Case Report

Urothelial carcinoma presenting as a gross hydronephrosis with secondary calculi – an unusual presentation

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ABSTRACT

Urothelial cancers of the renal pelvis and collecting system are rare malignancies that constitute less than 10% of all renal tumors. More than 90% of such malignancies are of transitional cell origin. Most patients present with hematuria, loin pain, or acute renal colic. While most of the presentations follow a specific clinical or radiological pattern, sometimes, atypical presentations do occur. The purpose of this manuscript is to highlight this fact it is imperative for the clinicians and the radiologists to be familiar with both the usual and the unusual radiologic presentations of these diseases. A 65-year-old male presented with dull aching left loin pain, storage urinary symptoms and hematuria. A radiological diagnosis of pelviureteric junction (PJU) calculus obstruction with gross hydronephrosis and multiple secondary calculi was made. Hematuria was attributed to either secondary infection of hydronephrotic kidney or anti-platelet effect or due to prostatomegaly. After initial transurethral resection of the prostate, he underwent per cutaneous nephrolithotomy for kidney stones. As the patient had persistent pus discharge from the nephrostomy site, he underwent nephrectomy. The biopsy report was suggestive of high-grade papillary urothelial carcinoma with squamous differentiation. A combination of urothelial malignancy with renal stones and gross hydronephrosis is a rare finding. The objective of this report is to reiterate the importance of bearing in mind such peculiar associations. The purpose of this manuscript is also to highlight the rarity of this condition and stress upon the need for a thorough knowledge of these unusual radiologic features of urothelial cancer of the renal pelvi-caliceal system will facilitate making the correct diagnosis and also in planning appropriate treatment strategies.

Keywords: Urothelial carcinoma; hydronephrosis; secondary calculi.

INTRODUCTION

Urothelial cancers of the renal pelvis and collecting system are rare malignancies, constituting approximately less than 10% of all renal tumors. The majority (more than 90%) is urothelial carcinoma (UC), 9% are squamous cell carcinoma, and 1% is adenocarcinoma. Mostly such tumors develop between 50 and 70 years of age. There is a definite male preponderance, with the males being affected three times more often than females (1). Such patients usually present with macro or microscopic hematuria, dull aching loin pain, or sometimes, as acute renal colic due to luminal obstruction by either the mass or by a blood clot. Synchronous bladder cancer occurs in 2-4% of patients with upper tract tumors. Even though the incidence is small, this warrants a full urothelial tract screening as urothelial malignancies exhibit a field change effect (2). Moreover, nearly half to two-thirds of patients with upper tract UC may develop UC of the lower urinary tract at some point of time in their lifetime. Hence, bladder surveillance is essential during follow-up of such patients.

The pattern of presentation may sometimes be varied and unusual. The symptomatology and the modes of presentation may also be variable with nonspecific symptoms (3). This might sometimes lead on to a state of clinical uncertainty, which largely can be deciphered by subsequent radiologic evaluation. Therefore, it is imperative for the clinicians and the radiologists to be familiar with both the usual and the unusual radiologic presentations of these diseases.

CASE REPORT

A 65-year-old male presented to us with dull aching left loin pain. He also had burning micturition and obstructive lower urinary tract symptoms for the past 3 months with increased frequency of micturition and nocturia. He also had dyspepsia and epigastric pain. He is a known hypertensive for the past 15 years and has suffered a cerebrovascular accident 10 years back and currently is on anti-platelets. He had one episode of macroscopic hematuria that brought him to the hospital. There was no history of genitourinary malignancies within the family. On general

examination he was mildly disoriented and drowsy. The vital parameters were normal. The abdominal examination was normal. On per-rectal examination, he was found to have grade 2 prostatomegaly with a normal sphincter tone. His uroflow was suggestive of an obstructive voiding pattern. Blood biochemistry revealed hyponatremia and elevated absolute leukocyte counts with normal creatinine.

