An MR microscopy study comparing Distal Interphalangeal Joint Arthropathy in patients with Psoriatic Arthritis and Osteoarthritis

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Introduction

Studies of Psoriatic Arthritis (PsA) have proposed that this condition is associated with pathology of the insertions of tendons and ligaments (the entheses)[1]. In Osteoarthritis (OA), most attention has been directed at cartilage, however recent studies have indicated that pan-ligamentous and tendon abnormalities are a feature of nodal OA, even in the early stages of disease[2]. Distal interphalangeal joint (DIPJ) arthropathy is characteristic of both psoriatic arthritis (PsA) and osteoarthritis (OA). The microanatomical basis for disease localization is however poorly understood within the DIPJ because these joints are small. This study has therefore used high-resolution Magnetic Resonance (MR) imaging techniques to investigate the basis for hand disease in both conditions.

Methods

Thirty subjects: 10 with DIPJ PsA (mean disease duration 16.0 months (2–48 months; mean age 40 years (18–76 years)), 10 with DIPJ OA (disease duration matched with PsA, 16.3 months (4–48 months)), and 10 normal controls (age-matched with PsA, mean 43 years (27–72 years)) had a DIPJ examined. MR images were obtained using a 1.5T Gyroscan ACS-NT scanner and a 23mm diameter microscopy coil to acquire data with displayed pixel dimensions of 80-100μm. The imaging sequences used included T1-weighted spin echo (T1W SE), T2-weighted fat suppressed (FS) SE, proton density-weighted SE, 3D gradient-echo water selective excitation and T1W FS SE acquired after the administration of the MR contrast agent Gd DTPA (post contrast). Two clinicians carried out a blinded and independent assessment for the presence or absence of arthropathy associated with cartilage, capsule/synovium, ligaments, tendons, entheses, bone cortex, bone oedema, cysts, erosions and osteophytes. The Stuart-Maxwell test of overall marginal homogeneity was used to test for agreement both in distinguishing disease and in the detection of abnormalities.

Results

PsA could be distinguished from OA on the basis of an increased incidence of inflammation in the ligaments and tendons, and more changes at the corresponding entheses (mean specific agreement for identifying PsA - 88%) (fig. **a-d**). Typical changes of PsA include striking extracapsular enhancement with nail bed involvement (fig. **a**, asterisks) and diffuse bone oedema particularly involving the distal phalanx (80% of PsA) often without cartilage damage (fig. **c**). The ligament and extensor tendon entheses in PsA appeared to be the epicentre of the inflammatory response with diffuse involvement of the adjacent structures including the formation of erosions and bone oedema at the entheses sites (fig. **c**, arrow=erosion). Comparison with the control group showed that the OA cohort had prominent ligament and entheseal changes, but much less contrast enhancement than in PsA ($p<0.007$) and less bone involvement at insertions (fig. **b and d**). Typically the OA joint had less soft tissue swelling but showed a loss of cartilage, typically at the volar aspect (fig. **b**, arrow) that is in contrast to the normal joint space observed in PsA. Osteophytes were evident in this OA joint (asterisks), with focal bone oedema at the tendon enthesis (open arrow) (fig. **b**).

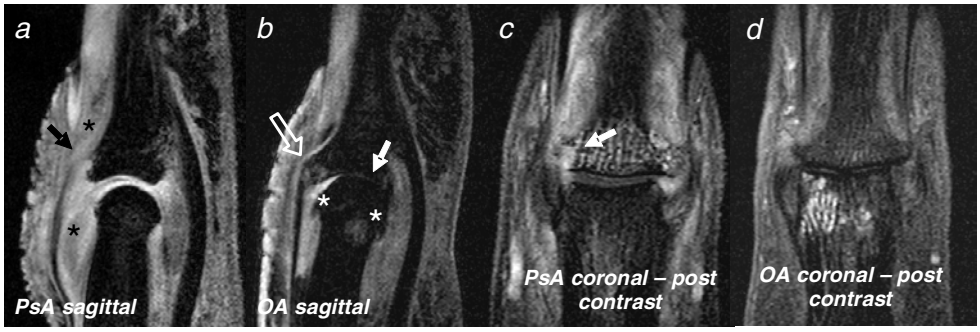

Figure:
Sagittal gradient-echo water selective excitation images (a and b) and coronal T1-weighted fat-suppressed post-contrast images (c and d) of a patient with Psoriatic Arthritis (a and c) and a patient with Osteoarthritis (b and d).

Conclusions

This study shows that there are prominent inflammatory changes in the ligaments, tendons and adjacent bone in PsA, with the epicentre of inflammation in DIPJ disease occurring at the entheses. Involvement of the same structures is common in OA DIPJ disease however the inflammatory changes are relatively less marked. Whilst these observations are consistent with the generally held views of PsA as an inflammatory condition and OA as degenerative disease, this study has shown some interesting parallels between these pathologies. Our results indicate that tendons and collateral ligaments appear to be a common target at clinical presentation in both conditions. This pattern of abnormalities therefore suggests that some intrinsic joint biomechanical factors may affect the phenotypic expression of both PsA and OA. These findings are important for characterising and for the understanding of arthritis in man.

[1]McGonagle D. et al. Arthritis Rheum. 1999; 42:1080-1086.

[2] Tan A-L. et al. Arthritis Rheum. 2005; 52:2355-2365.