LID HYGIENE
Going Beyond Blepharitis and MGD Dry Eye

- THE IMPORTANCE OF PREVENTATIVE OCULAR LID HYGIENE
- LID HYGIENE FOR SURGICAL PROCEDURES
- IMPROVE CONTACT LENS TOLERANCE

NovaBay PHARMA
Preventing Contact Lens-Related Microbial Keratitis

Many factors work against contact lens wearers, so a robust strategy is needed to reduce their bioburden.

CHRISTINE W. SINDT, OD, FAAO

We see these cases all the time. A 32-year-old woman has irritated eyes for three days, and then wakes up with red, painful eyes and photophobia. She is a contact lens wearer, and swears that she does not sleep in her contact lenses. Our examination does not show any true ulceration, but there is a lot of staining along the lid margin, so it’s clear that the eyelid areas are the source of the irritation (Figure 1).

Once we start the patient on moxifloxacin (Vigamox, Alcon) and prednisolone (Pred Forte, Allergan), along with lid hygiene, her eyes improve quickly and significantly. This tells us that this is an inflammatory process caused by the toxins from bacteria along her lid margins. After one week, the patient’s red eyes resolve completely. She continues with lid hygiene and we fit her for daily disposable contact lenses.

For the 40.9 million adult contact lens wearers in the United States, occasional flare-ups like this are common. Chronic discomfort is even more prevalent. Contact lens designs, materials, and solutions all contribute to contact lens wearers’ comfort (or discomfort). And I believe that, like the patient in this case, all contact lens wearers need daily lid hygiene to keep their eyes comfortable, healthy, and safe to prevent flare-ups.

**COMMON PROBLEM, COMMON CAUSES**

Contact lens-related microbial keratitis is all too common. Consider these statistics:1

- Contact lens wear is the single greatest risk factor for microbial keratitis, with an annual cost of $175 million.
- There are 40.9 million adult contact lens wearers in the United States — that’s one in six adults.
- Nearly one-third of contact lens wearers have had a red or painful eye at some point that required them to go to the doctor since they began wearing contact lenses.
- A remarkable 99% of contact lens wearers report
having at least one poor hygiene behavior that puts them at greater risk for microbial keratitis or a cornea infiltrative event.

In the decades since we have been prescribing contact lenses, the incidence of microbial keratitis has not improved. That means that all the advances in lens materials and solutions have not reduced the incidence — which indicates that microbial keratitis and other inflammatory events must be caused by something that is naturally introduced into the eye.

Several risk factors increase the incidence of inflammatory events such as microbial keratitis. For example, the incidence of infiltrative events is five times higher among patients with a high bioburden on their eyelids. Patients with previous cornea infiltrative events are seven times more likely to develop an infection, probably because they are colonized with a bacteria that causes infiltrative events. And, the risk for keratitis is more than six times higher for people with bioburden on their contact lenses or lens storage case.

All these risk factors point to the need to control the bioburden on our contact lens patients. In particular, we need to address the bacteria that most commonly cause microbial keratitis events: Pseudomonas, Serratia, and Staphylococcus. Pseudomonas is a gram-negative, biofilm-forming bacterium that adapts to different environments and may acquire solution resistance. It produces toxins and causes inflammatory events. Staphylococcus is gram positive. It exists in normal external ocular microbiota, and we see it commonly in contact lens peripheral ulcers. If patients have an abundance of any of these microorganisms in their lid margins, they are likely to experience microbial keratitis.

**THE ROLE OF BIOFILMS**

To reduce the bioburden on contact lens wearers, we need to understand biofilms. Bacteria produce biofilms, which are matrices that give them a platform for bacteria to live, colonize, grow, and mate. In the planktonic form, bacteria float around a contact lens case, but when they produce biofilms, they form a sessile unit that grows and adheres to other organisms in the case. This biofilm, containing multiple bacteria, proceeds to adhere to the contact lens case and the lenses themselves.

As bacteria reside within the biofilms, they grow increasingly resistant to antibiotics and disinfectants. They can even mutate, changing their genetics to produce a different phenotype that is much more aggressive at forming cornea infiltrative events.

