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Original Research Article

A Histopathological study of Malignant Lesions in Nephrectomy Specimens: A Two Year Study

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Abstract

Introduction: Renal tumors comprise a diverse spectrum of neoplastic lesions with patterns that are relatively distinct for children and adults. Radical nephrectomy is indicated to treat different malignant neoplastic conditions of the kidney.

Nephrectomy remains the standard of care for patients with a suspected renal mass. Accurate pathological evaluation of renal neoplasms is essential for sub typing, proper staging and assisting in further treatment protocols.

Methodology: The study was prospective and included 40 nephrectomy specimens over a period of 2 years. The gross morphology and the microscopic features were studied.

Results: In the present study, a total of 40 cases of nephrectomy specimens were studied. Of the 40 cases, 15 were neoplastic lesions (37.5%).

Conclusion: It is mandatory for every nephrectomy specimen to be subjected, to a detailed Histopathological examination, for a clinico-pathological correlation to ensure proper management. The clinical outcomes of various histologic subtypes are different, validating for accurate sub typing of renal neoplasms in clinical practice.

Keywords: Nephrectomy; Renal Cell Carcinoma; Sarcomatoid; Wilms Tumor.

Introduction

Like any other human body organ, kidney can be involved in various pathological processes, some of which may require its surgical removal.

Nephrectomy is a common procedure in urological practice. Simple nephrectomy is indicated in patients with an irreversible damaged kidney resulting from symptomatic chronic infections, obstruction, calculus, severe traumatic injury and renal dysplasia [1]. Renal cell carcinoma comprise for 3% of all cancer deaths. Staging and grading remain the most useful indicators for prognosis in renal neoplasia amidst the increasingly sophisticated techniques such as cytophotometry and molecular biological assessment [2].

Renal tumors comprise a diverse spectrum of neoplastic lesions with patterns that are relatively distinct for children and adults [3-6]. Simple nephrectomy is indicated in patients with an irreversibly damaged kidney resulting from symptomatic chronic infections, obstruction, calculus disease or severe traumatic injury.

Nephrectomy remains the standard of cure for patients with a suspected renal mass. Both benign and malignant tumors occur in kidney. A detailed and meticulous Histopathological examination of nephrectomy specimens is essential to establish histological type and to record accepted Histopathological prognostic determinants i.e. tumor size, histologic subtype, nuclear grade, and stage in cases of malignant renal neoplasm's [7-9].

Methodology

The present study was done on the nephrectomy specimens sent for Histopathological evaluation to the Department of Pathology, VIMS, Ballari, during a period of 2 years (July 2014-july 2016). This is a 2 year prospective study.

The nephrectomy specimens were studied in detail for gross findings sent in 10% Formalin, a detailed gross examination of the specimens was recorded. Required number of representative sections was taken for Histopathological study. After routine paraffin.

Processing, serial sections of 5-micron thickness were cut and routinely stained with Haematoxylin and eosin stain. Detailed microscopic features were studied and recorded.

Special stains were used as and when required. The final diagnosis was arrived at after correlating the clinical findings, gross and microscopic features.

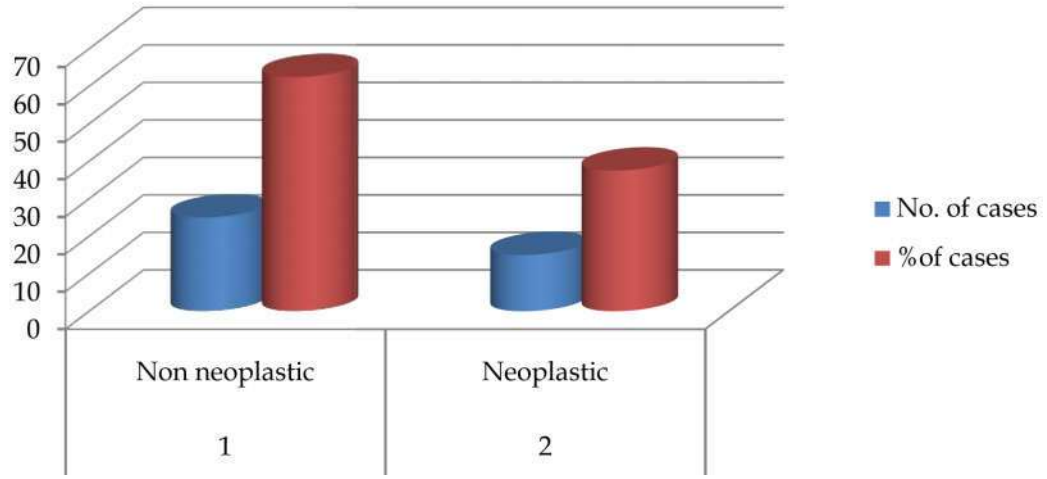
Required relevant clinical and imaging details were obtained from patients case sheets whenever required. In the present study 40 nephrectomy specimen's morphology was analyzed as per the proforma protocol.

