

## Histopathological Spectrum of Lesions in Nephrectomy Specimens: A Two Year Study

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### Structured Abstract

**Aim:** This study was conducted to evaluate the neoplastic and non-neoplastic conditions encountered in nephrectomy specimens that were received in our department over a 2 year period.

**Methods:** A hospital based two year retrospective study of all nephrectomy specimens received in the department of pathology.

**Result:** A total of 32 nephrectomy specimens were studied. Mean age at which nephrectomy was done was 40.6 years with a female preponderance. 62.5% cases were non neoplastic lesions and 37.5% neoplastic lesions. Wilm's tumor in pediatric age group and renal cell carcinoma in adult age group were commonly seen in the malignant category.

**Conclusion:** The present study provides a fair insight into the histological patterns of lesions in nephrectomy specimens at our institution. A wide range of lesions are encountered on histopathology of nephrectomy specimens, many of which may be misdiagnosed clinically and radiologically; therefore it is mandatory that every nephrectomy specimen should be subjected to a detailed histopathological examination for a clinicomorphological correlation to ensure proper management.

**Keywords:** Nephrectomy, Chronic Pyelonephritis, Renal Cell Carcinoma, Wilms tumor, PNET

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### I. Introduction

Kidney can be involved in various pathological processes, both neoplastic and non neoplastic conditions, some of which may require its surgical removal, nephrectomy. Simple nephrectomy is a common procedure in urological practice and it is indicated in patients with an irreversible damaged kidney resulting from symptomatic chronic infections, obstruction, calculus, severe traumatic injury and renal dysplasia[1]. Kidney can be affected by various pathological conditions like cystic disease, glomerulonephritis, pyelonephritis, renovascular hypertension, obstruction, calculous disease, benign and malignant tumor, etc some of which may require surgical treatment and some may require medical treatment[2].

Chronic pyelonephritis with hydronephrosis is the most common type of nephrectomy specimen for non-neoplastic conditions due to increase in the incidence of pelvi-ureteric junction obstruction by upper ureteric calculi. Renal cell carcinoma accounts for approximately 2 percent of adult malignancies and 80-85 percent of malignant kidney tumors.[3] Renal cell carcinoma occurs twice as commonly in men than in women, it is primarily a disease of elderly patients, typically presenting in the 5<sup>th</sup> to 7<sup>th</sup> decades of life; however, it has been reported in much younger patients as well.[4]

Wilms' tumor, though ranked fifth in frequency among childhood solid tumors, is the most common childhood abdominal malignancy; however, less than 1 percent of Wilms' tumor occurs in adults.[3]

Kidneys with endstage renal disease can give rise to major complications such as massive bleeding for which nephrectomy may be indicated. Other less frequent indications for nephrectomy are intractable hypertension, pain, and repeated infections.

Xanthogranulomatous pyelonephritis is also an indication for nephrectomy. Grossly, mass occupying nature of this lesion often mimics renal cell carcinoma.[5] Nephrectomy is the treatment modality in cystic renal dysplasia.

This study from a tertiary care hospital was undertaken to determine the most common clinical presentation, with age and sex distribution of renal tumours and to analyse the histomorphological spectrum of renal tumours from resected nephrectomy specimens.

