CASE REPORT
J Mycol Infect 2021; 26(1): 8-12
pISSN:1226-4709, eISSN:2465-8278
http://dx.doi.org/10.17966/JMI.2021.26.1.8

JMI

A Case of Cutaneous *Purpureocillium lilacinum* Infection

Eui-Sung Jung[1], Sang-Kyung Lee[1], Il-Jae Lee, Jin Park[1,2], Seok-Kweon Yun[1,2] and Han-Uk Kim[1,2†]

[1]Department of Dermatology, Jeonbuk National University Medical School & Hospital, Jeonju, Korea
[2]Research Institute of Clinical Medicine of Jeonbuk National University-Biomedical Research Institute of Jeonbuk National University Hospital, Jeonju, Korea

Purpureocillium lilacinum (formerly *Paecilomyces lilacinus*) is a saprophytic fungus found in the soil and decaying vegetation and is rarely pathogenic to humans. To our knowledge, only six cases of cutaneous infection caused by *P. lilacinum* have been reported in journals published by the Korean Dermatological Association and the Korean Society for Medical Mycology. Here, we report the case of a patient with localized cutaneous infection caused by *P. lilacinum*. An 84-year-old woman presented with a 2-month history of multiple plaques with surrounding erythematous patches on her left forearm and dorsum of the hand. Histopathological examination showed suppurative inflammation accompanied by fungal elements in the dermis. Furthermore, periodic acid-Schiff and methenamine silver staining showed revealed fungal elements. The sub-cultured fungus of the isolate revealed velvety pink colonies that were yellowish-tan on the reverse side, and lactophenol cotton blue staining showed flask-shaped phialides. The DNA sequence from the colony was identical to that of *P. lilacinum*. The patient was treated with oral itraconazole (200 mg/d) for 6 weeks that achieved significant improvement in the patient's condition.

Key Words: Cutaneous infection, *Purpureocillium lilacinum*

INTRODUCTION

Purpureocillium lilacinum, a saprophytic filamentous fungus commonly found in soil, is rarely pathogenic to humans. However, infective endocarditis, pulmonary infections, and localized skin infections caused by *P. lilacinum* have been reported in immunocompromised patients who have undergone kidney transplantation or bone marrow transplantation or have malignant tumors; these disorders may also have idiopathic origin[1,2]. Only six cases of cutaneous infection due to *P. lilacinum* have been reported in journals published by the Korean Dermatological Association (KDA) and the Korean Society for Medical Mycology (KSMM). Here, we report the case of a patient with cutaneous infection caused by *P. lilacinum* that was believed to be associated with repeated physical trauma in a healthy patient.

CASE REPORT

An 84-year-old female patient presented with a 2-month history of pruritic localized cutaneous lesions on her left forearm and the dorsum of the hand (Fig. 1A). There was no pain, direct tenderness, heating sensation, or fever. She was a farmer who used a hand hoe on a daily basis for performing her farm work, and she had a history of repeated trauma on the affected site, caused by the frequent use of farming tools. There was no underlying immunocompromising disease or

Received: September 23, 2020 Revised: January 25, 2021 Accepted: February 3, 2021
†Corresponding: Han-Uk Kim, Department of Dermatology, Jeonbuk National University Medical School, 20, Geonji-ro, Deokjin-gu, Jeonju-si, Jeollabuk-do, 54907, Korea.
Phone: +82-63-250-1975, Fax: +82-63-250-1777, e-mail: hanukkim@jbnu.ac.kr

