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Outcomes of Stereotactic Body Radiotherapy for T1-2 N0 Small Cell Carcinoma Based on Addition of Chemotherapy and Prophylactic Cranial Irradiation: A Multicenter Analysis

Vivek Verma, M.D.¹, Charles B. Simone II, M.D.², Pamela K. Allen, Ph.D.³, and Steven H. Lin, M.D. Ph.D.³

¹Department of Radiation Oncology, University of Nebraska Medical Center, Omaha, NE, USA

²Department of Radiation Oncology, University of Maryland School of Medicine, Baltimore, MD, USA

³Department of Radiation Oncology, University of Texas M.D. Anderson Cancer Center, Houston, TX, USA

Abstract

T1–2N0 SCLC is rare, but is often treated with SBRT alone similar to T1–2N0 NSCLC. This multi-center study assessed whether additional chemo/PCI improves outcomes. Chemotherapy improved DFS and OS and predicted for both on multivariate analysis. PCI was not statistically associated with outcomes herein. This analysis suggests that T1–2N0 SCLC should be treated as limited-stage SCLC.

BACKGROUND: Whereas T1–2 N0 non-small cell lung cancer (NSCLC) can be managed with stereotactic body radiotherapy (SBRT) alone, this management is often extrapolated for T1–2 N0 small cell lung cancer (SCLC). This multi-institutional cohort study investigated whether addition of chemotherapy and PCI improved outcomes for these patients.

METHODS: All cases of histologically-confirmed T1–T2N0M0 SCLC were obtained from 24 institutions' prospectively-collected SBRT databases. Clinical/treatment characteristics, toxicities, outcomes, and patterns of failure were assessed. Kaplan-Meier analysis evaluated survival outcomes. Univariate and multivariate analyses identified predictors of outcomes.

RESULTS: From 24 institutions, 76 lesions were treated in 74 patients (median follow-up 18 months). Chemotherapy and prophylactic cranial irradiation (PCI) were delivered in 56% and 23% of cases, respectively. Median SBRT dose/fractionation was 50 Gy/5 fractions. Patients receiving chemotherapy experienced increased median DFS (61.3 vs. 9.0 months, $p=0.02$) and OS (31.4 vs. 14.3 months, $p=0.02$). Chemotherapy independently predicted better outcomes for DFS/OS on multivariate analysis ($p=0.01$). Toxicities were uncommon; 5.2% experienced grade 2

* **Corresponding Author:** Steven H. Lin, MD PhD, Department of Radiation Oncology, The University of Texas M.D. Anderson Cancer Center, 1515 Holcombe Blvd, Unit 097, Houston, TX 77030, Phone: 713-563-8490, Fax: 713-563-2366, shlin@mdanderson.org.

CONFLICTS OF INTEREST

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pneumonitis. Post-treatment failures were most commonly distant (45.8% of recurrences), followed by nodal (25.0%), and elsewhere lung (20.8%). Median times to each were between 5–7 months.

CONCLUSIONS: In the largest report on SBRT for T1–2N0 SCLC to date, patients undergoing primary SBRT should also undergo additional chemotherapy. There is no established role of PCI in this population.

Keywords

chemotherapy; lung cancer; small cell carcinoma; stereotactic body radiation therapy; stereotactic ablative radiation therapy

INTRODUCTION

Stereotactic body radiotherapy (SBRT), also known as stereotactic ablative radiotherapy (SABR), is the standard treatment for inoperable early-stage non-small cell lung cancer (NSCLC) [1–5]. However, for inoperable stage I (non-nodal) small cell lung cancer (SCLC), the National Comprehensive Cancer Network (NCCN) Guidelines currently recommend chemotherapy with or without conventionally-fractionated RT [6]. Because SBRT is associated with high local control and low toxicity, it is an attractive option to treat T1–2N0 SCLC [7]. However, just three case series (totaling 22 patients) have described SBRT for this population [8–10]. Along with SBRT, the role of chemotherapy and prophylactic cranial irradiation (PCI) in this population is uncertain. Nevertheless, the importance of this issue is increased by the recent approval of low-dose computed tomography (LDCT) screening for eligible lung cancer patients [11–13]. Hence, there could be an increase in early-stage NSCLC and SCLC cases per the National Lung Screening Trial [14]. Though SBRT is an unproven treatment for these cases owing to few data, it is often administered with or without chemotherapy and PCI. In this multi-institutional study, we sought to address the effect of chemotherapy and PCI when added to SBRT in stage I SCLC.

