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Acanthamoeba Keratitis Leading to Loss of Sight: A Case Study

Dr. Mohamed Abdelmajeed M. Imam[1], Prof. E. S. Mahgoub[2]

[1]Resident, Department of Medicine, College of Medicine, Africa International University, Khartoum, Sudan
[2]Professor, Department of Microbiology and Medical Parasitology, College of Medicine, University of Khartoum, Sudan

Corresponding Author: Dr Mohamed Abdelmajeed M. Imam

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ABSTRACT

Acanthamoeba is a pathogenic free-living amoeba which is ubiquitously dispersed in the environment such as soil, water, and air. It is a recognized cause of keratitis in man, and can lead to loss of sight of the affected eye in 15% of cases, if undiagnosed and untreated. The typical risk factors for *Acanthamoeba* keratitis (AK) are minor eye trauma, contact lens wearing, agriculture work, and swimming in unchlorinated pools. The early clinical features of AK usually include unilateral ocular pain and/or redness, impaired sight, and photophobia. In this communication we describe a case of AK which resulted in loss of sight in an adult male farmer.

Keywords: *Acanthamoeba*, keratitis, sight loss

INTRODUCTION

Acanthamoeba is a pathogenic free-living protozoan which may be found in a wide range of environments which include farm soil, building construction soil, tap water, bottled water, air-conditioning units, unchlorinated swimming pools, sea water, hospital water systems, and air containing suspended soil particles (1). It exists in two forms: as an invasive active trophozoite stage and as a latent cyst stage. Under unfavourable survival conditions, the parasite converts from active trophozoite to a dormant cyst form. *Acanthamoeba* is well recognized as a human pathogen that can cause unilateral painful keratitis leading to loss of sight in up to 15% of undiagnosed and untreated cases (1). When abrasion of the human cornea occurs secondary to trauma, the mannose-containing glycoproteins are exposed and the parasite adheres with high affinity. The trophozoites, subsequently, penetrate and destroy the corneal epithelium. Next, the trophozoites perforate the Bowman membrane, and enter the underlying eye stroma. The earliest evidence of *Acanthamoeb*a infection is diffuse irregular oedema that may lead to dendritiform ulceration of the cornea. It is also known to cause granulomatous encephalitis and cutaneous infection in immuno-compromised patients such as those suffering from HIV/AIDS (2). The main risk factors related to *Acanthamoeba* keratitis (AK) are minor eye trauma, working in farms, and contact lens wearing. Initially, patients complain of severe eye pain, photophobia, and a unilateral red eye (3).

The diagnosis of AK is usually a clinical dilemma due to reduced awareness of this uncommon disease among clinicians. *Acanthamoeba* infection can be confirmed in the laboratory using light microscopy,

confocal microscopy, serology, culture, or molecular biology techniques. However, the initial laboratory methods are light microscopy examination of wet mounts of a corneal swab/scraping followed by culture of the same type of specimens in non-nutrient agar seeded with *Escherichia coli* bacteria (4). Loss of sight in the affected eye is commonly due to significant diagnostic delay because patients are treated initially as viral, bacterial, or fungal keratitis. The first cases of AK were reported from the United Kingdom (5). In this report we describe a blinding AK from Sudan.

CASE STUDY

A 45-year-old male farmer experienced a foreign body (dust particle) in his right eye. He was referred to our Khartoum University Clinic. Four weeks prior to presentation he started to complain of right eye pain, redness, and impaired vision. During that period, he was seen at many out-patient health facilities and was give several antibiotics as well as antiviral and antifungal agents. He presented to us with increasing unbearable eye pain, intense hyperaemia, and total loss of sight (Figure 1).

Figure 1: Right eye showing scarred cornea due to *Acanthamoeba* indicating a blind eye. Note intense hyperaemia (compare with left eye)

The patient gave no remarkable medical history and systemic clinical examination revealed no abnormalities. Local examination of the affected right eye showed thickly scarred cornea, intense hyperaemia, and total loss of sight. Light microscopy examination of a corneal swab from the affected eye showed a protozoal trophozoite, strongly suggestive of *Acanthamoeba*. We inoculated the same corneal swab specimen onto a non-nutrient agar seeded with *Escherichia coli* bacteria and was incubated at 30 C. *Acanthamoeba* trophozoites showing typical acantha (spine-like projections from the parasite surface) were easily identified and isolated after overnight incubation (Figure 2). Classification to *Acanthamoeba* Group 2 species level was made on the basis of thermotolerance and osmotolerance of the parasite during growth (8). Oral ketoconazole in a dose of 200 mg twice daily was given for two months. Meticulous eye hygiene was maintained by repeated topical applications of 0.9% saline. The patient was completely relieved of his unbearable eye pain and the hyperaemia disappeared. However, his cornea was already thickly scarred due to chronic AK and the patient remained with his loss of sight. At monthly follow up for 12 months, our patient was free of ocular pain and hyperaemia.

