

Imaging Findings in Sarcoid of the Humerus

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While case reports have appeared in radiology literature previously about sarcoid involvement of the tibia, the spine and the pelvis, there are no case reports describing involvement of the humerus. We report a case of sarcoid involvement of the humerus secondary to pulmonary sarcoidosis. While the imaging findings are non-specific, they follow the pattern of imaging characteristics described in sarcoid of other large bones.

Introduction

We report the case of a 50-year-old male with pulmonary sarcoidosis, who subsequently developed sarcoidosis of his right humerus. While the radiology literature contains reports describing osseous sarcoid affecting the hands and feet (1), tibia (2), spine (3, 4), bones of the skull (1), pelvis (5), ribs (4), sternum (4) and other bones (1), we are unaware of a prior case report describing humeral involvement.

Case Report

A 50-year-old male patient with a biopsy proven eight year history of pulmonary sarcoidosis presented with a two month history of right shoulder pain and mildly decreased mobility. Although he was currently on no systemic therapy for sarcoidosis, his pulmonary disease remained relatively stable. Following diagnosis of his pulmonary disease, he was initially treated with corticosteroids. However, the steroids were stopped once he developed manic symptoms.

A ^{99m}Tc radionuclide bone scan (Figure 1) demonstrated mild uptake in the right humeral head. No other osseous involvement was noted. A plain radiograph of the shoulder (Figure 2) was initially read as normal and notably demonstrated no signs of arthropathy.

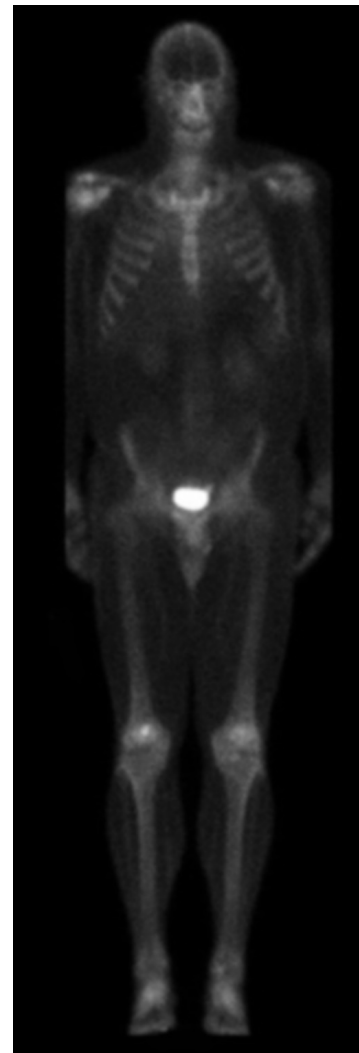


Figure 1. ^{99m}Tc radionuclide bone scan shows mild uptake in the right humeral head. A small focus of uptake in the area of the right knee likely represents focal osteoarthritis.

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Abbreviations: MRI, magnetic resonance imaging, STIR, short tau inversion recovery, CT, computed tomography

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A magnetic resonance imaging (MRI) examination was performed following the negative radiograph, and demonstrated an area of abnormal marrow signal intensity in the region of the medial humeral head extending to the surgical neck. This focus was of low signal intensity on T1-weighted images (Figure 3) and on T2-weighted images (Figure 4).

On proton density (Figure 5) and short tau inversion recovery (STIR) images (Figure 6), the mass was of higher signal intensity than the surrounding low signal intensity marrow. No cortical breaks were noted. A small joint effusion was noted, and thought to be reactive.

A computed tomography (CT) scan was then performed (Figure 7) which demonstrated a focal area of mild but relatively well-defined sclerosis at the same site as the marrow abnormality seen on MRI.

A biopsy, performed under fluoroscopic guidance, revealed non-caseating granulomatous inflammation, consistent with sarcoidosis. The patient was unwilling to undergo surgical resection, given his relatively mild symptoms. Because he had previously developed psychotic side effects from corticosteroid therapy, radiotherapy was considered for palliative treatment, and the patient subsequently received a total of 40 Gy. A follow-up MRI performed after radiation therapy demonstrated no change in size of the marrow signal abnormality, though the marrow signal

demonstrated some increased heterogeneity. The patient's symptoms subsequently improved.

Discussion

Sarcoidosis is an idiopathic multisystem disease most commonly affecting young adults. It frequently presents with hilar lymphadenopathy, pulmonary infiltration, ocular and skin lesions. It is characterized histologically by the presence of non-caseating granulomas.

The course and prognosis correlate with the mode of onset (6). An acute onset often leads to a self-limited course followed by spontaneous resolution. An insidious onset may be followed by relentless progressive fibrosis. Corticosteroids relieve symptoms and suppress the formation of granulomas.

