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Clinicopathological assessment of renal tumors in pediatric age group in a sample of Iraqi patients

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Abstract

Background: According to the Iraqi Cancer Registry, renal carcinoma is the 13th most common carcinoma, with 798 registered cases in 2020 and 418 deaths. Methods: This is a cross sectional retrospective study that includes the analysis of 116 randomly selected sample of pediatric patients (74 nephrectomies and 42 biopsies) sent to the Teaching Laboratories of AL-Emamain AL-Kadhmain city (AS), Baghdad medical city, and private laboratories from January 2019 to January 2023. Results: Histopathological diagnosis revealed a ratio from malignant to benign of 7.4:1. Wilm's tumor was the most common malignant tumor (65.5%), while multicystic renal dysplasia was the most common benign tumor (7.8%). Abdominal pain was the most common clinical feature (67.2%), followed by abdominal mass (20.7%). Regarding malignant cases, Pathological stage I was the most common (39.0%). As for the histopathological subtype, triphasic type was the most common (57.1%), followed by the biphasic type (10.5%). Conclusions, Malignant tumors make up the vast majority of renal tumors. Wilm tumor is the predominant malignant tumor. Fortunately, most cases of Wilm tumors exhibited an early stage and favorable histology. Neuroblastoma was the second most common malignant tumor. The abdominal lump is the most common presentation of pediatric renal tumor.

Keywords: *Renal carcinoma, Renal tumors, Wilm's tumor.*

Introduction

Based on data from the Iraqi Cancer Registry, renal carcinoma ranks 13th in prevalence, accounting for 798 documented cases and 418 fatalities in 2020 [1]. The most prevalent type of pediatric renal cancer is nephroblastoma (Wilms tumor) [2]. Primary benign tumors include mesoblastic nephroma, angiomyolipoma, multilocular cystic nephroma, ossifying renal tumor of infancy, and metanephric adenoma [3]. Pathologies with a substantially worse prognosis exist among malignant childhood renal tumors, including clear cell sarcoma of the kidney, renal cell carcinoma, malignant rhabdoid tumor of the kidney, and other rare tumors [4]. The clinical characteristics of children with renal tumors are similar; however, some (such as age distribution) may be useful in differential diagnosis. In practically all tumors, the ultimate diagnosis and classification of clinically important subtypes still depend on histopathologic diagnosis [5]. Imaging is critical in the diagnosis, staging, and follow-up of these tumors [6].

The majority of Wilms tumors (WT) (95%) are diagnosed in children under the age of ten. Bilateral and multifocal tumors, as well as Wilms tumors in the context of a cancer predisposition syndrome, tend to present at a younger age (median age of diagnosis of two years) than sporadic Wilms tumors (median age of diagnosis of three years)[7]. Wilms tumor most commonly manifests itself in a toddler (median age 38 months) as a painless abdominal lump palpated by the family or during a well-child check, although abdominal pain, constipation, decreased appetite, hematuria, fever, hypertension, and/or anemia can also occur [8] [9].

Wilms tumor is characterized morphologically by a triphasic pattern with blastemal, epithelial, and stromal cell components. Wilms tumor risk stratification according to the International Society of Pediatric Oncology is based on histological classification, with tumors with a high percent-

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age of blastemal cells after preoperative treatment or diffuse anaplastic characteristics (hyperchromasia, aberrant mitotic figures, and prominent nuclear enlargement) representing the high-risk group, while partially differentiated cystic nephroblastomas and tumors that are completely necrotic are considered within the low-risk group. Moderate-risk groups include tumors with epithelial, stromal, mixed, or regressive types with focal anaplasia alone [10].

Approximately 5% of WTs have known constitutional predisposition syndromes, the most common of which are those associated with genitourinary malformation due to underlying WT1 gene abnormalities (WT with Aniridia, Genitourinary Abnormalities, and Mental Retardation (WAGR) Syndrome; Denys-Drash syndrome; and those associated with an overgrowth phenotype [Beckwith-Wiedemann syndrome and Perlman syndrome][11]. One of the low-grade renal tumors of infancy is congenital meroblastic neprhoma, which includes classic, cellular, and mixed types and is rare after the age of nine months[12].

