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Case Report

Mycobacterium avium–intracellulare brain abscesses in an HIV-infected patient

Christopher Begley, Akshay Amaraneni, Larry Lutwick *

Department of Internal Medicine, Homer Stryker M.D. School of Medicine, Western Michigan University, Kalamazoo, MI, USA

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ABSTRACT

The *Mycobacterium avium–intracellulare* complex (MAC) is an uncommon cause of brain abscesses even in patients with acquired immunodeficiency syndrome (AIDS). We present a case of a multiple MAC brain abscesses, confirmed by brain biopsy and culture, in a patient with AIDS. The patient's initial symptoms were weakness, confusion and headaches. The patient was initially treated for toxoplasmosis and pyogenic bacterial brain abscesses with no resolution. Following treatment for MAC the patient's abscesses resolved.

Introduction

The *Mycobacterium avium–intracellulare* complex (MAC) consists of 2 closely related nontuberculous strains of mycobacterial species, *M. avium* and *M. intracellulare*. Prior to the advent of effective antiretroviral therapy and prophylaxis against MAC, opportunistic infection from disseminated MAC was commonplace among patients with HIV-infected patients with an estimated incidence of MAC bacteremia of 21 percent at 1 year and 41 percent at 2 years in a patient cohort with CD4 cell counts of $<50/\mu L$ [1]. Disseminated disease in HIV/AIDS patients appears to use the gastrointestinal tract as a portal of entry instead of the respiratory route, often presenting as a febrile illness with involvement of the liver and bone marrow [2]. Focal brain involvement is not a common presentation. We report a case of multiple brain abscesses secondary to MAC in a Hispanic man with acquired immunodeficiency syndrome.

Case report

A 47-year-old man presented to a Florida hospital emergency department with newly diagnosed and untreated HIV infection (viral load 320,000 copies/mL) and CD4 count of 22 cells/μL. The patient had initially presented to a hospital in south Florida with complaints of weakness, confusion, and headache. The patient had immigrated to the USA from Mexico 11 years prior. He lived alone and is employed as a janitor. The patient denied any history of intravenous drug use and has not been sexually active recently. In the past he had been sexually active with women only, occasionally using barrier contraception and never soliciting sexual intercourse.

At the Florida hospital, he complained of weight loss, blurry vision and intermittent lower extremity swelling. Pertinent exam findings included oral thrush, small left axillary lymphadenopathy, inguinal lymphadenopathy bilaterally and splenomegaly. Neurological exam showed unsteady gait but was otherwise unremarkable.

Having family in the state, the patient traveled by bus to southwestern Michigan for further workup. Labs on admission were significant for pancytopenia. Computed tomography (CT) of the brain revealed lesions in the right thalamus and basal ganglia capsular region. Patient subsequently underwent an MRI of the brain with contrast, which showed numerous brain lesions in the right basal ganglia, right medial frontal, right medial parietal, right lateral frontal, left lateral frontal and bilateral cerebellar lobes (Figs. 1 and 2). With concern for possible CNS toxoplasmosis, the patient was empirically treated for CNS toxoplasmosis with pyrimethamine, sulfadiazine and leucovorin. The patient was also begun on fluconazole for oral and esophageal candidiasis.

Lumbar puncture revealed glucose of 56, protein of 64, 0 RBC and 7 WBC, all lymphocytes. Serum galactomannan and (1 → 3)-β-D-glucan assays were negative. CMV and EBV testing revealed evidence of remote infection. Toxoplasma IgM and IgG were negative and toxoplasma therapy was discontinued. Routine blood cultures and blood cultures for AFB were negative.

* Corresponding author.
E-mail address: lutwick@isid.org (L. Lutwick).

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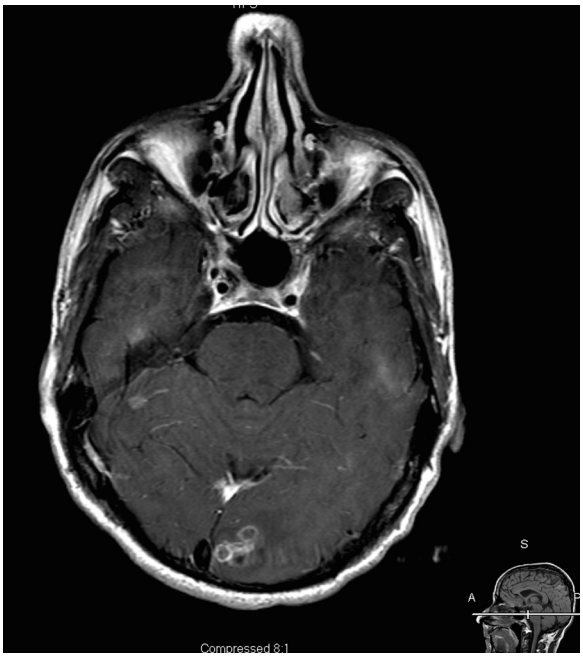

Fig. 1. Pretreatment brain MRI.

