A Patient With Mycobacteremia Due to Two Different Nontuberculous Mycobacteria

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Disseminated nontuberculous mycobacterial infections are most common in patients with severe immunosuppression, such as people with human immunodeficiency virus (HIV) and low CD4+ T-cell counts. In this report, we present a rare case of a person with HIV who was hospitalized for mycobacteremia due to 2 different nontuberculous mycobacteria. We also provide a comprehensive summary of published case reports describing nontuberculous mycobacterial coinfections.

Keywords. Mycobacterium avium-intracellulare; Mycobacterium kansasii; nontuberculous mycobacteremia.

Nontuberculous mycobacteria (NTM) are ubiquitous in the environment and can be found in natural waters, drinking waters, biofilms, soils, and aerosols [1]. Nontuberculous mycobacteria can be contracted via inhalation or ingestion. They are recognized as potential pathogens that can cause significant morbidity, particularly in patients with immunosuppression or structural lung disease. Multiple epidemiological studies have shown that the prevalence of disease from NTM is increasing [2–4]. Coinfection due to multiple species of NTM is rare. In this report, we present a case of a person with human immunodeficiency virus and asthma who was hospitalized for concurrent mycobacteremia due to Mycobacterium avium-intracellulare (MAI) and Mycobacterium kansasii.

CASE PRESENTATION

A 58-year-old man with a history of human immunodeficiency virus (HIV) and asthma was admitted to the hospital for grave disability and failure to thrive. He had last been seen in clinic 2 years prior. At that time, the patient was taking bictegravir/emtricitabine/tenofovir-alafenamide for antiretroviral therapy and trimethoprim-sulfamethoxazole for Pneumocystis jiroveci pneumonia prophylaxis; his CD4+ T-cell count was 136 cells/mm3 (5%) and HIV-1 viral load was 2780 copies/mL.

Upon arrival to the hospital, the patient reported experiencing chills, malaise, dyspnea on exertion, productive cough of clear sputum, odynophagia without dysphagia, 20-pound weight loss, and nonbloody diarrhea for the past 2 months. He also noted the development of a painful rash on his extremities over the past 1 month. Besides HIV and asthma, the patient had no other significant past medical history. He had not been taking any medications for the past year. He reported no drug allergies. He did not use tobacco or drink alcohol but did smoke methamphetamine occasionally. The patient was not sexually active and was currently unemployed.

The patient’s physical exam was notable for a temperature of 37.8°C, heart rate of 110 beats per minute, respiratory rate of 30 breaths per minute, blood pressure of 147/71 mmHg, and oxygen saturation of 96% on room air. His weight was 67.5 kilograms, down from 80.4 kilograms 2 years prior. He had white plaques on the oropharyngeal mucosa, tender lymphadenopathy in the right supraclavicular and left cervical regions, tachycardia, and inspiratory rhonchi throughout his lungs. He had erythematous nodules on his right arm, distal left arm, and left foot. The patient’s abdominal and genitourinary, neurologic, and psychiatric exams were unremarkable.

Initial laboratory tests revealed a white blood cell count of 9000/mm3 (neutrophils 80%; bands 8%; lymphocytes 7%; and eosinophils 0%), hemoglobin level of 11.1 g/dL, platelet count of 423 000/mm3, creatinine of 1.09 mg/dL, aspartate aminotransferase of 91 U/L, alanine aminotransferase of 50 U/L, and normal alkaline phosphatase and total bilirubin levels. A computed tomography (CT) scan of the chest with contrast showed a 1.7 × 2.1-centimeter thick-walled cavitary lesion in the upper lobe of the right lung, multiple enlarged and necrotic right hilar and mediastinal lymph nodes, and diffuse ground-glass opacities in all lobes of the left lung. A CT scan of the abdomen with contrast showed hepatosplenomegaly and severe bladder wall thickening.

On the day of admission, a broad infectious work-up was initiated. The patient also started having daily fevers (as high as 39.5°C). His CD4+ T-cell count was undetectably low (<10 cells/mm3), and his HIV-1 viral load was 384 000 copies/mL.

The patient’s infectious work up revealed 2 disseminated nontuberculous mycobacterial infections. Acid-fast bacilli (AFB) sputum, blood, and urine cultures were positive for Mycobacterium kansasii and Mycobacterium avium-intracellulare (MAI). A punch biopsy of a skin nodule on the patient’s right arm...
Figure 1. Skin nodule on right arm.