Malignant rhabdoid tumor of the kidney, a very rare type of malignant pediatric kidney tumor, is an extremely aggressive malignancy that affects newborns and young children with a poor prognosis and is characterized by loss of SMRCB1 / INI [13]. Kidney clear cell sarcoma is a rare malignant pediatric renal tumor that often manifests in the 2- to 3-year-old age range and is characterized by aggressive behavior and metastasis to bone, brain, and lungs[14]. The most common solid tumor in children is neuroblastoma, which causes around 15% of cancer-related deaths in children. There is genetic, structural, and clinical heterogeneity in neuroblastomas [15]. Forty percent of neuroblastomas are located in the adrenal glands, and 15% are retroperitoneal, while primary intrarenal neuroblastomas are very rare. Neuroblastoma tumors range greatly in prognosis, from those that spontaneously shrink and do not need treatment to those that are highly metastatic, resistant to treatment, and have a high death rate. Tumor biology plays an important role in explaining this uneven prognosis [16]. It is critical to distinguish Wilms' tumor from intrarenal neuroblastoma, since the two tumors have different prognoses and treatment responses [17]. This study aims to assess pediatric renal tumor cases according to parameters including age, sex, clinical presentation, radiological findings, tumor type, tumor size, tumor site, gross features, histological features, grade, and pathological stage.

Materials and Methods

A retrospective cross-sectional study that included 116 randomly selected pediatric patient samples (79 nephrectomies and 37 biopsies) sent to the Teaching Laboratories of Al-Emamain Al-Kadhmain Medical City (AS), Baghdad Medical City, and private laboratories from January 2019 to January 2023.

Clinicopathological data:

Clinicopathological data that were collected from patient pathology reports included: Age, Gender, Clinical presentation, Radiological findings, Tumor type, Tumor side (right or left), Tumor size, Gross Features, Histological features, Grade, and Stage.

Inclusion criteria:

• renal tumor cases treated in patients less than 16 years old

Exclusion criteria:

• Incomplete clinical or pathological data from referring physicians.

The diagnosis was reviewed by two pathologists.

Statistical Analysis:

All statistical analyses were performed utilizing SPSS, version 26, including mean, standard deviation, frequency, and percentage using Yates Chi square, with a p value <0.05 regarded as statistically significant.

Results

The study sample

A total number of 116 cases were included in the study sample.

Age and gender distribution

The age of the studied sample ranged from 7 days to 14 years with a mean of 3.6 years ± 2.6. Regarding the distribution of age groups, 20 (17.2%) were of the neonatal or infant age group, while 96 (82.8%) were of the pediatric age group. In terms of gender, the sample showed male predominance, as the male-to-female ratio was 1.41:1; as shown in Table (1).

Table (1): Distribution of cases according to age and gender.

Variable	Frequency (Total = 116)	Percentage (%)
Age		
Neonates or infants (≤1 year)	20	17.2
Pediatrics (1-14 years)	96	82.8
Gender		
Male	68	58.6
Female	48	41.4

Histopathological diagnosis

Histopathological diagnosis revealed a 7.4: 1 malignant = 105 (90.5%) to non-malignant =11(9.6%) ratio of 7.4:1.

Wilm's tumor was the most common malignant tumor (65.5%), while multicystic renal dysplasia was the most common benign tumor (7.8%); as illustrated in Table (2).

Table (2): Distribution of cases according to histopathological diagnosis.

Histopathology	Frequency	Percentage
Malignant, Total = 105 (90.5%).		
Wilm's tumor	76	65.5
Clear cell sarcoma	3	2.6
Cellular mesoblastic nephroma	2	1.7
Immature teratoma	3	2.6
Renal Rhabdoid tumor	2	1.7
Renal cell carcinoma coexistent with Wilm's tumor	2	1.7
Undifferentiated sarcoma	1	0.9
Neuroblastoma	16	13.8
Benign Total = 11 (9.6%)		
Multicystic renal dysplasia	9	7.8
Acquired cystic disease of the kidney	1	0.9
Horseshoe kidney	1	0.9
Total	**116**	**100.0**

Clinicopathological parameters of pediatric tumors:

About clinical features. Abdominal pain was the most common clinical feature (67.2%), followed by abdominal mass (20.7%).

