Section: Urology

Case Report

A LARGE RENAL MASS IN CKD PATIENT

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ABSTRACT

Upper tract urothelial carcinoma (UTUC) is a rare malignancy, comprising 5-10% of all urothelial carcinomas. Pyonephrosis as a primary presentation of UTUC is exceedingly uncommon. We report a 37-year-old male with chronic kidney disease (CKD) and a history of open pyeloplasty for left pelviureteric junction (PUJ) obstruction, who presented with left flank pain and pyuria. Imaging revealed a large renal mass with pyonephrosis, and biopsy confirmed high-grade invasive UTUC with squamous differentiation and sarcomatoid features. Preoperative USG guided biopsy was the key procedure which led to planning a single stage surgery. The patient underwent laparoscopic nephroureterectomy with bladder cuff excision. This case underscores the importance of considering malignancy in patients with persistent pyonephrosis, the role of chronic inflammation due to prior urological interventions in tumor pathogenesis, and the challenges in managing aggressive UTUC variants in patients with pre-existing renal dysfunction.

Keywords: Upper tract urothelial carcinoma (UTUC), pyonephrosis, chronic kidney disease (CKD), squamous differentiation, sarcomatoid features, laparoscopic nephroureterectomy.

INTRODUCTION

Upper tract urothelial carcinoma (UTUC) is an uncommon malignancy, occurring in 1-2 cases per 100,000 individuals annually, and accounts for 5-10% of all urothelial carcinomas. The majority arise in the renal pelvis (60-70%), with the remainder in the ureter (30-40%). Risk factors include smoking, occupational exposure to aromatic amines, chronic urinary tract infections, nephrolithiasis, and Lynch syndrome.[1-5]

Pyonephrosis, a suppurative infection of the renal collecting system, typically results from obstructive uropathy due to stones or strictures. Its association with UTUC is exceedingly rare. Chronic inflammation is implicated in urothelial carcinogenesis, and prior urological interventions, such as pyeloplasty or percutaneous nephrolithotomy (PCNL), may contribute to malignant transformation. This case highlights the diagnostic and therapeutic challenges of UTUC with pyonephrosis in a patient with CKD and a history of prior urological intervention.[6-10]

CASE PRESENTATION

Clinical History: A 37-year-old male presented with a 20-day history of left flank pain and pyuria. He had a history of hypertension (HTN) for two years, managed with antihypertensive medications, and CKD stage 4 (baseline serum creatinine ~3.0 mg/dL). His past urological history included left PCNL two years prior and open left pyeloplasty for PUJ obstruction 1.5 years prior. He denied gross hematuria, dysuria, fever, or urinary retention.

Physical Examination

Vitals: BP 110/70 mmHg, HR 90 bpm, afebrile.
Abdomen: Mild left flank tenderness, no palpable mass.
External Genitalia: Normal.

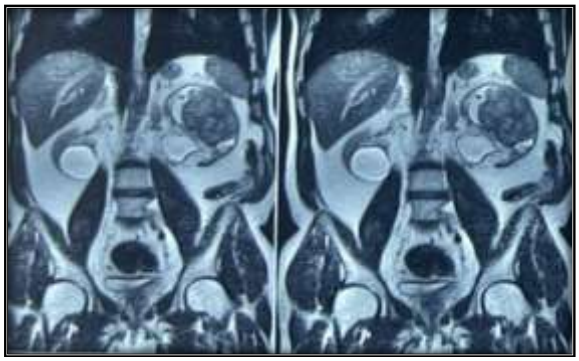
Laboratory Investigations

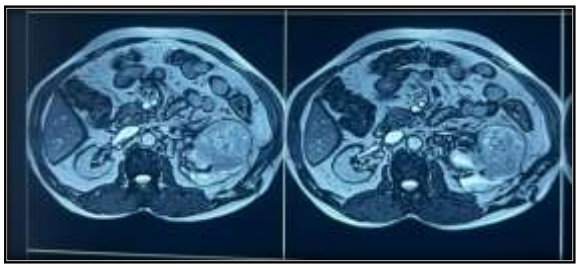
Hemoglobin: 9.0 g/dL (anemia).
Total Leukocyte Count (TLC): 11,190/cu mm (mild leukocytosis).
Serum Creatinine: 3.9 mg/dL (consistent with CKD stage 4).
Urinalysis: Pyuria, no hematuria.

