Case Report

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Pathology Section

# Primary Squamous Cell Carcinoma of Renal Pelvis in a Young Male: An Unusual Case Report

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## ABSTRACT

Squamous Cell Carcinoma (SCC) of the renal pelvis is an exceptionally rare neoplasm that is frequently associated with chronic irritation of the urothelium. It accounts for less than 1% of all renal malignancies and is often diagnosed incidentally due to non specific clinical and radiological features. Long-term renal calculi, as a sequel to pelviureteric junction obstruction or urinary tract infections, if untreated, can lead to mechanical irritation and chronic inflammation, which increases the risk of SCC. A few other factors that contribute to the development of SCC include smoking, exposure to chemical carcinogens like aromatic amines, schistosomiasis infection in endemic regions and retrograde instrumentation of the urinary tract. The term "primary SCC" is reserved for those tumours that exclusively contain squamous components without any evidence of urothelial components. Usually, these tumours are highly aggressive and have a poorer prognosis compared to other urinary tract malignancies. Although nephrectomy remains the treatment of choice, the role of neoadjuvant/adjuvant therapy requires further evaluation. The authors report an interesting and unusual case of primary SCC of the renal pelvis in a 36-year-old male with no prior history of calculi, who presented with significant weight loss and pain in the left flank over a period of just one month.

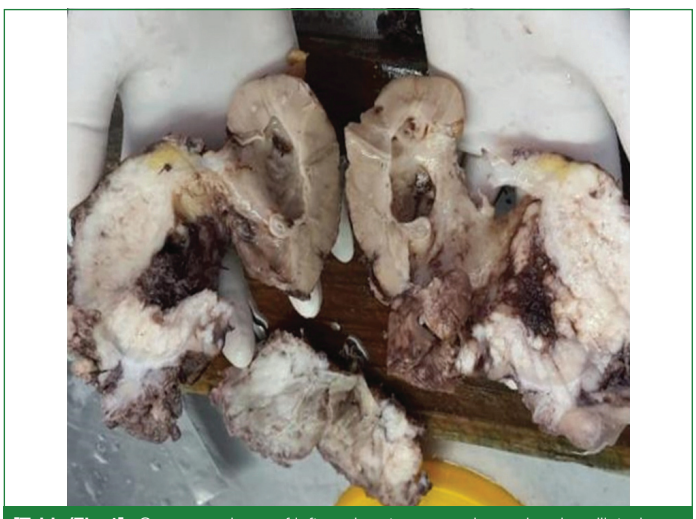
**Keywords:** Chronic inflammation, Malignancies, Obstructive uropathy, Prognosis

## CASE REPORT

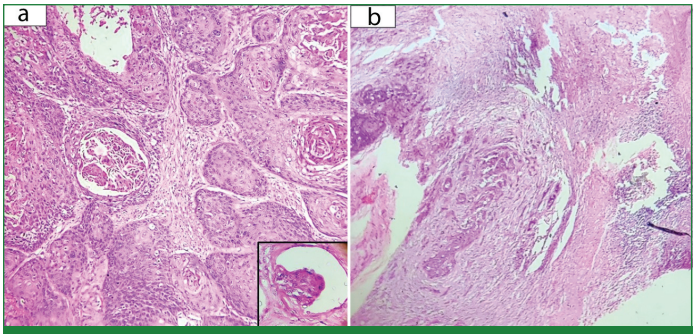
A 36-year-old male visited the Outpatient Department (OPD) of Urology at the present study institute with the chief complaints of left-sided intermittent dull flank pain for 26 days. The pain was sudden in onset and was associated with nausea, loss of appetite and weight loss. There was no history of burning micturition, urgency, frequency, or pyuria and there was no significant family history. Upon repeated questioning, the patient did not provide any history of surgical procedures in the past or any other significant medical history. Physical examination revealed a firm and ill-defined lump in the left flank. Routine laboratory investigations at the time of admission were mostly within normal limits, except for mild anaemia (Hb- 11.8 g/dL). The Total Leukocyte Count was elevated (TLC-16,800/cumm) and the differential count showed an increase in polymorphs (neutrophils 92%, lymphocytes 7% and eosinophils 1%). Urine examination revealed only 2-5 White Blood Cells (WBC) per high power field (WBCs/hpf), occasional red blood cells/hpf, proteinuria of 70 mg/L and no bacteriuria. Computed tomography of the whole abdomen revealed an enlarged left kidney measuring 13.4×7.8×4.5 cm with left Pelviureteric Junction (PUJ) obstruction and a Double-J stent draining the pelvicalyceal system of the left kidney. There was marked hydronephrosis with a mass lesion in the lower pole of the left kidney, accompanied by a small perinephric collection and a small collection along the left psoas muscle. Two consecutive urine samples from the patient were negative, but the third sample showed a few singly lying atypical cells. Based on clinical and laboratory findings, the provisional diagnosis was highly suspicious of malignancy. Subsequently, the patient underwent left radical nephrectomy and the specimen was submitted for histopathological examination {Haematoxylin and Eosin (H&E)}.

