

Limiting chest wall toxicity by adapting the dose schedule and dose constraints in SBRT for early-stage lung cancer

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Categories: Radiation Oncology

Keywords: stereotactic body radiotherapy, lung cancer, chest wall, toxicity

How to cite this poster

Jumeau R, Filion É, Bahig H, et al. (2016) Limiting chest wall toxicity by adapting the dose schedule and dose constraints in SBRT for early-stage lung cancer. *Cureus* 8(9): e.

Abstract

Purpose

Chest wall (CW) toxicity (rib fracture and/or pain) is recognized complication of stereotactic body radiotherapy (SBRT) for non-small cell lung cancer (NSCLC). The aim of this study was to evaluate the frequency of CW toxicity following SBRT and propose a new dosimetric parameter adapted to fractionation.

Materials and Methods

We reviewed the charts and SBRT plans from patients treated for T1-T2N0 peripheral NSCLC between 2009 and 2015. The CW structure was created through a 3 cm expansion of the lung. The median dose delivered to the planning target volume was 60 Gy. SBRT was delivered in 3 fractions for patients with CW V30 of less than 30cc. If the CW V30 exceeded 30cc, 5 fractions were used and the plan was optimized based on the CW V37 (considered biologically equivalent to the V30 of 3 fraction plans).

Results

In a cohort of 360 patients, 365 lesions were treated 301 in 3 fractions, 64 in 5 fractions. The median follow-up was 16 months. Twenty-five patients (7%) developed CW toxicity after a median time of 10 months following treatment. The mean CW V30/V37 was 21cc for patients with CW toxicity and 17cc for patients without toxicity ($p < 0.05$). The 2-year local control and the CW toxicity rates were similar in the 3 or 5 fractions group (97% vs. 96% and 7% vs. 6%).

Conclusion

This study confirms that CW V30/V37 is correlated to CW toxicity. When the CW V30 is greater than 30cc, delivering SBRT in 5 fractions with V37 optimization can limit CW toxicity.

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Published 09/14/2016

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