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abstract

The Results of High-Dose Chemotherapy with Autologous Stem Cell Transplantation in Ewing's Sarcoma in Children in the Republic of Kazakhstan

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Introduction: Ewing's sarcoma (ES) is an aggressive malignancy primarily affecting bones and soft tissues in children and adolescents. Despite multimodal treatments, including surgery, chemotherapy, and radiation, the prognosis for patients with recurrent or metastatic ES remains poor. Recent studies have focused on novel therapies, including autologous hematopoietic stem cell transplantation (HSCT), to improve outcomes in cases of refractory or relapsed disease. The Scientific Center for Pediatrics and Pediatric Surgery in Kazakhstan began performing HSCT in 2012. The objective was to assess the effectiveness of high-dose polychemotherapy combined with autologous HSCT and to identify prognostic factors in a cohort of high-risk Ewing's sarcoma patients.

Methodology: Between 2012 and 2024, 15 autologous HSCT procedures were performed. The cohort included 6 boys and 9 girls, with a median age of 9 years (range: 1–17). All diagnoses were confirmed morphologically. The conditioning regimen used Treosulfan (12g/m²,

days -5 to -3) and Melphalan (140mg/m², day -2). Hematopoietic stem cells were sourced from peripheral blood (100%). The median number of CD34+ cells transfused was $6.7 \times 10^6/\text{kg}$ (range: $1.0\text{--}19.2 \times 10^6$).

Results: All patients achieved successful graft engraftment. Leukocyte recovery ($>1.0 \times 10^9/\text{L}$) was observed on day 22 (range: 8–36 days), and platelet recovery ($>20 \times 10^9/\text{L}$) occurred on day 23 (range: 9–38 days), reaching $>50 \times 10^9/\text{L}$ by day 27 (range: 10–45 days). No early post-transplantation deaths occurred. The median follow-up was 39.5 months (range: 1–78). Eight patients relapsed 7 to 21 months post-transplantation.

Conclusion: The 5-year overall survival rate was $38.7\% \pm 14.7\%$, aligning with international studies. Autologous HSCT shows promise as a treatment for refractory or relapsed Ewing's sarcoma in children.