CASE REPORT

Concomitant Bilateral Nephrolithiases, High-Grade Muscle Invasive Urothelial Cancer, and Renal Mass: What Would You Do?

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This paper discusses the diagnostic and therapeutic approach to a patient with concomittant serious clinical conditions such as bilateral nephrolithiasis, and possible dual primary malignancies of the kidney and the urinary bladder.

A 62-year-old male presented with gross hematuria. Radiographic imaging revealed a large urinary bladder mass, bilateral hydronephrosis due to obstructive nephrolithiases, and a left solid renal mass. After appropriate cardiopulmonary optimization, the authors opted to do a preliminary transurethral resection of the bladder tumor. This was followed by staged therapies with right ultrasound-guided PCNL; a left partial nephrectomy with nephrolithotomy, and radical cystectomy with ileal conduit. Unfortunately, the patient did not survive the multiple surgeries and expired. The chronology of the various therapeutic procedures in cases of synchronous serious clinical conditions of the urinary tract such as nephrolithiasis, renal and bladder neoplasms need to be individualized and will dictate the outcome of the entire therapy.

Key words: nephrolithiasis, Xanthogranulomatous pyelonephritis, muscle-invasive urothelial carcinoma

Introduction

Serious clinical conditions such as genitourinary malignancy and nephrolithiasis, significantly impact on the prognosis of a patient. When diagnosed together in a single patient, this requires a well-planned chronology of therapeutic steps in order to provide a good clinical outcome. Presented here is a case of an elderly male with gross hematuria and subsequent diagnoses of muscle invasive bladder cancer, chronic kidney disease resulting from obstructing bilateral nephrolithiases, and a renal mass.

A comprehensive review of the related literature was conducted in an attempt to provide a broader understanding of these conditions and their management. However, there was no data available involving all three entities in a single patient. The main challenge is anchored on which condition to prioritize as most impactful on survival, while at the same time applying, a combination of minimally invasive and nephron-sparing approaches to both upper and lower tract pathologies in order to preserve as much renal function as possible while achieving adequate oncological control. The treatment of choice for bladder tumor is straightforward, consisting of a preliminary biopsy for histopathological diagnosis followed by radical extirpative surgery and urinary diversion. For the nephrolithiasis, PCNL is the standard of care. However, the presence of a renal mass with nephrolithiasis complicates the situation. They

deemed that an open partial nephrectomy with nephrolithotomy is most effective and safest for this condition. The final question is determining the sequence of events which may be variable depending on the clinical judgment. The authors present here their own approach.

The Case

A 62-year-old hypertensive male, complained of gross painless hematuria with amorphous clots. He has an unremarkable past medical, family and social history. History was significant for a previous transurethral resection of a large 9.6cm x 9.3cm bladder mass last March 2023. Histopathology revealed low grade urothelial carcinoma, with no muscle layer seen. No intravesical or adjuvant chemotherapy was conducted thereafter.

The patient then transferred to this institution for higher level of care. In April 2023, the patient sought consult in the emergency room due to persistence of gross hematuria. He had a creatinine of 6.7mg/dL. Unenhanced CT scan showed the following findings: 3.7-cm. (1689HU) pelvolithiasis and 2.2-cm (756HU) superior calyceal calculus on the right kidney; a 3.4-cm (1551HU) ureteropelvic junction (UPJ) calculus, inferior calyceal calculi measuring up to 0.9cm (987HU) (Figure 1) and a 3.4-cm middle pole mass on the left kidney (Figure 2) and a 3-cm urinary bladder mass located at the right lateral wall (Figure 3). There was no indication for dialysis and the patient was optimized through adequate hydration and electrolyte monitoring. The following procedures were done in sequence, after appropriate optimization by cardiology, nephrology and infectious diseases services:

The patient initially underwent bimanual examination under anesthesia, and transurethral resection of the bladder tumor on May 2, 2023. (Figure 4). Intraoperative findings showed

