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Case Report

Mycobacterial avium intracellulare (MAI) extensor tenosynovitis of wrist: An uncommon entity ☆,☆☆

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ABSTRACT

Rice bodies secondary to synovial inflammation, typically occur in the shoulders and knees of individuals affected by either rheumatoid arthritis or tuberculosis. It is uncommon to encounter these in nontubercular mycobacterial tenosynovitis especially in wrist extensor compartment. Understanding this condition and its distinctive imaging features is crucial for both treating clinicians and radiologists. In this case study, we present the imaging findings of a rare occurrence of tenosynovitis of the fourth extensor compartment in the wrist with the formation of rice bodies due to Mycobacterium avium intracellulare. We have chosen to document this case to emphasize its importance in considering the differential diagnosis of extensor tenosynovitis with rice bodies.

Introduction

Rice bodies are small, rice-like structures within the synvovial fluid in the joint space, bursae or tendon sheaths first described by Reise in tubercular arthritis in 1895 [1,2]. The pathogenesis of these loose bodies has sparked debate, and it is likely to be multifactorial [3,4]. One proposed theory suggests that their origin may be attributed to the shedding of infarcted synovium, serving as a nidus for cellular debris. The development of rice bodies is typically associated with chronic microinflammation of the synovium, particularly within the context of conditions like tuberculous arthritis, rheumatoid arthritis, and seronegative rheumatoid arthritis, and has also been reported in hip replacement surgery, fungal infections, and systemic lupus erythematosus [1,4]. Still their precise etiology remains unclear.

Rice bodies typically manifest in the shoulders and knees, occasionally affecting the wrists And in cases of wrist involvement, commonly affected are the flexor tendons and bursae [5]. Involvement of the extensor tendon sheath is uncommon [6]. Our presented case is distinctive, showcasing an unusual instance of mycobacterial tenosynovitis affecting the 4th extensor compartment of the wrist due to Mycobacterium Avium Intracellulare (MAI), with only a few case reports in the literature [1,7]. This case underscores the significance of

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including this possibility in the differential diagnosis for pronounced wrist tenosynovitis with rice bodies.

Case report

A 77 year old male presented with nontraumatic chronic spontaneous swelling on the dorsum of the right hand for 6-9 months. The patient had a remote renal transplant (in 90s) due to polycystic kidney disease, was hypertensive, and had been diagnosed with gout. On clinical examination, the lump was soft, nontender, nonpulsatile, and there was no restriction in wrist movements.

Imaging was performed on right wrist with the presumptive clinical diagnosis of dorsal ganglion cyst. Hand radiograph revealed a non specific dorsal wrist soft tissue swelling without calcification (Fig. 1). Incidentally noted volar arterial calcification. No erosive changes, periostitis, or bone destruction were evident. Targeted ultrasound of the region showed a significant hypoechoic diffuse synovial thickening throughout the fourth extensor compartment showing hyperemia on colour doppler (Figs. 2A and B). Tenosynovial fluid was minimal. The patient was referred for wrist MRI. This showed severe distension of the right fourth extensor compartment tendon sheath from the distal forearm to the level of the metacarpal bases. The thickened tendon sheath was heterogenous on T1/T2W images with multiple T1 isointense and T2 hypointense (compared to skeletal muscle), smooth, oval /round masses(rice bodies) within it. No blooming was seen on gradient recovery/medic images. No erosions, bone marrow edema or bone destruction were found. Mild heterogenous enhancement of the thickened tendon sheath was seen in postcontrast T1 fat saturated image (Figs. 3 A-D). Based on the MRI findings, differential considerations included inflammatory arthropathy, severe overuse, tendon sheath gout, amyloidosis, synovial chondromatosis and pigmented villonodular synovitis. For final diagnosis, tissue biopsy was obtained with surgical removal of several rice bodies which were negative for acid fast bacilli and amyloid protein on microscopy. On mycobacterium culture medium, growth of mycobacterium intracellulare was identified. The patient was started on antitubercular treatment(azithromycin, mixofloxacin and ethambutol) for 18 months supported by debulking surgery which revealed extensive tenosynovitis and numerous rice bodies around the extensor digitorum communis tendon to index, long and ring fingers. Two months clinical follow up showed healing at the operative site, good range of motion and no recurrence.

Fig. 1 – Plain X-ray lateral projection of right wrist showing lobulated soft tissue swelling dorsum of wrist and distal forearm (white arrows) without calcification or air loculi within it. Underlying bones are unremarkable. Incidentally noted extensive arterial calcification volar aspect of wrist.

