

BACKGROUND

Scleral lenses are an amazing solution for patients with irregular corneas to provide improved visual acuity. A variety of advancements have been implemented into practice regarding customizable options, including the ability to paint an iris onto the posterior surface of a gas permeable scleral lens. While options exist to create customized prosthetic or soft contact lenses, gas permeable options have historically been limited to PMMA lenses. A back surface painted lens provides the benefit of an opaque ring to decrease glare. It also provides a solution for cosmesis concerns.

Despite the advantages, the painted component has potential to compromise the oxygen transmission and fit. Oxygen transmission is limited with basic scleral lens wear and an additional layer of paint only adds to corneal compromise and edema¹. In addition, an optimal scleral lens fit will have 100-300um of clearance between the back surface of the lens and the cornea². Certain conditions, such as keratoconus may require more in order to clear the cone adequately.

CASE HISTORY

74 year old Caucasian male presented for a new contact lens fit. The patient was monocular following a shrapnel penetrating injury in 1970 that resulted in enucleation OD and aniridia with subsequent aphakia OS (fig 1). He arrived wearing an ocular prosthesis OD and an old painted PMMA corneal lens OS. BCVA was 20/40 with his contact lens. The patient was refitted into a new PMMA lens that would be sent for painting. The two week progress check revealed significant diffuse and coalesced SPK with microcystic edema after lens removal. The lens was deemed unsuccessful due to its effects on corneal health. The patient was diagnostically refitted into a Valley Contax Custom Stable Elite scleral lens with quadrant specific SLZ to promote corneal health.

BCVA with this lens was 20/40 with a +8.50D over-refraction. However, at the two week follow-up, the patient had complaints of glare due to the lack of an opaque painted iris. A supplier that provided painting of scleral lenses was located and the lens was sent for painting.