## II. Materials And Methods

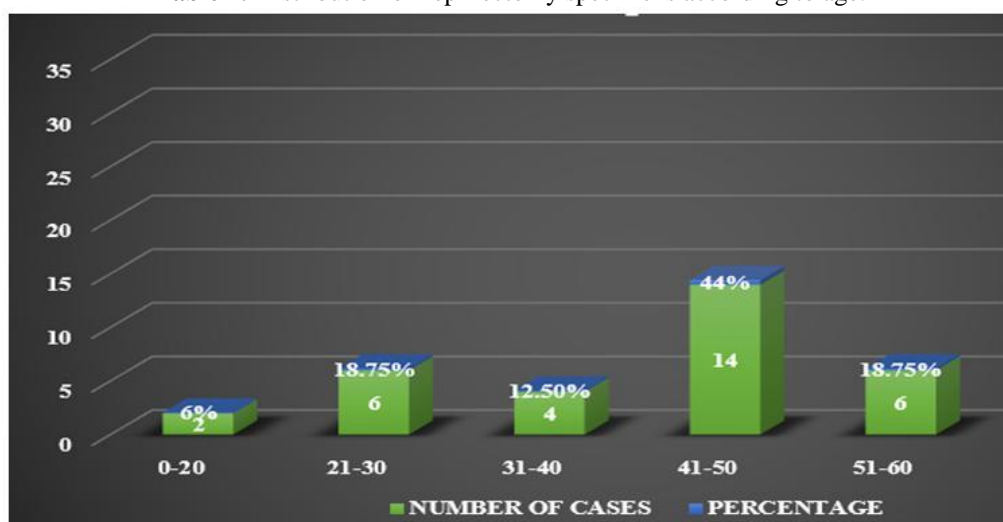
This study was carried out in the Department of Pathology, LN medical college and research centre, Bhopal. Nephrectomy specimens both simple and radical were included in our study.

Patient details were retrieved from the records which includes age, sex, clinical findings and radiological investigations. Nephrectomy specimens were examined in detail grossly and a minimum of three sections were taken from the tumors. The tissue was processed as per standard procedure; 4- to 5- $\mu$ m-thick sections were cut on a rotary microtome. Special stains and immunohistochemistry was also done where needed.

## III. Results

The present study includes 32 nephrectomy cases analyzed during a 2 year period. 62.5% cases were non neoplastic lesions and 37.5% neoplastic lesions. Higher incidence were observed in fifth and sixth decades of life, mean age at which nephrectomy was done was 40.6 years with a female preponderance. [Table 1] and [Table 2].

**Table 1:** Distribution of nephrectomy specimens according to age.



**Table 2:** Distribution of nephrectomy specimens according to gender



Maximum number of cases were of chronic pyelonephritis (56%), followed by renal cell carcinoma [Table 3] (25%).

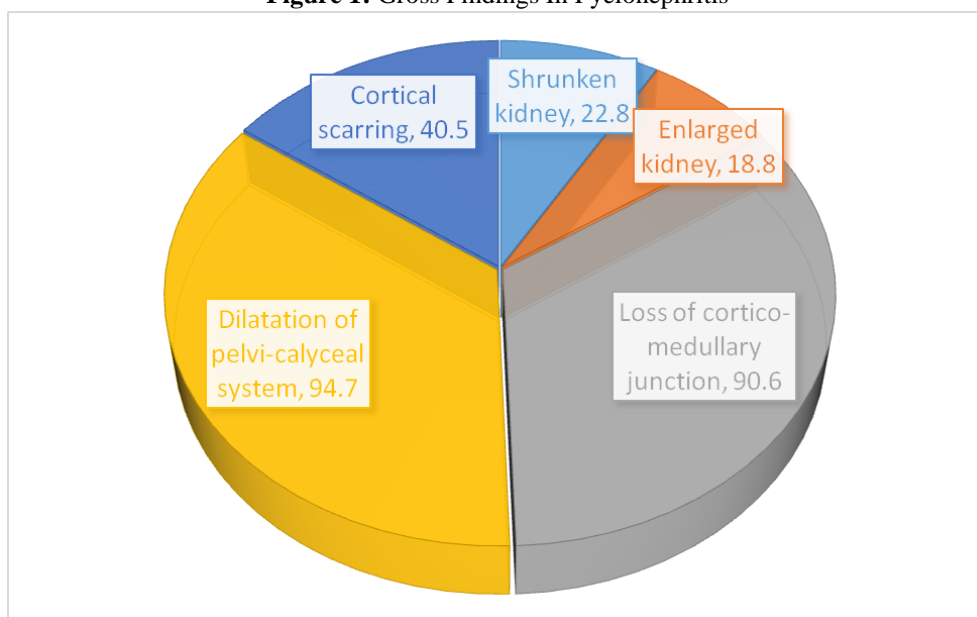
In Gross findings in pyelonephritis, predominant number of cases was found to have loss of cortico medullary junction with 90.6% and Dilatation of pelvi-calyceal system with 94.7%. Also 40.5% of cases were found to be cortical scarring and 22.8% of cases have shrunken kidney as shown in [Fig 1].