Concerning the site of involvement; the whole kidney parenchyma was the most common site (48.3%). As for the type of specimen, (68.1%) underwent nephrectomy, while (31.9%) underwent renal biopsy. Regarding tumor size (assessed by the largest dimension); the majority (75.9%) had tumor size of ≤10 cm. The solid gray mass was the most common gross characteristic (55.45%).

Regarding 105 malignant cases; pathological stage I was the most common (39.0%). Regarding the histopathological subtype, the triphasic type was the most common (57.1%), followed by the biphasic type (10.5%).

Table (3): relationship between clinicopathological parameters of pediatric renal tumor.

Clinicopathological parameters	Frequency	Percentage (%)
Chief complaint		
Abdominal pain	78	67.2
Abdominal distension	1	0.9
Abdominal mass	24	20.7
Renal failure	10	8.6
Hematuria	2	1.7
Incidental Finding	1	0.9
Total	116	100.0
Side		
Right side	62	53.4
Left side	54	46.6
Total	116	100.0

Site		
Whole kidney parenchyma	56	48.3
Center	16	13.8
Upper pole	14	12.1
Lower pole	5	4.3
Upper and lower pole	2	1.7
Lateral side	4	3.4
Medial side	1	9.
Perinephric fat	2	1.7
Intrarenal	16	13.8
Total	116	100.0
Type of specimen		
Nephrectomy	79	68.1
Biopsy	37	31.9
Total	116	100.0
Tumor size (largest dimension)		
cm 10≥	88	75.9
cm 10<	28	24.1
Total	116	100.0
Gross Features		
Solid grey mass	55	47.4
Variegated mass	26	22.4
Solid cystic mass containing blood	17	14.7
Multiple cystic lesions containing fluid	3	2.6
The heterogeneous firm mass white to red in color	1	0.9
Solid white mass	11	9.5
Whitish cystic space	2	1.7
Red-brown mass with areas of hemorrhage	1	0.9
Total	116	100.0
Histological type of malignant cases (N=105)		
Biphasic	11	10.5
Triphasic	60	57.1
Teratoid	2	1.9
Monophasic	7	6.7
Cellular	1	1.0
Not assessed.	22.9	24
Total	105	100.0
Stage of malignant cases (N=105)		
I	41	39.0
II	23	21.9
III	4	3.8
IV	1	1.0
Not assessed	36	34.3
Total	105	100.0

Relationship among clinicopathological parameters

Relationship between histopathological diagnosis and age

A statistically significant association was detected between histopathological type and age; as shown in Table (5).

Table (4): Relationship between histopathological diagnosis and age (P value = 0.009).

Histopathological diagnosis	Age		Total
	Neonates or infants (≤1 year)	Pediatrics (1-14 years)	
Wilm's tumor	9	67	76
	11.8%	88.2%	100.0%
Clear cell sarcoma	1	2	3
	33.3%	66.7%	100.0%
Cellular mesoblastic nephroma	2	0	2
	100.0%	0.0%	100.0%
Immature teratoma	2	1	3
	66.7%	33.3%	100.0%
Renal Rhabdoid tumor	1	1	2
	50.0%	50.0%	100.0%
Renal cell carcinoma coexistent with Wilm's tumor	0	2	2
	0.0%	100.0%	100.0%
Neuroblastoma	3	13	16
	18.8%	81.3%	100.0%
Multicystic renal dysplasia	1	8	9
	11.1%	88.9%	100.0%
Acquired cystic disease of the kidney	0	1	1
	0.0%	100.0%	100.0%
Horseshoe kidney	0	1	1
	0.0%	100.0%	100.0%
Undifferentiated sarcoma	1	0	1
	100.0%	0.0%	100.0%
Total	20	96	116
	17.2%	82.8%	100.0%

Relationship between histopathological diagnosis and gender

No significant association was detected between the histopathological diagnosis and gender; as shown in Table (5).

Table (5): Relationship between histopathological diagnosis and gender (P value = 0.536).