(Figure 1) showed suppurative dermatitis with necrosis, a positive AFB smear, and AFB culture growing MAI. Cultures were collected within 27 hours of each other, positive by mycobacterial growth indicator tubes (MGIT) 8 to 9 days after collection, and identified sequentially 8 to 37 days after collection; MAI was identified before *M kansasii* in urine and blood cultures. Organisms were identified via matrix-assisted laser desorption/ionization with time-of-flight mass spectrometry; MAI was unable to be specified to *M avium* or *Mycobacterium intracellulare*.

Random biopsies of his colon were positive on AFB smear, but no cultures were sent. Testing for *Mycobacterium tuberculosis* (MTB) of the sputum was negative by both culture and polymerase chain reaction. The patient was initially started on treatment for disseminated MAI, disseminated *M kansasii*, and possible culture-negative MTB with rifabutin, isoniazid, pyrazinamide, and ethambutol (RIPe) and azithromycin while organism identification and antimicrobial susceptibility testing were pending. The patient’s fevers began to improve 5 days after initiation of treatment.

During his hospitalization, the patient was also diagnosed and treated for biopsy-proven cytomegalovirus esophagitis. He was restarted on antiretroviral therapy 8 days after initiation of antymycobacterial therapy. Upon confirmation that both the MAI and *M kansasii* were macrolide-susceptible, the patient’s antymycobacterial regimen was consolidated to rifabutin (minimum inhibitory concentration breakpoint [MIC BP] of 1 µg/mL), ethambutol (MIC BP >20 µg/mL), and azithromycin. The patient was discharged with a treatment plan for at least 12 months of antibiotics pending infection clearance and meaningful CD4+ T-cell count recovery.

At a follow-up office visit 4 months after discharge, the patient reported medication adherence, resolution of his fevers, and improvement of his cough and rash. The patient’s CD4+ T-cell count was 41 cells/mm³ (3%), and his HIV-1 viral load was undetectable (<20 copies/mL). The most recent AFB sputum culture was positive for MAI, but the patient’s most recent AFB blood, urine, and stool cultures were negative. An interval CT scan of his chest showed resolution of the cavitary lesion and improvement of hilar and mediastinal lymphadenopathy.

**Patient Consent Statement**

This study was reviewed by the University of California San Diego Human Research Protection Program or Institutional Review Board (IRB) and was deemed to be exempt from IRB requirements under category 45 CFR 46.104(d). It was determined that patient consent is not required because the identity of the human subject cannot readily be ascertained directly or through identifiers linked to the subject.

**DISCUSSION**

Disseminated NTM infections are characterized by mycobacteremia or seeding of multiple organs. In the United States, they are most commonly caused by *M avium* complex (MAC), which includes *M avium* (responsible for more than 90% of these infections) and *M intracellulare* [5]. The second most common cause of disseminated NTM is *M kansasii*.

Disseminated NTM infections are typically seen in the setting of severe immunocompromise. In people with HIV, disseminated NTM infections occur when the CD4+ T-cell count is less than 50 cells/mm³ [6]. The risk increases with progressively lower CD4+ T-cell counts [7]. Our patient had some of the most commonly described signs and symptoms of disseminated NTM: fever, night sweats, weight loss, abdominal pain, diarrhea, anemia, and hepatosplenomegaly [8]. The majority of people with disseminated NTM will have positive blood cultures, but multiple blood cultures may be required for diagnosis in cases of low-grade mycobacteremia [7]. If blood cultures are negative, bronchoalveolar lavage or biopsies of involved organs may be required.

Coinfection with 2 different species of NTM is rare [9, 10], and the majority of coinfections occur in patients with advanced immunosuppression (Table 1). To our knowledge, this is the first case report in the literature of a patient with concurrent MAI and *M kansasii* mycobacteremia. The case is particularly unique because both MAI and *M kansasii* were cultured in 3 different bodily fluids—sputum, blood, and urine—on the day of admission. This demonstrates a high
mycobacterial burden and highlights the severity of the patient’s immunosuppression in the setting of untreated HIV.

Although NTM co-infection is a rare occurrence, it is important for clinicians to be aware of this possibility when evaluating people with advanced HIV or other forms of immunosuppression. Depending on the identified NTM species, empiric therapy with multiple agents may be required while additional culture data are pending.

CONCLUSIONS

We describe a case of mycobacteremia due to MAI and *M. kansasii* in a person with advanced HIV. We also summarize published case reports demonstrating NTM co-infections. Although these cases are rare, they are important to be aware of and may significantly impact treatment options.

Notes

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