Case Report

Chronic fungal pyelonephritis with perurethral fungal ball: A rare case report

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ABSTRACT

Chronic fungal pyelonephritis, an uncommon and severe infection mostly affecting immunocompromised persons such as those with poorly controlled diabetes, offers substantial diagnostic and therapeutic hurdles, particularly when exacerbated by obstructive fungal forms. We report the case of a 45-year-old male with a history of hypertension and type 2 diabetes who arrived with fever, dysuria, and abdominal pain. Initial studies indicated a *Candida albicans* urinary tract infection with obstructive fungal balls. While oral fluconazole offered temporary relief, repeated problems necessitated percutaneous nephrostomy with Amphotericin B irrigation, with systemic antifungals, guided by imaging and susceptibility testing. This case underscores the diagnostic and therapeutic complexity of persistent fungal pyelonephritis in immunocompromised patients, underlining the crucial relevance of early diagnosis, targeted antifungal treatments, and prolonged follow-up to optimize results and prevent severe consequences.

Key words: Antifungal therapy, Chronic fungal pyelonephritis, Obstructive uropathy, Percutaneous nephrostomy, Perurethral fungal ball

Chronic fungal pyelonephritis is a rare but serious condition, predominantly affecting immunocompromised individuals and those with underlying medical conditions such as poorly controlled diabetes, urinary tract abnormalities, or long-term antibiotic use. The most common culprit is *Candida albicans*, which can invade the renal parenchyma, leading to the formation of obstructive fungal balls (bezoars) in the urinary tract [1]. These fungal bezoars can cause significant urinary obstruction, pyelonephritis, and renal dysfunction, often mimicking bacterial infections but requiring a different therapeutic approach [2].

What makes this case particularly rare and significant is the recurrence of chronic fungal pyelonephritis despite an initial response to systemic antifungal therapy. The development of extensive bilateral fungal bezoars, coupled with the need for aggressive interventions such as percutaneous nephrostomy and continuous antifungal irrigation, highlights the complexity of managing this condition. Conventional systemic treatment alone proved insufficient, underscoring the need for an integrated approach combining both systemic and local therapies. Our case illustrates the potential for fungal urinary tract infections (UTI) to become chronic and resistant to standard treatment, particularly in patients with multiple risk factors. It contributes to medical knowledge by emphasizing the importance of considering fungal etiologies in recurrent or resistant UTI and underscores the need for prompt diagnosis and comprehensive management strategies to prevent long-term complications.

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CASE REPORT

A 45-year-old male with a 10-year history of type 2 diabetes mellitus (poorly controlled) and a 9-year history of hypertension presented with a 7-day history of high-grade fever, dysuria, and abdominal discomfort. He also reported intermittent passage of white material per urethra. The patient had a prior episode of acute pyelonephritis 1 year ago, which was treated with meropenem and vancomycin. Since then, he has been engaging in self-urinalysis and intermittent self-prescription of antibiotics.

On physical examination, the patient was febrile (temperature: 38.5°C) and exhibited marked suprapubic tenderness. No costovertebral angle tenderness or other signs of abdominal guarding were present. Cardiovascular, respiratory, and neurological examinations were unremarkable.

Laboratory tests showed neutrophilic leukocytosis (white blood cell [WBC] 14,000/µL) and azotemia (creatinine 2.65 mg/dL). Urine analysis revealed marked pyuria (56–60 WBC/high-power field) and glucosuria, with no casts or dysmorphic red blood cell. Urine cultures and tuberculosis (TB) polymerase chain reaction (PCR) were negative, but fungal staining showed numerous budding yeast cells with segmented hyphae.

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During hospitalization, the patient passed a substantial amount of whitish material (Fig. 1), which was collected and sent for histopathological examination (Fig. 2). Selective *Candida* culture on Sabouraud Dextrose Agar identified the organism as *C. albicans* (Fig. 3). The patient was initially treated with a 4-week course of oral fluconazole and underwent Double J (DJ) stenting to facilitate drainage of the fungal debris. He experienced significant symptomatic relief for the next 4 months, with follow-up imaging showing no signs of pyelonephritis, and his renal function returned to normal.

However, 4 months later, the patient presented again with a recurrence of high-grade fever, severe dysuria, and abdominal discomfort, accompanied by a recurrent passage of white material per urethra. Non-contrast computed tomography imaging revealed extensive bilateral perinephric fat stranding, grade 2 hydronephrosis (Fig. 4), diffuse thickening of the urothelium, bilateral pyelitis, and a markedly dilated left ureter.

Due to the severity of the recurrent symptoms, the patient was treated with a 14-day course of intravenous (IV) fluconazole (200 mg twice daily). In addition, percutaneous nephrostomy was performed, and amphotericin B deoxycholate irrigation was administered via the nephrostomy tubes, first on the left side and then on the right, over a 3-week period. Both nephrostomy tubes were used for continuous antifungal irrigation to ensure maximum efficacy against the deep-seated fungal infection.

