

Contact Lens Update

CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

Article Review: Assessment of a Novel Lens Surface Treatment for Scleral Lens Wearers with Dry Eye

April 28, 2022



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Mickles et al. Assessment of a Novel Lens Surface Treatment for Scleral Lens Wearers with Dry Eye. Eye Contact Lens 2021; 47;5: 308-313.

Introduction

Management options for patients with signs and/or symptoms of dry eye disease (DED) are many and varied.¹ One of these options is to consider is a scleral lens,¹ use of which is growing in terms of its prescribing rate for a wide variety of indications.²⁻⁵

Several factors may contribute to the potential for using a scleral lens to manage DED. First, the rigid material does not dehydrate during wear and lens dehydration can be a contributory factor to discomfort when wearing soft lenses.⁶ Second, the large-diameter protects a considerable area of the ocular surface from exposure.⁵ Finally, the large post-lens fluid reservoir created by the scleral lens lubricates and moistens the underlying ocular surface during wear.⁵ However, when considering patient satisfaction when wearing a scleral lens, patients with dry eye symptoms tend to report lower scores for comfort and overall satisfaction than patients without dryness symptoms, typically due to the patients experiencing more tear film debris and lens surface deposits.⁷ One potential way to increase wettability, reduce deposition and possibly improve comfort is to apply a polyethylene glycol (PEG)-based surface treatment to the scleral lens material.^{5, 8, 9}

This featured study investigates the impact of a PEG-based surface treatment on scleral lens comfort in dry eyed patients.

Study design

This was a double-masked, crossover, randomized, multicenter study undertaken at three locations in the United States. The study enrolled 21 established scleral lens wearers presenting with contact lens discomfort and moderate-to-severe dry eye, based on the Contact Lens Dry Eye Questionnaire-8 (CLDEQ-8) and the Ocular Surface Disease Index (OSDI), respectively. A participant was considered an established wearer if the lens wearing time was at least 8 hours per day, at least 5 days per week, and they had worn scleral lenses for 1-12 months. Subjects ranged in age between 25 to 73 years (mean 51.8 years), and most participants were female (84%). All participants wore their habitual untreated scleral lenses or PEG-treated lenses for 30 days, in a randomized cross-over design, with a one-week wash-out period between the two test phases. All participants used the same filling and disinfecting solutions, consisting of non-preserved buffered saline and a hydrogen

peroxide solution approved for disinfection of PEG-treated lenses, respectively. Participants could continue using their dry eye therapies, but they were instructed to avoid using ophthalmic drops that were not approved when wearing scleral lenses.

Results

Improvements were found in CLDEQ-8 and OSDI scores, comfortable wearing time and frequency of foggy vision when wearing the PEG-treated lenses. The comfortable wearing time was significantly longer for participants with PEG-treated lenses, with 37% vs 5% reporting a comfortable wearing time of 12 hours. None of the participants wearing treated lenses had <4 hours of comfortable wearing time, compared with 56% of participants wearing untreated lenses.

Patients frequently report foggy vision when wearing scleral lenses, ^{10, 11} often due to the accumulation of particulate matter, either on the lens surface or in the post-lens fluid reservoir.⁵ In this study, participants reported a reduction in foggy vision with PEG-treated lenses, which agrees with a previous study.¹² Walker and Redfern concluded that the improved foggy vision was related to enhanced lens surface wettability,¹² which was the same conclusion that the authors of this featured article arrived at.

In addition to improvements in subjective factors, objective findings also supported the use of the PEG-treated lenses. Corneal and temporal conjunctival staining, lid wiper epitheliopathy (LWE), and conjunctival papillae all improved when wearing the treated lenses. It was reported that the reduction in corneal staining was clinically significant, indicating meaningful improvements in the condition of the ocular surface. This was attributed to the improved lens surface wettability and the ability of the tear film to maintain a longer break up time over the lens. LWE is hypothetically caused by increased friction due to inadequate lubrication between the lid wiper area and the ocular surface.¹³⁻¹⁶ The authors of this paper presumed that the more “slippery” PEG-treated lenses reduced the friction between the lens surface and the palpebral conjunctiva, resulting in reduced LWE and an improvement in the appearance of the conjunctival papillae.

Potential clinical implications

- PEG-treated lenses improved CLDEQ-8 and OSDI scores. Thus, to increase success and diminish discomfort when wearing scleral lenses, consider hydrophilic surface treatments in scleral lens patients with contact lens discomfort, ocular surface diseases, and dry eye symptoms.
- PEG-surface treated lenses increased comfortable wearing time. Thus, consider hydrophilic coatings in scleral lens wearers who have reduced wearing time below that which they would optimally like.
- PEG-treated lenses improved subjective fogging of vision due to improved lens surface quality. Therefore, treated lenses may be indicated in patients with poor lens wettability or poor vision as a result of fogging.
- PEG-treated lenses enhance lens surface quality and may be beneficial in patients with marked LWE and corresponding reductions in lens comfort.
- The decreased friction with PEG-treated lenses could potentially be helpful in patients developing conjunctival papillae caused by mechanical trauma.
- PEG-treated scleral lenses may help ameliorate the ocular surface in eyes exhibiting excessive corneal exposure and staining.

Summary

This article demonstrates that PEG surface-treated scleral lenses provided improved comfort, reduced dry eye symptoms and reduced ocular surface compromise compared with untreated sclerals for participants with dry eye

symptoms. Although the results of this study are significant, more studies with a larger sample size for a longer duration are needed to fully elucidate the importance of surface treatments on scleral lens success.

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