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Pattern of Renal Tumors: A Tertiary Care Center Experience over a decade

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Abstract
Aim: *This study was undertaken to identify the age groups, gender distribution and different histopathological types of neoplastic lesions in nephrectomy specimens.*
Materials and Methods: *This was a retrospective record analysis done over a period of ten years (January 2006 to December 2015). All nephrectomy specimens with a diagnosis of renal tumor, received in the department of Pathology, Government Medical College, Kottayam, Kerala were recorded from histopathology registers and analyzed with regard to age, gender and histopathological types.*
Results: *A total of 250 renal tumors were encountered. The patients' age ranged from 2 months to 85 years. Males (66%) were affected more than females (34%) (M: F =1.94:1). Renal tumors were commoner in the 6th and 7th decades. Malignant tumors (90.4%) clearly outnumbered benign tumors (9.6%). Renal cell carcinoma (RCC) was the commonest tumor (71.2%) followed by transitional cell carcinoma (TCC) (10%), oncocytoma (4.4%) and Wilms tumor (WT) (4%). Most common benign tumor was oncocytoma. Wilms tumor was the commonest pediatric tumor.*
Conclusions: *This retrospective study showed distribution of renal tumors in nephrectomies performed at our institution. The results obtained were comparable with available data from other countries.*
Keywords: *Renal cell carcinoma, Nephrectomy, Wilms tumor, Oncocytoma, Kerala.*

Introduction

A wide variety of benign and malignant tumors arise from different components of the renal tissue, with patterns that are different in children and adults. In adults, renal cancer was the seventh most common malignancy and accounted for 3.3% of all newly diagnosed cancer in 2012.[1] Renal cancer is the 16th most common cause of death from cancer worldwide.[2] Renal cell carcinoma (RCC) is the commonest primary malignant renal tumor in adults and the average at diagnosis is 64 years.[3] The incidence of renal cell carcinoma is high in developed countries and low in Africa and Asia. Major etiological factors include cigarette smoking, obesity and hypertension. Twenty-five to thirty percent of renal tumors are asymptomatic, and are found incidentally. The gold standard treatment for renal tumors is radical or partial nephrectomy. Although malignant renal tumors can be removed surgically,

haematogeneous metastasis is frequent and may occur at an early stage of the disease. Benign tumors like oncocytoma, papillary adenoma, mixed epithelial and stromal tumor and angiomyolipoma are also encountered in the kidney. Accurate diagnosis is not possible before surgery and detailed histopathological examination.

Pediatric renal tumors are uncommon and include both benign and malignant tumors, the diagnosis and treatment of which also depend upon histopathology. Wilms tumor (nephroblastoma) is the most common renal malignancy in children and the fourth most common childhood cancer. Other renal tumors in children are clear cell sarcoma, rhabdoid tumor, renal cell carcinoma, ossifying renal tumor, mesoblastic nephroma, angiomyolipoma, multilocular cystic renal tumor, metanephric adenoma, lymphoma etc. Kidney tumors also occur in the setting of several inherited cancer syndromes, including von Hippel-Lindau disease, hereditary papillary renal cell carcinoma, tuberous sclerosis, WAGR syndrome etc.

There is a paucity of published data on the spectrum of renal tumors from Kerala. We undertook this study to determine the relative frequencies of different types of renal tumors, their age and gender distribution, histopathological types, and to compare our findings with those in previously published literature.

Materials and Methods

A 10 year retrospective record analysis (January 2006 – December 2015) was conducted at department of Pathology, Government Medical College, Kottayam, Kerala. Data regarding age, gender and final histopathological diagnosis of all nephrectomy specimens with a diagnosis renal tumor (Benign and malignant) were collected from the histopathology registers in our department. A total of 250 neoplasms were identified during the study period. Slides of available cases were retrieved and reviewed.

At the time of reporting, nephrectomy specimens were received in 10% formalin. Gross handling of nephrectomy specimens was done according to the standard protocol for examining nephrectomy specimens. Representative tissue blocks were processed by paraffin embedding and Hematoxylin and Eosin staining. Special histochemical staining and immunohistochemistry (IHC) were done when necessary. WHO classification of tumors of the urinary system and male genital organs (2004) was employed for the diagnostic categorization of the tumors. The data were then subjected to descriptive statistical tabulation and analysis. The study was approved by Institutional Ethics Committee.

