MAR Oncology & Hematology (2024) 4:2

Case Report

Extra-Osseous Ewing Sarcoma of the Thyroid Gland: A Case Report and Review of the Literature

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Received: 02 February 2024

Published: 28 February 2024

DOI: https://doi.org/10.5281/zenodo.10995866

Abstract

Ewing's sarcoma is a cancer of the soft tissues or bones that most commonly occurs in children and adolescents. However, the development of Ewing's sarcoma within the thyroid is exceptionally rare, with very few cases reported in the medical literature. This rarity makes each case a clinically significant entity, requiring medical attention and careful consideration.

The purpose of this case report is to present a unique example of Ewing's sarcoma localized in the thyroid. This unusual presentation posed diagnostic and therapeutic challenges, while highlighting the importance of recognizing such rare occurrences. It is essential to document and share these cases to increase our understanding of this disease and improve management strategies.

Introduction

Ewing's sarcoma is typically observed in the long bones in children and adolescents. It is a rare type of cancer of the soft tissues or bones that primarily develops in children and adolescents. It usually forms in long bones such as the arms, legs, pelvis, and ribs. Ewing's sarcoma in the thyroid is extremely rare, as it is more common in bones than in soft tissues.[1]

We present a very rare case of Ewing's sarcoma of the thyroid in a 31-year-old patient that required multidisciplinary management. This case report highlights the diagnostic and therapeutic challenges associated with this unusual presentation.

Interventions and Methods:

Our objective is to present a case of thyroidal Ewing's sarcoma to raise awareness among clinicians about this rare and complex entity. Frozen section examination was performed, confirming the diagnosis of Ewing's sarcoma. Staging evaluations revealed metastases. The patient was treated by a multidisciplinary team including surgeons, medical oncologists, and radiation oncologists.

Patient and Observation:

We report the case of a 31-year-old female patient, A.T, married with two children, with a surgical history of an ectopic pregnancy in 2012 with right salpingectomy, two cesarean sections, and gastrectomy performed in 2016, with no significant medical history.

Since early 2019, she presented with palpation of the thyroid gland showing right thyroid hypertrophy with the appearance of a nodule; thyroglobulin and calcitonin levels were found to be normal, leading to the decision to perform a right thyroid lobectomy with recurrent laryngeal nerve dissection on March 26, 2019.

The patient was not seen by an oncologist after her surgical intervention; however, 10 months later, she decided to present herself at the university hospital for further management.

Pathology Report

A frozen section examination was performed, revealing a right thyroid lobe localization of a round cell tumor, measuring 2.3 cm, confined by a fibrous condensation infiltrating and extending beyond without spreading to the perithyroid adipose tissue. Immunohistochemical study showed intense diffuse membranous staining of tumor cells by anti-CD99 antibody, heterogeneous staining of these cells by AE1/AE3 and synaptophysin antibodies, and exceptional staining of some cells by chromogranin antibody, with the presence of EWSR1 gene rearrangement: Ewing's sarcoma.

A review was requested, confirming the diagnosis of Ewing's tumor.

Clinical Examination

Performance status: 0, Palpation of the thyroid gland in the cervical region normal, Cardiopulmonary auscultation normal, Abdomen soft, no hepatosplenomegaly,Lower limbs: no edema or deep vein thrombosis.

Clinically, the patient reports joint pain in the thighs and knees.

Cervico-thoraco-abdomino-pelvic CT scan: No suspicious lesions detected.

A PET scan was performed: No suspicious uptake observed.

Hence, the decision was made to continue surveillance. The patient has been in complete response for 2

years post-op, but during surveillance, a necrotic ovarian lesion measuring 75 x 74 mm was discovered.

An MRI of the pelvis revealed a left ovarian solid necrotic mass of 8 cm, possibly compatible with a primary ovarian sarcoma or unilateral metastasis considering the history of Ewing's sarcoma of the thyroid. Indication for left salpingo-oophorectomy.

Definitive Histology:

Left ovarian tumor showing morphological and immunophenotypic characteristics suggestive of a known Ewing's sarcoma.

The left tube and peritoneal biopsies were free of tumor involvement.

This represents a left ovarian relapse 2 years post-resection of the primary tumor. Indicated treatment: NEO-AI chemotherapy: DOXORUBICIN 60 mg/m² on Day 1+ IFOSFAMIDE 3 g/m²/day from Day 1 to Day 3 (total 9 g/m²/cycle) + MESNA. Day 1 = Day 21, supported by G-CSF, for a total of 6 cycles.

The patient ultimately changed her mind and declined to start chemotherapy.

A year later, the patient experienced left rib and neck pain.

A PET scan revealed a hyperfixing costal lesion with pleural thickening.

MRI of the cervical and dorsal spine: C4-C6 degenerative discopathy, no secondary lesions.

