



Inflammation and infection

## Successful treatment of ureteral-stent-related fungal ball using fluconazole instillation through a nephrostomy tube

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### ABSTRACT

The kidneys are the most common solid organ to be infected by *Candida* sp. And may occur due to hematogenous spread, ascending infection, or with the presence of stent and nephrostomy tubes. Evidence for treatment is limited to case reports. We successfully cleared a candida infection of a ureteric stent in a 35-year-old diabetic gentleman by instilling 300 mg of fluconazole in 500 mL of normal saline over 8 hours once daily for 7 days via the nephrostomy tube.

### 1. Introduction

*Candida* infection of ureteral stents is notoriously difficult to treat. We present the case of a 35-year-old diabetic gentleman who was effectively cleared of a candida infection in his collecting system using antifungal instillation through a nephrostomy tube.

### 2. Case presentation

A 35-year-old gentleman with type 2 diabetes mellitus presented to our Urology Department with a right renal pelvic calculus measuring 1.7 cm. His pre-operative urine cultures were negative. He underwent a percutaneous nephrolithotomy, and a nephrostomy tube was left in-situ as a small stone was retained in the ureter. Before surgical treatment for the retained stone could be performed, he presented to the Emergency Department a few weeks later with features of urosepsis, after the nephrostomy tube had dislodged a few days prior. His urine culture did not show a significant growth of any organisms. A DJ stent was inserted on an emergency basis, and he was given intravenous gentamicin followed by oral amoxicillin-clavulanic acid for 7 days, with a plan for stone treatment once the infection settled.

He presented a few months later with urosepsis. The urine culture grew fecal streptococci and yeasts. CT abdomen showed features of emphysematous pyelonephritis, no evidence of fungus, and the stone had now passed. The DJ stent was exchanged, and he was treated with intravenous meropenem which was subsequently changed to oral amoxicillin/clavulanic acid after 7 days, as the yeast growth was not considered to be significant.

After the infection settled, his DJ stent was removed but he presented

a week later with fever and flank pain and this time only yeasts were isolated from the urine culture. CT urogram showed patchy enhancement of the right kidney with features of obstruction and gas-containing solid material in the distal ureter with paracaval lymphadenopathy. A nephrostomy tube was inserted, and a nephrostogram demonstrated blockage at the level of the renal pelvis (Fig. 1). He was started on treatment with oral amoxicillin-clavulanate and oral fluconazole for 4 weeks. Unfortunately, his nephrostomy tube dislodged on a day without provision for re-insertion. A DJ stent was inserted urgently but this subsequently blocked. It was removed cystoscopically, and a nephrostomy tube was re-inserted. During the cystoscopy performed to remove the DJ stent, a large fungal ball was noted blocking the holes of the stent (Fig. 2). Histopathological analysis confirmed candida albicans infection of the stent. The case was discussed at a Multi-Disciplinary Team meeting where it was decided to attempt the instillation of antifungals through the nephrostomy tube. The regimen used was based on a case report published by Abdeljaleel et al.,<sup>1</sup> instilling 300 mg of fluconazole in 500 mL of normal saline over 8 hours once daily for 7 days via the nephrostomy tube.

