Renal Primitive Neuroectodermal Tumor

Böbrek Primitif Nöroektodermal Tümmöörü

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Abstract

Renal primitive neuroectodermal tumor (PNET) is a rare entity and highly malignant neoplasm. It generally occurs in young adults and children. We report a case of 19-year-old female with the complaint of left flank pain. Ultrasonography showed a tumor of the left kidney. A big left inhomogeneous renal mass of 10x8 cm with areas of necrosis was observed on computed tomography. The patient underwent radical nephrectomy with lymphadenectomy. Immunohistochemical stains were positive for CD99 and FL-1. Immunohistochemical and microscopic results were compatible with PNET. Furthermore, the patient received eight cycles of chemotherapy, and was still alive without metastases at 6-month follow-up. Renal PNET is a rare and poor prognosis tumor. It is sometimes difficult to discriminate between PNET and Ewing's sarcoma. Renal PNET must be included in the differential diagnosis of renal tumors particularly in young adults and children. With this case report it aimed to create awareness about PNET.

Keywords: Primitive neuroectodermal tumor, kidney, Ewing's sarcoma

Öz


Anıtaar Kelimeler: Primitif nöroektodermal tümör, böbrek, Ewing’s sarcoma

Introduction

Primitive neuroectodermal tumor (PNET) is presumed to result from primitive neural crest cells and mostly involves the bone or soft tissue in children and young adults (1). PNET and Ewing’s sarcoma are considered almost the same entity because of the morphological and genetic similarities (2). Renal PNET is a rare condition having an aggressive clinical course towards metastatic disease and death. The median decade for renal PNET is second decade but it can be seen also in a wide age range between 3 and 78 years (3). It recurs locally and spreads to regional lymph nodes, lungs, liver, bone and bone marrow at an early disease stage (4). Prognosis seems to be better in younger patients, however, the 5-year disease-free survival rate is around 45-55% (5). We present a rare case of a 19-year-old female with renal PNET and a review of the literature.

Case Presentation

A 19-year-old female with the complaint of left flank pain for 1 week was admitted. Physical examination revealed a non-tender abdomen with fullness in the left upper quadrant. Laboratory evaluation, including complete blood count was normal.
Ultrasonography identified a left renal mass homogeneously hyperechogenic in comparison with renal parenchyma. Computed tomography scan showed a 10x8 cm substantive tumor involving the upper pole of the left kidney, while in the enhanced phase, the tumor presented inhomogeneous contrast enhancement with necrotic areas (Figure 1). Chest X-ray was negative.

The patient underwent left radical nephrectomy and retroperitoneal lymphadenectomy. Pathological analysis revealed a 13x8x5 cm tumor involving the entire left kidney, including Gerota's fascia, and negative surgical margins. The renal vein, ureter and lymph nodes were negative for malignancy. Histological examination revealed small circular undifferentiated tumoral cells with scarce cytoplasm, oval to round hyperchromatic nuclei. The tumor had massive areas of necrosis without tubule or rosette formation (Figure 2).

Immunohistochemistry revealed that tumor cells were strongly positive for MIC2 (CD99) as well as PanCK, CD56, CD57 and FL-1 (Figure 2). The tumor cells were negative for CK7, CK20, thrombomodulin, vimentin, neuron-specific enolase (NSE) and CD117. Based upon the immunohistochemical features and microscopic appearance, the diagnosis of PNET of the kidney was established. The pathologic stage of the tumor was pT3a. Eight cycles of chemotherapy with vincristine, ifosfamide and adriamycin, four cycles of ifosfamide and (etoposide) VP16 were sequentially performed and she was still alive without metastases at the 6-month follow-up.

**Discussion**

PNETs are small round cell tumors originating from cells of the primitive ectoderm and comprise 1% of all sarcomas (1). Renal PNET is rare entity and has aggressive behavior. It frequently occurs during childhood or adolescence, having an aggressive clinical course towards metastatic disease and death (6). The most common symptoms in renal PNET are flank pain (67.5%), hematuria (33.8%) and mass (33.8%). There is no relationship between the clinical manifestation and survival that is between the clinical signs and age (7). The mean survival is about 10 months. One patient was alive without evidence of disease with a survival of 64 months which seems to be the longest survival in the literature (5).

Renal PNET is diagnosed with pathological findings. Although Homer-Wright rosettes can be found also in neuroblastoma, these formations are the histologic hallmarks of PNET. Immunohistochemically, MIC2 (CD99), NSE, vimentin, synaptophysin and S-100 are expressed by PNET cells. The immune marker CD99 is present in virtually all tumors (8). However, CD99 is not specific and cannot be used as an absolute biomarker. The distinction from Wilms' tumor may be difficult, for Wilms' tumor may sometimes be positive for CD99. Nuclear protein FL-1 and WT-1 have been described in renal PNETs by Jimenez et al. (6). They observed FL-1 expression in 63% of PNETs, however it has not been found in Wilms' tumors. On the other hand, they did not view expression of WT-1 in renal PNETs whereas.

![Figure 1. Computed tomography scan of the kidney demonstrated a 10x8 cm substantive tumor involving the upper pole of the left kidney](image1)

![Figure 2. a) There is a thick capsule of the tumor is removed by the kidney with a sharp boundary (hematoxylin and eosin, x100), b) Neoplastic cells at the bottom right, shows perivascular pseudorosette formation and the upper left central necrosis and peripheral polizating (hematoxylin and eosin, x100), c) Neoplastic cells is greater magnification and narrow oval, round core coarse heterogeneous cytoplasm shows diffuse chromatin pattern (hematoxylin and eosin, x400), d) Tumor cells form Homer-Wright type rosettes, e) VT-1 negative expression, f) FL-1 diffuse nuclear positivity, g) CD99 diffuse cytoplasmic positivity, h) High positive Ki67 index (70%)](image2)
in 78% of Wilms' tumors. In this case, immunohistochemical stains were positive for CD99, PanCK, CD56, CD57 and FL-1 whereas negative for CK7, CK20, P63, WT-1, MACR, vimentin, thrombomodulin, synaptophysin, NSE, CRG and CD117. Both the pathological characteristics and the positive expression of CD99 and FL-1 as well as negative expression of WT-1 in the tumor cells could support the diagnosis of renal PNET.

The most common genetic mutation in PNETs is t(11;22) (q24;q12) and the erythroblast transformation-specific-related oncogene (11q24) has been detected in more than 90% of renal PNETs (9). Molecular testing is useful in situations with a confusing immunohistochemical profile. The diagnosis of renal PNET always needs to include tumor morphology, immunostaining profile and sometimes genetic mutations (10).

Renal PNET is a rare neoplasm with a poor prognosis and should be differentiated from other small cell tumors of the kidney. Specific histological features, immunostaining profile and genetic features must be considered in making the histologic diagnosis. Especially, immunohistochemical staining for CD99 and FL-1 with cytogenetic studies plays a great role in the diagnosis of renal PNET. In addition, multidisciplinary approach is essential in the management of renal PNET.

**Ethics**

**Informed Consent:** Written informed consent was obtained from the parents of the patient.

**Peer-review:** Externally peer-reviewed.

**Authorship Contributions**


**Conflict of Interest:** No conflict of interest was declared by the authors.

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**References**