



Arthroplasty in Patients with Rare Conditions

Simultaneous Concurrent Bilateral Total Knee Replacement in a Patient With Bilateral Lipoma Arborescens With End-Stage Osteoarthritis

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ABSTRACT

A 78-year-old Thai male presented with chronic bilateral knee pain and swelling. X-ray imaging revealed osteoarthritis in both knees, with a suspicious soft tissue shadow. Magnetic resonance imaging suggested lipoma arborescens (LA). The patient underwent LA excision with a complete synovectomy, followed by simultaneous bilateral total knee arthroplasty (SBTKA). Pathological examination confirmed LA. At the 2-year follow-up, the patient reported no complications, adverse outcomes, or recurrence. The intervention improved joint function and pain relief, allowing for early ambulation and full weight-bearing post-surgery. This case highlights the success of complete synovectomy with SBTKA, addressing bilateral knee pathology concurrently. The combined approach reduced operative time and significantly improved joint function and pain relief, emphasizing the benefits of timely surgical intervention and suggest potential advantages of SBTKA for optimal patient outcomes.

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Introduction

Lipoma arborescens (LA) is a rare benign indolent lesion consisting of subsynovial villous proliferation of mature fat cells [1], most common in the suprapatellar pouch of the knee joint. The term “arborescens” means “tree-like appearance,” describing the characteristic villous and frond-like morphology of this condition [2]. The etiology of LA is unknown; it has been hypothesized to be a nonspecific reactive synovial fatty proliferation in response to chronic traumatic or inflammatory stimuli rather than a neoplastic process. [1,3]

The symptoms usually have an insidious onset of painless swelling of the affected joint, persisting for many years, followed by progressive pain accompanied by intermittent episodes of joint effusion. Although the knee joint is the most common site of involvement, LA has also been reported in several other joints, including the shoulder, hip, elbow, ankle, and wrist, as well as in periarticular bursae and tendon sheaths. [4–6] The polyarticular and

bilateral involvements are not uncommon; involvement of both knees has been reported in up to 20% of affected patients in some studies. [7,8] LA does not require aggressive surgical treatment unless symptomatic, despite conservative management. The surgical treatment of choice is either open or arthroscopic synovectomy. [4,9]

In this report, we present a case of bilateral LA in the knees of a 78-year-old male. We provide an overview of the clinical, radiological, and pathological findings and review the literature on LA associated with secondary osteoarthritis (OA) and the treatment with simultaneous bilateral total knee arthroplasty (SBTKA). Our case highlights the potential effectiveness of SBTKA in improving joint function and relieving pain in patients with LA and OA. The patient was informed that data concerning the case would be submitted for publication, and he signed informed consent regarding publishing their data and photographs.

Case history

A 78-year-old Thai male with a history of chronic bilateral knee pain and swelling presented to the clinic expressing concerns regarding his knee joint functionality. He additionally reported a sensation of mass effect and tightness within his quadriceps

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Figure 1. Preoperative clinical presentation.

musculature, which he perceived as impeding his knee motion. This dual presentation suggests a complex pain generator involving both motion and weight-bearing-related discomfort typical of OA, as well as the mass effect exerted by the LA on the quadriceps, restricting its movement. (Fig. 1). X-ray imaging showed evidence of end-stage OA in both knees, with suspicious soft tissue shadowing (Fig. 2). Further magnetic resonance imaging evaluation revealed a soft tissue mass with a characteristic signal intensity like fat, which is a low signal on T1-weighted images, suggestive of a LA (Fig. 3).

To alleviate the patient's symptoms and enhance joint function, the orthopedic oncologist conducted the excision of the LA with a complete synovectomy. Subsequently, arthroplasty surgeons performed SBTKA (Attune; DePuy Synthes, Warsaw, IN) (Fig. 4). The postsurgical pathological report reveals a distinct frond-like pattern, which on microscopy demonstrates the papillary proliferation of synovial villi with substitution of subsynovial tissue by mature adipocytes, confirming the diagnosis of LA (Fig. 5). All pathologies and cultures, which included bacterial, fungal, and tuberculosis, were negative.