MRI of the thoracic wall confirmed the costal and pleuropulmonary relapse.

A CT-guided biopsy confirmed a new localization of her Ewing's sarcoma.

Indication to start NEO-AI chemotherapy, but the patient was lost to follow-up.

Eight months later, due to abdominal pain, the patient underwent hysterectomy and bilateral salpingo-oophorectomy for secondary localization of Ewing's sarcoma.

Chemotherapy with IFOSFAMIDE / ETOPOSIDE and VINCRISTINE / ADRIAMYCIN / CYCLOPHOSPHAMIDE.

Due to lower limb muscle weakness, a spinal MRI was performed, revealing secondary bone lesions at T3, T5, and T9 with fracture and spinal cord compression, benefiting from 5 sessions of radiotherapy.

Abdominal CT revealed multiple osseous, pulmonary, and supra-diaphragmatic lymph node metastases,

notably a left occipital lytic lesion contacting the ipsilateral vertebral foramen, anterior epidural involvement at T1 associated with left posterior-lateral lytic lesion of T3 causing mild compression.

Brain MRI was performed in addition to the brain CT due to persistent nausea and occasional vomiting, revealing diffuse and fine pachymeningeal enhancement with nodular appearance at the right parietal level, and a subcutaneous nodule at the right frontal area, both suggestive of secondary lesions.

Given WHO stage 3, severe malnutrition, oral VP 16 treatment: 50 mg/day for three weeks out of four was initiated. Palliative care with EMASP was provided concurrently with oncological follow-up.

Discussion

There are also 2 reports of a Ewing sarcoma/PNET arising within the thyroid [2, 3]

EoES/pPNET poses a diagnostic challenge. Some of these tumors are composed of small, uniform cells with minimal morphologic evidence of differentiation, while others feature larger, less uniform cells with various degrees of neuroectodermal differentiation. In view of the lack of characteristic morphologic features, EoES/ pPNET is difficult to distinguish from histologically similar small round-cell tumors, which include rhabdomyosarcoma, desmoplastic small round-cell tumor, poorly differentiated synovial sarcoma, mesenchymal chondrosarcoma, neuroblastoma, and lymphoma [4].

CD99 expression is seen in nearly all of the Ewing sarcoma family of tumors, and thus it is a useful positive marker when it is included in an immunostaining panel to make the differential diagnosis [5].

Translocations involving the Ewing sarcoma gene are detectable with both reverse transcriptase-polymerase chain reaction testing and fluorescence in situ hybridization in formalin-fixed, paraffin-embedded tissues. [6, 7].

In the head and neck, the reported sites of presentation have included the paranasal sinuses, jugular foramen, oral cavity, nasal cavity, neck, skull, lingual nerve, parotid gland, larynx, retropharyngeal space, maxilla, mandible, masseter, temporal area, pterygomaxillary space, esophagus, and orbit [8].

Current recommendations for treatment include complete surgical resection whenever possible, adjuvant rather than neoadjuvant chemotherapy, and radiotherapy. Multimodality treatment is suggested to prevent metastatic dissemination and recurrent disease, as well as to treat residual tumor after surgical resection.

In a comprehensive review of chemotherapeutic regimens in the treatment of the Ewing family of tumors and pPNET, Carvajal and Meyers recommended a regimen that includes vincristine, doxorubicin, and cyclophosphamide plus ifosfamide and etoposide [9].

As there is a paucity of reports of pPNET of the head and neck in the literature, clinical trials of treatment regimens specific to the head and neck are limited.

Angervall and Enzinger reviewed the pathologic features and behavior of 39 small round- and oval-cell sarcomas in the soft tissues that were considered to be histologically indistinguishable from those of Ewing sarcoma of bone [10].

To the best of our knowledge, only 4 cases of EoES/ pPNET of the thyroid have been published in the English language literature [11, 12]. Chung et al described an EoES/ pPNET that mimicked a thyroid nodule [11].

Biswas et al reported an EoES/pPNET of the thyroid that was initially diagnosed as a papillary carcinoma; the progression of the tumor in that case was rapid and fatal [13].

Adapa et al described a case of EoES/pPNET of the thyroid in a 9-year-old girl who was initially diagnosed with a hematologic malignancy [14]. In that case, immunohistochemical assays and cytogenetic and molecular studies identified specific chromosomal translocations specific to Ewing sarcoma. A combination of an early correct diagnosis and aggressive management with neoadjuvant chemotherapy, surgery, and radiotherapy contributed to a favorable outcome for that girl.

Conclusion

This case highlights the importance of recognizing rare presentations of Ewing's sarcoma. It also underscores the significance of a multidisciplinary approach for the diagnosis and management of these exceptional cases. Ongoing research is necessary to better understand this disease and enhance treatment strategies.

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