

Cavitary Pneumonia Caused by *Nocardia cyriacigeorgica* in an Immunocompromised Patient

Neumonía cavitada por Nocardia cyriacigeorgica en paciente inmunocomprometida

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ABSTRACT

Background: Pulmonary nocardiosis is an opportunistic infection that should be considered in the differential diagnosis of cavitary pneumonia with a protracted clinical course in immunocompromised patients. Access to advanced microbiological methods allows for timely diagnosis and appropriate treatment.

Case report: We present the case of a 28-year-old woman with stage IV colon cancer undergoing chemotherapy and corticosteroid therapy, who presented with persistent fever and productive cough.

Results: Chest computed tomography revealed a cavitary lesion in the right upper lobe. Sputum culture identified *Nocardia cyriacigeorgica* using matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometry. Treatment with trimethoprim-sulfamethoxazole was initiated, resulting in favorable clinical and radiological outcome

Key words: nocardia cyriacigeorgica pulmonary nocardiosis immunocompromised cavitary pneumonia MALDI-TOF

RESUMEN

Introducción: La nocardiosis pulmonar es una infección oportunista que debe considerarse en el diagnóstico diferencial de neumonías cavitadas de evolución tórpida en pacientes inmunocomprometidos. El acceso a métodos microbiológicos avanzados permite un diagnóstico oportuno y un tratamiento adecuado.

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Presentación del caso: Presentamos el caso de una mujer de 28 años con cáncer de colon estadio IV en tratamiento con quimioterapia y corticoides, que consultó por fiebre persistente y tos productiva.

Resultados: La tomografía computada de tórax (TC) evidenció una lesión cavitada en lóbulo superior derecho. El cultivo de esputo mediante espectrometría de masas MALDI-TOF identificó *Nocardia cyriacigeorgica*. Se inició tratamiento con trimetoprima-sulfametoxazol con evolución clínica y radiológica favorable.

Palabras clave: nocardia cyriacigeorgica, nocardiosis pulmonar, inmunocompromiso, neumonía cavitada, MALDI-TOF, histopatología

INTRODUCTION

Nocardiosis is an infection caused by aerobic, gram-positive, partially acid-fast bacteria of the genus *Nocardia*. It primarily affects patients with cellular immunosuppression, including those with malignancies and those receiving corticosteroids or chemotherapy.^{1,2}

Nocardia cyriacigeorgica, described by Yassin in 2001,³ is currently one of the most frequently identified species in invasive pulmonary infections.⁴ The implementation of molecular techniques and MALDI-TOF mass spectrometry has significantly improved diagnostic accuracy and species-level differentiation.⁵⁻⁷

We present a case of cavitary pneumonia caused by *N. cyriacigeorgica* in an immunocompromised patient, highlighting the diagnostic challenges and the relevance of modern microbiologic methods.

CASE REPORT

A 28-year-old woman with stage IV colon cancer with lymph node and bone metastases was receiving capecitabine plus oxaliplatin (XELOX), initiated 4 months before presentation; her most recent cycle had been administered 2 weeks before presentation. She had also been receiving dexamethasone, 4 mg/d, for 5 months. She presented with a 1-month history of persistent fever and cough with purulent sputum. She had received multiple courses of outpatient antibiotics without clinical improvement.

On physical examination, her heart rate was 145 bpm, temperature was 38.2 °C, and oxygen saturation was 94% on room air.

Laboratory studies showed a white blood cell count of $11.6 \times 10^3/\mu\text{L}$, with 64% neutrophils and

12% lymphocytes, and a C-reactive protein level of 26.7 mg/dL.

Chest CT revealed a 48 × 41-mm cavitary lesion in the apical segment of the right upper lobe, with irregular margins and a thick wall, surrounded by adjacent parenchymal consolidation. (Figure 1). Empiric treatment with piperacillin-tazobactam was initiated because of her recent hospitalization.

