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Tuberculous Tenosynovitis of Ankle with Rice Bodies

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Tuberculosis (TB) is still endemic in many developed countries. Involvement of the ankle at presentation is extremely rare, and the diagnosis is often missed. Tuberculosis can involve pulmonary as well as extrapulmonary sites. The musculoskeletal system is involved in 1–3% of patients with TB. Although musculoskeletal TB has become uncommon in the Western world, it remains a huge problem in India. Isolated soft tissue TB is extremely rare. Early diagnosis and prompt treatment are mandatory to prevent serious destruction of joints. Due to the nonspecific and often indolent clinical presentation, the diagnosis may be delayed. Radiological assessment is often the first step in the diagnostic workup of patients with musculoskeletal TB and further investigations are decided by the findings on radiography. Both the radiologist and the clinician should be aware of the possibility of this diagnosis. The authors encountered a rare case of tubercular tenosynovitis of ankle with rice bodies.

Key words: Tuberculosis, tenosynovitis, ankle, rice bodies, fibrin.

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Tuberculous tenosynovitis was first described by Acrel in 1777. Particles are named “rice body”, due to their resemblance to shiny rice grains, was first described by Reise in 1895.¹ Rice body formation may occur with a systemic inflammatory disease or alone in localized form. While it is mostly seen in patients with rheumatoid arthritis,² it may also be accompanied by juvenile rheumatoid arthritis,^{3,4} tuberculous arthritis, tuberculous tenosynovitis and tuberculous bursitis,⁵ atypical mycobacterial tenosynovitis,^{7,8} osteoarthritis,⁹ in addition to nonspecific arthritis, tenosynovitis, and bursitis.¹⁰

Rice body formation may occur in intra-articular structures, at tendon insertions and synovial structures like periarticular bursa of the shoulder, knee, wrist and ankles, which are the most common sites of involvement.^{2,5} Both primary tuberculous bursitis and tenosynovitis are rare conditions.⁶ Diagnosis with classical radiography is challenging. Arthrography, bursography, ultrasonography (USG) and magnetic resonance imaging (MRI) are useful techniques in preoperative diagnosis. The histological structure usually comprises an amorphous core of necrotic cells in the center, surrounded by a layer of fibrin and collagen.¹¹

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Figure 1A and 1B T1-weighted sagittal image showing hypointense mass with slightly hyperintense septae. (A) T2-weighted image showing hyperintense liquid with nodular, diffuse hypointense structures lined in a thick capsular mass.(B)

We present a case of rice body formation in tubercular tenosynovitis of ankle, without any systemic disease.

Case report

A 25-year-old woman presented with a mass in her right ankle, which had been present for 2 years. She experienced a mild pain during long walks and going up and down the stairs. She had no history of trauma, tuberculosis or systemic inflammatory disease. On physical examination there was an immobile soft tissue mass of 7×3×2 cm in her right ankle. The mass was tender on palpation and there was no redness or increase in warmth of the skin. There was no limitation in the motion of the ankle joint despite the pain. The laboratory tests were within normal limits and chest radiograph did not reveal any abnormality. Ankle radiograph showed a soft tissue shadow. On MRI images there was a lobulated mass with peripheral contrast enhancement around the lateral aspect of ankle. The mass had neat contours, consisted of numerous, small nodular regions and had no connection with the tibiotalar joint. There was no effusion or a space occupying lesion within the joint. T1-weighted sagittal image showed a hypointense mass with slightly hyperintense septae, and T2-weighted image a hyperintense liquid with nodular, diffuse hypointense structures with a thick capsule. (Fig. 1A and 1B)

Surgical treatment was advised for chronic, nonspecific bursitis. Numerous, shiny and grainy particles were removed following the incision of the tenosynovium around the peroneal tendon. (Fig. 2A and 2B)

Pathological examination of the excised particles revealed synovial necrosis and fibrin deposition in the center, surrounded by scores of granulomatous structures with giant cells, in addition to apparent inflammatory infiltration of lymphocytes, plasma cells and macrophages. (Fig 3A and 3B)

