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LETTER

High-frequency ultrasound can detect inflammatory changes of the finger pulleys anatomical entheses in early psoriatic arthritis

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The digital annular pulleys (DAP) of the hand are specialised fibrous structures that stabilise the flexor tendons. We recently demonstrated that the insertions of the DAP are anatomical entheses, with A1, A2 and A4 of triphalangeal digits exhibiting a fibrocartilaginous zone at their pulley-bone interface.[1]

High-resolution ultrasound (US) has been validated as a highly effective imaging modality for assessing DAP, particularly when combined with a dynamic manoeuvre involving contralateral finger rotation relative to the probe to optimally expose the entheses of the pulley.[1]

Enthesitis is a hallmark feature of spondyloarthritis and psoriatic arthritis (PsA). At hand level, the concept of digital polyenthesitis has emerged,[2] reflecting the complex anatomy of the fingers, which encompasses multiple entheses belonging to both the flexor and extensor tendon apparatus.

The potential involvement of DAP in PsA was first identified in 2018, when increased pulley thickness was observed in patients with established PsA compared with controls, suggesting intrinsic structural modifications that may contribute to disease pathogenesis.[3] The 'deep Koebner' phenomenon, described in psoriasis (PsO) and PsA, may be applicable to pulleys, which are subjected to high biomechanical stress. In predisposed individuals, this mechanical load could drive aberrant thickening, ultimately leading to inflammatory changes such as tenosynovitis and dactylitis. Supporting this hypothesis, intrapulley power Doppler signal was detected in cases of active clinical dactylitis,[4] and pulleys have been incorporated into the recently developed Global OMERACT Ultrasound Dactylitis Score for dactylitis assessment.[5]

To date, DAP have primarily been regarded as functional entheses, with previous reports predominantly focusing on pulleys' body while neglecting the anatomical entheses, which we have now defined by both gross anatomy, histology and US-imaging.[1] Indeed, DAP insertions exhibit the same structural features as larger entheses, including the presence of fibrous or fibrocartilaginous tissue at the interface between the soft tissue and the bony cortex. Inflammatory changes may occur at this level, mirroring the alterations described in enthesis-driven diseases such as PsA. DAP may effectively serve a dual role, being both functional and anatomical enthesis, with the latter representing a novel concept in rheumatological research that has yet to be fully characterised.

Here, we report the case of a young patient with PsO who presented with a 3-month history of intermittent joint pain and stiffness in the fingers and right knee. No significant past medical history, including traumas and surgery, was reported, and the patient denied practising manual job/sport/leisure activity. Symptoms were more prominent in the morning, lasting around 40 min. On physical examination, there were well-demarcated erythematous/scaling plaques on the scalp and elbows, as well as nail pitting. No joint swelling was observed, but there was tenderness on palpation of the second finger. The US study was performed with an Alpinion XCUBE70 equipped with a wideband ultrahigh-frequency linear transducer (10–25 MHz); Doppler settings were as follows: frequency 11 MHz, PRF 0.5 kHz, gain 40, WF 0. The examination revealed a Doppler-positive signal within the enthesis of the A2 pulley of the second finger in the right hand

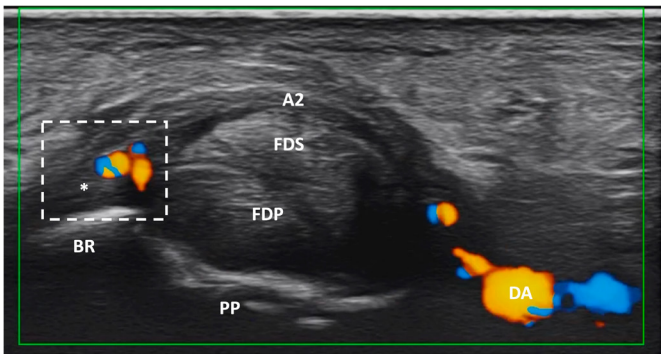

Figure 1 US-detected Doppler signal within the A2 pulley enthesis in early psoriatic arthritis (PsA). Transverse image obtained at the level of the radial enthesis of A2 pulley (second right finger) of a patient diagnosed with early PsA. The colour Doppler signal reveals active inflammation at the insertion of the pulley (dashed white box). *Enthesis of A2 pulley. A2, second annular pulley; BR, bony ridge; DA, proper palmar digital artery; FDP, flexor digitorum profundus; FDS, flexor digitorum superficialis; PP, proximal phalanx.

(figure 1), with no signs of pulley body alterations, nor tenosynovitis or dactylitis. No signs of osteoarthritis were evident.

Considering the US findings, the clinical characteristics of PsO, and the high suspicion of early PsA, the patient was scheduled for a follow-up visit after 3 weeks, at which synovitis was detected in the second and third metacarpophalangeal joints and the right knee, enabling a definitive diagnosis of PsA.

Our findings point out the need for further investigation to determine the clinical relevance of enthesitis affecting DAP, with the goal of incorporating their assessment into the evaluation of PsA patients, especially as a possible early marker of inflammation. Additionally, DAP enthesitis should be investigated in patients with PsO at risk as a possible predictive marker of transition to PsA, as well as in cases of subclinical PsA.[6] Prospective studies in different cohorts of patients, including PsO, subclinical PsA, PsA and PsA under treatment should be carried out to further assess the role of DAP anatomical enthesis as a biomarker in the psoriatic spectrum.

The current OMERACT definition of US-detected enthesitis requires the presence of at least two B-mode elementary lesions, namely enthesis thickening and hypoechogenicity, along with either Doppler signal within the enthesis or structural changes, such as enthesophytes or erosions.[7] However, the definition was originally developed for large entheses and may not be applicable to smaller entheses, where criteria, such as the 2 mm threshold for defining pathological Doppler signal specific to entheseal area, are not suitable.

In conclusion, we report, for the first time, the presence of a Doppler signal within the anatomical enthesis of the DAP, suggesting a potential new early feature of PsA. US remains the optimal imaging modality for assessing DAP structure and pathology, including the detection of hypervascularisation in the early stages of disease.

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