Case report

Localized form of pigmented villonodular synovitis of the knee: The meniscal mime

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ABSTRACT

The localized form of pigmented villonodular synovitis of the knee is a rare condition with non-specific symptoms. This makes diagnosis especially difficult when the meniscus is affected. A full assessment with several imaging modalities can help support the preoperative diagnosis. But in the case reported here, the full clinical and paraclinical assessment (X-rays, CT arthrography and MRI) was wrong – the localized form of pigmented villonodular synovitis had mimicked a lateral meniscus injury and was only detected during arthroscopy. The lesion was excised surgically and the diagnosis was confirmed through postoperative histopathology.

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1. Introduction

Pigmented villonodular synovitis (PVNS) is a rare condition [1]. Because the localized form has non-specific symptoms, diagnosis can be challenging. Results from additional imaging modalities could be misleading, especially if the assessment is incomplete. The PVNS case reported here mimicked a lateral meniscus injury on all of the preoperative assessments (clinical, X-rays, CT arthrography and MRI). The diagnosis of pigmented villonodular synovitis was only made during arthroscopy.

2. Case report

A 31-year-old male runner (two hours per week) consulted us for locking, catching, mechanical pain and exercise-induced swelling of his right knee, which had been present for several months, but had no known triggering event. His maximum walking distance was less than 2 km, with no feelings of instability. Palpation of the lateral tibiofemoral joint line elicited pain and the Apley grind test was positive. The patient had normal leg alignment. There was no joint laxity in the frontal or sagittal planes. There were no bone lesions visible on X-rays. CT arthrography revealed that the posterior horn of the lateral meniscus was detached and displaced from the lateral femoral cortex (Fig. 1) without cartilage injury. An MRI was performed to provide additional clues and confirmed the diagnosis of lateral meniscus injury (Fig. 2) without signs of osteonecrosis. A surgical indication was made for arthroscopy treatment of the lateral meniscus injury.

The procedure was performed with a tourniquet under spinal anaesthesia in dorsal decubitus using classic surgical approaches. Exploration of the lateral meniscus revealed a self-contained, loose mass of hypertrophic synovium about 7 mm long, red-brown in colour with a sessile insertion. This mass was adherent to the meniscus-synovium junction of the superior side of the middle part of the lateral meniscus, mimicking an unstable meniscus injury (Fig. 3). Complete resection of its base with basket forceps was performed to achieve a wide margin of safety and resulted in partial avulsion of the meniscus, widening of the popliteal hiatus and concerns about the mechanical integrity of the meniscus. A rasp was used to expose bleeding bone and then the meniscus reattached with anchors using an “all-inside” technique. This resulted in the meniscus being stable when pulled on (Fig. 4). The remainder of the intra-articular assessment was normal. After resection, the tissue specimen was sent to histopathology. Histology analysis found the cell combination that is characteristic of villonodular synovitis: multi-nucleated giant cells with no atypical features and globular looking cells, with round nuclei and cytoplasm overloaded with hemosiderin deposits. Immediate full weight-bearing was allowed with flexion limited to 90° for one month. At the clinical follow-up one month post-surgery, the symptoms were no longer present. There was no recurrence of the pain within the next two years of follow-up.

3. Discussion

PVNS is a rare condition with unknown aetiology. The annual incidence has been reported to be 1.8 per million people [1]. The
localized form of pigmented villonodular synovitis of the knee: The meniscal mime.

**Fig. 1.** Coronal (a) and axial (b) slices from CT arthrography of the right knee showing a lesion outlined by contrast medium in the lateral femoral cortex, that was initially interpreted as a dislocated meniscus tear in the posterior horn of the lateral meniscus.

**Fig. 2.** Coronal MRI slices with PD fat saturation sequences of the right knee showing a lesion with an intermediate signal in contact with the lateral meniscus.

**Fig. 3.** Intra-operative arthroscopy view of the localized pigmented villonodular synovitis lesion which is about 7 mm long, red-brown in colour with a sessile insertion adhered to the meniscus-synovium junction of the superior face of the middle segment of the lateral meniscus.

**Fig. 4.** Intra-operative arthroscopy view after anchor reattachment using an all-inside technique for the lateral meniscus peripheral avulsion created by resection of the sessile lesion and its base.

The average age of patients with PVNS is typically between 30 to 50 years old [2–5], which corresponds to the patient described here.

Two forms of pigmented villonodular synovitis have been described: diffuse and localized [6]. The localized form makes up 15–25% of PVNS cases [1,7], but one study found it seven times more common than the diffuse form [5]. The knee is affected in two-thirds of cases [7]. PVNS has been found in several locations within the knee joint: meniscus-synovium junction, intercondylar notch, lateral and medial femoral cortex, Hoffa’s fat pad, posterior compartment [3,4].

