

CASE REPORT

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Vertebral compression fracture as the only presentation sign of acute lymphoblastic leukemia: a case report

Dana Kanaan¹, Reem Abuzraiq^{1*} , Abdullah Abu-Aqoulah¹, Hanan Al-Thiabat¹ and Suleimman Al-Sweedan¹

Abstract

Background Pathological fractures in acute lymphoblastic leukemia (ALL) are uncommon, but our case highlights the possibility of it being an unusual presentation even in the absence of abnormal laboratory values. The importance of recognizing such rare manifestations cannot be overstated, as early detection and appropriate management can significantly improve patient outcomes.

Case presentation Here, we share a case study of a 7-year-old female patient who was diagnosed with acute lymphoblastic leukemia (ALL) after experiencing vertebral fractures. Interestingly, the patient was found to have osteoporosis before being diagnosed with ALL. This case highlights the importance of early diagnosis and prompt treatment to prevent complications and improve patient outcomes.

Conclusions In short, discovering acute lymphoblastic leukemia can be challenging. It is important to remain vigilant in recognizing atypical signs to ensure early detection and the best possible outcome. We describe a case with ALL that was presented with compression vertebral fracture. This highlights the significance of imaging studies in pediatric cases, particularly for musculoskeletal abnormalities related to serious pathologies, most notably malignancies, which may be the only way to diagnose patients presenting with vague symptoms.

Keywords Leukemia, Pediatrics, Fracture, Vertebral fracture

Background

When it comes to children, it is crucial to consider the possibility of fractures caused by underlying diseases. These diseases may include metabolic disorders, infections, neuromuscular pathologies, or malignancy. Several conditions may lead to such fractures, including eosinophilic granuloma, Ewing sarcoma, and leukemia [1].

Leukemia can often cause skeletal abnormalities such as osteoporosis and bone fractures, which may remain unnoticed as they are asymptomatic in many patients [1]. Pathological fractures are rare but can occur, which

is why it is crucial to maintain a high level of suspicion to diagnose such conditions at an early stage [2].

According to reports, 30% of children newly diagnosed with ALL experience bone pains, while 65% show radiological bone changes that are typical of leukemia [3, 4]. Osteopenia is present in 13% of ALL patients at the time of diagnosis and in 83% of patients after 2 years of chemotherapy [5].

Herein, we present a 7-year-old female patient who had osteoporosis and presented with vertebral fractures as the initial manifestation of ALL. Pathological fracture is considered a rare presentation for ALL [6].

Case presentation

A 7-year-old girl who was previously healthy has been referred to our hospital after an MRI revealed a vertebral compression fracture. The girl had been doing well until

*Correspondence:

Reem Abuzraiq
reemmad51@gmail.com

¹ Department of Pediatrics/Faculty of Medicine, Jordan University of Science & Technology, Irbid, Jordan

a month ago when she fell on her back and began experiencing lower back pain. Her mother witnessed the fall. Conservative treatment with analgesia did not improve the pain. The pain has been intermittent and getting worse over time. It does not radiate to other sites or joints. It is exacerbated by activity and wakes her up from sleep. The patient experienced night sweats, weight loss, and urinary incontinence. There was no hematuria, dysuria, abdominal pain or distention, or stool incontinence. Additionally, the patient had no fever, skin rashes, headache, weakness, or any abnormal neurological symptoms.

During the patient’s physical examination, normal growth parameters were observed with no focal neurological deficit, ecchymosis, pallor, lymphadenopathy, or organomegaly. Muscle power and reflexes were normal as well. Laboratory tests were conducted, including a complete blood count, serum calcium, alkaline phosphatase, random blood sugar, vitamin D level, serum LDH, uric acid, liver function, renal function tests, and thyroid function test. A blood film was also done and was found to be normal. The patient’s QuantiFERON test was negative, and tests for *Brucella* were negative in both bone marrow and peripheral samples. An MRI scan of the spine was performed (Fig. 1), and it showed multiple compression fractures in the thoracic and lumbar areas. There were no spinal compressions observed; however, there was an increased bone marrow in T2 signal intensity. The homogenous enhancement on post-contrast images is a matter of concern as it may indicate leukemia.

The DEXA scan (dual-energy X-ray absorptiometry) (Fig. 2) revealed a Z-score of -6.3 in the entire lumbar spine. This indicates severe secondary osteoporosis.

The patient’s bone marrow was aspirated and biopsied, and the results showed B-ALL (B-cell acute lymphoblastic leukemia) (Fig. 3). The bone marrow aspiration revealed hypercellular marrow with more than 90% of the cells being L1 blasts. We are now working with our medical team to develop a treatment plan as ALL protocol and provide the necessary support for our patient.

Discussion

Acute lymphoblastic leukemia (ALL) is considered the most common tumor in pediatric age groups accounting for 30% of all the cancers [2].

Clinical manifestation of ALL is initially due to bone marrow infiltration as a reduction in hematopoietic activity [2]. ALL can present as “extramedullary leukemia” if it is localized into internal organs such as lymph nodes, spleen, the liver, and the central nervous system [2, 7].

