



Severe conjunctival injection, corneal neovascularization, corneal edema, and infiltration can be observed. Microbial ulcers such as this one can be the painful result if poor contact lens habits and hygiene persist.

MICROBIAL INFECTIONS IN CONTACT LENS WEARERS



A review of risks serves as a reminder to patients and practitioners.

BY ANITA GULMIRI, OD, FAAO

Most of us recommend contact lenses to our patients without much hesitation. Whether from our years of clinical experience or trust in the significant advances in contact lens technology, we have been convinced, and for good reason, that contact lens wear is generally safe. Inevitably, we've all encountered that patient who dismisses proper contact lens hygiene as a needless formality, who refuses to change their bad habits yet goes on to experience many successful years of contact lens wear without significant ocular complications. We also know this patient, despite what they may think, is the exception, not the rule.

After seeing too many of these patients, we might feel like a

broken record, reiterating the same speech on proper lens care and contact lens hygiene to patients who make little effort to heed our advice. But I am here to tell you that our words of warning are not in vain. In fact, they have the power to make a profound impact and can help save our patients from preventable sight-threatening conditions.

We as eye care providers must not become complacent. We must convey to patients the real risks of contact lens wear and the consequences of developing a severe sight-threatening microbial infection through misuse.

RISK FACTOR REVIEW

Common risk factors associated with contact lens wear (see *Risk*

Factors Associated With Contact Lens Wear) should be etched into our brains, but it's still important to review them periodically, from rarest to most common, so that we don't overlook signs and symptoms in our daily interactions with patients.

As we know, contact lens wear alone is the largest single risk factor for microbial keratitis (Main Figure, above) in the United States.¹ But you may wonder whether the *type* of contact lens you prescribe poses different levels of risk for your patients. In fact, overnight and extended contact lens modalities are at the top of the list as the highest risk factors for microbial infection.² Microbial keratitis is seen less frequently in patients who wear rigid gas permeable contact lenses than in patients who



RISK FACTORS ASSOCIATED WITH CONTACT LENS WEAR^{2-5,9-12}

- Wearing contact lenses overnight
- Showering in contact lenses
- Swimming in contact lenses (eg, fresh water lakes, oceans, pools, etc.)
- Poor contact lens case hygiene, including infrequent contact lens case replacement
- Failure to wash hands with soap and water and completely dry hands before handling contact lenses
- Reusing multipurpose solution and topping off solution
- Failure to use rub-and-rinse multipurpose solutions appropriately
- Using saline instead of multipurpose or other recommended cleaning solutions
- Wearing contact lenses without professional clinical supervision
- Smoking

wear soft contact lenses daily.³

Interestingly, some studies have shown that daily disposable soft contact lens wear may not be associated with lower rates of microbial infection when compared with planned replacement wear soft lenses; however, the incidence of vision-threatening and severe disease is significantly reduced with daily disposable lenses.^{4,5}

MEET THE MICROBES

Microbial infections from contact lens wear can be caused by a number of microorganisms including bacteria, fungi, and protozoa. That being said, bacterial infections are at the top of the list, accounting for 95% of all contact lens–associated infections. When we encounter a bacterial infection, it is most likely to be a Gram-negative

organism, such as *Pseudomonas*, followed by Gram-positive bacteria, such as *Staphylococcus* and *Streptococcus*.⁶

Fungal infections tend to be a rare occurrence for most patients, but they can show up more frequently in hot and humid climates. They can also result from corneal trauma from organic matter (eg, tree branch or gardening injuries). The most common cause of fungal keratitis in the United States is *Fusarium* species, and, the most common worldwide is *Aspergillus*.⁷

Acanthamoeba is a water-borne protozoan and accounts for the vast majority of protozoa-related keratitis. Most patients with this type of infection present with a history of using tap water with their contact lenses or a report of swimming while wearing their lenses, although other etiologies are also possible.

Perhaps the most important factor to remember regarding fungal and protozoan infections in contact lens patients is that these are rare occurrences. And because they are rare, especially in comparison to bacterial infections, eye care providers may have a lower index of suspicion for them. Therefore, diagnosis and appropriate management can often be delayed. When this happens, fungal and protozoan infections can become challenging to manage and treat.

PREVENTION AND TREATMENT

Contact lens–associated infections usually present as a red, painful eye accompanied by reduced visual acuity, light sensitivity, mucous discharge, and eyelid swelling.⁸ Obtaining a thorough history can aid proper diagnosis; in some cases, elements of the history can be the key to unlocking a correct diagnosis.

