

CASE STUDY

SILENT INVADER AFTER INSTRUMENTATION: CONCURRENT PRIMARY RENAL ASPERGILLOSIS AND SEPTIC ARTHRITIS

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ABSTRACT: Primary renal aspergillosis is a rare and invasive clinical entity defined by isolated fungal involvement of the kidneys without prior or concurrent systemic infection, often presenting with non-specific symptoms such as lumbar pain, fever, and painful voiding that mimic bacterial pyelonephritis. While the condition is often associated with immunocompromised states, it can also manifest in immunocompetent individuals following local predisposing factors such as urinary tract instrumentation, endoscopic surgery, or orthopedic procedures. The pathogenesis in these cases often involves the introduction of fungal spores via contaminated medical instruments or inadequate sterilization, which may result in localized renal infection and even concurrent septic arthritis. **Case:** Here we discuss a case of primary renal aspergillosis with bilateral septic arthritis, the diagnosis of which is usually confirmed through a combination of radiological findings, microbiological investigation. Microscopy typically reveals narrow, septate hyaline hyphae with acute-angle branching, while cultures frequently identify *Aspergillus flavus* as the causative pathogen. **Conclusion:** Successful management requires surgical decompression, such as percutaneous nephrostomy (PCN) or stent removal, followed by targeted antifungal therapy with voriconazole, which has proven highly effective in restoring renal function.

Key words: Primary renal aspergillosis, septic arthritis, *Aspergillus flavus*, immunocompromised, voriconazole.

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INTRODUCTION:

Primary renal aspergillosis is exceedingly rare yet potentially life-threatening form of invasive fungal infection characterized by isolated involvement of the renal parenchyma without evidence of disseminated disease. It predominantly affects immunocompromised individuals—diabetes mellitus, malignancy, prolonged corticosteroid therapy, or post-transplant status as well as immunocompetent hosts, following local predisposing factors like urinary tract obstruction, nephrolithiasis, or prior urological instrumentation. The causative organisms include ubiquitous environmental moulds like *Aspergillus flavus* and *Aspergillus fumigatus*, which are capable of opportunistic tissue invasion. The pathogenesis involves hematogenous dissemination and occasionally direct ascending infection due to inoculation of fungal spores following instrumentation procedures such as ureteric stenting or endoscopic stone removal. Patients present with nonspecific features including fever, flank pain, dysuria, coupled with signs of obstructive uropathy, often mimicking bacterial pyelonephritis. Radiological imaging may demonstrate hydronephrosis and intraluminal filling defects, while definitive diagnosis relies on microbiological culture and histopathological identification of septate hyphae with acute-angle branching. Early diagnosis is crucial, as delayed treatment can result in progressive renal impairment or systemic spread.

Joint involvement may occur due to hematogenous spread or through direct contamination during procedures like joint aspiration or surgery, which present as septic arthritis. The coexistence of renal and articular involvement is exceptionally rare and underscores the diverse and atypical presentation of invasive fungal infection. Our study emphasizes the need for early recognition and appropriate treatment for optimizing patient outcomes.

CASE DISCUSSION:

A 55-year-old female with a known history of uncontrolled diabetes mellitus presented to the emergency OPD with complaints of altered sensorium, high-grade fever, diffuse abdominal pain, bilateral knee pain, and progressive shortness of breath for two weeks, along with a history of intermittent melena. She had been evaluated at an outside facility one week prior, where she was diagnosed with bilateral pyelonephritis, bilateral renal calculi with right-sided hydronephrosis, and bilateral knee septic arthritis, where she had undergone bilateral double J (DJ) stenting and left knee arthrotomy with drainage. On examination, she was febrile and disoriented, local examination revealed purulent discharge from the left knee surgical site. Laboratory investigations demonstrated significant anaemia (hemoglobin 8.9 g/dL), marked leukocytosis (total leukocyte count 49,200/mm³ with neutrophilic predominance), elevated inflammatory markers (C-reactive protein 234.4 mg/L, procalcitonin 10.14 ng/mL), (blood urea 71 mg/dL, serum creatinine 2.4 mg/dL) indicating acute renal injury. Urine microscopy revealed the presence of narrow septate fungal hyphae. Contrast-enhanced computed tomography (CT) of the abdomen (**Figure 1A, B**) showed bilateral pyelonephritis with a hypodense lesion in the mid-pole of the right kidney, suggestive of an evolving renal abscess, CT imaging of both knees (**Figure 1C**) demonstrated features consistent with infective effusion (left>right). Microbiological examination and culture of both renal aspirate and synovial fluid yielded growth of *Aspergillus flavus* (**Figure 1D**), confirming invasive aspergillosis involving the renal parenchyma and joint space. Notably, blood cultures remained negative throughout the course of illness. The patient subsequently underwent ultrasound-guided aspiration of the right renal lesion along with repeat arthrotomy and drainage of the left knee joint. The patient was managed aggressively in the intensive care unit with broad-spectrum intravenous antibiotics, systemic antifungal therapy, and supportive measures including hemodialysis for worsening renal function. Despite these interventions, her clinical course was complicated

by the development of septic shock and septic encephalopathy. Given the poor prognosis and financial constraints, the patient was ultimately discharged against medical advice in a critical condition.

