Ultrasound, Skin, and Joints in Psoriatic Arthritis

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ABSTRACT. Over the last decade, ultrasound has been increasingly used in rheumatology for assessing soft tissue involvement in patients with chronic arthritis. In spite of the high number of studies supporting the role and the validity of ultrasound in the assessment of patients with rheumatoid arthritis, the potential of ultrasound imaging in patients with psoriatic arthritis still waits to be adequately investigated. Our report illustrates the most relevant sonographic findings obtainable with the latest generation ultrasound equipment in patients with psoriatic arthritis. (J Rheumatol 2009;36 Suppl 83:35-38; doi:10.3899/jrheum.090220)

Key Indexing Terms:
ULTRASOUND
SKIN
PSORIATIC ARTHRITIS
JOINT

Over the last decade, ultrasound (US) has been increasingly used in rheumatology for assessing soft tissue involvement in patients with chronic arthritis[1-8]. In spite of the high number of studies supporting the role and the validity of US in the assessment of patients with rheumatoid arthritis, the potential of US imaging in patients with psoriatic arthritis (PsA) still waits to be adequately investigated[2-6]. Our report illustrates the most relevant US findings obtainable with the latest generation US equipment in patients with PsA.

METHODS

US imaging of patients with PsA requires dedicated equipment and proper scanning technique. Very high frequency probes (> 13 MHz for B mode and > 8 MHz for Doppler mode) and an adequate amount of gel are needed to obtain the best visualization of superficial soft tissues. This is particularly true for the US examination of skin and nails.

Dynamic, multiplanar US examination of joints and tendons is mandatory for revealing the main US findings detectable in patients with PsA, including synovial effusion, synovial proliferation, tendon tears, enthesitis, and bone erosions. The US images presented here were obtained using a MyLab70 XVG system (Esaote Biomedica, Genoa, Italy) equipped with 6–18 MHz and 4–13 MHz broadband linear probes.

RESULTS

Skin. US appearance of normal skin consists of a bilaminar layer: the epidermis is visualized as a sharp hyper-echoic line and the underlying dermis appears as a thicker and less echogenic band. Epidermis and dermis are clearly distinguishable due to their different echotexture. More difficult is the identification of the acoustic interface separating the dermis from the subcutaneous fat[9,10]. US findings of psoriatic plaque include inhomogeneous thickening of the epidermis with or without acoustic shadow and hypoechoic swelling of the dermis with or without power Doppler signal (Figure 1)[9].

Nails. On US examination, the normal nail plate appears as a trilaminar structure, characterized by 2 hyperechoic sharp margins with an interposed thin anechoic line. US features indicative of nail plate involvement in psoriatic onychopathy include the loss of the sharpness of the hyper-echoic lines, which may appear focally curved and/or thickened, and the loss of the intermediate anechoic layer, which may be focal or complete. The nail bed involvement is characterized by a variable degree of thickening associated with or without power Doppler signal.

Joints. Joint effusion and synovial proliferation can easily be distinguished by grey scale US imaging even at the distal interphalangeal joint[11]. Dynamic assessment while compressing the soft tissues under examination with the probe is the most reliable method to distinguish synovial fluid and synovial tissue, the former being more easily compressible and displaceable[12]. Power Doppler helps in the identification of inflamed synovial tissue and has been demonstrated to be of value in therapy monitoring of PsA patients[13-16] (Figure 2, A–A'). For the detection of sacroiliitis, contrast enhanced Doppler US has shown high negative predictive value in the observation of sacroiliac joints of patients with inflammatory low back pain[17].

