Acanthamoeba keratitis - A Growing Menace for Contact Lens Users
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The name *Acanthamoeba* comes from the Greek 'acantho' which means curled referring to the spear shaped pseudopodia of the trophozoite. Infection of humans with free-living amoebae is uncommon. CNS invasion by *Naegleria*, *Acanthamoeba*, and amoebae of the order *Leptomyxida* has been reported in fewer than 200 people worldwide, while *Acanthamoeba* keratitis has been diagnosed in more than 200 patients. Infections of humans with free living amoebas are an infrequent but often life threatening occurrence in both normal and immunocompromised individuals (1). Free living amoebae belonging to the genus *Acanthamoeba* have been found world wide in soil, dust, air and water and are relatively resistant to normal level of chlorine in tap water (1). Recent interest in *Acanthamoeba* spp. have focussed on their causative role in a painful, vision threatening keratitis that occurs mainly in contact lens users (2,3). Disseminated *Acanthamoeba* infection is increasingly described in immunocompromised host, but amoeba keratitis is usually seen in the healthy individuals. Martinez et al has till date reported a total of 1350 cases worldwide (4). Of the first 100 cases of *Acanthamoeba* keratitis reported to the Centre for Disease Control and Prevention, 83% occurred in people who were contact lens wearers and corneal infection was associated with the use of homemade saline to clean the lenses and wearing the lens while swimming (5). In non contact lens wearers, it is generally accepted that eye infection ensues subsequent to minor corneal trauma with introduction of amoebae from environmental sources (6). Because diagnosis is difficult and often delayed, infection with *Acanthamoeba* may result in total loss of sight in the infected eye. However, if infection is recognised early wide epithelial debridement may be curative, if epithelium alone is involved (7). However; a number of therapeutic agents are not effective in the later stages when amoebae invade tissue beneath the cornea (8).

At this moment there are more than 35 species known (based on cyst morphology, immunofluorescence and on isoenzyme structure), among which possible causative agents for *Acanthamoeba Keratitis* include: *A.castellani*, *A. polyphaga*, *A. hatchetii*, *A. culbertsoni*, *A.rhysodes* and *A. griffin* (1).

From a historical perspective *Acanthamoeba Keratitis* has been described as a recent epidemic. It was extremely rare before the widespread use of contact lenses. The first case of *Acanthamoeba Keratitis*, that involved *Acanthamoeba polyphaga*, was reported in 1974 when a Texas rancher splashed tap water from a contaminated river source into his eye. Very little is known about incidence of *Acanthamoeba Keratitis* before 1970s. The number of cases started to increase dramatically beginning in 1984, and by 1985, an association with the use of contact lenses was established.

Reports of Acanthamoeba keratitis are rare in Indian literature. Inadequate facilities for microbiological investigations in ophthalmic institutions probably are responsible for this lacuna. Suppurative keratitis due to *Acanthamoeba* spp is commonly associated with contact lens use and as a result of poor lens hygiene.
However, increasingly these ulcers are being reported in developing countries who have no history of contact lens wear. Acanthamoeba keratitis should be considered in the differential diagnosis of any chronically progressive ulcerative keratitis and in progressively worsening corneal ulcer that are non-responsive to usual antimicrobial therapy (10). It is also important to consider the possibility of a coexisting bacterial and Acanthamoeba infection. Osugi et al reported a case of initially MRSA positive Acanthamoeba keratitis from Japan (11). Recent findings in the University of Bath demonstrates that MRSA can infect and replicate inside of Acanthamoeba and these pathogens are more resistant to antibiotics and more virulent (12).

**Risk factors for infection in contact lens wearers are** (5)
- Use of tap water during lens care (to rinse lenses or the storage case).
- Wearing lenses while swimming (without goggles), showering or in hot tubs.
- Use of ineffective lens care solutions.
- Failure to follow lens care instructions.

Many contact lens users ignore the advice of their contact lens practitioner and lens care instructions and rinse their lenses or storage case in tap water, which may introduce *Acanthamoeba* to the storage case. Once inside the case, *Acanthamoeba* can survive and grow, feeding on bacteria that may also contaminate the case. Organisms are then transferred from the case to the cornea on the contact lens. The lens holds the organisms in place on the eye, which may ultimately lead to infection.

**Contact Lens Users should look for the following signs** (9)
- sensation of having something in the eye, watery eyes
- blurred vision,
- sensitivity to light,
- swelling of the upper eyelid and
- Extreme pain.

**Guidelines for the prevention of Acanthamoeba keratitis are** (9)
- Always use the lens care system prescribed to you by your contact lens practitioner
- Wash and thoroughly dry your hands prior to applying, removing and cleaning your contact lenses
- Dispose of the disinfecting solution when lenses are removed for wear
- Air-dry the storage case and keep dry when lenses are being worn
- Fill the storage case with fresh disinfecting solution when lenses are stored after use
- Never use tap water to store or wash lenses or cases – only sterile solutions should be used
- Replace your lens storage case monthly to prevent a build-up of contamination
- Remove lenses prior to showering, swimming, water sports, hot tub use etc
- If lenses must be worn when swimming, wear goggles for protection.

Fig 1: Acanthamoeba Keratitis showing central corneal ulcer with stromal infiltrate.

Fig 2: Trophozoites of *Acanthamoeba* spp. from culture. Notice the slender, spine-like acanthapodia

Fig 3: Cysts of *Acanthamoeba* sp. in tissue, stained with H&E.
Ocular medications effective against Acanthamoeba in vivo include the following (8,9)

- Biguanides
- Polyhexamethylene biguanide
- Chlorhexidine biguanide (0.02% and 0.1%)
- Benzamidines
- Propamidine isethionate (0.1%)
- Pentamidine isethionate (0.05% to 0.1%)
- Hexamidine diisethionate (0.1%)
- Imidazole solutions: Miconazole (1%); Clotrimazole (1%)

Conclusions:

Acanthamoeba keratitis has been described as a recent epidemic with soft contact lens wear as greatest risk factor. With most of the literature focusing on contact lens related Acanthamoeba keratitis, ophthalmologists may hesitate to diagnose this entity in patients without contact lenses, which may eventually lead to significantly delay in diagnosis and hence poor visual outcome in such patients. Hence a high index of suspicion is needed for this disease entity. Patients with therapy resistant keratitis, even non-contact lens wearers should be examined for the presence of Acanthamoeba by means of specific cultures, histopathological staining and if necessary-corneal biopsy, and appropriate therapy should be instituted at the earliest to prevent the progression of the disease process and prevent visual loss.

References:


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