Results

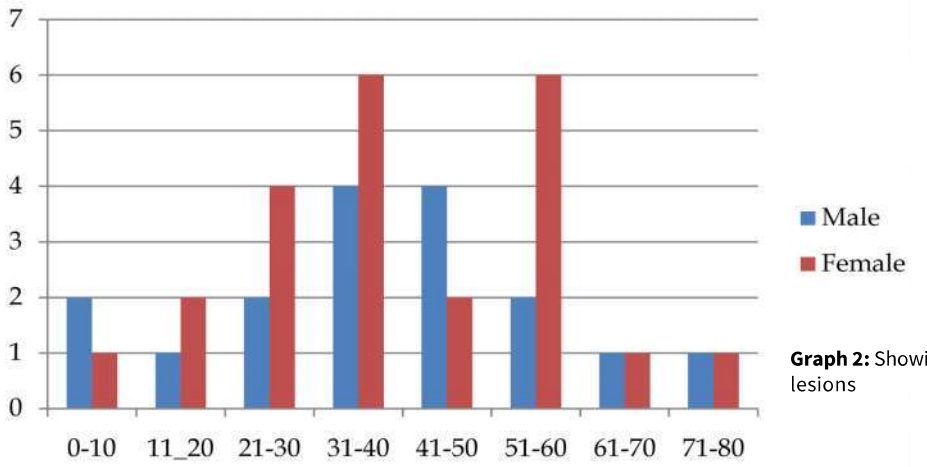
The present study was carried out on a total of 40 nephrectomy specimens. 15 cases (37.5%) were neoplastic. (Table 1) Out of 15 neoplastic lesions, renal cell carcinoma was most common lesion, accounting to 7cases (17.5%). (Table 2)

Table 1: Distribution of Neoplastic Lesions in the present study

Sl. No	Lesions	No. of cases	%of cases
1.	Neoplastic	15	37.5
	Total	40	100



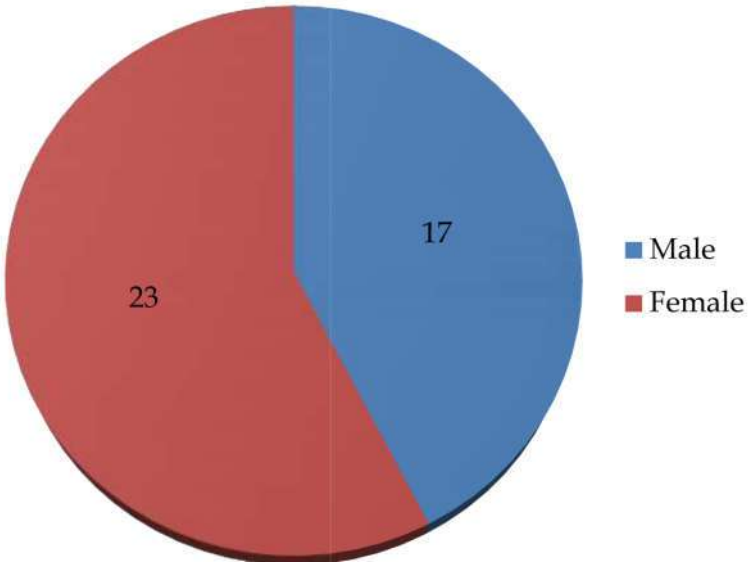
Graph 1: Showing distribution of Neoplastic Lesions



