

Nocardia Pneumonia in an Immunocompetent Patient : A Case Report

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Abstract

Nocardia pneumonia is a relatively rare lung infection in Taiwan. It is usually related to contact with soil or contaminated water. A 39-year-old previously healthy man had a work-related fall resulting in multiple wounds and fractures as well as aspiration of river water and soil. His hospital course was complicated by facial necrotizing fasciitis due to aeromonas species and acinetobacter pneumonia. Despite meropenem treatment for the latter, his pneumonia failed to resolve. Gram stain of fluid from bronchoalveolar lavage demonstrated nocardia, and he improved after trimethoprim-sulfamethoxazole added to the meropenem he was already receiving. When a patient with pneumonia has a history of soil or river water aspiration and the lung infection responds poorly to antimicrobial therapy for community-acquired pneumonia, pulmonary nocardiosis should be considered and a careful search performed for evidence of the organism is necessary. (J Intern Med Taiwan 2008; 19: 270-274)

Key Words : Nocardia, Pneumonia

Introduction

Actinomycetes are a somewhat loose grouping of aerobic and anaerobic gram-positive that tend to grow slowly with branching filaments. Only a few such organisms are pathogenic in man, including nocardia. These organisms are found worldwide in soil, decaying vegetable matter, and water, although they

have the propensity to become airborne, particularly in dust particles. Inhalation of the organism is considered the most common route of entry. Nocardiosis is more common in patients with immunodeficiency, but it also occurs in immunocompetent patients.

Case report

A 39-year-old man fell while at work on a con-

struction site. In addition to sustaining multiple fractures, he aspirated river water and soil. His previous medical history was unremarkable and he had been in good health. He was a smoker and drank alcohol socially. On admission, he was comatose. His temperature was 36.7 °C, pulse 106/min, respiratory rate 24/min, and blood pressure 139/81 mmHg. There were multiple lacerations and ecchymoses on his face and extremities. The lungs were clear to auscultation. The right leg and foot were obviously deformed, indicating fractures.

His hemoglobin was 12.6 g/dL and the leukocyte count 16000/ μ L with 2% bands and 74% neutrophils. X-rays of the right leg revealed fractures of the right tibia, fibula and distal phalanx of the right big toe. There was no imaging evidence of brain injury. An initial chest x-ray was clear, but a repeated film the next day showed bilateral infiltrates (Fig. 1). He was treated with agents active against community-acquired pneumonia. However, he developed shock and severe respiratory distress requiring intubation on hospital day 2.

Cultures of his facial wounds grew *Aeromonas* species and coagulase-negative staphylococci on hospital day 4. Fasciotomy was performed on the

face to treat the necrotizing fasciitis caused by the aeromonas. Despite broad-spectrum antimicrobial therapy, the lung infiltrates progressed, although his pulmonary function improved, followed by extubation. Fever, however, persisted and the chest x-ray revealed no improvement. Two sets of blood cultures yielded no growth after incubation for 5 days. One set of sputum culture grew *Acinetobacter baumannii* for which meropenem 1 gm every 8 hours was administered. On day 11, he was reintubated because of persistent respiratory distress. Chest computed tomography showed bilateral air bronchograms. Bronchoscopy revealed diffuse mucosal swelling and narrowing of the airways with copious purulent sputum coating the internal surface of the bronchi. Bronchoalveolar lavage was performed and gram stain of a specimen showed typical nocardia organisms (Fig. 2). *Nocardia* species grew on culture of the lavage fluid at a colony count of 50×10^2 . Trimethoprim-sulfamethoxazole (TMP/SMX) was added to the meropenem which had been administered for 5 days, after which the fever gradually subsided and the pneumonia improved significantly after 3 days. The patient was extubated on hospital day 26. His course was subsequently complicated by recurrent fever, a

