

To Corneal GP or not to Corneal GP, That is the Question?

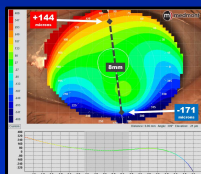
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Introduction

Patients with diseased, post surgical or asymmetric eyes often require GP lens optics to achieve functional vision. Eye care practitioners are faced with the difficult question, should a corneal GP or scleral lens be prescribed? Previous research has suggested the corneal topographer's elevation map can be a helpful guide, however, the method is time consuming and subject to user error¹. This study attempted to automate the analysis and refine our understanding of these elevation thresholds to best determine when to fit corneal GP or scleral lenses.

Methods

A retrospective analysis was performed on 90 consecutive irregular eyes where corneal GPs had been successfully fit or unsuccessfully attempted, resulting in a scleral lens being dispensed. A novel corneal topography algorithm was employed to search the elevation map for the meridian of greatest change in height. This calculation was performed across an 8mm chord diameter in order to match the optical zone size of standard corneal GP lenses. Height differential data was collected for each eye (Medmont Topographer), and whether a corneal GP was successfully fit or a scleral lens was required.

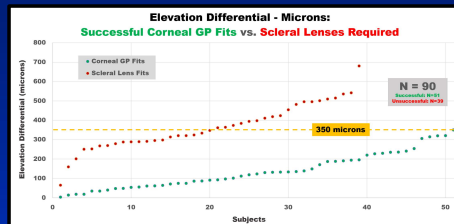


A novel algorithm searches the elevation map for the meridian of highest micron change in height across an 8mm chord.

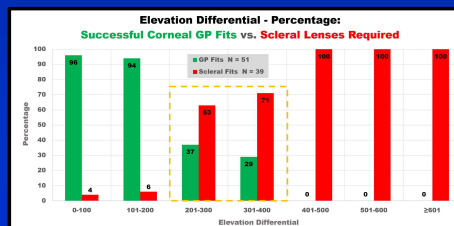
Elevation: +144
Depression: -171
Elevation Differential: 315 microns
Differential Angle: 97°

Results

Graph 1 displays the Elevation Differential for each subject eye with green dots representing successful corneal GP fits and red dots indicating a scleral was required. The x-axis defines the number of subjects analyzed across both groups and the y-axis defines the magnitude of elevation differential in microns for each eye.



Graph 2 provides the percentage of GP vs. Scleral fits across the range of elevation differentials. The x-axis categorizes the cohort into 100 micron elevation differentials. The y-axis defines the percentage of GPs successfully fit (green bars) and scleral needed (red bars).



Discussion

This study supports previous findings that show eyes with >350 microns of elevation differential are more challenging to fit in corneal GPs¹. 100% of patients above this threshold required a scleral lens to achieve a satisfactory fit. However, approximately 37% of patients with <350 microns required scleral lenses which may indicate the degree of corneal asymmetry contributes in addition to the magnitude of elevation change across the eye surface.

It is notable that 96% of subjects with 0-100 microns and 94% with 101-200 microns of elevation differential were successful in corneal GP lenses. Additionally, approximately 1 in 3 eyes with elevation differential between 201-400 microns could be fit in corneal GPs. It appears that practitioners can confidently fit eyes with under 201 microns, while eyes with over 400 microns of elevation differential may require scleral lenses due to the increased corneal irregularity.

Conclusions

This study indicates that the lower the elevation change across a single meridian of the corneal surface, the higher the fitting success in corneal GP lenses. Whereas the higher the elevation change, the greater the likelihood that scleral lenses will be required to manage the asymmetry of the eye.

References

1. Zheng et al, Corneal Elevation Differences and the Initial Selection of Corneal and Scleral Contact Lens, January, 2015, Poster, Global Specialty Lens Symposium