



A rare case of *Phialemonium obovatum* keratitis



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ABSTRACT

Purpose: We report a rare case of *Phialemonium obovatum* fungal keratitis in a patient sustaining a corneal laceration from impact with a piece of moldy plaster.

Observations: The patient was treated with topical voriconazole with resolution of active keratitis and formation of a stromal scar. The patient's final visual acuity was 20/20 in the affected eye.

Conclusions and importance: There is only one other case of *Phialemonium obovatum* keratitis reported in the literature. The patient in the previous case required amniotic membrane transplantation for persistent stromal melting with resultant visual acuity of hand motions only. The present case demonstrates that the early use of topical antifungal medication with close follow-up can prevent corneal perforation and result in excellent visual acuity.

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1. Introduction

Fungal keratitis is a leading cause of visual impairment worldwide.¹ The causative organism varies greatly by location and risk factors. In regions with a warm, humid climate, filamentous fungi, especially *Fusarium* species followed by *Aspergillus* species, tend to predominate.² Filamentous organisms are also associated with infections following trauma with vegetable-contaminated matter and contact lens wear. Yeast, especially *Candida* species, are more common in temperate regions. Yeast infections typically occur in eyes with ocular surface disease and in patients with chronic systemic or topical immunosuppression.^{3,4}

Rarer causes of fungal keratitis include filamentous fungi such as dematiaceous (pigmented) fungi. A study of infectious keratitis in south India found unidentified dematiaceous fungi as the causative organism in only 5% of fungal keratitis cases.³ *Phialemonium* species are a type of dematiaceous fungi widely distributed in the environment and have been isolated from air, soil, industrial water, and sewage.⁵ The majority of *Phialemonium* infections are invasive, affecting mostly immunocompromised patients and causing cutaneous infections after burn wounds, peritonitis, endocarditis, and osteomyelitis.^{6–8} Three species of *Phialemonium* have been

described on the basis of colony color and spore shape. *Phialemonium obovatum* has greenish colonies and obovate spores, *Phialemonium curvatum* has white colonies and allantoid spores, and *Phialemonium dimorphosporum* has grayish colonies with ellipsoidal spores.⁵ Due to difficulties in growing and identifying these species the true incidence in human infections and the management of such infections are poorly known.

2. Case report

Written consent for publication of the case with associated images was obtained from the patient.

A 61 year old man presented initially to an outside eye hospital after a piece of moldy plaster entered his right eye while he was completing a home improvement project in his bathroom. He was diagnosed with a shelved partial-thickness corneal laceration and an overlying epithelial defect in his right eye. The patient was also found to have a 0.2 mm hypopyon and 3+ white blood cells in the anterior chamber. No intraocular foreign body was noted on gonioscopy, funduscopy, or orbital CT scan. He was started on moxifloxacin hydrochloride 0.5%, every one hour and bacitracin zinc and polymyxin B sulfate ophthalmic ointment, every night before bedtime in the right eye. The patient followed at the outside hospital the next day and, given improvement in the epithelial defect, he was started on prednisolone acetate 1% four times daily and the moxifloxacin was decreased to four times daily. He was subsequently evaluated two days later, when it was noted that the

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epithelial defect had resolved with only a mild endothelial haze and 1+ Descemet's folds in the region. The patient was continued on his current medication regimen.

Three weeks later, the patient presented to the outpatient ophthalmology clinic of the VA Boston Healthcare System, Jamaica Plain Campus for further care. At this time, the patient had a visual acuity of 20/50–1 in the right eye. It was noted that there was a region of epithelial whitening in the right eye concerning for a possible foreign body. The epithelial whitening was removed with a Weck-Cel and a bandage contact lens was placed in the right eye. The patient was continued on moxifloxacin four times daily and the prednisolone acetate 1% was stopped.

The patient returned three days later with stable vision. The slit lamp examination was notable for a stromal infiltrate with feathery margins densest along the superior edge of an overlying epithelial defect measuring 1.4 mm horizontally by 1 mm vertically located paracentrally at three o'clock in the right eye. There was an anterior chamber reaction graded at 2+. Given the appearance of an infiltrate, corneal scrapings were obtained and sent for Gram stain, bacterial culture, and fungal culture. He was started on fortified vancomycin (25 mg/ml) and fortified tobramycin (14 mg/ml) every two hours. For the anterior chamber inflammation, he was additionally started on cyclopentolate hydrochloride 1% three times daily. The patient returned to the clinic two days later. His visual acuity had improved to 20/30 in the right eye, but there continued to be a stromal infiltrate with feathery margins along the inferior edge of the persistent epithelial defect (Figs. 1 and 2). At this time, the cultures were growing a colony of *Staphylococcus* species. However, given feathery appearance of the infiltrate and time since injury, the concern for fungal infection prompted initiation of an antifungal medication. The patient was started on topical voriconazole (10 mg/ml) every two hours in the right eye in addition to the fortified antibiotics. The next day, cultures became positive for a mold. He was evaluated again and found to have expansion of the feathery white infiltrate across the entire persistent epithelial defect. The patient underwent corneal scraping again in order to remove the infiltrate. The patient's voriconazole dose was increased to every one hour in the right eye. Since the bacterial cultures were still only growing coagulase-negative *Staphylococcus*, the fortified vancomycin was decreased to four times daily, moxifloxacin four times daily was re-started, and the fortified tobramycin was stopped. Three days later, his visual acuity was 20/40. He had an improved epithelial defect and only five punctate stromal infiltrates on examination (Fig. 3). The corneal scrapings were still positive for mold and coagulase-negative *Staphylococcus* sensitive to trimethoprim sulfate. The fungus was unable to be speciated and



