



Challenges of Fitting and Assessing Proper Fit of a Scleral Lens in a Chronic Cannabis User

with a Large Diameter Corneal Graft

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Introduction

In fitting corneal grafts with scleral lenses, it becomes very important to vault the graft area to prevent graft rejection and corneal compromise in an already unstable cornea. This case illustrates the challenges involved with fitting a scleral lens in a patient that has had multiple corneal transplants and large diameter grafts.

Fitting scleral lenses becomes more of a challenge in chronic cannabis users. It is common for cannabis users to have hyperemic and dry eye symptoms after smoking.^{1,2} In scleral lens wear, this makes it more difficult when trying to assess proper fit versus redness and irritation from cannabis use.

Case History and Exam

A **60-year-old Caucasian male** presents for same day scleral lens dispense and check.

Chief Complaint: Discomfort with lenses OD > OS; does not wear OD lens due to discomfort

Ocular History: Keratoconus OU, LASIK OU (1975), RK OD, PKP OD x 2, PKP OS; longstanding history of red, dry eyes with lens wear after smoking cannabis

Family History: Daughter with Keratoconus

Medical History: Ibuprofen, Vicodin, and medical marijuana for pain associated with a history of broken neck vertebrae

Monocular Subjective: **OD:** -4.25-13.25x013 (20/40+1)
OS: +4.75-13.50x127 (20/40-2)

Anterior Segment:

OD: Proud central clear graft ~10mm with LASIK scar, no sutures, trace neovascularization superiorly up to graft edge, scars at corneal edge of graft that look like previous RK vs. suture scars; no hyperemia

OS: Superiorly displaced proud clear graft ~7.5mm with surrounding LASIK scar, small round scar 4:00 on pupil margin on graft, no neovascularization; no hyperemia

Current Scleral lens:

