The effects of different filling solutions on the performance of scleral lens wear

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ABSTRACT

Purpose
To investigate and compare the visual performance and tear quality during scleral lens wear with the use of two different ophthalmic filling solutions.

Method
Twenty-eight subjects (35 eyes) with mean age of 21.50 ± 2.30 were successfully fitted with 18.2mm scleral lenses. After the achieving of optimal fittings, they were instructed to wear the scleral lenses filling with either non-preserved ophthalmic saline (0.9% sodium chloride solution) or non-preserved ophthalmic gel (0.3% sodium hyaluronate gel) for 4 hours. High (100%) and low (10% and 5%) contrast distant visual acuities, and tear debris were measured in each 1-hour interval within the 4-hour lens wear. Similar experimental protocols were repeated 7 to 10 days later with switching of tested filling solutions.

Result
The mean central vaulting from the lens in vivo was 200.43 ± 11.95 microns. The Wilcoxon signed-rank test was used to analyze the results. The group using sodium hyaluronate gel as filling solution showed significant less debris formation than saline solution in all four intervals of lens wear (p < 0.001). No statistically significant change could be revealed in high (100%) and low (5%) contrast distant visual acuities in all four intervals after using 2 different filling solutions. Likewise, for low contrast (10%) distant acuities, no statistically significant change was found in 2-, 3-, and 4-hour of lens wear between the two types of filling solutions except that there was a statistically significant difference in the 1-hour lens wear interval (Z = -3.188, p = 0.001).

Conclusion
Although no significant difference was found in high and low contrast distant visual acuities (except for 10% contrast), there is a significant less amount of tear debris in ophthalmic gel as compared with saline filling solution. The possible etiologies of such difference and the clinical management of debris formation in scleral lens wear will be discussed. Clinical significance and recommendations will be given to practitioners for proper choosing of filling solution in scleral lens practice.