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MRI of the SI joints commonly shows non-inflammatory disease in patients clinically suspected of sacroiliitis

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ABSTRACT

Purpose: To determine the prevalence of clinically relevant non-inflammatory disease on MRI of the sacroiliac (SI) joints in patients suspected of sacroiliitis. To assess the added value of axial imaging of the pelvis in these patients.

Methods: In a retrospective study of 691 patients undergoing MRI of the SI joints from January 2006 to December 2012 for inflammatory back pain the prevalence of sacroiliitis and non-inflammatory disease was recorded.

Results: In 285 (41%) patients MRI did not show any abnormal findings. In 36% of patients MRI features of sacroiliitis were present. Spinal degenerative changes were the most common non-inflammatory finding in 305 patients (44.1%) and consisted of disc degeneration in 222 (32%) patients, facet joint arthrosis in 58 (8.4%) patients and disc herniation in 25 (3.6%) patients. Hip joint disease in 44 (6.4%) patients, lumbosacral transitional anomaly in 41 (5.9%) patients, SI joint degenerative changes in 25 (3.6%) patients and diffuse idiopathic skeletal hyperostosis in 24 (3.5%) patients were also common. Osteitis condensans ilii in 17 (2.5%) patients, tumour in 11 (1.6%) patients, fracture in 8 (1.2%) patients, infection in 4 (0.6%) patients and acute spondylolysis in 2 patients (0.3%) were less frequently seen.

Conclusion: Our study shows that non-inflammatory disease is more common than true sacroiliitis on MRI of the SI joints in patients with inflammatory type back pain. Axial pulse sequences may demonstrate unexpected findings that remain undetected if only coronal images are obtained. Clinical relevance statement: MRI of the SI joints may demonstrate conditions that clinically mimic sacroiliitis. Axial imaging of the pelvis may help detect these unexpected findings.

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1. Introduction

Spondyloarthritis (SpA) is a group of joint conditions that are seronegative for rheumatoid factor and often are associated with the presence of HLA-B27 [1–5].

Rheumatologists increasingly request MRI of the SI joints for early diagnosis of SpA as new medical treatment options have become available [6,7]. The SI joints may show active as well as structural lesions in sacroiliitis [8–10]. Presence of bone marrow oedema (BMO) on MRI is the key criterion for diagnosing active sacroiliitis in the Assessment of SpondyloArthritis international Society (ASAS) classification [9,11].

BMO of the SI joints is not a specific finding for sacroiliitis, and may also be seen in non-inflammatory diseases. Furthermore non-inflammatory diseases such as axial degenerative changes, lumbosacral transitional anomaly, acute spondylolysis, sacral insufficiency fracture, tumour, infection and hip joint disease may clinically present as inflammatory type back pain [12,13]. MRI of the SI joints may demonstrate these unexpected lumbar and pelvic non-inflammatory entities that are related to the purpose of the examination [9].

The aim of this study was to determine the prevalence of non-inflammatory disease demonstrated on MRI of the SI joints in patients presenting with inflammatory type back pain.

2. Materials and methods

A retrospective study was approved by the institutional ethics committee. Informed consent was waived.

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2.1. Study group

All participants were recruited from the hospital rheumatology outpatient clinics in a tertiary care centre presenting with symptoms of sacroiliitis. Inclusion criteria were only clinical. All patients were clinically assessed by a consultant rheumatologist and referred for MRI if suspected for sacroiliitis according to the established criteria for ‘inflammatory type’ back pain: (a) age at onset < 40 years, (b) insidious onset, (c) improvement with exercise, (d) no improvement with rest, e. pain at night [9]. Patients who underwent back surgery were excluded.

From January 2006 to December 2012, 691 patients (261 (37.8%) men, 430 (62.2%) women), with a mean and median age of 36.2 years (range 8.4–72.6) met the inclusion criteria.

2.2. MRI

MRI was performed on a 1.5T MRI unit (Avanto/Symphony, Siemens Medical, Erlangen, Germany). The SI joints were imaged in a body flexed array coil (Siemens Medical, Erlangen, Germany). Sequence protocol included: semicoronal (along long axis of the sacral bone perpendicular to the S2 vertebral body) T1-weighted turbo spin echo (TSE) (slice thickness (ST): 3 mm; repetition time/echo time (TR/TE): 595/20 ms); semicoronal STIR (ST: 3 mm; TR/TE/TI: 5030/67/150 ms); axial STIR related to the pelvis (ST: 5 mm; TR/TE/TI: 7540/67/150 ms; field of view 400 mm × 400 mm) from L5 to the lesser trochanter. No cartilage enhancing gradient echo MRI sequences were obtained. As per ASAS guidelines, no contrast-enhanced pulse sequences were obtained [9].

