

# Radial Keratotomy: A Short-term Correction to a Long-Term Problem

Michelle Chung, OD

## CASE HISTORY

A 55-year-old white male presents for a solution to his blurry vision. Patient explains that since his radial keratotomy surgery in the 1990s his vision was 'never right'. In 2008 a corneal surgeon tried to correct his vision further with LASIK, however the effects of that was short-lived. He went to countless ophthalmologists for second opinions to try to get his vision better, but despite multiple pairs of glasses prescribed to him, his vision progressively worsened. The ophthalmologist told him the next step would be to get a corneal transplant. He was hesitant for another surgery and decided to get a second opinion. His current glasses prescription is as follows:

OD: +7.00 - 3.75 x 109 VA: 20/150  
OS: +9.00 - 4.00 x 016 VA: 20/300  
OU: 20/100

## CLINICAL FINDINGS

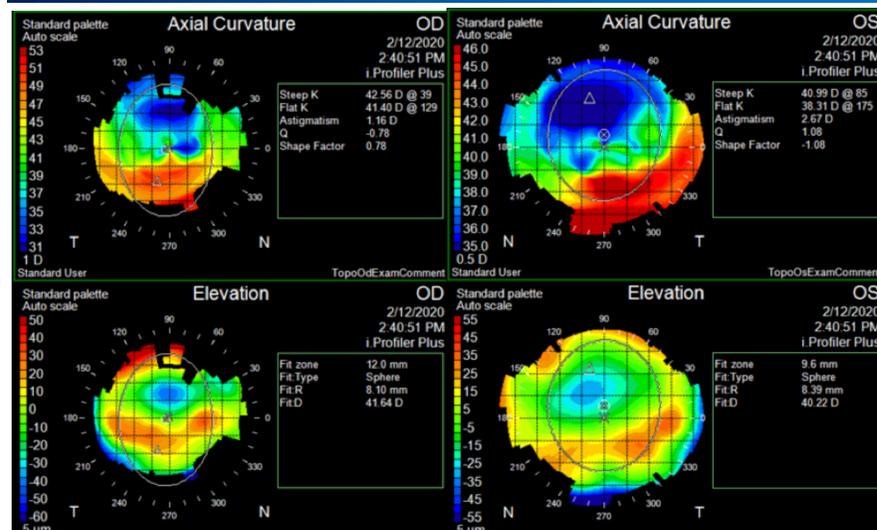


Figure 1 : Axial and elevation curvature topographies taken at initial visit. Both maps reveal central flattening and peripheral steepening from refractive surgery.

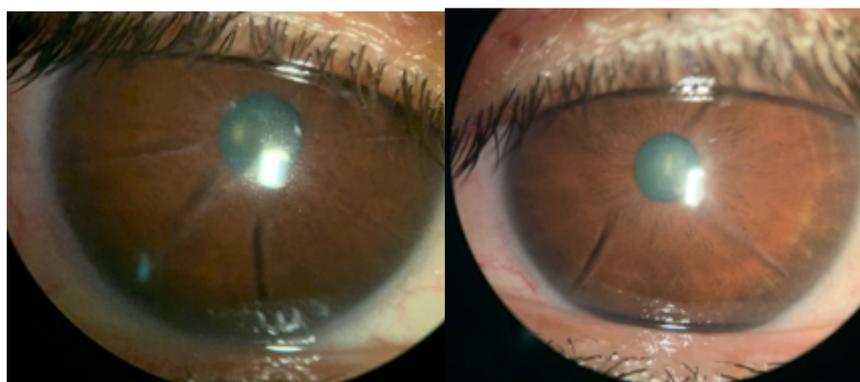


Figure 2: Slit Lamp evaluation in both eyes reveals eight Radial keratotomy incisions OD and four radial keratotomy incisions OS with peripheral thinning. Nasal and temporal Lasik scar. Otherwise unremarkable findings.

## EXAM FINDINGS

### Visit #1

Given the topography of the patient, a regular prolate scleral lens would create too much pooling centrally and will not conform to the irregular geometry properly. Therefore, we selected the set of lenses that has a reverse geometry design that accounts for the oblate shape of the patient's eye. Synergeyes VS Scleral lens was used to fit this patient, below is the initial trial lens selected:

	Vault	Diam (mm)	Base Curve	Power	Flat axis	Scleral Landing Zone Flat - Steep	DVA	Over Refraction/Vision
OD	3600	16	8.4	plano	135	36 - 42	20/25	+0.50 to 20/25
OS	3600	16	8.4	plano	70	36 - 42	20/40	+0.50 - 1.00 x 155 to 20/25

### Initial lenses at 30 min evaluation shows

OD: 500 microns central clearance with adequate limbal alignment, lens centered, mild conjunctival blanching 360, no movement.  
OS: 600 microns central clearance with adequate limbal alignment, lens centered, no conjunctival blanching 360, no movement.

