

Dosimetric and clinical predictors of radiation-induced lung toxicity in esophageal carcinoma

Shu-chai Zhu, Wen-bin Shen, Zhi-kun Liu, Juan Li, Jing-wei Su,
and Yu-xiang Wang

Department of Radiation Oncology, The Fourth Hospital of Hebei Medical University, Shijiazhuang, China

ABSTRACT

Aims and background. Radiation-induced lung toxicity occurs frequently in patients with esophageal carcinoma. This study aims to evaluate the clinical and three-dimensional dosimetric parameters associated with lung toxicity after radiotherapy for esophageal carcinoma.

Methods and study design. The records of 56 patients treated for esophageal carcinoma were reviewed. The Radiation Therapy Oncology Group criteria for grading of lung toxicity were followed. Spearman's correlation test, the chi-square test and logistic regression analyses were used for statistical analysis.

Results. Ten of the 56 patients developed acute toxicity. The toxicity grades were grade 2 in 7 patients and grade 3 in 3 patients; none of the patients developed grade 4 or worse toxicity. One case of toxicity occurred during radiotherapy and 9 occurred 2 weeks to 3 months after radiotherapy. The median time was 2.0 months after radiotherapy. Fourteen patients developed late irradiated lung injury, 3 after 3.5 months, 7 after 9 months, and 4 after 14 months. Radiographic imaging demonstrated patchy consolidation (n = 5), atelectasis with parenchymal distortion (n = 6), and solid consolidation (n = 3). For acute toxicity, the irradiated esophageal volume, number of fields, and most dosimetric parameters were predictive. For late toxicity, chemotherapy combined with radiotherapy and other dosimetric parameters were predictive. No obvious association between the occurrence of acute and late injury was observed.

Conclusions. The percent of lung tissue receiving at least 25 Gy (V25), the number of fields, and the irradiated length of the esophagus can be used as predictors of the risk of acute toxicity. Lungs V30, as well as chemotherapy combined with radiotherapy, are predictive of late lung injury.

Key words: esophageal cancer, three-dimensional conformal radiotherapy, radiation-induced lung toxicity.

Acknowledgments: This work was supported by the National Scientific Institution Fund (grant 30870743).

Correspondence to: Shu-chai Zhu, MD, Department of Radiation Oncology, The Fourth Hospital of Hebei Medical University, 12 Jiankang Road, Shijiazhuang, 050011, China.
Tel +86-311-86095317;
fax +86-311-86077634;
e-mail sczhu@heinfo.net

Received September 17, 2010;
accepted February 11, 2011.