Musculoskeletal involvement by sarcoid is usually infrequent. While an acute, self-limited polyarthritides may be observed in up to 40% of sarcoid patients, other manifestations, such as chronic arthritis (1–4%) or symptomatic muscle involvement (< 0.5%) are much less common (7).

The reported frequency of bone involvement in sarcoid varies from 1 to 13%, with an average of 5% (1, 2, 7). This frequency may be underestimated, as radionuclide bone scan abnormalities may occur in as many as 38% of patients with sarcoid (8). However, the overall prevalence of



Fig 2

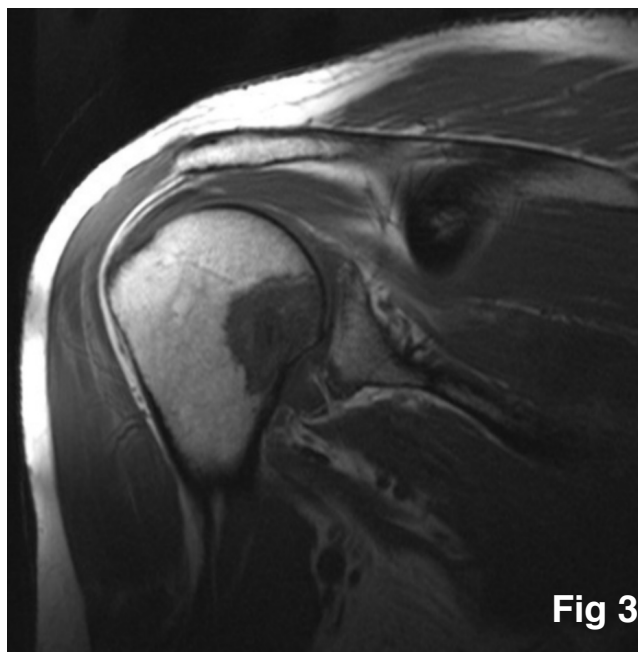


Fig 3

Figure 2. Plain radiograph of right shoulder was read as normal. In retrospect, a faint area of sclerosis is barely visible in the inferomedial humeral head, corresponding to the area of the abnormality seen on subsequent cross-sectional imaging.

Figure 3. T1-weighted coronal image demonstrates focus of low signal intensity involving the medial humeral head and its surgical neck.

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Fig 4

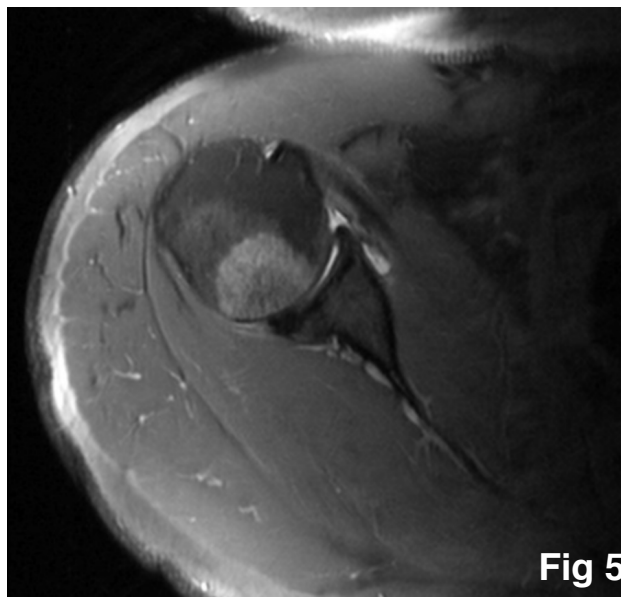


Fig 5

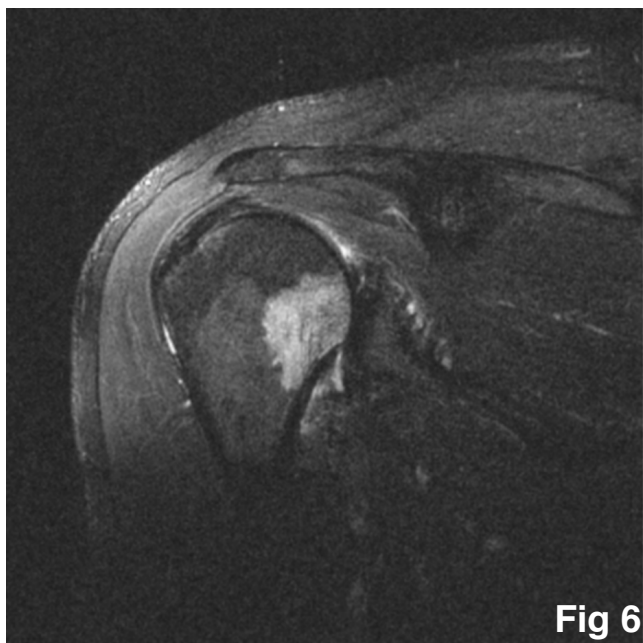


Fig 6

Figure 4. T2-weighted coronal image of the right shoulder demonstrates a focus of signal abnormality hypointense with respect to the other marrow. Within this area of hypointense signal is a central area that is isointense with normal marrow.