METHODS AND MATERIALS

This multi-center analysis examined primary stage I, biopsy-proven SCLC treated with SBRT. It was approved by the University of Nebraska Medical Center Institutional Review Board and Ethics Committee. Cases were collected by requesting academic institutions throughout the United States for all such instances in prospectively collected institutional SBRT databases. Exclusion criteria were prior history of SCLC, except one patient with history of limited-stage SCLC without evidence of disease for twelve years prior to developing a solitary contralateral lung lesion histologically confirmed as SCLC. Two patients had presumed synchronous primaries (different lobes) with histologic confirmation, and no nodal or distant metastasis. All patients were staged using positron emission tomography (PET) (90%) and/or pathologic nodal sampling (25%). Treatment and follow-up imaging varied by institution; all centers used managed respiratory motion and image-guided radiotherapy, and responses were evaluated using Response Evaluation Criteria in Solid Tumors (RECIST). Each clinician assigned toxicities per the Common Terminology

Criteria for Adverse Events Version 4.0. Broadly, information collected included clinical characteristics of patients, workup, treatment, and follow-up.

Statistics were done using Stata/MP14 software (College Station, TX). Tests were two-sided and significant at $p < 0.05$. Comparisons between groups of proportions and means were done by the Fisher's exact and Wilcoxon rank-sum test, respectively. Overall survival (OS) and disease-specific survival (DSS) referred to time between SBRT completion and death from any cause and due to SCLC, respectively. Disease-free survival (DFS) was measured from SBRT completion to first recurrence of disease. Distant failure referred to non-nodal/lung organs, nodal (regional) failure to lymphatics in the thorax or supraclavicular, and local failure referred to in-field failure only. Notably, in this comorbid population, new lung lesions developing during post-SBRT follow-up are often not biopsied and are considered either second primaries versus recurrences (i.e. following patterns of NSCLC). These isolated or so-called "oligo" lung lesions are often treated definitively (in this analysis, at the discretion of the treating physician); therefore, the term 'elsewhere lung failure' is being increasingly utilized, realizing that innumerable pulmonary nodules still represent distant failure. Cox proportional hazards modeling was utilized for multivariate analysis to evaluate the effect of several variables on outcomes by adjusting for potential confounders ($p = 0.25$ for entry).

RESULTS

From 2005–2015, at 24 academic centers throughout the United States, 76 lesions were treated in 74 patients. Median follow-up was 18 (range, 0.1–62.3) months. Forty-five (59.2%) patients received chemotherapy, and 27 (35.5%) did not; chemotherapy was likely delivered (albeit unconfirmed) in four (5.3%) cases. Most commonly, chemotherapy was a platinum compound with etoposide (95.9%), delivered for four cycles (61.2%), and administered post-SBRT (67.3%). Seventeen (23.0%) patients underwent PCI (25 Gy/10 fractions). **Table 1** displays complete clinical characteristics of the population as a function of receipt of chemotherapy and PCI. Notably, PCI was more commonly delivered in younger patients ($p = 0.042$) and chemotherapy in those with higher performance status ($p = 0.003$).

Figure 1 illustrates that patients undergoing chemotherapy had increased DFS ($p = 0.01$) and OS ($p = 0.01$). In patients receiving chemotherapy, median DFS and OS were 61.3 and 31.4 months respectively, versus 9.0 and 14.3 months without chemotherapy. In both groups, median DSS was not reached. Trends toward higher OS ($p = 0.08$) and DFS ($p = 0.12$) were observed in the cohort receiving PCI. When adjusting for potential confounders on multivariate analysis, chemotherapy independently predicted higher DFS (hazard ratio (HR) 0.37, 95% confidence interval (CI) 0.17–0.82, $p = 0.01$) as well as OS (HR 0.41, 95% CI 0.21–0.80, $p = 0.01$), but the same was not true for PCI. Other factors independently predicting lower OS included tumor size ≥ 2 cm (HR 2.80, 95% CI, 1.32–5.94, $p = 0.008$); and lower DFS with partial (versus complete) tumor response (HR 3.61, 95% CI 1.20–10.87, $p = 0.023$).