Material properties of contact lenses influence bacterial adhesion. For example, silicon hydrogel binds more easily to Pseudomonas aeruginosa and Staphylococcus Aureus bacteria than to other materials. Bacteria have higher affinity to low-energy hydrophobic surfaces than to high-energy hydrophilic surfaces. They also adhere more easily to rougher surfaces. Some silicone hydrogels are rougher than others, and both silicone hydrogel and HEMA lenses have rough surfaces when they have been working for some time.

Just as we thought that new contact lens materials would drive down our infection rates, we also thought that new solutions would reduce infection. Neither idea has proven to be true.

Which solution works best may depend on the organism. For example, Staphylococci produce catalase, which enzymatically degrades hydrogen peroxide and can build up a natural resistance to some peroxides.
Brush Your Teeth and Clean Your Eyelids

Lid hygiene should be as commonplace and accepted as regularly brushing your teeth. Just as we brush our teeth to control flora in our mouths, we should also clean our eyelids to control flora in our eyes.

Like cavities, lid margin disease is common and largely preventable or controllable. If you stopped brushing your teeth, you’d get bad breath, your gums would become red and sore, and you’d eventually have tooth decay. Similarly, if you don’t clean your eyelids every single day, bacteria will multiply, your eyes will get uncomfortable and red, and your vision may be compromised. Daily hygiene keeps your teeth and eyes clean and white.

I tell my patients that, similar to dental care, they need to care for their lids daily and see me regularly. With regular check-ups that may include imaging, examination, and in-office cleaning, I can see how their eyes are doing and ensure that they have clear, comfortable, healthy vision throughout their lives.

Serratia, however, is only susceptible to peroxide. And certain organisms, especially Pseudomonas, can build up resistance to multi-purpose solutions.4,7

What’s more, care systems influence surface roughness of material, which, in turn, influences biofilm adhesion. Peroxide may induce the fewest surface changes.6,7

Yes, solutions are helpful in decreasing the microbial load on the contact lenses — particularly two-step systems. But, we need to be aware of their imperfections to understand what’s going on in the eyes of contact lens wearers.

THE CONTACT LENS CONTRIBUTION

Biofilms are not the only factor at work to cause microbial keratitis in contact lens wearers. The very practice of contact lens wear increases the risk of cornea infiltrative events.

The presence of a contact lens on the eye suppresses the natural immune system and innate corneal epithelial defense mechanisms, causing reduced turnover of cells on the cornea. This effect on the immune system makes it even more important to protect the eye from bacteria as much as possible.

When we look at the tear fluid underneath the contact lens, we see components that absorb or adsorb to the contact lens surface. During contact lens wear, this posterior tear fluid loses its antimicrobial efficacy very quickly.6 Our tear film, which is naturally antimicrobial, stagnates as it resides under the contact lens and becomes ineffectual.

If there are microbes under the contact lens, the eye is without both the natural antimicrobial properties of tears and the immune strength of the ocular surface. Because of this, it is vitally important to ensure that there are no microbes underneath the contact lens, and we do that by controlling the flora around the eye when the lens is inserted.

APPROACHING LID HYGIENE WITH Avenova

What does this mean to the 32-year-old patient with contact lens-related microbial keratitis?
originating in her eyelids? As we work to control the flora introduced into the contact lens wearer's eye, lid hygiene is a key initiative. *Staph* isolates from eyelids of contact lens wearers are genetically more resistant to disinfection and antibiotics than isolates from people who don't wear contact lenses. The longer a patient wears contact lenses, the more resistant the lenses may become to cleaning and disinfec- ting. This suggests that the long-term use of multipurpose solutions selects for antibiotic-resistant flora."

A new hygiene option, a hypochlorous acid product called Avenova® (NovaBay), does not build up resistance. It uses a patented, pure, non-irritating hypochlorous acid, a substance that occurs naturally in the immune system, to counteract bacteria living on the eyelids.

I recommend all contact lens wearers wipe down their lids with Avenova® before and after contact lens wear. The product is gentle and comfortable and takes just a few minutes to use.

Christine W. Sindt, OD, FAAO, is the Director of the Contact Lens Service and a Clinical Associate Professor at the University of Iowa, Department of Ophthalmology and Visual Sciences. She is also a consultant for NovaBay.

REFERENCES: