

## *Phaeoacremonium parasiticum* myositis: A case report with imaging findings

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*Phaeoacremonium parasiticum* is an unusual cause of human fungal infection that was first reported in 1974. Since the initial description, only a small number of cases have been reported in the world literature. We report on the clinical and imaging findings of *Phaeoacremonium parasiticum* myositis in a renal transplant recipient. To our understanding, this is a first case report of *Phaeoacremonium parasiticum* myositis that includes imaging findings.

### Case report

A 56-year-old Caribbean-American man presented with a 10-year history of intermittent left thigh swelling. He had a past medical history of renal transplant, diabetes, gout, and hyperlipidemia.

The patient grew up in the Virgin Islands, and at the age of 17 years, he had a misadventure climbing a mango tree. A branch broke, sending him earthward, and his left thigh was impaled on a 6-cm branch. He dangled for an hour and a half before being extricated. He was treated in a local hospital for at least a month, but there was no surgical exploration. He underwent a renal transplant at the age of 52, in 2004, and since that time he suffered intermittent swelling and discomfort in his left thigh. The most recent episode of

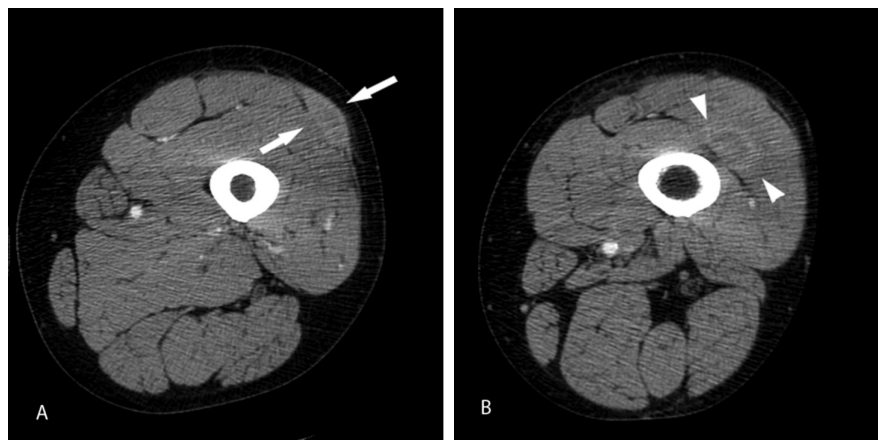


Figure 1. 56-year-old man with *Phaeoacremonium parasiticum* myositis. Axial CT of the left thigh with intravenous contrast. **A.** In the soft tissues of the lateral thigh, a 5.6 x 4.4 x 1.5-centimeter rim-enhancing abscess tracking appears between the iliotibial band and the underlying anterior compartment musculature (arrows). **B.** Note the deep extension into the underlying vastus lateralis (arrowheads).

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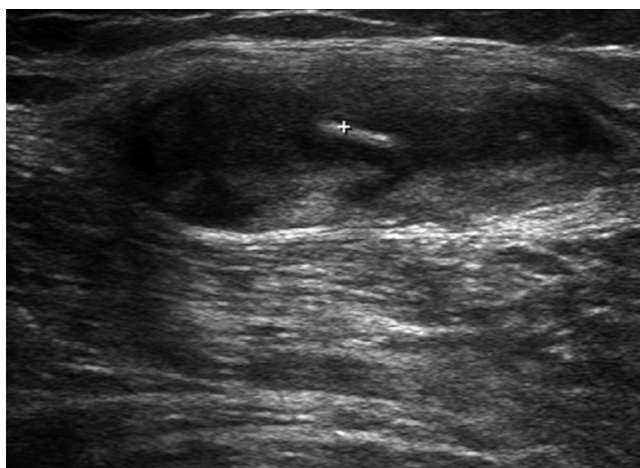
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this occurred in May or early June of 2008, when he noticed a marked increase in swelling and pain. He went to the emergency room, and was given some Bactrim. A few days later, on examination, the patient had a temperature of 100 F. His left thigh had a fullness in the lateral aspect, although it was not tender to palpation and there was no erythema. Laboratory findings were unremarkable with a white blood cell (WBC) count of 5.45K/uL (normal 4.3–10.0). At that time, a CT scan showed a 6 x 4 x 2 enhancing abscess cavity in the left anterior thigh with extension to deep structures (Fig. 1).

## ***Phaeoacremonium parasiticum* myositis: A case report with imaging findings**

He was taken to the operating room for irrigation and debridement, and two abscess cavities were opened. At that time, a small foreign body was removed (Fig. 2). It was later identified as a piece of wood.



