Cutaneous Hyalohyphomycosis Caused by *Paecilomyces marquandii* -A Case Report-

Che-Hao Hsu  Ming-Tuo Chuan*  Wan-Ting Chiu  Shu-Ling Hu

*Paecilomyces* species are ubiquitous saprophytic fungi that rarely cause human infections. We report herein a case of an immunocompromised patient with cutaneous hyalohyphomycosis caused by *P. marquandii*. The 68-year-old male suffered from diabetes mellitus, chronic obstructive lung disease, and iatrogenic Cushing syndrome due to a prolonged use of a systemic steroid for asthma. He fell down in the farm while gardening and many pustules and fluctuating ulcerative nodules with pus discharge then developed gradually on bilateral lower extremities. He had been treated as having cellulitis with intravenous antibiotics but the skin lesions progressed. Direct light microscopy of pustule scrapings in potassium hydroxide (KOH) revealed hyaline fungal hyphae. A histopathologic examination revealed dense acute and chronic inflammatory cell infiltration with abscess formation. Both periodic acid-Schiff and Gomori's methenamine-silver nitrate stains demonstrated septate hyphae and spores in the abscess. *Paecilomyces marquandii* was identified based on the morphological characters in culture. The cutaneous lesions were lessened gradually after the treatment with low-dose oral itraconazole (200 mg/day) for 3 months. This is the first report of a cutaneous infection caused by *P. marquandii* in Taiwan. (Dermatol Sinica 24: 52-57, 2006)

Key words: Hyalohyphomycosis, *Paecilomyces marquandii*, Itraconazole, Fungal infection

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INTRODUCTION

Hyalohyphomycosis is caused by a heterogeneous group of opportunistic fungi that produce hyaline hyphae in tissue. The term often refers to infections caused by infrequent opportunistic pathogens, such as *Fusarium*, *Paecilomyces*, and *Acremonium*.

*Paecilomyces* species are commonly isolated from soil and decaying organic matter. Infections in humans are rarely caused by these fungi. There are a few reported culture-proven cases of cutaneous disease caused by *Paecilomyces* species. The majority of *Paecilomyces* infections occur either iatrogenically or in immunocompromised hosts. Most of the *Paecilomyces* infections involved endophthalmitis after intraocular lens implantation. *Paecilomyces* is also known to cause postsurgical sinusitis, pleural effusions, and prepatellar bursitis after joint aspiration. *Paecilomyces* species other than *P. lilacinus*, such as *P. marquandii*, infrequently caused infections. To our knowledge, only two cases of cutaneous infections caused by *P. marquandii* have previously been reported. We present here one more case of cutaneous hyalohyphomycosis caused by this fungus.

CASE REPORT

A 68-year-old Taiwanese male had diabetes mellitus (DM), chronic obstructive lung disease (COPD), and iatrogenic Cushing syndrome due to a prolonged use of systemic
Paecilomyces marquandii

steroid for asthma. He fell down in the farm while gardening and had many abrasions on bilateral legs initially. Thereafter, many pustules and fluctuating ulcerative nodules with pus discharge developed gradually on both of his lower extremities (Fig. 1). No lymph nodes were palpable. The patient was diagnosed as cellulitis and treated with intravenous antibiotics, but the cutaneous lesions progressed. The patient visited our clinic, and direct light microscopy of pustule scrapings in potassium hydroxide (KOH) revealed hyaline fungal hyphae. A skin biopsy was taken from the patient’s left thigh for pathology and culture for routine bacteria, acid-fast bacilli, and fungi.

A histological examination revealed epidermal ulceration with dense and chronic inflammatory cell infiltration, abscess formation and focal foreign body giant cell reaction (Fig.

Fig. 3
At 27°C, fungal culture on 2% malt extract agar (MEA) was powdery and velvety in texture. The color was initially white then became light yellow (A) and the reverse was olive-brown (B).

Fig. 4
(A) Conidiophores were branched and bore the phialides on the tips. The phialides consist of a swollen basal part, tapering into thin and distinct necks. (B) Conidia were hyaline, unicellular, ellipsoidal and smooth-walled. (C) Chlamydo spor was present in the submerged hyphae.
Both periodic acid-Schiff and Gomori’s methenamine-silver nitrate stains demonstrated branched, septate hyphae and spores in the abscess and upper dermis (Fig. 2B & 2C).

The fungus grew rapidly on 2% malt extract agar (MEA) in one week. At 27°C, the colony was powdery and velvety in texture. The color was initially white, then became light yellow and the reverse side was olive-brown (Fig. 3). The microscopic morphological study showed hyaline branched septate hyphae, conidiophores, phialides, conidia and chlamydospores. Conidiophores were branched and bore the phialides on the tips. The phialides consisted of a swollen basal part, tapering into a thin, distinct necks (Fig. 4A). Conidia were unicellular, ellipsoidal and smooth-walled (Fig. 4B). Chlamydospores were present in the submerged hyphae (Fig. 4C). The culture was sent to Institute of Plant and Microbial Biology, Academia Sinica for determination and was identified as \textit{Paecilomyces marquandii}. Tests for routine bacteria and acid-fast bacilli were negative. Based on the histopathological and mycological features, a cutaneous \textit{P. marquandii} infection was diagnosed.

Oral itraconazole (200 mg/day) was prescribed as monotherapy for 3 months. The ulcerative nodules were treated with topical antibiotics cream twice daily. The lesions decreased in size and the pustules eventually cleared. There was no evidence of a recurrent infection after a five-month follow-up.

