

Success Rate with Free-Form Scleral Lenses for Patients with Corneal Irregularity

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INTRODUCTION

The development of cornea-scleral profilometers provides detailed measurements of the cornea and scleral surfaces, allowing for customization of scleral lenses. One of the goals of profilometry is to custom design scleral lenses from measurements without diagnostic lens fitting, thus saving chair time for both the patient and practitioner.

PURPOSE

The purpose of this study was to determine how successful scleral lenses designed by profilometry were for patients with advanced corneal irregularity.

METHODS

- Patients with corneal irregularity (keratoconus) who presented for scleral lens evaluation were asked to participate in this single visit study, which was reviewed and approved by the University of Illinois at Chicago IRB.
- Following the imaging, a diagnostic scleral lens was applied to the eye to determine the appropriate power and base curve (BC) for free-form scleral lenses to be ordered.
- All data was sent to the manufacturer and a free-form scleral lens was designed.
- Number of scans and data regarding initial scleral lens fit are reported.

FIGURE 1

Example of a profilometry scan showing adequate amount of data that was acquired on a patient with keratoconus.

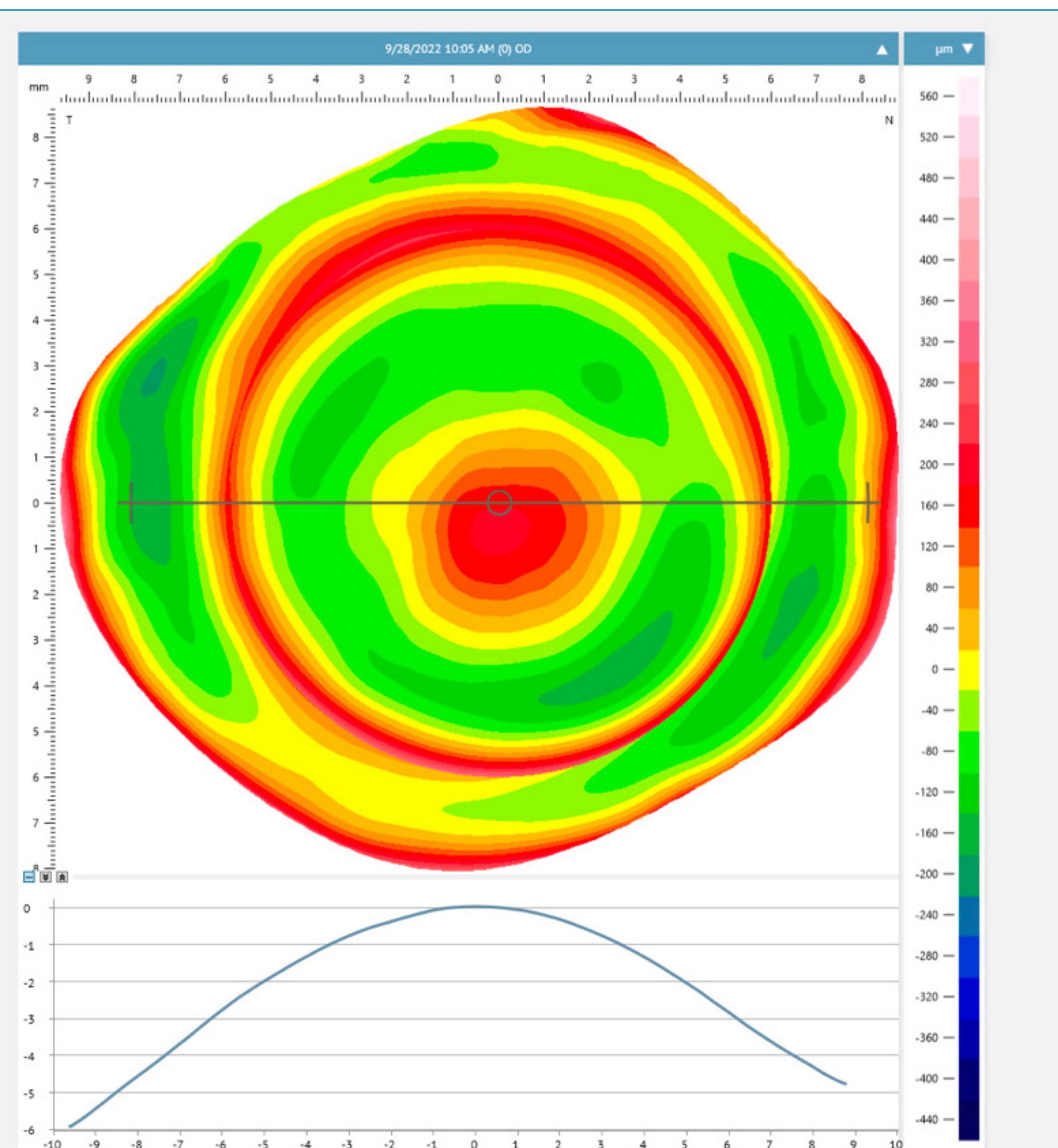


FIGURE 2

AS-OCT of a first scleral lens order showing adequate central corneal vault after a full day of wear.

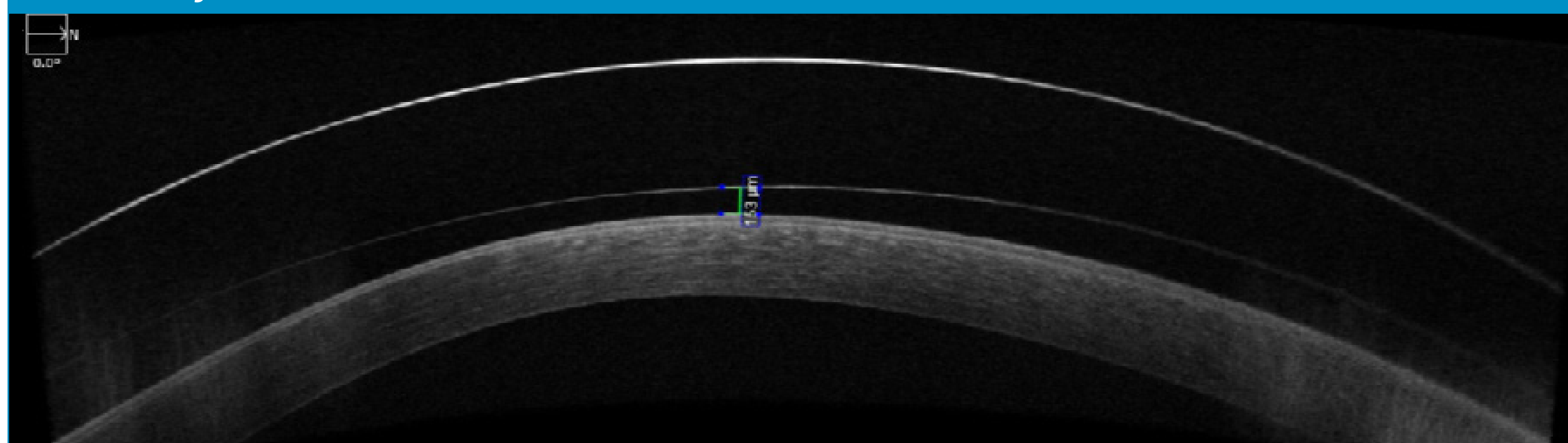


FIGURE 3

AS-OCT of a first scleral lens demonstrating central corneal touch after 4 hours of wear.

