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Pulmonary Mycobacterium Avium Infection in an Immunocompetent Host: an Unusual Presentation

Hammoud N[1*], Kteiche W[2], Alqudeimat Y[3], Alrashidi M[3], AlShammari D[3] Alrajihi B[3] and Termos S[3]

[1]Department of Pulmonary and Intensive Care Medicine, Dar Alshifa Hospital, Kuwait

[2]Department of Pulmonary Medicine, Kreiskrankenhaus Rotenburg an der Fulda, Germany

[3]Department of Surgery, Amiri Hospital, Kuwait

***Corresponding author:** Nijmeh Hammoud, Specialist Pulmonary and Intensive Care Medicine. Dar Alshifa Hospital, Kuwait

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Abstract

Non-Tuberculous Mycobacteria (NTM) are increasingly recognized causes of chronic pulmonary infection, even in immunocompetent individuals. Treatment sometimes is challenging due to delayed detection.

We report a case of a 62-year-old female with no significant comorbidities who presented with a five-month history of productive cough and polyarthralgia. Imaging demonstrated bilateral subpleural reticulation, traction bronchiectasis, and subsegmental consolidations. Sputum cultures grew Mycobacterium avium. She was successfully treated with azithromycin, ethambutol, and rifabutin, with significant clinical and radiologic improvement observed at one year.

This case underscores the importance of including NTM in the differential diagnosis of chronic respiratory symptoms in immunocompetent patients and demonstrates that appropriate antimicrobial therapy can result in substantial recovery.

1. Introduction

Non-Tuberculous Mycobacteria (NTM) are environmental organisms that increasingly cause pulmonary disease, even in immunocompetent individuals. Mycobacterium Avium Complex (MAC) is the most frequently identified pathogen, especially in postmenopausal women without underlying lung disease or immunodeficiency [1,2]. The disease commonly presents with non-specific symptoms and can be radiologically characterized by bronchiectasis and nodular infiltrates, particularly in the middle lobe and lingula [3].

The rising incidence of MAC pulmonary disease has been noted globally, including in North America and Asia, and is partly attributed to better detection methods and increased awareness [1,4]. In this report, we describe a case of MAC infection with an atypical presentation of polyarthralgia, which resolved following appropriate antibiotic treatment.

2. Case Presentation

A 62-year-old woman with no known medical conditions presented with a five-month history of productive cough and diffuse joint pains. She denied fever, weight loss, or night sweats. She had no smoking history or environmental exposures. Chest X ray showed bilateral perihilar peribronchial cuffing with bilateral lower zones peripheral reticular opacities as well as interstitial infiltrates and right middle lung zone thick linear fibroatelectatic band in favor of fibrotic interstitial lung disease (Figure 1). Chest CT scan demonstrated bilateral peripheral subpleural reticulation, subsegmental consolidations, and traction bronchiectasis predominantly in the right middle lobe and bilateral lower lobes (Figure 2).

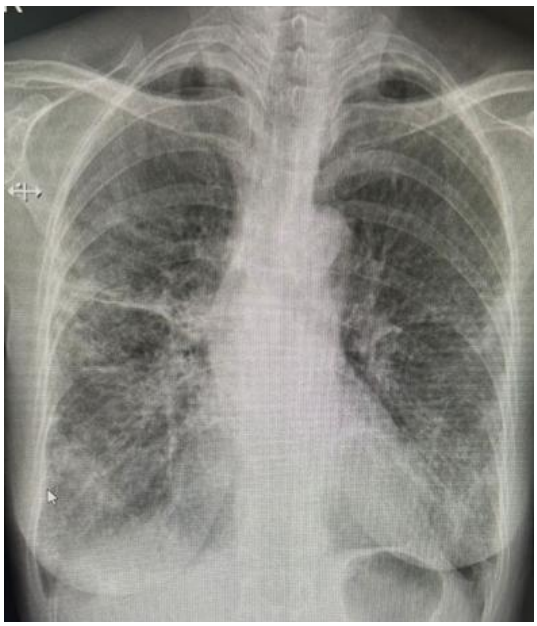

Figure 1: CXR PA projection showing bilateral lower lobes reticular opacities and interstitial infiltrates.

