550
APS: horizontal flat 1 vertical steep 2	APS: horizontal flat 6 vertical steep 9
Limbal increase: 100	Limbal increase: 100
Center thickness: 0.49	Center thickness: 0.50

Discussion

Radial Keratotomy (RK) was a common refractive surgical procedure in the 1980s and 1990s before the advent of excimer laser ablation procedures. The RK procedure often corrected vision to the point spectacles and contact lenses were no longer needed. However, we are seeing many post RK patients with distorted vision that progressively worsened many years later due to irregular astigmatism and diurnal fluctuation. These distortions and fluctuations can range from mildly annoying to severely debilitating. For many patients, eyeglasses do not adequately and consistently improve the vision. Some patients may be successfully visually rehabilitated with soft contact lenses, but oftentimes, rigid gas permeable and/or scleral lenses provide a more viable solution.

In recent years, there has been a wave of interest in the use of scleral lenses for patients with significant astigmatism, such as those with corneal ectasias. In addition to wearing comfort, scleral lenses offer excellent correction of astigmatism and enhanced lubrication of the ocular surface. As such, they may be especially well suited for management of post-RK patients. Oftentimes, despite their astigmatism and other ocular surface changes, these patients still have excellent vision potential. The contact lens specialist can play a valuable role in the management of these patients by providing a non-surgical means for vision rehabilitation.

As seen in this patient, scleral lenses provided therapeutic improvement of vision in a patient with high visual demands for his vocational needs. While the scleral lenses required some adjustments at each visit as detailed above, the patient was able to learn how to use the lenses effectively in a fairly short amount of time. We briefly explored the possibility of presbyopia correction with the scleral contact lenses, but unfortunately due to the high astigmatism, it was necessary to prioritize the latter at the expense of the former. Monovision with scleral contact lenses may be an option as well, but in patients with high visual demands for occupational needs (as would be expected in a pilot), maintaining adequate depth perception may be a higher priority.

Conclusion

Contact lens specialists may increasingly encounter presbyopic post-RK patients who have experienced worsening vision in recent years. As these patients may not be suitable surgical candidates yet for cataract surgery, vision rehabilitation with contact lenses may provide an excellent non-surgical option. While practitioners have a range of contact lenses to choose from, scleral contact lenses may provide excellent optical clarity and should be considered when the need arises.

Acknowledgements

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