Skeletal Radiol (2008) 37:351–355
DOI 10.1007/s00256-007-0430-3

CASE REPORT

Lateral meniscal cyst causing common peroneal palsy

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Received: 10 August 2007 / Revised: 23 October 2007 / Accepted: 23 November 2007 / Published online: 12 January 2008

Abstract Lateral meniscal cysts are relatively common, but only in rare instances do they cause common peroneal nerve irritation. There are, we believe, no cases reported in which both the sensory and motor functions of the nerve have been compromised. We present a case of a lateral meniscal cyst that became palpable and led to symptoms of numbness and weakness in the distribution of the common peroneal nerve. The MRI findings were of an oblique tear of the lateral meniscus with an associated multiloculated meniscal cyst that coursed behind the biceps tendon before encroaching on the common peroneal nerve. Surgical resection confirmed the tract as located on the MRI and histology confirmed the mass to be a synovial cyst. Resection of the cyst and arthroscopic excision of the meniscal tear led to resolution of the symptoms in 3 months.

Keywords Lateral meniscal cyst · Common peroneal nerve · Nerve palsy

Introduction

Space-occupying lesions occurring in association with neuropathy of the common peroneal nerve are not uncommon. Ganglion cysts of the proximal tibio-fibular joint leading to intraneural ganglia [1–5] causing a compressive neuropathy are the most frequent aetiology; however, the differential diagnoses to be considered are benign or malignant tumours of the adjacent anatomical structures (e.g. osteochondroma) or of the peripheral nerve itself. Lateral meniscal cysts have also been reported to cause sensory [6] and motor [7, 8] neuropathy, but, to our knowledge, never both.

Distinction between the above is usually possible using magnetic resonance imaging (MRI). Our case underlines the importance of considering lateral meniscal cyst in the differential diagnosis of a palpable mass on the lateral aspect of the knee in association with abnormal function of the common peroneal nerve.

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Case report

A 26-year-old woman presented with a palpable mass on the lateral aspect of her right knee together with foot drop. She had initially noticed a mass in the region 3 months prior to presentation, associated with pins and needles on the dorsum of her foot; there had been no preceding trauma. The mass spontaneously reduced in size until it was impalpable and the hyperaesthesia resolved. Two days prior to presentation the mass recurred following a long run, but no specific injury. A small focal region of numbness also developed on the dorsum of the foot. On the day of presentation she developed foot drop. There was no history of spinal problems.

On examination a 1.5 × 1.5-cm mass was palpable just posterior to the proximal fibula. It was ballotable and mildly tender. Examination of the knee was otherwise unremarkable, specifically no joint line tenderness and a negative McMurray's test. The power of the tibialis anterior was 2/5 (with 5/5 representing full power and 0/5 being absent), extensor hallucis longus 1/5, peroneus longus and

brevis 2/5 (Medical Research Council Grading System [9]) and there was decreased sensation on the distribution of the deep peroneal nerve and medial branch of the superficial peroneal nerve, as assessed using Semmes-Weinstein filament (5.07 g; Kom Kare, Middletown, OH, USA).

Radiological findings

Plain radiographs did not reveal any abnormality apart from minor soft tissue swelling over the lateral aspect of the fibular head and neck regions. Soft tissue calcification and a bone lesion were excluded. MRI (1.5 T; General Electric, Echospeed Plus (Milwaukee, WI, USA) was performed. The following sequences were performed with STIR (short tau inversion recovery; TR: 5,920, TE: 53.5; Fig. 1) and T1- weighted (TR: 560, TE: 9.7) in the coronal plane, and STIR (TR: 3,260, TE: 58; Figs. 2, 3), T1-weighted (TR: 540, TE: 9) and T2-weighted in the axial plane. After the administration of contrast enhancement three-plane fat suppression images were performed (TR: 590–700, TE: 9.7; Figs. 4, 5). They revealed an oblique tear of the lateral meniscus extending to the lateral border (hyperintense signal on a STIR sequence). The same sequence revealed a multi-loculated cyst extending from the anterior lateral meniscus all around its rim to pass in front of the popliteus tendon and posterior to the biceps femoris tendon to encounter the common peroneal nerve, which itself was thickened. It then passed down with the nerve showing evidence of rupture in this region, with the lower loculation and fluid from the rupture extending down into the peroneus longus muscle (this was represented as a high signal that could, on this sequence have represented early denervation of the peroneus longus, but given the acute onset of the consistent neurological signs the former was felt to be more likely (see Fig. 3). High signal on STIR sequence and rim enhancement on T1 with fat suppression following contrast confirmed its cystic nature. Apart from the lateral meniscal tear there was no evidence of other structural knee injury.