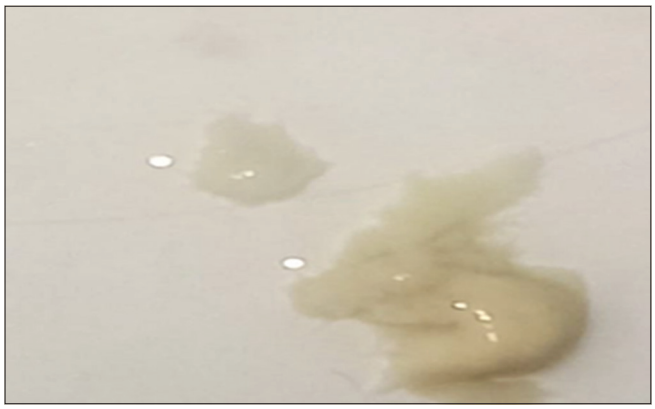

Figure 1: Whitish material in the form of fungal balls (bezoars)

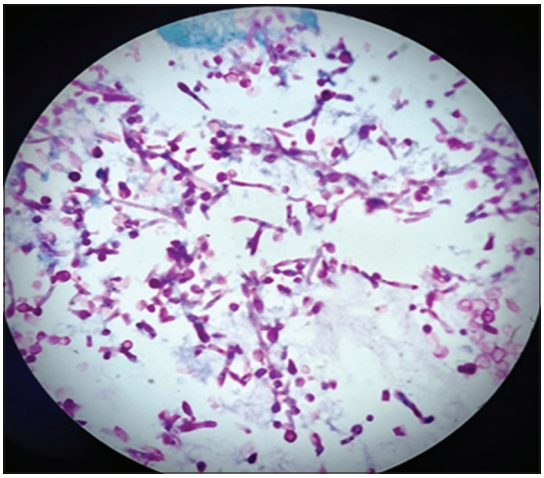

Figure 2: The histology revealed extensive fungal organisms, with sheets of septate fungal hyphae and spores intermixed with hemorrhage and dense inflammatory infiltrate

Mucosal biopsies obtained through the nephrostomy tubes revealed transitional lining epithelium with dense chronic inflammatory infiltrate, along with copious fungal hyphae and spores. Recognizing the chronic and severe nature of the patient's fungal pyelonephritis, the patient was diagnosed with fluconazole/voriconazole-sensitive chronic fungal pyelonephritis, with recurrent perurethral passage of fungal balls (candiduria). On discharge, he was prescribed voriconazole (200 mg every 12 h) for an extended 2-week period, with close monitoring and follow-up to ensure no recurrence of symptoms. At the 12-month follow-up, the patient remained symptom-free. His most recent imaging showed complete resolution of pyelonephritis, and routine urine microscopy revealed no pyuria. Kidney function tests were within normal limits, and the patient expressed immense relief, having recovered from this challenging course of illness.

Differential diagnoses included acute bacterial pyelonephritis, renal TB, emphysematous pyelonephritis, and renal calculi. Bacterial pyelonephritis was excluded due to negative urine cultures and the presence of fungal elements. Renal TB was ruled out by a negative urine PCR for *Mycobacterium tuberculosis*. Emphysematous pyelonephritis was unlikely due to the absence of gas in renal imaging. Kidney stones were excluded based on imaging and histopathology, which confirmed fungal bezoars.

The patient was initially managed with a 4-week course of oral fluconazole (400 mg once daily) after detecting *C. albicans* in the urine. This aimed to address the systemic fungal infection and dissolve the fungal bezoars. In addition, a DJ ureteral stent was placed to facilitate drainage. The patient experienced

Susceptibility Information		Analysis Time: 11.88 hours		Status: Final	
Antimicrobial	MIC	Interpretation	Antimicrobial	MIC	Interpretation
Flucanozole	<=0.5	S	Micafungin	<=0.06	S
Voriconazole	<=0.12	S	Amphotericin	0.5	S
Caspofungin	<=0.12	S	Flucytosine	<=1	S

Figure 3: Selective *Candida* culture on Sabouraud dextrose agar identified the organism as *Candida albicans*. Susceptibility testing showed sensitivity to multiple antifungal agents, including fluconazole, voriconazole, and caspofungin

