CASE REPORT

A rare cause of anuria in a case of pre-B acute lymphoblastic leukaemia

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SUMMARY

Renal failure in cases of acute lymphoblastic leukaemia during induction is mainly because of sepsis and tumour lysis syndrome. This 18-year-old man had sudden onset anuria with increase in creatine. At this time, patient did not have any overt signs or laboratory features suggestive of sepsis. Imaging studies documented bilateral hydronephrosis. Ureteroscopy was done, and it showed presence of soft tissue mass obstructing the ureter. On the left side, it was noted in its middle part and on the right, at the ureteropelvic junction. The mass on the left side was removed under ureteroscopic guidance and was sent for histopathology examination. It was confirmed to be fungal ball on histopathology examination. Though rare, even in immunocompromised patients, bilateral fungal ball should be considered in differential diagnosis in cases of acute leukaemia with sudden onset anuria. We share our experience in managing this case for which there are no clear guidelines.

BACKGROUND

Fungal ball in kidneys or ureters is very rare. While evaluating causes of anuria in immunocompromised hosts, this is not routinely considered a differential diagnosis. This is a treatable cause of renal failure, and outcomes are good if timely diagnosis is done. There are no clear guidelines for management of ureteral fungal balls due to paucity of data. High index of suspicion should be kept in patients, particularly those with haematological malignancies and those who have received prolonged duration of antibiotics since this condition is very rare.

CASE PRESENTATION

An 18-year-old male was undergoing treatment for pre-B acute lymphoblastic leukaemia. He was being treated according to BFM 2002 protocol.¹ He had completed 64 days of induction therapy according to this protocol. Bone marrow examination, done on day 33 of induction was suggestive of disease in remission. Significant events in entire induction included two episodes of febrile neutropenia which required broad spectrum antibiotics and amphotericin B. On day 74 of therapy, he complained of pain in bilateral flanks and anuria. On examination, there was no tenderness over renal angles, blood pressure was normal and there were no overt signs of sepsis or cardiac failure. Ultrasonography (USG) and CT scan of the abdomen were done which

showed bilateral hydronephrosis and hypodensity at right ureteropelvic junction.

INVESTIGATIONS

Patient was thoroughly evaluated on the day he complained of anuria. Complete haemogram showed haemoglobin, 6.1 g/dL; total leucocyte count, $8 \times 10^9/L$ absolute neutrophil count, $6.2 \times 10^9/L$; and platelet count, $150 \times 10^9/L$. Blood urea was 134 mg/dL, and serum creatinine was 5.6 mg/dL. Liver function tests were normal. USG result of the abdomen showed bilateral hydronephrosis with hypodense mass at the right ureteropelvic junction. CT scan result of the abdomen revealed the same findings.

Percutaneous nephrostomy was done, and within 3 days, urea and creatine returned to normal. CT urography was done, and it showed obstruction by a soft tissue mass in the left ureter in its middle portion and at the right ureteropelvic junction (figure 1). Histopathological examination showed branching septate hyphae suggestive of *Aspergillus* infection (figure 2). Fungal culture showed no growth.

DIFFERENTIAL DIAGNOSES

1. Nephrolithiasis.
2. Fungal ball.
3. Sepsis-induced acute kidney injury.

TREATMENT

Emergency haemodialysis was initiated when he developed anuria. The following day, percutaneous nephrostomy was done. After urea and creatine had normalised, CT urography was done and result showed obstruction of contrast by a hypodense material in the left ureter (in its middle part) and at the right ureteropelvic junction. The patient was referred for ureteroscopy and placement of double J stent. When ureteroscopy was done, a soft tissue mass obstructing the lumen was observed in both the ureters corresponding to the level of obstruction documented in CT urography (figure 3). Left-sided mass was removed under ureteroscopic guidance. Since the opposite side mass was located very high, it was decided to leave the mass in situ. Histopathological examination latter was suggestive of fungal ball (likely due to *Aspergillus* sp). Nephrostomy tubes were not removed and were used to deliver intrarenal amphotericin for 14 days (5 mg/100 mL sterile water) over 30 min four times a day. Along with this, patient received tablet

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Figure 1 CT urography picture with arrows showing obstruction of contrast in ureter by hypodense material (white arrow) in the lumen.

voriconazole 200mg twice daily for 3 months. Radiological resolution of the right fungal ball was documented after 14 days. Nephrostomy tubes were removed after radiological resolution was documented.

OUTCOME AND FOLLOW-UP

- Follow-up ureteroscopy at 6 weeks showed clear bilateral ureters (figure 4).
- Patient resumed consolidation therapy with a delay of 10 days.
- Patient successfully completed consolidation therapy.

DISCUSSION

Fungal ball in the urinary system is not a common condition. Furthermore, presence of bilateral fungal ball is a rare entity. The most common fungus implicated is *Candida* sp.² Involvement of the urinary tract by *Aspergillus* sp is extremely rare.³ Risk factors for development of fungal infections of the urinary

Figure 2 Histopathology image showing septate, branching fungal hyphae (HE ×100).

Figure 3 Ureteroscopy picture showing intraluminal soft tissue mass.

tract are prolonged antibiotic use, indwelling urinary catheter, use of steroids, malignancy, urinary tract anomaly, malnutrition, neonates and kidney transplant.^{2 4 5}

Less than 40 cases of aspergilloma of the urinary tract are reported until and less than 10 of these were of bilateral fungal balls causing ureteric obstruction. In a review of literature of 34 cases of isolated renoureteric *Aspergillus* infection (from 1926 to 1998), only two cases of bilateral renal aspergilloma were documented.⁶

Various approaches have been described for management of this condition. Open approach, percutaneous nephrostomy (with or without irrigation by antifungal drugs), ureteroscopy and removal of fungal ball have been used to treat this condition.^{4 7-9} Open approach may particularly be helpful in neonates where pelvis is very small or in patients where there is marked distortion of anatomy secondary to inflammation preventing ureteroscopy or inadequate response to minimally invasive procedures.⁴

In a case report of disseminated candidiasis secondary to *Candida norvegensis*, in a child with acute lymphoblastic leukaemia, non-invasive approach was used to manage the case. The child was treated with a combination of liposomal

Figure 4 Follow-up ureteroscopy showing lumen free of fungal ball.

amphotericin B and caspofungin.¹⁰ In another case report of aspergilloma of the kidney in a patient with relapsed acute lymphoblastic leukaemia, the child was successfully managed with amphotericin B.¹¹ In extensive review of literature, we could identify only two cases of fungal ball in patient with acute lymphoblastic leukaemia. In another case of acute myelogenous leukaemia, passage of fungal ball in urine was reported and was managed with amphotericin B.¹²

We opted for percutaneous nephrostomy to relieve the obstruction first. Then we went for ureteroscopic removal of the fungal ball on the left side. Tight-sided fungal ball was managed with amphotericin B irrigation and systemic antifungal (tablet voriconazole). Considering increasing resistance to amphotericin B, we opted for systemic therapy with voriconazole.

Learning points

1. High index of suspicion is required in immunocompromised patients, particularly when hypoechoic mass/structure is noted on ultrasonography.
2. Prompt relief of pressure is important for preventing permanent damage to kidneys.
3. Minimally invasive approach is to be selected particularly in immunocompromised patients to avoid further complications.

Contributors SAK wrote the case and managed the case. RS did imaging, reporting and PCN. MKB did ureteroscopy. MB guided patient management and edited the case.

Competing interests None declared.

Patient consent Obtained.

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