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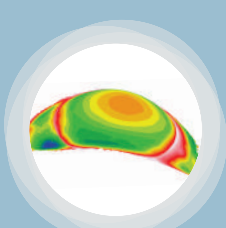
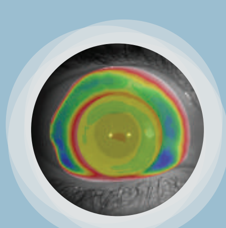
Case Report

Artificial intelligence softlens fitting





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Case Report:

Artificial intelligence softlens fitting

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Ilse Flux is an optometrist for Eaglet-Eye. She received her Bachelor of Science in Optometry in Utrecht, the Netherlands. Following her BA, she achieved a Master (Msc) degree at Glasgow Caledonian University, Scotland.
After returning to the Netherlands she gained clinical experience working in Amstelland Hospital as an optometrist.
Currently she is working as professional affairs manager for Eaglet Eye.

Introduction

A 50-year-old high myopic male is currently wearing glasses. He has tried RGP and soft lenses before but was not satisfied. Current refractive error is OD S-7.50 C-0.75 x 95 / OS S-7.25 C-0.50 x 3. Patient is known with a scotoma in the right eye due to an optical nerve lesion and is keen on trying soft lenses again.

Topography

For our first initial fit a 'standard' topographer was used (Figure 1). As the image shows data was gathered around the central 6.5 mm. Using the curvature measurements and extrapolating this data a sagittal height with a 15mm chord length was calculated (following the tangent angle method). The sagittal height was found to be 3238 micron.

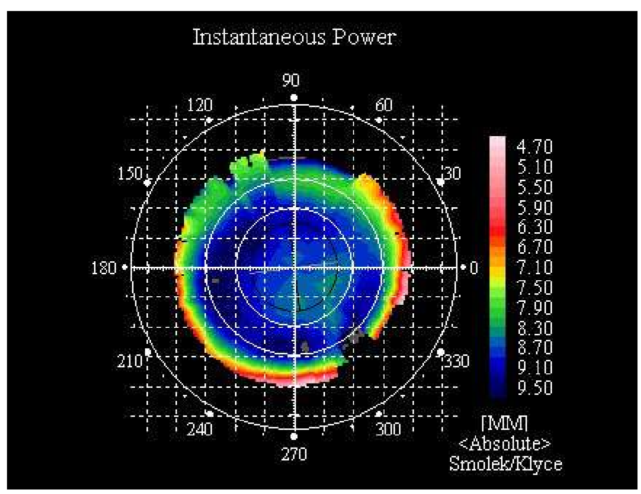

Figure 1

First order

Following general store guidelines, the first fitted lens was a in store available contact lenses. First lens used was a Biofinity (Coopervision) BCR 8.6, diameter 14.0, Rx S-6.50. According to Dr. Van der Worp the average sagittal height of a Biofinity contact lens is 3634 micron [1]. We know out of our own experience that we prefer the sagittal height to be slightly higher than that of the eye to have a perfect fit. Following standard topography and the tangent method we would expect a good fitting lens.

First Fit

After 1 week of wear patient came back with the complaint of 'moving' vision and low lens comfort. After examining the patient, excessive movement of the lens was noticed. Figure 2 is showing a decentration of the lens edge on the inferior/temporal cornea. This is suggesting that the lens is too loose which would indicate that the sagittal height of the lens is too small, causing too much movement (Figure 3).

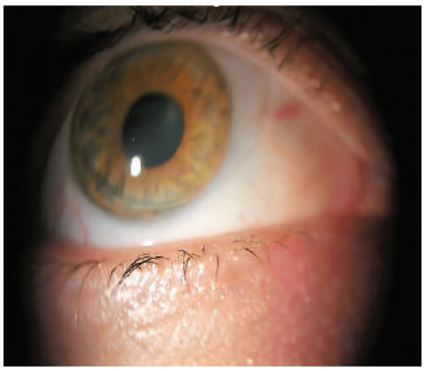

Figure 2

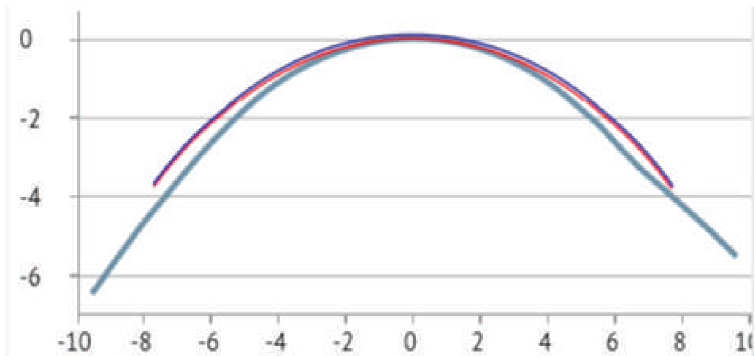

Figure 3

Profilometry

After the first fit an Eye Surface Profiler (ESP) measurement was taken. Figure 4 is visualizing the bisphere elevation map. The captured image is 20mm wide and directly measures sagittal height. No calculation is needed to gather data. The sagittal height was measured at 15 mm without any extrapolation.