Figure 5. Axial fat-saturated proton density image demonstrates a high signal intensity focus within the marrow with no interruption of the cortex. There is also a small joint effusion.

Figure 6. Coronal (STIR) image demonstrates a high signal intensity focus within the marrow with no interruption of the cortex. There is also a very small joint effusion.

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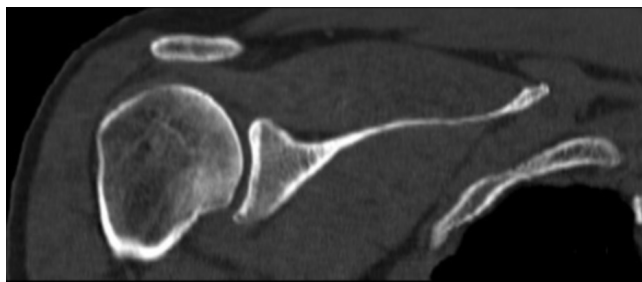


Figure 7. Oblique coronal reformation of CT scan of right shoulder demonstrates ill-defined sclerosis in the humeral head in the same region as the signal abnormality seen on MRI. No break is seen in the cortex.

clinically significant bone involvement in sarcoidosis is felt to be low (2–5%) (7).

Involvement of the skeleton system is generally limited to the small bones of the hands and feet, where it is often characterized by a lacy erosive process. Involvement of other bones is relatively rare. While the radiology literature contains reports describing osseous sarcoid affecting the hands and feet (1), tibia (2), spine (3, 4), bones of the skull (1), pelvis (5), ribs (4), sternum (4) and other bones (1), we are unaware of a prior case report describing humeral involvement.

Osseous sarcoid is more common in blacks, females and patients with lupus pernio, and is associated with chronic multisystem involvement (7). Osseous involvement by sarcoid is usually seen during the chronic disease stage of sarcoid, and generally in association with cutaneous, lymphatic or visceral involvement (4). Although our patient was on no systemic therapy for sarcoidosis, his pulmonary disease remained relatively stable.

The major radiographic finding of sarcoid is osteolysis, usually manifesting as generalized osteopenia with a lacy trabecular pattern. Cyst-like lytic lesions may accompany osteolysis, and can result in a “punched out” appearance (7). Osteosclerosis, such as seen in our patient’s CT, occurs less frequently than osteolysis, and is more commonly seen in the long bones than in the small bones of the hands and feet (7).

Sarcoid bone lesions are characterized by their appearance on either side of the body; the site of origin (cortical, with preservation of the periosteum); location (hands and feet); position usually the ends of the affected bones); and the shape (cystic or lacelike with minimal disturbance in the nearby soft tissues) (1). If the patient presents with typical pulmonary and extrapulmonary manifestations of sarcoidosis, these osseous lesions are relatively easy to diagnose. In the absence of these typical systemic manifestations, diagnosis may be difficult. The differential diagnosis of hand lesions may also include hyperparathyroidism, tuberculosis, enchondroma and thalassemia (1).

The pattern of marrow signal abnormality seen in our case is comparable to previously described cases in other large bones (5, 9). Large bone sarcoid presents as single or multiple foci of abnormal signal which are low intensity on

T1-weighted images and high intensity on T2-weighted and proton density images. These lesions may enhance after intravenous gadolinium administration, although contrast does not usually increase the conspicuity of the lesions. Cortical breakthrough can be seen in the small bones of the hands and feet, but is less likely in the long bones. No cortical breakthrough was seen in our patient’s humeral lesion.

Radiography and CT often (55%) show findings equivalent to MRI. However, MRI demonstrates sensitivity superior to that of radiography or CT in most other patients (45%) (5). The association of an intramedullary lesion on MRI with a negative radiograph is most likely to be seen with a large bone lesion. These reports are congruent with those seen in our patient, who exhibited a normal radiograph and subtle findings on CT.

In summary, we report a case of sarcoidosis of the humerus, with radionuclide and cross-sectional imaging correlation. While osseous sarcoid has been reported in a variety of other bones, we are unaware of a prior case report describing humeral involvement. The MRI features of sarcoid in long bones are not specific, and must be differentiated from metastatic disease, multiple myeloma, lymphoma, osseous hemangioma, and disseminated granulomatous infection (5, 8). However, knowledge of the MRI appearance of osseous sarcoid can help to refine the differential diagnosis in a patient with known sarcoidosis – particularly in a patient with dual diagnoses of sarcoidosis and neoplasm.

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