In most patients with the diffuse form, the diagnosis is straightforward given the suggestive clinical picture (repeated haemarthrosis with pain, then stiffness, mirrored bone cysts, cortical erosion, osteoarthritis) [7,8]. For certain diffuse forms, but especially for the localized forms, the observation of non-specific symptoms makes diagnosis challenging. Discomfort is always present but the clinical presentation is variable: locking (30–100%...
of cases), effusion (53–90%), diffuse pain (66–100%), reduced range of motion (45%), palpable mass (11–80%) or pain over the joint line suggestive of a meniscus injury (10–34%) [3,5,8,9–13]. The clinical presentation can also suggest the presence of an intra-articular floating foreign body and symptoms related to cartilage injury are also possible [12,14,15]. Granonowitz and Mankin were the first to provide a diagnosis of localized PVNS in cases of mechanical disorder of the knee with transient pain or locking [6]. A preoperative diagnosis of meniscus injury was made on 30% of localized PVNS cases [5] and the PVNS diagnosis was made in only 25% of localized form [16]. Given the typical clinical presentation of a meniscus injury, the diagnosis of localized PVNS was not made before additional examinations were performed.

In cases of PVNS, X-rays sometime detect bone cysts [4] but are quite often normal [16]. MRI helps with the diagnosis of diffuse forms as it detects areas of inflammation with hemosiderin deposits, and is the top diagnostic imaging modality for evaluating soft-tissue tumours [17]. But the localized forms are more challenging. A heterogeneous soft-tissue mass with T1 and T2 hypointensity appears on MRI. The signal is intermediate if only small hemosiderin deposits are present [18,19]. These hemosiderin deposits are more visible with gradient echo sequences [16,20]. The MRI appearance could be mistaken for haemangioma, fibro-angroma, synovial chondromatosis and amyloid or haemophilic arthropathy. The lesion could be undetected on MRI, despite being 4 cm in size [21]. In the case reported here, CT arthrography was performed for the suspected meniscus injury. But the result was wrong because it only outlined the lesion, thus we do not recommend using it for PVNS assessment. The appearance of the lesion on MRI with intermediate PD fat saturation signal did not provide sufficient discriminatory power and was mistaken for the signal of a meniscus injury. Since the diagnosis of the localized form of PVNS was not made clinically, gradient echo sequences were not performed.

Histopathology was needed to confirm the diagnosis. Macroscopically, the specimen consisted of a well-defined, peduncled or non-peduncled lesion, surrounded by a brown-coloured collagen capsule and containing septae [10,18]. Microscopically, observations consist of synovial membrane proliferation in villi and nodules without signs of malignancy, with fibroblasts, histiocytes, macrophages and giant cells loaded with brown hemosiderin deposits [6,18,22,23]. The case described here had a typical histological appearance.

Cases where PVNS mimicked a meniscus injury has been previously described, but preoperative MRI was not carried out [10,24–26]. De Ponti et al. [23] reported on a case of PVNS near the lateral meniscus where a lateral meniscus injury diagnosis was made based on MRI findings, but the associated preoperative symptoms were not described. Yotsumoto et al. [27] described a case of PVNS in combination with a lateral meniscus lesion with knee joint locking and flexion deformity. This 15 × 20 cm lesion was located in the posterior compartment of the knee and had been detected on MRI before the surgery. We found no published cases where PVNS had mimicked a meniscus lesion on all the clinical and arthroscopical tests as it did in our case.

Excision of the localized form of PVNS is the rule [23]. As long as the entire lesion can be removed, arthroscopy is the preferred technique because of the lower morbidity associated with it. After arthroscopy excision, Dines et al. [5] reported 90% excellent results based on the Lysholm score after 5 years and Rhee et al. [2] found an average Ogilvie-Harris score of 8 after 9 years of follow-up. The recurrence rate after arthroscopy removal was 0% for studies with 3–5 years follow-up [5,18,28,29]. The only exception was the Rhee et al. study [2] where an 18% recurrence rate was reported (2 of 11 cases within 6–9 months after surgery). The risk of recurrence can be reduced by cauteryization and complete removal of the base of the lesion [15,30]. If a true meniscus injury co-exists with the PVNS, it is treated simultaneously [5,31]. In the case described here, we resected the PVNS lesion and sutured the meniscus that had been detached when the base of the lesion was resected by arthroscopy.

4. Conclusion

A diagnosis of PVNS must be contemplated in cases of knee disorder so that appropriate MRI sequences are performed. Even if the paraclinical assessments lead to a potential diagnosis of meniscus injury, foreign body, soft tissue mass or osteochondral fragment, a PVNS diagnosis must not be put aside [5].

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References


