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CASE REPORT

Fibroma of the patellar tendon sheath—a rare case in a young boy

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Abstract
Fibroma of the tendon sheath is a rare benign fibrocollagenous soft tissue tumor, arising predominantly from the synovium of tendon sheath. Fibromas occur most commonly in relation to the tendons of the fingers, hand, and the wrist. Fibromas related to large joints are rather rare and though amongst the large joints, the knee is a common site. Fibromas of the patellar tendon sheath, specifically, are very rare. To the best of our knowledge, only three cases of fibromas arising from the patellar tendon sheath have been reported in the relevant English medical literature. Herein we describe the fourth biopsy-proven case of fibroma of patellar tendon sheath in a 6-year-old boy.

Keywords Fibroma · Patellar tendon · Infrapatellar mass

Introduction

Fibroma of the tendon sheath is a rare benign fibrocollagenous soft tissue tumor, arising predominantly from the synovium of tendon sheath [1, 2] but occasionally also from the joint capsule [3]. It usually presents as a slow-growing painless mass [3–5].

Fibromas occur most commonly in relation to the tendons of the fingers, hand, and the wrist [6]. Fibromas related to large joints are rather rare and though amongst the large joints, the knee is a common site [2, 4, 7–11]. Fibromas of the patellar tendon sheath, specifically, are very rare. To the best of our knowledge, only three cases of fibromas arising from the patellar tendon sheath have been reported in the relevant English medical literature [9, 10, 12].

Herein we describe the fourth case of fibroma of patellar tendon sheath. We also summarize the literature review with clinical, imaging, and histologic findings of fibromas in this rare location.

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Case report

A 6-year-old boy presented with a hard painless swelling in the left knee for 7–8 months. There was no history of significant trauma.

On physical examination, there was a hard, non-tender swelling in the infrapatellar region of the left knee. The muscle bulk and power around the knee was normal. There were no signs of neurological or vascular compromise. Laboratory data were unremarkable.

Conventional radiograph of the left knee joint showed a soft tissue shadow in the infrapatellar region (Fig. 1).

A plain MRI of the left knee was subsequently done, which showed a well-defined soft tissue tumor, measuring 3 × 3 cm, in the Hoffa's fat pad, closely adherent to and infiltrating the overlying patellar tendon. The lesion showed thick peripheral T1 isointense rim with central hypointensity (Fig. 2). The lesion on fat-saturated T2-weighted images showed a thick peripheral iso- to hyperintense rim with central fluid-like hyperintense signal intensity (Figs. 3 and 4). Contrast was not given to the patient.

On MRI, there was suspicion of patellar tendon fibroma and CT-guided biopsy was done.

Histopathological analysis showed a markedly hypocellular spindle cell lesion with scattered fibroblasts in

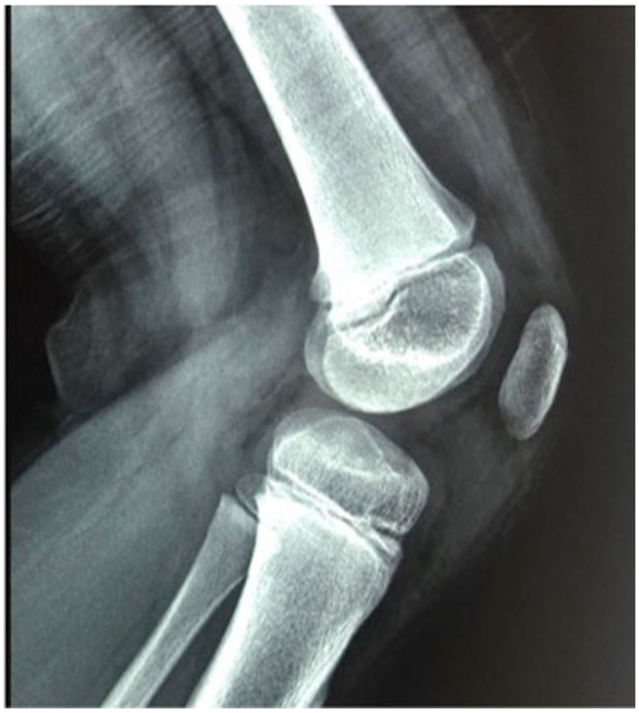

Fig. 1 Conventional radiograph of the left knee (lateral view) showing a soft tissue shadow in the infrapatellar region

chondromyxoid matrix and few "slit-like" blood vessels. Immunohistochemistry was performed and the lesional cells expressed SMA and were immunonegative for Desmin, CD 34 and S-100 protein. The features were in keeping with a fibroma of tendon sheath.

