

### **Kajian Kes/Case Study**

## **Cases of Contact Lens Related *Acanthamoeba* Keratitis**

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#### **ABSTRAK**

*Keratitis Acanthamoeba* adalah penyakit mata yang berpotensi menyebabkan kebutaan dan sering disalah diagnos serta sukar dirawat. Sekiranya tidak didiagnos awal, ia akan membawa kesan yang buruk terhadap penglihatan. Keratitis *Acanthamoeba* mungkin dikaitkan dengan kecederaan mata yang lepas, tetapi pada kebanyakan kes di negara maju ia adalah berkaitan dengan penggunaan kanta sentuh. Kami laporkan dua kes keratitis *Acanthamoeba* yang berkaitan penggunaan kanta sentuh yang telah disalah diagnos pada peringkat awal. Sejarah pesakit, penemuan klinikal dan rawatan yang diberi adalah dibincangkan secara ringkas. Adalah diharapkan bahawa pengajaran yang kita dapati daripada kes-kes ini terutamanya berkaitan penggunaan kanta sentuh secara tidak higienik dapat dimanfaatkan untuk pencegahan penyakit berkaitan.

*Kata kunci: Keratitis Acanthamoeba, kanta sentuh, penyakit mata*

#### **ABSTRACT**

*Acanthamoeba keratitis* is a potentially blinding ocular disease that is often misdiagnosed and remains difficult to treat. If not diagnosed early, it can be devastating to vision. *Acanthamoeba keratitis* may be associated with previous ocular trauma but the majority of cases in the developed world are associated to contact lens wear. We present two cases of contact lens related *Acanthamoeba keratitis* whose diagnosis were missed at initial presentation. The history, clinical findings and treatment instituted are briefly discussed here. In the light of prevention of the disease, lessons learnt from these cases especially on the role of poor hygienic practice during of contact lens wear in precipitating the disease, are highlighted.

*Key words : Acanthamoeba keratitis, contact lenses, ocular disease*

## INTRODUCTION

*Acanthamoebae* are ubiquitous free-living amoebae and are responsible for an uncommon yet increasingly diagnosed keratitis in human. They exist principally in an active trophozoite form that feeds on bacteria and other microorganisms. When challenged by unfavourable conditions, the amoebae are able to transform into a highly resilient cyst form, from which the trophozoite may emerge when conditions are again favourable. This survival strategy has earned these species the rank of the most common free-living amoebae in soil and fresh water.

*Acanthamoebae* have also been isolated from a variety of habitats including domestic water supply, bottled mineral water, swimming pools, aquaria, air conditioning units, sewage and dust in air (De Jonckheere 1991). In human they have been found in the nose and throat of patients with respiratory illness as well as in healthy persons (De Jonckheere 1987). More recently, they have been isolated from contact lens-care solutions (Govinda 1989), leading to the sudden upsurge of *Acanthamoeba* keratitis in individuals wearing contact lenses. Although we normally are oblivious to its ubiquitous presence, the association of contact lens wear with the devastating effects *Acanthamoeba* keratitis clearly warrants our attention and caution.

What makes such a relatively rare condition of such great interest is the devastating nature of the disease and its legendary resistance to treatment (Seal et al. 1994; Dart 1995; Seal 1994; Auran et al. 1987; Radford et al. 1995). Substantial pain and sight-threatening corneal changes characterise *Acanthamoeba* keratitis. Although treatments have evolved over the past several years, lengthy course of treatment, recalcitrant pain and threat of permanent and severe visual loss are still common features in many cases.

Two cases of contact lens related *Acanthamoeba* keratitis had previously been reported in Malaysia (Mohamed Kamel & Norazah 1995; Mohamed Kamel et al. 2000); they will be briefly described and the lessons learnt are discussed thereon.

## CASE REPORTS

### FIRST CASE

A 40 year lady who had been using contact lenses for 15 years experienced irritation of her right eye for 24 days prior to admission to the Kuala Lumpur Hospital. Prior to admission, she was treated by her company's doctor as a case of herpes simplex keratitis. She admitted that she seldom disinfected her contact lenses on a regular basis. She had no other medical illness. She

was given Zovirax<sup>®</sup> but her condition worsened. On admission, she was found to have a right corneal ulcer measuring 7 mm by 6.5 mm and the cornea had reduced sensation. Corneal scrapping samples sent for culture, grew *Pseudomonas* sp. and *Escherichia coli* and she was treated with gutt Gentamycin and Homatropine but the condition worsened. Repeat corneal scrappings showed numerous *Acanthamoeba* trophozoites on direct light microscopy examination and culture. Unfortunately gutt Brolene<sup>®</sup> was not immediately available in Malaysia and as immediate treatment was essential, the patient was granted, at her own risk, discharge for treatment abroad.