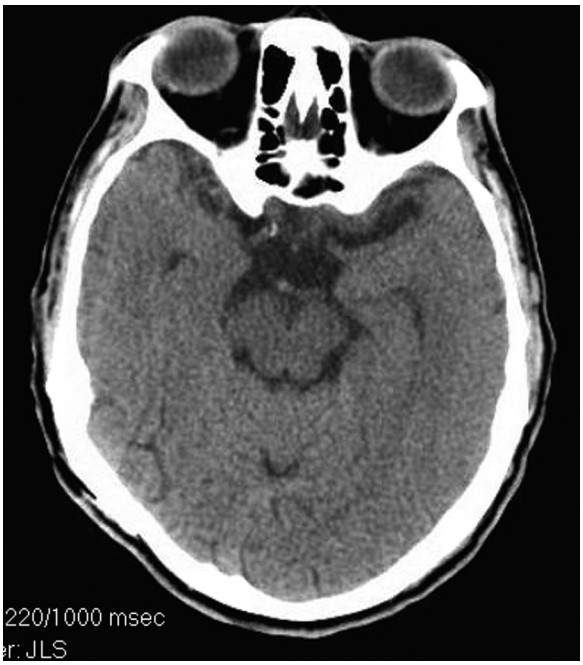

Fig. 3. 16 weeks of treatment CT scan.

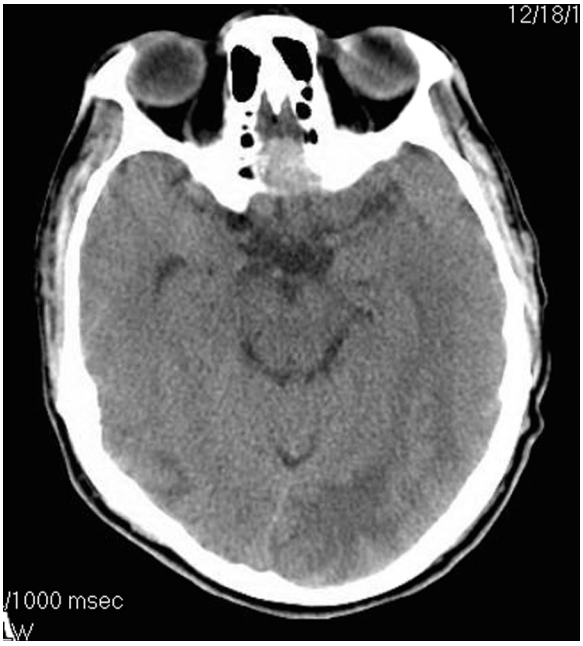

Fig. 2. Pretreatment brain CT scan.

Approximately one week into hospitalization, the patient had a seizure that was thought to be secondary to the intracranial lesions and was started on levetiracetam and dexamethasone. A transesophageal echocardiogram did not reveal any vegetations. The patient was treated on vancomycin, ceftriaxone and metronidazole for possible multicentric bacterial abscesses. A bone marrow examination showed no granulomas, fungi or AFB on special staining. Routine, fungal and AFB bone marrow cultures were negative. The patient was then begun on trimethoprim/sulfamethoxazole and azithromycin for opportunistic infection prophylaxis.

Brain biopsy was delayed because of prominent persistent thrombocytopenia (ranging around 20,000/μL). The patient was started on antiretroviral therapy with the fixed combination therapy of tenofovir/emtricitabine and lopinavir/ritonavir with broad spectrum continued antibacterial coverage although the size of the brain lesions did not shrink on subsequent imaging. The patient remained profoundly thrombocytopenic and was given a dose of eltrombopag (a small molecule agonist of the c-mpl receptor, the physiological target of the hormone thrombopoietin [3]), which increased his platelet count to over 100,000/μL.

