Original Article

Histopathological Spectrum of Neoplastic Lesions in Nephrectomy Specimens

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Abstract

Background: Renal neoplasms comprise a wide spectrum of tumors that differ not only in their histomorphological features but also in their tumorigenesis, biological behaviour, and clinical prognosis. Histopathological evaluation remains crucial to accurately diagnose and classify renal tumors, as well as to establish important prognostic parameters such as tumor size, histological subtype, nuclear grade, and pathological stage, particularly in malignant lesions. The present study aimed to evaluate the histopathological features of various renal neoplasms in nephrectomy specimens and to analyse their distribution according to age and gender. **Material and Methods:** This cross-sectional study was conducted in the Department of Pathology, in association with the Department of Urology and Surgery, Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur (M.P.). The study included 86 nephrectomy specimens submitted for histopathological examination to the Department of Pathology. Relevant clinical and demographic data of the patients were collected and analysed using a predesigned proforma. **Results:** A total of 86 nephrectomy specimens were studied and analysed. Among these, neoplastic lesions were identified in 17 cases (19.8%). The majority of neoplastic lesions (6 cases; 35.3%) were between 41–50 years of age, followed by 5 cases (29.4%) in the 51–60 years age group. Males (11cases; 64.7%) were more commonly affected than females (6 cases; 35.3%). The youngest patient was 33 years old male and the oldest was a 67 years old male. Among the malignant tumors, Clear Cell Renal Cell Carcinoma was the most frequent, accounting for 7 cases (41.2%), followed by Chromophobe Renal Cell Carcinoma 3 cases (17.6%), and Papillary Renal Cell Carcinoma 2 cases (11.8%). Rare entities included 1 case each of Angiomyolipoma, Moderately Differentiated Squamous Cell Carcinoma of the Renal Pelvicalyceal System, Low-Grade Myxoid Liposarcoma, and Mixed Epithelial and Stromal Tumor with malignant transformation. Additionally, 1 case of Invasive Adenocarcinoma arising from a ureteric mass of a duplex ureter with pyonephrosis was also reported. **Conclusion:** A detailed histopathological examination is essential for the accurate diagnosis and classification of renal neoplasms. Adopting a multidisciplinary approach is crucial for optimal patient management and improved prognostic outcomes.

Keywords: Nephrectomy, Neoplasm, Histopathology.

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Introduction

Kidney is an organ with cellular diversity, performing a range of complex physiological processes essential for maintaining homeostasis.[1] Various disease processes can affect the kidney, leading to irreversible functional deterioration and contributing significantly to morbidity and mortality. Renal neoplasms represent a heterogenous group of tumors that vary not only in histo-morphological features, but also in their tumorigenesis, biological behaviour, clinical course, and prognosis. Nephrectomy remains the standard surgical intervention for suspected malignant renal disease. In India, non-neoplastic conditions leading to end stage renal disease (ESRD) and subsequent nephrectomy are more common compared to other developed countries, where malignant tumors are the predominant indication.[2]

As per Globocan 2022 data, renal cancer is overall the 14th most common cancer worldwide, accounting for approximately 434,840 new cases and 155,953 deaths, while in India it ranks 20th, with an estimated 17,480 new cases (1.2 %) and 10,464 deaths.[3]

Radical nephrectomy is the standard surgical procedure for the management of malignant renal masses, whereas partial nephrectomy is preferred for small, localized (clinical stage T1a) tumors to preserve maximum functional renal parenchyma. For accurate diagnosis and classification, histopathological evaluation is indispensable. It helps establish the histologic type and identify prognostic parameters such as tumor size, histological subtype, nuclear grade, pathological stage, and margin status in malignant lesions.[4]

Among renal neoplasms, Renal cell carcinoma in adults and

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Wilms tumor in children are the most common. In contrast, Wilms tumor is the most frequent childhood abdominal malignancy, though less than 1% of cases occur in adults.[5] Renal Cell Carcinoma accounts for approximately 3% of all adult malignancies and 80–85% of malignant renal tumors, with a higher incidence in males. It typically presents in the fifth to seventh decade of life.[6]

Materials and Methods

This was a Cross-Sectional study conducted in the Department of Pathology, Netaji Subhash Chandra Bose Medical College, Jabalpur (M.P.) and has been approved by the Institutional Ethics Committee Netaji Subhash Chandra Bose Medical College, Jabalpur M.P. (IRB No. IEC/2022/8629)

This study comprised of 86 nephrectomy specimens submitted for histopathological examination in our department and the use of these specimens for research purposes was approved by the Ethics Committee. The relevant data of the patient was collected and analysed as per designed proforma. Patient consent was taken before performing surgical procedure.

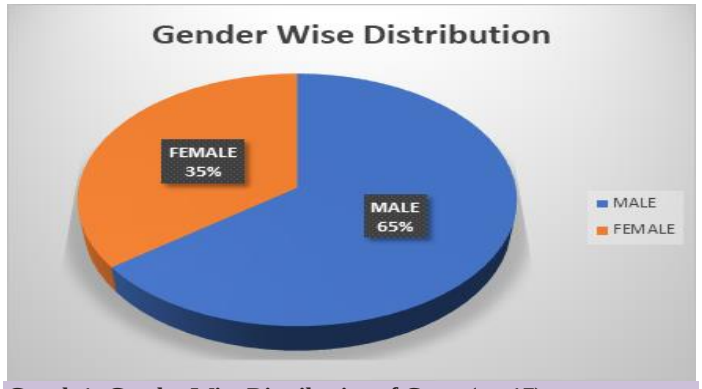
The inclusion criteria included all surgical specimens of Simple, Partial and Radical nephrectomy received in Pathology department for histopathological examination during the study period while small incisional biopsies, and autolyzed specimens were excluded from the study.