Fig. 1 Short tau inversion recovery (STIR) coronal image demonstrating high signal (*arrow*) curving around the neck of the fibula, in direct continuation with the meniscal cyst (see Fig. 2)

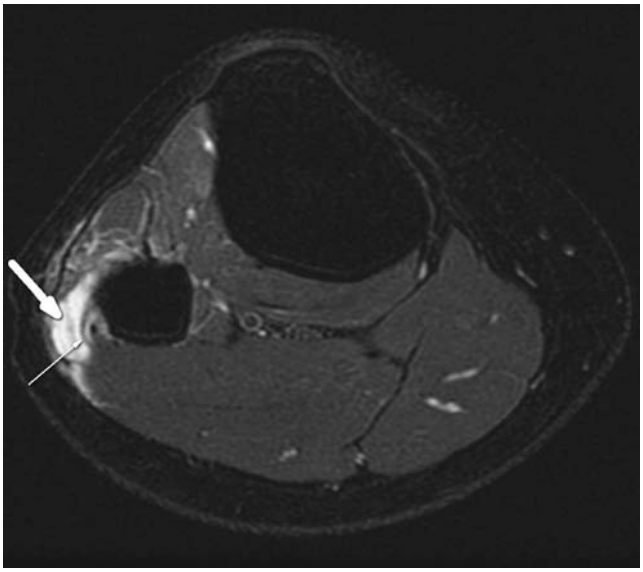

Fig. 2 Short tau inversion recovery (STIR) axial image demonstrating meniscal cyst (*solid thick arrow*) causing compression of the common peroneal nerve (*thin arrow*)

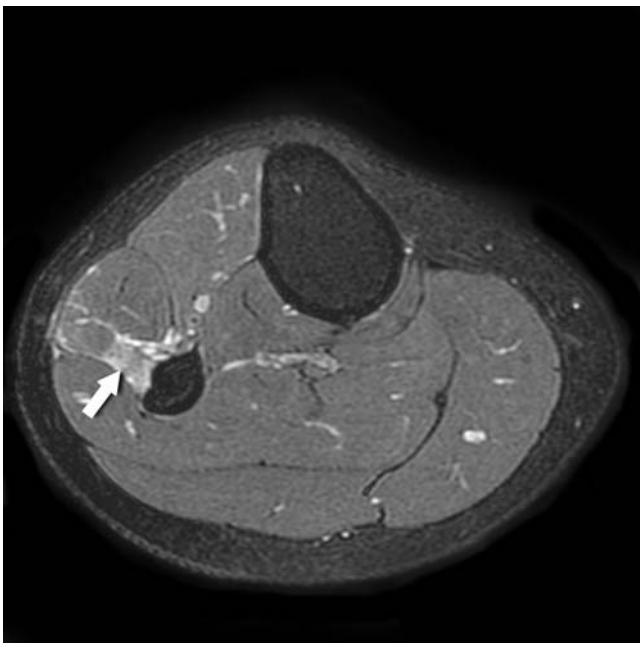

Fig. 3 More distal STIR axial image demonstrating high signal in the deep portions of the peroneus longus muscle (*arrow*) in keeping with early denervation, or fluid emanating from the partially ruptured meniscal cyst

