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Intra-Articular Fibroma of Tendon Sheath in a Knee Joint Associated with Iliotibial Band Friction Syndrome

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Iliotibial band (ITB) friction syndrome is a common overuse injury typically seen in the active athlete population. A nodular lesion on the inner side of the ITB as an etiology or an accompanying lesion from friction syndrome has been rarely reported. A 45-year-old male presented with recurrent pain and a movable nodule at the lateral joint area, diagnosed as ITB friction syndrome. The nodule was confirmed as a rare intra-articular fibroma of the tendon sheath (FTS) on the basis of histopathologic findings. We describe the MRI findings, arthroscopic and pathologic features, in this case of intra-articular FTS presenting with ITB friction syndrome.

Index terms: *Iliotibial band friction syndrome; Fibroma of tendon sheath; Knee; Magnetic resonance imaging*

INTRODUCTION

Iliotibial band (ITB) friction syndrome is a common overuse injury typically seen in runners, cyclists, and military recruits (1). Magnetic resonance imaging (MRI) can show the characteristic imaging findings (2). However, coincidental findings or other accompanying mass lesions on MRI have been rarely reported. A few reports described synovial cysts, meniscal cysts, periarticular ganglia, and synovial sarcomas causing ITB friction syndrome (3-5).

A fibroma of tendon sheath (FTS) is an uncommon benign, painless, slowly growing tumor that usually occurs in the tendon or tendon sheaths of the distal upper extremity (wrist and hand). An intra-articular location arising in the knee joint is extremely rare (6, 7). Intra-articular involvement with FTS may irritate the surrounding soft tissue (7).

We report a case of intra-articular FTS in a knee joint associated with ITB friction syndrome, confirmed by arthroscopy and pathology.

This study was approved by the Institutional Review Board and informed consent was waived.

CASE REPORT

A 45-year-old male presented with a history of several months of right lateral knee pain. He also complained of a creak and a movable mass at the lateral joint area during ambulation. He was a member of an amateur soccer team. An MRI was performed using a Magnetom Vision 1.5-T MR imaging unit (Siemens Medical Systems, Erlangen, Germany). The MRI showed a thickened ITB and poorly defined high signal intensity abnormalities in a compartment-like space bounded laterally by the ITB on coronal fat suppressed proton density weighted images (repetition time [TR] 1700 ms, echo time [TE] 10 ms) (Fig. 1A). The T1-weighted image (TR 400 ms, TE 20 ms) showed a decreased signal intensity lesion compared to adjacent fat, deep to the ITB (Fig. 1B). A well-demarcated, ovoid nodular lesion was also observed in the compartment-like space. The nodule showed

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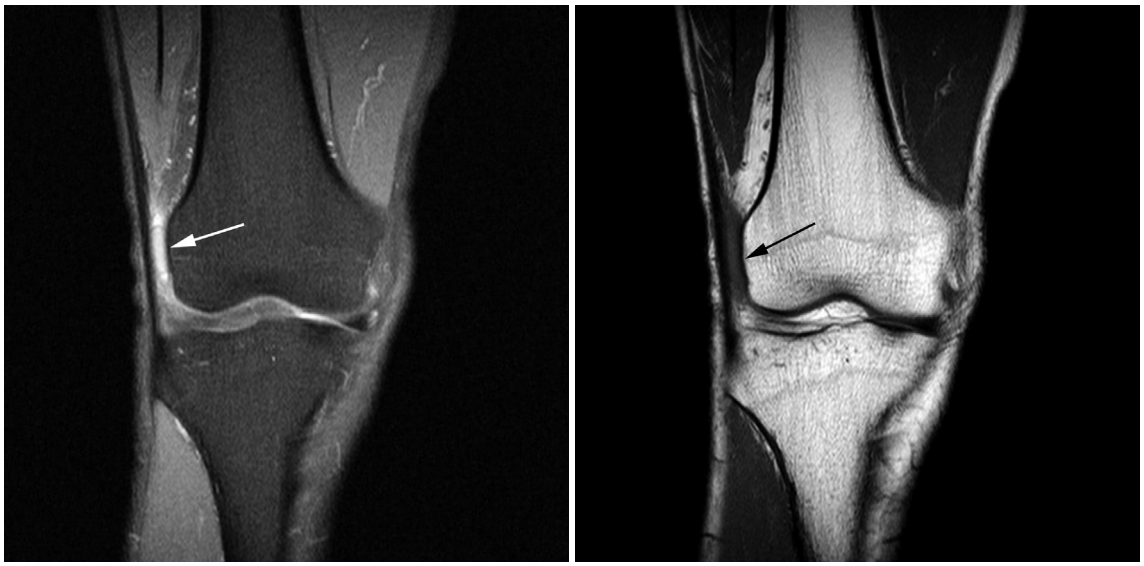
iso-signal intensity compared to the knee muscle on a T1-weighted image, high signal intensity on T2-weighted images (TR 3200 ms, TE 100 ms), and a slightly higher signal intensity with thin rim on fat suppressed proton density weighted images (Fig. 1A-C). The initial diagnosis based on the MRI findings, clinical history, and physical examination was ITB friction syndrome. We suspected the nodular lesion was a ganglion, focal synovial thickening, focal villonodular synovitis, or focal degenerative change of invaginated extraaritcular fatty tissue. Unfortunately, we did not consider the possibility of a FTS. During an arthroscopic examination, the surgeon found an inflamed lateral synovial recess, which is typically observed in ITB friction syndrome (Fig. 1D). After a sequential arthroscopic inflamed synovial recess resection with synovial shaver, a whitish intraarticular polypoid nodule was observed, attached to the lateral joint capsule (Fig. 1E). The nodule was successfully resected and was submitted to the Department of Pathology for histologic analysis. In the resected nodule, abundant collagen fibers and scattered



