



Anisometric Refractive Amblyope Managed with Gas Permeable Lens versus Soft Lens



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Introduction

Refractive amblyopia is a reduction in best-corrected visual acuity that develops in early childhood due to uncorrected refractive error. It can result from high and similar refractive errors in both eyes (isometropia) or, more commonly, unequal refractive errors (anisometropia).

The first-line treatment for refractive amblyopia is typically spectacles. However, patients with anisometric amblyopia may experience aniseikonia due to disproportionate retinal image sizes created by an excessive difference in spectacle lens powers. Aniseikonia is considered clinically significant if the difference in image size between the eyes is greater than 0.75%. Symptoms may range from non-specific asthenopia to nausea, headaches, photophobia, difficulty reading, or even spatial distortions or perception degradation.

This case examines the management of a patient with anisometric amblyopia with a corneal gas permeable (GP) contact lens to provide better potential vision and comfort than with commercial soft contact lenses or spectacles. Additionally, the Smart Optometry Aniseikonia (Smart-Optometry Ltd., Slovenia) tablet application was used to measure the amount of subjective aniseikonia induced by spectacle lens, commercial soft contact lens, and corneal GP contact lens.

Case Report

A 23-year-old Caucasian female presented with complaints of constant, longstanding blurry vision OS. She was diagnosed with anisometric amblyopia at 4 years old and had previously been treated with spectacles and commercial soft contact lenses. She reported that both treatment modalities caused her to have spatial disorientation and visual instability.

Based on her complaints and the exam findings, aniseikonia was highly suspected. Since previous treatment with commercial soft lenses did not completely alleviate her symptoms, corneal GP lenses were recommended, and a fitting was performed OS at that visit (Table 1, Figures 1-2).

At the initial dispense, she reported no disorientation or vision fluctuations, and a small improvement in visual acuity was also noted. Slight modifications were made to the GP contact lens prior to finalizing the prescription.

For comparison, a commercial soft contact lens was also trialed, however her vision occasionally fluctuated with each blink (Table 2). Subjective aniseikonia in the horizontal and meridians through each type of contact lens as well as spectacles was measured using the Smart Optometry Aniseikonia (Smart-Optometry Ltd., Slovenia) tablet application (Table 3, Figures 3a-d).

Table 1. Contact Lens Fitting

	OD	OS
VA with Spectacles	20/20	20/25-2
K's	N/A	42.50/43.75 @ 090
Axial Length	23.22 mm	21.69 mm
Refraction	+0.50D	+4.75-1.75x015
Thinsite GP Lens Trial		
Power	N/A	-3.00DS
BC	N/A	7.90
OAD	N/A	9.5 mm
VA with GPs	N/A	20/25+1
OR	N/A	+7.00D
Lens Evaluation	N/A	Lid attached fit with slight central pooling, midperipheral pooling inferiorly, adequate edge clearance horizontally with mild lift inferiorly, decentered slightly superotemporally, good movement on blink

Table 2. GP Lens & Soft Toric Contact Lens Assessment

	Thinsite GP Lens OS	Ultra for Astigmatism Soft Contact Lens OS
Material / Coating	Optimum Extra / HydraPEG coating	Silicone Hydrogel / None
Power	+5.00DS	+5.00-1.75x010
BC	7.94	8.60
OAD	10.0 mm	14.5 mm
VA	20/20-2	20/25+1
OR	PLANO	+0.25D
Lens Evaluation	Lid attached fit with soft with-the-rule alignment centrally and midperipherally, adequate edge clearance with mild lift inferiorly, good movement on blink, decentered slightly superotemporally (Figure 1 & 2)	Full coverage, centered, 0.30mm movement in primary gaze, no rotation, occasionally marker moves with blink

Figures 1 & 2. Final GP Lens Fit

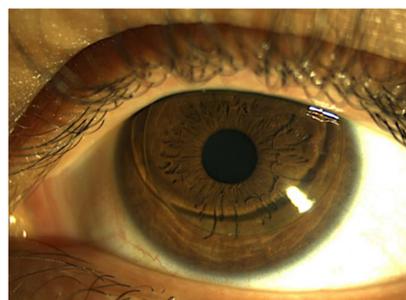


Figure 1. Optically fit lid attached GP lens in white light in the left eye.

