

Case Report

Pulmonary nocardiosis in a patient with chronic obstructive pulmonary disease and bronchiectasis*

Nocardiose pulmonar em portador de doença pulmonar obstrutiva crônica e bronquiectasias

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Abstract

We report the case of a patient with chronic obstructive pulmonary disease and bronchiectasis, chronically using corticosteroids, who acquired pulmonary nocardiosis, which presented as multiple cavitated nodules. The principal symptoms were fever, dyspnea and productive cough with purulent sputum. Chest X-ray and computed tomography of the chest revealed nodules, some of which were cavitated, in both lungs. Sputum smear microscopy and culture revealed the presence of *Nocardia* spp. The patient was treated with imipenem and cilastatin, which produced an excellent clinical response.

Keywords: Pulmonary disease, chronic obstructive; Nocardia infections; Bronchiectasis.

Resumo

Relatamos o caso de um paciente com doença pulmonar obstrutiva crônica e bronquiectasias, em uso crônico de corticosteróides, que desenvolveu nocardiose pulmonar, sob a forma de múltiplos nódulos pulmonares escavados. Os sintomas principais foram a tosse produtiva com escarro purulento, febre e dispnéia. A radiografia simples e a tomografia computadorizada do tórax mostravam nódulos em ambos os pulmões, alguns escavados. O exame direto de escarro e a cultura mostraram a presença de *Nocardia* spp. A paciente foi tratada com imipenem e cilastatina, com excelente resposta clínica.

Descritores: Doença pulmonar obstrutiva crônica; Nocardiose; Bronquiectasia.

Introduction

Pulmonary nocardiosis is a rarely observed disease caused by a Gram-positive actinomycete of the genus *Nocardia*. In the USA, the estimated annual incidence is 500 to 1000 cases. Transmission occurs through inhalation and most often affects patients presenting immunosuppression due to AIDS or neoplasia, as well as transplantation (kidney or bone marrow), and also occurs in patients with chronic obstructive pulmonary disease (COPD) and bronchiectasis, notably in those in chronic use of corticosteroids.

The objective of this study was to present the imaging findings—multiple cavitated pulmonary nodules—in a patient with COPD and bronchiectasis, using an inhaled

corticosteroid at the maximum dose, receiving a bacteriological diagnosis of pulmonary nocardiosis.

Case report

An 89-year-old white woman presented with COPD and bronchiectasis in the upper left lobe for 20 years. A functional diagnosis of COPD was made by calculating the ratio of the forced expiratory volume in one second/forced vital capacity, which was 41.2% after the use of bronchodilator in the pulmonary function test. She had been on daily use of tiotropium bromide, long-acting anticholinergics, associated with inhaled

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corticosteroid since September 2004; in acute exacerbations, she used systemic corticoids associated with broad spectrum antibiotics. She had presented cough with purulent sputum, 38°C fever, night sweats, severe prostration, dyspnea and anorexia for 5 days. A 10-day course of ciprofloxacin was prescribed, a treatment that resulted in no clinical improvement, and the patient was hospitalized for 10 days due to worsening of the clinical status. In this first admission, the chest X-ray showed thickening of the bronchial walls, small, ill-defined opacities in the right upper and lower lobes, as well as atelectasis with bronchiectasis in the left upper lobe. *Klebsiella pneumoniae* was isolated through sputum culture. Ceftriaxone, piperacillin and tazobactam were prescribed. The patient was discharged after improvement of the fever and cough. After discharge, there was recurrence of the symptoms, with worsening of the dyspnea. A chest X-ray was performed in the home, using a portable device. The X-ray showed disseminated nodules in the lungs, prompting a second hospitalization (Figure 1). Upon examination, the patient presented a general aspect of suffering: prostration; paleness; tachypnea (44 breaths/min); tachycardia (120 bpm); axillary temperature, 37°C; arterial pressure, 120/80 mmHg; peripheral oxygen saturation, 84% in room air. There were rhonchi in both lungs. The rest of the examination evidenced no alterations. Laboratory test results were as follows: 3,260,000 erythrocytes/mm³; hematocrit, 28%; hemoglobin, 9.6 g/dL; 11,130 leukocytes/mm³; rods, 5%; segmented, 64%; eosinophils, 0%; lymphocytes, 10%;

pH, 7.4; arterial oxygen tension, 68.7 mmHg; arterial carbon dioxide tension, 42.8 mmHg; peripheral oxygen saturation, 93%—with oxygen at 3 L/min using a nasal catheter; urea, 44.3 mg/dL; creatinine, 1.26 mg/dL; sodium, 135 mEq/L; and potassium, 5.4 mEq/L. The results of the liver function test, coagulation profile, echocardiogram and pelvic ultrasound were normal. Blood culture and serology were negative for HIV.