### Initial Lens to be ordered

	Vault	Diam (mm)	Base Curve	Power	Flat axis	Scleral Landing Zone Flat - Steep
OD	3300	16	8.4	+0.50 Sphere	135	32 - 38
OS	3200	16	8.4	+0.50-1.00x155	70	36 - 42

### Visit #2

Lens Evaluation of initial lenses after 30 mins of wear.

	Central Clearance	Limbal Clearance	VA	Over-Refracton	Scleral Landing Zone Appearance
OD	200nm	100nm	20/25	+0.50 Sphere	No conjunctival blanching or edge lift 360 OU
OS	250nm	75nm	20/30	+0.50-1.00x155	

Since vision and fit was acceptable, the patient is to wear the lenses take the lenses home to slowly build up wear time and follow up in a week

### Visit #3

At the time of evaluation the lenses has been on for roughly 5 hours. Patient reports discomfort towards the end of the day. He feels that the left lens feels more "stuck" on his eye when he tries to remove it after 4 hours of wear.

	Central Clearance	Limbal Clearance	VA	Over-Refracton	Scleral Landing Zone Appearance
OD	~150nm	~100nm	20/25	Plano	No conjunctival blanching
OS	<200nm	<25nm, bearing at some areas	20/30	Plano	or edge lift 360

Lens changes for OS increase limbal clearance we decided to steepen base curve from 8.4 to 8.3 and made the appropriate power adjustment by +0.5D. We also suggested the use of artificial tear prior to removal. New lens parameters for OS

	Vault	Diam (mm)	Base Curve	Power	Flat axis	Scleral Landing Zone Flat - Steep
OS	3200	16	8.3	+1.00-1.00x155	70	36 - 42

### Visit #4

Patient came back with a visual acuity of 20/25 OD, 20/25 OS, and 20/25+ OU at distance. He was happy with his new lens.

## DISCUSSION

For the most part the location of the thinning dictates the type of corneal ectasia disease it is. Since none of the patterns of corneal thinning secondary to corneal disease is consistent with the topography and geometry of the patient's presenting cornea, it is suggestive that his conditional is corneal ectasia secondary to refractive surgery.

Radial keratotomy (RK) is a surgical method that is for correcting myopia. This procedure involves radial incisions that start from the paracentral cornea to the peripheral cornea. The initial ideal of this surgery is believed that these incisions will in turn flatten the central cornea and result in a decrease in refractive power. However, in the Prospective Evaluation of Radial Keratotomy (PERK) study it shows that although that is true and it does correct one's refractive error, it only lasts for a short period of time before a hyperopic shift occurs. Our patient who was initially a myope has also experienced a drastic hyperopic shift. The complications following this surgery can range from mild to severe depending on the depth of the incision, the number of incisions length and location of the incisions. These complications includes the following: corneal perforations, accidental incisions across the visual axis, a decentered clear zone, limbal incisions, visual fluctuations, corneal edema, glare, iatrogenic keratoconus, irregular astigmatism, and falsely low IOP values. Due to all of the abovementioned reasons, RK has become obsolete.

In this case, the patient presents with corneal incision scars that ranged from para-cornea to peripheral cornea, leaving about a 4-5mm clear optic zone, but he still complains of glare and decreased vision with a progressively increase in his hyperopia over the past twenty years. Luckily, with the advancement in specialty lenses, we were able to fit him into the Synergeyes VS to attain good vision.

## CONCLUSION

The patient was relieved with the notion that we were able to correct and improve his vision without another surgery. He remarked on the noticeable difference in his quality of life in terms of enjoying golf games leisurely with his friends and family. When glasses are not working as they're intended for, the next step is not always surgery. We have to keep in mind that with the new advances of technology, specialty lenses may be one of the many stepping stones between glasses and surgery.

## REFERENCES

- Forister JF, Sun A, Weissman BA. Progress report on a post-radial keratotomy patient 20 years after surgery. Eye Contact Lens. 2007;33:334-337. doi: 10.1097/ICL.0b013e318030f1b6. [PubMed] [CrossRef] [Google Scholar]
- Gwon A. Prospective Evaluation of Radial Keratotomy (PERK) Study 10 years after surgery. Arch Ophthalmol 1995; 113(10): 1225-6.
- Leccisotti A, Fields SV. Femtosecond-assisted laser in situ keratomileusis for consecutive hyperopia after radial keratotomy. J Cataract Refract Surg. 2015;41:1594-1601. doi: 10.1016/j.jcrs.2015.08.014.