UWaterloo, SOVS Specialty Contact Lens Research Lab

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Case Report: Use of Contact Lenses in Managing Keratoconic Progression After Combined PRK and CXL

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Background

Corneal crosslinking (CXL) is a procedure that enhances the mechanical strength of the cornea to slow down the progression of keratoconus (KCN).[1] The combination of photorefractive keratectomy (PRK) and CXL has been shown to yield improved visual outcomes for KCN patients without compromising the effectiveness of the CXL to slow KCN progression.[2, 3] Yet, there is minimal evidence supporting the long-term efficacy of this combined procedure.

Purpose

This case report demonstrates the use of scleral and soft toric contact lenses to manage a patient who experienced KCN progression five years after the combined PRK and CXL procedure.

Case History

A healthy 56-year-old male with KCN was referred to the University of Waterloo Contact Lens Clinic for a contact lens (CL) fitting seeking an improvement in vision. He was diagnosed with KCN approximately 8-10 years ago, and in 2013 this patient underwent combined PRK and CXL procedure in both eyes. The combined surgery initially resulted in very favourable uncorrected visual outcomes (UCVA). However, UCVA had decreased gradually since the surgery, and the patient was failing to meet the 20/40 best corrected visual acuity requirements for his work in law enforcement. In addition to poor vision, the patient complained of glare and difficulty driving at night.

The patient's optometrist had attempted corneal gas permeable (GP) CL fitting but was unsuccessful in achieving adequate lens fit and visual acuity. The patient was not corrected for distance and used over the counter reading glasses at near. He had never worn CLs in the past.

Initial Assessment and Corneal GP Fitting

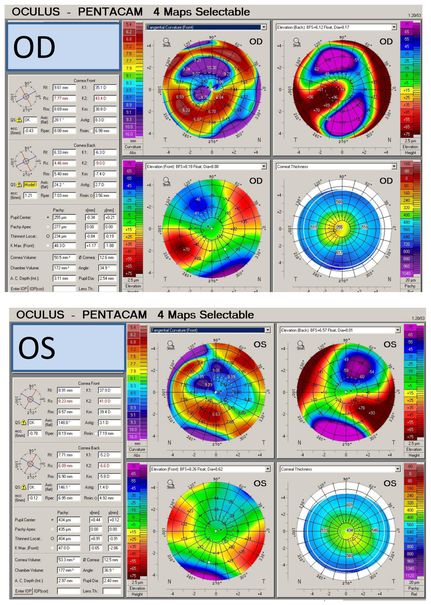

Figure 1:Pentacam topographies of the right and left eye at the initial assessment.

The presenting UCVAs were $20/80^{+2}$ OD and 20/40 OS, and was improved to $20/60^{-2}$ OD and $20/20^{-2}$ OS with subjective refraction. Corneal topographies showed irregularities in both eyes, as well as central flattening and mid-peripheral steepening which are characteristic of PRK. The central corneal thickness was greatly reduced in the right eye, indicating progression since surgery. Central corneal opacities were present in both eyes. A diagnostic fitting with Rose K2 IC was performed. With the final CLs (parameters shown below), the patient achieved $20/40^{+3}$ vision in OD and $20/30^{+2}$ in OS.

OD	GP Lens Parameter	OS
Rose K2 IC with front toric	**Lens Name**	Rose K2 IC
7.85	**Base Curve (mm)**	8.14
11.2	**Lens Diameter (mm)**	11.2
+0.25 -3.00x090	**Power**	-0.50 DS
Boston XO	**Material**	Boston XO

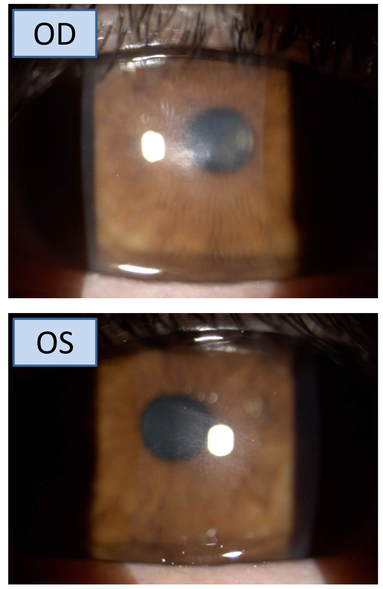

Figure 2: Slit lamp images of the patient's right and left eye.

