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## Treatment of Renal Fungal Ball with Fluconazole Instillation Through a Nephrostomy Tube: Case Report and Literature Review

Authors' Contribution:  
Study Design A  
Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
Funds Collection G

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**Conflict of interest:** None declared

**Patient:** Male, 60  
**Final Diagnosis:** Renal fungal ball  
**Symptoms:** Fever  
**Medication:** —  
**Clinical Procedure:** Fluconazole instillation through nephrostomy tube  
**Specialty:** Urology

**Objective:** Unusual setting of medical care

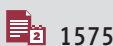
**Background:** Urinary tract candida infection can be due either to hematogenous dissemination of the organism or a retrograde infection. In debilitated or immunosuppressed septic patients, who have upper urinary tract obstruction with renal filling defect, fungal infection should be considered. We report on a patient with sepsis and renal fungal ball who was treated with percutaneous nephrostomy and intravenous antifungal agent, but the patient did not respond so instillation of fluconazole through nephrostomy was given.

**Case Report:** A 60-year-old male patient with a known case of diabetes mellitus with refractory urine retention underwent transurethral resection of the prostate. Postoperatively, the patient developed recurrent high-grade fever with left loin pain, and elevated septic parameters; urine and blood culture were positive for *Candida albicans*. Computed tomography urography showed left hydronephrosis with filling defect in the left renal pelvis with suspected renal fungal ball. Left percutaneous nephrostomy was performed and intravenous fluconazole started but the fever did not subside, therefore, the treatment was changed to anidulafungin. The patient improved but urine from both the bladder and the nephrostomy remained positive for candida. Instillation of fluconazole at 300 mg in 500 mL normal saline was applied through the nephrostomy tube over 12 hours at 40 mL/hour for 7 days.

**Conclusions:** Renal fungal ball is rare but can be serious, especially in immunocompromised patients. Management options for renal fungal ball include intravenous antifungal agents and percutaneous nephrostomy with antifungal instillation of antifungal agents. The objective of this case report was to document treatment success with the use of fluconazole instillation through a nephrostomy tube.

**MeSH Keywords:** Antifungal Agents • Fluconazole • Fungemia

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## Background

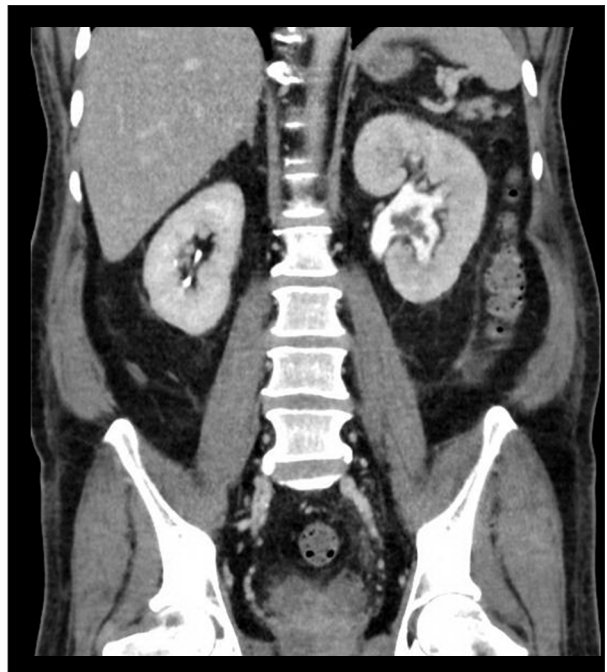
Urinary tract candida infection can be due either to haematogenous dissemination of the organism or a retrograde infection [1]. The fungi extend into the collecting system and rarely coalesce to form bezoars or fungus balls, which can cause hydronephrosis and obstructive uropathy [2]. In debilitated or immunosuppressed septic patients with upper urinary tract obstruction with renal filling defect, fungal infection should be considered, and a urine specimen culture is advisable. When a fungal urinary tract infection is diagnosed, a number of therapeutic options exists. We reported here on a case of a male patient with sepsis and renal fungal ball treated with percutaneous nephrostomy and intravenous antifungal agent; however, as the patient did not respond, instillation of fluconazole through the nephrostomy was given.

## Case Report

A 60-year-old male patient with known diabetes mellitus and hypertension was admitted to the hospital for transurethral resection of the prostate for refractory urine retention. His history showed no loin pain, no fever, no rigors, and no previous surgery. There was no renal angle tenderness with benign digital rectal examination. Preoperatively, repeated routine urine analysis revealed persistent pus cells (14/HPF) with positive pansensitive *Escherichia coli* even after 2 courses of antibiotics, including levofloxacin, with urethral catheter exchange. Urinary tract ultrasound showed an enlarged prostate of 46 gm. The patient underwent transurethral resection of the prostate under antibiotic coverage (piperacillin/tazobactam) according to the infectious team advice. Postoperatively, the patient developed recurrent high-grade fever with left loin pain, elevated septic parameters; urine and blood culture were positive for *Candida albicans*. Intravenous fluconazole was started but there was no response. CT urography showed left hydronephrosis with filling defect in the left renal pelvis; there was no enhancement, the contrast outlining the lesion with no attachment to the renal pelvis suspected renal fungal ball (Figures 1, 2). A left percutaneous nephrostomy was performed, the nephrostogram showed filling defects in the renal pelvis (Figure 3). Urine from the nephrostomy and urethral catheter showed whitish debris. The cultures from the nephrostomy, urethral catheter, and from blood were positive for *Candida albicans*. The fever did not subside with intravenous fluconazole, therefore, the treatment agent was changed to anidulafungin 100 mg, once daily. The patient improved; repeated blood culture was negative, but urine from both the bladder and nephrostomy remained positive for candida. Instillation of fluconazole at 300 mg in 500 mL normal saline was applied through the nephrostomy tube over 12 hours at a rate of 40 mL/hour for 7 days. Urine culture from the nephrostomy tube showed no growth, but midstream urine showed



