Diagnosing Acanthamoeba in Keratoconic Specialty Contact Lens Wearers

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Background:

Acanthamoeba is a ubiquitous protozoan that can result in a rare, vision-threatening microbial keratitis. They are known to thrive in ponds, swimming pools, and hot tubs. It is well documented that soft contact lens (CL) wear is a risk factor for *Acanthamoeba* keratitis; however, there is less literature when patients are scleral lens (SL) and hybrid lens wearers. The following is a case series of *Acanthamoeba* keratitis in keratoconic specialty CL wearers that were diagnosed via in-vivo confocal microscopy (IVCM).

Case #1:

- A 27-year-old Hispanic male keratoconic SL wearer presented for a confocal microscopy due to a non-resolving keratitis OU and new, non-healing epithelial defect OD. The patient had been treated for EKC for the past 6 weeks; however, symptoms and signs had not improved. He discontinued SL wear as soon as red eyes began. He was previously treated with Maxitrol QID OU x 1 week after symptoms began.
- Due to ocular discomfort, the patient stated that he stands in the shower and lets the shower water flow directly into his eyes for 5-10 minutes daily.
- Current medications: prednisolone acetate BID OU, moxifloxacin TID OD only, Valtrex 1gm PO QD, and doxycycline 100mg PO QD

Exam Findings:

- Entering visual acuities: OD_{CC}: 20/200 PH 20/60 OS_{CC}: 20/300 PH 20/125
- Slit lamp:

OD		OS
2+ diffuse bulbar injection	Conjunctiva	1+ diffuse bulbar injection
Nasal and temporal epithelial defect; central ring opacity over cone	Cornea	Diffuse sub-epithelial inflammation with microcystic appearance and perineural infiltrates
Deep and quiet	Anterior chamber	Deep and quiet

- Confocal microscopy

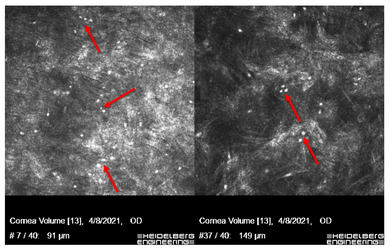


Figure 1: IVCM images revealed *Acanthamoeba* cysts down to 250µm. OD. No *Acanthamoeba* cysts imaged OS, but unable to image past 50µm due to poor patient fixation.

Outcome:

- The patient started 1% dilute iodine QID OU and PHMB 0.06% q1h OU x 48 hours then q1h WA OU. He continued prednisolone acetate 1% QOD OU.
- Five months into treatment, he was utilizing PHMB 0.04% QID OU and started using a SL OS due to the resolution of all infiltrates. His VA_{SC} was 20/40 (PH $20/25^{-2}$) OD and VA_{CCL} is $20/30^{+2}$ OS.

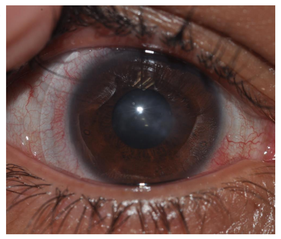


Figure 2: External photograph of patient's right eye (with SL on) 9 months into treatment (January 2022). Patient was told to discontinue all drops and be refit into SL OU. BCVA with SL was $20/25^{-2}$ OD and $20/25^{+2}$. Note the minimal scarring present as a result of the *Acanthamoeba* keratitis.

Case #2:

- A 50-year-old Caucasian male keratoconic SL wearer was referred for IVCM after rinsing his eye with water after fixing an AC leak in attic.
- Symptoms began immediately and the patient indicated a compression ring upon SL removal. He reported the eye was very painful, light sensitive, and red, but that this had occurred before with his SL.
- The patient saw an eye care provider after one month of no improvement in symptoms and was treated for a viral keratitis. The eye improved for one week and worsened again with the appearance of a new epithelial defect.
- Current medications: prednisolone acetate, Muro 128, ofloxacin, and ibuprofen
- Contact lens history:
  - 3-year-old scleral lenses with advice that a refit was recommended. The right lens was significantly scratched, and more appropriate solutions should be used with scleral lens wear.
  - Average wear time: 18 hours (and maybe even longer)
  - Solutions: Equate hydrogen peroxide to clean and uses Sensitive Eyes saline solution or a preservative free artificial tear to fill the SL
  - Changes lens case every 6 months

Exam Findings:

- Entering visual acuities: OD_{SC}: CF @ 1ft OS_{CC}: $20/20^{-2}$
- Slit lamp:

Figure 3: External photography of patient's right eye depicting 3+ bulbar conjunctival injection, diffuse corneal haze with 3+ edema, stromal scarring superior midperiphery, and deep stromal neovascularization at 7 and 8 o'clock and a large stromal neovascular frond at 6 o'clock. No cells were appreciated in the anterior chamber.