**DISCUSSION**

The term hyalohyphomycosis, as opposed to phaeohyphomycosis, denotes infections caused by fungi producing hyaline, septate hyphae in the host tissue.\textsuperscript{9} Hyalohyphomycoses are caused by a heterogeneous group of opportunistic pathogens (19 genera then) that produce hyaline hyphae in tissue.\textsuperscript{1} It is not introduced to replace well-established terms, such as aspergillosis, but refers to infrequent opportunistic pathogens, including species of \textit{Fusarium}, \textit{Paecilomyces} and \textit{Acremonium}.\textsuperscript{2}

Our case is a rare instance of hyalohyphomycosis caused by \textit{Paecilomyces marquandii}. The genus \textit{Paecilomyces} was established in 1907 for \textit{P. variotii}, thereby distinguishing the genus from \textit{Aspergillus} and \textit{Penicillium}.\textsuperscript{1} \textit{Paecilomyces} is a filamentous fungal genus which includes several species: \textit{P. crustaceus}, \textit{P. fumosoroseus}, \textit{P. javanicus}, \textit{P. lilacinus}, \textit{P. marquandii}, \textit{P. variotii} and \textit{P. viridis}. The habitat of the \textit{Paecilomyces} species is principally soil, but also can be found in dry pasture and decomposing vegetable matter.\textsuperscript{1} The majority of \textit{Paecilomyces} infections occur either iatrogenically or in immunocompromised hosts, and only five \textit{Paecilomyces} infections have been reported to occur in immunocompetent hosts.\textsuperscript{5} Suppression of the cell-mediated immune system is probably a predisposing factor to infections by \textit{Paecilomyces} species.\textsuperscript{5}

Two major pathogenic species of \textit{Paecilomyces} are \textit{P. lilacinus} and \textit{P. variotii}, with the former causing the most reported infections.\textsuperscript{3-5} To our knowledge, infections caused by \textit{P. marquandii} are infrequent. Besides the case that we report here, only two previous cases have been reported (Table 1). One was reported by Harris \textit{et al.}\textsuperscript{8} from a kidney transplant patient who developed deep cellulitis. The other occurred in a 50-year-old white male who had undergone a renal transplantation with immunosuppressive therapy. The skin manifestations in these cases included erythematous indurated lesions, ulcer and pustules. The infections were limited in the lower extremities. All 3 patients were immunocompromised. Although history of local trauma was noted only in our patient, one case occasionally worked outdoors in his garden was recorded.\textsuperscript{5}

A definitive diagnosis of the etiology of hyalohyphomycosis requires culturing to identify the causing organism.\textsuperscript{2} Most cases of cutaneous \textit{Paecilomyces} infections were diagnosed with routine culturing. On tissue section, PAS-positive \textit{Paecilomyces} hyphae can usually be seen. The hyphae are morphologically irregular and may demonstrate both 45° and 90° branching. Unlike \textit{Aspergillus}, \textit{Paecilomyces} may exist in various forms in tissue, and conidia and
phialides may also be present. The most distinguishing feature of the genus is the characteristic shape of the phialides, swollen at the base and terminating into long, slender tubes, frequently curved or bent away from the main axis. There are also long and unbranched chains of smooth, ellipsoidal to fusiform conidia produced from the tips. P. marquandii is distinguished from P. lilacinus by the smooth-walled, hyaline conidiophores, and chlamydospore-like cells that are usually present. Moreover, unlike most species of Penicillium, Paecilomyces species do not form blue or green colonies.

Different Paecilomyces species tend to have different sensitivities to antifungal agents. P. variotti is sensitive to amphotericin B, whereas P. lilacinus and P. marquandii appears more susceptible to the imidazoles. The previous two cases of cutaneous infections by P. marquandii responded well to theazole antifungal drugs. One case was successfully treated with intravenous miconazole for 41 days. During the last three weeks of parenteral miconazole therapy, the patient also treated with locally applied heat therapy because in vitro the Paecilomyces grew better at 25°C than at 37°C. The other was cured with oral itraconazole 400 mg daily for 3 weeks. The skin lesions in our case also resolved gradually after oral itraconazole 200 mg daily for 3 months.

In conclusion, we report a rare case of cutaneous hyalohyphomycosis caused by P. marquandii. We speculate that traumatic implantation of the organism is likely responsible for the infection in our patient. This case highlights the increasing significance of opport-

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**Table 1: Cases of Paecilomyces marquandii infections described in the literature**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Age</th>
<th>Sex</th>
<th>Clinical presentation</th>
<th>Underline</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harris et al.</td>
<td>56</td>
<td>F</td>
<td>cellulitis of the left leg; erythematous, ulcerated area</td>
<td>renal transplant, DM</td>
<td>Parenteral miconazole for 41 days</td>
<td>Cure</td>
</tr>
<tr>
<td>Naldi et al.</td>
<td>50</td>
<td>M</td>
<td>erythematous area on the anterior aspect of the left leg</td>
<td>renal transplant</td>
<td>Oral itraconazole for 3 weeks</td>
<td>Cure</td>
</tr>
<tr>
<td>Present report</td>
<td>68</td>
<td>M</td>
<td>many pustules and ulcerative nodules on bilateral legs.</td>
<td>DM, COPD, iatrogenic Cushing syndrome</td>
<td>Oral itraconazole for 3 months</td>
<td>Cure</td>
</tr>
</tbody>
</table>
tunistic telluric fungi in immunosuppressed hosts. Identification of Paecilomyces as a pathogen should be followed by species identification since antifungal susceptibilities vary. Based on our experience and that of previously published reports, cutaneous infection caused by Paecilomyces marquandii responded well to azole antifungal drug as monotherapy or combination of local heat therapy as needed.

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REFERENCES