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Case Report
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A Case of Squamous Cell Carcinoma of Kidney Manifesting After Percutaneous Nephrolithotomy for Renal Pelvic Calculi

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Abstract:
Squamous Cell Carcinoma (SCC) of the kidney is a rare neoplasm usually associated with long-standing nephrolithiasis. This disease has a poor outcome as it is highly aggressive and presents at an advanced stage. In this case report, we offer the SCC of the kidney in a middle-aged man who underwent Percutaneous Nephrolithotomy (PCNL) for long-standing renal stones. After a few days, there were recurrent episodes of pyelonephritis. After proper evaluation, renal mass was detected, and the patient underwent a radical nephrectomy. SCC was diagnosed from histopathology, and systemic therapy was started, but the patient died. So, the possibility of this rare neoplasm should be considered while treating long-standing nephrolithiasis.

Introduction:

In Squamous Cell Carcinoma (SCC), tumor cells appear like stratified squamous epithelium, commonly occurring in the oral cavity, cervix, skin, lungs, etc[1] Epithelial neoplasms of the upper urinary tract are rare and account for less than five percent of all urothelial tumors.[2] The incidence of squamous cell carcinomas (SCCs) in the upper urinary tract is 0.7 to 7.0%. There are many causes behind these carcinomas. Among these, the abuse of analgesics and chronic inflammation by nephrolithiasis are common. SCCs are highly aggressive and present at an advanced stage when they are already invasive. The incidence of SCC in the renal pelvis is six times higher than in the ureter[3]. The urethra and urinary bladder are more common sites of squamous cell carcinoma than the renal pelvis in males.[4] Herein we report a case of squamous cell carcinoma of the kidney, which developed in a patient who had renal pelvic calculi that was managed by percutaneous nephrolithotomy (PCNL) five months back.

Case presentation:

A 35 years old diabetic hypertensive gentleman presented with right loin pain for 10 months (from October 2021) and felt a mass lesion in the same region for 1 month (May 2022). He initially took conventional medication for the loin pain for 2 months, but there was no improvement in symptoms. The initial investigation by USG KUB was done in December 2021 and showed multiple bright echogenic structures (the largest one was 7mm) casting a posterior acoustic

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shadow within the pelvis of the right kidney. IVU showed radio-opaque calculi (at least three) in the right renal area.

Then he underwent Percutaneous Nephrolithotomy elsewhere for right renal pelvic calculi in January 2022. Post-operative x-ray showed complete stone clearance, and he was symptomless for 15 days after the surgery. Then he again developed right loin pain associated with intermittent fever and was diagnosed with pyelonephritis. There were recurrent episodes of pyelonephritis afterward. He was admitted to several private hospitals in Bangladesh and treated conservatively. Then he seeks better treatment abroad. He was evaluated and diagnosed as having renal mass, possibly neoplastic or infective, and advised for ultrasound-guided biopsy, but the patient denied it and returned to his homeland.

