

A Novel Technique of Resecting Localized Pigmented Villonodular Synovitis of the Knee Joint

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Learning Point of the Article:

Arthroscopic excision of localized Pigmented villonodular synovitis by piecemealing helps in decreasing tumor spillage, lower recurrence rate, and aids in faster recovery.

Abstract

Introduction: Pigmented villonodular synovitis is an uncommon benign proliferation of the synovium. In the knee joint, it can present as a localized or a diffuse form and can mimic numerous conditions.

Case Report: We present a case report of a 54-year-old male with localized form of this condition. The diagnosis is not often made clinically but usually made with the help of magnetic resonance imaging and histopathology. We used a novel technique for resecting the tumor by arthroscopy.

Conclusion: A high index of suspicion is required for the diagnosis of the condition and arthroscopic excision results in lower morbidity and lesser recurrence rates.

Keywords: Pigmented villonodular synovitis, localized, synovium.

Introduction

Pigmented villonodular synovitis (PVNS) is an uncommon benign proliferation occurring in the synovial joint, bursal membranes, and tendon sheath with an incidence of 1.8 per million [1]. It is seen in adults more commonly in the age group of 20–50 years and lesser frequently in the pediatric population [2]. It was first reported in 1852 by Chassaignac who identified it as a nodular lesion in the flexor tendon of the hand. In 1941, Jaffe, Lichtenstein, and Sutro coined the term and classified them as circumscribed and diffuse with similar histopathological features [3]. The circumscribed form is now termed as localized form, which may be pedunculated or sessile. Its most common location is the knee joint specifically arising from the meniscocapsular junction, Hoffa's fat pad, lateral recess, and tibial eminence [4].

Case Report

A 54-year-old male came with complaints of the left knee pain for 6-month duration which was insidious in onset and was associated with diffuse swelling. He had been evaluated in multiple hospitals and treated with analgesics, therapeutic knee aspiration, and compression bandage application. They were no history of preceding trauma, locking sensation, fever, constitutional symptoms, or night cries. On examination, there was diffuse fullness of the left knee with positive patellar tap (Fig. 1). The range of movement was 0–100° with pain during terminal flexion, and there was no evidence of ligamentous instability. The radiographs were unremarkable, magnetic resonance imaging (MRI) showed a T2 hypointense lesion in Hoffa's fat pad arising from the synovium measuring 2.5×4.5×2.5

Author's Photo Gallery



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Figure 1: Clinical image showing suprapatellar fullness of the left knee.

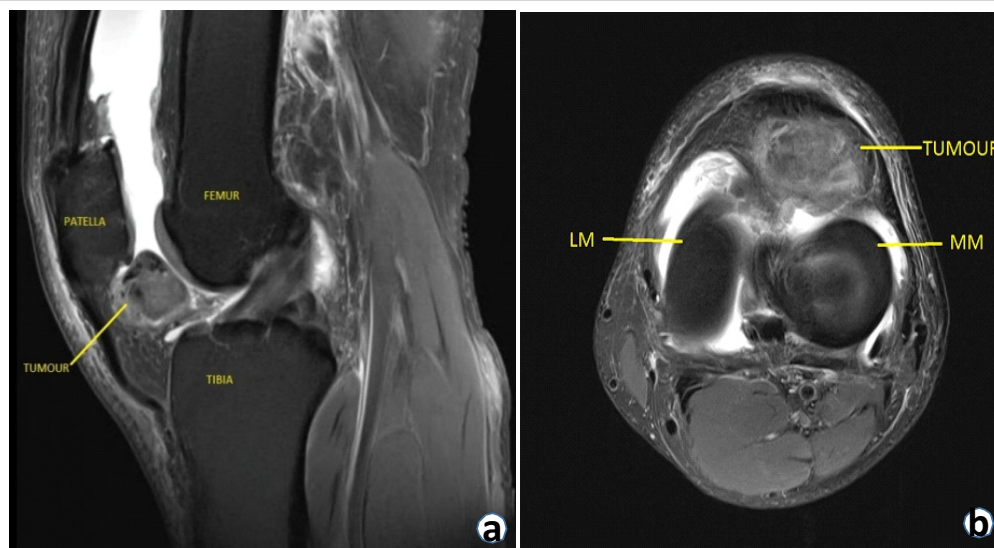


Figure 2: MRI T2-weighted images of the left knee. (a) Sagittal section showing the hypointense lesion arising from the Hoffa's fat pad with joint effusion. (b) Axial section showing the retroapatellar hypointense lesion arising in close proximity to the anterior horn of the medial meniscus.

cm (Fig. 2). A large joint effusion was noted with associated synovial hypertrophy. Routine hematological, biochemical, and immunological investigations did not reveal anything abnormal.

