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Case Report

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A Hidden Culprit: Fungal Ball Causing Obstructive Pyelonephritis in a Healthy Child – The Role of Early Drainage and Definitive PCNL

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Abstract

Fungal pyelonephritis is an uncommon but serious renal infection in children, particularly when complicated by obstructive uropathy. If not promptly recognized and treated, it can progress to life-threatening sepsis and irreversible renal impairment. We report a case of a 5-year-old girl with obstructive fungal pyelonephritis with large intrapelvic fungal ball. The patient was successfully managed through a staged interventional approach involving urgent percutaneous nephrostomy (PCN) to relieve obstruction and sepsis, followed by definitive fungal mass clearance via percutaneous nephrolithotomy (PCNL). This case underscores the importance of a multidisciplinary approach involving early imaging, prompt antifungal therapy, and timely surgical intervention to ensure optimal outcomes.

Keywords: Fungal pyelonephritis, fungal ball, PCNL, sepsis, antifungal therapy

Introduction

Fungal infections of the upper urinary tract, including fungal pyelonephritis, are rare in immunocompetent children. However, their incidence is increasing, especially in patients with prolonged antibiotic use, urinary tract abnormalities, or indwelling catheters (1,2). Candida species, particularly *Candida albicans*, are the most common culprits. A unique and challenging complication of fungal pyelonephritis is the formation of fungal balls (fungal bezoars), which can obstruct urinary flow, leading to hydronephrosis, infection, and subsequent renal impairment (2,3). Management of such cases requires high clinical suspicion, rapid imaging, microbiological confirmation, and a multidisciplinary intervention strategy (4). This report presents a paediatric case of obstructive fungal pyelonephritis with sepsis, managed effectively with percutaneous urinary drainage and minimally invasive surgical removal of the fungal mass.

Case presentation

A 5-year-old previously healthy girl was brought to the emergency department with complaints of high-grade fever for 3 days, lethargy, and severe left-sided flank pain. There was no significant past medical history, prior hospitalizations, or known urinary tract abnormalities. On clinical examination, the child was febrile (temperature 39.6°C), tachycardic (heart rate 132 bpm), and hypotensive, indicating early septic shock. She appeared toxic and was in visible discomfort due to flank tenderness.

Initial laboratory investigations revealed a white blood cell count of 22,000/mm³ with neutrophilic predominance, indicating a significant inflammatory response. C-reactive protein was markedly elevated at 108 mg/dL, and procalcitonin was 9.2 ng/mL, suggestive of severe infection. Serum creatinine was elevated at 1.4 mg/dL, higher than the normal range for age. Urinalysis showed pyuria, haematuria, and the presence of fungal elements

on microscopy. Both blood and urine cultures subsequently grew *Candida albicans*, confirming systemic fungal infection.

Ultrasound abdomen revealed moderate-to-severe left-sided hydronephrosis with echogenic debris in the renal pelvis, suggestive of obstructive pathology. Further evaluation with contrast-enhanced Computed tomogram of kidney, ureter and bladder (CT KUB) demonstrated a non-enhancing mass in the left renal pelvis measuring approximately 3 cm in diameter, consistent with a fungal ball. The left kidney was hydronephrotic with significant thinning of renal parenchyma. No calculi or anatomical malformations were seen (Figure 1).

DTPA (diethylenetriamine pentaacetate) renography confirmed obstructive drainage with reduced split renal function on the affected side (left kidney contributing 30% of total renal function) and delayed tracer excretion (Figure 2).

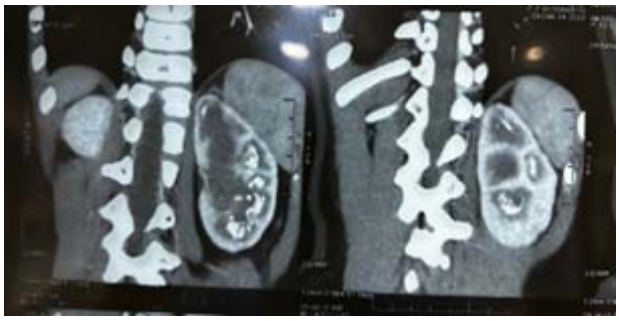

Figure 1. *CT KUB showing left renal pelvic non enhancing mass with moderate hydronephrosis.*

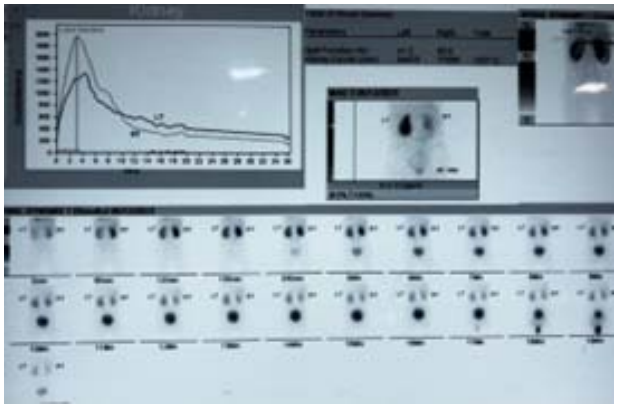

Figure 2. *DTPA scan showing delayed excretion and poor drainage of left kidney*

Management

Initial stabilization and antimicrobial therapy

The patient was admitted to the paediatric intensive care unit and started on intravenous fluids, inotropes for sepsis-related hypotension, and broad-spectrum antibiotics (meropenem and vancomycin) along with empirical antifungal therapy (liposomal amphotericin B). Following microbiology confirmation of *Candida albicans*, antifungal therapy was transitioned to intravenous fluconazole based on susceptibility. Despite initial therapy, the patient continued to have fever and persistent leucocytosis, raising concern for ongoing obstruction-related sepsis.

