Acanthamoeba Keratitis

An Important Consideration When Evaluating Ocular Complaints in Contact Lens Wearers

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Over 23 million Americans wear contact lenses, and the percentage of those who use soft or extended-wear contact lenses has gradually increased from the time of their introduction nearly a decade ago. Since that time evidence has mounted that the use of these lenses increases the risk of microbial corneal infection.[1–5] This heightened risk may be the result of increased bacterial adherence to soft lenses as compared with hard lenses.[6]

Additional risk factors include patient compliance problems, the common practice of using unpreserved saline solutions, and the increased degree of difficulty in sterilizing soft lenses.[2,4,5,7,8] The most common organisms cultured in contact lens-related corneal ulcers, from most to least common, are Pseudomonas aeruginosa, Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus pneumoniae, β-hemolytic streptococcus, and Serratia marcescens.[9]

A relatively rare but potentially devastating cause of keratitis is the amoeba. The Acanthamoeba is a genus found in virtually all fresh water and has been isolated in brackish and sea water as well.[9] It exists in nature as a uninucleated, mobile trophozoite or, during unfavorable conditions for the organism, may change to a double-walled cyst that is highly resistant to environmental insult. The amoeba in the trophozoite form may enter the body through contact with ground water; in the cyst form, it may exist in chlorinated pools or hot tubs or may be inhaled in dry environments.[10]

The first reports in the ophthalmic literature concerning the parasite were as a cause of chronic keratitis after minor corneal trauma.[11–13] More recently the organism has been shown to be a cause of acute and chronic stromal keratitis in people who wear contact lenses, particularly soft lenses.[14,15] Those who would appear to be at greatest risk wear soft lenses and have a history of minor corneal trauma and poor lens-cleaning habits.[16] The use of home-made saline solution for storage and cleaning has recently been linked to Acanthamoeba infections.[17]

CASE REPORT

An 18-year-old man with a four-year history of soft contact lens use was referred to the Ophthalmology Clinic at the University of Utah Health Sciences Center with a two-year history of mild, intermittent eye discomfort. Increasing pain in the left eye prompted this referral by his general ophthalmologist. For the first two years of soft contact use, lens care followed a regular, manufacturer-recommended regimen, and the patient reported no significant problems. For the last two years, however, he had prepared his own lens solution from salt tablets and distilled water. During that time the patient reported that his eyes were often sore and inflamed. He also related frequent exposure to dust and grit while tilling the soil on the family farm as being responsible for some minor ocular abrasions.

His initial visit on October 15, 1986, revealed an uncorrected visual acuity of 20/200 in the right eye, and finger counting at three feet in the left eye. He was very light sensitive and in moderate distress, making further visual testing difficult. The right eye showed mild conjunctival injection and was otherwise unremarkable. The left eye showed inflammation around the corneal nerves, with a diffuse area of central edema and dendritiform pattern of irregular epithelium that was otherwise intact. Corneal sensation was decreased in this eye with trace cell and flare. No subepithelial infiltrate was seen. The picture

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of corneal neuritis and dendritiform epithelial pattern was consistent with herpes simplex virus keratitis. The antiviral trifluridine five times per day, originally prescribed by his family ophthalmologist, was continued in the left eye, as the patient reported symptomatic improvement since beginning the treatment five days earlier. For control of anterior segment inflammation, 0.25 percent fluorometholone four times per day and homatropine two times per day were also prescribed. Culturing for herpes simplex virus did not appear indicated, since treatment with trifluridine was already started, and the clinical picture was atypical for Acanthamoeba. He was released to his general ophthalmologist for follow-up care.

The patient was seen again on November 14, 1986, because he had noted no significant improvement in vision or pain. There was conjunctival injection (2+) in the left eye, and he was severely photophobic. The epithelium remained intact with superficial stromal scarring, active white cell infiltrate, and peripheral corneal opacities. Complete corneal cultures were taken for amoeba, fungus, virus, and bacteria. In addition, corneal scrapings for cytologic examination were done, which resulted in a corneal epithelial defect. Trifluridine and fluorometholone were discontinued, and neomycin-polymyxin B-dexamethasone four times per day was started for bacterial coverage until the epithelial defect healed and because neomycin is an effective antiamoebic agent.