**Figure 2.** 56-year-old man with *Phaeoacremonium parasiticum* myositis. Intraoperative sonogram of the left thigh. Ellipsoid fluid collection with hyperechoic debris appears in the lateral thigh. Within the fluid collection, a linear hyperechoic foreign body measuring about 0.5 x 0.2 x 0.1 cm (cross mark) appears.

Following discharge from the hospital, he took oral levofloxacin for a couple of weeks. Fungal cultures from the operative specimens were positive, and definitively identified as *Phaeoacremonium parasiticum* by DNA sequence analysis. Antifungal treatment was begun with posaconazole (Noxafil). Followup MRIs were performed at 3, 6, and 9 months after the initiation of posaconazole treatment (Figs. 3-4).

There was a nodular, somewhat serpiginous focus of enhancement within the vastus lateralis muscle that presumably represented infected granulation tissue on 3-month followup MRI. Enhancing edema appeared in the surrounding vastus lateralis without rim-enhancing abscess. The contrast enhancement and edema in the vastus lateralis muscle and a conglomerated enhancing lesion had decreased in size on 9-month followup. On physical exam at 9 months followup, the patient had slight tenderness at the thigh but no fevers, chills, streaking, redness, or regional adenopathy.

### **Discussion**

This is the first reported observation of fungal myositis caused by *Phaeoacremonium parasiticum*, an unusual cause of human fungal infections. It was first reported in 1974 as *Phialophora parasitica*, causing subcutaneous tissue infection in a renal-transplant recipient (1). In 1996, a new hyphomycete genus, *Phaeoacremonium*, was proposed for six new species, including the type species, *P. parasiticum*, which was

formerly accommodated in *Phialophora* (2). Presently, the *Phaeoacremonium* genus includes 22 species (3). *Phaeoacremonium* is a genus of dematiaceous hyphomycetes (dark-pigmented fungi) characterized by the presence of melanin or melanin-like pigments in their vegetative cell walls, conidia, or both. These saprophytic fungi are widely distributed in the environment, particularly in soil, wood, and other plant matter.

Infections caused by dematiaceous fungi include eumycotic mycetoma, chromoblastomycosis, and phaeohyphomycosis. The formation of granules in tissue is diagnostic of mycetoma. The formation of sclerotic bodies is the diagnostic hallmark of chromoblastomycosis. Phaeohyphomycosis comprises a heterogeneous group of infections that range from superficial, cutaneous, and subcutaneous to systemic and are caused by more than 100 species of diverse dematiaceous fungi. In their invasive form in host tissue, these fungi develop as phaeoid yeastlike cells, hyphal elements, pseudohyphal elements, moniliform hyphae, or a combination of any of these forms (4).

Fungal infections in solid-organ-transplant patients are a major concern due to their associated morbidity and mortality. The prevalence of this problem ranges from 5% among kidney transplants to 50% among liver transplants. The outcome of fungal infection in solid-organ transplantation also varies by type of organ transplant (5). *Candida* and *Aspergillus* have been common fungal pathogens in the solid-organ-transplant population; however, the dematiaceous fungi are increasingly recognized in this immunocompromised patient population (6). Singh et al. reviewed 34 cases of dematiaceous fungal infections in solid organ transplant recipients (7). Not like commonly observed fungal infections after transplantation (for example, candidiasis and aspergillosis), which usually occur early (within 3 months of transplantation) and present predominantly as systemic invasive infections, infections due to dematiaceous fungi occurred late and presented most frequently as skin and/or soft-tissue infections. Environmental or accidental trauma preceded such lesions in 48% of the cases. The lesions were usually painless, had indolent courses, and smoldered for weeks to months before being brought to the attention of a physician.

*Phaeoacremonium* species are mainly found in the soil, in woody plants as endophytes, or as agents of plant disease (8). The spectrum of disease caused by *P. parasiticum* includes subcutaneous infection (1, 9), eumycetoma (10), arthritis (11), osteomyelitis (12), and disseminated disease including fungemia, endocarditis, and cases with multiorgan involvement (13-15). Most reported *Phaeoacremonium* cases were initiated by traumatic inoculation (16). However, in many reported cases, no known trauma occurred (9, 12). Of cases reported to date, many involve immunocompromised patients who are organtransplant recipients (1, 9, 14, 17). It is striking that many case reports involved renal-transplant patients with subcutaneous and/or joint infections, mostly involving the leg (1, 9, 17).

