



## Original Article

# A Study of Unusual Renal Neoplasms of Childhood in a Tertiary Care Centre of Eastern India for last 5 years

Author

**Dr Sanghamitra Mukherjee**

Assistant Professor, Pathology, RGKar Medical College, Kolkata, India

\*Corresponding Author

**Dr Sanghamitra Mukherjee**

## Abstract

*Paediatric renal neoplasms present special challenges to the surgical pathologists because of their histological diversity. Wilms' tumor is the commonest amongst these. Lack of familiarity with the other pediatric renal neoplasms can lead to erroneous diagnosis. All resected specimens of kidney tumors over a period of 5 years were studied. Out of total 36 cases, there were 27 cases of Wilms' tumor. Amongst the other 9 cases, there were 3 cases of congenital mesoblastic nephroma, 2 cases of multicystic nephroma, 3 cases of clear cell sarcoma and 1 case of rhabdoid tumor. The cases of mesoblastic nephroma and multicystic nephroma are all doing well on follow up but the cases of clear cell sarcoma and rhabdoid tumor were associated with poor prognosis.*

**Keywords:** *Mesoblastic Nephroma, Multicystic Nephroma, Clear Cell Sarcoma, Rhabdoid tumor.*

## Introduction

Renal neoplasms of paediatric age group are rare. Wilms' tumor is the commonest and predominant entity amongst them. Other tumors in this group include mesoblastic nephroma, multicystic nephroma, clear cell sarcoma, rhabdoid tumor, intra-renal neuroblastoma etc and together they comprise less than 10% of paediatric renal tumors.<sup>[1]</sup>

Lack of familiarity with these other paediatric renal neoplasms can lead to erroneous diagnosis. It is important to establish the diagnosis accurately as these tumors range from benign tumors like mesoblastic nephroma to those associated with poor outcome like rhabdoid tumor. This study was done to analyze the histopathological

spectrum of these unusual paediatric renal neoplasms.

## Case Reports

Mesoblastic Nephroma (cases 1, 2 & 3):

Two girls, both aged 3 months and a 2.5 month old boy presented with abdominal mass (Table 1). Abdominal ultrasonography and contrast-enhanced computed tomography revealed the masses to be of renal origin. All three patients underwent nephrectomy. On slicing, one of them showed a whitish homogenous tumor with a whorled surface. The second one showed a large pale cream, soft, solid tumor. Histologically, both the tumors showed spindle cells growing in fascicles with low cellular density, no cellular

atypia and infrequent mitosis. Entrapped renal glomeruli and tubules were present near the margin of the tumor. Dysplastic cartilage was also found in one case surrounded by the tumor cells (Fig1a). Angiomatous vascular proliferation was found in one case at the advancing margin of the tumor (Fig 1b). Evidence of renal dysplasia with dilated tubules surrounded by collars of mesenchyme and foci of cartilage was found entrapped within the tumor in one of the cases (Fig1c). There was no blastemal component even after extensive sampling of the tumors and the diagnosis of classical mesoblastic nephroma was made. In the third case, the kidney was 10x6x4 cm in size and weighed 410 g. Cut section showed a large pale-cream gelatinous tumor, 8x5x4 cm in size, almost replacing the whole parenchyma. The mass was partly cystic and partly solid (Fig1d). Microscopically, the tumor was composed of fascicles and sheets of oval to spindle monotonous cells. It showed increased cellularity, brisk mitosis (Fig1e), focal areas of necrosis and interdigitating borders and a diagnosis of cellular mesoblastic nephroma was made. No epithelial and blastemal component was noted even after extensive sampling of the tumor. No postoperative chemotherapy was administered in any of the three cases and two years postoperative follow up was event free.