In both the cohorts receiving chemotherapy and lack thereof, complete patterns of failure are displayed in **Supplementary Table 1**. Thirty-two of 74 (43.2%) patients experienced a total

of 46 recurrences; these occurred in 16/48 (33.3%) patients receiving chemotherapy and 16/26 (61.5%) patients not receiving chemotherapy ($p=0.03$). Distant recurrences were most common in both groups, followed by nodal failures. Local recurrences were uncommon in both groups. Specifically, 4/53 (7.5%) patients (three of which had chemotherapy) who did not undergo PCI developed brain metastases; however, none of the 17 patients (0%) who received PCI developed brain metastases ($p=0.57$). The times to failure appeared numerically longer in patients receiving chemotherapy, as follows: distant failure (9.8 months with chemotherapy vs. 3.6 months without, $p=0.08$), nodal failure (6.3 vs. 4.0 months, $p=0.29$), elsewhere lung failure (16.6 vs. 6.4 months, $p=0.09$), any failure (7.0 vs. 3.6 months, $p=0.03$).

DISCUSSION

Whereas T1–2 N0 NSCLC can be managed with SBRT alone, this management is often extrapolated for T1–2 N0 SCLC. This multicenter experience of SBRT for T1–2N0 SCLC most prominently illustrates that even small, isolated SCLC lesions should be treated per the paradigm of limited-stage SCLC, for which chemotherapy is the backbone. Indeed, though this study was designed to evaluate the feasibility of SBRT (and not evaluating chemotherapy with or without radiotherapy) for nonoperative stage I SCLC, SCLC is inherently a systemic disease that requires full course systemic therapy in all able patients. In these data, the addition of chemotherapy to SBRT was associated with over double the OS (31.4 versus 14.3 months, $p=0.01$) and nearly a sevenfold improvement in DFS (61.3 versus 9.0 months, $p=0.01$).

The role of PCI in this population is uncertain. While there was a trend towards longer OS, DFS, and DSS with PCI, these differences were not statistically significant, likely because the occurrence of brain metastases was relatively low, and because only 17 patients received PCI. However, a recent analysis of 954 resected pT1–2N0 SCLC cases from the National Cancer Data Base has demonstrated that adjuvant chemotherapy, both with and without PCI, positively correlates with OS after multivariate adjustment [15]. The patients in that study represent a somewhat different population, as they were all pathologically staged and had very few comorbidities (thus decreasing risk of death from other causes); however, our data in conjunction with this recent publication (both having drawbacks of unknown baseline MRI examination) may question the value of PCI in a population with relatively low risk of cerebral relapse.

Our results are similar to a series of 64 patients reported in abstract form [16]. Fifty-six percent of these patients received chemotherapy, and similar to these results, chemotherapy appeared to be an independent factor associated with survival. The same was not true of PCI, although the report did not detail the number of brain failures. In the absence of a complete publication, however, we anticipate that these results may corroborate many of those presented herein.