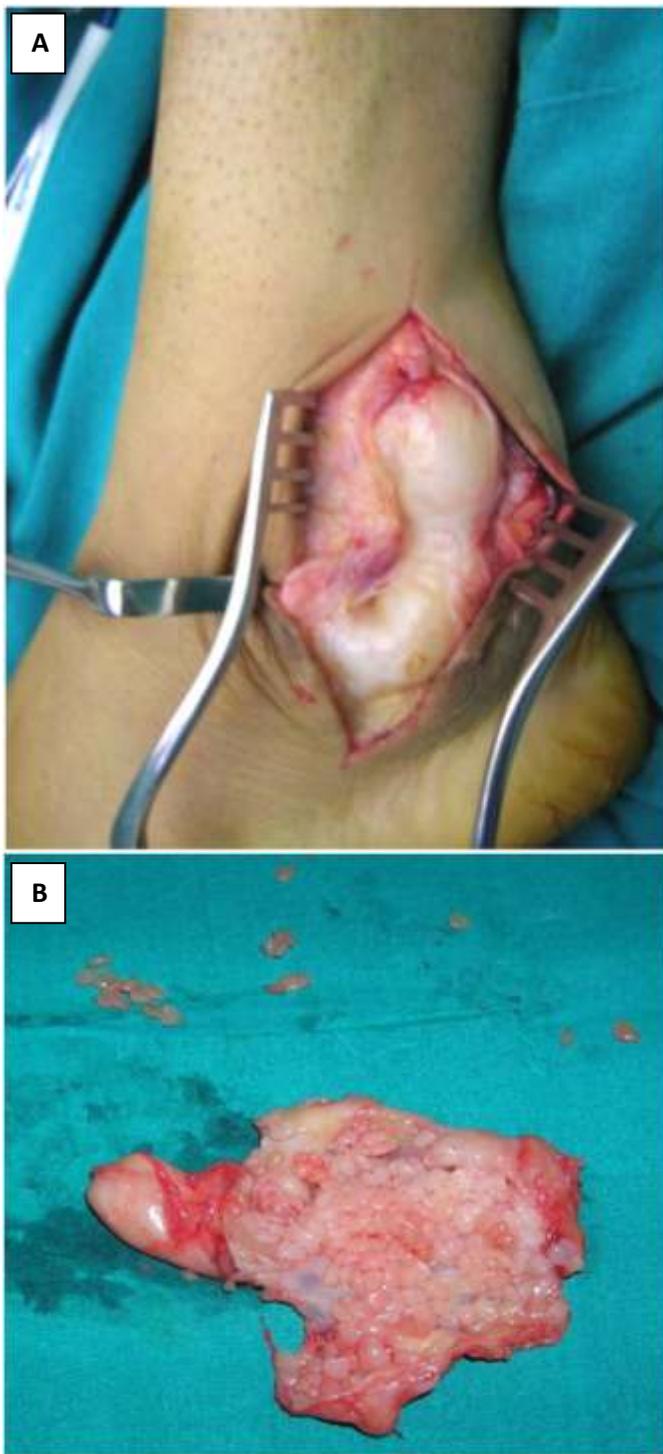


Figure 2A and 2B Surgical exploration reveals a large, nodular mass along the course of the peroneal tendon. (A) Inside the mass were numerous, grainy particles or rice bodies rich in fibrin and collagen. (B)

The case was diagnosed as rice body formation secondary to tubercular tenosynovitis of peroneal tendon, based on the MRI findings, intraoperative appearance, and histopathological report. Antituberculous treatment was started as soon as the identification of *M. tuberculosis* was confirmed. After one year of treatment the patient had full range of motion without pain. Recurrence was not observed during the two year follow-up period.

Discussion

Rice bodies are free particles that have a cartilage-like shiny appearance, can reach high numbers, and are of synovial origin.¹² There is no consensus on the etiology. The condition is believed to develop as a nonspecific response to synovial inflammation.³ Synovial ischemia and necrosis due to hypoxia, caused by the disruption of microcirculation, are thought to be the triggering factors. Rice bodies are formed by the necrotized particles which break away from the synovium and adhere to the fibrin in the joint space, tendon sheath or inside the bursa. After phagocytosis by the macrophages they are denatured in phagolysosomes and by acting like collagen antigens they lead to an auto-immune response.¹¹ Another hypothesis suggests that collagen, newly synthesized by synovial cells, can lead to formation of rice bodies. It should be, however, kept in mind that the condition might be misinterpreted as synovial chondromatosis. In the literature, it is emphasized that pathological misdiagnosis is possible and there is no evidence of cartilage tissue presence in rice bodies. Histopathological examination of our case, likewise, presented no sign of cartilage tissue in the bodies.

Some authors have advocated that the emergence of rice bodies is due to a new formation caused by the progressive growth of fibronectin and fibrin aggregates in the synovial fluid, independent from the synovial elements.^{11,13} While 47% of the synovial protein is composed of collagen in rheumatic diseases, in rice body proteins this percentage is only 10%. Rice bodies are richer in fibrin.

