

Two-Stage Total Knee Arthroplasty (TKA) for a Rigid and Infected Knee: A Rare Case Report of *Aspergillo*sis

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ABSTRACT

Knee infection caused by *Aspergillus* is a rare condition that presents a diagnostic challenge for orthopaedic surgeons and musculoskeletal specialists. This case report aims to describe the treatment of a patient with active articular *Aspergillus* infection and knee arthrofibrosis through a two-stage total knee arthroplasty (TKA). A 37-year-old woman presented with knee arthrofibrosis, which was complicated by an *Aspergillus* infection. The treatment involved a two-stage procedure: 1) bone cuts for TKA and systemic antibiotic therapy; and 2) TKA with the use of specific antibiotic-loaded cement. The patient has been followed for 30 months, showing no signs of failure.

Keywords: Aspergillus; Arthroplasties, Knee Replacement; Treatment

INTRODUCTION

Knee infection caused by *Aspergillus* is a rare condition that can pose a diagnostic challenge for orthopaedic surgeons and musculoskeletal specialists. It is more commonly reported in the ribs, spine, and sternum, particularly in patients with an identified primary infection site.^{1,2}

The typical clinical history is marked by slow progression and multiple incorrect treatments, which contribute to disease spread and significant joint compromise. Consequently, in advanced cases involving extensive articular surface destruction, complete fungal eradication may not result in a favorable clinical outcome, as symptoms are attributed to articular surface destruction.³

CASE REPORT

A 37-year-old woman presented with chronic, progressive knee pain attributed to knee synovitis. She reported no comorbidities or history of medication or drug use. Bone scintigraphy revealed isolated involvement of the left knee. Based on magnetic resonance imaging (MRI) findings, the presumptive diagnosis was lipoma arborescens, prompting a synovial biopsy that confirmed chronic, non-specific synovitis. At that time, no specimens were sent for culture (Figure 1).

Despite initial treatment, symptoms persisted and the patient underwent two additional arthroscopic total

synovectomies within one year. However, these surgical interventions failed to provide pain relief, and the patient's joint range of motion (ROM) progressively worsened. Clinical evaluation revealed a swollen left knee with a limited ROM of 10° to 30° and a limping gait, supported by crutches. A subsequent MRI indicated recurrent synovitis and an increase in both the size and number of bone erosions. Given the mirrored joint involvement, bone changes, slow progression, and mild systemic symptoms, an atypical or low-virulence intra-articular infection was considered the leading hypothesis (Figure 2).

The physicians in this case discussed treatment options with the patient, which included: 1) knee arthrodesis with an external fixator; 2) above-knee amputation; and 3) a two-stage total knee arthroplasty (TKA). The patient chose the two-stage TKA, despite being informed of the potential risk of recurrence and failure. During the initial stage of the procedure, all cuts for the TKA were made, and samples were sent for bacterial, fungal, and tuberculosis cultures. Broad-spectrum antibiotic therapy with vancomycin and meropenem was started, and an antibiotic-loaded static spacer (vancomycin and gentamicin) was placed in the joint.

Thirty days postoperatively, synovial tissue culture identified *Aspergillus* species, leading to the initiation

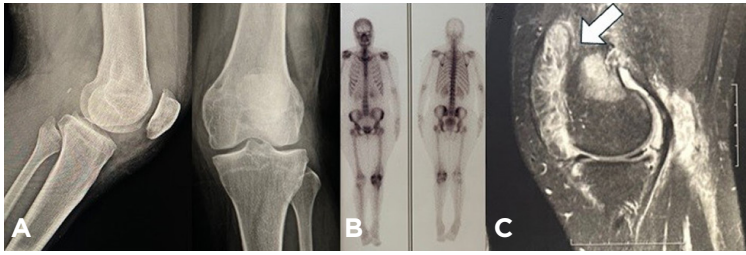


Figure 1. Initial image investigation. A) X-rays without gross abnormalities; B) Bone scintigraphy revealing isolated left knee compromise; C) Initial MRI scan. Arrow points to synovial thickening that was misdiagnosed as an arborescent lipoma.