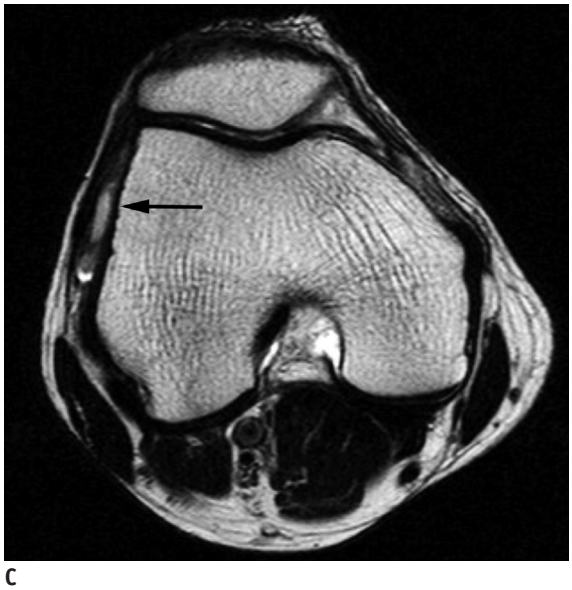


Fig. 1. 45-year-old male presented with recurrent lateral knee pain and movable nodule.
A. Coronal fat suppressed proton density weighted image (repetition time [TR] 1700 ms, echo time [TE] 10 ms) shows thickened iliotibial band (ITB), high signal intensity (SI) fatty abnormalities deep to ITB, and slight high SI nodule with thin rim (arrow). **B.** Coronal T1-weighted image (TR 400 ms, TE 20 ms) reveals low SI lesion (arrow) compared to adjacent fat and iso-SI compared to knee muscle. **C.** Axial T2-weighted image (TR 3200 ms, TE 100 ms) shows high SI nodule (arrow).

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fibroblasts were detected. The nodule did not contain necrosis, mitotic activity, or cellular atypia (Fig. 1F, G). The nodule was diagnosed as a FTS based on the histological findings. Arthroscopic debridement of the adjacent tissues near the surface between ITB and lateral femoral condyle was also performed to relieve the symptoms of ITB friction

