Lung Uptake on Technetium-99m-MDP Bone Scan in Wegener's Vasculitis

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A ^{99m}Tc-MDP bone scan was performed on a 65-yr-old woman because of joint pain. The study showed bilateral lung uptake and no abnormalities of the affected joints. Wegener's vasculitis was diagnosed. Lung uptake on bone scans has been noted in various conditions but not in Wegener's vasculitis. The differential diagnosis of lung uptake on bone scan should include Wegener's vasculitis.

Key Words: Wegener's vasculitis; technetium-99m-MDP; lung uptake; differential diagnosis

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Soft-tissue uptake on a bone scan can have many causes. Most causes can be attributed to some aspect of heterotopic calcification (*1*), being either metastatic or dystrophic. Lung uptake on a bone scan is commonly caused by metastatic calcification, fibrothorax, metastasis, pleural fluid, primary lung tumors or radiation therapy. Other causes, such as sarcoidosis, berylliosis, alveolar microlithiasis, mitral valve stenosis, idiopathic pulmonary ossification or radiopharmaceutical preparation are rather uncommon (*1,2*). We report a patient with Wegener's vasculitis with significant lung uptake which could not be attributed to any of the known conditions.

CASE REPORT

A 65-yr-old woman was referred because of pain in her knees and elbows. She complained of a sore throat, bloody nose, shortness of breath, a persistent cough and weight loss. Physical examination was normal. Blood tests showed raised erythrocyte sedimentation rate and anemia a chest radiograph revealed no structural lesions (Fig. 1). A bone scan was performed 4 hr after injection of 740 MBq ^{99m}Tc-MDP with a dual-head LFOV gamma camera, equipped with low-energy high-resolution collimators and peaked at 140 keV with 20% window.

This study, performed 2 days after the chest radiograph, showed significant uptake in both lungs (Fig. 2), especially at the basis. Knee and elbow joints were normal. Respiratory function tests showed significantly decreased diffusing capacity (59% of predicted value).

Major pathology was suspected but the patient refused further investigations. Six days later, she was admitted with severe dyspnea and fulminant hemoptysis. On admission, the patient's chest radiograph revealed bilateral basal infiltrates (Fig. 3). The final diagnosis was Wegener's vasculitis; perinuclear antineutrophil cytoplasmic antibodies (p-ANCA) were present but only nonspecific lesions were present in kidney and lung biopsies. Treatment with cyclophosphamide and glucocorticoid administration (*3*) resulted after 1 mo in marked clinical improvement, after 2 mo in normalization of diffusing capacity and after 4 mo in absence of p-ANCA and resolution of chest radiograph abnormalities.

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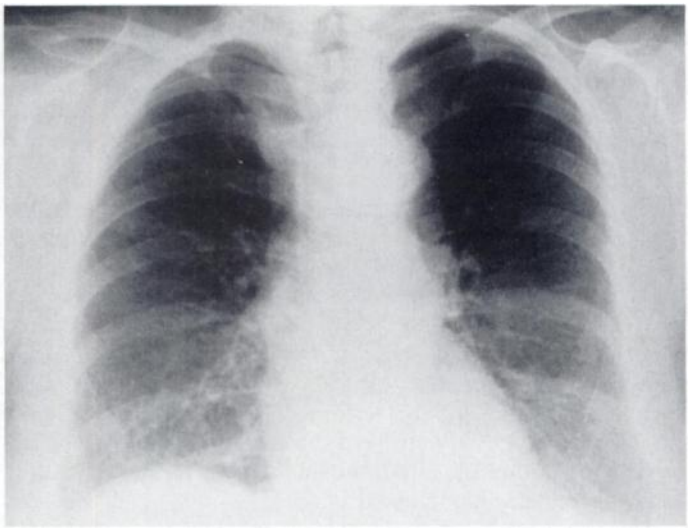

FIGURE 1. Chest radiograph. Posteroanterior view without definite abnormalities.

DISCUSSION

Wegener's granulomatosis is characterized by granulomatous inflammation and necrotizing vasculitis (*4*). Although these lesions could not be demonstrated in our patient, clinical criteria would make this diagnosis highly probably (*5,6*). There remains, however, a small diagnostic uncertainty (*6*) and the combined lung and kidney involvement with the presence of p-ANCA (*7*) can also be diagnosed with less uncertainty but sufficient precision of Wegener's vasculitis (*8*), which we preferred.

As for lung uptake of ^{99m}Tc-MDP bone scans, several coincident or secondary causes had to be excluded because specific lesions could not be demonstrated. Normal serum creatinine, calcium and phosphorus, calcitonine and parathyroid hormone levels and the chest radiograph findings in combination with the polymorfonuclear infiltrate on lung biopsy excluded all known causes except valvular heart disease and sarcoidosis.

