



Endourology

Isolated renal aspergilloma

Hasan Al-Ibraheem^{*}, George Shaker, Stella Roushias

NHS Wales Aneurin Bevan University Health Board, Newport, United Kingdom



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ABSTRACT

Aspergilloma localised solely to the kidneys is very rare and poses diagnostic and therapeutic challenges. We present the case of a 35-year-old male with a background of urolithiasis, type II diabetes and chronic kidney disease, who was found to have isolated renal aspergilloma associated with obstructing uric acid renal tract calculi. After poor progress to clear the fungal infection and remaining stones with ureteroscopy, he was successfully treated by percutaneous nephrolithotomy (PCNL) to surgically remove fungal balls and calculi. Additionally, he was treated with peri-operative oral and systemic antifungals and post-operative irrigation of the renal collecting system with amphotericin.

1. Introduction

Aspergillosis is an opportunistic fungal organism with many species which causes mainly pulmonary diseases, but in rare conditions it can affect other organs. Isolated renal aspergilloma, fungal mass inhabiting the kidney, is very rare and presents diagnostic and therapeutic challenges. Risk factors include diabetes, malignancy, instrumentation and any cause of compromised immune system.¹

Renal aspergillosis can present as fungal pyelonephritis, with fever and flank pain, or it can present as renal aspergilloma which may lead to obstruction of the urinary tract, hydronephrosis, oliguria, and anuria.²

We share our experience of Mr H, a 35-year-old male with a background of diabetes, hypertension and CKD, who developed isolated renal aspergilloma after ureteric obstruction due to stone disease. The diagnostic and treatment challenges faced offers valuable insight for clinicians encountering this disease.

2. Case presentation

A 35-year-old male with background of diabetes type II, hypertension and chronic kidney disease, initially presented to our hospital in 2021 with symptomatic right PUJ stone and complete left staghorn stone on CTKUB (see Fig. 1). The right PUJ stone was treated with ESWL after insertion of nephrostomy as emergency. The patient was symptomatic with intermittent left sided loin pain and DMSA renogram demonstrated 34% function of the left kidney on renogram.

The patient underwent left PCNL with 2 relooks on the same

admission, but two smaller stones remained. Stone analysis revealed 100% uric acid and therefore he was discharged with medical dissolution therapy using potassium citrate, in addition to Allopurinol. Follow-up CT 3 months later showed a remaining 14 mm stone in the left kidney and a possible fragment of wire. An urgent ureteroscopy was booked.

Unfortunately, there was a 5 month delay in his elective operation due to difficulties in contacting the patient and DNAs. On admission a pre-op CT was performed. This demonstrated a 1.5cm left PUJ stone with significant hydronephrosis and thinning of the renal cortex. At left ureteroscopy, the stone was dislodged to the kidney and thick milky foul-smelling discharge with mucous strands filling the collecting system were noted. A left ureteric stent was inserted due to poor views and risk of sepsis. Culture of the urine grew yeast but no further details.

A second session of URS was undertaken 4 weeks later. This revealed large fungal balls in the collecting system – attempts to suction and basket these were partially effective, the stone was fragmented with laser, wire fragment removed, and stent replaced. After discussion with microbiology, the patient received IV ambisome 390mg once daily post-operatively for 3 days along with IV Tazocin 4.5g TDS before switch to oral fluconazole. The urine/pus aspirate from the kidney subsequently returned as *Aspergillus fumigatus* species complex, sensitivities at that point unknown.

6 days post operatively the patient developed further loin pain and fever. CT scan showed severe left hydronephrosis and the stent was migrated to mid ureter along with impacted mid ureteric stone (Fig. 2).

Urgent URS and left ureteric stent change was performed the following day. Further microbiology testing of the aspergillus culture from the aspiration of the left kidney was performed and after discussion

^{*} Corresponding author.

E-mail address: hasan7.ali933@gmail.com (H. Al-Ibraheem).

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Fig. 1. CT KUB 3D reconstruction showing complete staghorn stone in the left kidney.



