Inflammatory Corneal Neovascularization from Hybrid Lens Wear

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Background

Corneal neovascularization (NV) is the formation and invasion of new blood vessels into the avascular cornea. There are two main etiologies for corneal NV: hypoxia and inflammation. Most contact lens (CL) induced corneal NV is due to hypoxia; however, a poorly fit CL can cause a traumatic corneal injury, triggering macrophages and inflammatory cells to incite the angiogenic cascade and form NV. Refitting these patients will improve overall ocular health and increase the chances of long-term success with CL wear.

Case

- 58 year old Caucasian male presents for a corneal consult due to blurry vision
- History of radial keratectomy approximately 20 years ago
- History of Synergeyes UltraHealth CL wear OU
  - Average wear time: 18 hours
  - Wear time at visit: 7 hours
  - Vision: OD 5/10, OS 7/10
  - Comfort: OD 8/10, OS 9/10
  - Using ClearCare and PureMoist solutions
  - Current lens pair is 1.5 years old
- Visual acuities through hybrid CLs:
  - OD: 20/30-2, PH 20/25-2
  - OS: 20/25+2, PH 20/20
- Pupils, EOMs, confrontation visual fields: normal
- CL assessment:

OD		OS
Centered	Centration	Centered
Full	Coverage	Full
0.50mm	Movement	0.00mm
50um vault over superior cornea; no vault over area of corneal scarring	Vault	No vault throughout lens

- Slit lamp examination (see photo 1a and 1b):

OD		OS
Papilloma LL, inspissated Meibomian glands	Adnexa/Eyelids	Inspissated Meibomian glands
White and quiet	Sclera	White and quiet
Pinguecula nasally	Conjunctiva	Pinguecula nasally
6 RK incision scars; 2+ coalesced punctate epithelial erosions paracentrally over NV frond and overlying corneal opacity. NV frond and scarring goes from temporal limbus to visual axis along RK incision	Cornea	6 RK incision scars; NV along superior/temporal RK incision
Deep and quiet	AC	Deep and quiet
Flat, intact	Iris	Flat, intact
Tr NS	Lens	Tr NS

- Plan: cautery removal of NV growth followed by Avastin
  - RTC 1 month S/P removal of NV growth for scleral lens fit

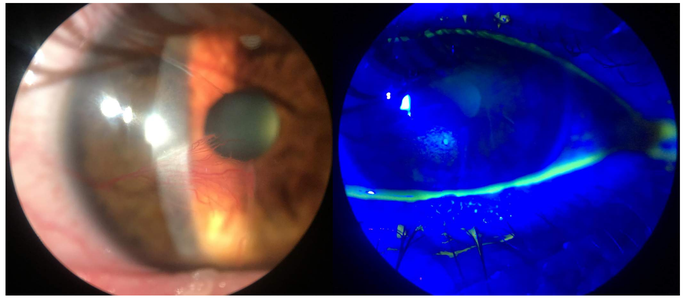

Photo 1a (left). Initial visit. Corneal NV growth and scarring of the right eye due to poor fitting hybrid CL. NV growth follows along inferior temporal radial keratectomy incision – the path of least resistance.
Photo 1b (right). Sodium fluorescein staining of the right cornea after hybrid CL removal shows coalesced punctate epithelial erosions over area of scarring and NV growth. Hybrid CL likely rubbed against the incision, causing an inflammatory response and resultant NV growth.

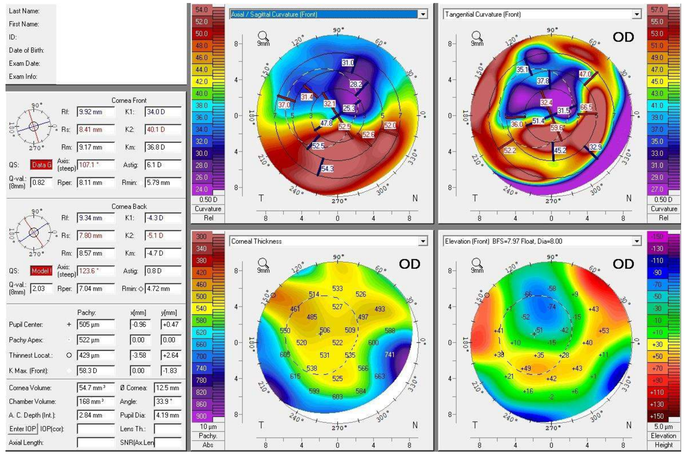

Photo 2. Initial visit. Oculus Pentacam corneal tomography showing significant flattening of the right superior cornea due to patient's previous radial keratectomy surgery. Significant steepening inferiorly likely contributed by NV growth and corneal inflammation due to the poor hybrid lens fit.

