

**Research Article**

**Effect of Palliative Radiotherapy on Overall Survival of Patients in Advance Lung Cancer**

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**Abstract**

**Background:** According to 2008 statistics, lung cancer accounts for 13% of the total cases of cancer and 18% of all cancer-related deaths around the world. Lung cancer is the most common cancer and the leading cause of cancer-related deaths in both men and women.

**Objective of Study:** To assess the overall survival of Iraqi patients with lung cancer treated with palliative radiotherapy.

**Patients and Methods:** This retrospective study was conducted to investigate survival after palliative radiotherapy in patients with lung cancer treated in Baghdad Center for Radiotherapy Treatment from 1<sup>st</sup> of Jan 2016 to the end of Dec 2017. The study sample consisted of 40 patients diagnosed with dyspnea, pain, hemoptysis, and superior vena cava obstruction. The radiation dose (20 Gy/5 fractions) was prescribed in 85 % of cases. For each patient, demographic data and information about primary and advanced disease were collected from health file records.

**Results:** The overall survival rate of lung cancer was 32.5%, with a mean of 19.4 months and a median of 14 months. The SCC 29 (72.5%) was the most common histopathology of lung cancer in our study. .

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The adenocarcinoma was recorded in 9 patients (22.5%) and other histopathological subtypes recorded in 2 patients (5%). According to our results, male patients 33 (82.5%) were more likely to be affected by lung cancer than female patients 7(17.5%). We obtained an M: F ratio of 4:1.

**Conclusions:** Palliative RT should be an integral part of multimodal and interdisciplinary management of patients with incurable lung cancer.

## Introduction

Lung cancer is the most common type of cancer and the leading cause of cancer-related deaths worldwide. More than 90% of lung cancer cases are associated with smoking or involuntary smoking [1]. It has one of the lowest survival rates among all types of cancers, with a 5-year survival of 7% in men and 9% in women, though it has undergone slight changes over the past 30 years. The last decade has seen a dramatic improvement in one-year survival, probably due to widespread use of palliative therapies. Palliative radiotherapy is highly effective in improving symptoms such as coughing, hemoptysis, and pain [2]. It is

broadly separated into SCLC and NSCLC types, with NSCLC accounting for approximately 80% to 85% of all cases. Smoking cessation at any age can reduce the risk of lung cancer (by about 30% and 50%) compared to the continuation of smoking in a 10-year period [3].

Palliative radiotherapy of the chest is a good alternative for patients in whom the disease is too large for radical RT or co-morbidity [4]. Radiotherapy can also improve the chance of symptom improvement by about 60%.

## Patients and Methods

### Study Design and Setting

We performed a retrospective review of 40 patients

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with lung cancer, who were treated at Baghdad Radiation Oncology Center. The study was conducted between Jan 2016 and Dec 2017. Patients were scheduled for treatment with palliative 3DCRT with symptoms such as chest pain, dyspnea, hemoptysis, SVCOC and tumor mass local control.

### Data Collection

For each patient, demographic data and information about primary and advanced disease were collected from health file records. The follow-up involved contacting live patients and relatives of dead patients via phone calls.

### Tools

1. **CT pore scanner** (85 cm) (Philips® 16 series)
2. **Linear Accelerator [Infinity™ and Synergy®]**; 2013 (core beam CT)
3. **Monaco® Electa HP version 5**, High precision RTtreatment planning
4. **XiO® Electa system version 5**, XiO provides a robust planning system for particle therapy treatments

All patients underwent a Computed Tomography (CT) simulation in the supine position with arms immobilized above the head in a comfortable position to allow a larger beam angle. The patient held on to a T-bar device with their elbows supported laterally.

### Radiotherapy Doses

In our study, the radiation dose was prescribed according to the following NCCN guidelines:

1. 20 Gy / 5 fractions (85%)
2. 12 Gy / 2 fractions(7.5%)
3. 39 Gy / 13 fractions (5%)
4. 30 Gy / 10 fractions (2.5%)

### Data Analysis

We first enter data into an EXCEL document, and the input was transferred to SPSS v22 software for statistical analysis. Descriptive analysis of clinical and pathological characteristics was performed. We used Kaplan-Meier survival curves for measuring overall survival.

### Results

This retrospective study was conducted on 40 patients treated with hypo fractionated palliative RT in Baghdad RT Center.

#### Age of Lung Cancer Patients

The mean age of patients was 63.1 years with a median of 64.5 years.

#### Gender and Lung Cancer

Men33(82.5%)were more likely than women (17.5%)to develop lung cancer in this study. We obtained an M: F ratio of 4:1.

#### Smoking History and Histopathology Subtypes

In this study, the smoking history of all patients was examined. Reported in 29 (72.5%) patients, SCC was acommon histopathology of lung cancer in our study. The adenocarcinoma was recorded in 9 patients (22.5%) and other histopathology reco-

-rded in 2 patients (5%).

