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Brief report

A comparison of the visual acuity outcome between Clearkone and RGP lenses

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Abstract

Purpose: To compare the visual acuity outcome of the ClearKone SynergEyes™ hybrid contact lens and Boston XO rigid gas permeable (RGP) contact lens in patients with keratoconus.

Methods: Twenty-eight eyes with keratoconus participated in this study. The visual acuity was examined once with the RGP lens and once with the ClearKone SynergEyes™ hybrid contact lens.

Results: The mean corneal keratometry, the mean lens back optic zone radius, and the mean vault was 7.23 ± 0.62 mm, 7.67 ± 0.44 mm, and 277.94 ± 104.5 μm, respectively. Visual acuity was significantly better with the ClearKone SynergEyes™ hybrid lens ($P = 0.004$). The mean best corrected visual acuity (logMAR) was 0.022 ± 0.03 and 0.057 ± 0.09 for the ClearKone and RGP lens, respectively. The Clearkone lens yields an average improvement of one line of the Snellen chart in comparison with the RGP lens.

Conclusion: The ClearKone hybrid contact lens and the RGP lens may improve visual acuity in corneal irregularities. But patients who are able to afford hybrid lens wearing may show better visual acuity.

Keywords: ClearKone hybrid contact lens; Rigid gas permeable; Keratoconus; Irregular cornea

Introduction

Keratoconus causes severe changes in the visual performance, which is essential for quality of life and may be associated with visual acuity loss.[1–3] Years ago, hard contact lenses were the best management modality for keratoconus.[4] rigid gas permeable (RGP) contact lenses are the first option in the management of keratoconus patients to rehabilitate their vision and improve their quality of life.[5] In recent years, alternative options for fitting patients with advanced stages of keratoconus or patients who have failed with RGP contact lense design for keratoconus, such as hybrid or scleral contact lenses, have been proposed.[6,7] Application of all criteria may not be possible, so a compromise between these factors can help to gain relative satisfaction.[8,9] The aim of the present study was to compare visual acuity in keratoconus patients using ClearKone and RGP lenses.

Methods

The inclusion criteria were a diagnosis of keratoconus by an ophthalmologist, tear health, and achievement of optimal

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contact lens fit with both RGP [Boston XO (Bausch & Lomb Inc, Rochester, NY, USA), three-point-touch was considered as the acceptable final fitting[10]] and Clearkone lenses.

In the next stage, fitting of the ClearKone started 30 min after removing the RGP lens, according to the standard fitting procedure. Visual acuity with two lenses was recorded separately.

Results

In this study, 28 eyes of 22 men and 6 women with a mean age of 34 ± 5.94 years (range, 24–46 years) were evaluated. Most of patients could not tolerate conventional RGP lenses as they were in stage three in Pentacam classification.

The descriptive statistics of the study are shown in Table 1.

Based on paired *t* test analysis, visual acuity was significantly better with the ClearKone hybrid lens ($P = 0.004$). The mean best corrected visual acuity (logMAR) was 0.022 ± 0.03 and 0.057 ± 0.09 for the ClearKone and RGP lens, respectively.

Discussion

RGP contact lenses were widely used as the best choice for management of corneal ectasia.[11] The visual acuity of the ClearKone contact lenses was better than the standard design of RGP lenses. However, Hashemi et al found no difference between the two groups,[12] but Carracedo et al showed that the visual acuity of the ClearKone lens was better than standard design of the RGP lenses.[13] The authors reported that the reason for this difference was the severity of keratoconus. In sever to moderate ectasia, ClearKone lenses are more effective.[13]

Vertical corneal apex decentration is another factor that decreases the centration of the RGP lens and decreases the visual acuity.[14]

It is important to mention that flatter fitting of the RGP lens results in a better visual acuity,[15] but it may be associated with corneal scaring.[16] A three-point touch was the fitting reference in this study to avoid central corneal scar, but lens stability and visual acuity cannot be achieved in all patients. Moreover, the ClearKone lens utilizes a reverse geometry system that increases its performance.[17]

Previous studies have shown that RGP lenses provide a better visual acuity than scleral lenses[18] due to the tear retention under the lens. If the tear film is about 50 μm, it improves visual acuity, but more than 150 μm, it worsens the patient's visual acuity.[19] Thus, the height of ClearKone lens is considered about 50 μm.[13,20,21]

In conclusion, the ClearKone hybrid contact lens and the RGP lens may improve visual acuity in corneal irregularities.

Table 1
Descriptive statistics of the study patients.

	Min	Max	Mean	Std Deviation	Mode
Flat K	6.55	9.37	7.57	0.612	7.45
Steep K	5.95	8.56	6.89	0.643	6.70
Mean K	6.25	8.97	7.23	0.626	7.17
BOZR	6.50	8.40	7.67	0.44	7.80
Vault	150	600	277.94	104.585	250
RGP VA (logMAR)	0	0.4	0.057	0.098	0
ClearKone VA (logMAR)	0	0.1	0.022	0.039	0

VA: Visual acuity, K: Keratometry, RGP: Rigid gas permeable, BOZR: Back optic zone radius.

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