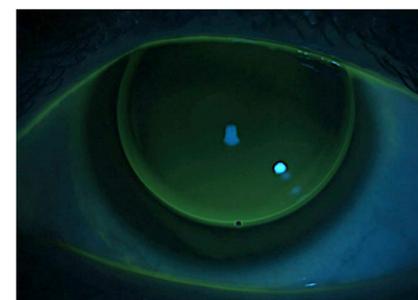


Figure 2. Optically fit lid attached GP lens with a mild with-the-rule central fluorescein pattern in the left eye.

Table 3. Aniseikonia Percentages Between Different Correction Modalities

	Smart Optometry Aniseikonia Tablet Application Results (measured at 40 cm)	
Spectacles	Horizontal: 1.1%	Vertical: Equal
Soft Toric Contact Lens	Horizontal: 1.3%	Vertical: 1.1%
GP Lens	Horizontal: Equal	Vertical: Equal

Figure 3a-d. Screenshots of Smart Optometry Tablet Application Results

Horizontal and vertical meridian testing with Soft Toric Contact Lens

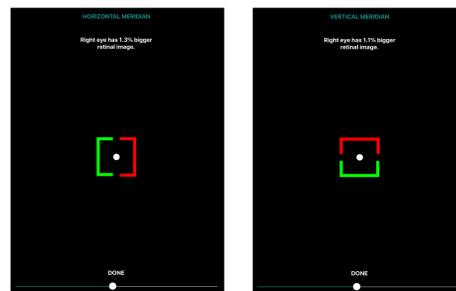


Fig. 3a) Horizontal meridian

Fig. 3b) Vertical meridian

Horizontal and vertical meridian testing with GP Lens

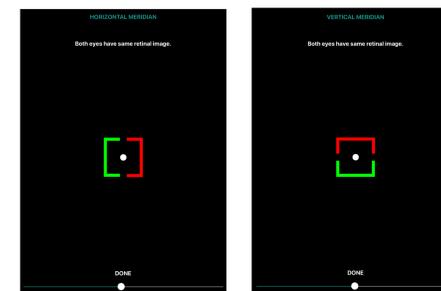


Fig. 3c) Horizontal meridian

Fig. 3d) Vertical meridian

Discussion

The prevalence of amblyopia is 2.4%, of which one third of cases are caused by anisometropia. The earlier the amblyopia is detected and treated, the greater the likelihood the condition may improve or even completely resolve. Moreover, successful treatment is dependent on compliance with refractive correction.

Aniseikonia is a main issue when anisometric amblyopia is treated, and the degree of anisometropia is directly related to the severity of symptoms. Unlike for refractive amblyopia, the first-line treatment of managing aniseikonia is typically contact lenses. GP lenses have been widely used to correct high refractive error and have been proven to provide superior optics when compared to commercial soft lenses.

This case demonstrates the advantages of treating anisometric amblyopia with GP lenses. Apart from alleviating the symptoms of aniseikonia, the VA improved the most through the GP lens in comparison to soft toric contact lens and spectacles.

Several devices and approaches have been developed to measure aniseikonia. Based on literature, there is no gold standard testing method. Smart Optometry Aniseikonia is a recently developed application for digital devices and has been shown to be a reliable testing method.

The Smart Optometry Aniseikonia tablet application results (Table 3) indicate:

- **GP lens:** Aniseikonia was completely resolved.
- **Spectacles:** Aniseikonia was present in the horizontal meridian only.
- **Soft toric lens:** Greatest aniseikonia present in both meridians. The presence of aniseikonia in both meridians was possibly due to lens rotation suggesting higher amounts of cylinder may result in increased aniseikonia with a soft contact lens.

Furthermore, with the elimination of aniseikonia, the patient will hopefully have better compliance in wearing her correction more regularly in hopes that her amblyopia will improve.

Conclusion

This case report demonstrates that GP lenses should be utilized over spectacles and commercial soft contact lenses for the treatment of anisometric amblyopia secondary to axial length. GP lenses have shown to improve or eliminate aniseikonia and have superior optical quality when compared to soft lenses, thus providing better potential vision.

Furthermore, studies have shown there is no age trend found in the success of treating amblyopia. Thus, regardless of age, optimally fitting refractive amblyopes into rigid contact lenses may indeed be one of the first steps in improving amblyopic outcomes as it did with this patient along with monitoring compliance. However, further research is still needed in order to best evaluate and monitor the use of rigid contact lenses for the treatment of children, specifically, with refractive amblyopia.

References

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