In microscopic findings of nephrectomy cases, Tubular atrophy and Thyroidisation of tubules were seen in 16 and 12 cases respectively. Maximum number of cases i.e. 20 cases were found to be interstitial inflammation as shown in [Table 4]. Glomerular sclerosis with hyalinization and periglomerular fibrosis were seen in 70% and 75% respectively.

**Table 3:** Spectrum of histopathological diagnosis in nephrectomy specimen.

S.NO.	LESION	NO. OF CASES	PERCENTAGE
1.	Chronic Pyelonephritis	18	56%
2.	Xanthogranulomatous Pyelonephritis	02	6.5%
3.	Wilm’s tumor	02	6.5%
4.	Renal cell carcinoma	08	25%
5.	Adenosquamous carcinoma	01	3%
6.	Primitive Neuroectodermal Tumor	01	3%

**Figure 1:** Gross Findings In Pyelonephritis



**Table 4:** Microscopic findings in Pyelonephritis.

MICROSCOPIC FINDINGS	NO. OF CASES	PERCENTAGE
Glomerular sclerosis with hyalinization	14	70%
Periglomerular fibrosis	15	75%
Tubular atrophy	16	80%
Thyroidisation of tubules	12	60%
Interstitial inflammation	02	10%
Acute	18	90%
Chronic		
Interstitial fibrosis	17	85%
Hyaline Arteriosclerosis	13	65%

Histopathological evaluation revealed neoplasm in 12 cases. Among malignant tumours, Clear cell RCC was the most frequent tumour in our study observed in 04 (33%) cases, followed by papillary RCC in 2 (17%) cases, chromophobe RCC in 2 (17%) cases, 2 (17%) cases of Wilms tumor, 01 (8%) case of adenosquamous carcinoma, and 1 (8%) case of Primitive Neuroectodermal Tumor [Table 5].

Nuclear grade (Furhman nuclear grading) was assessed in clear cell and papillary variants of RCC (06 cases). Most frequent nuclear Grade was II in 04 cases followed by Grade I and Grade III in 01 case each. [Table 6].

**Table 5:** Distribution of Tumors

HISTOLOGICAL TYPE OF TUMOR	NO. OF CASES	PERCENTAGE
Wilm’s tumor	02	17%
RCC-Clear cell type	04	33%
RCC- Papillary type	02	17%
RCC- Chromophobe type	02	17%
Adenosquamous carcinoma	01	8%
Primitive Neuroectodermal Tumor	01	8%
TOTAL	12	100%

**Table 6:** Furhman nuclear grading of Renal Cell Carcinoma

**FURHMAN NUCLEAR GRADE**

	No. of cases	GRADE I	GRADE II	GRADE III	GRADE IV
RCC- Clear cell type	04	01	03	-	-
RCC- Papillary type	02	-	01	01	-

**IV. Discussion**

In our study, 32 nephrectomy cases were studied. Nephrectomies showed a peak during 4<sup>th</sup>-5<sup>th</sup> decade. In the present study the most common indication requiring nephrectomy was chronic pyelonephritis (56%) followed by renal cell carcinoma (25%) as studied by Popat et al [6].

