

Case Report

The Arthroscopic Appearance of Lipoma Arborescens of the Knee

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Summary: Lipoma arborescens is a rare intra-articular lesion consisting of a villous lipomatous proliferation of the synovial lining. This case report draws attention to the history, physical findings, and arthroscopic appearance of lipoma arborescens, a rare lesion of the synovial lining of the knee. Arthroscopically, the lesion appears as a synovial lesion with numerous fatty-appearing globules and villous projections. In addition, magnetic resonance imaging is a valuable tool to differentiate the lesion from rheumatoid arthritis, pigmented villonodular synovitis, and synovial chondromatosis in those patients who present with a chronic, swollen, and painful joint. **Key Words:** Lipoma arborescens-Arthroscopy-Villous lipomatous proliferation-Knee.

Lipoma arborescens is a very rare intra-articular lesion consisting of a villous lipomatous proliferation of the synovial lining. Most cases have been reported in the knee, but cases have also been reported in the hip, wrist, and ankle. To the authors' knowledge, this is the first report to describe the arthroscopic appearance of this rare synovial lesion.

CASE REPORT

A 48-year-old obese black woman presented with a 4-year history of medial right knee pain that had become progressively worse. The pain was associated with knee swelling, was aggravated by weight-bearing, and was not relieved by nonsteroidal anti-inflammatory

drugs. She denied a history of trauma, previous infections, or prior surgery of the right leg. She had no history of tuberculosis or inflammatory arthritides.

The physical examination showed that she had an antalgic gait on the right but a normal right lower extremity alignment. No skin lesions were noted. The right knee was swollen with a boggy, tender mass along the anterior and medial knee. Range of motion was from -15° to 105° of flexion. Her knee was stable to stress testing. Valgus stress testing recreated painful crepitation along the medial joint line at 30° of flexion. In addition, she showed patellofemoral crepitation with range of motion.

Radiographs of the right knee showed diffuse lytic defects involving the medial femoral condyle and tibial plateau and below the tibial eminence (Fig 1). There was diminished joint space medially with mild osteophytic changes and subchondral sclerosis. The lateral compartment and patellofemoral joint showed no radiographic changes.

Laboratory studies showed a leucocyte count of 8,550/mL with a normal differential. Her hemoglobin was 11.2 g/dL and the Westergren sedimentation rate was elevated at 43 mm/hr. All other laboratory studies

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FIG 1. (A) Anteroposterior and (B) lateral radiographs of the right knee. Diffuse lytic lesions involving the medial compartment of the knee were seen.

were normal. A clinical diagnosis of pigmented villonodular synovitis was initially made, and a magnetic resonance image (MRI) was obtained to further delineate the extent of the lesion. The MRI showed villous proliferation of normal appearing fat involving the suprapatellar bursa, fat pad, and the medial and lateral gutters (Fig 2). The posterior capsule appeared normal. The lesion did not extend beyond the capsule and did not appear to infiltrate into the bone. The signal did not have characteristics of hemosiderin or calcium. A provisional diagnosis of lipoma arborescens was made based on the MRI characteristics, and the diagnosis of pigmented villonodular synovitis was excluded. The patient was taken to the operating room, where an examination under anesthesia was performed. An ill-defined fullness of the medial and suprapatellar joint was present. Arthroscopy showed large, multiple globular and villous projections of whitish and sometimes translucent synovial-covered tissue involving the anterior and suprapatellar compartments (Fig 3). The posterior compartment, as visualized through the intercondylar notch, was normal. There was no significant hyperemia noted. The medial tibio-femoral compartment and patellofemoral joint had significant grade III/IV chondromalacia. The villous projections were not seen to infiltrate into the bone. It was felt that the mass was too large to perform an arthroscopic resection adequately.

An anterior synovectomy was performed through a medial parapatellar arthrotomy (Fig 4). The dissection between the subsynovial layer and extracapsular connective tissue was easily performed allowing the capsule and synovium to be completely removed from the anterior joint and suprapatellar bursa. The retropatellar fat pad was also partially involved, and the abnormal tissue was removed with sharp dissection to normal appearing tissue. Minimal bleeding was encountered when the tourniquet was deflated. After removal of the mass, there was considerable redundancy of the anterior capsule. A medial capsular reefing was performed to restore normal patellofemoral tracking. A biopsy examination of the anteromedial proximal tibia was then performed with a 4-mm bone-biopsy cannula.

