Images in Clinical Oncology
Middle East Journal of Cancer; July 2017; 8(3): 167-169

A Child with Left Femoral Pain and Limping

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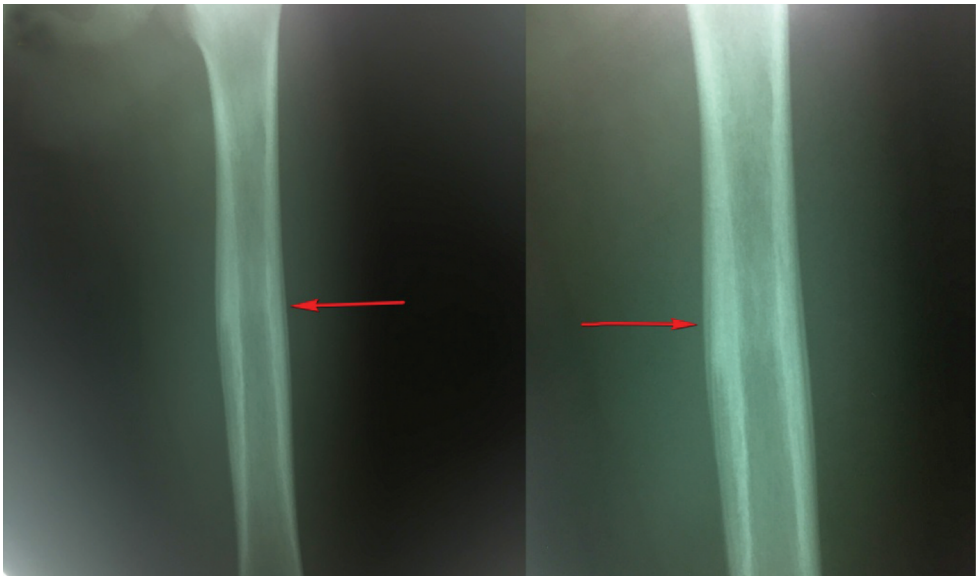
A 6-year-old old girl presented with left femoral pain and limping for about 3 week's duration. Plain X-ray of the femoral bone and a bone scan are shown in Figures 1 and 2. What is your differential diagnosis?



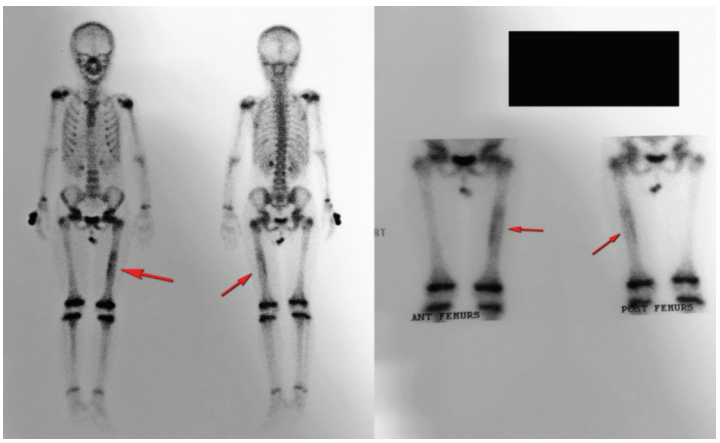


Figure 1. Plain X-ray of the left femur shows periosteal elevation and cortical thickening in the mid-shaft of the left femur.

Figure 2. Increased uptake in the mid-shaft of the left femur is noted. Delayed view also shows increased uptake.

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Received: February 18, 2017; Accepted: March 3, 2017

Answer

This was a case of acute lymphoblastic leukemia (ALL) that presented as isolated bone involvement.

Case presentation

A 6-year-old girl presented with left femoral pain and difficulty in walking for about 3 week's duration. She was referred to a pediatric oncologist and admitted with the impression of Ewing's sarcoma. Physical examination was remarkable for mild-to-moderate tenderness at the middle of the left femur and difficulty in walking. Her vital signs were normal. Physical examination of her heart, lungs, liver, spleen, and neurologic system were normal. She had the following laboratory work-ups: WBCs: $9200\times10^3/\mu L$ (neutrophils 56%, lymphocytes 38%, eosinophils 3%, monocytes 2%, band cells 1%; Hb: 11.7 g/dL; MCV: 80 fL; platelets: $481\times10^3/\mu L$; LDH: 612 U/L; ESR: 84; AST: 53 U/L; ALT 20 U/L; and CRP: 20 mg/L. She had normal calcium, phosphorous, and parathyroid hormone levels. Widal, Wright, and 2 mercaptoethanol (2ME) analyses were negative. A plain X-ray of the left femur showed periosteal elevation and cortical thickening in the mid-shaft of the left femur (Figure 1). She underwent a Tc99m-MDP bone scan that revealed abnormal increased uptake in the mid-shaft of the left femur. On delayed view, increased uptake was noted that favored tumor infiltration or Ewing's sarcoma (Figure 1). The patient had a bilateral bone marrow aspiration and biopsy which showed hypercellular marrow with more than 90% blasts suspicious for acute leukemia. Immunophenotyping revealed populations of blasts that were selected on SSC/CD45 and SSC/FSC Scatter plots. This population accounted for 90.0% of the total cells with an acute lymphoblastic leukemia (ALL) phenotype that was positive for CD34, CD45, CD19, and CD10. The immunohistochemistry profile on formalin fixed paraffin embedded tissue from the bone marrow biopsy tested positive for CD10, PAX5, and TDT with more than 90% positive cells. This finding suggested a diagnosis of acute precursor lymphoblastic leukemia, B cell type.

The patient was treated with the standard protocol of vincristine, peg-asparginase, dexamethasone, and intrathecal chemotherapy. CSF cytology was negative. Bone marrow aspiration for minimal residual disease was performed on day 7 of therapy which showed approximately 50% blasts. Her protocol was changed to high risk with the addition of doxorubicin.

The patient is under close observation with ongoing standard chemotherapy protocol treatment. Of note, the parents have provided written informed consent for report.

Discussion

Acute lymphoblastic leukemia has numerous clinical manifestations based on bone marrow failure and extra-medullary leukemic infiltration.[1,2]

Bone pain is a common presenting symptom in childhood ALL due to the involvement of multiple bones. The long bones are particularly affected due to infiltration of leukemic cells in the periosteum. Involvement of a single bone as the first presenting manifestation is rare[3] as we have reported. However, approximately 40% of pediatric ALL patients initially present with limping and bone pain.[4]

Other uncommon bony presentations of childhood ALL include hypercalcemia, vertebral compression, long bone fractures, osteoporosis, and chronic recurrent multifocal osteomyelitis.[5-8]

Differential diagnoses of bone lesions due to leukemic infiltration include Ewing's sarcoma, lymphoma, anaplastic large cell lymphoma, and Langerhans cell histiocytosis. Skeletal tuberculosis should be included in the differential diagnosis of a patient who presents with an isolated bone lesion.[9-13]

Conclusion

Acute lymphoblastic leukemia should be considered in the differential diagnosis of cases that have isolated bone lesions, particularly for children 4-7 years of age. It may be suggested that bone marrow aspiration and biopsy can be the first

easily performed procedure and a rapidly available pathology report when confronted with patients who present with bony lesions suspicious for malignancy.

Acknowledgement

The authors wish to thank the staff members of the Hematology and Oncology Department and Hematology Research Center of Shiraz University of Medical Sciences.

Conflict of Interest

No conflict of interest is declared.

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