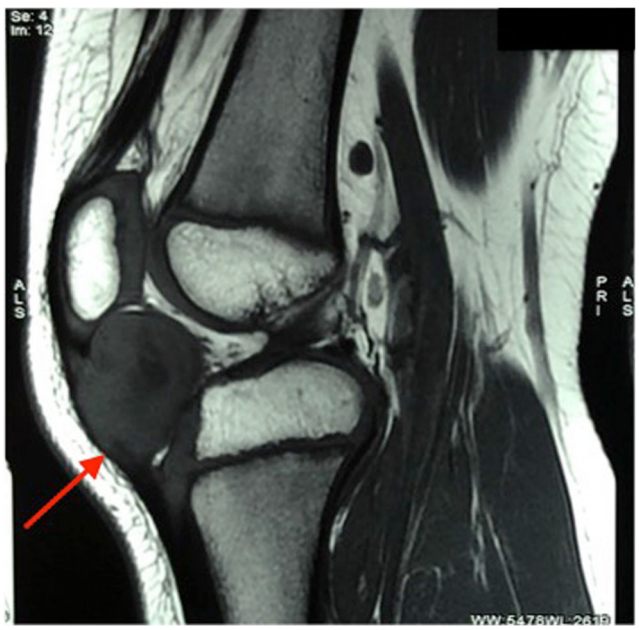

Fig. 2 Sagittal T2-weighted images of the left knee showing a well-defined soft tissue tumor (*red arrow*), in the Hoffa's fat pad showing thick peripheral T1 isointense rim with central hypointensity

Surgical excision of the lesion was subsequently performed via a midline incision and lateral parapatellar approach. An encapsulated, completely extra synovial mass attached to the patellar tendon was seen and excised completely with focal excision of the patellar tendon as well (Fig. 5). Subsequent histopathological evaluation showed a circumscribed collagen-forming lesion with fibroblasts arranged in fascicles within a myxoid and hyalinized matrix. The lesion had slit-like compressed vessels, characteristic of fibroma of the tendon sheath (Figs. 6 and 7). The final histopathology thus further confirmed the diagnosis of fibroma of the patellar tendon sheath.

Discussion

Fibroma of the tendon sheath, first described by Geschickter et al. in 1949 [13], is a rare benign fibrocollagenous soft tissue tumor. The largest series to date on this tumor was of 138 cases and published by Chung and Enzinger, in 1979, which described this lesion including its clinical and pathological features [4] in detail. These tumors arise mostly from the synovium of the tendon sheath [2, 3], but may also arise from the joint capsule because of their similar histological structure [14].

Fibromas most often occur in relation to the tendons of finger (47.9%), hands (24.8%), and wrist (10.3%) (approximately 80%) [4, 6, 9, 15]. Fibromas related to large joints are rather rare [1]. Fibroma of the tendon sheath occurring around large joints, such as the elbows, shoulders, hips, knees, ankles, foot, temporomandibular joint, chest, and back, together have

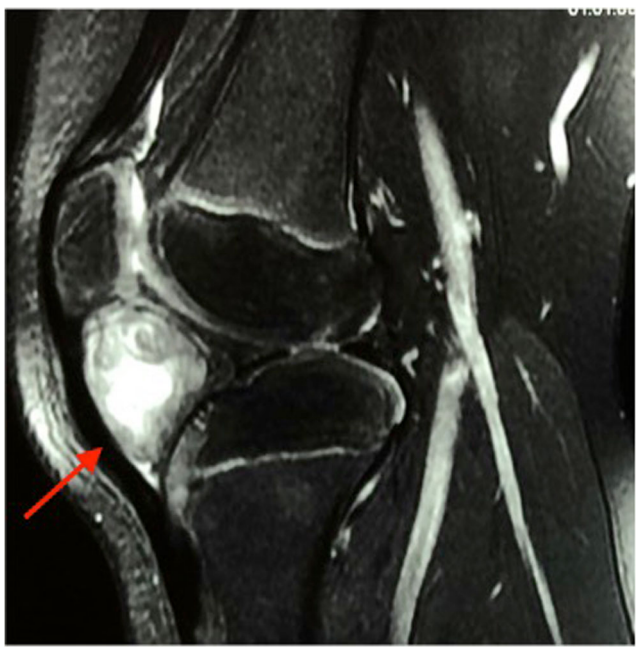

Fig. 3 Sagittal fat-saturated T2-weighted images of the left knee showing thick peripheral T2 iso- to hyperintense rim with central fluid-like hyperintense signal intensity (*red arrow*)

