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CLINICAL IMAGING

MRI with Magnetic Resonance Spectroscopy of multiple brain abscesses secondary to Scedosporium apiospermum in two immunocompromised patients☆

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Abstract

Scedosporium apiospermum is a deadly fungal infection that can infect the central nervous system, particularly in immunocompromised patients. We present two cases of Scedosporium brain abscesses. The first case was fatal and relevant conventional MRI and MR spectroscopy findings are discussed. To our knowledge, this is the first reported case of MR spectroscopy in Scedosporium apiospermum abscesses. In the second case, the patient recovered and conventional MR findings are followed over several months. In the appropriate clinical setting, conventional MR imaging and MR spectroscopy may facilitate diagnosis, earlier initiation of antifungal pharmacotherapy and surgical intervention in this frequently fatal infection.

Keywords: MRI; Magnetic Resonance Spectroscopy; Immunocompromised host; Abscess; Brain

1. Introduction

Scedosporium apiospermum (S. apiospermum) is a ubiquitous fungus that is the asexual form of Pseudallescheria boydii (P. boydii). S. apiospermum is found in many natural sites, including soil, animal manure, decaying vegetation, and polluted streams [1,2]. In the immunocompetent host, presentations include sinusitis, lung infection, or most often after traumatic inoculation through skin bruises, usually in the lower limbs, as a chronic suppurative infection known by the eponym "Madura foot" [3,4]. Central nervous system infection in immunocompetent individuals is usually associated with near drowning, aspiration of a large inoculum of fungi which likely reaches the central nervous system (CNS) through hematogenous spread after pulmonary infection [4,5], direct inoculation [5], extension from orbital infection [6], surgical procedures or ventriculoperitoneal shunting [7,8], epidural anesthesia [9] and sphenoidal sinusitis [10]. Invasive disease can occur in immunocompromised hosts, in patients with impaired anatomic barriers, and in cases of massive inoculation. When P. boydii infection with CNS involvement occurs, it most frequently manifests as either multiple or solitary parenchymal brain abscesses. The outcome is usually fatal, even when early aggressive therapeutic intervention is undertaken [6,11].

We present two cases of multiple brain abscesses secondary to S. apiospermum arising in immunocompromised patients. The first case was fatal, and we discuss relevant MR imaging findings for S. apiospermium abscess, including MR diffusion-weighted images and MR spectroscopy. To our knowledge, this is the first case describing this

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rare fungal infection with MR spectroscopy. In the second case, the patient recovered without significant neurologic deficits, and conventional MR findings over several months are presented.

2. Case report 1

A 62-year-old white male presented with symptoms of a lower gastrointestinal hemorrhage. His past medical history was significant for sclerosing cholangitis which led to orthotopic liver transplantation, with chronic immunosuppressive therapy.

On admission, the patient was found to be anemic and somnolent. He was subsequently admitted and transfused with packed red blood cells until his hematocrit stabilized, and he no longer demonstrated signs of gastrointestinal hemorrhage.

The patient subsequently acutely decompensated, with the physical exam revealing a left-sided hemiparesis. Immunosuppresants were immediately discontinued and an emergent computed tomography (CT) of the head demonstrated ill-defined hypodense lesions predominantly involving the white matter of the right temporal, posterior right frontal, and parietal lobes, with effacement of the right trigone. Contrast-enhanced CT of the head revealed a large rim-enhancing lesion extending from the right thalamus and basal ganglia through the right temporal and occipital lobes. Several other smaller rim-enhancing lesions were also present. The smaller "daughter" lesions involved primarily the deep white matter of the right cerebral hemisphere, with extension to the subcortical white matter. These patchy and ill-defined lesions involved all lobes of the right cerebral hemisphere. In addition, the right thalamus, caudate head, and anterior aspect lentiform nucleus were also involved. MRI of the brain demonstrated hyperintense lesions on T2-weighted fluid-attenuated inversion recovery (FLAIR) and T2-weighted fast spin echo (FSE) images with surrounding edema (Fig. 1A and B). After intravenous contrast, the lesions showed peripheral enhancement with thin walls (Fig. 1C). The central portions of these lesions demonstrated diffusion restriction (Fig. 1D). MRI spectroscopy using single voxel and multivoxel technique showed elevation of the lipid/lactate peak with decreased N-acetyl aspartate (NAA), choline, and creatinine peaks (Fig. 1E). The MRI and spectroscopy findings suggested abscesses.

A right frontal lobe stereotactic biopsy demonstrated a scattered collection of neutrophils and positive stains for fungal elements with septated hyphae. This initial histopathologic examination was interpreted as cerebral aspergillosis, and the patient was treated empirically with amphotericin B. However, cultures obtained during the procedure eventually grew Scedosporium apiospermum, and the patient was switched to voriconazole. Despite this intervention, the patient failed to improve and neurosurgical drainage of the abscess was performed. Post-operatively, the patient failed to extubate, became hypotensive, and was admitted to the intensive care unit, where he subsequently expired.

3. Case report 2

A 36-year old African American presented with witnessed tonic-clonic seizure and urinary incontinence. The patient had a history of relapsing diffuse large B-cell lymphoma status post autologous stem cell transplant, allogenic stem cell transplant and donor lymphocyte infusion, complicated by gastrointestinal graft versus host disease. The patient was on chronic immunosuppressive therapy.

On admission, CT of the head demonstrated bilateral low attenuation lesions in the frontal lobes. Subsequent MRI of the brain with contrast revealed bifrontal ring-enhancing lesions corresponding to heterogeneous hyperintensities on T2-weighted turbo spin echo (TSE) images with mild surrounding hyperintense edema (Fig. 2A and 2B). A third smaller ring-enhancing lesion was visualized in the left occipital cortex (not shown). MRI of the brain 5 weeks prior to presentation was within normal limits.

Three days after the admission the patient had bifrontal craniotomy. The aspiration yielded necrotic fluid and moderate size fungal hyphae with questionable septation and no thick walled yeasts. Liposomal amphotericin B was started. Posaconazole was added when the cultures grew Scedosporium apiospermum. Initial hospital course was complicated by fevers and hypotension, and broad spectrum antibiotic coverage was initiated.

The patient was transferred to our institution seven days after initial presentation for management of the Scedosporium infection. His main complaints at that time were blurry vision and headache. Antifungal therapy was switched to intravenous voriconazole and per os terbinafine. Immunosuppressive medications were decreased.

Soon after introduction of antifungal therapy, headaches and blurry vision subsided with no new neurologic deficit. Two weeks after the seizure episode, the patient's condition allowed for discharge on long term per os voriconazole and terbinafine with instructions to follow up.

At 1 month after presentation, repeat contrast enhanced MRI of the brain demonstrated mild interval decrease in the size of the three lesions with the thin peripheral enhancement (Fig. 2C). Restricted diffusion in the central portions of the lesions was consistent with abscesses (Fig. 2D). The hyperintense T2 and FLAIR vasogenic edema around the abscesses had also decreased. MRI of the brain 3 months after initial admission revealed considerable decrease in the size of the ring-enhancing lesions (Fig. 2E). Minimal central hyperintense signal on diffusion weighted imaging (DWI) was only demonstrated in the left frontal lesion (Fig. 2F). Approximately 6 months after the seizure episode, contrast enhanced MRI examination showed further improvement. The rim enhancing