

Radiological and Magnetic Resonance Imaging Findings in the Sacroiliac Joints in Patients with early Spondylarthropathy

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Abstract

Objective: To compare the radiological (X-ray) and magnetic resonance imaging (MRI) findings in the sacroiliac (SI) joints in patients with early spondylarthropathy (SpA).

Methods: Forty consecutive HLA B27 antigen positive patients with early SpA and inflammatory low back pain (LBP) were studied. Their SI joints were investigated by posterior anterior plain X-ray and MRI.

Results: The X-ray and MRI examinations gave similar results in the SI joints in 24 patients, whereas they differed in 16, this difference being significant ($p = 0.007$). In those 16 patients, in whom the findings differed, the X-ray findings were normal but MRI showed sacroiliitis which was bilateral in 13 and unilateral in 3 patients. The kappa coefficient between these investigations was 0.346, showing poor agreement.

Conclusion: These results indicate that MRI may considerably improve the diagnosis of sacroiliitis in HLA B27 antigen positive patients with early SpA and inflammatory LBP.

Keywords: early, spondylarthropathy, LBP, radiography, MRI

Introduction

The concept of spondylarthropathy (SpA) was formulated in the 1970s (1) and confirmed by the discovery of the association of these diseases with HLA B27 antigen (2,3). SpAs are classified into ankylosing spondylitis, reactive arthritis (ReA), psoriatic arthritis (PsA), arthritis with inflammatory bowel disease and undifferentiated spondylarthropathy (uSpA). One of the characteristic features of SpAs is inflammatory low back pain (LBP), which is often due to sacroiliitis (4). Inflammatory LBP is associated with stiffness which is usually worse in the morning and may awaken the patient from sleep during the night. However, in patients with chronic inflammatory LBP the probability of axial SpA is only 14% (5). The European Spondylarthropathy Study Group (ESSG) criteria are those most often used for the diagnosis of SpA (6). According to these criteria patients are defined as having SpA if they have inflammatory spinal pain or synovitis (asymmetric or predominantly in the lower limbs), together with at least one of the following: positive family history, psoriasis, inflammatory bowel disease, urethritis, or acute diarrhea, alternating buttock pain, enthesopathy, or sacroiliitis as determined from X-ray of the pelvic region. The diagnosis of sacroiliitis has traditionally been based on plain radiography (X-ray). When the patient's anamnestic data, clinical findings and possibly also results of laboratory examinations point to sacroiliitis, an X-ray of the SI joints has been considered indicated. However, it takes an average of 9 years before sacroiliitis can be detected by plain X-ray, whereas magnetic resonance imaging (MRI) can detect inflammatory changes in SI joints in early phases of the disease (7). In the present study we compared the X-ray and MRI findings in SI joints of HLA B27 positive patients with early SpA and inflammatory LBP.

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Patients and Methods

Forty consecutive patients fulfilling the ESSG criteria for SpA were included in the study. Other criteria for inclusion were: age 20–50 years, duration of disease not more than 6 years, HLA B27 antigen positivity, inflammatory LBP, and no sacroiliitis in possible earlier X-ray or MRI investigations. The mean age of the 40 patients, of whom 25 were women, was 34.1 (range 20–50) years, mean duration of SpA 2.8 (range 0.1–6.0) years, mean erythrocyte sedimentation rate 13.8 (range 1–88) mm/h and mean blood hemoglobin 137 (range 110–169) g/l. The diagnoses were the following: 23 uSpA, 14 ReA and 3 PsA. The protocol of the study was approved by the ethical committee of Satakunta Central Hospital. The objectives were explained to all patients prior to enrolment in the trial and their oral consent was obtained.

Altogether 80 SI joints of 40 patients were investigated by posterior anterior plain X-ray and by MRI using 0.5 Tesla magnet (Gyrosan, Philips). Three different semicoronal sequences were examined: T1 weighted TR 500 with TE 30; T1 SPIR TR 110 with TE 20 and the same sequence with intravenous bolus administration of 15 mL of contrast agent Magnevist (469 mg/mL, Schering AG); and SPIR/TSE TR 1400 with TE 140. In plain X-ray the SI joints were evaluated on the scale: normal

or sacroiliitis (grade I to IV) using the modified New York criteria (8). Correspondingly, the MRI images of the SI joints were evaluated on the scale: normal or sacroiliitis, which included one or more of the following: subchondral bone marrow edema, synovitis, capsulitis, irregularity and narrowing of joint space or erosion. Figure 1 shows normal X-ray finding of a patient and Figure 2 bilateral sacroiliitis in MRI of the same patient. The X-ray films and MRI images were mixed, patients' names and birth-days being concealed when they were interpreted by one of the authors (KV).

