

1063

Effect of Education and Standardization of Cardiac Dose Constraints on Heart Dose in Lung Cancer Patients Receiving Definitive Radiation Therapy Across a Statewide Consortium

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Purpose/Objective(s): Cardiac radiation exposure is associated with an increased rate of adverse cardiac events in patients receiving radiation therapy for locally advanced non-small cell lung carcinoma (NSCLC). Previous analysis of practice patterns within the statewide Michigan Radiation Oncology Quality Consortium (MROQC) revealed 1 in 4 patients received a mean heart dose > 20 Gy and significant heterogeneity existed among treatment centers in using cardiac dose constraints. The purpose of this study is to analyze the effect of education and initiation of standardized cardiac dose constraints on heart dose across a statewide consortium.

Materials/Methods: From 2012 to 2020, 1604 patients from 27 academic and community centers who received radiation therapy for locally advanced NSCLC were included in this analysis. Dosimetric endpoints including mean heart dose (MHD), mean lung dose, and mean esophagus dose were calculated using data from dose-volume histograms. These dose metrics were grouped by year of treatment initiation for all patients. Education regarding data for cardiac dose constraints was discussed in small lung cancer working group meetings and consortium-wide starting in 2016. This was followed in 2018 by implementation of a quality metric requiring mean heart dose < 20 Gy while maintaining dose coverage (D95) to the tumor. Dose metrics were compared before (2012-2016) and after (2017-2019) initiation of interventions targeting cardiac constraints. Statistical analysis was performed using the Wilcoxon Rank Sum test.

Results: Following education and implementation of the heart dose performance metric, mean MHD declined from an average of 12.2 Gy pre-intervention to 10.4 Gy post-intervention, and the percentage of patients receiving MHD > 20 Gy reduced by half. (Table). Mean lung dose and mean esophagus dose did not increase, and tumor coverage remained unchanged.

Conclusion: Education and implementation of a standardized cardiac dose quality measure across a statewide consortium was associated with a reduction of mean heart dose in patients receiving radiation therapy for locally advanced NSCLC. These dose reductions were achieved without sacrificing tumor coverage, increasing mean lung dose or mean esophagus dose. Analysis of the clinical ramifications of the reduction in cardiac doses is ongoing.

Abstract 1063 – Table 1

	2012-2016	2017-2020	P value
Mean MHD (Gy)	12.2	10.4	< 0.0001
Percent of Patients with MHD > 20 Gy	21.1%	10.3%	< 0.0001

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1064

The Impact of Radiotherapy Protocol Adherence on the Treatment Outcome in Patients With Locally Advanced NSCLC Treated With Concurrent Chemoradiation: Results From the Radiotherapy Quality Assurance of the International Randomized PET-Plan Trial

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Purpose/Objective(s): The success of intensification and personalization of the curative treatment of non-small cell lung cancer (NSCLC) is strongly associated with the precision in radiotherapy (RT) treatment, which must therefore follow high standards. Herein we evaluate the impact of RT protocol adherence in the prospective international multicenter trial on curative treatment of NSCLC.

Materials/Methods: In the open-label, randomized, controlled PET-Plan trial, patients with inoperable NSCLC were randomized at a 1:1 ratio regarding the target volume delineation informed by ¹⁸F-FDG PET and CT plus elective nodal irradiation (Arm A) or target volumes informed by PET alone (Arm B) and received iso-toxically dose-escalated concurrent chemoradiation. The prospectively organized quality assurance program (RTQA) included individual case review by predefined criteria. 24 items (arm A) and 20 items (arm B) were scored as per protocol (pP), minor (miD), intermediate (inD) and major (maD) deviation by a multicenter panel of radiation oncologists and medical physicists.

Results: Between 05/2009 and 11/2016, 205 patients were randomized, (one patient was excluded after randomization), 173 were treated per-RT