CLINICAL CASE - TEST YOURSELF Musculoskeletal Imaging

Sudden knee joint swelling in a male with a nodular lesion of Hoffa's fat pad

Zinovia Bolari, Evangelia Kalaitzidou, Ekaterini Tavernaraki
MRI Department, Director Demetrios N. Exarhos,
General Hospital of Athens "Evaggelismos"

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PART A

A 61-year-old male presented to our MRI department with sudden onset of pain, swelling, and reduced active and passive range of motion of the left knee joint. A knee X- ray was previously performed on a regular basis and revealed that a lesion imprinted and abutted the surface of the intercondylar eminences. An MRI of the knee was performed, findings consisted of a nodular lesion with dimensions of 1.9 x 1.1 x 2.2 cm in the fat pad of Hoffa (Fig.1,2,3), fluid in the suprapatellar bursa (Fig 1,2), and in the knee joint (Fig 2,3), edema of the biceps femoris muscle (Fig 1) was also noted.

Knee arthroscopy was performed by an orthopedic surgeon, the lesion was resected and was sent for pathologic evaluation. The patient was clinically evaluated post-operatively, there was no pain or discomfort and any limitations in the joint's range of motion.

CORRESPONDING AUTHOR, GUARANTOR

Zinovia Bolari , Radiology Department, General Hospital of Athens "Evaggelismos", GREECE E-mail: zinovia.bolari7@gmail.com

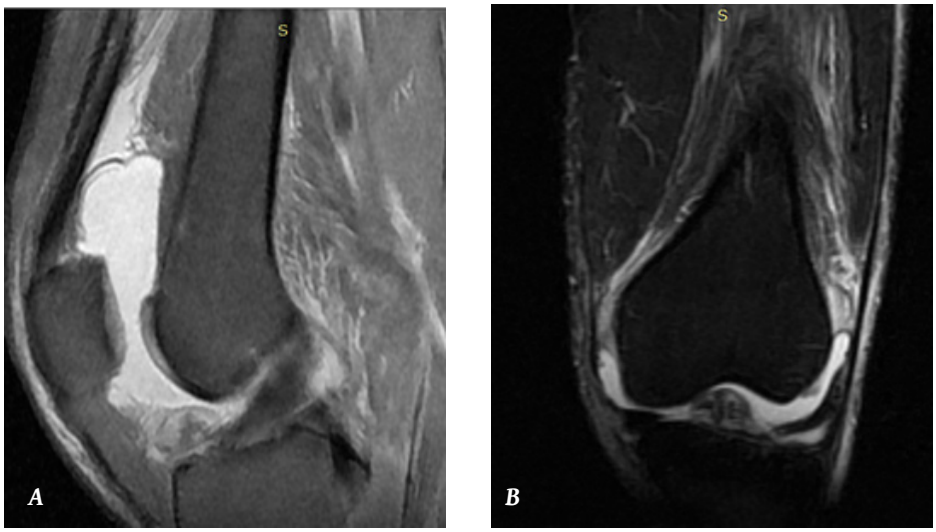

Fig. 1 *Sagittal (A) view, proton – density fat -sat weight imaging and coronal (B) view STIR imaging.*