On gross examination, the left kidney was enlarged, measuring 14.5×11×5 cm. The outer surface was smooth except at the lower pole, where it was nodular. The cut surface showed a dilated pelvicalyceal system and a solid grey-white growth arising from the renal pelvis [Table/Fig-1]. Microscopic examination revealed an infiltrative tumour composed of malignant squamous cells arranged predominantly in sheets, irregular nests and cords, with notable replacement of the entire transitional epithelium of the pelvicalyceal system by dysplastic squamous epithelium [Table/Fig-2a]. Lymphovascular invasion with tumour emboli was evident [Table/Fig-2b]. Tumour invasion was noted beyond the muscularis propria into the peripelvic fat. The intervening renal parenchyma showed a few atrophic tubules, while some exhibited thyroidisation of tubules along with intense chronic inflammatory infiltrate [Table/Fig-3a]. In some areas, calcific deposits were also present [Table/Fig-3b]. No urothelium was identified in the entire lower pole of the kidney. Based on the above findings, a diagnosis of well-differentiated SCC of the renal pelvis with chronic pyelonephritis was made.

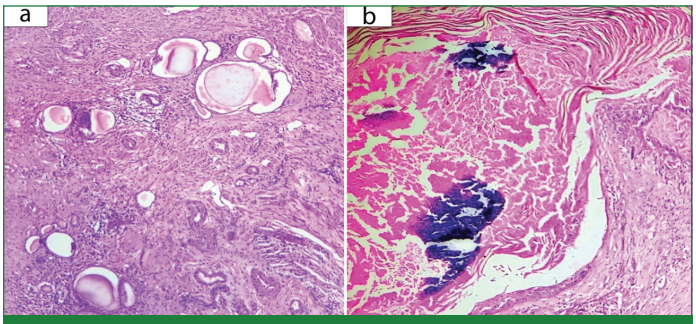
Since the patient was clinically stable, he was discharged postoperatively and advised to return for a follow-up visit after one week with the histopathology report. However, the patient did not return and it was reported by the attendants that he died three weeks after discharge.



**[Table/Fig-1]:** Gross specimen of left nephrectomy specimen showing dilated pelvicalyceal system and a grey-white solid tumour arising from the renal pelvis extending to the lower pole of the kidney.




**[Table/Fig-2]:** a) Atypical squamous cells infiltrating renal parenchyma in sheets, nests and clusters (H&E, 100X) and vascular invasion by tumour cells (Inset); b) Renal pelvis involvement by tumour islands (H&E, 50X).




**[Table/Fig-3]:** a) Thyroidisation of tubules with intense chronic inflammatory infiltrate (Chronic Pyelonephritis) (H&E, 100X); b) Areas of calcification and necrosis (H&E, 100X).

## DISCUSSION

Malignant epithelial tumours arising in the upper urinary tract are extremely uncommon and one such rare subtype of renal cancers is SCC, which accounts for less than 0.5-0.7% of all renal tumours [1]. Patients may exhibit non specific laboratory and clinical findings, including microscopic or macroscopic haematuria, flank pain, weight loss, fever, or a palpable abdominal mass. Thus, it becomes troublesome to differentiate a malignant lesion from other conditions such as Xanthogranulomatous Pyelonephritis (XGP), tuberculosis, or other more common neoplasms of the upper urinary tract [2].

Primary SCC of the renal pelvis is extremely rare and is typically diagnosed at an advanced stage due to a lack of distinguishable features. It usually presents in the fifth to seventh decade of life and is speculated to originate from the collecting duct or renal parenchymal stem cells [1-3]. Most previous reports have come from Western countries and it remains very uncommon in the Indian subcontinent. To the best of the present study knowledge, this is the 14$^{th}$ case in the world and additionally the youngest case from a developing country like India diagnosed as primary SCC of the renal pelvis in the last five years [Table/Fig-4] [1-12].

The second unusual finding in the present study patient was the short duration (only 26 days) of clinical presentation, which included dull intermittent flank pain associated with nausea and weight loss. Up until now, studies have reported that the minimum time duration from the appearance of symptoms to the detection of malignancies in kidney tumours was approximately more than two months [2,4,7,8]. The possible cause of such a shorter span in this case could be attributed to the patient's ignorance of the early symptoms and the highly aggressive nature of squamous carcinomas, which typically present as infiltrative growths. This has been identified as a unique feature of aggressiveness in renal tumours and is an independent predictor of patient survival [13]. Infiltrative neoplasms of the kidney are typically large and often present with advanced locoregional spread and metastases. Most kidney tumours exhibit an expansile growth pattern that can be managed by nephron-sparing interventions. However, infiltrative tumours show rapid growth, often producing clinical manifestations in the form of flank pain, palpable masses and haematuria [13,14]. In the present study patient, although flank pain and a palpable mass were present, haematuria was detected only in the third consecutive urine sample.

