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Original Research Article **Histopathology**

Histopathologic Pattern of Renal Tumors: A Tertiary Care Hospital Experience

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Abstract

Aim: The aim of this study to identify the different histopathological pattern of neoplastic lesions in nephrectomy specimens. ***Materials and Methods:*** This was a retrospective record analysis done over a period of three years (January 2021 to December 2023). All nephrectomy specimens with a diagnosis of renal tumor received in the Department of Histopathology, National Institute of Kidney Diseases and Urology, Dhaka were recorded from histopathology registers and analyzed for pattern and grading of renal tumors. ***Results:*** A total of 230 renal tumors were studied. Of the 230 renal tumors encountered during the study period, 205 cases (89.13%) were diagnosed as malignant tumors and 25 cases (10.87%) as benign tumors. There were 151 male and 79 were female cases (male-Female ratio 1.91:1) and Mean age 62 years. Renal tumors occurred most commonly in 6th and 7th decades and least in 2nd decade. In our study, mean age of patients with benign tumors was 52 years and that for patients with malignant tumors was 64 years. Renal cell carcinoma was the commonest tumor 170 (73.91%) followed by Wilm's tumor 18 (7.83%) followed by transitional cell carcinoma 06 (2.61%). Neuroblastoma and sarcomatoid renal cell carcinoma showed in 5 (2.17%) and 4 (1.74%) cases respectively. The most frequent subtype of RCC were clear cell carcinoma 135 (79.41%) followed by papillary renal cell carcinoma 17 (10%). Relatively serious collecting duct carcinoma and most serious renal medullary carcinoma were found in 06 (3.53%) and 04 (2.35%) cases respectively. A total of 152 cases of clear cell renal cell carcinoma and papillary renal cell carcinoma which were graded 1–3 based on nucleolar prominence, whereas grade 4 was defined by the presence of tumor cells with sarcomatoid and/or rhabdoid morphology and/or tumors containing tumor giant cells or showing extreme nuclear pleomorphism. Most frequent grade in this study group was grade-2 (53.29%) followed by grade-3 (33.35%) where the least frequent grade was grade-4 which is most dangerous. ***Conclusions:*** This retrospective study showed distribution and grading of renal tumors in the nephrectomy specimens performed at our institution. The results obtained from our study were comparable with available data from other countries.

Keywords: Renal cell Carcinoma, Histopathology, Nephrectomy, Wilm's Tomor.

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. 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, mixed epithelial and stromal tumor and angiomyolipoma are also encountered in the kidney. Accurate diagnosis of renal tumor is not possible before surgery and 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 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, 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.

Previously, RCC were studied and classify mostly on Cell cytoplasmic and tumor architectural features. Now a days, It is mandatory to use ancillary techniques such as immunohistochemistry, molecular and chromosomal study etc.

Adult renal epithelial neoplasms are a heterogeneous group with varying prognosis and outcome requiring sub-classification.

There is lack of published data on the spectrum or pattern of renal tumors in Bangladesh. In the light of above context, we undertook this study to determine the relative frequencies of different types of renal tumors, their histopathologic pattern and tumor grading to compare our findings with those in previously published literature.

MATERIALS AND METHODS

A 3 years retrospective record analysis (January 2021 – December 2023) was conducted at Department of Histopathology, National Institute of Kidney Diseases and Urology, Sher-E-Bangla Nagar, Dhaka. Information regarding age, gender and final histopathological diagnosis of all nephrectomy specimens with a diagnosis of renal tumor (Benign and malignant) were collected from the histopathology registers in the department. A total of 230 clinical and radiological diagnosed cases of renal tumors were selected for the present study. All slides of the available cases were retrieved and reviewed. All nephrectomy specimens were received in 10% formalin at the time of submitting for histopathology examination. Representative tissue blocks were processed by paraffin embedding followed by 4 µ sections cut and Hematoxylin-Eosin staining. Haematoxylin and eosin stained sections were reviewed by independent pathologists in a blinded manner. Special histochemical staining and immunohistochemistry (IHC) were done when necessary. Recent fith edition of WHO classification of tumors of the urinary system and male genital organs (2004) was employed for the diagnostic categorization of the tumors [4,5]. Subtyping of RCC of clear cell type and RCC of papillary type were performed by study of individual cell cytoplasm, nucleus and architectural features by light microscopy and Immunohistochemistry if necessary. During the subclassification of RCC, only concordant cases were included in the study, but discordant cases were not included in further study due to lack of all ancillary facilities.