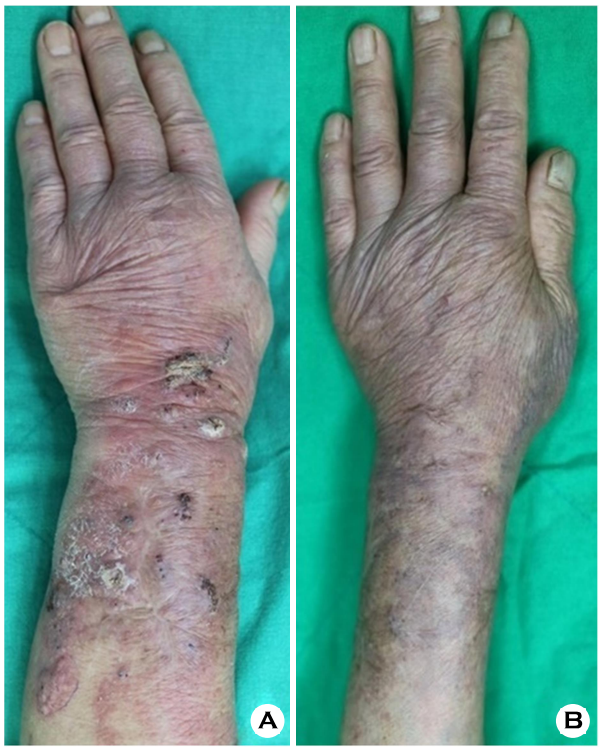

Fig. 1. (A) Crusted plaques with surrounding erythematous patches on the left hand dorsum and forearm and (B) after 6 weeks of treatment

relevant family medical history. Physical examination revealed multiple plaques with surrounding erythematous patches. Laboratory findings, including complete blood count, blood chemistry, and urinalysis, were within the normal ranges. A skin biopsy of the left forearm and a fungal culture of the biopsied specimen were performed. Hematoxylin and eosin (H&E) staining revealed suppurative inflammation with fungal elements in the dermis (Fig. 2A). Periodic acid-Schiff (PAS) staining was positive for fungal elements (Fig. 2B). The biopsied specimen was cultured on Sabouraud dextrose agar (SD Agar™, Asan Pharm, Hwaseong-si, Korea) and was kept in an incubator at 28℃. Velvety white and light brown colonies, observed from the original colony, were sub-cultured at room temperature (25℃) for 14 d, resulting in velvety pink colonies. A yellowish-tan color was observed on the reverse side of the sub-cultured fungus (Fig. 2C, 2D). Flask-shaped phialides were observed after staining the colony with lactophenol cotton blue (Fig. 2E, 2F). Subsequently, DNA sequence analysis of the internal transcribed spacer rRNA gene and assessment using the basic local alignment search tool program revealed 99% sequence similarity; thus, the colony was conclusively identified as *P. lilacinum* (Fig. 3). The patient was treated with oral itraconazole (200 mg/day) for a period of 6 weeks. Improvement in the cutaneous lesions with mild post-inflammatory hyperpigmentation was observed at the end of 6 weeks of treat-

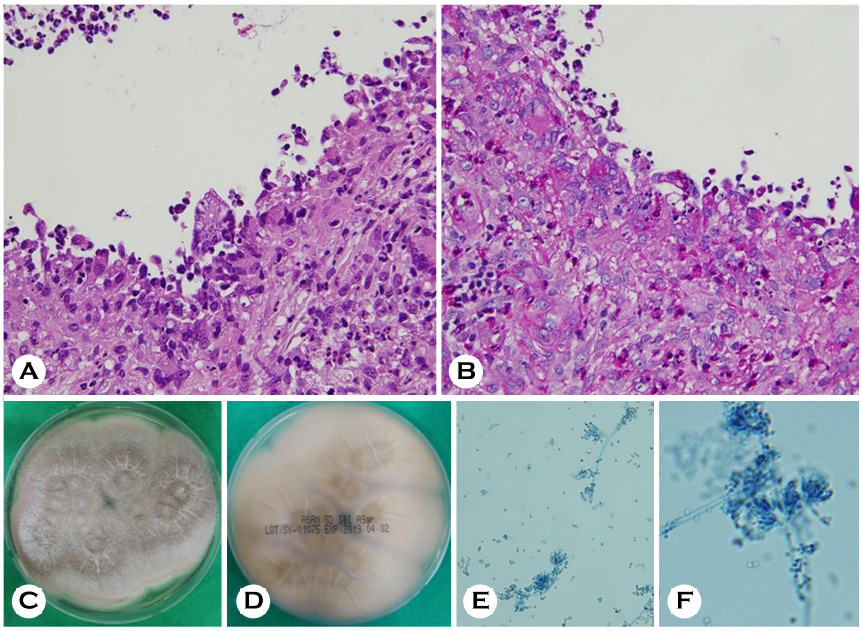

Fig. 2. (A, B) Histopathologic findings showed suppurative inflammation with fungal elements in the dermis (H&E ×400, PAS ×400). (C) Velvety pink colony on the surface and (D) yellowish-tan on the reverse side of the colony after sub-culture in Sabouraud dextrose agar, (E, F) Flask-shaped phialides on lactophenol cotton blue stain (x200, ×400)

