Early and Late Outcome, Mortality and Major Morbidity After Lung Cancer Surgery for Primary Carcinoma

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Abstract

Background: Radical surgical resection of lung cancer with or without adjuvant treatment is still a prerequisite for cure. Advances in operative and postoperative care led to a decline in complications and mortality rates during the last decades. In spite of different additional modes of treatment, survival is still poor.

The aim of study: To examine the operative mortality and morbidity after lung cancer surgery and to identify factors associated with an adverse outcome.

Material and methods: The study comprised 968 consecutive patients referred to University Hospital of Lung Disease, "Shefqet Ndroqi" Tirana, Albania, for lung carcinoma, during a 13-years period (January 2004-December 2017). All patients underwent routine laboratory examinations spirometry and preoperative CT- scan of the thorax and upper abdomen. PET-CT, EBUS–EUS, Mediastinotomy or Mediastinoscopy wasn't performed as routine.

Results: Of 968 patients, 690 (70.5%) were male and 278 (28.7%) female. Mean age 65.5±9.4 years (range 15 - 87 years). Lobectomy was the most used surgical modality in 566 (58.5%) patients, meanwhile pneumonectomy was performed in 112 (11.6%) of patients. Minor complications during surgery occurred in 45 (11.7%) of patients. Continuous air leakage was the most complication after surgery in 25.3%, followed by lung atelectasis in 21.3% and cardiovascular complications in 17%.

Conclusion: our results show low mortality and morbidity after lung cancer surgery. However, patients with reduced lung capacity, older age and those undergoing pneumonectomy should be treated with great care.

Key words: Outcome, complications, lung cancer, thoracic surgery.

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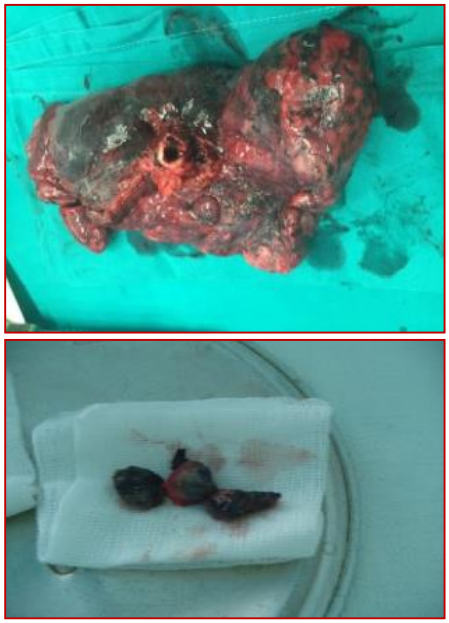
Introduction

Lung cancer *(Figures 1-5)* is the most common form and cause of cancer death world-wide. Radical surgical resection, with or without adjuvant treatment, is still a prerequisite for cure. In European countries the proportion of patients who undergo surgery for this disease varies between 10 and 20%. Advances in operative and postoperative care have led to a decline in complications and mortality rates during the last two decades (1).
In spite of different additional modes of treatment, survival is still poor. To be able to improve the quality of operative procedures it is important: to identify patients running the highest risk, optimizing the patient's condition, medication and respiratory status before surgery, to have knowledge of peri and postoperative mortality and morbidity, and also of risk factors prior to surgery.



Figures 1-5: 1- X-ray view; 2,3-Operative view; 4,5-Macroscopic specimens

Results

Of 968 patients, 690 (70.5%) were male and 278 (28.7%) female. Mean age 65.5±9.4 years (range 15

- 87 years), of them 271 (27.9%) patients were over 70 years. No differences is seen in death between gender (female vs. male 3.6% vs. 3.9% respectively; p=0.476).

Demographic characteristic	***Patients***	***Death within 30 days***		***Major complications***	
	N (%)	N (%)	P-value	N (%)	P-value
Age	697 (72.1)	18 (2.6)	0.039	23 (3.3)	0.0024
< 70 years	271 (27.9)	19 (7.0)		25 (9. 2) *	
≥ 70 years					
Gender	278 (28.7)	10	0.476	20 (7.1)	0.984
Female	690 (70.5)	(3.6)		28 (4,0)	
Male		27 (3.9)			
Co morbidity	257 (26.6)	17 (6.8)	0.064	29 (11.2) *	0.0001
Yes	711 (73.4)	20 (2.8)		9 (1.24)	
No					
Total cases	968	37 (3.8)		48 (7.2)	
	(100)				

Table 1: *Patient characteristics in relation to death within first 30 days of surgery and major complications*

