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INFLAMMATORY ARTHRITIS DRIVING RECURRENT KNEE JOINT EFFUSIONS AND POLYARTICULAR LIPOMA ARBORESCENCE: A CASE REPORT AND LITERATURE REVIEW

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ABSTRACT – ***Background:*** Lipoma arborescens (LA) is a rare, benign synovial disorder characterized by diffuse villous proliferation and replacement of the subsynovial connective tissue with mature adipocytes. Its diagnosis is often elusive due to its chronic and nonspecific clinical presentation.

Case Report: Our case involves a 27-year-old previously healthy male presenting with recurrent left knee effusions, managed conservatively with NSAIDs, corticosteroid injections, and serial arthrocentesis. Synovial fluid analysis demonstrated an inflammatory profile, and later imaging confirmed LA. Despite arthroscopic synovectomy, recurrent effusions persisted, and a polyarticular presentation involving the left elbow emerged, raising suspicion of an underlying spondyloarthropathy. Due to military service constraints, disease-modifying antirheumatic drugs (DMARDs) were initially deferred. However, following retirement, the patient started on sulfasalazine, later transitioning to adalimumab, with significant symptomatic improvement. As of January 2026, he remains asymptomatic, though a definitive diagnosis of inflammatory arthritis is pending further evaluation.

Conclusions: This case highlights lipoma arborescens as a potential manifestation of underlying inflammatory arthritis rather than an isolated synovial process, particularly in patients with recurrent or polyarticular effusions.

KEYWORDS: Inflammatory, Arthritis, Rheumatoid, Psoriatic, Lipoma, Arborescence, Case report.

INTRODUCTION

Lipoma arborescens (LA) is a rare benign synovial lesion characterized by diffuse villous proliferation of subsynovial fat, producing the characteristic tree-like appearance on imaging. Histologically, it consists of mature adipocyte proliferation within the subsynovial tissue and may be accompanied by mononuclear inflammatory cell infiltration[1]. Although LA has historically been described as a distinct synovial entity, it is increasingly understood to represent a nonspecific reactive process that may arise in response to chronic mechanical, traumatic, or inflammatory joint stimuli[2,3]. In younger patients, this is typically secondary to mechanical joint degeneration[1]. In older patients, the tumor tends to be linked to either local or systemic inflammatory conditions, such as gout or diabetes mellitus. These tumors are typically slow-growing and insidious. Patients with LA tend to present with recurrent effusion and pain

of the affected joint, as well as mechanical symptoms such as clicking or locking. The most common location for these tumors is the knee, specifically the suprapatellar pouch, but they can also be found in the elbow, wrist, shoulder, hip, and ankle[4,5]. Lipoma arborescence is diagnosed primarily by magnetic resonance imaging (MRI), which reveals characteristic frond-like villous synovial proliferation[6]. The diagnosis of LA can be challenging due to its nonspecific clinical presentation, overlap with other synovial disorders, and, in some cases, the need for histopathological confirmation when imaging findings are inconclusive. Here, we present a case of secondary LA involving multiple joints in association with undifferentiated spondyloarthropathy.

CASE REPORT

A 27-year-old previously healthy man presented in 2015 with recurrent left knee effusions managed with nonsteroidal anti-inflammatory drugs (NSAIDs), serial arthrocentesis, and intra-articular corticosteroid injections (CSI) over the course of 3 years. Synovial fluid analyses repeatedly revealed an inflammatory profile with leukocyte counts ranging from 10,000 to 15,000 cells/μL, absent crystals, and negative Gram stain and culture. Rheumatoid factor, cyclic citrullinated peptide, HLA B27, and Lyme antibodies were negative. Three years after his initial presentation, magnetic resonance imaging (MRI) revealed a moderate joint effusion, synovial hyperplasia, and fatty infiltration of the synovium consistent with LA (Figure 1A), which was managed with arthroscopy and mechanical synovectomy (Figure 1B). Despite this intervention, recurrent knee effusions persisted, managed with periodic joint aspirations and CSIs. He declined treatment with immunosuppressants, as their use may necessitate medical discharge from military service. Subsequent trials of NSAIDs and colchicine provided only limited symptomatic relief.