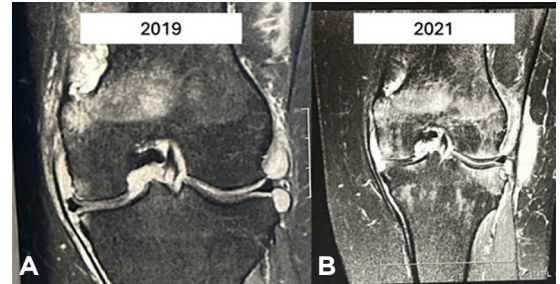


Figure 2. Changes on MRI images from 2019 to 2021. Advancement of bone compromise, including extension to the proximal tibia and distal femur.

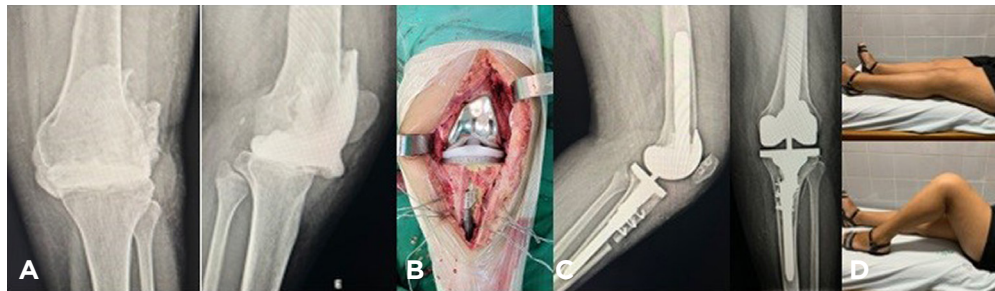


Figure 3. Stepwise approach to suspected unknown joint infection. A) TKA bone cuts and static spacer manufacture; B) Intraoperative image illustrating tibial tuberosity osteotomy to address the rigid knee situation; C) and D) 30-month follow-up visit x-ray and clinical aspect.

of 200 milligrams of voriconazole twice daily. After six weeks of antifungal treatment, the prosthesis implantation was performed. The bone cement was loaded with 750 milligrams of amphotericin B, 4 milligrams of vancomycin, and 500 milligrams of gentamicin. Non-cemented stems enhanced prosthesis fixation and oral voriconazole was prescribed for six months.

At the 30-month follow-up visit (2024), there were no signs of clinical or radiological failure. The patient was able to walk without assistive devices, had 90° ROM, complete extension, and was pain free (Figure 3).

DISCUSSION

Aspergillus sp infection is a rare condition that has few reports in the literature. Most cases are associated with underlying immunosuppressive conditions or previous joint surgical intervention. Tiwari et al⁴ have reported the occurrence of articular Aspergillosis in an immunocompetent patient and highlighted the importance of considering that diagnosis in patients without known risk factors. This case report presents notable aspects, including lack of risk factors indicating immunosuppression or previous knee intervention. The low virulence intra-articular infection emerged as a hypothesis based on insidious joint destruction without clear clinical manifestations of infection, such as fistulae and redness. The patient presented with synovitis (swollen knee) without accompanying local warmth. In situations such as these, it is important for physicians to be informed on atypical infections and specific culture protocols ordered.¹

Systemic and local antibiotic therapy are key to addressing bone and joint fungal infections. Although adequate pharmacologic therapy was guided by culture results in this case, additional local empiric therapy was offered through the cement. Anagnostakos and colleagues have demonstrated the importance of addressing the specific causative organism and widening the coverage for agents that were not identified through culture.⁵

The majority of studies describing approaches to knee fungal infection include surgical debridement and systemic antifungal therapy. Due to the fact that the patient in this case presented with advanced cartilage compromise and knee arthrofibrosis, the physicians adopted the two-stage TKA, aiming to treat infection, pain, and ROM issues.⁶

Koutserimpas et al⁷ summarized the treatment of articular *Aspergillus* infections by evaluating 29 patients with this condition. The authors described several surgical strategies, including arthrocentesis, arthroscopic techniques, and open synovectomy. However, they did not find any references to the use of TKA in such cases. A two-stage TKA may present a viable option in establishing an infection-free environment, allowing prosthesis implantation, and maintaining a functional ROM.⁷

TKA should be considered a viable option for patients with *Aspergillus* knee infections. The two-stage approach aids in diagnosis confirmation and allows for the planning of appropriate systemic and local antibiotic therapy, thereby improving the safety of the procedure.

This report presents a successful case that underscores the need for further investigation into this challenging scenario. Currently, patients should be made aware of the limited data regarding the outcomes of TKA in treating native knee fungal infection treatments, with treatment decisions based on an individualized case assessment.

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