

Localized nodular synovitis of the infrapatellar fat pad

Jong-Hoon Park, Kyung-Han Ro, Dae-Hee Lee

ABSTRACT

We report a case of localized nodular synovitis of the infrapatellar fat pad impinging on the patellofemoral joint causing limitation of extension. Arthroscopy involved use of a superolateral portal because location of lesion hindered access via a conventional anterior portal. The infrapatellar mass impinged in the patellofemoral joint upon knee extension and retracted upon flexion. Superior–superior triangulation allowed for complete excision of the mass.

Key words: Arthroscopy, infrapatellar fat pad, localized nodular synovitis

INTRODUCTION

Localized nodular synovitis is a benign lesion characterized by localized synovial proliferation. It is predominantly found in the tendon sheaths or joints of the fingers and toes, and rarely in larger joints such as the knee or ankle.^{1,2} Although localized nodular synovitis involving the infrapatellar fat pad has been occasionally reported,^{3,4} mechanical symptoms such as locking or restricted knee motion are rare, with vague anterior knee pain being the most common symptom.⁵ Localized nodular synovitis of the knee is usually easily identified using arthroscopy and can usually be removed arthroscopically via conventional anterior portals.⁶

The present report describes a case of localized nodular synovitis arising from the infrapatellar fat pad. The lesion caused extension limitation due to impingement by the mass along the patellofemoral joint. Arthroscopy required a superior–superior triangulation approach to identify and remove the mass because the mass and a thickened infrapatellar plica obstructed the anterior portal.

CASE REPORT

A 24-year-old male presented with a 2-year history of pain in the left knee joint on terminal extension and extension limitation. The symptoms developed insidiously without any antecedent trauma. He reported discomfort when ascending stairs, and no pain at rest or in bed at night, nor any constitutional symptoms.

An initial clinical examination revealed mild effusion but no clicking or localized joint line tenderness. Tests for Lachman’s sign, anterior drawer, pivot shift, and posterior drawer were all negative, indicating there was no knee instability. The knee joint was able to reach full flexion, but extension was restricted by 20°. Attempts to reach full extension resulted in severe anterior knee pain. There was dull tenderness on the anterior and medial aspect around the knee joint.

Roentgenograms of the left knee showed no abnormalities including no mineralized density. Sequential magnetic resonance image (MRI) scans were performed, and T1-weighted images revealed an oval shaped well-defined mass of intermediate signal intensity that lay superior to the infrapatellar fat pad and in between the distal half of the retropatellar region and the distal femur trochlea [Figure 1a]. The mass was approximately 2.5 × 2 × 1.5 cm in size. T2-weighted images showed that the mass was inhomogeneous and had relatively high signal intensity with hypointense areas. The mass was connected to a fibrotic thickening of the infrapatellar plica which traversed the fat pad [Figure 1b].

An arthroscopic examination and excision biopsy were performed. Initially, we created anteromedial and anterolateral portals. However, we found it very difficult to insert the arthroscope into the joint via those portals due thick soft tissue.

Department of Orthopedic Surgery, Korea University Anam Hospital, Korea University College of Medicine, Seoul, Korea

Address for correspondence: Dr. Dae-Hee Lee, Department of Orthopedics, Korea University Anam Hospital, Korea University College of Medicine, 126-1, Anam-dong 5-ga, Seongbuk-gu, Seoul 136-705, Korea. E-mail: eoak22@empal.com

Access this article online	
Quick Response Code:	Website: www.ijonline.com
	DOI: 10.4103/0019-5413.111514

We suspected that an extensively hypertrophied infrapatellar plica had adhered to the mass. To overcome the problems associated with those obstructions, we chose to create an alternative viewing portal—a superolateral portal. The superolateral portal view revealed a well-encapsulated, round pan-shape nodular brownish mass that extended upward and entered the patellofemoral joint upon joint extension so as to prevent full extension. That mass retracted when the joint was flexed greater than 30° [Figure 2a and b]. Those arthroscopic findings were consistent with the severe pain experienced on terminal extension and the extension limitation of the joint. We observed no damage to the cruciate ligament or menisci, nor did we observe articular cartilage without villous fronds. To remove the mass, we placed the knee at maximum extension such that the mass entered the patellofemoral joint, and then excised it using superior triangulation (i.e., a superolateral viewing portal and a superomedial working portal, or vice versa). The cut surface revealed yellowish and whitish fibrous tissue [Figure 3]. There was no evidence of a cystic component or acute hemorrhage. After excision, we assessed whether the knee could be moved through a full range of movement, and simultaneously confirmed via arthroscopy that there was no longer any mass impingement into the joint or any joint locking signs.

