

Histopathological study of Urinary tract neoplasms: A five year study in a Tertiary care hospital.

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ABSTRACT

Introduction: Neoplasms of the urinary tract are commonly encountered in clinical practice and important from clinical and pathological perspectives as they have various histological patterns with prognostic implications.

Aim: The aim of this study was to observe the spectrum of lesions among various organs of the urinary tract and categorize them into benign and malignant based on histopathological findings.

Materials and methods: This is a hospital based five-year retrospective study of urinary tract specimens received in the department of Pathology.

Results: A total of 90 cases were studied, 87 cases were malignant, and 3 cases were benign. Among the malignant cases, most common were Clear Cell type of Renal Cell Carcinoma (RCC) in kidney, low grade urothelial carcinoma of the ureter/Renal pelvis and non-invasive low grade urothelial carcinoma in bladder.

Conclusion: Most of the lesions in the urinary tract had a male predominance with most patients being in the 6th and 7th decades. In kidney Clear Cell Renal Cell Carcinoma predominated, in bladder Non-invasive Papillary Urothelial Carcinoma was the commonest lesion and in renal pelvis /ureter Low grade urothelial carcinoma was the commonest. Histopathological examination provides a confirmatory diagnosis which helps in the management and in assessing the prognosis of these lesions based on invasion into muscle, capsule, and adjacent tissues.

KEY WORDS: Urinary tract, benign, malignant, histopathology.

Introduction:**Kidneys:**

Kidney cancer is the 16th most common cause of death worldwide. It stands as 9th most prevalent in males and 14th most prevalent in women. The etiological factors are obesity, hypertension, smoking, occupational exposure to asbestos, petroleum products and heavy metals¹.

Renal pelvis and ureter: Cancers of the renal pelvis and ureter account for approximately 8% of the malignant tumours arising in the urinary tract and histologically they are urothelial carcinomas².

The major risk factor for these predominantly Urothelial neoplasms is cigarette smoking with an attributable risk estimates ranging from 56 to 82% among men and from 40 to 62% among women³⁻⁴.

Urinary bladder:

It is the 7th most common cancer.

Aetiology:

Smoking, occupational exposure, Radiotherapy, Schistosoma infection, Artificial Sweeteners, and long-acting use of analgesics.⁵

Aim: This study was conducted to assess the neoplastic conditions encountered in the urinary tract over a period of five years. To analyse the frequency of neoplastic lesions, assess age and sex wise distribution of various urinary tract neoplasms and compare it with other studies.

MATERIALS AND METHODS:

This is a retrospective study conducted in the department of Pathology on 90 consecutive cases received. The specimens included radical nephrectomies, transurethral resection bladder tumour specimens (TURBP), obtained from the department of surgery, oncology, and urology at NRI Medical College & General Hospital, Chinakakani from June 2016 to May 2021.

Inclusion criteria:

All the nephrectomy specimens with renal mass or ureteric mass and TURBP specimens received in Department of Pathology, NRI Medical College, Chinakakani.

Exclusion criteria:

Core needle biopsy tissue of renal masses was excluded from the study. Non neoplastic lesions were excluded.

Observations and Results:

In this study a total of 90 neoplastic tumours were studied, of which 87 were malignant and 3 cases were benign.

In this study, the age distribution among urinary tract neoplasms ranged from 10 to 80 years. Majority were seen in the age group of 61-70 years. 58 cases of neoplasms were found in males and 32 cases were found in females.

The most common site of involvement was kidney constituting 55 tumours, followed by 28 from bladder and 7 from renal pelvis/ureter.

In the 52 malignant lesions in kidney, RCC was the most prevalent tumour constituting 46 cases, followed by 4 cases of Wilms' tumour and 2 cases of Clear cell Sarcoma. In the 46 cases of RCC, the most prevalent variant was Clear Cell RCC accounting to 37 followed by 5 cases of Papillary RCC and one each of Tubulocystic RCC, Multilocular cystic RCC, Clear Cell papillary RCC and Chromophobe RCC. (Table 1)

Table 1: Histological types of Tumours of Kidney

Diagnosis (Malignant)	Number of cases	Percentages
Clear cell RCC	37	71.3
Tubulocystic RCC	01	1.9
Wilms tumour	04	7.7
Clear cell sarcoma	02	3.8
Papillary RCC	05	9.6
Multilocular cystic RCC	01	1.9
Chromophobe RCC	01	1.9
Clear cell papillary RCC	01	1.9
Total	52	100%
Benign		
Oncocytoma	02	66.7
Angiomyolipoma	01	33.3
Total	03	100%

Clear cell renal cell carcinoma macroscopically showed grey-white masses with areas of necrosis (Figure 1B) and a characteristic microscopic picture with clear cells in solid and alveolar patterns (Figure 1A).

