A Comparison of Previous vs. New Generation Topographer

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Introduction

Corneal topography is an important tool for researchers and clinicians alike. This instrument provides insight on the power, shape and elevation of the eye. Numerous studies have validated the accuracy of the Medmont E300 Corneal Topography for clinical and research application.[1,2] However, a new version of this instrument has been launched called the Medmont Meridia Advanced Topographer. Can the newer corneal mapping device perform similarly to its predecessor? This study set out to compare the repeatability between instruments.

Medmont E300

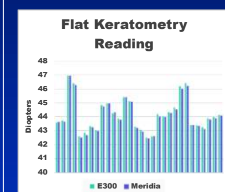
Medmont Meridia

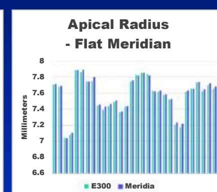
Methods

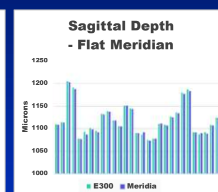
Fifteen patients without previous ocular surgery or trauma were recruited for the study. Four topography captures were performed on each eye using both instruments. The following data was collected by taking the average of the four exams: flat and steep Sim-K readings (keratometry readings), flat and steep apical radius (Ro), flat meridian sagittal depth (8mm chord) and flat meridian eccentricity (8mm chord).

Results

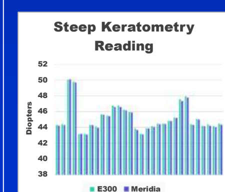
The average data from each eye was compared between instruments and an R-squared value determined. The Flat K R^2 was 0.996 while the Steep K was 0.998. The R^2 for the flat and steep apical radius measured similarly at 0.995. The flat meridian sagittal depth had an R^2 value of 0.997, while the flat meridian eccentricity measured 0.972.

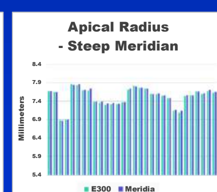


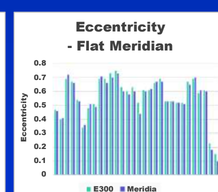




Each graph presents the six collected topography metrics. The 30 measured eyes are displayed along the x-axis with the E300 measurement first (green bar) paired with the Meridia finding immediately adjacent (blue bar) for each eye.







Discussion

Based on the data collected and compared, the two instruments appear to correlate with each other. The standard deviation of error of both flat and steep Sim K-readings represented 1/16th of a diopter. An eighth of a diopter (0.12D) might be considered an acceptable error but the findings were well below this threshold. Similarly, the apical radii compared very similarly with an error representing approximately 1/16th of a diopter. In sagittal depth, the error was just over a micron. To put this into perspective, corneal GP lens manufacturing has a standard deviation of error of approximately 4 microns[3]. Therefore, the instrument error is below the repeatability a GP lens can be manufactured to. Similarly, the eccentricity error represents approximately 1-2 microns which is again lower than the tolerance of rigid lens manufacturing.

One of the study limitations is only normal eyes were compared and not diseased or post surgical eyes where topography is critical to contact lens fitting. Additionally, this study shows the two instruments measure the eye with precision, but it did not seek to prove if both instruments are accurate.

Conclusions

Based on the collected data which evaluated power, shape and depth, the two instruments correlate. It appears the newer instrument can replace the previous generation for both research and clinical application as it relates to various typically evaluated topography metrics. However, a larger scale study to include a wider range of conditions would be recommended.

1 Tang W, Collins MJ, Carney L & Davis B. The accuracy and precision performance of four videokeratoscopes in measuring test surfaces. Optom Vis Sci. 2000;77:483-91.
2 Cho P, Lam AK, Mountford J & Ng L. The performance of four different corneal topographers on normal human corneas and its impact on orthokeratology lens fitting. Optom Vis Sci. 2002;79:175-83.
3 Mountford J, Cho P, Accuracy of RGP Manufacture, Presented at the Global Orthokeratology Symposium, 2004, Toronto, Canada

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