PSP 75th Annual Convention
Research Competition

Poster Presentation

Straddling Two Lineages: Mixed-Phenotype Acute Leukemia, B/T (MPAL-B/T) in a 12-year-old Filipino Male

Dan Angelo D. Matias, Francisco P. Tria IV, and Daphne C. Ang

Division of Pathology, Philippine Children's Medical Center

ABSTRACT

Introduction. Mixed-phenotype acute leukemia (MPAL) is a rare, biologically high-risk acute leukemia characterized by blasts expressing markers of more than one hematopoietic lineage. It accounts for <4% of acute leukemias. MPAL with B- and T-lineage differentiation (MPAL-B/T) is exceptionally rare, comprising ~6% of MPAL cases, with limited pediatric reports. Accurate recognition is critical, as this entity carries distinct therapeutic and prognostic implications compared with lineage-defined leukemias.

Case Presentation. We report a 12-year-old Filipino female presenting with epistaxis, pallor, and easy bruising. Laboratory studies revealed severe anemia, hyperleukocytosis, and circulating blasts. Peripheral blood flow cytometry revealed 73% blasts co-expressing T-lineage markers (surface and cytoplasmic CD3, CD5, CD7) and B-lineage markers (CD19, cytoplasmic CD79a), with CD34 and HLA-DR. Bone marrow flow cytometry confirmed persistent dual-lineage expression in blasts comprising 21% of total events.

Discussion. The findings meet WHO diagnostic criteria for MPAL, with definitive T-lineage assignment via cCD3 and strong B-lineage expression with CD19 and cCD79a. By European Group for the Immunological Classification of Leukemias criteria, lineage scores were 3.5 (T) and 3 (B), consistent with biphenotypic leukemia.

MPAL has inferior survival compared with lineage-defined ALL and remains therapeutically challenging due to uncertainty in optimal induction strategy. Emerging data support ALL-directed regimens with risk-adapted consolidation, underscoring that precise immunophenotypic classification informs treatment algorithms and risk stratification. Misclassification as isolated T-ALL or B-ALL may lead to inappropriate therapy and poorer outcomes.

Conclusion. To our knowledge, this is the first reported Filipino pediatric MPAL-B/T case, emphasizing the need for comprehensive immunophenotyping and local molecular and outcome data to guide evidence-based management.

Key words. *B- and T-cell, biphenotypic, acute leukemia, mixed phenotype*