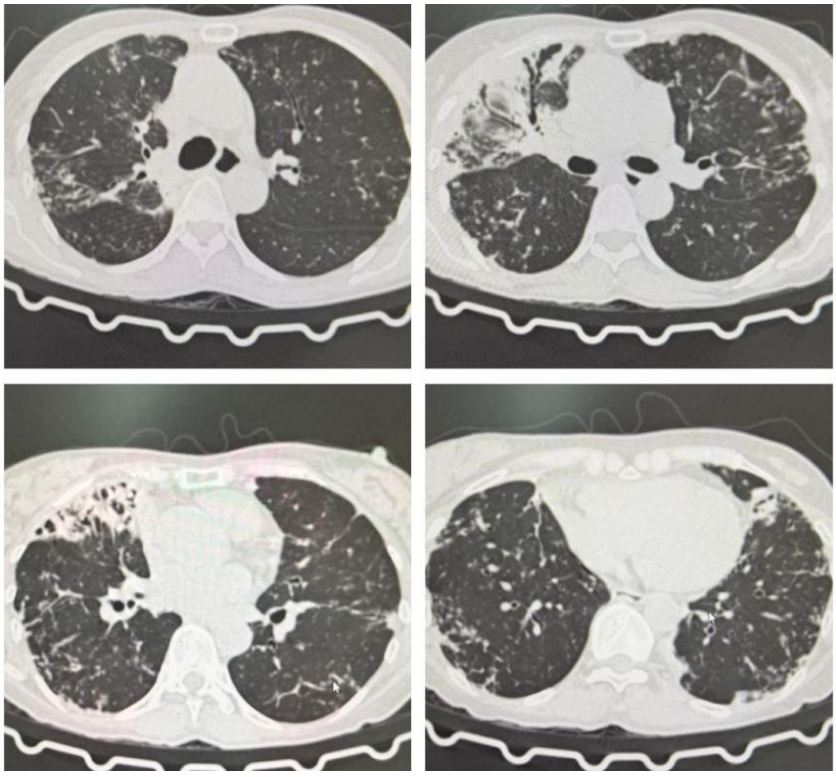

Figure 2: CT chest demonstrated bilateral lower subpleural reticulations, subsegmental consolidation and bronchiectatic changes mainly in the right middle lobe.

Autoimmune serologies (Antinuclear antibodies ANA, Anti U1RNP, Anti Sm, Anti Ro(SS-A), Anti La(SS-B), Anti jo 1, AntiScl 70, Anti CENP, Rheumatoid Factor Quantitative, Anti DS-DNA antibody, Anti -Cyclic Citrullinated Peptide (anti-CCP) were negative.

Covid19 test was performed and revealed no corona infection, however three separate sputum cultures (acid-fast bacilli, AFB) were positive for Mycobacterium avium. Pulmonary function tests revealed a restrictive pattern, with reduced diffusing lung capacity (DLCO).

She was started on guideline-based triple therapy with azithromycin, ethambutol, and rifabutin. Her respiratory symptoms gradually improved, and notably, her joint pain resolved by the sixth month. Repeat imaging at one year CT chest showed improvement in

ground-glass opacities and consolidations, although residual bronchiectasis persisted (Figure 3). Pulmonary function also improved significantly.

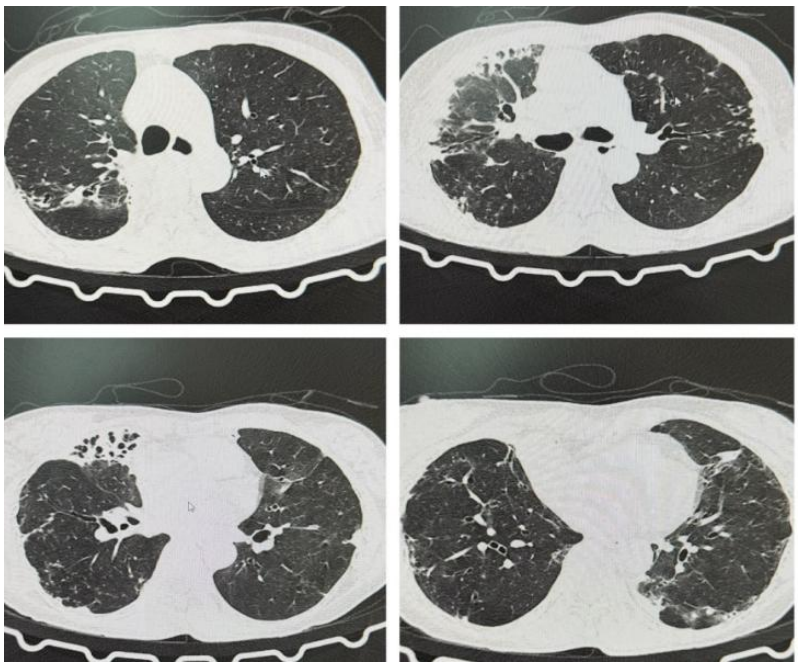

Figure 3: CT chest revealed resolution of ground-glass opacities and mosaic attenuation, with persistent fibrotic and bronchiectatic changes.

3. Discussion

Pulmonary Nontuberculous Mycobacterial (NTM) disease, particularly caused by Mycobacterium Avium Complex (MAC), is increasingly diagnosed in immunocompetent elderly women, even in the absence of classical risk factors or underlying immunosuppression. The most common clinical manifestations include chronic cough, sputum production, fatigue, and exertional dyspnea. In our case, the patient presented with several months of chronic productive cough and progressive respiratory discomfort, in addition to diffuse musculoskeletal pain, without systemic features such as fever or weight loss. Radiologic imaging revealed bronchiectasis, tree-in-bud opacities, and subsegmental consolidations—hallmarks of MAC pulmonary infection [5].