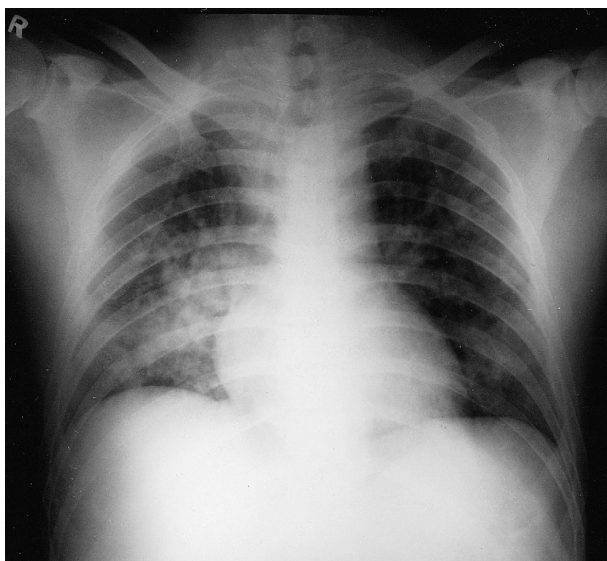


Fig.1. Chest x-ray taken on hospital day 2 showing bilateral infiltrates

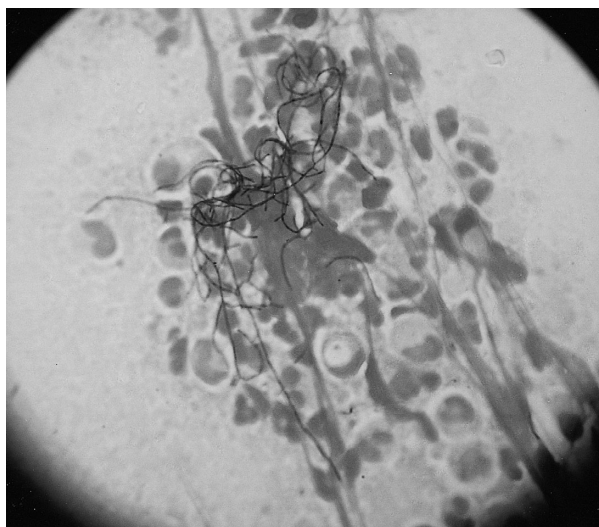


Fig.2. Gram stain of bronchoalveolar lavage fluid showing typical gram-positive organisms with branching filaments.

bleeding ulcer, and intra-abdominal sepsis. However, he eventually recovered fully and was discharged on hospital day 60.

Discussion

The interest in infection caused by nocardia is increasing because of the frequent use of immunosuppressive treatment and the emergence of AIDS. Other conditions in which it has been reported include pemphigus vulgaris¹, bronchiolitis obliterans², chronic respiratory infection³, and chronic granulomatous disease⁴. Kageyama et al. found the most common predisposing factors for nocardia infection were treatment for systemic lupus erythematosus, cancer, diabetes, and AIDS⁵. However, patients without obvious immune deficiency have also been reported⁶. Some older series reported up to 50% of patients with nocardiosis had normal immunity⁷. The infection can be chronic in some cases, and fulminant course as well⁸.

The clinical and radiological findings in nocardiosis are non-specific. Uttamchandani et al. reported a series of 30 cases of pulmonary nocardiosis, noting that infiltrates in 23 patients were located in the upper lobe, mimicking tuberculosis⁹. Delayed diagnosis is not unusual^{8,10}. The organism grows very slowly in blood cultures and may not be obvious after only 5 days, the point at which cultures are commonly reported as showing no growth and are discarded. Kontoyiannis et al. recommended incubating blood cultures for up to 2 to 3 weeks if nocardia infection is suspected¹¹. In a series of 35 cases of pulmonary nocardiosis, Hui et al. reported that the diagnosis was made based on sputum samples alone in half the cases. However, in 21 cases, additional organisms were recovered as well, the most common one being aspergillus¹². Gram stain of sputum were uninformative in our case, but the organism was seen on Gram stain of bronchoalveolar lavage fluid and grew on culture of this material. The initial sputum culture was positive for *A. baumannii*. Despite his

known exposure to soil and muddy water, which was likely the source of his aeromonas infection, nocardia infection was not considered at first. It was the treatment failure that prompted bronchoscopy, the procedure that yielded the correct diagnosis.