The resected specimen consisted of a light yellow adipose tissue mass that measured $13.0 \times 11.0 \times 5.0$ cm in greatest dimensions and weighed 187 g (Fig 5). About two thirds of the surface area was studded with multiple light yellow fatty tags; the smallest measured 0.4 cm in diameter and the largest measured $3.5 \times 2.0 \times 1.3$ cm in greatest dimensions. The rest of the surface was covered with gray-white to light-yellow, more slender, finger-like (villous) structures ranging from 0.2 to 1.1 cm in height and with an average diameter of 0.2 cm. The cut surface of the specimen was predominantly light-yellow and fatty. There was a small portion of gray-white fibrous and membranous tissue, especially toward the base. There were no hard or cartilaginous areas present. No areas of hemorrhage or pigmentation were identified.



FIG 2. MRI of right knee on 1.5T coronal proton density image shows intra-articular masses (↑) with signal characteristics similar to subcutaneous fat (*).

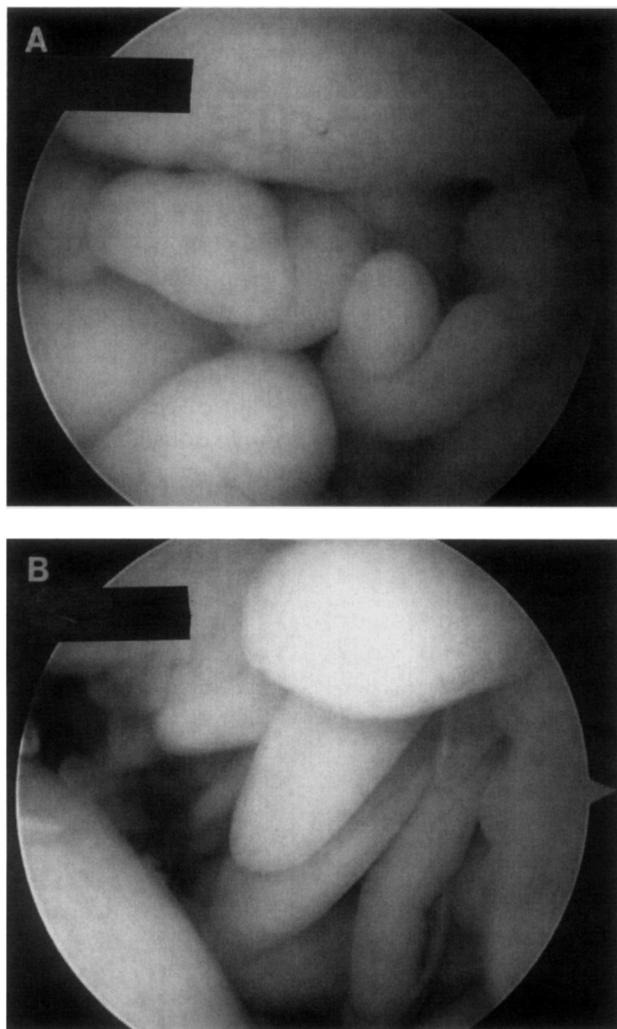


FIG 3. Arthroscopic appearance of lipoma arborescens. It appears as a synovial lesion with numerous fatty-appearing globules and villous projections. (A) Patellofemoral joint, (B) medial compartment gutter.

The central portions of the big lipomatous tags were made up of predominantly adipose tissue with little or no fibrous stroma, whereas those of the slender villous structures were made up of varying mixtures of fat and fibrous tissue. Some of them contained only fibrous tissue with mild chronic inflammation, and some of the villous projections were infarcted (Figure 6). There were no pigment deposits or multinuclear giant cells present. No mitotic figures or areas with cartilagenous differentiation were found. Examination of the bone biopsy specimen showed no pathological changes. Flow cytometric analysis was performed on the synovectomy specimen using the modified Vindelov procedure showing a diploid stemline with a low S-phase

fraction of 3.31%, which is consistent with a normal cell line and no evidence of malignancy.¹ Synovial fluid cultures showed no bacterial or fungal growth.

The patient's postoperative course was uneventful. She had immediate reduction of her knee pain. A 6-month follow-up examination showed wounds to be well healed, her pain with ambulation was significantly reduced, and her range of motion was from full extension to 110° of flexion.