Histological tumor grading is an accepted prognostic parameter of renal cell carcinoma (RCC). The grading schema of renal cell carcinoma (RCC) is based on the microscopic morphology of a neoplasm with hematoxylin and eosin (H&E) staining. Clear cell renal cell carcinoma (CCRCC) and papillary renal cell carcinoma (PRCC) has been graded by ISUP/WHO suggested grading system as follows [8]: This system depends on the morphology and staining character of nucleoli of tumor cells. Grade 1: Inconspicuous nucleoli at ×400 magnification and basophilic, Grade 2: Clearly visible nucleoli at ×400 magnification and eosinophilic, Grade 3: Clearly visible nucleoli at ×100 magnification and Grade 4: Extreme pleomorphism or rhabdoid and/or sarcomatoid morphology. The data were analyzed under standard statistical method.

RESULTS

Of the 230 renal tumors encountered during the study period, 205 cases (89.13%) were diagnosed as malignant tumors and 25 cases (10.87%) as benign tumors. There were 151 male and 79 were female cases (male-Female ratio 1.91:1) and Mean age 62 years. Renal tumors occurred most commonly in 6th and 7th decades and least in 2nd decade. In our study, mean age of patients with benign tumors was 52 years and that for patients with malignant tumors was 64 years (Table 01).

Table 01: shows benign and malignant renal tumors with mean age in years (n=230).

Tumor type	Number with percentage	Mean age
Benign	25 (10.87%)	52
Malignant	205 (89.13%)	64

Table-2: Overall pattern of renal tumors and frequency distribution in this study (n=230)

Type of Neoplasm	Histopathological diagnosis	Frequecy	%
Benign	Oncocytoma	10	4.34
	Angiomyolipoma	08	3.47
	Multilocular cystic nephroma	04	1.74
	Papillary renal adenoma	02	0.88
	Fibroma	01	0.44
	Total benign tumor	**25**	**10.87**
Malignant	Renal cell carcinoma	170	73.91
	Transitional cell carcinoma	06	2.61
	Sarcomatoid renal cell carcinoma	04	1.74
	Clear cell Sarcoma	01	0.44
	Wilms tumor	18	7.83
	Spindle cell sarcoma	01	0.44
	Neuroblastoma	05	2.17
	Total Malignant renal tumor	**205**	**89.13**
	Grand Total of renal tumors	**230**	**100.0**

Table-2 shows, among 205 cases (89.13%) of malignant tumor and 25 cases were benign tumor. Renal cell carcinoma was the commonest tumor 170 (73.91%) followed by Wilm's tumor 18 (7.83%) followed by transitional cell carcinoma 06 (2.61%). Neuroblastoma and sarcomatoid renal cell carcinoma showed in 5 (2.17%) and 4 (1.74%) cases respectively. Out of 205 cases (89.13%, n=230) of malignancy, 170 cases (73.91%, n=230) were renal cell carcinoma and 35 cases (15.21%, n=230) were other than renal cell carcinoma.

Most frequent benign tumor was oncocytoma 10(4.34%) followed by angiomyolipoma 08 (3.47%). Other benign tumors encountered in this study were multilocular cystic nephroma 4(1.74%) and papillary renal adenoma 2(0.88 and fibroma 1 (0.44%).

Table-3: Sub-typing of renal cell carcinoma found in this study (n=170)

Name of subtype	Number	Percentage
Conventional or clear cell RCC (CCRCC)	135	79.41
Papillary RCC (PRCC)	17	10
Chromophobe RCC (CRCC)	08	4.71
Collecting duct carcinoma (CDC)	06	3.53
Renal medullary carcinoma (RMC)	04	2.35
Total	**170**	**100**

Table-3 shows most frequent subtype of RCC were clear cell carcinoma 135 (79.41%) followed by papillary renal cell carcinoma 17 (10%). Relatively serious collecting duct carcinoma and most serious renal medullary carcinoma were found in 06 (3.53%) and 04 (2.35%) cases respectively.

