

Case Report

Exserohilum rostratum Keratitis in a Patient with Human Immunodeficiency Virus

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Keywords

Exserohilum rostratum · Keratomycosis · Dematiaceous fungus · Human immunodeficiency virus

Abstract

Purpose: To report a case of fungal keratitis infected by *Exserohilum rostratum* in a human immunodeficiency virus (HIV) patient. **Method:** A retrospective study of the HIV patient with keratomycosis caused by *E. rostratum* was reviewed for history, clinical characteristics, risk factors, laboratory findings, treatments, and outcomes. **Results:** A 48-year-old man with HIV infection presented with a history of trauma with an unknown species of insect in the right eye. He also had redness and blurred vision in the right eye. Biomicroscopic examination showed white infiltrate in the right cornea. A feathery edge, satellite lesion, and brownish pigmented deposits in the epithelial surface and anterior stroma were noted. Corneal scraping specimen showed numerous large dematiaceous septate hyphae and polymerase chain reaction (PCR) identified *E. rostratum*. Treatment was started with 5% natamycin eyedrops and oral itraconazole. The corneal lesion responded well to medication and debridement. **Conclusions:** Corneal phaeohyphomycosis caused by *Exserohilum* was noted in an immunocompromised patient with ocular trauma. A brown pig-

mented lesion in an otherwise white infiltrate due to *Exserohilum* was diagnosed with corneal scrapings and polymerase chain reaction. Antifungal medications and debridement were the mainstay of corneal fungal infection treatment.

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Introduction

Filamentous fungi are frequent etiologic agents of fungal keratitis, especially in tropical and subtropical countries. *Aspergillus* and *Fusarium* are the main species responsible for keratomycosis [1–5]. Dematiaceous or pigmented filamentous fungi have increasingly been identified as causative organism of keratomycosis in humans, so-called corneal phaeohyphomycosis [1]. These include three species of the genus *Exserohilum*: *Exserohilum rostratum*, *Exserohilum longirostratum*, and *Exserohilum mcginnisii*, which have been reported as human pathogens [1, 2, 6, 7]. *Exserohilum* sp. is characterized by darkly pigmented colonies capable of rapid growth which can cause systemic, cutaneous, and corneal infection. Immunosuppression status and trauma were frequent underlying conditions identified in previous reports [2, 6, 7]. This report describes the first known case of *E. rostratum* keratitis in an individual with human immunodeficiency virus (HIV) infection presenting after corneal trauma. Clinical features, management, and results of treatment are discussed.

Case Report

A 48-year-old male patient had phthisis bulbi due to congenital blindness in his left eye. The patient's right eye was injured by a foreign body, thought to be an insect, while riding a motorcycle 1 month prior to being seen. He went to a primary hospital and was treated with eye irrigation and 0.5% chloramphenicol topical eye drops for 3 days. However, his symptom was not alleviated. He used dexamethasone and neomycin eye drops purchased from a pharmacy, with no improvement. Therefore, he decided to go to a secondary hospital where he was diagnosed with corneal ulcer. He was treated for viral keratitis with oral acyclovir and 0.5% moxifloxacin eye drops for 2 weeks as an outpatient. After the lesion was not improved, he was admitted and treated with fortified cefazolin and gentamicin eye drops. He was diagnosed with HIV infection for the first time in this hospital. Nevertheless, the clinical condition was worse. Then, he was referred to the ophthalmological department of Chiang Mai University Hospital.

The patient complained of decreased vision, ocular pain, and photophobia in the right eye. Best-corrected visual acuity (BCVA) was 6/36 in the right eye and no light perception in the left eye. A whitish infiltration with a feathery edge, satellite, and a brownish pigmented lesion on epithelial surface and in the anterior stroma of the temporal site of the right cornea were found in his right eye with slit-lamp examination (Fig. 1a). Epithelial defect, corneal thinning, severe conjunctival injection, hypopyon, severe anterior chamber reaction, and decreased corneal sensation were observed. After having been treated as an inpatient, the corneal lesion was scraped for gram staining, potassium hydroxide (KOH) examination, calcofluor-white staining, and culture for bacteria and fungus. The gram staining was not identified. The KOH examination and calcofluor-white staining showed numerous large septate hyphae (Fig. 2a, b). Fasting blood sugar was normal, HIV antibody test was positive, and CD4 was 131.9%.

