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EVALUATION OF CLINICOPATHOLOGIC PATTERNS OF ADULT RENAL TUMORS

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Abstract

Introduction: Renal tumors comprise a diverse spectrum of neoplastic lesions with patterns that are relatively distinct for children and young adults.

Objectives: The basic aim of the study is to find the clinicopathologic patterns of adult renal tumors.

Material and methods: This retrospective study was conducted in 4 hospitals of Peshawar: Northwest General Hospital Peshawar, Institute Of Kidney Diseases Hayatabad Medical Complex Peshawar, Lady Reading Hospital Peshawar and Khyber Teaching Hospital Peshawar from june 2022 to January 2023. Sample sizes of 30 respondents were taken from each hospital. A total of 120 patients diagnosed with renal tumors were included in the analysis. Patients of all age groups and both genders were considered for inclusion. Data for this retrospective study on clinicopathologic patterns of adult renal tumors were collected systematically from the medical records of 120 patients. Demographic data, including age, gender, and ethnicity, were recorded for each patient to provide an overview of the study population.

Conclusion: It is concluded that, our study contributes to the growing body of knowledge regarding renal tumors by offering a comprehensive analysis of clinicopathologic patterns in a cohort of 110 adult patients. The findings highlight the importance of early recognition of clinical symptoms, the role of radiological evaluation in characterizing tumors, and the histological and molecular diversity of renal tumors.

Key words: Renal, Tumor, Kidney, Adults, clinicopathological, Patients

Introduction

Renal tumors comprise a diverse spectrum of neoplastic lesions with patterns that are relatively distinct for children and young adults. Adult renal cell carcinomas (RCCs) comprise 6% of all

cancers with a peak incidence in the 6th decade. Clear cell renal cell carcinoma (CCRCC) is the predominant subtype in older patients [1]. Kidney cancer is the 14th most common cancer by incidence and accounted for 1.8% of global deaths from cancer according to Globocan 2020 estimates, with most of these cancers being renal cell carcinomas (RCC). Globocan 2020 estimates that kidney cancer represented 1.1% of new cancers and 1.1% of deaths from cancer in Kenya. Most early-stage RCC are discovered on routine imaging for other diseases or patient complaints [2]. Less than 20% of patients present with pressure (flank pain, abdominal fullness or swelling), urinary tract symptoms (bleeding, repeated infections from obstruction) or paraneoplastic syndromes. Of note, up to 20% of patients may present initially with metastatic disease to various sites [3].

Understating pathologic characteristics of renal tumors is of momentous importance as pathologic diagnosis is seldom available at the time of resection and therefore primary treatment of renal tumors largely rest on radiologic extent of the disease. Although the role of immunotherapy and targeted molecular therapy is being established, especially for metastatic disease, complete surgical resection is the only known effective treatment for renal cancers [4]. Moreover patients with non-clear cell renal cell carcinoma don't appear to have a good response to immunotherapy. Detailed surgical pathology of the resected specimen remains a valuable tool in prognostic stratification of the patients in addition to evaluate the applicability of these newly developed treatment modalities [5].

Renal tumors can be broadly categorized into benign and malignant entities, with renal cell carcinoma (RCC) being the most prevalent malignancy. However, recent advances in molecular and genetic profiling have revealed substantial heterogeneity within RCC itself, leading to the identification of distinct subtypes with varying clinical implications [6]. Beyond RCC, other malignancies such as urothelial carcinoma, oncocytoma, and angiomyolipoma, to name a few, pose unique diagnostic and therapeutic challenges. The evaluation of clinicopathologic patterns in adult renal tumors extends beyond histological classification. It encompasses an intricate analysis of patient demographics, clinical presentations, imaging characteristics, and molecular signatures, all of which influence treatment decisions and outcomes. In addition, the recognition of rare or emerging renal tumor subtypes is essential for accurate diagnosis and appropriate management [7]. Data also reflects that Asian Americans have the lowest incidence of renal tumors compared to African Americans and Caucasians. A study in Brazil concluded that papillary RCC had much higher occurrence among black patients compared to non-blacks [8].

Objectives

The basic aim of the study is to find the clinicopathologic patterns of adult renal tumors.

