CASE REPORT

Cutaneous *Paecilomyces lilacinus* infection mimicking cellulitis in an immunocompetent patient: Report of a case and review of the literature

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**ABSTRACT**

*Paecilomyces lilacinus*, a ubiquitous saprophytic mold found in the environment, is an emerging pathogen that causes localized to severe systemic diseases, especially in immunocompromised patients. Thus far, there are only eight reports on immunocompetent patients with cutaneous *P. lilacinus* in the English literature. We herein present the case of an 87-year-old immunocompetent Taiwanese man who presented with a progressive, tender, erythematous plaque mimicking cellulitis on the ventral surface of the right forearm for 2 weeks. The patient was initially diagnosed as a case of cellulitis; however, due to unresponsiveness to the treatment for 1 week, we decided to perform skin biopsy and tissue culture. Results of histopathologic analysis, tissue culture, and polymerase chain reaction assay indicated cutaneous *P. lilacinus* infection. Consequently, systemic antifungal treatment with oral itraconazole (200 mg/d) was initiated and the skin lesion resolved after a 4-week treatment.

**Introduction**

*Paecilomyces* species are saprophytic molds found ubiquitously in the environment. Although they were deemed as laboratory contaminants in the past, recently there has been an increase in the number of *Paecilomyces*-related infections. The most commonly reported pathogenic species are *Paecilomyces lilacinus*, *Paecilomyces variotii*, and *Paecilomyces marquandii*. Clinically, cutaneous and subcutaneous infection was the second most common manifestation, following oculomycosis.1 Most of these cases were found in immunocompromised patients who were under post-transplantation status, with hematological malignancies or AIDS.1–9 The main route of cutaneous infection reported in the literature was direct cutaneous inoculation through the colonization of clinical materials, such as applying contaminated skin lotion or using incompletely sterilized central venous catheter, although some patients contracted the infection through dog bite, contaminated water after flooding, or wounds of mechanical trauma.1–3, 10 *Paecilomyces* infection is an emerging hyalohyphomycosis in humans, but there is relative inexperience in treating this infection. In this paper, we present the case of a cutaneous *P. lilacinus* infection in an elderly but immunocompetent patient, who had been successfully treated with oral itraconazole. We also reviewed all the cases of cutaneous *P. lilacinus* infection in immunocompetent patients reported in English literature to provide treatment guidance for physicians in the future.

**Case Report**

An 87-year-old Taiwanese man, with no known immunocompromised status, presented with a progressive, tender, erythematous plaque on the ventral surface of the right forearm for 2 weeks (Figure 1A). Before the skin lesion developed, he alleged that there were some itchy rashes over the area, and excoriated wounds due to frequent scratching were noted by his daughter. Under the initial impression of cellulitis, he was admitted to our hospital and empiric treatment with intravenous oxacillin was initiated.
Nevertheless, due to unresponsiveness to the treatment for 1 week, we decided to perform skin biopsy and tissue culture to diagnose the underlying condition. Histopathologic analysis of the skin specimen revealed suppurative granulomas with pathogens showing nonpigmented, septated, branching hyphae, which were highlighted by periodic acid–Schiff-diastase (PAS-D) stain (Figures 1C and 1D). The tissue culture on Sabouraud dextrose agar (SDA) showed whitish floccose colonies with central lilac discol- oration and brownish pigmentation on the reverse side of the culture plate. However, due to the lack of malt extract agar in our hospital, we did not demonstrate fungal culture result on it. The fungal morphology under a microscope revealed erection of the conidiophores with clustered tenpin-shaped phialides and round to oval nonbranching conidia (Figures 1D, 2A, and 2B). The pathogen

![Figure 1](image1.png)

(A) A cellulitis-like erythematous plaque on the ventral surface of the right forearm. (B) After oral itraconazole treatment (200 mg/d) for 4 weeks, the skin lesion resolved drastically. (C) Nonpigmented, septated, branching hyphae demonstrated by periodic acid–Schiff-diastase staining (original magnification 1000×). (D) Morphological identification of Paecilomyces lilacinus: conidiophores with clustered tenpin-shaped phialides and round to oval nonbranching conidia (original magnification 400×).