All nephrectomy specimens were examined and specimen integrity was checked. Surgical specimens were fixed in 10% formalin for 24 hrs. A detailed gross and microscopic examination of nephrectomy specimens was done as per CAP protocol.[6] Haematoxylin and eosin-stained sections were prepared and examined and renal tumors were classified as per WHO histological classification of tumors of the urinary system and male genital organs;5th edition,2022.[7]

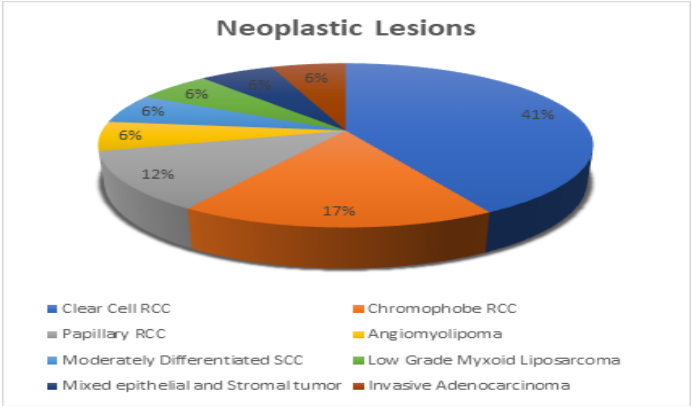
Statistical Analysis: The data of the present study were recorded and entered into MS Excel 2019. After proper validation and error checking, the data were compiled and analyzed using SPSS software version 27.0, for windows. Appropriate univariate and bivariate analyses were carried out, and descriptive statistics were calculated. Statistical tests such as Student's t-test for continuous data and Fisher's Exact test or Chi-square (χ^2) test for categorical data and Kappa statistics were applied as necessary to support the hypothesis. Sensitivity, specificity, positive predictive value, and negative predictive value were measured. All means are expressed as mean ± standard deviation and proportions in percentages (%). The critical value for the significance of the results was considered at 0.05 level.

Results

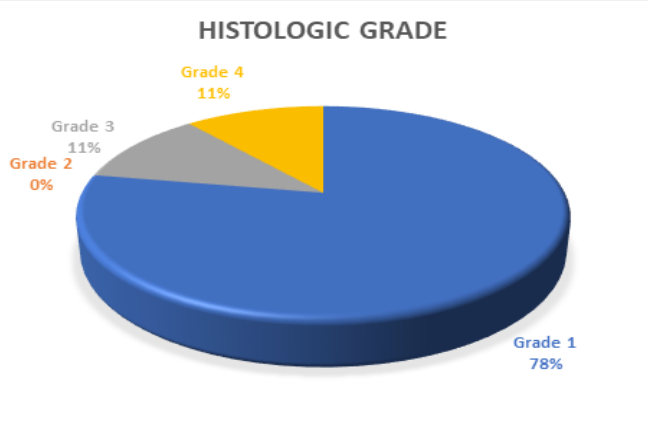
A total of 86 cases of nephrectomy specimens were studied and analysed, out of which neoplastic lesions were seen in 17 cases (19.8%). The majority of neoplastic lesions, 6 cases (35.3%), were seen between 41–50 years of age, followed by 5 cases (29.4%) in the 51–60 years age group. There was a male predominance with 11 cases (64.7%), while 6 cases (35.3%) were females. The youngest case was a 33-year-old male and the oldest was a 67-year-old male. The most common clinical presentation among these cases was flank pain and haematuria in 12 cases (70.6%), followed by a lump in 7 cases (41.2%). Radiological imaging showed a mass lesion in the renal fossa in all 17 cases (100%). Radical nephrectomy was performed in 8 cases (47.1%) and partial nephrectomy in 2 cases (11.8%). Out of the 17 neoplastic lesions, 7 cases (41.2%) were diagnosed as Clear cell renal cell carcinoma, followed by 3 cases (17.6%) of Chromophobe renal cell carcinoma and 2 cases (11.8%) of Papillary renal cell carcinoma. Other lesions included 1 case (5.9%) each of Angiomyolipoma, Moderately differentiated squamous cell carcinoma of the renal pelvis, Low-grade myxoid liposarcoma, Mixed epithelial and stromal tumor with malignant transformation, and Invasive adenocarcinoma (enteric type) of the ureter with pyonephrosis and duplex ureter. WHO/ISUP histologic grading was performed for Clear Cell RCC and Papillary RCC. Among 9 cases (100%) of Clear cell RCC, 7 cases (78%) showed Grade 1 nuclear features, while 1 case (11%) each showed Grade 3 and Grade 4 features. Out of 12 renal cell carcinomas, maximum cases were presented in Stage pT3 with 9 cases (75%) followed by 3 cases (25%) in pT1 stage. Renal sinus invasion was observed in most of the cases. Among Clear cell renal cell carcinoma cases, renal sinus invasion was seen in 85.8%, in Chromophobe renal cell carcinoma cases, invasion was seen in 66.7% and among Papillary renal cell carcinoma cases, invasion was seen in 50%. A single case of ureteric mass of invasive adenocarcinoma enteric type showed muscularis propria invasion of ureteric wall.



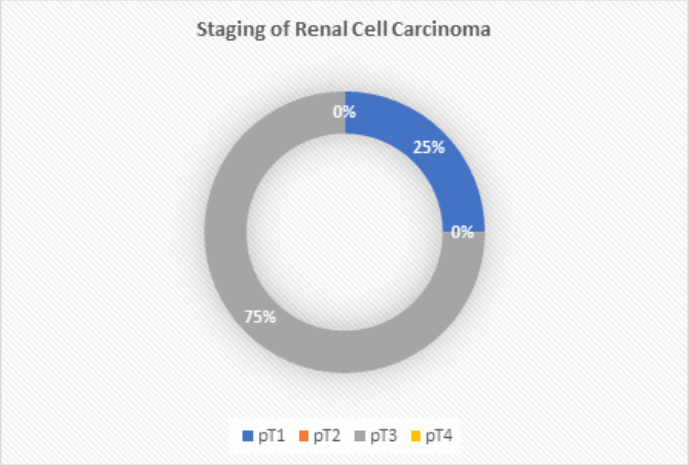
Graph 1: Gender Wise Distribution of Cases (n= 17)