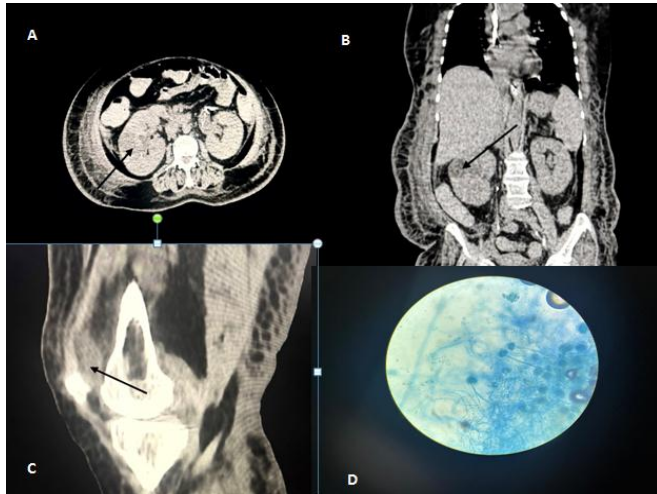


Figure 1: A, B. Contrast-enhanced Computed tomography image of abdomen showing hypodense lesion in the midpole of right kidney. C. Computed tomography image of left knee showing minimal fluid with air pockets in suprapatellar bursa. D. Lactophenol cotton blue stain showing vesicles of *Aspergillus flavus*

DISCUSSION:

Primary renal aspergillosis and *Aspergillus* septic arthritis are uncommon manifestations of invasive fungal disease and are rarely reported concurrently, particularly following separate instrumentation procedures. *Aspergillus* species are ubiquitous environmental fungi found in soil, water, and air; however, invasive disease most commonly develops in patients with diabetes mellitus, malignancy, organ transplantation, prolonged corticosteroid exposure, or other forms of immunosuppression [1,2]. Nevertheless, procedure-related inoculation has increasingly been recognized as an alternative pathogenic mechanism even in immunocompetent individuals. In renal aspergillosis, previous reports by Biggers and Edward [3], and Kueter et al. [4]

described fungal infection occurring after urinary tract intervention or presenting with obstructive manifestations, suggesting direct inoculation or contamination during instrumentation as a possible mechanism. Likewise, the review of *Aspergillus* septic arthritis by Kaneko et al. [5] demonstrated that prior surgical manipulation and instrumentation may serve as portals for fungal entry in addition to haematogenous dissemination. Owing to its angioinvasive characteristics, *Aspergillus* can invade vascular structures causing tissue necrosis and facilitating dissemination to distant organs including bone and joints [2,6]. Therefore, as described in previous studies, fungal infection should remain an important differential diagnosis even in the absence of immune compromised state when symptoms develop after instrumentation.

Diagnosis of both renal and articular aspergillosis is challenging because clinical manifestations are often indolent and overlap with common bacterial infections. Renal involvement usually presents with persistent fever, flank pain, pyelonephritis-like illness, sterile pyuria, or obstructive uropathy, whereas *Aspergillus* septic arthritis frequently manifests with joint pain, swelling, restricted mobility, and variable systemic features [5,6]. As highlighted by previous reports, persistent symptoms despite antibacterial therapy and repeatedly sterile bacterial cultures should increase suspicion for fungal aetiology [5,6,7]. Diagnostic evaluation includes inflammatory markers, urine and tissue cultures, histopathological demonstration of septate acute-angle branching hyphae, and radiological assessment to define extent of involvement and identify obstruction [7]. Additional modalities including galactomannan assays, PCR-based methods, and MALDI-TOF MS have improved species identification and diagnostic precision in recent years [6,8].

Management of concurrent renal aspergillosis and *Aspergillus* septic arthritis requires early multidisciplinary intervention combining prolonged antifungal therapy with timely procedural source control. Previous studies have demonstrated that medical treatment alone may not be sufficient

because *Aspergillus* possesses angioinvasive properties leading to tissue necrosis, abscess formation, obstruction, and poor antifungal penetration into infected tissues [2,6]. Current evidence supports voriconazole as the preferred first-line antifungal agent for invasive aspergillosis following its introduction into clinical practice, owing to its broad activity against clinically relevant *Aspergillus species*, favourable tissue penetration, and lower nephrotoxicity compared with conventional amphotericin B formulations [6].

For renal aspergillosis, treatment should additionally focus on elimination of urinary obstruction and preservation of renal function. Previous reports by Biggers and Edward [3], Kueter et al. [4] demonstrated successful outcomes with combined antifungal therapy and decompressive procedures such as ureteric catheterisation, DJ stenting, or drainage depending on the level of obstruction. In selected cases with extensive tissue destruction, nephrectomy may become necessary. In *Aspergillus* septic arthritis, prolonged antifungal treatment alone may not achieve eradication because fungal biofilm formation and devitalised tissue reduce drug penetration. Therefore, surgical procedures are frequently required and were reported in the majority of reviewed cases [6].

Antifungal treatment is usually prolonged and should be individualized based on clinical response, radiological resolution, microbiological clearance, and recovery of host factors. Early initiation of targeted antifungal therapy combined with adequate source control remains the most important determinant of favorable outcome in these rare post-instrumentation infections.

CONCLUSION:

This case highlights the importance of maintaining a high index of clinical suspicion for fungal infections, in non-resolving infections among diabetic or critically ill patients. Improved environmental control measures, optimized sterilization protocols, continuous surveillance, early microbiological diagnosis, prompt initiation of appropriate antifungal therapy, and adequate

surgical management are essential to reducing nosocomial fungal infections and improving patient outcomes in these severe but uncommon presentations.

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