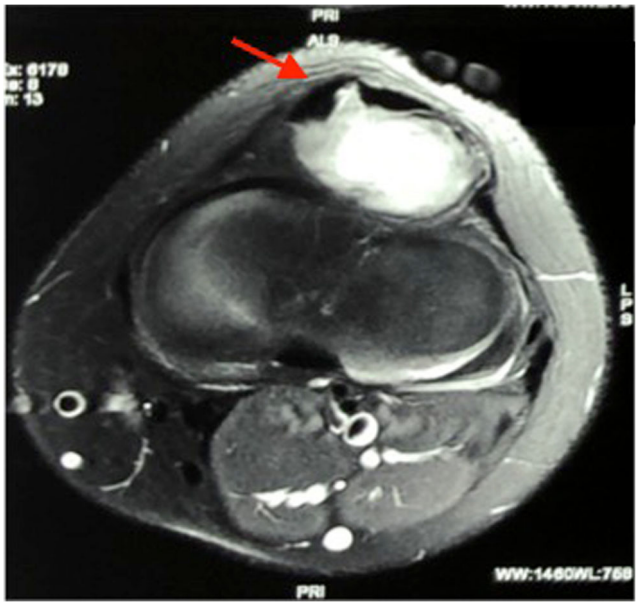

Fig. 4 Axial fat-saturated T2-weighted images of the left knee showing the relation of the tumor to the patellar tendon well, with areas of focal scalloping/insinuation into the patellar tendon (*red arrow*)

been reported in only approximately 2.8–4.2% cases [4, 6, 9, 12, 15–18]. Among the large joints, though the knee is the most frequently involved [2, 4, 7–12, 15, 18–22], fibromas of the knee have most often been reported in relation to the PCL and/or posterior capsule. Fibromas arising from the patellar tendon sheath are very rare.

A PubMed search was performed to identify cases of fibroma of the patellar tendon sheath. The search term was "fibroma of tendon sheath AND patellar tendon OR patellar ligament. Only three papers [9, 10, 21] were identified, all of which were case reports of single cases and one among which was an infrapatellar fat pad fibroma not related to the patellar tendon [21], this was thus excluded.

Another PubMed search for fibroma of tendon sheath AND knee was also performed. Twenty-one papers were identified. These included the above-mentioned three papers. The remaining 18 papers were read in detail to find a mention of the patellar tendon fibroma. Only one paper [case series of three cases] [12] amongst the remaining 18 had a mention of a fibroma arising from undersurface of the patellar tendon. The remaining described cases of fibroma around the knee joint were those related to the joint capsule, PCL, iliotibial band, MCL, and Hoffa's fat pad.

The final search result thus comprised only three reported cases of fibromas of the patellar tendon sheath in literature. Ours is only the fourth reported case of this entity.

Fibromas are reportedly more common in males and occur especially in patients aged between the second and fifth decades [4, 15, 16]. Our case was also peculiar, as it presented at a younger age of 6 years. These tumors usually present as slow-growing masses [1, 3–5], occasionally with pain due to irritation or pressure of the surrounding structures.

Fibromas of the tendon sheath appear as well-defined low-signal soft-tissue masses with slightly hypointense to-isointense signal to muscle on T1-weighted images [2, 7–12, 19–21, 23]. On T1-weighted images, the lesion may appear heterogenous or have a homogenous low signal intensity [2,

