CASE REPORT

Acta Orthop Traumatol Turc 2013;47(2):142-145
doi:10.3944/AOTT.2013.2683

# Rice body formation characterized by the chronic non-specific tenosynovitis in the tibialis anterior tendon

**Mehmet BULUT[1], Erhan YILMAZ[2], Lokman KARAKURT[2], M. Reşat ÖZERCAN[3]**

*[1]Department of Orthopedics and Traumatology, Faculty of Medicine, Dicle University, Diyarbakır, Turkey;*
*[2]Department of Orthopedics and Traumatology, Faculty of Medicine, Fırat University, Elazığ, Turkey;*
*[3]Department of Pathology, Faculty of Medicine, Fırat University, Elazığ, Turkey*

In this case report a 38-year-old woman who presented with swelling and pain on her right ankle for two years is presented. Physical and radiological examinations revealed a soft, lobulated and fixed mass in the ankle. During surgical resection shiny, whitish bodies were removed from the tendon sheath of tibialis anterior and synovectomy was performed. Histopathological diagnosis was rice body formation and syovitis. There was no recurrence at the 5th year follow-up. Magnetic resonance imaging was effective in the diagnosis of this rare case of extra articular rice body formation presenting with tenosynovitis and full recovery was achieved with surgical treatment.

**Key words:** Local resection. rice body formation; tenosynovitis; tibialis anterior.

Particle named "rice body", due to their resemblance to shiny rice grains, was first described by Riese 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 synovitis and tuberculous bursitis,[5,6] atypical mycobacterial tenosynovitis,[7,8] osteoarthritis,[9] in addition to non-specific arthritis, tenosynovitis, and bursitis.[10-18] 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.[2,5,11-13,18-21] 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.[11,22,23]

In our study, we reviewed a patient who had rice body formation in her anterior tibial tendon sheath, without any systemic disease.

## Case report

A 38-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, tubercu-

**Correspondence:** Mehmet Bulut, MD. Dicle Üniversitesi Tıp Fakültesi, Ortopedi ve Travmatoloji Anabilim Dalı, 21280 Diyarbakır, Turkey.
Tel: +90 530 - 695 49 68 e-mail: bulmeh@yahoo.com

**Submitted:** June 6, 2011 **Accepted:** March 4, 2012



Available online at
www.aott.org.tr
doi:10.3944/AOTT.2013.2683
QR (Quick Response) Code:

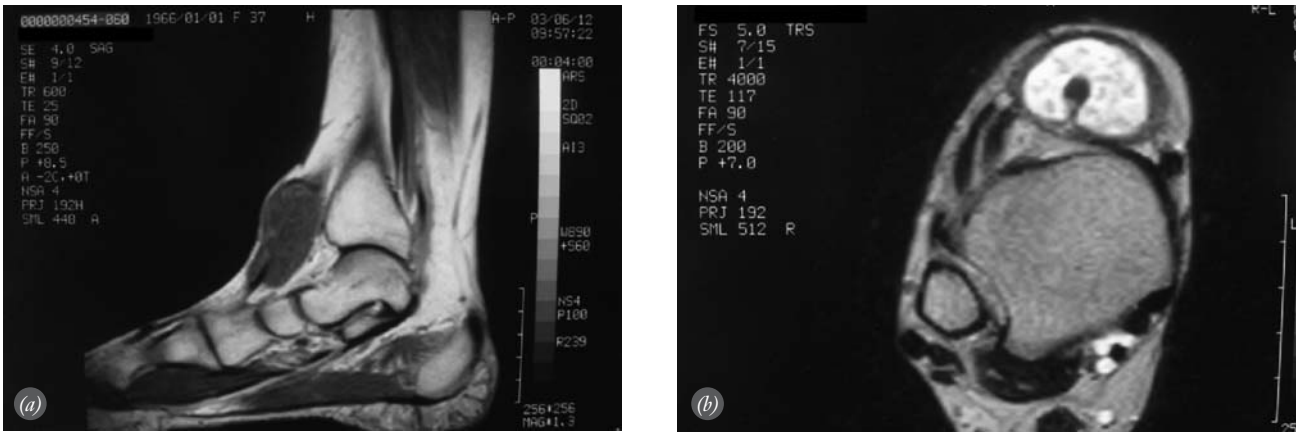


**Fig. 1.** **(a)** Hypointense mass is seen in the T1-weighted sagittal MRI image. **(b)** Numerous hypointense particles in the hyperintense synovial fluid are seen in the T2-weighted axial MRI image.

losis 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 and increase in warmth on the skin. There was no limitation in the movements 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. Sonograhic examination of the ankle revealed synovial hypertrophy and edema. On MRI images there was a lobulated mass with peripheral contrast enhancement around the tibialis anterior tendon. 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 septas, and T2-weighted image a hyperintense liquid with nodular, diffuse hypointense structures with a thick capsule that surrounded the tibialis anterior tendon (Fig. 1).

**Fig. 2.** Rice bodies were excised from the tibialis anterior tendon sheath. [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

Surgical treatment was advised for the prediagnosis of chronic, nonspecific tenosynovitis. Numerous, shiny and grainy particles were removed following the incision of the tibialis anterior tendon sheath (Fig. 2). The sheath was repaired after synovial excision. Rheumatoid factor, anti-nuclear antibody and purified protein derivative (PPD) test results were negative. 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. 3). The case was diagnosed as rice body formation associated with synovitis, based on the MRI findings, intraoperative appearance, and histopathological report. Two months after the surgery, the patient had full range of motion without pain. Recurrence was not observed during the five-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.[6,11,12,20] There is no consensus on the etiology. The condition is believed to develop as a nonspecific response to synovial inflammation.[3,15,22] 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 synovi-

um 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,.[19,23] 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.[15] 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.[23,24] 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. However, Popert et al. have shown the particles are not homogenous.[24] 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.[20,23] 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..[16] 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.[16,21,22] 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 tibialis anterior tendon (Fig. 2). 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. 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.[3,25]

**Fig. 3.** Histopathological examination showing the structure with necrosis and fibrin deposition in the center (arrows) surrounded by a granulomatous structure (arrowheads). Note the degenerative changes in the free rice body, rich in fibrinoid material (star) (HE ×40). [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

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.[17,24,26] No recurrence was observed in the follow-up period of five years, following the excision of rice bodies and the synovium 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.