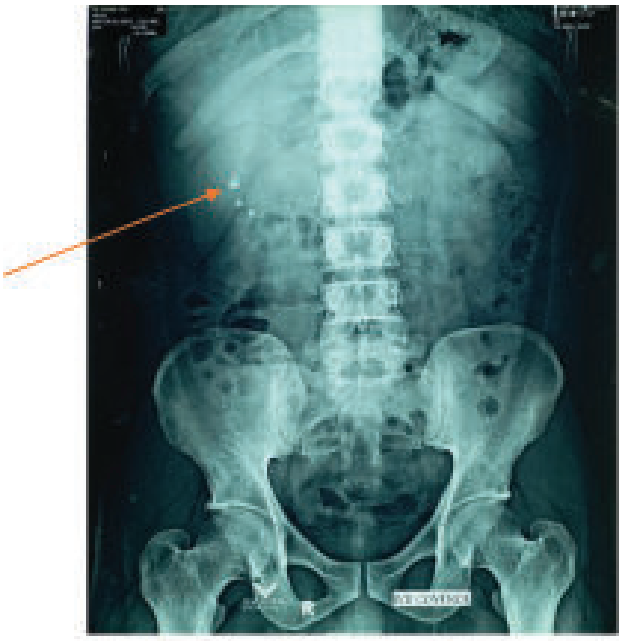

Fig.-1: *Scout film of IVU showing right renal calculi.*

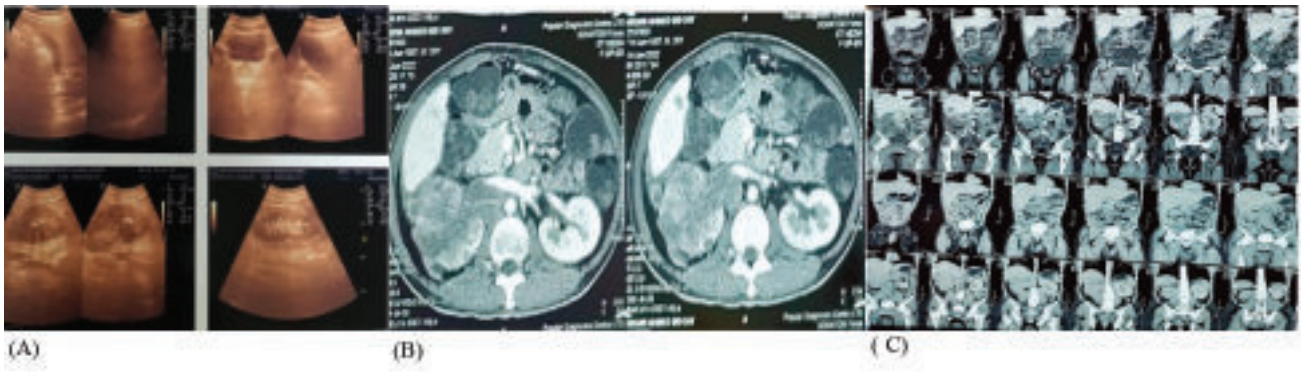

Fig 2: *(A) USG W/A showing enlarged right kidney, (B), (C) CT scan of the whole abdomen showed inhomogeneous mixed density diffuse lesion (11cm x 6cm) seen predominantly in the calyceal system in right kidney with cortical and perinephric invasion and mild contrast enhancement of the lesion seen and the lesion extending into the right renal vein and adjacent IVC. The liver showed a lobulated hypodense lesion (4.5cm) in right lobe segment VI suggesting a metastatic lesion.*

After returning to my homeland in the middle of June 2022, the patient came to us, and we correctly evaluated the patient with detailed history, physical examination, and investigation. He told us there were two episodes of hematuria with the passage of thread-like clot just two months after the surgery. He also occasionally felt a mass-like lesion in his right loin for one month. He had a significant weight loss of about 15kgs in the previous three months. On palpation, there was a lump in his right loin about 10x8cm in size, tender, hard in consistency with an ill-defined margin, and fixed with surrounding structures.

His urine R/E revealed pus cell 1-3/HPF, RBC-nil, and serum creatinine was 1.63mg/dl. USG of the whole abdomen was done for initial evaluation, which showed an enlarged, swollen right kidney with loss of cortico-medullary differentiation. Contrast-enhanced CT scan of the entire abdomen showed an inhomogeneous mixed-density diffuse lesion (11cm x 6cm) predominantly in the calyceal system in the right kidney with cortical and perinephric invasion after IV contrast, mild enhancement of the lesion was seen, and the lesion extended into the right renal vein and adjacent IVC. The liver showed a lobulated hypodense lesion (4.5cm) in right lobe segment VI suggesting a metastatic lesion. Hemoglobin was 10.8g/dL, HbA1C was 6.20%, and other investigations were normal.

