ORIGINAL ARTICLE

AHI EVRAN MEDICAL JOURNAL
E-ISSN: 2619 - 9203

Survival and Stage in Lung Cancer

Akciğer Kanserinde Sağkalım ve Evre

Kubilay İNAN[1] *İlknur Aytekin CELİK*[2] *Merve Şengül İNAN*[3]

Özgür Ömer YILDIZ[4] *Nurettin KARAOĞLANOĞLU*[2]

ÖZ

Amaç: Akciğer kanseri, dünya çapında kanser ölümlerinin önde gelen nedenidir. Küçük hücreli dışı akciğer kanseri (KHDAK) için 5 yıllık sağkalım oranları %20 ile %70 arasında değişmektedir.
Bu çalışmada KHDAK nedeniyle opere edilen toplam 83 hastada erken nüks oranları araştırılmakta ve literatürdeki veriler ışığında ilgili bulgular sunulmaktadır.
Araçlar ve Yöntem: Mart 2019-Eylül 2021 tarihleri arasında malignite nedeniyle akciğer rezeksiyonu yapılan hastalar retrospektif olarak incelendi. Yaş, cinsiyet, ameliyat öncesi kemoterapi uygulamasının varlığı, yapılan ameliyatlar, ameliyat tarihleri, patoloji sonuçları, ameliyat sonrası evreleme, sağkalım ve nüksleri içeren hasta verileri belgelendi.
Bulgular: Mart 2019 ile Eylül 2021 arasında malignite nedeniyle akciğer rezeksiyonu yapılan toplam 83 hasta incelendi. Hastaların medyan yaşı 62 idi. Toplam 4 hastada nüks gelişti ve 79'u nüks olmadan takiplerine devam etti. Akciğer rezeksiyonu yapılan hastaların sekizi (%9.6) postoperatif ilk 2 yıllık dönemde kaybedildi. Bu sekiz hastanın ortalama sağkalım süresi 14.6 ay (7-20 ay) idi.
Sonuç: Yaş, cinsiyet, patolojik tip, tümörün yerleşim yeri gibi çeşitli parametreler incelenip karşılaştırılsa da cerrahi uygulanan hastaların uzun dönem sağkalımlarını etkileyen asıl parametrenin tümörün evresi olduğu bilinmektedir.

Anahtar Kelimeler: cerrahi; göğüs cerrahisi; kanser; malignite

ABSTRACT

Purpose: Lung cancer is the leading cause of cancer death worldwide. Although the 5-year survival rates of for non-small cell lung carcinoma (NSCLC) ranges from 20% to 70%. The present study investigates the rates of early recurrence in a total of 83 patients operated for NSCLC and presents the related findings in reference to the data available in the literature.
Materials and Methods: Patients who underwent lung resection for malignancy between March 2019 and September 2021 were retrospectively examined. The patient data, including age, gender, presence of preoperative chemotherapy administration, operations performed, operation dates, pathology results, postoperative staging, survival, and relapses, were documented.
Result: A total of 83 patients who underwent lung resection for malignancy between March 2019 and September 2021 were examined. The patients had a median age of 62 years. Of the total number of patients four patients developed recurrence and 79 continued their follow-up without any recurrence. Of the patients who underwent lung resection, eight (9.6%) patients died within the first postoperative 2-year period. The mean survival period of these eight patients was 14.6 months (7–20 months).
Conclusion: Although various parameters, such as age, gender, pathological type, and location of the tumor are examined and compared, according to the available data on the long-term survival of surgical patients, it is known that the only parameter that affects survival is the pathological stage of the patient.

Keywords: cancer; malignancy; surgery; thoracic surgery

Received: 03.10.2022; Accepted: 17.03.2023

[1]Ankara Bilkent City Hospital, Department of Thoracic Surgery, Ankara, Türkiye.
[2]Yildirim Beyazit University, Faculty of Medicine, Ankara Bilkent City Hospital, Department of Thoracic Surgery, Ankara, Türkiye.
[3]Health Sciences University Gulhane Education And Research Hospital, Department of Thoracic Surgery, Ankara, Türkiye.
[4]Yildirim Beyazit University, Yenimahalle Education and Research Hospital, Department of Thoracic Surgery, Ankara, Türkiye.