Discussion

Atypical or nontubercular mycobacteria as the name implies are organisms quite distinct from mycobacterium tuberculosis. These organisms are omnipresent, often infecting immunocompromised hosts, with the majority (more than 90%) involving the lungs. The remaining 5-10% involve musculoskeletal system with extremity involvement; especially the hands and wrist being most common, owing to the potential for penetrating trauma to seed abundant synovial tissue [6,8]. Considerable overlap is seen between the clinical and radiological manifestations of nontubercular and tubercular tenosynovitis. Compared to tubercular tenosynovitis, nontubercular mycobacterial tenosynovitis is even more insidious with nonspecific symptoms, hence, the diagnosis is often delayed [3]. The most common causative organisms are mycobacterium marinum and mycobacterium kansasii [6]. These infections are usually secondary to direct bacterial inoculation at sites of trivial trauma. Hosts are often immunocompromised [9].

Rice body formation is classic but not specific for atypical mycobacterial tenosynovitis [10]. These bodies can be the result of chronic synovitis alone, microinfarctions secondary to synovial inflammation and ischemia causing synovial shedding and subsequent encasement by fibrin [11,12]. Alternatively, these bodies may reflect denovo formation followed by fibrin deposition [13].

The predilection of rice bodies for certain joints, such as the shoulders and knees, as opposed to others, is not fully understood and may be influenced by various factors including the composition and dynamics of synovial fluid; and biomechanical stress in different joints. Joints like the shoulders and knees undergo significant biomechanical stress due to their weight-bearing and functional roles. This increased stress and movement might contribute to the development or release of

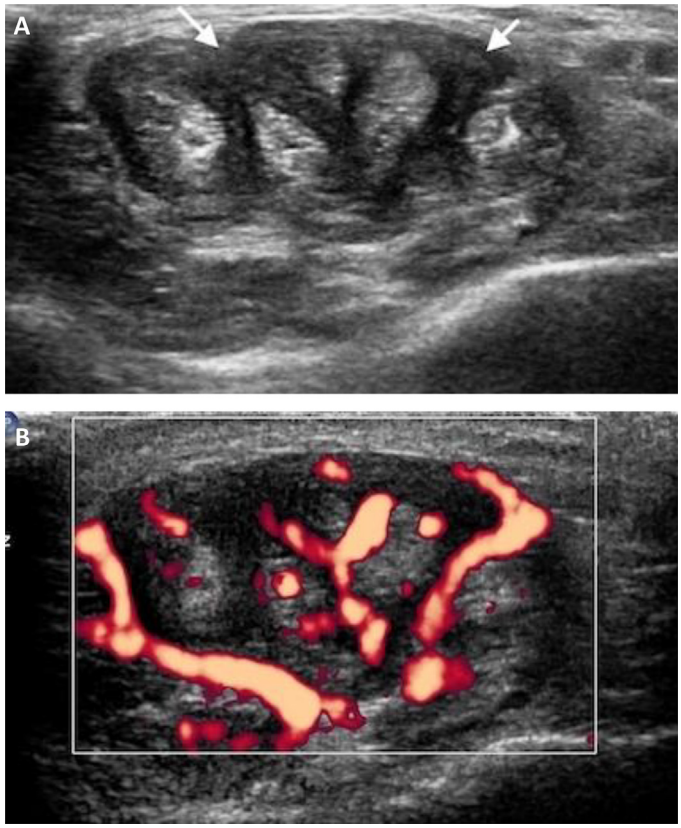

Fig. 2 – (A) Transverse ultrasound image dorsum of right wrist corresponding to the palpable mass depicting diffuse hypoechoic solid material consistent with synovitis between the tendons of the fourth extensor compartment (white arrows). No identifiable rice bodies were evident on sonography B) Color doppler of the involved area showing marked hyperemia throughout the tendon sheath both within the tendons and the synovitis.

cellular debris that can form rice bodies. In addition, variations in the vascular supply to different joints could influence the susceptibility to infarction or other processes that contribute to rice body formation [14]. Rice bodies, when observed on pathology, typically appear as small, elongated, and translucent structures resembling grains of rice. They can vary in size, ranging from a few millimeters to several centimeters. Under microscopic examination, rice bodies exhibit a histological composition that includes layers of fibrin, synovial lining cells, and inflammatory cells [3]. Similarly, the specific reasons for the preferential formation of rice bodies in certain anatomical locations, such as the flexor tendons and bursa, compared to the extensor tendon sheath, is not fully elucidated [15].

Plain x-ray findings are nonspecific, predominantly showing soft tissue swelling involving the volar more often than dorsal aspect of the wrist. Sonography usually reveals fulminant organized tenosynovitis containing echoes and debris. Rice bodies, if present appear as linear echogenic foci within the tenosynovitis when large, or as debris or ovoid soft tissue masses when small [3]. On MRI, findings are not different from other causes of tenosynovitis with the exception of T2 hypointensity of the thickened synovium suggesting mycobacterial infection considered secondary to granulomas. Rice bodies appear as oval or linear areas isointense on T1W and hypointense on T2W within a thickened tendon sheath [11]. In cases with extensive tenosynovitis, it is imperative to search for and mention presence of rice bodies as it often necessitates extensive surgical debridement to prevent recurrence. Underlying bone involvement and tendon rupture are not common features of atypical mycobacterial tenosynovitis [10].