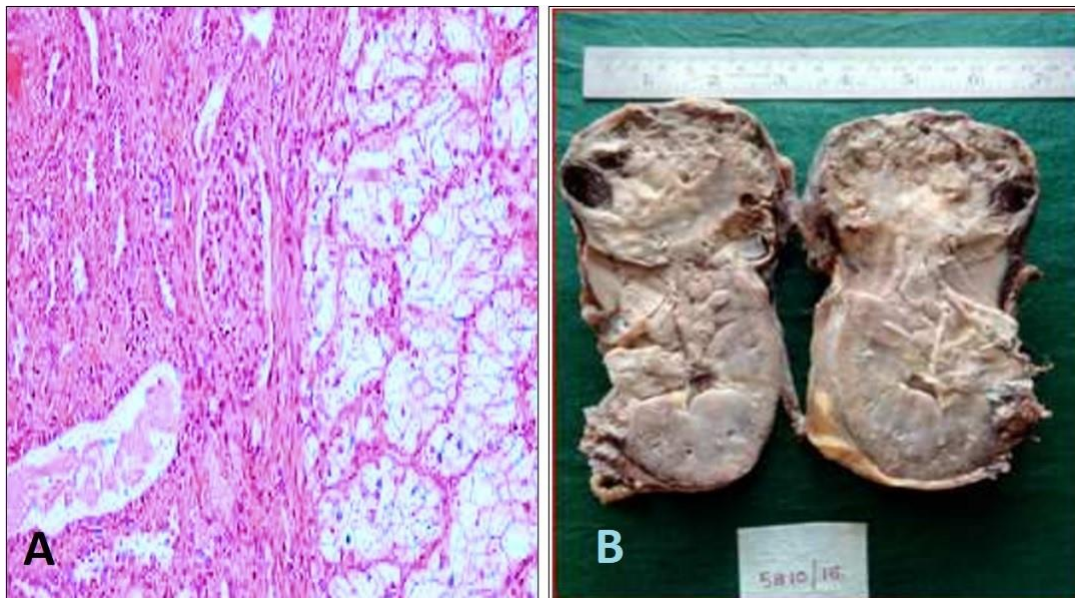


FIG 1A: Clear cell RCC: Microphotograph showing clear cells with alveolar growth pattern (H&EX100)

B: Clear Cell RCC: Gross appearance –Cut section–grey white with areas of necrosis. The Papillary RCC was composed of cuboidal to low columnar cells in papillary patterns with fibrovascular cores (Figure 2A).

