Osseous and Central Nervous System Sarcoidosis: Scintigraphic and Radiographic Findings

Diane C. Sweeney and James C. Roberson

Department of Nuclear Medicine and Rheumatology Division, Department of Internal Medicine, Washington Hospital Center, Washington, D.C.

We present a case of painful osseous sarcoid involving the tibiae bilaterally. Lesions were initially found on plain radiographs and on a ^{99m}Tc-MDP bone scan. The patient was also found to have CNS involvement of sarcoidosis in the form of diabetes insipidus and panhypopituitarism. CNS lesions were demonstrated on CT and MR images.

Key Words: radionuclide imaging; sarcoidosis; panhypopituitarism; technetium-99m-MDP; bone scanning

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CASE REPORT

A 51-yr-old black female with a history of pulmonary sarcoidosis, noninsulin dependent diabetes mellitus, hypertension and gout was admitted to the hospital with depression, anorexia, malaise and left knee pain. The knee pain had worsened over several weeks preceding admission. There were no aggravating or alleviating factors relating to the knee pain. The patient had been diagnosed with sarcoidosis 18 yr earlier when hilar adenopathy was found on a routine chest radiograph. The patient was treated with corticosteroids approximately 1 yr after diagnosis, but this was discontinued after 1 mo due to marked glucose instability. Transbronchial biopsy confirmed noncaseating granulomas consistent with sarcoidosis. She had not been treated with corticosteroids since that time as her disease was considered inactive.

Her physical examination was unremarkable and showed no evidence of iritis, pulmonary symptoms, pericardial symptoms or skin lesions suggesting activity of her sarcoidosis. On the third hospital day, the patient developed a temperature spike to 39° and complained of worsening left knee discomfort. Aspiration of a trace knee effusion demonstrated 500 WBC/mm^3, 59% PMNs, no crystals and no bacterial growth. Plain radiographs of both knees demonstrated a 2.5 cm ovoid lytic lesion in the left tibial shaft (Fig. 1A) and a 2 cm ovoid lytic lesion in the right tibial shaft (Fig. 1B). The lesions were felt to be suspicious for metastatic disease. A ^{99m}Tc-MDP bone scan was performed which demonstrated multiple focal areas of intense tracer uptake in both lower extremities distal to the knees (Fig. 2).

A bone biopsy of the left tibia and left patella demonstrated noncaseating granulomas consistent with sarcoid. AFB stains were negative, as was a serum protein electrophoresis to detect myeloma. The patient was placed on high-dose steroids and improvement in her bone pain occurred over the next 24 hr.

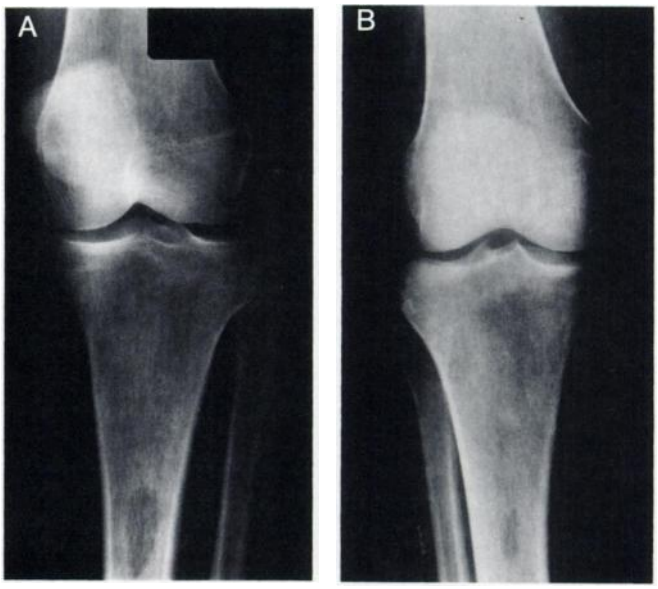

FIGURE 1. (A) Anteroposterior view of the left knee and tibia reveals a 2.5-cm ovoid lytic lesion in the anterolateral cortex of the left tibial shaft and lucent zone in medial half of left patella. (B) A 2-cm ovoid lytic lesion in the anterior cortex of proximal right tibial shaft.