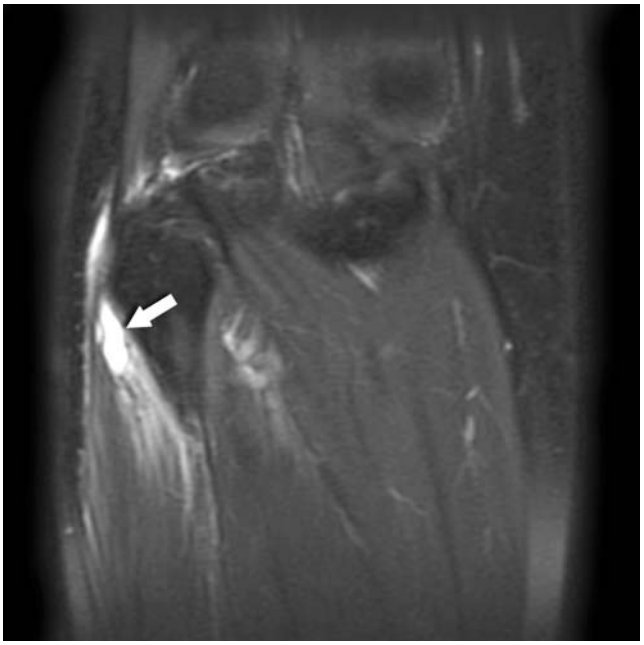

Fig. 4 Coronal T1-weighted image after the administration of intravenous contrast with fat suppression demonstrating an oblique meniscal tear extending from the tibial surface through to the lateral margin (*arrow*)

Surgical findings

Surgical exploration confirmed the radiological findings. The horizontal tear of the lateral meniscus was excised arthroscopically and the cyst excised using an open technique,

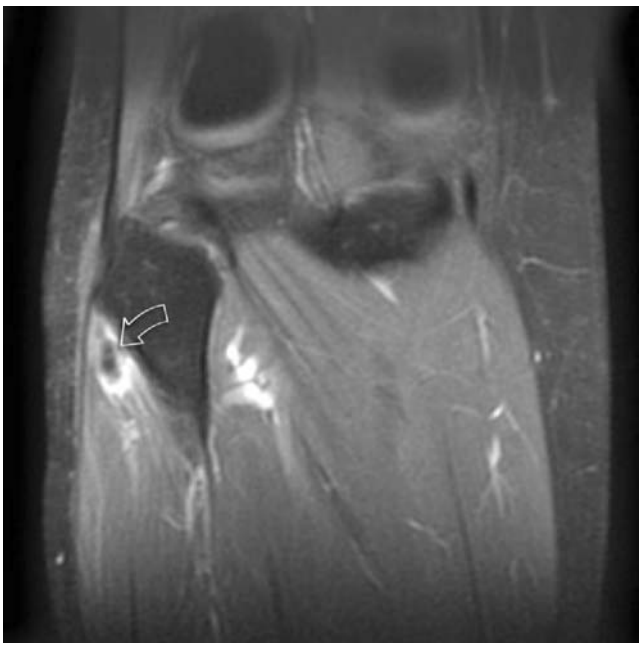

Fig. 5 Coronal T1-weighted image after the administration of intravenous contrast with fat suppression demonstrating peripheral enhancement (*arrow*) of the same region as seen in Fig. 4, and confirming its cystic nature

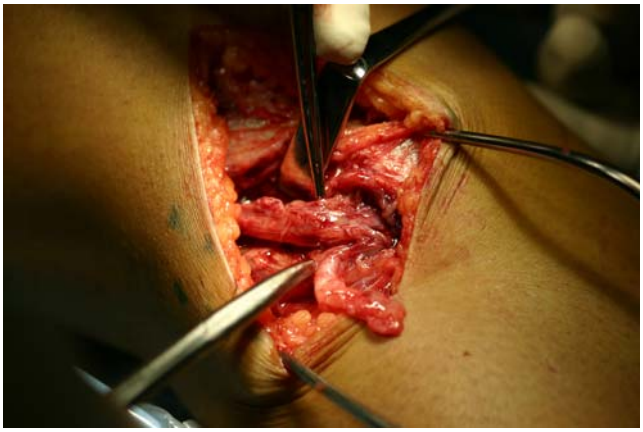

Fig. 6 Surgical photograph showing the cyst and its relationship to the common peroneal nerve and the biceps tendon inserting into the fibula

which confirmed that the cyst was extrinsically compressing the nerve which was mildly thickened (see Figs. 6, 7, 8).