**Histopathology**

**Overall Survival of Patients with Lung Cancer** The mean and median overall survival of SSC The overall survival rate of patients with lung were 19.7 months and 14 months, respectively. For cancer was 32.5% in this study. According to the Adenocarcinoma, the mean and median were 13.1 Kaplan-Meier, the mean survival rate was 19.4 months and 14 months, respectively, as displayed months (95% CI=12-26.8) and the median in Table 1 and Fig 2. survival was 14 months (95% CI=10.2-17.8) in our study, as shown in Fig 1.

Histopathology Subtypes	Mean			Median		
	Estimate (month)	95% Confidence Interval		Estimate (month)	95% Confidence Interval	
		Lower	Upper		Lower	Upper
SCC	19.7	11.6	27.9	14	10.1	17.9
Adenocarcinoma	13.1	9.5	16.7	14	6.7	21.3
Others	14	9.8	18.2	11	-	-
<b>Overall</b>	<b>19.4</b>	<b>12</b>	<b>26.8</b>	<b>14</b>	<b>10.2</b>	<b>17.8</b>

Table 1 Overall Survival of Lung Cancer (month) Among Different Histopathology Subtypes (n=40).

Table 2. Overall Survival of Lung Cancer (Month) in Terms of Patients Gender (n=40)

Patients Gender	Mean			Median		
	Estimate (month)	95% Confidence Interval		Estimate (month)	95% Confidence Interval	
		Lower	Upper		Lower	Upper
Male	21.9	12.5	31.2	14	8.7	19.3
Female	10.9	6.8	15	10	7.4	12.6
<b>Overall</b>	<b>19.4</b>	<b>12</b>	<b>26.8</b>	<b>14</b>	<b>10.2</b>	<b>17.8</b>

**-Overall Survival in Terms of Gender**

The mean overall survival was 21.9 months (95% CI= 12.5-31.2) in male patients with a median of 14 months (95% CI=8.7-19.3). This figure was 10.9 months (95% CI= 6.745-14.969) in female patients with a median of 10 months (95% CI=7.4 -12.6) as shown Table 2, and Fig 3.

**Palliative Radiotherapy (PRT) Indications:**

Overall survival of lung cancer is manifested with different signs and symptoms, which serve as indications for PRT including dyspnea 16(40%), hemoptysis 6(15%), SVCO 6(15%) and pain 12 (30%), as depicted in Table 3.

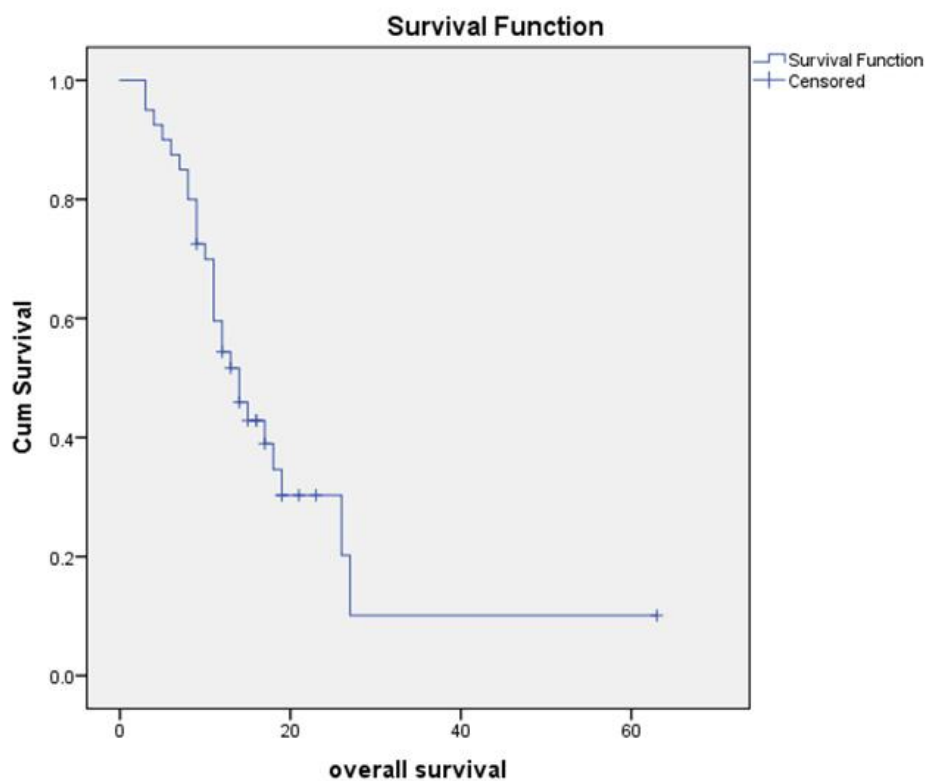
Signs and Symptoms	Frequency (%)
Dyspnea	16 (40)
Hemoptysis	6 (15)
SVCO	6 (15)
Pain	12 (30)
Total	40

