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Pigmented villonodular synovitis of the knee: A retrospective analysis of 214 cases at a UK tertiary referral centre

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ABSTRACT

Aims: Pigmented villonodular synovitis (PVNS) is a rare, locally aggressive and potentially recurrent synovial disease. We present the largest single-centre experience of knee PVNS. Our aim was to evaluate our tertiary hospital's experience in the management of knee PVNS.
Patients and methods: Retrospective data collection of consecutive cases of knee PVNS from 2002 to 2015.
Results: In total, 214 cases of knee PVNS were identified which represented 53.4% of all PVNS (12.1% were recurrent at presentation). 100 were localised PVNS (LPVNS), 114 diffuse PVNS (DPVNS) and two malignant PVNS. Knee PVNS was more likely to occur in females with a mean age of 39. Following surgery, 47.6% had recurrence with DPVNS as opposed to 8.6% with LPVNS. In LPVNS, there was no significant difference in recurrence between open and arthroscopic synovectomy (8.7% vs 9.1%, $P > 0.05$). However, in DPVNS, there was a significantly higher risk of recurrence with arthroscopic compared to open synovectomy (83.3% vs 44.8%, $RR = 1.86$ 95% CI 1.32–2.62, $P = 0.0004$).
Conclusion: PVNS can be difficult to treat. We found no difference in local recurrence rates between open and arthroscopic treatment of LPVNS but significantly increased rates of recurrence for DPVNS following arthroscopic treatment. We would therefore recommend open synovectomy for DPVNS.

1. Introduction

Pigmented villonodular synovitis (PVNS), first described by Chassaignac [1] in 1852 and synonymous with tenosynovial giant cell tumour, is a synovial proliferative disease of the joint, tendon sheath or bursa. PVNS is rare with an incidence of 1.8 per million population [2] and is generally considered to be a benign, locally aggressive condition, which if left untreated, can lead to osteoarthritis (OA) [3] or symptoms from the mass effect of the tumour. Histologically, PVNS is characterised by the presence of haemosiderin deposition, lipid-laden macrophages and multinucleate giant cells [4].

The aetiology of PVNS is currently unclear although the presence of aneuploidy and trisomy 7 in many diseased synovial cells may suggest a neoplastic process [5]. Chronic inflammation has also been implicated in its pathogenesis [6]. Very few cases of malignant pigmented villonodular synovitis (MPVNS) and subsequent metastatic spread have been reported in the literature [7]. PVNS of synovial joints usually presents as a monoarticular process with the knee joint being the most commonly involved. It

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affects males and females almost equally and although it can occur at any age, it is most common in the second to fourth decades [2,4].

Two forms of PVNS have been described depending on the extent of synovial involvement, albeit with similar histological appearances. Localised PVNS (LPVNS) presents as a solitary pedunculated lesion surrounded by normal synovium whereas the diffuse form (DPVNS) can involve the entire joint and is villous by nature [8]. Clinical presentation is notoriously vague; with pain, swelling, and locking frequently reported. This variability often leads to a delayed diagnosis. At present, the most effective screening tool remains MRI, however, definitive diagnosis can only be made following biopsy [9].

The aim of treatment of PVNS is to resect all abnormal synovium, thereby avoiding local recurrence and ultimately the risk of OA. This may be achieved through an open, arthroscopic or combined approach. Arthroscopic surgery has been shown to be associated with a lower complication rate and shorter hospital stay [10], however recurrence, principally with posterior disease, remains a concern. Two recent meta-analyses have differed on whether open synovectomy does indeed reduce recurrence rate [11–12]. Alternative therapies include external beam radiation and chemical synovectomy although conservative management may also be appropriate in certain cases.

The low incidence of PVNS has precluded a large randomised controlled trial and consequently it has been difficult to ascertain which treatment options remain superior. Its rarity has resulted in observational retrospective studies with relatively small numbers. We present the largest single-centre retrospective study of knee PVNS with the aim of evaluating patient characteristics, presenting symptoms, disease features, treatment and outcomes.

2. Materials and methods

We retrospectively reviewed our prospective computerised database and analysed all patients treated for PVNS between 2002 and 2015 at our centre, a large tertiary referral unit in the UK. The distribution of cases by anatomical location is depicted in Figure 1, showing the knee to be the most common location of PVNS in 53.4% of cases.

All episodes of knee PVNS were included in this study. A total of 214 patients were identified during this study period and were treated under six orthopaedic surgeons. Data was collected by two reviewers using a specially designed table (reporting patient demographics, clinical/disease characteristics, treatment and outcomes) and included auditing of the other reviewer's data to minimise error. All cases of knee PVNS, diffuse and localised, were included irrespective of whether the patient had already been treated at another institution. All patients had magnetic resonance imaging (MRI) interpreted by an experienced radiologist, to assess the extent of disease. The diagnosis of PVNS was confirmed either with a needle/excision biopsy or review of pathology if the patient had already been treated elsewhere and established OA was determined with the aid of weight-bearing radiographs, MRI or at surgical intervention.

Indications for surgery were mechanical symptoms, pain and stiffness due to large volume disease and associated effusion or due to the early onset of degenerative disease felt to be secondary to the presence of the PVNS. Surgical options were determined by the surgeon, with the benefit of pre-operative MRI. Although exact technique was dictated by disease extent and location, for an open anterior synovectomy, our approach was through a midline incision with medial parapatellar arthrotomy to allow eversion of the patella. Following thorough joint inspection; including ligaments, menisci, intercondylar notch and suprapatellar pouch, all visible diseased tissue was removed. For posterior synovectomy, the most commonly used approach was a 'lazy S' incision with the patient prone. The medial and lateral heads of gastrocnemius were then mobilised and the neurovascular bundle identified and protected. Medial and lateral arthrotomies were then performed to allow meticulous removal of diseased tissue.

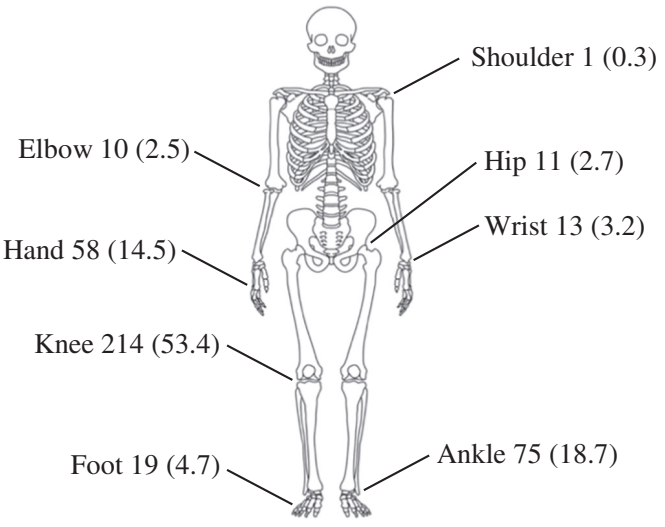

Figure 1. Anatomical distribution of 401 PVNS cases from 2002 to 2015 (%).

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