□ CASE REPORT □

Solitary Pulmonary Nodule Due to *Mycobacterium kansasii*

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Abstract

A 46-year-old man with no past history of underlying disease was admitted to our hospital for examination of abnormal chest shadow on chest radiograph. He had no respiratory symptoms on admission. Chest radiograph showed a solitary nodule (35×20 mm) in the left upper lung field. On chest CT, this nodule in the left upper lobe (S¹⁺²) did not demonstrate calcification, the margin was clear but irregular, and there was pleural indentation. The solitary nodule was strongly positive on PET/CT. Therefore, we suspected primary lung cancer. Because we could not establish the diagnosis by bronchoscopic examination, video-assisted thoracoscopic surgery (VATS) was performed. Histological diagnosis of the solitary nodule demonstrated epithelioid granuloma with caseous necrosis. Smear test of the resected tissue was positive for acid-fast bacilli and culture was positive for mycobacteria, which was identified as *Mycobacterium kansasii*. There are a few case reports of solitary nodule due to *M. kansasii*.

Key words: solitary nodule, *Mycobacterium kansasii*

(Intern Med 50: 775-778, 2011)

(DOI: 10.2169/internalmedicine.50.4958)

Introduction

Mycobacterium kansasii is the second most common non-tuberculous mycobacteria (NTM) following *Mycobacterium avium* complex in the United States and Japan (1, 2). The frequency of isolation of *M. kansasii* has been increasing recently (2). The radiological findings of pulmonary *M. kansasii* disease are nearly identical to those of pulmonary tuberculosis. Although cavitation was found in 90% of patients with pulmonary *M. kansasii* disease in older reports (3, 4), this finding was observed in 30~50% of patients with pulmonary *M. kansasii* disease in recent reports (5, 6). A variety of radiological findings have been reported in pulmonary *M. kansasii* disease including non-cavitary or nodular/bronchiectatic lesions (6, 7). However, in a search of the literature we found only one report of pulmonary *M. kansasii* disease with a solitary nodule (8). In the present case, it was difficult to distinguish lung cancer because PET/CT was positive for solitary pulmonary nodule. Finally, we obtained a pathological diagnosis of pulmonary *M. kansasii* disease causing a solitary nodule after surgical

resection of the nodule.

Case Report

A 46-year-old man with no past history of underlying disease was admitted to our hospital in mid-August 2010 because of an abnormal chest shadow caused by a solitary nodule with a comparatively clear margin that had recently appeared in the left S¹⁺². He had no respiratory symptoms on admission. There were no abnormal findings on chest radiograph obtained the previous year.

On admission, there were no abnormal physical or laboratory findings (Table 1). Although he had a past history of Bacille Calmette Guérin (BCG) vaccination, purified protein derivatives (PPD) was negative and QuantiFERON Gold test also showed a negative response.

Chest radiograph on admission showed a solitary nodule (25×20 mm) in the left upper lung field (Fig. 1). Chest computed tomography (CT) disclosed a solitary nodule with a comparatively clear margin and pleural indentation, but without cavity, calcification, satellite lesion (Fig. 2). PET/CT demonstrated a hot lesion corresponding to this solitary nod-

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Received for publication December 7, 2010; Accepted for publication January 6, 2011

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Table 1. Laboratory Data on Admission

Peripheral blood		CRP	<0.03 mg/dL
RBC	502×10 ⁴ /μL	Na	140 mEq/L
Hb	15.8 g/dL	K	4.4 mEq/L
Ht	47.7%	Cl	103 mEq/L
WBC	5760 /μL	Serology	
Plate	17.2×10 ⁴ /μL	β-D-glucan	<6.0 pg/mL
ESR	18 mm/hr	Cryptococcus antigen	(-)
Chemical screening		Aspergillus antigen	(-)
TP	7.4 g/dL	Tumor marker	
Alb	4.6 g/dL	CEA	2.2 ng/mL
ALT	13 U/L	SLX	17.1 U/mL
AST	18 U/L	CYFRA	<1.0 ng/mL
Bil(T)	0.7 mg/dL	SCC	1.5 ng/mL
ALP	232 U/L	ProGRP	28.3 pg/mL
LDH	128 U/L	NSE	8.1 ng/mL
ChE	384 U/L	PPD	0×0 mm
Crn	0.66 mg/dL	QuantiFERON TB-Gold	
BUN	11 mg/dL	ESAT-6	<0.05
UrA	4.6 mg/dL	CFP-10	<0.05

PPD: purified protein derivatives (diameter of induration)

Figure 1. Chest radiograph showed a solitary nodule (25×20mm) in the left upper lung field (→). **Figure 2.** Chest computed tomography (CT) showed a solitary nodule (→) with a comparatively clear margin and pleural indentation in segment S¹⁺² of the left upper lobe.

ule, but there were no other hot lesions (Fig. 3). We could not establish the definite diagnosis by bronchoscopic examination. Therefore, we performed partial resection by video-assisted thoracoscopic surgery (VATS) to deny the possibility of lung cancer.

