

Extensive *Exserobium* infection in a burn patient

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Key words: burn; dematiaceous fungi; *Exserobium rostratum*; phaeohyphomycosis.

INTRODUCTION

Dematiaceous fungi are an uncommon cause of skin infections and rarely cause widespread cutaneous infections except in immunosuppressed patients.^{1,2} We report a case caused by *Exserobium rostratum* in a patient with extensive burns and no exposure to compounded corticosteroids.

CASE REPORT

A 71-year-old woman originally hospitalized with 40% total body surface area fourth-degree burns (ie, into subcutaneous tissue) and respiratory failure subsequently had skin discoloration in her groin and overlying her exposed quadriceps. Her hospital course was complicated by fever and episodes of hypotension in spite of broad antimicrobial coverage with levofloxacin, vancomycin, and meropenem and fluconazole. She underwent 2 surgical debridements separated by 6 days to her right lower extremity, right side of the chest, and right arm down to fascia. Pathology specimens from her right lower extremity debrided tissue showed necrosis with no organisms seen on routine or special stains. Tissue cultures were pending from the right arm and right side of the chest from her first and second operations, respectively. Physical examination found an exposed right quadriceps muscle with areas of greenish-grey discoloration (Fig 1). Extending from the left proximal medial thigh was a velvety greenish-yellow confluent plaque with flecks of brown pigmentation and scattered pink macules on the leading edge of the plaque (Fig 2). Pseudomonas infection was in the differential diagnosis because of the greenish color and necrosis in the clinical setting of a burn patient. Also in the differential diagnosis was a fungal infection because of the velvety appearance and brownish-black discoloration.

Abbreviations used:

KOH: potassium hydroxide
PCR: polymerase chain reaction

A smear was taken from the green and brown areas of the left thigh plaque and stained with potassium hydroxide (KOH) 5% with chlorazol black E stain. In addition to abundant hyphae, a structure resembling a septate cigar-shaped fruiting body was observed that could be consistent with *Bipolaris*, *Drechslera*, or *Exserobium* (Fig 3). Empiric treatment was initiated with liposomal amphotericin B at 3 mg/kg/d, which was 300 mg/d in the patient for 6 days. Tissue cultures eventually grew mold identified as *Exserobium rostratum* based on the morphologic characteristics of the conidia, which were smooth walled with multiple distosepta, dark basal, and distal septa and having the characteristic protruding hila. The patient's condition deteriorated quickly and, although voriconazole, 200 mg intravenously every 12 hours, had been added, she only received a loading dose before her family elected to place her in hospice care.

DISCUSSION

Exserobium species are saprophytic, ubiquitous fungi commonly present in grasses and soil of warm tropical and subtropical regions. When pathogenic, it is similar to the other causes of phaeohyphomycotic infections, including *Bipolaris*, *Alternaria*, *Drechslera*, and *Curvularia* in that *Exserobium* may cause superficial, cutaneous, or subcutaneous infections.¹ For subcutaneous infections, the most common clinical presentations are single cysts, nodules, or plaques in trauma-prone areas. In a review of all published cases of *Exserobium* species

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Fig 1. Cutaneous *Exserobilium*. Anterior thighs show exposed quadriceps with greenish-grey discoloration and scattered pink macules.



Fig 2. Cutaneous *Exserobilium*. Velvety yellow-green and brown plaque from proximal medial left thigh.

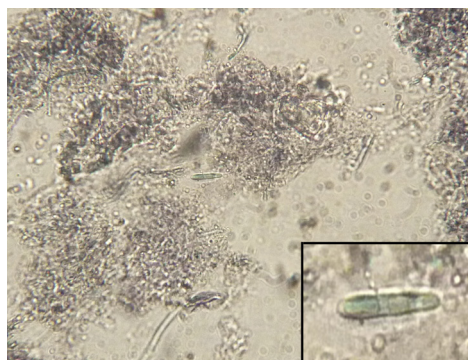


Fig 3. Cutaneous *Exserobilium* conidia. Skin smear taken from left medial thigh plaque shows fungal hyphae and a cigar-shaped septate conidium (50 μ m long) staining green with chlorazol black E and KOH 5%.

infections before 2012, the skin was found to be the second most frequent site after sinuses.² Among the various presentations were subcutaneous nodules,¹ chronic plaques,^{3,4} necrotic purpura,^{5,6} hemorrhagic vesicles,^{7,8} and nonhealing ulcers.^{9,10} In 2012, *Exserobilium rostratum* was identified as the cause of fungal meningitis secondary to contamination of compounded corticosteroids and has been linked to 751 cases with at least 64 deaths.^{11,12}

Extensive burns are a well-known predisposing factor to infections of all varieties. Common viral and

bacterial agents such as herpes simplex virus and *Pseudomonas* species, respectively, have been classically associated with burn patients. Of the fungi, *Candida* species were identified as the most common cause of positive fungal infections from any site among 6918 burn patients; however, infections with mold species had the highest mortality rate at 41% compared with 11% with *Candida* species.¹³ No other case of *Exserobilium* infection in a burn patient was found in the English-language literature.

The diagnosis of fungal infections is usually slow because it relies on fungal culture and biochemical assays for identification. Newer diagnostic techniques using matrix-assisted laser desorption ionization time-of-flight mass spectroscopy or multiplex polymerase chain reaction (PCR) offer the promise of faster diagnosis and even antifungal susceptibilities, but they are not yet widely available.¹⁴ Recently, a PCR-based assay was developed with primers designed against the ITS-2 region of the *Exserobilium* genome that had a sensitivity of 29% compared with 14% for fungal culture.¹⁵ This PCR assay was used on a different cohort of 40 patient samples known to be positive for *Exserobilium* species and found to have a sensitivity of 50%; however, polyclonal antibodies raised to several fungal species had a sensitivity of 100% in the same study.¹⁶ This case, however, illustrates the diagnostic power and speed of the routine fungal smear. We typically use a commercial preparation of chlorazol black E mixed with KOH 5% and dimethyl sulfoxide 10% (Delasco, Council Bluffs, IA), which stains the chitinous fungal wall green as in Fig 3. A drawback to the chlorazol stain compared with only KOH preparations is that the pigmented hyphae of dematiaceous fungi are completely obscured by the chlorazol as they were in our case.

Similar to other phaeohyphomycosis, for isolated nodules, cysts, or plaques, surgical excision with or without debridement has been used with success.^{1,6,9,10,17,18} In addition to surgical excision, advanced infections may benefit from antifungal therapy. *Exserobilium* spp. isolates are found to be the most susceptible to amphotericin B, voriconazole, itraconazole, posaconazole, and terbinafine while the highest minimum inhibitory concentrations were found with fluconazole and the echinocandins.^{12,19} Interestingly, our patient had been on fluconazole for 5 days when she grew positive *Exserobilium* cultures confirming the organism's relative resistance to this agent. Additionally, there was a 4-day delay between the first culture showing mold and the initiation of amphotericin, which may have played a role in our patient's poor outcome. It is possible that the *Exserobilium* was simply growing

on already necrotic tissue; however, given that 2 separate tissue cultures from 2 different operating room debridements grew the same organism, it is likely that the *Exserohilum* played a pathogenic role.

This case illustrates the flexibility of the *Exserohilum* species to cause human disease in a variety of settings as reported here in a burn patient. Dermatology is one of the few medical specialties that retains the ability to perform and interpret the fungal smear in a variety of clinical situations, which may aid in narrowing the differential and optimizing antimicrobial therapy.

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