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Original Article

Outcomes of Pediatric Renal Tumors over 5 Years in Regional Cancer Center, Kidwai Memorial Institute of Oncology, Bengaluru, South India

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Abstract

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Wilms' tumor (WT) is the most common malignant renal tumor in the pediatric population and it is managed with a multimodal treatment. Improvements in chemotherapy and risk stratification have led to dramatic improvement in the prognosis of renal tumors, which was once a lethal malignancy. Seventy-three patients with histopathologically proven diagnosis of renal tumor who received treatment from January 2011 to December 2015 were included for analysis. Eight children underwent upfront nephrectomy. The patients were analyzed for event-free survival and overall survival. The outcomes were correlated with age, sex, stage at presentation, and histology. A favorable histology was found in 74% patients, while an unfavorable histology was observed in 26% of the cases. The 5-year event-free survival was 82.7% and overall survival was 87.6%. The stage at presentation had a prognostic value ($p < 0.001$). Tumor histology was the single most important factor in predicting the survival.

Keywords

- renal tumor
- Wilms' tumor
- children

Introduction

The kidney is the site of around 7% of pediatric malignancies including nephroblastoma (Wilms' tumor), clear cell sarcoma of the kidney (CCSK), malignant rhabdoid tumor, renal cell carcinoma, and congenital mesoblastic nephroma. Wilms' tumor is the most common malignant renal tumor in the pediatric population. It accounts for 90% of all malignant renal tumors.[1] It is the fourth most common pediatric cancer. In India, documented incidence of renal tumors is 0.9 to 5.5% in boys and 1.9 to 6.8% in girls. Data regarding the outcome of treatment in India are scarce; hence, our study aims in bridging the lacuna.

Materials and Methods

All the patients with proven diagnosis of renal tumor between the period of January 2011 and December 2015 were identified from the hospital records. Details of the demographic profile, clinical features, imaging studies, histopathology, treatment, and outcome were collected as per a predesigned proforma.

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The initial diagnostic workup of these patients included complete blood count, renal function, and liver function. Imaging included abdominal ultrasonography and contrast-enhanced computed tomography of the abdomen and thorax. Image-guided tissue diagnosis was done in all children. Bone scan and serum calcium were done in patients with clear cell sarcoma kidney.

The patients were treated as per the International Society of Paediatric Oncology (SIOP) protocol and only 8 of 73 underwent upfront nephrectomy.[2] The patients with locally advanced renal tumor received 4 weeks of vincristine and dactinomycin chemotherapy, and those with metastatic disease receive 6 weeks of vincristine, dactinomycin, and doxorubicin chemotherapy. The mean, median, event-free survival, and overall survival were evaluated for all patients using the Kaplan–Meier curve (SPSS 19, IBM SPSS Inc., United States).

Results

Seventy-nine patients were registered during the study period, and 6 of them were excluded as they did not opt for treatment. Hence, 73 patients were analyzed. The age of the patients ranged from 1 month to 10 years. In all, 78.1% presented with abdominal mass, 26% with abdominal pain, 6.8% had hypertension, and 1.4% had hematuria. Left renal mass was found in 56.2% patients, while 41.1% had right side renal mass and 2% had bilateral Wilms' tumor. In total, 54.8% of the patients were below the age of 2 years and 45.2% were above 2 years, with a mean age of 5.5 years. The male-to-female ratio was 1.8.

There were 27.4% patients in stage I, 15.1% in stage II, 46.6% in stage III, 8.2% in stage IV, and 2.7% in stage V. The risk stratification included the following: 83.6% intermediate risk (favorable histology: 74%; focal anaplasia: 9.6%) and 16.4% high risk (diffuse anaplasia: 6.8%; blastemal: 4.1%; clear cell: 5.5%). All the patients received adjuvant chemotherapy and radiotherapy as per stage and risk stratification. There were in total eight deaths (seven due to progressive disease at local and metastatic sites and one due to relapse). None of the deaths occurred due to treatment-related toxicity. The 5-year survival as per stage was as follows: stage I, 100% ($n = 20$); stage II, 100% ($n = 10$); stage III, 89.2% ($n = 21$, 2 event); stage IV, 0% ($n = 1$, event = 1); and stage V, 50% ($n = 2$, 1 event). The 5-year survival as per histology as follows: 91.7% in intermediate risk (favorable and focal anaplasia) and 73.25% in high risk (including diffuse anaplasia, blastemal, clear cell sarcoma variant). The 5-year event-free survival was 82.7% and overall survival was 87.6% (►Figs. 1 and 2; ►Tables 1 and 2).