The main limitation of this retrospective, multicenter study is the lack of standardized workup, treatment, and follow-up. First, it is likely that a proportion of patients were not true T1–2N0M0 and had occult metastases, as pathologic nodal staging was not performed in

most patients. However, PET staging was done in the vast majority (90%). Lung function tests were also not addressed. Additionally, specific indications for administration of chemotherapy were also unassessed. Thus, the issue of selection bias in receipt of chemotherapy cannot be understated, which is the primary drawback to conducting the largest known study of these rare cases. However, though it is possible to surmise that patients not healthy enough to receive chemotherapy died of other causes, the DFS improvement with chemotherapy also cannot be ignored (as well as the association on multivariate analysis, even adjusting for age/performance status). Furthermore, the proportion of patients with unknown cause of death may alter DSS figures. Next, the stratification by receipt of chemotherapy was done with the omission of four patients that most likely underwent chemotherapy (without definitive confirmation). Lastly, it is also unclear why DMFS was not statistically improved by chemotherapy despite a DFS/OS improvement, but is potentially related to the relatively smaller sample size (N=21) of distantly metastatic patients. Lastly, the purpose of this report was not to compare outcomes of SBRT with/without chemotherapy to the current NCCN-recommended option of chemotherapy with/without RT, although performing local therapy in nonoperable patients may be advantageous.

CONCLUSIONS

Whereas T1–2 N0 NSCLC can be managed with SBRT alone, this management is often extrapolated for T1–2 N0 SCLC. Based on this multicenter experience of SBRT for T1–2N0 SCLC cases, these cases must be treated as limited-stage SCLC, and thus chemotherapy is necessary. PCI was not shown to influence outcomes, albeit with few intracerebral events.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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REFERENCES

1. National Comprehensive Cancer Network. Non-Small Cell Lung Cancer. Version 1.2016 http://www.nccn.org/professionals/physician_gls/PDF/nscl.pdf Accessed March 24, 2016.
2. Timmerman R, Paulus R, Galvin J, et al. Stereotactic body radiation therapy for inoperable early stage lung cancer. *JAMA* 2010;303(11):1070–1076. [PubMed: 20233825]
3. Simone CB, 2nd, Wildt B, Haas AR, Pope G, Rengan R, Hahn SM. Stereotactic body radiation therapy for lung cancer. *Chest* 2013;143(6):1784–1790. [PubMed: 23732589]
4. Verma V Stereotactic radiotherapy versus surgery for early-stage operable lung cancer: more questions than answers. *J Natl Compr Canc Netw* 2015;13(10):1293–1295. [PubMed: 26483066]

5. Simone CB, 2nd, Dorsey JF. Additional data in the debate on stage I non-small cell lung cancer: surgery versus stereotactic ablative radiotherapy. *Ann Transl Med* 2015;3(13):172. [PubMed: 26366389]
6. National Comprehensive Cancer Network. Small Cell Lung Cancer. Version 1.2016 http://www.nccn.org/professionals/physician_gls/PDF/sclc.pdf Accessed March 24, 2016.
7. Verma V, Simone CB, 2nd, Zhen W. Stereotactic radiotherapy for stage I small cell lung cancer. *Oncologist* 2016;21(2):131–133. [PubMed: 26764248]
8. Videtic GM, Stephans KL, Woody NM, et al. Stereotactic body radiation therapy-based treatment model for stage I medically inoperable small cell lung cancer. *Pract Radiat Oncol* 2013;3(4):301–306. [PubMed: 24674402]
9. Shioyama Y, Nakamura K, Sasaki T, et al. Clinical results of stereotactic body radiotherapy for stage I small-cell lung cancer: a single institutional experience. *J Radiat Res* 2013;54(1):108–112. [PubMed: 22923748]
10. Ly NB, Allen PK, Lin SH. Stereotactic body radiation therapy for stage I small cell lung cancer: a single institutional case series and review of the literature. *J Radiat Oncol* 2014;3(3):285–291.
11. Verma V Lung cancer: implementing lung-cancer screening – oncological ‘grey areas’. *Nat Rev Clin Oncol* 2015;12(5):256–257. [PubMed: 25850551]
12. Verma V, Zhen W. Treatment costs of early-stage lung cancers detected by low-dose computed tomography screening. *Int J Radiat Oncol Biol Phys* 2015;93(1):207–208. [PubMed: 26279036]
13. Verma V, Beriwal S. Medicare approves coverage for lung cancer screening: the case for symptomatic screening. *JAMA Oncol* 2015;1(8):1027–1028. [PubMed: 26226384]
14. Aberle DR, Adams AM, Berg CD, et al. Reduced lung-cancer mortality with low-dose computed tomographic screening. *N Engl J Med* 2011;365(5):395–409. [PubMed: 21714641]
15. Yang CF, Chan DY, Speicher PJ, et al. Role of adjuvant therapy in a population-based cohort of patients with early-stage small-cell lung cancer. *J Clin Oncol* 2016;34(10):1057–1064. [PubMed: 26786925]
16. Shioyama Y, Nagata Y, Komiyama T, et al. Multi-institutional retrospective study of stereotactic body radiation therapy for stage I small cell lung cancer: Japan Radiation Oncology Study Group (JROSG). *Int J Radiat Oncol Biol Phys* 2015;93:S101.

