Nocardiosis with diffuse involvement of the pleura: A case report

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Abstract

BACKGROUND
Nocardiosis is an uncommon infection that usually occurs in immunocompromised patients, and the pulmonary system is the most common site. We report an uncommon case of nocardiosis with diffuse involvement of the pleura, which presented as multiple localized nodular or hillock lesions on computed tomography (CT) with local chest wall infiltration.

CASE SUMMARY
A 54-year-old woman was referred to our hospital due to cough and fever for 20 d. She had a history of nephrotic syndrome for 7 mo and was given prednisone (60 mg/d) 6 mo previously. The hormone was then gradually reduced to the current dose of 25 mg/d. Chest CT showed many nodular or hillock lesions in the right pleura, mediastinum, and interlobar fissure areas. On the lower layer, one lesion infiltrated the chest wall. She was treated with piperacillin sodium and sulbactam sodium, but the therapeutic effect was not good. In this regard, ultrasound-guided local infiltration anesthesia was further conducted for perihepatic hydrops drainage to improve diagnostic accuracy. Puncture fluid culture isolated Nocardia species, confirming the diagnosis of nocardiosis. Subtype Nocardia farcinica was identified by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry. Antibiotic treatment was switched to trimethoprim/sulfamethoxazole and imipenem. After 8 d of treatment, the patient was discharged from the hospital with improved condition, and she has been recurrence-free for 2 years.

CONCLUSION
This report illustrates that nocardiosis should be suspected when clinicians encounter patients who are immunocompromised and have diffuse involvement of the pleura.
Core Tip: Nocardiosis is an uncommon subacute or chronic suppurative infection that usually occurs in immunocompromised patients. The pathological manifestations of nocardiosis are usually granulomas or abscesses. This case of nocardiosis exhibited diffuse involvement of the pleura and presented as multiple localized nodular or hillock shadows in the pleura, mediastinum, and interlobar fissure areas on computed tomography, which differs from simple pleural effusion or general bacterial infection.

INTRODUCTION

Nocardia species, which belong to Actinomycetes, are ubiquitous in the environment, especially in soil and water[1,2]. Nocardiosis usually occurs in the pulmonary system most commonly through direct inhalation of Nocardia[1,3]. An accurate diagnosis of nocardiosis is essential for determining the appropriate treatment, but it is often misdiagnosed as other infections or malignancy. Only a few studies have described the computed tomography (CT) findings of pulmonary nocardiosis; the most common CT finding is pulmonary manifestations[4-6]. This report describes an uncommon case of nocardiosis with diffuse involvement of the pleura.

CASE PRESENTATION

Chief complaints
A 54-year-old woman was referred to our hospital due to cough and fever.

History of present illness
The patient developed cough and fever 20 d ago after catching a cold. The cough was paroxysmal with white sticky sputum. Her body temperature ranged from 38°C to 39°C.

History of past illness
She had a history of nephrotic syndrome for 7 mo and was given prednisone (60 mg/d) 6 mo previously. The hormone was then gradually reduced to the current dose of 25 mg/d. The patient was a farmer, but she did not work after she became sick. She had no special contact history, such as going into the greenhouse, dust exposure, or pet breeding.

Personal and family history
The patient denied any family history.

Physical examination
On admission, her temperature was 38.3°C, respiratory rate was 23 breaths/min, heart rate was 114 bpm, and blood pressure was 90/69 mmHg. Breath sounds in both lungs were rough, and moist rales were heard.

Laboratory examinations
Laboratory data revealed the following values: white blood cell count, $12.58 \times 10^9/L$; hemoglobin, 102 g/L; platelets, $118 \times 10^9/L$; C-reactive protein, 240 mg/L; and procalcitonin, 2.93 ng/mL.
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Figure 1 Axial computed tomography showed many nodular or hillock lesions in the right pleura, mediastinum, and interlobar fissure areas. A and B: At the upper level of the lung, the lesions were located in the right pleural and mediastinum areas; C and D: At the middle level of the lung, the lesions were located in the right pleura, mediastinum, and interlobar fissure areas (arrow); E and F: At the lower level of the lung, the lesions were located in the right pleura and mediastinum areas with atelectasis of adjacent lung.