Neoplastic diseases-

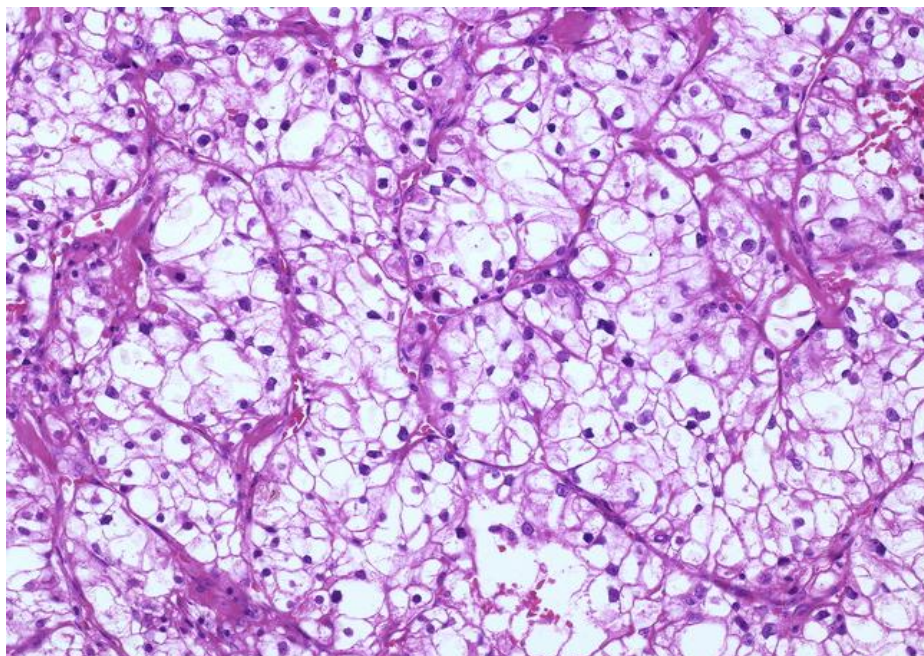
Nephrectomy is a standard treatment offered to patients who present with benign as well as malignant mass lesions in the kidney.

Most common malignant tumor in adults is renal cell carcinoma-clear cell type and Wilms tumor in childhood.

**Clear Cell Carcinoma**

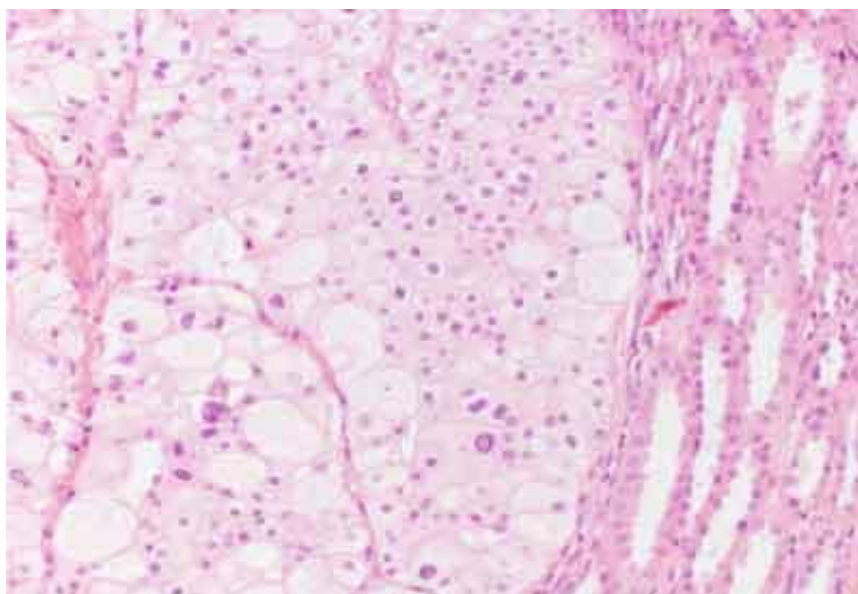
This tumour is known to originate from the renal tubular epithelium and accounts for about 70% to 75% of all RCCs [7]. The ‘clear’ cytoplasm of the tumour cells is due to the presence of intracytoplasmic glycogen and lipids which gets dissolved during tissue processing [8]. Higher grade tumours have more granular-eosinophilic cytoplasm. Gross examination reveals golden yellow coloured tumour due to abundant intracytoplasmic lipid. The high grade tumours display variegated appearance because of less lipid and glycogen and with areas of haemorrhage and necrosis. Microscopically, the tumour displays cells arranged in acinar and solid nest patterns, along with arborizing intricate capillaries [9].

In our study, we observed 04 cases of clear cell RCC. Majority of them involved the upper pole with a mean size of 8.04 cm.



