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Air Bronchogram Sign in Primary Pulmonary T-Cell Lymphoma with Multiple Nodules

A 33-year-old man was admitted with fever, chest pain and multiple nodules. Infection was the first diagnosis and antibiotic therapy was considered for the patient. After two weeks of no improvement, infection was ruled out and based on the CT findings, metastatic tumor of the lung was strongly considered. The CT imaging of the patient also demonstrated air bronchogram in a mass-like lesion and one nodular lesion. Eventually, the patient underwent CT-guided transthoracic needle biopsy of the mass-like lesion in the right upper lung. The sample confirmed a primary pulmonary T-cell lymphoma. The patient entered complete remission after one course of CHOP (cyclophosphamide, adriamycin, vincristine and prednisone) combination chemotherapy. During the second course of combination chemotherapy, the patient died of an uncontrollable secondary pulmonary infection.

Keywords: Pulmonary, T-Cells, Lymphoma, Computerized Tomography

Introduction

Primary pulmonary lymphoma (PPL) is a particular form of lymphoma characterized by clonal lymphoid proliferation only appearing in the parenchyma (and/or bronchi) of the lung.¹ PPL is composed of non-Hodgkin's lymphoma (NHL) and Hodgkin's disease (HD). The definition of primary pulmonary non-Hodgkin's lymphoma (PPNHL) includes; 1) B-cell PPNHL, the most common form, 2) T-cell PPNHL, and 3) T/NK-cell PPNHL, a rare disease.

PPNHL is uncommon which represents less than 1% of NHL or primary pulmonary malignant tumors.¹⁻³ B-cell PPNHL is usually low-grade PPNHL, most of which is mucosa-associated lymphoid tissue non-Hodgkin's lymphoma (MALT-NHL) inferred in many literatures.^{4,6} T-cell PPNHL is much more uncommon and little valuable clinical or radiographic characteristics on this disease are present.^{7,8} CHOP combination chemotherapy and lung resection seem useful for T-cell PPNHL.^{4,5} The authors suggested that the prognosis was relatively worse in T-cell PPNHL than B-cell PPNHL.⁷ Therefore, the diagnosis and treatment of T-cell PPNHL needs further investigation.

To the best of our knowledge, only few cases of T-cell PPNHL have been reported,^{7,8} and the majority have presented as multiple nodules on CT.⁸ Here we report a rare case of T-cell PPNHL in which multiple nodules and a mass-like lesion were seen together. Simultaneously, the air bronchogram sign was found in one mass-like lesion and one nodular lesion.

In this patient, two tumor markers were abnormal, which were not reported in other patients. We could not further evaluate the importance of these tumor markers in diagnosis or prognosis of the disease because of its rareness.

Case Presentation

A 33-year-old man presented with irregular fever of one-month duration,

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productive cough, chest pain and emaciation. The chest radiograph of the patient revealed multiple nodules. He was treated with antibiotics (cefazolin 0.5g twice a day intravenously for three days; cefuroxime 1.5 g twice a day intravenously for two weeks) as experimental therapy without evident improvement. Then, he was referred to our institution for definite diagnosis. A repeated chest radiograph showed bilateral, multiple and partly ill-defined nodules in the two lungs (Fig. 1A). Furthermore, CT scan of the lung showed multiple nodules, ranging from 3.0×3.0 mm to 1.4×1.6 mm, which were mostly smooth (Fig. 1B). The air bronchogram sign was found in only one of these nodules (Fig. 1C). The nodules also showed subpleural preponderance, which was similar to metastatic tumors of the lung. CT imaging also clarified a mass-like lesion in the upper lobe of the right lung, in which the bronchiole was slightly widened (Fig. 1D). He was admitted due to suspicion of metastatic tumor of the lung.

In our institution, his medical history and physical examination did not provide further significant information. Laboratory findings revealed normal complete blood count and unremarkable biochemical indicators of the blood. Rheumatoid related indicators, antineutrophil cytoplasmic antibody (ANCA) and