Graph 2: Showing age distribution in renal lesions

Table 2: Distribution of Various Lesions in the Present Study

	Neoplastic lesions		
Benign lesions:			
1.	Angiomyolipoma	5	12.5%
Malignant lesions:			
2.	Renal cell carcinoma	7	17.5%
3.	Wilms' Tumors	3	7.5%
	Total	15	37.5%



Graph 3: Showing sex distribution in various renal lesions

Table 3: Clinical Presentation of Neoplastic Lesions of the kidney

Clinical Symptoms	Neoplastic lesions
Pain abdomen	12
Mass per abdomen	03
Hematuria	14
Fever	0
Burning micturation	2

In neoplastic lesions, hematuria (20 cases- 50%) was common presenting symptom. Only 1case presented with the classical triad. (Table 3)

Neoplastic Lesions

In the present study, neoplastic lesions were encountered in 15 cases, of the total 40 nephrectomy specimens (37.5%) received at the department. They were classified into parenchymal 12 cases (30%), and primitive parenchymal (Wilms' Tumour) 3 cases (7.5%).

The parenchymal Tumors composed of renal cell carcinoma (7 cases), 5 cases of Angiomyolipoma. There were 3 cases of Wilms Tumor.

Age

Renal cell carcinoma was the commonest tumor encountered in the present study and was found to be frequent between 51 to 60 years of age. Angiomyolipoma was the next common tumor. The age ranged from 32 to 65 years, with mean age of 35 years, followed by 3 cases of Wilm's tumor. (Table 4).

Sex: All neoplastic lesions were more common in females (M: F-2:3). (Table 5).

Regarding the side of occurrence, there was no significant difference between right and left kidney (Table 6).

Table 4: Age distribution of the neoplastic lesions

Neoplastic Lesions	Age groups								Total no. of cases	% of cases
	0-10	11-20	2I-30	31-40	41-50	51-60	61-70	71-80		
Benign lesions:										
Angiomyolipoma	-	-	-	3	-	1	1	-	5	12.50
Malignant lesions:										
RCC	-	-	-	-	-	4	2	1	7	17.5
Wilms' Tumour	3	-	-	-	-	-	-	-	3	7.5
Total	3	-	-	3	-	5	3	1	15	37.5

Table 5: Sex distribution of the neoplastic lesions

Neoplastic lesion	Male	Female	No. of eases	% of cases
Benign lesions:				
Angiomyolipoma	2	3	5	12.5
Malignant lesions:				
RCC	3	4	7	17.5
Wilms' Tumour	1	2	3	7.5
Total	6	9	15	37.5

Table 6: Tumor Location in the Neoplastic Lesions of kidney

Neoplastic lesions	Right Kidney					Left Kidney				
	Upper Pole	Midd le	Lower pole	Entire surface	Pelvis	Upper Pole	Midd le	Lower pole	Entire surface	Pelvis
Angiomyolipoma	-	-	3	-	-	-	-	2	-	-
RCC	3	-	1	-	-	2	-	1	-	-
Wilms' Tumour	-	-	2	-	-	-	-	1	-	-
Total	3	-	6	-	-	2	-	4	-	-

Gross Morphology

External Surface

In the present study, out of 15 cases of neoplastic lesions, enlargement of kidney was seen in 8 cases, while 5 were normal in shape.4 cases showed thickened and adherent capsule. (Table 7)

Cut Section

Benign Tumours

5 cases of Angiomyolipoma in our study involved the lower pole, with a mean tumour size of 8-9cms, grey white to yellow in color, with areas of hemorrhage and necrosis in 3cases. (Table 7)

Table 7: Gross features of the kidney in neoplastic lesions

Gross findings	RCC	WT	No. of cases
Normal size	-	-	-
Enlarged kidney	6	2	8
Shrunken kidney	1	-	1
Normal shape	4	1	5
Distorted	-	1	1
Adherent renal	4	-	4
Cut Section			
Solid grey white to yellow areas	6	-	6
Cystic areas	2	2	4
Calculi	1	1	2
Haemorrhage and Necrosis	2	6	8

Malignant Lesions

In the present study the maximum diameter of tumour was 25x12x13cm, overall mean size of, all the renal tumour was 7.5cm.