The results were remarkably higher compared to the calculation made using a topographer. The measured sagittal height was 3950 micron. Profilometry show that with a more accurate measurement the sagittal height of the Biofinity lens is too low. Expected is that this patient would benefit more from a customized soft lens, for example a Saphir lens by Mark'ennovy.

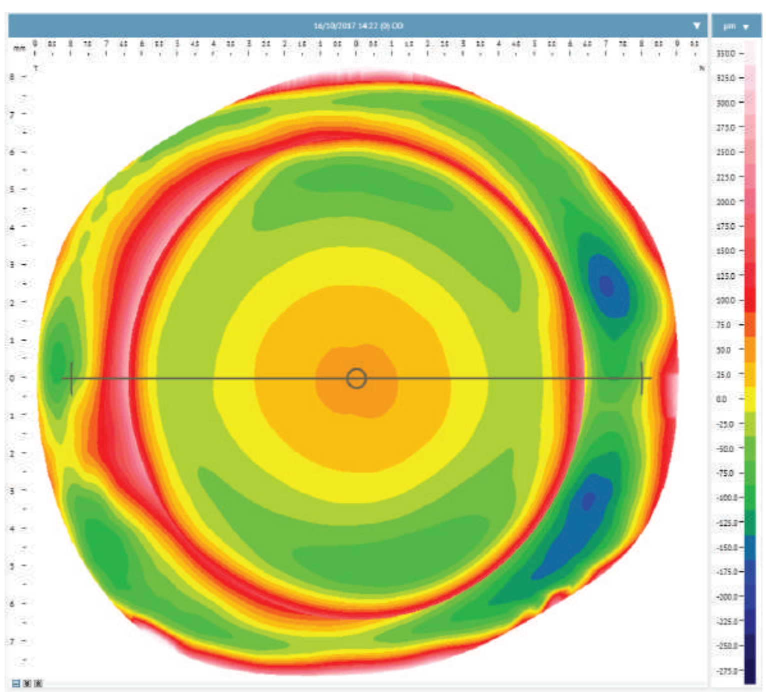

Figure 4

Artificial Intelligent soft lens fitting

To determine the second lens fit our build in Artificial Intelligent soft lens (A.I Soft) fitting tool was used. This algorithm includes soft lens characteristics such as shrinking of the lens, edge strain, sagittal height and HVID to predict if a subject can benefit from a in store lens, or the need for customisation [2,3]. When the sagittal height is found to be to high the software will suggest to order a custom lens. Another reason to go custom could be an abnormal HVID.

Second order

As expected, the A.I. soft is suggesting a custom lens fit based on the sagittal height measurement (Figure 5). Second lens order was a S-6.50 BCR 8.6, diameter 15.5, sagittal height 4190 micron. This resulted in a much better fitting lens and no comfort issues.

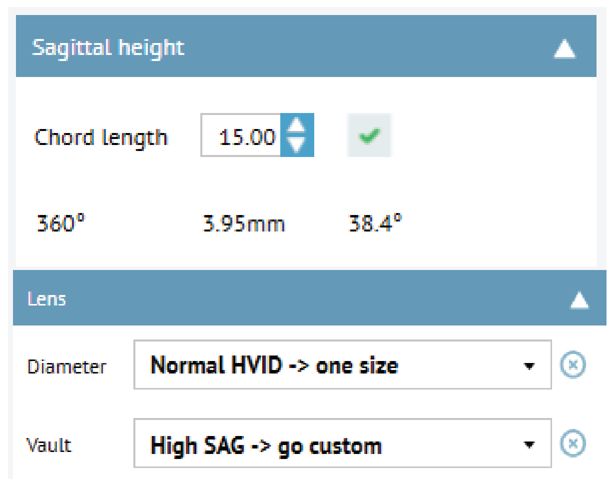

Figure 5

Conclusion

Using the A.I Soft fitting tool resulted in a better understanding of what lens to order. It gives a quick and easy prediction if a subject is eligible for a in store lens or in need of a customized lens. The A.I Soft tool will reduce the number of refits and could provide a more confident lens fitting when new to lens fitting. In addition, the sagittal height calculations based on extrapolation and curvatures seems to be very untrustworthy when fitting lenses. The ESP does a much better job to determine the sagittal height of the ocular surface without the need for extrapolation.

References

1. van DW, Mertz C. Sagittal height differences of frequent replacement silicone hydrogel contact lenses. *Contact Lens and Anterior Eye*. 2015;38(3):157-162.
2. Young G, Potts M, Sulley A. The effect of temperature on soft contact lens diameter. *Eye & Contact Lens: Science & Clinical Practice*. 2016;42(5):298-302.
3. Young G. Mathematical model for evaluating soft contact lens fit. *Optometry Vision Sci*. 2014;91(7):e167-e176.