Graph 2: Histopathological Diagnosis of Neoplastic Lesions (n= 17)



Graph 3: Histologic Grading (WHO/ISUP) for Clear cell RCC/Papillary RCC (n=09)



Graph 4: Pathological staging of Renal cell carcinoma (n=12)

Table 1: Frequency distribution of neoplastic lesions (N=17)

	No. of Cases	Percentage %
Clear Cell Renal Cell Carcinoma	07	8.1%
Chromophobe Renal Cell Carcinoma	03	3.4%
Papillary Renal Cell Carcinoma	02	2.3%
Angiomyolipoma	01	1.1%
Moderately Differentiated Squamous Cell Carcinoma of Pelvicalyceal System	01	1.1%
Low Grade Myxoid Liposarcoma	01	1.1%
Mixed Epithelial and Stromal Tumor with Malignant Transformation	01	1.1%
Ureteric Mass of Invasive Adenocarcinoma Enteric Type with Pyonephrosis	01	1.1%

Table 2: The Pathological Characteristics of Nephrectomy Specimens for Renal Cell Carcinomas (n=12)

TNM Classification	No. of Cases	Percentage %
Pathological stage pT, n.		
pT (Primary tumor cannot be determined)	-	-
pT0 (No evidence of primary tumor)	-	-
pT1(Tumor≤7 cm, limited to kidney)	-	-
pT1a (Tumor≤4 cm in greatest dimension)	3	25%
pT1b (Tumor>4cm, but ≤7 cm)	-	-
pT1 (subcategory cannot be determined)	-	-
pT2 (Tumor >7cm, limited to kidney)	-	-
pT2a (Tumor>7cm, but ≤10cm)	-	-
pT2b (Tumor >10cm)	-	-
pT3 (Tumor extends into major veins or perinephric tissues, but not into the ipsilateral adrenal gland and not beyond Gerota's fascia)	-	-
pT3a (tumor extends into the renal vein or its segmental branches, or invades the pelvicalyceal system, or invades perirenal and /or renal sinus fat but not beyond Gerota's fascia)	9	75%
pT3b (Tumor extends into the vena cava below the diaphragm)	-	-
pT3c (Tumor extends into the vena cava above the diaphragm or invades the wall of the vena cava)	-	-
pT3 (subcategory cannot be determined)	-	-
pT4 Tumor invades beyond Gerota's fascia (including contiguous extension into the ipsilateral adrenal gland)	-	-
TNM Classification	**No. of Cases**	**Percentage %**
Pathological Lymph node stage pN, n (%)		
pN not assigned (no nodes submitted or found)	12	100%
pN0 No regional lymph node metastasis		
pN1 Metastasis in regional lymph node(s)	-	
Pathological stage pM, n(%)		
pM cannot be determined from the submitted specimen(s)	12	100%
pM1 Distant metastasis (including non-contiguous adrenal gland involvement)	-	-
Adjacent Renal Parenchyma, n%		
Dilation of Pelvicalyceal system	1	8.3%
Simple Renal Cyst	1	8.3%
Unremarkable	10	83.4%
Lymph vascular invasion, n(%)		
Present	2	16%
Absent	10	84%
Histological Type, n(%)		

Clear Cell Renal Cell carcinoma	7	58.3%
Chromophobe Renal Cell Carcinoma	3	25%
Papillary Renal Cell Carcinoma	2	16.7%
Histologic Grade, n=9 (%)		
Grade1	7	78%
Grade 2	-	-
Grade 3	1	11%
Grade 4	1	11%
Tumor Necrosis, n%		
Present	3	25%
Absent	9	75%

Among 12 Nephrectomy specimens, 7 cases of Clear Cell RCC, 3 cases of Chromophobe RCC and 2 cases of Papillary RCC were present.

- There were 3 cases of stage pT1a and 9 cases of stage pT3a.
- Lymph nodes not submitted with nephrectomy specimens.
- Associated adjacent renal parenchyma findings were dilation of pelvicalyceal system and a simple renal cyst.
- Lympho vascular invasion was seen in 2 case (12.5%).
- Tumor necrosis was observed in 3 cases (25%).
- Rhabdoid and sarcomatoid features were observed in 1 case (11%).

Discussion

Age & Gender Wise Distribution of Neoplastic Lesions (n=17)

In our study, out of 17 neoplastic cases, 4 cases (23.5%) were seen in individuals aged less than 40 years, 6 cases (35.3%) in the 41-50 years age group, 5 cases (29.4%) in the 51-60 years of age group, and only 2 cases (11.8%) in the 61-70 years of age group. The youngest case was a 33-year-old male and the oldest was a 67-year-old male. Similarly study done by Abbas F et al,[8] showed definite peak in the 5th decade, Basnet.D et al,[9] showed highest number of neoplastic lesions in 41 to 50 years of age group with 4 cases (35.29%), Chandanwale SS et al,[10] showed maximum cases in age group of 41-60 years 6 cases (12%).

In present study 11 (64.7%) cases of neoplastic lesions were seen in males and 6 (35.3%) cases were seen in females, giving a Male to Female ratio of 1.8:1.

Histopathological Diagnosis of Neoplastic Lesions (n= 17)

In the present study, among 17 neoplastic cases, the majority were diagnosed as Clear cell renal cell carcinoma, comprising 7 cases (41.2%), followed by Chromophobe renal cell carcinoma with 3 cases (17.6%), and Papillary renal cell carcinoma with 2 cases (11.8%). Other neoplastic lesions included 1 case (5.9%) each of Angiomyolipoma, Moderately differentiated squamous cell carcinoma of the renal pelvis, Low-grade myxoid liposarcoma, Mixed epithelial and stromal tumor with malignant transformation, and Invasive adenocarcinoma (enteric type) of the ureter associated with pyonephrosis and duplex ureter. These findings were in concordance with Hamid S et al,[13] found 49 cases (74%), Aiman et al,[5] reported 25 cases (53.1%), Mohan BP et al,[14] showed 178 (54.4 %), Basnet. D et al,[9] showed 7 cases (53.85%) and Bansal. M et al,[12] reported 04 cases (50%) of Clear cell carcinoma as most predominant type among neoplastic lesions.