Shortly thereafter, the patient developed episodes of psychosis with notable polyuria and polydipsia. Subsequent CT and MRI revealed a 1-cm hypothalamic mass and right frontal pial enhancement (Fig. 3). Diabetes insipidus and panhypopituitary function was supported by serum and urine studies and low TSH, FSH and LH, respectively. Subsequently, the patient was transferred to a long-term care facility where she died after 2 mo. Her interval clinical course at that facility is unknown.

DISCUSSION

The frequency of bone lesions in sarcoidosis varies from 1% to 13% (*1*). It is most often seen in the short tubular bones of the hands and feet (*1,2*), but has been reported in the spine (*3*), sternum (*4*), calvarium, pelvis (*5*), ribs (*2*), nasal bones (*2*), tibia and femur (*6,7*). Bone pain is present in approximately one half of patients (*8*). Soft-tissue swell-

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For correspondence or reprints contact: Diane C. Sweeney, MD, Department of Nuclear Medicine, BB43, Washington Hospital Center, 110 Irving Street, N.W., Washington, D.C. 20010.

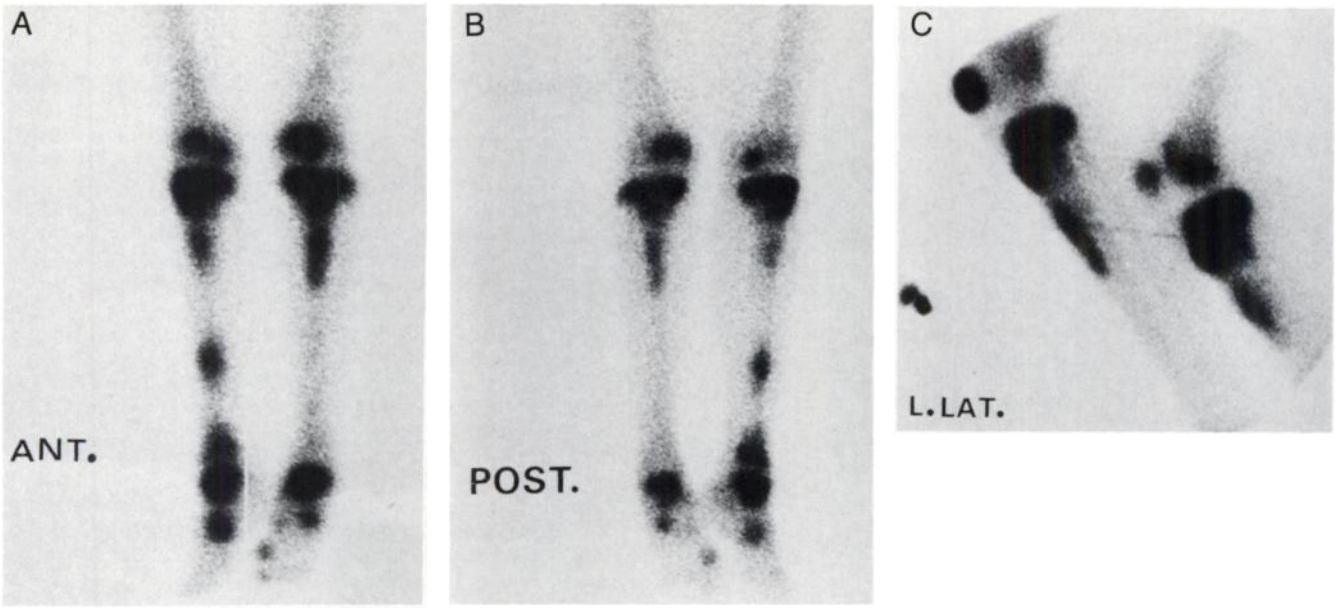

FIGURE 2. Technetium-99m-MDP delayed images. (A) Anterior image. (B) Posterior image. (C) Lateral view of the lower extremities showing multiple areas of increased tracer accumulation.

ing and skin lesions can also occur in conjunction with osseous sarcoid lesions (*6,7*).

