Whole-body MRI as a new screening tool for detecting axial and peripheral manifestations of spondyloarthritis

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Involvement of the axial skeleton is a characteristic feature of spondyloarthritis (SpA). Asymmetrical arthritis and enthesitis of the peripheral joints are found in about 30–60% of patients.^{1–3}

A 52-year-old patient with a history of psoriasis reported inflammatory back pain, painful ankles and knees and severe morning stiffness on admission. The physical examination revealed tender entheses at different locations: upper thoracic spine, lumbar spinous processes, both iliac crests and posterior superior iliac spines. Furthermore, there was tenderness of both sacroiliac joints, both knees and both ankles without joint swelling.

HLA-B27 antigen was negative. The sedimentation rate (70/76) and levels of C reactive protein (1.48 mg/dl) were increased. The Bath Ankylosing Spondylitis Activity Index was 6.0, and the Bath Ankylosing Spondylitis Functional Index was 4.6. Radiographs of the pelvis showed bilateral grade 3 sacroiliitis. Thus, ankylosing spondylitis (AS) associated with psoriasis was diagnosed. Treatment on admission comprised methotrexate (15 mg/week) and prednisolone (5 mg/day). Whole-body MRI (WB-MRI) was performed on a special 1.5 T scanner (Avanto, Siemens, Germany) for evaluation of the extent of suspected widespread inflammatory lesions. Images of the entire body, excluding the hands, were acquired in a head-to-toe scan using parallel imaging and a whole-body surface coil system. Total imaging time was about 65 min.

WB-MRI detected multiple extensive foci of inflammatory spondylitis from C4 through T8 and T12 through L4 (fig 1A,B,E,F) and erosive spondylodiscitis from C6 through C8 (fig 1B). In addition, there was florid arthritis of various facet and costovertebral joints at the cervicothoracic junction. The sacroiliac joints showed grade 3 chronic changes⁴ and florid changes spreading into the sacral and iliac bone, predominantly on the right side (fig 1D, H). Erosions were found on the distal right tibia (fig 1C, G, 2C) and on the left posterior calcaneus (fig 2D). There was peripheral bone marrow oedema of the right sternoclavicular joint (fig 2A), manubriosternal synchondrosis, right proximal tibia (fig 2B), distal tibia (fig 2C), distal fibula, navicular bone (fig 2D) and posterior aspect of the left calcaneus (fig 2D).

DISCUSSION

This is the first report on the use of WB-MRI in a patient with active AS. Remarkably, this technique allowed us to identify multiple disease manifestations with a single procedure. We could clearly correlate clinical symptoms with WB-MRI findings: the painful lumbar spinal segments showed acute inflammatory changes, such as spondylitis and spondylodiscitis. The tender spinal segments showed acute inflammatory changes, such as spondylitis, spondylodiscitis, costovertebral joint arthritis and facet joint arthritis. Tenderness of the knee and ankle joints correlated with focal bone marrow oedema and erosive arthritis. In addition, mild subclinical enthesitis of the sternum was detected.

MRI is highly sensitive and superior to conventional radiography in depicting inflammatory bone lesions of the axial

skeleton and peripheral arthritis.^{5–7} Normally, patients with multiple disease manifestations as in the case given here would need several examinations at different times on a conventional scanner (eg, sacroiliac joints, thoracic spine, hindfoot), which is usually not done in clinical practice because of budget limitations. The cost of WB-MRI is about 1.4 times that of conventional MRI. WB-MRI may be more cost effective than scanning at two separate locations (eg, sacroiliac joints and spine) in patients with suspected widespread inflammation. The use of novel coil systems and accelerated imaging techniques enables whole-body scanning in about 60 min.⁸ Currently, the technique of WB-MRI is still limited by the inability to include the finger and wrist joints in the imaging volume, because of the maximum width of the field of view.

The case presented here underlines the potential of WB-MRI as an emerging tool in identifying widespread inflammation in patients with AS and other forms of SpA, which might be especially useful if expensive treatments such as anti-tumour necrosis factor α agents are considered.

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Abbreviations: AS, ankylosing spondylitis; SpA, spondyloarthritis; WB-MRI, whole-body MRI

Figure 1 **A.** T1-weighted sagittal fast spin echo sequence (repetition time TR: 689 ms, echo time TE: 11 ms, image size: 1078×556 pixel) of the spine showing vertebral endplate erosions at the Th7,8 and L3 levels (arrows). **B.** Sagittal short tau inversion recovery (STIR) sequence (TR: 3690 ms, TE: 38 ms, image size: 796×414 pixel) at the same slice position shows localized bone marrow edema at the Th12 to L4 levels (arrows) and diffuse and localized bone marrow edema from C4 to T8 (e.g. white star at Th5). **C.** T1-weighted coronal fast spin echo sequence (TR: 642 ms, TE: 10 ms, image size: 1902×526 pixel) of the whole body showing vertebral endplate erosions at the L3 and L4 levels (arrowheads) and erosions at the right ankle joint (arrows). **D.** Coronal STIR sequence (TR: 6282 ms, TE: 83 ms, image size: 1906×524 pixel) at a different slice position as fig. 1C shows bone marrow edema at multiple levels (large arrows) of the thoracic spine, the right sacroiliac joint (arrowheads) as well as and on the dorsal part of the left calcaneus (small arrow). **E.** Magnified view of fig. 1A showing erosive chronic spondylitis of the endplate of L3 (arrow). **F.** STIR sequence with magnification of fig. 1B showing anterior bone marrow edemas due to florid spondylitis of Th12 through L3 (arrows). **G.** Coronal T1-weighted sequence (magnified from fig. 1C) of the right ankle joint showing erosions and bone defects. **H.** Zoomed view of fig. 1D showing the sacroiliac joints with extensive bone marrow edema on the right side.

Figure 2 A. Coronal STIR sequence shows localized bone marrow edema at the proximal head of the right clavicle (arrowheads) B. Coronal STIR sequence with bone marrow edema at the medial plateau of the proximal tibia (arrows). C. Sagittal STIR sequence of the right ankle comprising bone marrow edema in the distal tibia (arrow). Additionally, mild fluid collection is seen in the retrocalcaneal bursa (arrowhead). D. Sagittal STIR sequence of the left ankle with bone marrow edema due to enthesitis in the left navicular bone (arrow) and at the insertion site of the Achilles tendon at the dorsal aspect of the calcaneus (arrowhead).

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