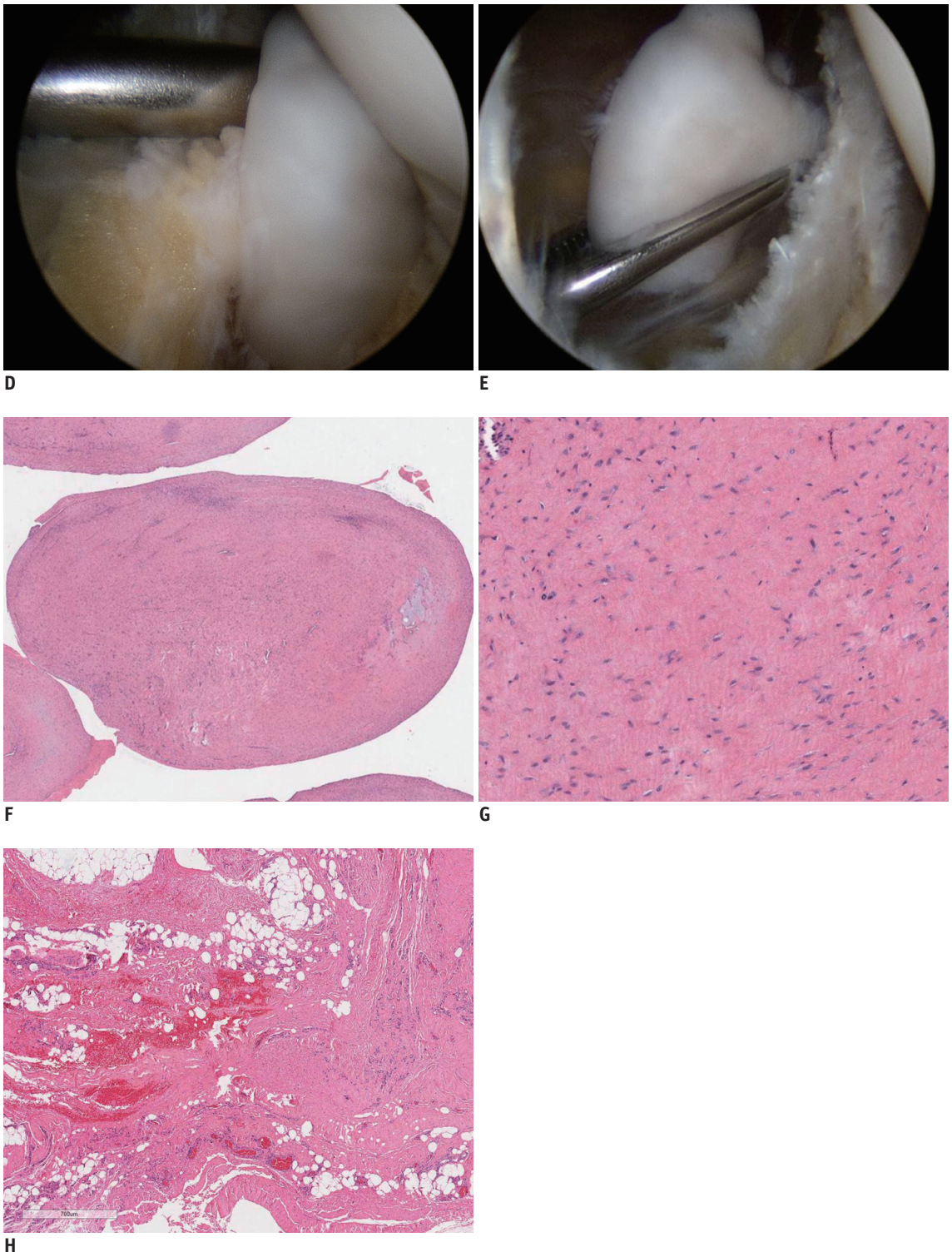

Fig. 1. 45-year-old male presented with recurrent lateral knee pain and movable nodule.
D, E. Arthroscopic examination shows presence of inflamed lateral synovial recess **(D)** and whitish polypoid intraarticular nodule **(E)** attached to joint capsule. **F, G.** Resected fibrous nodule (**F**, H&E staining, x 10) composes of collagen fibers and scattered fibroblasts (**G**, H&E staining, x 200). **H.** Resected adjacent tissues show fibrosis, marked hemorrhage, and prominent capillary proliferation (H&E staining, x 30).

syndrome. The resected tissues showed fibrosis, marked hemorrhage, prominent capillary proliferation, and mild chronic inflammation that was consistent with ITB friction syndrome (Fig. 1H).

DISCUSSION

Fibroma of tendon sheath usually forms as a small, slow-growing, firm nodule in association with tendons and tendon sheath (6). An estimated 80–95% of FTS occurred in the small joint of the upper extremity (finger, hand, and wrist) (8, 9). In 1979, Chung and Enzinger (8) reported that only 7 cases from 138 cases of FTS were found around the knee joint, mostly in an extra-articular location. To date, less than 30 reported cases of the disease have been related to the knee (9). Furthermore, the intra-articular location is less common. To our knowledge, only 7 cases of intra-articular FTS in the knee joint have been reported (6, 7, 9). However, among cases of intra-articular FTS, the knee joint is the most common location (7, 9).

Clinically, FTS can occur at any age, with peak incidence at 20–50 years, and predominantly in males (8, 9). FTS usually presents as a solitary, painless tumor that may later irritate the surrounding tissue (10). Intra-articular FTS usually present with symptoms of fullness or mechanical symptoms (7, 9, 11, 12). In the knee joint, 71% of lesion present with pain or discomfort and 31% present with palpable masses (9). This case was an intra-articular FTS that presented with recurrent pain and a movable mass, consistent with ITB friction syndrome.