#### Multicystic Nephroma (cases 4 and 5):

Two boys, aged 12 and 18 months presented with abdominal masses detected by their mothers (Table 1). Abdominal ultrasound suggested the possibility of cystic dysplastic kidneys and nephrectomy was performed. Grossly, the kidneys measured 7x5x4 cms and 6x5x4 cms, respectively. Both the kidneys were replaced by several cysts varying in size from 0.5-2.5 cms (Fig 2a). On microscopic examination, these cysts were lined by a single layer of cuboidal epithelial cells, some with hobnail configuration and surrounding stroma was fibrous (Fig 2b, 2c). Blastema condensed beneath the lining epithelium and small islands of immature mesenchyme was

noted in one of the cases (Fig 2d). However, solid neoplastic nodules were lacking. A diagnosis of multicystic nephroma was made on this. Both the patients are doing well on follow up and chemotherapy was not given.

#### Clear Cell Sarcoma (cases 6, 7 and 8):

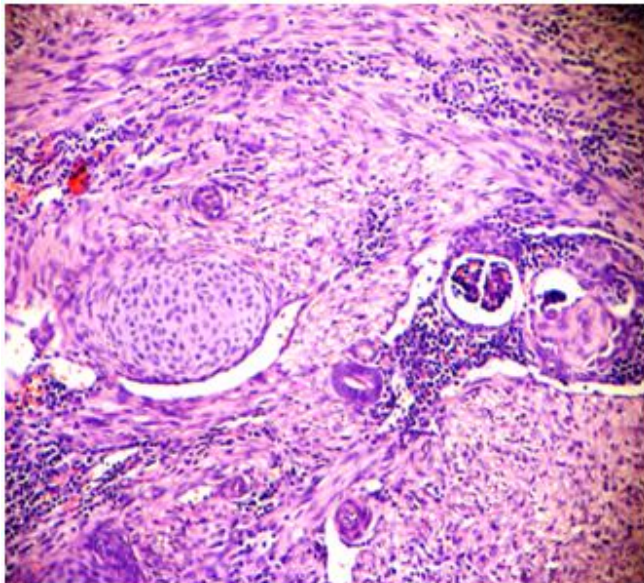
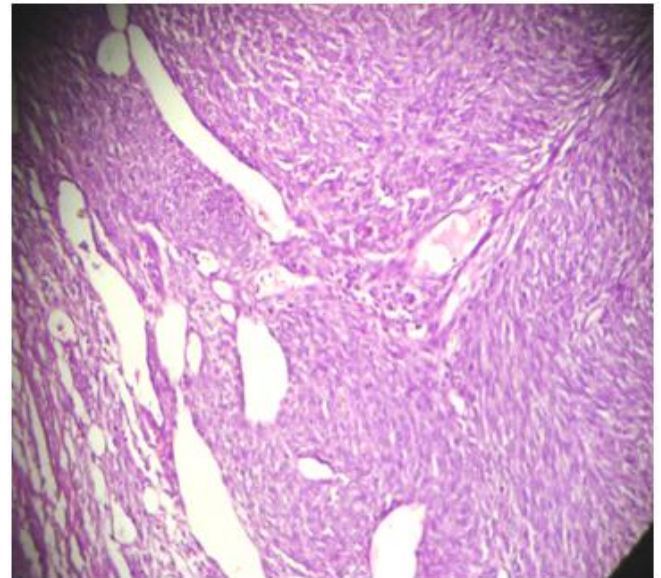
Two boys aged 18, 24 months and a girl aged 30 months presented with abdominal masses (table 1). Abdominal ultrasound revealed masses to be of renal origin and diagnosis of Wilms' tumor was suspected in all these cases. All the patients underwent nephrectomy. The kidneys were found to be replaced by large pale-cream solid masses without noticeable areas of hemorrhage and necrosis. Histology showed complete lack of tubular and blastemal components. All the tumors were composed of sheets of uniform cells separated by delicate capillary network of vessels (Fig3a). The cells had clear cytoplasm in most places, however, granular in other areas. The nuclei had finely dispersed chromatin and inconspicuous nucleoli (Fig 3b). The stroma was, at places, cystic and myxoid. Entrapped tubules and glomeruli were noted at the infiltrating border of the tumor. Diagnosis of clear cell sarcoma was made in all the cases. All the three patients were put on post-operative chemotherapy. One patient was lost to follow up and another patient died 4 months after diagnosis during chemotherapy. One case developed skeletal metastases in the rib and died subsequently.

