Utilizing Technology Instead of Time To Successfully Fit The Irregular Cornea with Hybrid Lenses

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BACKGROUND:

Contact lens fitting of the irregular cornea can be challenging due to the corneal anatomy and integrity, but also due to resources available to the clinician in terms of chair time, trial fitting sets and technology. The new ISO standards also present disruptions in clinical practice that will require more rigorous techniques to stay in compliance. There has been tremendous growth in the scleral lens arena, however there are other alternatives such as specialty soft, corneal GPs and hybrid lenses.

This case series demonstrates how hybrids can be designed utilizing software to create a 3D model of the eye and a simulated fluorescein pattern that will result in various lens designs and sagittal vaults.

METHOD:

- In this study, hybrid lenses were designed empirically without using a diagnostic fitting set.
- The prescriber simply provided the consultant either the topographical raw data or a PDF which included the eccentricity values and steep K to determine a best lens design. The practice exported the topographical raw data to the consultant. The information was then entered into the Focal Points Professional program to create a 3D model of the eye and fluorescein pattern that corresponded to various hybrid lens designs and parameters. Original software engineered by Renato Lifredo, Milan, Italy.
- If the raw data was not available due to networking issues or the topography unit had not been programmed for this protocol, a doctor can send in the PDF of the topography that lists the eccentricity (e value) and K reading so that the sagittal depth can be calculated (see Figure 2, 4, 6).
- Utilizing a proprietary calculator, the information was entered to design the appropriate lens and this can be combined with the Focal Points Professional program. This method was effective and accurate for the apical region and the peripheral architecture was extrapolated (see Figure 4).
- Using this method, a lens can still be demonstrated on the model to determine the best design/BC/vault.

DISCLOSURES:
Dr. Sclafani is a Clinical Associate Professor at Illinois College of Optometry; VP of Professional Affairs, SynergEyes, Private Practice, SoLo Eyecare

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Case 1: Newly Diagnosed KCN First Fit