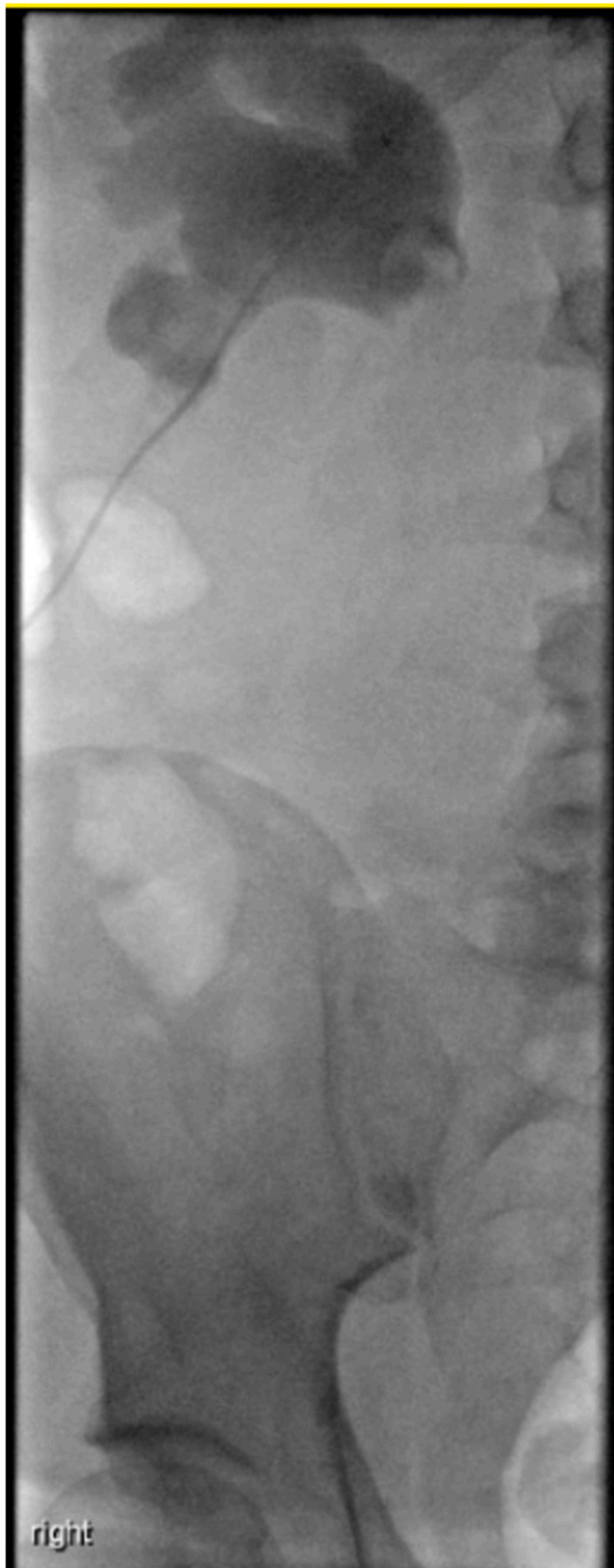
The treatment was tolerated well with no side effects reported. After completion of treatment, a nephrostogram confirmed clearance of the infection (Fig. 3), following which the patient returned home without a tube or stent for the first time in 2 years. A urine culture confirmed clearance of the infection. At the last follow-up 6 weeks later, he was asymptomatic.

### 3. Discussion

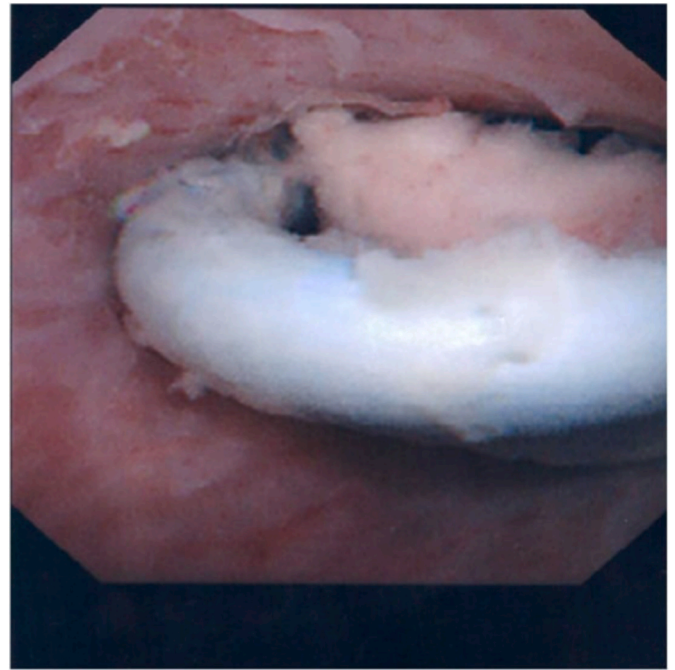
Infection of ureteral stents with candida species is a dreaded

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**Fig. 1.** Nephrostogram image performed prior to instilling fluconazole through the nephrostomy tube illustrating a blockage in the right renal pelvis obstructing the flow of contrast.