OD: 8D Reverse Geometry Jupiter Scleral Lens

OS: 6D Reverse Geometry Jupiter Scleral Lens

Power: -8.50 OD & OS, **Material:** Optimum Extra

BC: 7.67 OD, 6.96 OS; **DIA:** 16.0

BCVA: 20/60-2 OD, 20/20-2 OS

Clinical Findings

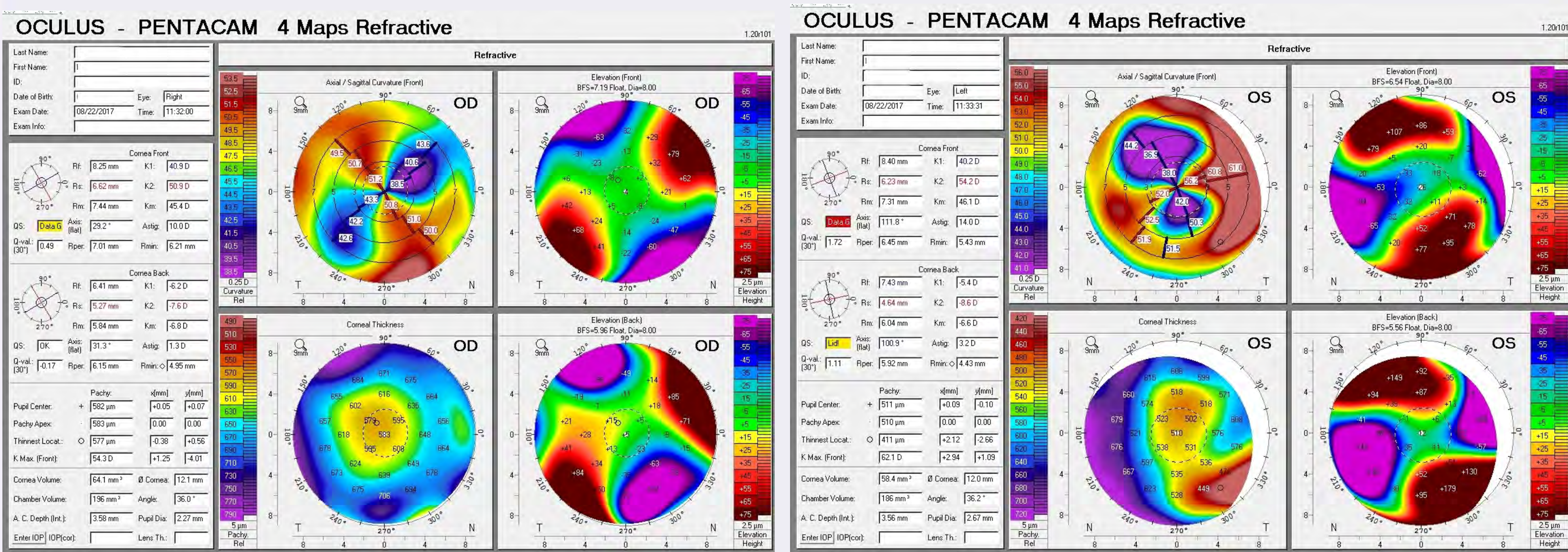


Figure 1 & 2 (above, left and right): Oculus Pentacam Imaging – OD and OS shows Irregular Astigmatism due to PKP

Fit of Current Scleral Lens:

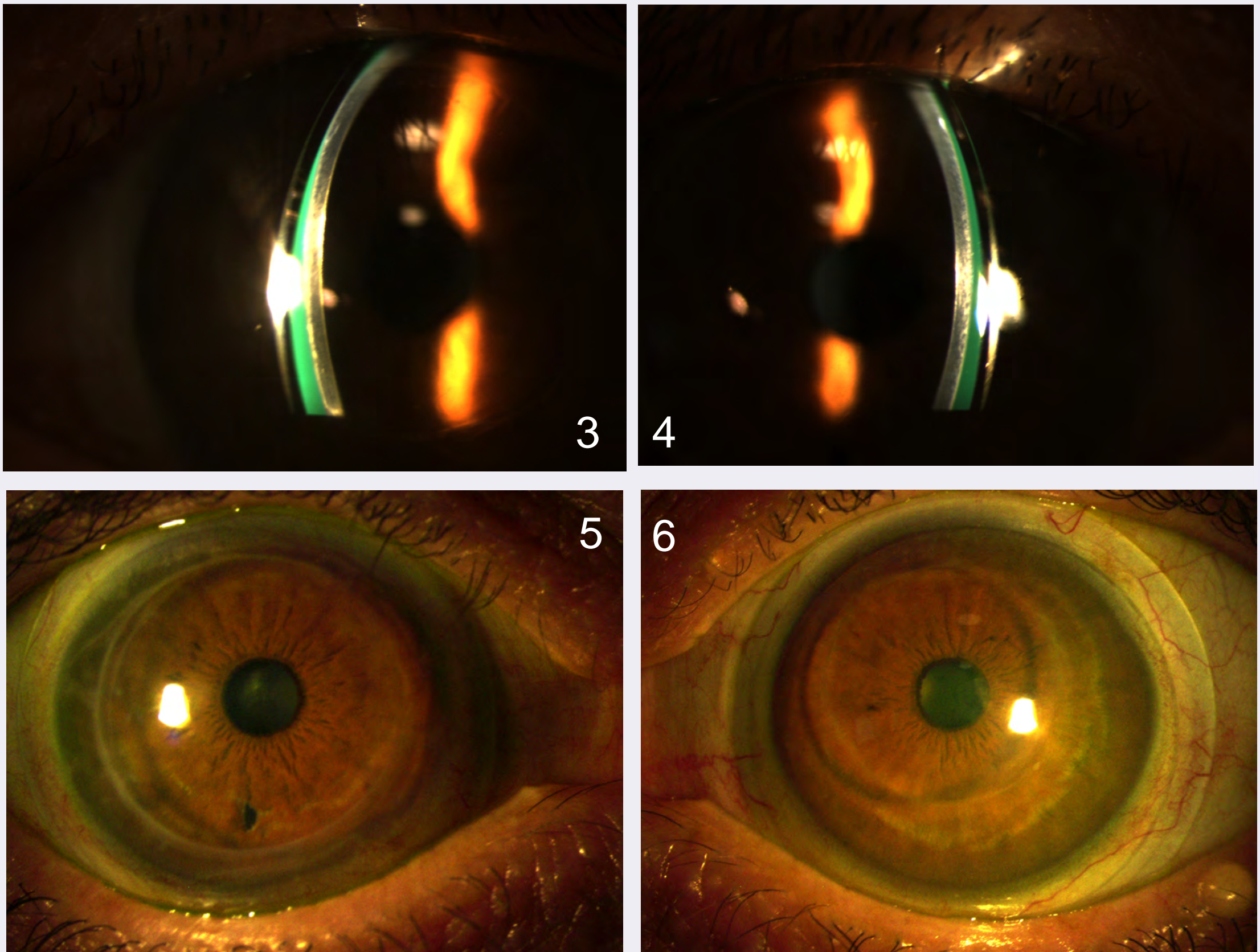
OD: Central clearance 262 um with mild inferior prism, graft touch supero-nasal that feather clears on downgaze, limbal clearance 360, good peripheral alignment, (-) blanching 360, inferiorly decentered

