MRI findings leading to the diagnosis of acute lymphoblastic leukemia

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Abstract

Acute lymphoblastic leukemia (ALL) is the most common malignancy in childhood. Initial symptoms of ALL are usually non specific. Anorexia, fatigue, malaise, low grade fever are often present. Bone pains particularly in lower extremities may be present but for atypical presentation a high degree of clinical suspicion is required. Bone involvement is seen in only 25% of people as initial presentation. We are presenting a case of ALL which was diagnosed after MRI changes were observed in the lower limbs.

Introduction

Acute lymphoblastic leukemia (ALL) is the most common malignancy representing about 31% of all childhood malignancies. The initial symptoms of ALL are mostly non specific. Anorexia, fatigue, malaise, intermittent low grade fever are often present. Bone pains particularly in lower extremities may be present.(1) We report a 3½ year old boy who presented initially with fracture and bone pain of left lower limb, which upon findings in MRI of lower limb was diagnosed as ALL.

Case Report

A 3½ year old boy was referred to us with a history of spontaneous fracture of left tibia 2 months back. Plaster cast was applied at that time and child was followed up. 15 days back he developed fever and pain in right lower limb also. X-ray of affected limb showed periosteal reaction of right tibia. In view of suspected osteomyelitis, a below knee plaster cast was applied and antibiotics were started. The child was referred to pediatrics for further opinion and management in view of non improvement. There was no complaints of decreased intake, weight loss, bleeding from any site or joint swelling.

On examination, child had mild pallor with weight 14 kg (50^{th} centile for age). There was no lymphadenopathy or petechiae. Affected limb was swollen below knee and tender, with temperature of skin mildly raised. Rest systemic examination remained normal.

Initial investigations revealed anemia (Hemoglobin: 8.6g/dl), Total white blood cell count - $7.1x10^9$/L / neutrophils 37%, lymphocytes 60% and eosinophils 3%, platelets count 1.38 $x10^9$/L. Peripheral smear showed microcytic, hypochromic blood picture. CRP and Blood culture was negative. Serum electrolytes, liver and kidney function tests were normal. Serum Calcium 10.6 mg/dl, Serum Phosphorous 4.8 mg/dl, Alkaline phosphatase 148 U/L. Serum LDH was 463 IU. Repeat X ray done showed periosteal reaction of tibia in both lower limbs. MRI of both lower limbs was planned, which revealed diffuse marrow proliferative disorder involving the tibia and femur bilateral with osteonecrosis at lower end of femur and upper end of tibia. In view of above findings, bone marrow aspiration was done which revealed 86% blasts, myelocytes (1%) and lymphocytes (13%). Smear was cellular with blasts which were 1.5 times the size of small mature lymphocyte with normal marrow elements, suggestive of Acute Leukemia. Immunohistiochemistry was positive for CD3+, CD 19+ and CD 20+ cells suggestive of pre B cell Acute lymphoblastic leukemia. The child was then planned for starting chemotherapy, but soon his hemoglobin and platelet count depressed. He was given packed cell transfusion along with platelet rich plasma, but unfortunately he succumbed to sudden intracranial bleed.

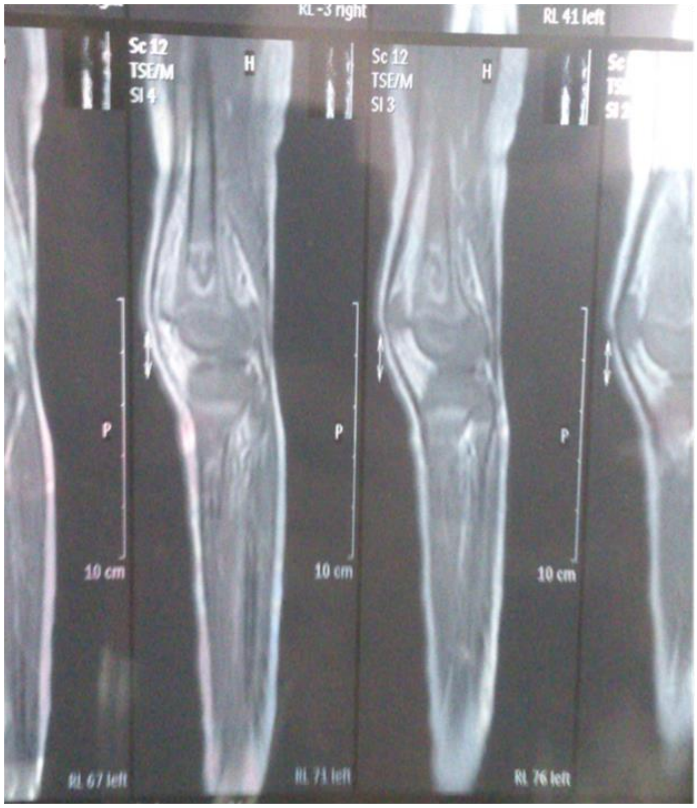

Fig. 1: Osteonecrosis at Lower end of Femur and Upper end of Tibia

Discussion

Acute leukemia at presentation can mimic several orthopedic pathologies including osteoporosis, periosteal reaction, reactive sclerosis, lytic defects and vertebral compression fractures.[2] Skeletal manifestation in children with ALL are reported within a wide variety and distribution with incidence rate ranging from 10% to 40%.[3] 5.7% had pathological fracture at presentation.[4] In twenty-two % (20.6 per cent) of the patients, the presenting complaints were pain in the extremities, back pain, osteomyelitis, septic arthritis, or fracture.[5]

In our patient bone pain and fracture was the only initial presentation of leukemia. The pathogenesis of skeletal manifestation in childhood ALL is multifactorial, including soluble products of malignant cells, invasion of bone by leukemia cells, corticosteroid and methotrexate treatment and radiation.[6] Bone pain is usually present in around 23% of leukemic children at diagnosis. It reflects leukemic involvement of periosteum and bone. Bone pain can be very severe with close to normal peripheral blood count leading to delay in diagnosis. Bone pain with or without hypercalcemia can mislead in making a diagnosis of JRA. Skeletal changes particularly in long bones are common and include transverse radiolucent metaphyseal growth arrest, periosteal elevation with reactive subperiosteal cortical thickening, osteolytic lesions and diffuse osteoporosis. ALL may masquarede as osteomyelitis.[6]

A high index of clinical suspicion is required to diagnose ALL with atypical presentation. As in our case child just presented with only bone pain and fracture and no other major feature which could lead to initial diagnosis of leukemia. Diagnosis was clinched on the basis of MRI findings. Therefore, MRI can be a useful tool for diagnosis in atypical presentation of leukemia before invasive procedures are undertaken, because a delay in diagnosis has adverse effect on survival.

Treatment consist of chemotherapy. Bone pain usually resolves quickly after initiation of antileukemic therapy. For fractures reduction and stabilization in plaster and cast is required.

Conflict of interest: None

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