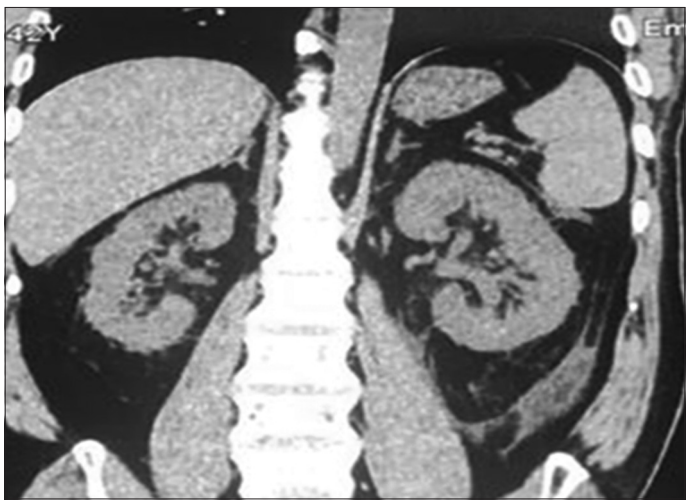

Figure 4: Bilateral hydronephrosis with perinephric fat stranding

significant improvement, and follow-up imaging showed no signs of pyelonephritis or obstruction, with normalized renal function. Four months later, the patient experienced a recurrence of symptoms, necessitating more aggressive treatment. On readmission, IV fluconazole (200 mg twice daily) was administered for 14 days. Due to the persistence and severity of symptoms, percutaneous nephrostomy was performed on the left side to relieve hydronephrosis. Amphotericin B deoxycholate irrigation was administered via nephrostomy tubes at 50 mg in 500 mL sterile water, continuously infused over 10 days. After 10 days, a nephrostomy was performed on the right side, with similar amphotericin B irrigation for another 10 days.

Biopsies obtained during the nephrostomy procedures confirmed *C. albicans* with dense chronic inflammatory infiltrates, necessitating continued systemic antifungal therapy. After 3 weeks of combined treatment, the patient showed marked reduction in symptoms, and imaging confirmed resolution of hydronephrosis. Upon discharge, voriconazole (200 mg every 12 h) was prescribed for an additional 2-week course. This choice was based on *C. albicans* susceptibility and its tissue penetration. The patient was monitored at 2, 6, and 12 months. At each visit, renal function tests, urine microscopy, and imaging were performed. At the 12-month follow-up, the patient remained symptom-free with normal kidney function. The patient showed significant improvement following systemic antifungal therapy and local nephrostomy irrigation. Upon discharge, he was asymptomatic, with cessation of fungal balls per urethra. Laboratory tests showed normal kidney function. At the 2-month follow-up, the patient remained symptom-free, with imaging showing no pyelonephritis, and renal tests within normal limits. He continued to be monitored at 6 and 12 months. Throughout follow-up, he reported no recurrence of symptoms, and imaging showed no signs of obstruction or infection. Urine microscopy revealed no pyuria or hematuria, and no fungal elements were detected. The patient expressed relief after recovery from this challenging illness and has since resumed normal activities. No further intervention was required beyond the initial treatment course.

DISCUSSION

This case report describes a rare and complex presentation of chronic fungal pyelonephritis with perurethral fungal balls in a patient with poorly controlled diabetes and hypertension. Initial symptoms included high-grade fever, dysuria, and abdominal discomfort. Although systemic antifungal therapy with fluconazole offered temporary relief, symptom recurrence prompted the need for invasive management. Imaging revealed bilateral hydronephrosis caused by fungal bezoars, necessitating percutaneous nephrostomy and local amphotericin B irrigation - an approach supported by the Infectious Diseases Society of America guidelines [3]. Chronic fungal pyelonephritis, often caused by *C. albicans*, is uncommon but more likely in immunocompromised individuals with prior antibiotic use [4]. This case underscores the limitations of systemic therapy in bezoar-associated infections and highlights the importance of early imaging, combined local and systemic treatment, and long-term follow-up for preventing recurrence.

This case also illustrates the severity of fungal infection requiring a multi-modal approach-systemic fluconazole, voriconazole, and local amphotericin B irrigation. These aggressive measures align with the Infectious Diseases Society of America guidance, recommending amphotericin B or fluconazole irrigation in patients with persistent obstruction due to fungal bezoars. This individualized approach highlights the need for aggressive, customized treatment in managing complex fungal infections [4].

This case highlights key clinical insights into managing chronic fungal pyelonephritis, particularly in immunocompromised patients like those with diabetes. A high index of suspicion is essential, as fungal UTI often mimic bacterial infections and risk underdiagnosis [5]. Systemic antifungal therapy alone may be inadequate in cases involving fungal bezoars; recurrence in this patient required local intervention [6]. Combining percutaneous nephrostomy with amphotericin B irrigation proved effective, aligning with Infectious Diseases Society of America guidelines for refractory cases [4]. Long-term follow-up and glycemic control were critical in preventing recurrence. While access to advanced interventions may be limited in some settings, alternative approaches should be explored [7,8]. This case underscores the value of early diagnosis, combined systemic and local therapy, and a multidisciplinary approach for optimal outcomes.

This case highlights key clinical lessons: the importance of regular follow-up with imaging and renal function tests, especially in diabetic patients; the need to tailor treatment by addressing comorbidities like poor glycemic control; and the value of cost-effective antifungal strategies in resource-limited settings. Future research should focus on optimizing antifungal use and treatment duration to improve outcomes in chronic fungal pyelonephritis.

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