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Title: Impact of cardiac doses on survival of non-small cell lung cancer (NSCLC) patients following radical accelerated radiotherapy

Tahir BA[1], Robinson SD[1], Bradshaw J[2], Riley S[2], Das T[3], Lee C[3], Fisher PM[3], Bates E[3], Tozer-Loft S[2], Hatton MQ[1,3].
[1]Academic Unit of Clinical Oncology, University of Sheffield, Sheffield, UK
[2]Department of Radiotherapy Physics, Weston Park Hospital, Sheffield, UK
[3]Department of Clinical Oncology, Weston Park Hospital, Sheffield, UK

Background: RTOG 0617 identified cardiac dose-volume metrics as independent predictors of survival for locally advanced NSCLC patients following chemoradiotherapy with conventional and dose escalated regimes. Accelerated radiotherapy schedules such as continuous hyperfractionated accelerated radiotherapy (CHART) are widespread in the UK. In this single-centre retrospective analysis, we study the impact of cardiac dosimetry on survival of early stage and locally advanced patients radically treated with accelerated radiotherapy.

Methods: We reviewed the records of all stage I-III NSCLC patients treated at our institution with radical accelerated radiotherapy (CHART, 54Gy/36# over 12 days; hypofractionated, 55Gy/20# over 4 weeks) between 2010 to 2015. Patient demographics, tumour characteristics, survival and dosimetric data were recorded. Cardiac dosimetric parameters included heart V5, V30, V33, V50, V67, V100 and mean dose. The impact of these metrics on survival was assessed using Cox regression.

Results: We identified 563 patients treated of whom 294 had cardiac dosimetric data for analysis. For these patients, 55% were male with a mean age of 72. The percentage of patients with stage I, II and III disease were 33%, 16% and 51%, respectively. 60% had a WHO performance status of 0-1. 124 received CHART and 171 received hypofractionated radiotherapy. 2 year overall survival was 48% with a median overall survival of 22.5 months. On univariate analysis, gender, stage, tumour recurrence, PTV volume and all cardiac dosimetric parameters were significantly associated with survival. However, multivariate analysis identified only PTV volume and heart V30, V33, V50 and mean dose as independent predictors of survival with mean heart dose being the most predictive (HR=1.027, 95% CI=1.002-1.053, p = 0.032).

Conclusion: We identified several cardiac dosimetric parameters as independent predictors of survival following accelerated radiotherapy. Consequently, minimising cardiac dose may improve outcomes and warrants further study.

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