

More than Just a Stone: Staghorn Surprise with Ureteric Transitional Cell Carcinoma - A Rare Co-Incidence

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Abstract: Upper tract urothelial carcinoma (UTUC) accounts for approximately 5-7.5% of all urologic malignancies. Its concurrent occurrence with an ipsilateral staghorn calculus is exceedingly rare, with only isolated case reports in the published literature. We present a 75-year-old male who reported a single episode of gross haematuria and right loin pain of two weeks duration. Plain computed tomography (CT) revealed a 3.7 × 2.6 × 0.9 cm staghorn calculus involving the right renal pelvis, upper and middle calyces. CT Urogram additionally demonstrated a homogeneously enhancing soft tissue mass measuring 1.5 × 1.7 × 3.7 cm within the right mid-ureter with proximal ureteric and pelvicalyceal system dilatation. The right kidney showed hypo-enhancement compared to the left and absent excretion on delayed-phase imaging, indicating severely compromised function. The patient underwent laparoscopic right nephroureterectomy with bladder cuff excision. Post-operative histopathology confirmed high-grade invasive urothelial carcinoma of the mid-ureter with invasion into the muscularis propria (pT2N0Mx), with clear surgical margins. Immunohistochemistry demonstrated diffuse CK7 and Uroplakin positivity. This case highlights the critical importance of comprehensive radiological evaluation- including CT Urogram- in elderly patients presenting with haematuria and loin pain, even when a calculus appears to account for the symptoms, as a concurrent urothelial malignancy may be masked by coexisting stone disease.

Keywords: Staghorn calculus, ureteric transitional cell carcinoma, upper tract urothelial carcinoma, nephroureterectomy, haematuria, CT urogram.

1. Introduction

Upper tract urothelial carcinoma (UTUC) is an uncommon malignancy, accounting for approximately 5-7.5% of all urothelial tumours. The majority arise from the renal pelvis, while ureteric primaries constitute roughly 25% of UTUC. Its concurrent presentation with an ipsilateral staghorn calculus is an exceptionally rare co-incidence, with only isolated case reports documented in the literature, thereby underscoring its rarity. The diagnostic challenge lies in the fact that the predominant symptoms of haematuria and loin pain are shared by both conditions, and initial non-contrast CT may fail to reveal the soft tissue component of a concurrent urothelial malignancy.

2. Case Report

A 75-year-old male presented with a single episode of gross painless haematuria two weeks prior to admission, accompanied by persistent right loin pain. There was no history of prior urinary tract infections, tuberculosis, analgesic abuse, smoking, or previous urological surgery. Physical examination revealed mild right costovertebral angle tenderness. Urinalysis demonstrated microscopic haematuria without significant pyuria. Renal function tests were within normal limits.

Plain CT of the abdomen and pelvis revealed a 3.7 × 2.6 × 0.9 cm staghorn calculus occupying the right renal pelvis and extending into the upper and middle calyces. In view of this finding, CT urogram was planned for comprehensive evaluation.

CT Urogram demonstrated, in addition to the staghorn calculus, a homogeneously enhancing soft tissue mass measuring 1.5 × 1.7 × 3.7 cm within the right mid-ureter. There was associated proximal ureteric dilatation and pelvicalyceal system (PCS) dilatation upstream to the lesion. The right kidney exhibited hypo-enhancement compared to the left kidney and demonstrated absent contrast excretion on delayed-phase images, indicating severely impaired ipsilateral renal function. No regional lymphadenopathy or distant metastatic lesions were identified.

A diagnosis of right mid-ureteric urothelial carcinoma with concurrent staghorn calculus and a poorly functioning obstructed right kidney was established. Following multidisciplinary discussion and pre-operative optimisation, the patient underwent laparoscopic right nephroureterectomy with bladder cuff excision.

3. Pathological Findings

Gross examination of the resected specimen- comprising the right kidney with attached ureter measuring 19 cm in length and bladder cuff measuring 3 × 3 cm- revealed a grey-white proliferative mass in the mid-ureter measuring 1.9 × 2.0 cm. The staghorn calculus occupied the renal pelvis and extended into the upper calyces. A large cystic cortical cavity was identified adjacent to the calculus; the renal parenchyma appeared dilated and atrophic.

Microscopic examination demonstrated an infiltrating malignant neoplasm arranged in papillary and solid patterns, composed of round to oval cells with moderate eosinophilic cytoplasm, polymorphic nuclei, prominent nucleoli, and frequent mitoses- consistent with high-grade urothelial

carcinoma. Tumour invasion into the muscularis propria was confirmed. Lymphovascular invasion was not identified. All surgical margins- including the radial soft tissue margin, bladder cuff margin (0.2 cm), and renal artery and vein cut margins- were free of tumour involvement. Sections from the renal parenchyma showed pyelonephritic changes, glomerular fibrosis, and tubular atrophy without tumour infiltration.