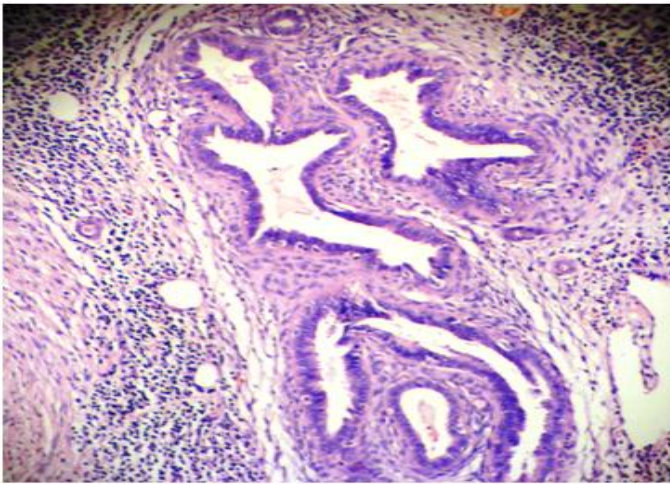
#### Rhabdoid Tumor (case 9):

A 9 month old boy came with presentation similar to the above cases (Table 1). On gross examination, a large pale-cream tumor mass weighing 600 gms was noted replacing the entire kidney. Microscopically, the tumor was composed of large, atypical mononuclear cells with a prominent nucleolus in each nucleus (Fig 4). The cytoplasm was eosinophilic in appearance, mitotic figures were identifiable. However, anaplasia, as defined in Wilms' tumor was lacking. The diagnosis of rhabdoid tumor was made. Patient died 3 months after nephrectomy.

**Table1:** Summary of clinical data and histological features

Case	Age	Sex	Presentation	Treatment	Histology	Outcome
1	3 months	F	Abdominal mass	Nephrectomy	Classical mesoblastic nephroma	2 year follow-up:uneventful
2	2.5 months	M	Abdominal mass	Nephrectomy	Classical mesoblastic nephroma	2 year follow-up:uneventful
3.	3 months	F	Vomiting and Abdominal mass	Nephrectomy	Cellular mesoblastic nephroma with brisk up:uneventful	2 year follow-up: mitosis
4.	12 months	M	Abdominal mass, detected by mother	Nephrectomy	Multicystic Nephroma with multiple cysts	2 year follow-up:uneventful
5.	18 months	M	Abdominal mass, detected by mother	Nephrectomy	Muticystic Nephroma	2 year follow-up:uneventful
6.	18 months	M	Abdominal mass	Nephrectomy,post-op chemotherapy	Classical variety of Clear cell sarcoma	Lost to follow-up
7.	24 months	M	Abdominal mass	Nephrectomy, post-op chemotherapy	Classical variety of Clear cell sarcoma	Died 4 months after diagnosis
8.	30 months	F	Abdominal mass	Nephrectomy, post-op chemotherapy	Classical variety of Clear cell sarcoma	Died with skull mets.
9.	9 months	M	Abdominal mass	Nephrectomy,post-op chemotherapy	Rhabdoid tumor with brisk mitosis	Died 3 months after diagnosis

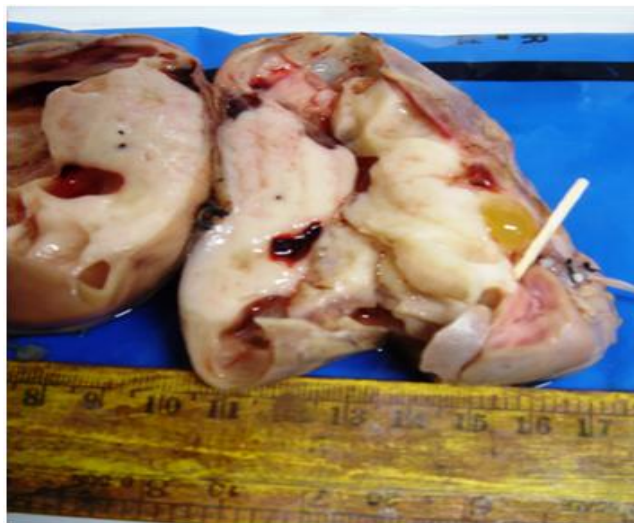
**Fig.1a-** Photomicrograph showing low power view of dysplastic cartilage surrounded by spindle cells**Fig.1b-** Photomicrograph showing haemangiopericytomatous vascular proliferation at the advancing age of the tumor



