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Abstract

Stereotactic Body Radiation Therapy for the Treatment of Pulmonary Oligometastases Originating from Non-Lung Primaries

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Objectives: Stereotactic body radiation therapy (SBRT) is increasingly used in the treatment of oligometastatic cancers and is the subject of prospective clinical trial by the NRG. We report outcomes from a high-volume single-institution series of pulmonary oligometastases originating from non-lung primaries treated with SBRT.

Methods: We conducted a retrospective review of patients with non-lung primaries who were treated to one or more pulmonary oligometastases with SBRT. Two hundred and two patients with 324 pulmonary lesions were identified from 2002-2015. Local control, progression-free (PFS) and overall survival (OS) were calculated with Kaplan-Meier with log-rank test and Cox analysis.

Results: Median age was 67 years and follow-up was 23.1 months. Median time from initial diagnosis to pulmonary SBRT was 43.8 months; 12% had synchronous oligometastases, 52.5% had lung-only oligometastases (LO) disease at metastatic presentation, 78.1% had LO disease at SBRT, 58.3% had 1-2 pulmonary lesions, and 26.2% had radio-resistant primaries (RRP: sarcoma, melanoma, or renal cell). Lung metastasis-directed therapy was undertaken prior to SBRT in 47.5%. Primary distribution was: 38% gastrointestinal, 19.0% head/neck, 10.5% genitourinary, 9.6% sarcoma, 7.1% both GYN and breast, and 8.6% other. Median lesion size was 1.6cm and the most common fractionation was 54Gy in 3 fractions (range: 12-60Gy in 1-5 fractions). Target-lesion control was 96.4% and 93.7% at 1 and 2 years, respectively and were similar between carcinomas vs RRP but were dependent upon the treatment platform ($p<0.001$). Median distant metastasis-free survival (DMFS) was 87.8 vs 31.5 months for patients with LO vs those with extra-pulmonary disease at presentation ($p=0.013$) and at SBRT (median DMFS 87.8 vs 11.1 months, $p<0.001$). Median PFS and OS were 10.6 and 36.0 months, respectively. Median PFS was 10.9 vs. 7.4 months for carcinomas and RRP ($p=0.051$). Patients with LO at presentation trended towards improved PFS (11.0 vs 8.9 months, $p=0.057$) and at SBRT had an improved PFS (13.9 vs 4.3 months, $p<0.001$). Increasing tumor size was associated with increased risk of progression (HR 1.277 [95%CI 1.154-1.414], $p<0.001$). In multivariate analysis, female gender, non-Caucasian race, prior metastatectomy or chemotherapy, smaller lesion size, and no post-SBRT chemotherapy predicted for improved OS (all $p<0.05$).

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Conclusions: SBRT for pulmonary oligometastases originating from non-lung primaries results in excellent local control. Patients who have lung-only oligometastases have an improved progression-free survival compared to patients with extra-thoracic disease but survival appears to be multifactorial, warranting careful patient selection.