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CASE REPORT

Medicine Science International Medical Journal

Medicine Science 2018;7(4):946-8

Bone marrow metastasis of alveolar rhabdomyosarcoma mimicking Burkitt's lymphoma

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Received 04 April 2018; Accepted 26 April 2018
Available online 02.07.2018 with doi: 10.5455/medscience. 2018.07.8831

Abstract

Some rare malignant diseases exhibit clinical features and bone marrow aspirate morphology similar to that of acute leukemia. For instance, rhabdomyosarcoma, neuroblastoma, medulloblastoma, anaplastic oligodendroglioma, small cell carcinoma, Ewing's sarcoma and neuroendocrine tumors have been reported to display an acute leukemia-like morphology in bone marrow aspirates after metastasizing to the bone marrow. Rhabdomyosarcoma (RMS), a malignant tumour of mesenchymal origin which can occur at various sites in the body, is one of the most common soft tissue sarcomas in both children and adolescents, but is rare in adults with a prevalence of less than 1 %. Bone marrow metastases associated with this condition may be readily confused with acute leukemia or lymphoma. Diagnostic confirmation requires immunohistochemical and flowcytometric examinations. In patients with positive CD56 and negative CD45, rhabdomyosarcoma should be included in the differential diagnosis. Here, we report an unusual case of RMS confined to the bone marrow in an older adult.

Keywords: Rhabdomyosarcoma, Burkitt's lymphoma, bone marrow, CD56(+), CD45(-)

Introduction

Although rhabdomyosarcoma (RM) is the most common soft tissue tumor of childhood, it is a rare condition in adults. Alveolar rhabdomyosarcoma (ARM) reaches a peak incidence in adolescents, and typically arise from sinuses, breast, and soft tissue of the extremities. Of these tumors, approximately 23% are associated with bone marrow metastases [1]. Differentiation between acute leukemia and bone marrow metastasis of rhabdomyosarcoma is challenging, as both of these conditions may lead to diffuse involvement with blast-like cells [2-4].

Case Report

A 53-year old male patient presented with complaints of fatigue, weight loss, and nasal bleeding for the past 2-3 month period. Physical examination showed multiple fixed, hard, painless palpable mass lesions bilaterally in submandibular, jugular, posterior cervical, and supraclavicular areas. Laboratory results were as follows: Leukocyte count: 5.4 x 10 3/µL, hemoglobin: 9.7 g/dl, platelet count: 34 x 103/µL, lactate dehydrogenase: 2099 U/L, INR: 1.7, aPTT: 33.3 sec, fibrinogen: 60 mg/dl and d-dimer: > 20 µg/ml. He had disseminated intravascular coagulopathy. Peripheral smear showed a shift to the left, nucleated erythrocytes, and Cabot's rings. Bone marrow aspiration showed 80% atypical cellular infiltration with large, dark basophilic cytoplasm and vacuoles in the cytoplasm and nucleus (Figure 1). Although these findings were suggestive of Burkitt's lymphoma morphologically, the results of flow cytometry were not supportive of this diagnosis. Myeloid, lymphoid, and plasma cell surface markers were negative in P1 gate of flow cytometry, and 50% of the cell population had CD56 positivity only. Granulocytes showed normal distribution in P2, and lymphocytes showed normal distribution in P3 gate (Figure 2). Imaging studies revealed a mass lesion invading the left maxillary, sphenoid and ethmoid sinuses; bilateral multiple lymphadenopathies in cervix, the largest being 4.5x3 cm; and a hypodense 4x1.5 cm area in the posterior upper lobe of the right lung. Immunohistochemical staining of the bone marrow showed vimentine, desmine, and CD56 positivity. Based on these results, the patient considered to have alveolar rhabdomyosarcoma. Lymph node biopsy was also suggestive of rhabdomyosarcoma. Despite the initial morphological resemblance to Burkitt's leukemia, flow cytometry was not supportive of our diagnosis. Pathological examination confirmed alveolar rhabdomyosarcoma.

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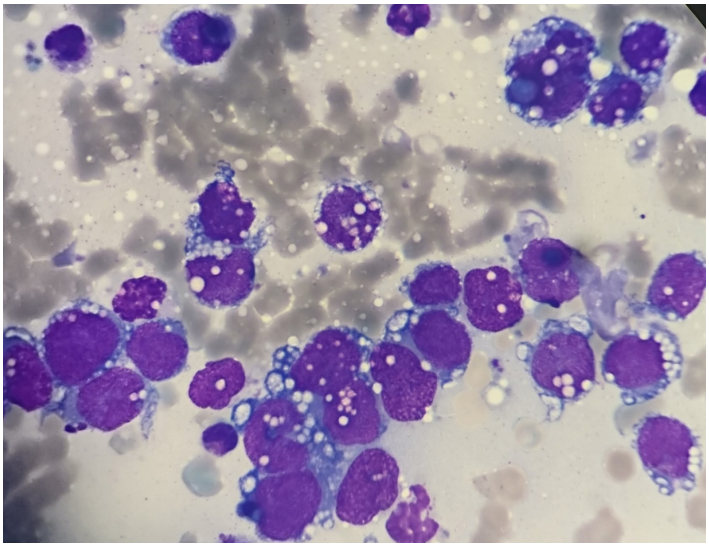