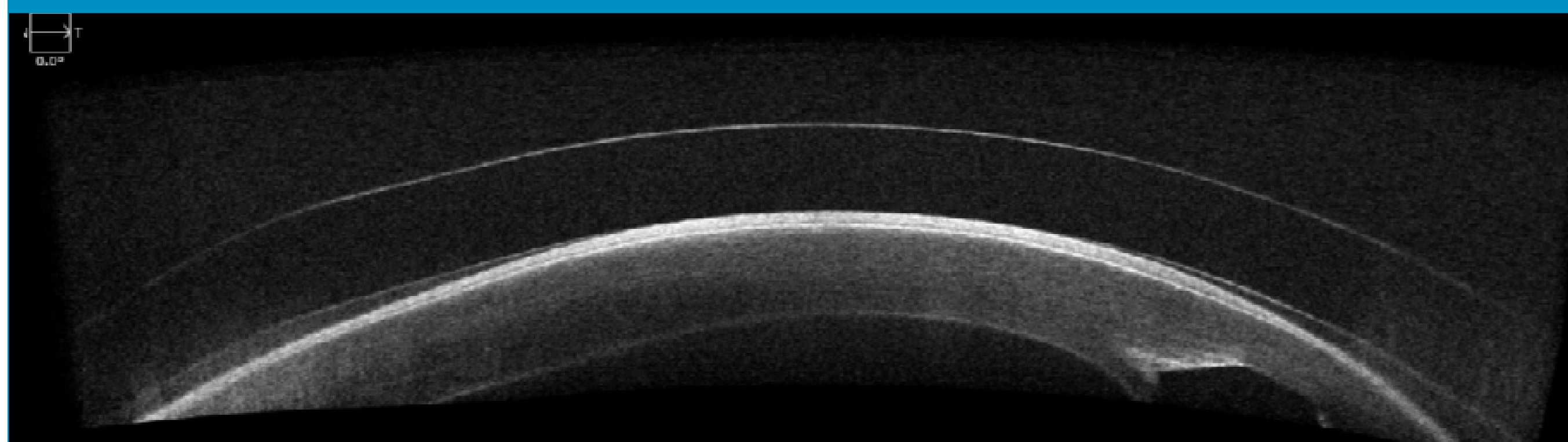
