

## CASE REPORT: PULMONARY NOCARDIOSIS IN THE SETTING OF OVERLAP SYNDROME AND HYPOTHYROIDISM: A CHALLENGING DIAGNOSIS

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Article Received on 22/02/2025

Article Revised on 12/03/2025

Article Accepted on 02/04/2025

### ABSTRACT

Pulmonary nocardiosis is a type of necrotizing pneumonia that can manifest in sub-acute, chronic, or acute forms, particularly affecting immunocompromised individuals. It is caused by aerobic actinomycetes of the genus *Nocardia*. This report details a case involving a 50-year-old female with overlap syndrome (rheumatoid arthritis and polymyositis) and primary hypothyroidism, who had been on immunosuppressive therapy for five months. She presented with a sudden onset of cough, expectoration, shortness of breath, and fever over the past week. Diagnosis was confirmed through sputum microscopy, revealing filamentous gram-positive bacteria.

### INTRODUCTION

*Nocardia* is a gram-positive bacillus known for its branching hyphae and primarily impacts immunocompromised hosts, though it can also infect some immunocompetent individuals. Diagnosing nocardiosis can be challenging due to its similarity to other respiratory infections, leading to a scarcity of reported cases and limited literature. Prognosis is generally poor in immunocompromised patients, especially with central nervous system involvement. This case highlights pulmonary nocardiosis in an immunocompromised patient.

### CASE REPORT

A 65-year-old female presented at our outpatient department with acute cough, expectoration, shortness of breath, and high fever lasting seven days. She had been diagnosed with overlap syndrome (rheumatoid arthritis and polymyositis) and primary hypothyroidism five months prior, exhibiting symmetrical polyarticular joint pain, swelling, early morning stiffness, and mobility difficulties. Laboratory tests showed positive ANA, elevated anti-CCP2, and negative anti-dsDNA and U1RNP. She was on steroids, azathioprine, and thyroid hormone supplementation.

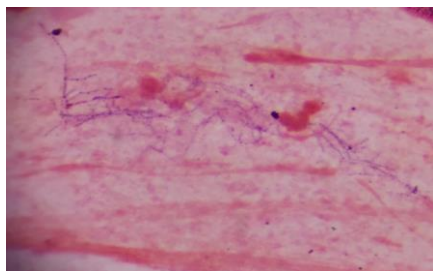
During the examination, she was alert but in respiratory distress, with an oxygen saturation of 88% on room air, a temperature of 101.5°F, a pulse of 110/min, blood pressure of 106/60 mmHg, and a respiratory rate of 28/min. Pallor was noted, while other systemic examinations were unremarkable. Routine tests indicated anemia (Hb 7.2 g/dL), leukocytosis (TLC 17,740/mm<sup>3</sup>), neutrophilia (95%), and thrombocytopenia (platelet

count 40,000/mm<sup>3</sup>). Renal function tests showed elevated creatinine (1.7 mg/dL) and urea (72 mg/dL), with liver function tests within normal limits.

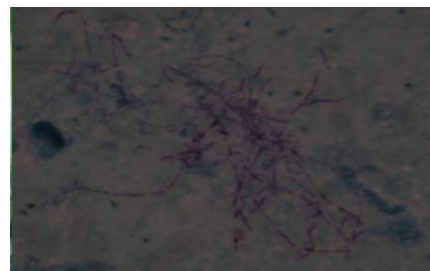
A chest X-ray revealed non-homogeneous opacity in the right middle and lower zones, along with infiltrates in the left lower zone. (figure1) She was started on empirical antibiotics (ceftriaxone and azithromycin) along with supportive treatment. Sputum examination showed gram-positive branching filaments indicative of *Nocardia*. (figure 2 & 3) A CT scan of the thorax confirmed heterogeneous opacities in the right lung and left lower lobe. (figure4) Treatment with trimethoprim-sulfamethoxazole was initiated based on sputum findings.



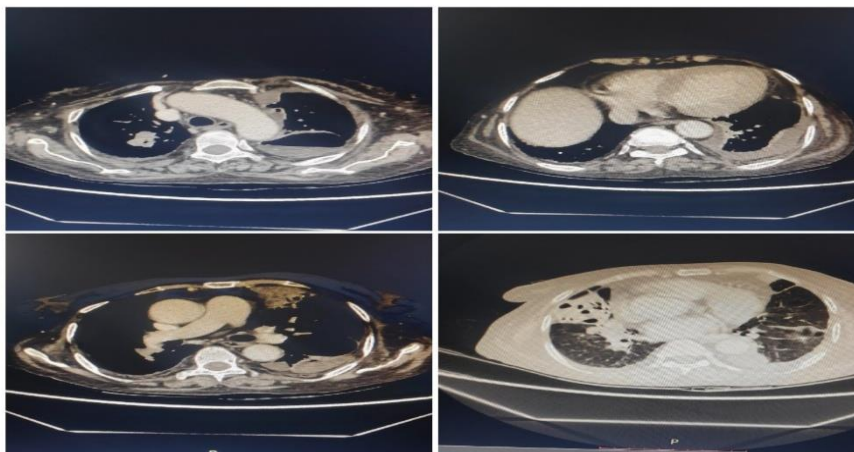
**Figure 1: CXR shows right sided non homogenous opacity mainly in middle and lower zone.**



**Figure 2:** sputum light microscopy gram Stain shows thin, branching, gram positive bacilli with beaded app.



**Figure 3:** ZN stain shows thin, beaded, filamentous, acid fast – branching bacilli.



**Figure 4:** CT thorax shows opacity in right lung and left lower zone.

Despite initial treatment, her condition worsened, prompting the addition of imipenem and amikacin based on her weight and renal function. Unfortunately, her status continued to deteriorate, leading to her transfer to the intensive care unit for mechanical ventilation. Despite aggressive resuscitation efforts, she did not survive.

## DISCUSSION

*Nocardia* is an environmental bacterium that often causes opportunistic infections in immunocompromised individuals. It is found in soil, decaying vegetation, and water. The *Nocardia asteroides* complex is the primary cause of human infections. Microscopic examination reveals filamentous, branching gram-positive rods, which can exhibit varying degrees of acid-fastness.

Pulmonary nocardiosis typically arises from inhalation, presenting with symptoms ranging from productive cough to high-grade fever. Radiographic findings are often non-specific, with pleural effusion occurring in about one-third of patients. Extrapulmonary infections can also develop, especially in those who are immunocompromised.

Diagnosis is frequently delayed due to the non-specific clinical presentation and difficulties in cultivation. The primary treatment is trimethoprim-sulfamethoxazole, with combination therapy recommended for severe cases. Continued immunosuppressive therapy is generally advised for patients with underlying conditions.

## CONCLUSION

As the number of individuals undergoing immunosuppressive therapy rises, *Nocardia* remains a significant pathogen. Early recognition and prompt treatment are essential for improving patient outcomes.

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