

CASE REPORT

An Anteriorly Presenting ‘Wrap Around’ Popliteal Cyst

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Abstract

The article describes a case in which a popliteal cyst was identified presenting as a mass on the anterior aspect of the right tibia. This occurred as a result of polyethylene wear debris from previous total knee arthroplasty. Although alternative diagnoses for an anterior tibial mass are more likely, a popliteal cyst must be considered, particularly if the patient has a history of total knee arthroplasty.

Keywords: Baker’s, Cyst, Popliteal

Introduction

The popliteal cyst, as first described by William Baker in 1877, is defined as a fluid-filled mass that is a benign swelling of bursa in the popliteal fossa, usually the gastrocnemio-semimembranosus bursa (1). Popliteal cysts nearly always have a cause, normally being a reaction to loose bodies formed in conditions such as osteoarthritis (OA), rheumatoid arthritis or in the presence of meniscal tears (1). More recently, popliteal cysts have been seen in relation to wear particles following knee arthroplasty, mostly from the polyethylene liner (1, 2).

Popliteal cysts in adults typically present with posterior knee pain, a localised swelling and a feeling of tightness in the popliteal region. Upon examination, a tender palpable mass may be felt in the popliteal fossa (2). However, it must be noted that fewer than half of patients with a confirmed popliteal cyst on ultrasonography had any positive clinical findings, so clinical examination results must be treated with caution (1). The gastrocnemio-semimembranosus bursa communicates with the knee joint capsule posteriorly (1). This communication allows synovial fluid to move between the two spaces and this is the reason that popliteal cysts usually present posteriorly or rarely laterally (1–3). We report the case of a patient who developed a symptomatic, complex popliteal cyst with an unusual presentation, on the anterior aspect of the tibia, fourteen years after total knee arthroplasty (TKA).

Case presentation

A 75 year-old male underwent bilateral TKA (Active Knee – ADMS) for OA. His past medical history consisted of acromegaly and non-insulin dependent diabetes mellitus. The operation was successful, with an uneventful postoperative course, the patient had minimal pain and 0-115 degrees range of motion at 6 week follow-up. Fourteen years later, the patient returned with knee pain and a swollen mass located over the anterior aspect of his right tibia, which had been progressively increasing in size over the course of several months. He denied any history of trauma or constitutional symptoms.

Examination of the lower limb demonstrated no obvious swelling or effusions of either the knee or ankle joints. The swelling over the right tibia was a smooth, raised, fluctuant, non-pulsatile mass which was 5x3cm in size and not fixed to the overlying skin [Figure 1]. There was normal range of movement in both the knee and ankle joints. Upon examination of the popliteal fossa, a palpable popliteal cyst without any obvious communication with the anterior swelling was detected.

An ultrasound scan revealed a 150mm x 40mm cystic lesion with some solid material within it located over the anterior aspect of the right proximal tibia. Plain film anterior-posterior and lateral radiographs demonstrated moderate wear of the polyethylene insert as well as joint space narrowing and osteophytes affecting the patella

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Figure 1. Image of right lower limb showing mass over anterior aspect of tibia viewed from medial side.

femoral joint.

Magnetic resonance imaging (MRI) of the right knee and proximal tibia revealed a large cyst arising from the posterolateral aspect of the knee extending inferomedially, deep to the popliteus muscle, wrapping around the posterior and medial surface of the tibia at the medial edge of the soleus muscle [Figure 2]. The cyst was associated with an area of bone resorption in the central part of the tibial metaphysis between the four metallic prongs of the tibial tray.

Laboratory blood tests showed a normal C-reactive protein and erythrocyte sedimentation rate. Sterile

aspiration of the right knee joint was performed; Gram stain and culture of the joint fluid were negative for micro-organisms. On polarisation, the aspirate scattered brightly polarisable debris of variable size consistent with polyethylene wear particles.

Following a failed period of conservative management, the patient was consented for revision TKA. Exposure of the knee joint through the original medial arthrotomy revealed extensive polyethylene debris and synovitis and therefore a full synovectomy was performed. Femoral and tibial components were well fixed and so were left in situ, the polyethylene liner was replaced.

