Cavitation in Large Multinodular Pulmonary Disease*  
A Rare Manifestation of Sarcoidosis

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Multiple large pulmonary nodules are an uncommon manifestation of sarcoidosis. Cavitation of these nodules has not previously been reported. An asymptomatic young white man had this unusual roentgenographic finding. Open-lung biopsy for diagnosis revealed noncaseating granulomata but did not elucidate the pathogenesis of the cavitation.

Multiple pulmonary nodules with or without cavitation are a common roentgenographic finding in neoplastic metastases but may also be seen in infectious disease, immunologic disorders, vascular malformations, mucoid impaction, and pulmonary infarction. Sarcoidosis rarely causes multiple, large pulmonary nodules, and cavitation in such lesions must be very rare. We report a case of biopsy-proven sarcoidosis with this most unusual roentgenologic finding.

CASE REPORT

A 21-year-old white man was noted to have an abnormal chest roentgenogram on routine evaluation. He admitted to having a chronic nonproductive cough; he denied weight loss, shortness of breath, fatigue, or wheezing. He had smoked a pack of cigarettes a day for six years. He was in good general health and denied recent fevers, loss of consciousness, arthritis, disorders of the urinary tract, and drug abuse. Findings from physical examination were normal. The results of a complete blood cell count, determinations of levels of electrolytes and calcium, tests of hepatic function, urinalysis, fungal serologic studies, and bone, brain, and liver scans were all normal. Cutaneous tests were negative with intermediate-strength purified protein derivative of tuberculin and streptokinase-streptodornase. A chest x-ray film showed multiple bilateral nodular densities, some of which had cavities (Fig 1 and 2). Tests of pulmonary function revealed a forced expiratory volume in one second (FEV₁) of 3,640 ml, an FEV₁ to forced capacity ratio of 64 percent, a vital capacity of 5,850 ml (108 percent of predicted), a total lung capacity of 7,090 ml (108 percent of predicted), and a single-breath diffusing capacity of 148 percent of predicted. Fiberoptic bronchoscopy and transbrachial lung biopsy were done on two occasions, and although adequate pulmonary tissue was obtained, the specimens were nondiagnostic. Therefore, the patient underwent left anterior thoracotomy with wedge resection of a portion of the superior segment of the left lower lobe. Multiple nodular lesions of the lung were seen.

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Figure 1. Chest x-ray film (Sept 23, 1975) showing multiple bilateral pulmonary nodular densities, with suggestion of cavitation in left upper pulmonary field.

The specimen was a 5 × 1.5-cm section of lung with a 1.5 × 0.8-cm encapsulated mass of homogeneously brown tissue with focal areas of black pigment. On microscopic examination, multiple noncaseating granulomata were seen (Fig 3). Minimal fibrosis was present. No cavitated granulomata were found in the specimens. Special staining reactions for fungi and acid-fast bacilli were negative.

No treatment was given. After six months, the patient remains in good health. His chest x-ray film shows partial resolution of all of the lesions previously seen.

DISCUSSION

In 1973, Kirks et al reviewed the chest x-ray films of 150 patients with biopsy-proven sarcoidosis. Three showed a large multinodular pattern. Sharma et al described six cases of nodular disease in a series of 150 patients with sarcoidosis. When Felson described the rarer roentgenographic manifestations of pulmonary sarcoidosis, he included four patients with the large multinodular pattern. He considered the fluffy margins of

Figure 2. Whole-lung tomogram (Oct 28, 1975) showing definite cavity in left upper pulmonary field (arrow).
the nodules and the tendency toward confluence as clues to the diagnosis of sarcoidosis.

Freundlich et al. reviewed the chest x-ray films of 300 patients with sarcoidosis and described 25 cases considered to have cavities, as manifested by abnormal pulmonary air spaces or surrounded by a mass of hyaline fibrosis. In no case did the cavitation occur in large nodular densities of the kind we have described. Harden and Barthakur described three patients with pulmonary sarcoidosis with cavitating pulmonary disease. All cavities were believed to be due either to bullae or fibrosis.

The chest x-ray film in our patient (Fig 1) showed relatively large (2-cm to 3-cm) multiple nodular lesions, some of which were cavitary (Fig 2). The margins were diffuse and ill-defined. There was no coalescence. The walls of the cavities were thick, and there was no evidence of a fungous ball. This picture is compatible with the nodular lesions described by Felson with the exception that they are cavitary.

Histologically noncaseating granulomata were found (Fig 3). There was no evidence of infection, necrosis, vasculitis, hyalinization, emphysema, or fibrosis; however, the largest lesion with cavitation was not in the surgical specimen. All special staining reactions and cultures were negative for fungi and acid-fast bacilli.

The cause of cavitation in pulmonary sarcoidosis is unknown. Some considerations are as follows: (1) a pyogenic infection or tuberculosis may develop and lead to cavitation; (2) the masses of hyaline fibrosis may undergo necrosis, possibly due to infection; (3) infection may cause thickening of a bulla which acts as a cavity; (4) ectatic bronchi and cystic bronchiectasis may be present; or (5) coalescence of granulomata may form a cavity-like lesion, as proposed by Scadding. This case may be an example of the final theory, but since the nodule with cavitation was not obtained surgically, this proposed mechanism remains speculative.

In conclusion, when confronted with multiple cavitary pulmonary nodular lesions in an asymptomatic young patient, sarcoidosis should be included in the differential diagnosis, whether or not hilar adenopathy is present. Every effort should be made to obtain a nodule undergoing cavitation in the surgical specimen.

REFERENCES


