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Original article

Enthesopathy in rheumatoid arthritis and spondyloarthritis: An ultrasound study

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ABSTRACT

Objective: We aimed to compare the prevalence of enthesopathy seen on ultrasonography (US) in spondyloarthritis (SpA) and rheumatoid arthritis (RA) and compared it to healthy controls.
Methods: All included patients with RA (2010 ACR/EULAR criteria) and SpA (ASAS criteria) and healthy controls underwent clinical and US evaluation of enthesis at seven sites (quadriceps, proximal and distal patellar, Achilles and triceps tendons, plantar aponeurosis and lateral epicondyle enthesis). The Glasgow Ultrasound Enthesitis Scoring System (GUESS) and the Madrid Sonographic Enthesitis Index (MASEI) scores were determined by two sonographers blinded to clinical data.
Results: We included 30 patients with RA (mean age: 55.7 ± 14.8 years, mean disease duration 10.5 ± 7.9 years); 41 with SpA (mean age: 45.3 ± 15.4 years, mean disease duration 9.2 ± 8.7 years) and 26 healthy controls (HC) (mean age: 50.4 ± 17.3 years). Patients with SpA and RA had similar prevalence of painful enthesis of examined sites (17% vs. 14%, non-significant [ns]), but more than among in healthy controls (3%, $P < 0.05$ for RA and SpA comparison). Comparison between SpA and RA patients revealed that at least one US enthesis abnormality was found with similar frequency (46% and 48% sites [ns]) but both rheumatic diseases had higher frequency of US enthesis abnormality than HC (31%, $P < 0.05$ for RA and SpA comparison). The mean MASEI score was 8.5 ± 7.3 for RA patients, 7.8 ± 6.5 for SpA patients (ns) and 3.4 ± 2.8 for healthy controls ($P < 0.05$ for RA and SpA comparison). Overall, 6 RA (20%) and 4 SpA (10%) patients had a MASEI score ≥ 18 (ns). None of the healthy controls had a MASEI score ≥ 18 ($P < 0.05$ for RA and SpA comparison). The mean GUESS score was 5.8 ± 3.1 and 6.3 ± 3.9 for RA and SpA patients (ns), and 4.0 ± 3.1 for healthy controls ($P < 0.01$ vs. SpA and < 0.05 vs. RA).
Conclusions: RA and SpA patients did not differ in entheseal abnormalities seen on US. Such US features may have low specificity in inflammatory conditions affecting joints and enthesis such as SpA and RA.

1. Introduction

Enthesopathy is characterized by inflammation of insertions of tendons, ligaments or capsules into the bone. It is a common feature of spondyloarthritis (SpA) that could be searched for diagnostic classification of SpA [1] and for treatment management [2]. However, recognizing enthesopathy could be challenging because of low sensitivity and specific clinical testing. To detect enthesopathy, the European League Against Rheumatism (EULAR) recommends magnetic resonance imaging (MRI) or ultrasonography (US).

The low availability of MRI limiting its use, US seems to be interesting for enthesopathy detection. US grey-scale is a performant tool to detect structural modifications of the enthesis such erosion, bursitis, calcification, thickening or hypoechogenicity [3]. Power doppler (PD) allows for visualizing hypervascularization. Some studies suggested that US assessment of enthesopathy might be sensitive and specific for SpA diagnosis [4–7]. However, the diagnostic performance seems variable, and other studies found similar prevalence of US enthesopathy in rheumatoid arthritis (RA) and SpA [8] or psoriatic arthritis [9]. In addition, US assessment of heels could not differentiate SpA from controls [10]. These variable results might suggest a lack of specificity of US in detecting features of enthesopathy or for scoring systems.

Several semi-quantitative scoring systems have been developed to quantify enthesopathy. The Madrid Sonogarhc Enthesitis Index

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(MASEI) [6] and Glasgow Ultrasound Enthesitis Scoring System (GUESS) [10] are the most used in studies, and the main entheseal studied sites are triceps tendon, lateral epicondyle enthesis and insertions of lower limbs tendons.

We aimed to determine the US prevalence of enthesopathy in SpA and RA patients compared to healthy controls to assess the usefulness of the main enthesitis scoring systems with US in patients with inflammatory diseases.

2. Methods

2.1. Patients and study design

We performed a single-center, cross-sectional study including RA patients who fulfilled the 2010 ACR/EULAR criteria [11], patients with SpA according to ASAS criteria [1] and healthy controls ((HC), no rheumatic disorders). All patients were consecutively recruited in a 6-month period in the rheumatology department of Bichat Hospital (Paris, France). The following data were collected: gender; age; disease duration; number and locations of entheseal pain; pain on a visual analog scale (VAS, 0–100 mm); use of disease-modifying anti-rheumatic drugs (DMARDs), corticosteroids or previous biologic agents; erythrocyte sedimentation rate; and C-reactive protein (CRP) level. For RA patients, the following data were also collected: tender joint count (TJC) and swollen joint count (SJC) in 28 sites, positivity for anti-citrullinated peptide antibodies (ACPA) and rheumatoid factor (RF), erosive status, and disease activity score in 28 joints (DAS28). For SpA patients, we also collected positivity for HLAB27 allele, the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and Bath Ankylosing Spondylitis Functional Index (BASFI).