purified protein derivative of the tuberculin (PPD) test were negative. Three sputum cultures were also negative. Two blood tumor markers; namely, carbohydrate antigen 125 (CA 125) and serum ferritin (SF) measured as 80.8 U/ml (normal <35U/ml) and 373.8μg/L (male normal, 22-322μg/L), respectively were abnormal, and the other tests including carcinoembryonic antigen (CEA), alpha-fetoprotein (AFP), carbohydrate antigen 19-9 (CA19-9) and carbohydrate antigen 153 (CA153) were normal. Bronchial endoscopy showed abnormal macroscopic aspects with a general mucosal hyperemia and a small amount of purulent secretion in the bronchial lumen. Film preparation showed many inflammatory cells without tumor cells. Trans-bronchial biopsy (TBB) confirmed mucosal inflammation. Respiratory function test indicated mixed dysfunction of ventilation function. Several ultrasonographies did not detect any abdominal tumor or obviously enlarged lymph nodes in the superficial or retroperitoneal regions. Finally, a CT guided transthoracic needle biopsy of the mass-like lesion of the right upper lobe was performed with a 20-gauge automatic biopsy needle in an attempt to identify the nature of the lesions. The sample including three pieces of pulmonary tissue was successfully obtained. The microscopical aspect

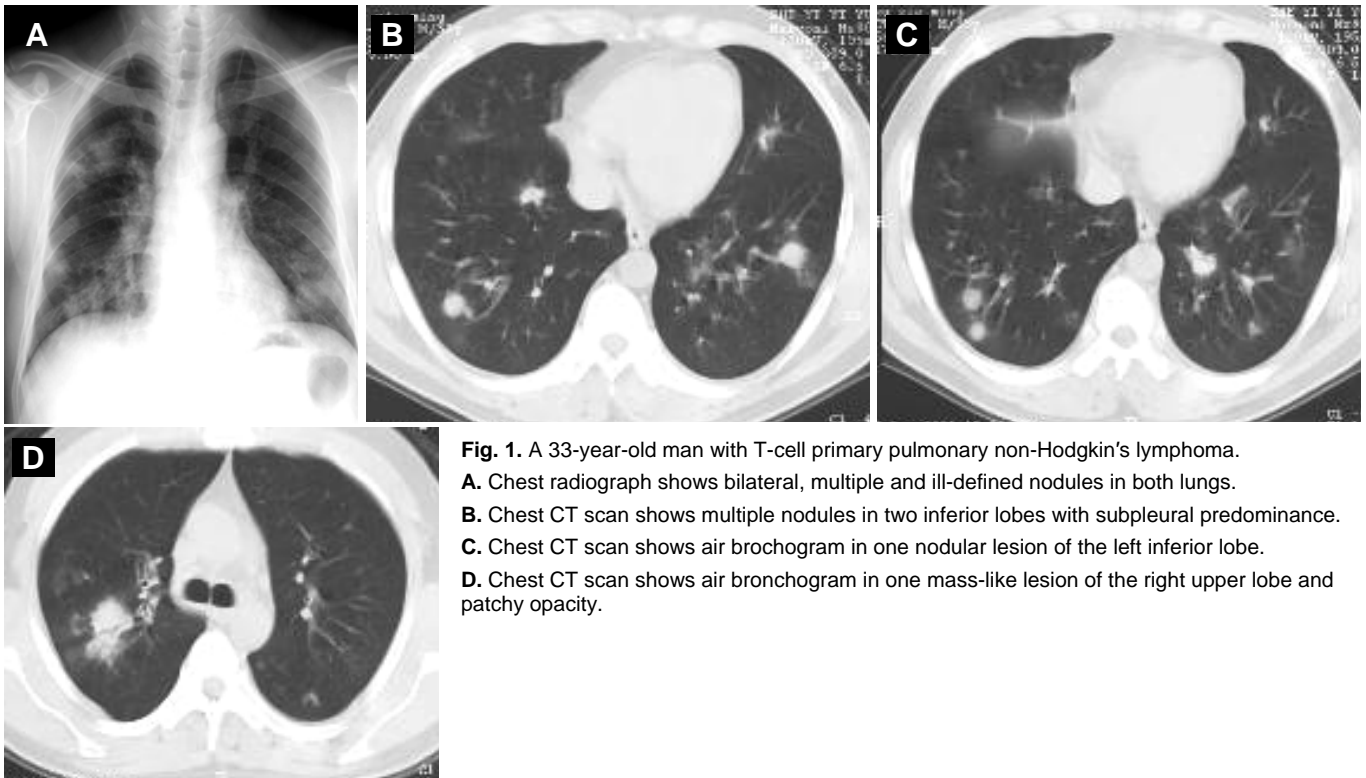


Fig. 1. A 33-year-old man with T-cell primary pulmonary non-Hodgkin's lymphoma. **A.** Chest radiograph shows bilateral, multiple and ill-defined nodules in both lungs. **B.** Chest CT scan shows multiple nodules in two inferior lobes with subpleural predominance. **C.** Chest CT scan shows air bronchogram in one nodular lesion of the left inferior lobe. **D.** Chest CT scan shows air bronchogram in one mass-like lesion of the right upper lobe and patchy opacity.

