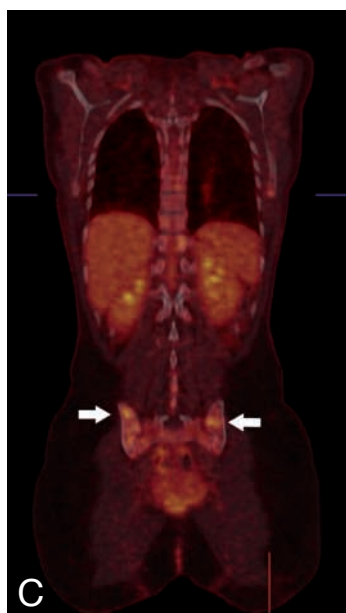
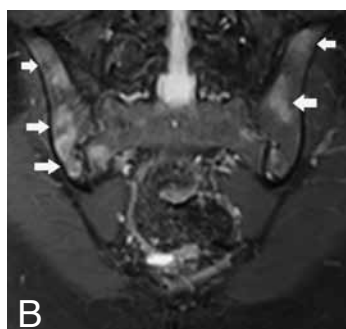
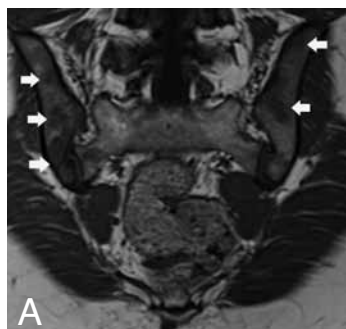


## IMAGES IN CLINICAL RADIOLOGY



### *Bone marrow involvement in sarcoidosis*

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A 36-year-old woman presented with joint pain and swelling, not improving with nonsteroidal anti-inflammatory drugs. Plain radiographs of feet, ankles, pelvis and lumbar spine were unremarkable. To rule out seronegative spondylarthropathy, MRI of the sacro-iliac joints (SIJ) was performed. The SIJ were normal, but multiple, nodular zones of bone marrow replacement were seen within the iliac and ischial bones, sacrum and lumbar spine. The lesions were hypointense on T1-Weighted Images (WI) (Fig. A, arrows) and of intermediate to high signal intensity on T2-WI (Fig. B, arrows). Given the young age of the patient and relative minor complaints, sarcoidosis was suspected. Other differential diagnoses included metastatic disease, lymphoma, mastocytosis and widespread granulomatous infectious disease.

Subsequent CT of the chest showed micronodular thickening of fissures, subpleural micronoduli and multiple enlarged hilar and mediastinal lymph nodes, in keeping with pulmonary sarcoidosis (not shown).

On [<sup>18</sup>F]Fluorodeoxyglucose positron emission tomography (FDG-PET)-CT, multiple foci of increased FDG uptake in the pelvis, spine and mediastinum were seen (Fig. C, arrows). Transbronchial needle aspiration of the PET-positive infracarinal lymph nodes confirmed the presence of non-caseating granulomas. The patient's symptoms resolved spontaneously.

#### *Comment*

Sarcoidosis is a granulomatous disease of unknown origin with a worldwide distribution. It can affect virtually every organ and typically affects young to middle-aged adults. The highest prevalence is found amongst African-Americans, Swedes and Danes, with an incidence of sarcoidosis of 10,9-35,5 cases per 100.000. The typical histopathological appearance is that of non-caseating granulomas within the involved organs. Pulmonary involvement is the most common manifestation of sarcoidosis, but further discussion is beyond the scope of this short manuscript. Musculoskeletal (MSK) sarcoidosis was previously considered as uncommon, but due to the more widespread use of MRI and FDG-PET, bone marrow involvement is more commonly seen.

Clinically, patients with musculoskeletal involvement present with weakness, unexplained local pain or joint swelling.

Within the hands and feet, a typical lace-like pattern of osteolysis on plain radiographs is pathognomonic. Lesions may extend into the adjacent joints.

MRI is the imaging modality of choice for detection of lesions within the bone marrow of the axial skeleton. Bone marrow involvement may either consist of multiple focal round ("cannonball") lesions, diffuse confluent marrow infiltration or multiple ill-defined discrete lesions with "starry-sky" appearance. The signal intensity of the lesions may vary, but they are usually hypo-intense on T1-WI and hyper-intense on T2-WI. Rarely, lesions may be hypointense on T2-WI.

CT is normal in most cases. In rare cases, purely lytic, mixed or purely sclerotic lesions may be seen. Sarcoidal lesions are highly FDG avid on PET-CT.

Bone marrow involvement may mimic metastatic disease both on MRI and PET. The radiologist should consider the diagnosis of sarcoidosis in young patients with unexplained musculoskeletal symptoms particularly in the absence of known malignancy.

As 90% of patients with MSK sarcoidosis have systemic involvement, particularly of the chest, additional chest imaging is mandatory for a more confident diagnosis. Biopsy may be needed to confirm the diagnosis.

#### *Reference*

1. Moore S.L., Teirstein A., Golimbu C.: MRI of sarcoidosis patients with musculoskeletal symptoms. *AJR*, 2005, 185: 154-159.

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