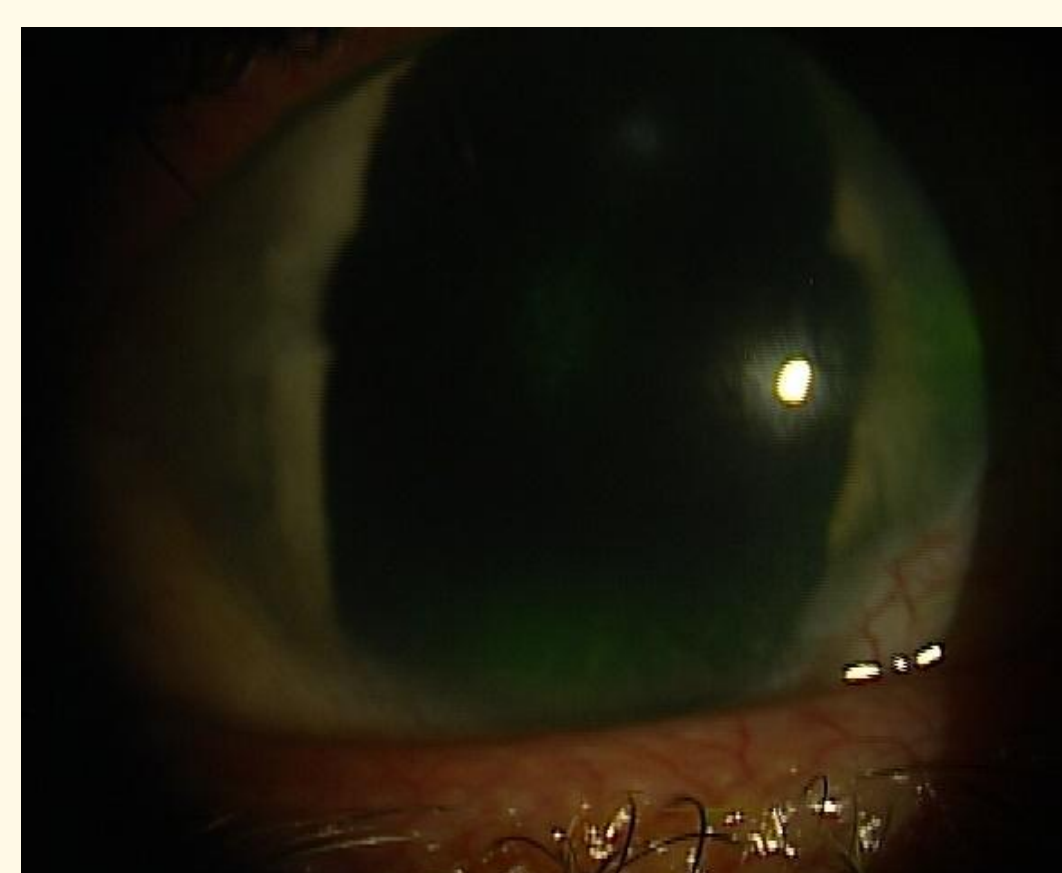


Figure 1

LENS FITTING AND FINDINGS

Trial #1 was returned with a layer of paint on the posterior surface of the lens that varied from 200-400um with palpable surface irregularity. The patient reported pain and symptomatic touch in various locations on the cornea after application and the lens was deemed intolerable.

A new lens (Trial #2) was ordered with a 400um increase in central clearance then sent for painting in an attempt to provide room for the paint layer. Although enough clearance (600um centrally) was achieved with the paint layer to relieve pain, the patient only achieved 20/60 BCVA and complained of visual haze lens. The lens was also decentered inferiorly, likely due to the heavy lens reservoir produced by the excessive clearance, high plus prescription, and additional weight from the paint layer. The patient was refit into a scleral lens with 200um of central clearance and a dark gray tint (Tyro-97 Gray #3 - Acuity Polymers) to decrease photosensitivity, glare complaints, and maintain corneal health. The patient reported adequate comfort and vision after two weeks of habitual wear.

Trial #1: Base Curve: 8.04 | Power: +9.50 | Dia: 15.8 | Sag: 4.283
Material: Optimum Extra (Dk 100) | VA 20/50-2 | Clearance 323um

Trial #2: Base Curve: 8.04 | Power: +10.00 | Dia: 15.8 | Sag: 4.683
Material: Optimum Infinite (Dk 180) | VA 20/60 | Clearance 670um

Final lens order:

Base Curve: 8.04 | Power: +9.50 | Dia: 15.8 | Sag: 4.283
Material: TYRO-97 Gray #3 (Dk 97) | VA: 20/50-2 | Clearance 200um

