Case Report

Extraskeletal Ewing's Sarcoma of the Scapula: A Case Report and Literature Review

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Background: Extraskeletal Ewing's sarcoma [EES] is an unusual aggressive malignant tumor that is neuroectodermal cell in origin. Presentation in the scapula region is extremely rare. We herein present a case report and literature review of EES of the scapula.

Case Report: An 18-year-old Thai female patient presented with a 1-year history of a gradual swelling on her right scapula that had rapidly progressed during the past 2 months. The patient was subsequently diagnosed with EES with pulmonary metastases. She received multi-agent chemotherapy and underwent debulking surgery. Despite this aggressive treatment, her clinical condition worsened and she died of pulmonary metastasis.

Conclusion: EES of the scapula is rare, and knowledge regarding therapy for this condition is still limited. Despite multimodal treatment approaches including surgery, multi-agent chemotherapy, and radiation, the prognosis remains poor.

Keywords: Extraskeletal Ewing's Sarcoma, Scapula, Bone cancer

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Ewing's sarcoma is the second most common primary bone cancer in children and adolescents and is derived from primitive small round cells of neuroectodermal origin. Extraskeletal Ewing's Sarcoma [EES] is more frequent in the paravertebral region and lower extremities; only a few cases in the upper extremities have been reported. Although no definite consensus has been reached regarding treatment, multi-agent chemotherapy and surgery are currently suggested as the standard of care. We here in present a rare case involving a female patient with EES of the scapula.

Case Report

An 18-year-old Thai female patient presented with a 1-year history of a gradual swelling on her right scapula that had rapidly progressed during the past 2 months. She also reported pain when moving her shoulder, significant weight loss, fatigue, and a low-grade fever.

On the initial examination, the swelling was present over the superoposterior aspect of the right scapula region and exhibited a globular shape and firm consistency. The patient's range of shoulder motion was restricted, but no focal neurological deficits were detected.

A plain radiograph showed a large soft tissue mass overlying the right scapula and a faint osteolytic lesion in the body of the right scapula and acromial process (Figure 1A). Magnetic resonance imaging demonstrated a soft tissue mass measuring about 26- x 18- x 23- cm and showing iso-intensity on T1-weighted imaging and high signal intensity on T2-weighted imaging with heterogeneous enhancement. The epicenter was located in the muscles around the right shoulder, including the deltoid, supraspinatus, infraspinatus, and trapezius muscles (Figure 1B).

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Core needle biopsy revealed a small, undifferentiated round cell neoplasm. The tumor was positive for CD99 (diffuse membranous pattern), FLI-1, CD117, AE1/AE3, and WT-1 but negative for leukocyte common antigen (Figure 2). EWS gene translocation was later confirmed by fluorescent in situ hybridization [FISH].

Additional evaluation with positron emission tomography/computed tomography also illustrated an abnormal hypermetabolic enhancing mass in both lobes of the lung and right axillary lymph node (Figure 1C). Thus, metastatic EES of the scapula was diagnosed.

The patient received three cycles of multi-agent neoadjuvant chemotherapy consisting of vincristine, adriamycin, and cyclophosphamide. She responded well to treatment, and the lesion was excised with preservation of the glenohumeral joint. Postoperative chemotherapy with the same protocol was resumed. However, the tumor progressed with the development of pulmonary metastasis and local recurrence. Second-line chemotherapy consisting of Ifosfamide plus Etoposide and local radiation were then given, but the patient developed progressive pulmonary metastasis and died of respiratory failure.

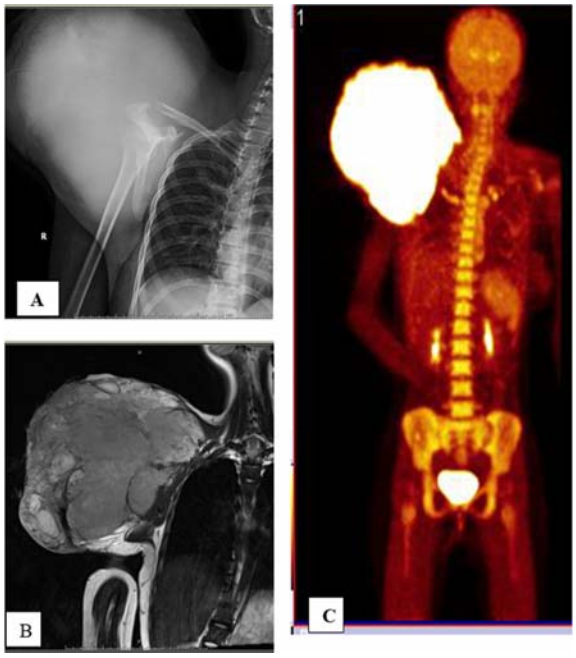

Figure. 1 Imaging findings. A) A plain radiograph showed a large soft tissue mass overlying the right scapula and a faint osteolytic lesion at the body of the right scapula and acromial process. B) Magnetic resonance imaging of the shoulder showed iso-intensity on T1-weighted imaging and high signal intensity on T2-weighted imaging with heterogeneous enhancement. A 26- x 18- x 23-cm soft tissue mass was observed at the right scapula. C) Positron emission tomography/computed tomography showed an abnormal hypermetabolic enhancing mass at the right scapula.

Discussion

The Ewing's sarcoma family of tumors [ESFT] represents a group of small round cell tumors, including Ewing's sarcoma of bone, peripheral primitive neuroectodermal tumor, Askin tumor and extraskeletal Ewing's sarcoma. These tumors originally derived from similar primitive neuroectodermal cell but separately by degree of cellular differentiation and anatomical location[1].