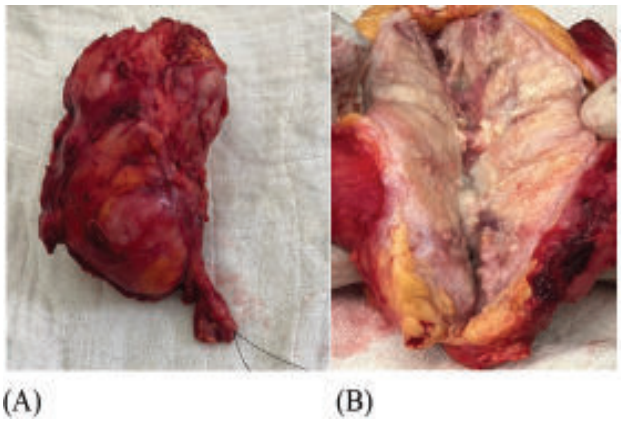

Fig 3: *(A) Specimen of right radical nephrectomy consisted of a 14 x 8 x 8 cm kidney with surrounding fat and 6cm long ureter. (B) The cut surface is grey white, and yellowish.*

Then we performed a right-sided open radical nephrectomy under general anesthesia. After giving a right-sided subcostal incision, the kidney was approached transperitoneal, and adhesion was found around the kidney, perirenal tissue, and liver. There was no ascites, regional seedling, or lymphadenopathy. Adhesiolysis from the liver bed and surrounding structures were done by meticulous dissection. Then the kidney with upper ureter was dissected, extracted, and sent for histopathology. The patient's post-operative recovery was uneventful. On gross examination of the specimen, it consisted of a 14x8x8 cm kidney with surrounding fat and 6cm long ureter. A renal artery and renal vein segment were present at the hilum. Sectioning revealed a tumor measuring 13x7x7 cm. The tumor was located in all lobes. The cut surface was grey-white, and yellowish. The tumor extended into perinephric fat.

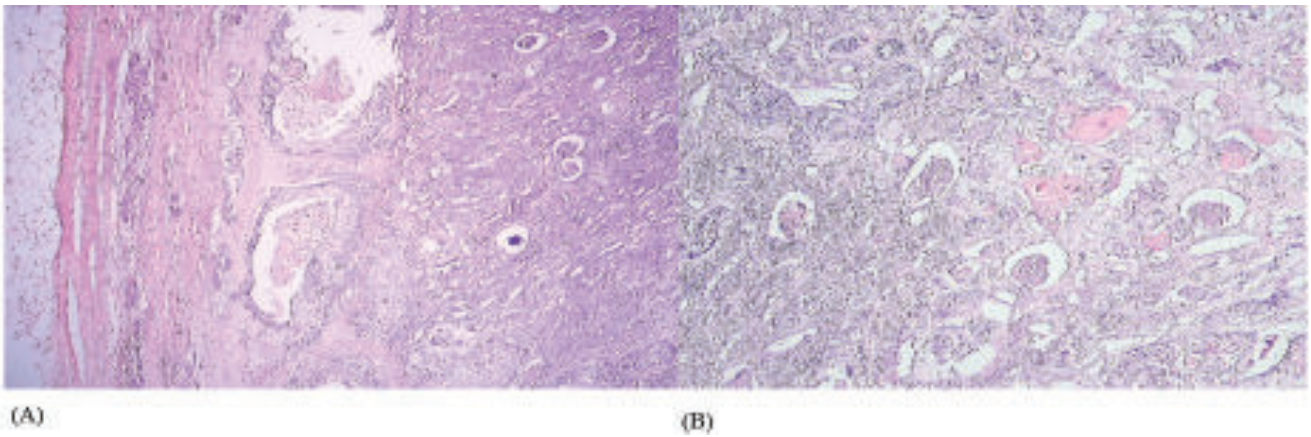

Fig 4.1: *Histopathology samples stained with H&E (A) x120, (B) x220 showing well differentiated invasive squamous cell carcinoma of kidney*

