Who Needs Zone Modifications in a Scleral Lens?

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Introduction

For most scleral lens practitioners, a diagnostic set is considered essential to the fitting process. Based on the eye shape or condition, the initial lens is selected and placed on eye. To optimize the apical clearance, the practitioner may select a higher or lower sagittal depth to fine tune the thickness of fluid between the lens and cornea. Determining the correct height of lens may be one of the most important goals of any scleral fit. Thankfully, most trial sets offer a wide range of sagittal depths to aid practitioners in fine tuning the fit (Figure 1). However, the depth of the lens isn't the only consideration that creates a successful fit. For example, how often does the diagnostic lens have the correct vault at the limbus or an appropriate landing on the conjunctiva? Should we expect the diagnostic parameters to fit acceptably on most patients and only require an over-refraction to fine tune vision? If not, what zones are we likely to change and how often?

Figure 1: Various trial lenses illustrating the difference in depth from one lens to the next

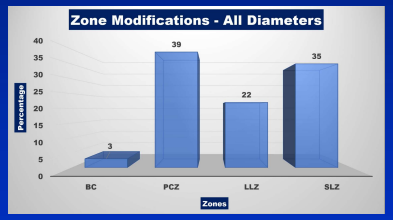
Methods

Retrospective data was collected between January and December 2018 to included every Ampleye Scleral Lens manufactured and delivered by Art Optical (Grand Rapids, MI) during the sample period. The volume of lenses supplied is considered proprietary however, considering the size of Art Optical and its national reach in distribution, the number of patients and eyes can be considered substantial. Like many scleral lenses, the Ampleye is constructed with four principle zones that can be modified as required by the fit.

Methods (Continued)

For every lens manufactured and delivered, regardless of diameter, it was determined if any of the four zones were modified? The number of modifications to each individual zone was determined and compared to the total number of lenses ordered. Figure 2 displays the percentage of modifications made to each of the four fitting zones during the 12 month sample period.

Figure 3: Distribution of zone modifications made across all diameters of the Ampleye and includes the percentages each zone was altered.



Data Analysis

The base curve (BC) of the lens was modified only 3% of the time and was the least likely zone to be altered. The second zone in the lens is the Peripheral Corneal Zone (PCZ) and was modified 39% of the time. The third zone is the Limbal Lift Zone (LLZ) which was altered in 22% of lenses. The fourth and outermost zone of the lens is the Scleral Landing Zone (SLZ) and was modified the second most in 35% of lenses.

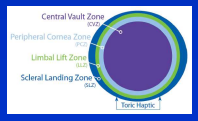


Figure ?: Ampleye scematic displaying the four principle scleral lens zones

Discussion

Base curve/ Central Vault Zone (Zone 1): Many scleral lenses are defined by the sagittal depth of the lens which is the sum total of each zone height. The central base curve contributes only a small amount to the total depth of a large diameter scleral lens. This may be the reason it is modified so little.

PCZ (Zone 2): The second zone in a scleral lens has the ability to raise and lower the elevation of the central zone (Zone 1). Following the diagnostic or custom lens settling period, it is common to require small or large changes to central or peripheral corneal clearance of the lens. This may be the reason the PCZ was altered so routinely. Practitioners are likely to use this zone of the lens to make small vault changes of only 25 microns or large alterations of 150 microns or more.

LLZ (Zone 3): Ensuring the scleral lens clears and protects the sensitive limbal stem cells is imperative to the fit. Considering the wide range of scleral angles present in the population, it may be necessary to increase the elevation of this zone to avoid limbal bearing and in rare cases a decrease in vault when conjunctival prolapse is present.

SLZ (Zone 4): An appropriate landing is imperative to a successful scleral lens fit. Again, considering the normal bell curve of scleral angles, it is logical that this zone may require modification to increase or decrease edge lift for patients with very high or low angles.

Conclusions

The data presented would suggest that practitioners should expect changes to the various zones of the scleral lens. The wide range of patient eye shapes and conditions dictates that modifications to the standard parameters are likely in a percentage of cases in order to optimize the fit.

Acknowledgements

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