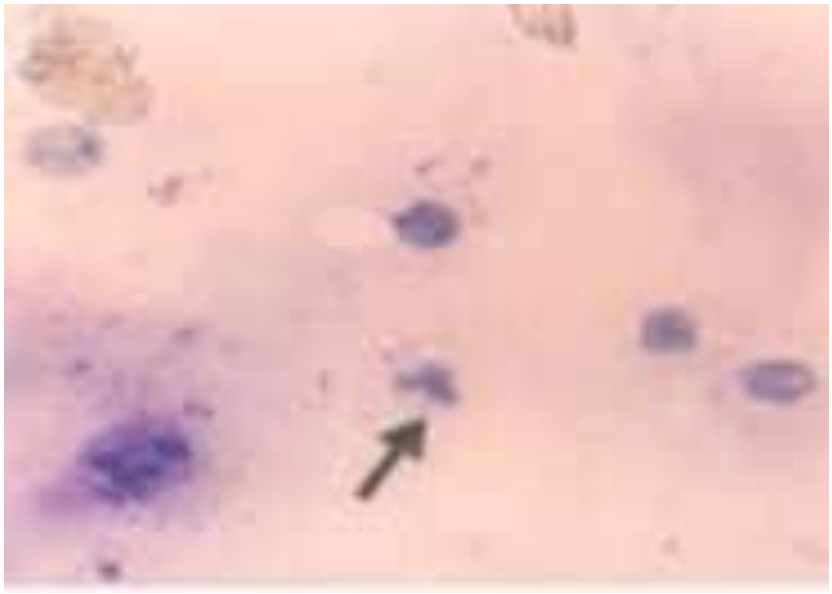

Figure 2: *Acanthamoeba* trophozoite (arrow). Note typical acanthapodia. Giemsa stain (X 400).

DISCUSSION

AK, associated with contact lens wearing was described as an epidemic in a study from the USA (8). In a case series of 11 AK patients from India, all of them were agricultural workers who did not use contact lenses (9). Similarly, a case report of AK from Sweden described an HIV infected female patient who did not use contact lenses (10). Our patient, being a farmer, who had minor eye trauma following foreign body (soil particle) entry, emphasizes the point that risk factors for AK depend on the way the parasite reaches the eye cornea. It can also be inferred that soil related work is important as risk factor for AK in areas where manual agriculture is a common activity.

Loss of sight due to *Acanthamoeba* is a preventable disease. In a population based study on causes of blindness in Sudan (11), *Acanthamoeba* was not reported, probably because it was not suspected and hence not looked for. Significant diagnostic delay of AK is a major factor that may lead to sight loss in up to 15% of undiagnosed and untreated cases (1). In our case the laboratory culture technique was a feasible confirmatory method for AK.

Laboratory diagnosis using molecular biology methods such as mitochondrial DNA Restriction Fragment Length Polymorphism, has been used for confirmatory purposes in *Acanthamoeba* infection. However, the parasite high degree of heterogeneity is problematic in using that technique (7). Some investigators have used parasite isoenzyme analysis for diagnosis and species differentiation of *Acanthamoeba* (12) These tests do not always give reproducible findings. For example, clear differences in the acid phosphatase and esterase isoenzymes in *Acanthamoeba palestensis* and *Acanthamoeba pustulosa* were found by one researcher, but identical isoenzymes were found by another investigator (13).

CONCLUSION

Patients who present with chronic keratitis not responding to standard therapy against viral, bacterial, or fungal agents should be examined for *Acanthamoeba* infection. Following clinical suspicion of AK, the culture method is a convenient confirmatory test which we recommend to be available in a general hospital laboratory.

Declaration by the Authors

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