DISCUSSION

Villous lipomatous proliferation of the synovium, or lipoma arborescens, is a rare, intra-articular, benign disease process of the synovium. The first mention of this entity, by Hoffa in 1904, described the clinical presentation, pathology, and treatment of "some cases" presented by Johannes Muller.² He was the first to differentiate this disease from hyperplasia of the

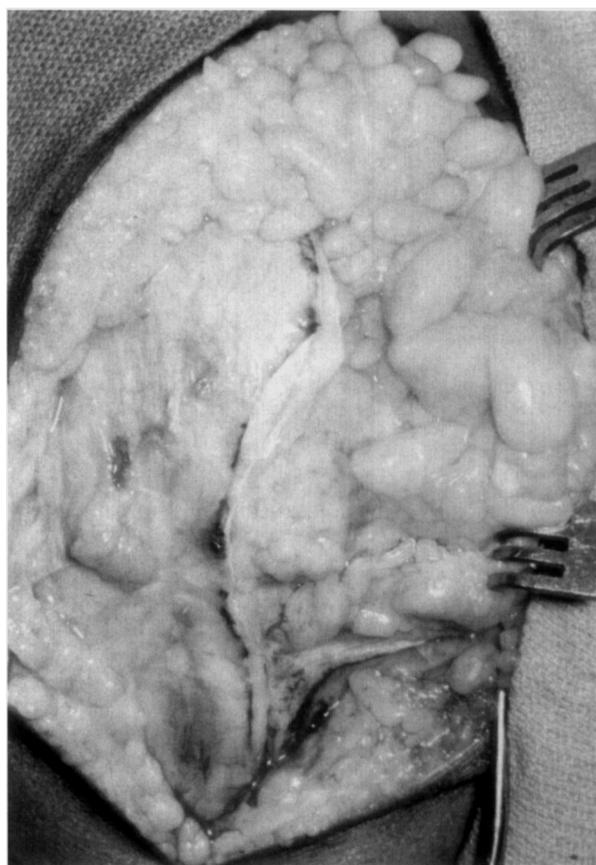


FIG 4. Appearance of lipoma arborescens lesions with an anterior medial arthrotomy. The lipoma arborescens lesion was seen to extrude through the arthrotomy incision.

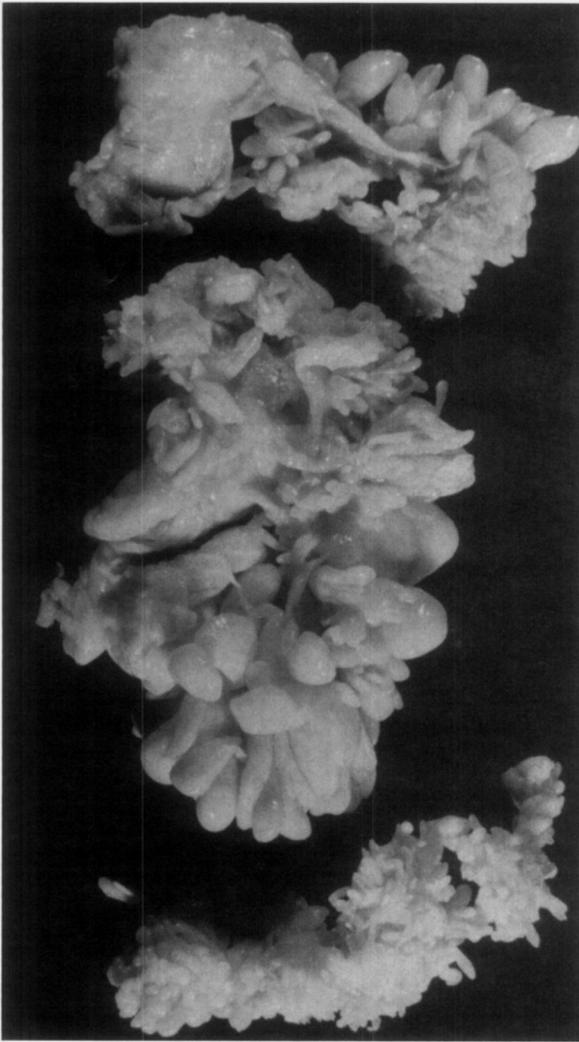


FIG 5. Gross picture of resected specimen with multiple fatty tags and slender villous structures on surface.

infrapatellar fat pad, usually a result of trauma or internal derangement, called "Hoffa's disease." The first case report was presented in 1957 by Arzimanoglu.³ Since then, 20 cases of this disease have been reported, the largest series being by Hallel, et al., in 1988.⁴⁻¹⁶ Most cases involve the knee, but involvement of the hip, wrist, and ankle is reported.^{11,14,16}