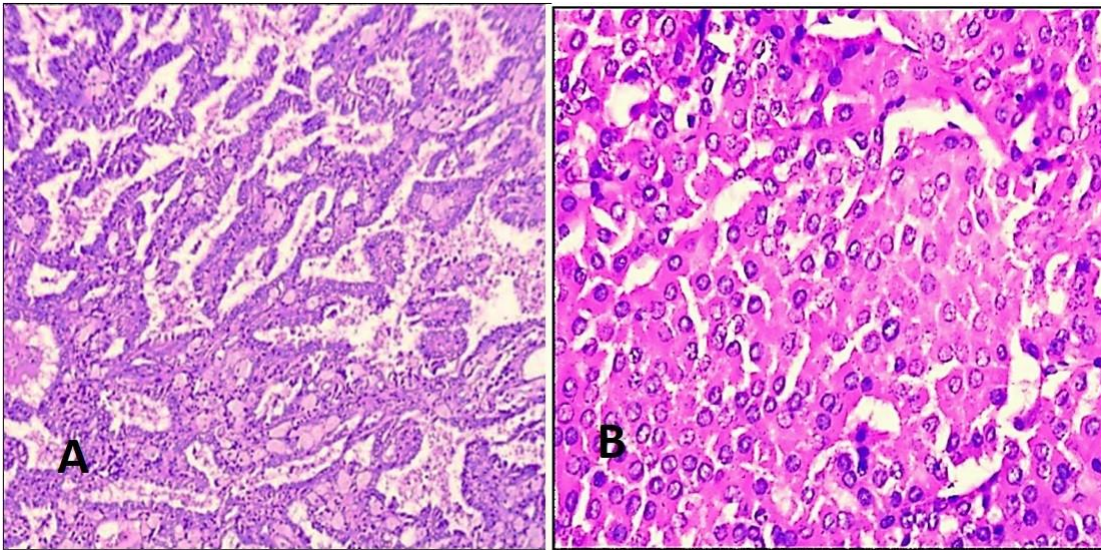


FIG 2A: Papillary RCC: Microphotograph showing papillae with fibrovascular cores. (H&E X100)

B: Oncocytoma: Microphotograph showing solid nested architecture composed of large cells with abundant eosinophilic cytoplasm (H&E X400)

The most prevalent age group affected in malignant tumours was 61-70 years. The youngest being 1 year and oldest being 81 years. In the malignant tumours, 29 were males and 23 were females.

Fuhrman grading was given for RCC of Clear cell and papillary types. In the 42 cases of RCC, 16 (38%) were grade 1 and 13 (31%) were of grade 2 and 13 of grade 3 (31%).

In the 46 cases of RCC, 19(40%) showed invasion into the adjacent structures and 27(60%) had no invasion.

Among the 3 cases of benign tumours, 2(66.6%) were Oncocytoma and one (33.3%) was Angiomyolipoma (Table 1). In the 3 benign lesions of kidney, 2 (66%) were seen in males and one (33.3%) was seen in a female. All the 3 were above the age of 40 years.

Microscopically oncocytoma was recognised by solid nests of cells with large round cells, granular cytoplasm and regular round nuclei with conspicuous nucleoli.(Figure 2B)

In this study of 90 tumours, 7 showed tumours in Renal pelvis and Ureter. All were malignant tumours, 6 (86%) of which were Low grade Urothelial Carcinomas and one (14%) was an Invasive moderately differentiated Squamous Cell Carcinoma (Table 2).

Table 2: Histological Types of Malignant tumours of Renal pelvis and Ureter:

Histological type	No of cases	Percentage
Low grade Urothelial carcinoma	06	86
Infiltrating moderately differentiated squamous cell carcinoma	01	14
Total	07	100%

Six (86%) of these tumours were in the age group of 60-70 years and one (14%) was present in the age group of 72. Five (71%) of these were seen in males and 2(28%) were in females.

Out of 90 neoplasms in this study, 28 were tumours from urinary bladder, all these 28 were malignant.

In the 28 neoplasms of the urinary bladder, the prevalent tumour was Papillary urothelial carcinoma accounting to 26 cases, of which, 16 (60%) were Non-Invasive low-grade type and 10 (38%) were Non-Invasive high grade type , followed by one case (1%) of Poorly differentiated urothelial carcinoma and one of Clear Cell Urothelial Carcinoma.(Table 3)

Table 3: Histological types of malignant tumours of the Urinary Bladder:

Histological type	No. of cases	Percentage
Non -invasive Low grade Urothelial Carcinoma	16	60
Non- invasive High grade urothelial Carcinoma	10	38
Clear cell Variant of Urothelial high-grade Carcinoma	01	01
Poorly differentiated Urothelial Carcinoma	01	01
Total	28	100%

In these cases, 13 (46.4%) cases were in between 60-70 years of age group, the youngest patient was 41-year-old, and the oldest patient was 81 years. In these patients 24 (85%) were males and 4 (15%) were females.

Microscopically the bladder tumours were predominantly Non-invasive, papillary with papillae lined by urothelium and composed of cells with mild nuclear irregularity and pleomorphism.(Figure 3A).The Non-invasive high grade papillary Carcinoma showed cells with marked pleomorphism and high mitotic activity(Figure 3B)