Abdominal ultrasonography (USG) demonstrated multiple left renal calculi with hydroureteronephrosis with cystitis and prostatomegaly. Computed tomography (CT) of the abdomen revealed multiple left renal calculi, the largest measuring 3.1x1.6 cm in the lower pole with left gross hydroureteronephrosis with abrupt tapering of ureter at L4 vertebral body level, bilateral perinephric fat stranding, cystitis and prostatomegaly. A radiological diagnosis of pelviureteric junction (PJU) calculus obstruction with gross hydronephrosis and multiple secondary calculi was made. The rationale for hematuria was attributed to either secondary infection within the grossly hydronephrotic kidney or due to anti-platelet drug effect or due to prostatomegaly. Urinalysis revealed 2-3 red blood cells per high power field. Since the patient attributed most of his symptoms to prostatomegaly, he was initially taken up for transurethral resection of the prostate. The postoperative period was uneventful, and the histopathology report was suggestive of benign hyperplasia of the prostate gland. Four weeks later, a dimercaptosuccinic acid (DMSA) renogram was done, which showed a functioning and a salvageable left kidney. Hence, he was readmitted and underwent a left percutaneous nephrolithotomy (PCNL) with double "J" (DJ) stenting and was maintained on regular follow up. Pyeloplasty at the time of PCNL was not considered as there was a stone at PJU with resultant edema at PJU and was sent home with a DJ stent in situ. Fig. 1 describes the preoperative CT scan imaging and the DMSA renogram findings.

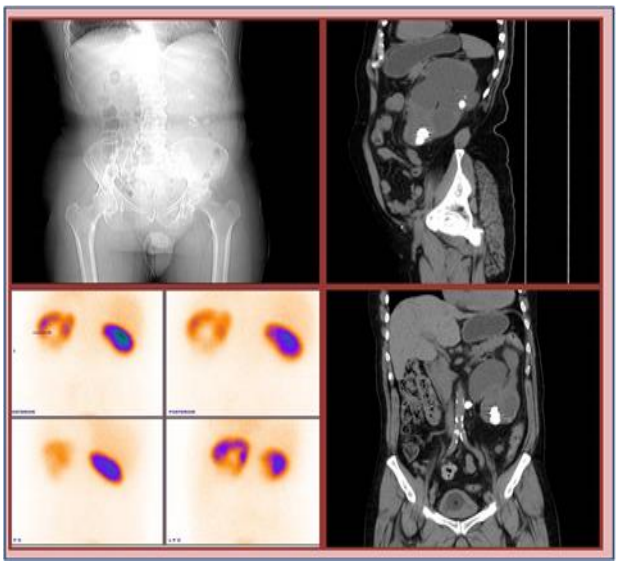

Fig 1: CT scan and the DMSA renogram images showing the stones, degree of hydronephrosis and the functional status of the kidneys.

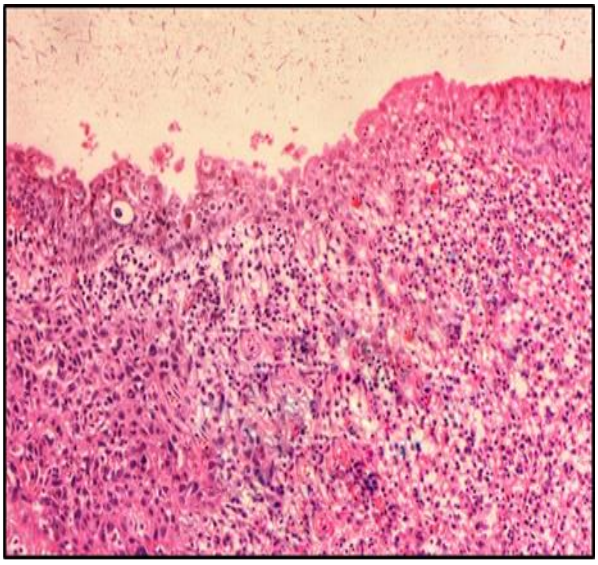

Fig. 2: H&E stain 200 X surface epithelium showing dysplastic cells along with reactive inflammatory cells and underlying tumor.

Three weeks later, the patient presented with fever, pyuria and left loin pain with raised serum creatinine. Ultrasound revealed a gross hydronephrosis. Percutaneous nephrostomy drained frank pus from the system and hence he was advised to undergo open nephrectomy.