Figure 1. Atypical cellular infiltration with cytoplasmic and nuclear vacuolization

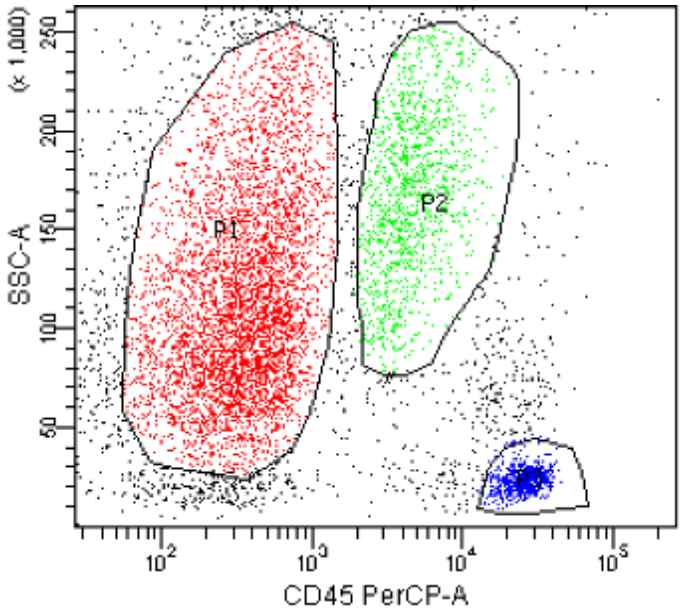

Figure 2. Cells with CD56 positivity and lymphoid, myeloid, and plasma cell antigen negativity in P1 gate; normal granulocytic distribution of cells in P2 gate; and normal lymphocytic distribution of cells in P3 gate

Discussion

In some malignant conditions, clinical signs and bone marrow findings may be similar to those of acute leukemia. Rhabdomyosarcoma, neuroblastoma, medullablastoma, anaplastic oligodendrioglioma, small cell carcinoma, Ewing's sarcoma, and neuroendocrine tumors are among such malignancies that may exhibit morphological signs closely resembling those of acute leukemia [5-7]. A distinction between these conditions based on morphological findings alone may be challenging.

Flow cytometry (FCM) is a technique that is commonly used in the diagnosis of hematological malignancies. It may also be useful for the detection of bone marrow metastasis due to RM. While FCM may rule out a diagnosis of leukemia and lymphoma, detection of CD56 +/CD90 +/CD45- immune-phenotype is suggestive of RM [8]. Also, neuroblastoma (NB) represents the most common type of metastatic non-hematopoietic tumor in children, with a CD56 +/CD90 +/CD45- immuno-phenotype [8-10]. The similar immuno-phenotypic characteristics in FCM may complicate the differentiation between RM and NB. As shown by previous studies, gangliocyte D2 (GD2) is expressed by neuroectodermal tumors such as retinoblastoma and NB [10-13]. RM cells exhibit negativity for GD2[8,9]. Also, CD56 expression is seen in a number of malignancies including acute myeloid leukemia, blastic plasmocytoid dendritic cell neoplasias, multiple myeloma, peripheral T cell lymphoma, small cell carcinoma, Merkel cell carcinoma, and Ewing's sarcoma [14,15]. Due to the absence of CD90 and GD2 kits in our laboratory, FCM could not be used for that purpose. However, FCM was able to rule out the diagnoses of Burkitt's lymphoma and other malignances, despite the morphological resemblance to Burkitt's lymphoma. Immunohistochemically, RM exhibits > 99% polyclonal desmine staining, while muscle-specific actin, myogenin, and myoglobin positivity occurs in 95%, 95%, and 78% of the cases, respectively. Myogenin is more commonly expressed by alveolar type as compared embryonal RM. Typically, it is found in myogenic tumor cells with lesser degree of differentiation. It has been associated with a poor prognosis irrespective of the histological subtype, tumor area [16,17].

Conclusion

In conclusion, bone marrow metastases associated with rhabdomyosarcoma may be readily confused with acute leukemia. This diagnosis may be easily overlooked, particularly when one considers its rare occurrence in adulthood. In patients with a morphological suspicion of acute leukemia without supportive findings in flow cytometry, a diagnosis of RM should be borne in mind.

Competing interests
The authors declare that they have no competing interest

Financial Disclosure
The authors declared that this study has received no financial support.

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