Pathological findings

Microscopic examination of the cyst using haemotoxylin and eosin staining revealed focally reactive synovial cells with surrounding dense fibrous tissue. The features were characteristic of a synovial cyst (see Fig. 9).

At 3 months postoperatively, the patient's symptoms had completely resolved with a return of normal sensation and power of the common peroneal innervated muscles.

Discussion

Lateral meniscal cysts are relatively common and are classically associated with horizontal tears of the lateral meniscus [10, 11]. They occur most commonly secondary to trauma or degenerative change; however, as in our case,

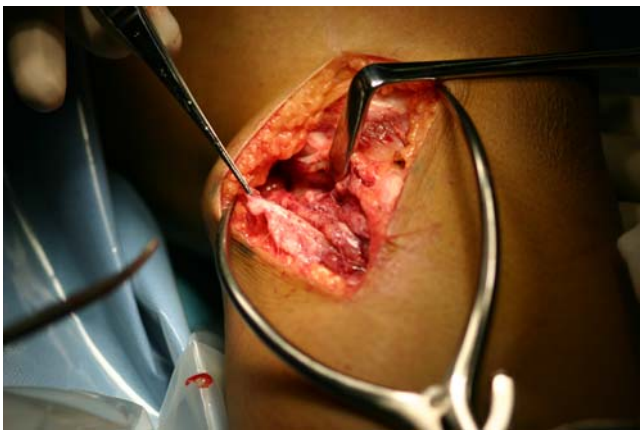

Fig. 7 Surgical photograph showing the cyst and its relationship to the common peroneal nerve and the biceps tendon inserting into the fibula

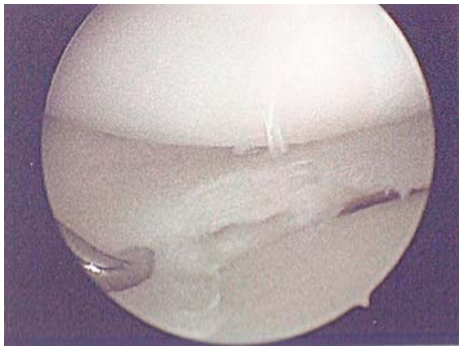

Fig. 8 Arthroscopic photograph showing horizontal tear of the lateral meniscus

in only 50% of cases is a history of trauma elicited [10, 12]. They are more common in men than women (2 to 3:1) and occur at an average age of 30–40 years [10, 11]. Their presence usually leads to positive joint line tenderness on examination and a palpable mass in 60% of cases [13].

Pathologically, the cyst develops as a result of softening of the meniscus in the region of the meniscocapsular junction [14]. Movement of the knee forces synovial fluid through this region and thus a cyst develops. Cysts of the lateral meniscus have been reported to be detected clinically three times more commonly than those of the medial meniscus [11]; however, some studies have shown that on MRI the incidence may be equal or in fact the reverse [15–17]. Lateral meniscal cysts tend to be smaller due to being confined by the soft tissues of the lateral (in particular the posterolateral corner) side of the knee, but are more often symptomatic [12]. The relative mobility of the lateral meniscus provides a potential space for the cyst. The