Histopathological diagnosis	Gender		Total
	Male	Female	
Wilm's tumor	43	33	76
	56.6%	43.4%	100.0%
Clear cell sarcoma	2	1	3
	66.7%	33.3%	100.0%
Cellular mesoblastic nephroma	2	0	2
	100.0%	0.0%	100.0%
Immature teratoma	2	1	3
	66.7%	33.3%	100.0%
Renal Rhabdoid tumor	0	2	2
	0.0%	100.0%	100.0%
Renal cell carcinoma coexistent with Wilm's tumor	2	0	2
	100.0%	0.0%	100.0%
Neuroblastoma	11	5	16
	68.8%	31.3%	100.0%
Multicystic renal dysplasia	4	5	9
	44.4%	55.6%	100.0%
Acquired cystic disease of the kidney	0	1	1
	0.0%	100.0%	100.0%
Horseshoe kidney	1	0	1
	100.0%	0.0%	100.0%
Undifferentiated sarcoma	1	0	1
	100.0%	0.0%	100.0%
Total	68	48	116
	58.6%	41.4%	100.0%

Clinical presentation

A statistically significant association was detected between histopathological type and clinical presentation (P value <0.001); as shown in table (6).

Table (6): Relationship between histopathological diagnosis and clinical presentation.

Tumor type	Clinical presentation						Total
	Abdominal pain	Abdominal distension	Abdominal mass	Renal failure	Hematuria	Incidental Finding	
Wilm's tumor	73	0	2	0	1	0	76
	96.1%	0.0%	2.6%	0.0%	1.3%	0.0%	100.0%
Clear cell sarcoma	2	0	0	0	0	1	3
	66.7%	0.0%	0.0%	0.0%	0.0%	33.3%	100.0%
Cellular mesoblastic nephroma	0	1	1	0	0	0	2
	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	100.0%
Immature teratoma	2	0	1	0	0	0	3
	66.7%	0.0%	33.3%	0.0%	0.0%	0.0%	100.0%
Renal Rhabdoid tumor	0	0	2	0	0	0	2
	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Renal cell carcinoma coexistent with Wilm's tumor	1	0	0	0	1	0	2
	50.0%	0.0%	0.0%	0.0%	50.0%	0.0%	100.0%
Neuroblastoma	0	0	16	0	0	0	16
	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Multicystic renal dysplasia	0	0	1	8	0	0	9
	0.0%	0.0%	11.1%	88.9%	0.0%	0.0%	100.0%
Acquired cystic disease of the kidney	0	0	0	1	0	0	1
	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Horseshoe kidney	0	0	0	1	0	0	1
	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Undifferentiated sarcoma	0	0	1	0	0	0	1
	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Total	78	1	24	10	2	1	116
	67.2%	0.9%	20.7%	8.6%	1.7%	0.9%	100.0%

Tumor size

A statistically significant association was detected between histopathological type and tumor size (P value = 0.021); as shown in Table (7).

Table (7): Relationship between histopathological diagnosis and tumor size (P value = 0.340).

Histopathological diagnosis	Tumor size		Total
	cm 10≥	cm 10<	
Wilm's tumor	54	22	76
	71.1%	28.9%	100.0%
Clear cell sarcoma	3	0	3
	100.0%	0.0%	100.0%
Cellular mesoblastic nephroma	0	2	2
	0.0%	100.0%	100.0%
Immature teratoma	3	0	3
	100.0%	0.0%	100.0%
Renal Rhabdoid tumor	2	0	2
	100.0%	0.0%	100.0%
Renal cell carcinoma coexistent with Wilm's tumor	2	0	2
	100.0%	0.0%	100.0%
Neuroblastoma	16	0	16
	100.0%	0.0%	100.0%
Multicystic renal dysplasia	6	3	9
	66.7%	33.3%	100.0%
Acquired cystic disease of the kidney	0	1	1
	0.0%	100.0%	100.0%
Horseshoe kidney	1	0	1
	100.0%	0.0%	100.0%
Undifferentiated sarcoma	1	0	1
	100.0%	0.0%	100.0%
Total	88	28	116
	75.9%	24.1%	100.0%

Tumor side

No significant association was detected between histopathological type and tumor side; as shown in Table (8).

Table (8): Relationship between histopathological diagnosis and tumor size (P value = 0.296).