Grossly variegated appearance of tumour, with areas of hemorrhage and necrosis, along with cystic change, was most commonly seen in clear cell variant of RCC, where as in papillary RCC, hemorrhage with areas of necrosis was observed. A calculus was noted in a single case, which was single, black in color, m/s 2.5x2x1 cms.Wilms tumour showed solid grey white areas in all three cases, with cystic areas in only two cases. Hemorrhage and necrosis was observed in 8 cases. (Table 7)

Microscopic Features of the Neoplasticlesions (Table 8)

Benign Lesions

Angiomyolipoma

Five cases of angiomyolipoma was found in the present study and microscopically showed predominantly fascicles of smooth muscle cells admixed with foci of tortuous thick walled blood vessels and lobules of adipose tissue.

Malignant Lesions

Renal Cell Carcinoma:

Cellular Architecture:

The most common cellular architecture observed was solid pattern in 5 cases (71.4%), followed by glandular pattern in 4 cases (57.14%), and papillary in 1 case (14.28%).

Cell Type

The predominant cell type observed was clear cells in 4 cases, mixed pattern in 3 cases and spindle cells in 1 case.

Histologic Variant

Most common variant in the present study was clear cell carcinoma (6 cases) followed by single case of papillary carcinoma.

Secondary Features: Cystic change in 4 cases (57.14%), Hemorrhage and necrosis was seen in 6 cases (85.71%).

Invasion: Out of 7 cases, 3showed capsular infiltration (42.85%), 1 case renal vein invasion (14.28%).

Lymph node metastasis was seen in two cases of renal cell carcinoma. (Table 8)

Nuclear Grading

In all the cases of RCC, Fuhrman nuclear grading was applied. Most of the RCC were grade 2 followed by grade 1, 3 and 4. (Table 9).

Staging of RCC

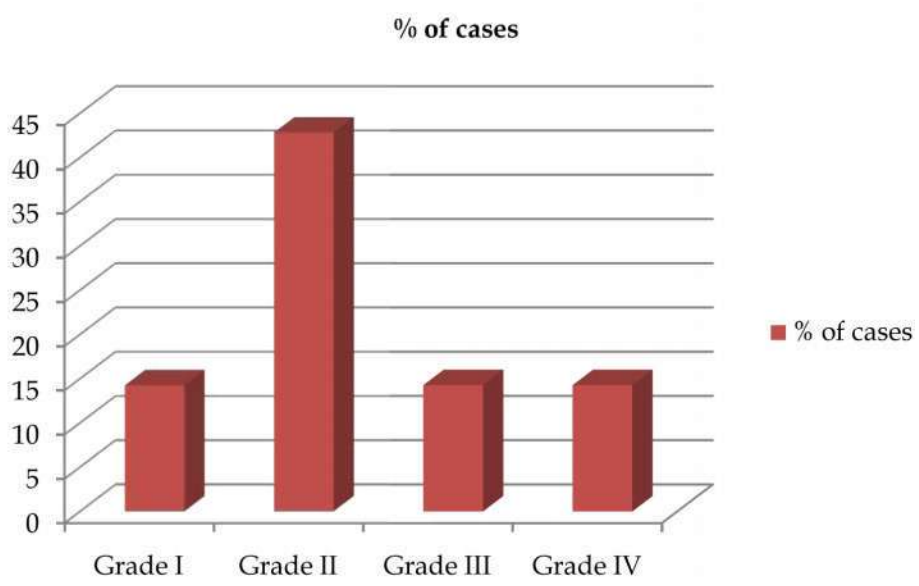
Among 7 cases of RCC, 4 cases were of stage I, stage II – 2 cases, Stage III - I Case. There were no cases belonging to stage IV. (Table 10).

