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Bloodstream Infection Caused by *Mucor velutinosus*

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Abstract

A 74-year-old man with diffuse large B-cell lymphoma was admitted to our institution for chemotherapy treatment. He developed a neutropenic fever, and blood cultures were drawn. After 48 hours from the time of draw, 2 of 2 blood culture bottles flagged positive. Thin, septate hyphae were seen on Gram stain of both blood culture bottles. In 1 day, gray fluffy mold began growing on chocolate agar plates from both of the positive bottles. A tease prep revealed a Mucorales sporangioophore. The specimen was sent out for further identification, and sequencing identified the mold as *Mucor velutinosus*.

Keywords

blood; mold; *Mucor*; Mucorales

CASE REPORT

A 74-year-old man was transferred to our tertiary referral center with altered mental status. One month prior, he had been admitted to an outside hospital with fever and pancytopenia and was diagnosed with hemophagocytic lymphohistiocytosis. He was treated with systemic steroids and etoposide. He continued to deteriorate and was transferred for further hematology workup. A bone marrow biopsy was performed, and the patient was subsequently diagnosed with diffuse large B-cell lymphoma. Prior to chemotherapy, he developed fluoroquinolone-resistant *Escherichia coli* bacteremia. He was treated with piperacillin/tazobactam, and his bacteremia resolved with negative blood cultures drawn 3 and 5 days after treatment. He was started on chemotherapy on day 21 of admission with CHOP (cyclophosphamide, hydroxydaunorubicin, oncovin, prednisone) and rituximab, and he continued to decline clinically with increasing liver transaminase levels, refractoriness to platelets, and worsening altered mental status. Two sets of blood cultures were drawn 1.5 hours apart 28 days into admission as follow-up to the *E. coli* bacteremia. Two of 2 sets became positive approximately 48 hours later, demonstrating the isolate was likely not a contaminant. Gram stain of the blood cultures demonstrated thin, filamentous, septate hyphae (Fig. 1). The blood culture was plated on chocolate agar and grew a gray fluffy mold in 1 day from both sets. The tease prep revealed sporangioophores consistent with a

Mucorales mold. The isolate was sent to the Centers for Disease Control and Prevention in Atlanta, Ga, and was sequenced as previously described.¹ Concatenated ITS and D1/D2 sequences were compared with type sequences described by Alvarez et al.² The morphology and sequence phylogeny clearly identified the isolate as *Mucor velutinosus*.

Mucor velutinosus was first described by Alvarez et al² in 2011. It is taxonomically placed in the order Mucorales and the family Mucoraceae, aerobic filamentous fungi formerly called zygomycetes (Fig. 2).³ Mucorales, also known as mucormycetes, are a ubiquitous group found worldwide in soil, decaying matter, and contaminated food. The majority of human infections are acquired through spore inhalation, leading to rhino-orbital-cerebral disease or pulmonary mucormycosis. Other modes of transmission include cutaneous inoculation and ingestion, leading to gastrointestinal mucormycosis.⁴ The most common underlying disease in patients with mucormycosis is diabetes mellitus, followed by hematologic malignancies. Disseminated disease is rare and is more common in patients on deferoxamine therapy or those who are severely immunosuppressed.^{5,6} Mucorales will usually grow in culture media after 2 to 5 days of incubation, producing fluffy, white, gray, or brownish colonies that often “lift the lid” of the Petri dish.⁷ Microscopically, the hyphae are wide and pauciseptate to aseptate. Sporangiophores can be branched and have terminal round sporangia. In addition to laboratory identification, histopathologic diagnosis can be inferred by identifying broad, irregularly shaped, pauciseptate hyphae with right angle branching,⁸ which was not present in this patient’s bone marrow biopsy that was performed 6 days prior to the blood culture. Tissue sections can be stained with Grocott-Gomori methenamine-silver nitrate, periodic acid–Schiff, or fluorescent staining.⁶ However, no genus or species identity can be made by histopathology. This case is unusual, as *Mucor* infection is not generally diagnosed by blood culture. In addition, the majority of hyphae seen in the blood culture were thin septate hyphae, atypical for a mucormycete. Molds are notorious for atypical presentations. This blood culture is an example that would not elicit an empiric diagnosis of a mucormycete and could lead to incorrect empiric therapy or discarding the isolate as a contaminant. The primary source of the patient’s infection is not clear but is likely catheter associated, as there was no evidence of a primary infection, and there was no imaging performed to rule out pulmonary or rhinocerebral disease.