Histopathological examination of the mass revealed that it was composed of an admixture of osteoclast-type giant cells and mononuclear cells in a collagenous stroma. Nuclear pleomorphisms and mitotic figures were rare, and there were no villous projections of the synovium, either macroscopically or microscopically [Figure 4]. Those pathological features were consistent with localized nodular synovitis. There were no postoperative complications, and the patient was discharged on postoperative day 2. At a 22-month followup, the patient was found to be pain-free and had a full range of knee motion with no evidence of recurrence. The patient was informed that data concerning the case would be submitted for publication, and he consented.

DISCUSSION

The present report describes the diagnosis and treatment of localized nodular synovitis in the infrapatellar fat pad which caused extension limitation and knee joint pain. The extension limitation appeared to be due to an infrapatellar fat pad mass being caught in the patellofemoral joint. The mass was identified and excised arthroscopically using superior-superior triangulation because access via standard anteromedial and anterolateral portals was obstructed by adhesions and hypertrophied soft tissue around the mass.

Localized nodular synovitis has often been identified as a giant cell tumor of the tendon sheath (GCTTS) since the



Figure 1: (a) T1 weighted image showing the well-defined oval-shaped mass with intermediate signal intensity located superior to the infrapatellar fat pad and between the distal half of the retropatellar region and the distal femur trochlea. (b) T2 weighted image showing that the mass appears as inhomogeneous, and with relatively hyperintense signal intensity with hypointense areas. Note the fibrotic thickening of the infrapatellar plica (white arrows) which traverses the fat pad and connects to the mass

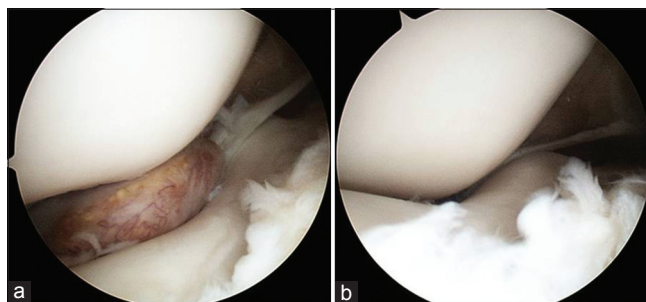


Figure 2: Arthroscopic view showing the round, pan-shape nodular brownish mass impinging in between the patellofemoral joint at full extension (a) which then retracted when the knee was flexed at greater than 30° (b)



Figure 3: Peroperative photograph showing the gross appearance of the resected mass, with yellowish and fibrous cut surfaces

two conditions share similar pathology. Although some vagueness remains regarding the features that distinguish those two conditions, a review of the literature indicates

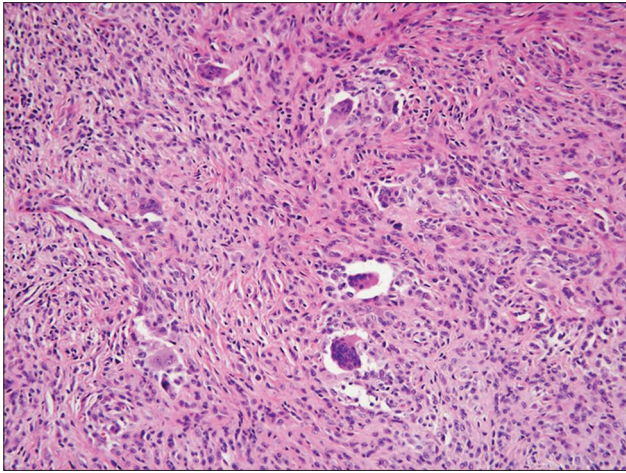


Figure 4: Histological examination of the mass. (H and E stain $\times 100$ magnification). Note the admixture of osteoclast-type giant cells and mononuclear cells in a collagenous stroma. These features are typical of localized nodular synovitis