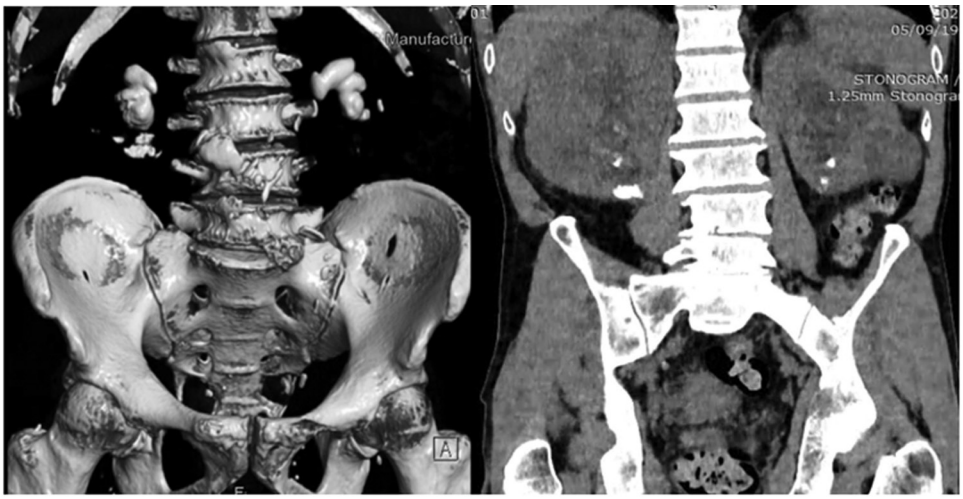

Figure 1. Left: Coronal view of CT scan showing the left renal mass (encircled).
Figure 2. Right: 3D reconstruction showing bilateral nephrolithiasis.

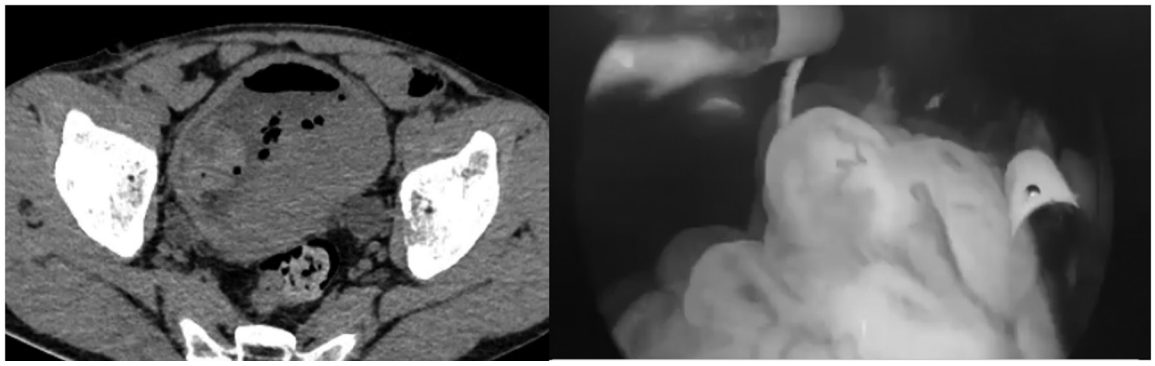

Figure 3. Left: Axial view of the CT scan showing the urinary bladder mass (encircled).
Figure 4. Right: Urinary bladder mass as seen in cystoscopy.

multifocal fungating intravesical masses arising from the left lateral wall. Histopathology revealed high grade papillary urothelial carcinoma with squamous differentiation.

After recovery, he underwent an ultrasound-guided right PCNL, with nephrostomy tube insertion. He also received triple lumen internal jugular catheter on May 20, 2023 (Figures 5 & 6) in anticipation of possible hemodialysis.

He underwent a left open partial nephrectomy with nephrolithotomy and nephrostomy tube insertion on May 26, 2023 (Figure 7). Intraoperative findings revealed a 3.5cm ureteropelvic junction calculus and pyohydronephrosis. Purulent urine came out after extraction of the renal calculus. There was a 3.5cm cystic mass on middle to inferior pole with no enlarged lymph nodes. The estimated blood loss was 500cc, and the warm ischemia time was 15 minutes. Histopathology showed xanthogranulomatous pyelonephritis, with no evidence of malignancy.

Finally, the patient underwent an open radical cystectomy, bilateral pelvic lymph node dissection, and ileal conduit on June 20, 2023. Intraoperative findings included a urinary bladder with irregular and asymmetric thickened walls, with multiple