After the surgery, the patient was advised to begin early ambulation and full weight-bearing activities. The postoperative course was uneventful, and the patient was discharged within 1 week of surgery. Three months after the surgery, the patient had ceased the use of pain medications and was ambulating without the aid of assistive devices. No complications, adverse events, or

recurrence of LA have been reported as of the 2-year follow-up appointment. Overall, the patient experienced significant improvement in knee function and pain control following the surgical intervention.

Discussion

LA is a rare, benign tumor of the synovial tissue, characterized by the growth of villous projections of fat lined by synovial cells. It can cause pain and swelling in affected joints and lead to significant impairments in joint function if left untreated. Adults in their fourth or fifth decade of life make up the majority of LA patients. Women and men are both equally affected. Previous research has suggested that unilateral knee involvement is typical, but situations where both knees are involved or other joints are involved are considered atypical. Patients often present with chronic, painless swelling in the affected joints. While joint effusion is nearly always present, limitations in motion and pain typically manifest only in the later stages of OA development. As a result, patients typically seek medical attention when pain and restricted range of movement become more pronounced. Table 1 summarizes clinical and demographic features of surgically treated cases of LA exclusively affecting the knee, as reported in the literature. [10-13] The patient in our report also presented with a typical clinical manifestation as above.



Figure 2. Preoperative X-ray imaging showed evidence of end-stage osteoarthritis in both knees manifested by significant joint space loss with suspicious soft tissue shadowing.

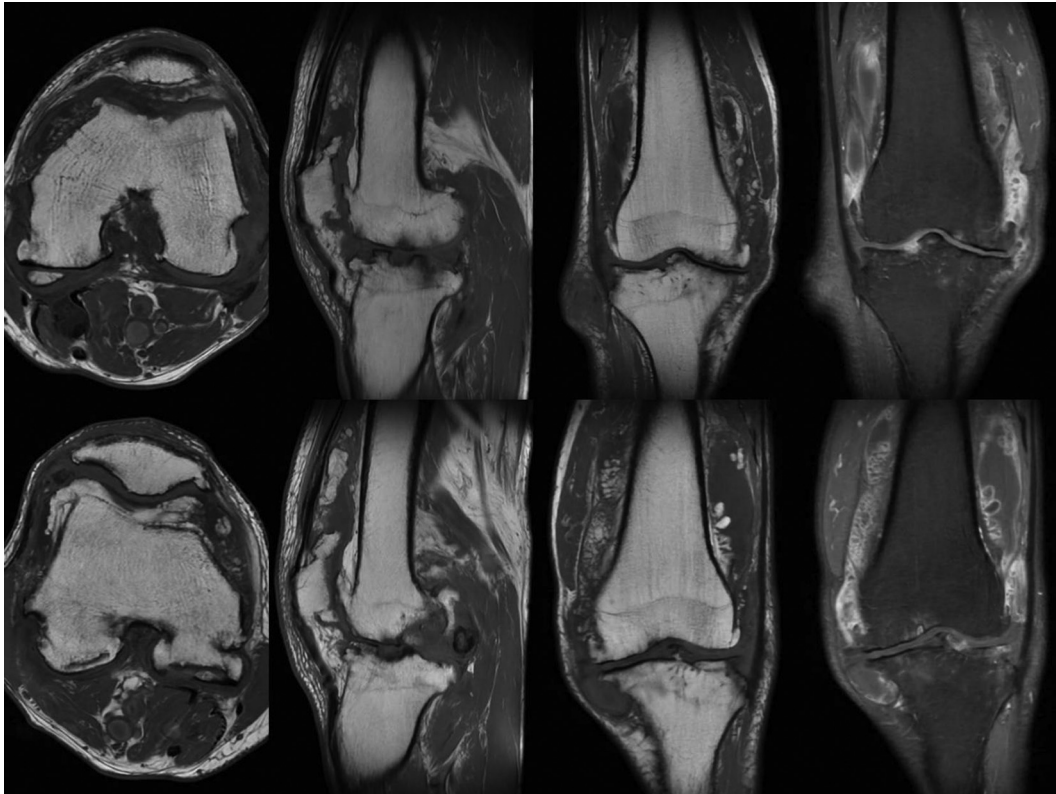


Figure 3. The magnetic resonance images (MRI) on T1-weighted spin echo (T1SE) in respective axial, coronal, and sagittal views of both knees (the first 3 columns) demonstrate frond-like villi inwardly projecting from the synovium with T1 hyperintensity. The contrast-enhanced T1-weighted spin echo with fat suppression images (T1FS + Gd) in the last column confirm suppressible high T1 signal in these lesions on all images, representing fat. Note diffuse thin rim enhancement of the lesions and knee synovium owing to synovitis.