![Figure 2](image2.png)

(A) White floccus colonies with central brownish discoloration on the Sabouraud dextrose agar culture plate. (B) Paecilomyces lilacinus shows brownish pigmentation on the reverse side of the culture plate.
was identified to be *P. lilacinus*. Moreover, we conducted polymerase chain reaction with primers internal transcribed spacers 1 (ITS1) and ITS4 to amplify the ITS1, 5.8S RNA gene, and ITS2 regions of the fungal DNA. The resulting sequence, composed of 573 nucleotides, was compared with the public database (http://blast.ncbi.nlm.nih.gov/Blast.cgi) and the results best matched with *P. lilacinus*, showing 100% similarity. According to the final diagnosis of cutaneous *P. lilacinus* infection, treatment with oral itraconazole (200 mg/d) was subsequently initiated and the erythematous plaque on his right forearm resolved after a 4-week treatment (Figure 1B).

**Discussion**

*P. lilacinus* is a saprophytic mold found ubiquitously in the environment; however, it has now become an emerging pathogen causing localized to severe systemic infection. Most of the reported cases were under immunocompromised status and the main predisposing factors included solid organ transplantation, bone marrow transplantation, corticosteroid therapy, liver cirrhosis, diabetes mellitus, AIDS, and primary immunodeficiency, such as chronic granulomatous disease.1–3,10 However, an increasing number of events occurring in healthy people had been reported recently. This growing incidence strongly suggests that the pathogen *P. lilacinus* is no longer only an opportunistic pathogen and that the worldwide disease burden could have been underestimated.2,5–10

As the previous case reports demonstrated, the main route of *P. lilacinus* cutaneous infection is direct inoculation and the possible mediators were contaminated skin lotion, incompletely sterilized central venous catheters, contaminated water after flooding or through the wounds of mechanical trauma.1–3,10 In our case, before the current episode, the patient suffered from itchy eczematous skin rashes over his bilateral forearms for an unknown period, and excoriated wounds due to frequent scratching were noted by his daughter. Therefore, the possible route of infection in our patient might be direct fungal inoculation through contaminated hands (repeated scratching of the wounds with his hand).

The clinical manifestation of cutaneous *P. lilacinus* infection varies drastically, ranging from solitary or multiple disseminated erythematous macules, papules, pustules, nodules, vesicles, and ulcers to cellulitis-like plaques.1–15 As a result, accurate clinical diagnosis of cutaneous *P. lilacinus* infection is extremely challenging for dermatologists. At present, the pathogen is identified by histopathologic analysis of the skin biopsy specimen, and tissue culture is still the golden standard for the definite diagnosis. In histopathology, nonpigmented, septated, branching hyphae with adventitious sporulation could be accentuated by PAS-D stain. In tissue culture, vinaceous to lilac colonies develop on malt extract agar due to sporulation of the fungi; however, on SDA, brownish colonies develop.1 The morphology of *P. lilacinus* under a microscope displays hyaline, rough-walled conidiophores with clustered t(enpin-shaped phialides and round to oval nonbranching conidia.1–15

The optimal treatment for *P. lilacinus* infection is still unclear. High minimum inhibitory concentration and minimum fungicidal concentration of amphotericin B, fluconazole, fluconazole, ketoconazole, and itraconazole were identified in previous studies for treating *P. lilacinus* infection. By contrast, the pathogen was more susceptible to the new-generation azoles, such as voriconazole and posaconazole.16–18 Pastor and Guarro1 reported a high failure rate in treating cutaneous *P. lilacinus* infection with systemic itraconazole in clinical practices after reviewing all the reported cases from 1964 to 2001. In the reviewed cases, there were 20 patients suffering from cutaneous *P. lilacinus* infection who were treated by oral itraconazole. Among them, two patients were immunocompetent, whereas the others were immunocompromised. Both immunocompetent patients were cured with itraconazole (100% response rate), whereas only two of the 18 immunocompromised patients showed clinical response to the treatment (11.1% response rate). Their result suggests that host factors, such as the immune status, might play an important role in the efficacy of the systemic antifungal medication. Therefore, we reviewed previous studies (English only) on the cutaneous *P. lilacinus* infection in immunocompetent patients from 1997 to 2015 (Table 1).5,7,10–15 We identified a total of nine cases, including our present case. Among these cases, five of six patients (83.3%) treated with oral itraconazole were cured, except one patient who failed to respond to fluconazole, itraconazole, and ketoconazole. Eventually, this patient was cured by surgical excision. The reported treatment dosage of oral itraconazole ranged from 200 mg/d to 400 mg/d and the treatment course differed from 4 weeks to 6 months. Because the *in vitro* susceptibility data of fungi might not be available in most hospitals, oral itraconazole is considered the first-line empiric therapy for immunocompetent patients suffering from cutaneous *P. lilacinus* infection.