The histological findings on VATS showed an epithelioid granuloma with caseating necrosis (Fig. 4). Smear test of the resected tissue was positive for fast-acid bacilli and the

culture test was also positive. The final diagnosis due to DNA-DNA hybridization (DDH) test was pulmonary *M. kansasii* disease (solitary nodule type).

Although antituberculous drugs were not administered after partial resection of the left upper lobe by VATS, there has not been any relapse in this patient.

Discussion

In Japan, *M. kansasii* constitutes 15-20% of NTM organ-

Figure 3. PET/CT showed a hot lesion corresponding to this solitary nodule (→), but there were no other hot lesions.

Figure 4. Histological findings showed an epitheloid granuloma with caseating necrosis (Hematoxylin and Eosin staining, ×100)

isms isolated from clinical specimens (2). The findings on the chest radiograph of pulmonary *M. kansasii* disease are similar to those of pulmonary tuberculosis, including cavitary infiltrates with upper lobe predilection. However, non-cavitary lung disease has also recently been recognized as part of the spectrum of pulmonary *M. kansasii* disease (5, 6). We encountered a peculiar case of solitary nodule formation due to *M. kansasii* in the present patient. The most common cause of benign granulomas is pulmonary tuberculoma. Pulmonary tuberculomas are pathologically diagnosed by transbronchial lung biopsy or computed tomogra-

phy (CT)-guided lung biopsy in most cases. In some cases, surgical lung biopsy is performed and solitary pulmonary nodules similar to granulomas are assumed to be attributable to *M. tuberculosis* infection. In these cases, bacteriological confirmation is not always performed (9, 10). Therefore, there was no distinction made between tuberculous and NTM infections (11, 12). The possibility is high that cases of solitary pulmonary nodules due to NTM infection may have been included among with pulmonary tuberculoma.

Gribetz et al first reported 20 cases of solitary pulmonary nodules due to NTM infection in 1982 (13). Twelve of 20 cases were due to *Mycobacterium avium* complex (MAC) infection and there were no cases due to *M. kansasii*. Although Hahm et al and Yonemori et al reported cases of solitary pulmonary nodules due to NTM infection (16 cases and 24 cases, respectively) (14, 15), there has been only one case of solitary pulmonary nodule due to *M. kansasii* diagnosed by thoracotomy as reported by Kurasawa et al (8).

Diseases showing a solitary pulmonary nodule on radiography consist of primary or metastatic lung cancer, benign tumor of the lung, inflammatory granuloma of the lung (16). Although radiological diagnostic methods have been rapidly developing since the introduction of CT, it is difficult to establish a differential diagnosis for solitary pulmonary nodules <3 cm (17). In the present case, because the solitary pulmonary nodule had a comparatively clear margin and pleural indentation, but did not demonstrate calcification or satellite lesions, we could not deny the possibility of lung

cancer and performed partial resection by VATS. In addition, the solitary pulmonary nodule showed high FDG uptake on FDG-PET imaging. FDG-PET is capable of demonstrating the glucose metabolism of a solitary pulmonary nodule, indicating an active lesion regardless of whether the lesion is benign or malignant. Granulomatous nodules such as tuberculoma frequently show positive results (10, 18). FDG-PET is obviously not a test of malignancy but of metabolism. This is also true for solitary pulmonary nodule due to NTM infection (19). Because the present case also demonstrated that a solitary pulmonary nodule due to *M. kansasii* can exhibit high FDG uptake on FDG-PET imaging, it was difficult to distinguish lung cancer.

Another potential tool supporting the diagnosis of pulmonary *M. kansasii* disease is interferon-gamma release assays (IGRAs). Although patients with pulmonary infection due to *M. kansasii*, which demonstrate *M. tuberculosis*-specific antigens such as CFP-10 or ESAT-6, are expected to present a positive response, about 50% of patients with *M. kansasii* infection showed positive IGRAs test results in our previous study (20). We think that it is difficult for IGRAs to become a supportive diagnostic method for pulmonary *M. kansasii* disease since the present case showed a negative response on QFT Gold test.

Concerning the management of patients with solitary pulmonary nodule due to *M. kansasii* infection, there is no evidence indicating whether anti-*M. kansasii* antibiotic treatment should be performed after surgical resection of solitary pulmonary nodule as in other mycobacterial diseases. Although we did not perform combined chemotherapy after the surgical resection for the present case, we think we must continue to monitor this patient for relapse in the future.

In conclusion, although lung cancer or pulmonary tuberculoma is first suspected when a solitary nodule is strongly positive on PET/CT such as in the present case, NTM infection including MAC or *M. kansasii* infection must also be considered as differential diagnoses of solitary pulmonary nodule. Because the treatment method differs based on the disease causing the solitary pulmonary nodule, it is important to distinguish malignant and benign diseases by performing surgical resection and to identify causative microorganisms by acid-fast culture examination of the resected lung tissue when granulomatous tissue is detected.

The authors state that they have no Conflict of Interest (COI).

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