There has been 1 previous case report of *M. velutinosus* in a patient with an autologous stem cell transplant and no other identification of localized *Mucor* infection.⁹ There have also been reports of cutaneous infection occurring with even minor breaks in the skin, including intravenous catheters.⁴ Our patient had leukopenia (white blood cell count $<0.1 \times 10^3 \mu\text{L}$) for over 10 days prior to his diagnosis and was receiving glucocorticoids for the entirety of his admission at our institution, as well as the month prior to admission, both risk factors associated with disseminated disease. The patient was discharged to hospice the day that the blood cultures were drawn and was lost to follow-up.

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Figure 1:
Gram stain of blood culture, 100X magnification

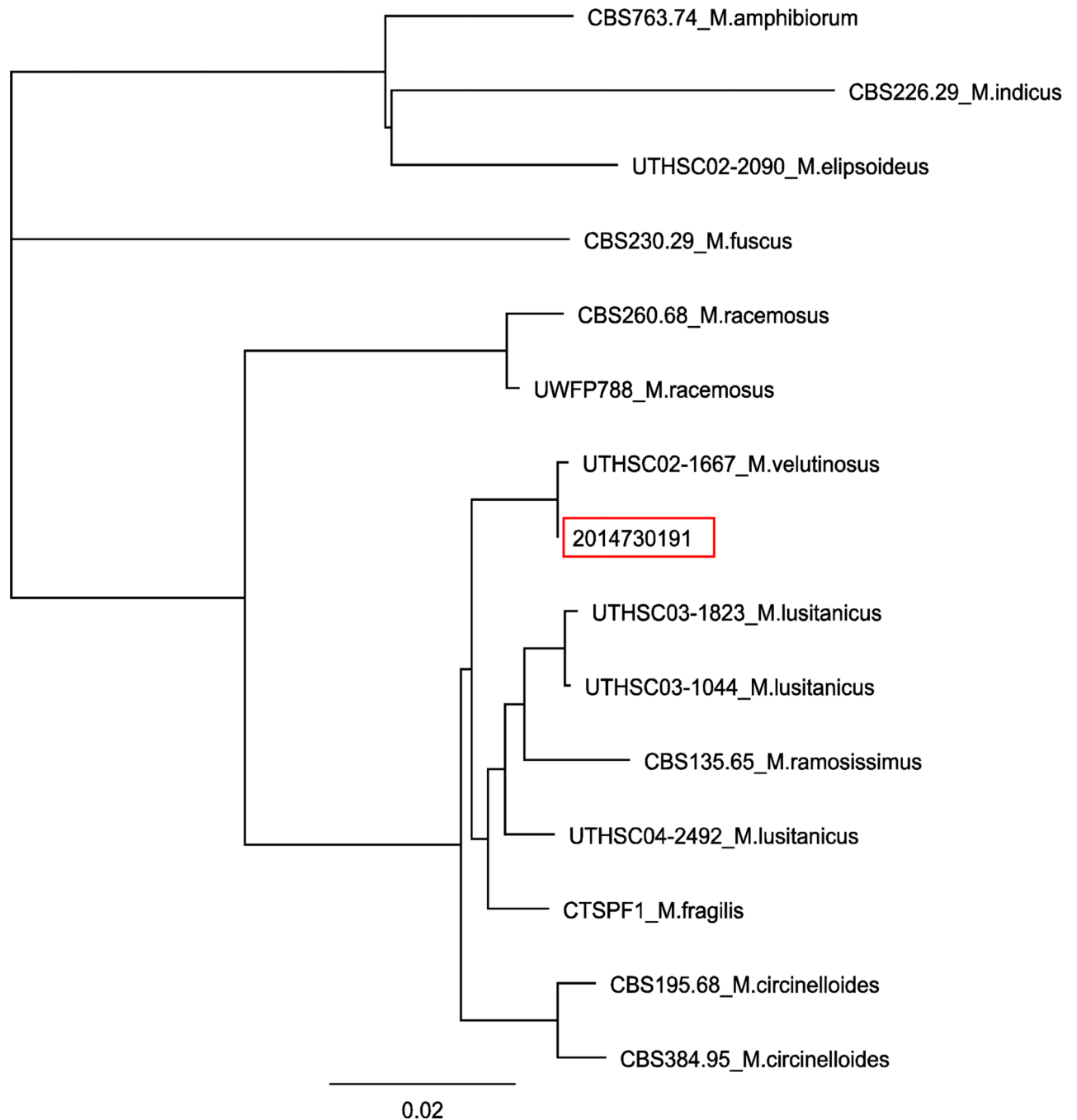


Figure 2:
Neighbor-joining phylogenetic tree of *Mucorales* species showing the patient isolate's sequence aligning most closely with *Mucor velutinosus*