Fungal involvement of the musculature is uncommon but has been described in case reports. Most cases have in-

***Phaeoacremonium parasiticum* myositis: A case report with imaging findings**

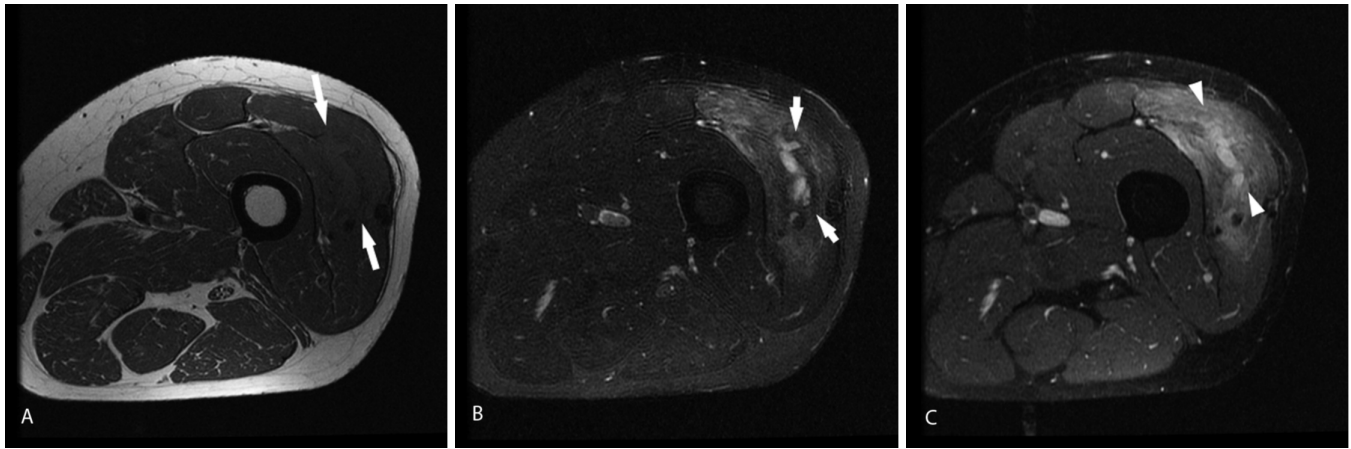


Figure 3. 56-year-old man with *Phaeoacremonium parasiticum* myositis. MRI of the left thigh with IV contrast obtained 3 months after surgical drainage. **A.** Axial T1-weighted MRI shows a nodular lesion of intermediate signal intensity (long white arrows) within the substance of the vastus lateralis muscle. **B.** Fat-suppressed, T2-weighted MRI shows hyperintensity within the lesion, and a surrounding rim of low signal intensity (short white arrows) that presumably represents infected granulation tissue. **C.** Axial, fat-suppressed, T1-weighted MRI following intravenous gadolinium-based contrast injection shows a nodular, somewhat serpiginous focus of enhancement within the vastus lateralis muscle (arrowheads). There is enhancing edema in the surrounding vastus lateralis muscle, and no rim-enhancing abscess. **D.** Sagittal STIR MRI shows superficial and deep extension of the lesion, but the remaining muscles of the anterior compartment and the bone marrow are normal in signal.