Fig. 1. Slit lamp photograph of the right eye demonstrating a feathery stromal infiltrate along the inferior margin of the epithelial defect located paracentrally at 3 o'clock. Slit lamp beam illuminating epithelial defect and portion of the infiltrate.

so was sent to an outside laboratory for further testing. The patient was instructed to continue the voriconazole every one hour, continue moxifloxacin four times daily, stop the fortified vancomycin, and start polymyxin B sulfate and trimethoprim sulfate ophthalmic drops four times daily in the right eye.

At the next follow-up (eight days after starting topical antifungal medication), only one punctate stromal infiltrate was noted and the epithelial defect was improving. Due to the persistent punctate stromal infiltrate, confocal imaging was performed and revealed fungal hyphae at 245 μm (Fig. 4). The patient was continued on voriconazole every one hour, polymyxin B sulfate and trimethoprim sulfate ophthalmic drops four times daily and the moxifloxacin was stopped. The patient was seen in multiple follow-up examinations over the next few weeks with stable visual acuity, improving epithelial defect, and resolution of all stromal infiltrates. The patient's voriconazole dose was gradually tapered down to four times daily and the polymyxin B sulfate and trimethoprim sulfate was stopped.

On further follow-up two weeks later, he was noted to have 20/30 vision a stromal opacity consistent with a scar measuring 1.5 mm by 1.2 with no epithelial defect and no punctate stromal infiltrates. Confocal imaging was again obtained that revealed very rare fungal hyphae. The fungal culture returned positive for *Phialemonium obovatum*. The voriconazole was slowly tapered down to three times a day after several months with monitoring for fungal elements on confocal. Sixteen months after initial presentation, confocal microscopy was negative for fungal elements. Over the next three months, he was tapered off of voriconazole. In follow-up off voriconazole, there was a question of rare hyphae on confocal, but clinically he was stable without inflammation or infiltrate and the voriconazole was not restarted. His last examination, 17 months after presentation, 9 months after voriconazole was stopped, his best corrected visual acuity right eye was 20/25 + 2, with a small stromal scar and no sign of recurrent infection.

3. Discussion

Fungal keratitis may occur secondary to trauma, and its incidence is increased by the use of steroids and contact lens wear.² The current patient sustained trauma from a piece of moldy plaster resulting in a partial thickness corneal laceration and significant anterior chamber reaction (0.2 mm hypopyon). The patient was subsequently treated with both steroids and a bandage contact lens. The patient was therefore exposed to multiple risk factors for fungal keratitis.

The patient was treated at initial presentation with moxifloxacin, a topical antibiotic with some activity against fungal infections. A study of the susceptibility of *Aspergillus* and *Fusarium* found that moxifloxacin has modest activity against *Fusarium* species but no effect on *Aspergillus*.⁹ The sensitivity of *Phialemonium* to moxifloxacin has never been evaluated. It is possible, then, that the use of moxifloxacin may have partially treated the patient and delayed appearance of the feathery white infiltrate.

Given the patient's risk factors and eventual appearance of an infiltrate with feathery borders, the patient was started on topical voriconazole prior to receiving the fungal culture results. This early initiation of topical antifungal medications may have contributed to the patient's excellent visual outcome.

Fungal corneal ulcers are frequently more challenging to treat compared to bacterial corneal ulcers given the difficulty recognizing a fungal infection and the depth of fungal hyphae in the corneal stroma. Although the corneal infiltrate of the current patient recurred, multiple corneal debridements and persistent use of voriconazole slowly improved the patient's fungal keratitis over a period of many months. Topical voriconazole was used to treat this

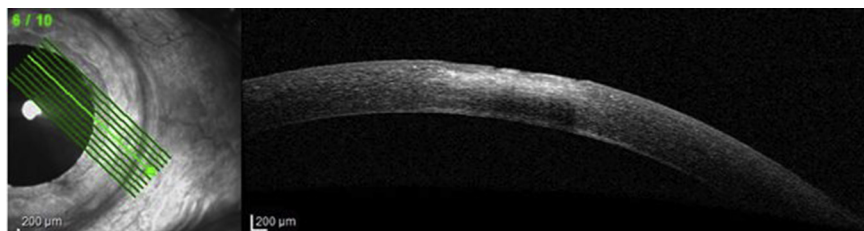


Fig. 2. Anterior segment optical coherence tomography of the right eye showing irregular and missing epithelium over region with underlying stromal hyperintensity suggestive of an infiltrate.