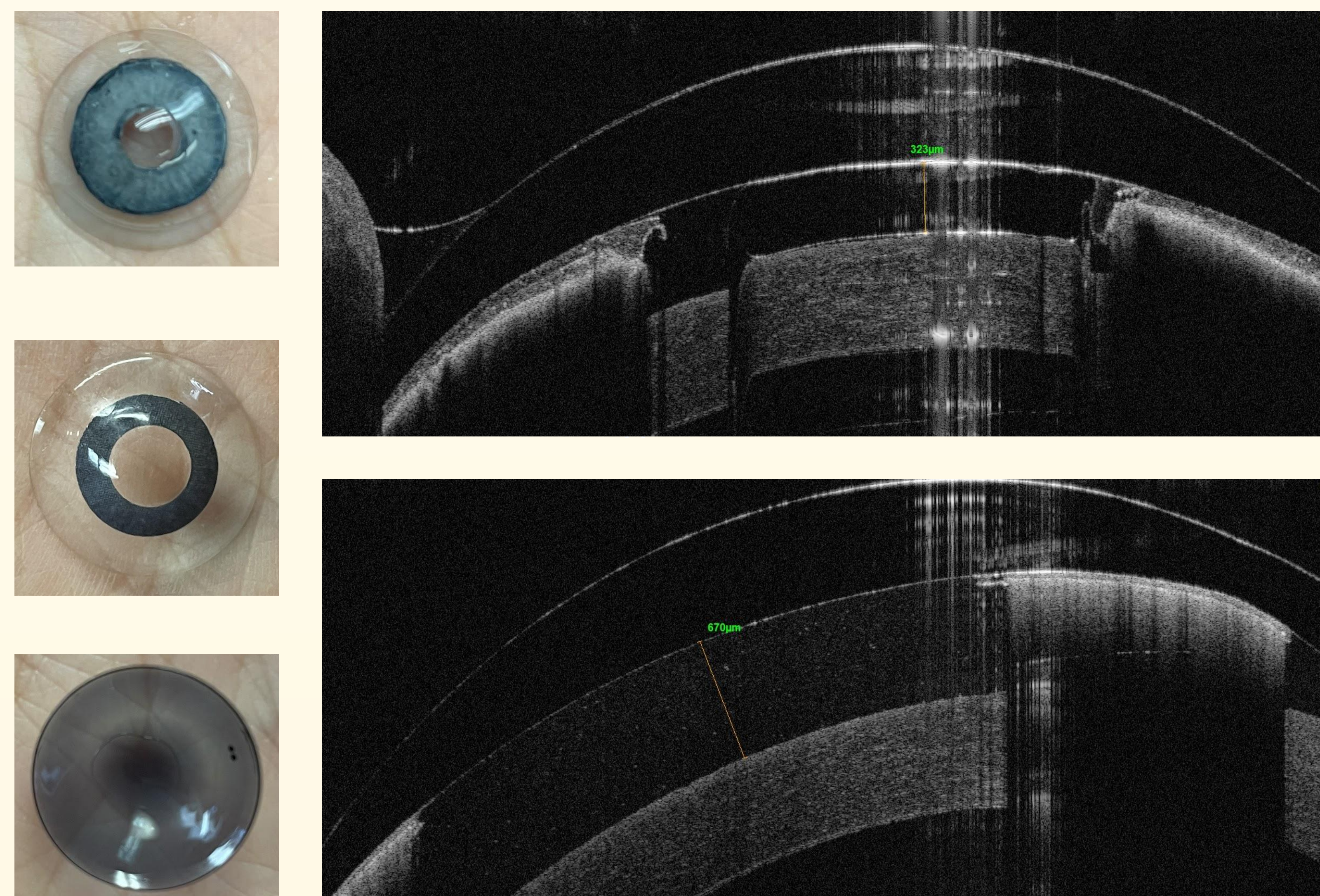


Figure 2: (Top) Back painted trial #1 - sag 4.283
(Bottom) Trial #2 - sag 4.683

CONCLUSIONS

Special considerations for lens fitting and corneal health must be made for back surface painted scleral lenses. The added thickness on the posterior lens surface can cause complications such oxygen transmissibility during the fitting process and habitual wear. The additional weight of the lens must also be adjusted in order to compensate for the inferior decentration.

A tinted scleral lens may be an acceptable alternative, keeping in mind the cosmetic effect. Thorough patient education regarding the advantages and disadvantages of various options is key. Other options that are being explored include piggybacking an RGP on a prosthetic soft contact lens.

REFERENCES

1. Dhallu, S. K., Huarte, S. T., Bilkhu, P. S., Boychev, N., & Wolffsohn, J. S. (2020). Effect of scleral lens oxygen permeability on corneal physiology. *Optometry and Vision Science*, 97(9), 669-675.
2. Worp, E. V. der. (2015). *A guide to scleral lens fitting*. College of Optometry, Pacific University.

ACKNOWLEDGEMENTS

Special acknowledgements to my supervisors Dr. Latricia Pack and Dr. Jenna Lighthizer for their endless support and knowledge. Also to Dr. Chandra Chawan at LaSER Eye Jewelry for providing the back surface painted lenses.

Contact and Disclosures

No financial disclosures

Northeastern State University Oklahoma
College of Optometry
1001 N Grand Ave, Tahlequah OK 74464
Email: drcindyshan@gmail.com