According to histopathology most of patients result squamous cell carcinoma (56%), followed by adenocarinoma (36%) and the rest other types. Significant difference in mortality within 30 days is seen between adenocarcima, squamous cell carcinoma and other type of cancer ((2, 7%, 3.8% vs. 12.6% respectively; p< 0.01). In spite major complications were in other group of cancer no significant differences is seen between groups. Over 2/3 of patients 78% were current smokers and only 22% never smokers. No differences are seen in term of death or major complications among the groups (2.6% vs. 2.0% and 6.4% vs. 9.4% respectively). Lung function is the parameter of particular importance as a prognostic factor in evaluation of patients after surgery. A significant difference in patients is seen with FEV1< 70% compared with them with FEV1> 70% in term of mortality and major complications (10.7% vs. 2.3% and 23, 8% vs. 2.6% respectively.

	Patients (Nr.%)		***Mortality (≤ 30-days) (Nr. %)***		***Major complications (Nr. %)***	
Histopathological type						
Adenocarcinoma	348	36	9	2.7	26	7.6
Squamous cell ca.	542	56	21	3.8	35	6.4
Other types	78	8	9	12.0*	9	12.0
Smoking habits						
Smoker	756	78	20	2.6	48	6.4
Never smoked	212	22	4	2.0	20	9.4
Lung function (FEV1, %)						
FEV1 > 70%	765	79	17	2.3	20	2.6
FEV1 < 70%	203	21	22	10.7**	49	23.8***

Table 2: *Mortality and major complications, tumor and patient characteristic, (nr. %);* *******statistically significant*

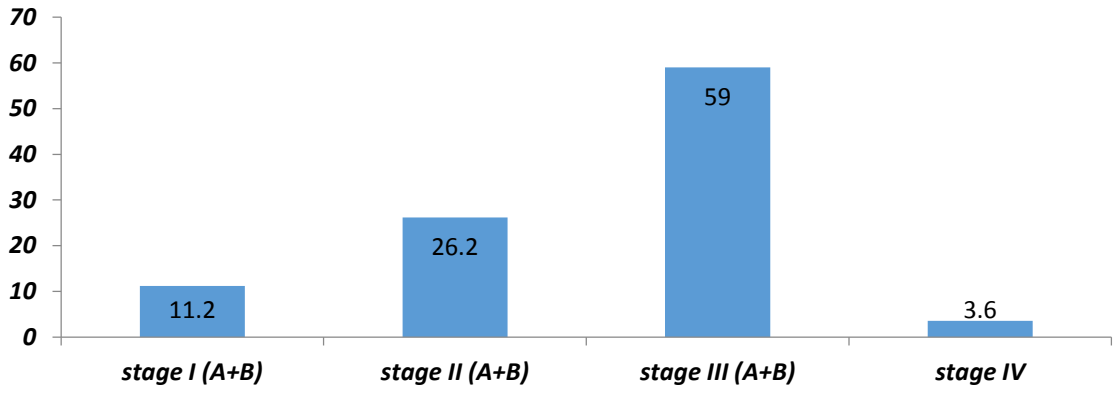


Table 3: *Stage of diseases and surgery modality.*

It is noted that the largest number of patients belonging to stage III + IV (63%) of cases, compared to 37% in stages I + II. Single lobectomy (58%) predominate significantly versus other types of surgery.

Lobectomy was the most used surgical modality in 566 (58.5%) patients, meanwhile pneumonectomy was performed in 112 (11.6%) of patients. Minor complications during surgery occurred in 45 (11.7%) of patients.

Surgery approach	*Patients (N, %)*		*Mortality within 30-days, (N, %)*		*Major complications (Nr, %)*	
Pneumonectomy	112	13.4	15	13.4	30	26.7
Right	42	4.4	11	26.1	20	39.2
Left	70	7.2	4	5.7	10	14.3
Lobectomy	566	58.5	7	1.2	16	2.8
Bilobectomy	126	13	7	6	8	8
Explorative thoracotomy	51	5.3	5	9.8	5	9
Wedge, Segmentectomy	107	11	3	3	3	3
Total	**968**	**100%**	**37**	**3.8**	**62**	**6.4**

Table 4: *Patient characteristics according surgery modalit*

The 30 days mortality rate was 3.8% (37) patients, 1.2% after single lobectomy and 13.4 % after pneumonectomy.

Continuous air leakage was the most complication after surgery in 25.3%, followed by lung atelectasis in 21.3% and cardiovascular complications in 17%. Of the life-threatening complications respiratory failure was the most events in 20.0% of patients,

followed by Broncho-pleural fistula in 18.7% and pulmonary edema in 15% of patients.