Table 8: Microscopic Features of Renal cell carcinoma

Microscopic findings	No of cases	% of cases
Arrangement of cells:		
Solid sheets	5	71.42
Papillary areas	1	14.28
Cystic areas	-	-
Glandular(tubular)	4	57.14
Cell type:		
Clear cell	4	57.14
Granular cell	-	-
Mixed	3	42.85
Spindle cell	1	14.28
Histologic variant:		
Clear cell	6	85.7
Sarcomatoid	1	14.28
Papillary	1	14.28
Secondary features:		
Cystic change	4	57.14
Hemorrhage and necrosis	6	85.71
Infiltration of:		
Capsule	3	42.85
Renal vein	1	14.28
Lymphatic's	-	-
Adrenal gland	-	-
Lymph node metastasis	2	28.57

Table 9: Nuclear grading of the RCC

Fuhrman nuclear grading	No. of cases	% of cases
I	2	14.28
II	3	42.85
III	1	14.28
IV	1	14.28



Graph 4:

Table 10: Staging of the RCC

	Stage of the tumour			
RCC	Stage I 4(57.14%)	Stage II 2(28.57%)	Stage III 1(14.28%)	Stage IV -

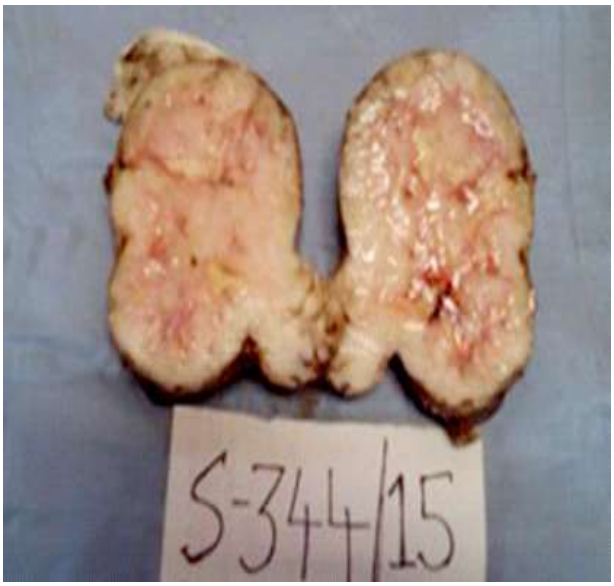


Fig. 1: Cut section of Wilm's tumour showing tumor replacing the entire kidney with solid and **cystic areas.**

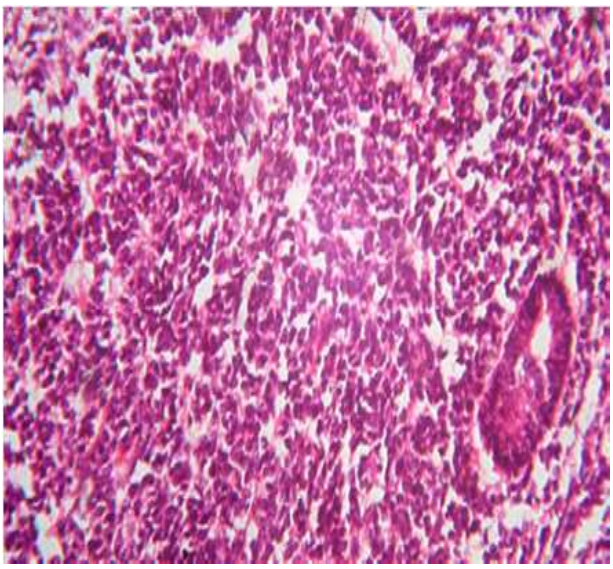


Fig. 2: Microphotograph of Wilm's tumor showing blastemal component and epithelial component showing tubule lined by columnar cells.H&E (10X)

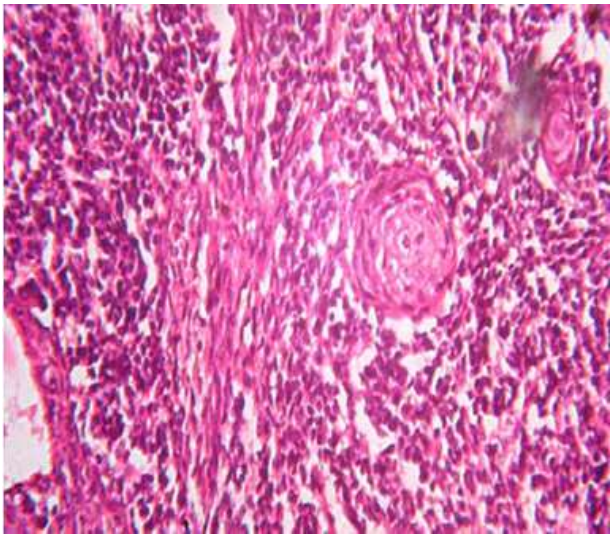


Fig. 3: Microphotograph of Wilm's tumor showing Blastemal, stromal and epithelial component in the form of abortive glomerulus. H&E (10X)