CLINICAL PRACTICE POINTS

- T1–2N0 SCLC is rare, but is often treated with SBRT alone similar to T1–2N0 NSCLC.
- This multi-center study assessed whether additional chemo/PCI improves outcomes.
- Chemotherapy improved DFS and OS and predicted for both on multivariate analysis.
- PCI was not statistically associated with outcomes herein.
- This analysis suggests that T1–2N0 SCLC should be treated as limited-stage SCLC.

Figure 1. Kaplan-Meier curves of overall survival (A & B) and disease-free survival (C & D) when stratifying for receipt of chemotherapy (A, C) and prophylactic cranial irradiation (B, D).

Table 1

Clinical and Treatment Variables of Patients Stratified by Receipt of Chemotherapy and PCI

Parameter	Chemotherapy			PCI		
	Yes	No	P Value	Yes	No	P Value
Age at diagnosis (y)			.280			.049 [*]
Median	71.8	71.9		69.2	73.6	
Range	44.0–104.5	57.2–91.9		44.0–104.5	50.6–91.9	
Ethnicity			.698			.788
White	43 (87.8)	24 (92.3)		15 (88.2)	48 (88.9)	
African-American	5 (10.2)	1 (3.8)		2 (11.8)	4 (7.4)	
Other	1 (2.0)	1 (3.8)		0 (0.0)	2 (3.7)	
Gender			.632			.164
Male	26 (53.1)	12 (46.2)		6 (35.3)	31 (57.4)	
Female	23 (46.9)	14 (53.8)		11 (64.7)	23 (42.6)	
Smoking history (pack-years)			.713			.240
Median	50	47.5		45	50	
Range	0–110	10–162		0–100	12–162	
Persistent smoking at last follow-up visit			.731			.694
Yes	6 (12.2)	4 (15.4)		3 (17.6)	7 (7.4)	
No	43 (87.8)	22 (84.6)		14 (82.4)	47 (92.6)	
History of malignancy			.947			.021 ^a
None	34 (68.0)	20 (76.9)		11 (64.7)	32 (59.3)	
Lung, early-stage NSCLC	6 (12.0)	4 (15.4)		0 (0.0)	10 (18.5)	
Lung, locally advanced NSCLC	4 (8.0)	1 (3.8)		1 (5.9)	4 (7.4)	
Lung, SCLC	2 (4.0)	1 (3.8)		0 (0.0)	3 (5.6)	
Genitourinary	3 (6.0)	0 (0.0)		1 (5.9)	2 (3.7)	
Head and neck	2 (4.0)	0 (0.0)		0 (0.0)	2 (3.7)	
Lymphoma	2 (2.0)	0 (0.0)		1 (5.9)	1 (1.9)	
Breast	1 (2.0)	1 (3.8)		2 (11.8)	0 (0.0)	
Melanoma	1 (2.0)	0 (0.0)		1 (5.9)	0 (0.0)	
Malignancy within 1 y of diagnosis			1.000			.677
Yes	6 (12.2)	3 (11.5)		1 (5.9)	8 (14.8)	
No	43 (87.8)	23 (88.5)		16 (94.1)	46 (85.2)	
Indication for SBRT			.241			.353
Medically inoperable	44 (88.0)	24 (88.9)		15 (88.2)	48 (87.3)	
Other active cancer	1 (2.0)	3 (11.1)		0 (0.0)	4 (7.3)	
Refused surgery	3 (6.0)	0 (0.0)		1 (5.9)	2 (3.6)	
Other/unknown	2 (4.0)	0 (0.0)		1 (5.9)	1 (1.8)	