**Figure 1.** Computed tomography urography axial section showed filling defect in the left renal pelvis.

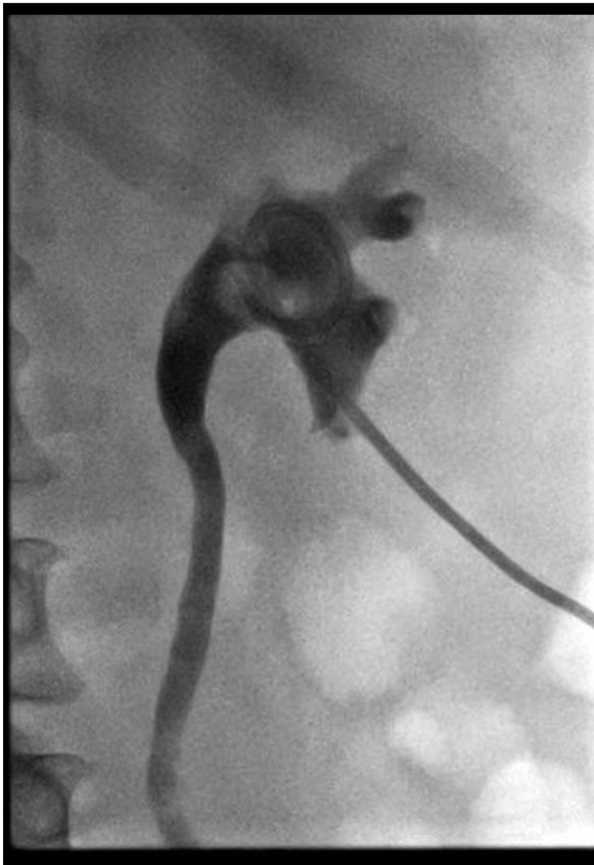


**Figure 2.** Computed tomography urography coronal section showed filling defect in the left renal pelvis.

mixed growth with some candida. Follow-up renal ultrasound showed normal left kidney with no lesion in the pelvicalyceal system and the nephrostomy tube in place (Figure 4). The nephrostomy tube was removed, the urine culture was repeated one week later, which showed no candida growth.

## Discussion

Urinary drainage devices are considered a major risk factor for candiduria. In a multi-center study done by Kuffman et al., which

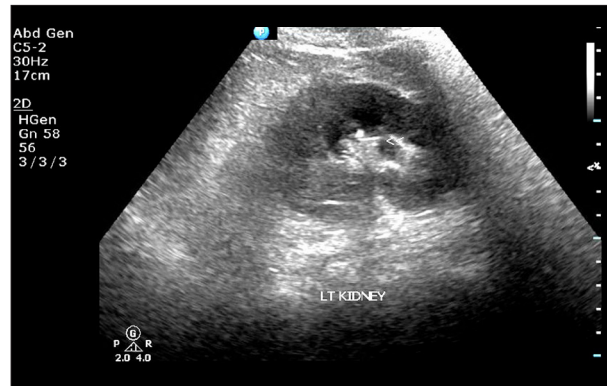


**Figure 3.** Antegrade pyelography showed filling defect in the renal pelvis.

include 861 patients with funguria, the presence of a urinary device was found in 83% of patients and the other associated conditions included diabetes mellitus, urinary tract abnormalities, and malignancies [3]. In critically ill patients admitted to intensive care units, risk factors for candiduria were age >65 years, female gender, diabetes mellitus, total parenteral nutrition, length of hospital stay, mechanical ventilation, and use of antibiotics [4].

In the general healthy population, candida infection occurrence is rare. However, community acquired candiduria was found more in pregnant women and patients confined to bed. Other risk factors were similar to hospitalized patients, including diabetes mellitus, use of antibiotics, and urinary catheters [5]. Our patient had many predisposing factors for candida infection including diabetes mellitus, indwelling urethral catheter, and the use of 2 courses of antibiotics for eradication of preoperative bacterial infection. Presence of a fungal ball in the renal pelvis in the early postoperative period, which needed a long time for formation, indicated community-acquired infection before hospitalization.