It is presumed that SCC of the urothelial tract evolves from the transformation of the transitional epithelium, triggered by prolonged and persistent irritation, which is essentially associated with nephrolithiasis, recurrent infections and less frequently, chemicals, hormonal disturbances, schistosomiasis, smoking and vitamin A deficiency [14]. Another peculiar finding in the present case was that the development of SCC was not associated with any history of stones, although the patient had left PUJ obstruction and a DJ stent draining the pelvicalyceal system. This implies that some form of chronic blockage in the tract was present for quite some time, leading to the development of the metaplasia-dysplasia-carcinoma sequence.

Squamous differentiation is quite frequent in urothelial carcinomas, to the extent that locating a conventional urothelial carcinoma component can be challenging. Therefore, it is essential to search for a urothelial component in the entire tumour before labelling it as SCC. Additionally, the occurrence of squamous malignancy in the renal pelvis is so infrequent that metastasis from other sites must be ruled out as a priority. In the present study case, urothelial elements were completely absent in the tumour region, which necessitated extensive grossing; however, these efforts were unavailing. The morphological features were almost similar to those of squamous malignancy observed at other sites, exhibiting characteristics such as keratin pearl formation, intercellular bridges and atypical squamous cell nests. Atrophic tubules and glomeruli were seen entrapped within the tumour. Tumour necrosis was extensive, with both lymphovascular and perineural invasion.

| S. No. | Author | Year | Age/Gender | Duration of pain | Site | Risk factor | Additional pathology |
|---|---|---|---|---|---|---|---|
| 1 | Brits NF et al., [1] | 2020 | 61/F | 1 month | Left renal pelvis and parenchyma | Calculi | Hydronephrosis, Renal cysts |
| 2 | Hosseinzadeh M et al., [2] | 2020 | 59/F | 3 months | Right renal pelvis and parenchyma | Calculi | Hydronephrosis |
| 3 | Yadav CS et al., [3] | 2021 | 67/F | - | Left renal pelvis | Calculi | - |
| 4 | Sun X and Li Y, [4] | 2020 | 66/M | >2 months | Right renal pelvis and parenchyma | Calculi | Hydronephrosis |
| 5 | Prachi et al., [5] | 2021 | 53/M | 1 month | Left renal pelvis and parenchyma | Calculi | Pyelonephritis |
| 6 | Senghor F et al., [6] | 2021 | 79/F | - | Left renal pelvis and parenchyma | - | - |
| 7 | Patel AM et al., [7] | 2022 | 61/F | 2 months | Right renal pelvis | Calculi | Hydronephrosis |
| 8 | Patel AM et al., [7] | 2022 | 79/F | 2 months | Right renal pelvis | Calculi | - |
| 9 | Bajaj S et al., [8] | 2022 | 65/M | 2 months | Left renal pelvis and parenchyma | Calculi | Pyelonephritis |
| 10 | Al-Janabi MH et al., [9] | 2023 | 58/M | 2 months | Right renal pelvis | Smoking | Hydronephrosis |
| 11 | Nedjim SA et al., [10] | 2023 | 62/F | For years | Renal pelvis and parenchyma | Calculi and recurrent UTI | Pyelonephritis |
| 12 | Variar P et al., [11] | 2024 | 40/F | 2 months | Right renal pelvis and parenchyma | Calculi | - |
| 13 | Shetty A et al., [12] | 2024 | 55/M | - | Left renal pelvis and parenchyma | UTI | Pyelonephritis |
| 14 | Present case | 2024 | 36/M | 26 days | Left renal pelvis and parenchyma | - | Pyelonephritis |

**[Table/Fig-4]:** Brief review of similar cases reported in the last five years [1-12].
UTI: Urinary tract infection

Detecting the tumour through imaging modalities is often challenging due to inconclusive radiological features, which can be characteristic of various other obstructive processes. Consequently, the definitive diagnosis of Renal Squamous Cell Carcinoma (RSCC) typically relies on histological analysis of the resected specimen [14].

Lee TY et al., classified SCCs of the upper urinary tract into two primary categories based on the location of the tumour: central and peripheral [15]. Central-type tumours are usually intraluminal and are associated with increased nodal metastasis and lower overall survival rates, while peripheral-type tumours reveal parenchymal thickening with perirenal infiltration. The present case was classified as a central type according to this classification.

Currently, the traditional treatment protocol in the form of nephrectomy remains the mainstay for SCC of the renal pelvis. Radiotherapy and chemotherapy show no added benefit in the overall survival rate of such patients [16].

## CONCLUSION(S)

Primary renal SCC is a rare neoplasm that is often associated with long-standing renal stone disease. However, in the present case, a young male with no past history of renal calculi developed SCC with unanticipated significant weight loss and pain in the left flank over a period of just one month. Herein, the authors emphasise that SCC can occur even in the absence of the aforementioned risk factors. Thus, it is recommended to rigorously investigate all patients with a non functioning kidney, along with an imperative histopathological examination for a conclusive diagnosis and, ultimately, appropriate treatment.

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