**Renal cell carcinoma- Chromophobe type**

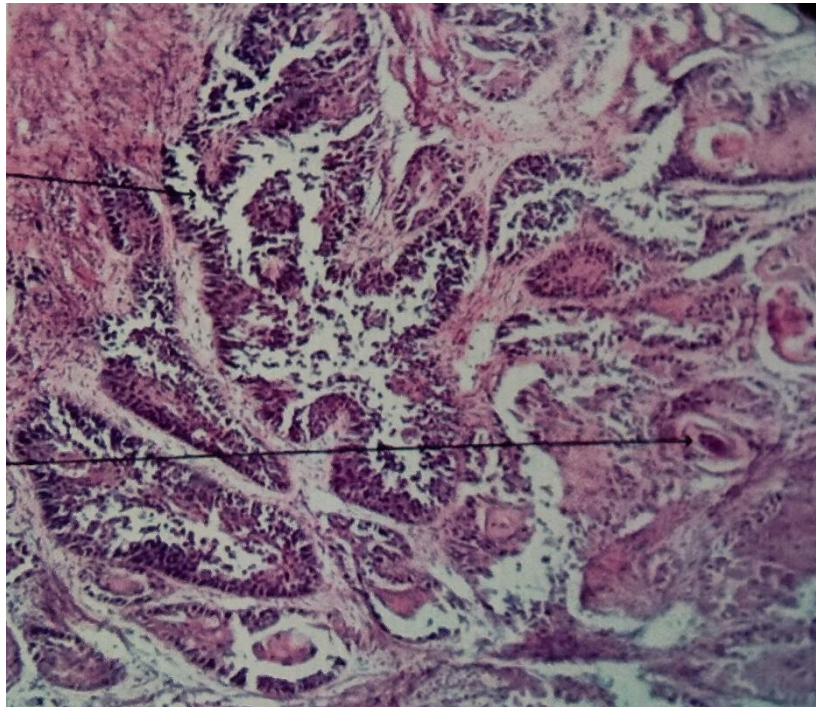
Solid growth, nests or broad trabeculae, composed of polygonal cells with distinct cell borders. Nuclei are irregular, wrinkled and angulated with perinuclear halos.



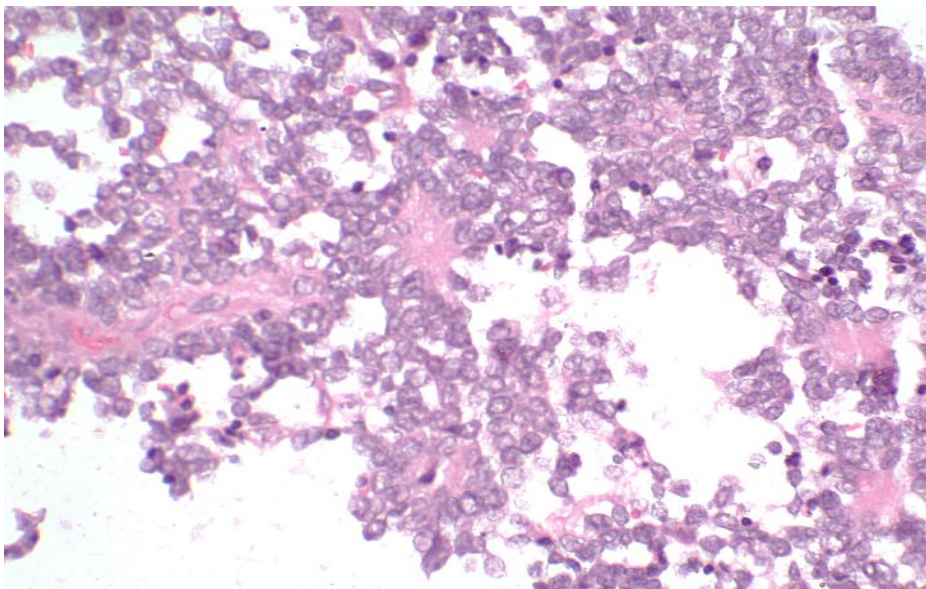
A rare case of **Primary Adenosquamous carcinoma** of the kidney was reported. Patient was a 45 year old male who presented with calculi, hydronephrosis and associated pyelonephritis.