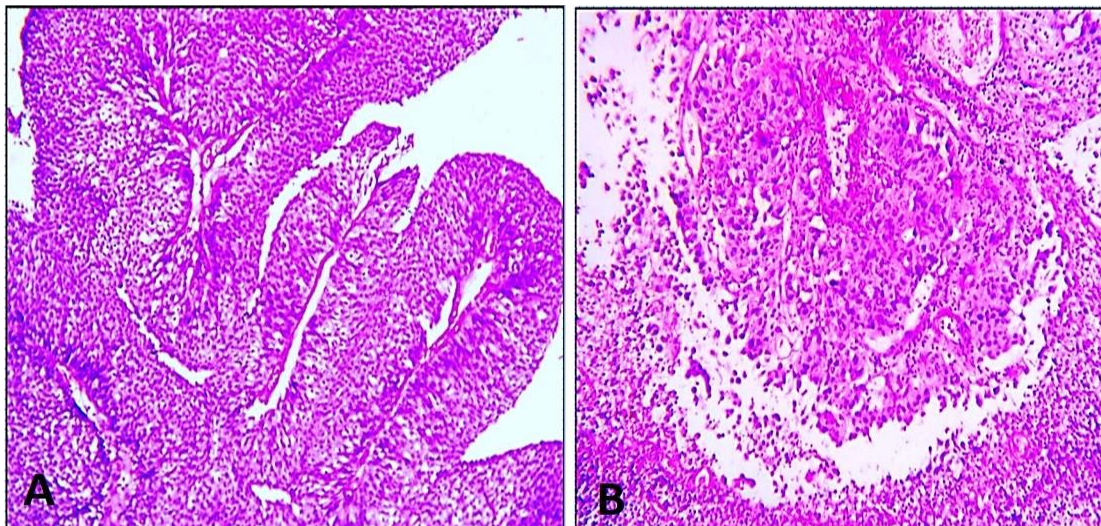


FIG 3A: Bladder: Non-invasive low grade papillary urothelial carcinoma: Microphotograph showing papillae lined by cells with mild nuclear irregularity and pleomorphism. (H&EX100)

B: Bladder: Non-invasive high grade papillary urothelial carcinoma: Microphotograph Showing cells with marked pleomorphism and high mitotic activity (H&EX100)

Discussion:

This study consists of 90 neoplasms of various diverse tumours of Urinary tract. These were analysed over a period of 5 years from June 2016 to May 2021.

Among the total 90 neoplasms of urinary tract, 55 were kidney tumours, with 52 malignant tumours and 3 were benign, 7 cases were ureteric and renal pelvis tumours, and 28 were bladder tumours. All the cases of ureter and urinary bladder were malignant.

Kidney:

In this study among the 55 kidney tumours, 3 (10%) were benign and 52 (90%) were malignant, Similar to our study, malignant lesions were more common in studies done by Vikram Narang et al⁶ (96.3%), Swarnalatha Ajmeera et al⁷ (58.46%) and Abdulghafoor S. Abdulkareem et al⁸ (88%).

In this study the most common age group affected among neoplastic lesions in kidney were 61-70 years which was in contrast to the study conducted by the Suryawanshi et al⁹, and Sheik bilal et al¹⁰ where majority of cases were reported in the age group of 41-60 years.

In this study there was a male predominance among the neoplastic lesions of kidney similar to Suryawanshi et al⁹, and sheik bilal et al¹⁰.

In this study among the malignant lesions of kidney, the prevalent histopathological type was Renal cell carcinoma constituting (88%) similar to the studies done by the Anitha Padmanabhan et al¹¹ (94%) and Vikram Narang et al⁶ (85.3%).

Similar to our study the highest incidence of Renal cell carcinoma was of the Clear Cell type. This was also reported by, Aiffa Aiman et al⁵ (80%).

In the present study, out of 42 cases of Clear cell and papillary variant of RCC, 16 cases (38%) were of grade I, 13 cases (31%) were grade II, 13cases (31%) grade III and no grade IV tumours. This is in contrast with the studies conducted by Aiffa Aiman et al⁵, in which 4 cases (16%) show grade I, 13 cases (52%) show grade 2, 6 cases (24%) show grade 3, 2 cases (8%) show grade IV.

In the 46 cases of RCC, 19(40%) showed invasion into the adjacent structures and 27(60%) had no invasion. In contrast, Anitha Padmanabhan et al¹¹ reported 17% of RCC cases with perinephric fat tumour infiltration and 19.1% of capsular infiltration in their study.

Benign tumours:

In this study among the total 55 kidney lesions, 3 cases (18%) were benign. In contrast, Abdul gafoor et al⁸ reported 6 cases (12%) and Kotta Devender Reddy et al¹² reported 2 cases (15.3%).

