

UC Davis
Radiation Oncology

Title

Detection of second primary lung cancers on surveillance imaging following Stereotactic Ablative Radiotherapy for early stage non-small cell lung cancer

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Data Availability

The data associated with this publication are not available for this reason: N/A

Background

Background: Second primary lung cancer (SPLC) occurs at a rate of 1-2% per year in non-small cell lung cancer (NSCLC) patients following surgical resection. Wang and colleagues examined patterns of second primary lung cancer in patients undergoing CT scans at fixed 6-month intervals during the first 2 years. All patients in their study but one had the second primary lung cancer identified at the asymptomatic stage (Y. Wang et. al). It is critical to detect SPLC when asymptomatic as presence of symptoms at diagnosis is associated with detection at later stage and worse overall survival (L. Calman et. al)(F. Lou et. al). With increasing implementation of stereotactic ablative radiotherapy (SABR) for medically inoperable, early stage NSCLC, improved understanding of SPLC in this population is important.

Purpose: The purpose of this study is to report incidence of and outcomes for SPLC detected on routine surveillance imaging in a patient cohort treated with SABR for early stage NSCLC. The secondary objective is to correlate timing of surveillance imaging and detection of SPLC.

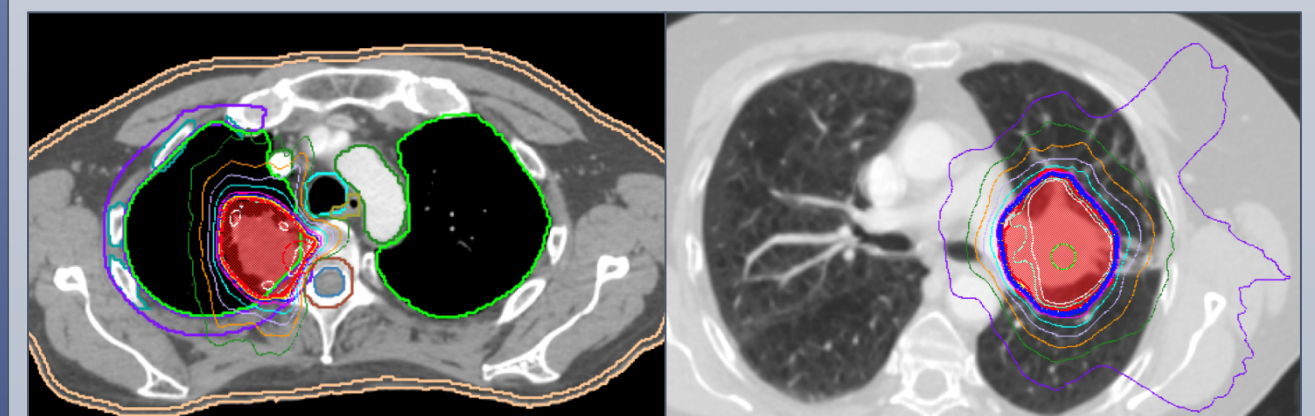


Figure 1. Patient with early Stage NSCLC treated with SABR

Figure 2. Patient with early stage NSCLC treated with SABR to SPLC

Methods & Results

Methods: Following IRB approval, all patients treated with SABR for early stage NSCLC at our institution between 04/2012-05/2019 were identified and reviewed. Patient and treatment characteristics, frequency and duration of surveillance chest CT, and development of SPCL, recurrence, or death were documented. Restaging PET/CT staging was performed for all patients with new SPN. Actuarial estimates of development of SPLC, PFS and OS were generated with the Kaplan Meier method.

Results: We identified 123 patients treated with SABR for early stage NSCLC, 94 of whom had ≥6 months of clinical and radiographic follow up and were considered eligible. The scan frequency median was 3.5 months (range 1-9.7 months). Fourteen patients (14.8%) had multiple synchronous tumors treated with the initial course of SABR. The median age was 76.3 years (range: 61.8-92.1), and pack-year (PY) smoking history was 33 PY (range: 0-160 PY).

Eleven patients (11.8%) developed a SPLC at a median of 20.6 months (range 3.3-84.7 months) following the first course of SABR. The 3-year actuarial estimate of development of SPLC was 12.9% (Figure 3). Among 11 patients who developed SPLC, 10 were identified with early stage disease and treated with curative intent SABR. One patient developed a new metastatic small cell lung cancer and enrolled on hospice.

Among the entire patient cohort, 3-year OS was 75% (Figure 4). Among 10 patients treated with curative intent for SPLC, 2-year OS was 90% following detection of SPLC (Figure 5).