Histopathological diagnosis	Tumor side		Total
	Right	Left	
Wilm's tumor	38	38	76
	50.0%	50.0%	100.0%
Clear cell sarcoma	3	0	3
	100.0%	0.0%	100.0%
Cellular mesoblastic nephroma	1	1	2
	50.0%	50.0%	100.0%
Immature teratoma	3	0	3
	100.0%	0.0%	100.0%
Renal Rhabdoid tumor	0	2	2
	0.0%	100.0%	100.0%
Renal cell carcinoma coexistent with Wilm's tumor	1	1	2
	50.0%	50.0%	100.0%
Neuroblastoma	10	6	16
	62.5%	37.5%	100.0%
Multicystic renal dysplasia	4	5	9
	44.4%	55.6%	100.0%
Acquired cystic disease of the kidney	0	1	1
	0.0%	100.0%	100.0%
Horseshoe kidney	1	0	1
	100.0%	0.0%	100.0%
Undifferentiated sarcoma	1	0	1
	100.0%	0.0%	100.0%
Total	62	54	116
	53.4%	46.6%	100.0%

Gross Features

A statistically significant association was detected between histopathological type and gross features; as shown in Table (9).

Table (9): Relationship between histopathological diagnosis and gross features (P value <0.001).

Histopathological diagnosis	Gross features								Total
	Solid grey mass	Variegated mass	Solid cystic mass containing blood	Multiple cystic lesions containing fluid	Heterogenous firm mass white to red in color	Solid white mass	Whitish cystic space	Red brown mass with areas of hemorrhage	
Wilm's tumor	49	19	8	0	0	0	0	0	76
	64.5%	25.0%	10.5%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Clear cell sarcoma	2	0	0	0	0	1	0	0	3
	66.7%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	100.0%
Cellular mesoblastic nephroma	0	0	1	0	0	0	0	1	2
	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	50.0%	100.0%
Immature teratoma	1	0	0	0	1	0	1	0	3
	33.3%	0.0%	0.0%	0.0%	33.3%	0.0%	33.3%	0.0%	100.0%
Renal Rhabdoid tumor	1	0	0	0	0	1	0	0	2
	50.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	100.0%
Renal cell carcinoma coexistent with Wilm's tumor	1	0	1	0	0	0	0	0	2
	50.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Neuroblastoma	0	7	0	0	0	9	0	0	16
	0.0%	43.8%	0.0%	0.0%	0.0%	56.3%	0.0%	0.0%	100.0%
Multicystic renal dysplasia	0	0	6	3	0	0	0	0	9
	0.0%	0.0%	66.7%	33.3%	0.0%	0.0%	0.0%	0.0%	100.0%
Acquired cystic disease of kidney	0	0	0	0	0	0	1	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Horseshoe kidney	0	0	1	0	0	0	0	0	1
	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Undifferentiated sarcoma	1	0	0	0	0	0	0	0	1
	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Total	55	26	17	3	1	11	2	1	116
	47.4%	22.4%	14.7%	2.6%	0.9%	9.5%	1.7%	0.9%	100.0%

Stage

No significant association was detected between the histopathological type and tumor stage; as shown in Table (10).

Table (10): Relationship between histopathological diagnosis and tumor stage (P value = 0.738).

Histopathological diagnosis	Stage				Total
	I	II	III	IV	
Wilm's tumor	36	23	4	1	64
	56.3%	35.9%	6.3%	1.6%	100.0%
Clear cell sarcoma	2	0	0	0	2
	100.0%	0.0%	0.0%	0.0%	100.0%
Renal Rhabdoid tumor	2	0	0	0	2
	100.0%	0.0%	0.0%	0.0%	100.0%
Renal cell carcinoma coexistent with Wilm's tumor	1	0	0	0	1
	100.0%	0.0%	0.0%	0.0%	100.0%
Total	41	23	4	1	69
	59.4%	33.3%	5.8%	1.4%	100.0%

Relationship between histopathological diagnosis and histopathological type

No significant association was detected between the histopathological type and the tumor side; as shown in Table (11).

Table (11): Relationship between histopathological diagnosis and histopathological type (P value = 0.205).

