



# Treatment of resistant *Paecilomyces lilacinus* keratitis with topical voriconazole and oral itraconazole: a rare case report from Somalia

Hassan Muhumed Mohamed, MD\*, Ibrahim Ali Hassan, MD, Aisha Abdirahman Yussuf, MD, Yahye Abshir Nor, MD, Abdirisak Abdikarin Ahmed, MD, Abdullahi Ali Roble, MD

**Introduction and importance:** *Paecilomyces* species are rare fungi that are resistant to standard treatment and have increasing clinical relevance. The *Purpureocillium lilacinum*, formerly known as *Paecilomyces lilacinus*, has a unique sensitivity for the corneal surface. However, only a few cases have been documented globally. This case report presents the successful management of a patient with *Paecilomyces lilacinus* keratitis with topical voriconazole and oral itraconazole.

**Case presentation:** A 40-year-old woman came to our ophthalmology clinic complaining of right eye pain due to a severe corneal infection in her right eye. Corneal scraping and identification of the cultured pathogen were performed, which revealed *Paecilomyces lilacinus*. The corneal infection improved after being treated with hourly topical voriconazole (10 mg/ml) and oral itraconazole.

**Clinical discussion:** *Paecilomyces/Purpureocillium* keratitis, which accounts for 5% of keratomycosis cases in tropical and subtropical areas, is extremely rare. It does not respond well to conventional antifungal treatment and frequently requires therapeutic surgery. Risk factors include wearing contact lenses, ocular trauma, ocular surgery, corticosteroids, and intraocular lens implantation.

**Conclusion:** For the treatment of *Paecilomyces lilacinus* keratitis that is unresponsive to conventional antifungal medications, voriconazole may be helpful. Early organism detection and the appropriate therapy are necessary for the management of keratitis.

**Keywords:** *paecilomyces lilacinus*, voriconazole, and keratitis

## Introduction

Infectious keratitis is caused by viruses, fungus, bacteria, and protozoa. More than 100 various types of fungi have been identified to cause keratitis, with *Fusarium*, *Aspergillus*, and *Candida albicans* being the three most reported ones<sup>[1]</sup>. The prevalence of ocular fungal infections has significantly increased during the past few decades as microbiological diagnostic capabilities have improved<sup>[2]</sup>. *Paecilomyces lilacinus* is a filamentous fungus that lives in soil, decaying plants, and food products. Although it is usually considered a contaminant, it also infects humans and animals<sup>[3]</sup>. *Paecilomyces* spp. are uncommon fungi that have greater clinical significance and are resistant to standard therapy. The *Purpureocillium lilacinum*, formerly known as *Paecilomyces lilacinus*, has a unique sensitivity for the ocular surface. A few cases

Department of Ophthalmology, Mogadishu-Somalia-Turkish Training and Research Hospital, Mogadishu, Somalia

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

\*Corresponding author. Address: Mogadishu, Somalia. Tel.: +25618361464. E-mail: xasanfooley@gmail.com (H.M. Mohamed).

Copyright © 2024 The Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

*Annals of Medicine & Surgery* (2024) 86:2172–2175

Received 19 October 2023; Accepted 25 February 2024

Published online 6 March 2024

<http://dx.doi.org/10.1097/MS9.0000000000001925>

## HIGHLIGHTS

- A 40-year-old woman came to our ophthalmology clinic complaining of severe right eye pain, redness, and photophobia for 2 weeks duration.
- Corneal scraping for culture was performed, which revealed *Paecilomyces lilacinus*. The corneal infection improved after treatment with hourly topical voriconazole (10 mg/ml) and oral itraconazole.
- The ocular infection disappeared, but the corneal scarring persisted.

have, however, been reported worldwide<sup>[4]</sup>. Increased use of corticosteroids and/or broad-spectrum topical antibiotics, compromised host defenses, and physical trauma may create conditions that are preferable for the growth of fungus<sup>[5]</sup>. It has been found that voriconazole is an effective therapy. However, it looks likely that increased usage of voriconazole will result in the emergence of strains that are resistant to it<sup>[6]</sup>. Diagnosing infectious keratitis, particularly fungal keratitis, is challenging due to the small size of corneal scraping samples and the potential for false negative results in culture testing<sup>[7]</sup>. This case we report a severe fungal keratitis caused by *Paecilomyces lilacinus* successfully treated with topical voriconazole and oral itraconazole at Mogadishu-Somali Turkish Hospital, which is a tertiary hospital located in Mogadishu, Somalia.

