IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 1, May 2025
Impact Factor: 7.67

Pulmonary MAC in the Immunocompetent Elderly: A Case Report

Shifa Farooq Siddiqui and Ranjana Ganesh Khade
Department of Microbiology
Seva Sadan's R. K. Talreja College, Ulhasnagar, Maharashtra, India

Abstract: *Mycobacterium avium-intracellulare complex (MAC) is the most common cause of nontuberculous mycobacterial pulmonary disease (MAC-PD), particularly in elderly, immunocompetent individuals with underlying lung conditions such as bronchiectasis. Diagnosing MAC-PD is often challenging due to its clinical and radiological similarity to tuberculosis, especially in high TB-burden settings. We report a case of a 76-year-old woman with a history of bronchiectasis who presented with chronic dry cough, fatigue, weight loss and low-grade fever over six months. HIV testing was negative and sputum smears and GeneXpert were non-reactive for Mycobacterium tuberculosis. High-resolution CT of the chest revealed cylindrical bronchiectasis, centrilobular nodules and a characteristic tree-in-bud pattern. Bronchoscopy with bronchoalveolar lavage (BAL) was performed, which showed acid-fast bacilli and subsequent culture confirmed MAC. The patient was started on a standard macrolide-based triple-drug regimen comprising azithromycin, rifampin and ethambutol. At six months, sputum cultures were negative and radiological imaging showed significant resolution. This case underscores the need for heightened clinical suspicion and early diagnostic evaluation for MAC-PD in elderly patients with chronic lung disease. Timely initiation of appropriate therapy is essential for favorable outcomes and further research is warranted for refractory and resistant cases.*

Keywords: Immunocompetent; Nontuberculous mycobacteria; *Mycobacterium avium-intracellulare* complex; pulmonary disease

I. INTRODUCTION

Mycobacterium avium complex (MAC)—comprising *M. avium* and *M. intracellulare*—is the most frequently isolated group of nontuberculous mycobacteria (NTM) responsible for human disease (Nakamura et al., 2022). Due to the difficulty in differentiating these two species, they are often collectively referred to as *Mycobacterium avium-intracellulare* (MAI).

MAC predominantly affects immunocompromised individuals, such as those with AIDS, hematologic malignancies, or on immunosuppressive therapies. In this population, it can lead to disseminated infections, involving the liver, spleen, lymph nodes and bone marrow, with *M. avium* accounting for over 95% of such cases in AIDS patients (Maekura *et al*., 2022; Nakamura *et al*., 2022; Marukawa *et al*., 2019).

In contrast, *M. intracellulare* is more frequently associated with progressive pulmonary infections in immunocompetent patients, particularly those with pre-existing lung diseases like bronchiectasis or COPD, contributing to approximately 40% of such infections (Portell-Buj et al., 2022).

MAC organisms are ubiquitous in the environment, present in soil, water (both natural and piped), household dust, birds, farm animals and even tobacco products. Common exposure sources include tap water, hot tubs, aerosolized water and household plumbing (Nakamura *et al*., 2022).

Diagnosis relies on acid-fast bacillus (AFB) staining and culture from respiratory specimens such as sputum or bronchoalveolar lavage (BAL). In suspected disseminated MAC (DMAC), blood and urine cultures are also necessary.

Copyright to IJARSCT
www.ijarsct.co.in
DOI: 10.48175/IJARSCT-26169

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 1, May 2025
Impact Factor: 7.67

Due to overlapping clinical and radiological features, MAC infections are frequently misdiagnosed as tuberculosis, especially in high TB-burden regions (Portell-Buj *et al*., 2022).

Treatment involves a macrolide-based multidrug regimen—typically azithromycin or clarithromycin combined with ethambutol and a rifamycin continued for at least 12 months after culture conversion. Aminoglycosides such as amikacin or streptomycin may be added in severe or resistant cases. Surgical intervention is occasionally required, especially in pediatric lymphadenitis or refractory localized disease (Portell-Buj *et al*., 2022).

Case Presentation: A 76-year-old woman presented with progressive fatigue, unintentional weight loss, low-grade fever and a chronic dry cough over six months. She experienced increasing dyspnea but denied hemoptysis, night sweats, or chest pain.

Her history included bronchiectasis diagnosed five years ago. There was no prior tuberculosis, smoking, or immunosuppressive condition. Clinical examination revealed coarse bilateral crackles and wheezing without digital clubbing or lymphadenopathy.

Diagnostic Evaluation: Basic labs revealed anemia, elevated ESR and CRP and negative HIV serology. Initial sputum smears for AFB and GeneXpert MTB/RIF were negative.

HRCT chest revealed classic features of NTM infection—cylindrical bronchiectasis in the middle lobe and lingula, along with centrilobular nodules and a "tree-in-bud" pattern.