On slit-lamp examination, the characteristics of the infiltrate can give the clinician subtle indications of the underlying etiology. You may be able to differentiate the slightly yellow color of a bacterial infiltrate from the

AT A GLANCE

- **Overnight and extended contact lens wear are the highest risk factors for microbial infection.**
- **Microbial keratitis is seen less frequently with rigid gas permeable contact lens wear than with daily wear soft contact lenses.**
- **Contact lens-associated infections usually present as a red, painful eye accompanied by reduced visual acuity, light sensitivity, mucous discharge, and eyelid swelling.**



SUMMARY OF FDA RECOMMENDATIONS FOR REDUCING INFECTION RISK¹³

- Replace contact lens case at least every 3 months or as directed by eye care provider. If using hydrogen peroxide solution, use contact lens case that comes with each new box.
- Replace contact lenses as recommended by eye care provider.
- Do not swim while wearing contact lenses.
- Do not reuse contact lens solution. Discard used solution after each use and add fresh solution.
- Do not top off solutions.
- Do not expose contact lenses to water, including ponds, lakes, oceans, homemade saline, etc.
- Do not put lenses in mouth or put saliva on lenses.
- Do not sleep while wearing contact lenses unless otherwise instructed by an eye care provider.

Remove contact lenses and call eye care provider if symptoms of irritation or infection present. These include discomfort, excess tearing or other discharge, unusual sensitivity to light, gritty feeling, unusual redness, blurred vision, swelling, and pain.

whiter color, feathery borders, and satellite lesions common in the stromal infiltrates seen in some cases of fungal keratitis. Other common clinical signs include dense conjunctival injection, corneal epithelial defects, stromal edema, an anterior chamber reaction, and hypopyon.

General management protocols include suspending contact lens use and treating empirically as a bacterial ulcer if the cause of infection is unclear and until culture results return from the lab. Microbial culture is the definitive way of identifying the underlying organism; however, this is usually not necessary for small ulcers. That being said, if the area of insult is central or larger than 2 mm with associated stromal thinning or melting,

or if the lesion is not responding to empiric treatment, it is best to err on the side of caution and order a culture. It is important to maintain daily, close follow-up at onset. Some severe cases may require urgent referral to ophthalmology.⁷

For small bacterial ulcers (<2 mm), a broad-spectrum fourth-generation topical fluoroquinolone, such as besifloxacin ophthalmic suspension 0.6% (Besivance, Bausch + Lomb), gatifloxacin ophthalmic solution 0.5% (Zymaxid, Allergan), or moxifloxacin (various) dosed hourly is recommended for the first 24 to 48 hours. Larger ulcers may require topical broad-spectrum fortified antibiotics such as tobramycin 14 mg/mL, cefazolin 50 mg/mL, or fortified vancomycin

50 mg/mL every 30 minutes for the first 24 to 48 hours. Adjunctive use of a topical steroid should be avoided until a therapeutic response and improvement are noted, usually 48 to 72 hours after initiating topical antibiotics.^{7,8}

For fungal infections, treatment should be initiated with the topical antifungal natamycin (Natacyn, Eyeavance Pharmaceuticals) and compounded amphotericin B alternating every 30 minutes until the defect has decreased in size. Topical steroids are contraindicated for these patients.

Acanthamoeba infections tend to be more difficult to treat. They may require multiple medications, such as antifungals (voriconazole [Vfend, Pfizer] or ketoconazole [various]), cationic antiseptics (polyhexamethylene biguanide or chlorhexidine), diamides (propamidine), and topical broad-spectrum antibiotics (neomycin or paromomycin). A combination of two to three of the above can be effective, although treatment may have to be continued for 2 to 4 months until signs and symptoms have resolved.^{7,8}

EDUCATION AND PREVENTION

Considering the severity of risks associated with contact lens–related microbial infections, it is paramount for us to establish proper patient education protocols centered around the prevention of infection (see *Summary of FDA Recommendations for Reducing Infection Risk*). We cannot and should not underestimate the power of consistent and thorough patient education. During annual examinations, take the time to re-educate patients (yes, for the tenth time, if necessary!) on these important contact lens care and hygiene instructions.

To drive home the point, provide first-time contact lens wearers with a written document summarizing your contact lens care recommendations. I like to use the Health Habits handouts from the Association of



“CONSIDERING THE SEVERITY OF RISKS ASSOCIATED WITH CONTACT LENS-RELATED MICROBIAL INFECTIONS, IT IS PARAMOUNT FOR US TO ESTABLISH PROPER PATIENT EDUCATION PROTOCOLS CENTERED AROUND THE PREVENTION OF INFECTION.”

Optometric Contact Lens Educators (aocle.org/). There are printable PDF documents available for different types of contact lenses. These can serve as good resources and reminders for patients. ■

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- Financial disclosure: None