Results

Of the 250 renal tumors encountered during the study period, malignant tumors (n=226; 90.4%) clearly outnumbered benign tumors (n=24; 9.6%) (Figure 01).

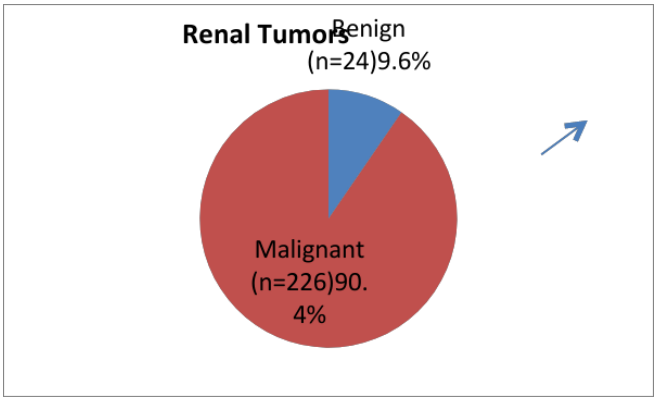

Figure 01: Distribution of renal tumors

There were 165 male patients and 85 female patients (M: F = 1.94:1). Renal tumors occurred most commonly in 6th and 7th decades and were least common in 2nd decade. Age and gender distribution of tumors are represented in Table 01

Table 01. Age and gender distribution of renal tumors

Age in years (Neoplasms)	Gender				Total	
	Male		Female			
	N	%	N	%	N	%
≤1	1	0.6	2	2.4	3	1.2
1-10	6	3.6	7	8.2	13	5.2
11 - 20	0	0.0	1	1.2	1	0.4
21 - 30	3	1.8	3	3.5	6	2.4
31 - 40	9	5.5	12	14.1	21	8.4
41 - 50	44	26.7	16	18.8	60	24.0
51 - 60	46	27.9	15	17.6	61	24.4
61 - 70	41	24.8	20	23.6	61	24.4
>70	15	9.1	9	10.6	24	9.6
Total	**165**	**100.0**	**85**	**100.0**	**250**	**100.0**

Histopathological diagnosis and frequency distribution of tumors are shown in Table 02.

Table 02. Histopathological diagnosis and frequency distribution of renal tumors

Type of Neoplasm	Histopathological diagnosis	Frequency	%
Benign	Oncocytoma	11	4.4
	Angiomyolipoma	5	2.0
	Mixed epithelial and stromal tumor	3	1.2
	Multicystic nephroma	3	1.2
	Tubulopapillary adenoma	2	0.8
Malignant	Renal cell carcinoma	178	71.2
	Transitional cell carcinoma	25	10.0
	Clear cell Sarcoma	4	1.6
	Wilms tumor	10	4.0
	Spindle cell sarcoma	5	2.0
	Paraganglioma	1	0.4
	Neuroblastoma	1	0.4
	Pleomorphic liposarcoma	1	0.4
	Neuroendocrine tumor	1	0.4
	Total	**250**	**100.0**

Renal cell carcinoma was the commonest tumor (n=178; 71.2%), followed by transitional cell carcinoma (n=25; 10%), oncocytoma (n=11; 4.4%) and Wilms tumor (n=10; 4%). Spindle cell sarcoma (n=5; 2%), clear cell sarcoma (n=4; 1.6%), paraganglioma, neuroblastoma, pleomorphic liposarcoma and neuroendocrine tumor (n= 1each, 0.4%) were the other malignant tumors noted. Other benign tumors encountered in this study were angiomyolipoma (n=5; 2%), mixed epithelial and stromal tumor, multicystic nephroma (n=3 each; 1.2%) and tubulopapillary adenoma (n=2; 0.8%).

Age and gender distribution of each histopathological type of tumor is given in Table 03.