A computed tomography (CT) scan of the chest revealed nodules, some cavitated, of various sizes (Figure 2). Three sequential sputum samples were tested for acid-fast bacilli and fungi (silver staining), and the results were negative. In the three sputum samples collected, smear microscopy (Gram staining) revealed filamentous bacteria, strongly suggestive of *Nocardia* spp., which was confirmed by Ziehl-Neelsen staining, showing the characteristic partial acid-fastness (Figure 3).

Initially, the association trimethoprim-sulfamethoxazole was prescribed, without clinical response. A 15-day course of amikacin, with imipenem and cilastatin, was then prescribed, resulting in an excellent clinical and radiological response (Figure 1). The patient was discharged with a prescription for an additional 8 weeks of trimethoprim-sulfamethoxazole.

Discussion

Pulmonary nocardiosis is an infection caused by gram-positive aerobic bacilli of the genus *Nocardia*. The principal species involved is *N. asteroides*, which

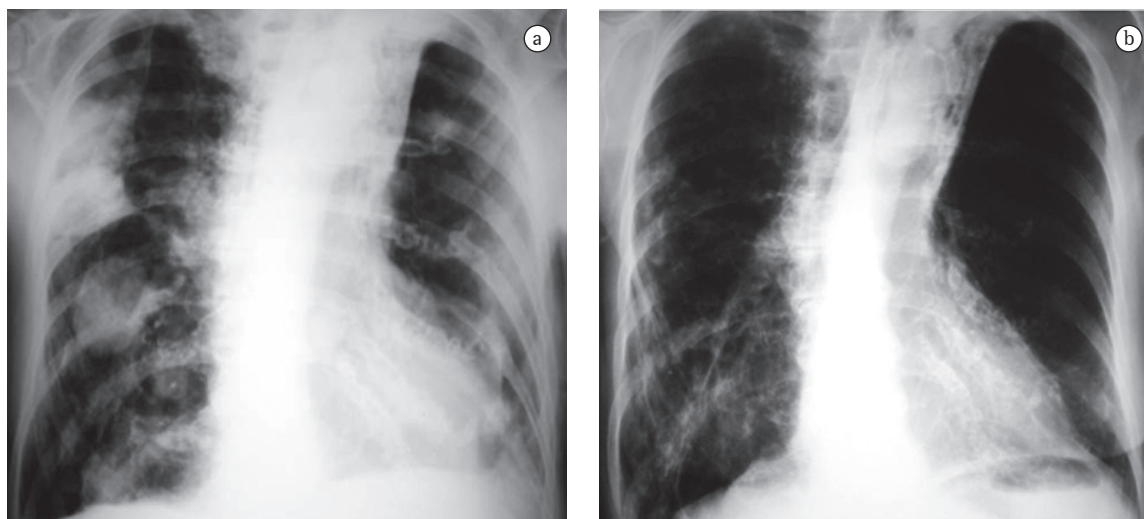


Figure 1 – Anteroposterior chest X-ray. In A, multiple nodules of various sizes, affecting both lungs. In B, control test, conducted 15 days later, showing complete resolution of the lesions.

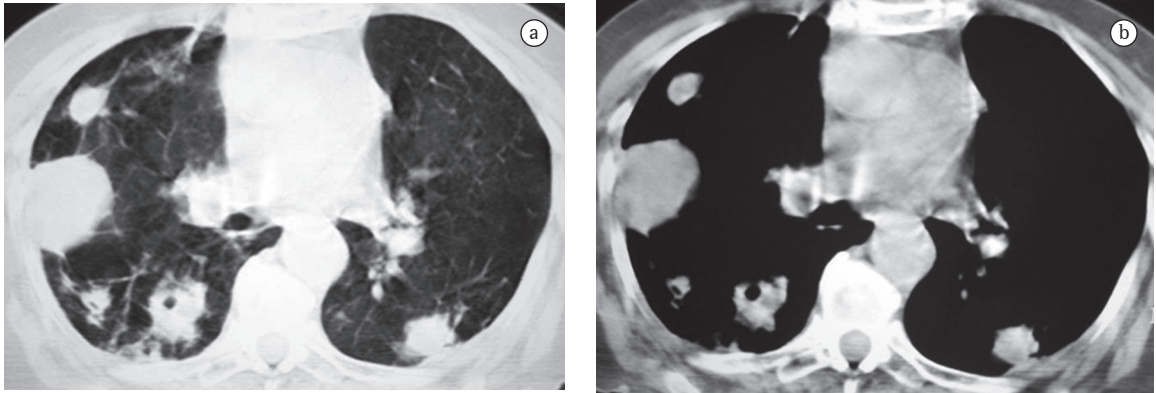


Figure 2 – Computed tomography scans with parenchymal (A) and mediastinal (B) window, showing multiple pulmonary nodules of various sizes, some cavitated.