During nephrectomy, the kidney and the renal pelvis was found to be thick walled and densely adherent to the retro-peritoneum. The cut surface of the kidney showed an ill-defined grey white firm lesion predominantly involving the pelvis and focally extending into the cortex and medulla. The lesion obliterated the lumen of the proximal ureter. Microscopic examination of the lesion showed an infiltrating tumor with nests and cords of tumor cells having moderate cytoplasm and prominent nucleoli. Focal areas showed squamous differentiation with intracellular keratin and perineural invasion. Fig. 2 illustrates surface epithelium showing dysplastic urothelial cells with no squamous metaplasia and underlying urothelial tumor, further reiterating that it is actually an urothelial carcinoma with squamous differentiation. The final histopathology report revealed a high-grade papillary urothelial carcinoma with squamous differentiation (Fig. 3 A, B, C, D).

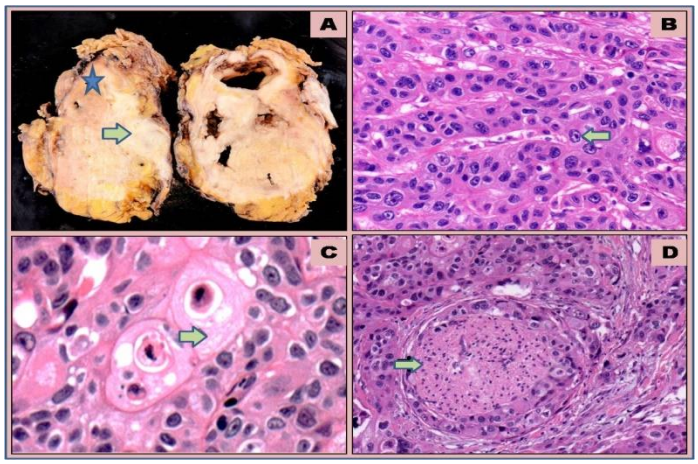

Fig. 3A: Macroscopy – Cut surface of the kidney showing an ill circumscribed grey white, firm lesion centred predominantly in the pelvis (arrow mark) with focal extension into cortical region; no granular or friable areas made out. The normal uninvolved kidney is seen in the periphery (star). **3B:** Microphotograph H & E stain - 200 X: nests and cords of cells showing prominent nucleoli and moderate amount of cytoplasm. **3C:** Microphotograph H&E stain - 400 X: Individual cells show abundant eosinophilic cytoplasm and keratin formation (arrow). **3D:** Microphotograph H&E stain - 100 X: malignant cells surrounding the nerve fibre indicating perineural invasion (arrow).

This postoperative period was uneventful. PET-CT was done four weeks later, which revealed a well-defined metabolically active soft tissue density in the posterior abdominal wall on the left side involving the abdominal wall muscles, two metabolically active hypodense lesions in segment VII and VIII of liver, nodular lesion/airspace opacities in the lateral basal segment of the right lower lobe of the lung with no evidence of metabolically active disease anywhere else in the body (Fig. 4). Patient refused adjuvant chemotherapy and is currently on regular follow-up.

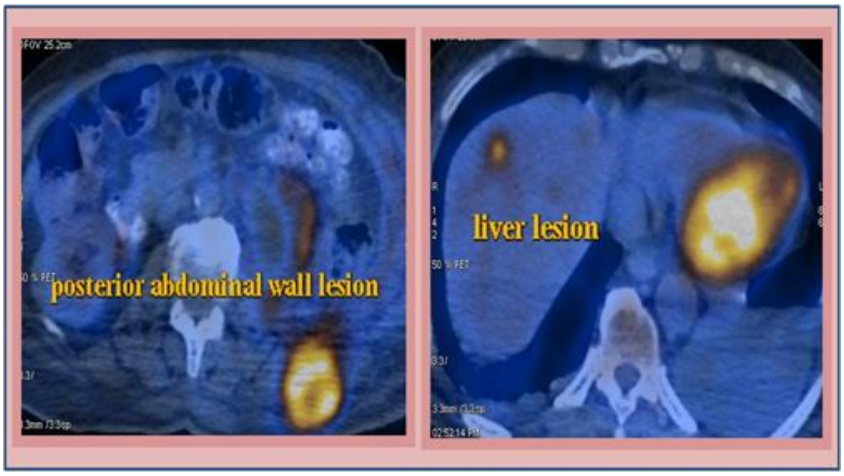

Fig 4: PET CT scan image-showing lesions in the posterior abdominal wall and the liver.