## Case presentation

A 40-year-old woman came to the ophthalmology outpatient department with right eye pain, redness, and photophobia for a

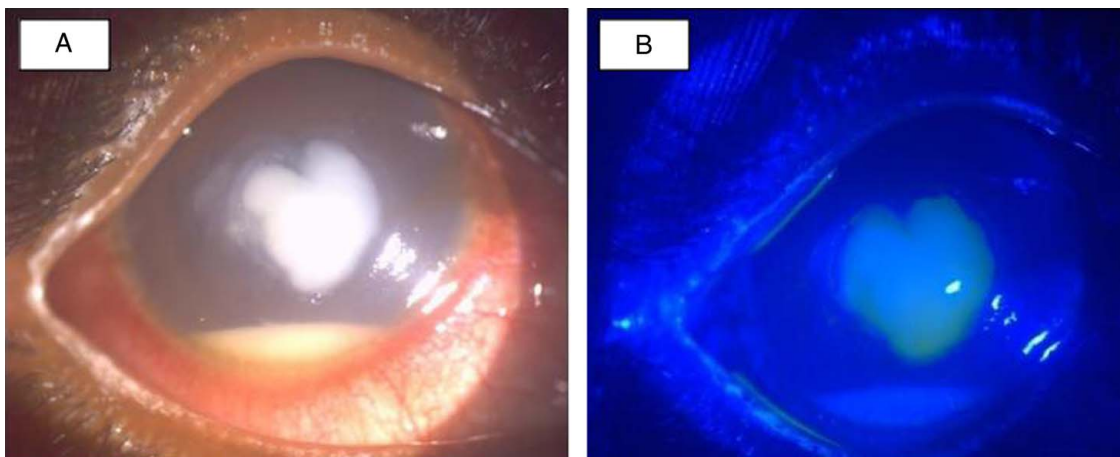
duration of 2 weeks. There was no significant previous medical, ocular, or familial history of ocular disease. Before coming to our tertiary level hospital, the patient went to another hospital, where she was prescribed and used 0.1% moxifloxacin eye drops five times per day, 0.3% gentamycin ophthalmic ointment two times per day, and erythromycin tab 500 mg three times per day, but the patient complained that her condition had not improved and came to our hospital. The ophthalmologic exam showed the best-corrected visual acuity of the left eye was 6/6, whereas the right eye had hand movement only. The left-eye ophthalmological examination was normal. The right eye had a ciliary injection, a central corneal ulcer with satellite stromal infiltration, and a 1.5-mm-sized hypopyon but no epithelial defect (Fig. 1A and B). The fundus was not visible. We have done ocular ultrasound shows normal posterior segment. We immediately stopped her current treatment after 24 h. Corneal scraping was performed, and she was empirically treated with vancomycin (25 mg/ml), voriconazole 1% every hour, and cyclopentolate three times per day. After one week, microbiological results identified *Paecilomyces lilacinus* as the infective agent (Fig. 2). The patient received oral itraconazole at a dosage of 100 mg three times a day, in conjunction with the application of topical voriconazole administered hourly. After 2 weeks of starting antifungal therapy, she responded well and improved clinically, and the ulcer was seen to be regressing. There was no hypopyon. On follow-up, 1 month later, the right eye conjunctiva was quite normal, with no epithelial defect on the cornea, through a fluorescein paper strip after the installation of topical anaesthesia. The patient was then maintained on oral itraconazole and voriconazole eye drops for three months. Later, the corneal infection disappeared, but the corneal scars persisted (Fig. 3). This case has been reported in line with the SCARE criteria<sup>[8]</sup>.

## Discussion

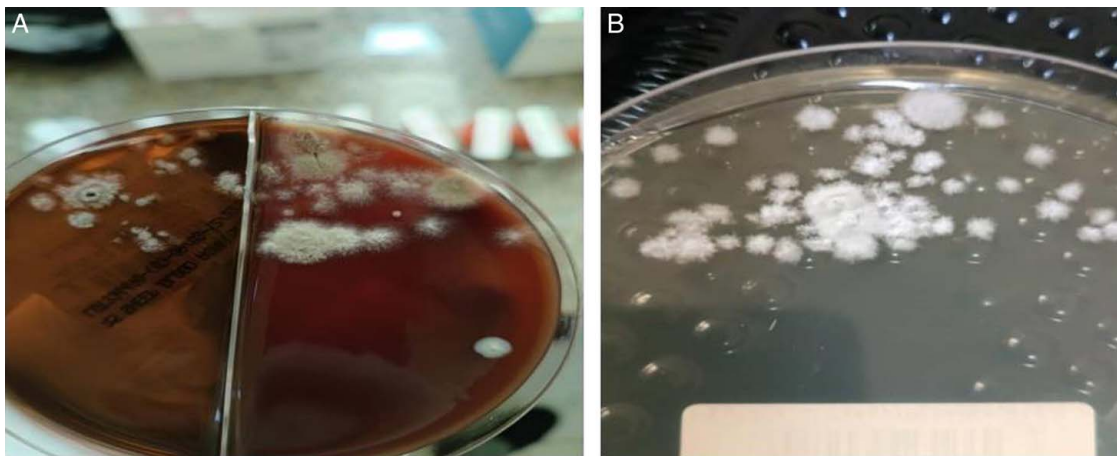
There are several ways that fungal keratitis can appear, including as endothelial plaques, corneal ulcers, and superficial keratitis. Fungi-induced corneal ulcers are historically hard to heal and frequently lead to irreversible blindness. It must be done to