Timeline

May 28, 2018
Initial assessment & corneal GP diagnostic fitting

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July 26, 2018
Delivery of corneal GP CLs

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August 22, 2018
Trial of soft toric CL OS

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August 27, 2018
Diagnostic fitting of scleral lens OD

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September 10, 2018
Scleral lens delivery

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September 17, 2018
Progress check & re-order of ScCL

Soft Toric & Scleral Contact Lens Fitting

After four weeks of adaptation to the corneal GP CLs, the patient continued to complain about fluctuating vision, itch, and discomfort. A Biofinity toric soft CL was trialed for the left eye, as subjective refraction improved VA in that eye to 20/20. A diagnostic fitting was performed on the right eye with Onefit MED scleral lenses (Blanchard, Montreal). The following CLs were ordered:

OD	Lens Parameter	OS
Onefit MED	**Lens Name**	Biofinity toric
Prolate	**Design**	Toric
8.2	**Base Curve (mm)**	8.7
4500	**Sag (um)**	
16.0 mm	**Lens Diameter**	14.5 mm
Std	**Mid-peripheral zone**	
Std	**Limbal Zone**	
+75/-75	**Peripheral Zone**	
Optimum Extra	**Material**	Comfilcon A
+0.50 DS	**Power (D)**	+2.00 -1.25x010

At the 1 week progress check following CL dispense, the patient reported excellent comfort and vision. Assessment of the scleral lens showed optimal central clearance, inadequate limbal clearance resulting in limbal staining, and mild blanching in all quadrants which was more severe inferiorly. Vision was improved with a small over-refraction. No changes were required for the soft toric CL in the left eye. The scleral lens was re-ordered with increased limbal clearance, change in power, and flattened scleral peripheries in both meridians.

At subsequent follow-ups, the patient continued to report good comfort, stable and adequate vision, and good depth perception.

OD	CL Assessment at Progress Check	OS
$20/50^{+2}$	**Distance VA**	20/20
+0.75 DS; 20/40	**Over-Refraction**	Pl
250 µm	**Central Corneal Clearance**	
Minimal	**Limbal Clearance**	
Blanching 360, worse inferiorly	**Landing Zone**	
25° CCW, stable	**Rotation**	3° CCW, stable
0	**Movement**	1mm at primary, 3mm at up gaze

OD	Final Lens Parameter	OS
Onefit MED	**Lens Name**	Biofinity toric
Prolate	**Design**	Toric
8.2	**Base Curve (mm)**	8.7
4500	**Sag (um)**	
16.0	**Lens Diameter (mm)**	14.5
Std	**Mid-peripheral zone**	
+100um	**Limbal Zone**	
+125/-25	**Peripheral Curves**	
Optimum Extra	**Material**	Comfilcon A
+1.25 DS	**Power (D)**	+2.00 -1.25x010

Conclusion

Practitioners should be made aware that KCN progression is among the complications of the combined PRK and CXL procedure. This case report demonstrates the successful use of contact lenses to improve the vision of patients who experience KCN progression subsequent to combined PRK and CXL. Various contact lens options can be employed to match the severity of the patient's corneal irregularities.

References

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2. Kontadakis G, Kankariya V, Tsoulnaras K, et al. Long-term comparison of simultaneous topography-guided photorefractive keratectomy followed by corneal cross-linking versus corneal cross-linking alone. Ophthalmology. 2016; 123:974–983.
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