**Imaging examinations**

Chest CT showed many nodular or hillock lesions in the right pleura, mediastinum, and interlobar fissure areas (Figures 1-3). Most of the lesions showed low density, and some showed soft-tissue density at the peripheral areas with low density in the center and had cavitary appearance. The edge of the lesion was clear, and the right lung was compressed with volume reduction and partial atelectasis. On the lower layer, one lesion infiltrated the chest wall, and the adjacent liver was compressed (Figure 3D). Right pleural effusion and pericardial effusion were also observed.

**Further diagnostic work-up**

She was treated with piperacillin sodium and sulbactam sodium, but her temperature still fluctuated. Her inflammatory markers were still elevated, and follow-up chest CT
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Figure 2 Sagittal computed tomography showed many nodular or hillock lesions in the right pleura, mediastinum, and interlobar fissure areas. A and B: The lesions were located in the right pleura and interlobar fissure areas (arrow); C and D: The lesions were located in the right pleura and mediastinum areas.

scan showed no improvement. In this regard, ultrasound-guided local infiltration anesthesia was further conducted for perihepatic hydrops drainage to improve diagnostic accuracy.

**Microbiological identification of causative agent**

The puncture fluid was thick pus. Gram staining of the puncture fluid depicted Gram-positive bacteria with branching filaments (Figure 4A), and the bacteria were positive for weak acid-fast staining (Figure 4B). The tentative diagnosis of nocardiosis was made. Puncture fluid culture isolated *Nocardia* species, confirming the diagnosis of nocardiosis. Subtype *Nocardia farcinica* was identified by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry.

**FINAL DIAGNOSIS**

The final diagnosis of the presented case was nocardiosis.
Figure 3 Coronal computed tomography showed many nodular or hillock lesions in the right pleura, mediastinum, and interlobar fissure areas. A and B: The lesions were located in the right pleura, mediastinum, and interlobar fissure areas (thin arrow); C and D: The lesions were located in the right pleura and mediastinum areas. On the lower layer, one lesion infiltrated the chest wall, and the adjacent liver was compressed (thick arrow).

Figure 4 Gram staining and weak acid-fast staining of the bacteria. A: Gram staining showed filamentous, branching Gram-positive bacilli; B: The bacteria were positive for weak acid-fast staining.

**TREATMENT**

Antibiotic treatment was switched to trimethoprim/sulfamethoxazole and imipenem.
Figure 5 Axial computed tomography showed that the lesions were obviously improved in terms of absorption after 1 mo of treatment. A and B: At the upper level of the lung, the lesions located in the right pleural and mediastinum areas were significantly reduced; C and D: At the middle level of the lung, the lesions located in the right pleura, mediastinum, and interlobar fissure areas were significantly reduced; E and F: At the lower level of the lung, the lesions located in the right pleura and mediastinum areas were significantly reduced and atelectasis of adjacent lung was markedly improved.

OUTCOME AND FOLLOW-UP

After 8 d of treatment, the patient was discharged from the hospital with improved condition. After 1 mo of treatment, the CT scans showed that the lesions were obviously improved in terms of absorption (Figure 5). The patient has been recurrence-free for 2 years.

DISCUSSION

*Nocardia* species, which belong to Actinomycetes, are ubiquitous in the environment,
especially in soil and water[1,2]. Nocardiosis is an uncommon infection that usually occurs in immunocompromised patients, such as those with organ transplantation, corticosteroid or cytotoxic agent treatment, HIV infection, and malignancies[1,3]. Infection can occur in many organs, and the pulmonary system is the most common site. The infection can be disseminated further by blood and progress into systemic infection, resulting in poor prognosis, especially if the central nervous system is involved[5,7]. As such, monitoring the patient’s immunity status, especially cellular immunity during corticosteroid use for the present case, is very important.

An accurate diagnosis of nocardiosis is essential for determining appropriate treatment, but it is often misdiagnosed as other infections or malignancy. The definitive diagnosis of nocardiosis is usually based on isolation of microorganisms from clinical samples; however, microorganisms are often difficult to isolate by conventional culture methods. The growth of microorganisms is very slow and may be overlooked by overgrowth of other rapidly growing aerobic bacteria in mixed flora. As such, microbiological samples should be incubated longer to allow

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CONCLUSION

This report illustrates that nocardiosis should be suspected when clinicians encounter patients who are immunocompromised and have diffuse involvement of the pleura on CT. More severe manifestations of nocardiosis should be suspected when prolonged administration of corticosteroids is present.
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