ESFT is the second most common primary bone tumor in children and adolescent, which commonly affect long bone of extremities and the bone of pelvis. In contrast, EES that accounts for approximately 20 to 30% of ESFT arise from soft tissue. Patients with EES were more likely arise in axial location and lower extremities[2], however ESS of the scapula is a rare entity.

Previous reports of EES of the scapula[3-7] are shown in Table 1. Most were diagnosed before the age of 20 years, and two cases involved congenital EES of the scapula. Most cases of EES have been reported in female and older patients[2,8,9]. Although all patients in our review were female, most cases of EES of the scapula occurred during childhood and adolescence, similar to skeletal Ewing's sarcoma.

Our literature review revealed various malignant tumors that affect the scapula[10], including chrondrosarcoma, synovial sarcoma, metastasis, and Ewing's sarcoma. The typical morphological

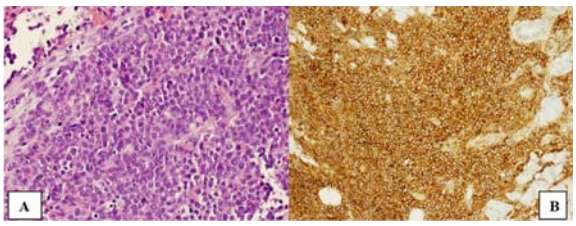

Figure. 2 Histopathology of tumor (x100 magnification). A) The tumor was composed of homogenous, small, round blue cells with scant cytoplasm (hematoxylin and eosin staining). B) The tumor cells were diffusely positive for CD99.

Table 1. Characteristic and treatment outcomes of patients with extraskeletal Ewing's sarcoma of scapula

	Gender	Age of diagnosis (years)	Metastasis site at diagnosis	Surgery	Preoperative or post operative chemotherapy	Radiation Therapy	Outcome
Present case	Female	18	Lung	Yes	vincristine, adriamycin, cyclophosphamide, ifosfamide, etoposide	Yes	Died after 10 months after diagnosis
Waqar, et al[1]	Female	9	No	Yes	vincristine, adriamycin, cyclophosphamide	Yes	No recurrence after 24 month
Jinkala, et al[2]	Female	Since birth	Bone marrow	Yes	No	No	Not available
Kella, et al[3]	Female	Since birth	No	Yes	vincristine, adriamycin	No	Died due to severe sepsis
Atsumi, et al[4]	Female	1	No	No	ifosfamide, adriamycin, vincristine, actinomycin D	No	Died after 5 months after diagnosis
Hiramoto, et al[5]	Female	57	No	Yes	ifosfamide, etoposide, vincristine, actinomycin D, cyclophosphamide	No	Died after 18 months after diagnosis

characteristic of Ewing's sarcoma is the presence of small, uniform, undifferentiated round blue cells. The cytoplasm diffusively shows strong CD99 expression in a chain-mail pattern on immunohistochemical examination, which is widely used as a convenient diagnostic tool. The findings of Ewing's sarcoma may mimic those of lymphoblastic lymphoma, neuroblas toma, rhabdomyosarcoma, and small cell synovial sarcoma; however, the negativity of other markers, such as CD45, neuron-specific enolase, Leu-7, or vimentin, can differentiate Ewing's sarcoma from other cancer cells[11]. Molecular genetic analysis is currently considered a diagnostic standard and is performed using FISH or reverse transcriptase polymerase chain reaction [RT-PCR] to identify chromosome 11 and 12 translocation. Approximately 85% of affected patients have EWS/FLI-1 gene fusion[1].

Hence, the treatment of this rare disease has always been challenging. It is recognized that patients with EES will benefit from treatment protocol for patients with Ewing's sarcoma of bone. Multimodality approaches have been used to help improve the survival rate in patients with skeletal Ewing's sarcoma. Surgical resection with a wide margin and chemotherapy is the main stay of treatment[12]. Almost all patients in our review underwent surgery and multi-agent chemotherapy, radiation, or a combination of both.

Cash et al[13] reported a favorable prognosis of EES independent of age, race, and primary site. Similar to the report by Applebaum et al[8], the 5-year overall survival was better for localized EES than localized skeletal tumors. However, there were no differences in overall survival between patients with metastatic skeletal tumors and EES.

Although no metastasis was found at presentation in our review of EES of the scapula, the prognosis remained poor. Most patients died of metastasis within 2 years after aggressive multimodality treatments. Hence, novel therapeutic approaches such as targeted therapy or immunotherapy are required to improve outcomes.

Conclusion

Herein, we present a rare entity of EES of the scapula. Multimodal treatment involving surgery, chemotherapy, and radiation was performed despite the limited knowledge regarding therapeutic considerations. However, the prognosis remained poor.

What is already known on this topic?

Extraskeletal Ewing's sarcoma of scapula is a

malignant tumor arising from the scapula and should be considered in childhood and adolescence. Identification of EWS/FLI-1 gene fusion using FISH or RT-PCR is a useful diagnostic tool. Although there is no standard treatment of EES of the scapula, multi-agent chemotherapy, surgery, and radiation are still used according to our literature review. Despite multimodality treatments, the prognosis of EES of the scapula remains poor.

What this study adds?

This report describes a rare case of EES of the scapula. Ewing's sarcoma is a malignant tumor a rising from the scapula in childhood and adolescence. Multimodality approaches including surgery, multi-agent chemotherapy, and radiation are suggested as standard treatments. Nevertheless, the prognosis remains poor.

Potential conflicts of interest

The authors declare no conflict of interest.

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