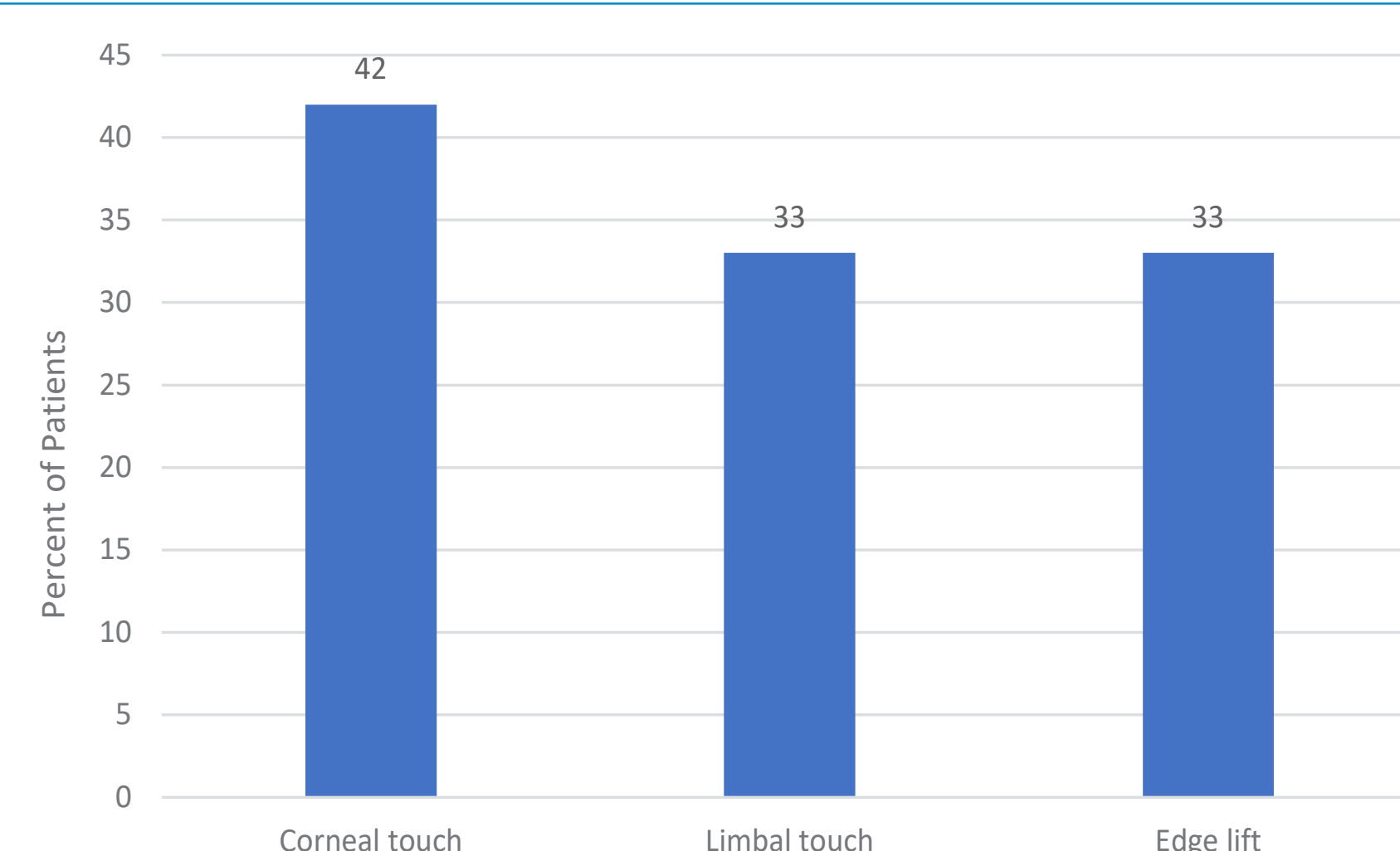


