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Conference Abstract A7

The Role of Allogeneic Hematopoietic Stem Cell Transplantation in Patients with Blast Crisis of Chronic Myeloid Leukemia in the Era of Tyrosine Kinase Inhibitors

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Background

The prognosis for patients with blast crisis of chronic myeloid leukemia (CML blast crisis) remains extremely poor in the era of tyrosine kinase inhibitors. The median overall survival does not exceed 12 months. The role and optimal timing of allogeneic hematopoietic stem cell transplantation remain undefined.

Aim

To evaluate the outcomes of patients with CML blast crisis depending on whether or not they underwent allogeneic hematopoietic stem cell transplantation.

Materials and Methods

A total of 170 patients with CML blast crisis followed at the R.M. Gorbacheva Research Institute were included between 2001 and 2024. The diagnosis of CML blast crisis was established according to the World Health Organization 2022 criteria. Seventy-nine patients (46%) underwent allogeneic hematopoietic stem cell transplantation, while 91 patients (54%) did not. Both groups were comparable in their main biological characteristics: presence of additional chromosomal abnormalities ($p = 0.4$); complex karyotype/3q26 ($p = 0.3$); BCR::ABL1 mutations ($p = 0.5$); and extramedullary involvement ($p = 0.4$).

Results

At a median follow-up of 63.3 months (57.1–69.5), the 5-year overall survival for the entire cohort was 26.5% (95% confidence interval: 19.5–33.8). The median overall survival of patients undergoing allogeneic hematopoietic stem cell transplantation (landmark analysis at 6 months from the onset of blast crisis) was 60 months (16.3–not reached), compared with 21.4 months (7.7–not reached) in the group without allogeneic transplantation ($p = 0.044$). Allogeneic hematopoietic stem cell transplantation performed within the first 10 months from the onset of blast crisis did not demonstrate an effect on improvement of overall survival ($p = 0.3$) (Figure 1). Additional chromosomal abnormalities (hazard ratio 3.1; 95% confidence interval: 1.7–5.8; $p < 0.001$) and complex karyotype/3q26 (hazard ratio 2.8; 95% confidence interval: 1.5–5.1; $p = 0.001$) negatively affected overall survival in univariate analysis. Age, time of blast crisis onset (de novo versus transformed from chronic phase), immunological variant of blast crisis, BCR::ABL1 mutations, and extramedullary involvement did not affect overall survival. In multivariate analysis, only allogeneic hematopoietic stem cell transplantation demonstrated an independent positive impact on overall survival (hazard ratio 0.3; 95% confidence interval: 0.2–0.4; $p < 0.001$), whereas additional chromosomal abnormalities retained their negative impact (hazard ratio 1.9; 95% confidence interval: 1.3–2.8; $p = 0.002$).

Conclusions

The prognosis of patients with CML blast crisis remains unfavorable in the era of tyrosine kinase inhibitors. Allogeneic hematopoietic stem cell transplantation improves therapeutic outcomes. Transplantation performed within the first 6 months from the onset of blast crisis demonstrates the best results. Timely referral of patients to a transplantation center is essential.

Figure 1. Overall survival of patients with CML blast crisis depending on the timing of allogeneic hematopoietic stem cell transplantation (landmark analysis): A – landmark analysis at 6 months from the onset of blast crisis; B – landmark analysis at 10 months from the onset of blast crisis.