Histopathological and Immunohistochemical Analysis of Eosinophilic Kidney Tumors

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Introduction: Eosinophilic renal tumors represent a diverse group of neoplasms that challenge differential diagnosis due to overlapping histopathological and immunohistochemical features. These tumors, which can be malignant, benign, or indeterminate in behavior, require accurate classification to guide prognosis and treatment. The recent updates in the World Health Organization (WHO) 2022 classification introduce new categories for these tumors, enhancing diagnostic precision.

Methods: This retrospective study reviewed cases of eosinophilic renal tumors diagnosed between January 2013 and November 2023 at Bezmialem Vakif University Hospital. A total of 735 patients who underwent partial or radical nephrectomy were included. Pathological reports were re-evaluated according to the WHO 2022 classification, documenting histopathological and immunohistochemical features. Demographic and clinical data were also analyzed.

Results: In the study, 299 out of 735 tumors were identified as eosinophilic kidney tumors. Demographic and clinicopathological data are given in Table 1.

Gender distribution	• Male: 177 (59,2%) • Female: 122 (40,8%)
Age	• Mean age: 57,1±12,3 • Mean age in male patients: 57,22±12.123 • Mean age in female patients: 57,07±12,685
Type of surgery	• Radical nephrectomy: 134 (44,8%) • Partial nephrectomy: 165 (55,2%)
Tumor location	• Right kidney: 159 (53,2%) • Left kidney: 140 (46,8%)
Tumor diameter	• Median value: 5 cm Minimum value: 1, cm Maximum value: 23 cm • Male patients: Median value: 5,4 cm Minimum value: 1,7 cm Maximum value: 23 cm • Female patients: Median value: 5 cm Minimum value: 1,3 cm Maximum value: 14,5 cm
Pelvic invasion	• Invasion (-) : 230 (76,9%) • Invasion (+) : 69 (23,1%)
Perinephric fat tissue invasion	• Invasion (-) : 236 (78,9%) • Invasion (+) : 63 (21,1%)
Lymph node	• Lymph node (-) : 253 (84,62%) • Reactive lymph node (+) : 36 (12,04%) • Lymph node metastasis (+) : 10 (3,34%)

Table 1. Demographic and clinicopathological data

Table 2 shows the stains to be used for the differential diagnosis of these eosinophilic kidney tumors that are difficult to differentiate.

	CK7	**CD117**	**Cathepsin K**	
Oncocytoma	-	+	Focal +	
Eosinophilic vacuolated tumor	-	+	+	
Chromophobe renal cell carcinoma	Diffuse +	+	+	Perinuclear halo
Low grade oncocytic tumor	Diffuse +	-		Perinuclear halo

Table 2. Separation-related stains

When the cases diagnosed with eosinophilic kidney tumor were re-evaluated according to the WHO 2022 criteria, the diagnosis of 3 cases was changed. These cases are summarized in Table 3.

		Case 1	Case 2	Case 3
Diagnoses	Old diagnosis	Oncocytoma	Chromophobe renal cell carcinoma	Chromophobe renal cell carcinoma
	Updated diagnosis	Eosinophilic vacuolated tumor	Low grade oncocytic tumor	Low grade oncocytic tumor
Stains	CK7	-	Diffuse +	Diffuse +
	CK20	-	-	-
	CD117	+	-	-
	CA-IX	-	-	-
	CD10	Focal +	+	-
	Cathepsin K	+	-	-
	SDHB	+	+	+

Table 3. Cases with updated diagnosis

Upon follow-up, all three patients are discovered to be alive and in good health. They continue to be followed up with.

When 299 eosinophilic kidney tumors were re-evaluated according to the WHO 2022 criteria, the types and numbers of kidney tumors are given in Table 4.

Renal tumor	**Number**
Angiomyolipoma	21
Eosinophilic clear cell renal cell carcinoma	119
Eosinophilic solid cystic renal cell carcinoma	1
Eosinophilic vacuolated tumor	1
Chromophobe renal cell carcinoma	53
Low grade oncocytic tumor	4
Oncocytoma	35
Papillary renal cell carcinoma	48
Sarcomatoid renal cell carcinoma	7
Synchronous oncocytoma and angiomyolipoma	1
Succinate dehydrogenase deficient renal cell carcinoma	1
TFE3 gene-rearrangement renal cell carcinoma	2
Unclassified renal cell carcinoma	6
Total	**299**

Table 4. Updated list of all cases of eosinophilic renal cell carcinoma

Conclusion: This study underscores the complexity of diagnosing eosinophilic renal tumors and emphasizes the importance of using the updated WHO 2022 classification for accurate diagnosis. The findings provide valuable insights into the epidemiology, histopathological characteristics, and classification of these rare tumors, contributing to improved understanding and clinical management.

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