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Poster Presentation

Beyond the Bone: Extraskeletal Ewing Sarcoma Primary to the Breast in a 13-year-old Male

Jaeson M. Jimenez, John Nicholas M. Pantoja, and Manuelito A. Madrid

Division of Pathology, Philippine Children's Medical Center, Quezon City

ABSTRACT

Introduction. Extraskeletal Ewing sarcoma (EES) is a rare subtype of Ewing Sarcoma. It is more common in older age group compared with Classic Ewing Sarcoma that is seen in pediatric patients. It usually presents in the upper extremities, hips, and pelvis. The breast is an unusual primary location for this tumor, and there are very few reported cases in the literature. In the Philippines, there have been no reported cases yet of EES primary to the breast in the pediatric age group.

Case Description. This is a case of a right upper chest mass from a 13-year-old male noted with progression of size for the past 8 months associated with pain. A biopsy was done in the initial consult and yielded unremarkable results, hence management with unrecalled antibiotics and pain medications. Continuous worsening of symptoms led to consultation at our institution, wherein a non-tender, non-erythematous, non-movable, firm, 15 x 13 cm mass was noted at the right chest during his ER consult and subsequent admission. CT scan with contrast revealed a right chest wall mass (16.8 x 18.1 x 9.5 cm) with focal areas of intrathoracic extension and associated pleural thickening. The patient subsequently underwent an incision biopsy for further workup.

Microscopically, sheets and cords of small round blue cells are seen with scant to ample amphophilic cytoplasm, increased nuclear to cytoplasmic ratio, coarse chromatin pattern, and inconspicuous nucleoli set in a background of fibrocollagenous stroma. About 5-10 mitoses are also seen per 10 high-power fields, some of which are atypical. Based on the patient's medical history, radiographic findings and histomorphologic characteristics of the case, the primary working diagnosis for this case is a malignant small round blue cell neoplasm. Immunohistochemistry studies showed strong, diffuse, membranous, and cytoplasmic immunoreactivity to CD99, while the rest of the immunohistochemical stains (Desmin, Myogenin, Chromogranin, CD45, and SALL4) yielded negative results. Additionally, NKX2.2 was also performed which showed strong, diffuse, nuclear immunoreactivity to the neoplastic cells. The case is compatible with the diagnosis of Ewing Sarcoma. Subsequent molecular test on ESWR1 via Fluorescence in-situ hybridization (FISH) revealed an ESWR gene break apart, which further supports the diagnosis of Ewing Sarcoma.

Six months after the biopsy, and having completed 3 cycles of chemotherapy, the patient subsequently underwent excision of the mass. The excised tumor was submitted for histopathologic evaluation, which showed good response (89% treatment effect, mainly composed of extensive necrosis). There is no involvement of the adjacent rib bone, and all surgical margins are negative for tumor; thus, this has been signed out as a case of Extraskeletal Ewing Sarcoma of the Breast.

Discussion. Extraskeletal Ewing Sarcoma (EES) is a highly aggressive tumor seen among 12% of patients with Ewing Sarcoma (ES). It has a wide anatomic distribution.Typically, it is most common on the upper extremities, hips and pelvic area. It is also seen more among older age group, usually in the 4th decade of life in some of the reported cases, in comparison with classic ES. The breast is an unusual location for the tumor for both adult and pediatric patients. Most tumors of the breast commonly seen in the pediatric age group are metastatic processes, which include rhabdomyosarcoma and lymphoma. CD99 is an important and essential immunohistochemical stain (IHC) in the diagnosis of Ewing sarcoma; 95% of cases of ES has a diffuse, strong membranous expression. NKX2.2 is also useful in the diagnosis, as it is more specific with ES. S100, ERG and FL1 can also be used to support the diagnosis of ES.

Molecular testing is also a requirement and helpful in the diagnosis of EES. The tumor is associated with FET-ETS fusion genes. *EWSR1-FLI1* fusion is the most common genetic alteration with EES which resulted from translocation in the t(11;22)(q24;q12). Other mutation of the tumor include *ESWR-ERG1*.

EES primary to the breast has a poorer prognosis despite multimodal treatments in comparison to EES located in different sites with a good prognosis.

There have been nineteen (19) reported cases of EES primary to the breast. This accounts for less than 1% of overall cases for EES. Currently, there have been no reported cases of EES primary to the breast in the local setting.

Conclusion. Ewing sarcoma should still be considered as one of the main differential diagnoses for pediatric patients presenting with soft tissue mass in the breast as well as in other locations. Due to its aggressive clinical course, prompt diagnosis can help increase survivability, surveillance of recurrence, and metastasis.

Key words. *Extraskeletal Ewing Sarcoma, breast, ESWR mutation, pediatric*