Erythrophagocytosis by Blasts and Numerous Cytoplasmic Granules in a Child with de novo T-lymphoblastic Leukemia

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Abstract
Erythrophagocytosis by leukemic cells is an extremely uncommon phenomenon in acute myeloid leukemia (AML), with less than 1% in one previous research. This finding is typically associated with myelomonocytic or monocytic morphology (also designated as FAB-AML M4 or M5). The most common chromosomal anomalies includes the following: t(8;16) or its variants, inv(8)(p11q13) and t(16;21)(p11;q22), and less frequent in B-lymphoblastic leukemia (B-ALL) with ETV6-RUNX1 or BCR-ABL1. Besides, abundant cytoplasmic granules can occasionally occur in B-ALL, but rarely seen in T-lymphoblastic leukemia (T-ALL). Here, we describe a child diagnosed with de novo T-ALL with SIL-TAL1 fusion gene, with concurrence of numerous cytoplasmic granules and erythrophagocytosis by blast cells. This case emphasizes the great value of comprehensive diagnosis, with morphological as well as flow cytometry and molecular diagnostic technique playing a crucial role in the diagnosis of some leukemias with deceptive morphology.
Keywords: erythrophagocytosis, T-lymphoblastic leukemia, SIL-TAL1 fusion gene, cytoplasmic granules, flow cytometry

Declarations

A 7-year-old boy was admitted complaining of cough for four days. Physical examination revealed dense needle-sized bleeding spots on the face. Complete blood count revealed a white blood cell count of 39.58×10^9/L, mild anemia and platelets of 85×10^9/L. Peripheral blood smear showed some promyelocyte-like blasts with numerous cytoplasmic granules (Figure 1A), accompanied by abundant blast cell fragments (Figure 1B). Bone marrow aspiration showed 62% blasts with dispersed nuclear chromatin, multiple inconspicuous nucleoli and occasional vacuolated cytoplasm and cytoplasmic fragment. Of interest, erythrophagocytosis by leukemic cells was also noted (Figure 1C-D). Immunophenotyping showed the blasts were positive for CD34, CD2, CD5, CD7, cTdT, CD38, cCD3 and CD99, partially positive for CD4, CD8, CD1a and CD10. Cytogenetic analysis showed a normal male karyotype. Reverse transcription polymerase chain reaction demonstrated SIL-TAL1 fusion gene.

In addition, biopsy of the anterior superior mediastinal lymph node was also performed, and the immunohistochemical findings were basically consistent with the immunophenotype of bone marrow samples. All these findings confirmed the diagnosis of T-lymphoblastic leukemia (T-ALL) with SIL-TAL1 rearrangement. After diagnosis, the patient underwent chemotherapy with VDLD (vindesine+idarubicin+dexamethasone+pegaspargase) and regimens of cyclophosphamide, cytarabine, 6-mercaptopurine and pegaspargase (CAML). The boy failed to obtain a complete remission and he is currently in a state of myelosuppression post-chemotherapy.

Erythrophagocytosis by leukemic cells is a very rare phenomenon and is mostly found in acute myeloid leukemia with t(8;16) [1], t(16;21)(p11;q22) [2], and less commonly, in B-lymphoblastic leukemia [3,4]. Abundant cytoplasmic granules can occasionally occur in B-lymphoblastic leukemia, but rarely seen in T-ALL. Concurrent erythrophagocytosis and cytoplasmic granules in a child with de novo T-ALL with SIL-TAL1 was extremely uncommon. This case exemplifies the diagnostic value of the flow cytometry and molecular technique in the identification of some leukemias with deceptive morphology (such as promyelocyte-like blasts with abundant cytoplasmic granules).
Figure 1. Peripheral blood smear showed some promyelocyte-like blasts with numerous cytoplasmic granules (A), accompanied by abundant blast cell fragments (B). Bone marrow aspiration showed 62% blasts with dispersed nuclear chromatin, multiple inconspicuous nucleoli and occasional vacuolated cytoplasm and cytoplasmic fragment. Erythrophagocytosis by leukemic cells was also noted (C-D).

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Conflict of Interest The authors declare that they have no conflicts of interest.

Informed consent Informed consent was obtained from this patient.

Ethical approval All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent for publication Informed consent was obtained from the publication.

References