Discussion

The age and gender distributions were similar to those in other large series.[3] The median age was 5.5 years. Males were affected most commonly (61.6%). The most frequent presenting feature in our study was abdominal mass (78%) compared to 50% in another Indian study.[3] The majority (46.6%) of patients presented with stage III disease in our study. This is in contrast to other study done by Stephen et al, where early presentation is much commoner.[4] This may be due to the fact that the majority of patients present with advanced disease. A favorable histology had an event-free survival of 91.7%. Age and sex did not contribute to prognostication ($p = 0.915$ and 0.154, respectively). Stage at presentation had prognostic value ($p < 0.001$). Compared to stages I to III, stage IV had poorer outcome in terms of survival. A favorable histology had a significant impact on survival ($p = 0.0025$) compared to other

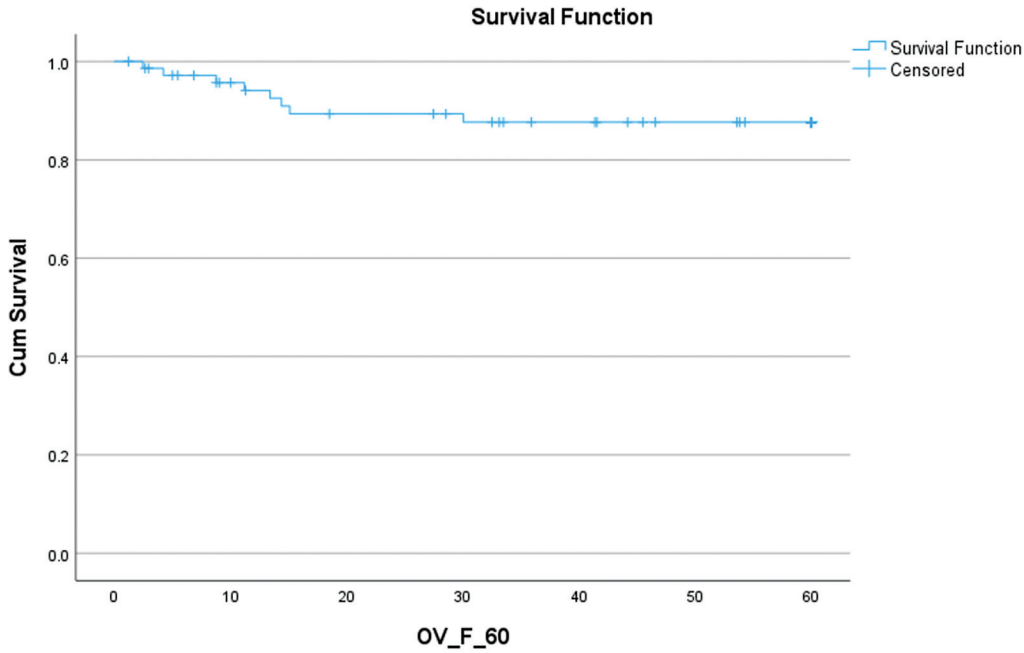

Fig. 1 Kaplan–Meier curve analysis. In our study, the estimated overall survival was 87.6% at five years. X-axis: overall survival in months; Y-axis: cumulative survival.