Table 03 Age and gender distribution of each histopathological type of renal tumor

TUMOR	Age group	Sex				Total	
		Male		Female			
		N	%	N	%	N	%
Oncocytoma	31 - 40	0	0	1	16.7	1	9.1
	41 - 50	1	20	2	33.3	3	27.3
	51 - 60	1	20	0	0	1	9.1
	61 - 70	2	40	3	50	5	45.5
	>70	1	20	0	0	1	9.1
Angiomyolipoma	11-20	0	0	1	20	1	20
	21 - 30	0	0	1	20	1	20
	31 - 40	0	0	1	20	1	20
	41 - 50	0	0	1	20	1	20
	51 - 60	0	0	1	20	1	20
Mixed Epithelial and Stromal Tumor	31 - 40	0	0	2	100	2	66.7
	41 - 50	1	100	0	0	1	33.3
Multicystic Nephroma	<= 1	0	0	1	50	1	33.3
	1-10	1	100	0	0	1	33.3
	51 - 60	0	0	1	50	1	33.3
Renal Cell Carcinoma	21 - 30	3	2.3	1	2.1	4	2.2
	31 - 40	8	6.1	7	14.9	15	8.4
	41 - 50	37	28.2	11	23.4	48	27
	51 - 60	40	30.5	9	19.1	49	27.5
	61 - 70	35	26.8	12	25.5	47	26.5
	>70	8	6.1	7	14.9	15	8.4
Transitional	41 - 50	4	26.7	1	10	5	20
	51 - 60	2	13.3	3	30	5	20
Cell	61 - 70	3	20	4	40	7	28
Carcinoma	>70	6	40	2	20	8	32
Clear Cell Sarcoma	1-10	1	50	2	100	3	75
	51 - 60	1	50	0	0	1	25
Wilms Tumor	<= 1	1	20	1	20	2	20
	1-10	4	80	4	80	8	80
Spindle cell sarcoma	31 - 40	0	0	1	33.3	1	20
	41 - 50	1	50	1	33.3	2	40
	51 - 60	0	0	1	33.3	1	20
	61 - 70	1	50	0	0	1	20
Paraganglioma	21 - 30	0	0	1	100	1	100
Neuroblastoma	1-10	0	0	1	100	1	100
Pleomrophic Liposarcoma	61 - 70	0	0	1	100	1	100
Neuroendocrine Tumor	51 - 60	1	100	0	0	1	100
Tubulopapillary Adenoma	31 - 40	1	50	0	0	1	50
	51 - 60	1	50	0	0	1	50

Among the benign tumors, oncocytoma (n=11; common in 6th decade) and angiomyolipoma (n=5; age range 11-60years) were more common in females. There were 3 cases each of mixed epithelial and stromal tumor (2cases in 4th decade; 1 in 5th decade) and multicystic nephroma (<1 year, 1st and 6th decades) in this study, which were also more common in females. 2 cases of tubulopapillary adenoma (4th and 6th decades) noted in the study, were seen in males.

Renal cell carcinoma was the predominant malignant tumor (n=178; 71.2%). RCC was most common in 6th decade, followed by 5th and 7th decades and males were more affected. Transitional cell carcinoma was the 2nd commonest malignant tumor (n= 25; 10%) which was more common in males of 8th decade. 3rd commonest malignant tumor and 4th commonest tumor was Wilms tumor (n=10; 4%) with M: F ratio 1:1. Other rare malignant tumors encountered were spindle cell sarcoma (n=5; 2%) (Age range 30-70 years), clear cell sarcoma (n= 4; 1.6%) (3 cases in 1st decade; one case- 6th decade) and one case (0.4%) each of hilar paraganglioma

(3rd decade), neuroendocrine tumor (well differentiated) (6th decade), neuroblastoma (1st decade) and pleomorphic liposarcoma (7th decade).

In our study, mean age of patients with benign tumors was 45 years and that for patients with malignant tumors was 52 years (Table 04).

Table 04. Mean age (Years) of renal tumors

Tumor type	N	Mean age (Years)
Benign	24	45.0
Malignant	226	52.0

Mean ages of different benign and malignant tumor types is shown in Table 05.