Histologic Grading (WHO/ISUP) for Clear Cell RCC/Papillary RCC (n=9)

In our study, Histologic grade WHO/ISUP for Clear cell and Papillary renal cell carcinoma showed Grade 1 nuclear features in maximum number of cases n=7 (78%), 1 case, n=1(11%) each showed Grade 3 and Grade 4 features.

A study done by Chandanwale SS et al [10] showed Grade 2 in n=6 (54.54%) cases and grade 1 & grade 3 in n=2 (18.18%) cases each, Anu Gupta et al [24] showed majority cases with grade 2 and grade 3 nuclear features.

Pathological staging of Renal cell Carcinoma (n=12)

Out of 12 cases of renal cell carcinomas, maximum no. of cases were present in Stage pT3 with n=9 (75%) cases followed by n=3 (25%) cases in pT1 stage. In the present study 6 cases of Clear cell carcinoma, 2 cases of Chromophobe renal carcinoma and 1 case of Papillary renal carcinoma were stage pT3. Whereas 1 case each of Clear cell carcinoma, Chromophobe renal carcinoma and Papillary renal carcinoma were staged as pT1.

A study conducted by Basnet.D et al [9] reported maximum cases in pT1stage with 5 (71.44%) cases and 1 (14.28%) case each in stage pT2 and pT3.

Correlation Between Clinic-radiological diagnosis and histopathological diagnosis in Nephrectomy Specimen

Out of 17 neoplastic lesions, 16 cases were radiologically diagnosed as renal mass which on histological examination were also diagnosed as neoplastic lesions. Although 2 cases were clinically misdiagnosed as renal mass which on histopathology were diagnosed as non-neoplastic. A case of a 50-year-old male presented with pain in right flank. Radiological findings revealed mixed density mass lesion at mid pole of right kidney and due to its space occupying nature the correct preoperative diagnosis was not possible and clinically as well as on imaging also it was misdiagnosed as Renal mass. Right Nephrectomy was done. Grossly specimen showed multiple irregular yellow nodular areas surrounding the renal pelvis and calyces. Microscopic examination showed Xanthogranulomatous pyelonephritis features.

Another 1 case of a 40-year male presented with left flank pain and clinically misdiagnosed as renal mass. Left Nephrectomy was done. Gross examination showed dilatation of pelvicalyceal system filled with hemorrhagic friable brown material. Microscopically findings were consistent with features of Chronic pyelonephritis.

Among 17 neoplastic lesions, 15 cases (88.4%) were clinically diagnosed as Renal mass which on histopathology were also diagnosed as neoplastic lesions. The correlation was statistically analysed for two methods with kappa. The kappa value was

calculated as 0.853 which means there was an excellent agreement between both the diagnosis.

Case discussion

Angiomyolipoma

Angiomyolipoma is a benign mesenchymal tumor composed of an admixture of smooth muscle, adipose tissue and thick-walled blood vessels in a variable amount. It is a member of the PEComa tumor family characterized by proliferation of perivascular epithelioid cells.

In the present study, one case of classic Angiomyolipoma /PEComa was reported in 67 years old male who presented with right flank pain. Radiological imaging showed right renal mass. The Mass was heterogeneously attenuated hypodense with a lobulated margin noted at the junction of the mid and lower pole of the right kidney mass measures 48 x 41 millimeters with internal calcification.

Gross examination showed the right kidney measuring 4.5 x 3 x 1.8 cm along with a well-circumscribed mass at the mid to lower pole of the kidney measuring 4 x 3.8 x 3.5 cm. It has lobulated solid firm gray-white to soft yellow-tan cut surface. There were focal areas of necrosis and hemorrhage. The tumor was limited to the kidney and grossly perinephric fat, renal sinus, ureter and renal vessel resection margins were free of tumor.

Microscopy showed features of classic Angiomyolipoma. The tumor was composed of fascicles of smooth muscles, mature adipose tissue, and thick-walled blood vessels. There were fascicles of elongated spindle cells which appeared to radiate from blood vessels.

Clear Cell Renal Cell Carcinoma

Clear cell renal cell carcinoma is morphologically heterogeneous malignant tumor arising from renal tubular epithelial cells.[15]

Among 17 neoplastic lesions, clear cell renal cell carcinoma was the commonest histological diagnosis reported in 7 cases. Male preponderance was noted; out of 7 cases, 6 were males. Patients were presented with the complaints of hematuria and flank pain. Nephrectomy was done.

Gross examination showed solitary, unifocal spherical mass that has distorted the renal outline. In present study the main tumor mass ranged in size from 4 cm to 9.8 cm. Sectioning revealed variegated cut surface. Reddish to golden yellow surface with areas of hemorrhage, necrosis, fibrosis and cystic changes were seen. White firm area with area of necrosis indicates sarcomatoid or high-grade lesion in one case. The tumors of pT3a stage showed grossly renal sinus fat invasion whereas renal vein and ureteric resection margin was grossly uninvolved by the tumor.

Microscopy showed tumor cells arranged in nested, alveolar or tubular pattern which are surrounded by characteristic delicate branching vascular network. Tumor cells were round to polygonal in shape and show mixture of abundant optically clear cytoplasm or fluffy eosinophilic granular cytoplasm.

Out of 7 cases, 6 cases had histological grade 1 and one case had histological grade 4 due to sarcomatoid component as per WHO/ISUP grading system. This grading system is based on nucleolar prominence/eosinophilia for grade 1 - 3 and prominent nuclear pleomorphism with tumor giant cells or any amount of sarcomatoid and rhabdoid differentiation indicate grade 4. In grade 1 tumour nucleoli were inconspicuous and basophilic at 400X magnification. Sarcomatoid component was comprised of spindle cells and Rhabdoid cells. Cells had abundant eosinophilic granular cytoplasm with eccentrically placed nuclei indicating nuclear grade 4.

