

Case Report

Pulmonary tuberculosis presenting with a crazy-paving pattern on high resolution CT: a case report

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Abstract: We report a case of a 46-year-old man with pulmonary tuberculosis in whom a high-resolution CT findings consistent with a crazy paving pattern. The diagnosis of tuberculosis was made by lung biopsy and the detection of mycobacterium tuberculosis in the tissue culture. We suggested the pulmonary tuberculosis may present as the crazy-paving pattern on the HRCT in adult patients.

Keywords: Tuberculosis, crazy-paving pattern, HRCT

Introduction

The crazy-paving pattern was observed on high-resolution CT (HRCT) as a reticular pattern superimposed on ground-glass opacity. It was first described in patient who had pulmonary proteinosis [1], and was later observed in several other diseases [2, 3]. It was rarely report in the tuberculosis. In this case report we described a case of pulmonary tuberculosis presenting with crazy-paving pattern on HRCT.

Case report

A 46-year-old man was admitted with dry cough and dyspnea for more than six months. The physical examination: fine crackles were heard in both lower lobes. Smoking history was 80-100 pack-year and the patient quit smoking four months before admitted to our hospital. The HRCT of pulmonary showed reticular pattern superimposed on bilateral ground glass opacity (crazy-paving pattern) (**Figure 1**). There was no enlarged lymph node in the mediastinum. The laboratory tests: white blood cells were $5.89 \times 10^{12}/L$, hemoglobin was 187 g/L. The result of blood gas analysis: pH value was 7.403, PaO_2 was 51.7 mmHg, $PaCO_2$ was 37.8 mmHg, and SaO_2 was 84.3% in the condition without oxygen therapy. The human immunodeficiency virus antibody was negative. The diagnosis of pulmonary alveolar proteinosis was highly suspected. The patients did a bronchoscope examination and the results were nor-

mal. Bronchoalveolar lavage fluid (BALF) was harvested in the lower lobe of the left lung and the number of different cell in the BALF was counted. There was 71% macrophage, 11% lymphocyte, 16% neutrophil and 2% eosinophil granulocyte in the BALF. The Periodic Acid-Schiff (PAS) staining of the cells in the BALF was negative. Then we did a CT guided fine needle biopsy in the lower left lung. Under microscopy, numerous granulomatous nodules and acid-fast bacillus were detected in the biopsy specimen without necrotic tissues (**Figures 2 and 3**). The tuberculin skin test was positive. The Interferon gamma release assay was positive. The antigen ESAT-6 was 13 SFC and antigen CFP-10 was 23 SFC. Finally, the diagnosis was proven by tissue culture of mycobacterium tuberculosis. A four drug regimen of isoniazid, rifapentin, pyrazinamide and levofloxacin was initiated. After six month follow up, the clinical symptoms were significantly improved.

Discussion

The CT presenting of our case was the crazy paving pattern which was associated with a fine reticular pattern superimposed on areas of ground glass opacity (GGO). Crazy paving pattern was firstly described in the late 1980s in patients with pulmonary alveolar proteinosis [4]. Later, a variety of lung diseases including pneumocystis carinii pneumonia, bronchioalveolar carcinoma, sarcoidosis, nonspecific interstitial pneumonia, cryptogenic organizing

Pulmonary tuberculosis presenting crazy paving pattern

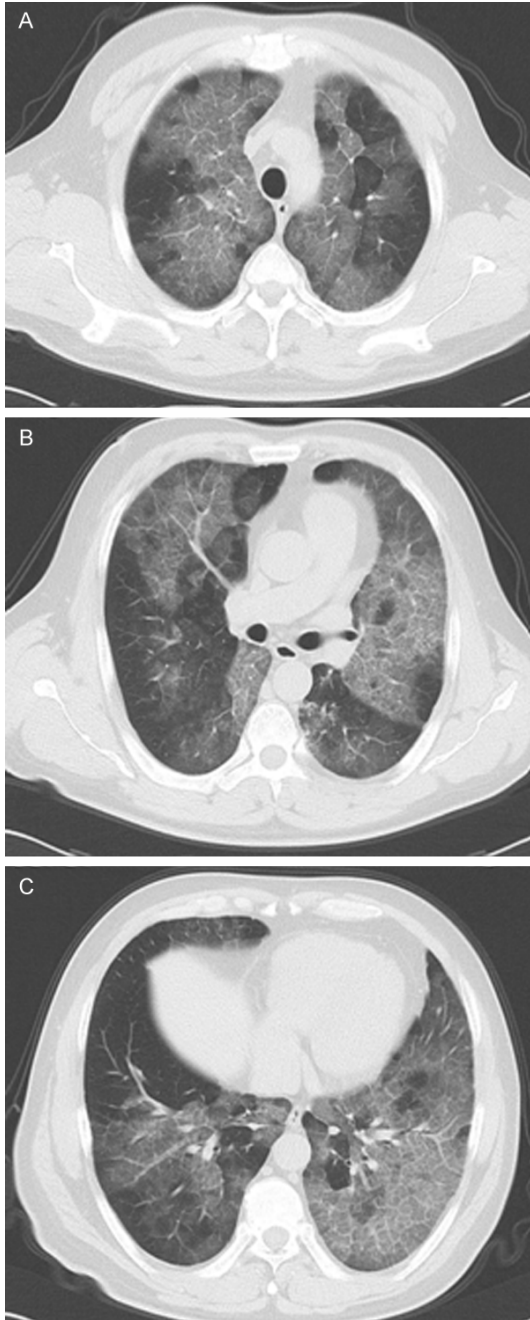


Figure 1. (A-C) High-resolution CT scan at the level of superior (A), middle (B), and inferior (C) pulmonary lobe. The presence of the reticular pattern superimposed on bilateral ground glass opacity (crazy-paving pattern).

pneumonia, exogenous lipoid pneumonia, pulmonary alveolar microlithiasis, adult respiratory distress syndrome, and pulmonary hemorrhage syndromes were found to have the HRCT presenting as crazy paving pattern [4]. In the crazy paving pattern, GGO may reflect the presence of abnormalities of interstitial or airspace.