In May 2019, the patient developed a new left elbow effusion, causing limited range of motion but not necessarily pain. MRI of the left elbow revealed several T1 hyperintense interdigitating “frond-like” foci suggestive of secondary LA (Figure 1C). The appearance of LA in a second joint, together with his longstanding inflammatory knee effusions, strengthened suspicion for an underlying systemic inflammatory process driving a reactive synovial proliferation rather than two isolated mechanical lesions. Repeat testing for antibody against rheumatoid factor and cyclic citrullinated peptide was negative. No surgical intervention was pursued for the left elbow. As the patient was nearing normal military retirement age, he agreed to start an immunosuppressant for a working diagnosis of spondylarthritis. The patient commenced sulfasalazine in March 2021 with suboptimal response and later transitioned to adalimumab in September 2022. Over the next 18 months since initiating adalimumab, his symptoms of joint effusion remained quiescent, further supporting the suspicion of an underlying inflammatory arthritis as a contributing factor in the development of LA. As of January 2026, the most recent clinical update indicated that he remains asymptomatic on adalimumab.

DISCUSSION

Evaluation of LA initially begins with plain film imaging, which can detect a joint effusion and may reveal underlying pathology, such as osteoarthritis or gout. Ultrasound may also be helpful and typically demonstrates frond-like synovial projections with marked hyperechogenicity, similar to subcutaneous fat, a useful feature that can raise suspicion for LA at the bedside before advanced imaging. MRI is the most sensitive and specific and will also show a tree-shaped mass arising from the synovium with fatty characteristics on all imaging sequences. In addition, MRI may reveal underlying joint abnormalities, including but not limited to erosions, effusions, calcifications, and osteochondral bodies, that could predispose a patient to the development of LA[7]. Other synovial tumors should be considered, but given LA’s very characteristic imaging findings, it is easily differentiated on MRI. Further appreciation of the mass can be achieved during arthroscopy during synovectomy. For management, synovectomy is curative, and recurrences are uncommon[7].

A significant advantage in this patient’s care was the accessibility of longitudinal data through the military healthcare system, which allowed for review of several years of joint swelling evaluations before and after rheumatologic assessment. Although he initially presented with recurrent effusions in the setting of degenerative knee changes, the overall clinical course was more consistent with a chronic inflammatory synovitis that likely preceded, and ultimately drove, the development of LA. This interpretation is supported by recurrent inflammatory synovial fluid analyses years before MRI confirmation of LA, the persistence of effusions despite synovectomy, and the subsequent development of a similar lipoma-