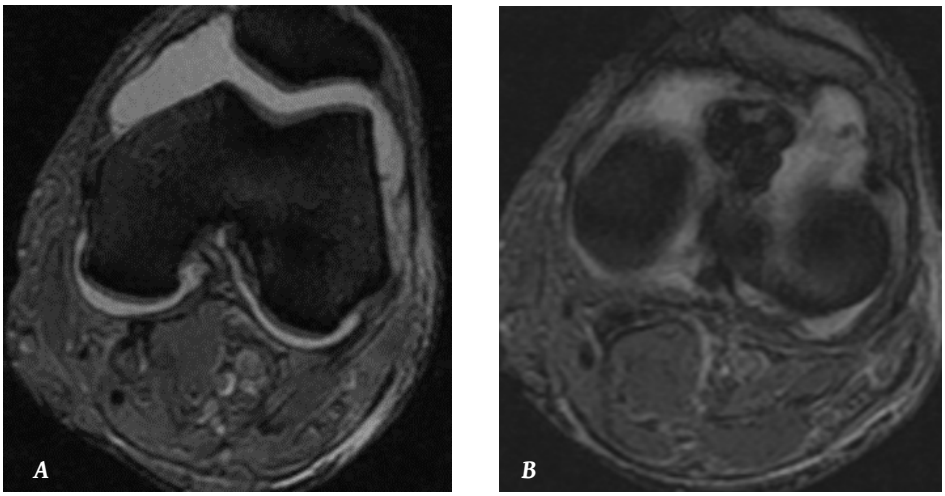

Fig. 2 *Axial view, T2 GRE imaging.*

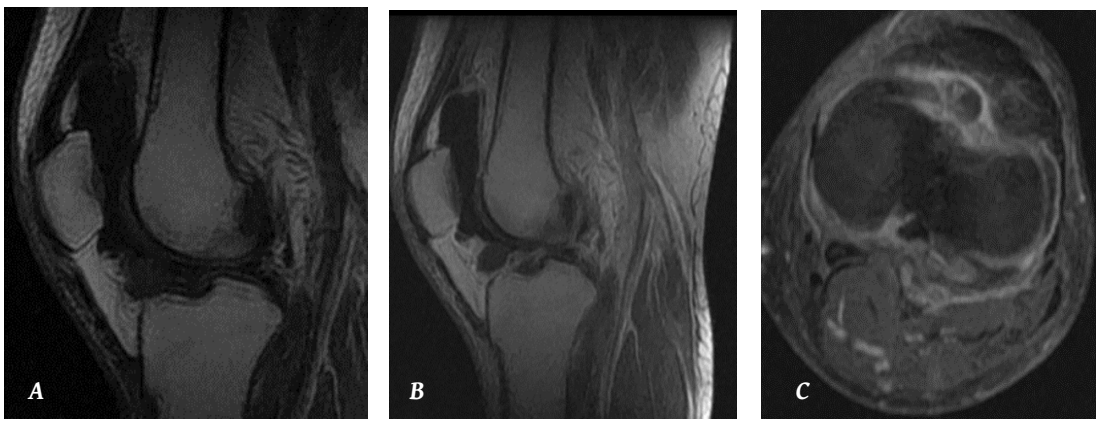

Fig. 3 *Sagittal (A, B) view T1 pre and post -contrast and axial (C) view T1 fat-sat post-contrast imaging.*

PART B

Diagnosis: Local Pigmented Villonodular Synovitis (PVNS) of the knee

The arthroscopically resected lesion was pathologically identified as a nodular–local pigmented villonodular synovitis. The lesion located in the fat pad of Hoffa displayed low SI on T1, high SI on T2 sequences with a capsule and several internal septations with low SI (Fig 1,3). On GRE imaging, the lesion exhibited low SI and blooming artifact, reflecting the presence of hemosiderin deposition (Fig.2). In addition, on T1-weighted post-gadolinium images α slight peripheral enhancement was observed (Fig.3). On plain radiographs the lesion abutted and imprinted the surface of the intercondylar eminences.

Pigmented villonodular synovitis is a rare aggressive neoplastic synovial disease characterized by joint effusions, bone erosion and expansion of the synovium (type of a benign soft tissue tumor that arises from the thickening and overgrowth of the synovium) [1]. This kind of synovial hyperplasia leads to the formation of villi and nodules characterized by the deposition of intracellular hemosiderin. It does not metastasize to other parts of the body but can erode the bones and lead to arthritis.

Any joint can be affected but it is most commonly found in the knee and hip joint. It primarily affects young adults between the age of 30-40, it is rare in children [1, 2]. Given its rarity in pediatric patients, the diagnosis can be easily delayed and misdiagnosed as a case of juvenile idiopathic arthritis [3,4].

There are two types of PVNS: Localized PVNS (or localized nodular synovitis) and Diffuse PVNS [2,5].

Localized PVNS: The tumor occurs in just one area of the joint or involves the tendons that support the joint. This type usually responds well to treatment and is identified most commonly in the infrapatellar fat pad. The tumor is usually small, well-circumscribed, and grows outward in a pedunculated fashion [5]. Diffuse PVNS: The tenosynovial giant cell tumor is more widespread, involves the entire joint, and therefore restricts motion. It is considered a more aggressive entity and its management is more complicated. [5].