In most studies, *Candida albicans* was the most common species isolated, however, other species such as *Candida glabrata*



**Figure 4.** Ultrasound image of the left kidney showed normal left kidney with no lesion in the pelvicalyceal system and the nephrostomy in place (white arrow).

and *Candida tropicalis* were not uncommon [3,4,6]. Urinary tract candida infection occurs due to either antegrade infection, which is mostly a consequence of candidemia, or through retrograde ascending infection. Candidemia from ascending infection is usually associated with urinary tract obstruction [1].

Women with indwelling bladder catheters who are found to have candiduria with strains that are genetically related to strains found in the vagina, mostly have the infection spread in retrograde fashion to the urinary tract [7]. Biofilm of extracellular matrix around an indwelling catheter provides a media for candida to grow and become resistant to eradication [8].

Fungal balls that originate from inflammatory debris, sloughed renal papilla, mucous debris, and lithiasic debris can cause urinary tract obstruction. This makes urinary tract candida infection persistent and difficult to eradicate [2]. Radiologic features of fungus balls, although characteristic, are not pathognomonic and can be mimicked by blood clots, radiolucent urinary calculi, air bubbles, inflammatory debris, and transitional cell carcinoma; the typical aspect is an intraluminal filling defect of the drainage system sometimes leading to obstruction [9].

Candiduria treatment is recommended in symptomatic patients and in asymptomatic patients who are neutropenic or will undergo a surgical procedure [10]. The choice of antifungal agent depends on the infecting species susceptibility and the pharmacokinetic of the drug with its ability to be excreted in urine in adequate concentration. Fluconazole and amphotericin B are the most common antifungal drugs utilized because of their high urine concentration. However, nephrotoxicity is a major complication associated with the use of amphotericin B [2,11]. Other antifungal drugs, such as echinocandins, are not excreted in urine as an active form, which limits their use for urinary tract infection although there are studies that have shown the effectiveness of use of caspofungin in fluconazole-resistant organisms because these agents have adequate tissue

concentrations and can be effective in renal parenchymal infection [11–13].

Upper tract candida infections associated with obstruction have a high risk of candidemia especially in immunocompromised patients. This may require relieve of the obstruction by insertion of a percutaneous nephrostomy or ureteric stent in addition to antifungal therapy administration. Fungus ball with obstruction can be managed with systemic antifungal agents in addition to removal or dispersion of the obstruction by radiological or surgical intervention [14].

Fungal urinary tract infection can also be treated using local irrigation. According to the Infectious Diseases Society of America (IDSA), bladder irrigation with amphotericin B to the bladder is recommended in fluconazole-resistant candida species especially *Candida glabrata* [10]. However, there has been very little evidence related to treatment of fungal balls in the kidney. Local antifungal irrigation via the nephrostomy tube yields a high local concentration of antifungal agent and has direct physical action to help disperse the fungal ball.

There have been case reports that document the use of fluconazole and amphotericin B which were infused locally through nephrostomy tubes [15–18]. However, amphotericin B is well known for its nephrotoxicity through direct toxicity to proximal and tubular cells.

One case report was of a 72-year-old renal transplant recipient admitted with pyonephrosis caused by fungus ball. His cultures showed non-albicans *Candida* in pus samples that was treated first using amphotericin irrigation (50 µg/mL) followed by caspofungin irrigation (50 mL of 2 µg/mL). The irrigation resolved the obstruction. This was followed by stent removal and ureter reconstruction [15].

Another case report published by Chung et al. documented successful treatment of a renal fungal ball. The patient presented with a hematuria and fever of 1 month. Then, a right-sided renal biopsy showed yeast and pseudo-hyphae. The patient was treated with oral fluconazole and continuous irrigation of 300 mg of fluconazole in addition to 500 mL of

5% dextrose with alteration with normal saline at a rate of 40 mL/hour. The irrigation was drained through the Foley catheter, which became clear by day 7 [16]. Another case report documented successful treatment of an aspergillus fungal ball causing ureteral obstruction using amphotericin B irrigation for 7 days [17]. Another 2 case reports used fluconazole irrigation for 12 hours a day with unknown duration. The dose was 300 mg in 500 mL of normal saline. Both regimens were in addition to systemic fluconazole. However, this attempt succeeded in only 1 of the 2 cases [2]. Another case report showed success of fluconazole as a local irrigant for nephrostomy tubes in a cancer patient who presented with renal obstruction secondary to candidiasis. Systemic treatment failed with oral fluconazole and was successful with fluconazole irrigation [18]. As a result, fluconazole was used as the drug of choice for treatment in this case. In the literature, there is a discrepancy in success of treatment, dose, and duration. Therefore, in our case, fluconazole at 300 mg was used for 7 days with monitoring of urine and clinical outcome. The indicator for treatment success was the clinical symptoms, clarity of the irrigation, negative culture, and radiological imaging follow-up with disappearance of the fungal ball.

## Conclusions

Renal fungal ball is rare but can be serious, especially in immunocompromised patient.

Management options for renal fungal ball include intravenous agents and percutaneous nephrostomy with antifungal instillation. Antifungal irrigation via the nephrostomy tube provided a high local concentration of antifungal agent as well as direct physical disperse of the fungal ball in our patient's case. The objective of this case report was to document treatment success with the use of fluconazole instillation through the nephrostomy tube.

## Conflicts of interest

None.

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