The radiographic findings of the bone lesions are nonspecific and often biopsy is necessary for definitive diagnosis. The roentgenograms may show a lytic lesion (*3*) with periosteal reaction (*7*), expansile cyst-like lesions (*6*) and reticular, lace-like permeative changes (*9*). The differential diagnosis includes metastatic lesions, lymphoma, infectious processes including tuberculosis, bone infarctions and Paget's disease (*3,10*). One author also suggested inclusion of eosinophilic granulomas in the diagnosis (*4*).

Radioisotope scanning with ^{99m}Tc diphosphonate compounds has been suggested to be more sensitive than plain radiographs in detecting skeletal involvement (*9*). Our findings support this, as more extensive and numerous lesions were apparent on the bone scan when compared to the radiographs. There has been, however, a report of a child with lytic lesions in the femur and tibia who had a negative bone scan (*11*). Comparative studies with gallium imaging were not available on that patient or ours. Increased sensitivity of diphosphonate bone scanning compared to gallium scanning in the detection of osseous sarcoidosis has been described (*9*).

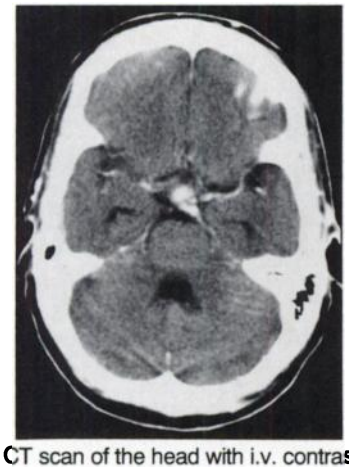

FIGURE 3. CT scan of the head with i.v. contrast. An ill-defined enhancing mass in the suprasellar cistern is consistent with CNS sarcoidosis.

CNS involvement with sarcoidosis occurs in approximately 5% of patients (*12*). The cranial nerves, leptomeninges, hypothalamus and, less frequently, the cerebral hemispheres, cerebellum and brain stem are generally affected (*13*). CNS involvement usually occurs in the early phase of the disease, in contrast to peripheral nervous system and skeletal muscle involvement which accompanies chronic sarcoidosis (*12*). Pituitary hypofunction is secondary to sarcoid (*14*). Presentation varies from optic nerve compromise to deficiency of one or more pituitary hormones. Sarcoid involvement of the hypothalamus has also been well described by demonstrating pituitary responsiveness to hypothalamic releasing hormones (*15*). Recent literature supports MRI with contrast enhancement as the most sensitive method of detecting CNS lesions (*16*). Contrast-enhanced CT has been reported to demonstrate diffuse meningeal involvement not seen on MRI (*17*).

The response of neurosarcoidosis to steroids therapy has been variable (*18,19*). Radiotherapy has also been used in CNS sarcoidosis. One author reports progressive CNS sarcoid which responded to CNS radiation after a poor response to steroid therapy (*20,21*). Cyclosporine has also been used in a case of CNS sarcoid when the side effects of prednisone had become intolerable (*22*). Although bone pain responded rapidly to steroid therapy, our patient demonstrated symptoms of hormone deficiency which neces-

sitated replacement. Although serum angiotensin converting enzyme levels reportedly have not been helpful predictors of CNS response to steroids in the absence of pulmonary involvement, CSF ACE levels have been shown to be useful in monitoring CNS sarcoid (*23,24*).

This complex presentation of a patient with osseous sarcoidosis and CNS involvement demonstrates the multisystem nature of sarcoidosis. We feel biopsy is warranted in a patient with lytic lesions in the long bones who is at risk for sarcoidosis. It should be remembered that the osseous and CNS manifestations of sarcoidosis may occur without overt or severe pulmonary disease.

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