

## Short Communication

# Five-year survival after palliative radiotherapy of T4/N3 lung cancer: case series and review of the literature

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## Abstract

There is sparse literature regarding extended survival of patients treated for T4 and/or N3 lung cancers. We present the results of a case series from our radiotherapeutic experience over the last 12 years to provide additional information. Out of 189 individuals diagnosed with lung cancer between 1997 and 2008, seven treated patients who survived five years or longer were identified. The median age was 56 years. More than half of the subjects were symptomatic at the time of hospitalization, possessed voluminous, non-small-cell histologic type malignant neoplasms, and received chemotherapy also. All individuals responded to treatment, and their survival ranged from 60 to 169 months. Our observed long-term survivors seem to justify the continued practice of modern standards of care in patients with lung cancer.

**Keywords:** lung cancer; radiotherapy; chemotherapy; supraclavicular/mediastinal nodal metastasis

## INTRODUCTION

Locally advanced lung cancer (LA-LCa) remains a significant source of morbidity and mortality. Only carefully selected patients with T4N0–1M0 non-small cell lung cancer (NSCLC) may be considered for curative surgery, and individuals with N3 nodal involvement are not.<sup>1</sup> Hence, it is not unlikely that many individuals will receive palliative treatment.

Despite the administration of concurrent chemoradiotherapy, the prognosis in patients with LA-LCa remains poor. Estimating the prognosis of cancer patients with incurable disease remains

a difficult task, and clinicians have repeatedly been shown to be poor at predicting survival. The description of long-term (LT) survivors after accepted therapeutic interventions are delivered in this particular patient subset has not generated much attention. In this retrospective study, we aimed to increase our understanding of the clinical characteristics of such advantaged people.

## METHODS AND RESULTS

One hundred eighty-nine individuals diagnosed with mostly stage III NSCLC between August 1997 and January 2008 were identified from a review of the radiation oncology and cancer center databases. Of these individuals, seven (4%) patients with T4 and/or N3 disease survived for 5 years or longer after treatment. Primary tumors

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**Table 1.** Patient, tumor and treatment characteristics

Case no.	Age (years) gender	Histology	Tumor	
			Stage <sup>a</sup>	Volume (cc) <sup>b</sup>
1	56/M	SCLC	T4N3M0	376
2	54/F	NSCLC	T4N3M0	198
3	66/M	SCLC	T4N0M0	234
4	48/M	'Carcinoma'	T4N3M0	22
5	30/F	NSCLC	T1N3M0	1703
6	70/F	NSCLC	T4N2M0	81
7	66/M	NSCLC	T4N2M0	135

  

Case no.	Palliative total dose	Radiotherapy treatment plan <sup>c</sup>	Chemotherapy <sup>d</sup>	Follow-up in months
1	46 Gy	2D	+	63
2	60 Gy	3D	+	64
3	60 Gy	3D	+	70
4	30 Gy	2D	+	169
5	35 Gy	3D	–	60
6	60 Gy	3D	+	77
7	52 Gy	2D	NK	138

Notes: <sup>a</sup>American Joint Committee on Cancer staging system.

<sup>b</sup>Gross tumor volume estimation using the formula:  $\pi/6$  (width) (length) (height).

<sup>c</sup>2D, two-dimensional treatment planning; 3D, three-dimensional treatment planning.

<sup>d</sup>Cisplatin and etoposide drugs.

Abbreviations: NSCLC, non-small cell lung cancer; SCLC, small-cell lung cancer; NK, not known.

**Table 2.** Long-term survival<sup>a</sup> of patients with NSCLC: review of the literature

Author	Stage total no.	No. of LT survivors	No. of T4 and/or N3 NSCLC	Applied treatment
MacManus et al. <sup>5</sup>	IIIA-B/488 <sup>b</sup>	49	4	Radical radiotherapy
Quddus et al. <sup>6</sup>	I-IV/4531	61	17	Palliative radiotherapy
Wang et al. <sup>7</sup>	III-IV/846	56	9	Multimodality therapy
This series	IIIA-B/189	7	7	Palliative radiotherapy <sup>c</sup>

Notes: <sup>a</sup>≥5-year survival.