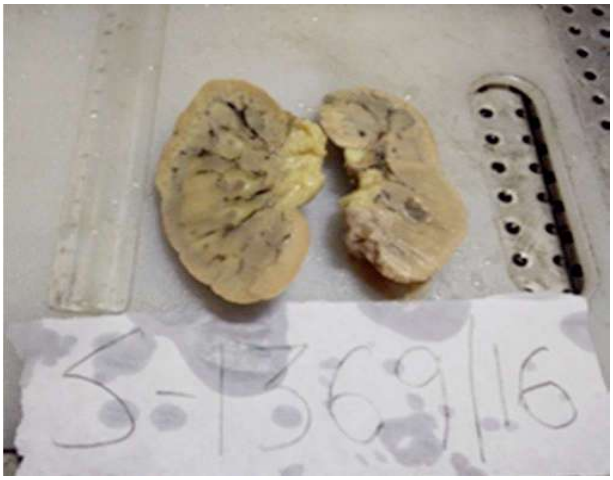


Fig. 4: Cut section of RCC showing tumor with Grey white to grey yellow areas

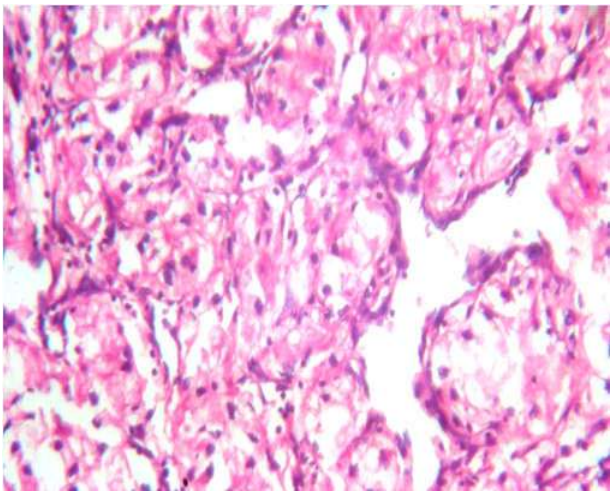


Fig. 5: Microphotograph of clear cell variant of RCC showing clear cells with alveolar pattern and moderate degree of nuclear atypia. H&E (10X)

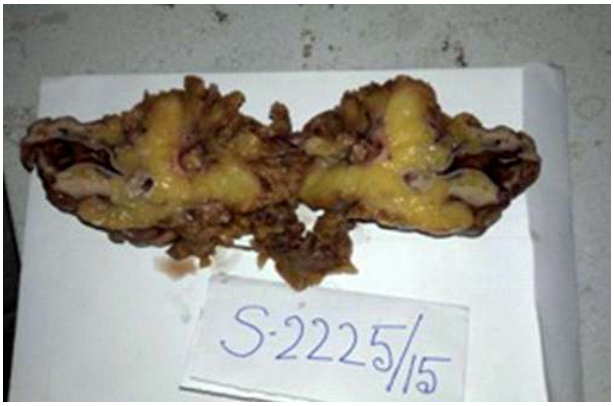


Fig. 6: Cut section of AML showing loss of renal architecture and yellow-grey white areas

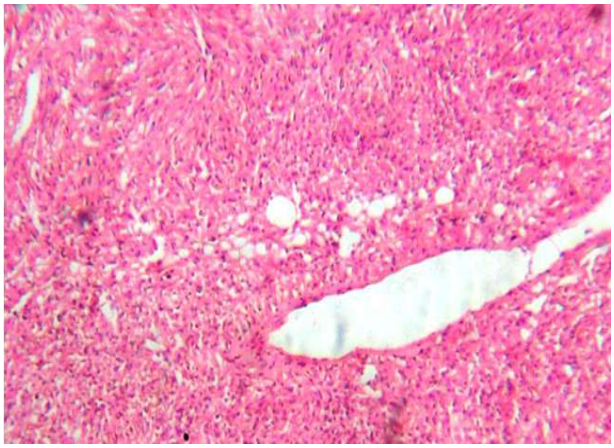


Fig. 7: Microphotograph of AML showing smooth muscle fibres, few adipose tissue and thick walled blood vessel.H&E (4x)