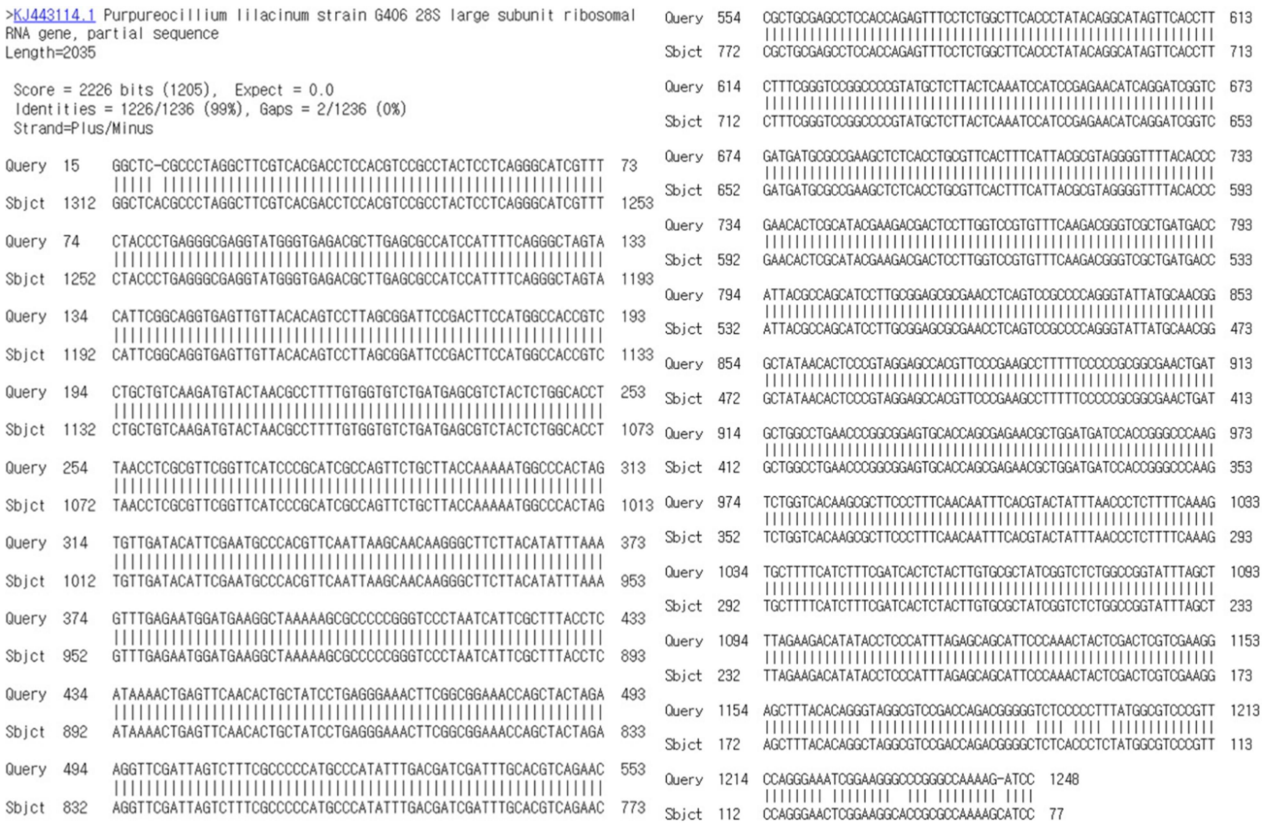

Fig. 3. The sequence of ITS region of the isolate was matched 99% with those of *Purpureocillium lilacinum*.

ment (Fig. 1B). A follow-up biopsy culture was not performed because the patient did not visit us for the follow-up appointment.

DISCUSSION

P. lilacinum, formerly called *Paecilomyces lilacinus*, is a fungal pathogen that is commonly found in soil and decaying vegetation. Skin and soft tissue infections caused by *P. lilacinum* are very rare[3]. The first reported case of localized cutaneous infection by *P. lilacinum* that manifested as unilateral cellulitis was reported in 1977[4]. Thereafter, only six case reports of cutaneous infection caused by *P. lilacinum* have been published by the KDA and the KSMM (Table 1)[5-10]. Our report describes the case of a patient with cutaneous infection caused by *P. lilacinum* that was believed to be associated with repeated physical contact with farming tools.