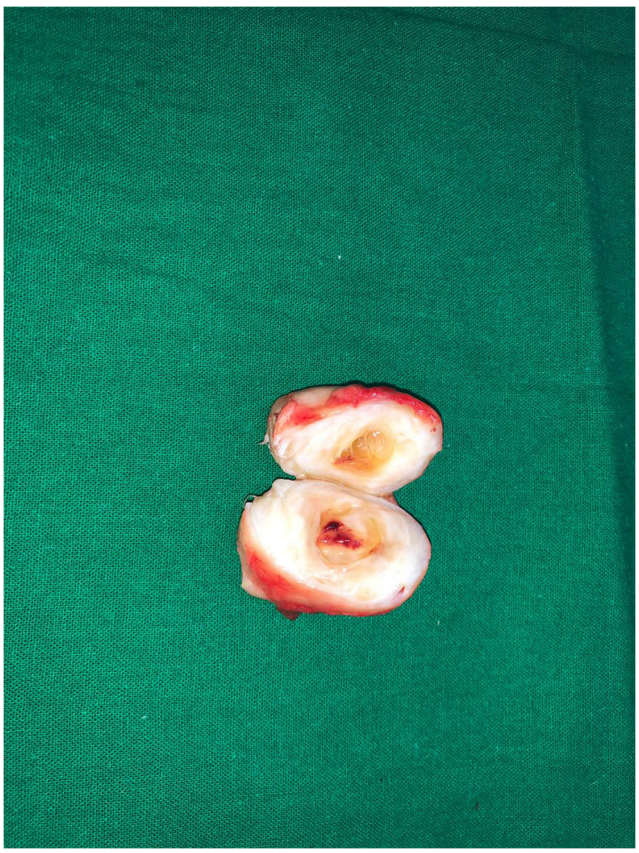

Fig. 5 Excised tumor. A well-encapsulated mass with fibrous consistency on cut section and with central cystic area filled with myxoid material/blood mixed fluid

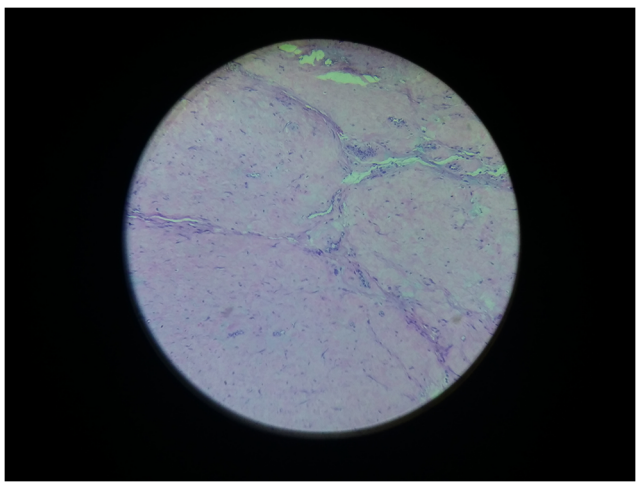

Fig. 6 Histopathology of the excised lesion. Low-power view;, hypocellular tumor with nodular pattern showing scattered fibroblasts in chondromyxoid matrix and "slit-like" blood vessels

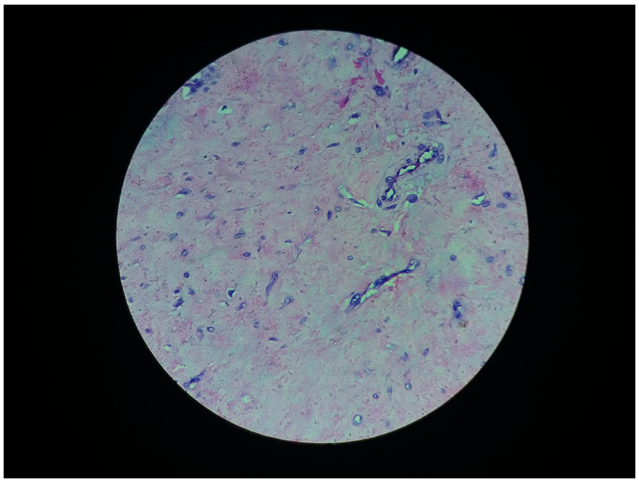

Fig. 7 Histopathology of the excised lesion. High-power view; hypocellular tumor with scattered fibroblasts in a myxoid stroma and "slit-like" blood vessels

7–12, 19–21, 23]. The low signal intensity lesions have more significant fibrous elements and marked hypocellularity [24]. Pinar et al. [2] also reported that variations in T2 signal on MRI may be due to differences in the amounts of hyalinization and the number of proliferating fibroblasts. Various different enhancement patterns are reported, including no enhancement, peripheral [2, 8, 20, 21], patchy, or homogenous enhancement [2, 7, 8, 12, 14, 22, 25]. The radiographs and CT only show a non-specific soft tissue mass.