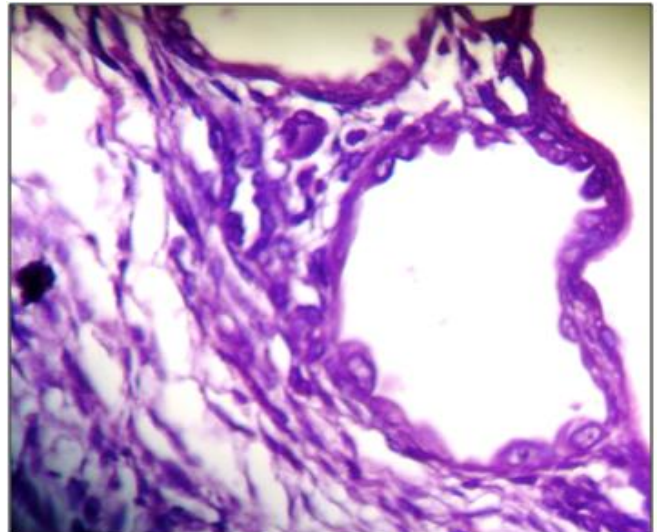
**Fig.1c-** Photomicrograph showing low power view of dysplastic tubules surrounded by collars of mesenchyme (within the tumor)



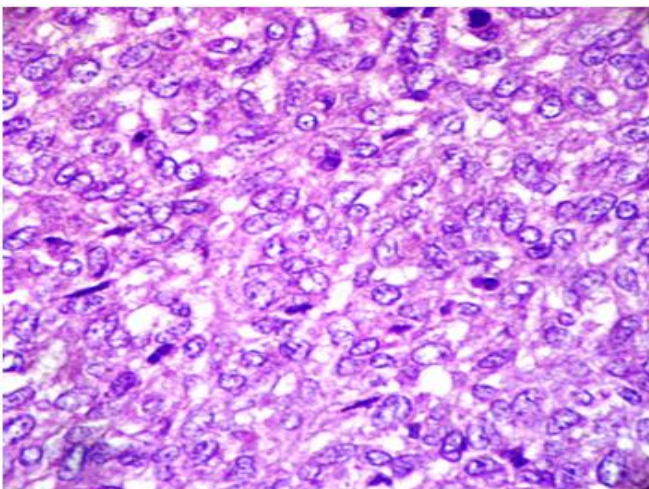
**Fig. 2a-** Photograph showing gross specimen of multicystic nephroma



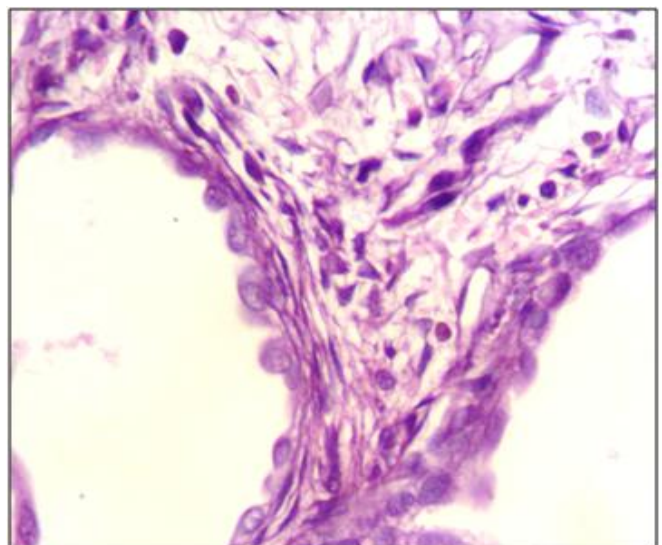
**Fig. 1d-** Photograph of the gross specimen of cellular mesoblastic nephroma showing large, pale-cream tumor with solid and cystic area



