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POSTER ABSTRACTS

721.ALLOGENEIC TRANSPLANTATION: CONDITIONING REGIMENS, ENGRAFTMENT AND ACUTE TOXICITIES

A Novel Prediction Model for BK Virus Associated Hemorrhagic Cystitis in Acute Leukemia Patients Following Allogenic Hematopoietic Cell Transplantation: A Retrospective Cohort Study

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Introduction

BK polyomavirus (BKV) has been associated with hemorrhagic cystitis (HC) after allogeneic hematopoietic cell transplantation (HSCT). BK virus hemorrhagic cystitis (BKHC) is associated with high morbidity and higher mortality. Previous studies have identified several risk factors associated with BKHC (Biol Blood Marrow Transplant, 2022). However, these results are contradictory among studies, and the potential mechanisms of BKHC are still unclear. Therefore, an accurate systematic evaluation method for screening high-risk populations before the onset of BKHC is highly necessary. This study was designed to establish an efficient prediction model for BKHC in acute leukemia patients following HSCT, thereby facilitating identification and early intervention in patients at high risk of BKHC.

Methods

In our retrospective study, a cohort of 789 acute leukemia patients following allogenic hematopoietic cell transplantation in 2019 was included and further divided into a BKHC group and a non-BKHC group. Among these patients, 80% were assigned to the derivation cohort, and 20% were assigned to the validation cohort. We first calculated the univariate association of each variable with the occurrence of BKHC. Second, the variables with p values less than 0.05 in the univariate analysis were further included as candidate predictors in the multivariate analysis using a backward stepwise logistic regression model. The variables that remained in the final model based on the outcomes of the multivariate analysis in the derivation cohort were identified as independent risk factors. The discrimination power of the model was assessed in both derivation and validation cohorts through ROC curve (AUC), calibration curve and decision curve analyses.

Results

Among 789 acute leukemia patients following allogenic hematopoietic cell transplantation, 171 patients were diagnosed with BKHC 14 days post transplantation according to the European Conference on Infections in Leukemia (ECIL) definition of BKHC. Patients with early-onset HC occurring within 14 days post transplantation were excluded from the BKHC group. The incidence rate of developing BKHC after allo-HSCT was 21.7%. The median time from transplantation to BKHC development was 30 days. Using multivariable logistic regression methods with stepwise variable selection, four highly significant independent risk factors for developing BKHC were identified: use of ATG during the transplantation regimen ($p=0.048$; odds ratio [OR], 2.32; 95% confidence interval [CI], 0.025-1.71), use of bone marrow blood and peripheral blood as sources of stem cells ($p<0.001$; odds ratio [OR], 0.25; 95% confidence interval [CI], 0.025-1.71), age less than 30 years old ($p=0.02$; odds ratio [OR], 1.74; 95% confidence interval [CI], 0.089-1.021) and absolute lymphocyte count at 14 days post-transplantation less than 0.035×10^{9}/L ($p=0.02$; odds ratio [OR], 2.59; 95% confidence interval [CI], 0.31-1.62). The area under the ROC curve (AUC) was 0.741 (95% confidence interval [CI], 0.694-0.789). According to the calibration plots, the model-predicted probabilities showed a good correlation with actual observed frequencies in both the derivation and validation cohorts. Decision curve analysis indicated that the clinical implementation of this model could benefit BKHC patients. A BKV-associated HC Risk Index (BHRI) was constructed according to the regression coefficients. The patient cohort was divided into a high-risk group and a low-risk group according to risk scores. Kaplan–Meier estimations of the probabilities of BKHC were significantly different between the two risk groups.

Conclusions

Patients with BKHC after allo-HSCT usually have high morbidity and higher mortality. A novel prediction model, BHRI, was developed and validated, and this is the first straightforward scoring system designed to evaluate the probability of patients developing BKHC after receiving allo-HSCT to treat hematological malignancies. This model can be effectively utilized to help improve the prognosis of BKHC patients by accelerating the early identification of patients at a high risk of developing BKHC and contributing to the appropriate implementation of timely medical support.

Disclosures No relevant conflicts of interest to declare.

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