Chromophobe Renal Cell Carcinoma

Chromophobe renal cell carcinoma represents 5% of all renal cancers. They are thought to arise from intercalated cells of collecting duct and have good prognosis compared with that of clear cell and papillary carcinoma and close differential includes oncocytoma.[16]

Total 3 cases of Chromophobe renal cell carcinoma were diagnosed histopathologically. All three cases were female patients. Two cases were presented in a pT3a stage and one case was diagnosed in pT1a stage.

Chromophobe Renal Cell Carcinoma comprise 6 to 11% of renal epithelial tumors.[17] Similarly in the present study out of 17 neoplastic cases; 3 cases were diagnosed as Chromophobe renal cell carcinoma (17.64%). Radiology CT scan imaging showed well defined lobulated exophytic heterogeneous mass arising from lower pole of the right kidney. It measures 6.6 x 5.5 x 5.6 cm. Patient presented with right lower pole exophytic mass and underwent right side partial nephrectomy. Sectioning of the specimen revealed 6.2 x 6 cm solid hemorrhagic dark brown coloured well circumscribed mass. Another specimen showed areas of hemorrhage and necrosis along with Central scar.

Microscopic examination showed tumor cells arranged predominantly in a solid sheet like manner separated by thin incomplete fibrovascular septa. Focally they showed nested, broad cystic spaces and trabecular pattern. Tumor cells were large round to polygonal cell with well-defined cell borders. Cell membrane was prominent and has a plant cell like morphology, the cytoplasm was abundant clear to foamy and the finely reticulated. Nuclei were hyperchromatic, irregular and showed perinuclear haloes. Another cell type has deeply eosinophilic and granular cytoplasm. These eosinophilic cells were randomly juxtaposed. The nuclei showed irregular wrinkled raisinoid appearance and binucleation was seen.

Papillary Renal Cell Carcinoma

This malignant neoplasm is thought to arise from distal convoluted tubules and may be multifocal and bilateral.[18] Two cases were reported in the present study.

The first case was a 55 years old male who presented with the complaints of left flank pain and hematuria. CT scan revealed left renal mass arising from lower pole of kidney laterally along with a subcortical simple renal cyst at lower pole of kidney. Patient underwent left laparoscopic partial nephrectomy.

Gross examination of this specimen revealed a circumscribed rounded discrete gray-yellow mass measuring 3.5 x 2.8 cm along with central area of hemorrhage. Microscopic examination showed tumor cells arranged in papillary fronds with fibrovascular core, tubular as well as tubular papillary architecture; at places trabecular pattern lined by cuboidal to low columnar cells with scanty lightly basophilic to amphophilic cytoplasm. Foamy macrophages were seen in papillary cores. Renal parenchymal resection margin was free of tumor. Histological diagnosis of Papillary renal cell carcinoma; WHO/ISUP Histologic grade 1 and pathological stage pT1a was given because tumor was less than 4 cm in greatest dimension

and limited to kidney.

Another case was 48 years old male who presented with right lower Pole mass kidney and underwent right radical nephrectomy. Grossly specimen showed a tumor measuring 9 x 7 x 7 cm. The mass had creamish-yellow to red-brown coloured cut surface with central area of necrosis. Perinephric fat and renal sinus fat infiltration was grossly seen. Histological diagnosis of Papillary renal cell carcinoma with WHO/ISUP Histologic grade 3 and pathological stage pT3a was given. Section showed prominent and eosinophilic nucleoli at 100X magnification along with perinephric fat and renal sinus fat infiltration by the tumor. Lymphovascular invasion was seen. Ureteric resection margin was free but renal vessel was involved by the tumor.

Ureteric Mass of Invasive Adenocarcinoma Enteric Type with Pyonephrosis and Duplex Ureter

20% to 30% of all prenatal anomalies constitute congenital anomalies of the kidney and urinary tract, including double ureter.[19] The prevalence of this malignancy is 0.7%.[20]

The ureter derived from the Wolffian mesonephric duct undergoes complex changes during development. Duplication of the ureter is of two types complete or incomplete. Complete duplication of the ureter is commoner than incomplete. Incomplete duplication of the ureter is known as bifid ureter.[21]

In the present study, a case of a 45-year male presented with the complaint of left side flank pain. Radiology findings revealed left renomegaly with gross pyonephrosis along with thinned out cortex and Duplication of Ureter. Sludge with mucosal thickening in left lower moiety ureter and mass lesion in left vesico-ureteric junction. Left nephroureterectomy was done.

Gross examination revealed marked dilatation of pelvicalyceal system along with multiple calculi. Attached ureteric stump on sectioning showed a soft gray white polypoidal growth in the upper part of the ureter measuring 1 x 5 x 0.3 cm which was missed on radiology. Grossly the separately submitted left ureter on serial sectioning revealed two ureteric lumens (partial duplication) only in the proximal segment. Microscopic examination from the polypoidal growth showed neoplastic cells forming glands and papillae with complex architecture lined by pleomorphic mucin producing pseudostratified intestinal type epithelium. The tumor invades the subepithelial connective tissue and reaches the muscularis propria. Adjacent overlying epithelium showed glandular metaplasia, however, urothelial carcinoma components were not identified in all the sections. Histological diagnosis of Invasive Adenocarcinoma - Enteric Type [pT2 (tumor invading muscularis)] was given.

While sections from the kidney revealed features consistent with pyonephrosis and sections from the ureter (duplication of ureter) show fibrocollagenous and fibromuscular tissue with two ureteric lumens lined by histologically unremarkable urothelium and the subepithelium shows chronic inflammatory cell infiltrates.

Low Grade Myxoid Liposarcoma

A case of low grade myxoid liposarcoma was reported in a 45-year female who presented with left flank pain. Imaging showed a heterogeneously enhancing lesion with well-defined margins measuring 107 x 100 millimeters in the left kidney upper pole showing internal septa and peripheral calcification suggestive of complex renal cortical cyst. Left nephrectomy was done.