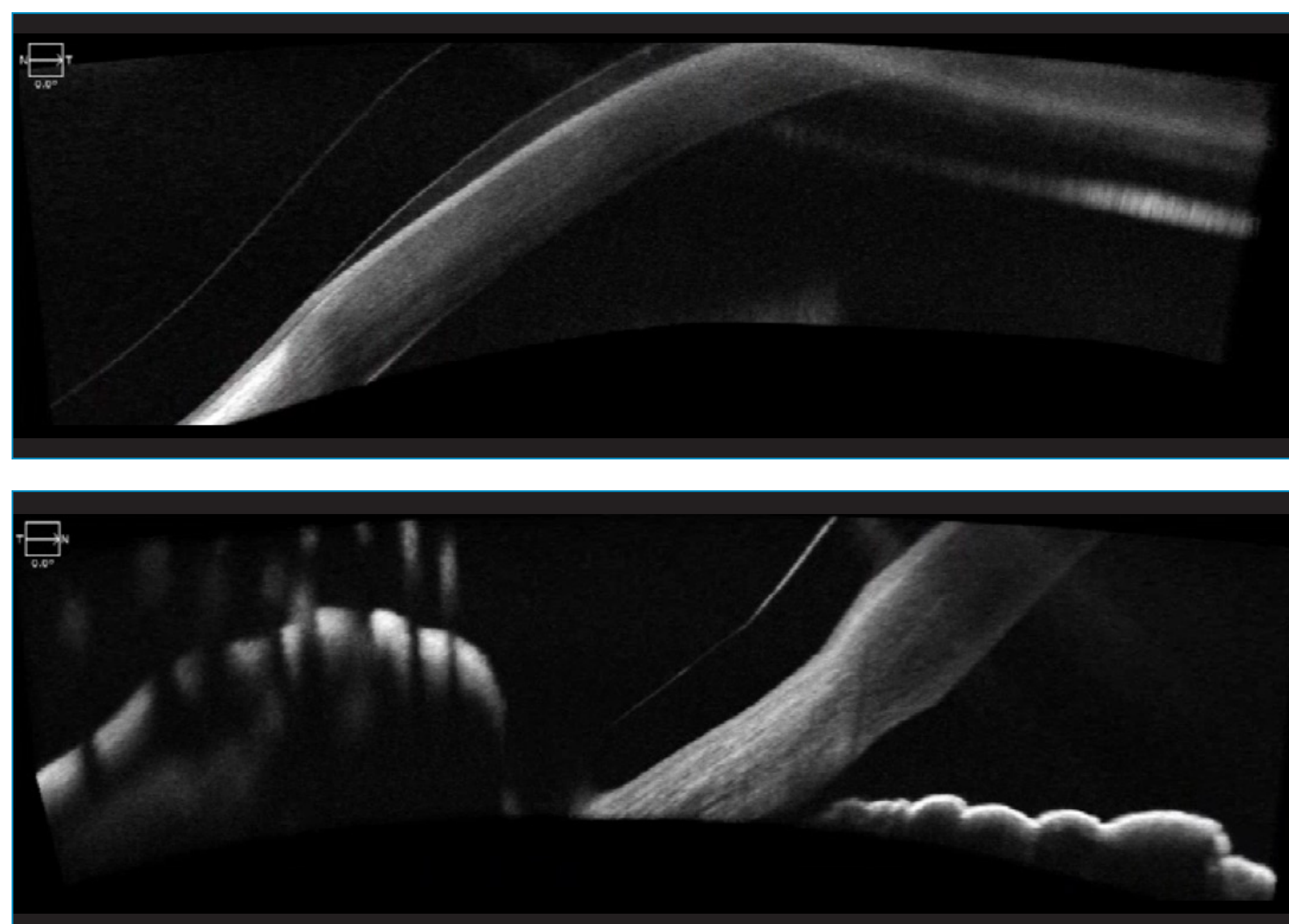
FIGURE 4

Percentage of Initial Scleral Lenses with Corneal Touch, Limbal Touch, Edge Lift



FIGURES 5 & 6

AS-OCTs of first scleral lenses for patients exhibiting limbal touch and edge lift after 4 hours of wear.



RESULTS

- Cornea-scleral profilometry images were obtained on 6 patients, 12 eyes. (Figure 1)
- An average of 3 images per eye (range 2-7) were acquired to ensure enough data could be extrapolated.
- 4 patients had to return to the office for additional image acquisition due to inadequate image quality of the sclera.
- Only 25% (3 of 12) of the initial scleral lenses ordered were able to be dispensed due to adequate fit. (Figure 2)
- All 3 of these SLs had to be re-ordered with an added over-refraction.
- 33% (4 of 12) of the first SL ordered exhibited corneal touch within 30 minutes to 4 hours of lens settling and patients experienced redness and irritation with SL wear. (Figures 3 and 4)
- 42% (5 of 12) of the first SL ordered exhibited limbal touch and 33% (4 of 12) had edge lift. (Figures 5 & 6)
- 2 patients discontinued free-form SL design due to inadequate fit after multiple re-orders.

DISCUSSION

- The majority of scleral lenses are fit in-office using diagnostic fitting sets.
- Cornea-scleral profilometers can measure both the cornea and scleral surfaces, allowing practitioners to custom design scleral lenses from these measurements.
- Adequate tear film, eyelid control, proper fixation, and user familiarity with the profilometer are critical to obtain quality measurements for scleral lenses to be designed.

CONCLUSION

- While cornea-scleral profilometry can provide details about the ocular surface, the number of scans needed to produce sufficient data slowed our clinic's flow and several patients had to return for subsequent image acquisition.
- The patients in this cohort had moderate to severe keratoconus. While this technology provides the practitioner with valuable data, it may be more successful for patients with milder corneal irregularities.

SUPPORT



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