Extreme Hyperleukocytosis in CML Blast Crisis Successfully Managed With Hydroxyurea: A Case Challenging Conventional Urgency Protocol

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Introduction

Extreme hyperleukocytosis is a hematologic emergency typically seen in acute leukemias or chronic myeloid leukemia (CML) in blast crisis, with white blood cell (WBC) counts >100×10^9/L carrying risks of leukostasis, tumor lysis syndrome (TLS), and disseminated intravascular coagulation (DIC)

Case presentation

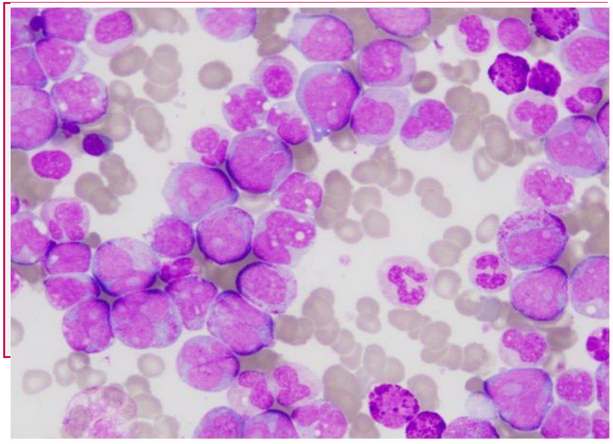
We present the case of a 55-year-old male who arrived with progressive dyspnea and a WBC count of 695 × 10^9/L—one of the highest reported in CML blast crisis. Laboratory findings revealed tumor lysis syndrome (TLS) and hypoxemia; chest imaging demonstrated bilateral pulmonary infiltrates suggestive of leukostasis. Bone marrow biopsy confirmed blast crisis evolving from CML, with Philadelphia chromosome positivity and no additional high-risk mutations.

Objectives

To describe the successful management of extreme hyperleukocytosis in CML blast crisis without leukapheresis and to evaluate the role of pharmacologic cytoreduction and supportive care in such cases.

Methods

The patient underwent baseline laboratory evaluation including complete blood count, metabolic panel, and arterial blood gases, along with chest imaging and bone marrow examination. Cytogenetic analysis for BCR::ABL1 was performed. Management consisted of high-dose hydroxyurea, rasburicase, aggressive intravenous hydration, electrolyte monitoring, and supportive oxygen therapy. TLS prophylaxis was initiated promptly. Leukapheresis was not performed. Clinical status, WBC count, and biochemical markers were monitored at 12–24-hour intervals.



Results

Over 96 hours, WBC levels declined steadily, respiratory distress resolved, and biochemical markers normalized. The patient achieved complete resolution of TLS and hypoxemia without any procedure-related complications.

Hematology Lab Trends (Key Days)

Date	WBC (x10^3/µL)	HGB (g/dL)	HCT (%)
13 Mar	695.2 (C)	8.0 (L)	22.4 (L)
15 Mar	505.6	7.0 (L)	19.9 (L)
17 Mar	328.5 (C)	7.2 (L)	22.3 (L)
19 Mar	226.4 (C)	7.3 (L)	22.1 (L)
20 Mar	154.0 (C)	7.1 (L)	21.6 (L)
22 Mar	137.1 (C)	7.8 (L)	23.2 (L)
23 Mar	70.7 (C)	6.9 (L)	21.8 (L)
24 Mar	58.8 (C)	8.5 (L)	26.1 (L)
25 Mar	35.8 (H)	9.3 (L)	27.7 (L)
26 Mar	23.4 (H)	9.4 (L)	27.8 (L)
27 Mar	18.0 (H)	9.5 (L)	28.0 (L)

Flags: **(H)** High | **(L)** Low | **(C)** Critical
Normal range (4.0 to 11.0 × 10^3/µL)
Table 1

Summary

this case contributes to the evolving discussion regarding the necessity of leukapheresis in hyperleukocytosis. It reinforces the importance of individualized treatment strategies based on patient physiology, clinical response, and institutional resources rather than rigid protocol adherence. Prospective studies are warranted to further evaluate hydroxyurea-first approaches in extreme leukocytosis.

Discussion

Despite conventional recommendations for leukapheresis in symptomatic patients with extreme leukocytosis, our case demonstrates that pharmacologic cytoreduction alone can result in rapid clinical and laboratory improvement, even in ultra-high WBC scenarios. This supports emerging evidence questioning the survival benefit of leukapheresis and underscores potential risks, including hypocalcemia, cerebral edema, and fluid overload. Early TLS prophylaxis and vigilant supportive care remain crucial in managing such patients.

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