Histopathologically, the fibromas are characterized by a dense fibrocollagenous stroma with scattered spindle or stellate-shaped cells and characteristic elongated thin-walled vessels or clefts, so-called slit-like spaces [4, 5, 12, 13, 16]. Atypia is usually not seen.

The most common differential diagnostic considerations for FTS is giant cell tumor of tendon sheath/focal pigmented villonodular tenosynovitis [6, 16, 23, 26, 27] and nodular fasciitis [4–6, 28].

It is very difficult to differentiate giant cell tumor of tendon sheath/focal pigmented villonodular tenosynovitis from fibroma of the tendon sheath, both clinically as well as on imaging, as both of these entities have significant overlap in their clinical presentation and in their imaging appearance and also have a predilection for similar location, viz. finger and wrist. Blooming on the GRE sequences is however considered nearly pathognomonic of giant cell tumor of tendon sheath/nodular tenosynovitis at MR imaging [29–31]. This is, however, not seen in all cases of giant cell tumor of tendon sheath resulting in the persisting diagnostic dilemma between the two entities on MRI.

Histopathology is the final verdict in differentiating GCTTS from FTS, where GCTTS is characterized by the presence of multinucleated giant cells, hemosiderin-laden macrophages, and xanthoma cells, which are seldom present in FTS [4, 6, 11, 16].

Nodular fasciitis is the other close differential. This benign soft tissue lesion originates from the surface of fascia and extends into subcutaneous tissue or occasionally muscle. It is very rarely intra-articular [28]. Nodular fasciitis also shows a relatively more rapid growth and are rather painful. The MR findings are, however, again a close overlap with FTS [32]. NF and FTS also show overlap in their histological appearance but FTS is more hypocellular and densely collagenous than NF and the characteristic slit-like vascular space of FTS are not seen in NF [28].

FTS are shown to have good prognosis after marginal excision. However, the largest series to date on FTS revealed a local recurrence rate of 24% after excision [4]. They speculated that recurrence was attributable to incomplete tumor excision.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

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References

1. Kundangar R, Pandey V, Acharya KK, Rao PS, Rao L. An intraarticular fibroma of the tendon sheath in the knee joint. Knee Surg Sports Traumatol Arthrosc. 2011;19(11):1830–3.
2. Pinar H, Ozkan M, Ozaksoy D, Pabuccuoglu U, Akseki D, Karaoglan O. Intraarticular fibroma of the tendon sheath of the knee. Arthroscopy. 1995;11:608–11.
3. Sciot R, Dal CP. Fibroma of tendon sheath. In: CDM F, Bridge JA, PCW H, Mertens F, editors. WHO classification of tumours of soft tissue and bone. Lyon: IARC; 2013. p. 59–60.
4. Chung EB, Enzinger FM. Fibroma of tendon sheath. Cancer. 1979;44(5):1945–54.
5. Pulitzer DR, Martin PC, Reed RJ. Fibroma of tendon sheath: a clinicopathologic study of 32 cases. Am J Surg Pathol. 1985;13(6):472–9.
6. Weiss SW, Goldblum JR. Fibroma of tendon sheath. In: Enzinger Weiss SW, Goldblum JR, editors. Enzinger and Weiss's soft tissue tumors. 5th ed. St. Louis: Mosby Inc.; 2008. p. 203–6.
7. Hitora T, Yamamoto T, Akisue T, et al. Fibroma of tendon sheath originating from the knee joint capsule. Clin Imaging. 2002;26(4):280–3.
8. Takakubo Y, Fukushima S, Asano T, Yamakawa M. Intraarticular fibroma of the tendon sheath in the knee. Clin Orthop Relat Res. 2005;439:280–5.
9. McGroty JE, Rock MG. Fibroma of tendon sheath involving the patellar tendon. Am J Orthop. 2000;29:465–7.
10. Hur J, Damron TA, Vermont AI, Mathur SC. Fibroma of tendon sheath of the infrapatellar tendon. Skelet Radiol. 1999;28:407–10.
11. Ayanici O, Kerimoglu S, Ozturk C, Saracoglu M, Yildiz K. Intraarticular fibroma of the tendon sheath arising from the infrapatellar fat pad in the knee joint. Arch Orthop Trauma Surg. 2009;129:291–4.
12. Moretti VM, de la Cruz M, Lackman RD, Fox EJ. Fibroma of tendon sheath in the knee. Knee. 2010;17(4):306–9.