P. lilacinum infections predominantly occur in immunocompromised patients, such as those with a history of organ transplantations, diabetes mellitus, malignant tumors, and prolonged use of immunosuppressants or steroids[7,11]. However, *P. lilacinum* infections in immunocompetent patients have been reported to occur following ophthalmic surgery or non-surgical trauma[12,13]. As per Pastor et al.[13], 18.6% of cutaneous *P. lilacinum* infections occurred in patients who had no predisposing factors. Five out of the 6 (83.3%) patients reported by the KDA and the KSMM did not have any immunocompromising illness. In our case, the patient had no immunocompromising disease; however, he had a history of repeated trauma owing to the use of farming tools. Kwak et al.[12] suggested that frequent exposure to soil and unnoticed injuries that are commonly found in farmers are risk factors for cutaneous *P. lilacinum* infections. Our patient was a farmer; two out of six (33.3%) previously reported cases also had agriculture-related occupations. The unnoticed wound site in our patient was considered to be the entry point for the opportunistic infection. Therefore, we suggest careful physical examination and clinical history-taking for the identification of signs of trauma that may be inconspicuous or may have been unnoticed by the patients themselves.

Clinical manifestations of cutaneous *P. lilacinum* infections

Table 1. Clinical features of localized skin infection due to *Purpureocillium lilacinum* in Koreans

Author	Age/ Sex	Cutaneous presentation	Location	Predisposing factor	Treatment
Cho et al.[5]	19/M	Erythematous patch	Cheek	None	Griseofulvin, Ketoconazole
Shin et al.[6]	46/M	Erythematous nodules	Forearm	Renal transplantation	Excision
Ko et al.[7]	83/M	Erythematous plaque	Wrist	None	Itraconazole
Hwang et al.[8]	81/M	Erythematous plaque and pustules	Hand	None	Itraconazole
Jung et al.[9]	72/M	Erythematous plaque	Shoulder	None	Itraconazole, Voriconazole
Kwak et al.[10]	81/M	Erythematous pustular plaque	Dorsal hand	None	Itraconazole
Present case	84/F	Erythematous papules & patch	Forearm	Injury from hoe	Itraconazole

show considerable variation[14]. Erythematous macules, patches, plaques, nodules, pustules, vesicles, and necrotic crusts have been described in previous trials[5-10,14]. Fungal cultures and histologic studies are essential for confirming the diagnosis[12,13]. Colonies of *P. lilacinum* rapidly grow on SD agar at room temperature with a velvety, whitish light-pink and lilac color, and a dome-shaped appearance[7,8]. Lactophenol cotton blue staining show that the conidiophores have delicate phialides with long tapering necks arranged like paintbrushes and elliptical conidia attached to chains at the ends[12,13]. Histopathological examination of the skin reveals spores and chronic granulomatous inflammation with lymphocytes, histiocytes, and giant cells in the dermis on H&E stains[5,7]. Molecular techniques, including real-time polymerase chain reaction (PCR) and species-specific primers, are also highly effective as diagnostic tools[15]. In our study, we identified *P. lilacinum* with the fungus isolate observed from the fungal culture of the biopsied specimen and the DNA sequencing of ITS rRNA gene.

Treatments for *P. lilacinum* include surgical debridement, systemic antifungal therapy, or a combination of these two methods. High resistance to conventional antifungal drugs has been reported in various studies[13]. Furthermore, the selection of antifungal drugs based on previous case reports is essential because there are no established guidelines for the treatment of *P. lilacinum*. Unfavorable outcomes have been observed with amphotericin B, flucytosine, fluconazole, miconazole, terbinafine, and itraconazole. A review of 20 cases of cutaneous infection by *P. lilacinum* showed that only 4 of the 20 patients responded to itraconazole[13]. In cases reported by KDA and KSMM, including our case, four patients showed clinical improvement with itraconazole administration, and one patient, who did not respond to this treatment, showed improvement after voriconazole administration[5-10]. In our case, the cutaneous lesions had almost resolved by the end of 6 weeks of itraconazole treatment. However, no improvement was observed even after itraconazole was administered for 14 weeks in the cases reported by Jung et al.[9] and Pastor et al.[13]. This suggests that the use of voriconazole in combination with surgery is the most effective treatment. Owing to the variable susceptibility of *P. lilacinum* to antifungal drugs and the absence of unanimous treatment guidelines, the measurement of the minimal inhibitory concentration to determine resistance to antifungal agents before treatment may help in selecting the most appropriate agent[9].

