doi:10.17659/01.2024.0002

Journal of Case Reports 2024;14(1):5-7

Challenging Case of Mycobacterium Avium Complex (MAC) Disease in a Malnourished Non-HIV Patient

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Received : July 24, 2022
Accepted : October 30, 2023
Published : January 15, 2024

Abstract

Background: Mycobacterium avium complex (MAC) infections are increasingly recognized as significant opportunistic pathogens, particularly in immunocompromised hosts. With advances in diagnostic methods, including RNA probes and fluorescent stains, accurate identification of MAC is feasible, although challenges persist in detection. *Case Report*: We present the case of a 62-year-old female with a BMI of 15 kg/m² and a history of tuberculosis, Barrett's esophagus, adrenal adenoma, chronic obstructive pulmonary disease, primary hyperparathyroidism, and alcohol abuse, who presented with difficulty walking upon waking and altered mental status. Radiological findings suggested MAC involvement, confirmed by biopsy, despite negative acid-fast bacilli staining. Additionally, the patient exhibited *Enterobacter* urinary tract infection (UTI), complicating the diagnostic and therapeutic approach. Treatment included a combination of antibiotics targeting both UTI and suspected MAC infection. *Conclusion*: This case emphasizes the challenges in diagnosing and managing MAC infections in immunocompromised patients. Tailored antimicrobial therapy, multidisciplinary collaboration, and consideration of surgical intervention are crucial for optimizing outcomes in such cases.

Keywords: Antibiotics, Immunocompromised Hosts, Mycobacterium avian Complex, Urinary Tract Infections.

Introduction

Reporting cases of *Mycobacterium avium complex* (MAC) disease is crucial due to its significance as an opportunistic pathogen, particularly in severely immunocompromised individuals [1,2]. MAC comprises *Mycobacterium avium* and *Mycobacterium intracellulare*, ubiquitous in various environmental sources such as soil, water, and animals, with recirculating hot water systems in hospitals and recreational facilities being common reservoirs. Aerosol transmission is hypothesized, and MAC's slow growth on solid media poses challenges in diagnosis and treatment. MAC's resistance to traditional antimicrobials emphasizes the need for tailored therapeutic approaches [3]. The disease spectrum ranges from respiratory manifestations to disseminated infections, affecting immunocompromised hosts disproportionately. Despite improvements in diagnostics and treatment modalities, MAC's incidence has risen notably, particularly coinciding with the AIDS epidemic.

Distinct clinical presentations exist, with pulmonary manifestations predominant in HIV-negative patients with predisposing conditions such as chronic obstructive pulmonary disease (COPD) and bronchiectasis. Notably, individuals with a history of tuberculosis and heavy smoking are at heightened risk [4]. The disease's clinical spectrum varies widely, encompassing pulmonary disease, lymphadenitis, and disseminated infections, each presenting with unique symptomatology [5-9]. Diagnosis primarily relies on culture and molecular techniques, with ATS and BTS guidelines offering therapeutic recommendations,

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emphasizing macrolides and adjunctive therapies in disseminated cases. Surgical interventions and immunomodulation may complement antimicrobial therapy.

This report presents a case study of an elderly woman presenting with pulmonary manifestations of MAC, highlighting the disease's diverse clinical presentations and therapeutic challenges. Reporting such cases contributes to the understanding and management of this complex disease entity.

Case Report

A 62-year-old female with a BMI of 15 kg/m² and limited medical history provided by her husband due to her poor memory presented with difficulty walking upon waking up and altered mental status. Her medical history included tuberculosis (TB), Barrett's esophagus, adrenal adenoma, COPD, primary hyperparathyroidism, and alcohol abuse. Radiological examinations revealed a nodular mass suspected to be Mycobacterium avium complex (MAC), confirmed by biopsy. During her last hospitalization, she was diagnosed with pneumonia, while the mass persisted. Her alcohol abuse escalated following her husband's recent pancreatic cancer diagnosis, leading to progressive weakness over the past few months, rendering her unable to perform daily tasks independently.

On presentation, she displayed tachycardia, tachypnea, and hypotension, with elevated white blood cell count (WBC) and lactate levels. Urinalysis showed hazy urine with proteinuria, nitrites, and white blood cells. Imaging indicated left lower lobe pneumonia suggestive of MAC superinfection. Treatment involved antibiotics for pneumonia and urinary tract infection (UTI), with subsequent adjustments based on culture results. Bronchoscopy performed to assess the cavitary lesion yielded no significant findings. Additionally, the patient underwent alcohol withdrawal management and nutritional support. Sedative medications were tapered due to suspected overdose-related somnolence, leading to improved alertness. Discharge arrangements included home hospice care for urinary reassessment, oxygen therapy, continuation of antibiotics, and encouragement of maximal activity within tolerance limits.

Discussion

Mycobacterium avium complex (MAC) infections are becoming increasingly prevalent, particularly in immunocompromised and elderly populations. Advances in diagnostic techniques have facilitated accurate identification, although challenges remain in detecting MAC, as highlighted by the absence of acid-fast bacilli (AFB) staining in our case. Despite negative AFB staining, clinical indicators such as lobar pneumonia, pulmonary symptoms, and patient demographics strongly suggested MAC infection, further supported by imaging findings of nodular masses and cavitary lesions.