Patients with prominent bone pains and normal hematological values cause a delay in their diagnosis [2].

A study conducted on 296 children with acute lymphoblastic leukemia (ALL) showed that 60% of them did not experience bone pain, 22% had some bone pain, and 18% had severe bone pain. The study revealed significant differences in the initial hemoglobin levels, total leukocyte count, absolute neutrophil count, platelet count, and the percentage of circulating blasts among these three groups of patients [8].

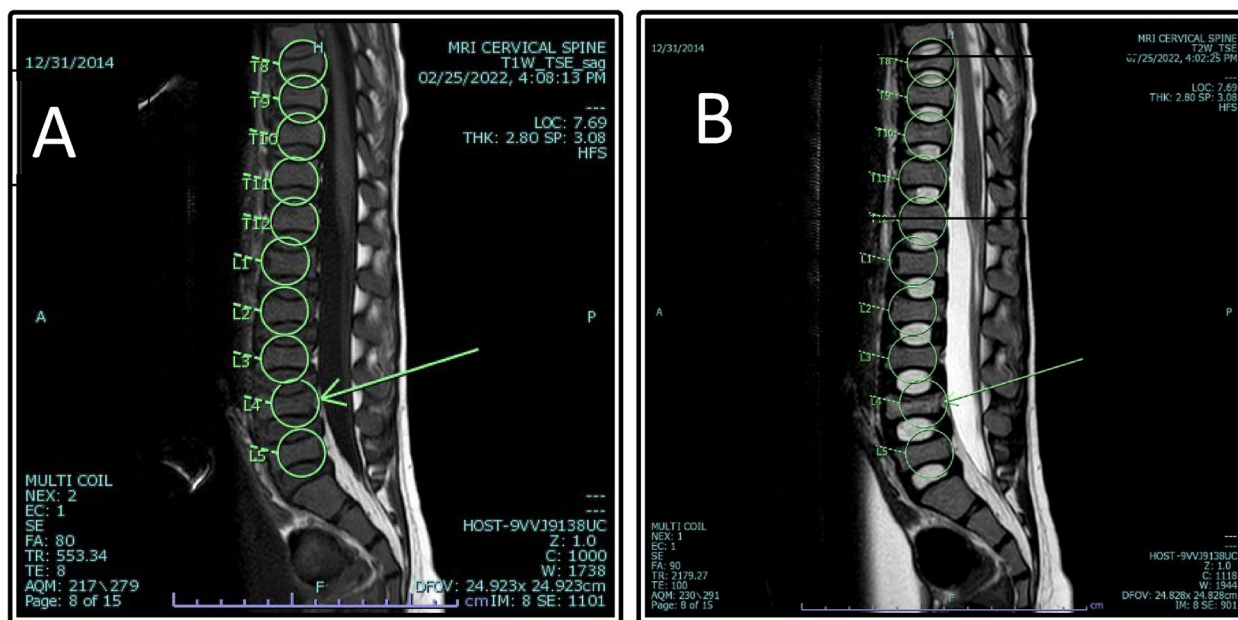


Fig. 1 MRI lumbar showing compression fracture at L4. **A** T1W. **B** T2W*

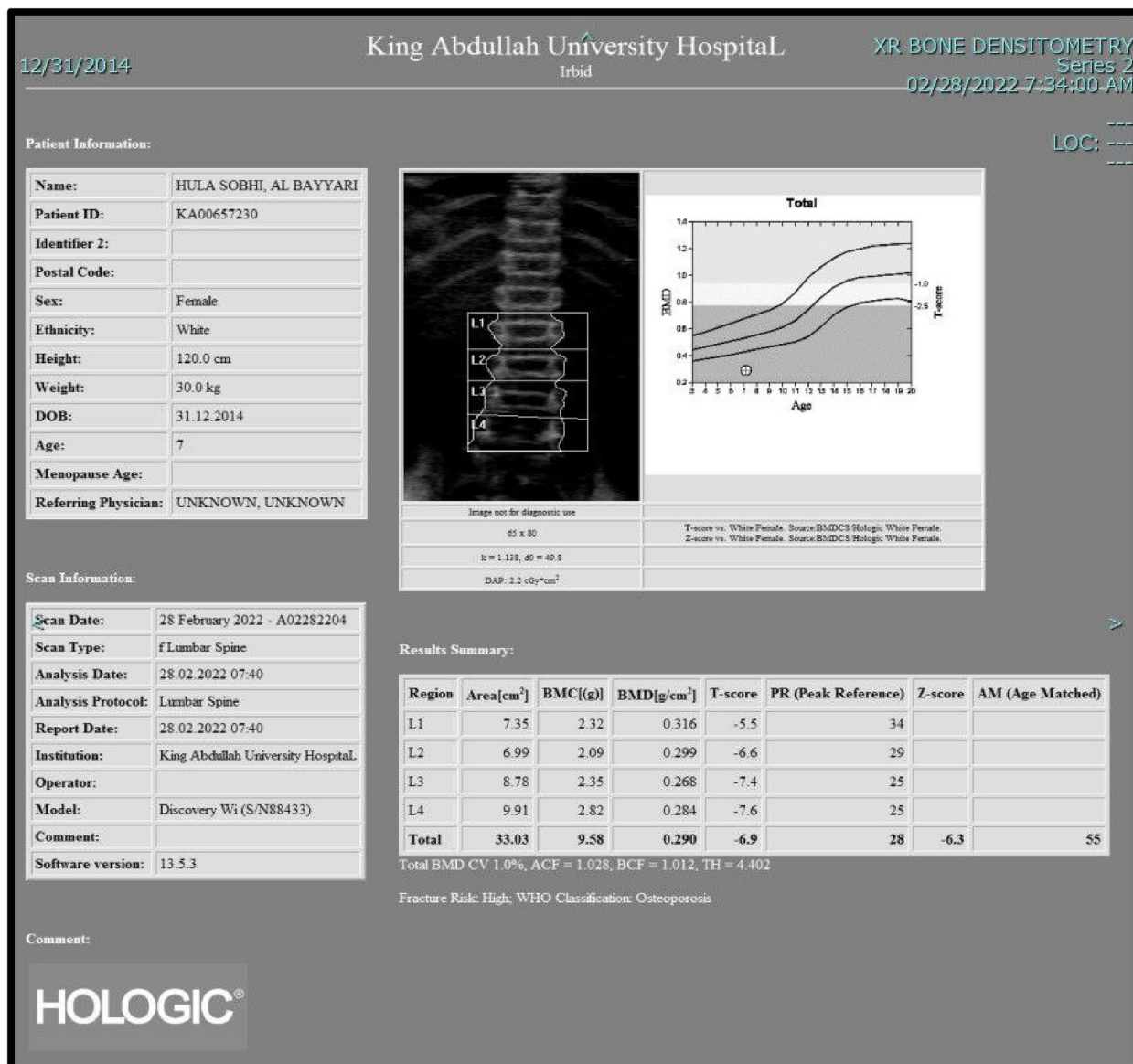


Fig. 2 DEXA (dual X-ray absorptiometry, z-score (-6.3)

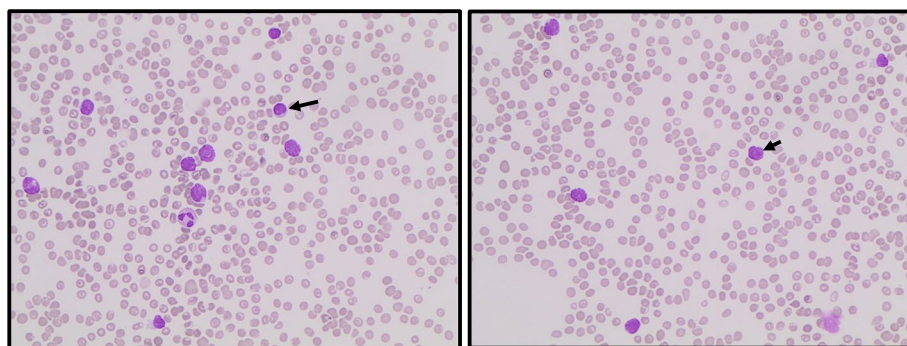


Fig. 3 Blast cells in bone marrow

We have not found any prior reports of vertebral compression fractures being the only symptoms before the diagnosis of ALL in this age group. However, it is important to note that both the CBC and blood film showed no abnormalities. These findings suggest that further research is required to identify other possible early indicators of ALL [9].

Rare cases of ALL presenting with severe osteoporosis and spontaneous humerus fractures have also been described [9].

Typically, this type of fracture is caused by minor trauma that generally would not inflict the level of damage observed. Everyday activities, such as coughing, standing up, or bending over, can fracture a bone that has been weakened by an illness [1].

MRI is highly sensitive to changes in bone marrow composition and plays a role as a modality to confirm hematological malignancies. Furthermore, its role in monitoring response to treatment as well as in diagnosing complications is well established [10].

Following an MRI of the spine for back pain, our patient received a diagnosis of leukemia after the results showed some concerning signs. The diagnosis was then confirmed through a bone marrow aspirate and biopsy.

Conclusions

In short, discovering acute lymphoblastic leukemia can be challenging. It is important to remain vigilant in recognizing atypical signs to ensure early detection and the best possible outcome. We describe a case with ALL that was presented with compression vertebral fracture. This highlights the significance of imaging studies in pediatric cases, particularly for musculoskeletal abnormalities related to serious pathologies, most notably malignancies, which may be the only way to diagnose patients presenting with vague symptoms.

Abbreviations

ALL Acute lymphoblastic leukemia
DEXA Dual-energy X-ray absorptiometry

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Authors' contributions

DK and AA, draft preparation; RA and HA, review and editing. Prof SA, he was the senior consultant of the patient and with all authors approved the final manuscript as submitted and agreed to be accountable for all aspects of the work.

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Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Verbal informed consents were given by the patient's parents for the publication of this case.

Competing interests

The authors declare that they have no competing interests.

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