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

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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 hematogenous 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 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
include 861 patients with funguria, the presence of a urinary de-
vice was found in 83% of patients and the other associated con-
ditions included diabetes mellitus, urinary tract abnormalities,
and malignancies [3]. In critically ill patients admitted to inten-
sive 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 di-
babetes mellitus, use of antibiotics, and urinary catheters [5].
Our patient had many predisposing factors for candida infec-
tion including diabetes mellitus, indwelling urethral catheter,
and the use of 2 courses of antibiotics for eradication of pre-
operative 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 infec-
tion before hospitalization.

In most studies, Candida albicans was the most common spe-
cies isolated, however, other species such as Candida glabrata
and Candida tropicalis were not uncommon [3,4,6]. Urinary
tract candida infection occurs due to either antegrade infec-
tion, which is mostly a consequence of candidemia, or through
retrograde ascending infection. Candidemia from ascending in-
fection is usually associated with urinary tract obstruction [1].

Fungal balls that originate from inflammatory debris, sloughed
renal papilla, mucous debris, and lithiasic debris can cause uri-
inary tract obstruction. This makes urinary tract candida infec-
tion 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 un-
dergo a surgical procedure [10]. The choice of antifungal agent
depends on the infecting species susceptibility and the phar-
cokinetic 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-resis-
tant organisms because these agents have adequate tissue

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

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).
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 ug/mL) followed by caspofungin irrigation (50 mL of 2 ug/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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