<sup>b</sup>Eighty percent of the patients possessed stage IIIA–B disease.

<sup>c</sup>Included some patients who were diagnosed with small-cell lung cancer and treated with chemotherapy.

Abbreviations: NSCLC, non-small cell lung cancer; LT = long term.

were defined as T4 lesions based on tumor involvement of the superior vena cava (four patients), extension into the mediastinum (one patient) or the presence of satellite lesions in the same lobe (one patient). Regional N3 nodal abnormalities were present in the supraclavicular space or contralateral mediastinal area.

Palliative megavoltage external beam irradiation of the intrathoracic neoplasm and the mediastinum with inclusion of clinically evident supraclavicular disease was applied. Radiation treatment planning technique, either two-dimensional (2D; using orthogonal radiographs) or 3D; computed tomography (CT)-aided), was dependent on time period of irradiation – pre-CT or CT era. The

primary or nodal neoplasms were outlined based on accepted CT criteria of abnormality or very avid radionuclide uptake as visualized on positron emission tomography; the tumor volumes were calculated using the formula  $\pi/6$  (width) (length) (height). The two-drug chemotherapy regimen generally consisted of cisplatin and etoposide, with the substitution of carboplatin instead of cisplatin in patients with impaired renal function. Response to treatment was assessed after completion of irradiation according to the RECIST criteria.<sup>2</sup> Survival was estimated from the time of diagnosis until death.

The clinical characteristics of this fortunate cohort are summarized in Table 1. Three individuals were

women and four were men. The median age was 56 years. The presenting complaints included chest or arm pain, shortness of breath, cough, >10 pounds weight loss and dyspnea. Most of the patients were symptomatic at the time of diagnosis (5/7), had a gross tumor volume of >100 cc (5/7), and non-small cell cancer histologic type (4/7). In addition, many of these LT survivors received chemotherapy (5/7) and a dose that ranged from 30 to 60 Gy (mean dose 49 Gy); some individuals were treated to a lower dose because of the belief that the prognosis is poorer when superior vena caval obstruction is present<sup>3</sup> or when the gross tumor volume is excessively large, and that the tumor is more radioresponsive when the histologic type is small-cell lung cancer.<sup>4</sup> All of the patients subjectively and objectively responded to treatment. The overall median survival time was 70 months.

## DISCUSSION

Analysis of our 11-year experience of 189 LA-LCa cases yielded a 5-year survival rate of 4% (a finding not inconsistent with the  $\leq 1\%$  reported in the literature<sup>5-7</sup>). The present study confirms observations from accounts of LT survivors that aggressive therapy is beneficial<sup>7</sup> and radiation dose may not be a significant prognostic factor.<sup>5</sup> On the other hand, the mean age of such fortunate people has been 60 to 65 years,<sup>7</sup> which is unlike the median age of 56 years in this limited study. Some clinical features with a connotation of an adverse outcome (like a larger tumor volume<sup>8</sup> or poor performance status<sup>5</sup>) did not have a significant impact on prognosis in our patients.

This report about a selected lung cancer population of T4 and N3 disease can only add to the sparse literature about LT survival (Table 2).<sup>5-7</sup> Meaningful comparisons with the published data about clinicopathological characteristics deemed potentially influential toward prolonged survival

are difficult mainly because the extent of disease has varied.

The benefit of radiotherapy with chemotherapy, in terms of prolonged survival, in select patents with LA-LCa has not been firmly realized. In conclusion, in light of the described results, 5-year survival (including symptom palliation) can be successfully effected by standard therapy. We believe that such a potential achievement indicates that treatment of these disease subsets is worthwhile.

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