How Does Optical Zone Diameter Affect Ortho-k Treatment?

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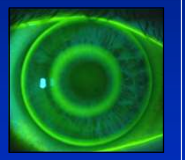
Introduction

Orthokeratology has emerged as one of the principle treatments for children with myopia progression[1]. Research findings have shown the greater the power shift across the anterior corneal surface and the higher the spherical aberration induced, the less the eye grows[2,3]. Customizing the optical zone size in orthokeratology lenses has been proposed as a method to manipulate the corneal shape changes and its resultant myopia controlling effect[4]. This study evaluated the topographical changes in ortho-k patients wearing varied optical zone sizes.

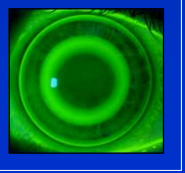
Methods

This retrospective study reviewed the case files of consecutive orthokeratology patients wearing a conventional 6.0mm optical zone design (BE Retainer) and a novel 5.5mm optical zone design (BE Free). Inclusion criteria required that all subjects achieved full effect (>7 consecutive nights of treatment) and exhibited a centered "bulls-eye" topographical response. 213 eyes in the 6mm optical zone were eligible for inclusion and 76 eyes in the 5.5mm OZ. Baseline and full effect topographies were analyzed using the Medmont Corneal Topographer. The resultant power shift or Myopia Defocus Dosage (MDD) was recorded as well as the change in anterior surface Spherical Aberration Z_4^0 (SA).



5.5mm OZ

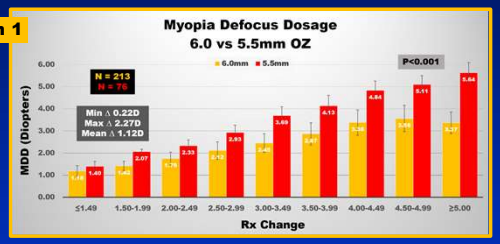
6.0mm OZ



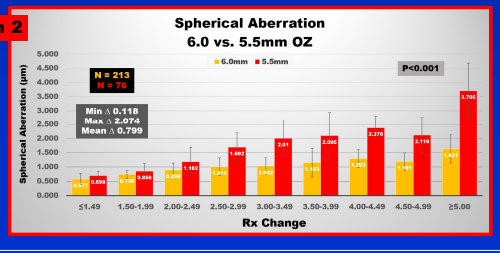
Results

The 6.0 and 5.5mm optical zones are compared in relation to the MDD in Graph 1 and the SA on Graph 2. Findings are categorized based on the magnitude of refractive change measured for each eye analyzed (x-axis).

Graph 1



Graph 2



Discussion

The 6.0 and 5.5mm optical zones displayed similar findings where the lower the Rx change, the lower the MDD and SA values. Both exhibited a positive correlation with the higher the orthokeratology effect, the greater the MDD and SA. However, the 5.5mm optical zone created a 42.7% stronger MDD on average and a 66.7% higher average SA signal than the 6.0mm OZ (P<0.001 for both analysis).

This study has numerous limitations which include: both adults and children were enrolled, the post wear visit (duration of effect) was not standardized for each subject, inter-eye bias may be present and the subjects in the lowest and highest Rx changes are reduced in sample size.

Conclusions

These findings would suggest that the use of smaller optical zones in orthokeratology lenses might produce a stronger myopia control signal in children. Prospective, long-term studies in children is recommended to better understand this type of lens customization in controlling eye growth over time.

References

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