



READ IT BEFORE YOUR PATIENTS

Oesophageal

Prediction of Severe Lymphopenia During Chemoradiation Therapy for Oesophageal Cancer: Development and Validation of a Pretreatment Nomogram

Peter S N van Rossum, Wei Deng, David M Routman, Amy Y Liu, Cai Xu, Yutaka Shiraishi, Max Peters, Kenneth W Merrell, Christopher L Hallemeier, Radhe Mohan, Steven H Lin

Pract Radiat Oncol. Jan-Feb 2020;10(1):e16-e26. doi: 10.1016/j.prro.2019.07.010. Epub 2019 Jul 29.

INTRODUCTION

In patients with oesophageal cancer, occurrence of severe radiation-induced lymphopenia during chemoradiation therapy has been associated with worse progression-free and overall survival. The aim of this study was to develop and validate a pre-treatment clinical nomogram for the prediction of grade 4 lymphopenia.

METHODS AND MATERIALS

A development set of consecutive patients who underwent chemoradiation therapy for oesophageal cancer and an independent validation set of patients from another institution were identified. Grade 4 lymphopenia was defined as an absolute lymphocyte count nadir during chemoradiation therapy of $<0.2 \times 10^3/\mu\text{l}$. Multivariable logistic regression analysis was used to create a prediction model for grade 4 lymphopenia in the development set, which was internally validated using bootstrapping and externally validated by applying the model to the validation set. The model was presented as a nomogram yielding four risk groups.

RESULTS

Among 860 included patients, 322 (37%) experienced grade 4 lymphopenia. Higher age, larger planning target volume in interaction with lower body mass index, photon- rather than proton-based therapy, and lower baseline absolute lymphocyte count were predictive in the final model (corrected c-statistic, 0.76). External validation in 144 patients, among whom 58 (40%) had grade 4 lymphopenia, yielded a c-statistic of 0.71. Four nomogram-based risk groups yielded predicted risk rates of 10%, 24%, 43%, and 70%, respectively.

CONCLUSIONS

A pre-treatment clinical nomogram was developed and validated for the prediction of grade 4 radiation-induced lymphopenia during chemoradiation therapy for oesophageal cancer. The nomogram can risk stratify individual patients suitable for lymphopenia-mitigating strategies or potential future therapeutic approaches to ultimately improve survival.