5% natamycin eye drops were prescribed to his right eye hourly, whereas fortified cefazolin, fortified gentamicin eye drops, and acyclovir were discontinued, 1% atropine and 0.5% levofloxacin eye drops were administered to his right eye 4 times a day with oral itraconazole (100 mg) 2 tablets a day, and vitamin C (500 mg) 1 tablet twice a day. Liver function was closely monitored during the treatment process.

Investigation and management of HIV infection was advised supported by an infectious disease specialist. Opportunistic infection was investigated. Cryptococcal titer antigen serum was positive, but cryptococcal titer antigen CSF was negative. Hepatitis B surface antigen was negative, the venereal disease research laboratory was nonreactive, the treponema pallidum hemagglutination test was negative, and chest X-ray was unremarkable. The infectious disease specialist prescribed itraconazole (100 mg) 2 tablets twice daily for cryptococcal infection prophylaxis and sulfamethoxazole/trimethoprim (400/80 mg) 2 tablets daily for *Pneumocystis carinii* pneumonia prophylaxis.

After 1 week of treatment, the patient's clinical condition did not improve, and the lesion seemed to be unresponsive to 0.5% natamycin. The edge of the infiltrate remained dense, and the overlying epithelial defect and corneal plaque increased in size (Fig. 1b). Therapeutic corneal debridement and subconjunctival injection of fluconazole (0.5 mg) on every other day were performed. All other medications remained unchanged for 5 weeks. The consequence of the previous fungal culture revealed numerous unidentified dematiaceous fungi (Fig. 2c, d). Therefore, corneal scraping was repeated for polymerase chain reaction analysis and identified as *E. rostratum* (asexual state) in 2 weeks after admission.

After 5 weeks of treatment, the lesion was improved and replaced by a corneal scar without an overlying superficial corneal plaque or epithelial defect (Fig. 1c). Antifungal therapy was switched from 5% natamycin to 2% ketoconazole eye drops to the right eye every 2 h for 2 weeks due to the patient's financial problems, with 1% atropine eye drops to the right eye 2 times daily. Other medications remained unchanged including subconjunctival injection of fluconazole (0.5 mg) every other day for 2 weeks.

Two months after admission, the patient was discharged with 2% ketoconazole eye drops to the right eye 4 times per day, 1% atropine eye drops to the right eye 2 times per day, and 0.5% levofloxacin eye drops to the right eye 4 times per day. Four weeks after discharge, the lesion improved, with no recurrence infiltration and no anterior chamber inflammation; however, the lesion was replaced with a corneal scar (Fig. 1d). BCVA improved to 6/12 in the right eye with no light perception in the left eye.

Discussion/Conclusion

Exserohilum species are environmental fungi classified as a dematiaceous or darkly or brownish pigmented fungi that are mainly found in tropical and subtropical countries including India, southeast Asia, and southern USA. They are common in grass and soil [8–11]. They are rarely pathogenic for humans, and only three species, *E. rostratum*, *E. longirostratum*, and *E. mcginnisii*, can cause infection in humans, either immunocompromised or immunocompetent patients [1, 2]. Previous studies have shown that they can cause a broad range of infections, from systemic to topical infections such as subcutaneous infection, sinusitis, endocarditis, meningitis, and corneal infection [2, 4, 12]. Corneal infection caused by *E. rostratum* has rarely been reported, with only 8 cases described before the tragic outbreak from methylprednisolone contamination in 2012 in the United States. Moreover, most of the cases were from India and corneal trauma is the major predisposing factor [12].