Histopathological diagnosis		Histopathological type				Total
	Biphasic	Triphasic	Teratoid	Monophasic	Cellular	
Wilm's tumor	11	56	2	7	0	76
	14.5%	73.7%	2.6%	9.2%	0.0%	100.0%
Clear cell sarcoma	0	1	0	0	0	1
	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Cellular mesoblastic nephroma	0	0	0	0	1	1
	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Renal Rhabdoid tumor	0	2	0	0	0	2
	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Renal cell carcinoma coexistent with Wilm's tumor Wilm's tumor	0	1	0	0	0	1
	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Total	11	60	2	7	1	81
	13.6%	74.1%	2.5%	8.6%	1.2%	100.0%

A statistically significant association was detected between the histopathological subtype and each age, clinical presentation, tumor size, and gross features.

No statistically significant association was detected between histopathological type and each of gender, tumor side, stage, and histopathological subtype.

Variable	Age	Clinical presentation	Gender	Tumor size	Tumor side	Stage	Histopathological type	Gross features
P value	0.009	0.001>	0.536	0.021	0.296	0.738	0.205	0.001>

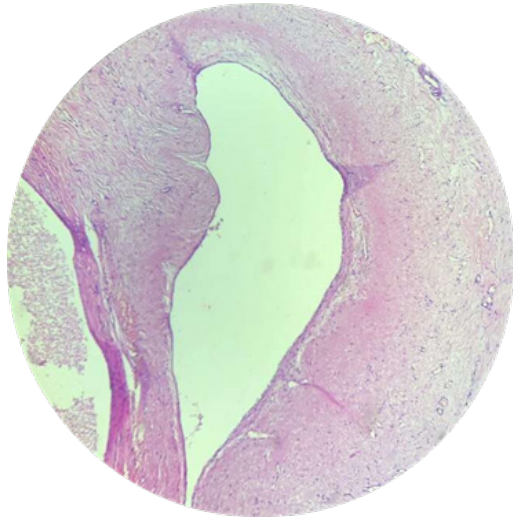

Figure (1): Photomicrograph renal tissue shows multicystic dysplastic kidney characterized by two large cysts lined with a flat cuboidal epithelium, (4X).

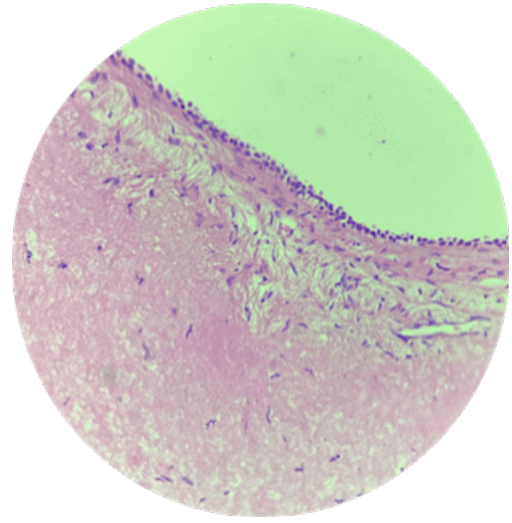

Figure (2): Photomicrograph of renal tissue shows a cyst lined by a flat cuboidal epithelium (arrow), (40X).

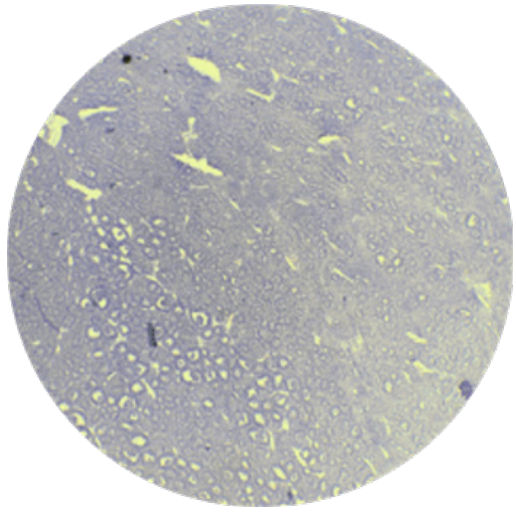

Figure (3): The photomicrograph of renal tissue shows a Wilms tumor that is composed of mixed epithelial and stromal components (4X).