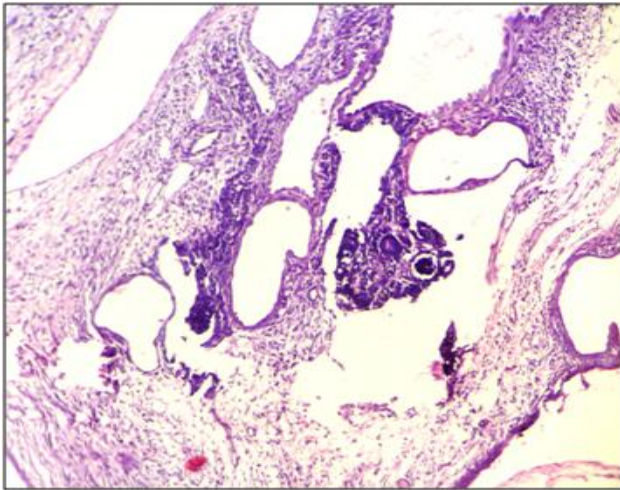
**Fig. 2b-** Photomicrograph showing cystic spaces lined by hobnail cells



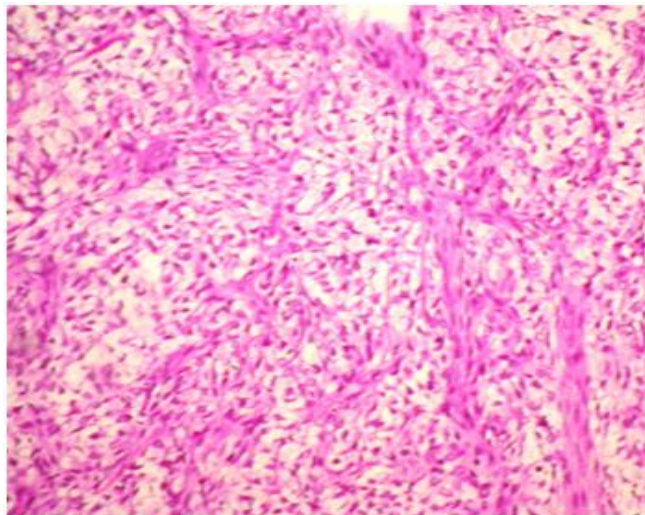
**Fig.1e-** Photomicrograph showing high power view of cellular mesoblastic nephroma with brisk mitotic activity