Gross examination showed a well circumscribed solid mass attached to the kidney measuring 10.8 x 10 cm. It has solid gelatinous pale-yellow color cut surface with areas of hemorrhage. Microscopy showed a hypocellular lesion composed of bland spindle to stellate cells dispersed in a myxoid stroma with a delicate, thin walled, arborizing curving vasculature. There was no nuclear atypia or mitosis. Multivacuolated and univacuolated lipoblasts were seen. Histological diagnosis of an Adipocytic Tumor- Low grade myxoid liposarcoma was given. Sections from the adjacent renal parenchyma shows some atrophic tubules and thyroidization of tubules. The interstitium shows mild infiltrates of chronic inflammatory cells and there is hyaline arteriosclerosis.

Squamous Cell Carcinoma of Urothelial Tract (Renal Pelvicalyceal System)

Squamous cell carcinoma of urothelial tract is thought to arise from squamous metaplasia of urothelium due to chronic long-term inflammation associated with infections, stones, repetitive trauma and Bilharziasis.[22]

Case of pure squamous cell carcinoma was reported in 55 years old female patient who presented with the complaints of right flank pain and fever. Radiological imaging revealed right hydronephrosis kidney with calculus. Renal DTPA scan showed no appreciable tracer uptake in right kidney. Simple nephrectomy was done and showed irregular distorted kidney and dilated calyces with a one stone of 1 x 1 CM size in upper calyces. The lining mucosa of the calyces was rough irregular and few calyces lodges necrotic, friable gray-brown tissue. Histopathological examination showed moderately differentiated squamous cell carcinoma (Grade2) of renal pelvicalyceal system in the background of chronic pyelonephritis and nephrolithiasis. Tumor infiltrated the renal sinus fat and Perinephric fat. Lymphovascular invasion was noted. Tumor was composed of nets and Islands of squamous cells with nuclear pleomorphism and showed keratinization. The adjacent mucosa showed squamous metaplasia. Rest of the renal parenchyma showed features of chronic pyelonephritis.

Images Case 1

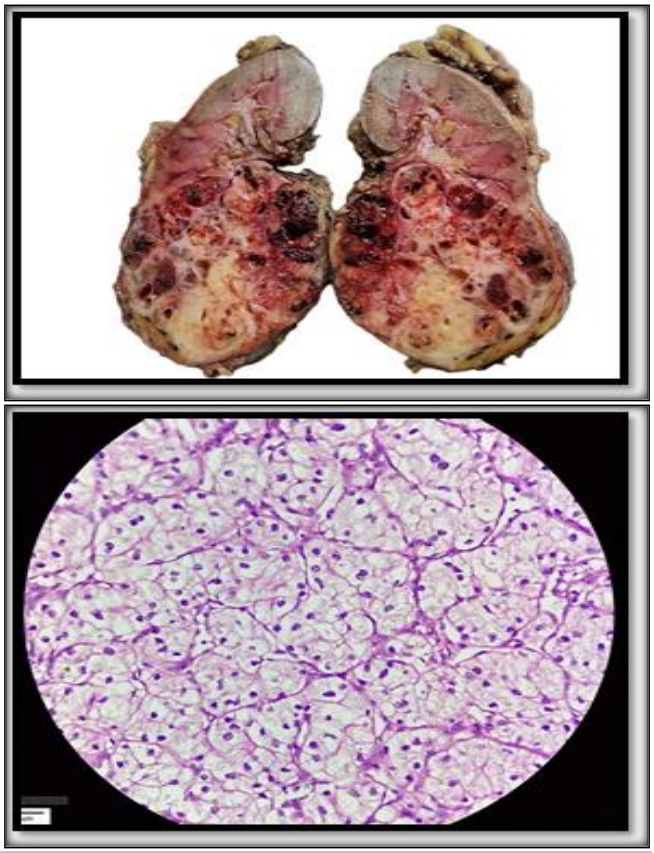


Figure 1: Clear Cell Renal Carcinoma
(a) CT Scan Image - Showed heterogeneously hypoechoic lesion, relatively well defined with cystic spaces measuring 9.1 x 7.2cm at lower pole of left kidney.
(b) Gross image - Left radical nephrectomy specimen showing Gray-white to yellow cut section of the tumor with areas of cystic degeneration & necrosis in middle & lower pole of the kidney.
(c) Microphotograph (H&E 400X) - Showed tumor cells arranged in nested and alveolar pattern which are surrounded by characteristic delicate branching vascular network. Tumor cells were round to polygonal in shape and show mixture of abundant clear cytoplasm or fluffy eosinophilic granular cytoplasm. WHO/ISUP Histological Grade1.

Images case 2

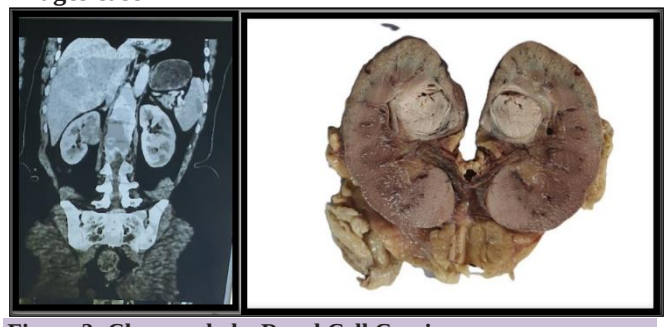
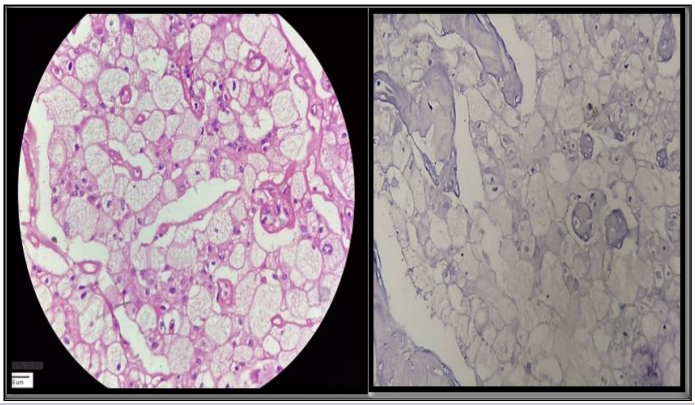


Figure 2: Chromophobe Renal Cell Carcinoma
(a) CT Scan Image - Showed a 4 x 3.8 x 3.6 cm sized moderately enhancing well defined mass noted in medial aspect of upper half of right kidney indenting in renal pelvis.
(b) Gross image - Right Radical Nephrectomy specimen showing a mass of 4 X 3.8 X 3.6 cm in medial aspect of upper half of the right kidney indenting the renal pelvis.