OS: Central clearance 350 um with mild inferior prism, limbal clearance 360, well centered, (-) blanching 360

Figure 3: Right Eye - graft touch superiorly with current scleral lens

Figure 4: Left eye - graft clearance with current scleral lens

Figure 5 & 6: Right eye and left eye with finalized scleral lens



Discussion

In patients with large diameter grafts, increasing the diameter of the lens or increasing the reverse curve of the lens can prevent graft touch. However, it is also important to consider the amount of clearance in other areas of the cornea because too much vault may cause corneal hypoxia,³ but too shallow of a vault may cause corneal compromise.

Tetrahydrocannabinol (THC) is the ingredient in cannabis that is responsible for red eyes after cannabis use.^{1,2} THC is thought to cause conjunctival injection from vasodilation of the blood vessels.^{4,5} THC has also been reported to cause dry eye symptoms, although the pathogenesis has not been elucidated and further studies are needed to explore its association with dry eyes. With regards to assessing scleral lens fit, patients who smoke cannabis should be advised to refrain from smoking before examination so that hyperemia and discomfort after a few hours of lens wear are not misinterpreted as poor fit.

Management

Final Scleral Lens:

OD: 11 D Reverse Geometry Jupiter Scleral Lens

OS: 10 D Reverse Geometry Jupiter Scleral Lens

Power: -2.00 OD, -3.00 OS; Toric Peripheral Curves

BC: 9.00 OD, 7.94 OS; **DIA:** 16.4

BCVA: 20/40+2 OD, 20/20 OS

Final Scleral Fit:

OD: Central clearance 85 um, mild inferior prism, thin supero-nasal but clears on downgaze, graft clearance 360, mild compression horizontally, (-) blanching

OS: Central clearance 265 um with large inferior prism, thin supero-nasal and feather clearance over graft at 11:00 but clears on downgaze, limbal clearance 360, inferiorly decentered, (-) blanching 360 but pushes on nasal cyst; no hyperemia