Even though conventional radiographs frequently appear normal, magnetic resonance imaging can clearly display various morphological patterns with pathognomonic features, such as a big frond-like mass emerging from the synovium with signal intensity equivalent to fat. LA has multilobulated fatty projections and a tree-like appearance in the gross clinical presentation.

Current controversies and future considerations

The rarity of bilateral involvement in LA adds complexity to the establishment of a definitive treatment algorithm. Nevertheless, it

is known that a total synovectomy can effectively relieve the accompanying symptoms. SBTKA emerges as a viable solution for this unique challenge, offering the advantage of obtaining a pathological diagnosis from both knees in a single operation, particularly in cases where LA coexists with end-stage OA. This concurrent technique involves 2 surgeons working simultaneously, not only providing a comprehensive diagnostic approach but also shortening the overall operative time for the patient. Although the excision of the tumor during SBTKA may lead to increased blood loss compared to standard total knee arthroplasty cases, our experience indicates that this can be effectively managed. In

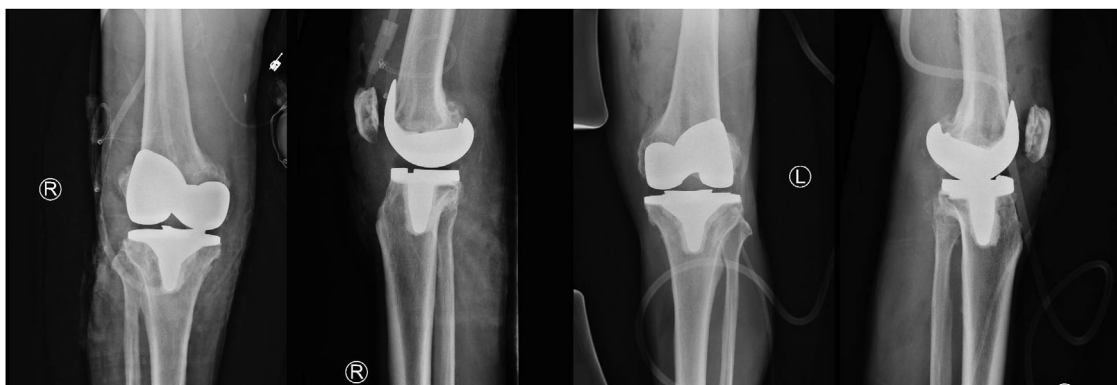


Figure 4. Post-bilateral total knee arthroplasty with total synovectomy X-ray shows an intact prosthesis with good alignment.