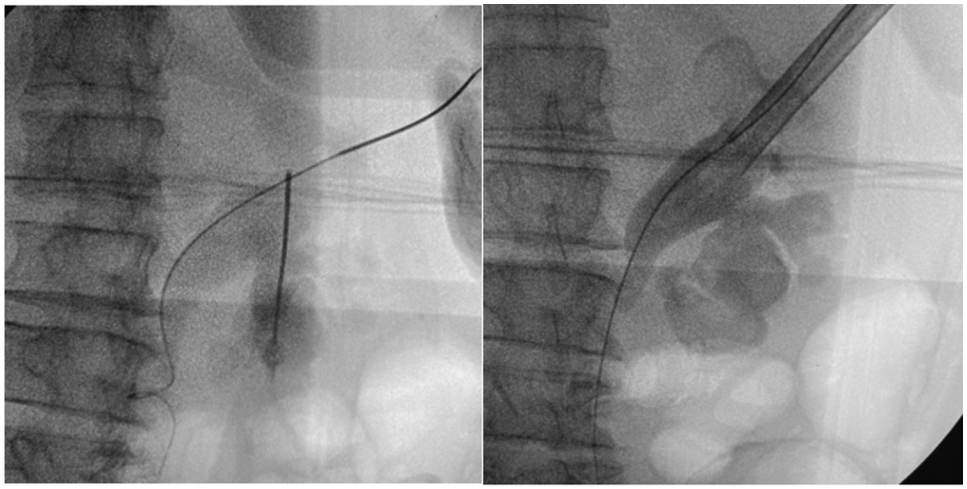

Figure 5. Left: Prone access of right kidney showing pelvolithiasis.
Figure 6. Right: Nephrostogram post percutaneous nephrolithotomy, showing maximal stone clearance.

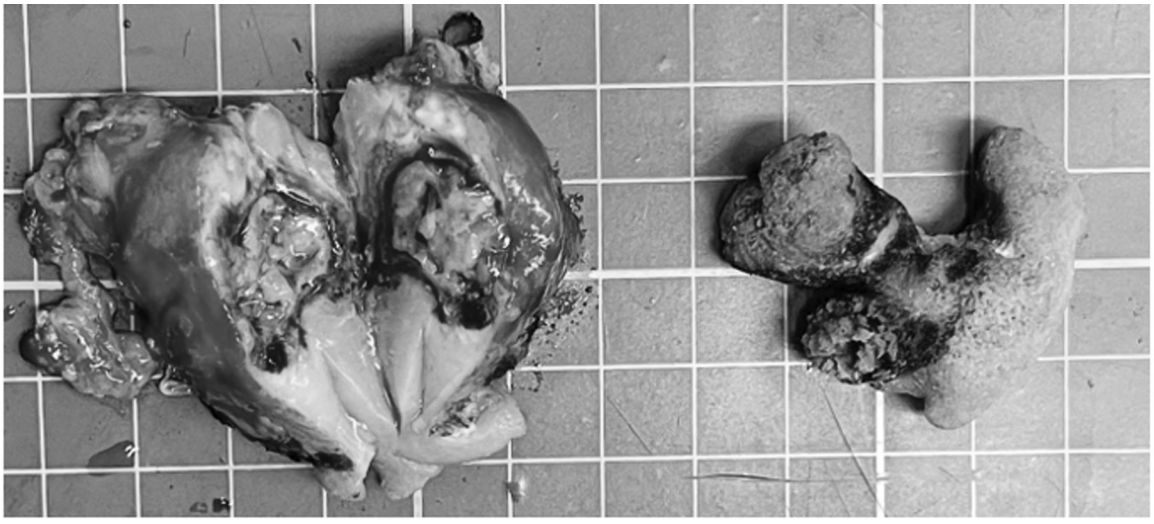

Figure 7. On the Left: 3.4cm left renal mass. On the Right: 3.4cm Ureteropelvic junction calculus

intraluminal fungating fleshy masses; no enlarged pelvic lymph nodes. The estimated blood loss was 900cc, and the operative time was 270mins. The final histopathology was high grade muscle invasive urothelial carcinoma pT4N0M0.

All procedures were completed successfully, with blood loss remaining within acceptable limits. Following the last surgery, the patient was stable and cleared by anesthesia to return to regular ward. Overnight, he remained comfortable with stable vital signs. He reported no fever, chest, abdominal or flank pain or dyspnea. However, in the morning, he was found pulseless and with no blood pressure. He expired on 21st of July (post operative day 1) secondary to fatal arrythmia.

Discussion

The coexistence of multiple urological pathologies such as obstructive nephrolithiasis, renal mass, and a urinary bladder tumor in a single patient highlights the complexity of diagnosis and dilemma in management.

A case report by Gaines, et al (2024) discussed a patient with horseshoe kidney, bilateral nephrolithiasis and high grade UTUC treated in a percutaneous approach – the first of its kind. While Another report by Guglin, et al (2023) had a young patient with upper tract urothelial carcinoma in the setting of xanthogranulomatous pyelonephritis, which are rare entities on its own but even more challenging altogether. In a retrospective study by A Fallatah et al, 10 patients with XGP were treated with nephrectomy in their department between 1988-2000: nine cases were associated with renal stones leading to non functioning kidney, 1 case associated with renal cell carcinoma and 1 case associated with transition cell carcinoma of the renal pelvis, illustrating the possible link between inflammatory processes and malignancy.