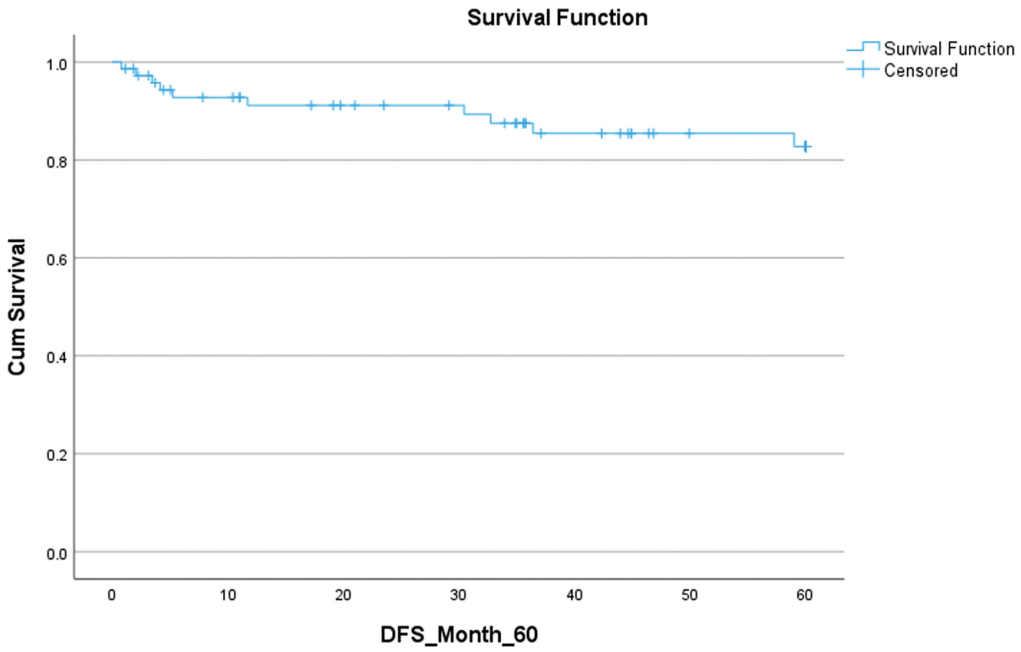

Fig. 2 Kaplan–Meier curve analysis. In our study, the calculated event-free survival was 82.7%. X-axis: disease-free survival (DFS) in months; Y-axis: cumulative survival.

Table 1 Clinical features and percentage in our study

Clinical features		No. of cases (%)
Age	<2 y	40 (54.8)
	>2 y	33 (45.2)
Sex	Male	45 (61.6)
	Female	28 (38.4)
Laterality	Right	30 (41.1)
	Left	41 (56.2)
	Bilateral	2 (2.7)
Stage at presentation	I	20 (27.4)
	II	11 (15.1)
	III	34 (46.6)
	IV	6 (8.2)
	V	2 (2.7)
Histology	Favorable	54 (74)
	Focal anaplasia	7 (9.6)
	Diffuse anaplasia	5 (6.8)
	Blastemal	3 (4.1)
	Clear cell sarcoma	4 (5.5)

Source: This study.

histological types. Out of 73, 10 patients relapsed: 7 with progressive disease and 3 with pulmonary metastasis. Late and advanced stages at presentation are still a major problem in the Indian setting.

The event-free survival for a favorable histology in stages I and II was 100 and 60%, respectively, and 50% with an unfavorable histology and higher stages. Advanced stages pose the risk of survival because of inoperability, and an unfavorable histology is an individual prognostic factor.[5] Neo-adjuvant chemotherapy followed by surgical intervention seems to be a better option for these patients. Clear cell sarcoma is less responsive to chemotherapy.

A larger sample size would provide greater confidence and more accurate conclusion of this study, which is renal

Table 2 Histology and stage of our study in comparison with National Wilms Tumor Study stage IV (NWTS IV)

Histology	Stage	Our study	NWTS IV[2](Geen et al.)
Favorable	I	100%	94.9%
	II	100%	85.9%
	III	89.2%	91.1%
	IV	0	80.6%
	V	50%	
Focal anaplasia	I–IV	84%	
Diffuse anaplasia	I–IV	60%	83.3%
CCSK	I–IV	50%	84.1%

Abbreviation: CCSK, clear cell sarcoma of the kidney.

tumor has a good prognosis in the Indian scenario. A more comprehensive investigation with special attention to loss of heterozygosity (LOH) at chromosomes 1p and 16q[6] and long-term follow-up of patients for studying the late effects of treatment and survival are recommended.

Conclusion

Children with childhood renal tumor present in advanced stages in our setting. This poses poor prognostication. Histology is the most important predictor in outcome, with a favorable renal tumor histology demonstrating a better prognosis.

Conflict of Interest

None declared.

Acknowledgments

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