DISCUSSION

The renal pelvic and ureteral urothelial malignancies are rare to be seen. They account for about 5 to 7% of all renal tumors and about 5% of all urothelial malignancies (4). In addition, more than 90% of renal pelvic tumors are urothelial in origin. Other malignancies including squamous cell carcinoma and adenocarcinoma are very rarely seen. Urothelial neoplasms have a sequence of events taking place before turning malignant: dysplasia, carcinoma in situ and invasive malignancy (5). Neoplastic change of urothelium without breach of basement membrane is considered as carcinoma in situ. The majority of them are high-grade neoplasms with positive urine cytology (6). They are seen more common in elderly males. Smoking, high tea intake and long-term use of analgesic like phenacetin are considered to be potential risk factors (7). Urothelial carcinoma in non-functioning with nephrolithic kidney is very uncommon. Wani *et al.*, described a case of upper urothelial malignancy in non-functioning kidney with renal stones (8). The occurrence of urothelial cancers with stones and hydronephrosis in a non-functional status is extremely uncommon. Our patient is also one such case with gross hydronephrosis mimicking pelviureteric junction calculus obstruction with secondary calculi. Renal pelvis and ureter malignancies

are similar in overall incidence, but only one-tenth as common as their bladder counterpart (9).

Kim *et al* reported that upto 7.5% of all urological malignancies are constituted by urothelial tumours. Males are three times more commonly affected than females (10). Chronic infection associated with stone disease and obstruction has been related to the development of upper urinary tract squamous cell carcinoma (SCC). It is hypothesized that squamous metaplasia may occur as a result of chronic urothelial irritation, which may later on turn into SCC. On the other hand, the association between stag horn stones and UC of the renal pelvis has rarely been documented. Moreover, upper urinary tract tumors associated with renal stone and hydronephrosis are often missed in urine cytological examination because degenerative changes in cells produced by chronic irritation of epithelium. Radical nephroureterectomy with bladder cuff removal is considered to be the Gold standard treatment for such patients. It is prudent to remove the cuff of the urinary bladder due to a very high rate of ureteral stump recurrence, which has been reported to be between 30-75% (11). In our case the ureter and bladder cuff were not removed because malignancy was diagnosed post-operatively. Therefore, close follow up of the patient was advised.

The prevalence of malignancy associated with a non-functioning kidney caused by stone disease remains unclear. Yeh *et al.,* reported that 24 of 47 (51.0%) patients who underwent nephrectomy to treat a non-functioning kidney caused by stone disease were shown to have a high incidence of malignancy (12). Our patient also fits into this group of patients, in whom impacted stone causing UPJ obstruction with gross hydronephrosis and secondary stones were thought to be the reason for non-functional status, and malignancy was an incidental finding. Multi-detector CT urography has high sensitivity and specificity for detection of urothelial tumor. It is superior to excretory urography in evaluation of the collecting system and ureters (13). Urothelial malignancies may appear single or multiple and may compress the renal sinus pad of fat. It may also result in tumour filled dilated calyx, called onco calyx (14).

Tumours of the renal pelvis may cause obstruction at the level of pelvi-ureteric junction and hydronephrosis. Conversely, any structural abnormalities that cause stasis of the urine, such as horseshoe kidney and chronic UPJ obstruction, are associated with an increased prevalence of pelvic UC (15). Meticulous evaluation of a hydronephrotic kidney is necessary, particularly in older patients, to avoid missing an occult urothelial tumor. It is important for the radiologists to keep in mind the possibility of an underlying carcinoma of the upper urinary tract in patients with a non-functioning kidney with associated stone disease (16).

CONCLUSION

The objective of this case report is to stress upon the fact that it is important to bear in mind the possibility of such peculiar associations. A high index of clinical suspicion with proper preoperative investigation, especially urine cytology and CT/MRI scan, would help the clinicians to decide on the appropriate treatment for such patients. Unusual radiologic features sometimes characterize Urothelial cancer of the renal pelvi caliceal system. The urologists and the radiologists must also be aware of the importance of meticulous sonographic evaluation of a hydronephrotic kidney, particularly in older patients, to avoid missing an urothelial cancer. Despite these rare appearances, in most cases involvement of an urothelial surface is the key finding that leads to the correct diagnosis. The purpose of this manuscript is to highlight the rarity of this condition and to stress upon the fact that a thorough knowledge of these unusual radiologic features of urothelial cancer of the renal pelvi caliceal system will facilitate making the correct diagnosis and in developing adequate treatment strategies.

CONFLICTS OF INTEREST: None.

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