Material and methods

This retrospective study was conducted in 4 hospitals of Peshawar: Northwest General Hospital Peshawar, Institute Of Kidney Diseases Hayatabad Medical Complex Peshawar, Lady Reading Hospital Peshawar and Khyber Teaching Hospital Peshawar from june 2022 to January 2023. Sample sizes of 30 respondents were taken from each hospital. A total of 120 patients diagnosed with renal tumors were included in the analysis. Patients of all age groups and both genders were considered for inclusion.

Inclusion criteria

- Patients of all age groups and both genders, diagnosed with renal tumors was included in the study.

Exclusion criteria

- Patients with incomplete or missing medical records, preventing comprehensive data collection.
- Patients with a previous diagnosis of renal tumor who were not within the specified study duration.

- Patients <age of 18 years.
- Patients with non-renal primary tumors that metastasized to the kidney.
- Patients who underwent kidney transplantation and developed post-transplant lymphoproliferative disorders.

Data collection

Data for this retrospective study on clinicopathologic patterns of adult renal tumors were collected systematically from the medical records of 120 patients. Demographic data, including age, gender, and ethnicity, were recorded for each patient to provide an overview of the study population. Clinical symptoms and presentations at the time of renal tumor diagnosis were documented. Common symptoms such as flank pain, hematuria, weight loss, and other clinical manifestations were noted. Radiological reports, primarily from computed tomography (CT) scans and magnetic resonance imaging (MRI), were reviewed to assess tumor characteristics. This included information on tumor size, location within the kidney, the presence of metastasis, and any distinctive radiological features. Pathology reports were meticulously examined to classify renal tumors based on their histological subtypes. This included identifying subtypes such as clear cell renal cell carcinoma (RCC), papillary RCC, chromophobe RCC, urothelial carcinoma, oncocytoma, and angiomyolipoma. Histologic grading and staging, when available, were also documented. In cases where molecular profiling data were accessible, genetic alterations were documented. Specifically, the presence of mutations in genes such as VHL, PBRM1, and BAP1, known to be associated with certain renal tumor subtypes, was recorded.

Statistical analysis

Data was collected and analyzed using SPSS v27.0. Descriptive statistics, including means, medians, standard deviations, and percentages, were used to summarize demographic and clinicopathologic variables. The distribution of renal tumor subtypes was assessed.

Results

Data was collected from 120 adult patients. The mean age of the patients was approximately 62.1 years, with a standard deviation of 8.6 years, indicating a relatively elderly population. Gender distribution showed that 58.2% were male, while 41.8% were female. The most common clinical symptom was flank pain, reported by 61.8% of patients, indicating its prevalence as a presenting symptom. Hematuria was another frequently observed symptom, affecting 34.5% of patients. Weight loss and fatigue were reported in 22.7% and 15.5% of patients, respectively.

Table 01: Demographic data of patients

Characteristic	**Number of Patients (n=110)**	**Mean (± SD)**
Age (Y)	110	62.1 ± 8.6
Gender		
- Male (%)	64	58.2%
- Female (%)	46 (41.8%)	41.8%
Ethnicity		
- Muslim (%)	75	68.2%
- Non-Muslims (%)	28	25.5%
- Others (%)	7	6.4%
Clinical symptoms		
Flank Pain	68	61.8%
Hematuria	38	34.5%
Weight Loss	25	22.7%
Fatigue	17	15.5%

Table 02: Radiological Characteristics

Radiological Parameter	Number of Patients (n=110)	Percentage (%)
Tumor Size (cm)		
- Mean (± SD)	7.6 ± 2.3	
Tumor Location		
- Left Kidney (%)	54	49.1%
- Right Kidney (%)	44	40%
- Bilateral (%)	12	10.9%
Presence of Metastasis		
- Yes (%)	18	16.4%
- No (%)	92	83.6%
Distinctive Radiological Features		
- Enhancement on CT (%)	75	68.2%
- Hypervascularity on MRI (%)	22	20%

Table 2presents radiological characteristics of renal tumors as determined by CT scans and MRI findings. The mean tumor size was approximately 7.6 cm with a standard deviation of 2.3 cm, suggesting a considerable variation in tumor sizes. Tumor location showed that the majority were in the left kidney (49.1%) followed by the right kidney (40%), with a small proportion being bilateral (10.9%). Metastasis was present in 16.4% of cases, indicating the importance of early detection and intervention. Distinctive radiological features, such as enhancement on CT (68.2%) and hypervascularity on MRI (20%), were notable characteristics.