- Confocal microscopy

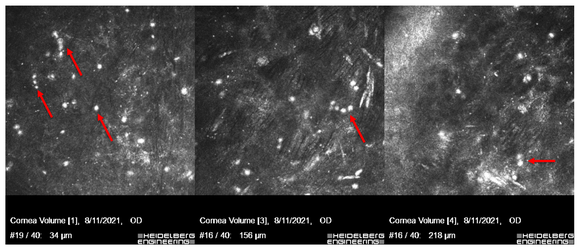


Figure 4: IVCM images revealed *Acanthamoeba* cysts down to 200µm OD. Unable to image past 200µm due to poor patient fixation.

Outcome:

- Unknown. Patient has a history of no shows with previous optometrist and missed follow up appointment with corneal specialist.
- At appointment, patient was educated that he will likely need a corneal transplant OD and that he must be refit into a new SL OS as his current SL is touching the limbus in multiple quadrants. Recommended filling his lens with a SL appropriate solution.

References:

1. Kumar RL, Cruzat A, et al. Current state of in vivo confocal microscopy in management of microbial keratitis. Semin Ophthalmology, 2010 Sep-Nov, Volume 25(5-6), 166-170.

Acknowledgements:
Thank you to Dr. John Gonzales at UCSF Proctor Foundation for his mentorship while learning confocal microscopy imaging and to Dr. Robert Fintelmann for his continued mentorship and support.

Case #3:

- A 30-year-old Hispanic male hybrid CL wearer presented for IVCM due to an unresolving ring infiltrate that has persisted for three months OS and new onset of redness, pain, and light sensitivity OD within the past week.
- Current medications: erythromycin ung q2h OD, ketorolac 0.5% QID OS, ofloxacin 0.3% QID OS, prednisolone acetate 1% BID OU, and Muro 128 5% TID OS
- Contact lens history:
  - Patient was new to hybrid CLs and CLs were 3 months old at the start of the infection; he stopped CL wear immediately when symptoms began.
  - Solution: ClearCare
  - Sometimes slept in CLs because he could not remove them
  - Cleans CL case with tap water

Exam Findings:

- Entering visual acuities: OD_{SC}: HM @ 3ft OS_{SC}: HM @ 3ft
- Slit lamp:

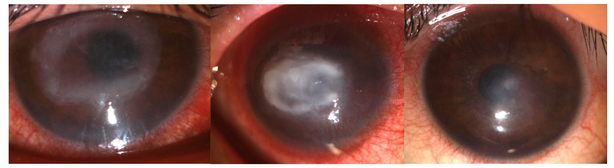
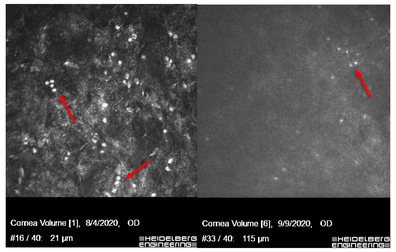


Figure 4: External photography depicting the OD at 1 week *(left)* and 1 month *(middle)* of treatment. Stromal thinning and boggy epithelium were noted along with the ring infiltrate. External photography of the OS (right) depicting the OS at 4 months of treatment (initial visit for IVCM). Note the dense central scarring. Stromal thinning was noted at the slit lamp.

- Confocal microscopy

Figure 5: IVCM images revealed *Acanthamoeba* cysts down to 300µm OD at his first visit *(left)*. IVCM images revealed Acanthamoeba cysts down to 185 µm OD at his second visit *(right)*; however, image reliability was poor due to corneal swelling after 185 µm. Cysts were not imaged OS.



Outcome:

- The patient was started on PHMB q2h OU, then changed to chlorhexidine QID OD and QD OS. In addition, PHMB was started QID OD and QD OS. Prednisolone acetate 1% BID OU was started upon improvement.

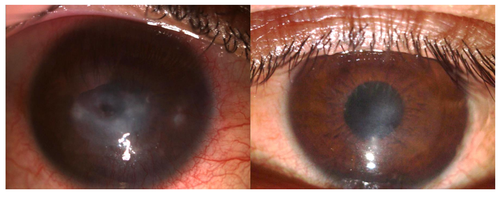


Figure 6: External photography of the OD (left) and OS (right) at his last visit after 3 months and 7 months of treatment, respectively. VA was CF @ 3ft OD and $20/25^{+2}$ OS. IVCM was performed and no cysts were imaged in either eye.

Clinical Pearls and Conclusions:

- Reviewing proper use and care of specialty CLs should be emphasized.
- Patients should be reminded regularly to **not** reuse saline, top off on solution, or expose their CL to water, and to clean their plungers and cases.
- Hydrogen peroxide containing solutions are the only CL solutions effective against all *Acanthamoeba* strains and should be given consideration when a patient's CL hygiene is questionable.
- Keratoconic patients heavily rely on their CLs in order to see and this can easily lead to overuse or misuse of their CLs. Patients who wear specialty CLs are still at risk of *Acanthamoeba* keratitis if lenses are exposed to water.