- Bronchoscopy with BAL was performed:
- AFB stain from BAL culture: Positive
- Culture: Slow-growing colonies typical of NTM

Molecular identification**:** Confirmed *Mycobacterium avium-intracellulare* complex

Diagnosis: Pulmonary disease caused by *Mycobacterium avium-intracellulare* complex in an immunocompetent elderly woman with bronchiectasis.

Treatment: A macrolide-based triple-drug regimen was initiated as Azithromycin 250 mg daily, Rifampin 600 mg daily and Ethambutol 15 mg/kg daily. After three months, she showed marked improvement in symptoms, appetite and energy. The regimen was transitioned to intermittent dosing (thrice weekly), to be continued for 12 months post-culture conversion. Supportive measures included nutritional rehabilitation was followed.

Outcome And Follow-Up: After six months, Sputum cultures were negative for AFB, HRCT showed significant radiological improvement and slight increase in weight was observed and reported better respiratory capacity

II. DISCUSSION

This case highlights the increasing prevalence of MAC pulmonary infections in non-HIV elderly patients, particularly women with bronchiectasis. MAC-PD presents a diagnostic challenge due to its resemblance to tuberculosis and its slow-growing nature. Delay in diagnosis may lead to significant morbidity.

In our case, clinical suspicion prompted early bronchoscopy, facilitating the identification of MAC despite negative sputum AFB. HRCT findings provided essential radiological clues. The treatment followed standard protocols with macrolide-based combination therapy, resulting in clinical and radiologic improvement.

The pathophysiology of MAC-PD in immunocompetent hosts is thought to involve localized defects in mucociliary clearance, often seen in elderly women. Voluntary cough suppression, as described in "Lady Windermere's Syndrome," may also contribute to pathogen retention and infection (Portell-Buj *et al*., 2022).

III. CONCLUSION

The global rise in the incidence and prevalence of NTM pulmonary disease (NTM-PD), particularly due to *Mycobacterium avium complex* (MAC), highlights a growing public health concern. Timely diagnosis and initiation of appropriate therapy are crucial, especially in elderly patients. A macrolide-based multidrug regimen, as per established guidelines, remains the cornerstone of treatment. However, in cases of treatment failure or macrolide resistance,

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 1, May 2025
Impact Factor: 7.67

medical therapy alone may be insufficient (Wang *et al*., 2022). For patients with localized disease, surgical intervention can enhance treatment outcomes, but it should be pursued judiciously.

The evolving landscape of NTM-PD treatment underscores the need for further research into newer and repurposed agents. A concerted global effort is essential to advance the understanding and management of MAC-PD and improve patient outcomes worldwide.

IV. INFORMED CONSENT

Written informed consent was obtained from the patient for sharing and publication of her medical case for academic purposes.

V. ACKNOWLEDGEMENT

The author expresses sincere gratitude to the patient for providing information about her experience and giving the opportunity to use this material for case study.

REFERENCES

[1]. Nakamura, K., Nakayama, H., Sasaki, S., Takahashi, K., & Iwabuchi, K. (2022). Mycobacterium avium-intracellulare complex promotes release of pro-inflammatory enzymes matrix metalloproteinases by inducing neutrophil extracellular trap formation. *Scientific reports*, *12*(1), 1-12.

[2]. Portell-Buj, E., González-Criollo, C., López-Gavín, A., Fernández-Pittol, M., Busquets, M. A., Estelrich, J., ... & Gonzalez-Martin, J. (2022). Activity of Antibiotics and Potential Antibiofilm Agents against Biofilm-Producing Mycobacterium avium-intracellulare Complex Causing Chronic Pulmonary Infections. *Antibiotics*, *11*(5), 589.

[3]. Wang, G., Stapleton, J. T., Baker, A. W., Rouphael, N., Creech, C. B., El Sahly, H. M., ... & Abate, G. (2022). Clinical Features and Treatment Outcomes of Pulmonary Mycobacterium avium-intracellular Complex with and without Coinfections. In *Open forum infectious diseases* 9(8): 375. Oxford University Press.

[4]. Marukawa, M., Taniguchi, A., Kimura, G., Kunichika, N., Kuyama, S., Maeda, Y., ... & okayama. Respiratory Disease Study Group. (2019). Solitary pulmonary nodules caused by *Mycobacterium avium* complex. *Respiratory Investigation*, *57*(6), 566-573.

[5]. Maekura, R., Miki, K., Tateishi, Y., Matsumoto, S., Kitada, S., Miki, M., & Kida, H. (2022). Long-Term Prognosis and Antimycobacterial Glycolipid Antibody as Biomarker in *Mycobacterium avium*-intracellular Complex Pulmonary Disease. *Microbiology Spectrum*, 530-22.