Sputum culture, analyzed by MALDI-TOF mass spectrometry, identified *Nocardia cyriacigeorgica*. The microbiologic workup included acid-fast bacillus smear, *Mycobacterium tuberculosis* culture, and fungal culture, all of which were negative.

Brain CT showed no evidence of central nervous system involvement.

Treatment was initiated with trimethoprim-sulfamethoxazole (15 mg/kg/day of trimethoprim/sulfamethoxazole), with a favorable clinical response and radiologic improvement (Figure 2). A 6-month treatment course was indicated given her immunocompromised status and the absence of central nervous system involvement. Monotherapy was selected based on her stable clinical course, absence of oxygen requirement, and involvement of a single pulmonary lobe on CT.

DISCUSSION

Pulmonary nocardiosis is an opportunistic infection that primarily affects immunocompromised patients.^{1,2,8} It is caused by aerobic bacteria of the genus *Nocardia*, which have a predilection for the lungs and may disseminate systemically.¹

The clinical presentation commonly includes cough, fever, dyspnea, chest pain, and, occasionally, hemoptysis.^{1,2,8,9}

Figure 1. Chest CT. Chest CT revealed a 48 × 41-mm cavitary lesion in the apical segment of the right upper lobe, with irregular margins and a thick wall, surrounded by adjacent parenchymal consolidation.

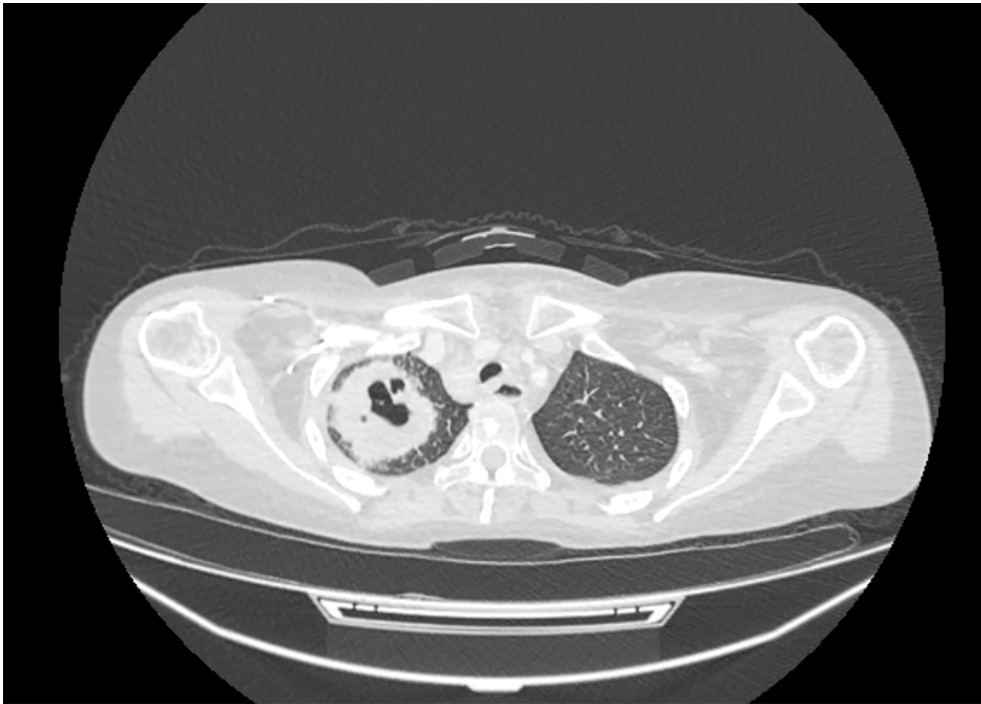
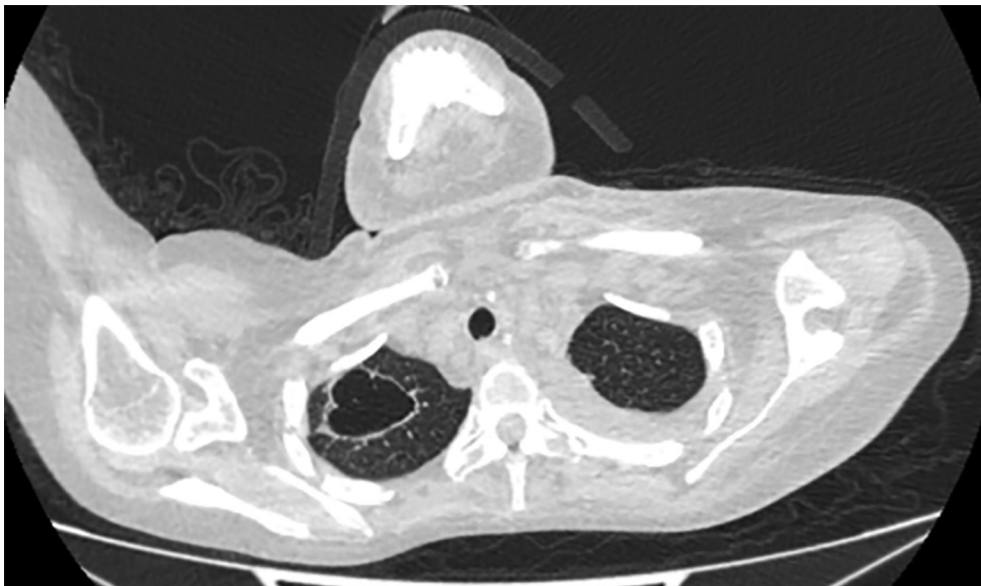