Tendons. Tenosynovitis is a relatively common finding in patients with PsA, the hand and ankle being the most frequently involved anatomic regions. When examining tenosynovitis of the finger flexor tendons, particular attention must be paid to not misinterpreting finger tendon pulleys as signs of synovial proliferation. At ankle level, posterior tibialis and peroneal tendons represent common sites of tenosynovitis even in asymptomatic PsA

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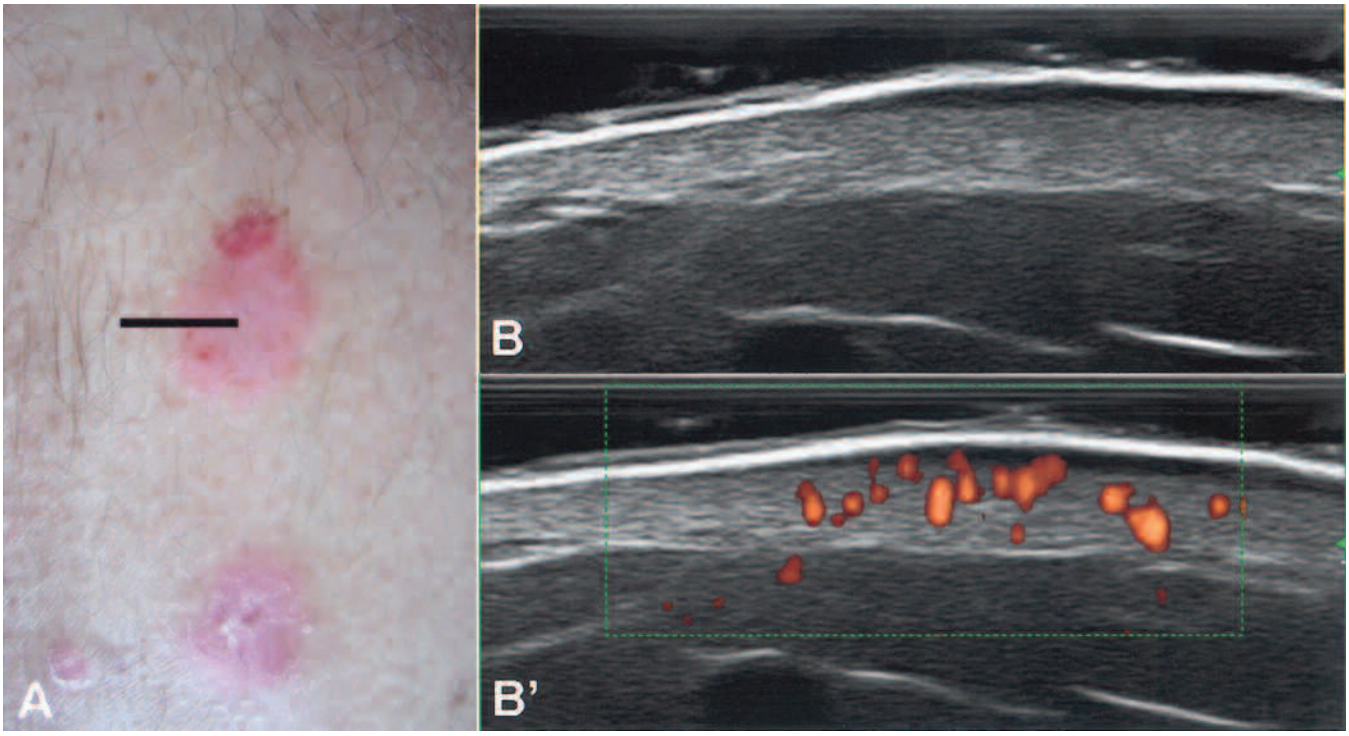

Figure 1. Psoriasis. A. Psoriatic plaque at the anterior aspect of the leg. Black line indicates the exact point where the probe was placed. B. Grey scale imaging showing hypoechoic swelling of the dermis. B'. Power Doppler imaging showing increased perfusion of the dermis.