that GCTTS is considered as an isolated discrete lesion found predominantly in the tendon sheaths or joints of the fingers and toes, whereas localized nodular synovitis is considered as a solitary intra-articular nodule arising from an area of abnormal synovium of a large joint such as the knee.^{7,8} Those two disease entities differ from diffuse-type pigmented villonodular synovitis (PVNS) which shows more aggressive pathology findings (i.e. diffuse frond-like projections of the synovium and abundant hemosiderin deposition³) and requires a complete synovectomy as well as mass excision as it has a higher recurrence rate compared to localized nodular synovitis or GCTTS.

The clinical manifestations of localized nodular synovitis of the knee are nonspecific. A retrospective review of 26 cases of localized nodular synovitis of the knee by Dines *et al.*⁵ demonstrated that vague pain was the most common presentation complaint (92% of patients), whereas mechanical symptoms such as locking or restricted knee motion were rare. Mechanical symptoms were found to occur more commonly in cases involving localized nodular synovitis of a large size that was sandwiched into a small space between joint structures such as the infrapatellar fat pad.⁴ However, although the infrapatellar fat pad is a common site for localized nodular synovitis,³ a large localized nodular synovitis in the fat pad does not always result in mechanical symptoms because the fat pad can tolerate significant volume changes such as those which occur during knee motion.⁹

If a meniscal tear can be completely excluded, the intra-articular cause of knee extension limitation associated with anterior knee pain or swelling usually originates from lesions of the infrapatellar fat pad area. Possible differential diagnoses of our patient included a benign mass, such as

an intraarticular [oste] chondroma, localized nodular synovitis, or fibroma of the tendon sheath; a malignant mass such as a synovial sarcoma; or Hoffa's disease.^{10,11} Our patient showed extension limitation and pain on full extension. An MRI showed localized nodular synovitis located in the superior infrapatellar fat pad, and between the distal half of the retroapatellar region and the trochlea of the distal femur. We believe that this site could be quite narrow at knee extension, and this may cause a bottleneck phenomenon since the contact area of the patellofemoral joint moves distally as extension increases.¹²

Although patients with localized nodular synovitis have a better prognosis than patients with diffuse-type PVNS, due to a much lower recurrence rate, the recurrence rate of localized nodular synovitis is still 10-20%.¹³ The major predictor of recurrence is the completeness of surgical excision.¹ Other potential risk factors include cell type, mitotic activity and radiological osseous erosion.¹⁴ Recently, arthroscopic excision has been preferred to arthrotomy unless the mass is exceptionally big or is located in areas difficult to access arthroscopically.¹⁵ Others report arthroscopic excision of localized nodular synovitis around the infrapatellar fat pad via a conventional anterior portal.^{16,17} However, in our case, it was difficult to insert the arthroscopic camera through the anterolateral portal and locate the mass due to obstruction by a thickened edematous infrapatellar plica and an hypertrophied fat pad which adhered to the mass. We were obliged to create a superior portal for viewing. Use of superior-superior triangulation was very helpful in the present case. Although an arthroscopic approach through multiple portals can be utilized for complete excision, this approach is associated with a significant risk of inadequate excision and subsequent recurrence, particularly for lesions in the posterior compartment of the knee. Therefore, open excision is more advisable for recurrent lesions.¹⁸

In conclusion, the present report shows that limitation of knee extension can be caused by the displacement into the patellofemoral joint of a localized nodular synovitis on the infrapatellar fat pad. In addition, we found that superior-superior triangulation can be a valuable approach for locating and excising an infrapatellar fat pad mass that is difficult to identify and excise via a conventional anterior portal due to an obstructed visual field.