Once the diagnosis was made, the patient responded well to the addition of TMP/SMX. In addition to TMP/SMX, other agents used to treat pulmonary nocardiosis include sulfonamide, ampicillin, amoxicillin-clavulanic acid, minocycline, doxycycline, amikacin, cefuroxime, cefotaxime, imipenem, meropenem, erythromycin, and rifampicin¹³. TMP/SMX is often regarded as the drug of choice, but Yildiz et al. found that only 3 of 9 patients with nocardiosis had organisms susceptible to TMP/SMX¹⁴. In Taiwan, Chen et al. found that 82% of 11 *Nocardia* isolates are susceptible to TMP/SMX and 82% are susceptible to imipenem¹⁵. *Nocardia* species are generally susceptible to imipenem, amikacin and linezolid (100%). The use of TMP/SMX alone for patients with nocardiosis may not be inferior to imipenem. In 1983, Gombert et al. tested 26 *N. asteroides* isolates and found that imipenem-TMP/SMX was synergistic in 21 strains, imipenem-cefotaxime in 24, and amikacin-TMP/SMX in 22¹⁶. In 1988, Wallace et al. found that sulfonamides failed in 20% of patients and urged sensitivity testing, particularly as alternative treatment is needed in people who are allergic to sulfonamides¹⁷. In vitro susceptibility testing of *Nocardia* species is thus recommended, but the results may not correlate well with the clinical response. Lerner et al. reported that combinations of imipenem/cefotaxime and imipenem/TMP-SMX were not statistically better than imipenem alone¹⁸. Our patient was already being treated with meropenem for acinetobacter pneumonia when we diagnosed nocardiosis. It's impossible to tell if he would have responded to TMP-SMX alone, but clinical condition did improve significantly after the addition of TMP-SMX.

The duration of treatment for nocardiosis is not well-defined. Wallace et al. reported that 60% of pa-

tients with pulmonary nocardiosis treated for less than 3 months with TMP/SMX relapsed within 4 weeks¹⁷. Stropes et al. reported a patient with no underlying diseases who had three relapses of pulmonary nocardiosis after treatment periods of 9, 15, and 12 months¹⁹. Prolonged treatment may therefore be necessary. Lerner recommended that parenteral therapy should be continued for at least 3 to 6 weeks¹⁸ with careful assessment of response, and longer course is usually recommended.

This case illustrates the need for a high index of suspicion of pulmonary nocardiosis. In Taiwan, according to the guidelines for treatment of community-acquired pneumonia, not all recommended agents are generally active against *Nocardia* species. So unless the pathogen is identified, it is unlikely that appropriate therapy will be given. Fortunately for our patient, once adequate specimens were obtained, the organism was easily identified on Gram stain. Nocardiosis should be considered in any patient with potential exposure, particularly if they are not responding to treatment for a more common infection.

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土壤菌絲屬 (Nocardia) 肺炎發生在一位免疫力正常病人身上：病例報告

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摘 要

土壤菌絲屬(Nocardia)肺炎在台灣是相當罕見的肺部感染疾病，感染通常和接觸泥土或污染的水有關。一個39歲免疫力正常的病患因工安意外跌落而產生多處傷口及骨折以及吸入河水及泥土，病患的住院病程中有產氣單胞菌(aeromonas species)感染造成壞死性筋膜炎及感染acinetobacter species肺炎。儘管使用了meropenem但是病患肺炎狀況持續惡化，直到支氣管沖洗術之革蘭氏染色及痰液培養出土壤菌絲屬(Nocardia)後，調整抗生素並以trimethoprim-sulfamethoxazole及meropenem合併使用後臨床狀況才顯著改善。從這個病例，我們可以學到當病患接觸泥土或受到污染的水的病史時，而且病患對於治療社區型肺炎的抗生素毫無反應時，必須將土壤菌絲屬(Nocardia)肺炎列入鑑別診斷。