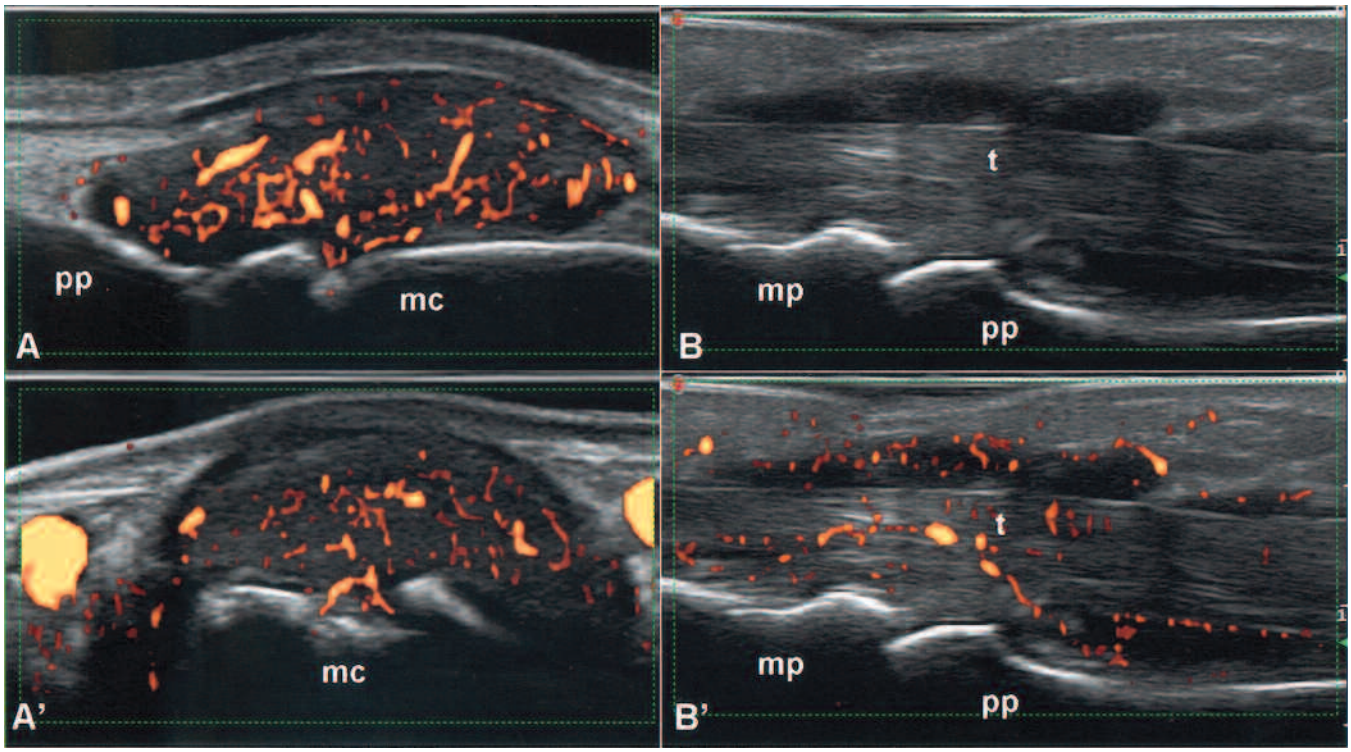

Figure 2. Psoriatic arthritis. A–A': proliferative synovitis. Longitudinal (A) and transverse (A') views on the dorsal aspect of the metacarpophalangeal joint showing marked intraarticular power Doppler signal. B–B': dactylitis. B. Proliferative tenosynovitis. Longitudinal view on the volar aspect of the proximal interphalangeal joint showing an evident tendon sheath widening. B'. Power Doppler imaging revealing increased perfusion of the synovial tissue surrounding the flexor tendons (t). mp: middle phalanx; pp: proximal phalanx; mc: metacarpal bone.