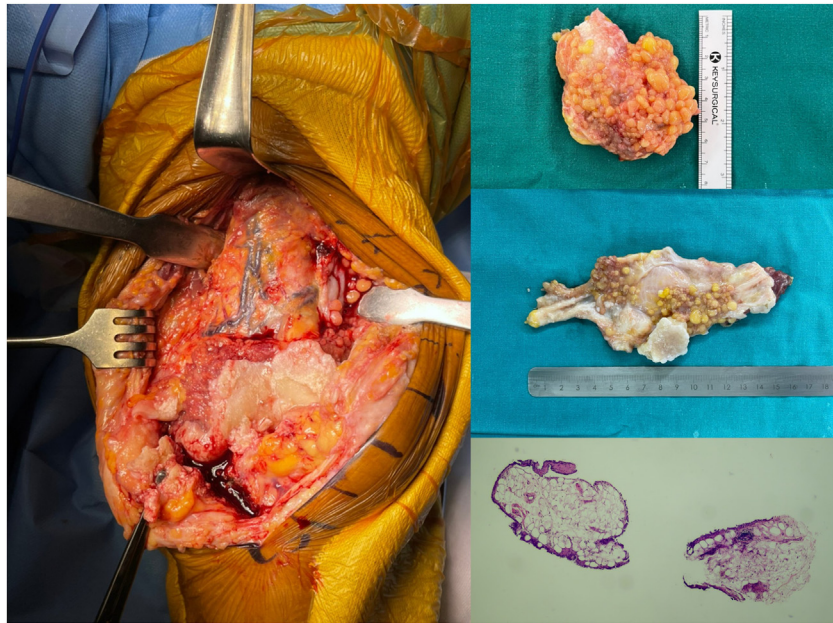


Figure 5. Intraoperative image shows a large intra-articular fatty tumorous tissue, which, on microscopy, demonstrates the papillary proliferation of synovial villi with substitution of subsynovial tissue by mature adipocytes, confirming the diagnosis of lipoma arborescens (LA).

standard cases, the redivac drain typically records around 150-200 ml per knee, whereas in this case, the drain recorded approximately 350 ml per knee. However, despite this higher blood loss, careful volume replacement strategies were employed, and postoperative outcomes were not significantly impacted. In this case, SBTKA performed due to advanced OA, has been executed concurrently with great results, further emphasizing the potential benefits of this approach in managing cases of bilateral LA involvement. Moreover, even when it is necessary to extend the quadriceps muscle incision to remove all the tumor from both sides, the patient exhibited no impairment in quadriceps strength and can ambulate early, similar to other patients undergoing standard procedures.

Summary

Our case report highlights a patient with bilateral LA and secondary end-stage OA who underwent a complete synovectomy with simultaneous bilateral total knee replacement (SBTKA). At the 2-year follow-up, the patient demonstrated an excellent functional outcome. Despite the late presentation with pain and limitations in range of movement, the surgical intervention resulted in significant improvement. Highlights from this case suggest a potentially positive impact of SBTKA in addressing complex conditions such as LA and end-stage OA. Further studies involving larger cohorts are warranted to confirm these findings.

Table 1
Summary of clinical and demographic features of surgically treated cases of lipoma arborescens (LA) exclusively affecting the knee, as reported in the literature.

Study	Year	Age/sex	Location	Clinical data	Treatment	Result	Follow-up
Takkal et al.	2022	60/M	Knee	Knee osteoarthritis with worsening right knee pain and progressive swelling	Open partial synovectomy		
Ambrosiussen et al.	2022	44/F	Knee	pain, swelling, and reduced function in her left knee since the teenage years	Arthroscopic total synovectomy		6 mo: well-functioning, minimal residual discomfort
Alshehri et al.	2022	64/M	Knee	6-y bilateral knee pain with progressive pain aggravated by movement	Bilateral TKA with total resection of the lipoma with synovectomy		
Tsifountoudis et al.	2017	30/M	Knee	2-y history of slowly progressive swelling of his right knee	Open complete synovectomy	The patient regained a full range of knee motion	18 mo: fully returned to his activities without any symptoms
		58/M	Knee	4-y history of swelling and mild pain in both knees, medial compartment OA	Arthroscopic synovectomy	Postoperative period was uneventful	20 mo: no recurrence; patient returned to his previous level of activity without restriction in the range of movement.
		44/M	knee	5-y history of pain and swelling in his right knee	Open complete synovectomy	Postoperative period was uneventful	18 mo: no recurrence; patient returned to his previous level of activity with improvement in knee flexion

TKA, total knee arthroplasty.

Conflicts of interest

The authors declare there are no conflicts of interest.

For full disclosure statements refer to <https://doi.org/10.1016/j.artd.2024.101406>.

Informed patient consent

The author(s) confirm that written informed consent has been obtained from the involved patient(s) or if appropriate from the parent, guardian, power of attorney of the involved patient(s); and, they have given approval for this information to be published in this case report (series).

CRedit authorship contribution statement

Chayut Chaiperm: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis. **Akaphuth Ittiravivongs:** Visualization, Methodology, Conceptualization. **Puttipol Waipanya:** Methodology, Investigation, Data curation. **Buncha Athikraimongkol:** Visualization, Resources, Conceptualization. **Thana Narinsorasak:** Project administration, Methodology, Data curation, Conceptualization.

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