Corresponding Author: Kubilay İnan, Ankara Bilkent City Hospital, Department of Thoracic Surgery, Ankara, Türkiye. e-mail: kubilay_nan@yahoo.com

How to cite: İnan K, İnan MŞ, Çelik İA, Yıldız ÖÖ, Karaoğlanoğlu N. Survival and stage in lung cancer. Ahi Evran Med J. 2023;7(2):219-224.
DOI: 10.46332/aemj.1183432

©2023 All right reserved by the Ahi Evran Medical Journal - Available onlina at- https://dergipark.org.tr/tr/pub/aemj

INTRODUCTION

Lung cancer is the leading cause of cancer death worldwide. The 5-year survival rate of lung cancer is 10%-20%.[1] Surgical resection is the best treatment option for non-small cell lung cancer. According to the reports available, approximately 30%–70% of patients develop recurrence despite performing curative resection.[2-5]

Although the 5-year survival rates of lung cancer vary in different healthcare centers, the total 5-year survival rate of the patients operated for non-small cell lung carcinoma (NSCLC) ranges from 20% to 70%.[5-7]

Surgical treatment in lung cancer is known to contribute significantly to survival. We think that surgery has a positive effect on survival in also advanced resectable lung cancers.

The present study investigates the rates of early recurrence in a total of 83 patients operated for NSCLC and presents the related findings in reference to the data available in the literature.

MATERIALS and METHODS

Approval for this study was obtained from the Ankara City Hospital No. 1 Clinical Research Ethics Committee. The approval number is E1-20-817 (25.06.2020). Patients who underwent lung resection for malignancy between March 2019 and September 2021 were retrospectively examined. The patient data, including age, gender, presence of preoperative chemotherapy administration, operations performed, operation dates, pathology results, postoperative staging, survival, and relapses, were documented.

Prior to surgical resection, the patients were preoperatively examined. For a routine preoperative examination, the patients were asked to undergo PET-CT scan and pulmonary function test, along with the hemogram and biochemical blood tests. High FDG (fluorodeoxyglucose) involvement in the mediastinal lymph nodes during PET-CT was considered to cause mediastinal lymph node metastasis (We considered lymph node involvement with a suvmax value of 3 and above as suspected metastatic). For the cases with suspected mediastinal lymph node metastasis, mediastinoscopy was performed for mediastinal lymph node sampling. Postoperative pathological staging was performed in accordance with the 8th edition of the TNM staging system. Patients were followed up for 1-32 months.

Statistical Analysis

Statistical analyses were performed using IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. The descriptive analyses were presented as medians and interquartile ranges (IQR) for the non-normally distributed and ordinal variables respectively. The Kruskal-Wallis test was used to compare the continuous data between the groups, and the Chi-square test was used to compare the categorical data. For investigating the associations between non-normally distributed and ordinal variables, the correlation coefficients and their significance were calculated using the Spearman's test. A p value of <0.05 was considered to show a statistically significant result.

RESULTS

A total of 83 patients who underwent lung resection for malignancy between March 2019 and September 2021 were retrospectively examined. The patients had a median age of 62 years (IQR: 13 [22-77]). The number of male and female patients was 71 and 12, respectively. Of the masses detected, 34 were in the left lung and 49 in the right lung. A total of seven patients received preoperative neoadjuvant chemotherapy. Systematic lymph node dissection was performed in all the patients who had undergone lung resection. Prior to the resection, mediastinoscopy was performed in three patients for lymph node sampling and frozen-section investigation. The distribution of the surgical resections performed is shown in Table 1. The postoperative stages of the patients are shown in Table 2 and 3.