#### SECOND CASE

A 19 year old lady who had been using contact lenses for more than one year experienced pain and redness of the left eye for one day prior to admission. She also experienced photophobia but no history of blurring of vision at that time. She had no other medical illness. She was first seen by general practitioner who subsequently referred her to the ophthalmologist as a case of fungal infection of the eye. She claimed that she had cleaned her lenses regularly but she had occasionally used domestic tap water to rinse them. On admission she was found to have a well circumscribed radiating left corneal ulcer measuring 4.5 mm by 5.0 mm. *Acanthamoeba* keratitis was suspected and her corneal scrapping samples showed the presence of numerous cysts and trophozoites by direct microscopy. Culture of the scrappings also grew *Pseudomonas aeruginosa* and the patient was immediately put on gutt Brolene<sup>®</sup>, Atropine, Gentamycin and gutt Chlorhexidine 0.02% was added once available. The patient experienced rapid relieve of the symptoms and the ulcer healed completely after about 6 weeks of treatment. Water samples taken from her home proved to be culture positive for *Acanthamoeba*.

#### DISCUSSION

Contact lens wear is gaining popularity worldwide (Seal et al. 1995) especially among women. Contact lenses are worn by 5% of the Malaysian population (Anne 2001). They offer great visual and cosmetic benefits. They also offer good visual correction for sports person, patients with keratoconus and high refractive errors and anisometropes. Cosmetically contact lenses can be used to cover a disfigurement in order to restore the normal appearance of the eye. Cosmetic colour contact lenses offer the change in the colour of the eyes to keep up with the ever changing fashion trends. However, their improper usage is not without any risk, as whenever contact lenses are worn, this represents a significant single risk factor for

*Acanthamoeba* keratitis (Seal et al. 1995; Moore et al. 1987; Seal et al. 1994; Stehr-Green et al. 1989). *Acanthamoeba* is easily transferred into the material of soft lenses where it can live in close proximity to the eye whereby it can then cause infections.

Both of the cases described here, involved female contact lens wearers who were otherwise healthy. In the first case, the patient did not pay much attention to the care of her contact lenses as she seldom disinfected them on a regular basis. The patient in the second case cleaned her lenses regularly but she had used domestic tap water to rinse them. A majority of individuals who acquire *Acanthamoeba* keratitis are contact lens wearers (Seal et al. 1995; Moore et al. 1987; Seal et al. 1994). The primary source of *Acanthamoeba* infection of the cornea in contact lens wearers is domestic tap water (Seal et al. 1995, Seal 1994; Schaumberg et al. 1998; Bacon et al. 1993; Harf 1991; Kirkness et al. 1994; Radford et al. 1995) and potable water derived from the workplace that is used to clean or rinse the storage case. This is not to discount completely the fact that *Acanthamoeba* can also be found in dust and dirt around wash basins and in hot tubs and swimming pools, the latter even in the presence of chlorine (Seal et al. 1994).

There are two major problems that appear to be of considerable importance in the acquisition of contact lens associated *Acanthamoeba* keratitis. First is inappropriate disinfection practice (Seal et al. 1994; Schaumberg et al. 1998; Kirkness et al. 1994). A number of disinfection solutions are completely ineffective against *Acanthamoeba*, especially in its cystic form (Seal & Hay 1992). Cysts are resistant to commercially-available chlorine-generating systems used in contact lens disinfection practice. There are very few products of disinfecting solutions in the Malaysian market currently that claim their efficacy against *Acanthamoeba*. One of them is Opti-Free<sup>®</sup> Express<sup>®</sup> which is a multi-purpose disinfecting solution with Aldox<sup>®</sup> antimicrobial. Buck et al. 1998 reported the amoebicidal activity of this product against both trophozoite and cyst of *Acanthamoeba* spp. Probably contact lens wearers should consider using this product. Under no circumstances whatsoever should tap water or any other non-sterile aqueous material containing tap water come into contact with the lenses (Seal et al. 1995; Seal et al. 1994; Schaumberg et al. 1998, Kirkness et al. 1994).

Secondly, many users of contact lenses admit to washing their lenses and/or storage cases in non-sterile water from domestic tap, as what had happened in the second case presented. Water samples taken from her home proved to be culture positive for *Acanthamoeba*. This usually, but not invariably, occurs with the cold-water supply of the bathroom. Once in the storage case, the *Acanthamoeba* trophozoite may find a very favourable environment for its survival and replication. The solution in which it is

located is generally stored at temperatures which greatly suits its growth. Gram negative bacteria, yeasts, algae and other organisms will provide it with a ready source of nutrition. Mechanical transfer of the *Acanthamoeba* to the eye can then occur since it can adhere to the contact lens polymers. If local conditions permit, the amoebae are capable of invading the cornea to produce a devastating keratitis.

We have seen the difficulty in arriving at the right diagnosis even though the patient presented early. Very often in most cases, the patients are seen first by the general practitioner or family physician who might not be aware of such infections. The patients might be wrongly treated for other types; the treatment which might not be effective for *Acanthamoeba* as it is very resistant to many common antimicrobials such as antibacterials, antifungals and antivirals. Such patients would only be referred to the ophthalmologist at a later date, when their condition had deteriorated. *Acanthamoeba* keratitis if not diagnosed early, can be devastating. If *Acanthamoeba* has not been identified as the cause of this ocular disease, the infection will progress remorselessly (Seal et al. 1994; Kirkness et al. 1994).

