
Mycobacterium avium Pulmonary Infection Disguised as a Urinary Tract Infection

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Abstract

In the United States, *Mycobacterium avium* complex (MAC) has been found to be the most common isolate in non-tuberculous disease, and pulmonary infection is the most frequent presentation. It is ubiquitous in the environment, particularly in soil and manufactured water supply sources. Worldwide, *M. avium* infections, both pulmonary and disseminated, are steadily increasing. Due to MAC's ability to cause non-specific symptoms and its pervasiveness within the environment, it is paramount to incorporate this diagnosis in the differential, especially in those most susceptible. We report a case of a *Mycobacterium avium* complex pulmonary infection in 72-year-old Caucasian male with history of chronic immunosuppression and large hiatal hernia, highlight the imaging features, and discuss the importance of maintaining awareness in immunocompromised hosts.

Keywords

Immunosuppression, Nontuberculous Mycobacterium, Tree-in-Bud Opacities

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Mycobacterium avium Pulmonary Infection Disguised as a Urinary Tract Infection

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Abstract

In the U.S., *Mycobacterium avium* complex (MAC) has been found to be the most common isolate in non-tuberculous disease, and pulmonary infection is the most frequent presentation. It is ubiquitous in the environment, particularly in soil and manufactured water supply sources. Worldwide, *M. avium* infections, both pulmonary and disseminated, are steadily increasing. Due to MAC's ability to cause non-specific symptoms and its pervasiveness within the environment, it is paramount to incorporate this diagnosis in the differential diagnosis, especially in those most susceptible. We report a case of a *Mycobacterium avium* complex pulmonary infection in 72-year-old Caucasian male with history of chronic immunosuppression and large hiatal hernia, highlight the imaging features, and discuss the importance of maintaining awareness in immunocompromised hosts.

Introduction

Mycobacteria distinct from *Mycobacterium tuberculosis* complex have been well documented since the 1800s, but only since the 1950s have they been understood as opportunistic pathogens capable of causing disease. In accordance with the American Thoracic Society, we will refer to these species as nontuberculous mycobacteria (NTM).¹ Symptoms varied based on organ systems involved, severity of infection, and the cellular immunity of the host. They are often non-specific and range from fatigue and myalgias to chest pain and hemoptysis. Chronic pulmonary disease is the most common presentation of NTM, in which chronic or recurrent cough is nearly always present. Lung disease due to NTM commonly occurs in those with chronic lung conditions such as COPD and those with esophageal motility disorders.¹ Here, we report a case of incidentally diagnosed *Mycobacterium avium* complex pulmonary infection in 72-year-old Caucasian male with history of chronic immunosuppression and large hiatal hernia. We obtained consent to utilize this case for educational purposes.

Case

A 72-year-old Caucasian man was admitted to the hospital after a week of progressively worsening encephalopathy, weakness, and malaise. His past medical history was significant for end stage renal disease status post bilateral renal transplants with one remaining kidney on chronic immunosuppression, recurrent urothelial cancer, hypertension, gastroesophageal reflux disease with a large intrathoracic hiatal hernia, and primary hyperparathyroidism. Medications taken at home included amlodipine, apixaban, aspirin, atorvastatin, furosemide, hydralazine, metoprolol tartrate, mycophenolate, pantoprazole, phenazopyridine, prednisone, and tacrolimus. On examination, he appeared cachectic and fatigued. Lung sounds were diminished in the bilateral bases. Palpation of the epigastric abdominal region revealed a hernia, and his left lower quadrant was slightly tender. During work-up of his nonspecific symptoms, his creatinine was found to be mildly elevated to 1.93 (baseline, 1.4-1.6), and his urine culture was positive for pansensitive *Enterococcus faecalis*. He clinically improved on ceftriaxone before switching to fosfomycin to complete an antibiotic regimen based on sensitivities. Coincidentally, during evaluation of his vague left lower quadrant pain, an abdominal x-ray exhibited imaging abnormalities in his lung bases that were further clarified as worsening tree-in-bud opacities and mild bronchiectasis in bibasilar lung fields on a dedicated chest computed tomography image (Fig. 1). Upon further questioning, he admitted to increased dyspnea and cough with sporadic choking events over the past few months and one episode of hemoptysis. Given his immunocompromised state, a bronchoscopy with bronchoalveolar lavage was performed which ultimately revealed *Mycobacterium avium* pulmonary infection.

Discussion

Mycobacterium avium is a member of the *M. avium* complex (MAC) which consists of the four *Mycobacterium* subspecies: *avium*, *hominissuis*, *silvaticum*, *paratuberculosis*. In the U.S., MAC has been found to be the most common isolate in non-tuberculous disease, and pulmonary infection is the most frequent presentation.² MAC infection can

have protean manifestations based on the host immune environment, bacterial species, and organ affected. Signs and symptoms can include but are not limited to fever, localized lymphadenitis, cough, fatigue, hemoptysis, adenopathy, anemia, abdominal pain and diarrhea. Pulmonary disease typically occurs in patients with deficient cellular immunity or chronic lung disease. Radiographic findings are diverse and can include bronchiectasis, infiltrates in the upper lobes, nodules, and tree-in bud opacities.³ Studies utilizing high resolution CT have described up to 90% of cases of noncavitary MAC pulmonary disease having multifocal bronchiectasis and small (<5 mm) nodules in associated areas of the lung.⁴ According to a joint statement by the American Thoracic Society and Infectious Diseases Society of American, patients presenting with bronchiectasis are recommended to undergo a three-times weekly regimen of a macrolide, rifampin, and ethambutol for 3-6 weeks.¹