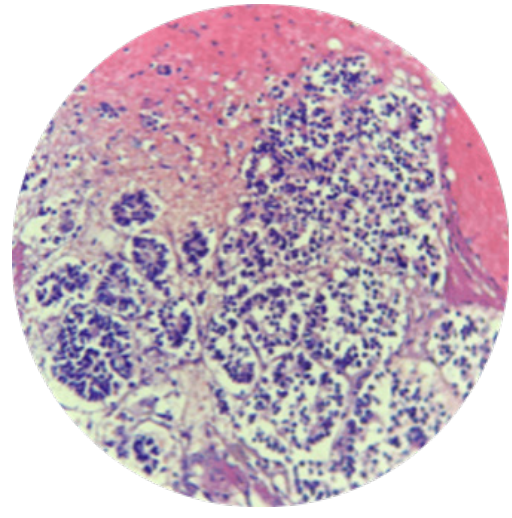

Figure (4): Photomicrograph of renal tissue shows Wilms tumor that is composed of mixed epithelial and bastemal element, (10X).

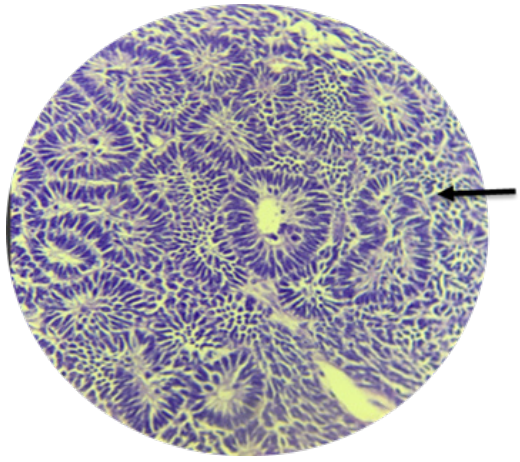

Figure (5): The photomicrograph of renal tissue shows a Wilms tumor that is composed of an epithelial component arranged as a gland, an arrow, (40X).

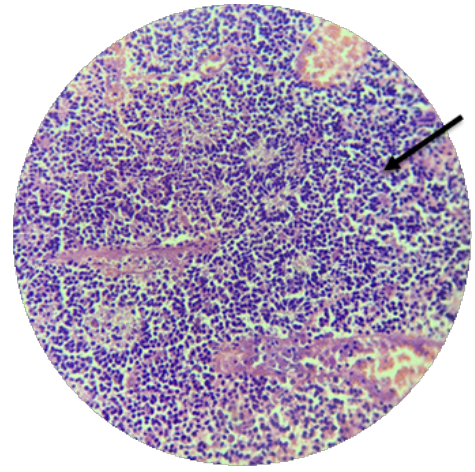

Figure (6): Photomicrograph of renal tissue shows Wilms tumor that is composed of a blastemal component arranged as diffuse growth pattern, (4X).

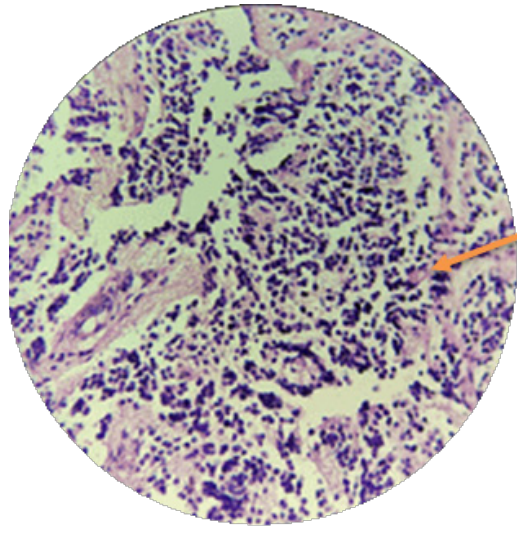

Figure (7): Photomicrograph of renal tissue shows neuroblastoma of Homer –Wright pseudorosette, arrow (40X).

Discussion

According to a study conducted at the Children's Welfare Teaching Hospital, Medical city, Baghdad by Al-Hadad et al., Wilm's tumor was the third most common pediatric cancer after lymphoma and leukemia [18].

In the present study, the mean age of diagnosis was 3.6 years ± 2.6. This is in agreement with an Iraqi study by Al-moamen et al. who reported a median age of 2.5 years. In Turkey, Bozlu et al. reported that the mean age of diagnosis was 4.44 years [19]. Furthermore, males were more likely to be affected than females. This is in agreement with what was reported in Iraq by Raghad Dawood Najem who reported a male to female ratio of 1.18:1[20]. However, Okbah et al. in Yemen reported female predominance (56% females vs. 44%

males)[21]. These discrepancies between different studies can be attributed to the reason that each study was conducted in a distinct population characterized by a unique genetic composition.