Neurosurgery performed a right parietal sterotactic guided craniotomy with excisional biopsy. Necrotic tissue was found with no granulomas and special stains for fungi, pneumocystosis, and AFB were all negative. Six weeks following the biopsy, culture from the brain biopsy grew AFB identified as *Mycobacterium avium–intracellulare* complex. Azithromycin was discontinued and patient was started on clarithromycin, ciprofloxacin and ethambutol. Because of gastrointestinal intolerance to the clarithromycin, rifampin was substituted and his lopinavir/ritonavir combination was switched to raltegravir to avoid drug/drug interactions.

The patient followed up in the outpatient setting in the 6 months after discharge where his viral load became undetectable (<20 copies/mL) and CD4 count rose to 85/μL. Follow up CT imaging showed resolution of multiple brain lesions (Fig. 3).

Discussion

MAC consists of two phenotypically similar organisms, *M. avium* and *M. intracellulare*. The organisms are quite ubiquitous in nature being found in water, soil and food and can be acquired via inhalation or ingestion [4]. Initially a common opportunistic infection in patients with AIDS, this diagnosis has become less frequent with widespread use of combination antiretroviral therapy. Based on recent meta-analyses, the incidence of MAC infections in the post antiretroviral therapy (ART) period (2001–2008) was 0.32/100 person years (PY) as compared to 8.52/100 PY in the pre-ART period [5].

To our knowledge, there have been only a few other cases of MAC brain abscesses reported. One report described a patient who had a MAC abscess 30 months after the discontinuation of therapy for MAC in a patient on ART whose CD4 was low (31/μL) [6]. Murray et al. [7]

Table 1
Summary of previous cases.

Reference	HIV status	Age/sex	CD4 count	Site	Imaging	Underlying conditions
Our patient	Positive	47/M	22	Thalamus, frontal, temporal, cerebellar	Multiple, ring-enhancing	None
Berger et al. [6]	Positive	40/M	31	Occipital	Single mass, edema	HAART, CMV, retinitis
Murray et al. [7]	Positive	35/M	215	Fronto-parietal	Single mass, edema	HAART, cryptococcal meningitis
Karne et al. [8]	Positive	42/F	14	Fronto-parietal	Single, mass-effect	Tuberculosis
Verma and Dhamija [9]	Positive	33/M	2	Frontal, parietal, occipital	Multiple, ring-enhancing	Disseminated MAC, lung, lymph nodes
Arkun et al. [10]	Negative	52/M	175	Occipital, cerebellum	Single, ring-enhancing	Tuberculosis sarcoidosis
Uldry et al. [11]	Negative	31/F	N/A	Temporal	Single mass, edema	MAC meningitis
Morrison et al. [12]	Negative	38/M	90	Frontal, parietal	Multiple masses, edema	Sarcoidosis

described a case of CNS MAC in a patient following immune reconstitution with a CD4 count of 215/μL who had recently changed from multidrug anti-MAC medication to secondary prophylaxis with azithromycin. In 2011, Karne et al. [8] reported an HIV infected patient (CD4 14) with a single MAC brain abscess causing mass effect and focal neurologic deficits including left hemiplegia requiring emergent drainage of the 5 cm × 4 cm × 4.5 cm abscess and clarithromycin and ethambutol treatment along with ART.

Verma and Dhamija [9] describe a case of a patient with known MAC disseminated infection and non-adherence to ART who presented three to four weeks later with generalized weakness and lethargy. Similar to the patient that we present, this patient received a presumptive diagnosis of toxoplasmosis after initial imaging showed multiple ring enhancing lesions. Biopsies were obtained after the lesions did not respond to treatment and growth of *Mycobacterium avium* complex was observed. The patient was started on treatment but eventually elected to pursue palliative care. Arkun et al. [10] described a non-HIV infected individual with a transiently low CD4 count of 175/μL who developed a cerebellar and posterior occipital lobe lesion that was positive for MAC using DNA sequencing analysis. No treatment of follow up information was provided for this patient.

There are several other relevant case reports of this rare cause of brain abscess even in patients with AIDS. The findings are listed in Table 1.

This case report is important because while toxoplasmosis is the most common cause of enhancing brain lesions in patients with advanced untreated HIV infection, alternate etiologies should be considered, and when patients do not improve with empiric therapy, a biopsy is needed to establish a diagnosis.

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