Predicting Mortality after Autologous Transplant: Development of a Novel Risk Score

Abstract

There have been several efforts to predict mortality after autologous stem cell transplantation (ASCT), such as the hematopoietic cell transplant-comorbidity index (HCT-CI), described for allogeneic stem cell transplantation and validated for ASCT, but there is no composite score in the setting of ASCT combining comorbidities with other clinical characteristics. Our aim is to describe a comprehensive score combining comorbidities with other clinical factors and to analyze the impact of this score on nonrelapse mortality (NRM), overall survival (OS), and early morbidity endpoints (mechanical ventilation, shock or dialysis) after ASCT. For the training cohort, we retrospectively reviewed data of 2068 adult patients who received an ASCT in Argentina (October 2002 to June 2017) for multiple myeloma or lymphoma. For the validation cohort, we analyzed 2168 ASCTs performed in the Medical College of Wisconsin and Spanish stem cell transplant group (Grupo Español de Trasplante Hematopoyético (GETH)) (January 2012 to December 2018). We first performed a multivariate analysis for NRM in order to select and assign weight to the risk factors included in the score (male patients, aged 55 to 64 and ≥65 years, HCT-CI ≥3, Hodgkin lymphoma and non-Hodgkin lymphoma). The hazard ratio for NRM increased proportionally with the score. Patients were grouped as low risk (LR) with a score of 0 to 1 (686, 33%), intermediate risk (IR) with a score of 2 to 3 (1109, 53%), high risk (HR) with a score of 4 (198, 10%), and very high risk (VHR) with a score of ≥5 (75, 4%). The score was associated with a progressive increase in all the early morbidity endpoints. Moreover, the score was significantly associated with early NRM (day 100: 1.5% versus 2.4% versus 7.6% versus 17.6%) as well as long term (1 to 3 years; 1.8% to 2.3% versus 3.8% to 4.9% versus 11.7% to 14.5% versus 25.0% to 27.4%, respectively; P< .0001) and OS (1 to 5 years; 94% to 73% versus 89% to 75% versus 76% to 47% versus 65% to 52% respectively; P < .0001). The score was validated in an independent cohort (N = 2168) and was significantly associated with early and late events. In conclusion, we developed and validated a novel score predicting NRM and OS in 2 large cohorts of more than 2000 autologous transplant patients. This tool can be useful for tailoring conditioning regimens or defining risk for transplant program decision making.

Keywords: Comorbidities; Lymphoma; Multiple myeloma; Nonrelapse mortality.

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