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MIXED-PHENOTYPE ACUTE LEUKEMIA: T/MEGAKARYOBLASTIC - DOES IT REALLY EXIST?

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INTRODUCTION

Among the mixed-phenotype acute leukemias (MPALs), B/myeloid and T/myeloid combinations are relatively common subtypes. However, megakaryoblastic lineage in combination with other lineages is still rare. We report 2 MPAL cases with a biphenotypic pattern consistent with T/megakaryoblastic lineage.

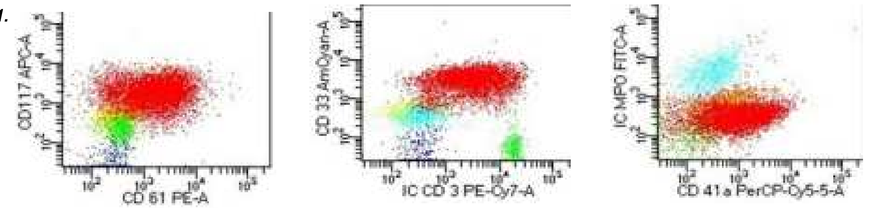
CASE PRESENTATIONS

Case 1: 7-month-old child presented with fever for 2 weeks. General physical examination was unremarkable. CBC reported anemia, thrombocytopenia and leukocytosis (WBC 94 x 10^9/L). Differential count revealed 55% blasts. Flow cytometry for immunophenotyping was performed and revealed a population of blasts positive for CD34, CD117, IC CD3, CD61 and CD41 while negative for MPO, TdT, CD79a, CD4, CD8 and HLA-DR. Thus the case was concluded as mixed phenotype acute leukemia (T/Megakaryoblastic). FISH analysis using RUNX1::RUNX1T1 probe showed gain of RUNX1.

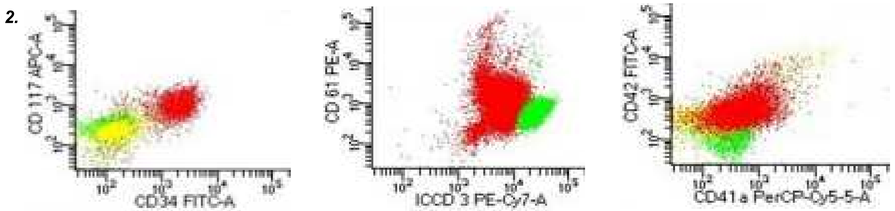
Case 2: 1.5-year-old female patient, presented with fever for 3 weeks. General physical examination was unremarkable. CBC reported anemia, thrombocytopenia and leukocytosis (WBC 23.6 x 10^9/L). Differential count showed 37% blasts. Flow cytometry for immunophenotyping was performed and revealed a CD45 negative blast population positive for CD34, CD117, IC CD3, CD61, CD33, CD42 and CD41, while negative for MPO, CD79a and CD64. Thus the case was concluded as mixed phenotype acute leukemia (T/Megakaryoblastic). Karyotype showed an abnormal female hyperdiploid chromosome complement with gain of one copy of chromosome X, 5, 9, 14, 19, 22 and 2 copies of chromosome 21. FISH analysis using RUNX1::RUNX1T1 probe showed gain of RUNX1.

IMMUNOPHENOTYPING

Case 1.



Case 2.



DISCUSSION

The cases presented here satisfy the criteria for both T-lineage assignment (cyCD3 intensity reaches that of normal T-lymphocytes) and acute megakaryoblastic leukemia (≥ 2 megakaryocytic marker in >50% blasts). Data on the disease course and outcomes of these patients are very scarce and few cases are reported in the literature. The reported cases showed that incidence of this rare subtype is more common in children <5 years of age. Case 1 patient was very sick and started on steroids but the condition worsened and the patient died on day 3. Case 2 patient was given induction chemotherapy of acute lymphoblastic leukemia protocol. She initially responded well but unfortunately acquired *E-coli* infection during the course and later expired.

CONCLUSIONS

We recommend adding definitions and diagnostic criteria for these entities in leukemia classification systems to overcome diagnostic challenges. Further studies are needed to determine optimum management protocols for these rare entities.

REFERENCES

1. Klairmont MM, Choi JK (2018) Mixed-phenotype acute leukemia, T/megakaryoblastic. Blood 132(22):2418–2418. https://doi.org/ 10.1182/blood-2018-09-871194.
2. Rossi JG, Rubio P, Alonso CN, Bernasconi AR, Sajarof EO, Digiorge J et al (2018) Cytoplasmic CD3 expression in infant acute megakaryoblastic leukemia: a new ambiguous lineage subtype? Leuk Res 71:6–12. https://doi.org/10.1016/j.leukres.2018. 05.009.
3. Khoury JD, Solary E, Abla O, Akkari Y, Alaggio R, Apperley JF, et al 2022 The 5th edition of the World Health Organization classification of hematolymphoid tumors: myeloid and histiocytic/ dendritic neoplasms. Leukemia 36(7):1703–1719 https://doi.org/ 10.1038/s41375-022-01613-1.

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