13. Geschickter CF, Copeland MM. Tumors of bone. 3rd ed. Philadelphia: J.B. Lippincott; 1949. p. 693–5.
14. Misawa A, Okada K, Hirano Y, Sageshima M. Fibroma of tendon sheath arising from the radio-ulnar joint. Pathol Int. 1999;49:1089–92.
15. Smith PS, Pieterse AS, McClure J. Fibroma of tendon sheath. J Clin Pharmacol. 1982;35(8):842–8.
16. Suzuki K, Yasuda T, Suzawa S, Watanabe K, Kanamori M, Kimura T. Fibroma of tendon sheath around large joints: clinical characteristics and literature review. BMC Musculoskelet Disord. 2017;18:376.
17. Li TJ, Kitano M, Tsuneyoshi M, Sonoda S, Mimura T. Intra-articular fibroma of tendon sheath in the temporomandibular joint. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1997;84(4):407–10.
18. Hermann G, Hoch BL, Springfield D, Abdelwahab IF, Klein MJ. Intra-articular fibroma of tendon sheath of the shoulder joint: synovial fibroma. Skelet Radiol. 2006;35(8):603–7.
19. Ahn JH, Lee YS, Lee DH, Ha HC. Intraarticular fibroma of the posterior compartment in the knee. A case report. Knee. 2008;15(2):155–8.
20. Le Corroller T, Bouvier-Labit C, Sbihi A, Champsaur P. Mineralized fibroma of the tendon sheath presenting as a bursitis. Skelet Radiol. 2008;37(12):1141–5.
21. Okada J, Shinozaki T, Hirato J, Yanagawa T, Takagishi K. Fibroma of tendon sheath of the infrapatellar fat pad in the knee. Clin Imaging. 2009;33(5):406–8.
22. Griesser MJ, Wakely PE, Mayerson J. Intraarticular fibroma of tendon sheath. Indian J Orthop. 2011;45(3):276–9.
23. Fox MG, Kransdorf MJ, Bancroft LW, Peterson JJ, Flemming DJ. MR imaging of fibroma of the tendon sheath. Am J Roentgenol. 2003;180(5):1449–53.
24. Sundaram M, McGuire MH, Schajowicz F. Soft-tissue masses: histologic basis for decreased signal (short T2) on T2-weighted MR images. AJR Am J Roentgenol. 1987;148(6):1247–50.
25. De Maeseneer M, Van Isacker T, Lenchik L, Van Caillie MA, Shahabpour M. Fibroma of the tendon sheath of the long head of the biceps tendon. Skelet Radiol. 2014;43(3):399–402.
26. Ha DH, Choi S, Kim SJ, Lih W. Intra-articular fibroma of tendon sheath in a knee joint associated with iliotibial band friction syndrome. Korean J Radiol. 2015;16(1):169–74.
27. Wang CS, Duan Q, Xue YJ, et al. Giant cell tumour of tendon sheath with bone invasion in extremities: analysis of clinical and imaging findings. Radiol Med. 2015;120(8):745–52.
28. Hornick J, Fletcher CD. Intraarticular nodular fasciitis–a rare lesion: clinicopathologic analysis of a series. Am J Surg Pathol. 2006;30(2):237–41.
29. Murphey MD, Rhee JH, Lewis RB, Fanburg-Smith JC, Flemming DJ, Walker EA. Pigmented villonodular synovitis: radiologic-pathologic correlation. RadioGraphics. 2008;28:1493–518.
30. Kransdorf MJ, Murphey MD. Synovial tumors. In: Imaging of soft tissue tumors. Philadelphia: Lippincott Williams & Wilkins; 2006. p. 381–436.
31. Dorfman HD, Czerniak B. Synovial lesions. In: Bone tumors. St Louis: Mosby; 1998. p. 1061–71.
32. Coyle J, White LM, Dickson B, Ferguson P, Wunder J, Naraghi A. MRI characteristics of nodular fasciitis of the musculoskeletal system. Skelet Radiol. 2013;42(7):975–82.