In our study, based on age, the relapse and survival assessment was conducted in two groups where they were divided into groups of patients aged under and over 70. The median survival for those under 70 years was found to be 12 months (IQR=13.5), whereas it was found to be 5 months (IQR=10.5) in the group who were 70 years and over. There were no any statistically significant difference between these two groups (p=0.60). Relapse was detected

in four (5.7%) patients under the age of 70, whereas none of the patients aged 70 and over developed relapse. There was no statistically significant difference between these two age groups in terms of relapse (p=1.000).

Table 1. Distribution by Resection Type.

Operation Type	Number of Patients
Right Lung Lower Lobe Wedge Resection	1
Combination of Right Lung Upper Lobe Wedge Resection and Chest Wall Resection	1
Lower Right Lobectomy	8
Combination of Lower Right Lobectomy and Chest Wall Resection	2
Bilobectomy Inferior	2
Bilobectomy Superior	3
Upper Right Bronchovascular Sleeve Lobectomy	1
Right Extended Pneumonectomy	1
Intermediate Bronchial Resection and Bronchoplasty/Reconstruction	1
Right Carinal Sleeve Pneumonectomy	2
Middle Lobectomy	1
Right Pneumonectomy	3
Upper Right Sleeve Lobectomy	2
Combination of Upper Right Sleeve Lobectomy and Middle Lobectomy	1
Upper Right Lobectomy	17
Combination of Upper Right Lobectomy and Chest Wall Resection	4
Upper Left Lobe Wedge Resection	1
Lower Left Lobectomy	9
Combination of Lower Left Lobectomy and Chest Wall Resection	1
Left Pneumonectomy	7
Upper Left Lobectomy	14
Combination of Upper Left Lobectomy and Chest Wall Resection	1
Total	83

Table 2. Distribution of patients by stage.

Stage	Number of patients	Survival rate	Median survival
1A1	5	95.7%	15 months (IQR = 18)
1A2	11		
1A3	7		
1B	9	100%	12 months (IQR = 10)
2A	6	100%	14 months (IQR = 11)
2B	24	91.7%	9.5 months (IQR = 15.75)
3A	17	82.4%	13 months (IQR = 11)
3B	4	50%	4.5 months (IQR = 6.5)
Total	83	90.36%,	12 months (IQR=14)

Table 3. Distribution by T and N stage.

T stage	Number of patients	N stage	Number of Patients
T1a	5	N0	53
T1b	13		
T1c	11		
T2a	12	N1	19
T2b	17		
T3	15		
T4	10	N3	11
Total	83	Total	83

Relapse was detected in 5.6% of the male patients, whereas no relapse was detected in the female patients. There was no statistically significant difference in survival and relapse rates by gender (p=0.595, p=0.999 respectively).

Relapse was detected in four patients (5.2%) who did not receive neoadjuvant chemotherapy, whereas none of the patients receiving neoadjuvant chemotherapy were found to relapse. However, the incidence rate of recurrence was not statistically different between these two groups (p=0.999). When the patients with relapse were further evaluated, it was observed that three patients were in stage 3a, whereas one in stage 1a3 (Table 4).

The recurrence (p=0.281) and survival (p=0.014) rates did not statistically differ based on the operation method. The patients undergoing pneumonectomy had a median survival of 8 months (IQR=9), the patients undergoing lobectomy had a median survival of 12 months (IQR=13.5), and those undergoing wedge resection had a median survival of 28 months. The incidence rate of recurrence (p=0.999) and the survival rate (p=0.707) also did not differ based on the operation side.

Table 4. Distribution of patients with relapse and stage and survival times of patients receiving neoadjuvant chemotherapy.