According to the current clinical practice guidelines from the American Thoracic Society (ATS), Infectious Diseases Society of America (IDSA), the diagnosis of MAC pulmonary disease requires compatible clinical symptoms, characteristic radiologic findings, and microbiologic confirmation [6]. This patient met all diagnostic criteria: she had persistent respiratory symptoms, HRCT imaging consistent with nodular bronchiectatic disease, and multiple positive sputum cultures for M. avium.

HRCT demonstrated bilateral peripheral subpleural reticulation, traction bronchiectasis, and segmental consolidations, particularly in the right middle lobe and lower lobes. These findings correspond to the nodular bronchiectatic phenotype of MAC pulmonary disease, which is most commonly observed in non-smoking middle-aged or elderly women without prior lung disease [5]. This form differs from the fibrocavitary phenotype, which typically involves upper lobe cavitation and is more frequent in older male smokers. Interstitial radiologic features and clinical symptoms were similar to post Covid 19 infection pulmonary sequelae mainly due to immunocompromised condition however the long duration of the illness and the negative PCR test had ruled out the diagnosis [7].

An unusual aspect of this case was the patient's diffuse bone and joint pain. Although musculoskeletal manifestations are not classic features of MAC pulmonary disease, similar symptoms have been reported and may reflect a parainfectious or immune-mediated phenomenon. Negative autoimmune serologies and the resolution of symptoms following antimicrobial therapy support this hypothesis [4]. This case illustrates pulmonary MAC disease in an immunocompetent host, presenting with respiratory symptoms and non-specific systemic complaints such as arthralgia. While polyarthralgia is not a typical manifestation of MAC lung disease, similar immune-related symptoms have been documented and may reflect a para-infectious inflammatory response [8].

Microbiological confirmation was achieved by isolating M. avium from serial sputum cultures. Given the significant symptoms and radiographic findings, treatment was initiated with a standard three-drug regimen: azithromycin, ethambutol, and rifabutin. This regimen aligns with established treatment guidelines, which emphasize the need for a macrolide-based combination therapy. Ethambutol plays a key role in preventing the emergence of macrolide resistance, while rifabutin serves as a viable alternative to rifampin, particularly in patients at risk of drug-druginteractions or intolerance [9].

The efficacy of maintaining both ethambutol and a rifamycin alongside a macrolide has been supported by retrospective studies showing higher microbiologic cure rates in patients treated with this combination. Rifabutinwas selected in this case due to its favorable drug interaction profile compared to rifampin. Ethambutol plays a critical role in preventing macrolide resistance, which can develop rapidly if monotherapy is used [9].

After six months of treatment, the patient reported significant improvement in respiratory symptoms and complete resolution of joint pain. Repeat pulmonary function testing showed improvement in forced vital capacity and diffusing capacity. At the 12-month follow-up, HRCT scans demonstrated resolution of ground-glass opacities and mosaic attenuation, although residual fibrotic and bronchiectatic changes persisted, consistent with chronic remodeling.

MAC pulmonary infection can occur without classic risk factors such as structural lung disease, smoking, or immunosuppression. The nodular bronchiectatic form, as seen in this patient, is most frequently observed in older non-smoking women and can progress slowly without treatment [5]. Diagnosis is based on combined clinical, radiologic, and microbiologic criteria as per ATS/IDSA guidelines [2]. Treatment typically includes a macrolide, ethambutol, and a rifamycin (e.g., rifampin or rifabutin), with studies showing that this triple-drug approach improves microbiologic clearance and reduces relapse [10].

Despite a favorable treatment response, recurrence remains a major concern in MAC pulmonary disease, particularly in patients with underlying structural lung abnormalities. Reported recurrence rates may reach up to 50%, and long-term follow-up is therefore essential [6]. Monitoring should include periodic sputum cultures, imaging, and pulmonary function assessments to detect relapse early and guide potential re-treatment. Long-term follow-up with sputum cultures, imaging, and pulmonary function monitoring is essential [11].

A recent real world, retrospective case control study by Wang et al. reinforces the importance of adhering to both triple-drug therapy and prolonged treatment duration for optimal outcomes in MAC lung disease. In a cohort of 106 patients treated from 2011 to 2020, those on macrolide + ethambutol + rifamycin achieved significantly higher favorable outcomes compared to non-triple regimens (90.9% vs. 67.5%, $p = 0.008$). Moreover, a treatment duration of over 12 months was linked to improved outcomes (62.1% vs. 42.5%, $p = 0.07$). Multivariable analysis confirmed both triple therapy and treatment duration >12 months as independent protective factors against unfavorable outcomes [12]

4. Conclusion

This case reinforces the need to consider MAC pulmonary disease in immunocompetent patients with chronic cough and bronchiectasis. Clinicians should be aware of atypical systemic features, such as arthralgia, which may resolve with antimicrobial therapy. Timely diagnosis and adherence to guideline-based combination therapy can lead to significant clinical and radiologic improvement.

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