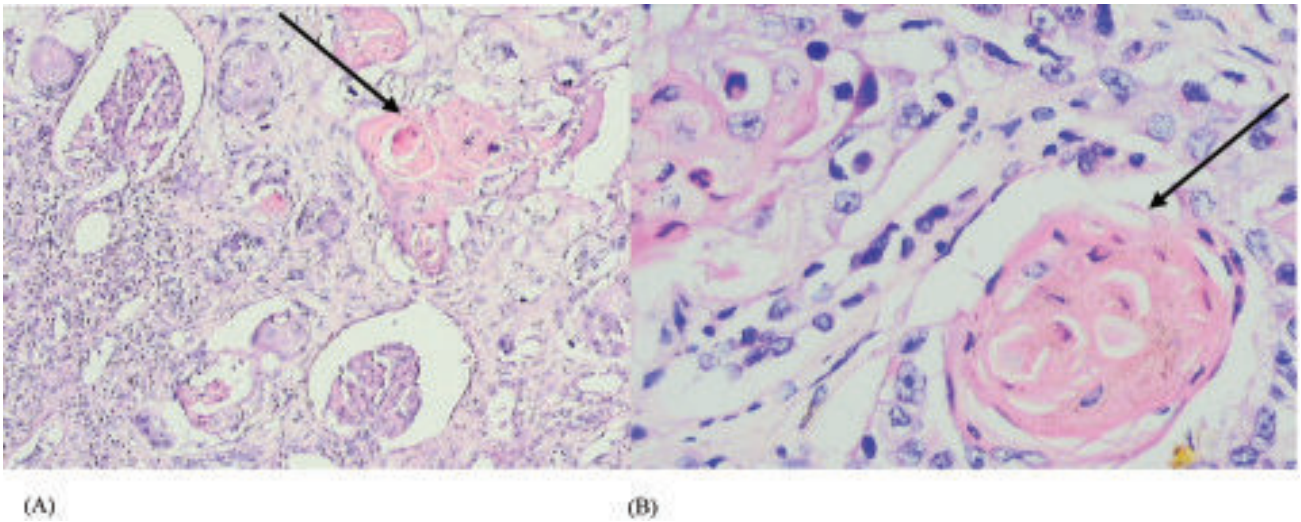

Fig. 4.2: *Histopathology samples stained with H&E (A) x440, (B) x800 showing well-differentiated invasive squamous cell carcinoma of the kidney with keratin pearls (arrows)*

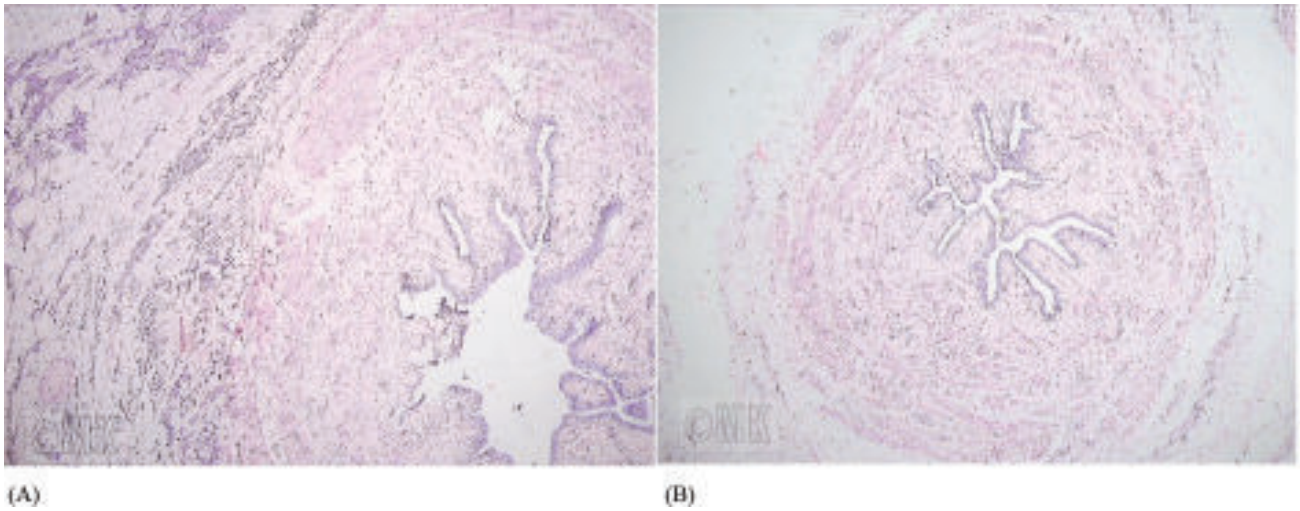

Fig. 4.3: *(A) Section of upper ureter involved by SCC (H&E, x800), (B) Section of lower ureter free of tumor (H&E, x800)*

On microscopic examination, the kidney and pelvis sections revealed invasive squamous cell carcinoma, well-differentiated, WHO grade 3. The tumor reached the renal capsule and also invaded into hilum. Areas of thickened part of the ureter showed tumor invasion into the ureteric wall sparing its mucosa.