Among patients with renal tumors, the present study has shown that malignant tumors accounted for the majority (90.5%) of the cases. This is in exact concordance with Mohan et al., who found that malignant cases constituted 90.4%[22].

This study has found that Wilm's tumor is the most common pediatric renal tumor, followed by neuroblastoma. In Basrah, Almoamen et al. found that Wilms tumor constituted 85%, followed by clear cell sarcoma (8%)[23]. Ooms et al. found that Wilm tumor constituted 88% of cases, followed by clear cell sarcoma (3.6%), malignant rhabdoid tumor (3.0%), congenital mesoblastic nephroma (3.0%), and renal cell carcinoma (1.8%)[5]. Das et al. reported that the incidence of Wilm's tumor was 74.1%, of mesoblastic nephroma 11.1%, of clear cell sarcoma was 11.1% and of rhabdoid tumor was 3.7%[24]. These findings are not surprising given that Wilm's tumor represents 7% of childhood malignancies and is the fourth most common childhood cancer in general.

Concerning benign tumors, multicystic renal dysplasia was the most common. Multicystic dysplastic kidney disease is a congenital disease in which the entire renal parenchyma is replaced by cysts. If the condition occurs bilaterally, it is incompatible with life [25]. The study by Menon et al. found that multilocular cystic nephroma was the most common benign tumor in children, followed by congenital mesoblastic nephroma, mature cystic teratoma, and angiomylipoma [26].

The present study found that abdominal pain was the most common clinical presentation (67.2 %), followed by abdominal mass (20.7%). This is in discordance with the Iraqi study by Almoamin et al., which also revealed that abdominal mass was the most common presentation (44.3%)[23]. Bozlu et al. found that the most common symptom was a lump or mass in the area of the kidneys (45.8%), abdominal pain, and hematuria (14.6%)[19]. Differences in clinical presentation can be attributed to random chance. The clinical presentation was not significantly associated with either histological type.

Regarding the affected side, the current has shown a small right-sided predominance. Ossei et al. reported that the left side was the most common side affected by malignancy [27].

Concerning the pathological stage; it was found to be significantly associated with the pathological stage; as the cases of Wilm's tumor tended to be of a lower stage (among 64 cases of Wilm's tumor; 56.3% were in stage I, 35.9% were in stage II, 6.3% in stage III and 1.6% in stage IV). This is in agreement with Das et al. who found that most of the cases of WT were in stage I (55.55%) and in stage II (33.33%)[24]. Moreover, most of the cases of Wilm tumor were of triphasic type, indicating a favorable histology. These findings are fortunate, as the prognosis of Wilm tumor depends on stage and histology (Favorable histology has survival rates of 99% to 86%, while unfavorable histology survival ranges from 84% to 38%, depending on the stage)[28]. Das et al. showed that of the 18 cases included in their study, 17 cases (94.4%) showed a favorable histology and only one case (5.6%) had an unfavorable histology [24]. However, an Iraqi study by Phelps et al. revealed that among 20 patients with Wilm's tumor, 14/20 (70%) had advanced stages (III and IV)[29]. In Basrah, Almoamin et al. also reported that 49.3% were at advanced stages (III, IV, V) and only 65.6% had favorable histology [23]. The higher early-stage rate in our study can be attributed to its setting, as it was conducted in a tertiary center where early diagnosis is more feasible.

A notable finding of the present study is that neuroblastoma was the second most common malignant tumor in the pediatric age group. Unfortunately, staging of these tumors was not available in the present study. Parukuttyama et al. reported that among patients with neuroblastoma, 15% of children had early-stage disease and 85% had advanced disease (5 with stage III and 22 with stage IV disease)[30].

Conclusions Based on the findings of the present study, the following can be concluded: Malignant tumors make up the vast majority of renal tumors. Wilm's tumor is the predominant malignant tumor. Fortunately, most cases of Wilm tumors exhibited an early stage and favorable histology. Neuroblastoma was the second most common malignant tumor. The abdominal lump is the most common presentation of pediatric renal tumor.

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