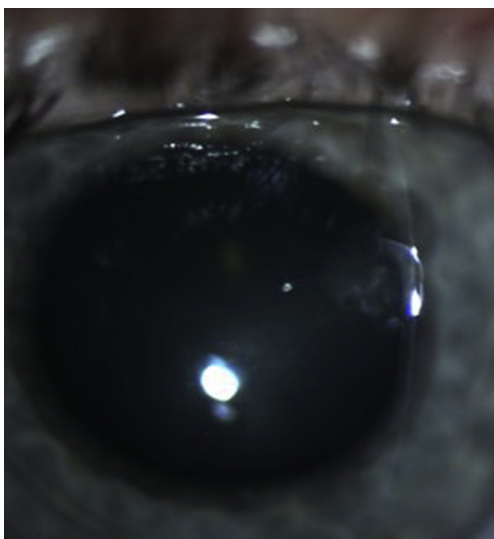


Fig. 3. Slit lamp photograph of the right eye demonstrating five punctate stromal infiltrates and epithelial irregularity highlighted by the slit lamp beam.

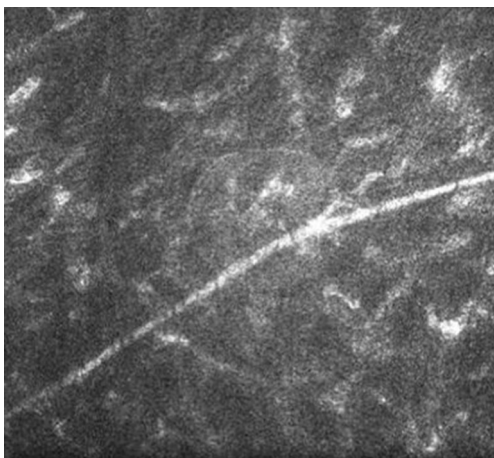


Fig. 4. Confocal microscopy of the right eye with branching hyphae within corneal stroma at the site of the corneal infiltrate at 245 μm.

patient given its availability, concern for a non-*Fusarium* fungal species, and improved corneal penetration. Topical natamycin has been shown to result in better visual acuity outcomes and fewer corneal perforations than topical voriconazole in the treatment of fungal keratitis, but the difference is evident mostly in *Fusarium* cases.¹⁰ Furthermore, topical voriconazole has superior penetration of the cornea for treatment of deep stromal fungal infections compared to natamycin which settles out on the cornea and

degrades easily.¹¹ In the current case, the patient had stromal involvement of the corneal infiltrate and never experienced any significant corneal thinning to raise concern for perforation and thus voriconazole was utilized.

The *Phialemonium* genus is classified into three species, *Phialemonium curvatum*, *Phialemonium dimorphosporum*, and *Phialemonium obovatum* based on spore shape and colony color. In the past twenty-two years, only thirty-seven cases of *Phialemonium* genus-induced infections have been reported in the medical literature and only five of these infections involved the eye.⁵ Four of the five cases were intravitreal infections with a *Phialemonium* species.⁵ One of the five cases is the only previously documented case of *Phialemonium obovatum* fungal keratitis. This case occurred in a 54 year old man in Korea after sustaining a corneal laceration from a nail fragment with damage to the anterior lens capsule and a hyphema. The corneal laceration was closed with suture repair. The patient was found to have an epithelial defect and stromal melting with infiltrates near the laceration site two weeks after primary closure of the wound. The patient was initially treated with vigamox and prednisolone acetate. Corneal cultures grew *Phialemonium obovatum*, identified by colony appearance after 7 days of incubation at 25 °C on a blood agar plate. The patient was treated with natamycin every 2 h about four weeks after surgery. The patient, however, continued to have stromal melting and the patient underwent an amniotic membrane graft with subsequent dehiscence of the graft. About three weeks after the amniotic membrane transplantation, the epithelium had completely healed but the cornea was opaque and the patient had hand motions only visual acuity.¹²

The current case of *Phialemonium obovatum* demonstrates the risk factors for the development of fungal keratitis and the need for a high clinical suspicion for fungal keratitis in these cases. The early use of topical antifungal medication with close follow-up can prevent corneal perforation and result in excellent visual acuity.

4. Patient consent

Written consent was obtained from the patient to publish details of his case as well as ophthalmic imaging from his case.

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Conflict of interest

The following authors have no financial disclosures: ECD, MKD and DSL.

Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

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