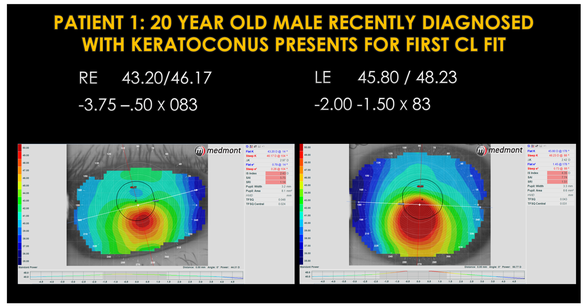

Figure 1

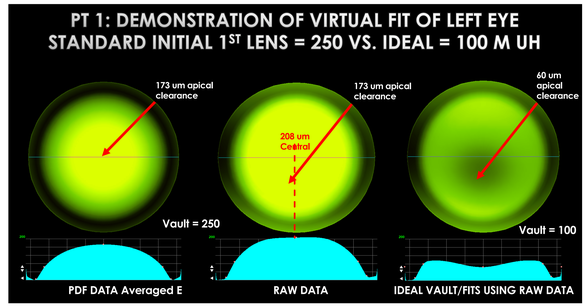

Figure 2

Case 2: Post-RK Fit

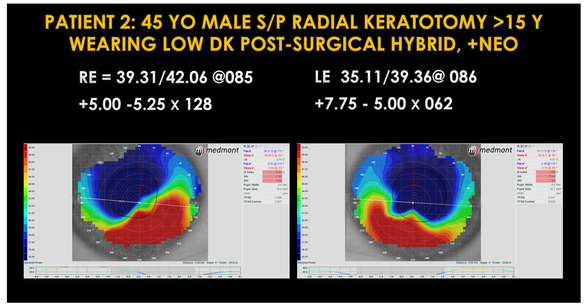

Figure 3

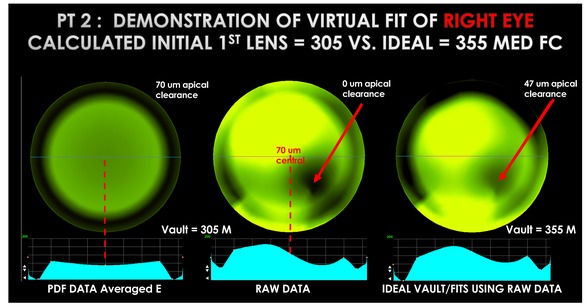

Figure 4

Case 3: Scleral Lens Failure

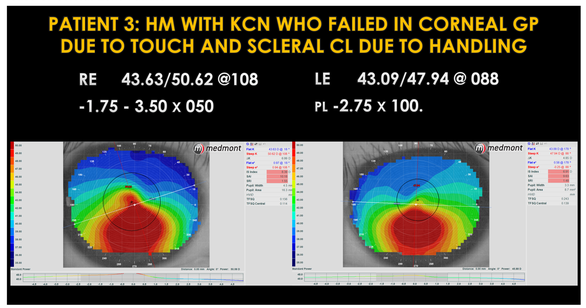

Figure 5

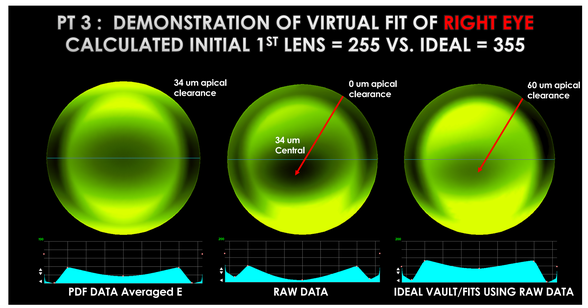

Figure 6

RESULTS:

Successful Fits

Total Eyes Fit = 295 Successful Fits = 247 = 84%

Total Exchanges = 193

- Eyes fit successfully with 1st or 2nd lens = 199 = 80% of successful fits
- Eyes needing a 3rd lens to get to success = 42 (most for just minor power "tweak")
- Skirt or power exchanges = 67% of lenses ordered
- 9 were originally ordered with flat skirt that were successful with the switch to medium skirt
- 10 were mis-ordered (wrong data entered, misread, etc...)
- Actual fit changes in vault + or - 50µm = 46
- Actual fit changes in vault + or - 100µm = 26
- 10 refits due to poor quality topography

Non-Adapts = 48

- Due to fluting issues that could not be resolved = 5
- Due to vaulting or residual astigmatism = 8
- 5 refit into a scleral, 1 Stayed in habitual hybrid
- Due to insertion or removal issues = 5
- Due to patient dropout or initial comfort (no attempt to remedy) = 30

CONCLUSIONS:

- This small case series demonstrates that various hybrid lens designs can be fit empirically with much success and efficiency.
- The system allows for better selection of lens design and predictability of sagittal depth, combined with a healthy relationship of the skirt.
- When raw data vs. PDF values is provided, better alignment can be achieved as was demonstrated.
- This technology has been available in the past for corneal GP lenses, however the soft skirt of a hybrid lens allows for more predictable and precise centration on the cornea, therefore the theoretical models are more likely to simulate the lens in situ.
- The system allows for use with various topography units and the future may even allow for more customized hybrid lenses beyond what is commercially available.

REFERENCES
Nosch DS, Ong GL, Mavrikakis I, Morris J. The application of a computerised videokeratography (CVK) based contact lens fitting software programme on irregularly shaped corneal surfaces. Contact Lens and Anterior Eye 2007;30(4): 239–48.
Preeji S. Mandathara[a,b,*] Mariya Fatima[b], Sobia Taureen[b], Srikanth Dumpati[b], Mohd. Hasnat Ali[a], Varsha Rathi RGP contact lens fitting in keratoconus using FITSCAN technology. Contact Lens and Anterior Eye 2013;36 (3): 126–129
Szczotka, L B. Clinical evaluation of a topographically based contact lens fitting software. Optometry and vision science 1997: 74 (1) 14–19 [1040-5488]