identify and diagnose fungal corneal ulcers as soon as attainable. Currently, the mainstay of treatment remains antifungal drug therapy. Furthermore, the wide range of Voriconazole has been shown, making it the most promising treatment for FK at this time<sup>[9]</sup>. *Paecilomyces lilacinus* is the *Paecilomyces* species that is most commonly found to be the dominant species. It has been established by the results of a phylogenetic study carried out on the 18S ribosomal RNA (rRNA) gene that these two species are not connected in any way that can be considered phylogenetic. *Paecilomyces lilacinus* has been subjected to a taxonomic reclassification, as a result of which it has been reallocated to the family Ophiocordycipitaceae under the new genus *Purpureocillium*, and it has consequently been renamed as *Purpureocillium lilacinum*. On the other hand, *Paecilomyces variotii* is still considered to be a member of the Trichocomaceae family<sup>[10]</sup>.

*Paecilomyces* species are a newly recognized fungal keratitis aetiology that has garnered significant research in recent years. In tropical or subtropical regions, *Paecilomyces/Purpureocillium* keratitis is rare, constituting 5% of keratomycosis cases. It responds poorly to conventional antifungal medications and often needs therapeutic surgery<sup>[11]</sup>. Risk factors for *Paecilomyces* keratitis and wearing contact lenses, as well as ocular trauma, ocular surgery, corticosteroids, and intraocular lens implantation<sup>[12]</sup>. There is no history of these risk factors in our patient. The clinical signs of *Paecilomyces* or *Purpureocillium* keratitis were an epithelial defect with stromal infiltrate having a rough surface, raised edge, or feathery margin; The location of corneal infiltration was seen to be central in six eyes (50%) out of the total 12 eyes examined. Additionally, it was found to be paracentral in five eyes (42%), with peripheral vision present in one eye. Out of the total of 12 ocular units observed, about half, namely six eyes, showed the presence of hypopyons, as reported in a previous study<sup>[11]</sup>. Our patient had epithelial defects and hypopyon with central stromal infiltration and a feathery margin. Since the clinical signs are not sufficient to diagnose fungal keratitis, cultures are required to detect specific species. To effectively administer *Paecilomyces lilacinus* in the management of keratitis, typical treatment protocols encompass the utilization of polyenes, azoles, and antimetabolites by topical, subconjunctival, and



**Figure 1.** Corneal findings from the right eye at the initial examination are shown in (A). A slit-lamp photograph shows severe conjunctival hyperaemia, white infiltration covering over one-third of the cornea, minimal epithelial defects, an ulcer extending into the anterior corneal stroma, hypopyon, and widespread white infiltration. (B) Fluorescein stained picture shows a large corneal ulcer.



**Figure 2.** (A) and (B) findings from culture result of corneal scrapings.

systemic routes of administration. Additionally, surgical intervention may be employed as a complementary approach, Penetrating keratoplasty, unfortunately, often yields unsatisfactory results<sup>[13]</sup>. *P. lilacinum*, causing ocular infections following long-term treatment either locally or systemically, hasn't even been found to be resistant to the antifungal medication voriconazole. Patients who cannot be treated with voriconazole or patients for whom voriconazole treatment is not effective due to cases of voriconazole treatment failure and efficacy in treating *P. lilacinum* eye infections may be candidates for posaconazole prescriptions<sup>[2]</sup>. Therapeutic penetrating keratoplasty may be needed if medical treatment fails or corneal perforation occurs.

### Conclusion

In this report, we present a case study detailing the effective medical intervention for *Paecilomyces lilacinus* keratitis with the application of topical voriconazole. Voriconazole exhibits

potential as a viable therapeutic alternative for the treatment of *Paecilomyces lilacinus* keratitis, which is unresponsive to conventional antifungal medications. The timely identification of the pathogen and the administration of suitable therapy are crucial in order to eliminate the infection effectively and mitigate the risk of consequences, including endophthalmitis and perforations.

### Ethical approval

In our institute, the ethical approval is not required for publication of case reports, so our hospital is waived for case reports.

### Consent

The patient given both verbal and written informed consent for the publication of this case report and any accompanying images.

### Source of funding

None.