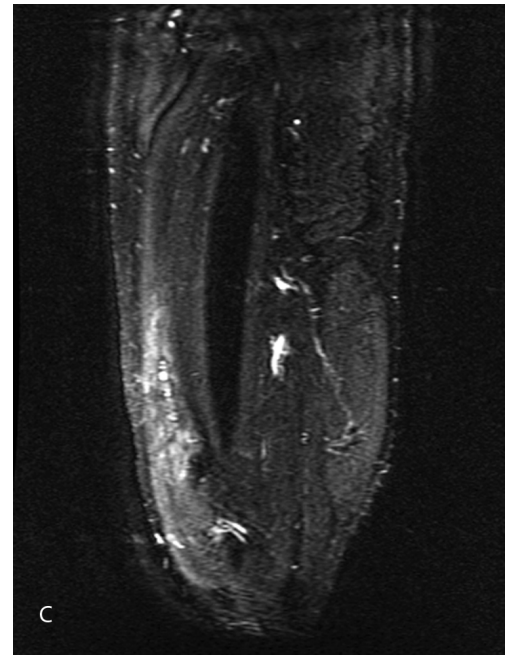
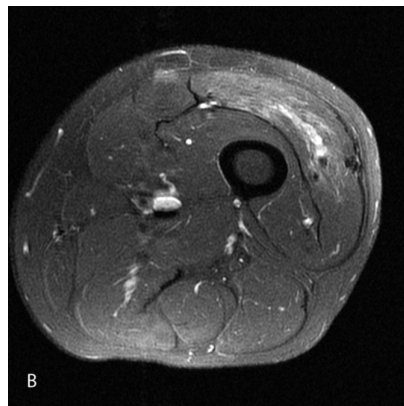
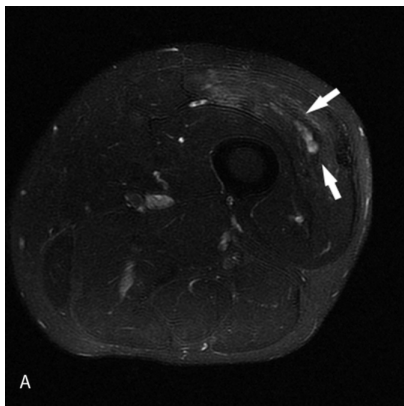
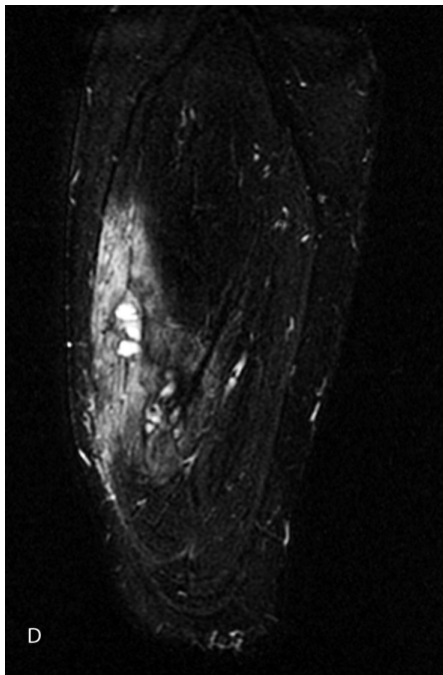


Figure 4. 56-year-old man with *Phaeoacremonium parasiticum* myositis. Followup MRI of the left thigh with IV contrast 9 months after surgical drainage. **A.** Axial, fat-suppressed, T2-weighted MRI shows hyperintensity lesion with surrounding edema in the vastus lateralis muscle that is decreased in size and intensity. There is a persistent low-signal-intensity rim (arrows). **B.** Axial, fat-suppressed, T1-weighted MRI following intravenous gadolinium-based contrast injection shows small conglomerated enhancing lesion that is decreased in size. **C.** Sagittal STIR MRI shows resolved extension into the deep tissue.

## Phaeoacremonium parasiticum myositis: A case report with imaging findings

involved immunocompromised patients; occasionally, fungal myositis has been reported in immunocompetent patients. The symptoms of fungal myositis often overlap with that of bacterial myositis. A history of severe immunosuppression and evidence of other sites of fungal infection may point to a fungal etiology (18). The most commonly reported cause of fungal myositis is *Candida* spp. (19). *Cryptococcus neoformans* (20), *Histoplasma capsulatum* (21), *Coccidioides* spp. (22), *Aspergillus* spp. (23), *Pneumocystis jirovecii* (24), and *Fusarium* spp. (25) have also been reported.

Reports on MRI findings of fungal myositis are rare. Schwartz et al. (19) reported multimodality imaging of the lower extremity in the case of *Candida tropicalis* myositis and revealed changes in the muscles typical of both myositis and solid-organ fungal disease. MRI demonstrated these findings best, with good visualization of the numerous microabscesses, similar in appearance to the lesions seen in solid-organ fungal disease. Those microabscesses were superimposed on a background of diffuse muscular signal abnormality, consistent with inflammation. Our patient presented with a subcutaneous and intramuscular abscess demonstrated as a rim-enhancing lesion on postcontrast CT. After the surgery, initial followup MRI demonstrated a nodular, lobulated, and serpiginous enhancing lesion on top of diffuse myositis. The lesion was considered to be granulation tissue, and it responded to antifungal treatment. The low-signal-intensity rim observed in microabscesses of *Candida* myositis also was observed in our case, mainly on the fluid-sensitive sequences. The significance of this low-signal-intensity rim related to fungal infection is uncertain, and further imaging and pathologic study is necessary.

The ideal treatment for *P. parasiticum* infection is not defined, and the paucity of cases does not allow for meaningful comparisons of antifungal agents. Agents commonly used in reported cases include amphotericin B preparations and azoles, but terbinafine and 5FC have also been administered (10, 11). In the case we report, the use of posaconazole, a triazole antifungal agent, was empiric. Surgical debridement appears to be an important aspect of the treatment of localized *P. parasiticum* infection. However, wide excision of the lesions has been recommended because of the possibility of relapse (3).

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## ***Phaeoacremonium parasiticum* myositis: A case report with imaging findings**

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***Phaeoacremonium parasiticum* myositis: A case report with imaging findings**