Valvular heart disease was highly unlikely by initial normal findings on chest radiographs and auscultation. Sarcoidosis was

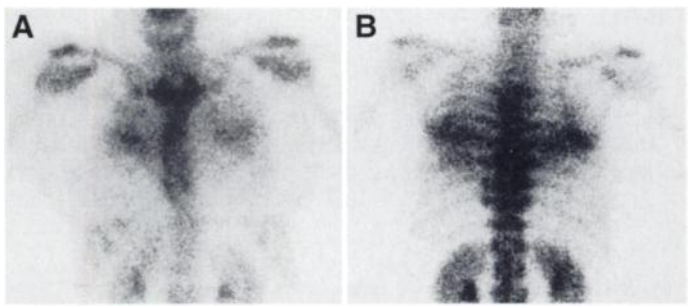

FIGURE 2. Technetium-99m-MDP bone scan. Anterior (A) and posterior (B) views of the thorax showing bilateral, mainly basal lung uptake.

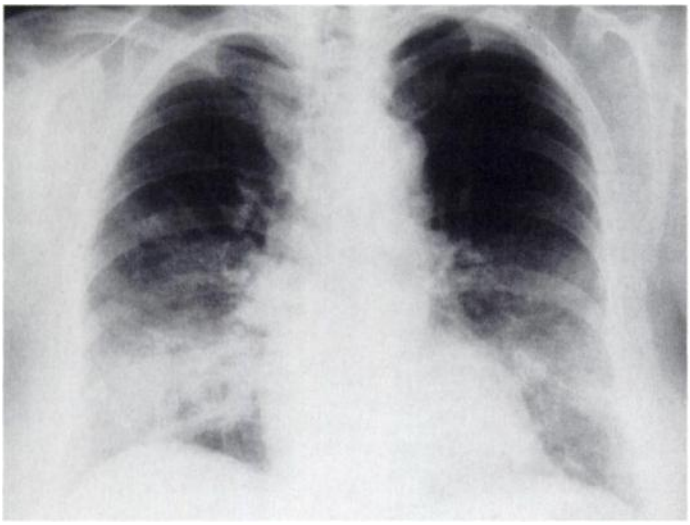

FIGURE 3. Chest radiograph. Posteroanterior view showing bilateral basal infiltrates.

excluded on the presence of p-ANCA, which had not been reported in sarcoidosis (*9,10*), chest radiograph and rapid clinical detoriation of the patient. For ^{99m}Tc-MDP, instant thin-layer chromatography of the administered preparation revealed 0.2% free [^{99m}Tc]pertechnetate. On the bone scans of six other patients who received the same preparation, no lung uptake was seen. The administered ^{99m}Tc-MDP was therefore unlikely to cause lung uptake.

The primarily basal lung uptake on the bone scan corresponded well to the chest radiograph abnormalities discovered 6 days later. These lesions were probably present microscopically when the bone scan was performed and are due to the presence of necrotic or degenerative tissue that sets free intracellular calcium and phosphorus complexes (*1*). The pattern of diffuse and main basal lung uptake might point toward Wegener's vasculitis, as it has not been reported previously.

CONCLUSION

The differential diagnosis of lung uptake on ^{99m}Tc-MDP bone scan should include, among the known causes, Wegener's vasculitis. Additionally, awareness of this diagnosis should prompt nuclear medicine physicians to warn clinicians for a possible rapid clinical detoriation.

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Indium-111-Leukocyte and Technetium-99m-Sulfur Colloid Uptake in Paget's Disease

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We report a case of polyostotic Paget's disease of bone that caused an unusual pattern of accumulation of ^{111}In leukocytes that mimicked, at some sites, uptake of osteomyelitis, which was suspected in this patient. Technetium-99m sulfur colloid scan clarified the nature of ^{111}In-leukocyte accumulation as secondary to expanded active bone marrow uptake in some pagetic bones. Additionally, a spectrum of ^{111}In-leukocyte and ^{99m}Tc-sulfur colloid uptake was noted in the bones involved by the disease that represented uptake by pagetic foci at different pathologic phases of the disease.

This case suggests that Paget's disease should be considered as a diagnostic possibility for areas of ^{111}In-leukocyte accumulation, particularly when expanded uptake is seen. When suspected, correlation with bone marrow scan and/or standard radiographs should be obtained. Recognizing that Paget's disease cannot only cause absent but also expanded bone marrow (depending on the disease stage) and consequently abnormal ^{111}In leukocyte uptake, should help avoid interpretational confusion.

Key Words: indium-111 leukocyte; technetium-99m sulfur colloid; osteomyelitis; Paget's disease

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Although labeled leukocyte imaging is one of the most specific modalities for detecting acute infections and specifically osteomyelitis (*1*), false-positive results are known to occur in a variety of conditions. These include sites of noninfected active bone marrow (*2,3*), recent fractures (*4*), tumors (*5*), hematomas (*6*), charcots joints (*7,8*), rheumatoid arthritis (*9*) and others (*4*). Bone marrow scanning has been used with increasing frequency to differentiate osteomyelitis as a reason

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