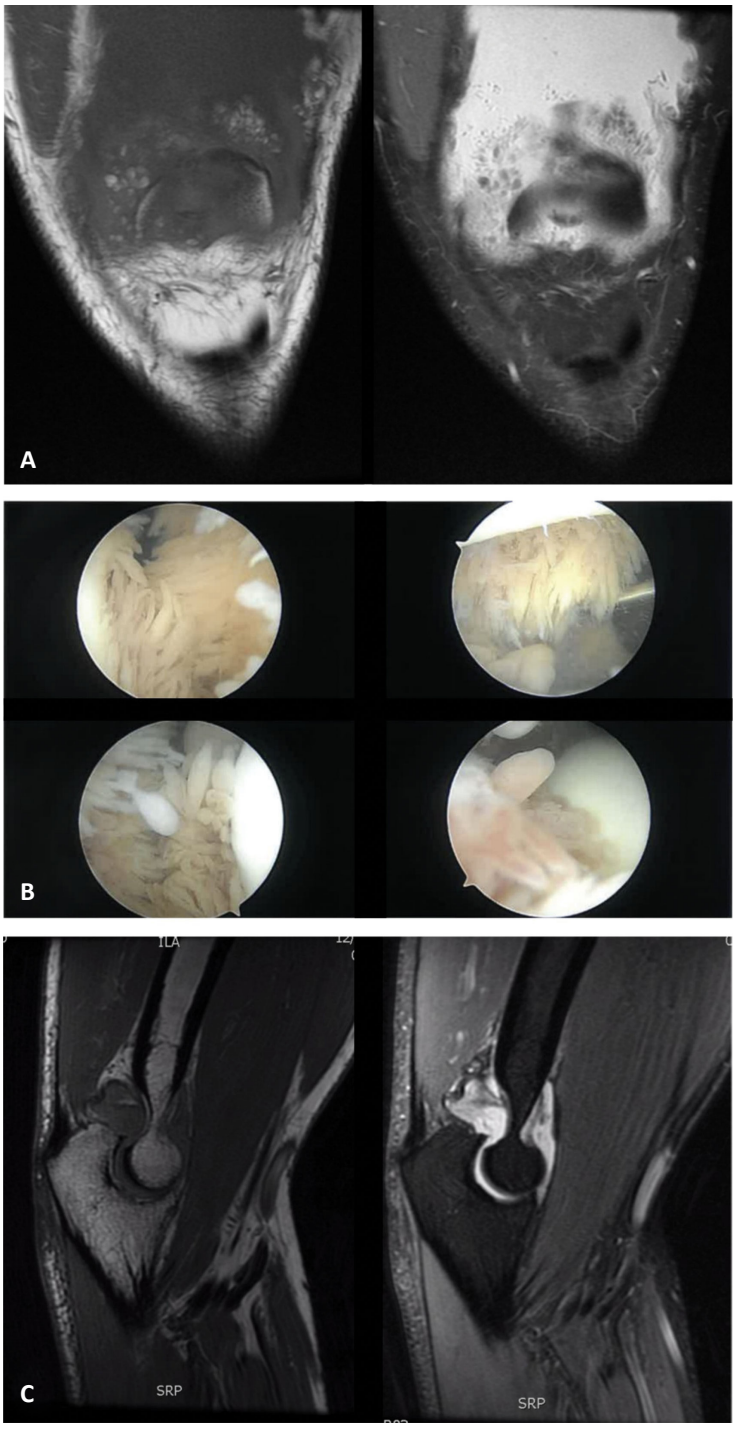

Figure 1 A, MRI Left Knee, 2018. T1 fat saturated (left) and T2 fat saturated (right). **B**, Intraoperative lipoma arborescens direct visualization, synovectomy, 2018. **C**, MRI Left Elbow, 2021. T1 fat saturated (left) and T2 fat saturated (right).

tous synovial proliferation in the left elbow. Taken together, these findings suggest that LA in this case was not an isolated primary synovial lesion, but rather a secondary reactive fatty proliferation arising from ongoing, and perhaps initially subclinical, inflammatory arthritis. The patient's marked improvement after TNF-α inhibitor therapy further supports an inflammatory rather than a purely degenerative mechanism, the latter being more commonly associated with LA[8]. This case, therefore, underscores the importance of considering underlying autoimmune or autoinflammatory arthritis when LA is identified, particularly in patients with recurrent or polyarticular effusions, even when overt inflammatory features are initially limited.

LA is an uncommon benign intra-articular lesion characterized by villous proliferation of mature adipocytes within the synovial membrane. Although its precise etiology remains incompletely defined, accumulating evidence suggests that LA is often not a primary isolated lesion, but rather a nonspecific reactive synovial proliferation that develops in response to chronic inflammatory, traumatic, or degenerative stimuli[22]. Associations with rheumatoid arthritis, psoriatic arthritis, juvenile idiopathic arthritis, and other inflammatory arthropathies support this interpretation (Table 1). These cases underscore the importance of considering LA in young patients with chronic persistent joint swelling and pain exacerbated with activity, especially in the setting of inflammatory arthritis being treated with adequate IS. Equally important is the consideration of underlying inflammatory arthritis in patients with surgically resolved LA who present with recurrent or persistent joint effusions or limited range of motion, as exemplified by our patient. While the pathophysiological mechanisms underlying LA in the context of inflammatory joint disorders are not fully understood, it is postulated that chronic inflammation and cytokine activity drive synovial hyperplasia and subsequent adipose metaplasia. The persistent inflammatory environment may promote the differentiation of synovial mesenchymal stem cells into adipocytes, leading to the characteristic lipomatous proliferation of LA[9]. Initial presentation of symptoms, radiographs, and fluid analysis may be unspecific, thus making lipoma arborescens an elusive diagnosis. MRI serves as the diagnostic modality of choice for LA, typically revealing villous projections of synovial proliferation with signal intensities consistent with fat on all pulse sequences. Histopathological examination confirms the diagnosis by re-demonstrating the villous projections of mature adipose tissue lined by synovial cells. Curative treatment often involves synovectomy, either open or arthroscopic, to remove the proliferative synovium. In cases where LA is associated with an underlying autoimmune arthritis, addressing the primary disease is crucial to prevent recurrence. Immunosuppression may be necessary to control the underlying arthritis and reduce synovial inflammation.

Table 1. Selected published case reports of lipoma arborescens occurring in patients with concurrent nondegenerative inflammatory arthropathy. This table is not intended to represent the full breadth of the literature, but rather a substantial illustrative collection.