Differential diagnoses were loose body, synovial chondromatosis, hematoma, and localized PVNS. Patient was planned for arthroscopic excision of the tumor. Under spinal anesthesia, standard arthroscopic portals were made and with the arthroscope in the anterolateral portal, a diagnostic arthroscopy was done. A yellowish-brown pedunculate mass was noted arising from Hoffa's fat pad near the meniscocapsular junction of the anterior horn of the medial meniscus extending into the suprapatellar region. The synovium was hypertrophied with villous projections (Fig. 3).

Due to the large extent of the tumor, the following steps were carried out to resect it:

- Superolateral and superomedial portals were made in addition to the standard arthroscopic portals

- On visualizing the entire extent of the tumor, it was grasped from the superolateral portal using a Kocher forceps after impaling it with a needle. Impaling the tumor gives stable conditions to resect the tumor

- The intra-articular resection was carried out by piecemealing the tumor using arthroscopic cautery (Vulcan) from the superomedial portal

- Following which the tumor was resected from its base attachment near the anterior horn of the medial meniscus using arthroscopic cautery and shaver.

Histopathology showed fragments of synovial tissue with inflammatory cell infiltrate comprising lymphocyte admixed with any foamy cells and hemosiderin-laden macrophages. Extensive areas of hyalinization and fibrous areas mimicking osteoid with fibromuscular and fibro collagenous tissue regions were noted (Fig. 4). The immediate post-operative period was uneventful and the patient returned to his daily activities after the 2nd post-operative week. There was no recurrence of

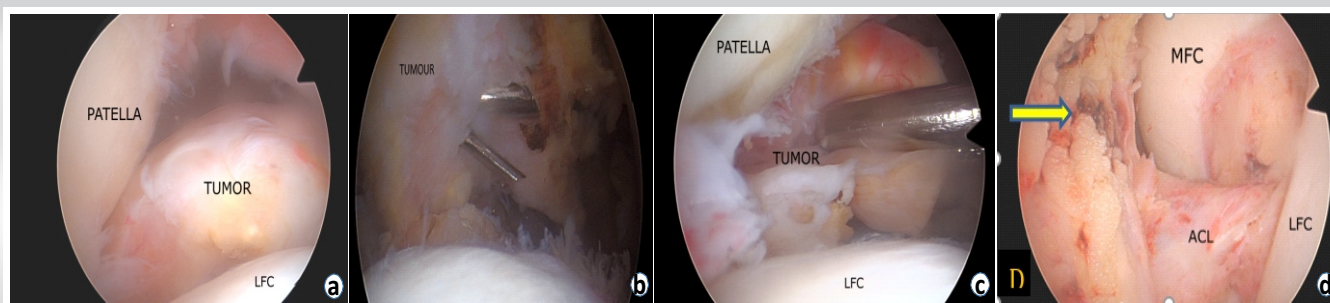


Figure 3: Intraoperative arthroscopic images showing. (a) Location and size of the lesion situated between the patella and the femoral condyle. (b) Tumor being impaled by needle through superomedial portal. (c) Tumor being grasped by the Kocher's forceps through the superolateral portal. (d) Post-excision image showing the Hoffa's fat pad from which the tumor was excised from its base [arrow] using arthroscopic cautery.