As in our case, the diagnosis can be strongly suggested on MRI rather than radiographs. On T1-weighted sequences, the heterogenous signal is almost always seen (intermediate and low) with the low signal reflecting the hemosiderin content. GRE sequences are extremely useful, they reveal the low signal blooming (hemosiderin's paramagnetic effect). Gadolinium is not usually recommended for evaluation, but if administered PVNS usually enhances slightly and heterogeneously. As mentioned by Murphey et al. some foci of high T1 signal can be reported by these foci which likely correspond to entrapment of peri-synovial fat (as fat is not identified on histopathology reports) [6].

PVNS, especially the diffuse form, should be differentially diagnosed from any proliferative synovial lesion with hemosiderin deposition. The most common conditions are synovial chondromatosis and hemophiliac arthropathy. A thorough history especially for the aforementioned conditions and a histopatho-

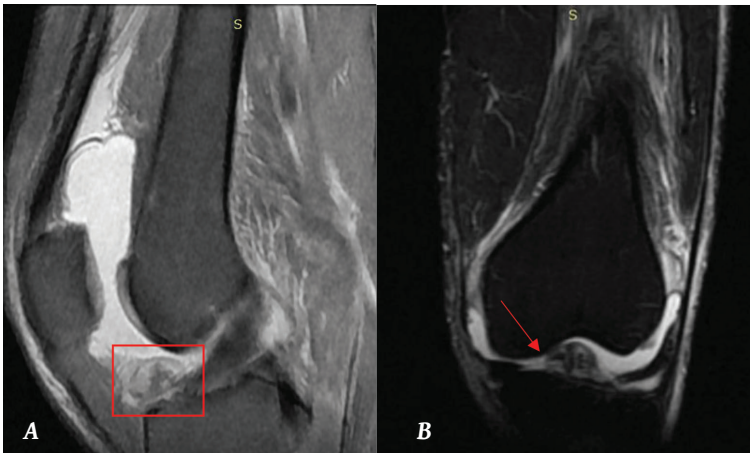

Fig. 1 *Sagittal (A) view, proton – density fat – sat weight imaging demonstrates a nodular shaped mass lesion with high SI and coronal (B) view STIR imaging.*

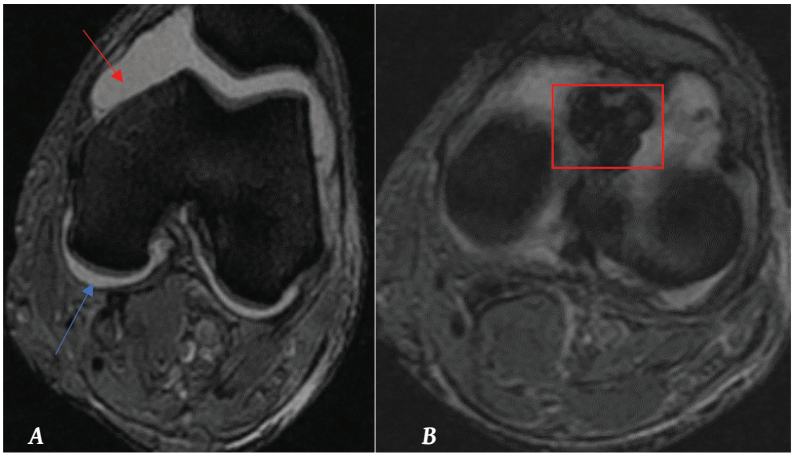

Fig. 2 *Axial view, T2 GRE imaging. Fluid collection is present in the knee joint (blue arrow) and the suprapatellar bursa (red arrow) Fig A. Notice the extremely low SI which reflects the prominent accentuation of hemosiderin in this local PVNS located in the fat pad of Hoffa (red square) Fig B.*