Table 05. Mean age of different renal tumors

TUMOR	N	Age in years	
		Mean	S.D
Tubulopapillary Adenoma	2	46.0	11.3
Oncocytoma	11	56.3	12.1
Angiomyolipoma	5	37.8	15.8
Mixed Epithelial And Stromal Tumor	3	38.7	6.0
Multicystic Nephroma	3	21.3	31.9
Renal Cell Carcinoma	178	54.4	12.1
Transitional Cell Carcinoma	25	62.4	10.1
Clear cell Sarcoma	4	16.3	25.8
Wilms Tumor	10	2.6	1.6
Spindle Cell Sarcoma	5	51.2	12.4
Paraganglioma	1	30.0	0
Neuroblastoma	1	4.0	0
Pleomorphic Liposarcoma	1	70.0	0
Neuroendocrine Tumor (WD)	1	56.0	0

S.D: Standard deviation, W.D: Well differentiated

Mean age of RCC cases = 54.4 years; TCC = 62.4 years; oncocytoma = 56.3 years and Wilms tumor = 2.6 years.

Discussion

Kidney can be affected by a variety of benign and malignant tumors in both adults and children. The histopathological pattern and behavior of adult and pediatric tumors are different. Kidney cancer is currently the ninth most common cancer in men and the 14th most common in women worldwide.[4] RCC is the most common type of kidney cancer and accounts for 90% of all malignant kidney tumors. [4] Incidence of RCC is high in developed countries and low in Africa and South-East Asia. But in Asia, significant increase in incidence of RCC has been observed in males of China and females of India and Singapore.[4]

In the present study we have observed that malignant tumors are predominating over benign tumors. The most common age groups affected were 6th and 7th decades. Renal tumors were least common in 2nd decade. Also, males were predominantly affected by renal tumors (M: F=1.94:1). Similar results are shown by authors from different parts of the world. [5-9]

The commonest tumor (overall and malignant) in our study was renal cell carcinoma (71.2%). This was similar to the observation by Albasri AM et al (85.8%) and Latif F et al (87.2%) whose studies were mainly on adult renal tumors. [7, 8]We have included pediatric renal tumors as well. A similar study by Bashir N et al [5] (reviews both adult and pediatric tumors) has also shown renal cell carcinoma as the predominant renal tumor (69%).

2nd commonest tumor in our study was transitional cell carcinoma (10%). Wilms tumor was reported as 2nd commonest renal tumor by Bashir N et al (14.7%) and squamous cell carcinoma by Albasri AM et al (4.7%). [5, 7] According to Latif F et al transitional cell carcinoma and rhabdomyo-sarcoma were 2nd commonest tumors (4.2%). [8] We have found Wilms tumor as the 4th commonest tumor (4%). Commonest benign tumor (also, 3rd commonest tumor) in this study was oncocytoma (4.4%). Bashir N et al has reported angiomyolipoma (5.9%) and Albasri AM et al have shown oncocytoma (4.7%) as the commonest benign tumor.[5, 7] However the results were almost similar to most studies from Asian countries.

Mean age of patients with benign tumors in our study was 45 years and that of patients with malignant tumors was 52 years. Mean age of RCC cases in this study was 54.4 years; TCC was 62.4 years and oncocytoma was 56.3 years. The mean age of RCC at the time of diagnosis has been reported to be 48 years in Nigeria; 60 years in

Malaysia and 60.3 years in Lebanon; 54.2 years in Saudi and 64 years by American Cancer Society. [3,7] Kyei MY et al have found the mean age of the patients with malignant renal tumors as 52.2 years. [10]

Wilms tumor was the major childhood neoplasm in this study with an equal gender incidence, the age group varied from 3 months to 5 years (Mean age= 2.6 years). Other tumors in children we found were clear cell sarcoma (1.6%), multicystic nephroma (1.2%) and neuroblastoma (0.4%). Mandal KC et al have reported clear cell sarcoma as the commonest non- Wilms renal tumor in children.[11] RCC in childhood is uncommon, representing only 2.3% to 6.6% of all renal tumors in children.[9]

Conclusion

In this single center based study, we have come across most of the common renal tumors described in adults and children and obtained results almost comparable with worldwide data. The latest revision of WHO classification of renal tumors incorporates rarer molecular subtypes. Larger multicentric studies are suggested to evaluate the differences in demographic profile and histopathological spectrum of renal tumors in our setting.

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