Short Communication

An Unusual Case of Large Opacity in Pneumoconiosis

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Introduction

Coal dust inhalation can result in industrial bronchitis and coal workers' pneumoconiosis (CWP) presenting as either simple pneumoconiosis or complicated CWP. With prolonged excessive exposure, small opacities in simple pneumoconiosis may coalesce and form larger opacities, recognized as progressive massive fibrosis (PMF) greater than 1 cm in diameter on a chest X-ray. Even though the degree of respiratory impairment or the presence of symptoms does not always correlate well with the extent of PMF, most workers frequently describe dyspnea, a cough and sputum production. It may be caused by deviation of the prominent area of coalescence, loss of upper zone lung volume, elevation of the hila, and basilar emphysema.

We present a case of large opacity in pneumoconiosis which included a finding of ischemic necrosis. Rapid change in the solitary mass caused a diagnostic dilemma in attempting to distinguish a primary or metastatic neoplasm from an unusual presentation of PMF.

Case Report

A 63 year-old man was referred to our hospital with complaints of productive cough, shortness of breath, and weight loss (6 kg in 3 months) in November, 1998. He had been a coal miner for 33 yr and had a 35 pack-a-year smoking history. In 1980, he was treated for pulmonary tuberculosis and completely cured. He had no other respiratory illness and denied any special history of diabetes mellitus, high blood pressure or allergic diseases.

A chest radiograph taken in November, 1998, showed ILO category 2/1, τ/q , and large opacity of C from consolidation of right upper and left middle lung fields (Fig. 1B). On auscultation, there was decreased breathing

sound in the whole chest area, especially dominant in the right upper lung field. Compared with a chest radiograph taken 2 months previously (Fig. 1A), there was rapid aggravation of consolidation in the right upper lung, but neither stridor nor wheezing was audible at that time.

There were no palpable superficial lymph nodes, skin eruption, rash, or exanthem. An electrocardiogram showed no abnormality. There were no abnormal findings in complete blood counts, blood chemistry, urine analysis or tumor markers. A swab culture for *M. pneumoniae* in the throat was negative. A sputum culture showed only

Fig. 1A. The chest radiograph taken 2 months before admission (in September, 1998) showed an approximate 9×6 cm sized huge lobulated mass with increased opacity in the right upper lung field.

Fig. 1B. The chest radiograph taken on admission (in November, 1998) showed an approximately 11×7 cm sized huge lobulated mass with increased opacity in the right upper lung field. Compared with Fig. 1A, the mass showed signs of rapid growth.

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Fig. 2. This contrast enhanced chest computed tomograph showed a non-enhancing ovoid structure in a thin membrane in the right lung.

normal respiratory flora. There was no abnormal finding in sputum cytology. The arterial blood gas analysis findings were as follows: pH 7.43; PO_2 , 71 mmHg; PCO_2 , 34 mmHg.

To evaluate the rapidly growing consolidation, computed tomography was performed. There was a non-enhancing ovoid structure in a thin membrane in the right lung. In contrast, the left lung showed a typical findings of progressive massive fibrosis with higher density than soft tissue (Fig. 2).

A percutaneous needle aspiration (PCNA) was performed to evaluate the consolidation in the right lung. Tan brown liquid was aspirated and microscopic examination showed red blood cells, inflammatory cells and necrotic debris in the liquid (Fig. 3). We performed PCNA several times at many locations to exclude the possibility of lung abscess, *M. tuberculosis* or hemorrhagic abscess. Culture of the aspirated liquid did not show any growth of *M. tuberculosis* for 8 wk.

We confirmed the consolidation as a necrotizing mass because it was not enhanced by contrast media in chest CT and the size of the mass was decreased after aspiration. Just after the aspiration, the patient produced a large amount of melanoptysis for several days, and we could find no evidence of cancer in the PCNA material.

Taken together, the consolidation of the right lung was diagnosed as a rapid growing progressive massive fibrosis with ischemic necrosis. After conservative treatment with bronchodilators, he was discharged with symptomatic improvement.

Discussion

The word pneumoconiosis was introduced in the 19th century to describe lung diseases consequent on the inhalation of mineral dusts. According to the International

Fig. 3. This percutaneous needle aspiration (PCNA) specimen contained red blood cells (RBC), inflammatory cells and necrotic debris.

Pneumoconiosis Conference in 1971, the term has been defined as “the accumulation of dust in the lungs and the tissue reactions to its presence”. Since then the chest radiographic classification of pneumoconiosis, fixed by the International Labour Organization (ILO), has been used widely to describe pneumoconiosis, and was partially revised in 1980.

The diagnosis of pneumoconiosis is made on the basis of the occupational history and the appearance of nodular density in the chest radiograph. The large opacity, of which the size is more than 1 cm, is defined as progressive massive fibrosis. The PMF is developed from a conglomeration of small pneumoconiotic nodules. Most pneumoconiotic nodules first appear in the upper two thirds of the lung, and then they are distributed evenly in the upper lobes, although the lower lobes may subsequently become involved. The progress of PMF is slow and accompanied with general calcification. The epidemiologic round survey of 1995–1998 predicted the risk of PMF to be 1.4%¹⁾. Another study²⁾ showed that simple pneumoconiosis predisposes to PMF, with five-yr attack rates of 13.9%, 12.5%, 4.4% and 0.2% among people in categories 3, 2, 1, and 0, respectively.

PMF appears with various shapes primarily in coal miners who have worked for more than 20 yr³⁾. When PMF is recognized on the chest radiograph, the worker frequently complains of dyspnea. It may be round or oval with lobular or irregular edges. There is often a well-defined lateral border parallel to the lateral chest wall frequently with an ill defined medial border⁴⁾. The depth of the mass may be significantly less than the side-to-side diameter; namely, it usually is a lens-shaped opacity. The PMF is frequently bilateral and accompanied by widespread nodulation in the remainder of the lung, but there are a few cases with completely or predominantly unilateral mass shadows without any

nodules in the background. Moreover, whenever mass shadows appear within a short time, the differential diagnosis from lung carcinoma becomes clinically important. It is particularly difficult to differentiate PMF from lung carcinoma because pneumoconiosis patients often show debilitating characteristics which are the same as in lung cancer. In pneumoconiosis, the incidence of lung carcinoma is reported to be 17.9% and the most common type is squamous cell carcinoma (54.2%) followed by small-cell carcinoma (22.9%) and adenocarcinoma (14.6%)⁵⁾.

Nodular lung reaction often accompanied by the development of PMF grossly presenting a giant silicotic nodule. Microscopically there is a small amount of dust with necrosis in the center surrounding a cellular zone infiltrated by lymphocytes and plasma cells.

In this case, the mass was unilateral, rapidly growing and round-shaped. The follow-up chest X-ray showed a rapid change with liquefied necrosis. If the mass is developed by the coalescence of nodules, if the mass decreases in size, if its margin becomes not sharply

defined, or if the mass migrates medially, previous chest radiographs are valuable and virtually diagnostic. Careful serial evaluation of lung masses will help prevent unnecessary surgery in this group of PMF.

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