WILM'S Tumour

The present study consisted of 3 Wilms' Tumours and was the second most common neoplastic lesion. 1 case showed triphasic pattern and the other two cases were biphasic. 2 cases showed blastemal and epithelial components and 1 case showed mesenchymal differentiation with skeletal muscle and smooth muscle. 2 cases showed cystic change with one case of capsule infiltration. Among three cases two were of stage I and one case of stage II.

Discussion

Nephrectomy is a standard treatment offered to patients who present with benign as well as malignant mass lesions in the kidney. In the present study, 40 nephrectomy cases were analyzed. There were 15(37.5%) neoplastic diseases.

In the present study, there were 23 females and 17 males, with a ratio of 46:34.Most of the cases were between 20-40 years, followed by 50-70 years.

Neoplastic Lesions:

In the present study, a total of 15 (37.5%) neoplastic lesions were observed, out of total 40 nephrectomy specimens.

The kidneys are affected by various types of malignant tumours, 99% of renal neoplasms are malignant. RCC and Wilms Tumour being the most common.

In the present study, out of 15 cases of renal tumors studied, (66%) were malignant and (33%) benign.

Most common malignant tumor in adults is RCC and Wilms tumor in childhood.

In the present study, a total of 7 cases of RCC were observed and 3 cases of Wilms tumor. This was similar to the findings of Rafique, who observed that the majority neoplasm (97%) of the kidney were RCC [10].

Benign tumours of the kidney are common in post mortem examination and as an incidental finding in imaging study during life. In our study, 5 cases of AML were seen.

Renal Cell Carcinoma

RCC accounts for 1 to 3% of all visceral cancers and 85% of renal cancers affect older individuals in the 5th and 6th decades and show male preponderance. But in our study, females were most commonly affected, showing F: M ratio of (3:2). Age distribution was comparable to other studies (Table 11)[11-14].

Table 11: Showing Age Range of Different Studies and Present Study [11-14]

Authors	No. of Cases	Age (years)
Siddharth et al	50	60-70
Hashmi et al	50	18-84
Latif et al	41	17-80
Anitha et al	60	41-60
Present study	15	50-80

Table 12: Showing Sex and Side Distribution of Different Studies and Present Study [14, 10, 15]

Authors	No of cases	Male	Female	Right side	Left side
Anitha et al	60	36	24	37	23
Rafique et al	154	22	14	20	16
Ibrahim fathi ghalayini et al	423	60	30	36	54
Present study	15	6	9	9	6

Table 13: Showing Distribution of clinical symptoms in Different Studies and Present Study [16, 17]

Authors	No. of cases	Hematuria	Pain abdomen	Mass abdomen
Aiman et al	140	30%	22%	92%
Divyashree et al	116	37%	-	98%
Present study	40	33%	20%	86%

Out of 7 cases of renal cell carcinoma, 5 cases showed tumour in upper pole, 2 in lower pole. Ashima N Amin et al. studied 70 cases and observed 18.7% involving upper pole and mid portion, lower pole in 16.6%.Entire cut surface in 43.8% and pelvis in 6.3% [18]. The maximum diameter of tumor observed in our study was in the range of 6-25 cms. Cut section of the tumor in the present study showed yellow grey white areas in majority of cases (6). 2 cases showed cystic change, one case showed hemorrhage and necrosis and one case showed calculi. Similar findings were observed by studies done by Latif et al, Amin et al and Hashmi et al [13, 18, 12]. In the present study, the common microscopic patterns observed were solid (71.42%) followed by glandular (57.14%) and one case of papillary (14.28)%. Syrjanen and Hzett (1978) in a study of 138 cases of RCC found, papillary pattern as the commonest pattern (48.7%) followed by tubular (25.6%),undifferentiated (22.4%) and glandular (3.3%), which is in contrast to our study[19]. The most common cell type in our study was clear cell in 4 cases (57.14%), followed by 3 cases of mixed type (42.85%) and spindle cell type in one case(14.28%), this was similar to observations noted by Mahesh Kumar et al and Aiffa Aiman et al. [20,16]. (Table 12 ,13).