Distribution of patients with relapse	Stage	Survival Time (month)
Patient		
Patient 1	1a3	20
Patient 2	3a	14
Patient 3	3a	6
Patient 4	3a	Alive (14 months)
Stage and survival times of patients receiving neoadjuvant chemotherapy		
	Stage	**Survival Time (month)**
Patient		
Patient 1	1a2	26
Patient 2	2b	25
Patient 3	2b	24
Patient 4	3a	24

The incidence rates of recurrence did not statistically significantly differ among the stage groups (p=0.212). The incidence rates of recurrence did not statistically significantly differ between the group of patients who underwent mediastinoscopy and the one that did not (p=1.000). Survival in stage 3B was statistically significantly shorter than in other stages (p=0.048) (Table 2).

Among the patients included in our study, 49.39% (n=41) had squamous cell carcinoma, 32.53% (n=27) had adenocarcinoma, 1.2% (n=1) had small cell carcinoma, and 16.88% had other types of cancer. Statistical analyses for the survival and incidence data were then performed in these groups. The group of squamous cell carcinoma patients had a median survival of 9 months (IQR=10), whereas the adenocarcinoma group had a median survival of 16 months (IQR=12.0) and the group of other lung malignancies had a median survival of 9 months (IQR=11.25). The survival rates of these pathologically grouped patients were not statistically different (p=0.077).

When the pathological groups were evaluated for relapse, three (7.3%) patients with squamous cell carcinoma and one (3.7%) patient with adenocarcinoma were found to develop relapse and the group of other lung malignancies did not develop relapse. The pathological groups did not show any statistical difference in terms of incidence rates of relapse (p=0.51).

The median survival was 24 months (IQR=17) in patients receiving neoadjuvant chemotherapy and 12 months (IQR=13) in patients who did not receive neoadjuvant chemotherapy. There was no statistical difference between the groups in terms of survival rates (p=0.999).

Of the total number of patients who continued their routine postoperative follow-up, four patients developed recurrence and 79 continued their follow-up without any recurrence. Of the patients who underwent lung resection, eight (9.6%) patients died within the first postoperative 2-year period. Of these eight patients, three had relapses and one died of coronavirus infection in the postoperative 3rd week, whereas the remaining patients died due to comorbidities. The mean survival period of these eight patients was 14.6 months (7–20 months).

DISCUSSION

Lung cancer is the leading cause of cancer death worldwide. Although tobacco use is the primary risk factor that accounts for 80%–90% of all lung cancer diagnoses, there are non-smoking risk factors as well.[8,9] All the patients included in this study had a history of tobacco use (This is a retrospective study, it was coincidental that all patients were smokers).

The incidence rate of lung cancer is higher among men than women across the world.[8] In the present study, the male-to-female ratio was found to be 71 to 12, which was consistent with the literature.

Although upto 20% of patients with early-stage NSCLC are considered to be medically inoperable at the time of diagnosis, surgical resection is a curative treatment method in stage I NSCLC cases.[9,10] The patients with stage I NSCLC who receive medical or surgical treatment have an overall survival rate of 43%–73%, whereas the 5-year survival rate is 6% in the group of untreated patients.[11]

The incidence of lung cancer remains low in the fourth

decade and peaks in the 6th–8th decade range.[12] Our patients had a median age of 62 years (IQR=13) and an age range of 22–77 years. Cough is the most common symptom in 50%–75% of the patients and is followed by hemoptysis, chest pain, and shortness of breath.[13] Among the symptoms reported by our patients at the time of admission, cough was the most common complaint followed by chest pain.

The most common pathological type of NSCLC is adenocarcinomas, which accounts for approximately 40% of lung cancers,[14-15] whereas squamous cell carcinomas account for 25%– 30%.[15] Large cell cancers constitute for approximately 5%–10% of all lung cancers.[14] It was noted that the distribution of our patients is different from the ones present in the literature. This difference is attributed to the small number of patients and the fact that all our patients were smokers.