Table 03: Distribution of Histological Subtypes

Histological Subtype	Number of Patients (n=110)	Percentage (%)
Clear Cell RCC	50	45.5%
Papillary RCC	28	25.5%
Chromophobe RCC	11	10%
Urothelial Carcinoma	9	8.2%
Oncocytoma	7	6.4%
Angiomyolipoma	5	4.5%

The most common histological subtype was clear cell renal cell carcinoma (45.5%), followed by papillary RCC (25.5%). Chromophobe RCC (10%) and urothelial carcinoma (8.2%) were also identified, albeit in smaller proportions. Oncocytoma (6.4%) and angiomyolipoma (4.5%) represented less common histological subtypes within the study cohort.

Table 04: Molecular Analysis Results

Genetic Alteration	Number of Patients (n=110)	Percentage (%)
VHL Mutation	16	14.5%
PBRM1 Mutation	11	10.0%
BAP1 Mutation	7	6.4%

VHL mutations were observed in 14.5% of patients, which is significant as VHL mutations are associated with clear cell RCC.PBRM1 mutations were identified in 10% of cases, contributing to our understanding of the genetic landscape of renal tumors. BAP1 mutations were present in 6.4% of patients, shedding light on the molecular diversity within the study cohort.

Discussion

Renal tumors represent a diverse group of neoplasms that can present with a wide range of clinical, radiological, histological, and molecular characteristics. In this study, we aimed to comprehensively

explore the clinicopathologic patterns of renal tumors among 110 adult patients. The findings of this study provide valuable insights into the demographics, clinical presentations, radiological features, histological subtypes, and molecular alterations associated with renal tumors in our patient cohort [9,10].

The demographic profile of our patient cohort revealed several noteworthy trends. The mean age of approximately 62.1 years highlights that renal tumors tend to affect an older population. This observation aligns with the existing literature, which often reports a higher incidence of renal tumors in older individuals. The gender distribution indicated a slight male predominance, consistent with established epidemiological patterns [11].Our analysis of clinical presentations underscored the significance of certain symptoms in the context of renal tumors. Flank pain was the most common symptom, reported by 61.8% of patients, emphasizing its role as a key clinical indicator for renal tumor suspicion. Hematuria, weight loss, and fatigue were also observed, albeit with varying frequencies, highlighting the multifaceted clinical presentations of renal tumors [12].

Radiological evaluation remains instrumental in diagnosing and characterizing renal tumors. The mean tumor size of 7.6 cm suggests that renal tumors in our cohort were, on average, sizeable at the time of diagnosis [13]. This underscores the need for early detection and surveillance in patients at risk. Tumor location data demonstrated a predominant left-sided occurrence, while the presence of metastasis, albeit in a minority of cases, highlights the potential for disease progression [14].

Histological analysis revealed a diverse landscape of renal tumor subtypes within our cohort. Clear cell renal cell carcinoma was the most prevalent subtype, consistent with global trends. The presence of papillary RCC, chromophobe RCC, urothelial carcinoma, oncocytoma, and angiomyolipoma underscored the histological heterogeneity of renal tumors [15].Our molecular analysis provided insights into the genetic underpinnings of renal tumors. VHL mutations were observed in a significant proportion of cases, aligning with the known association between VHL mutations and clear cell RCC. The identification of PBRM1 and BAP1 mutations in select cases contributes to our understanding of the molecular diversity within the cohort [16-18].

Conclusion

It is concluded that, our study contributes to the growing body of knowledge regarding renal tumors by offering a comprehensive analysis of clinicopathologic patterns in a cohort of 110 adult patients. The findings highlight the importance of early recognition of clinical symptoms, the role of radiological evaluation in characterizing tumors, and the histological and molecular diversity of renal tumors. These insights are valuable for improving diagnostic accuracy, patient management, and potential therapeutic interventions in the context of renal tumors.

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