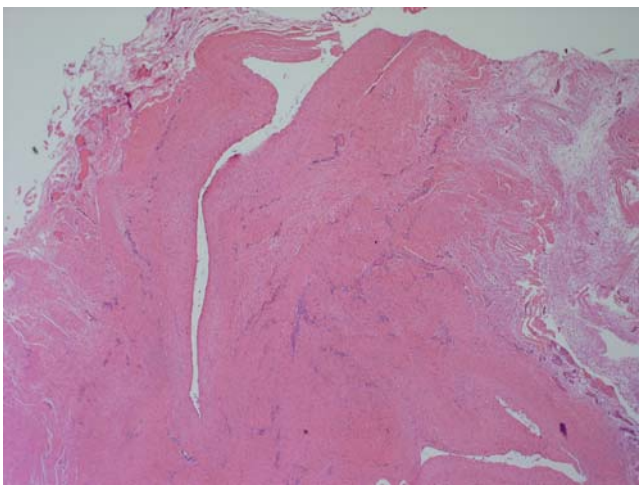

Fig. 9 Haematoxylin and eosin staining of the cyst tissue, revealing a cleft-like space lined by focally reactive synovial cells

popliteus muscle, the fibulopopliteal ligament, the biceps tendon and the lateral collateral ligament separate an emerging cyst from the common peroneal nerve.

The common peroneal nerve emanates from the popliteal fossa as one of the two components of the sciatic nerve. It passes medial to the biceps tendon deep to the lateral head of the gastrocnemius, around the neck of the fibula, through a tight opening in the fascia overlying the tibialis anterior, deep to the peroneus longus. Here it divides into the superficial and deep peroneal nerves to provide motor innervation to the ankle and toe dorsiflexors (deep peroneal) and the ankle everters (peroneus longus and brevis, superficial peroneal) as well as the sensory innervation to the dorsum of the foot. During its course it gives off three articular and two cutaneous branches [18]. The common peroneal nerve is, however, in close proximity to the joint capsule posterior to the popliteus tendon.

The published literature describes cysts passing posteriorly to encounter the common peroneal nerve [6, 7], although the description of the path of the cysts is not more specific. In the latter publication the cyst appeared to track from a posterior horn tear round to lie in the extensor digitorum longus. This extrusion into a muscle is unusual, but was also present in our case, in which the cyst extruded and ruptured into the peroneus longus muscle.

There has been more detailed study of the course of the cysts arising from the superior tibiofibular joint that compress/erode into the tibial and common peroneal nerve. These tend to follow the articular branch of the respective nerves, which innervate the aforementioned joint [4, 19].

The MR images in this case revealed a definitive tract, confirmed at surgery, for a meniscal cyst. It would appear to be tracking back along the articular branch of the common peroneal nerve, which passes with the inferior geniculate artery. This passes from the popliteal artery over the popliteus, deep to the lateral head of the gastrocnemius and under the fibular collateral ligament and biceps tendon to the knee joint. The other articular branches follow the paths of the superior and the recurrent articular artery [18].

The MRI appearances were classical for both a horizontal/oblique lateral meniscal tear and a meniscal cyst with high signal in both regions on STIR images and the cyst showed peripheral rim enhancement on T1-weighted images after the administration of intravenous contrast with fat suppression. Other classical MRI findings of meniscal cysts, such as low signal on T1 and high signal on T2, were also present [20]. The radiological differential diagnosis for soft tissue, apparently cystic masses around the knee joint include other ganglion cysts, synovial sarcoma with more cystic or haemorrhagic components or pathologies related to joints such as synovial osteochondromatosis or Baker's cyst. Clear visualisation of the meniscal tear and continuation into the cystic structure allowed for the diagnosis of a

parameniscal cyst, which is the case for most, but not all such cysts [17].

The associated neurology was more pronounced than in other published cases, but resolved in 3 months (as was the case in other similar reports [7, 8].

The case clearly demonstrated the usefulness of MRI in differentiating the mass from an intraneural ganglia or other neural or soft tissue tumour. Demonstration of the meniscal tear in the absence of a history of trauma or joint line tenderness also facilitated the correct surgical approach.

In conclusion, lateral parameniscal cysts may have unusual anatomical paths and be associated with both sensory and motor nerve deficits. Being aware of these features helps with correct diagnosis.

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