Contact lens risks in fitting extreme ametropes in contact lenses

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Extreme ametropes often appreciate the advantages of contact lenses over spectacles, due to the lack of peripheral distortion and prismatic effect. Are these extreme hyperopes and myopes at an increased risk for contact lens complications over their mild ametropic counterparts?

It’s all about oxygen

The amount of oxygen required to maintain corneal physiology through a contact lens has been debated profusely in research and literature. Contact lens materials are quoted in terms oxygen permeability (Dk) through the central portion of a -3.00 material. However, oxygen transmissibility (Dk/t) is more clinically relevant, since oxygen flow to the cornea varies with lens thickness. This difference presents a unique challenge in the high ametropic population. Dk/t can be greatly reduced by the thickness of the contact lens, thereby increasing the risk for hypoxic related complications.

Hypoxia related risks

- Corneal Edema
- Limbal and Bulbar Hyperemia
- Neovascularization
- Epithelial Micropustules
- Epithelial and Long Term Stromal Thinning
- Endothelial Polymegethism
- Corneal Exhaustion Syndrome
- Contact Lens Intolerance
- Increased Bacterial Adhesion to Epithelial Cells

Central vs. peripheral oxygen

The central cornea derives much of its oxygen from the environment, whereas the periphery has access to the local vasculature for oxygen. One would hypothesize that the central cornea is more susceptible to hypoxic related changes. However, a Manchester study suggests the peripheral cornea requires more oxygen transmissibility to avoid hypoxic corneal swelling. Therefore, extreme myopic contact lenses may be slightly more susceptible to corneal hypoxic complications, due to the increased thickness at the location of the limbal stem cells.

Other factors to consider

Higher Dk materials are not the solution for every patient. Higher Dk materials, such as SiHy materials, have a tendency to deposit more lipids. Complications still exist, such as papillary conjunctivitis, mucin balls, Superior Epithelial Arcuate Lesions (SEAL), and Contact Lens Acute Red Eye (CLARE). In the absence of non-hypoxia related complications, good clinical practice suggests selecting the best fitting lens of the highest Dk whenever possible. High Dk materials are a critical element to the long term success of extreme ametropic contact lens wearers.

References

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