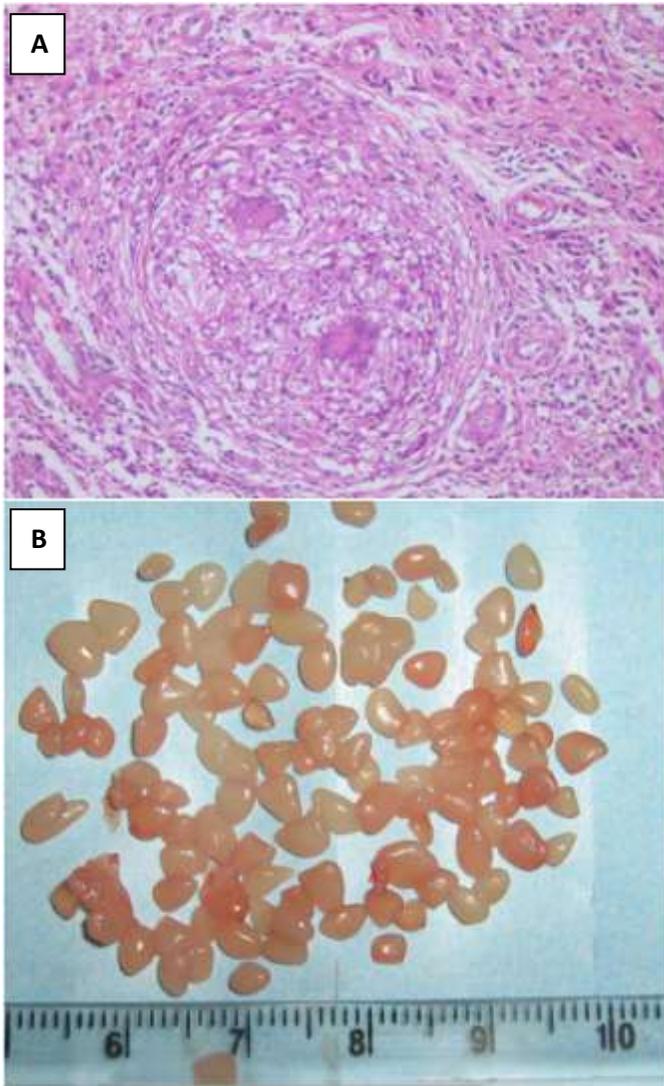


Figure 3A and 3B Microscopic evaluation reveal synovial necrosis and fibrin deposition (center) surrounded by scores of granulomatous structures with giant cells, in addition to apparent inflammatory infiltration of lymphocytes, plasma cells and macrophages. (A) Numerous rice bodies isolated from the mass. (B)

However, Popert, et al., have shown the particles are not homogenous.¹³ While some rice bodies are mostly formed of fibrin, some are composed of synovial membrane. Some others are formed of synovial core surrounded by fibrin.^{11,12} Muirhead et al., in their ultrastructural study, reported that rice bodies can be of multiple origins based on their localizations.¹⁰

In our study, pathological examination of the excised bodies presented a structure with synovial necrosis and fibrin deposition in the center.

Chen et al.,¹⁴ in their case study, discussed the probability of correct preoperative diagnosis and emphasized the importance of T2-weighted MRI. They reported that rice bodies were seen in the hyperintense bursal fluid as numerous hypointense areas. This view is slightly hyperintense compared to skeletal muscle.¹⁴ Likewise, in our case, preoperative T2-weighted MRI images with sagittal sections showed hyperintense synovial fluid with nodular and diffuse hypointense structures that had a thick capsule, surrounding the peroneal tendon. In addition, two entities stand out in differential diagnosis: pigmented villonodular synovitis and synovial osteochondromatosis. Rice bodies differ from villonodular synovitis with the absence of hemosiderin deposits, and from osteochondromatosis with the absence of radiographic evidence of ossification in the soft tissues. Synovial chondromatosis was a differential diagnosis in this case. This rarely involves a synovium lined bursa¹⁵ and has an unmineralised metaplastic cartilage.¹⁶ In unossified synovial chondromatosis, MRI will be helpful in the differential diagnosis. As rice bodies are rich of fibrous structures, they appear darker (hypointense) in T2-weighted images, close to the intensity of muscles. In contrast, synovial chondromatoses are rich in cartilage and appear more hyperintense, compared to rice bodies.^{3,17}

Looking at the MR images of our case and other patients, we believe the T2-weighted images can be an important criterion in diagnosis and differential diagnosis. Although symptomatic improvements with long-acting steroids, aspiration and lavage have been reported, basic approach in the treatment is surgical excision.^{13,18} No recurrence was observed in the follow-up period of two years, following the excision of rice bodies in our case. It should be kept in mind that rice bodies can be seen in an extra-articular localization and with no association with a systemic inflammatory disease. Clinical examination and MRI are of great importance in diagnosis and surgical excision will provide a safe and definitive treatment.

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