(c) Microphotograph- Showed tumor cells arranged predominantly in a solid sheet like manner. Round to polygonal cell with plant cell like morphology. The cytoplasm was abundant clear to foamy and finely reticulated. Nuclei were hyperchromatic, irregular and showed perinuclear haloes. Another cell type has deeply eosinophilic and granular cytoplasm. These eosinophilic cells were randomly juxtaposed (H&E 400X).
(d) Microphotograph - Shows Chromophobe renal cell carcinoma with osseous metaplasia (H&E 400 x).

Images Case 3

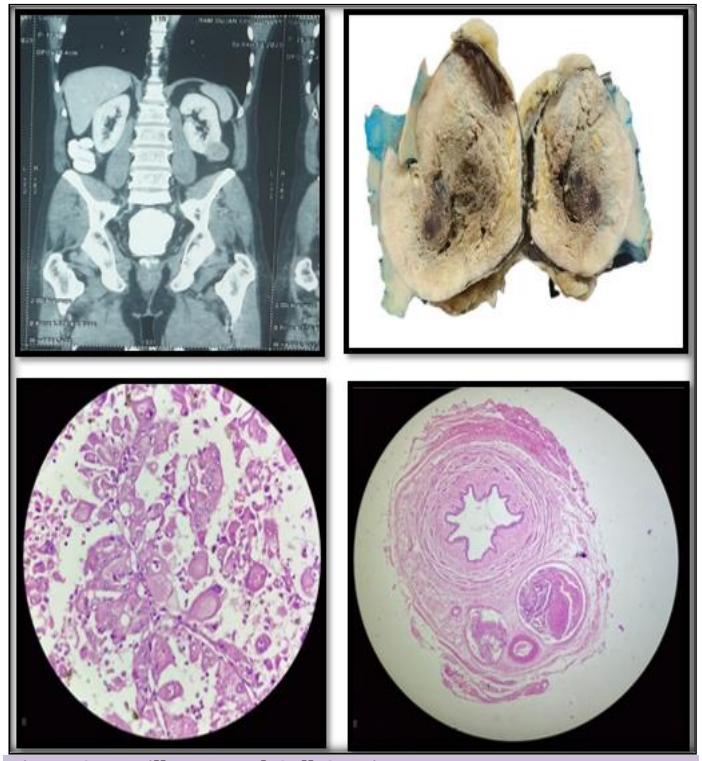


Figure 3: Papillary Renal Cell Carcinoma
(a) CT Scan Image - Shows mass lesion from lower pole of left kidney.
(b) Gross image - Left Partial nephrectomy revealed a circumscribed rounded discrete gray-yellow mass measuring 3.5 X 2.8 cm along with central area of hemorrhage.
(c) Microphotograph - Shows tumor cells arranged in papillary fronds with fibrovascular core. WHO/ISUP Grade 3 (prominent & eosinophilic nucleoli at 400 X magnification).
(d) Microphotograph - Shows renal vessels involved by the tumor & free ureteric resection margin (H&E 100X).

Images Case 4

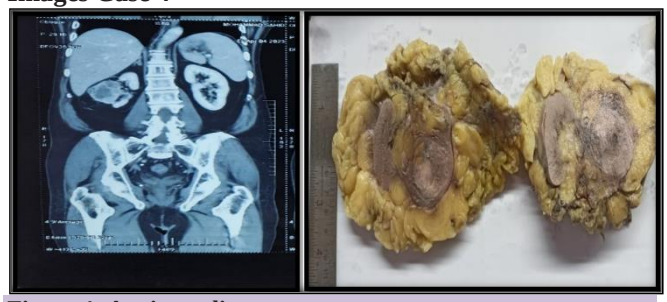
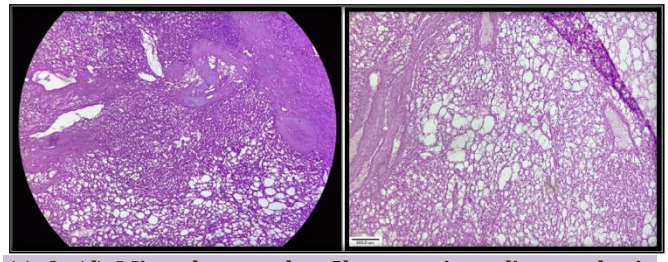


Figure 4: Angiomyolipoma
(a) CT Scan Image - Shows heterogeneously attenuated hypodense lesion with lobulated margins in right kidney measuring approx. 48 x 11 mm showing internal calcification.
(b) Gross image - Right Nephrectomy showing a well circumscribed mass at the upper pole with yellow tan cut surface.



(c) & (d) Microphotograph - Shows angiomyolipoma classic variant, composed of myoid spindle cells, adipose tissue & thick wall sclerosed vessels (H&E 100X, 400X).

