

A comparison of multipurpose and conventional 2-step rigid gas-permeable solutions with Paragon corneal refractive therapy lenses

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KEYWORDS

Orthokeratology;
Contact lens care
system;
Visual acuity;
Contact lens comfort

Abstract

PURPOSE: This investigation compared 2 commonly used care systems, Boston Advance[®] care system and Boston Simplus[™] (Bausch & Lomb, Rochester, New York) multipurpose solution, and the effects of these solutions on unaided daytime vision, care, and handling and comfort with Paragon corneal refractive therapy (CRT)[®] (Paragon Vision Sciences, Mesa, Arizona) lenses.

METHODS: Eighteen subjects wearing CRT lenses were recruited. Three evaluations were conducted over 2 months. Subjects were randomly assigned a solution and returned for a follow-up visit after 1 month. At the conclusion of the 1-month visit, each patient was reassigned the other solution for the second month. The final visit included an additional questionnaire regarding which solution was deemed the best and worst for unaided daytime vision, comfort, care, and handling.

RESULTS: From the responses of the 18 patients, a trend is evident that patients favor Boston Simplus over Boston Advance for comfort, unaided daytime vision, and care and handling. However, the sample size is small in this study; therefore, most of the differences are not significant at the 0.05 level except the preference for care and handling ($P = 0.03$).

CONCLUSIONS: Patients preferred Boston Simplus to Boston Advance with corneal reshaping lens wear when evaluated for comfort, unaided daytime vision, and care and handling. The preference of Boston Simplus to Boston Advance for care and handling is very strong and statistically significant, whereas other such advantages of Boston Simplus were not found to be statistically significant in this study. Further confirmation of these results as well as a better understanding of other visual and ocular interactions of Boston Simplus versus conventional solutions, will require using a larger sample in further studies.
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With new advances in gas-permeable (GP) lens design and high oxygen transmissible materials, overnight orthokeratology has become a safe and viable option for the correction

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of myopia.¹⁻⁸ Paralleling these advances in lens design are advances in GP cleaning and disinfecting solutions. These advances have led to the creation of multipurpose GP solutions with the goal of making lens care easier for patients.⁹ It has been shown that patient comfort is influenced by the wettability, viscosity, and substantivity of the soaking solutions used for rigid GP (RGP) contact lenses.¹⁰ Solutions with higher viscosity have been found to result in greater

patient comfort¹⁰ and a slowed rate of decentering of rigid contact lenses.¹¹ In addition to viscosity, the length of time the solution remains on the lens during normal blinking can also affect comfort.¹² Overnight orthokeratology presents a new frontier for RGP solutions because these lenses are worn overnight while the patients' eyes are closed. The lenses are much less mobile compared with conventional RGP lens wear.

This investigation compared 2 commonly used care systems, Boston Advance[®] care system (which includes the Boston Advance Cleaner[®] and Boston Advance[®] Comfort Formula conditioning solution), and Boston Simplus[™] multipurpose solution (Bausch & Lomb, Rochester, New York), and the effects of these solutions on unaided daytime vision, comfort, and care and handling with regard to Paragon corneal refractive therapy (CRT)[®] (Paragon Vision Sciences, Mesa, Arizona) lenses.

Methods

The tenets of the Declaration of Helsinki were followed throughout the study. The Institutional Review Board at the New England College of Optometry approved the protocol, and informed consent was obtained from all subjects after the protocol had been explained.

Each subject was required to have had a complete eye examination, including dilated fundus examination, at the New England Eye Institute within 10 months before enrollment in the study. Three visits were conducted over 2 months and were performed by masked investigators. A baseline examination was conducted to determine eligibility. At the initial visit, eligible patients completed a questionnaire regarding their current contact lens solution and care methods. The care system to be used for the first month was selected randomly and dispensed by a research assistant. The investigators were masked to the type of solution being used. The assistant educated the patient regarding lens care and proper use of solution (as indicated on the package inserts and manufacturer's instructions.) At the conclusion of month 1, a progress evaluation was performed, a questionnaire was completed with regard to the first solution, and the second solution was dispensed to the patient. Once again, the patient was educated on the proper use of this solution. The patient was asked to use the second solution for 1 month. Any questions the patients had regarding solutions and cleaning were directed to the research assistant. After month 2, the final progress evaluation included an additional questionnaire regarding which solutions were deemed the best and worst for unaided daytime vision, comfort, and care and handling.

Statistical methods

The exact binomial tests were conducted to assess the significance of patients' preference of one solution to

Table 1 Baseline solutions used by patients before initiation of study protocol

Solution	No. of Patients
Unique pH	7
Boston Simplicity	3
Boston Original	3
Boston Simplus	2
ClearCare*	1
Renu†	1
B & L Rigid Gas Permeable Care System	1

* CIBA Vision, Duluth, Georgia.

† Bausch & Lomb, Rochester, New York.

another regarding comfort, unaided daytime vision, and care and handling because the sample size is small and the normal approximation is not suitable. All patients were asked which they favored most and which they favored least for comfort, unaided daytime vision, and care and handling among the 3 care system options (Simplus, Boston Advance, and the baseline system used before entering the study). For each test area, a preference score was created as follows: +1 for a brand if it is the most favored; -1 if it is the least favored; and zero for neither most favored nor least favored brand or brand with both most and least favored responses from the same patient. The difference in preference scores yielded directly a patient's preference between 2 brands. If patients like the 2 brands equally, then the chance that one is more favored is 50%. A 2-sided binomial test is applied to test equal preferences ($P = 0.5$) between Boston Simplus and Boston Advance.

Results

Eighteen subjects wearing CRT lenses were recruited. Eight patients used the Boston Advance as the first care system, whereas 10 patients used Boston Simplus first. A list of the solutions being used before the study can be found in Table 1. From the responses of the 18 patients, a trend was evident that patients favor Boston Simplus over Boston Advance care system when evaluated with regard to comfort, unaided daytime vision, and easy care and handling with corneal reshaping lenses (see Figures 1-3). However, because the sample size is small in this study, most of the differences were not significant at the 0.05 level with the exception of the preference for Simplus with regard to care and handling ($P = 0.03$; see Table 2).

Discussion

Satisfaction and comfort with GP contact lenses can depend on the care system utilized by the patient. A preference for Boston Simplus over Boston Advance with regard to care and handling was detected in this study. Similar trends were noted for patient-reported comfort and unaided daytime vision.

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