Bilateral knee lipoma arborescens: a case report

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ABSTRACT

A 45-year-old Chinese man presented with recurrent bilateral knee swelling and pain. He was initially diagnosed with gouty arthritis, but later found to have lipoma arborescens. Magnetic resonance imaging demonstrated frond-like proliferations of fatty synovium. Arthroscopic synovectomy was performed. Histological examination of the specimen revealed villiform fatty tissue covered by slightly thickened synovium characteristic of lipoma arborescens. Magnetic resonance imaging is useful in differentiating lipoma arborescens from other intra-articular lesions in patients with recurrent knee pain and swelling.

Key words: arthroscopy; knee joint; lipoma; magnetic resonance imaging

INTRODUCTION

Lipoma arborescens is a rare benign intra-articular hyperplastic tumour characterised by villous, polyploid, and lipomatous proliferation of the synovium, with the subsynovial layer replaced by mature fat cells. The term ‘arborescens’ originated from the Latin word *arbor* meaning tree, describing the characteristic tree-like morphology. The knee is most commonly affected, especially over the supra-patellar region, but the hip, wrist, and ankle can also be involved. Bilateral knee involvement is not uncommon and occurs in up to 20% of affected patients in some studies. Patients usually present with recurrent knee pain and swelling. Diagnosis is often delayed because of its rarity and benign nature. Our patient had a history of gouty arthritis, which further complicated the diagnosis.

CASE REPORT

In April 1999, a 45-year-old man presented with a 3-year history of right knee swelling and pain that limited flexion. He had no history of injury, but did have infrequent gouty attacks. One year earlier, he underwent knee aspiration, which yielded some clear fluid, and was treated with non-steroidal anti-inflammatory drugs (NSAIDs).

Physical examination revealed a soft tissue mass...
in the right supra-patellar region measuring about 10 cm in diameter, with mild dull tenderness over the medial tibiofemoral joint line. The range of movement was 0° to 120°, with 5° varus but no evidence of ligamentous laxity. Blood tests showed a normal leukocyte count and differential. The erythrocyte sedimentation rate was not elevated. Other laboratory studies were unremarkable. Radiographs showed mild narrowing of the joint space especially over the medial tibiofemoral joint, with osteophyte formation around the patellofemoral and tibiofemoral joints, but no evidence of articular erosion. The findings were consistent with mild degenerative changes.

The initial diagnosis of gouty arthritis was made and fine needle aspiration yielded 45 ml of pale yellowish fluid. Cytological examination was inconclusive. Urate crystals were not detected. The pain and swelling improved initially after aspiration. As the soft tissue mass in the suprapatellar pouch could not result from gouty arthritis, magnetic resonance imaging was performed to delineate the lesion. There was frond-like proliferation of the synovium showing T1-hyperintense signals within the villi representing complete fat saturation, most severe at the suprapatellar pouch. The findings were consistent with lipoma arborescens (Fig. 1).

Arthroscopic resection was proposed, but the patient declined and defaulted follow-up. Three and a half years later, he presented with bilateral knee soft tissue masses. Radiographs of the left knee showed osteophyte formation and mild narrowing of the medial tibiofemoral joint space. Magnetic resonance imaging suggested the diagnosis of lipoma arborescens (Fig. 2).

Diagnostic arthroscopy was performed on the right knee only and demonstrated diffuse yellowish frond-like synovial projections in the suprapatellar pouch in addition to some degenerative changes (Fig. 3). The synovial lesion was excised with a shaver using a 4-portal inter-changing technique. Histological examination of the synovium showed multiple villiform fatty tissue covered by a slightly thickened synovium (Fig. 4).

The patient’s recovery was uneventful, though he complained of persistent right knee effusion 5 weeks postoperatively. 120 ml of clear pale yellowish fluid was aspirated from the right knee. Subsequently, the knee effusions became refractory despite repeat aspirations. He also received NSAIDs for the treatment of gout at another hospital and continued to experience occasional knee pain. At 7-year follow-up, he had no effusions in either knee, with a range of movement of 0° to 130°.