REFERENCES

1. Monaghan H, Salter DM, Al-Nafussi A. Giant cell tumour of tendon sheath (localised nodular tenosynovitis): Clinicopathological features of 71 cases. *J Clin Pathol* 2001;54:404-7.
2. Ushijima M, Hashimoto H, Tsuneyoshi M, Enjoji M. Giant cell tumor of the tendon sheath (nodular tenosynovitis). A study of 207 cases to compare the large joint group with the common

- digit group. *Cancer* 1986;57:875-84.
3. Huang GS, Lee CH, Chan WP, Chen CY, Yu JS, Resnick D. Localized nodular synovitis of the knee: MR imaging appearance and clinical correlates in 21 patients. *AJR Am J Roentgenol* 2003;181:539-43.
 4. Yoo JH, Yang BK, Park JM. Localized nodular synovitis of the knee presenting as anterior knee pain: A case report. *Knee* 2007;14:398-401.
 5. Dines JS, DeBerardino TM, Wells JL, Dodson CC, Shindle M, DiCarlo EF, *et al.* Long term followup of surgically treated localized pigmented villonodular synovitis of the knee. *Arthroscopy* 2007;23:930-7.
 6. Lee BI, Yoo JE, Lee SH, Min KD. Localized pigmented villonodular synovitis of the knee: Arthroscopic treatment. *Arthroscopy* 1998;14:764-8.
 7. Granowitz SP, D'Antonio J, Mankin HL. The pathogenesis and long term end results of pigmented villonodular synovitis. *Clin Orthop Relat Res* 1976;114:335-51.
 8. Johansson JE, Ajjoub S, Coughlin LP, Wener JA, Cruess RL. Pigmented villonodular synovitis of joints. *Clin Orthop Relat Res* 1982;163:159-66.
 9. Saddik D, McNally EG, Richardson M. MRI of Hoffa's fat pad. *Skeletal Radiol* 2004;33:433-44.
 10. Nouri H, Ben Hmida F, Ouertatani M, Bouaziz M, Abid L, Jaafoura H, *et al.* Tumour-like lesions of the infrapatellar fat pad. *Knee Surg Sports Traumatol Arthrosc* 2010;18:1391-4.
 11. Park JH, Lee AH, Lee DH. An unusual presentation of Hoffa's disease in an elderly patient with no trauma history: A case report. *Acta Orthop Traumatol Turc* 2011;45:195-9.
 12. Scott JW, Scott WN. *Insall and Scott surgery of the knee*. 4th ed. Philadelphia: Churchill Livingstone Elsevier; 2006.
 13. Sheppard DG, Kim EE, Yasko AW, Ayala A. Giant-cell tumor of the tendon sheath arising from the posterior cruciate ligament of the knee: A case report and review of the literature. *Clin Imaging* 1998;22:428-30.
 14. Al-Qattan MM. Giant cell tumours of tendon sheath: Classification and recurrence rate. *J Hand Surg Br* 2001;26:72-5.
 15. Hantes ME, Basdekis GK, Zibis AH, Karantanis AH, Malizos KN. Localized pigmented villonodular synovitis in the anteromedial compartment of the knee associated with cartilage lesions of the medial femoral condyle: Report of a case and review of the literature. *Knee Surg Sports Traumatol Arthrosc* 2005;13:209-12.
 16. Lu KH. Arthroscopic excision of juxta-articular giant-cell tumor arising from the patellar tendon sheath. *Arthroscopy* 2004;20:eE35-8.
 17. Yotsumoto T, Iwasa J, Uchio Y. Localized pigmented villonodular synovitis in the knee associated with locking symptoms. *Knee* 2008;15:68-70.
 18. van der Heijden L, Gibbons CL, Dijkstra PD, Kroep JR, van Rijswijk CS, Nout RA, *et al.* The management of diffuse-type giant cell tumour (pigmented villonodular synovitis) and giant cell tumour of tendon sheath (nodular tenosynovitis). *J Bone Joint Surg Br* 2012;94:882-8.

How to cite this article: Park J, Ro K, Lee D. Localized nodular synovitis of the infrapatellar fat pad. *Indian J Orthop* 2013;47:313-6.

Source of Support: This work (2012-0001308) was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology., **Conflict of Interest:** None.