Fibroma of tendon sheath typically show a smooth, well-circumscribed, lobulated architecture. FTS has been described as a fibrotic neoplasm or a reactive fibrosis, but its precise origin is still unclear (7, 11). Microscopically, the mass is composed of scattered, spindle shaped fibroblasts or myofibroblasts within a dense fibrocollageneous stroma and frequently bears dilated or slit-like vascular channels (8, 13, 14). The term FTS suggests that the tumor originates from the tendon or tendon sheath. Actually, most of the cases do occur in close association with the tendon or tendon sheath (8, 14). However, various unusual locations have been reported (10-12, 15). Intra-articular FTS usually originates in the joint synovium or capsule, with no apparent connection to any tendons (7, 11, 12, 15).

The major differential diagnosis of intra-articular FTS includes giant cell tumor of the tendon sheath (GCTTS) and nodular fasciitis (NF) (12, 14, 15). FTS is most often confused with GCTTS at clinical examination and even under gross pathology (14). Microscopically FTS is quite distinct from GCTTS. FTS is hypocellular with slit-like vascular channels within a dense collagen matrix (12, 14). This characteristic vascular pattern of FTS is not seen in NF (16). GCTTS is less hyalinized and more cellular, with multiple multinucleated giant cells, foamy histiocytes, and hemosiderin-laden macrophages (12, 14). However, in some cases, morphological heterogeneity may result in diagnostic confusion. Due to similarities between some forms of the two tumors, some authors have hypothesized that they may be two phenotypic extremities of a single entity (17). Other authors have suggested that FTS is the end sclerosing stage of GCTTS, probably consequent on progressive vascular impairment (18). Intra-articular FTS must also be distinguished from intra-articular NF (7, 15). NF is a benign myofibroblastic proliferation with a prediction for the subcutaneous tissue or muscle (16). NF resembles FTS histologically and up to one fourth of cases of FTS are indistinguishable from NF (19). Intra-articular NF is very rare, similar to intra-articular FTS (15, 16). NF is typically presents as a rapidly growing painful mass. But, most cases of intra-articular NF seem to have a longer clinical history and nonspecific symptoms, compared with subcutaneous or intramuscular NF (16).

Fibroma of tendon sheath usually appears as well defined, small, soft tissue mass on MRI (9, 14). Signal intensity of the tumor is variable. On T1-weighted images, the tumor is generally of a low signal intensity compared to the adjacent muscle. The mass shows heterogeneous, low to high signal intensity on T2-weighted images and a variable enhancement pattern (7, 9, 14). This variation on T2-weighted images and contrast enhancement study mostly rests on the contents of fibrocollagenous tissue and capillary vascularity near the mass (14).

Fibroma of tendon sheath can be hard to distinguish from other benign or malignant lesions, because of its infrequent occurrence in the knee joint and small, nonspecific nodular appearance on MRI (9, 14). The radiologic differential diagnosis of FTS includes GCTTS, NF, pigmented villonodular synovitis, and extra-abdominal desmoid tumor. Inflammatory synovitis, juxta-articular myxoma, synovial chondromatosis, synovial sarcoma, and fibrosarcoma also could be considered (9, 14).

The patients with ITB friction syndrome can show the characteristic MR imaging findings, including thickened iliotibial band, poorly defined signal intensity alterations

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in the fatty tissue deep to the ITB on coronal images, or circumscribed fluid collection in compartment-like space bounded laterally by ITB (2). In chronic cases, MRI studies are essential to rule out other pathologic entities causing lateral knee pain, such as lateral meniscal tear and lateral compartment degenerative joint disease (1). In our case, the MRI showed a typical finding of ITB friction syndrome with a small ovoid nodule in the compartment-like space of the lateral gutter. The nodule was confirmed as FTS based on the histopathologic examination. To the best of our knowledge, we report the first case of an intra-articular FTS in a knee joint associated with ITB friction syndrome in English literature.

The exact pathogenesis of ITB friction syndrome is still controversial (20). Generally proposed etiologies of ITB friction syndrome include friction of the ITB against the lateral femoral epicondyle during repetitive flexion and extension activities, compression of the fat and connective tissue deep to the ITB, or chronic inflammation of the ITB bursa (1, 21). Nemeth and Sanders (4) found and labeled a lateral synovial recess under the ITB that consists of a synovium that is a lateral extension and invagination of the knee joint capsule and is not a separate bursa. Biopsies of lateral synovial recesses in patients with ITB friction syndrome showed histopathologic changes consisting of chronic inflammation, hyperplasia, fibrosis, and mucoid degeneration (4, 20). We found an inflamed lateral synovial recess on arthroscopic and histologic examination of our patient. Even though we did not clearly understand the correlation between a fibroma of a tendon sheath and ITB friction syndrome, the tumor can aggravate the ITB friction syndrome.