Outcome and follow-up:

The patient was sent to medical oncology for systemic therapy. He got one course of chemotherapy (Gemcitabine and Carboplatin). Before taking another course of chemotherapy, the patient died in September 2022.

Discussion:

The presence of renal stones increases the risk of developing squamous cell carcinoma (SCC) of the renal pelvis[5]. SCC is a rare entity in the upper urinary tract with an incidence of 0.7 to 7% of all upper urinary tract cancers[3,6]. Various risk factors have been associated with renal pelvic SCC like nephrolithiasis, chronic pyelonephritis, renal tuberculosis, radiation therapy, percutaneous nephrostomy, immunosuppression, schistosomiasis, vitamin A deficiency, smoking, and several endogenous/exogenous chemicals etc[1,6]. Chronic irritation due to long-standing nephrolithiasis, inflammation, and infection initiates squamous metaplasia of the renal collecting system, which may progress to dysplasia and carcinoma in some patients[7]. Renal pelvis neoplasms are commonly associated with staghorn stones, but smaller calculi within a hydronephrosis or pyonephrosis could also be related to such growths[8].

As these neoplasms are highly aggressive and the disease is high stage at diagnosis, they are expected to have poor clinical outcomes. The majority of tumors are locally advanced or metastatic when detected. The aggressiveness of renal pelvis SCC combined with non-radiological features leads to the patient being diagnosed at stage pT3 or advanced stages. Thus, the survival time decreases significantly for these patients[9].

Clinically our case presented with recurrent episodes of right-sided pyelonephritis, which started from 2weeks after doing percutaneous nephrolithotomy for right-sided renal pelvic calculi. The feeling of abdominal lump and hematuria occurred 2-3 months after PCNL. Radiologically right renal mass with metastasis was suspected. After radical nephrectomy, histopathology revealed invasive SCC of the kidney with the renal pelvis.

There is a case report of a 54 years old woman who presented with a skin mass that surrounded the muscle tissue of the right flank. The patient had been treated for a right staghorn calculus by PCNL three months earlier. Histological examination of the skin mass showed an invasive well-differentiated squamous cell carcinoma. There is almost a similar case of a 50 years old male who underwent radical surgery for urothelial carcinoma of the lower pole of the kidney detected 2 weeks after PCNL for renal pelvic calculus[10].

SCC of the renal pelvis produces nonspecific clinical and radiological features. CT is non-invasive and can provide a high-resolution anatomical extension of the tumor. Differential diagnoses for renal squamous cell

carcinomas are urothelial carcinomas and xanthogranulomatous pyelonephritis. To make a correct diagnosis, an extensive histopathological examination should be made by pathologists to ensure squamous differentiation and exclude all other differentials[4,6,9,10].

As the disease is aggressive at presentation, the current recommendation on the best possible treatment for such cases is a radical nephrectomy with close post-operative follow-up, considering the patient's age and compliance. A chemotherapy regimen of methotrexate, cisplatin, and bleomycin may be used, but still no effectiveness has been proven. The prognosis is poor, with a 5-year survival rate of less than10%[9,10].

Conclusion:

Squamous cell carcinoma of the kidney and renal pelvis is rare but aggressive with an unfavorable prognosis. SCC should be suspected in any patient presenting with recurrent episodes of pyelonephritis and a history of nephrolithiasis. Early suspicion, diagnosis, and treatment of squamous cell carcinoma of the kidney may have a better prognosis and prolong the patient's chance of survival.

Humble Recommendation:

1. A high degree of suspicion is needed in cases of chronic nephrolithiasis for early diagnosis of SCC of the kidney and renal pelvis.
2. In all cases of long-standing nephrolithiasis, contrast radiography, preferably Contrast Enhanced CT scan, may be suggested to detect associated mass lesions early.

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