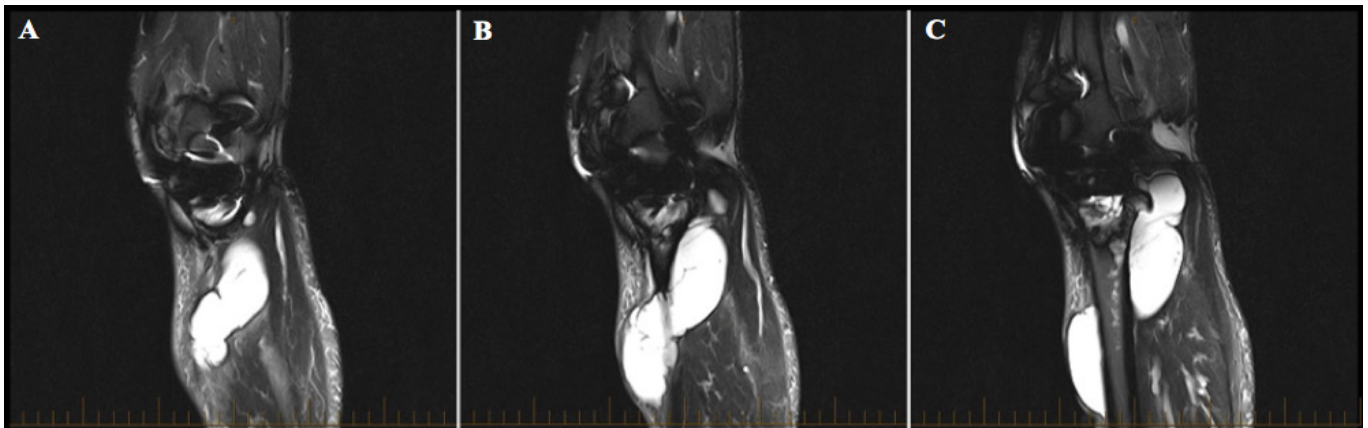


Figure 2. T2 weighted sagittal MRI of right knee, showing the popliteal cyst extending inferomedially around the tibia images progress from medial aspect laterally from A-C.

It was not possible to drain the popliteal cysts intra-articularly through the posterior aspect. The large fluctuant collection at the anteromedial aspect of the proximal tibia was opened and the complex cyst was drained distally resulting in over 70ml of gelatinous fluid with fibrin and polyethylene debris being drained from this area. The wound was closed in layers and a Robert-Jones bandage was applied. The post-operative course was uneventful with good patello-femoral tracking and a stable knee with good range of movement, including near full extension and flexion to 90°. Twelve-month follow-up confirmed good ongoing function and with no recurrence of the cystic lesion anteriorly and no symptomatic recurrence posteriorly in the popliteal fossa.

Discussion

The popliteal cyst described in this case report is thought to have occurred as a result of a reaction to the accumulation of polyethylene wear particles. In the absence of infection, degradation of the polyethylene implant can lead to aseptic loosening and is the most common cause of arthroplasty failure (1). The anterior presentation of a popliteal cyst is exceptionally rare, and other diagnoses for an anterior mass in the lower limb such as erythema nodosum, cellulitis, rheumatoid nodules and soft tissue tumours may be more likely (1). Popliteal cysts usually present with a painless mass in the medial side of the popliteal fossa, larger popliteal cysts can present with impaired knee flexion or extension and pain, although this may be caused by the underlying abnormality in the knee. MRI is the imaging modality of choice to investigate soft tissue abnormalities and has the added advantage of being accurate at diagnosing associated joint disorders (4).

Popliteal cysts can extend, medially, laterally or superiorly. Arthrography has shown communication between the gastrocnemio-semimembranosus bursa and the knee joint capsule, which allows movement of fluid between the two spaces (5). A valve-like mechanism that allows only unidirectional flow from the joint into the bursa has been described in some of these openings and is believed to play a role in the development and propagation of popliteal cysts. Abdelrahman et al. described a case of a popliteal cyst that dissected proximally and ruptured in the soft tissue of the thigh (6-8). Jensen and Jorgensen described a case of a popliteal cyst presenting as a lateral knee mass after herniation through the iliotibial band (9). Hammoudeh et al. and Ushiyama et al. have both published reports in rheumatoid patients of an anteriorly dissecting

popliteal cyst causing anterior lower leg compartment syndrome (10, 11). To our knowledge there is only one other report in the published literature of a popliteal cyst presenting as an un-ruptured anterior mass. In 1984, O'Dell et al. described a case of an anterior cyst which originated on the postero-lateral aspect of the knee and tracked obliquely round the back of the tibia to present on its antero-medial surface (12). In this case arthrography showed the cyst communicated with the knee capsule directly. MRI has shown that the case presented in this manuscript also presented with an anterior swelling due to a medial 'wrap around' popliteal cyst with the shape of a 'curved barbell'. According to Pascal's principle, pressure exerted anywhere in a confined incompressible fluid is transmitted equally in all directions throughout the fluid such that the pressure ratio remains the same. The result is that joint fluid that is compressed will flow along the path of least resistance. In this case, the path of least resistance was inferomedially beneath popliteus and soleus, resulting in a mass presenting subcutaneously over the anterior tibia. Popliteal cysts usually rupture before such extensive propagation occurs and may point to development of the cyst over a considerable period of time.

Summary

Polyethylene wear debris following TKA can lead to a variety of pathologies, including a popliteal cyst. Although the vast majority of popliteal cysts present posteriorly, our case illustrates that it can rarely present as a swelling on the anterior surface of the proximal tibia. It must therefore be considered, as part of the differential diagnoses in such cases, particularly when faced with a patient with a previous history of an ipsilateral TKA.

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