Acute Leukemia Cytochemically Myeloid and Immunophenotypically T Lymphoid

Shano Naseem, MD, Pallavi Agarwal, MD, and Neelam Varma, MD

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A 15-year-old boy presented at our center with shortness of breath and swelling in the neck since 4 months. On examination he had hepatosplenomegaly and generalized lymphadenopathy. Clinically, acute lymphoblastic leukemia, possibly T-cell lineage was considered. His hemogram showed a hemoglobin level of 56 gm/L, total leukocyte count of 3.4 x 10^9/L, platelets of 105 x 10^9/L, and 50% circulating blasts. Blasts were variable in size with opened up chromatin and scant to moderate basophilic cytoplasm. Bone marrow examination showed 72% blasts with similar morphology; however, an occasional blast had an Auer rod (Fig. 1). Cytochemical staining for myeloperoxidase (MPO) further highlighted the Auer rod and showed positivity in 6% blasts (Fig. 2). On flow cytometric immunophenotyping (FCM-IP), blasts were positive for terminal deoxynucleotidyl transferase (TdT), CD2, CD5, CD7, and cCD3 and negative for B-lymphoid and myeloid markers. The myeloid markers, which were tested and found to be negative by flow cytometry, include CD13, CD33, CD14, CD64, and MPO. Reverse transcriptase polymerase chain reaction for BCR-ABL and MLL-AF4 fusion genes was negative. On the basis of diagnostic criteria from the WHO classification for acute leukemias, our case was classified as a mixed phenotype acute leukemia T-/myeloid (MPAL).

MPAL-T-lymphoid/myeloid is a rare group of acute leukemias, representing <1% of all acute leukemias. They can be seen both in children and adults. They have no unique clinical and morphologic features. In most cases blasts are lymphoid morphologically; however, in few cases there may be a dimorphic population with one resembling lymphoid and other myeloid. Most cases have clonal chromosomal abnormalities, although none is specific for them. They generally have a poor prognosis.\(^1\)

A recent large study by Matutes and colleagues published the clinical and laboratory features of 100 cases of MPAL, classified strictly according to the 2008 WHO criteria. In this study there were 28 children, B-/myeloid MPAL was reported as more common than T-/myeloid MPAL (18 vs. 6) but, overall, there was no significant difference between B-/myeloid and T-/myeloid immunophenotypes for age, sex, and morphology. A high incidence of cytogenetic abnormalities was observed with only 4 of 28 (14.3%) children displaying a normal karyotype; however, no single cytogenetic abnormality was overrepresented. This study also analyzed the treatment outcome and reported median survival for children higher than adults (139 vs. 11 mo), which was statistically significant. Overall, MPAL was found to be a poor-risk disease with age,
Philadelphia (Ph) chromosome, and type of induction therapy being significant strong predictors for survival.\textsuperscript{2}

Morphologically, MPAL is heterogenous and a diagnosis of MPAL may not be suspected by morphology alone; therefore, for the diagnosis of MPAL immunophenotyping is indispensible. Although if either of them is used alone, MPAL diagnosis may be missed. The present case reinstates the importance of careful review of both: (i) morphology along with cytochemical staining for MPO, and (ii) FCM-IP, in acute leukemia cases, as, if in this case, only morphology was taken into consideration, then lymphoid lineage would have been not documented, and if only FCM-IP was taken into consideration, then myeloid lineage would have been not documented.

REFERENCES