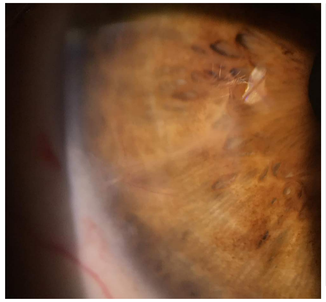

Photo 3. Scleral lens fit appointment – 6 weeks after cautery procedure and Avastin treatment. Patient reported improvement in vision. He discontinued wearing his hybrid CL OD after the procedure. Entering visual acuities were 20/125 OD uncorrected, PH 20/15, and 20/20 OS through his hybrid CL. The photo on the left shows the patient's right cornea at this visit. Note the ghost vessels and residual fine NV vessels. The scarring and inflammation of cornea significantly decreased once the patient discontinued hybrid lens wear and received the cauterization procedure and Avastin treatment. His left eye had 1+ scattered paracentral punctate epithelial erosions after hybrid lens removal. The superior/temporal NV remained unchanged.

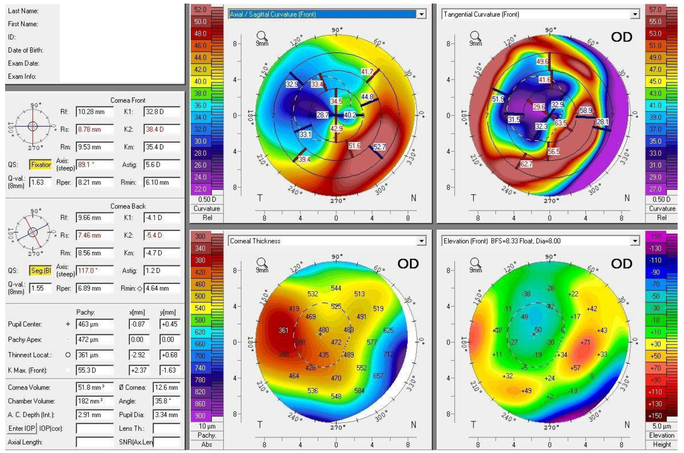

Photo 4. Scleral lens fit appointment – 6 weeks after cautery procedure and Avastin treatment. Oculus Pentacam corneal tomography showing corneal flattening and reduction of corneal pachymetry values of the temporal quadrant of the cornea S/P NV growth removal.

Material	BC (D)	CLP (D)	DIA (mm)	Sag (mm)	OZD (mm)	CT (mm)	PC1r/w (mm)	PC2r/w (mm)	PC3r/w (mm)	PC4r/w (mm)
Boston XO2 Clear	41.00	-3.62 -0.62 x 090	16.5	4.771	8.50	0.35	7.2/2.35	9.5/0.75	13.5/0.5	14.5/0.4
Boston XO2 Blue	40.00	-1.75	16.5	4.791	8.50	0.35	7.09/2.35	9.5/0.75	13.5/0.5	14.5/0.4

The final lens parameters are listed above. In addition to the above parameters, the lenses had a precision lift in the nasal quadrant OU due to the patient's pinguecula.

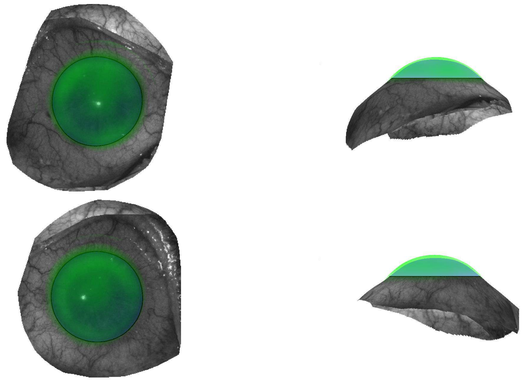

Photo 5. sMap3D rendition of the initial scleral contact lens fit on the patient's eye. The pictures on the left demonstrate the fluorescein pattern on the right eye (top left) and the left eye (bottom left) when there is no eyelid interference. The pictures on the right demonstrate the approximate vault of the lenses on the eye using the sMap3D software. The final lenses were very similar to the sMap3D designed lenses: peripheral curve 1 was steepened to improve limbal vault and precision lift was incorporated OU.

The patient requested monovision through his scleral lenses. Through his right lens he was able to see 20/50 at distance and 20/20 at near. Through his left lens he was able to see 20/20 at distance and 20/50 at near. Through both eyes, he was able to see 20/20 at distance and 20/20 at near. He was pleased with the comfort and vision through both lenses.

- Average wear time: 14 hours
- Vision: 10/10 OD, 10/10 OS
- Comfort: 10/10 OD, 10/10 OS
- Solution: Clear Care, filling with Lacripure

OD lens fit:

- Central vault: 250um
- Limbal vault: 250um inferiorly, 25um superiorly, 25um nasally, 50um temporally
- Mild toe blanching at 4 o'clock, trace limbal congestion inferiorly

OS lens fit:

- Central vault: 400um
- Limbal vault: 250um inferiorly, 25um superiorly, 25um nasally, 50um temporally
- Trace limbal congestion inferiorly

After three months of scleral lens wear, there continues to be no sign of new NV growth.

Conclusion

Not all corneal NV is due to hypoxia, but can be inflammatory in nature. Poor fitting or old CLs can induce complications that the patient may not feel; therefore, it is important for patients to follow up with their eye care provider regularly. In addition, co-management of patients with a corneal specialist can improve patient outcomes and shorten the fitting process.