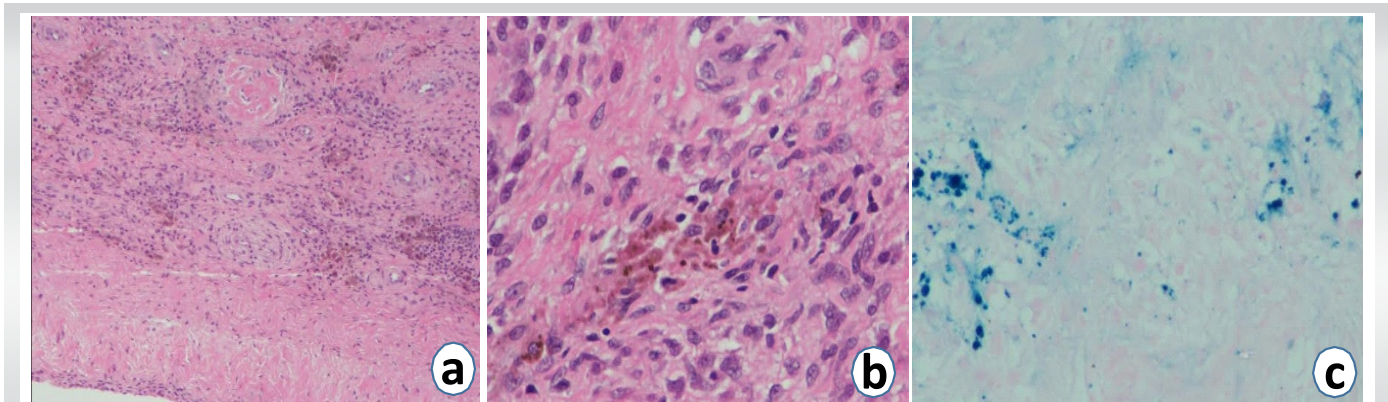


Figure 4: Histopathological images. (a) Low power image in hematoxylin and eosin (H and E) stain showing the synovial tissue with inflammatory cell infiltrate comprising of lymphocyte admixed with any foamy cells and hemosiderin-laden macrophages. Extensive areas of hyalinization and fibrous areas mimicking osteoid with fibromuscular and fibro collagenous tissue regions. (b) High power image in H and E stain showing pigment-laden macrophages in the collagenized stroma. (c) High power image in Perl's stain showing hemosiderin pigment-laden macrophages.

symptoms after 1 year of post-operative period of follow-up.

Discussion

Classically, there are three types of PVNS, an extra-articular localized tumor arising from the tendon sheath also known as a giant cell tumor of the tendon sheath. Second is an intra-articular localized tumor most commonly found in the knee seen in meniscocapsular junction [5], lateral recess, suprapatellar recess, Hoffa's fat pad, and posterior compartment of the knee in order of decreasing frequency [6]. Third is a diffuse variety which is a monoarticular proliferation of the synovium most common site being the knee followed by hip, ankle, shoulder, and elbow [7].

Fisk had postulated that PVNS occurs due to repeated microtrauma and hydroarthrosis occurring in the synovial fringes [8]. However, there is a lot of speculation regarding the etiology being neoplastic or a result of an inflammatory process.

The clinical presentation is very non-specific for the localized type of PVNS unlike the classic symptoms of diffuse PVNS and therefore, a clinical diagnosis is very challenging [9]. The initial presentation is mild-to-moderate knee pain or in some cases, patients refer it to as discomfort in the knee. Localized PVNS may present as a palpable mass or may cause a locking sensation in the knee or restricted terminal range of movement [10]. Clinically, the localized lesions can mimic meniscal injuries or other intra-articular pathologies and hence, formulating a surgical plan after locating the lesion on MRI is advisable [6].

The radiology might reveal a soft-tissue shadow and the MRI shows a low signal intensity in the T1- and T2-weighted images and a large joint effusion. Bony erosions and hypertrophied synovium are the additional features. The hypointense signals are the result of the hemosiderin deposits in the synovium [11]. Macroscopically, they may be sessile or pedunculated

yellowish-brown masses firm to elastic inconsistency and on the cut section, they have variegated surfaces with focal areas of hemorrhage [12]. Histopathology shows active proliferation of fibroblastic and histiocytic element showing an evident macrophagic activity with phagocytosis and abundant hemosiderin and lipids [13].

Excision of the localized PVNS tumor is the mainstay of the treatment, arthroscopic excision is the preferred method in this type, and as it allows for identifying the size and location of small localized lesions accurately. Being less invasive is associated with decreased complications, lower morbidity, shorter hospital stay, and a lower recurrence rate as compared to the open method of excising the tumor [14]. The localized form has a low recurrence rate of around 8% when surgically managed appropriately [15].

Conclusion

Localized PVNS is an uncommon condition and a high degree of clinical suspicion is required to diagnose this condition. MRI is the diagnostic modality of choice. However, it can be confirmed only by histopathology. Arthroscopy plays an instrumental role in the diagnosis and surgical excision with lower morbidity and recurrence rates.

Clinical Message

A high index of suspicion is required for the diagnosis of localized PVNS and arthroscopic excision results in lower morbidity and lesser recurrence rates.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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