Images Case 5

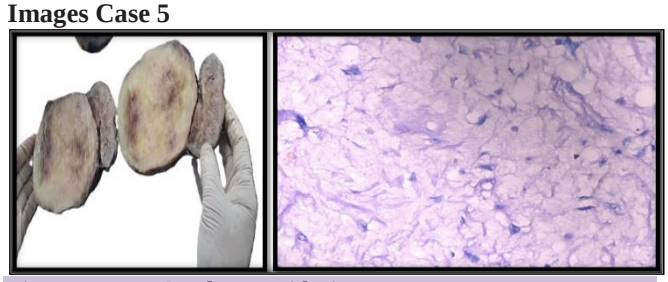
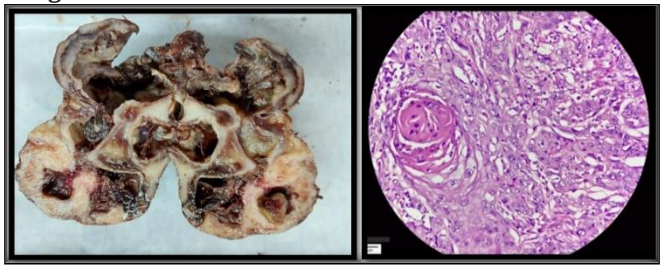


Figure 5: Low Grade Myxoid Liposarcoma
(a) Gross image - Left Nephrectomy specimen showed a solid mass attached to the kidney. Cut surface showed solid well circumscribed mass of gelatinous pale-yellow color.
(b) Microphotograph - Shows a hypocellular lesion composed of bland spindle to stellate cells dispersed in a myxoid stroma with a delicate, thin walled, arborizing curving vasculature and shows multivacuolated and univacuolated lipoblasts (H&E 100X).

Images Case 6



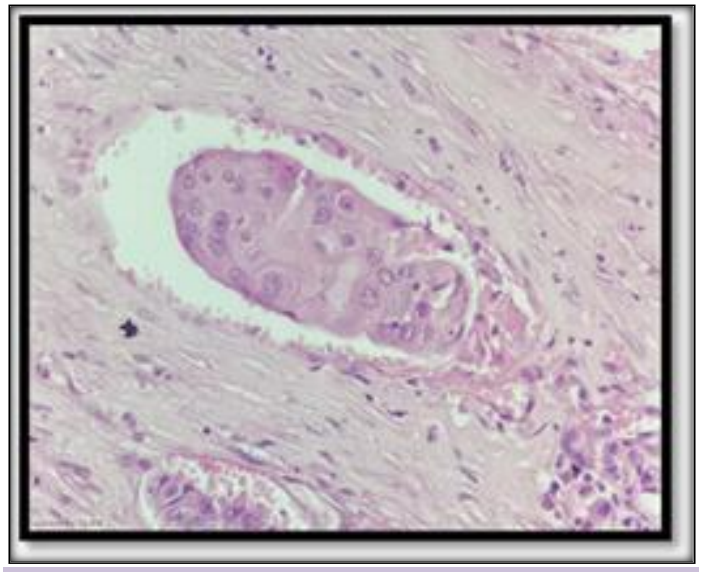
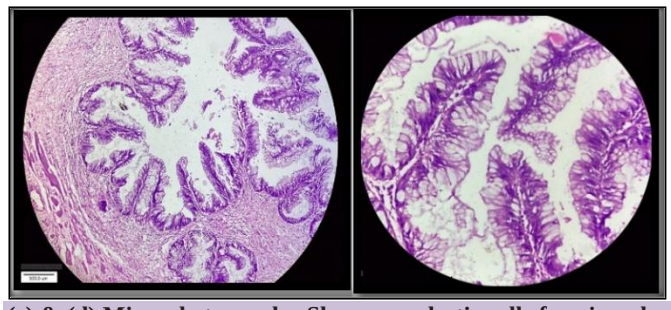


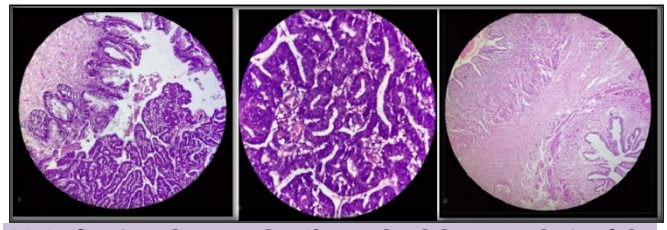
Figure 6: Squamous Cell Carcinoma
(a) Gross image - Right Nephrectomy showing rough and irregular lining of delicate calyces with necrotic friable gray-brown tissue in few calyces.
(b) Microphotograph - Show moderately differentiated Squamous cell carcinoma of renal pelvicalyceal system (H&E 400x).
(c) Microphotograph - Showing Lymphovascular invasion of the tumor cells (H&E 400X).

Images Case 7

Figure 7: Invasive Adenocarcinoma Enteric Type
(a) & (b) Gross image - Specimen showing dilated pelvi-calyceal system with calculus in mid & lower pole along with a polypoidal growth in the upper part of ureter and left Ureter showing two ureteric lumens (Partial duplication) in the proximal segment.



(c) & (d) Microphotograph - Shows neoplastic cells forming glands and papillae with complex architecture lined by pleomorphic mucin producing pseudostratified intestinal type epithelium (H&E 100X and 400X).



(e) & (f) Microphotograph - Shows glandular metaplasia of the adjacent overlying epithelium with transformation into adenocarcinoma enteric type (H&E 100X & 400X).
(g) Microphotograph - Shows sections from the ureter (duplication of ureter) showing fibrocollagenous and fibromuscular tissue with two ureteric lumens (H&E 100X).

Conclusion

The most common malignant lesion was renal cell carcinoma. Histopathological examination of the nephrectomy specimen not only categorizes the renal neoplasms but also helps in proper grading and staging of the tumor, so that patients can be managed appropriately. Histological stage and nuclear grade are the important prognostic predictors.

In few cases, discrepancies were noted between clinic-radiological diagnosis and histological findings. Some cases were misdiagnosed and, in some others, incidental findings were missed, which were picked up and confirmed by histological examination of the nephrectomy specimen. Histological examination is hence, the gold standard for giving a proper diagnosis, and multi-disciplinary approach should be adopted to ensure the optimal management of the patients.

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Conflicts of interest

There are no conflicts of interest.

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