Percutaneous nephrostomy (PCN)

Given the imaging findings of obstructed renal drainage and clinical deterioration, an urgent ultrasound-guided percutaneous nephrostomy was performed under sedation. Approximately 80 ml of purulent and necrotic debris was drained, and a nephrostomy tube was left in place for continuous drainage. Post-PCN, the patient showed marked clinical improvement over 48 hours, with normalization of hemodynamic and reduction in inflammatory markers.

Definitive surgical management with PCNL

After 4 weeks of stabilization and improvement, definitive management was planned. Under general anaesthesia, percutaneous nephrolithotomy was performed using fluoroscopic guidance. A brownish grey, friable fungal mass consistent with a fungal bezoar was visualized and removed completely (Figure 3). The renal pelvis

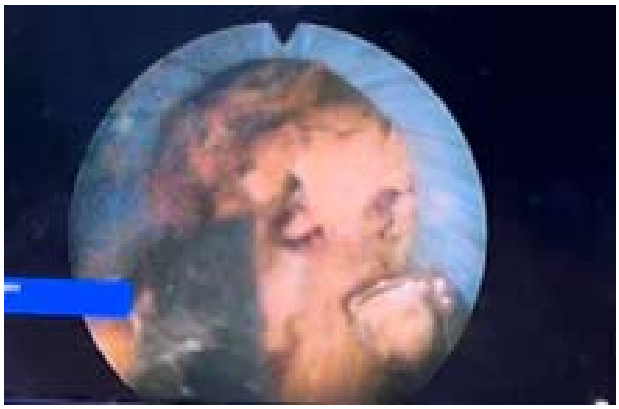

Figure 3. *I ntraoperative image during PCNL showing removal of fungal ball from renal pelvis.*

and calyceal system were irrigated thoroughly to remove residual debris. No intraoperative complications occurred. Postoperative nephrostogram confirmed free flow of contrast into the bladder without evidence of obstruction.

Outcome and follow-up

The patient recovered uneventfully and was discharged on oral fluconazole for a total of 6 weeks. Repeat renal function tests normalized, and follow-up DTPA scan at 6 weeks post-surgery showed improved drainage and partial recovery of split renal function (left kidney contribution improved to 36%). Nephrostomy tube was removed in 3 weeks and Follow-up ultrasound at 3 and 6 months revealed no evidence of recurrence.

Discussion

Obstructive fungal pyelonephritis is an uncommon but serious condition in immunocompetent children, often leading to diagnostic uncertainty and delayed management. It is typically associated with urinary tract abnormalities, prior instrumentation, long-term antibiotic use, or immunocompromise. However, the present case is unique, as it occurred in a previously healthy child with no known predisposing factors-highlighting the importance of clinical vigilance even in low-risk individuals.

Fungal balls, or fungal bezoars, form when fungal organisms colonize and aggregate within the renal collecting system, leading to physical obstruction and superimposed infection. *Candida albicans* is the most frequently implicated species, consistent with the microbiological findings in our patient (1,2). The formation of fungal balls is rare, particularly in children, but has been documented in a few case reports and small series. Song et al. describe a case of obstructive fungal pyelonephritis managed with antifungal therapy and nephrostomy drainage, underscoring the need for multimodal intervention in advanced disease (3).

Early and accurate diagnosis is essential. Ultrasound remains the first-line imaging modality in pediatric urinary tract infections, but it can miss early or subtle fungal masses. In our case, echogenic debris within a hydronephrotic system raised suspicion for an obstructive process. Contrast-enhanced CT helped to define the extent and density of the mass and rule out nephrolithiasis or anatomical anomalies. DTPA renography further contributed by confirming obstruction and assessing split renal function, which informed the decision for nephron-sparing surgical intervention. Microbiological confirmation through urine and blood cultures is essential for targeted therapy. In our case, both cultures grew *Candida albicans,* justifying systemic antifungal treatment. Although medical management with antifungals such as amphotericin B or fluconazole is effective in many cases, the presence of obstruction or failure of conservative treatment necessitates interventional procedures (1,3).

Percutaneous nephrostomy (PCN) plays a pivotal role in managing sepsis by relieving pressure and allowing decompression of the infected system. It also facilitates local antifungal irrigation when systemic therapy is insufficient. PCN served as a bridge to definitive surgical management in this case, as the child's condition stabilized post-decompression (3).

While open surgical removal of fungal balls (Pyelotomy) has been reported in neonates and infants (4), percutaneous nephrolithotomy (PCNL) represents a less invasive but effective option. Although PCNL is well established for paediatric stone disease, its use for fungal bezoar removal remains rarely documented. Ranjan et al. demonstrated the safety and efficacy of PCNL in children, primarily for calculi, but the technique is also adaptable for soft, obstructive fungal masses when performed by experienced teams (5). Our successful use of PCNL to remove the fungal bezoar adds to the growing body of evidence supporting its role in paediatric infectious obstruction.

Conclusion

In conclusion, this case highlights the importance of a multidisciplinary and staged approach in managing obstructive fungal pyelonephritis. Early imaging, prompt antifungal therapy, and timely surgical intervention are essential. PCNL can serve as a definitive and kidney-sparing solution in selected paediatric cases, with careful pre-operative planning and post-operative follow-up. Long-term surveillance is vital to monitor renal recovery and prevent recurrence.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms from the parents of the child. Parents understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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