Case Report

Cytodiagnosis of Ewing's sarcoma and its confirmation by histopathology and immunohistochemistry

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ABSTRACT

Ewing sarcoma (EWS) is a rare malignant round cell tumor. It is the second common primary tumor of the bone found in children. The most common site in which it occurs is in the pelvis, the femur, the humerus, and the ribs. Due to its morphological overlap, there is diagnostic difficulty and for accurate diagnosis, requires special studies such as immunohistochemistry, electron microscopy, and molecular genetic analysis. We report a case of EWS in a 19 years boy who presented with pain and tenderness of left thigh. Fine-needle aspiration cytology was done and reported as Malignant round cell tumor suggestive of EWS. Diagnosis of EWS was confirmed with special stains and immunohistochemistry.

Key words: Cytology, Ewing's sarcoma, round cell tumor

INTRODUCTION

Ewing sarcoma (EWS) a highly malignant primary bone tumor that is derived from red bone marrow was first described by James Ewing in 1921. This tumor is most frequently observed in children and adolescent aged 4–15 years and rarely develops in adults older than 30 years.[1]

Males are affected more frequently than female with ratio of 1.5:1. EWS is the most lethal and second most common malignant tumor after osteosarcoma in the young patient. EWS accounts for about 2–3% of childhood cancer.[2] The majority of EWS results from the reciprocal translocation (11;22)(q24;q12), which results in the fusion of the EWS gene with the FLI genes. This translocation, which are detectable by reverse transcription-polymerase chain reaction, can be used for the primary diagnosis and for the detection of metastatic or residual disease in tissue or body fluids.[3] The EWS family of tumors are categorized because of the shared translocation and the similar physiology, which includes EWS, peripheral primitive neuroectodermal tumor, neuroepithelioma, atypical EWS and Askin tumor.[4]

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CASE REPORT

An 18 year-old male patient presented with pain and swelling of left thigh for 2 months. X-ray revealed destruction of bone and mottled appearance. Fine-needle aspiration cytology (FNAC) revealed small round cells with fine chromatin, 1-2 nucleoli, moderate amount of finely vacuolated cytoplasm. And darkly stained cells with a small nucleus, dense chromatin, narrow rim of cytoplasm arranged in sheets and few cells forming the rosettes Figure 1.

Periodic acid-Schiff (PAS) reaction-demonstrate the presence of intracytoplamic glycogen Figure 2.

Considering the clinical presentation, a diagnosis of small round cell tumor possibly EWS was given.

H/P-consists of sheets of cells divided into irregular masses by fibrous strands. The nuclei are round, with small nucleoli,

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with variables mitotic activity with indistinct cell margins. Some tumor cells arranged around blood vessels forming pseudorosette, few true rosette without true lumina also seen. Some tumor cells composed of larger and more pleomorphic cells exhibiting conspicuous nucleoli Figure 3.

Immunohistochemistry demonstrate the positivity for CD99 Figure 4.

DISCUSSION

Ewing's sarcoma/primitive neuroectodermal tumor (PNET) of bone is a type of cancer usually found in children and young adults. The peak incidence is between age 10 and 20 years. It is less common in children under 5 or in adults over 30.[5] Clinically tumor may simulate osteomylitis because of pain, fever, and leukocytosis. It generally arises in the medullary canal of the shaft from which it permeates the cortex and invades soft tissue.[6] In addition to bones and soft tissue, the lesion can occur in other sites including skin and viscera.

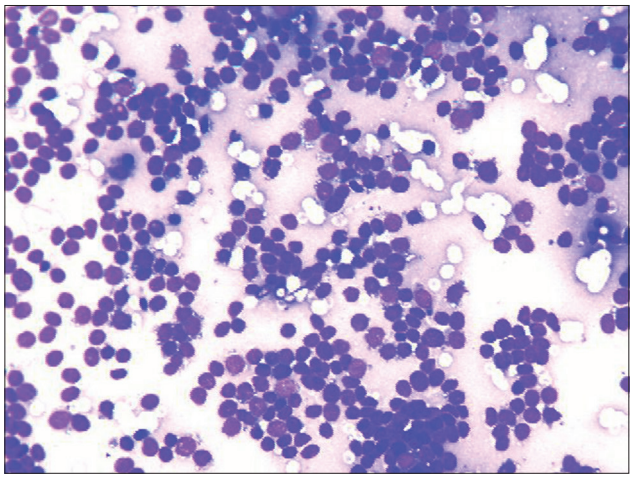

Figure 1: Fine-needle aspiration cytology showing small tumor cells arranged in sheets and rosettes (Giemsa stain, ×400)