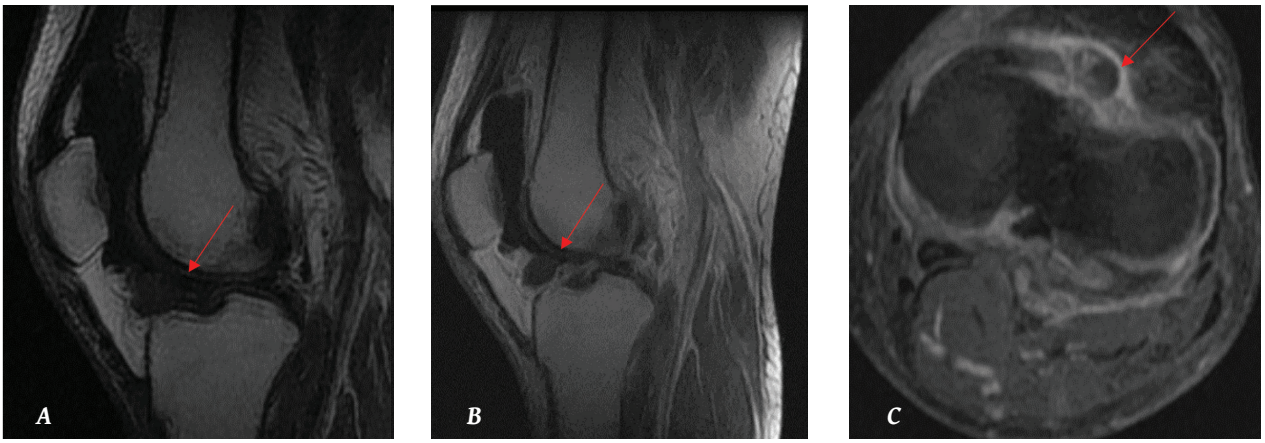

Fig. 3 *Sagittal (A, B) view T1 pre and post -contrast and axial (C) view T1 fat-sat post-contrast imaging. Fig A, B depicted the round localized mass of low SI located in the anterior knee compartment – fat pad of Hoffa – compatible with localized PVNS. In Fig B, C the round mass presents slightly heterogenous peripheral enhancement, on post-contrast imaging.*

logic examination led to the diagnosis [7].

PVNS is an pathological joint entity known to radiologists and while the knee is the most common site of involvement, it can occur in any joint or synovial-containing structure. Rare sites of location include, the temporomandibular joint, the apophyseal joints of the spine but it could also be isolated to a bursa in these cases. PVNS should be differentially diagnosed by a primary bone lesion, synovial chondromatosis, rheumatoid arthritis and a septic joint. The definitive diagnosis is made by excision and tissue sampling [8,9]. **R**

Conflict of interest

None declared.

Ethical Consideration

Written informed consent was taken from the patient, regarding their inclusion in the study and its subsequent publication. Patient identity was anonymized.

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No funding was received for the study.

KEY WORDS | PVNS; radiology; knee; MRI; differential diagnosis

References

1. Samuel J Lynskey, Marcus J Pianta. MRI and thallium features of pigmented villonodular synovitis and giant cell tumours of tendon sheaths: a retrospective single centre study of imaging and literature review. Br J Radiol. 2015;88(1056):20150528
2. Antonio Barile, Mylene Sabatini et al. Pigmented villonodular synovitis (PVNS) of the knee joint: magnetic resonance imaging (MRI) using standard and dynamic paramagnetic contrast media. Report of 52 cases surgically and histologically controlled. Radiol Med. 2004 Apr;107(4):356-66.
3. Karami M, Soleimani M, Shiari R. Pigmented villonodular synovitis in pediatric population: review of literature and a case report. Pediatr Rheumatol Online J. 2018 Jan 17;16(1):6.
4. Baroni E, Russo BD, Masquijo JJ, et al. Pigmented villonodular synovitis of the knee in skeletally immature patients. J Child Orthop 2010 Apr;4(2):123-127.
5. Karami M, Soleimani M, Shiari R. Pigmented villonodular synovitis in pediatric population: review of literature and a case report. Pediatr Rheumatol Online J. 2018 Jan 17;16(1):6
6. Tyler WK, Vidal AF, Williams RJ, Healey JH. Pigmented villonodular synovitis. J Am Acad Orthop Surg 2006 Jun;14(6):376-385
7. Murphey MD, Rhee JH, Lewis RB, et al. Pigmented villonodular synovitis: radiologic-pathologic correlation. RadioGraphics 2008; 28:1493-1518
8. P. Schvartzmana,b,, V. Carrozzab et al Radiological features of pigmented villonodular synovitis and giant cell tumor of the tendon sheath. Rev. Argent. Radiol. 2015;79(1): 4-11
9. Roguski M, Safain MG, Zerris VA, et al. Pigmented villonodular synovitis of the thoracic spine. J Clin Neurosci 2014 Oct;21(10):1679-1685
10. Safaee M, Oh T, Sun MZ, Parsa AT, et al. Pigmented villonodular synovitis of the temporomandibular joint with intracranial extension: A case series and systematic review. Head Neck. 2015 Aug;37(8):1213-1224

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