CASE REPORT

Primary primitive neuroectodermal tumor of the breast: a case report and literature review

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Abstract

Primitive neuroectodermal tumor belongs to the spectrum of Ewing's family tumors, the primary site of the breast is a very rare disease, about ten cases have been reported in the literature, the multidisciplinary approach increases the survival of the patients; however, there is not a standard treatment using chemotherapy – vincristine, adriamycin, and cyclophosphamide in the most cases.

Key words: *Primitive neuroectodermal tumor. Breast cancer. Vincristine, adriamycin, cyclophosphamide.*

Tumor neuroectodérmico primitivo primario de mama: reporte de caso y revisión de la literatura

Resumen

Los tumores neuroectodérmicos primitivos (PNET) pertenecen al espectro de enfermedades la familia de Ewing (EFT), la mama como sitio primario de estas, representa una enfermedad muy rara, se han reportado alrededor de 10 casos en la literatura, el manejo multidisciplinario incrementa la supervivencia de este tipo de pacientes, sin embargo, no existe un tratamiento estándar por lo que se usa el esquema de quimioterapia VAC en la mayoría de los casos.

Palabras clave: *PNET. Cáncer de mama. VAC.*

Introduction

Ewing´s family tumors (EFT), include Ewing Sarcoma (ES) and it´s form extraosseous (EES) and includes Primitive Neuroectodermal Tumor (PNET) and represent about the 5-10% of the primary bone tumors, extra skeletal PNET form it is a rare presentation, and the breast are described only in case reports; there is not information about the best treatment in this cases, but surgery of early stage represents the most used management, and the chemotherapy on the advanced cases with Vincristine/Adriamycin/Cyclophosphamide (VAC), the multidisciplinary model to treat this cases results indispensable to increase the overall survival (OS).

Case report

A 49-year-old female with a progressively enlarging breast nodule of 6 months of evolution, she had no significant past medical or family history. Initially, she was on alternative medicine for 4 months without improvement. The initial mammography reported Breast

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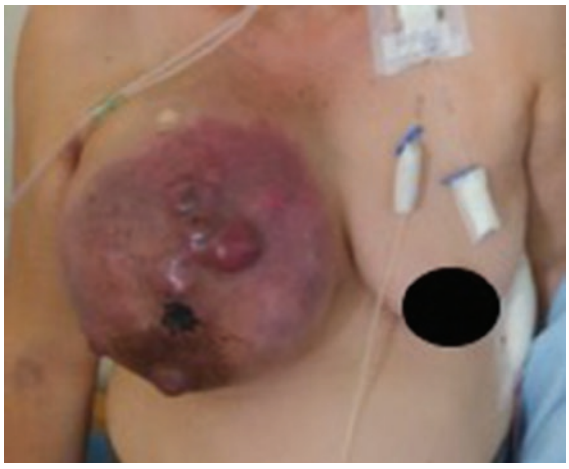

Figure 1. The tumor occupied completely the rigth breast and with some scab areas.

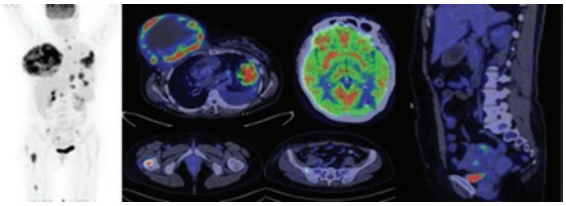

Figure 2. (18F-FDG) PET/CT scanner showing bulky disease in the right breast, locoregional nodes and metastatic disease.

Imaging Reporting and Data System-3. Physical examination revealed a hyperemic 10 × 9 cm mass, occupying all quadrants of the right breast; ipsilateral axillary adenopathy was palpable (Fig. 1).

A positron emission tomography – computed tomography (Fig. 2) scan reveals a multilobulated and septated right breast mass with nipple-areola complex infiltration, axillary, and internal mammary lymph node chain infiltration. Metastases were detected in multiple intra-axial lesions of the brain, infraspinatus muscle, bilateral lung nodules, supradiaphragmatic implant, left malignant pleural effusion, mediastinal disease, parenquimal implant in left kidney, intramural uterine lesion and bone deposits on proximal right femur, ipsilateral iliac, and spinal column (T1, T3, L1).

An incisional biopsy of the right breast was performed with a pathological report of a neuroectodermal primitive tumor (primitive neuroectodermal tumor [PNET) with positive immunohistochemistry for Vimentin, CD99, TLE-1, CD56, and CK AE1/AE3 (Fig. 3).