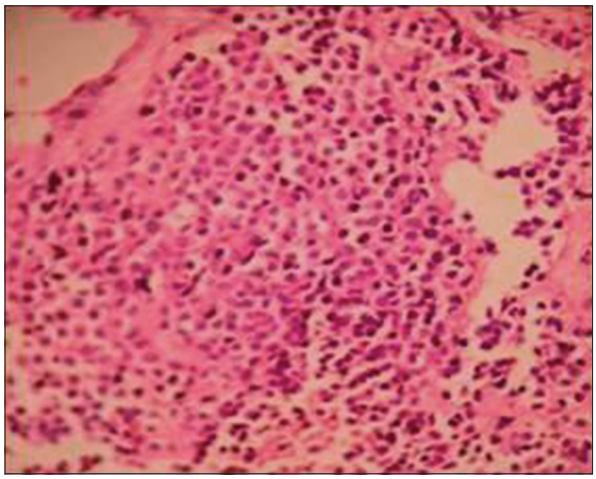

Figure 3: Tumor cells arranged in sheets showing round to oval cells with high N:C ratio, hyperchromatic nuclei and scant cytoplasm. H and E, ×400

The differential diagnosis of ES/PNET includes all other "small cell tumors" particularly lymphoblastic lymphoma, desmoplastic small cell tumors and embryonal/alveolar rhabdomyosarcoma. The cells of ES/PNET usually contain large amounts of cytoplasmic glycogen as demonstrated by a PAS stain with diastase control.[7]

The metastatic spread of ES/PNET is to the lungs and pleura, other bones (skull), central nervous system and regional lymph nodes.[8] The prognosis depends on various factors, extension of EWS into soft tissue, presence of metastasis, presence of neural differentiation, overexpression of p53 are associated with poor prognosis.[9] Treatment is chemotherapy with radiation therapy sometimes combined with limited surgery. The tumor is typically radiosensitive.

Ewing's sarcoma is one of the cause for the pathological fractures besides other causes such as fibrous dysplasia, osteomylitis, leukemia, rhadomyosarcoma and osteogenesis imperfecta and physician and family should be alerted to

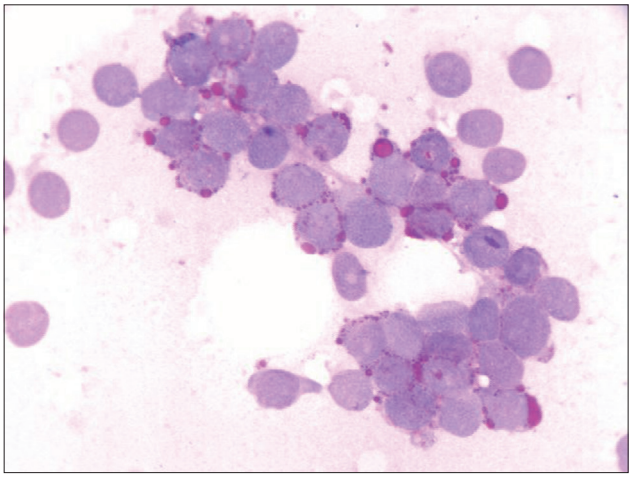

Figure 2: Fine-needle aspiration cytology showing tumor cells revealing large amount of cytoplasmic glycogen in Ewing sarcoma (PAS stain, ×1000)

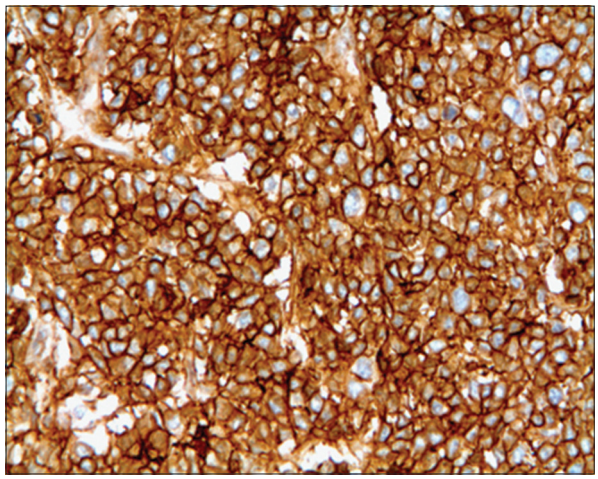

Figure 4: Tumor cells showing strong membrane immunoreactivity for CD99

the prolonged course involved in treating these fractures to union.[10]

