Diagnosis and treatment of aniseikonia associated with pseudophakia and penetrating keratoplasty

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Diagnosis and treatment of aniseikonia associated with pseudophakia and penetrating keratoplasty

Description
Aniseikonia is defined as a perceived difference in image sizes between the two eyes. Post-surgical anisometropia continues to be the primary cause. Often contact lenses (CL) are used to treat the image size difference but sometimes the disparity is large enough to remain symptomatic even after CL correction. This case report details the diagnosis and treatment of a symptomatic patient with significant anisometropia, pseudophakia OS and post-penetrating keratoplasty OU secondary to keratoconus using size lenses and common clinical equipment.

Disciplines
Optometry

Comments
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ABSTRACT
Aniseikonia is defined as a perceived difference in image size between the two eyes. Post-surgical anisometropia continues to be the primary cause. Often contact lenses (CL) are used to treat the image size difference but sometimes the disparity is large enough to remain symptomatic even after CL correction. This case report details the diagnosis and treatment of a symptomatic patient with significant anisometropia, pseudophakia OS and post-penetrating keratoplasty OU secondary to keratoconus using size lenses and common clinical equipment.

INTRODUCTION
Optically-induced aniseikonia may be caused from anisometropia, pseudophakia, and/or post-refractive surgery and result in binocular difficulty. Clinical measurement of aniseikonia is considered as difficult. This is in part due to “gold standard” obsolete instrumentation (i.e. the Space Eikenometer), inaccurate analog methods (i.e. the Awaya plate test) and accurate but rarely available software, like The Aniseikonia Inspector (Optical Diagnostics). Yet for aniseikonic patients, there are readily-available alternatives. An aniseikonia of 3-5% is considered clinically significant.

Contact lenses are often one of the first treatment options for refractive aniseikonia. In this case, the use of contact lenses were primarily prescribed to correct the patient’s irregular astigmatism secondary to keratoconus and a subsequent corneal transplant.

METHODS
A 62 YOWF presented with blurry vision OS after a full thickness penetrating keratoplasty and cataract surgery one year prior. She was a successful corneal gas permeable CL wearer in the fellow eye. Due to the irregular astigmatism and large axial differences in the corneal topography (Figure 1), she was fit with a large diameter scleral CL OS. Her best corrected acuities were 20/20 OD and 20/30 OS. Both contact lenses were well fit and with best correction, the patient noted poor depth perception, clumsiness, and non-specific asthenopia. Using the Brecher test (Figure 2), consisting of a Maddox rod and two penlights, aniseikonia was diagnosed and quantified.

RESULTS
The aniseikonia was measured over the contact lenses at 6% OD (image was 6% larger OS) using plano magnifiers (size lenses) with a best-corrected visual acuity of 20/20 OD and 20/40 OS. A 6% size lens was prescribed for the OD with a 2 prism diopeter base in correction. A 10 D base curve (BC) spectacle lens in CR-39 (n=1.498) and 1.5 mm center thickness was prescribed OD, matching the BC of the plano magnifier used over the patient’s contact lens correction for residual post-surgical aniseikonia. At follow-up the following year, the aniseikonia measured 7% OD, but the patient preferred the thinner 6% magnifier since it still allowed fusion and comfortable vision. Horizontal prism correction was changed to 1.0 prism diopeter base out. Note that base in prism slightly enlarges size perception OU, while base out prism diminishes size perception. The patient was asymptomatic with the spectacles over her contact lenses (Figure 3).

REFERENCES

CONCLUSIONS
• Aniseikonia can present with symptoms of asthenopia and/or other non-specific concerns (Table 1)
• Consideration should be made for symptoms of aniseikonia once adequate binocular acuity is achieved in a previously monocular patient
• The Brecher test combined with a size lens set (Figure 4), lens clock, and specialty CL can be used to diminish or eliminate aniseikonia without requiring additional equipment, mathematical calculation of spectacle base curve or center thickness.
• Aniseikonia should be ruled out even in CL wearers, as CLs can only eliminate up to ~5% size difference

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Table 1: Our patient exhibited three of the symptoms listed

<table>
<thead>
<tr>
<th>Characteristics of Aniseikonia Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches</td>
<td>67%</td>
</tr>
<tr>
<td>Asthenopia</td>
<td>67%</td>
</tr>
<tr>
<td>Photophobia</td>
<td>27%</td>
</tr>
<tr>
<td>Reading Difficulty</td>
<td>23%</td>
</tr>
<tr>
<td>Nausea</td>
<td>15%</td>
</tr>
<tr>
<td>Motility</td>
<td>11%</td>
</tr>
<tr>
<td>Nervousness</td>
<td>13%</td>
</tr>
<tr>
<td>Vertigo and Dizziness</td>
<td>7%</td>
</tr>
<tr>
<td>General Fatigue</td>
<td>7%</td>
</tr>
<tr>
<td>Distorted Space Perception</td>
<td>6%</td>
</tr>
</tbody>
</table>

Figure 1: Axial topographical maps showing oblate corneas post penetrating keratoplasty OU.

Figure 2: Brecher Test. Photo credit: Brandon Reed OD

Figure 3: A large diameter scleral contact lens and spectacles with size lens

Figure 4: Plano magnifiers used as size lenses