A rare case of acute aleukemic mast cell leukemia (MCL) presenting with diffuse osteoblastic lesions involving the appendicular skeleton

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Introduction

Mast cell leukemia (MCL) is a rare and aggressive form of systemic mastocytosis (SM) that commonly involves the bone. This often presents as osteoporosis with focal osteolytic lesions and pathological fractures. Osteoblastic (sclerotic) lesions are rarely seen in MCL, with the common location being vertebral bodies. MCL presenting with osteoblastic lesions has been reported in the literature; however, there are no reported cases of osteoblastic lesions in the appendicular skeleton [1-3].

Case report

Our patient presented with a mechanical fall after experiencing nausea, vomiting, diarrhea, bilateral leg weakness, diffuse musculoskeletal pain, and epigastric abdominal pain for two weeks. CT scans revealed hepatosplenomegaly, portal vein thrombosis, and diffuse osteoblastic lesions in the ribs, vertebrae, and pelvic bones (Fig. 1, 2). Laboratory results indicated pancytopenia. She underwent a bone marrow (BM) biopsy and a bone biopsy of the left iliac sclerotic lesion. Both biopsies revealed dense areas of atypical mast cell infiltrates that expressed increased CD117 alongside CD33, CD4, and CD13, consistent with MCL (Fig. 3, 4). Treatment with FDA-approved agents (Avapritinib or Midostaurin) and transfer to a higher center with available clinical trials was discussed. However, the patient experienced rapid clinical deterioration and passed away approximately three weeks after the initial presentation under hospice care.



Figure 1: CT Chest with contrast showing the osteoblastic lesions in the ribs and vertebrae.



Figure 2: CT Abdomen & Pelvis with contrast showing the pelvic osteoblastic lesions.

Discussion

MCL is an exceedingly rare and aggressive variant of SM. MCL is classified as primary, occurring de novo without prior mast cell disorders or secondary, from a pre-existing mast cell neoplasm; acute aggressive form with C-findings that indicate organ damage or chronic stable form without C-findings; and leukemic (>10%) or aleukemic variants (<10%) based on the percentage of mast cells circulating in the blood [1-2].

Common clinical findings of MCL include constitutional symptoms, pruritus, flushing, gastrointestinal (GI) bleeding, musculoskeletal pain, and diarrhea. Initial workup could show pancytopenia, coagulopathy, hepatosplenomegaly, GI ulcers, and bone lesions [1-3]. Usual bone manifestations of MCL are osteoporosis and focal osteolytic lesions with pathological fractures. Osteoblastic (sclerotic) lesions are rarely seen in MCL. It is observed that bone metastases in MCL outside of the spine/ vertebral column are uncommon, and lesions outside of the axial skeleton are extremely rare [1-3].

The common molecular abnormality seen in MCL is the mutations in the KIT gene, the KIT D816V mutation, present in approximately 90% of cases. Diagnosis is usually confirmed by >20% atypical or immature mast cells in the BM or tissue biopsy. Elevated tryptase levels strengthen the diagnosis [1-5].

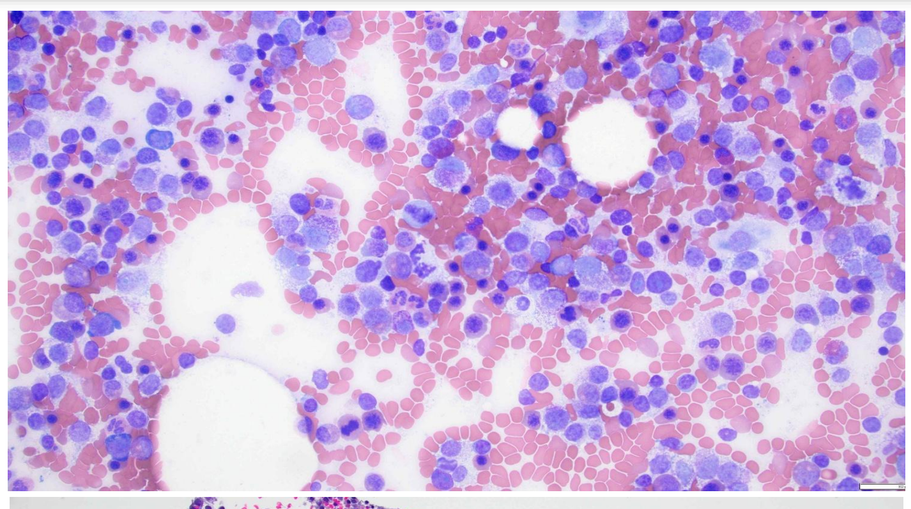


Figure 3: Bone marrow biopsy showing atypical mast cells

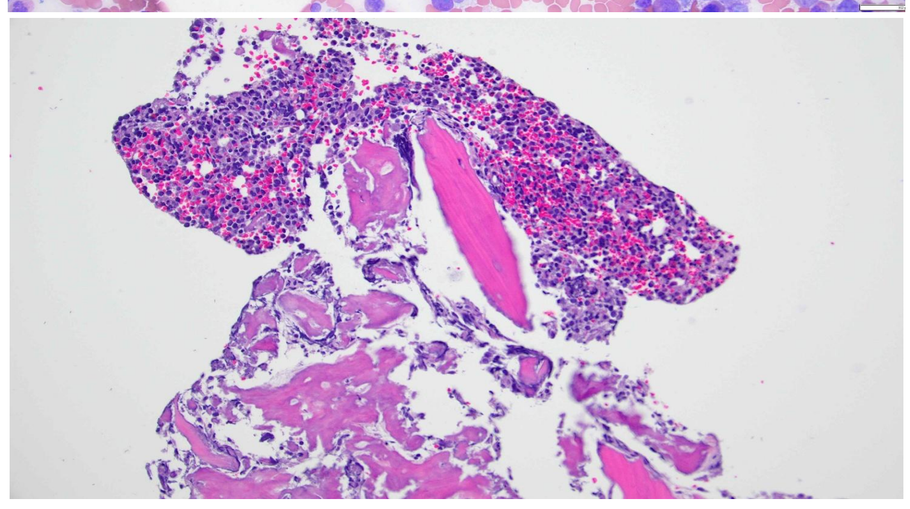


Figure 4: Iliac bone biopsy showing atypical mast cells

Treatment modalities include chemotherapeutic agents, Interferon-alpha, glucocorticoids, tyrosine kinase inhibitors, antibody drug conjugates, and allogenic hematopoietic stem cell transplantation (HSCT), which are used with variable response and limited success. The two targeted therapies approved for MCL are Midostaurin and Avapritinib [1,2,4, 5-8]. Supportive measures in managing complications such as cytopenias, infections, tumor lysis syndrome, mast cell activation syndrome (MCAS), and organ dysfunction also play a crucial role in the management of MCL. MCL has an overall survival (OS) ranging between 0 and 2.5 years. Acute MCL tends to be highly aggressive and carries an extremely poor prognosis with a median OS of 2-3 months despite treatment [2, 9].

Conclusion

We described here a very rare case of aleukemic MCL with diffuse osteoblastic metastatic bone lesions involving the axial and appendicular skeleton. Osteoblastic presentation of MCL in this case is confirmed with bone biopsy. By this case, we like to report that MCL is a malignancy that can present with both osteolytic and osteoblastic bone lesions and stress the importance of doing a bone biopsy in suspected cases of MCL with bone lesions. MCL carries a very poor prognosis, particularly acute MCL, which has a median OS of 2-3 months despite treatment.

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