Predictive value of a near-term prediction model for severe irAEs in cancer treatment with immune checkpoint inhibitors

Jun Zhao1*, Ying Zhang1,2, Wenging Hu1, Yunyi Du1, Xiaoling Zhang1, Ning Ma1, Wei Yang1, Bo Yang1

1212P

Changzhi People's Hospital Affiliated to Changzhi Medical College, Shanxi, China

Background

Immune checkpoint inhibitors (ICIs) have opened a new chapter in the treatment of malignant tumors. However, the incidence of immune-related adverse events (irAEs) is as high as 94.9%, with grade 3 or higher irAEs occurring at a rate of 3%-5%. Severe irAEs affect treatment efficacy and benefit. Current research on irAEs is mainly focused on early prediction, with a lack of near-term prediction, especially for grade 3 or higher irAEs occurring within one cycle and the current cycle. Early prediction based on baseline data may limit patients’ exposure to immunotherapy. Studies have reported that baseline lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) can predict irAEs; absolute eosinophil count (AEC) is associated with immune-related pneumonia, but its correlation with other systemic irAEs requires further exploration. The purpose of this study is to investigate the near-term predictive value of NLR, PLR, and AEC for grade 3 or higher irAEs caused by PD-1 inhibitors, and to construct a near-term prediction model.

Method

Data were collected from cancer patients treated with PD-1 inhibitors in our department from January 2020 to May 2022. A total of 138 cases were included, with 65 experiencing grade 3 or higher irAEs (NLR, PLR, and AEC data were collected one cycle before and during the occurrence of irAEs (median cycle number was 2nd and 3rd cycles, respectively). Logistic analysis was used to analyze the correlation between NLR, PLR, AEC, and irAEs, and to construct a prediction model. The model’s performance was assessed by obtaining sensitivity and specificity through the receiver operating characteristic curve (ROC).

This study was registered on Chinese Clinical Trial Registry (ChiCTR2000049849).

Result

Out of the 138 cancer patients, 65 experienced at least one type of irAE. Forty-seven experienced grade 1-2 irAEs, and 18 had grade 3 or higher irAEs (including 2 fatal irAEs). Univariate analysis showed that the current cycle’s NLR (OR=1.484, p=0.001) was associated with irAEs. Multivariate analysis showed that the current cycle’s NLR (OR=1.839, p=0.000) and PLR (OR=0.994, p=0.029) were independent risk factors for irAEs, while AEC had no correlation with irAEs. Patients with grade 3 or higher irAEs had higher NLR (previous cycle p=0.048, current cycle p=0.021) and PLR (current cycle p=0.009) than those with grade 1-2 irAEs. A binary logistic regression analysis was used to construct a prediction model for the occurrence of irAEs. Model A predicted the occurrence of irAEs in the next cycle with an area under the curve (AUC) of 0.788, a sensitivity of 62.9%, and a specificity of 68.5%. When the probability obtained from Model A was ≥38.8% (cutoff value), Model B (AUC=0.900) was entered, predicting the occurrence of grade 3 or higher irAEs in the next cycle with a sensitivity of 67.7% and a specificity of 72.6%. Similarly, Model C predicted the occurrence of irAEs in the current cycle with an AUC of 0.860, yielding a sensitivity of 81.5% and a specificity of 86.3%.

Conclusion

The model consisting of NLR, PLR, and AEC in this study can predict the occurrence of grade 3 or higher irAEs within one cycle, thus providing an early warning for severe irAEs. Compared with early prediction, our near-term prediction model maximizes the number of cycles of immune therapy obtained by patients, thereby improving the effectiveness of immunotherapy. This model has significant clinical application value.