A Patient with Pure Erythroid Leukemia with Leukemic Cells Mimicking Myeloma Cells

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A 64-year-old male patient presented to the hospital complaining of dizziness, fatigue, and loss of appetite for more than 20 days. The patient had a 3-year history of coronary heart disease. Initial hematological results revealed a total leukocyte count of $3.51 \times 10^9/L$, RBC count of $2.07 \times 10^{12}/L$, hemoglobin of 63g/L, and platelet count of $70 \times 10^9/L$. Serum folate and vitamin B$_{12}$ were normal. Other laboratory results showed LDH levels of 2,220U/L, ferritin levels of 1,878.97ng/ml, and ESR of 120mm/h. Peripheral blood smear revealed 5% large-sized myeloma-like cells (Figure 1A, 1,000×, Wright–Giemsa staining). The patient was suspected of having multiple myeloma. However, Ig concentration, serum protein electrophoresis, and immunofixation results were within reference values or negative, which was inconsistent with the peripheral blood morphology. Other biochemical results were within normal reference values. Bone marrow aspiration was then performed, and myeloma-like cells were also observed on the smear, with 47% of nucleated cells. These myeloma-like cells had large irregular nuclei, dispersed chromatin, deeply basophilic cytoplasm with vacuoles, and high nuclear-to-cytoplasmic ratios (Figure 1B, 1,000×, Wright–Giemsa staining). And myeloperoxidase staining for these blast were negative on bone marrow smear. Additionally, 1% basophilic erythroblasts, 6.5% polychromatophilic erythroblasts, and 11% orthochromatic erythroblasts were also observed in the bone marrow. Furthermore, megakaryocytes were not found in the bone marrow smear. However, further bone marrow immunophenotyping by flow cytometry was positive for CD36 and CD71, but negative for CD2, CD3, CD5, CD7, CD8, CD10, CD11b, CD13, CD14, CD15, CD16, CD19, CD20, CD34, CD38, CD56, CD64, and HLA-DR for blast cells, excluding myeloid, lymphocyte, or plasma cell phenotypes. Thus, these findings were consistent with de novo pure erythroid leukemia with morphological features similar to myeloma cells, and the patient was diagnosed with pure erythroid leukemia. However, the patient refused further cytogenetics, gene sequencing, and treatment for financial reasons. Unfortunately, this patient died 1 year after initial admission.

Pure erythroid leukemia accounts for <1% of acute myeloid leukemia cases and develops de novo or evolves from a prior myelodysplastic syndrome[1]. Depending on the maturation of the erythroblast, erythroid markers such as CD36, CD71, hemoglobin, glycophorin A, E-cadherin, spectrin or ferritin, and other molecules are commonly used to support the diagnosis of leukemic cells[1,2]. In this case, we describe pure erythroid leukemia with leukemic cells mimicking myeloma cells. Therefore, such cases should be promptly diagnosed with awareness of this morphologic defect and proper application of ancillary flow cytometry studies.

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**Patient Consent Statement:** This study did not involve the personal information, only report the laboratory data. Then the patient consent was waived, and this waive was approved by the ethical committee of The Hongda Hospital of Jiamusi University.

**Authorship Contribution**
Guoliang Song provide the picture and clinical data and wrote the manuscript. Xueshan Tian, Yan Wang and Ying Wang analyzed the data. Jiwei Zhao and Jinlin Liu wrote the manuscript.

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References
Figure 1A. Patient with pure erythroid leukemia with leukemic cells mimicking myeloma cells. Representative myeloma-like cells in the peripheral blood (A) and bone marrow (B) with large irregular nuclei, dispersed chromatin, basophilic cytoplasm with vacuoles, and high nuclear-to-cytoplasmic ratios (1,000×, Wright-Giemsa staining).