Scrotal Peripheral Primitive Neuroectodermal Tumor

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Case Report

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Introduction

Primitive neuroectodermal tumor (PNET) is a rare malignant tumor originating from neuroectoderm that usually occurs in children or adolescent and is frequently located in the extremities, chest cavity, pelvic cavity and chest wall. We present a rare case of an 84-year-old man with a history of PNET in the scrotal sac, to our knowledge not previously published in the literature. The presence of a large irreducible mass in the inguinal sac forced to exclude a tumor. Ultrasound and MRI are very useful modalities to assess the location of the mass, its dependency from any organ and the tumoral internal structure. Molecular imaging with the detection of EWS-FLI1 fusion transcripts is useful for the diagnosis and differential diagnosis of Ewing sarcoma/pPNETs.

Abstract

The peripheral primitive neuroectodermal tumor (pPNET) is a rare malignant tumor originating from neuroectoderm that usually occurs in children or adolescent and is frequently located in the extremities, chest cavity, pelvic cavity and chest wall. We present a rare case of an 84-year-old man with a history of pPNET in the scrotal sac, to our knowledge not previously published in the literature. The presence of a large irreducible mass in the inguinal sac forced to exclude a tumor. Ultrasound and MRI are very useful modalities to assess the location of the mass, its dependency from any organ and the tumoral internal structure. Molecular imaging with the detection of EWS-FLI1 fusion transcripts is useful for the diagnosis and differential diagnosis of Ewing sarcoma/pPNETs.

Case Report

An 84-year-old man was admitted to our hospital with an inguinoscrotal, hard consistency, irreducible, and painless mass, which had progressed over the last 6 months. There was no presence of urinary or intestinal symptoms. Alpha-fetoprotein, beta human chorionic gonadotropin and lactate dehydrogenase values were found normal. Plain abdominal X-ray showed a normal gas pattern. Ultrasound revealed a large mass that occupied the scrotal sac without correctly identification of the testes, thus a magnetic resonance imaging was performed. It confirmed a 12 × 11 × 19 cm solid mass, with areas of necrosis and hemorrhage (fig. 1A). The testes showed a normal morphology and signal on T2-weighted sequences (fig. 1A). Based on these observations, the diagnosis of sarcoma was suggested.

The patient was operated (fig. 1B) and the pathologic (fig. 1C) report with the immunohistochemical stains revealed a rare presentation of a pPNET. The presence of neurosecretory granules in the electronic microscopy and the EWS-FLI1 translocation confirmed the diagnosis (fig. 2). Oncology and urology services decided to submit the patient to radiation therapy and performed a control CT in 6 months, which ruled out tumor recurrence.
**Discussion**

Inguinal masses may indicate different conditions and pathologies, ranging from congenital anomalies to neoplasms. Although inguinal hernias represent the majority “masses” in the inguinal canal, there are other rare lesions that may occur. For this reason, irreducible masses shall always receive an appropriate preoperative diagnosis. In this report, we describe a rare case of sarcoma/pPNET originating from the scrotal sac/inguinal canal in an adult patient.

pPNET is a highly malignant tumor and has poor prognosis. It’s an aggressive neoplasm, with a large size at presentation, which metastasize rapidly and predominantly affects children and adolescents [2–4]. The most frequent sites for pPNET are the soft tissues or bones of the chest, trunk, pelvis and paraspinal region; they occur less frequently at various other sites along the genitourinary tract, in the testes, the ovaries, the uterus and the pancreas. It is extremely rare in adults but some reports of genitourinary involvement have been described [2, 3].

PNET tumor shows no specific imaging features, but radiologic studies are useful to rule out other possible etiologies, defining the location of the tumor and its morphological characteristics as well as its distance extension. A recent article published by Tan et al. [5] reviewed their characteristics on imaging. These tumors were large soft tissue masses (the average diameter was 8.1 cm) with ill-defined margins and exhibited aggressive local extension into normal tissue. On unenhanced CT without contrast the tumors were iso-density and had areas of necrosis. On MRI the tumors were heterogenous hyper-intensity signal on T2. The presence of calcifications are uncommon occurring in less than 10% of tumors. A unique characteristics of pPNET was that most had heterogeneous enhancement, on CT and on MRI had significant enhancement.