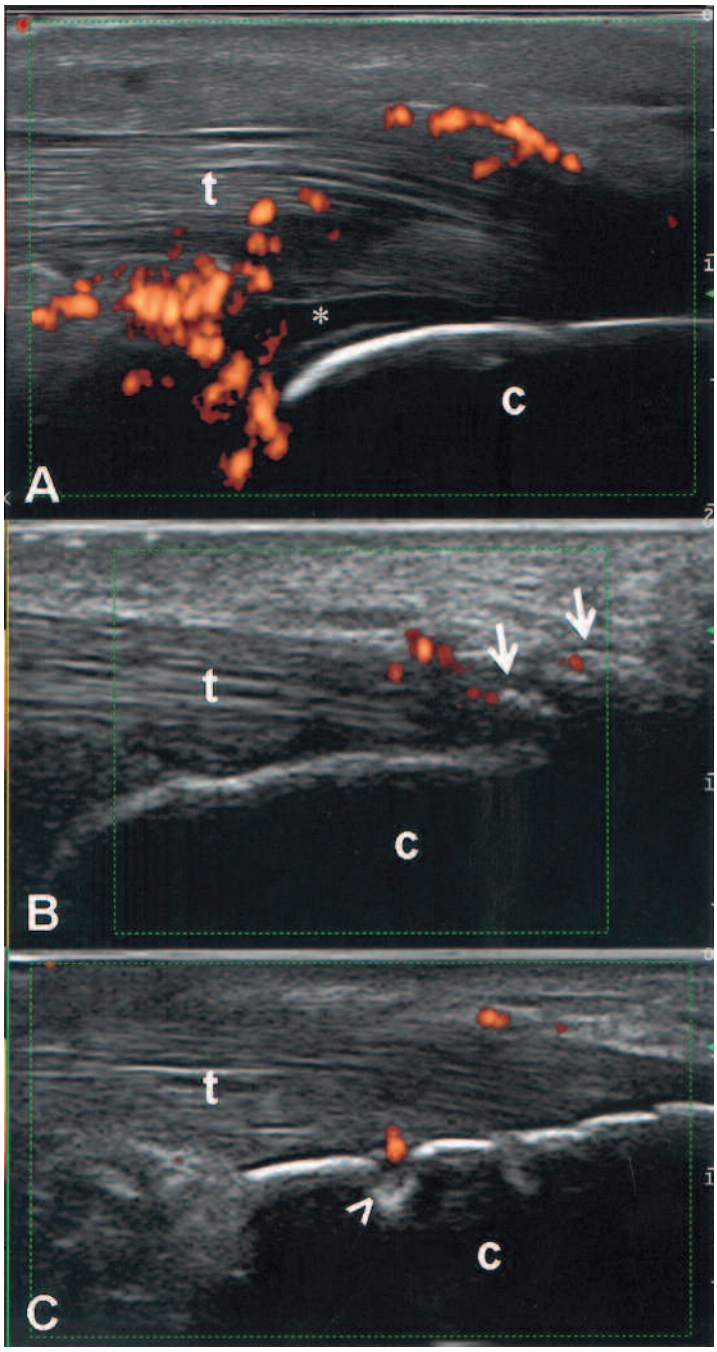

Figure 3. Psoriatic arthritis. Enthesitis of the Achilles tendon (t). A. Proliferative retrocalcaneal bursitis. Asterisk indicates an area of bursal effusion. B. Arrows indicate enthesophytes. C. Arrowhead indicates a calcaneal erosion. c: calcaneal bone.

patients[18]. In dactylitis or "sausage-like" digits, US imaging allows the identification of different patterns of soft tissue involvement generated by the variable association of flexor tenosynovitis, synovitis of interphalangeal and metacarpophalangeal joints, and surrounding soft tissue edema[19-21] (Figure 2, B–B'). Achilles tendon, plantar fascia, and patellar tendon are the most frequently affected tendons without tendon sheath. US findings indicative of tendon pathology include tendon fusiform swelling and focal derangement of tendon echotexture with or without intratendinous power Doppler signal.

Enthesis. At lower limb entheses, US has been shown to be a sensitive tool for revealing subclinical entheseal involvement[22,23]. US allows detailed assessment of both tendinous and bony side involvement[25-32]. At the Achilles

tendon insertion into the calcaneal bone, early US signs of enthesitis include hypoechoic swelling of the tendon insertion, increase of blood flow detectable with power Doppler, and retrocalcaneal bursal enlargement[24] (Figure 3). Although most studies have been conducted at the entheses of the lower limbs, there is also evidence of US ability to evaluate enthesitis of the upper limbs[25]. In established disease, US changes at the bony level become more evident and include erosions and enthesophytes.

CONCLUSION

Grey scale and power Doppler US imaging with very high frequency probes allows a detailed assessment of a wide range of morphostructural and perfusional changes at skin, enthesis, tendon, and joint level. Several US patterns result from the variable association of these findings.

The data obtained in patients with rheumatoid arthritis are expected to be reproduced also in those with PsA. Studies investigating validity issues, including accuracy and reproducibility, are required to define the role of US in the assessment of psoriasis.

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