Nonmetastasized extra-osseous Ewing tumors have a prognosis at least similar to that of osseous Ewing tumor.[11]

Approximately 80% of patients present localized disease, whereas 20% present with clinically detectable metastatic disease most often to the lung, bone or bone morrow.[12]

Early and correct diagnosis of EWS is essential for clinical management since it belongs to the group of small round cell tumors.

The diagnosis of EWS was not made clinically but diagnosis was given on cytology and confirmed on histopathology.

The patient underwent surgical excision of the lesion followed by radiotherapy and chemotherapy.

CONCLUSION

Fine-needle aspiration cytology is very economic and quick procedure in the diagnosis of EWS family of tumors. Clinically tumor may simulate osteomyelitis because of pain, fever, and leukocytosis. FNAC can be used for early diagnosis and long term follow-up.

REFERENCES

1. Ewing J. Classics in oncology. Diffuse endothelioma of bone. James Ewing. Proceedings of the New York Pathological Society, 1921. CA Cancer J Clin 1972;22:95-8.
2. Delattre O, Zucman J, Melot T, Garau XS, Zucker JM, Lenoir GM, *et al.* The Ewing family of tumors – A subgroup of small-round-cell tumors defined by specific chimeric transcripts. N Engl J Med 1994;331:294-9.
3. Miser JS, Goldsby RE, Chen Z, Krailo MD, Tarbell NJ, Link MP, *et al.* Treatment of metastatic Ewing sarcoma/primitive neuroectodermal tumor of bone: Evaluation of increasing the dose intensity of chemotherapy – a report from the Children's Oncology Group. Pediatr Blood Cancer 2007;49:894-900.
4. Verrill MW, Judson IR, Harmer CL, Fisher C, Thomas JM, Wiltshaw E. Ewing's sarcoma and primitive neuroectodermal tumor in adults: Are they different from Ewing's sarcoma and primitive neuroectodermal tumor in children? J Clin Oncol 1997;15:2611-21.
5. Paulussen M, Ahrens S, Dunst J, Winkelmann W, Exner GU, Kotz R, *et al.* Localized Ewing tumor of bone: Final results of the cooperative Ewing's Sarcoma Study CESS 86. J Clin Oncol 2001;19:1818-29.
6. Parija T, Shirley S, Uma S, Rajalekshmy KR, Ayyappan S, Rajkumar T. Type 1 (11;22)(q24:q12) translocation is common in Ewing's sarcoma/peripheral neuroectodermal tumour in south Indian patients. J Biosci 2005;30:371-6.
7. Asif N, Khan AQ, Siddiqui YS, Mustafa H. Metastasis from scapular Ewing's sarcoma presenting as sutural diastasis: An unusual presentation. Int J Shoulder Surg 2010;4:18-21.
8. Shrader MW, Schwab JH, Shaughnessy WJ, Jacofsky DJ. Pathologic femoral neck fractures in children. Am J Orthop (Belle Mead NJ) 2009;38:83-6.
9. van den Berg H, Heinen RC, van der Pal HJ, Merks JH. Extra-osseous Ewing sarcoma. Pediatr Hematol Oncol 2009;26:175-85.
10. Kelleher FC, Thomas DM. Molecular pathogenesis and targeted therapeutics in Ewing sarcoma/primitive neuroectodermal tumours. Clin Sarcoma Res 2012;2:6.
11. Bordia S, Meena S, Meena BK, Rajak V. Fine-needle aspiration cytology of ewing's sarcoma of thoracic spine with extension into the intradural space. Case Rep Oncol Med 2014;2014:351386.
12. Pawar VR, More S, Patil PP. Cytological diagnosis of Ewing sarcoma clavicle. Indian Med Gaz 2011;CLXV:495-7.

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