In conclusion, *P. lilacinus* is a saprophytic mold that exists ubiquitously in the environment; however, this has now become an

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<tr>
<th>Patient</th>
<th>Study</th>
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<th>Treatment</th>
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<tbody>
<tr>
<td>1</td>
<td>Takayasu et al11</td>
<td>20/F</td>
<td>Dark red scaly plaques on the left cheek, 4.6 × 5.0 cm</td>
<td>1% clotrimazole cream, then griseofulvin (500 mg/d); Griseofulvin (500 mg/d); 1% itraconazole for 6 wk failed; ketoconazole for 12 wk with success</td>
<td>Failed</td>
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<td>2</td>
<td>Cho et al12</td>
<td>19/M</td>
<td>Erythematous patch with fine scales on the left cheek</td>
<td>Oral itraconazole (400 mg/d) for 4 wk</td>
<td>Cure</td>
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<td>3</td>
<td>Hecker et al5</td>
<td>86/M</td>
<td>Erythema &amp; swelling of the left index finger with a few small pustules</td>
<td>Oral itraconazole (200 mg/d) for 3 mo</td>
<td>Cure</td>
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<tr>
<td>4</td>
<td>Gutiérrez-Rodero et al13</td>
<td>36/F</td>
<td>Lesion on the left leg</td>
<td>Oral itraconazole (200 mg/d) for 6 mo</td>
<td>Cure</td>
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<td>5</td>
<td>Gottlieb &amp; Atkins14</td>
<td>59/F</td>
<td>A tender nodule above the right lateral malleolus</td>
<td>Oral itraconazole (400 mg/d) for 4 wk</td>
<td>Cure</td>
</tr>
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<td>6</td>
<td>Hall et al7</td>
<td>65/M</td>
<td>A bruise with pus formation &amp; surrounding red papules</td>
<td>Poor response to itraconazole, ketoconazole, fluconazole. Finally, removed by excision</td>
<td>Presumed to be cured</td>
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<td>7</td>
<td>Zendri et al19</td>
<td>59/M</td>
<td>Erythematous plaques on the right leg (wounds of dog bite over the same area 3 mo ago)</td>
<td>Oral itraconazole (400 mg/d) for 4 wk &amp; then a reduced dose (200 mg/d) for another 5 wk</td>
<td>Cure</td>
</tr>
<tr>
<td>8</td>
<td>Keshtkar-Jahromi et al15</td>
<td>60/F</td>
<td>Painful swelling &amp; intermittent erythematous change over the 3rd metacarpophalangeal joint of the right hand</td>
<td>Oral voriconazole for 3 mo</td>
<td>Cure</td>
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<td>9</td>
<td>This case</td>
<td>87/M</td>
<td>A tender erythematous plaque on the right forearm</td>
<td>Oral itraconazole (200 mg/d) for 4 wk</td>
<td>Cure</td>
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</table>
emerging pathogen in humans with variable clinical presentations in both immunocompetent and immunocompromised patients. Therefore, whenever a physician encounters refractory cellulitis-like lesions that have poor response to empiric treatment, further evaluations, including evaluating the patient’s history of deep fungal infection, are strongly recommended, even if the patient is immunocompetent. Although more clinical data and experience would be needed to identify the optimal treatment regimen for cutaneous _P. lilacinus_ infection, based on existing literature sources, empiric oral itraconazole (200–400 mg/d) for at least four weeks might be considered as the first-line therapy for the immunocompetent patients.

References