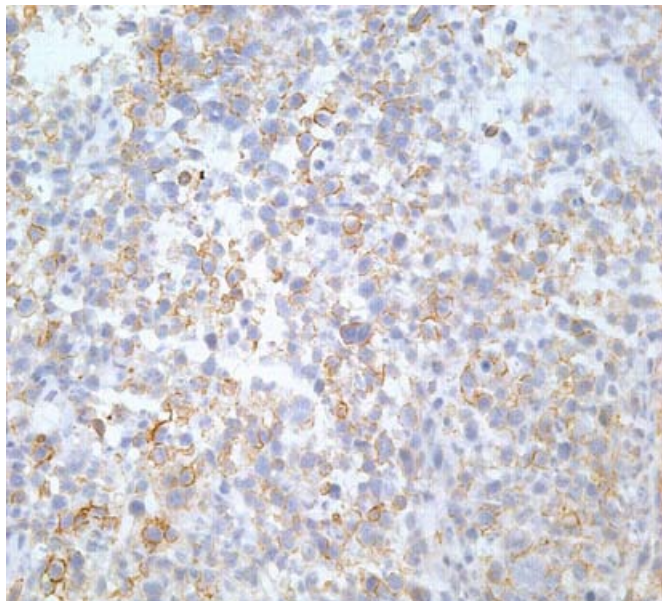


Fig. 2. The result of immunohistochemical staining. The tumor cells express CD45RO T-cell marker($\times 400$).

was of small lymphoid cells with diffuse distribution. In the immunohistochemical evaluation, CD3 and CD45RO were positive (Fig. 2), while CD5, CD19 and CD20 were negative. Additionally, in the bone marrow biopsy no abnormal blood cells were detected. Finally, the patient was diagnosed as T-cell PPNHL.

Subsequently, the patient was treated with a CHOP-based chemotherapy used for high-grade nodal NHL leading to temporary complete remission. During the second course of treatment, the patient died of an uncontrolled secondary pulmonary infection.

Discussion

In 1991, Maehara and Asano firstly reported T-cell NHL in the lung.^{9,10} Recently, Roberto et al.⁸ reported their review of fourteen T-cell PPNHLs from 1990 to 2009, most of which were Japanese. The patients were usually elderly with female preponderance (2:1).⁷ However, the patient in our case was male and young. Similarly, our patient had respiratory symptoms, fever and an abnormal radiography. In contrast to B-cell PPNHL, the patients with T-cell genesis are less asymptomatic, presumably because of larger pulmonary area involvement.

Various chest radiographic features of T-cell PPNHL have been previously described in a few case reports, including multiple nodules, mass-like consolidation, cryptogenic organizing pneumonia (COP)-

like lesions, hilar adenopathy and pleural effusion.^{7,8} Bilateral diffuse nodular lesions were considered as the most common radiographic findings and mass and COP-like lesions were the second most common.⁷ In this case, two rare imaging findings were detected simultaneously in one patient. The margin of the lesions in T-cell PPNHL are usually indefinite and no valuable radiographic character is stated.⁷⁻¹³ To our knowledge, no air bronchogram mimicking metastasis has been reported in T-cell PPNHL yet, although this feature is usual in B-cell PPNHL lesions. Air bronchograms found in B-cell PPNHL lesions are deemed to have diagnostic significance,^{4,14} but the lesions are usually lobar pneumonia-like lesions and mass-like consolidations. However, air bronchogram was found in one of the nodules in our patient. We believe that the pathological basis of the air bronchogram in our case might be similar to B-cell PPNHL,⁴ and the feature of multiple nodules might associate with the higher grade of T-cell PPNHL. We speculated that air bronchogram persistently existing in one nodular lesion of T-cell PPNHL might also be important in the differential diagnosis. In addition, the difference of air bronchogram between B-cell PPNHL and T-cell PPNHL might be trivial. A recent article reported that T/NK-cell PPNHL usually had nodule(s) or consolidation on CT.^{12,15} It seems there is little difference between T-cell PPNHL and T/NK-cell PPNHL regarding radiological characteristics.

In conclusion, when the air bronchogram sign and multiple nodules are present in a patient, T-cell PPNHL should be included in the differential diagnosis.

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