**CASE REPORT**

Peripheral Primitive Neuroectodermal Tumor of Breast

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**ABSTRACT**

Peripheral primitive neuroectodermal tumor (PNET) is a malignant tumor of the young, usually found in bony structures. It is extremely rare to find it in the breast. Only 9 cases have been reported in the medical literature. A 35-year lady had a painless lump in upper left outer quadrant of her left breast which appeared as a BIRADS III lesion on mammography. However, biopsy and later surgery was done on clinical grounds. Histopathology and immunohistochemistry diagnosed a PNET tumor. It had recurred 8 years after surgery and required chemotherapy.

**Key Words:** Breast cancer. PNET. Recurrence. Chemotherapy.

**INTRODUCTION**

Peripheral primitive neuroectodermal tumors (PNET) are highly malignant tumors comprising small round cells of neuroectodermal origin. Batsakis et al. classified the primitive neuroectodermal tumors into the following 3 groups: Central nervous system primitive neuroectodermal tumors; neuroblastomas - derived from the autonomic nervous system; peripheral primitive neuroectodermal tumors (PNETs) - derived from tissues outside the central or autonomic nervous system.1 The variant PNET usually occurs in bony tissues of adolescents and the young.2 A PNET arising from the breast is extremely rare and, according to our research, only 9 cases have been reported in the literature.

This is a case of a patient with PNET of the breast which was treated surgically and recurred after 8 years of surgical treatment.

**CASE REPORT**

The patient was a 35-year female with past history of excision of a painless swelling in the upper left outer quadrant of her left breast, 8 years back. There had been no clinical or radiological evidence of any metastasis. The patient had not been offered any other adjuvant treatment. The patient had not followed-up for further evaluation and no records were available of the histopathology of the resected lesion. For 8 years, the patient was fine till two and a half months before presentation. She was again noted to have a painless swelling in the upper left outer quadrant of the same breast without any nipple discharge.

On clinical examination, a swelling was noted in the upper left outer quadrant of the left breast. It was mobile, hard, non-tender, with normal areola and nipple. The swelling was 3 x 4 cm in size. There was no axillary or cervical lymphadenopathy and rest of the clinical examination was normal. A mammography showed a well defined radio-opaque shadow along the axillary tail of the left breast, classified as BIRADS III lesion (Figure 1). There was no calcification and rest of the breasts was normal. An initial impression was of a possible adenocarcinoma of breast with recurrence.

FNAC of the lesion was done on clinical suspicion which revealed PNET. Contrast enhanced CT of chest, abdomen, and pelvis revealed no evidence of any primary or secondary growth other than in the mentioned breast. Bone scan and bone marrow examinations were also normal.

The patient underwent surgery and a wide local excision with axillary clearance was done. A 3 x 4 cm growth was noted with enlarged axillary nodes. On histopathological examination, PNET was confirmed (Figure 2). There was no evidence of vascular, perineural or nodal metastasis. Deep resection margin and nearest skin margin were positive for tumor cells. Thus the lesion was classified as T2N0MO with Bloom Richardson grade II. On immunohistochemistry, the growth was positive for CD99, negative for estrogen, progesterone receptors and leukocyte common antigen LCA (Figure 3).

With these findings, a final diagnosis of PNET of the breast with recurrence was made. The patient was put on adjuvant chemotherapy with vincristine, adriamycin, cyclophosphamide, alternating with ifosphamide and etoposide. At 6 months follow-up, there was no clinical or radiological sign of local or distant recurrence of the tumor, and the patient was having a good quality of life.

**DISCUSSION**

Peripheral primitive neuroectodermal tumors (PNET) are small round cell tumors, found mostly in bones and soft tissues of the limbs.2 The tumors arise from...
neuroectodermal elements that develop from migrating embryonic cells of the neural crest. PNETs are composed of small, malignant, undifferentiated cells, and often present in the trunk or axial skeleton in adolescents. PNETs were first described by Askin et al. in 1979. Primary PNETs have a predilection to occur in the truncal and axial soft tissue, in the chest wall called as Askin tumor, 50 - 60% of cases in the paravertebral region, and the extremities (20 - 25% of cases). Very rarely these may occur in the kidney, ureter, bladder, ovary, pancreas, uterus, parotid gland, lungs, testis and seminal vesicles. Only 9 cases of primary PNETs of the breast have been reported in medical literature.

PNETs clinically present with a painful mass and constitutional symptoms most of the times. Other symptoms and signs are specific to the organ involved, like cranial neuropathies, exophthalmos, headache, epistaxis, nasal obstruction, anosmia and neck masses. On light microscopy, PNETs appear as an unvarying collection of small, round, dark staining cells. But PNETs cannot be differentiated from other tumors with small round cells based on histological findings alone. This group of tumors is characterized by the presence of the typical translocation (11; 22) (q24; q12) and the expression of CD99 antigen (MIC2) on immunohistochemistry. Immunohistochemistry can be used to detect antibodies to FLI-1 in the gene fusion product of EWS. PNETs typically co-express CD99 and vimentin. Other markers are S-100, neuron-specific enolase, synaptophysin and CD75.

A review of the reported cases of PNETs of breast shows that the presentation is usually of a breast lump, painless or painful. Majority of these are small in size at presentation. All cases, except one, presented with unilateral breast involvement. Pulmonary metastasis was seen in two cases. Four of ten patients were free of disease at a variable follow-up of 6 - 36 months, two had local and pulmonary progression, two died, and the follow-ups of two were not known. The size of the tumor shows relation to prognosis with tumors more than 3.5 cm showing worse prognosis. With the limited data available, a comment cannot be made about the relation of age to the prognosis of PNET of breast. In all cases of suspected PNET of breast, imaging should be carried out to screen the primary locations, most frequently affected by this tumor, in order to differentiate primary from metastatic disease.

This case refers to a young patient with a primary PNET of her left breast and no evidence of local or distant metastasis. It was thus considered a PNET primarily arising from the breast. This patient has the longest follow-up of all the cases reported. As the patient had local recurrence after surgical treatment, so we suggest therapy of every case should be individualized. Further work needs to be done to frame guidelines. An absence of metastatic disease at the time of diagnosis may favour a good prognosis as was in this case, who survived the disease for 8 years.

A complete resection of the tumor with negative margins is important in surgically treating PNETs. In some cases, the truculent nature and diffuse spread of these tumors prove a hurdle for complete surgical excision. Current recommendations are for complete surgical resection whenever possible, adjuvant versus neoadjuvant chemotherapy, and radiotherapy. Carvajal and Meyers, in a review of the chemotherapeutic regimens for the treatment of PNETs, recommend a regimen that includes vincristine, doxorubicin, and cyclophosphamide with ifosfamide and etoposide.

PNET is a rare malignancy of breast. It may not always have an aggressive course; and proper surgical and chemotherapy should be offered. Histopathology and immunohistochemistry are essential for the diagnosis. Literature is limited about this malignancy, so in the absence of no proper recommendations about treatment, individualized decisions about patients should be made.

REFERENCES

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