2.3. Image review

The MR images were reviewed in consensus for the presence of sacroiliitis or non-inflammatory disease by 2 musculoskeletal radiologists with 10 and 14 years of experience (L.J. and V.L.), who were blinded to clinical and other imaging findings.

Sacroiliitis was considered present if the ASAS definition was fulfilled: “BMO is depicted as high signal on STIR images, typically located periarticularly. BMO is highly suggestive of sacroiliitis when clearly present and located in the typical anatomical areas (subchondral or periarticular bone marrow). If there is only one signal (lesion) per MRI slice suggesting active inflammation, the lesion should be present on at least two consecutive slices. If there is more than one signal (lesion) on a single slice, one slice may be sufficient” [9].

Non rheumatologic conditions were recorded to be present or absent [14–26]:

- L5-S1 degenerative disc disease with loss of signal and intervertebral disc space on coronal images and disc herniation on axial images with or without adjacent BMO,
- SI joint degenerative changes (sclerosis, joint space narrowing and osteophytosis),
- Hip joint disease (joint effusion/arthritis, herniation pit, coxarthrosis, labral cyst, avascular necrosis),
- Diffuse idiopathic skeletal hyperostosis (DISH) as bridging ossifications about the anterior articular margins of the SI joint, resulting in periarticular fusion,
- Osteitis condensans ilii with bilateral, triangular and symmetric sclerosis of the ilium adjacent to the SI joint,
- Scoliosis as abnormal lateral spinal curvature on the coronal images,
- Lumbosacral transitional anomaly with or without adjacent bone marrow oedema,

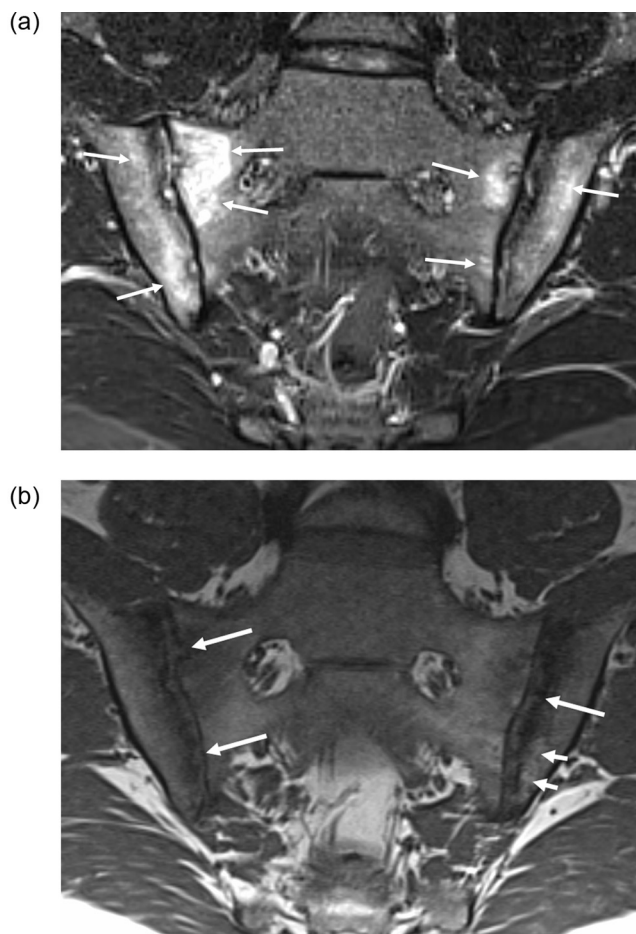


Fig. 1. BMO of the SI joint in spondyloarthritis. (a) Semicoronal STIR MR image shows bilateral extensive BMO of the SI joint (arrows). (b) Semicoronal T1-weighted MR image shows bilateral erosions (arrows) and minimal fat infiltration of the left SI joint (short arrow).

- Acute spondylolysis (focal bone marrow oedema of the pars interarticularis),
- Septic arthritis with soft tissue involvement, confirmed on infectious blood tests,
- Fracture as a low signal intensity line with surrounding bone marrow oedema,
- tumour, confirmed by biopsy.

2.4. Statistical analysis

Statistical analysis was performed using software package SPSS 15.0 for Windows (SPSS, Chicago, IL, USA). Basic descriptive statistics were performed where appropriate.

3. Results

In 285 (41%) of the patients the MRI findings were normal.

3.1. Prevalence of sacroiliitis

In 249 (36.0%) patients (median age 34.6; mean age 34.8 years; range 8.4–72.8) the MRI findings fulfilled the ASAS definition of a ‘positive MRI’ for sacroiliitis, with final clinical diagnosis of axial SpA (Fig. 1).

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