Previous studies have shown that corneal trauma was the most common predisposing factor for *E. rostratum* keratomycosis, similar to our case [8, 9, 11]. *E. rostratum* is frequently found in plant material, wood and soil, and can be introduced to the eye in incidental trauma. Our patient was immunocompromised, and the history of topical steroid use during the first few days of treatment enhanced the risk of keratomycosis [10]. Because of the HIV infection that was initially diagnosed at the secondary hospital, the diagnosis during the onset was misled by decreased corneal sensation and corneal epithelial defects, mimicking those of herpes simplex keratitis. However, the corneal lesions progressed to whitish infiltration with a feathery edge, satellite, and a brownish pigmented lesion on the epithelial surface and in anterior stroma, consistent with reports by Peerapur et al. [10] and Joseph et al. [11]. The lesions are distinguishable from other dematiaceous fungal corneal ulcers [10]. Although numerous large septate hyphae could be found by the KOH examination and calcofluor-white staining and fungal culture by Sabouraud dextrose agar showed dark septate hyphae with numerous dematiaceous fungi, a more specific mycologic investigation, such as polymerase chain reaction, was required to confirm the final diagnosis of *E. rostratum* [7, 13].

In this case, the initial specific treatments included topical natamycin, oral itraconazole, and corneal debridement to remove the corneal plaque. Although topical natamycin has been reported for successful treatment of most dematiaceous keratomycosis [6, 10, 11], the lesion did not respond well in the early period. Therefore, subconjunctival fluconazole was added. Consequently, the lesion finally improved and BCVA was regained.

In conclusion, we demonstrated the success of treating *E. rostratum* keratomycosis in an HIV patient with a combination of antifungal medications including topical natamycin, subconjunctival fluconazole injections, and oral itraconazole. The corneal debridement should be considered to remove the corneal plaque. Treatment resulted in resolution of the corneal lesion and improved BCVA, which overall reduced ocular morbidity and blindness.

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Statement of Ethics

This study complied with the tenets of the Declaration of Helsinki. The study protocol was approved by the Research Ethics Committee of the institute on human research. Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Disclosure Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Study concept and design: Winai Chaidaroon, Nutt Phaocharoen. Acquisition, specimen analysis, and interpretation of data: all authors. Drafting of the manuscript: Winai Chaidaroon, Nutt Phaocharoen. Critical revision of the manuscript for important intellectual content: Winai Chaidaroon, Nutt Phaocharoen. Study supervision: Winai Chaidaroon.

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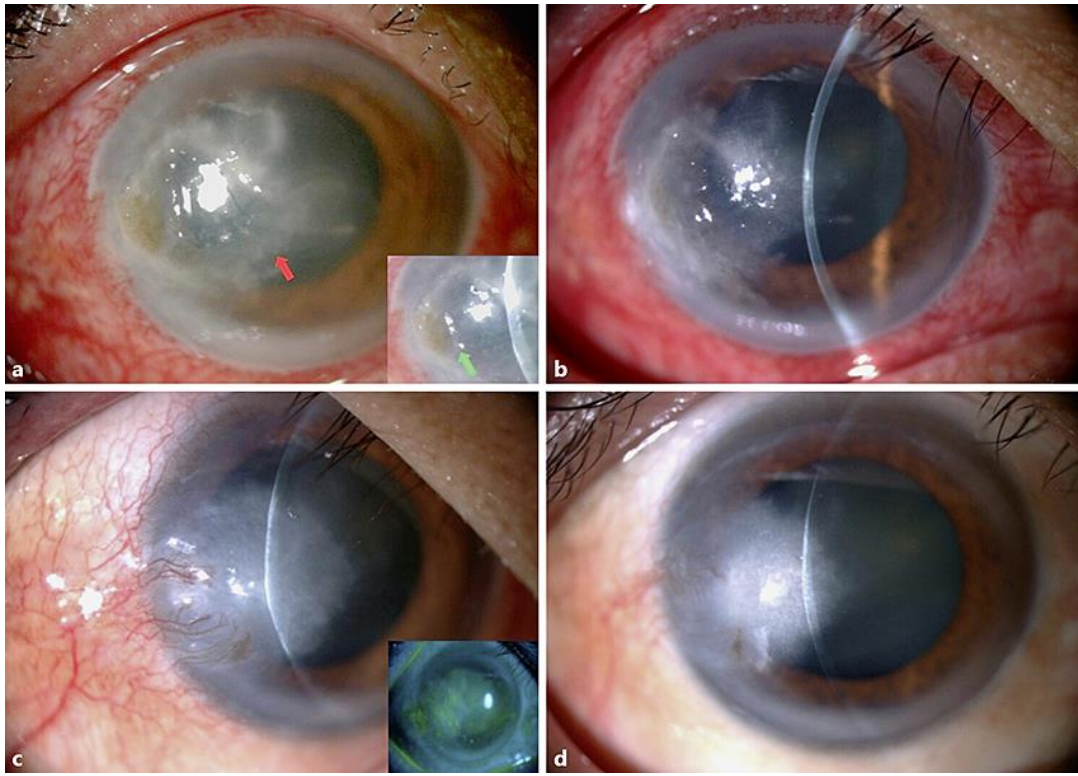