Tumor cells arranged in glandular pattern.

Tumor cells showing squamous differentiation



Another rare tumor was reported- **Primitive Neuroectodermal Tumor (Renal PNET)**. The diagnosis was made in view of cytological picture of surgical specimen, Homer-Wright rosette formation and immunohistochemical staining.



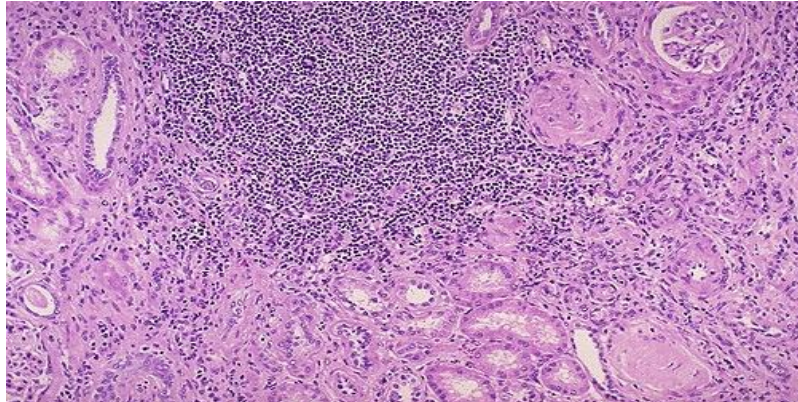
Tumour showed small round cells arranged in sheets, nests, trabeculae and rosettes.

**Non neoplastic diseases-**

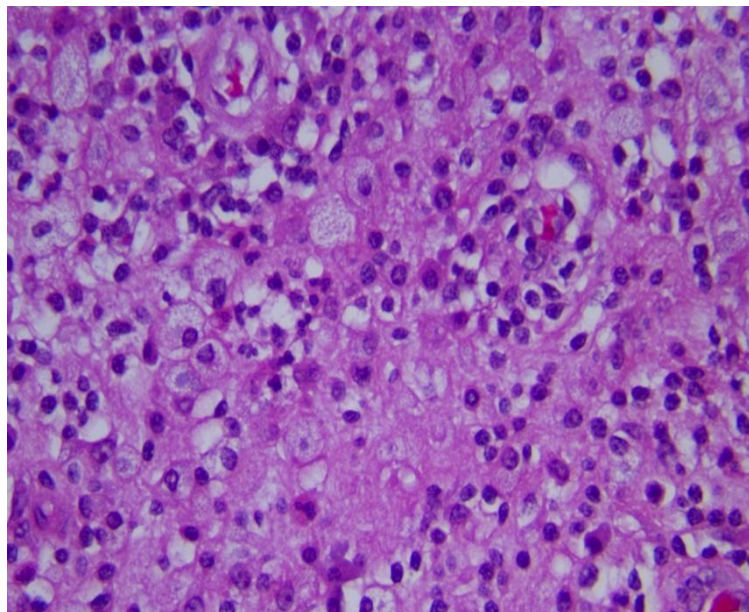
Chronic pyelonephritis (CPN) is the most common non-neoplastic lesion with series of microscopic changes like thyroidisation of tubules, tubular atrophy, interstitial fibrosis, etc.

CPN also seems to be associated with various findings like pyonephrosis, calculi, malignancies etc.

Hence it is mandatory to study each CPN case in detail along with clinical and radiological findings.



Xanthogranulomatous pyelonephritis



**V. Conclusion**

The present study provides a fair insight into the histological patterns of lesions in nephrectomy specimens in our institution and its correlation with studies conducted across the world.

This histopathological spectrum correlated well with the available literature studies except the fact that the incidence of chronic pyelonephritis had declined in the developed countries.

In RCC, Nuclear grade and stage of tumour are essential for therapeutic decisions and help in prognostication, thus necessitating a systematic gross and histopathological examination of nephrectomy specimens.

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