Results

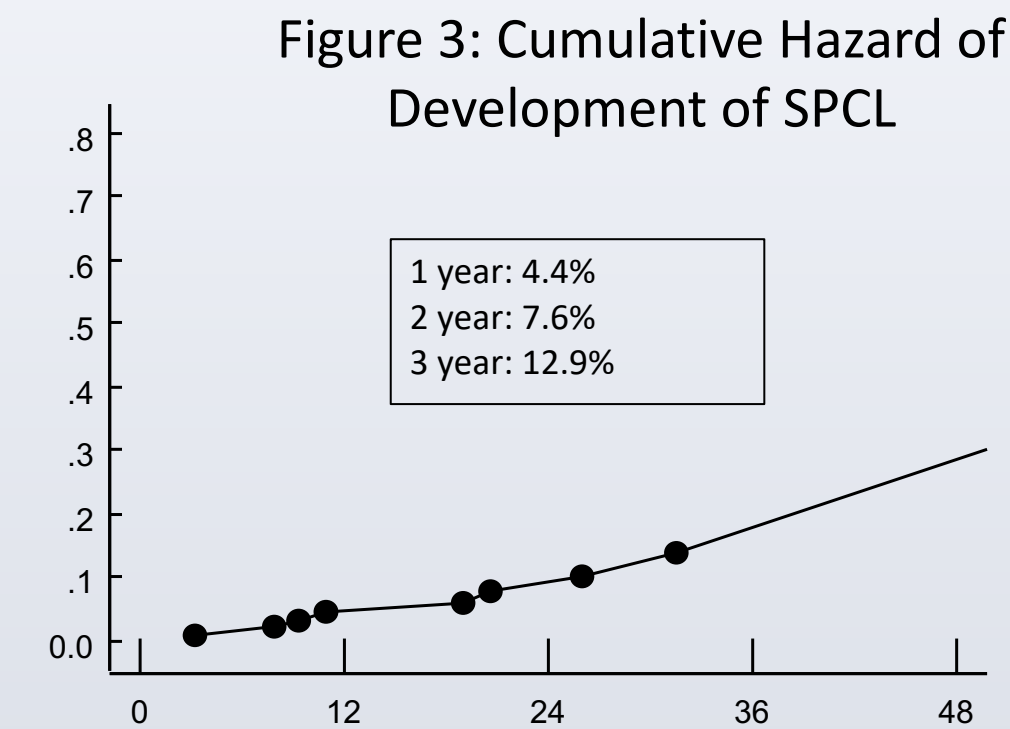


Figure 4: OS for Entire Cohort

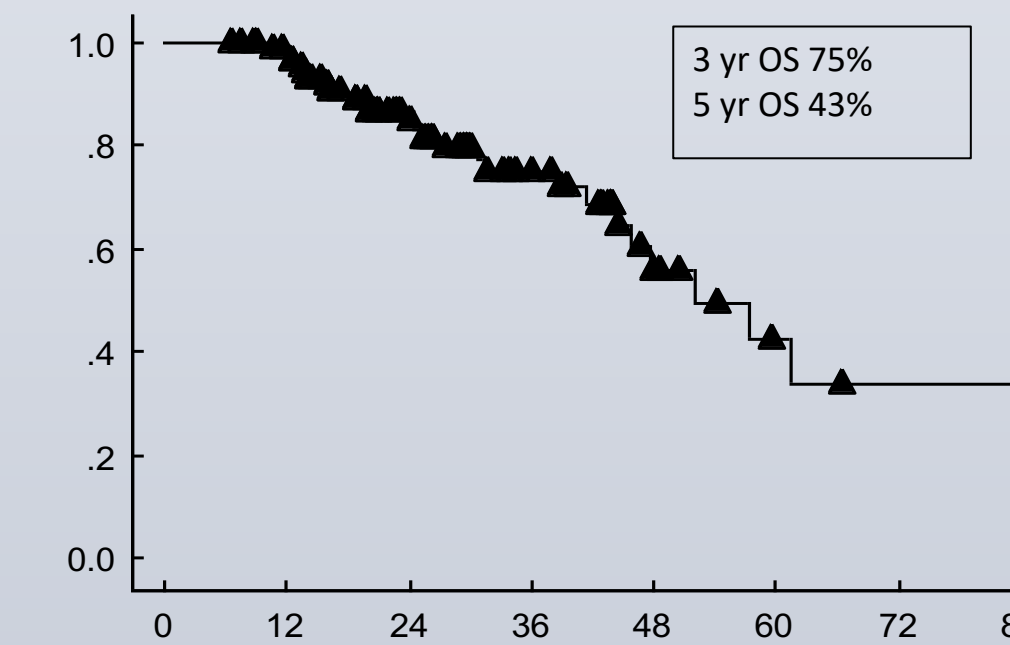
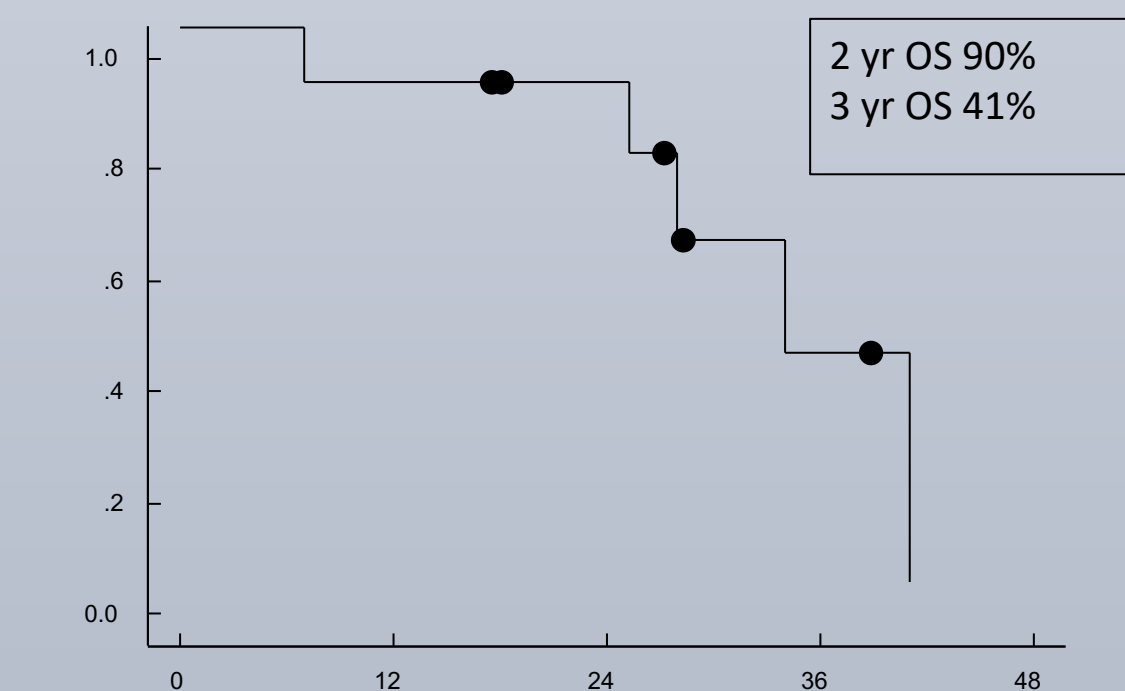


Figure 5: OS Following Detection and Curative Intent Treatment of SPLC



Conclusion

Conclusion: Close surveillance with chest CT following SABR for early stage NSCLC results in frequent detection of SPLC at earlier stages of the disease, which allows for definitive intent treatment for curative management of SPLC. The rates of SPLC in our series were higher than other published studies, potentially related to high rates of tobacco use and older age in our cohort compared to similar series in surgical patients. Surveillance imaging appears to provide the opportunity to detect and cure SPLC in a high percentage of patients.

References

N. Martini, M.R. Melamed, *Multiple primary lung cancers* J Thorac Cardiovasc Surg, 70 (1975), pp. 606-612

Y. Wang, J.C. Yeung, W.C. Hanna, F. Allison, N.S. Paul, T.K.Waddell, *et al.*, *Metachronous or synchronous primary lung cancer in the era of computed tomography surveillance*

L. Calman, K. Beaver, D. Hind, P. Lorigan, C. Roberts, M. Lloyd-Jones, *Survival benefits from follow-up of patients with lung cancer: a systematic review and meta-analysis*

F. Lou, C.S. Sima, V.W. Rusch, D.R. Jones, J. Huang, *Differences in patterns of recurrence in early-stage versus locally advanced non-small cell lung cancer*

Spratt DE, Wu AJ, din Su et. Al, *Reccurance patterns and Second Primary Lung Cancers After Stereotactic Body Radiation therapy for Early-stage Non-Small-Cell Lung cancer: Implications for Surveillance*

Acknowledgment

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