

# Surgery for Non-small Cell Lung Cancer in Younger Patients: What are the Differences?



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Received 20 April 2014; received in revised form 4 June 2014; accepted 2 July 2014; online published-ahead-of-print 14 July 2014

## Background

Non-small cell lung cancer (NSCLC) in young adults is uncommon. The objective of this study was to evaluate the clinicopathological characteristics, outcomes and prognosis of people younger than 50 years old treated surgically for NSCLC.

## Methods

A retrospective study was conducted using the institutional database of four thoracic surgery units to collect patients with NSCLC younger than 50 years who had undergone surgery. These patients were compared with older patients (>75-years) operated in the same institutions and in the same period.

## Results

We identified 113 young patients and 347 older patients. Younger patients were more likely to be female, non-smokers, with fewer comorbidities. Younger patients were more likely to be symptomatic at the time of diagnosis. Risk factors for poor prognosis in younger patients were T-stage, and disease-free-interval less than 548 days.

Kaplan-Meier analysis showed a lower five-year survival in older patients compared with the younger ones (66% vs 38%,  $p = 0.001$ ).

## Conclusions

In conclusion NSCLC in younger patients has some distinct clinicopathological characteristics. The overall-survival of young patients is better than in older patients. Young patients receive more complete and aggressive treatment that could explain better survival. Further prospective studies with larger patient populations are required, to clarify the biological and genetic variance of NSCLC in younger patients.

## Keywords

Lung cancer • Younger patients • Thoracic surgery • Lung surgery • Lung cancer prognosis

## Introduction

Non-small-cell lung cancer (NSCLC) is the second most common cancer in men and the third in women in Italy, with about 30,384 new cases per year in men and 6784 in women [1,2]. Lung cancer is mainly a tumour of the elderly

with a peak of incidence between the sixth and seventh decades of life. Only 5% to 10% of NSCLC are diagnosed in individuals younger than 50 years of age. The estimated probability of developing invasive lung cancer within a selected age is 0.03% in males and females between birth and 39 years old, 0.91% in male and 0.76% in female between

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40 to 59 years old. After 70 years old the probability is 6.7% in males and 5% in females [3,4]. Although various reports about lung cancer in the young have been published, there are still conflicting data on whether young people with NSCLC have a better or worse prognosis compared with the older population [5–8]. The objective of this multi-institutional study was to evaluate the clinicopathological characteristics, outcomes and prognosis of people younger than 50 years old treated surgically for NSCLC.

## Materials and Methods

We identified 113 patients younger than 50 years old (group-A) who had undergone intended curative lung resection for NSCLC (neuroendocrine tumours were excluded) between January 2000 and December 2012 in four different thoracic surgery units. These patients were matched to patients older than 75 years (group-B) who had undergone intended curative lung resection for NSCLC and whose details were obtained from the same institutional registries in the same period of time (347 patents). Preoperative characteristics of both populations are reported in Table 1. Preoperative assessment included careful medical history, physical examination, routine blood test, electrocardiogram and spirometry with blood gas analysis. Echocardiography and myocardial scintigraphy were performed if the patient had a history of angina or an abnormal baseline electrocardiogram. CO diffusion capacity and lung perfusion scintiscan were performed in the event of poor pulmonary function ( $FEV_1 < 1$ liter) or when a major resection was planned. The histological diagnosis of the tumour was preoperatively obtained in the majority of the patients by trans-bronchial needle aspiration (TBNA),

brushing or bronchial-alveolar lavage (BAL) during flexible and/or rigid bronchoscopy, or alternatively by trans-parietal CT guided biopsy. The clinical staging process started with total-body computed tomography (CT) followed, as of 2005, by positron emission tomography (PET) even in the event of no evidence of lymph node enlargement on the CT-scan. Before 2005, all patients with enlarged mediastinal lymph nodes on CT-scan (short axis  $>1$  cm) underwent mediastinoscopy to complete clinical staging. Bone scintigraphy was used until the advent of PET. After 2005, only patients who had PET positive mediastinal lymph nodes underwent mediastinoscopy or EBUS/EUS biopsy to complete clinical staging. Surgical lymphadenectomy was defined as follows: on the right side lymphadenectomy was defined as the removal of all the 2R, 4R, 7,8,9 lymph nodes, on the left side the 5,6,7,8,9 lymph nodes were removed. The 4L station was dissected only in the event of high suspicion of neoplastic involvement, if preoperative mediastinoscopy and/or EBUS were negative. Details of the major post-operative complications were collected from the clinical report of each patient. The long-term follow-up was obtained through examination, wherever possible, or by telephone interview of the patients themselves or of a family member. In the remaining cases, follow-up was obtained from the patient's general practitioners or registry offices.

## Statistical Analysis

Continuous variables are reported as mean  $\pm$  SD whereas categorical variables as percentages. Comparisons between group A and B were performed using the unpaired t-test for continuous variables and the Fisher exact test for discrete variables. The variables showing a p-value  $<0.1$  on univariate analysis were used as independent variables in multivariate analysis for younger patients. Variables related to surgical

**Table 1** Preoperative patient's profile.

Variables	Group A n (%)	Group B n (%)	p-value
Patients	113	347	N/A
Age	44.7 $\pm$ 5.3SD (25–50)	77.2 $\pm$ 2.6SD (75–89)	N/A
Gender			
Male	66 (58)	274 (79)	
Female	47 (42)	73 (21)	0.001
Smoking history			
Never	26 (23)	41 (12)	
Active	71 (63)	103 (30)	
Former	16 (14)	203 (59)	0.001
COPD/asthma	9 (8)	112 (32)	0.001
Low respiratory reserve	7 (6)	96 (28)	0.004
Major morbidity	21 (19)	216 (62)	0.001
Prior malignancy	16 (14)	89 (26)	ns
Symptoms at presentation	97 (86)	166 (48)	0.001
Neoadjuvant Chemotherapy	21 (19)	7 (2)	0.001
Neoadjuvant Radiotherapy	6 (5)	1 (0.2)	0.001

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