Histologic Variant

In the present study, the most common variant, observed was clear cell carcinoma 6 cases (85.71%), followed by papillary cell carcinoma, one case (14,28%), and one case of sarcomatoid carcinoma (14.28%). Histological features of the renal cell carcinoma in our studies were similar to the findings in the literature [21].

Table 14: Showing comparison of RCC Subtypes in various studies and the present study

Histological subtype	Siddharth et al	Hashmi et al	Latif et al	Present study
Clear cell	82	62	73	71.42
Papillary	14	24	14.6	14.28
Sarcomatoid	-	8	9.7	14.28

In the present study, sarcomatoid variant of RCC was noted in a 55 year old female. Tomera et al observed 13 cases of renal tumor with sarcomatoid features. There were 11 men and 2 women, with mean age of 56 years. Microscopic features of the present study were similar to the features of Tomera et al. [22]. Nuclear grade of the Tumour as determined in microscopic sections is an important predictor of survival. The most marked prognostic difference is between grades I and II on one side and grades III and IV on the other. In the present study, 3 out of 7 renal cell carcinomas (42.85%) showed nuclear grade II, 1 case showed grade I, 2 cases showed nuclear grade III and 1 case showed grade IV. (Table 14,15)

Table 15: Showing Distribution of nuclear grading in renal cell carcinomas of Different Studies and Present Study

Authors	Cases	Grades			
		I	II	III	IV
Latif et al	40	6.6	63.3	20	10
Amin et al	377	6	21.6	53.2	19.6
Hashmi et al	50	-	71	25.8	3.2
Present study	7	14.28	42.85	28.57	14.28

Table 16: Showing Comparison of stages of tumour with Different Studies and the Present Study

Authors	No of cases	Staging of the tumour (%)			
		I	II	III	IV
Latif et al	40	6.6	63.3	20	10
Amin et al	377	6	21.6	53.2	19.6
Hashmi et al	50	-	71	25.8	3.2
Present study	7	14.28	42.85	28.57	14.28

Staging of the Tumours

In the present study, majority of the cases were in stage II which was observed in other studies done by Latif et al, Amin et al, and Hashmi et al. [13, 18, and 12]. (Table 16).

WILMS' Tumour

Salma et al observed, 2 cases of Wilms tumour (18.19%). Both occurred in boys aged 2-1/2 and 9 years [23]. In our study we encountered 3 cases of Wilms tumor. 2 cases were 2 years of age and one case was 3 years old. In these cases there was no associated syndromes or congenital malformation described in the literature. Most wilms tumor have been found to be triphasic with a representation of blastemal, mesenchymal and epithelial components. However in our study, two cases had triphasic component and one case of biphasic component. Ali Tabibi et al. also had only 1.4% cases of wilms tumor in their study [24].

Angiomyolipoma

In the present study, 5 cases of angiomyolipoma were identified, with a M: F ratio of 2:3. The age ranged from 32 to 65 years, with a mean age of 35 years. Majority of the angiomyolipoma in our study, involved the lower pole of the right kidney with a mean tumor size of 8.9cms. Graham et al studied 11 cases of AML out of 149 tumors and found M: F ratio of 1:10 [25]. Another study conducted by Kulkarni et al. also showed a female preponderance with M: F ratio of 1:8 [26].

We did not find any association with tuberous sclerosis in our study, whereas Graham et al encountered a single case associated with tuberous sclerosis [25].

Conclusion

It is mandatory for every nephrectomy specimen to be subjected, to details of Histopathological examination, for a clinic-pathological correlation to ensure proper

management. The clinical outcomes of various histologic subtypes are different, validating for accurate subtyping of renal lesions in clinical practice.

It needs a better co-ordination among the clinician, radiologist and pathologist for early and accurate diagnosis and to evaluate the prognostic factors in case of malignant lesion of the kidney.

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