**Fig. 2.** Photograph taken during cystoscopy performed to remove the blocked double-J ureteric stent, demonstrating the fungal hyphae.

complication as it is notoriously difficult to treat. *Candida* has been found to colonize up to 10% of ureteral stents, of which *Candida albicans* is the most commonly isolated species (up to 70%), followed by *Candida glabrata* (up to 50%).<sup>2</sup> The primary pathogenic mechanism contributing to persisting infection in patients with ureteral stents is a biofilm formation that increases tolerance to antifungal drugs.<sup>3</sup> Additionally, a variety of host factors such as diabetes mellitus, use of broad-spectrum antibiotics and prolonged indwelling time of stents have been found to be independent risk factors in the development of candiduria – all of which our patient had.<sup>2</sup> When his initial urine culture grew yeasts and *Enterococcus faecalis*, a decision was made to treat the infection with broad-spectrum antibiotics, as the yeast growth was not deemed to be significant. This could have led to propagation of yeast, and serves as a useful learning point when encountering such situations in the future.

The 2016 update of the Infectious Diseases Society of America suggested that patients undergoing urological procedures in the presence of candiduria should be treated with

Oral fluconazole, 400 mg (6 mg/kg) daily, OR Amphotericin B (AmB) deoxycholate, 0.3–0.6 mg/kg daily, for several days before and after the procedure. Additionally, Irrigation through nephrostomy tubes, if present, with AmB deoxycholate, 25–50 mg in 200–500 mL sterile water, is recommended.<sup>4</sup> The reason for choosing AmB could be due to the inherent resistance to azoles represented by *C. albicans* biofilms due to efflux pumps and gene alterations resulting in a 1000-fold decreased susceptibility to fluconazole.<sup>3</sup>

Amphotericin B deoxycholate as a bladder wash is recommended for fluconazole-resistant candida cystitis at a 50 mg/L concentration but the administration can be difficult when fungal balls are located either in the renal pelvis or ureter.<sup>4</sup> Fluconazole possibly has less nephrotoxicity and direct toxicity to the proximal and distal tubular cells as compared to amphotericin B, and is excreted unchanged in higher concentrations in urine.<sup>5</sup> The quality of evidence for treatment of candida in ureters, is limited to case reports. Although surgical management with ureteroscopic removal of fungal ball may be considered in severe cases, we decided to attempt a less invasive approach based on the success reported in the case report published by Abdeljaleel et al.<sup>1</sup>

We measured the success of treatment based on clinical symptoms,



**Fig. 3.** Nephrostogram image after 7 instillations of fluconazole through the nephrostomy tube, illustrating clearance of the obstruction, and flow of contrast down the ureter.

negative urine culture and nephrostogram documenting the clearance of fungal ball and restoring good renal drainage.

#### 4. Conclusions

Candida infections of ureteral stents are difficult but not impossible to treat. We successfully treated Candida infection of a ureteral stent with local instillation of fluconazole through a nephrostomy tube resulting in clearance of the infection as evidenced by a symptomatic improvement, normal nephrostogram and negative urine culture.

#### Ethical statement

Informed consent was taken from the patient for publication of this case report and the associated images.

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#### Author contributions

All authors made substantial contributions to conception and design. They have all agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

#### Declaration of competing interest

The authors have no conflicts of interest.

#### References

1. Abdeljaleel OA, Alnadhari I, Mahmoud S, et al. Treatment of renal fungal ball with fluconazole instillation through a nephrostomy tube: case report and literature review. *Am J Case Rep.* 2018;19:1179–1183. <https://doi.org/10.12659/AJCR.911113>.
2. Vallée M, Bey E, Bouiller K, et al. Epidemiology and risk factors for ureteral stent-associated urinary tract infections in non-transplanted renal patients: a systematic review of the literature. *World J Urol.* 2021;39(10):3845–3860. <https://doi.org/10.1007/s00345-021-03693-7>.
3. Bujdaková H. Management of Candida biofilms: state of knowledge and new options for prevention and eradication. *Future Microbiol.* 2016;11(2):235–251. <https://doi.org/10.2217/fmb.15.139>.
4. Pappas PG, Kauffman CA, Andes DR, et al. Clinical practice guideline for the management of candidiasis: 2016 update by the infectious Diseases society of America. *Clin Infect Dis Off Publ Infect Dis Soc Am.* 2016;62(4):e1–e50. <https://doi.org/10.1093/cid/civ933>.
5. Ashley ESD, Lewis R, Lewis JS, Martin C, Andes D. Pharmacology of systemic antifungal agents. *Clin Infect Dis.* 2006;43(Supplement\_1):S28–S39. <https://doi.org/10.1086/504492>.