Differences between findings in X-ray and MRI investigations of the SI joints were determined using chi-square test and the level of agreement between these investigations was evaluated by kappa coefficient (9). Kappa values range from –1 to +1, the value 1.0 representing perfect agreement.

Results

The X-ray and MRI examinations gave similar results on the SI joints in 24 patients, whereas they differed in 16 cases, the difference being significant ($p = 0.007$). Of the patients with similar results in the X-ray and MRI, 14 yielded normal findings, 9 had bilateral sacroiliitis and one had unilateral sacroiliitis. Of the remaining 16 patients the X-ray findings in the SI joints were normal but MRI

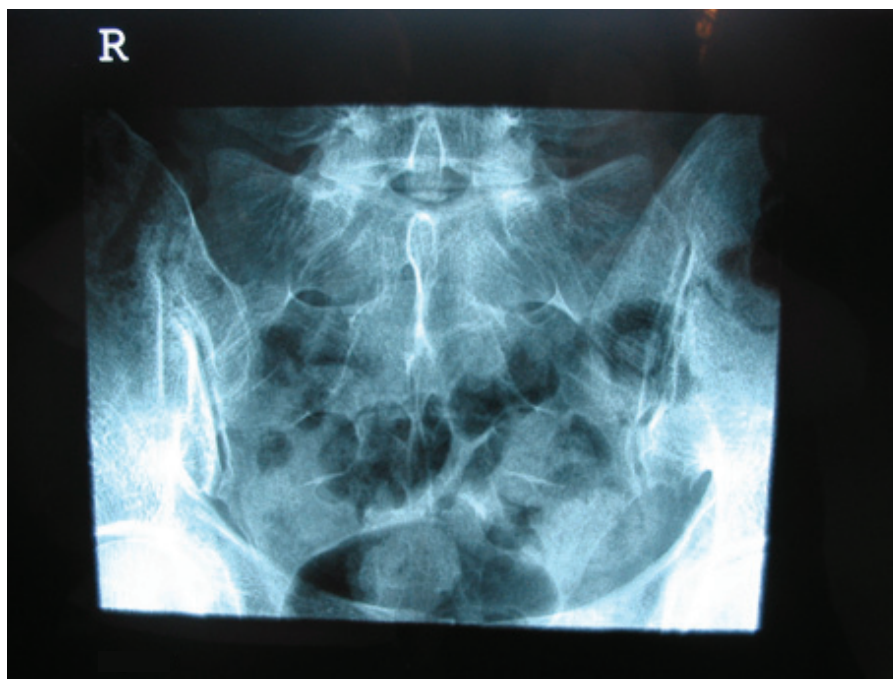


Figure 1. Normal X-ray findings of the SI joints.



Figure 2. Bilateral sacroiliitis in MRI of the same patient.

showed sacroiliitis which was bilateral in 13 and unilateral in 3 patients. There were no significant differences in the X-ray and MRI findings between the patients with uSpA, Rea and PsA. The grade of X-ray and MRI examinations did not correlate. The kappa coefficient for X-ray and MRI investigations was 0.346.

Discussion

LBP is a very common symptom attributable to many etiological factors, one of which is sacroiliitis. In most cases, however, the cause of pain remains unknown (10). It is important to diagnose sacroiliitis in such patients as early as possible, since its treatment differs from that of LBP with other etiologies (11). Inflammatory involvement of one or both SI joints causing chronic LBP is a characteristic feature of SpAs (12). Conventional plain X-ray and also computed tomography are insufficient in the diagnosis of sacroiliitis in the early stages of the disease, since they can detect only abnormalities of cancellous or cortical bones. X-ray cannot detect inflammation or bone marrow edema in the absence of bone changes. Erosion of the SI joint has often to be fairly severe before being visualized by X-ray, which is the case in SpAs of even up to 9 years of duration of the disease (7). In contrast, MRI is able to detect soft tissue components such as bone marrow, cartilage, synovium and joint capsule, and can thus detect

both acute and chronic inflammatory changes in the SI joints (7,13).

The disadvantage of MRI is its relatively high cost. Since LBP is a particularly common symptom, the SI joints of all such patients cannot be investigated by MRI. To be cost-effective, selection of patients is therefore essential. Patients with spondylarthropathy belong to the group in which MRI has to be considered.

In this study X-ray and MRI gave similar results in only 24 out of the 40 HLA B27 antigen positive patients with early spondylarthropathy and inflammatory low back pain, whereas they differed in the remaining 16 patients, in whom MRI showed either bilateral or unilateral sacroiliitis.

In conclusion, the results of this study thus suggest that MRI may considerably improve the diagnosis of sacroiliitis in HLA B27 antigen positive patients with spondylarthropathy and inflammatory low back pain.

Disclosure

The authors report no conflicts of interest.

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