Table-4: ISUP/WHO Grading of clear cell and papillary renal cell carcinoma by light microscope (n=152)

Nuclear grade	Character	Number	%
Grade-1	Inconspicuous nucleoli at ×400 magnification and basophilic.	14	9.21
Grade-2	Clearly visible nucleoli at ×400 magnification and eosinophilic.	81	53.29
Grade-3	Clearly visible nucleoli at ×100 magnification	51	33.55
Grade-4	Extreme pleomorphism or rhabdoid and/or sarcomatoid morphology.	06	03.95
Total		**152**	**100**

International Society of Urological Pathology (ISUP); WHO: World Health Organisation

In this study, there were a total of 152 cases of clear cell renal cell carcinoma and papillary renal cell carcinoma which were graded 1–3 based on nucleolar prominence, whereas grade 4 is defined by the presence of tumor cells with sarcomatoid and/or rhabdoid morphology and/or tumors containing tumor giant cells or showing extreme nuclear pleomorphism.

Most frequent grade in this study was grade-2 (53.29%) followed by grade-3 (33.35%) where the least frequent grade was grade-4 which is most dangerous. Areas of rhabdoid differentiation were noted in 2 cases while sarcomatoid change was seen in 4 cases in grade-4 RCC.

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. Renal cancer is currently

the ninth most common cancer in men and the 14th most common in women worldwide. RCC is the most common type of kidney cancer and accounts for 90% of all malignant kidney tumors [9]. Incidence of RCC is high in developed countries and low in Africa and South-East Asia. But recently in Asia, significant increase in incidence of RCC has been observed in males of China and females of India and Singapore [9].

In the present study It was observed that malignant tumors (89.13%) are predominating over benign tumors (10.87%). 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=1.91:1). Similar results are shown by authors from different parts of the world [10-14].

In our study, mean age of patients with benign tumors was 52 years and that for patients with malignant tumors was 64 years. Mean age of malignant renal cancer in Malaysia 60.3 years, in Lebanon 54.2 years and in Saudi Arabia 64 years [3,12]. Kyei MY *et al.*, have found the mean age of the patients with malignant renal tumors as 52.2years [18].

The commonest tumor (overall and malignant) in our study was renal cell carcinoma (89.13%). 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 [15,16] included pediatric renal tumors as well. A similar study by Bashir N *et al.*, [10] (reviews both adult and pediatric tumors) has also shown renal cell carcinoma as the predominant renal tumor (69%).

Renal cell carcinoma (RCC), accounts for 2–3% of all new cancers diagnosed and 85% of all primary renal cancer in adults [11] which is more or less similar to our study.

Wilm's tumor was the 2nd commonest tumor in our study 18 (7.83%). 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%) [10,11]. According to Latif F *et al.*, transitional cell carcinoma and rhabdomyo- sarcoma were 2nd commonest tumors (4.2%) [13].

Commonest benign tumor (also 3rd commonest tumor) in this study was oncocytoma 10(4.34%) followed by angiomyolipoma 08 (3.47%). Bashir N *et al.*, has reported angiomyolipoma (5.9%) and Albasri AM *et al.*, have showed noncocytoma (4.7%) as the commonest benign tumor [10,12]. However, our results were almost similar to most studies from Asian countries.

Wilms tumor was the major childhood neoplasm in this study with an equal gender incidence where the age group varied from 6 months to 6 years (Mean age= 2.7 years). Other tumors in children we found were clear cell sarcoma and spindle cell sarcoma (0.44%) and neuroblastoma 5 (2.17%). Mandal KC *et al.*, have reported clear cell sarcoma as the commonest non-Wilms renal tumor in children [17]. RCC in childhood is uncommon, representing only 2.3%to 6.6% of all renal tumors in children [9].

Thus classification of renal cell carcinoma is important from the treatment and prognostic point of view as well as for understanding its histogenesis, molecular and cytogenetic behavior for further improvement in its management approach. However, The ISUP/WHO grading system has not been validated as a prognostic parameter for other tumor subtypes renal cell carcinoma but can be used for descriptive purposes.

