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Case Report

Subcutaneous Hematoma as an Unusual Presentation of Chronic Myelogenous Leukemia following Bone Marrow Aspiration: A Case Report and Narrative Review

Pourya Mashategan[1], Hassan Abolghasemi[1*], Mohammad Kazem Emami Meibodi[2*]

[1]Department of Pediatrics, School of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran.
[2]Department of Orthopedics, School of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran.

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Abstract

Chronic myeloid leukemia (CML) is a myeloproliferative neoplasm characterized by the presence of the BCR-ABL1 fusion gene, also known as the Philadelphia chromosome. Bleeding complications are uncommon in the chronic phase of CML due to preserved platelet function. However, rare cases of subcutaneous hematoma have been reported in association with factor XIII deficiency or other coagulopathies.

We report the case of a 19-year-old adolescent diagnosed with CML who developed a subcutaneous hematoma after bone marrow aspiration. The patient presented with localized swelling and tenderness at the aspiration site, which was later confirmed as a hematoma on imaging. Laboratory tests revealed a preserved platelet count, but suggested a possible underlying coagulopathy. Further investigation revealed a factor XIII deficiency contributing to the unusual presentation.

This case highlights the importance of considering rare bleeding disorders, such as factor XIII deficiency, in patients with CML who present with unusual bleeding manifestations. Early recognition and management of such complications are critical for optimal patient outcomes.

1. INTRODUCTION

Chronic myeloid leukemia (CML) is a myeloproliferative neoplasm that originates in the hematopoietic stem cells of the bone marrow (1). It is primarily driven by the BCR-ABL1 fusion gene, also known as the Philadelphia chromosome, which leads to uncontrolled proliferation of granulocytes (2, 3). Clinically, CML typically presents with non-specific symptoms such as fatigue, weight loss, night sweats, and splenomegaly. Less commonly, patients may experience complications such as gout due to elevated uric acid levels (4).

CML progresses through three distinct phases: chronic phase (CP), accelerated phase, and blast crisis. The chronic phase is characterized by relatively stable disease and preserved hematologic function, making bleeding complications rare (5). However, in the accelerated or blast

* Corresponding Author:
Pourya Mashategan
E-mail: Hassanabol@Yahoo.com

Mohammad Kazem Emami Meibodi
E-mail: dr.mkemamimeybodi@gmail.com

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phase, symptoms may mimic those of acute leukemia, including anemia, thrombocytopenia, and bleeding manifestations such as petechiae and ecchymosis. Bleeding in CML, although uncommon in the chronic phase, can occur due to qualitative or quantitative platelet dysfunction and is often a sign of disease progression (6).

This case report describes an unusual presentation of a subcutaneous hematoma in a young patient with chronic phase CML. The patient underwent diagnostic procedures, including a bone marrow biopsy, which was followed by the development of localized bleeding and hematoma formation. This case highlights the importance of considering rare bleeding complications in CML patients, even in the absence of significant thrombocytopenia.

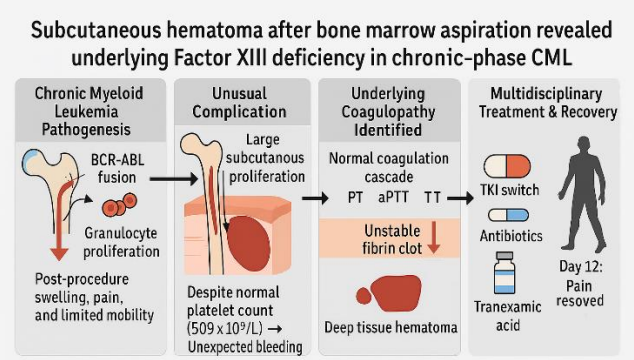
2. CASE PRESENTATION

A 19-year-old female from Tajikistan presented to the emergency department of Baqiyatallah Hospital with severe left pelvic and thigh pain. The pain had started two days earlier, several hours after a bone marrow aspiration (BMA), and had progressively worsened, resulting in an inability to bear weight on her left lower extremity. The pain originated in the left buttock, radiated to the anterior thigh, and was accompanied by paresthesias. Ten days prior to presentation, the patient had experienced intermittent fever and left upper quadrant (LUQ) pain in Tajikistan. Diagnostic studies revealed splenomegaly and abnormal CBC results, including a markedly elevated WBC count (176×10^9/L), low hemoglobin (7 g/dL), and normal platelet count (509×10^9/L). Chronic myeloid leukemia (CML) was suspected, and treatment with hydroxyurea, imatinib, and allopurinol was initiated. A subsequent CBC during the BMA revealed a further increase in WBC (557×10^9/L) and worsening anemia (Hb: 6 g/dL). Genetic testing for BCR-ABL confirmed the presence of the p210 isoform.

Following BMA, the patient developed large subcutaneous hematomas in the left gluteal region and over the left iliacus muscle. Imaging studies revealed two distinct hematomas: one measuring 92 × 37 × 63 mm (volume: 112 mL) in the subcutaneous tissue of the left gluteal region and another with a volume of approximately 200 mL over the left iliac muscle. Orthopedic consultation was requested due to uncontrolled pain, significant limitation of hip motion, and abnormal findings on examination of the left femoral motor nerve. Electromyography and nerve conduction velocity (EMG-NCV) studies revealed an acute partial lesion of the left lumbar plexus. Abdominal and pelvic ultrasonography confirmed massive splenomegaly (190 × 66 mm).