2.2. Ethics statement

Local institutional review board (No. 12-011) approved the study, and written informed consent was obtained from all participants.

2.3. Clinical assessment

The distal insertion of the quadriceps femoral tendon (QFT), proximal (PTPI) and distal origin of patellar tendon (PTDI), plantar aponeurosis (PA), Achilles tendons (AT), distal insertion of triceps tendon and lateral epicondyles (LE) were assessed in both limbs. Pain was assessed by local pressure. Clinical examination was performed by a rheumatologist blinded to US assessment.

2.4. US assessment

US assessment was standardized and performed the same day as clinical assessment by two trained rheumatologists (SO and BC) who used an Esaote MyLab70 echograph (Genoa, Italy) with 5–12 MHz (knees) and 12–18 MHz (feet and elbows) linear transducers. US assessment was performed in the morning, after a period of rest of 30 minutes. The temperature of the room was kept stable at 20°C. The US assessor was blinded to clinical data. US grey-scale was used for tendon thickness, tendon echogenicity, calcifications, enthesophytes, bursitis and erosions (Fig. 1). To assess the vascularization of enthesis, PD was used with pulse repetition frequency 750 Hz and medium wall filter, and gain was adjusted to remove background signals. Each entheseal site was assessed in both longitudinal and transversal planes.

As required by the MASEI [6] and GUESS [10] scoring systems, we scanned the following bilaterally: patella (at insertions of the quadriceps femoris and patellar tendons), Achilles tendon and plantar fascia insertions on the calcaneus, and triceps tendon insertion to the olecranon process. We also used US evaluation of lateral epicondyle enthesis as previously described [4,12]. Each examination took about 20 min. Patients were placed in a supine position with the knee flexed at 30 degrees to assess patellar and quadriceps enthesis.

The Achilles tendons and plantar aponeurosis were examined with the patient in the ventral decubitus position with feet hanging over the edge of the examination table at 90 degrees flexion or with the patient lying supine and knees and ankles flexed at 90 degrees. Lateral epicondyles were assessed with the hand lying prone on the examination table and the elbow flexed at 90 degrees. The triceps insertion was examined with the elbow flexed at 90 degrees.

US assessment included tendon thickness and echogenicity, bone erosion, bursitis, PD, calcifications and enthesophytes. Bursitis was defined as a well-circumscribed, localized anechoic or hypoechoic area at the site of an anatomical bursa, which was compressible by the transducer. The thickness of the enthesis was measured at the insertion of the deeper tendon margin into the bone in a longitudinal axis. As required for the MASEI score, the PD signal was assessed in the bursa or enthesis full tendon (at the cortical bone insertion and intratendon).

The GUESS and MASEI scores were calculated as previously reported [6,10].

2.5. Statistical analysis

Continuous variables are expressed as mean (SD) or median (interquartile range [IQR]). Categorical variables are expressed as frequency (%). Pearson χ^2 test or Fisher test was used for comparing categorical variables and Student t test or Wilcoxon rank-sum test for continuous variables. The intra- and inter-observer reliability of both imaging procedures was calculated with images obtained for 10 patients. These images were re-analysed under blinded conditions at least 1 month after the initial assessment. The intra- and inter-observer agreement for US was estimated by the κ coefficient, with agreement scored as > 0.8, almost perfect; 0.6–0.8, substantial; 0.4–0.6, moderate, 0.2–0.4, fair, ≤ 0.2, slight; < 0, poor beyond chance.

2.6. Role of the funding source

The echograph purchase was funded by Roche-Chugai.

3. Results

3.1. Patient characteristics

Clinical characteristics of the whole population are in Table 1. A total of 30 RA patients (17% of male, mean age 55.7 ± 14.8 years, 93% ACPA +), 41 SpA patients (68% male, mean age 45.3 ± 15.4, 64% HLAB27+) and 26 HC (34% male, mean age 50.4 ± 17.3 years) were consecutively included.

3.2. Clinical examination of enthesis

Clinical examination revealed painful enthesis in 98/574 examined sites (17%) in SpA patients and 59/420 sites (14%) in RA patients (non-significant [ns]) and 11/364 sites (3%) in healthy controls ($P < 0.05$ for RA and SpA comparison) (Table 2). SpA and RA patients had a mean of 2.4 and 1.96 painful enthesis sites per patients (ns), and 0.44 for healthy controls ($P < 0.05$ for RA and SpA comparison). The median painful site per patient was 2 for SpA, 1 for RA and 0 for HC.

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