The foremost goals of therapy include achieving an oncologically free status, rendering patient stone-free and maintaining as much renal function as possible. While this case resulted in a tragedy and the authors saddened by the outcome, they based their decision on the following rationalization. The initial transurethral resection of bladder tumor was performed in order to re-establish the nature of the previously diagnosed urothelial cancer. They felt that this takes precedence over all the other clinical conditions because any delay in the management equates to a poorer prognosis.

The right ultrasound-guided PCNL was done as a minimally invasive approach to achieve a high-stone free rate while relieving the obstruction and minimizing renal trauma. This allowed maximal renal preservation for this side. The presence of both nephrolithiasis and a possible malignant renal mass in the left kidney presents a complex clinical situation. Therefore the authors opted to do an open partial nephrectomy provided adequate removal of the tumor, with renal conservation and an opportunity to remove the stone via the nephrolithotomy. While the final histopathological analysis showed a xanthogranulomatous pyelonephritis, their intent was to treat it as a renal cell carcinoma, and this justified the partial nephrectomy, which was intended to preserve renal function while achieving oncological control.

Finally, a radical cystectomy with bilateral pelvic lymph node dissection and ileal conduit was necessary in order to treat the muscle invasive bladder cancer as is consistent with the recommendations of the recent NCCN guidelines. Unfortunately, the patient did not survive this last procedure which was apparently uneventful intraoperatively. The likely cause of death may have been an arrhythmia or acute pulmonary embolism.

The synchronous presentation of conditions like those seen in the patient is rare due to the lack of prior reports and studies indicating its uncommon occurrence. The association between urothelial tumor of the renal pelvis and staghorn calculus has been described in a study by Katz, et all, where 3 of the 500 PCNLs were diagnosed with urothelial cancer during or following stone removal, but not preoperatively, affirming its diagnostic dilemma. They concluded that a high index of suspicion be raised in those with infected staghorn calculi. Urinary calculi are also frequently seen in post radical cystectomy patients with urinary diversion, however again, not simultaneously.

Conclusion

There is no perfect algorithm that will determine the most ideal treatment for this patient. The literature supports the effectiveness of each

of the procedures the authors had performed, in the treatment of bladder tumors, kidney stones, renal tumors, and muscle-invasive bladder cancer. The choice of therapy depends on factors such as the stage and extent of the disease, patient characteristics, and surgical expertise. Further studies are needed to explore advancements in surgical techniques, perioperative care, and long-term outcomes in patients undergoing these complex procedures. The challenge for similar patients with multiple diseases is rooted may be resolved through an individualized approach that takes into account the severity of each condition and its impact on the patient's prognosis.

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References

1. Kim LHC & Patel MI. Transurethral resection of bladder tumour (TURBT). Translational Andrology Urology 2020; 9(6): 3056–72. https://doi.org/10.21037/tau.2019.09.38
2. NCCN
3. Sabler IM, Katafigiotis I, Gofrit ON & Duvdevani M. Present indications and techniques of percutaneous nephrolithotomy: What the future holds?. Asian J Urol 2018; 5(4): 287–94. https://doi.org/10.1016/j.ajur.2018.08.004
4. Anastasiadias E, Brien T & Fernando A. Open partial nephrectomy in renal cell cancer – Essential or obsolete? Department of Urology, Guy's and St Thomas NHS Foundation Trust, London, UK 2016; 36: 541-7.
5. Chang SS & Cookson MS. Non-muscle-invasive bladder cancer: The role of radical cystectomy. Urology 2005; 66(5): 917–22.doi:10.1016/j.urology.2005.05.003
6. Katz R, Ofer N, Gofrit D, et al. Urothelial cancer of the renal pelvis in percutaneous nephrolithotomy patients. Urol Int 1 July 2005; 75 (1): 17–20. https://doi.org/10.1159/000085921
7. Birowo P, Tambunan MP, Rasyid N & Atmoko W. Case report: Treatment of urinary calculi using percutaneous nephrolithotomy in patient with ileal conduit and history of bladder transitional cell carcinoma. Urology Case Reports 2020; 33: 101330. https://doi.org/10.1016/j.eucr.2020.101330
8. Gaines JM, Macdonald EJ, Rai A, et al. Bilateral nephrolithiasis and upper tract transitional cell carcinoma in horseshoe kidney. Curr Urol 2024; 18(3): 247–9. doi: 10.1097/CU9.0000000000000109
9. Guglin A, Weiss R, Singh A, Mittal A, Hwang T, Shah A. Concurrent Xanthogranulomatous pyelonephritis and upper urinary tract transitional cell carcinoma. Case Rep Urol 2023 Mar 31;2023:6021178. doi: 10.1155/2023/6021178.