Figure 2. Follow-up chest CT. Subpleural residual apical right cavity with regular margins and a thin wall, associated with adjacent scarring changes.



Radiologically, nocardiosis may mimic tuberculosis, lung malignancy, or fungal infection, particularly in immunocompromised patients, with findings including cavitation, masses, and persistent nodular infiltrates.¹⁰⁻¹² Cavitation is reported in approximately 30% to 50% of the cases and appears to be more common in immunocompromised patients and in infections caused by *Nocardia cyriacigeorgica*, *N. farcinica*, or *N. asteroides*.^{1,2,9,13,14} In published series, Martínez Tomás et al reported cavitation in 34% of 54 patients, whereas Peleg et al observed cavitation in approximately 40% of transplant recipients.^{13,14} These findings underscore the importance of considering *Nocardia* in the differential diagnosis of cavitary lung lesions in immunocompromised patients, as in our patient, whose CT scan demonstrated a solitary cavitary lesion consistent with previously reported findings.^{11,12}

Accurate diagnosis is critical for guiding the treatment. MALDI-TOF mass spectrometry enables rapid identification of *Nocardia* and may overcome some limitations of conventional identification methods, thereby reducing the time to initiation of targeted therapy.⁵⁻⁷ Several studies have demonstrated that MALDI-TOF mass spectrometry can reliably differentiate *Nocardia* species.⁵⁻⁷

In Latin America, nocardiosis is likely underdiagnosed because of the high prevalence of tu-

berculosis and limitations in access to specialized diagnostic methods. In Argentina, recent studies using MALDI-TOF have identified *N. cyriacigeorgica* as the most frequently recovered species from respiratory specimens, underscoring the importance of accurate species-level identification to guide antimicrobial therapy.^{5,6}

Regarding treatment, in pulmonary infections without central nervous system involvement, trimethoprim-sulfamethoxazole is recommended for 6 months, with high rates of clinical and radiologic response.^{2,8,9} In cases with cerebral involvement or dissemination, the duration is extended to ≥12 months, with combination therapy guided by the susceptibility profile.^{2,88}

CONCLUSION

Pneumonia caused by *Nocardia cyriacigeorgica* should be included in the differential diagnosis of cavitary pulmonary lesions in immunocompromised patients with a protracted clinical course.

Identification by MALDI-TOF enables timely diagnosis and optimizes the therapeutic strategy, with a direct impact on prognosis.

DISCLOSURES

Conflict of interests

Authors have no conflicts of interest to declare.

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