CONCLUSION

This was a single center based study. We have found most of the common renal tumors described in adults and children. Although limitations, our results almost comparable with worldwide data. The latest revision of WHO classification of renal tumors incorporates rarer molecular subtypes. Larger multicentric studies with large sample are suggested to evaluate the differences in demographic profile and histopathological spectrum of renal tumors.

REFERENCES

1. Ferlay, J., Soerjomataram, I., Ervik, M.et al. GLOBOCAN 2012v1.0, Cancer IncidenceandMortalityWorldwide.IARC Cancer Base No. 11. Lyon, France: International Agency for Research on Cancer. 2013.
2. H.Moch,AminM.B,ArganiP,ChevilleJ, Delahunt B, Martignoni G.et al. World Health Organization Classification of Tumours of the Urinary System and Male Genital Organs. Lyon: IARC Press; 2016, p.14.
3. American Cancer Society. Cancer Facts & Figures; 2017. Atlanta: American Cancer Society; 2017.
4. *World Health Organization. WHO Classification of Tumours of the Urinary System and Male Genital Organs. Lyon: IARC Press; 2016. WHO Classification of Tumours of the Urinary System and Male Genital Organs.*
5. *Tracking cancer evolution reveals constrained routes to metastases: TRACERx renal. Turajlic S, Xu H, Litchfield K, et al. Cell. 2018;173:581–594. doi: 10.1016/j.cell.2018.03.057.*
6. Jemal A, Murray T, Ward E, Samuels A, Tiwari RC, Ghafoor A, Feuer EJ, Thun MJ: Cancer statistics, 2005. CA Cancer J Clin. 2005, 55: 10-30. 10.3322/canjclin.55.1.10.
7. Parth R Goswami , Gyanendra Singh , Tarang Patel , Rushang Dave. The WHO 2022 Classification of Renal Neoplasms (5th Edition): Salient Updates. Cureus. 2024 Apr 17;16(4):e58470

8. Moch H, The WHO/ISUP grading system for Renal Cell Carcinoma.German, Pathologoe 2016 July 37(4): 355-60
9. ZnaorA,etal. InternationalVariations and Trends in Renal Cell Carcinoma. Eur Urol. 2015; 67:519-30.
10. Bashir N, BashirY, Shah P, Bhat N, Salim O, Samoon N. Histopathological study of renal tumors in resected nephrectomy specimens - An experience from tertiary care centre. Nat J Med Res. 2015; 5:25-9.
11. Rafique M: Nephrectomy: indications, complications and mortality in 154 consecutive patients. J Pak Med Assoc. 2007; 57:308-11.
12. Albasri AM, El-Siddig AA, Hussainy AS, Alhujaily AS. Clinicopathologic patternsof adult renal tumors. Saudi J Med Sci. 2017; 5:242-7.
13. Latif F, Mubarak M, Kazi JI. Histopathological characteristics of adult renal tumours: a preliminary report. J Pak Med Assoc. 2011; 61: 224-8.
14. Dogra PN, Gupta NP, Ishwar R, Kumar A, Seth A. Renal tumors presentation: Changing trends over two decades. IndianJ Cancer. 2010; 47: 287-91.
15. Albasri AM, El-Siddig AA, Hussainy AS, Alhujaily AS. Clinicopathologic patternsof adult renal tumors. Saudi J Med Sci. 2017; 5:242-7.
16. Latif F, Mubarak M, Kazi JI. Histopathological characteristics of adult renal tumours: a preliminary report. J Pak Med Assoc. 2011; 61: 224-8.
17. Mandal KC, Mukhopadhyay M, BarmanS, Halder P, Mukhopadhyay B, Kumar R. Uncommon renal tumors in children: A single center experience. J Indian Assoc Pediatr Surg.2016; 21: 61-5.
18. Kyei MY, Klufio GO, mensah JE, Gyasi RK, Attee SG, Ampadu K. Nephrectomyin adults: Experience at the Korle Bu Teaching Hospital, Accra, Ghana. Saudi J Kidney Dis Transpl 2015; 26: 638-42.