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Prospective Evaluation of Non-Small Cell Lung Cancer Radiation Therapy Treatment Interruptions in a Large Statewide Quality Collaborative

A.L. Elaimy,[1] M. Schipper,[1,2] H. Yin,[1,2] M.M. Matuszak,[1] M.M. Dominello,[3] D.P. Bergsma,[1] P.A. Paximadis,[4] M. Zaki,[5] L.L. Kestin,[6] J.A. Hayman,[1] A.F. Dragovic,[1] and S. Jolly[1]; *[1]Department of Radiation Oncology, University of Michigan, Ann Arbor, MI, [2]Department of Biostatistics, University of Michigan, Ann Arbor, MI, [3]Department of Radiation Oncology, Karmanos Cancer Center, Detroit, MI, [4]Department of Radiation Oncology, Corewell Health South, St. Joseph, MI, [5]Covenant HealthCare, Saginaw, MI, [6]Michigan Healthcare Professionals/GenesisCare USA, Farmington Hills, MI*

Purpose/Objective(s): For patients receiving radiation therapy for non-small cell lung cancer (NSCLC), unplanned interruptions prolong the treatment course and may be associated with adverse outcomes. However, little is known regarding patient and treatment planning characteristics that contribute to interruptions. The purpose of this study was to characterize the frequency, type duration and predictors of interruptions in radiation therapy in patients with NSCLC treated with conventional fractionation throughout a statewide quality collaborative.

Materials/Methods: Clinical and dosimetric data as well as frequency and duration of treatment interruptions (> or ≤ 5 days) were prospectively collected by 29 institutions within the Michigan Radiation Oncology Quality Consortium between 2012 and 2024 for patients with NSCLC treated with conventional fractionation using a physician-assessed survey. In version 1 of the survey (2012 to August 2017) data regarding toxicity breaks only were recorded. In version 2 of the survey (September 2017 to 2024) data regarding both any treatment interruption and toxicity breaks were recorded. We modeled the influence of patient, disease and treatment characteristics including mean and other radiation dose metrics for lung, heart and esophagus on the odds of any treatment interruption using multivariate logistic regression.

Results: Toxicity breaks were reported in 9% (131/1476) of patients and toxicity breaks greater than 5 days were reported in 3.5% (51/1476) of patients. Any treatment interruption was reported in 18% (154/867) of patients and toxicity breaks were reported in 6% (56/867) of patients enrolled during version 2 of the survey. Stepwise modeling identified a MV model for any toxicity break including heart V10Gy (OR per 10% increase = 1.16, p = 0.001), concurrent chemotherapy (Yes vs No = 2.67, p = 0.024) and ECOG (OR per 1 point increase = 1.91, p<0.001). In this model, all of the other tested heart dose metrics (mean and V10-V60) were significant predictors for any toxicity break and mean esophagus dose was not a significant predictor for any toxicity break. Stepwise modeling identified a MV model for toxicity break > 5 days including heart V10Gy (OR per 10% increase = 1.12, p<0.001) and ECOG (OR per 1 point increase = 1.87, p <0.001). Additionally, stepwise modeling selected smoking status (p = 0.05), ECOG (p<0.01) and lung V10Gy (p<0.01) as jointly significant predictors of any toxicity related break. PTV volume was not associated with treatment interruptions in all 3 models.

Conclusion: Both clinical and dosimetric factors are associated with treatment interruptions in patients with NSCLC undergoing conventional fractionation. Efforts should be made to identify patients at increased risk of interruptions to optimize treatment planning and minimize toxicity.

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Inducing Abscopal Response by Local Radiotherapy and Granulocyte-Macrophage Colony-Stimulating Factor as Monotherapy in Patients with Pretreated Advanced Thymic Epithelial Tumors: A Retrospective Analysis

M. Fan,[1,2] H. Li,[2,3] J. Chen,[3] B. Wang,[1,3] and J. Wen[1,3]; *[1]Department of Radiation Oncology, Fudan University Shanghai Cancer Center, Shanghai, China, [2]Fudan University Shanghai Cancer Center, Shanghai, China, [3]Department of Oncology, Shanghai Medical College, Fudan University, Shanghai, China*

Purpose/Objective(s): The study aimed to investigate the induction of abscopal effect in patients with pretreated advanced thymic epithelial tumors through local radiotherapy in combination with granulocyte-macrophage colony-stimulating factor (GM-CSF) alone.

Materials/Methods: In this retrospective serial, thymic epithelial tumor patients with at least three distinct measurable sites of disease, treated with concurrent radiotherapy (35 Gy in ten fractions or 30 Gy in ten fractions, over 2 weeks) to one metastatic site and GM-CSF (125 $\mu g/m^2$ subcutaneously injected daily for 2 weeks, starting during the second week of radiotherapy), were recruited. The course was repeated, targeting a second metastatic site. No systemic treatment was applied. The primary endpoint of this study was the proportion of patients exhibiting abscopal effect and treatment response. The treatment response was evaluated according to ITMIG-Modified RECIST (version 1.1). Secondary endpoint included therapeutic safety and treatment-related toxicities. Adverse events were reported using CTCAE (version 5.0). Experimental endpoint includes changes of peripheral immune markers during and/or after treatment by blood routine test.

Results: Twenty patients from April 28, 2016, to January 11, 2021, were enrolled in this study, with 2 type B1 thymoma (10.0%), 4 type B2 thymoma (20.0%), 4 type B3 thymoma (20.0%), 9 thymic squamous cell carcinoma (45.0%) and 1 thymic atypical carcinoid (5.0%). Five out of twenty patients (25.0%) had obvious abscopal effect. And the median time for abscopal effect occurrence was 23 days. Six patients (30.0%) were evaluated as partial response at 1-month assessment after treatment. The median overall survival time was not reached, and the median progression free survival time was 12.0 months (95% CI:5.4-18.6) for all patients. Seven ≥ Grade 3 adverse events (6 Grade 3, 1 Grade 4) occurred but were controllable. Lymphocytes may relate to abscopal effect based on blood routine results.

Conclusion: Combining local radiotherapy with GM-CSF alone successfully induced abscopal effect in patients with pretreated advanced thymic epithelial tumors, resulting in favorable long-term outcomes, with adverse events being manageable.

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Impact of Radiation Therapy on Long-Term Survival in Patients with KRAS-Mutant Stage IV NSCLC Treated with Immune Checkpoint Inhibitors

S. Fattahi,[1] F.K. Keane,[2] M.J. Khandekar,[3] J. Gainor,[4] and H. Willers[5]; *[1]Harvard Radiation Oncology Program, Boston, MA, [2]Department of Radiation Oncology, Massachusetts General Hospital, Boston, MA, [3]Harvard Medical School, Boston, MA, [4]Department of Medicine, Massachusetts General Hospital, Boston, MA, [5]Massachusetts General Hospital, Boston, MA*