In this case, chronic immunosuppression in the setting of prior kidney transplantation compromised the host's immune response to infection. However, prevention often proves difficult due to MAC's ubiquitous nature, particularly in soil and manufactured water supply sources.⁵ Mullis and Falkinham found that billions of mycobacteria exist as biofilms in typical household pipes composed of many different surfaces (i.e., copper, glass, zinc-galvanized steel, and PVC).⁶ Much research has been published on the dispersion and aerosolization of these bacteria through shower heads, water heater systems, humidifiers, and hot tubs.⁷ An additional, more esoteric source, is likely aspiration via gastric reflux. Thomson et al. elucidated that patients with MAC pulmonary disease had a higher incidence of gastroesophageal reflux disease than in matched MAC-negative controls.⁸ The aforementioned patient had a large known hiatal hernia seen on imaging and described active gastroesophageal reflux-type symptoms for which he was scheduled for surgical evaluation.

Worldwide, it is apparent that *M. avium* infections are steadily increasing.^{9,10} However, reporting non-tuberculous disease is not mandatory in many countries and states, making incidence and prevalence comparisons in distinct geographical regions difficult to study. One explanation for this increase

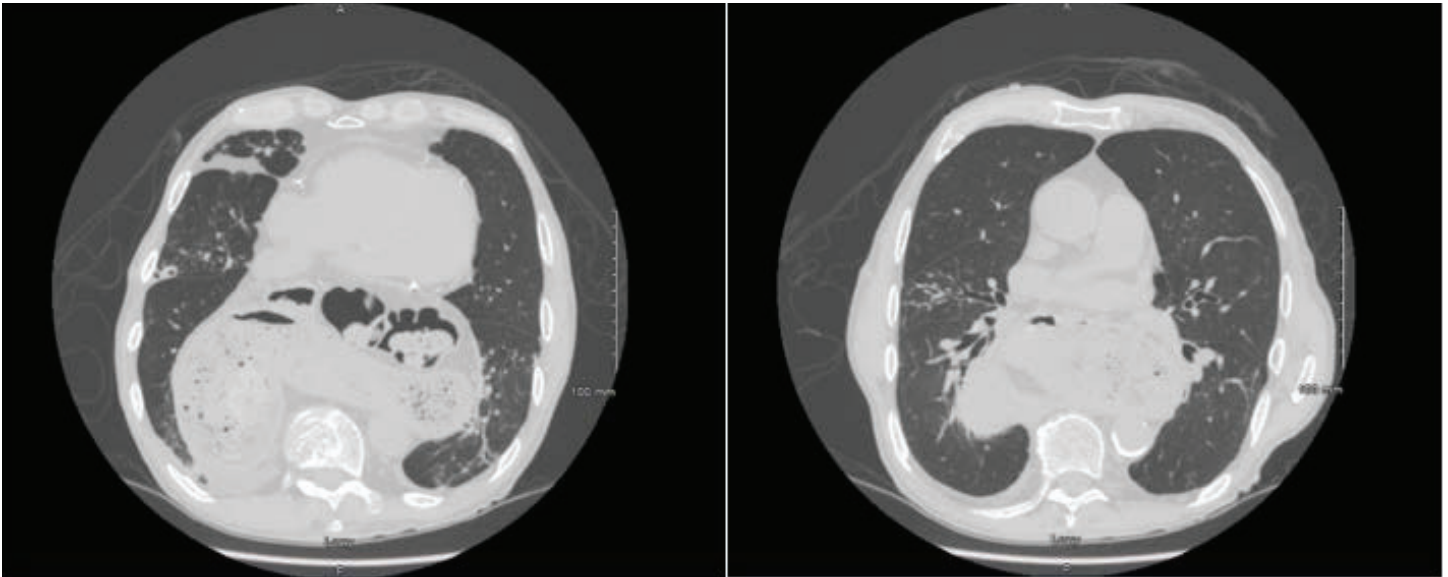


Figure 1. Axial non-contrast CT images of the chest showing a large hiatal hernia, multifocal bronchiectasis with multiple small nodules, and tree-in-bud opacities in the mid- and lower lung regions. Imaging findings are varied in MAC pulmonary infections but prominent bronchiectasis is often described.

could be due to improvement of diagnostic capabilities and greater awareness in the healthcare setting.¹⁰ Alternatively, it may be due to an expanding portion of the population that is defined as immunosuppressed from regimens imposed after transplantation, chronic infection or inflammation, or simply senescence. Whether it be from increased scrutiny or the increasing prevalence of immunocompromised states it is safe to assume that cases of NTM will continue to rise.

Conclusion

The immunocompromised state is commonly encountered by the internist. It is important to keep a wide differential in the immunocompromised patient who presents with non-specific symptoms. Among nontuberculous mycobacterium, *Mycobacterium avium* is the most common cause of pulmonary disease worldwide as it is ubiquitous in the environment.² Symptoms are variable based on pre-existing disease, but cough, fatigue, malaise, weakness, dyspnea, and hemoptysis are common. Typically, symptoms persist for a significant period of time before the diagnosis is made, which contributes to decreased quality of life and increased healthcare burden. Clinicians should maintain heightened awareness in immunocompromised patients. ■

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