While our patient tested positive for *Enterobacter* infections causing urinary tract infection (UTI), genitourinary involvement of non-tuberculous mycobacteria (NTM) common in older women, was not observed. This discrepancy may stem from limitations in diagnostic sensitivity, as suggested by the potential for false-negative AFB cultures. Additionally, the patient's history of alcohol abuse may have contributed to her susceptibility to MAC infection, given ethanol's known impact on immune function and susceptibility to respiratory infections.

Considering the patient's clinical presentation and UTI etiology, MAC likely acted as an opportunistic pathogen contributing to pulmonary manifestations and cavitary lesions. The patient's immunocompromised status, attributed to various factors including prior tuberculosis history and stress related to her husband's cancer, further heightened susceptibility to MAC infection. Notably, the elevated white blood cell count could indicate either immunocompromise or be attributed to the *Enterobacter* UTI.

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Treatment initially targeted the *Enterobacter* UTI with vancomycin, with subsequent transition to meropenem based on susceptibility profiles and the rising incidence of vancomycin-resistant *Enterobacter* strains [10,11]. Meropenem effectively prevented septicaemia, as evidenced by negative blood cultures, and its selection was supported by *Enterobacter cloacae* sensitivity. Levofloxacin was prescribed upon discharge to address suspected MAC and prevent pyelonephritis [12], supported by its efficacy against multidrug-resistant *Enterobacter* species and MAC. While levofloxacin or moxifloxacin in combination with ethambutol and rifampicin are recommended for MAC treatment, the choice between them hinges on the infection's refractoriness, with moxifloxacin favoured for refractory cases. Surgical interventions such as wedge resection may offer long-term resolution, particularly in refractory NTM infections. A recent study showed that wedge resection could prevent the recurrence of refractory NTM (including MAC) for around 8 years [3].

Conclusion

This case emphasizes the importance of considering MAC infection in non-HIV patients presenting with pulmonary manifestations. Treatment strategies should prioritize fluoroquinolone-based regimens, with surgical intervention reserved for refractory cases. Regular monitoring and potential surgical resection like lobectomy and segmentectomy offer avenues for long-term management.

Contributors: KP did manuscript writing and editing, patient management and will act as a study guarantor. The author approved the final version of this manuscript and are responsible for all aspects of this study.
Funding: None; *Competing interests*: None stated.

References

1. Aberg JA, Chin-Hong PV, McCutchan A, Koletar SL, Currier JS. Localized osteomyelitis due to Mycobacterium avium complex in patients with Human Immunodeficiency Virus receiving highly active antiretroviral therapy. Clin Infect Dis. 2002;35:E8-E13.
2. Benson CA. Disseminated Mycobacterium avium Complex Infection: Implications of recent clinical trials on prophylaxis and treatment. *In*: Volberding PA, Jacobson MA (eds). AIDS Clinical Review 1997/1998. New York: Marcel Dekker; 1998:271-287.
3. Huang HL, Liu CJ, Lee MR, Cheng MH, Lu PL, Wang JY, Chong IW. Surgical resection is sufficient for incidentally discovered solitary pulmonary nodule caused by nontuberculous mycobacteria in asymptomatic patients. PLoS One. 2019;14(9):e0222425.
4. Horsburgh CR, Hanson DL, Jones JL, Thompson SE, 3rd. Protection from Mycobacterium avium complex disease in human immunodeficiency virus-infected persons with a history of tuberculosis. J Infect Dis. 1996;174:1212-1217.
5. Nightingale SD, Byrd LT, Southern PM, Jockusch JD, Cal SX, Wynne BA. Incidence of Mycobacterium avium-intracellulare complex bacteremia in human immunodeficiency virus-positive patients. J Infect Dis. 1992;165:1082-1085.
6. Gordon FM, Horsburgh CR. Mycobacterium avium Complex. *In*: Mandell GL, Bennett JE, Dolin R (eds). Principles and Practice of Infectious Disease, Sixth Edition. Philadelphia: Elsevier; 2005:2897-2909.
7. Phillips P, Bonner S, Gataric N, Bai T, Wilcox P, Hogg R, *et al*. Nontuberculous mycobacterial immune reconstitution syndrome in HIV-infected patients: spectrum of disease and long-term follow-up. Clin Infect Dis. 2005;41:1483-1497.
8. Grosset JH. Assessment of new therapies for infection due to the Mycobacterium avium complex: appropriate use of in vitro and in vivo testing. Clin Infec Dis. 1994;18(Suppl 3):S233-6.
9. Swensen SJ, Hartman TE, Williams DE. Computed tomographic diagnosis of Mycobacterium avium-intracellulare complex in patients with bronchiectasis. Chest. 1994;105(1):49-52.
10. Kulengowski B, Rutter WC, Campion JJ, Lee GC, Feola DJ, Burgess DS. Effect of increasing meropenem MIC on the killing activity of meropenem in combination with amikacin or polymyxin B against MBL- and KPC-producing Enterobacter cloacae. Diagn Microbiol Infect Dis. 2018;92(3):262-266.
11. Bassetti M, Peghin M, Pecori D. The management of multidrug-resistant Enterobacteriaceae. Curr Opin Infect Dis. 2016;29(6):583-594.
12. Rafat C, Debrix I, Hertig A. Levofloxacin for the treatment of pyelonephritis. Expert Opin Pharmacother. 2013;14(9):1241-1253.

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