Parameter	Chemotherapy			PCI		
	Yes	No	P Value	Yes	No	P Value
Lobe of lung			.702			.012 *
Right upper	14 (28.0)	7 (25.9)		3 (17.6)	16 (29.1)	
Left upper	12 (24.0)	8 (29.6)		1 (5.9)	17 (30.9)	
Right lower	12 (24.0)	3 (11.1)		3 (17.6)	12 (21.8)	
Left lower	6 (12.0)	6 (22.2)		4 (23.5)	7 (12.7)	
Right middle	4 (8.0)	2 (7.4)		4 (23.5)	3 (5.5)	
Unknown	2 (4.0)	1 (3.7)		2 (11.8)	1 (1.8)	
Location			1.000			.460
Peripheral	41 (82.0)	23 (85.2)		13 (76.5)	47 (85.5)	
Central	9 (18.0)	4 (14.8)		4 (23.5)	8 (14.5)	
Lesion size (cm)			.151			.287
Median	2.3	2.1		2.3	2.2	
Range	0.8–7.2	0.7–3.7		1.4–6.0	0.7–7.2	
Lesion size 2 cm vs. >2 cm			.476			.418
2 cm	21 (42.0)	14 (51.9)		6 (35.3)	26 (47.3)	
>2 cm	29 (58.0)	13 (48.1)		11 (64.7)	29 (52.7)	
Lesion size 3 cm vs. >3 cm			.032 *			.216
3 cm	33 (66.0)	24 (88.9)		10 (56.2)	42 (76.4)	
>3 cm	17 (34.0)	3 (11.1)		7 (43.8)	13 (23.6)	
Mediastinal nodal sampling			.417			.759
Performed	14 (28.0)	5 (18.5)		5 (29.4)	14 (25.5)	
Not performed	36 (72.0)	22 (81.5)		12 (70.6)	41 (74.5)	
ECOG PS at diagnosis			.003 *			.453
0	10 (20.0)	6 (22.2)		3 (17.6)	12 (21.8)	
1	30 (60.0)	6 (22.2)		11 (64.7)	25 (45.5)	
2	8 (16.0)	7 (25.9)		1 (5.9)	12 (21.8)	
3	2 (4.0)	7 (25.9)		2 (11.8)	6 (10.9)	
4	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	
Unknown	0 (0.0)	1 (3.7)		0 (0.0)	0 (0.0)	
ECOG at 6–12 mo after SBRT			.445			.864
0	5 (10.0)	2 (7.4)		1 (5.9)	6 (10.9)	
1	13 (23.0)	5 (18.5)		2 (11.8)	16 (29.1)	
2	6 (12.0)	6 (22.2)		2 (11.8)	9 (16.4)	
3	4 (8.0)	4 (14.8)		2 (11.8)	6 (10.9)	
4	0 (0.0)	1 (3.7)		0 (0.0)	1 (1.8)	
Unknown	22 (44.0)	9 (33.3)		10 (58.8)	17 (30.9)	
Total SBRT dose (Gy)			.089			.087