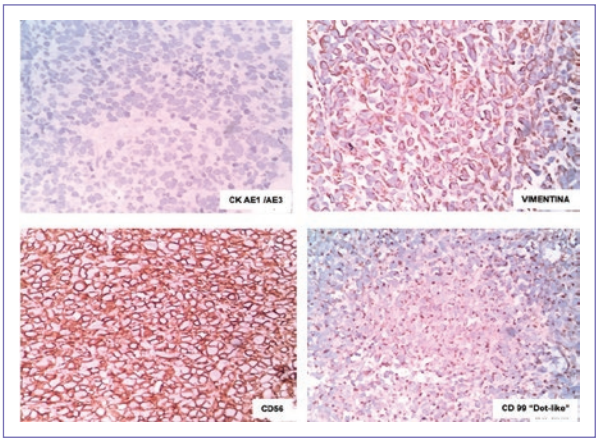

Figure 3. Immunohistochemistry for CK AE1/AE3, Vimentin, CD56 and CD99.

A tunneled pleural catheter was placed on the left chest; due to intense neuropathic pain in T4-T8 left regions, an erector spinae plane block was made.

Whole-brain radiotherapy was administered, 30 Gy on 10 fractions. At the end of the WBR, vincristine, adriamycin, cyclophosphamide (VAC) chemotherapy was administered for one cycle. She complicated with hemodynamic deterioration by septic shock, respiratory failure leading to cardiac arrest, and die.

Discussion

PNET tumors belong to the spectrum of Ewing's family tumors (EFT), having similar histologic characteristics with small round cell morphology but a different neuroectodermal differentiation. The definitive diagnosis includes histology sample, immunohistochemistry, molecular pathology, and biobanking; CD99 is a relevant diagnostic marker, is evident by immunohistochemistry in about 95% of Ewing's sarcoma; however, CD99 expression is not specific, immunohistochemical detection of FLI1 is more specific for Ewing's sarcoma than CD99; however, the specificity of FLI1 is limited by its expression in other hematologic diseases and soft-tissue sarcomas[1,2].

In 85% of the cases is associated with translocation t(11;22)(q24;q12), this fusion of EWS gene on 22q12 with the FLI1 gene on 11q24 results in a chimeric fusion transcript EWS-FLI1, there are others in less frequency like the translocation t(21;12)(22;12) in about 10-15%[3].

The skeletal variant represents about 5-10% of bone tumors, and the peripheral presentation is more uncommon[3,4], has been described in different organs being the

Table 1. Cases reported in the literature

Reference	Age	Presentation disease	Treatment	Chemotherapy scheme	Metastases
Tamura et al.[6]	47	Localized	Mastectomy	NA	NA
Maxwell et al.[7]	35	Localized	Lumpectomy + chemotherapy	NR	NA
Da Silva et al.[8]	35	Localized	Chemotherapy + radiotherapy	Cisplatin, adriamycin, etoposide	NA
Ko et al.[9]	33	Localized	Lumpectomy	NA	NA
Suebwong et al.[10]	46	Localized	Chemotherapy + radiotherapy	VAC	NA
Kim et al.[11]	35	Localized	Mastectomy + chemoradiotherapy	VAC	NA
Vindal and Kakar[12]	26	Localized	Wide excision + chemotherapy	VAC	NA
Majid et al.[13]	30	Metastatic	Chemotherapy	VAC -IE	Contralateral breast
Kwak et al.[14]	49	Metastatic	Chemotherapy	Adriamycin, cisplatin	Axillar conglomerate
Ikhwan et al.[15]	33	Metastatic	Chemotherapy	VAC	Contralateral breast, skin and lung

NA: not apply; NA: not available; NR: not reported; VAC: vincristine, adriamycin, cyclophosphamide; IE: ifosfamide and etoposide.

breast a very rare primary site; the information is limited and the prognostic can be established by extraskeletal EFT with overall survival (OS) at 5 years of 38%[5].

Breast PNET is only in the literature by case reports; there are only a few previous cases (Table 1) and only three with metastatic disease and different prognostic.

The treatment involves a multidisciplinary approach between chemotherapy and local therapy (surgery, radiation therapy, or both) to maximize the chance of cure and minimize the risk of long-term sequelae. However, although OS for patients with the localized disease now approaches 65-75%, efforts should be pursued to better tailor therapy and especially to improve the outcome for patients with metastatic and recurrent where the OS is < 30%[16].

Therefore, we translate the information of the articles in bone and soft tissue diseases, so we use the VAC scheme as an initial treatment for our patients.

We do not have evidence of the benefit of adding etoposide and ifosfamide in the metastatic context is useful[17], in addition to the series of cases already mentioned (Table 1) where the most used scheme was VAC.

Conclusion

PNET tumors are a rare disease and the presentation as a primary site in the breast, even more, there is no standard treatment for this pathology, and the scheme of chemotherapy results controversial using VAC in the most cases; however, the prognosis is poor in the metastatic and recurrent setting, leading to the individualization of the case for multidisciplinary treatment.

Authors' contributions

All the authors contributed equally to the realization of this manuscript.

Conflicts of interest

The authors have not conflicts of interest and do not have support, financial involvement, or other non-financial relationships that may potentially influence the writing of the manuscript.

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Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

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