

The Effect of Scleral Lens Wear on Corneal Topography after Cross-linking for Keratoconus

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PURPOSE:

To evaluate the changes in the anterior corneal topography induced by scleral contact lens (SCL) wear in eyes of patients with and without previous history of corneal cross-linking (CXL). Up today little is known about ongoing corneal changes following SCL wear[1,2]. This area is even more vague when scleral lenses are fitted shortly after CXL procedure.

METHODS:

Nine keratoconic subjects with (7 eyes) and without (7 eyes, control) history of CXL had been recruited into the study. There were no statistically significant differences in between the groups in terms of central corneal thickness (CCT). All subjects were fitted with 18.50 mm SCL. The amount of corneal clearance varied from 150 to 350 mic.

Corneal topography was performed prior to and two and five hours after contact lens wear (Fig. 1). The differences between baseline and post-SCL wear for simulated steep (Ksteep), flat (Kflat) and maximal (Kmax) corneal powers and central corneal astigmatism (CCA) were evaluated.

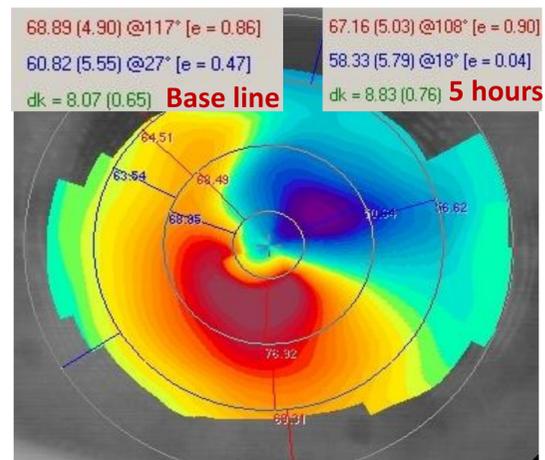
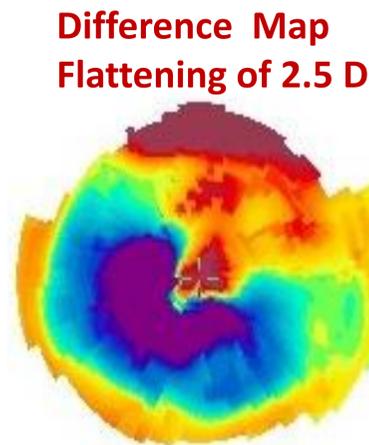


Fig. 1. Represents the change in simulated K readings and corneal shape changes after 5 hours of scleral lens wear.

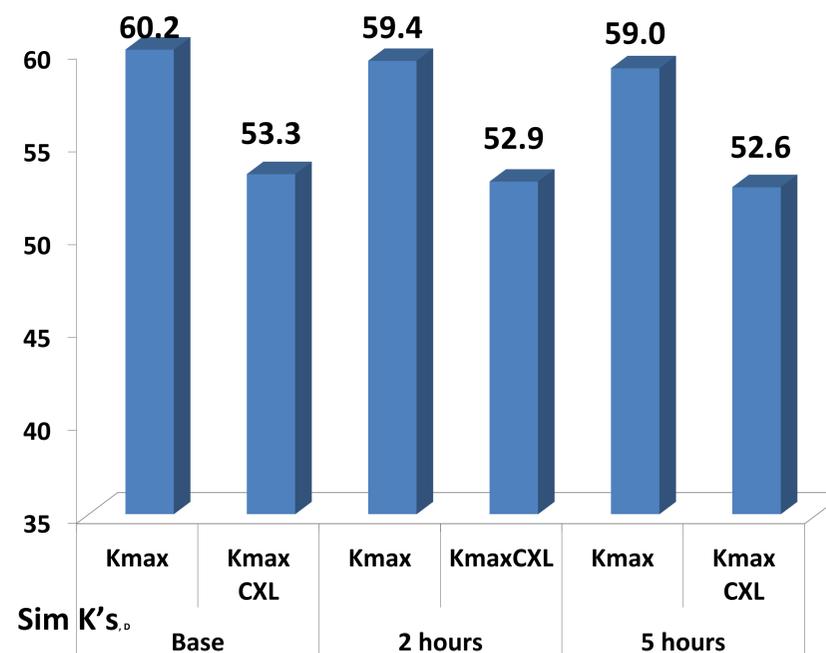


RESULTS:

- The mean base line Ksteep values were 50.6 ± 5.0 diopters (D) for CXL group and 55.6 ± 7.6 for control, respectively.
- After 2 and 5 hours of SCL wear a statistically significant flattening of Ksteep (mean values of 0.4 ± 0.6 and 0.7 ± 0.6 D) and K max (0.6 ± 0.6 and 0.9 ± 0.7 D, respectively) was observed in 12 out of 14 fitted eyes, ($p < 0.05$). Contrary, the mean Kflat values exhibited minor steepening in both groups (Tab. 1).
- After 5 hours of lens wear no statistically significant difference was found in the amount of Ksteep flattening between cross-linked (0.6 ± 0.5 D) and untreated (0.73 ± 0.7 D) eyes.

ΔK (change after 5 h)	Flat, D	Steep, D	Max, D	CCA, D
KC	-0.19 ± 0.5	0.7 ± 0.62	1.1 ± 0.74	0.94 ± 0.85
KC+CXL	-0.41 ± 0.7	0.57 ± 0.54	0.63 ± 0.64	1.0 ± 0.73

Tab. 1. Represents the differences in corneal curvature following SCL wear



RESULTS CON'T

- After 5 hours of SCL wear CCA decreased by 1.0 ± 0.73 D in post CXL and 0.94 ± 0.85 D in control group. Corneal irregularity index exhibited a tendency towards surface regularization in both groups (Fig. 2).
- There was no association between the amount of corneal clearance and the degree of corneal flattening.
- CCT measurements didn't exhibit statistically significant differences from the base line values.

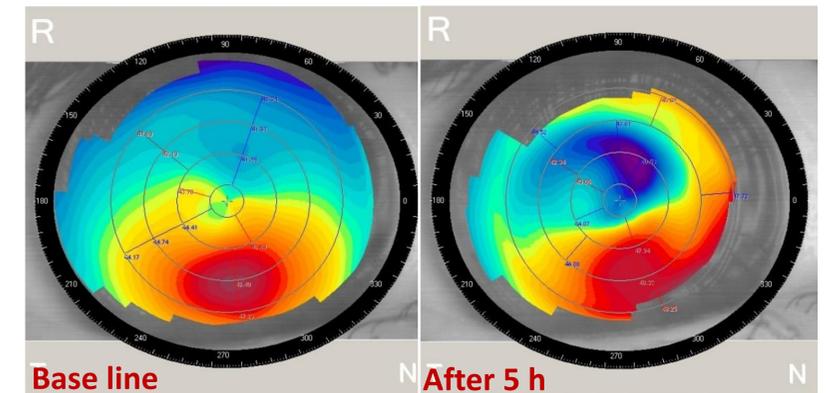


Fig. 2. Represents a decrease of 2.4 diopters in CCA after 5 hours of SCL wear

CONCLUSION:

- Although scleral lenses do not mechanically rest on the cornea, short term SCL wear may cause flattening of the anterior cornea.
- Practitioners should be aware of these changes since SCL induced corneal flattening may mask the signs of keratoconus progression.
- CXL treatment doesn't warrant for corneal shape stability following scleral lens wear. Discontinuation of lens wear prior to evaluation is necessary for proper follow up on the ongoing corneal changes, however further studies are required to determine its duration.

References:

1. Soeters et al. Scleral lens influence on corneal curvature and pachymetry in keratoconus patients. Cont Lens Anterior Eye. Aug. 2015
2. Vincent SJ et al. Miniscleral lens wear influences corneal curvature and optics. Ophthalmic Physiol Opt. Mar. 2016