Parameter	Chemotherapy			PCI		
	Yes	No	P Value	Yes	No	P Value
Median	50	50		50	50	
Range	40–60	30–60		48–60	30–60	
SBRT dose group			.572			.655
60 Gy	9 (18.0)	3 (11.1)		5 (29.4)	7 (12.7)	
50–59 Gy	37 (74.0)	18 (66.7)		11 (64.7)	41 (74.5)	
40–49 Gy	4 (8.0)	5 (18.5)		1 (5.9)	6 (10.9)	
<40 Gy	0 (0.0)	1 (3.7)		0 (0.0)	1 (1.8)	
Biologically effective dose (Gy)			.956			.170
Median	109.1	112.5		112.5	105.6	
Range	72–180	80–180		100–180	72–180	
Biologically effective dose group			.786			.109
<130 Gy	36 (72.0)	21 (77.8)		10 (58.8)	44 (80.0)	
>130 Gy	14 (28.0)	6 (22.2)		7 (43.8)	11 (20.0)	
Receipt of PCI			.072	NA	NA	NA
Yes	35 (70.0)	20 (74.1)				
No	15 (30.0)	2 (7.4)				
Unknown	0 (0.0)	5 (18.5)				
Receipt of chemotherapy	NA	NA	NA			.072
Yes				15 (88.2)	35 (63.6)	
No				2 (11.8)	20 (36.4)	
Type of chemotherapy		NA	NA			.058
Cisplatin/etoposide	28 (56.0)			11 (73.3)	17 (30.9)	
Carboplatin/etoposide	19 (38.0)			3 (20)	16 (29.1)	
Other/unknown	3 (6.0)			1 (6.7)	2 (3.6)	
Chemotherapy cycles (n)		NA	NA			.145
1	3 (6.0)			0 (0.0)	3 (8.6)	
2	4 (8.0)			1 (6.7)	3 (8.6)	
3	4 (8.0)			0 (0.0)	4 (11.4)	
4	30 (60.0)			10 (66.7)	20 (57.1)	
6	4 (8.0)			2 (13.3)	2 (5.7)	
8	1 (2.0)			0 (0)	1 (2.9)	
Unknown	4 (8.0)			2 (13.3)	2 (5.7)	
Timing of chemotherapy with SBRT		NA	NA			.430
After	33 (66.0)			9 (60)	24 (68.6)	
Before	13 (26.0)			5 (33.3)	8 (22.9)	
Before/concurrently	2 (4.0)			0 (0.0)	2 (5.7)	
Before/concurrently/after	1 (2.0)			1 (6.7)	0 (0.0)	

Parameter	Chemotherapy			PCI		
	Yes	No	<i>P</i> Value	Yes	No	<i>P</i> Value
Unknown	1 (2.0)			0 (0.0)	1 (2.9)	
Primary tumor response			.822			.856
Complete response	13 (26.0)	6 (22.2)		5 (29.4)	13 (23.6)	
Partial response	18 (36.0)	12 (44.4)		6 (35.3)	23 (41.8)	
Stable	8 (16.0)	5 (18.5)		2 (11.8)	10 (18.2)	
Progression	3 (6.0)	0 (0.0)		1 (5.9)	2 (3.6)	
Unknown	8 (16.0)	4 (14.8)		3 (17.6)	7 (12.7)	
Residual lesion size (cm)			.056			.885
Median	1.6	1.1		1.25	1.4	
Range	0.5–3.5	0.4–1.8		0.9–1.6	0.4–3.5	
SUV_{max} of residual lesion			.267			.272
Median	2.0	0		0	2.0	
Range	0–6.1	0–3.2		0–0	0–6.1	
Alive at last follow-up visit			.808			.270
Yes	21 (42.9)	10 (29.6)		9 (52.9)	20 (37.0)	
No	28 (57.1)	19 (70.4)		8 (47.1)	34 (63.0)	
Cause of death			.532			.463
SCLC	10 (35.7)	6 (31.6)		3 (37.5)	13 (38.2)	
Other neoplasm	3 (10.7)	0 (0.0)		1 (12.5)	2 (5.9)	
Cardiopulmonary	4 (14.3)	4 (21.1)		0 (0.0)	7 (20.6)	
Other	3 (10.7)	3 (15.8)		2 (25.0)	4 (11.8)	
Unknown	8 (28.6)	6 (31.6)		2 (25.0)	8 (23.5)	

Summed numbers in a category might be slightly dissimilar, depending on whether the parameter relates to the number of lesions or number of patients.

Abbreviations: ECOG = Eastern Cooperative Oncology Group; NA = not applicable; NSCLC = non-small cell lung cancer; PCI = prophylactic cranial irradiation; PS = performance status; SBRT = stereotactic body radiotherapy; SCLC = small cell lung cancer; SUV_{max} = maximal standardized uptake value.

* Statistically significant.