Differential considerations in cases with extensive tenosynovitis and presence of rice bodies include rheumatoid arthritis, seronegative inflammatory arthritis and tubercular tenosynovitis [1]. Definite diagnosis is usually established by synovial biopsy and tissue culture. Synovial fluid aspiration alone is often negative for infection and fine needle aspiration biopsy or preferably core biopsy is required to diagnose many nonpyogenic organisms including mycobacteria [3,5,8,9].

Amyloidosis and gout(both known to produce rice bodies) were considered in this case owing to chronic renal disease and hypointense T2 signal in the synovium. However, amyloid deposition is more common within joints and periarticular tissues rather than tendon sheaths and is often associated with erosions mimicking erosive arthropathy [16]. Possibility of acute gout attack was also considered(given patient on antihypertensives and immunosuppressants, triggering factor for

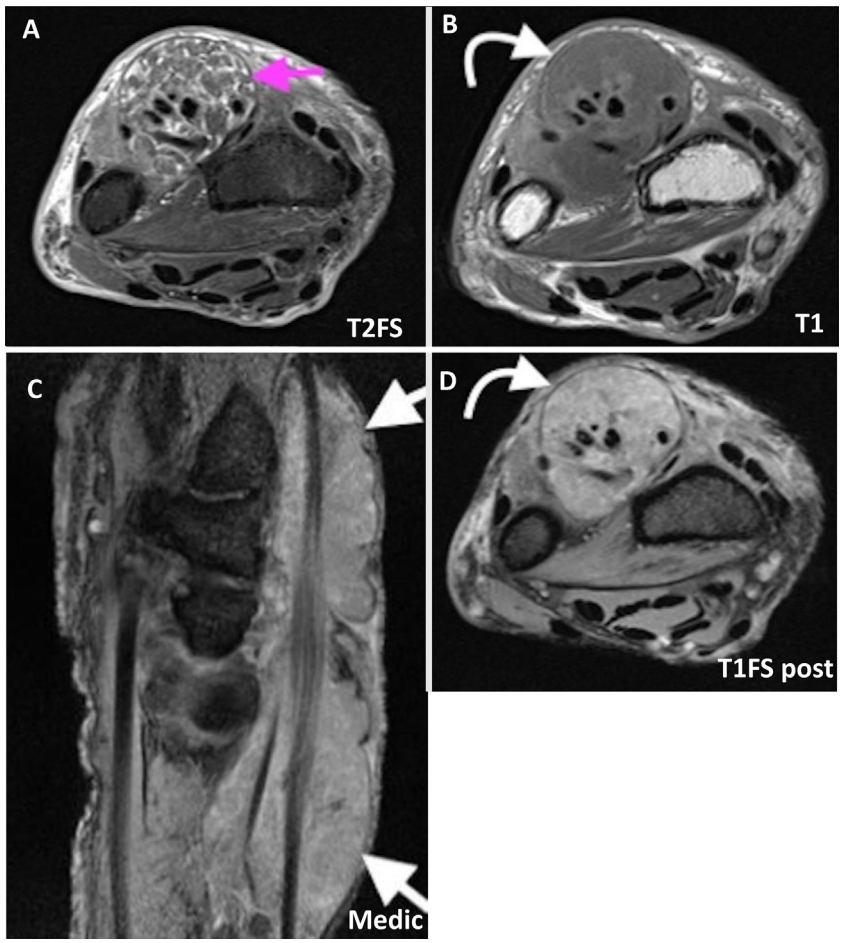

Fig. 3 – MR Imaging (A) Axial fat suppressed T2 weighted(labelled as T2FS), B) axial T1 without fat saturation (T1) (C) sagittal gradient recovery (Medic), and (D) axial contrast enhanced fat suppressed T1 weighted images (T1FS post) of the right distal forearm, wrist and hand illustrating severe tenosynovitis of fourth extensor compartment appearing isointense to skeletal muscle on T1 (curved white arrows in 3B) and heterogeneously hyperintense on T2FS images. Note numerous rice bodies (pink arrow in 3A) in the form of oval hypointense foci within the thickened tendon sheath without blooming on MEDIC image. Mildly heterogenous contrast enhancement of the involved tendon sheath is noted in T1FS post (white arrow in 3D).

the same), however, was excluded based on no change in laboratory findings or drug history. Synovial chondromatosis was not considered given T1 hypointense signal of the rice bodies.

In summary, we present a case of a 77-year-old male, who manifested with nontender dorsal wrist soft tissue swelling that was found to reflect extensive 4th extensor compartment tenosynovitis secondary to mycobacterium avium intracellulare. With only a few case reports published, this diagnosis is rare and should be included in differential considerations in cases with fulminant tenosynovitis containing rice bodies especially in immunocompromised patients.

Author contributions

All authors have made substantial contributions including: (1) Conception and design. (2) Drafting the article or revising it critically for important intellectual content. final approval of the version to be published.

Patient consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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