Imaging Studies

MRI Abdomen and Pelvis
Right Kidney: 100×42 mm, normal parenchymal thickness, no hydronephrosis. Simple cyst (42×40 mm) in the lower pole.
Left Kidney: 112×70 mm, with an 80×76 mm partially exophytic lesion involving the upper and

mid poles, protruding into the renal pelvis. Moderate to gross hydronephrosis with internal pyonephrosis. Left renal hilar lymphadenopathy (largest node 24×12 mm).

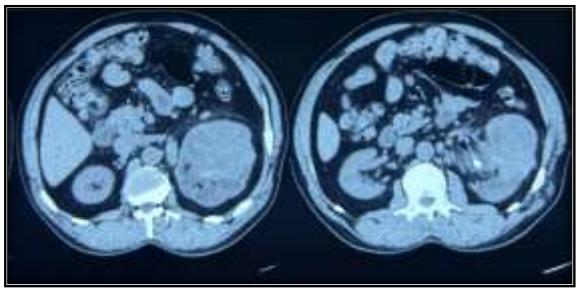


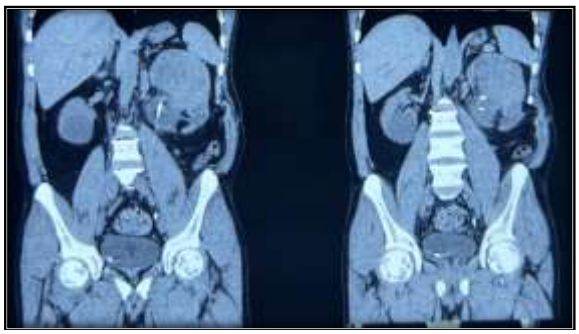


Non-contrast CT (NCCT) KUB

Right Kidney: Normal size (98×50 mm), with a simple cyst (44×44 mm).

Left Kidney: Enlarged (108×90 mm) with a heterogeneously hyperdense exophytic lesion (76×76 mm), containing calcific foci. Gross hydronephrosis with parenchymal thinning (3-6 mm). Perinephric fat stranding and thickened Gerota's fascia, suggestive of malignancy with secondary infection.

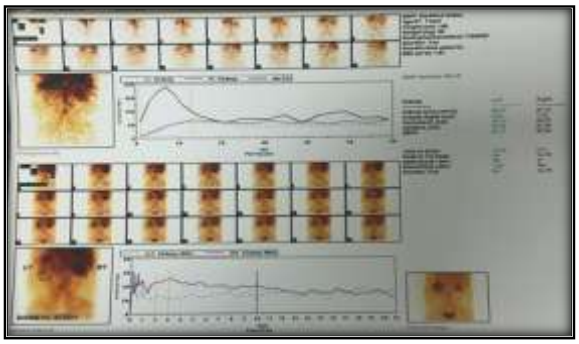




EC Renogram

Right Kidney: Moderate function (Relative function: 68%, EPRF: 88 mL/min).

Left Kidney: Severely impaired (Relative function: 32%, EPRF: 42 mL/min).



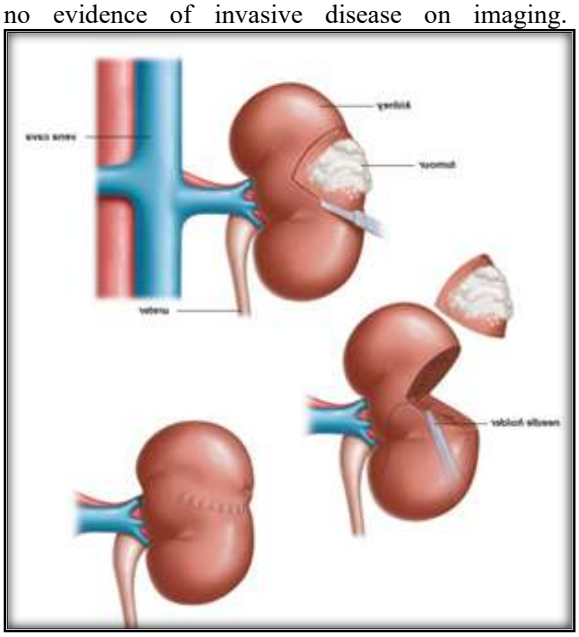
USG-guided core needle biopsy: High-grade invasive urothelial carcinoma with focal sarcomatoid differentiation and squamous features.