In sum, we report a case of cutaneous *P. lilacinum* infection in a healthy patient who was exposed to repeated physical trauma, wherein the patient responded favorably to itraconazole treatment. Thus, we concluded that careful and meticulous physical examination and history-taking may provide important clues for opportunistic infections. We also expect this report to contribute toward a deeper understanding of cutaneous *P. lilacinum* infection.

CONFLICT OF INTEREST

In relation to this article, we declare that there is no conflict of interest.

ORCID

Eui-Sung Jung: 0000-0001-6616-9456
Sang-Kyung Lee: 0000-0001-9415-8674
Il-Jae Lee: 0000-0003-1689-8719
Jin Park: 0000-0002-8830-5479
Seok-Kweon Yun: 0000-0002-1498-3701
Han-Uk Kim: 0000-0002-7173-7937

PATIENT CONSENT STATEMENT

The patient provided written informed consent for publication and the use of her images.

REFERENCES

1. Kwon-Chung KJ, Bennett JE. Medical mycology. Philadelphia: Lea & Febiger, 1992:747-750
2. Castro LG, Salebian A, Sotto MN. Hyalohyphomycosis by *Paecilomyces lilacinus* in a renal transplant patient and a review of human Paecilomyces species infections. J Med Vet Mycol 1990;28:15-26
3. Gutiérrez-Rodero F, Moragón M, Ortiz de la Tabla V, Mayol MJ, Martín C. Cutaneous hyalohyphomycosis caused by *Paecilomyces lilacinus* in an immunocompetent host successfully treated with itraconazole: case report and revew. Eur J Clin Microbiol Infect Dis 1999;18:814-818
4. Takayasu S, Akagi M, Shimizu Y. Cutaneous mycosis caused by *Paecilomyces lilacinus*. Arch Dermatol 1977; 113:1687-1690
5. Cho GY, Choo EH, Choi GJ, Hong NS, Houh W. Facial cutaneous mycosis by *Paecilomyces lilacinus*. Korean J Dermatol 1984;22:89-93
6. Shin SB, Lee HN, Kim SW, Park GS, Cho BK, Kim HJ. Cutaneous abscess caused by *Paecilomyces lilacinus* in a renal transplant patient. Korean J Med Mycol 1998;3: 185-189
7. Ko WT, Kim SH, Suh MK, Ha GY, Kim JR. A case of localized skin infection due to *Paecilomyces lilacinus*. Korean J Dermatol 2007;45:930-933
8. Hwang SL, Kim JI, Song KH, Cho YS, Nam GH, Park J, et al. A localized skin infection due to *Paecilomyces lilacinus*. Korean J Dermatol 2011;64(Suppl. 1):255
9. Jung MY, Park JH, Lee JH, Lee JH, Yang JM, Lee DY. A localized cutaneous *Paecilomyces lilacinus* infection treated with voriconazole. Korean J Dermatol 2013;51: 833-836
10. Kwak HB, Park SK, Yun SK, Kim HU, Park J. A case of localized skin infection due to *Paecilomyces lilacinum*. Korean J Med Mycol 2017;22:42-49
11. Van Schooneveld T, Freifeld A, Lesiak B, Kalil A, Sutton DA, Iwen PC. *Paecilomyces lilacinus* infection in a liver transplant patient: case report and review of the literature. Transpl Infect Dis 2008;10:117-122
12. Antas PR, Brito MM, Peixoto E, Ponte CG, Borba CM. Neglected and emerging fungal infections: review of hyalohyphomycosis by *Paecilomyces lilacinus* focusing in disease burden, in vitro antifungal susceptibility and management. Microbes Infect 2012;14:1-8
13. Pastor FJ, Guarro J. Clinical manifestations, treatment and outcome of *Paecilomycese lilacinus* infections. Clin Microbiol Infect 2006;12:948-960
14. Itin PH, Frei R, Lautenschlager S, Buechner SA, Surber C, Gratwohl A, et al. Cutaneous manifestations of *Paecilomyces lilacinus* infection induced by a contaminated skin lotion in patients who are severely immunosuppressed. J Am Acad Dermatol 1998;39:401-409
15. Kim JR, Kim DH, Jang JH, Sung HS, Kim MN. A case of fungal keratitis caused by *Purpureocillium lilacinum*: a microbiological review of Korean cases. Korean J Med Mycol 2016;21:84-91