For a patient with stage I or II NSCLC, surgical resection remains the preferred treatment provided that the patient is functionally operable. Surgical resection can be performed for the treatment of patients with clinical stage IIIb and stage IV disease only if the surgery achieves R0 resection. Chemotherapy, radiotherapy, and immunotherapy treatments are used in cases of inoperable patients.[16-18]

Lobectomy is considered as the optimal surgical treatment method.[19,20] However, few studies have reported that selected patients with lung cancer who had a residue of ≤2 cm with no lymph node involvement have long-term survival after wedge resection or segmentectomy.[21,22] In another study reporting 192 patients with malignancy who underwent pneumonectomy, the 5-year overall survival was 35.9%.[23] We think that the reason why upper lobe tumors are mostly seen in our series is the frequent occurrence of infective lung diseases (eg, tuberculosis, etc.) in our country and the formation of scarring.

The 5-year survival rate of lung cancer is approximately 10%–20%; however, it varies among operated patients depending on the stage of the disease and the healthcare center. Regardless of the stage, patients who are operated for NSCLC have an overall 5-year survival rate of 20%-70%.[5-7] In our study, the operated patients were found to have a median survival of 12 months (IQR=14). The overall survival rate was 90.36%, whereas the overall recurrence rate was 4.8%.

In a study by Ferguson et al.[24] the group of patients in which pneumonectomy was performed were found to have more advanced T stage, N stage, and general stage compared to those who underwent a lobectomy/bilobectomy. In the same study, the overall operative mortality, overall median and 5-year survival rates was higher in the pneumonectomy group than in the lobectomy/bilobectomy group. In a study comparing two different surgical approaches (i.e., segmentectomy and lobectomy) performed on patients with clinical T1aN0M0 NSCLC, the two approaches did not significantly differ in terms of overall survival.[19]

Although various parameters, such as age, gender, pathological type, and location of the tumor are examined and compared, according to the available data on the long-term survival of surgical patients, it is known that the only parameter that affects survival is the pathological stage of the patient. Based on the investigation here, it can be interpreted that the principal parameter affecting the survival times of the patients is the pathological stage.

Conflict of Interest

The authors declare that there is not any conflict of interest regarding the publication of this manuscript.

Ethics Committee Permission

Approval for this study was obtained from the Ankara City Hospital No. 1 Clinical Research Ethics Committee (25.06.2020 dated and E1-20-817 numbered).

Authors' Contributions

Concept/Design: Kİ, MŞİ, İAÇ, ÖÖY, NK. Data Collection and/or Proces-sing: MŞİ, İAÇ, ÖÖY. Data analysis and interpretation: Kİ, MŞİ, NK. Literature Search: Kİ, İAÇ, NK. Drafting manuscript: Kİ, ÖÖY. Critical revision of manuscript: NK. Supervisor: NK.