The lines of reticular opacities may reflect the thickening of interlobular and intralobular septal [5]. In our case, the imaging of crazy paving pattern was associated with the pathological findings. Multi granulomatous nodules and acid-fast bacillus were observed under the microscopy. In military tuberculosis interlobular septal thickening and GGO were well known in CT findings. It has been reported that small granulomas which make the minimal thickening of the septal interstitium, alveolar wall thickening could account for GGO [6, 7]. In the study of McGuinness et al interlobular and intralobular septal thickening on HRCT scans was pathologically associated with diffuse thickening of pulmonary interstitium. They assume that innumerable tiny granulomata scattered throughout the pulmonary interstitium could account for diffuse interlobular and intralobular thickenings in some cases [8]. Fujita J et al demonstrated that GGO was considered to represent a transient exudative change of the lung [9]. However, we did not find the exudative change in the biopsy specimen in our case.

Among the patients with microbiological confirmed pulmonary tuberculosis, the symptoms include chronic cough, fever, night sweat, sputum, weight loss, shortness of breath, and chest pain. In present case, the patients showed dyspnea and dry cough for 6 months without fever, night sweat and sputum. The clinical evidence showed that patients with extensive ground glass opacity suffered more frequent dyspnea and acute respiratory distress syndromes [8]. So the symptoms of our case were in correspondence with the imaging presence.

Classically, pulmonary TB can be divided into a primary and a post primary pattern, each presenting with characteristic radiological features. The radiological features of primary pattern include the middle or lower lung zone opacity, hilar lymph node enlargement and pleural effusion. The radiology of primary tuberculosis showed as four main entities: parenchymal disease, lymphadenopathy, pleural effusion and military disease and any combination of above pattern. The most common radiographic manifestation of PTB is focal or patchy heterogeneous, poorly defined consolidation involving the apical and posterior segments of the upper lobes and the superior segments of the lower lobes. To our knowledge, only one case of a crazy paving pattern in tuberculosis has been

Pulmonary tuberculosis presenting crazy paving pattern

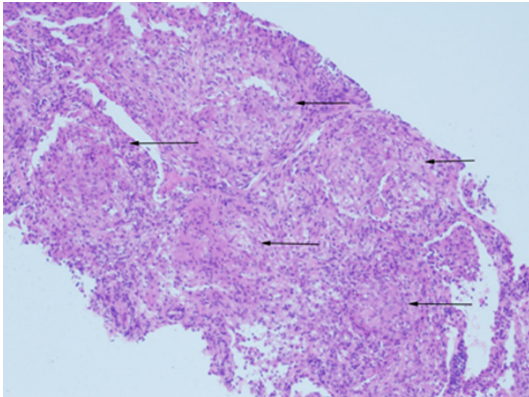


Figure 2. Lung biopsy revealed granuloma (black arrow) including multinucleated giant cells (HE staining 200×).

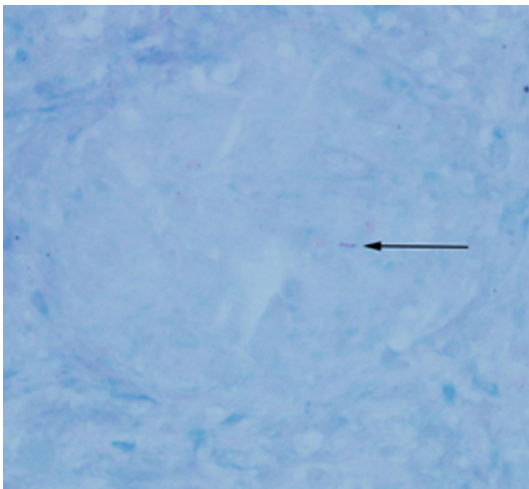


Figure 3. Ziehl-Neelsen stain demonstrating acid fast bacilli (black arrow) (400×).

previously described. Huang et al report a case of pulmonary tuberculosis showing crazy-paving pattern. However, the patient in that case has symptoms including night sweating, fever and sputum which was the typical symptoms of pulmonary tuberculosis [10]. In our case, the main symptoms of patient were dyspnea and cough which was not typical symptoms of pulmonary tuberculosis. Based on the CT imaging and symptoms, the pulmonary alveolar proteinosis were highly suspected. The symptoms of pulmonary alveolar proteinosis presents as progressive dyspnea of insidious onset. So in our case the patients with dry cough and dyspnea without typical tuberculosis symptoms whose HRCT present as crazy paving pattern is easily made an erroneous diagnosis as pulmo-

nary alveolar proteinosis. However, the following PAS staining of the BALF was negative. So we did a lung biopsy and the final diagnosis was pulmonary tuberculosis.

In conclusion, we show that pulmonary tuberculosis may present as the crazy paving pattern on HRCT in adult patients.

Disclosure of conflict of interest

None.

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