Radical surgery is mandatory. On pathology examination, PNET is usually presented as a big grayish-white tumor with multiples areas of necrosis and hemorrhage [1, 7]. Calcifications are rare and sometimes it is surrounded by a fibrous capsule [1], as in our case. Histological study consists of small, round to ovoid hyperchromatic cells with minimal cytoplasm and the cells are often arranged in nests forming rosettes. This characteristic is more typical of Ewing sarcoma. In the adult the PNET couldn’t have this morphology because it is undifferentiated. All the tumors of the Ewing family are characterized by the staining of MIC2 (CD99) despite the fact that it’s not pathognomonic because it is also found in synovial sarcomas and gastrointestinal stromal tumors [1, 8]. In order to diagnose PNET, and differentiate it from other tumors of Ewing’s family, we need to demonstrate the expression of some neural markers on the immunohistochemical stains, including neurofilament, NSE (95%), Leu-7, vimentin, S-100, CD-56, chromogranin and synaptophysin [2]. A definitive finding is the EWS-FLI1 translocation, which is described in 95% but its presence is not mandatory for the diagnosis [7, 9]. Electron microscopy also displays the neural differentiation because neurosecretory granules could be found.

Fig. 1. Axial T2 TSE magnetic resonance imaging (A) shows a large heterogenous inguinocrotal mass that displaces the penis (void arrows) but apparently not infiltrates it. Note a central hyperintense area (black arrows) probably due to necrosis. Surgical photograph (B) shows the spermatic cord (white arrows), which is displaced but not affected by the large mass. A long axis section of the mass (C) reveal a heterogeneous tumor of mottled appearance with partially embossed, clear brownish areas, which are the solid ones (black asterisks). It also has extensive necrotic and hemorrhagic component (white asterisks).
Fig. 2. The extensive immunohistochemical study (× 400) shows a positive immunostaining of tumor cells with the O13 (CD99) antibody, which is diffusely brown colored (A), a negative staining with cytokeratin AE1-AE3 (B) (the tumoral cells are blue stained with no brown color, typical of a positive reaction) which ruled out the existence of a metastasis of neuroendocrine carcinoma or a synovial sarcoma (which are CD99 positive) and also staining with CD56 (C) and chromogranin (D) (× 1000). Electronic microscopy (E) confirms the presence of neuroendocrine granules (white circles) of various sizes (from 80 to 120 nm) in the cytoplasm of the tumor cells. This finding demonstrates the neuroendocrine differentiation of the neuroectodermal tumor.

Comprehensive therapy may include surgery, chemotherapy and radiotherapy. There is no consensus about the treatment of these tumors because there are few cases reported in the literature. For this same reason, it’s also difficult to make an inference of stage progression based on the tumor size or site [2]. The best treatment option is to perform an appropriate preoperative work-up in order to plan the surgery [3]. On approach, in stage I (tumor size < 5 cm) complete resection of tumor is enough and in stage II (gross tumor resection but residual microscopic disease) surgery followed by irradiation is the treatment of choice [6]. If the tumor is inoperable, radiotherapy can be done as palliative treatment [3].

This is a poorly-known tumor, but there have been some markers described that confers a poor prognosis to the tumor as the synaptophysin expression and a palpable tumor mass. Fascina expression has been described in many carcinomas and some sarcomas associated with aggressive behavior of tumors, especially in relation to metastatic capacity. The absence of the EWS-FLI1 translocation might portend an unfavorable prognosis [2].

pPNET tends to recur locally and to metastasize early to regional lymph nodes, lungs, liver, bone, and bone marrow within 2–3 years after surgery, with a resulting of very poor prognosis. Outcome depends upon the localization and staging of the tumor, age of the patient, histologic classification, extent of surgical resection and time to treatment.
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