REFERENCES

1. Allemani C, Weir HK, Carreira H. et al. CONCORD Working Group. Global surveillance of cancer survival 1995-2009: analysis of individual data for 25.676.887 patients from 279 population-based registries in 67 countries (CONCORD-2). Lancet. 2015;385(9972):977-1010.
2. Martin J, Ginsberg RJ, Venkatraman ES. et al. Long-term results of combined-modality therapy in resectable non-small-cell lung cancer. J Clin Oncol. 2002;20(8):1989-1995.
3. Taylor MD, Nagji AS, Bhamidipati CM. et al. Tumor recurrence after complete resection for non-small cell lung cancer. Ann Thorac Surg. 2012;93(6):1813-1821.
4. Gourcerol D, Scherpereel A, Debeugny S. et al. Relevance of an extensive follow-up after surgery for nonsmall cell lung cancer. Eur Respir J. 2013;42(5):1357-1364.
5. Endo C, Sakurada A, Notsuda H. et al. Results of long-term follow-up of patients with completely resected non-small cell lung cancer. Ann Thorac Surg. 2012;93(4):1061-1068.
6. Westeel V, Choma D, Clément F. et al. Relevance of an intensive postoperative follow-up after surgery for non-small cell lung cancer. Ann Thorac Surg. 2000;70(4):1185-1190.
7. Yue D, Gong L, You J et al. Survival analysis of patients with non-small cell lung cancer who underwent surgical resection following 4 lung cancer resection guidelines. BMC Cancer. 2014;14:422.
8. Schabath MB, Cote ML. Cancer progress and priorities: lung cancer. Cancer Epidemiol Biomarkers Prev. 2019;28(10):1563-1579.
9. Mehta HJ, Ross C, Silvestri GA. et al. Evaluation and treatment of high-risk patients with early-stage lung cancer. Clin Chest Med. 2011;32(4):783-797.
10. Vest MT, Herrin J, Soulos PR. et al. Use of new treatment modalities for non-small cell lung cancer care in the Medicare population. Chest. 2013;143(2):429-435.
11. Scott WJ, Howington J, Feigenberg S. et al. Treatment of non-small cell lung cancer stage I and stage II: ACCP evidence-based clinical practice guidelines. 2nd ed. Chest. 2007;132(3):234-242.
12. Kratzke R, Franklin MJ. Lung cancer epidemiology. Schwab M, ed.: Encyclopedia of Cancer. Berlin, Germany: Springer; 2011:2100-2104.
13. Kocher F, Hilbe W, Seeber A. et al. Longitudinal analysis of 2293 NSCLC patients: a comprehensive study from the TYROL registry. Lung Cancer. 2015;87(2):193-200.
14. Duma N, Santana-Davila R, Molina JR. Non-small cell lung cancer: epidemiology, screening, diagnosis, and treatment. Mayo Clin Proc. 2019;94(8):1623-1640.
15. Travis WD, Brambilla E, Burke AP. et al. Introduction to the 2015 World Health Organization classification of tumors of the lung, pleura, thymus, and heart. J Thorac Oncol. 2015;10(9):1240-1242.
16. Pardoll DM. The blockade of immune checkpoints in cancer immunotherapy. Nat Rev Cancer. 2012;12(4): 252-264.
17. Gilligan D, Nicolson M, Smith I. et al. Preoperative chemotherapy in patients with resectable non-small cell lung cancer: results of the MRC LU22/NVALT 2/EORTC 08012 multicentre randomised trial and update of systematic review. Lancet. 2007;369(9577): 1929-1937.
18. Felip E, Rosell R, Maestre JA. et al. Spanish Lung Cancer Group. Preoperative chemotherapy plus surgery versus surgery plus adjuvant chemotherapy versus surgery alone in early-stage non-small-cell lung cancer. J Clin Oncol. 2010;28(19):3138-3145.
19. Khullar OV, Liu Y, Gillespie T. et al. Survival After Sublobar Resection versus Lobectomy for Clinical Stage IA Lung Cancer: An Analysis from the National Cancer Data Base. J Thorac Oncol. 2015;10(11):1625-1633.
20. Billmeier SE, Ayanian JZ, Zaslavsky AM. et al. Predictors and outcomes of limited resection for early-stage non-small cell lung cancer. J Natl Cancer Inst. 2011;103(21):1621-1629.
21. Kodama K, Higashiyama M, Okami J. et al. Oncologic Outcomes of Segmentectomy Versus Lobectomy for Clinical T1a N0 M0 Non-Small Cell Lung Cancer. Ann Thorac Surg. 2016;101(2):504-511.
22. Kodama K, Doi O, Higashiyama M. et al. Intentional limited resection for selected patients with T1 N0 M0 non-small-cell lung cancer: a single-institution study. J Thorac Cardiovasc Surg. 1997;114(3):347-353.
23. İnan, K., İnan, M. Ş., Bıçakçıoğlu, P. et al. The surgical management in pneumonectomy cases for lung cancer treatment. Curr Thorac Surg. 2020;5(2):64-70.
24. Ferguson MK, Karrison T. Does pneumonectomy for lung cancer adversely influence long-term survival? J Thorac Cardiovasc Surg. 2000;119(3):440-448.