The onset of corneal infection by *Acanthamoeba* occurs in various ways and with varying intensity. Basically, in almost every instance, trauma (Auran et al. 1987; Schaumberg et al. 1998; Sharma et al. 1990; Munro et al. 1995) and contaminated water, appear to be incriminated. Contact lens associated abrasion of the cornea facilitates invasion of the protozoan into the underlying tissue leading to corneal ulceration, thus increasing corneal infiltration and clouding. Iritis and often scleritis with severe pain, hypopyon, and marked loss of vision will ensue. When the condition occurs in contact lens wearers, the symptomatology usually begins more subtly but progresses just as inexorably (Kirkness et al. 1994).

When no obvious trauma has occurred, the early corneal findings may be nonspecific or may suggest (and be treated as) herpes simplex infection, as seen in the first case. In some patients the condition waxes and wanes and may apparently clear completely, only to reappear suddenly as a rapidly progressing corneal abscess characterised by a unique ring-shaped morphology of definite diagnostic importance (Kirkness et al. 1994). This finding should alert ophthalmologists to the possibility of an amoebic infection. Such suspicion leads to simple, readily available diagnostic microbiologic studies that usually will confirm the diagnosis.

Failure to arrive at the correct diagnosis was clearly evident as in the first case, resulting in the patient being seen late by the ophthalmologist. Early intervention even with a regimen comprising chlorhexidine and propamidine isethionate is essential (Mohamed Kamel et al. 2000; Seal et al. 1994). Treatment commence at later stages in the disease process will usually require corneal grafting on one or more occasions. This may be due to cystic forms of *Acanthamoeba* being retained within the

remaining host corneal tissue undergoing excystation with migration into the graft, thus inducing recrudescence of the ocular disease (Seal et al. 1994).

The second case was referred early by the general practitioner to the ophthalmologist and the right diagnosis was made. This was probably due to the increasing awareness brought about by the report of the first case in the country (Mohamed Kamel & Norazah 1995). Because treatment had started early in the second case, recovery was rapid and progressive, and the ulcer healed. It was unfortunate that in the first case the drug propamidine isethionate (Brolene®) was not available in the country at the time. The combination of chlorhexidine and propamidine isethionate have proven efficacious for the treatment of *Acanthamoeba* keratitis (Mohamed Kamel et al. 2000; Seal and Hay 1996).

## RECOMMENDATIONS

In summary, contact lenses are safe if fitted properly by qualified practitioners especially optometrists who will in turn prescribe a proper care regimen. Patients must be educated regarding proper disinfection and use of other cleaning products. Even if you have used your solutions for years, take a few moments to read the instructions and make sure that you are using all the components of the system and are not skipping any of the recommended steps. The most important step is to physically clean the lens by rubbing it in the palm of your hand with your finger before the disinfecting step. You can either use a separate cleaner or, in the case of the modern 'all in one' system, the disinfecting solution alone. Rubbing removes debris from the lens surface and allows the disinfecting solution to reach and penetrate the lens material. Without rubbing, a 'Bio-Film' of debris will build up on the lens which will eventually become too thick for the disinfecting agent (even peroxide) to penetrate (Seal & Hay 1992). Such a film is an ideal breeding ground for bacteria.

Another important point is to make sure that you know the shelf-life of your solutions after they have been opened. All solutions are manufactured under sterile conditions and remain sterile until the seal is broken. Once they are opened the solutions become prone to contamination. The manufacturer will have printed on the bottle, or the accompanying leaflet, a time limit after which any remaining solution should be discarded. In addition, the importance of a clean contact lens case must also be stressed to the patient. The lens case should be cleaned regularly to prevent the build up of micro-protein material, which serves as a good culture medium for microbial growth. It is important to thoroughly rinse the case out and allow it to air dry after use. Never use water straight from the tap to rinse your

case. You should always use either sterile saline solution or freshly boiled tap water which has been allowed to cool. Your storage case should also be replaced at regular intervals. Many contact lens solutions now come with a free case each time you buy a pack. Always throw your old case away and use the new one to ensure maximum hygiene.

As a contact lens gets older there is more opportunity for contaminants to build up on the surface, even with good cleaning techniques. For this reason most optometrists now recommend that patients with soft contact lenses join a frequent replacement programme. These are based on disposable contact lenses which you discard at 14 day or 1 month intervals depending on the speed at which deposits build up on the lenses. Your optometrists will help you to decide on the best programme for your eyes. Condoning short cuts and misinforming patients on approved procedures places patients at risk of tragic complications and places practitioners at risk of litigation.

We hope that this paper helps increase awareness among contact lens wearers, optometrists and doctors about the need for increased clinical recognition of the signs and risk factors for *Acanthamoeba* keratitis in patients wearing contact lenses, as early diagnosis and prompt treatment are associated with improved clinical outcome.

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