Management

Given the non-functioning left kidney, gross hydronephrosis, and biopsy-proven high-grade UTUC, a laparoscopic left nephroureterectomy with bladder cuff excision was performed on 03/02/25.

Consideration of Partial Nephrectomy

In select cases of upper tract urothelial carcinoma (UTUC), particularly in patients with pre-existing renal dysfunction, partial nephrectomy may be considered as a nephron-sparing approach. This is especially relevant in patients with CKD, where preserving renal function is critical. Partial nephrectomy can be guided by intraoperative ultrasound (USG) to ensure complete tumor excision with negative margins. However, the indications for partial nephrectomy in UTUC are limited and include small, low-grade tumors localized to a specific region of the kidney or ureter, absence of multifocality, and no evidence of invasive disease on imaging.



In this case, partial nephrectomy was not feasible due to the extensive nature of the disease, including the large tumor size (80×76 mm), involvement of multiple renal poles, gross hydronephrosis, and

evidence of perinephric fat invasion on imaging. Additionally, the presence of high-grade histology with aggressive features (squamous and sarcomatoid differentiation) further contraindicated a nephron-sparing approach. Radical nephroureterectomy with bladder cuff excision was deemed the most appropriate treatment to achieve oncological control.

Adjuvant therapy was deferred due to:

1. Absence of lymphovascular invasion (LVI).
2. Negative surgical margins.
3. Underlying CKD limiting chemotherapeutic options.

Postoperative recovery was uneventful, and the patient is advised for close surveillance.

Histopathology

Postoperative pathology: Moderately differentiated UTUC (Grade 2) with 60% squamous differentiation, invading perinephric fat (pT4NxMx). No lymphovascular invasion (LVI) or positive margins.

DISCUSSION

UTUC with Pyonephrosis: A Rare Presentation

UTUC rarely presents with pyonephrosis. The presence of pyonephrosis in this case likely resulted from chronic obstruction and superimposed infection secondary to the tumor. Persistent or recurrent pyonephrosis despite prior surgical intervention should raise suspicion of an underlying malignancy.

Role of Chronic Inflammation and Prior Urological Interventions

The patient's history of PUJ obstruction, open pyeloplasty, and recurrent infections may have contributed to chronic inflammation, a known factor in urothelial carcinogenesis. Chronic irritation can lead to squamous metaplasia, a precursor to squamous differentiation in urothelial carcinoma. Additionally, sarcomatoid differentiation is associated with a more aggressive phenotype, often presenting at an advanced stage (pT3-T4) with poor outcomes.

Management Considerations in CKD

In patients with CKD, managing UTUC poses challenges due to nephron-sparing considerations and chemotoxicity. Radical nephroureterectomy remains the gold standard for high-grade UTUC, even in the presence of impaired renal function. However, adjuvant systemic therapy is often limited due to renal insufficiency. In such cases, close surveillance is essential to detect early recurrence.

Literature Review

UTUC accounts for 5-10% of urothelial carcinomas, with an annual incidence of 1-2 cases per 100,000 individuals.

Squamous differentiation occurs in 10-20% of UTUC cases and is linked to chronic inflammation. Sarcomatoid transformation is rarer (<5%) and is associated with poor prognosis.

Radical nephroureterectomy with bladder cuff excision remains the standard of care, with adjuvant therapy considered in pT3/pT4 or node-positive disease.

CONCLUSION

This case highlights a rare presentation of UTUC with pyonephrosis, emphasizing the importance of malignancy in patients with persistent pyonephrosis and a history of prior urological interventions. Chronic inflammation likely played a role in tumor pathogenesis, leading to aggressive histology with squamous and sarcomatoid differentiation. Given the challenges of managing UTUC in CKD patients, a multidisciplinary approach is crucial for optimizing outcomes.

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