A Comparison of Outcomes after Stereotactic Lung Radiotherapy or Wedge Resection for Stage I Non–smallcell Lung Cancer (NSCLC)

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Purpose/Objective(s): Local failure after wedge resection (W) for early stage NSCLC is higher than after anatomic lobectomy, but borderline operable patients often undergo W alone. This study hypothesizes that such patients might be equally good candidates for lung stereotactic radiotherapy (SBRT) and compares SBRT to W.

Materials/Methods: A total of 124 cases of Stage I (T1-2N0M0) NSCLC were treated with W (n = 69) or image-guided lung SBRT (n = 58) from February 2003–February 2009. The SBRT patients were treated on a Phase II trial. All patients were ineligible for anatomic lobectomy; 95% undergoing SBRT so were medically inoperable; 5% refused surgery. The mean FEV1 and DLCO were 1.49L and 12.4 mL/minute/mm Hg for W vs. 1.49L and 11.0 mL/minute/mm Hg for SBRT (p = NS). Median Charlson Comorbidity Index and age were 3 and 74 years for W vs. 4 and 77 years for SBRT (p \0.01 for both). A total of 60% of both groups were female; more SBRT patients were African American (19 vs. 4%; p = 0.02). All patients were staged using Chest CT, ^{18}FDG PET-CT, pulmonary function testing, and chemistries. The SBRT patients had bone scan and brain MRI. Mediastinoscopies were performed for 30% of W cases vs. 19% for SBRT (p = NS). The SBRT was prescribed as 48 (T1) -60 (T2) Gy in 4–5 fractions to the edge of the target volume. Adjuvant chemotherapy was given to 16% of SBRT and 10% of W patients (p = NS). No significant differences existed in T-Stage or size for SBRT vs. W. More W patients had adenoca or adenosquamous cancer (75%) vs. SBRT (62% adeno, 31% squamous cell), p = 0.03.

Results: Median potential follow-up = 2.5 years. No statistically significant differences were identified in 30-month regional recurrence (RR) (4% SBRT vs. 18% W), locoregional recurrence (LRR) (9% vs. 27% W), distant metastasis (DM; 19% vs. 21% W), or freedom from any failure (FFF; 77% vs. 65% W) between groups (p . 0.16 for all). The SBRT reduced the risk of local recurrence (LR), 4% vs. 20% W, (trend p = 0.07). Overall survival (OS) was higher with W (87% vs. 72% SBRT, p = 0.01), but cause-specific survival (CSS) was nearly identical (93% W vs. 94%, p = NS). Results excluding cases of synchronous primary or nonbiopsied tumors or pT4 disease (satellite lesion at W) showed reduced LR (5 vs. 24%; p = 0.05), RR (0% vs. 18%; p = 0.07 trend), and LRR (5 vs. 29%; p = 0.03) with SBRT, but no differences in DM or FFF. OS was again higher with W (85 vs. 70%; p = 0.02), but CSS the same (93% W vs. 92% SBRT; p = NS). On multivariate analysis for W, LR predicted RR, DM, FFF, and CSS (p = 0.001–0.02).

Conclusions: Both lung SBRT and wedge resection are good treatment options for stage I NSCLC patients ineligible for anatomic lobectomy. The SBRT was associated with reduced LR, RR, and LRR. As would be expected for a nonrandomized population of patients selected for surgery vs. RT (medically inoperable) at physician discretion, OS was higher in surgical patients. The SBRT and surgery, however, were associated with identical rates of CSS.

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