Three days later the cultures were reported positive for Acanthamoeba castellani. Treatment with neomycin-polymyxin B-dexamethasone was continued, and topical propamidine therapy four times per day, oral ketoconazole 200 mg four times per day, 1 percent prednisolone acetate four times per day, homatropine four times per day, and 5 percent sodium chloride ointment two times per day were added to the protocol. All other cultures remained negative.

On December 12, 1986, the patient was still photophobic, with only mild conjunctival injection in the left eye. The epithelium of the left cornea appeared intact, with central punctate staining indicating probable epithelial erosions overlying the defect. There was a 20-percent corneal stromal loss in the area of his nasal immune ring, decreased infiltrate around the nerves, and signs of improvement.

On January 13, 1987, the patient presented with severe pain and photophobia of the left eye. Uncorrected visual acuity on the left was finger counting at two feet. Ocular examination revealed a ring of corneal infiltrate and two areas of epithelial defect with 50 percent thinning. New Acanthamoeba cultures were sent to rule out active infection. The cultures were negative at 72 hours, and penetrating keratoplasty was performed three days later because of impending corneal perforation. Histopathology of the excised corneal button showed stromal degeneration as well as cysts typical of Acanthamoeba.

DISCUSSION

Routine laboratory procedures used to evaluate most patients with microbial keratitis may not reveal the typical Acanthamoeba trophozoite or cyst. To further complicate the clinical and laboratory picture, the Acanthamoeba can flourish in a substrate of gram-negative bacilli[16] and be overlooked in a culture positive for Pseudomonas.

It is important to note that calcofluor white, a chemofluorescent dye with an affinity for the polysaccharide polymers of the amoebic cyst, is now being used. The calcofluor white method is currently the most sensitive test available for the diagnosis of amoebic keratitis, making an accurate, early diagnosis more likely. Most laboratories are not equipped to perform this test, however, which should be done under the direction of an ophthalmologist.

Using data from 74 cases of acanthamoebic keratitis, a mean interval of 22 weeks and a range of two to 68 weeks from onset of symptoms to diagnosis have been reported recently.[16] The rarity of the disease, coupled with the difficulty in differentiating it from more common ocular problems, likely leads to delays in diagnosis. The most common misdiagnosis illustrated by this case is herpes simplex keratitis. As with most diseases, the more quickly acanthamoebic keratitis can be diagnosed and an appropriate treatment regimen started, the more favorable is the prognosis.

Corneal transplantation to prevent or treat perforations and to restore vision is required in over 90 percent of these cases. Medical cures at this time are rare. A high index of suspicion coupled with early ophthalmic referral is essential if corneal transplant is to be avoided.

Family physicians should be alert to the possibility of acanthamoebic infection in their workups on patients with seemingly common eye complaints, particularly those who wear soft contact lenses and those with a history of minor ocular trauma. The practice of making one's own saline and the use of intravenous saline solutions have become popular both because of lower cost and because many patients become allergic or sensitive to the preservative in some of the commercially prepared contact lens saline solutions. Since risk factor is significant, patient education for all those who wear soft contacts should reinforce the need for contact lens care and cleaning and discourage the use of homemade cleaning solutions.[17] General advice and instructions to patients who wear contact lenses should include the following:

1. Do not use anything but commercially prepared preserved saline solution in the storage and cleansing of any contact lenses, unless your physician feels you have an allergy to the preservative. (Nonpreserved saline solutions, whether homemade or commercially obtained, must be refrigerated and discarded after one week. Nonpreserved saline solution in aerosol containers is considered sterile.)
2. Do not place lenses in your mouth for any reason.
3. Do not wear contact lenses while swimming or in hot tubs or saunas.
4. Do not handle contact lenses without first washing your hands.
5. Heat disinfection is the only reliable method of killing both forms of the amoeba; therefore, do not use nonpreserved saline (this includes salt tablets) with any contact lens that is not regularly heat disinfected.
6. Extended wear lenses cannot be heat disinfected, which puts the wearer at greater risk; therefore, do not use nonpreserved saline with extended wear polymers.
7. Of the soft lenses available, a daily wear soft lens used on a daily wear basis coupled with proper lens hygiene is safer than the extended wear lens.

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