Pathological staging: pT2N0Mx. Histological grade: High grade (WHO 2004/2016 classification). Immunohistochemistry (IHC): CK7- diffuse strong positivity in 80% of tumour cells; Uroplakin- diffuse strong positivity in 50% of tumour cells; CK20- non-contributory; p53- negative; Synaptophysin- negative. The IHC profile was consistent with invasive urothelial carcinoma.



Figure 1: Gross specimen showing the kidney with the tumor in ureter and its cross section revealing the presence of stones and ureteric TCC

4. Discussion

UTUC is a relatively uncommon but clinically significant malignancy. Its co-occurrence with ipsilateral staghorn calculus represents an especially rare clinical entity. Chronic urinary stasis, recurrent infection, and prolonged mucosal irritation associated with staghorn calculi have been postulated as potential carcinogenic stimuli capable of promoting malignant transformation of the urothelium. However, whether this relationship is causal or coincidental remains unclear, given the scarcity of reported cases (Rouprêt et al., 2021).

The diagnostic challenge in such presentations is considerable. Haematuria and loin pain are non-specific symptoms attributable to both urolithiasis and upper tract malignancy. Plain CT, while highly sensitive for detecting calculi, may obscure or fail to delineate an associated soft tissue lesion. CT urogram- with corticomedullary, nephrographic, and excretory phase acquisitions- is the imaging modality of choice for the evaluation of urothelial pathology and should be performed whenever haematuria is the presenting complaint, even in the presence of a demonstrable calculus. In the present case, it was the CT urogram that revealed the ureteric mass that would otherwise have been attributed to the calculus alone.

Laparoscopic nephroureterectomy with bladder cuff excision remains the gold standard treatment for high-grade UTUC, as was performed in this patient. The surgical margins were

clear, offering a favourable oncological outcome for this stage of disease.

Post-operative surveillance must include regular cystoscopy (every 3 months for the first year, then at increasing intervals) and imaging of the upper urinary tract, given the well-documented risk of metachronous bladder tumours (20-50%) and contralateral upper tract recurrences in UTUC (Rouprêt et al., 2021). The role of adjuvant chemotherapy in pT2 disease without nodal involvement remains debated and should be discussed in a multidisciplinary setting.

5. Conclusion

The concurrent occurrence of a staghorn calculus and ureteric urothelial carcinoma in the same renal unit is rare and poses a significant diagnostic challenge. A systematic radiological evaluation using CT Urogram is essential, as reliance on non-contrast CT alone risks a missed or delayed diagnosis of upper tract malignancy. Clinicians must maintain a high index of suspicion for concurrent urothelial neoplasia in elderly patients presenting with haematuria and apparent nephrolithiasis. Timely nephroureterectomy with bladder cuff excision, followed by rigorous urological surveillance, is the cornerstone of management in such cases.

Declaration

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References

- [1] Rouprêt, M., Babjuk, M., Burger, M., Capoun, O., Cohen, D., Compérat, E. M., Dominguez-Escrig, J. L., Gontero, P., Liedberg, F., Masson-Lecomte, A., Mostafid, A. H., Palou, J., van Rhijn, B. W. G., Shariat, S. F., Soria, F., Sylvester, R., Zigeuner, R., & Sternberg, C. N. (2021). European Association of Urology guidelines on upper urinary tract urothelial carcinoma: 2020 update. *European Urology*, 79(1), 62-79. <https://doi.org/10.1016/j.eururo.2020.05.042>
- [2] Siegel, R. L., Miller, K. D., Fuchs, H. E., & Jemal, A. (2022). Cancer statistics, 2022. *CA: A Cancer Journal for Clinicians*, 72(1), 7-33. <https://doi.org/10.3322/caac.21708>
- [3] Messing, E. M., & Catalona, W. (1998). Urothelial tumors of the urinary tract. In P. C. Walsh, A. B. Retik, E. D. Vaughan, & A. J. Wein (Eds.), *Campbell's Urology* (7th ed., pp. 2327-2410). W. B. Saunders.
- [4] Petersen, A. C., & Petersen, T. C. (2003). The association of renal cell carcinoma and renal calculi: A review of the literature. *Scandinavian Journal of Urology and Nephrology*, 37(3), 207-212. <https://doi.org/10.1080/00365590310011082>

- [5] Kassouf, W., Traboulsi, S. L., Kulkarni, G. S., Shayegan, B., Bhatt, J. R., & Aprikian, A. G. (2016). CUA guidelines on the management of non-muscle invasive bladder cancer. *Canadian Urological Association Journal*, 10(7-8), E227-E250. <https://doi.org/10.5489>