Minor complications	*Nr.*	*%*	*Major Complications*	*Nr.*	*%*
Supra-ventricular arrhythmias	13	17.3	Respiratory failure	10	20.8
Continuous Air leakage	19	25.3	Broncho-pleural fistulas	9	18.75
Lung Atelectasis	16	21.3	Pulmonary edema	7	14.6
Obstructive symptoms	11	14.6	Cardiac failure	6	12.5
Paresis of recurrent Nerve	1	1.3	Tumor embolism	5	10.4
Insufficient wound healing	4	5.3	Myocardial infarction	3	6.25

Diaphragmatic paresis	6	8.0	Chilothorax	3	6.25
Mediastinal Shift displacement	5	6.6	Postoperative bleeding	4	8.3
			Cerebral infarction	1	2.0
Total	75	7.7%	Total	48	4.9%

Table 5: *Minor and Major Complications within first 30 days after surgery, (7.7% vs.4.9%)*

Discussion

Bronchial cancer today represents a health problem all over the world and one third of them meet at the age of 70 **(1-3).** In our study there have been 70.5% male and 28.7% female. This is closely related to the smoking habit which is widespread in males. The number of tobacco users affected by pulmonary cancer in our country in a study conducted at our hospital by Vakeflliu. Y and al. results up to 86.6% of cases. We found differences is seen in death between gender (female vs. male 3.6% vs. 3.9% respectively; p=0.476).

In this study, the age of the intervening pulmonary carcinoma varies from 15 to 87 years. Of 968 cases in total 271 patients were over 70- years old. Mortality and major complications result with significant differences comparing to those under 70 years old (p=0.03 and 0.0024 respectively). Nevertheless, old age alone does not appear to be a definite contraindication to surgery

There are surgical experiences in patients over 70 years, which indicate that this therapeutic strategy can be performed with good results (11-13). Shirakuza et al. (11), in a series of 33 patients older than 80 years, operated for pulmonary tumor, conclude that, in an elderly subject, not age, but the spread of the disease and the cardio-pulmonary reserve should guide the choice of intervention. Also significant differences are seen according to patients with co morbidity. Furthermore, previous studies have indicated that concomitant diseases such as ischemic heart disease, diabetes mellitus or chronic obstructive lung disease represent significant risk factors for an adverse outcome.

The histological examination of the material in this study shows the significant predominance of the squamous cell carcinoma and adenocarcinoma versus other types. However, based on the sex of the patients, predominance of adenocarcinoma is observed in females, due to the increase in the number of smokers.

Surgical treatment of pulmonary cancer is the method chosen for stage I and II. Procedures that save pulmonary parenchyma offer lower mortality and morbidity than pneumonectomy and instability when complete resection has taken place. (12)

Lung function is the parameter of particular importance as a prognostic factor in evaluation of patients after surgery. In this study a significant difference in patients is seen with FEV1< 70% compared with them with FEV1> 70% in term of mortality and major complications (10.7% vs. 2.3% and 23, 8 % vs. 2.6% respectively.

According to the extent of pulmonary resection, the largest number of cases is treated with lobectomy (58%) followed by bilobectomy and pneumonectomy (13%) and segmentectomy (11%), less is performed explorative thoracotomy [p <0.001].

As expected, the mortality was higher following pneumonectomy (13.4%) than other type of surgery.

The major complications most often related to a postoperative death were respiratory failure (20.0%) followed by Broncho-pleural fistula in

18.7% and pulmonary edema in 15% of patients. These data are in accordance with other reports. In several studies risk factors for major complications after lung resections have been identified, namely: age, male sex, smoking and concomitant disease. As confirmed in the present study, a low respiratory capacity, assessed as FEV1% and pneumonsctomy, appears to be the most important predictor of a high risk of complications after lung resections.
Our results confirm that low mortality 3.8% and an acceptable level of major morbidity 6.4 % can be achieved after surgical resections for lung cancer, especially after single lobectomies (1.2%).

Conclusion

Our results show low mortality and morbidity after lung cancer surgery. However, patients with reduced lung capacity and those undergoing pneumonectomy should be treated with great care, as they run a considerable risk of major complications or death during the first 30 days postoperatively. Older age (>70 yrs), does not appear to be a contraindication to lung cancer surgery, but patients in this group should undergo careful preoperative evaluation.
Pneumonectomy sinister et systemic mediastinal lyphonodulectomy ca bronchopulmonare hilare sinister,post neoadjubvant chemiotherapy.

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