Fig. 2. CT KUB non contrast coronal section showing impacted left mid ureteric stone with severe left hydronephrosis.

with microbiology, fluconazole was switched to voriconazole 400 mg BD for one day then 200 mg twice daily thereafter. The patient was discharged on voriconazole and ciprofloxacin. Serum fungal markers with beta-D-glucan and galactomannan were arranged, together with serial LFTs for monitoring when using voriconazole.

Unfortunately, within 9 days on voriconazole, the patient developed liver toxicity (ALT 318) and so voriconazole discontinued. Moreover, K citrate was changed to sodium bicarbonate 1g TDS due to concerns about renal function. One month later, liver function returned to baseline and the patient was started on Isavuconazole 200 mg three times daily for 2 days then 200 mg daily for five days on microbiology advice.

Definitive planning was made with microbiology and specialist urology input from nationwide experienced urology centres. The patient was planned for nephrostomy, PCNL, ureteral catheter and antifungal irrigation together with IV antifungal.

Pre-op US guided nephrostomy insertion failed as the system was not sufficiently dilated. Left URS and left PCNL was performed successfully, fungal balls were removed in addition to a 1 cm recurrent stone. Both an 18Fr nephrostomy and a 5Fr ureteral catheter secured to a catheter were left in place - any irrigation with antifungal agents must have low risk of obstruction due to toxicity if unable to flow. Day 1 post op, the patient had irrigation with 50 mg of amphotericin in 1 L of 0.9% NaCl, 40 ml/hour through ureteral catheter with nephrostomy on free drainage for 24 hours. IV isavuconazole was given for 48 hours peri-operatively. The ureteral catheter and nephrostomy were removed in a staged fashion, and the patient was discharged with oral Isavuconazole 200 mg od for 7 days and trimethoprim PO 200 mg bd for 5 days.

All the stones from the left kidney were 100% uric acid and the patient was discharged stone free with allopurinol and sodium bicarbonate.

A follow up CT KUB showed no stone on the left side but an atrophic kidney. However, any preservation of renal function was deemed important given the young age of the patient, hypertension and diabetes risking future deterioration of CKD.

3. Discussion

While aspergillosis primarily targets the lungs, renal involvement through colonisation and mycetoma formation (aspergilloma) is uncommon. It typically manifests in individuals with compromised immunity. Treatment of renal aspergillomas lacks protocol due to the rarity of the disease. The optimal approach depends on factors such as fungal species, extent of renal involvement, and presence of complications.¹

Aspergillosis in the kidney can present in many ways including renal abscesses, as a fungal ball can cause obstructive uropathy, or ascending aspergillosis including urethra, prostate, ureters and kidney.³

Our patient had risk factors, including diabetes, CKD, and history of multiple interventions for uric acid renal stones. However, he was not frankly immunocompromised, on no steroids and was not on an SGLT-2 inhibitor, which have been associated with increased fungal UTIs due to drug-induced glycosuria.⁴ The renal fungal ball was discovered visually during ureteroscopy procedure and aspergillus fungus confirmed by culture of the aspiration taken directly from the kidney.

Despite the lack of clear guidelines, expert opinions from several urology centres, consulting with microbiologists and review of relevant case reports allowed formulation of a sensible treatment strategy. The emergence of liver toxicity to voriconazole further added to the treatment challenges. That said, oral antifungals alone are insufficient for resolution of infection as drugs such as voriconazole, isavuconazole and posaconazole have extremely low levels in the urine. IV amphotericin has good urine penetration, but unfortunately significant risk of nephrotoxicity particularly with this patient's eGFR 30. Irrigation of amphotericin to the collecting system avoids the systemic absorption and the regime was based on the Infectious Disease Society of America candidiasis guidelines for bladder instillation.⁵

The definitive treatment using PCNL to remove all visible aspergilloma together with systemic and local irrigation of antifungals successfully eradicated aspergillosis in this patient.

4. Conclusion

Isolated renal aspergilloma is a rare medical entity with complex diagnostic and treatment pathways. We successfully tackled this case by surgically removing the fungal ball through PCNL, followed by amphotericin irrigation and peri-operative systemic isavuconazole.

ORCID iD authorship contribution statement

Hasan Al-Ibraheem: Writing – review & editing, Writing – original draft. **George Shaker:** Writing – review & editing. **Stella Roushias:** Writing – review & editing, Supervision.

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