Primitive Neuroectodermal Tumour of Breast—A Case Report

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Case Report

Fifty year old lady presented to the surgical outpatient department of our hospital with 5 months history of lump in right breast with skin ulceration. Seven months ago patient had undergone lumpectomy elsewhere which was reported as phylloides tumour. Fine needle aspiration cytology (FNAC) performed on this recurrent lump, elsewhere, was opined as carcinoma of breast. FNAC slides reviewed at our institution were reported as a malignant lesion not further characterized. On clinical examination there was a large mass in the right breast with skin ulceration in the inner medial quadrant (Fig. 1a). There was no axillary lymphadenopathy. Computed tomography was suggestive of 14×10 cm mass in right breast with heterogeneous contrast enhancement (Fig. 1b). There was no evidence of metastatic disease on whole body 18-Fluoro-deoxy-glucose Positron emission tomography-Computed tomography (^{18}F FDG-PET-CT). Mammogram of left breast was normal. Incisional biopsy revealed a high grade undifferentiated malignancy with features suggestive of malignant round cell tumour. Immunohistochemistry (IHC) showed positivity for vimentin, bcl2 and CD 99 (strong membrane positive). CD34, leucocyte common antigen (LCA) and pancytokeratin were negative in the tumour cells. The provisional diagnosis rendered was malignant round cell tumour and possibilities considered were synovial sarcoma or PNET/ES.

Per operatively, the lump was found to be adherent to pectoralis major muscle. The patient underwent mastectomy with removal of pectoralis major muscle. Histopathologic examination of the specimen revealed diffuse sheets of round cells with pleomorphic nuclei and brisk mitotic activity (Fig. 1c). IHC studies confirmed the findings of incisional biopsy (Fig. 1d). FISH assessment was performed on interphase cells of formalin fixed paraffin embedded tissues and tested for SYT and EWSR1 gene rearrangements using the Vysis LSI SYT (18q11.2) dual color break apart rearrangement probe and Vysis LSI EWSR1 (22q12) dual color break apart rearrangement probe. The cells showed one green, one red and one fusion (orange/green) signal pattern suggestive of positivity for EWSR1 break apart rearrangement in 19 % of cells examined (Fig. 1e). However signal pattern demonstrated the absence of SYT (18q11.2) gene rearrangement. The histopathology in correlation with IHC and FISH findings was consistent with the diagnosis of PNET/ES. In absence of disease elsewhere diagnosis of primary PNET/ES of breast was made.

The patient is disease free at 8 months follow up and undergoing chemotherapy (Ifosfamide and etoposide alternating with vincristine, doxorubicin and cyclophosphamide).

Discussion

The ES/PNET family of tumors is part of a rare group of malignant neoplasms arising from neuroectodermal elements, with small round cell morphology. This variant typically occurs in bony structures of adolescents and young adults [1]. In adults, they are extremely rare, but have been reported in the chest wall and other body parts, including the breast [2–4]. Primary PNETs demonstrate a predilection for the truncal and axial soft tissue, including the chest wall (Askin tumor), the paravertebral region (50–

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Fig. 1 **a** Breast lump with skin ulceration. **b** Computed Tomography – Heterogeneously enhancing mass 10×14 cm in size in right breast. **c** Photomicrograph showing round cells with pleomorphic nuclei and brisk

mitotic activity. **d** IHC CD-99 positive. **e** Interphase cells show one green, one red and one fusion (*green and red*) FISH signal pattern suggestive of positivity for EWSR1 breakapart rearrangement

60 % of cases), and the extremities (20–25 % of cases) [5]. The thoracopulmonary region (Askin tumor) is the single most common primary site. PNET in the breast is extremely

rare and has been reported only nine times earlier in the world literature [2–10]. This is the third case being reported from India.

Table 1 Summary of PNET of breast reported in literature

Reference	Age (years)	Presentation	Size (cm)	Disease	Treatment	Outcome
Tamura et al. [4]	47	Breast lump	2.1×1.8	Primary	Mastectomy	Disease free at 6 months
Maxwell et al. [3]	35	Breast lump	1.8	Primary	Lumpectomy + chemotherapy	Disease free at 2.5 years
da Silva et al. [2]	35	Breast lump	12×7.5	Primary	Chemotherapy + radiotherapy	Local and pulmonary relapse
Ko et al. [7]	36	Breast lump	2.5×2	Primary	Lumpectomy	Disease free at 6 months
Vindal and Kakkar [6]	26	Breast lump	3×2	Primary	Wide local excision + chemotherapy	Disease free at 36 months
Kwak et al. [5]	49	Mass in axilla		Metastatic	Chemotherapy	Not available
Dhingra et al. [8]	26	Breast lump	3.5×3	Primary	Wide excision	Not available
Sueb Wong et al. [9]	46	Breast lump	4	Primary	Chemotherapy + radiotherapy	Local and pulmonary progression
Majid et al. [10]	30	Bilateral breast lump	7 and 5 in right and left respectively	Metastatic	Chemotherapy	Death after 2 cycles of chemotherapy
Present study	50	Breast lump with skin ulceration	10×14	Primary	Mastectomy + chemotherapy	Disease free at 8 months

Differential diagnosis of malignant round cell tumours includes- rhabdomyosarcoma, neuroblastoma, lymphoma, PNET/ES and synovial sarcoma. In this case CD-99 positivity excluded rhabdomyosarcoma and neuroblastoma. LCA negativity ruled out lymphoma. Synovial sarcoma and PNET/ES are both characterized by expression of CD-99 antigen. However, translocation (11;22) (q24;q12) and (X;18) (q11.2;p11.2) are specific for PNET/ES and synovial sarcoma respectively and can be diagnosed rapidly by FISH (performed on formalin fixed paraffin embedded tissue).

In our case FISH was used to differentiate between the two entities and confirm the diagnosis of PNET/ES. FISH is highly sensitive and rapid technique specific for PNET, especially in unusual locations [4]. FISH is a more reliable and sensitive ancillary technique than reverse transcriptase (RT-PCR) for diagnosis of PNET/ES [11]. Further this case is different from cases reported earlier. Age at presentation of our case (50 years) is older than that reported previously and the size of lump is larger with skin ulceration (Table 1).

Multidrug chemotherapy (including vincristine, doxorubicin, cyclophosphamide, ifosfamide and etoposide) is indicated in the treatment of all patients as at least 90 % of patients with apparently localized disease at diagnosis have occult metastatic disease [12].

Conclusion

The uniqueness of this case is the rarity of primary PNET/ES of breast and appropriate use of diagnostic techniques to arrive at the diagnosis.

Conflict of Interest The authors have no conflict of interest to disclose.

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