**DISCUSSION**

Refractory knee effusion is the most common symptom before and after excision of lipoma arborescens. Its exact cause is unknown. It could be due to the increase of the total surface area of the synovial membrane as a result of villous proliferation, or
due to the underlying degenerative joint disease, as the amount of abnormal synovium is reduced considerably after resection. The subsidence of effusion is either due to the natural cycle of symptoms or the effect of NSAIDS.

The aetiology of lipoma arborescens remains unknown. There is an association between lipoma arborescens and degenerative joint disease, but a causal relationship is difficult to establish. It has been suggested that there are 2 types of lipoma arborescens: primary and secondary. The primary type is rarely seen as a cause of degeneration of the knee joint.\(^7\)\(^,\)\(^8\) Chondromalacia of the lateral tibial plateau was found in a 9-year-old girl with lipoma arborescens.\(^9\)

The secondary type is defined as lipomatosis associated with chronic irritation and is more common than the primary type. It is a reactive process of the synovium secondary to chronic irritation, as is seen with degenerative joint diseases, trauma, meniscal injuries, chronic synovitis or arthritis, rather than a true neoplasm.\(^1\)\(^,\)\(^5\)

Patients typically present with chronic painless swelling of the knee of several years’ duration. The lesions are soft in consistency and non-tender on palpation. Recurrent knee effusions may decrease the range of movement. As the concurrent degenerative joint disease worsens, the patient may experience pain. Tenderness over the joint line, limited range of movement, and joint crepitus are non-specific findings associated with many degenerative joint diseases. Most patients with lipoma arborescens do not have a history of trauma and their symptoms are cyclical, with intermittent exacerbations caused by the mechanical trapping of the lipoma villi inside the joint space.\(^5\)

Laboratory findings are generally unremarkable.\(^5\)\(^,\)\(^9\)\(^,\)\(^10\) Blood tests usually show a normal leukocyte count and erythrocyte sedimentation rate. Joint fluid is typically negative for crystals and bacteria. Plain radiographs commonly show features of degenerative joint disease, i.e. narrowing of the joint space, osteophyte formation, subchondral sclerosis, and bony cyst formation.

Magnetic resonance imaging is the gold standard to diagnose lipoma arborescens.\(^6\)\(^,\)\(^11\)\(^,\)\(^12\) The features are pathognomonic: hypertrophic adipose proliferation of the subsynovial tissues, especially using the fat-suppressed or short T1 inversion recovery sequences. The pathologies include joint effusions, degenerative changes, synovial cysts, bone erosions, and chondromatosis.\(^6\)

The differential diagnosis of lipoma arborescens includes pigmented villonodular synovitis, true intra-articular lipoma, synovial chondromatosis, and chronic inflammatory synovial proliferation. Pigmented villonodular synovitis produces a diffuse low-intensity signal on T1- and T2-weighted sequences, related to haemosiderin deposition.\(^13\)

Synovial chondromatosis shows variable intensity signals according to the cartilaginous nature of the lesion.\(^14\) The differentiation between the lipoma arborescens and intra-articular lipoma lies in the microscopic and macroscopic appearances. Under the microscope, lipoma arborescens reveal a diffuse replacement of the subsynovial layer by mature fat cells with a moderate infiltration of mononuclear
inflammatory cells. Intra-articular lipoma, which may be covered by synovium, does not arise from or replace the subsynovial layer. Intra-articular lipoma lacks the villous frond-like appearance.

The recommended treatment for lipoma arborescens is arthrotomy and synovectomy. Arthrotomy is more invasive and may not provide adequate access to the posterior compartment of the knee joint. Arthrotomy is more commonly used as it can be performed arthroscopically. The lesion is usually accessible through standard arthroscopic portals. This minimally invasive method not only reduces soft tissue trauma but also facilitates postoperative rehabilitation. Although some patients may have recurrent knee effusions, actual recurrence of lipoma arborescens is rare.

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