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Failure Rates of Lower Lobe Lung Cancers Treated with Stereotactic Body Radiotherapy

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Abstract
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Abstract

Objectives:

Failure to account for tumor motion with respiration in patients treated with Stereotatic Body Radiotherapy (SBRT) for early-Stage primary lung cancers can impair disease control. Prior studies have shown a higher rate of marginal failure for lower lobe (LL) tumors with SBRT (Perlstein 2018), possibly related to increased tumor motion. This study examines factors that may be correlated with local failure in LL lung cancers treated with SBRT.

Methods:

We performed a retrospective review of early-Stage primary LL lung cancer patients treated from 2008-2019 with definitive SBRT. A 3-8 fraction regimen to dose of 48-60 Gy was delivered using either Cyberknife radiosurgery (CKRS) or linear accelerator (LINAC) based treatment. Diagnostic CT or PET/CT scans were used to determine the distance of the target lesion to the diaphragm. Local failure (LF) is defined as a recurrence within 3 cm of original tumor location. Patient and tumor factors were examined for correlation with failure.

Results:

71 patients with either T1N0M0 (63%) or T2N0M0 (37%) primary LL lung tumors were treated with CKRS (60) or LINAC (11). Median age was 73 (range 51-95). There were 37 females and 34 males, 63 with a smoking history and 8 without. Histological confirmation was present in 70% of patients, most being adenocarcinoma (28) or squamous cell (22). The median distance to the diaphragm was 3.9 cm (range 0-20.7 cm). After a median follow-up of 19 months, rates of local failure, locoregional failure, and distant failure were 9.9%, 24%, and 21%. Tumor size, histology, CKRS vs LINAC, laterality, and distance of the tumor to the diaphragm were not significantly associated with rates of failure.

Conclusion(s):

Among patients treated with SBRT for early-Stage LL lung cancer, overall local control was excellent. The pattern of increased marginal failure in LL tumors noted in other studies was not present, and there did not appear to be a correlation between distance from the diaphragm, a surrogate for tumor motion, and local failure. The heavy use of 4DCT (65%) or generous treatment margins may have reduced the rate of marginal failure compared to historic controls.