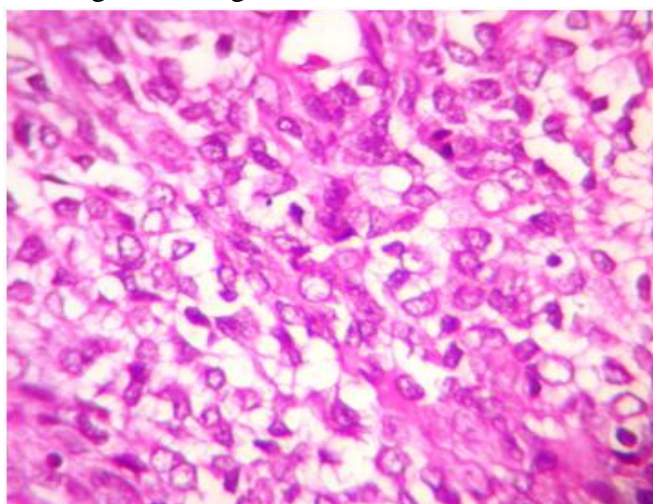
**Fig 2c-** High power view of the same



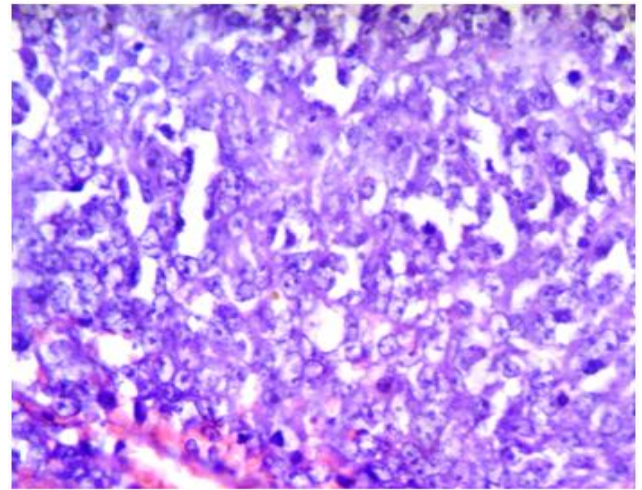
**Fig. 2d-** A case of multicystic nephroma with entrapped tubular and blastemal elements moulded along the walls of the dilated spaces



**Fig.3a-** Low power view of clear cell sarcoma showing arborizing delicate vascular network



**Fig. 3b-** High power view of CCSK showing vesicular nuclei and inconspicuous nucleoli



**Fig. 4-** Photomicrograph of Rhabdoid tumor showing sheets of large round cells. Prominent nucleoli can easily be discerned at this power.

### Discussion

Paediatric renal neoplasms present special challenges to the surgical pathologists because they are often undifferentiated and their histological diversity includes mimicry with other renal and extra-renal tumors. Lack of familiarity with these tumors can lead to erroneous diagnosis. A combination of careful gross examination followed by detailed microscopic study is required to arrive at a correct diagnosis. It is important as these tumors range from those which do not require chemotherapy and follow-up (e.g. Mesoblastic nephroma, multicystic nephroma) to those with a prognosis far worse than the usual favorable histology Wilms' tumor (e.g. clear cell sarcoma, rhabdoid tumor) and varying chemotherapeutic regimen.

In our small series, mesoblastic nephroma formed 8.33% of total cases. This was slightly higher than that reported in literature which is, 5%.<sup>[2]</sup> The main differential diagnoses of mesoblastic nephroma are stroma predominant Wilms' tumor and spindle cell variant of clear cell sarcoma.<sup>[3]</sup> The age of presentation is extremely important as mesoblastic nephroma typically presents in the first 3 months of life as found in our cases.<sup>[4]</sup> The haemangiopericytomatous vessels at the periphery and entrapped tubules and glomeruli<sup>[3]</sup> also favor a diagnosis of mesoblastic nephroma over Wilms'

tumor. In one of the cases, presence of foci of cartilage and entrapped dysplastic tubules were noted which is rarely seen in mesoblastic nephroma.<sup>[5]</sup> Cellular mesoblastic nephroma is shown to be associated with ETV6/NTRK3 fusion transcript.<sup>[6]</sup> A possible link of cellular mesoblastic nephroma with congenital fibrosarcoma has been suggested on the basis which bears a similar fusion transcript. The absence of this translocation helps to differentiate clear cell sarcoma from cellular mesoblastic nephroma.

Multicystic nephroma is an extremely rare tumor and needs to be distinguished from renal dysplasia,<sup>[3]</sup> cystic Wilms' tumor<sup>[3]</sup> and polycystic renal disease.<sup>[7]</sup> Presence of foci of cartilage, immature tubules and foci of dysplasia are completely lacking in multicystic nephroma. The tiny foci of immature blastemal element present in one of our cases were found to be moulded along the dilated cystic spaces. However, expanding foci of immature blastemal tissue were lacking in this case. It is important to make accurate diagnosis in these cases as the nephrectomy alone is curative and do not require post-operative chemotherapy.