Interventional radiology was performed under ultrasound guidance to drain the hematomas. Two 12F catheters were placed in the iliac and gluteal collections and both hematomas were successfully evacuated. Postoperatively, the patient received antibiotic therapy (meropenem and vancomycin), granisetron, and cytarabine. She also received blood transfusions, including one unit of leukoreduced packed red blood cells, one unit of fresh frozen plasma (FFP), and several units of platelets and cryoprecipitate. Despite initial improvement, mild pain persisted and another small hematoma (50 mL) formed over the iliacus muscle, which was drained. Intravenous tranexamic acid was started and nilotinib was substituted for imatinib.

By the twelfth day of hospitalization, the patient showed significant improvement. Pain resolved and she regained the ability to walk independently. Laboratory results improved to WBC: 30.7×10^9/L, Hb: 9.2 g/dL, and PLT: 198×10^9/L. Blood and urine cultures were negative, confirming the absence of infection. The patient was discharged in good general condition with a follow-up plan for physical therapy and continued monitoring. A summarized figure describing the case has been provided (**Figure 1**).



3. DISCUSSION AND NARRATIVE REVIEW

Chronic myeloid leukemia (CML) is a relatively rare hematologic malignancy whose incidence varies with age, geographic region, and population demographics (7). According to a population-based registry study conducted in 20 European countries, the annual incidence of CML ranges from 0.39 per 100,000 individuals in the 20-29 age group to 1.52 per 100,000 individuals over 70 years of age. Notably, Italy reported the highest incidence rate at 1.39 per 100,000, while Poland reported the lowest at 0.69 per 100,000 (8) .In the United States, researchers analyzed CML incidence trends from 1975 to 2009 and found an annual incidence of 1.75 per 100,000 individuals, with rates increasing with age .Geographic variations were also observed, with the highest prevalence reported in Detroit and the lowest in Asian populations (9).

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Bleeding complications are uncommon in the chronic phase (CP) of CML, as platelet counts and coagulation function are generally preserved. However, when bleeding does occur, it is often indicative of disease progression and is often associated with quantitative or qualitative platelet abnormalities (10). Rarely, bleeding during CP in CML may result from metastasis of leukemic cells (11), inhibition of coagulation factors produced by interferon-γ (IFN-γ), or the use of tyrosine kinase inhibitors (TKIs), which impair platelet function (12).

Factor XIII (FXIII) deficiency has also been implicated in unusual bleeding presentations in CML patients. FXIII plays a critical role in stabilizing fibrin clots, and its deficiency can lead to delayed or deep bleeding, such as intramuscular hematomas, joint bleeding, or mucosal bleeding (13). In cases where standard coagulation screening tests (e.g. PT, APTT, TT) are normal, specific testing for FXIII activity is critical as this deficiency may otherwise go undetected (14).

Most cases of CML are incidental findings on a routine complete blood count (CBC) and present with systemic "B symptoms" such as fever, weight loss, and night sweats. While purpura is rare in CML patients (<10%), bleeding is primarily due to impaired platelet function rather than thrombocytopenia (5).

Hematomas are a rare but significant complication of CML, especially in the chronic phase. Over the past six decades, only eight reports of CML patients with hematomas have been documented. These hematomas typically occur in the deep soft tissues, mediastinum, spinal cord, epidural space, or subdural regions (except for our patient) (15,16). Interestingly, these patients had no evidence of metastasis and had not received TKI or IFN-γ treatment. Unlike external bleeding, which is often associated with platelet defects, deep hematomas are more likely to be caused by coagulation factor deficiencies (13).

In our case, the development of large subcutaneous hematomas following bone marrow aspiration highlights the potential role of underlying coagulopathies, such as FXIII deficiency, in predisposing CML patients to bleeding complications. This underscores the importance of vigilant monitoring and targeted coagulation screening in CML patients, particularly prior to invasive procedures such as bone marrow aspiration. Of note, only two of the previously reported cases had abnormal coagulation screening tests, including PT, APTT, TT, and platelet counts (15).

This narrative review emphasizes the rarity of bleeding complications in the chronic phase of CML and highlights the need for heightened awareness of coagulation factor deficiencies, particularly FXIII deficiency, in CML patients presenting with unusual bleeding symptoms. Early recognition and appropriate management of such complications are essential to prevent morbidity and improve patient outcomes.

4. CONCLUSION

This case report highlights the rare but clinically significant presentation of chronic myeloid leukemia (CML) with deep tissue hematomas during the chronic phase. The development of hematomas in CML patients, particularly in the absence of significant thrombocytopenia, underscores the potential role of underlying coagulation factor deficiencies, such as factor XIII deficiency. Early recognition of such complications, along with prompt intervention - including targeted coagulation factor screening and appropriate supportive care - is critical to preventing further morbidity and improving patient outcomes.

This case also highlights the importance of a multidisciplinary approach in the management of CML patients, especially when invasive procedures such as bone marrow aspiration are planned. Further research is warranted to better elucidate the mechanisms underlying coagulation abnormalities in CML and to explore targeted therapeutic strategies to address these rare but serious complications.

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Conflict of interest

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Ethical statement

Ethics approval and consent to participate: Informed consent was obtained from patient.

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