is found in 70% to 90% of the cases.⁽¹⁻⁶⁾ *Nocardia* sp. can colonize the respiratory tract without symptoms or radiographic abnormalities.^(1,3,5,7,8)

Transmission occurs through inhalation and principally affects patients whose cellular immunity is compromised due to AIDS, neoplasia, transplantation or chronic use of corticosteroids, although there are reports of cases in previously healthy patients.^(1,3,5,6,9-11) In many studies in the literature correlating nocardiosis with corticosteroid therapy, it has been demonstrated that this correlation is more frequently observed in COPD than in any other disease.^(1,3) Another disease in which this correlation is common is bronchiectasis.⁽⁵⁾

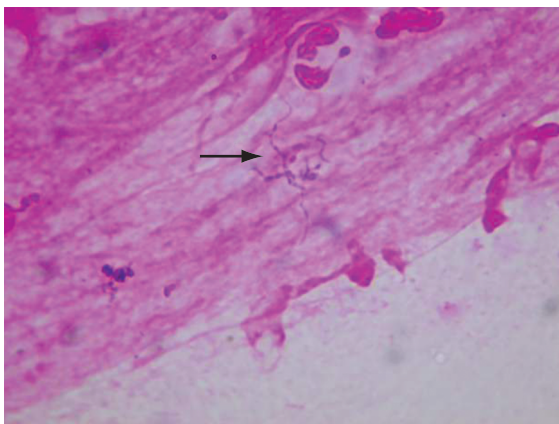


Figure 3 – Direct sputum smear microscopy, stained using the Gram method. Amid the mucus and near two polymorphonuclear leukocytes, there are filamentous, branched bacterium presenting irregular Gram staining (solid black arrow), suggestive of *Nocardia* spp.

The pulmonary clinical profile can be acute, subacute or chronic in evolution,^(3,5,9) and the principal symptoms are dyspnea, productive cough and fever.^(2,8,9) In the case reported here, the patient presented a profile of dyspnea and fever, in addition to cough with purulent sputum, night sweats and severe prostration, with subsequent worsening of the dyspnea.

The chest X-ray presentation of pulmonary nocardiosis is nonspecific. The most common radiological findings are consolidations and large irregular nodules. Nodules, cavitated masses, pleural effusion, pneumothorax, ground-glass opacities and interstitial patterns can occur as well.^(1,4,5,11) Some studies show that, in HIV-infected patients, there is a higher percentage of cavitated lesions.⁽⁸⁾ Alveolar consolidation in the upper lobes is often confused with pulmonary tuberculosis.⁽⁶⁾ Although the alterations observed on CT scans are similar to those of the conventional X-rays, CT is superior in demonstrating the exact location and extent of the lesions, as well as in the differentiation between pulmonary and pleural lesions.⁽⁵⁾ In the case reported, the patient presented nodules of various sizes, disseminated throughout both lungs, and some of those nodules were cavitated.

It can be difficult to confirm the diagnosis, and achieving such confirmation is dependent on the isolation of the microorganism in sputum samples, bronchoalveolar lavage fluid or culture.^(2,5,6) Sputum cultures are positive in approximately 90% of patients, and positivity can be as high as 100% in bronchoalveolar lavage.⁽³⁾ It is fundamental that the laboratory be informed of the suspicion of nocar-

diosis. Due to the slow growth of the bacterium, the incubation time of the culture should be extended to 20–30 days, also using adequate concentrations and sample decontamination techniques.^(2,3,6,9,11) Positive blood culture is rare.⁽⁶⁾ The infection is often confused with tuberculosis, both due to the nonspecific clinical profile and to the acid-fastness of the bacillus, which shows positivity in Ziehl-Neelsen staining.^(5,6,9)

In conclusion, patients with COPD and bronchiectasis, immunocompromised due to the chronic use of corticosteroids, who present alveolar consolidation or cavitated pulmonary nodules, with or without pleural effusion, should be investigated as to the diagnostic possibility of pulmonary nocardiosis.

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