Comparison of sagittal height measurements with Fourier domain profilometry and with narrow cone corneal topographer

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Introduction

Today, it is easy to obtain the curvature radius, diameter and eccentricity of the cornea by using corneal topography. Therefore, the ocular sagittal height (OC-SAG) can be accurately calculated for chord diameters within the cornea. However, the concept of designing contact lenses by selecting the sagittal depth of the lens (CL-SAG) for a given OC-SAG has become more relevant in the scleral lens fitting and has also re-emerged in the soft lens fitting. These are large diameter lenses and consequently the OC-SAG must be calculated for chords diameters beyond the cornea. Optical coherence tomography (OCT) or profilometry, can provide these parameters. Unfortunately, these technologies are not as widespread at the clinical practice as corneal topography. Hence, OC-SAG values are usually calculated for chord diameters within the cornea (10 or 11 mm) and then extrapolated for larger chord diameters.

Purpose

To compare sagittal height measurements in the corneal and scleral regions provided by two commercially available instruments in order to identify similarities and differences between them.

Methods

- ✓ 126 eyes of 63 patients (24 men and 39 women) were measured with the ESP (Eaglet Eye, The Netherlands) and the Medmont E300 Corneal Topographer (Medmont International Australia).
- ✓ 67 eyes were regular and 59 were irregular cornea.
- ✓ OC-SAG was measured for a chords diameter of 10 mm (within corneal diameter) and 15 mm (beyond corneal diameter).
- ✓ Values provided by the Medmont E300 Corneal Topographer beyond the corneal chord diameter were extrapolated.
- ✓ OC-SAG values obtained with both devices at 10 and 15 mm chord diameters were compared for both groups (regular and irregular)

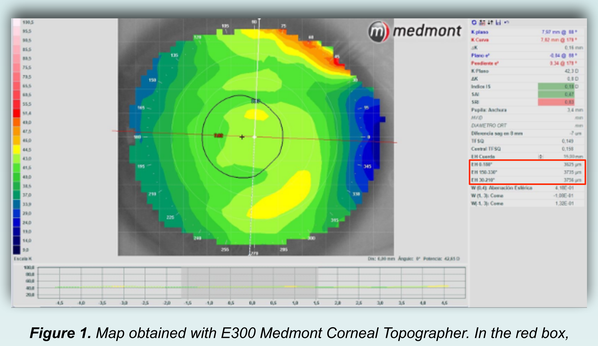

Figure 1. Map obtained with E300 Medmont Corneal Topographer. In the red box, extrapolated OC-SAG values at 15mm with E300 Corneal Topographer Medmont

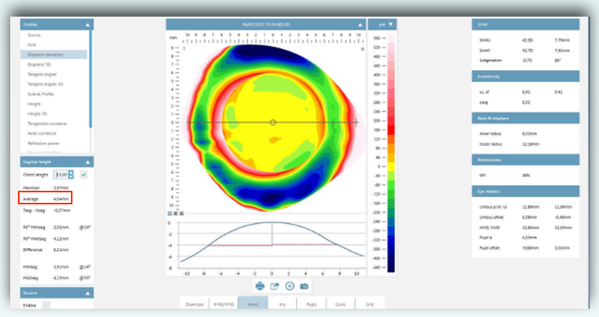

Figure 2. Map obtained with the ESP. In the red box, measured OC-SAG values.

Results

- ✓ Differences in OC-SAG values in the regular cornea group:
  - At 10 mm chord diameter -5 ± 28 μm (The Medmont value was higher). No statistically significant differences (p = 0.17)
  - At 15 mm chord diameter 47 ± 182 μm (The ESP value was higher). Statistically significant differences (p < 0.05)
- ✓ Differences in OC-SAG values in the irregular cornea group:
  - At 10 mm chord diameter -6 ± 109 μm (The Medmont value was higher). No statistically significant differences (p = 0.68)
  - At 15 mm chord diameter 122 ± 430 μm. (The ESP value was higher). Statistically significant differences (p < 0.05)

	Chord diameter (mm)	Medmont mean value ± SD (µm)	ESP mean value ± SD (µm)	Difference ± SD (µm)	p-value	LoA (µm)
Regular cornea	10	1765 ± 77	1769 ± 79	-5 ± 28	0.17	55
	15	3734 ± 205	3886 ± 189	47 ± 182	0.03*	239
Irregular cornea	10	1826 ± 213	1832 ± 235	-6 ± 109	0.68	214
	15	3928 ± 604	3807 ± 298	122 ± 430	0.04*	843

Table 1

Discussion and conclusions

There are statistically significant differences between the sagittal height measured with both devices for the 15 mm chord. For 10 mm chord, no statistically significant differences were observed. According to the LoA, values provided by both devices are no interchangeable and clinical significant differences were observed for values obtained at 10 and 15 mm chord diameter.

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Credentials

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