A RARE CASE OF B-ACUTE LYMPHOBLASTIC LEUKEMIA PRESENTING WITH t(2;11)(p15;p15) AND t(7;19)(p15;q13.3) TRANSLOCATIONS SUGGESTED PREDICTED GENE FUSIONS WITH NUP98 AND HOXA9

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Background: Chromosomal rearrangements involving 11p15 and 7p15 regions are rare in acute lymphoblastic leukemia (ALL) and are frequently associated with the NUP98 and HOX gene families, which are linked to leukemogenesis and poor prognosis. Purpose: This study aims to report a B-ALL patient with monosomy 9 and complex chromosomal abnormalities, and to evaluate cytogenetic and molecular findings, highlighting the potential biological significance of newly identified t(2;11)(p15;p15) and t(7;19)(p15;q13.3) translocations.

Methods: Cytogenetic evaluation was performed using karyotype analysis and FISH studies. Molecular analyses of NPM1, FLT3, and CEBPA mutations as well as BCR::ABL1 fusion were conducted using real time polymerase chain reaction and next generations sequencing methods. Post-treatment and post-transplantation cytogenetic follow-up analyses were also performed.

Results: A 67-year-old female patient presented with leukocytosis. Molecular analyses revealed no mutations in NPM1, FLT3, or CEBPA, and no BCR::ABL1 fusion was detected. FISH analysis showed no abnormalities for t(8;21)(q22;q22), t(15;17)(q22;q21), inv(16)/t(16;16)(p13q22), or t(9;22)(q34;q11.2). The patient was diagnosed with B-ALL. Karyotype analysis revealed 45,XX,t(2;11)(p15;p15),t(7;19)(p15;q13.3),-9 in all metaphases. Breakpoint regions were suggested to involve BCL11A (2p15), NUP98 (11p15), HOXA9 (7p15), and BCL3/BCL6 (19q13.3). The patient achieved remission following Hyper-CVAD therapy. Follow-up cytogenetic analysis showed 46,XX,t(7;19)(p15;q13.3)[1]/46,XX[13], while the t(2;11) clone was no longer detected. Subsequently, the patient underwent haploidentical allogeneic stem cell transplantation from her son with 6/10 HLA matching, achieving 100% donor chimerism. However, the patient died on day +28 post-transplant due to sepsis.

Conclusions: This case demonstrates the rare coexistence of monosomy 9 with t(2;11)(p15;p15) and t(7;19)(p15;q13.3) in B-ALL, suggesting significant clonal heterogeneity. Disruption of NUP98 and HOXA9-associated transcriptional networks and potential involvement of BCL11A, BCL3, and BCL6 loci may contribute to leukemogenesis through genetic dysregulation, differentiation arrest, and apoptosis evasion. Further molecular characterization of such rare cytogenetic abnormalities is needed for better understanding of their biological and prognostic significance.