**Table 3. Signs and Symptoms of Lung Cancer (n=40)**

**Table 4. Chemotherapy Protocols Used for Lung Cancer (n=40)**

Chemotherapy Protocol	No (%)
<b>Taxol - Carboplatin</b>	<b>15 (37.5)</b>
Pemetrexed - Cisplatin	5 (12.5)
Vinorelbine - Cisplatin	1 (2.5)
Etoposide - Carboplatin	1 (2.5)
Vinorelbine	1 (2.5)
Gemcitabine	1 (2.5)
Carboplatin	1 (2.5)

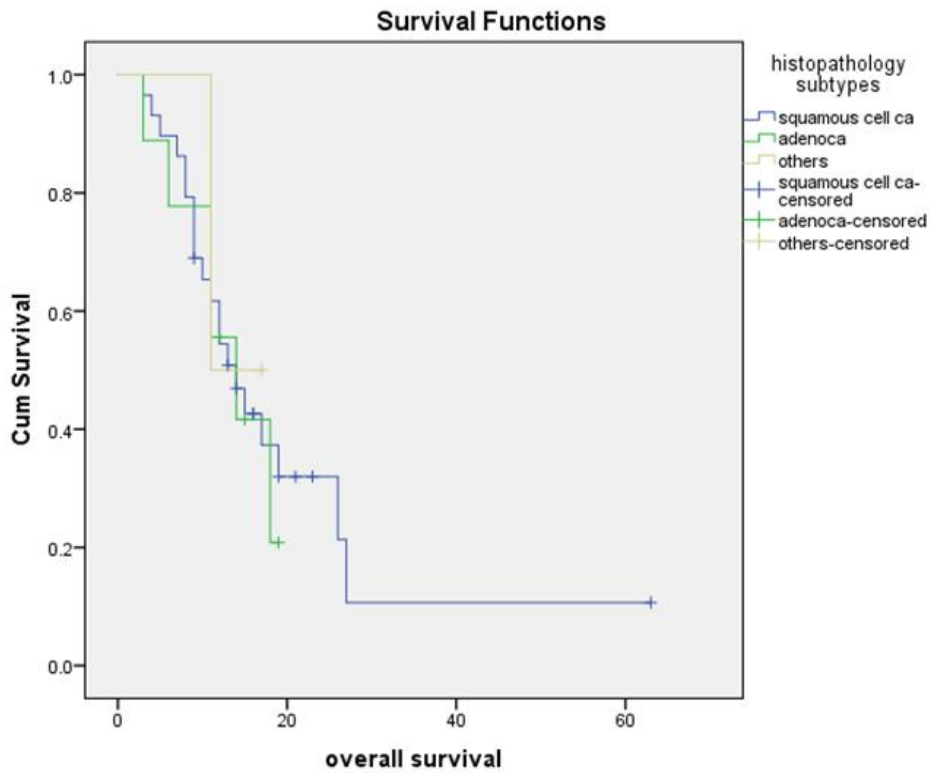
**Figure 1** Kaplan-Meier curve showing overall survival of patients with lung cancer (n=40).



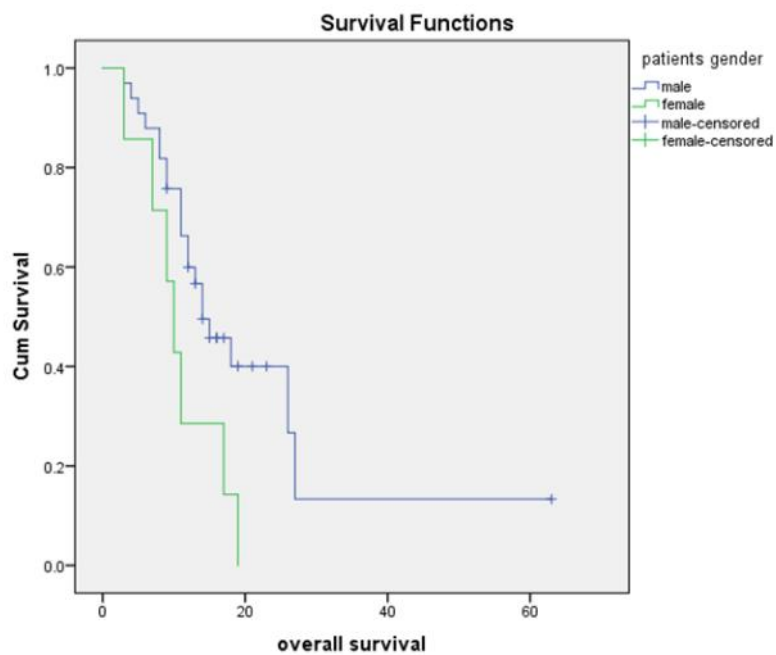
**Table 5.**Hypo-Fractionation Schedule used as a Palliative RT Dose in Lung Cancer Patients (n=40)