Fig. 1. Photographs of the right eye before and after treatment. **a** At the first visit, a whitish infiltration with a feathery edge, satellite (red arrow), and a brownish pigmented lesion (green arrow) on the epithelial surface and anterior stroma were presented at cornea. **b** One week after medical treatment, dense infiltrates and corneal plaques were found. **c** Five weeks after medical treatment, the lesion was replaced by a corneal scar without an overlying superficial corneal plaque and epithelial defect. **d** The lesion became a corneal scar after 2 months of treatment.

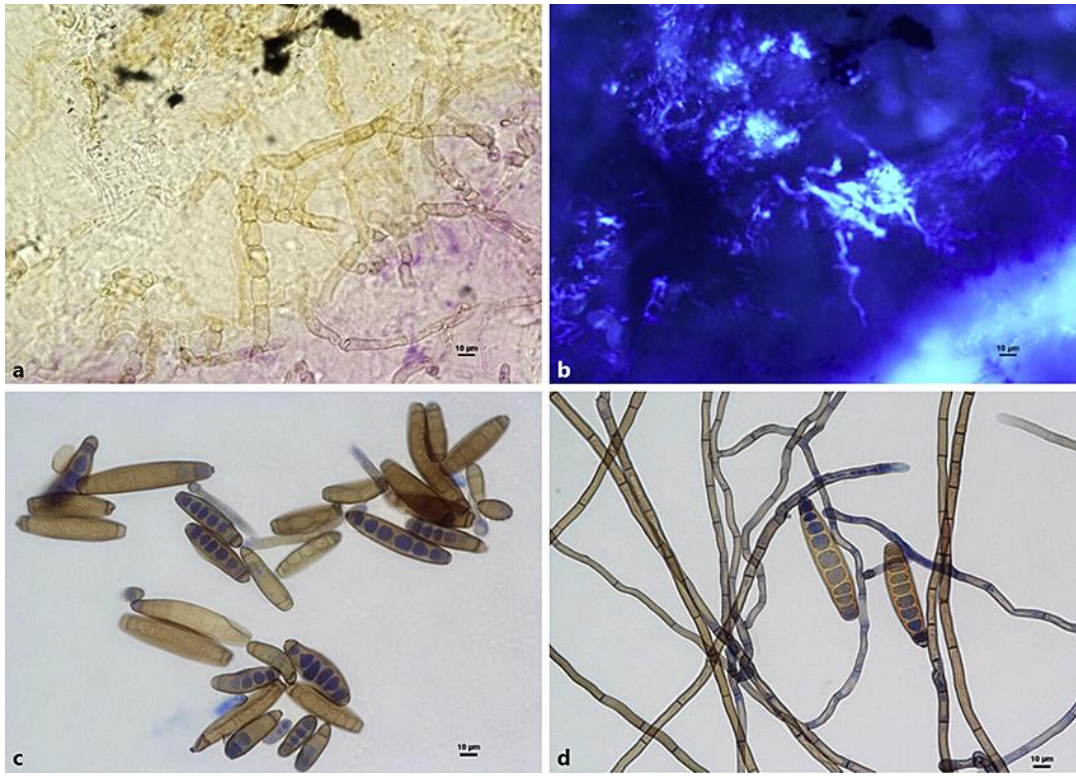


Fig. 2. KOH examination (a) and calcofluor-white staining (b) showed numerous large septate hyphae. c, d Fungal culture revealed numerous dematiaceous fungi of *Exserohilum rostratum* (asexual state).