The majority of cases have very similar presenting characteristics, which are an insidious onset of knee swelling, usually for many years, followed by progressive pain and debilitation. Mechanical symptoms of locking or popping may occur, along with joint line tenderness and crepitus. The earliest reported onset of symptoms is 1 day, with the longest duration being 30 years. Twenty percent of the time, the presentation has

been bilateral.^{3,4,14} The majority of patients have no history of preceding trauma to the involved joint. Physical examination shows boggy crepitation of the anterior knee, with limitation of flexion. A hemarthrosis may be present.⁷ Plain radiographs show degenerative changes, such as joint space narrowing, osteophytes, and subchondral cystic changes in a majority of instances. Knee arthrograms have shown multiple, grape-like lobular intra-articular filling defects.^{5,10,15} Computed tomography scanning shows low signal intensity villonodular intraarticular masses.^{9,15} Recently, two reports have discussed the MRI findings that were diagnostic for this lesion.^{7,8} None of the cases had involvement of the posterior capsule or had infiltration of the pathological process outside the extraarticular soft tissues.

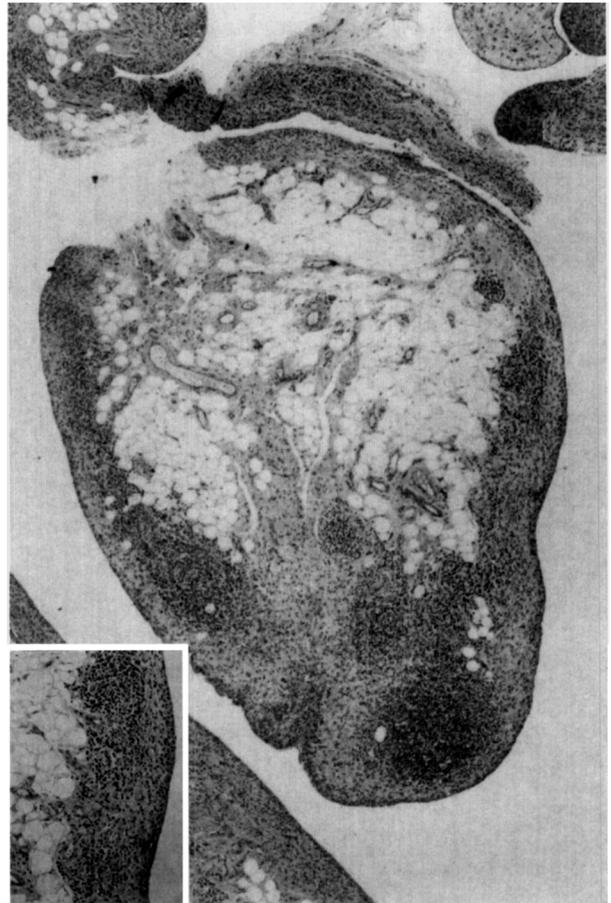


FIG 6. Histologically, the central portion of one of the surface processes (this one partly villous-like and partly tag-like) is made up of adipose tissue surrounded by a band-like area of chronic inflammation, sometimes forming lymphoid nodules with mild fibrosis. (H&E, original magnification $\times 40$). Insert shows close-up view of band-like infiltrate and associated hyperplasia of synovial lining cells (H&E, original magnification $\times 160$).

The arthroscopic appearance of lipoma arborescens that was encountered was very unusual but appears to be classical for this lesion, closely paralleling the MRI findings. The numerous globules and villous projections visualized filled a significant portion of the suprapatellar pouch and medial and lateral gutters (including the popliteal hiatus). The fatty-appearing globules appeared grossly to be covered by and intimately connected with the synovial lining of the joint.

All the reported cases have undergone open synovectomy, with most patients receiving relief of their presenting symptoms. Only Coventry et al.⁶ have reported a recurrence, which was in a 9-year-old with multiple lesions. One would assume that synovectomy can substantially reduce the chance of a recurrence. In our case, the lesions were too extensive to be treated with an arthroscopic synovectomy. We believe that the less extensive cases of lipoma arborescens of the knee could be treated with an arthroscopic anterior synovectomy because the lesion is accessible through standard arthroscopic portals, provided that a complete excision of the lesion can be performed.

Although only 20 cases of lipoma arborescens have been reported in the English literature, the majority of these cases have been reported in the previous decade. It would appear that this lesion, although quite rare, has been underreported in the past. We believe that it is important for the knee arthroscopist to have this lesion in the differential diagnosis, along with rheumatoid arthritis, pigmented villonodular synovitis, and synovial chondromatosis, for those patients with a chronic swollen and painful joint resulting from an apparent synovial lesion.

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