RT Doses/ Fraction	No (%)
30 Gy / 10	1 (2.5)
<b>20 Gy / 5</b>	<b>34 (85)</b>
12 Gy / 2	3 (7.5)
39 Gy / 13	2 (5)
<b>Total</b>	<b>40</b>

**Figure 2** Kaplan-Meier curve for overall survival of lung cancer histopathology (n=40).



**Figure 3** Kaplan-Meier curve for overall survival of patients in terms of gender (n=40).



**Chemotherapy Protocols and Lung Cancer**

As far as chemotherapy protocols are concerned, the Taxol-Carboplatin regimen was the most common protocol used for lung cancer patients as shown in Table 4.

**Radiation Doses Used in the Study**

The most common PRT doses involved 20 Gy/5 fractions in 34 (85%) patients, as described in Table 5.

**Discussion**

In this study, the overall survival rate of advanced lung cancer was estimated at 32%. The 2-year survival rate was 25% with a median of 14 months, which was similar to the results reported by Janssen et al., though the RT dose of our study (20 Gy /5 fractions) was different from that of Janssen et al. who reported that regimens with higher dose of 47-52 Gy resulting in survival rates of 20% while lower doses (31-46 Gy) yielded 2-year survival rate of approximately 15% [3]. A larger prospective randomized trial in Norway reported non-comparable 2-year survival rates of 8% (2 fractions of 8.5 Gy), 13% (42 Gy / 15 fractions) and 10% (50 Gy in 25 fractions of 2 Gy).

Also, no significant difference was reported with regard to median survival in this study, while the results of a Dutch randomized study observed significant survival improvement after 10 fractions of 3 Gy compared to 2 fractions of 8 Gy (EQD2 33 vs. 24 Gy) (P = 0.03). One-year survival was 20% vs. 11%. An earlier prospective trial exhibited that a 30 Gy/10 fractions radiotherapy schedule was better than a 16 Gy/2 fractions schedule for palliative treatment of patients with stage IV NSCLC.

Van Oorschot et al. studied 120 NSCLC patients treated with 13-15 fractions of 3 Gy [5]. The median survival of all patients was 5.8 months with a 2-year survival rate of 10%. This is inconsistent with our results where a median overall survival of 14 months with PRT dose of 20 Gy / 5 fractions was observed. Also, they investigated prognostic factors among 120 patients with NSCLC who had received different fractionated regimens, finding that non-metastatic disease and PS, but not comorbidity, were significant predictors of overall survival [5].

**References**

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In a palliative radiotherapy of locally advanced symptoms and had no beneficial impact on overall lung cancer, Rades et al. found a significant survival. Thus, delayed radiotherapy seems correlation between N and M stage and survival acceptable in asymptomatic patients with locally [6]. advanced NSCLC [7].

The palliation rate was 60-80% for chest pain and Gripp et al., reviewed the cases of patients (with hemoptysis, while dyspnea and cough were all diagnoses) dying of palliative radiotherapy controlled at a lower rate of 50-70%. General over the past 30 days to identify prognostic symptoms included fatigue, anorexia and factors. They found that Karnofsky PS score < depression, which only affect a minority of treated 50% (WHO PS 3-4), brain metastases and patients. RT rarely alleviates dysphagia and dyspnea at rest were associated with an hoarseness [6]. undesirable prognosis [7, 8]. The prognosis of

In our study, we found that dyspnea and pain were NSCLC patients is closely linked to both pre-the most frequent indications of RT. The other treatment and post-treatment performance status. most frequent indications were hemoptysis and In the present study, patients whose post-treatment SVCO. KPS scores were stable or increasing had higher

Sundstrom et al., and Falk et al. in two different overall survival rates and longer PFS than patients studies demonstrated that radiotherapy whose scores were falling [8].

administered to asymptomatic patients did not In sum, the results of our study, consistent with the prevent the development of disease-related literature, suggest that regimens with high radia-

## References

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-ation dose might be associated with relatively small, if any, improvement of 2-year survival rate. It is worth noting that the 2-year survival was less than 10% in all studies where radiotherapy with radiation dose  $\leq 33$  Gy had been administered. In contrast, survival rates  $\geq 10\%$  were reported in many studies where a higher dose had been administered [8].

### **Conclusion**

The majority of unselected patients had limited survival irrespective of radiation dose. There are no similar comprehensive guidelines for radiotherapy. In about three fourth of lung cancer patients, radiotherapy is indicated and palliative radiotherapy is the most common type of treatment.

**Conflict of Interest:** The authors have no conflict of interests to declare.