In the malignant end of the spectrum, clear cell sarcoma of the kidney (CCSK) forms the majority. CCSK is capable of mimicking, or being mimicked by, every other major paediatric renal tumor.<sup>[8]</sup> Because this neoplasm has a propensity for widespread metastases, it is included in the "unfavorable histology" category of the NWTs.<sup>[8]</sup> Grossly, this tumor is difficult to distinguish from Wilms' tumor. Similar to classical mesoblastic nephroma, entrapped uninvolved tubules and glomeruli immediately alert us against the possibility of Wilms' tumor. All our cases had the typical arborizing vasculature and focal clear cells with vesicular nuclei which supported the diagnosis of classical pattern of CCSK.<sup>[3]</sup> As this tumor can have innumerable histological variations, the diagnosis can be tricky and thorough search for focal classic appearance is mandatory to arrive at a correct diagnosis. CCSK

usually presents at a stage higher than Wilms' tumor and chemotherapeutic regimen is also more aggressive. Rhabdoid tumor is among the most malignant neoplasms of childhood and despite the intensified therapeutic regimens of recent NWTs trials, the prognosis for this neoplasm remains poor.<sup>[3]</sup> Attention to the nuclear details helps to distinguish rhabdoid tumor from CCSK. Exceptionally prominent nucleolus is diagnostic of rhabdoid tumor<sup>[3]</sup> in addition to co-expression of vimentin, cytokeratin and epithelial membrane antigen.<sup>[9]</sup> CCSK, on the other hand, expresses only vimentin.<sup>[3]</sup> Immunohistochemical differentiation from Wilms, tumor is sometimes confusing because the diversity of cell lines and degrees of differentiation imparts a correspondingly varied profile of immunohistochemical results.<sup>[10]</sup> Primary renal lymphoma of childhood is practically unheard of; however, histologically high grade lymphoma forms the differential diagnosis of rhabdoid tumor. Our case succumbed 3 months after diagnosis.

## References

1. Brocker B. Non-Wilms' renal tumors in children. *Urol Clin North Am* 2000;27:463-9.
2. Wozniak ZM, Sawicz- Birkowska K, Zaleaska- Dorobisz U, Rabezysknjh Jelen M, Apoznanski W. Congenital mesoblastic nephroma: a clinicopathologic study of five cases. *Med Wieku Rozwoj* 2006;10:677-86.
3. Pedram Argani, J Bruce Beckwith. Renal neoplasms of childhood. In, Sternberg (ed). *Diagnostic Surgical Pathology*, 4<sup>th</sup> edition. 2004;2001-2033.
4. Bisceglia M, Carosi I, Vairo M, Zaffarano L, Creti G Congenital mesoblastic nephroma: report of a case with review of the most significant literature. *Pathol Res Pract* 2000;196:199-204.
5. Nadasdy T, Roth J, Johnson DL, Bane BL, Weinberg A, Verani R et al. Congenital

- mesoblastic nephroma: an immunohistochemical and lectin study. *Hum Pathol* 1993;24:413-9.
6. Rubin BP, Chen CJ, Morgan TW, Xiao S, Grier HE, Kozakewich HP et al. Congenital mesoblastic nephroma t(12:15) is associated with ETV6-NTRK3 gene fusion: cytogenetic and molecular relationship to congenital (infantile) fibrosarcoma. *Am J Pathol* 1998;153:1451-8.
  7. Cho KJ, Thornbury JR, Bernstein J, Heidelberger KP, Walter JF. Localized cystic disease of the kidney: angiographic-pathologic correlations. *AJR* 1979; 132:891-5.
  8. Beckwith JB. Tumors of infancy and childhood. In, Murphy WM, Beckwith JB, Farrow GM (eds). *Tumors of the kidney, bladder and related urinary structures: atlas of tumor pathology; 3<sup>rd</sup> series, Fascicle 11.* Washington DC, Armed Forces Institute of Pathology, 1994;12-91.
  9. Wick M, Ritter JH, Dehner LP. Malignant rhabdoid tumors: a clinicopathologic review and conceptual discussion. *Semin Diagn Pathol* 1995;12:233-48.
  10. Wick MR, Cherwitz DL, Manivel C, Sibley R. Immunohistochemical findings in tumors of the kidney. In, Eble JN (ed). *Tumors and tumor- like conditions of the kidneys and ureters.* New York, Churchill Livingstone, 1990;207-247.