**Conflicts of Interest:** No conflicts declared.

## References

1. Riese H. Die Reiskorpschen in tuberculs erkranken synovalsacken. Deutsche Ztschr Chir 1895;42:1.
2. Kataria RK, Chaiamnuay S, Jacobson LD, Brent LH. Subacromial bursitis with rice bodies, as the presenting manifestation of rheumatoid arthritis. J Rheumatol 2003;30: 1354-5.
3. Chung C, Coley BD, Martin LC. Rice bodies in juvenile rheumatoid arthritis. AJR Am J Roentgenol 1998;170:698-700.

4. Cuomo A, Pirpiris M, Otsuka NY. Case report: biceps tenosynovial rice bodies. J Pediatr Orthop B 2006;15:423-425.
5. Suso S, Peidro L, Ramon R. Tuberculous synovitis with "rice bodies" presenting as carpal tunnel syndrome. J Hand Surg Am 1988;13:574-6.
6. Kim RS, Lee JY, Jung SR, Lee KY. Tuberculous subdeltoid bursitis with rice bodies. Younsei Med J 2002;43:539-42.
7. Chau CL, Griffith JF, Chan PT, Lui TH, Yu KS, Ngai WK. Rice body formation in atypical mucobacterial tenosynovitis and bursitis: Findings on sonography and MR imaging. AJR Am J Roentgenol 2003;180:1455-9.
8. Sanger JR, Stampfl DA, Franson TR. Recurrent granulomatous synovitis due to *Mycobacterium kansasii* in a renal transplant recipient. J Hand Surg Am 1987;12:436-41.
9. Li-Yu J, Clayburne GM, Sieck MS, Walker SE, Athreya BH, DeHoratius RJ, Schumacher HR. Calcium apatite crystals in synovial fluid rice bodies. Ann Rheum Dis 2002;61:387-90.
10. Muirhead DE, Johnson EH, Luis C. A light and ultrastructural study of rice bodies recovered from a case of date thorn-induced extra-articular synovitis. Ultrastruct Pathol 1998;22:341-7.
11. Tyllianakis M, Kasimatis G, Athanaselis S, Melachrinou M. Rice body formation and tenosynovitis of the wrist: a case report. J Orthop Surg 2006;14:208-11.
12. Seagger RM, Gregg-Smith SJ. Imaging of rice bodies in a nonrheumatoid shoulder. J Rheumatol. 2007;46:64.
13. Ergun T, Lakadamyalı H, Aydın O. Multiple rice body formation accompanying the cronic nonspecific tenosynovitis of flexor tendons of the wrist. Radiat Med 2008;26:545-8.
14. DiVito A, Kan JH. Juvenile idiopathic arthritis with rice bodies. Pediatr Radiol 2008;38:1263.
15. Steinfeld R, Rock MG, Younge DA, Cofield RH. Massive subacromial bursitis with rice bodies. Clin Orthop Relat Res 1994;(301):185-90.
16. Chen A, Wong LY, Sheu CY, Chen BF. Distinguishing multiple rice body formation in cronic subacromial-subdeltoid bursitis from synovial chondromatosis. Skeletal Radiol 2002;31:119-21.
17. Martini G, Tregnaghi A, Bordin T, Visentin MT, Zulian F. Rice bodies imaging in juvenile idiopatic arthritis. J Rheumatol 2003;30:2720-1.
18. Uludağ S, Seyahi A, Ege Y, Tetik O. Rice body mass formation mimicking a neoplastic disease around the trochanteric bursae of the hip. Acta Orthop Traumatol Turc 2010;44:492-5.
19. Akman S, Ayanoğlu S, Aksoy B, Kavukçuoğlu F, Öztürk I. A case of subacromial bursitis with rice bodies presenting as a soft tissue mass. Acta Orthop Traumatol Turc 2000;34:528-31.
20. Aşık M, Eralp L, Çetik O, Altınel L. Rice bodies of synovial origin in the knee joint. Arthroscoy. 2001;17:E19.
21. Sugano I, Nagao T, Tajima Y, Ishida Y, Nagao K, Ohno T, Ooishi S. Variation among giant rice bodies: report of four cases and their clinicopathological features. Skeletal Radiol 2000;29:525-9.
22. Narvaez JA, Narvaez J, Roca Y, Aguilera C. MR imaging assesment of clinical problems in rheumatoid artritis. Eur Radiol 2002;12:1819-28.
23. McCarty DJ, Cheung HS. Origin and significance of rice bodies in synovial fluid. Lancet 1982;1:715-6.
24. Popert AJ, Scott DL, Wainwright AC, Walton KW, Williamson N, Chapman JH. Frequency of occurrence, mode of development, and significance of rice bodies in rheumatoid joints. Ann Rheum Dis 1982;41:109-17.
25. Griffith JF, Peh WCG, Evans NS, Smallman LA, Wong RWS, Thomas AMC. Multiple rice body formation in cronic subacromial/subdeltoid bursitis: MR appearences. Clin Radiol 1996;51:511-4.
26. Popert J. Rice bodies, synovial debris and joint lavage. J Rheumatol Br 1985;24:1-5.