In this study among the benign lesions, 2 cases were Oncocytoma, and one case was Angiomyolipoma. In contrast, Abdul gafoor et al⁸ reported 4 cases of Angiomyolipoma and 1 each of Multicystic nephroma and adenoma. Kotta Devender Reddy¹² reported 1 case each of Angiomyolipoma and Oncocytoma.

Males were more affected than females in our study, in contrast, Abdul gafoor et al⁸ reported female predominance among the benign lesions of kidney.

Renal pelvis and ureter tumours:

In this study among 90 urothelial neoplasms, 7(12%) malignant lesions were noted from renal pelvis and ureter. In contrast, both Jagadeeswari Suvvari et al¹³ and Majabeen Salma et al¹⁴ reported 7% incidence of lesions in renal pelvis and ureter.

In this study among the 7 cases from renal pelvis and ureter, 6 cases were Low grade urothelial carcinoma and 1 case was infiltrating moderately differentiated squamous cell carcinoma.

All the 6 cases in our study belonged to 60-70 years, 1 case belongs to 72 years which is in contrast to studies by Jagadeeswari Suvvari et al and Majabeen Salma et al who reported all cases below 70 years of age.

In contrast Jagadeeswari Suvvari et al reported equal incidence of transitional cell carcinoma and squamous cell carcinoma.

In this study among 7 cases, 6 (71%) were of low grade urothelial carcinoma, 4 cases were seen in male and one case seen in female and 1 case of infiltrating moderately differentiated squamous cell carcinoma in male patient.

Bladder tumours:

In this study among the 90 urinary tract neoplasms, 28 cases were noted in the urinary bladder, of which 16 (57%) were Non-invasive low grade papillary urothelial carcinoma, 10 (36%) were Non-invasive high grade papillary urothelial carcinoma, 1 case (3%) was Clear cell variant of high-grade urothelial carcinoma and 1 (3%) was a poorly differentiated urothelial carcinoma.

In the present study, Non-invasive low-grade tumours (61%) were more prevalent than the Non-invasive high-grade tumours (38%), similar to studies done by the Rajesh Singh Laishram et al¹⁶ (46.6%), Vaidya et al¹⁷ (43.21%) and Bhavana grandhi et al¹⁸ (50%)

In contrast, Aparna et al³ and Mahesh et al² reported higher incidence of high grade papillary urothelial neoplasms constituting 34.6% and 53.57% respectively followed by low grade papillary urothelial neoplasms.

In the present study among the bladder tumours, male preponderance was noted with male to female ratio of 6:1. This was comparable with the study done by Shah et al⁴, who also reported male predominance with male to female ratio is 2:1.

In this study all 28 tumours in urinary bladder had no invasion into the muscle. In contrast Shah et al⁴ reported 8 cases (50%) out of 16 cases of urothelial neoplasms with muscle invasion. In study done by Aparna et al³, out of 16 high grade urothelial carcinomas, 10 cases (62.5%) showed muscular invasion.

The incidence of bladder tumours in females is probably lower because of less exposure to industrial carcinogens and fewer women smoking.

In this study among the bladder tumours, all the 28 cases were malignant, and no benign cases were observed which was similar to the studies done by the Aparna et al³ and Shah et al⁴.

Summary and conclusion:

There were 90 cases of urinary tract tumours during the study period of five years. Malignant tumours were 87 and benign were 3.

Majority of the tumours were seen in the kidney. In 55 cases of kidney tumours 52 were malignant and 3 were benign. A total of 28 tumours were found in the urinary bladder and 7 were found in the ureter and renal pelvis. All the tumours in urinary bladder and ureter were malignant.

Among malignant lesions of the kidney, RCC was the most common tumour followed by Wilms' tumour and Clear cell Sarcoma. In RCC, the most common variant was Clear Cell RCC followed by Papillary RCC, Tubulocystic RCC, Multilocular Cystic RCC, Clear Cell Papillary RCC and Chromophobe RCC.

In the malignant neoplasms of urinary bladder, the most common tumour was Papillary urothelial carcinoma of types Non-Invasive low-grade and Non-Invasive high grade. None of the tumours showed invasion into the underlying muscle.

Tumours of the Renal pelvis and ureter were the least common and all were malignant, most being Low grade Urothelial Carcinomas and one tumour of an Invasive moderately differentiated Squamous Cell Carcinoma which was metastatic from cervix.

It is mandatory for every nephrectomy specimen to be subjected to details of histopathological examination for a clinico-morphological correlation to ensure proper management.

Conflicts of interest: Nil

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