### Author contribution

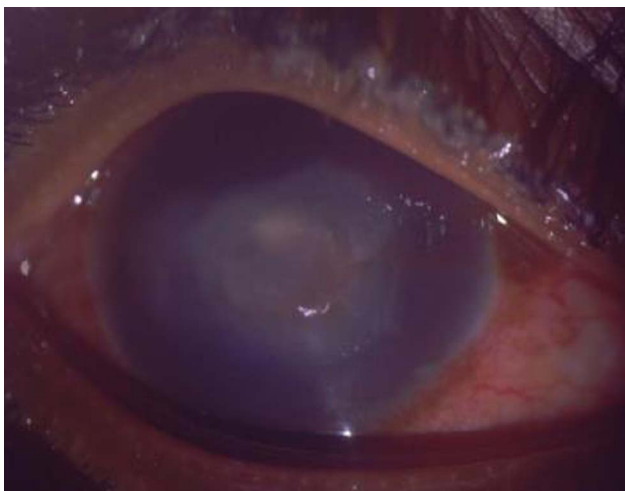
All of the authors made a significant contribution to the work that was reported, whether it was in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all of these areas; they took part in drafting, revising, or critically reviewing the manuscript; they gave final approval of the version that was going to be published; they agreed on the journal to which the article was submitted; and they agreed to be accountable for all aspects of the work.

### Conflicts of interest disclosure

The authors do not have any conflicts of interest.

### Research registration unique identifying number (UIN)

Not applicable.



**Figure 3.** Shows the corneal findings obtained from the right eye following a duration of 1 month of antifungal medication. The slit-lamp image reveals the resolution of the corneal infection. The presence of corneal scarring persisted, and there was also the development of corneal neovascularization.

## Guarantor

Hassan Muhumed Mohamed.

## Data availability statement

The full data are available by the corresponding author in case of need or the request.

## Provenance and peer review

Not commissioned, externally peer-reviewed.

## Acknowledgement

The authors thank the patient, her family and all the clinical and research partners who help them to provide current study.

## Reference

- [1] Mahmoudi S, Masoomi A, Ahmadikia K, *et al.* Fungal keratitis: an overview of clinical and laboratory aspects. *Mycoses* 2018;61: 916–30.
- [2] Kuthan R, Kurowska AK, Izdebska J, *et al.* First report of a case of ocular infection caused by purpureocillium lilacinum in Poland. *Pathogens* 2021;10.
- [3] Gracitelli CPB, Ferrar PV, Pires Pereira CA, *et al.* A case of recurrent keratitis caused by Paecilomyces lilacinus and treated by voriconazole. *Arq Bras Oftalmol* 2019;82:152–4.
- [4] Burgos-Blasco B, Gegúndez-Fernández JA, Díaz-Valle D. Purpureocillium lilacinum fungal keratitis: confocal microscopy diagnosis and histopathology correlation. *Med Clin (Barc)* 2021;157:398–9.
- [5] Anderson KL, Mitra S, Salouti R, *et al.* Fungal keratitis caused by Paecilomyces lilacinus associated with a retained intracorneal hair. *Cornea* 2004;23:516–21.
- [6] Monden Y, Sugita M, Yamakawa R, *et al.* Clinical experience treating Paecilomyces lilacinus keratitis in four patients. *Clin Ophthalmol* 2012;6: 949–53.
- [7] Kiriya T, Hariya T, Yoshida M, *et al.* A rare case of fungal keratitis caused by Plectosphaerella cucumerina Diagnosed with repeated corneal scrapings: a case report. *Cureus* 2022;14:e27628.
- [8] Sohrabi C, Mathew G, Maria N, *et al.* The SCARE 2023 guideline: updating consensus Surgical CAse REport (SCARE) guidelines. *Int J Surg Lond Engl* 2023;109:1136.
- [9] Cai Y, Sang-Hwa S, Chen Y, *et al.* (2023, May 11). *Oral voriconazole monotherapy for fungal keratitis: efficacy, safety, and factors associated with outcomes.* *Frontiers in Medicine; Frontiers Media.* <https://doi.org/10.3389/fmed.2023.1174264>
- [10] Barker AP, Horan JL, Slechta ES, *et al.* Complexities associated with the molecular and proteomic identification of Paecilomyces species in the clinical mycology laboratory. *Med Mycol* 2014;52:537–45.
- [11] Chen YT, Yeh LK, Ma DHK, *et al.* Paecilomyces/Purpureocillium keratitis: a consecutive study with a case series and literature review. *Med Mycol* 2020;58:293–9.
- [12] Coates DR, Chin JM, Chung STL. 基因的改变 NIH Public Access. *Bone* 2011;23:1–7.
- [13] Wu PC, Lai CH, Tan HY, *et al.* The successful medical treatment of a case of paecilomyces lilacinus keratitis. *Cornea* 2010;29:357–8.