Figure 7: Right

Eye, graft clearance superiorly

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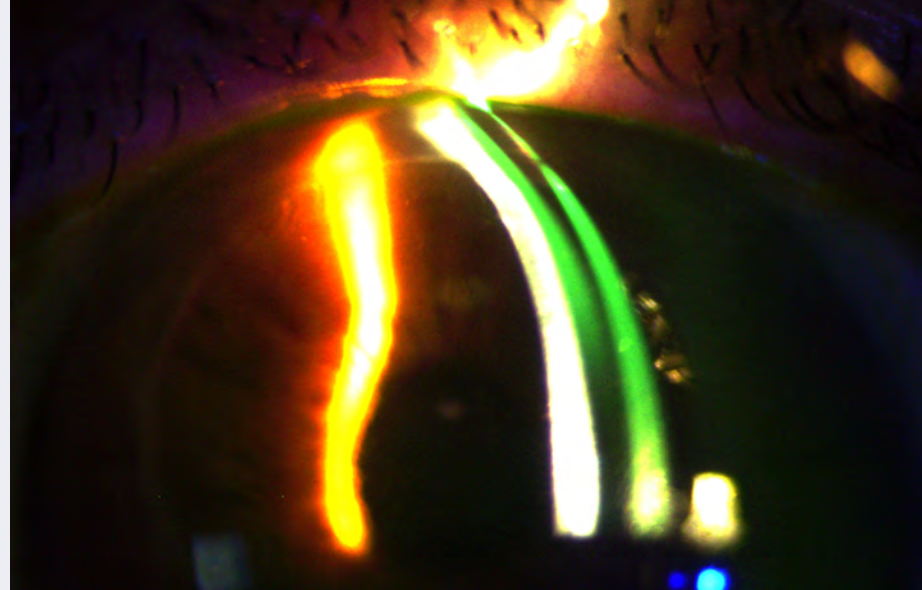
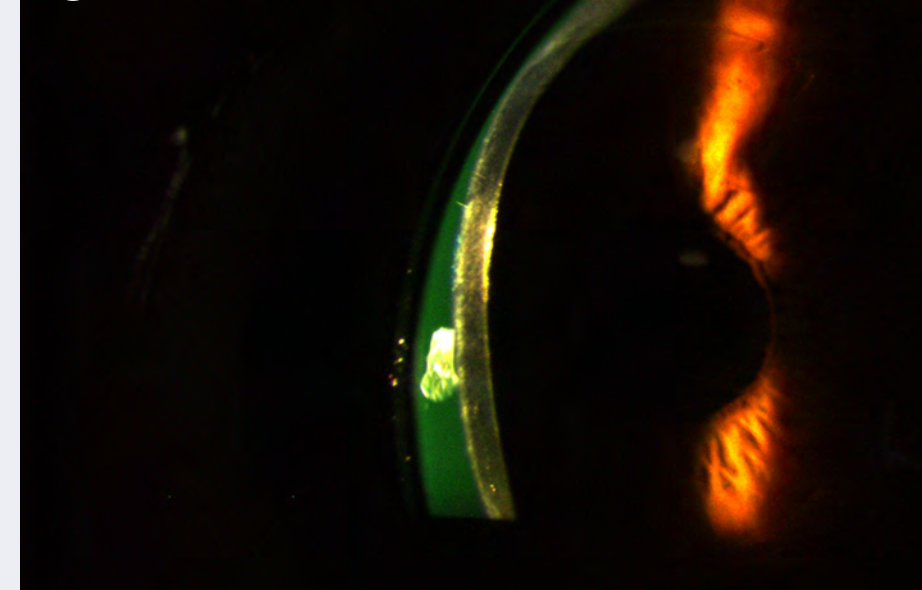


Figure 8: Left Eye, feather graft clearance superiorly

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Patient reports best comfort and vision with both scleral lenses.

- No discomfort with the right lens compared to previous lens; he is now able to wear both lenses comfortably
- Reports instilling Refresh Celluvisc in bowl of lenses before insertion helps with dry eye symptoms and comfort.

Clinical Pearls

- Increase lens diameter or increase the reverse curve to better vault large diameter corneal grafts.
- Consider clearance in other areas of the lens in order to prevent over-vaulting the cornea and causing hypoxia.
- Educate patients to not smoke cannabis before contact lens follow ups in order to accurately assess fit.
- Instilling a preservative free artificial tear into the bowl of the scleral lens can help with scleral lens wear comfort.

Acknowledgements & References

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- Ware MA, Wang T, Shapiro S, et al. Smoked cannabis for chronic neuropathic pain: A randomized controlled trial. *Cmaj*. 2010;182(14).
- Cao D, Srisuma S, Bronstein AC, Hoyte CO. Characterization of edible marijuana product exposures reported to United States poison centers. *Clin Toxicol*. 2016;54(9):840-846.
- Walker MK, Bergmanson JP, Miller WL, Marsack JD, Johnson LA. Complications and fitting challenges associated with scleral contact lenses: A review. *Contact Lens Anterior Eye*. 2016;39(2):88-96. doi:10.1016/j.clae.2015.08.003.
- Hillard CJ. Endocannabinoids and vascular function. *J Pharmacol Exp Ther*. 2000;294(1):27-32.
- Bramness, J. G., Khiabani, H. Z. and Mørland, J. (2010), Impairment due to cannabis and ethanol: clinical signs and additive effects. *Addiction*, 105: 1080–1087.