Patient's Demographics	Year Published	Concurrent Arthropathy	Joint(s) Affected with LA	Case Reference
24-year-old male	2005	Undifferentiated inflammatory arthropathy	Bilateral knees, bilateral hips	Bejia et al, 2005[10]
13-year-old female	2005	Juvenile rheumatoid arthritis	Bilateral knees	Cil et al, 2005[11]
32-year-old female	2007	Undifferentiated inflammatory arthropathy	Left knee	Ragab et al, 2007[12]
21-year-old female	2007	Undifferentiated inflammatory arthropathy	Right knee	Ragab et al, 2007[12]
24-year-old female	2011	Rheumatoid arthritis	Bilateral knees	Coll et al, 2011[13]
17-year-old male	2013	Juvenile spondyloarthropathy	Bilateral knees	Xue et al, 2013[14]
12-year-old male	2013	Non-necrotizing sarcoid granulomas	Right ankle	Semnic et al, 2016[15]
45-year-old male	2013	Psoriatic arthritis	Bilateral knees	Bent et al, 2013[16]
13-year-old female	2015	Juvenile rheumatoid arthritis	Bilateral knees	Kamaci et al, 2015[17]
21-year-old female	2015	Rheumatic fever	Right knee	Kamaci et al, 2015[17]
30-year-old male	2015	Tuberculous arthritis	Right knee	Kamaci et al, 2015[17]
49-year-old male	2019	Gouty arthritis	Bilateral knees	Hayashi et al, 2019[18]
54-year-old male	2020	Rheumatoid arthritis	Right elbow	Paccaud et al, 2020[19]
29-year-old male	2020	Ankylosing spondylitis	Bilateral knees	Khalid et al, 2020[20]
16-year-old female	2022	Psoriatic juvenile idiopathic arthritis	Bilateral knees	Frkovic et al, 2022[21]

Review of the literature in Table 1 suggests that the temporal relationship between LA and inflammatory arthritis is heterogeneous. In these reports, LA may be recognized after an inflammatory arthropathy has already been recognized and treated, including in patients with persistent synovitis despite ongoing disease-directed therapy. In these same cases, LA appears to be the presenting or early structural manifestation that prompts subsequent investigation into an underlying inflammatory disease. Importantly, however, the literature does not yet provide robust prevalence estimates for either scenario. As of now, most published data remain limited to case reports, case-based reviews, and small imaging series rather than longitudinal cohorts, so it is more accurate to describe these patterns qualitatively than to imply a defined frequency. Importantly, however, the literature does not yet provide robust prevalence estimates for either scenario. As of now, most published data remain limited to case reports, case-based reviews, and small imaging series rather than longitudinal cohorts, so it is more accurate to describe these patterns qualitatively than to imply a defined frequency.

CONCLUSIONS

There is a significant relationship between inflammatory and autoimmune joint disorders and the development of lipoma arborescens. Rather than representing an isolated synovial abnormality, LA may, in many cases, reflect a secondary reactive fatty proliferation arising from chronic, and sometimes initially subclinical, synovial inflammation. Recognition of this relationship is essential for accurate diagnosis and effective management, as treatment should address not only the lipomatous synovial proliferation itself but also the underlying inflammatory disease driving its development and recurrence.

Conflict of Interest:
The authors declare that they have no financial, commercial, or other conflicts of interest related to the content of this publication.

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Informed Consent:
The patient provided both written and verbal informed consent for their medical history, treatment, and clinical course to be documented and published. All reasonable efforts have been made to protect the patient's privacy and confidentiality, ensuring that no personally identifiable information is disclosed.

Ethics Statement:
This publication complies with ethical guidelines for case reporting and has been prepared in accordance with applicable institutional and journal policies regarding patient consent and confidentiality. All information has been handled in compliance with the Health Insurance Portability and Accountability Act (HIPAA) regulations, ensuring the highest standards of patient privacy and data protection.

AI Disclosure:
OpenEvidence AI was used as a research support tool to assist with information gathering, identification of related literature, and educational synthesis. All manuscript text and figures were independently authored by the investigators, and no content was directly generated or plagiarized from the tool.

Authors' Contribution:
Luke G. Qin conceptualized the case report, performed the primary chart review and literature review, drafted the initial manuscript, and communicated with the patient over phone. He was responsible for the synthesis of the clinical timeline and the incorporation of revisions based on co-author feedback.
Sarah M. Dibacco contributed to the initial manuscript drafting, with a focus on clinical timeline, differential diagnosis, and treatment course.
Jess D. Edison provided senior clinical oversight, contributed to interpretation of rheumatologic findings and management decisions, and critically reviewed the manuscript for clinical accuracy and intellectual content.
Michael F. Loncharich supervised the overall project, guided case selection and framing, contributed expert input on diagnosis and management, and performed critical revisions of the manuscript.

Data Availability:
All relevant data supporting the findings of this study are included within the article.

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