The mainstay therapy of ITB friction syndrome is nonsurgical management. In persistent or chronic cases, surgery may be necessary (1). There are several different surgical techniques, percutaneous release of ITB, open surgical release of ITB, ITB Z lengthening, arthroscopic ITB debridement, and open ITB bursectomy (20, 21). If there is a nodular lesion in a patient with ITB friction syndrome, MRI recognition is also important to help the physician choose the proper surgical technique.

When nodular lesions on MRI are detected in patients with ITB friction syndrome, a fibroma of tendon sheath could be included in the differential diagnosis.

REFERENCES

1. Lavine R. Iliotibial band friction syndrome. *Curr Rev Musculoskelet Med* 2010;3:18-22
2. Muhle C, Ahn JM, Yeh L, Bergman GA, Boutin RD, Schweitzer M, et al. Iliotibial band friction syndrome: MR imaging findings in 16 patients and MR arthrographic study of six cadaveric knees. *Radiology* 1999;212:103-110
3. Costa ML, Marshall T, Donell ST, Phillips H. Knee synovial cyst presenting as iliotibial band friction syndrome. *Knee* 2004;11:247-248
4. Nemeth WC, Sanders BL. The lateral synovial recess of the knee: anatomy and role in chronic Iliotibial band friction syndrome. *Arthroscopy* 1996;12:574-580
5. Mesiha M, Bauer T, Andrish J. Synovial sarcoma presenting as iliotibial band friction syndrome. *J Knee Surg* 2009;22:376-378
6. Hitora T, Yamamoto T, Akisue T, Marui T, Nagira K, Ohta R, et al. Fibroma of tendon sheath originating from the knee joint capsule. *Clin Imaging* 2002;26:280-283
7. 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;19:1830-1833
8. Chung EB, Enzinger FM. Fibroma of tendon sheath. *Cancer* 1979;44:1945-1954
9. Moretti VM, de la Cruz M, Lackman RD, Fox EJ. Fibroma of tendon sheath in the knee: a report of three cases and literature review. *Knee* 2010;17:306-309
10. Jacobs E, Witlox MA, Hermus JP. Fibroma of tendon sheath located within Kager's triangle. *J Foot Ankle Surg* 2014;53:208-211
11. Hermann G, Hoch BL, Springfield D, Abdelwahab IF, Klein MJ. Intra-articular fibroma of tendon sheath of the shoulder joint: synovial fibroma. *Skeletal Radiol* 2006;35:603-607
12. Ciatti R, Mariani PP. Fibroma of tendon sheath located within the ankle joint capsule. *J Orthop Traumatol* 2009;10:147-150
13. Smith PS, Pieterse AS, McClure J. Fibroma of tendon sheath. *J Clin Pathol* 1982;35:842-848
14. Fox MG, Kransdorf MJ, Bancroft LW, Peterson JJ, Flemming DJ. MR imaging of fibroma of the tendon sheath. *AJR Am J Roentgenol* 2003;180:1449-1453
15. Glover M, Chebib I, Simeone FJ. Intra-articular fibroma of tendon sheath arising in the acromioclavicular joint. *Skeletal Radiol* 2014;43:681-686
16. Hornick JL, Fletcher CD. Intraarticular nodular fasciitis--a rare lesion: clinicopathologic analysis of a series. *Am J Surg Pathol* 2006;30:237-241
17. Pinar H, Ozkan M, Ozaksoy D, Pabuççuoğlu U, Akseki D, Karaoğlan O. Intraarticular fibroma of the tendon sheath of the knee. *Arthroscopy* 1995;11:608-611
18. Satti MB. Tendon sheath tumours: a pathological study of the relationship between giant cell tumour and fibroma of tendon sheath. *Histopathology* 1992;20:213-220
19. Pulitzer DR, Martin PC, Reed RJ. Fibroma of tendon sheath.

A clinicopathologic study of 32 cases. *Am J Surg Pathol* 1989;13:472-479
20. Michels F, Jambou S, Allard M, Bousquet V, Colombet P, de Lavigne C. An arthroscopic technique to treat the iliotibial band syndrome. *Knee Surg Sports Traumatol Arthrosc* 2009;17:233-236
21. Strauss EJ, Kim S, Calcei JG, Park D. Iliotibial band syndrome: evaluation and management. *J Am Acad Orthop Surg* 2011;19:728-736