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Impact of Timing of Lung resection on Survival for Clinical Stage I and II Lung Cancer

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Background

Lung cancer is the second most common cancer in both men and women, and comprise 13% of all new cancers. It is by far the leading cause of cancer death among men and women. Each year, more people die of lung cancer than of colon, breast, and prostate cancers combined.(1,2) There is an increasing effort towards early detection of lung cancer, since it is a curable cancer if diagnosis and treatment are performed in a timely manner.(3)

Surgical resection is the most effective treatment for lung cancer in early stages, providing greater long-term survival. Clinical guidelines on acceptable time frames between diagnosis and resection of early-stage lung cancer do not exist.

Objectives

This work aims to assess whether increasing time between diagnosis/first doctor visit and surgery for early stage non-small cell lung cancer (NSCLC) is associated with poorer survival.

Methods

We identified a retrospective cohort of incident lung cancer cases who had surgical treatment for lung cancer at our institution between January 2009 and December 2017, and no prior radiation or chemotherapy. We assessed overall survival (OS) and predictors included a) time from first contact to surgery; and b) time from diagnosis to surgery. The association between date of diagnosis and date of first contact of a health care provider to surgery, and survival for patients with early stage NSCLC was assessed using multivariable Cox proportional hazard. We investigated four cut-off points: surgery within 15 days, 30 days, 60 days and 90 days. We controlled for socio-demographic characteristics as well as clinical outcomes.

Results

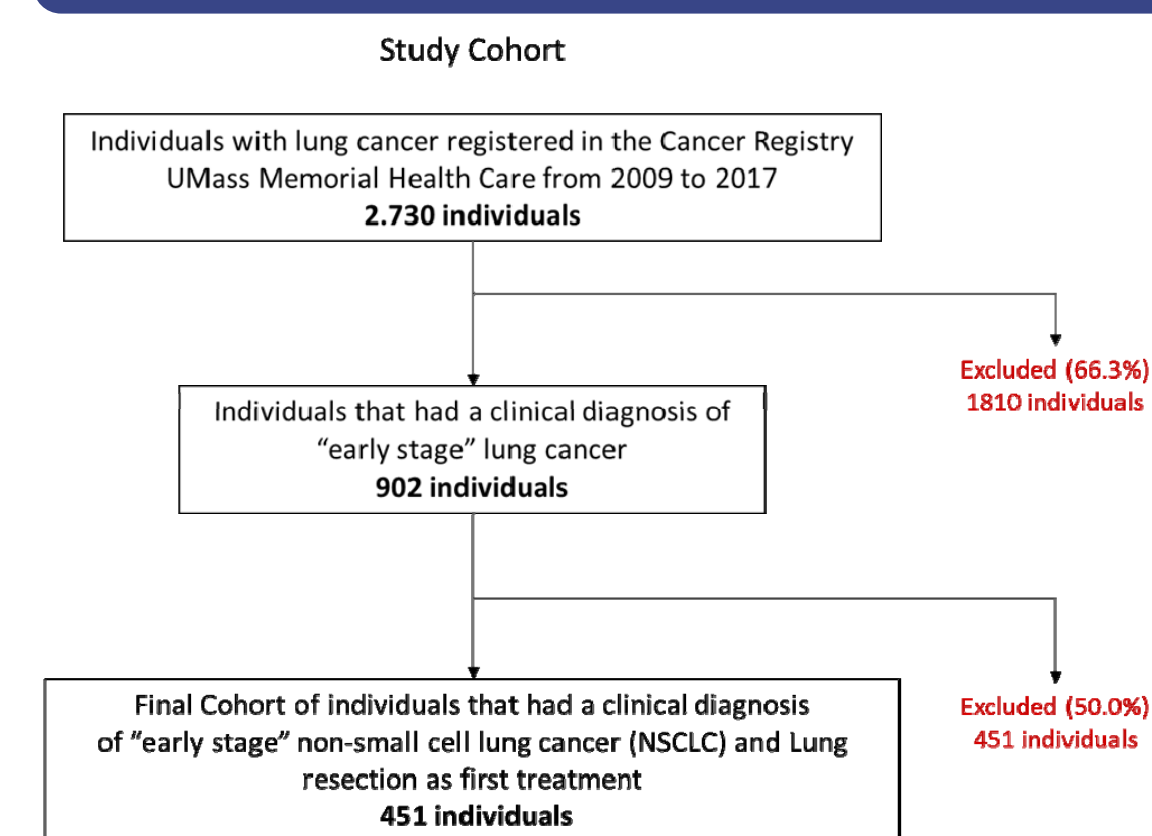


Figure 1. Diagram showing schema of study subject selection. NSCLC, early stage.

Our cohort comprised 451 patients. The age average was 67 years, 61% female, 94.7% white, and 9% never smoked. Clinical Stage 1A and 1B corresponded to 86.5% of patients while in pathological stage it was 76%.

Table 1. Characteristics of the study cohort of lung cancer patients registered in the UMass Memorial Health Care from 2009 to 2017.

	Total (N)	%
Age [Mean(SD)]	67	0.4
Gender	Female	276 61.20%
Ethnicity	White	427 94.70%
	Black	12 2.70%
Hispanic Origin	Yes	13 3%
High Education	Yes	178 39%
High Income level	Yes	13 3%
Smoking status	Current smoker (cigarette, cigar/pipe)	175 39%
	Never used	41 9%
	Previous use	234 52%
Charlson Comorbidities Score	0	339 75%
	1 to 3	105 23%
	4 to 6	7 2%
Health Insurance	Medicaid	51 11%
	Medicare	270 60%
	HMO_PPO	117 26%
	Non-specified	13 3%
Type of Resection	Lobectomy	227 50%
	Pneumonectomy	33 7%
	Segmentectomy	6 1%
	Wedge	185 41%
Histology	adenocarcinoma	336 75%
	squamous cell carcinoma	101 22%
	Others	14 4%
Primary Site of Lesion	Lower Lobe	151 33%
	Middle Lobe	20 4%
	Upper Lobe	274 61%
Regional Nodes Examined [Mean(SD)]	9.3	(0.4)
Regional Nodes Examined	Yes	356 79%
Any regional Node positive	Yes	50 11%
Laterality	Right	270 60%
	Left	180 40%
Radiation (post-surgery)	Yes	27 6%
Chemotherapy (post-surgery)	Yes	78 17%
TNM Pathological staging group categories	Stage 1	33 7%
	Stage 1A	185 41%
	Stage 1B	111 25%
	Stage 2, 2A e 2B	38 8%
	Stage 3A, 3B and 4	38 8%
Specialty seen in the first contact	Thoracic	272 64%
	Oncology	34 8%
	Pulmonary	97 23%
	PCP	15 4%
	Others	5 1%

We did not find any significant association between OS and (a) the time from first visit to surgery for either, any provider or thoracic surgery.

The time from diagnosis to surgery (b) was associated with OS and the threshold time associated with statistically significant worse survival was 60 days after diagnosis.

Results

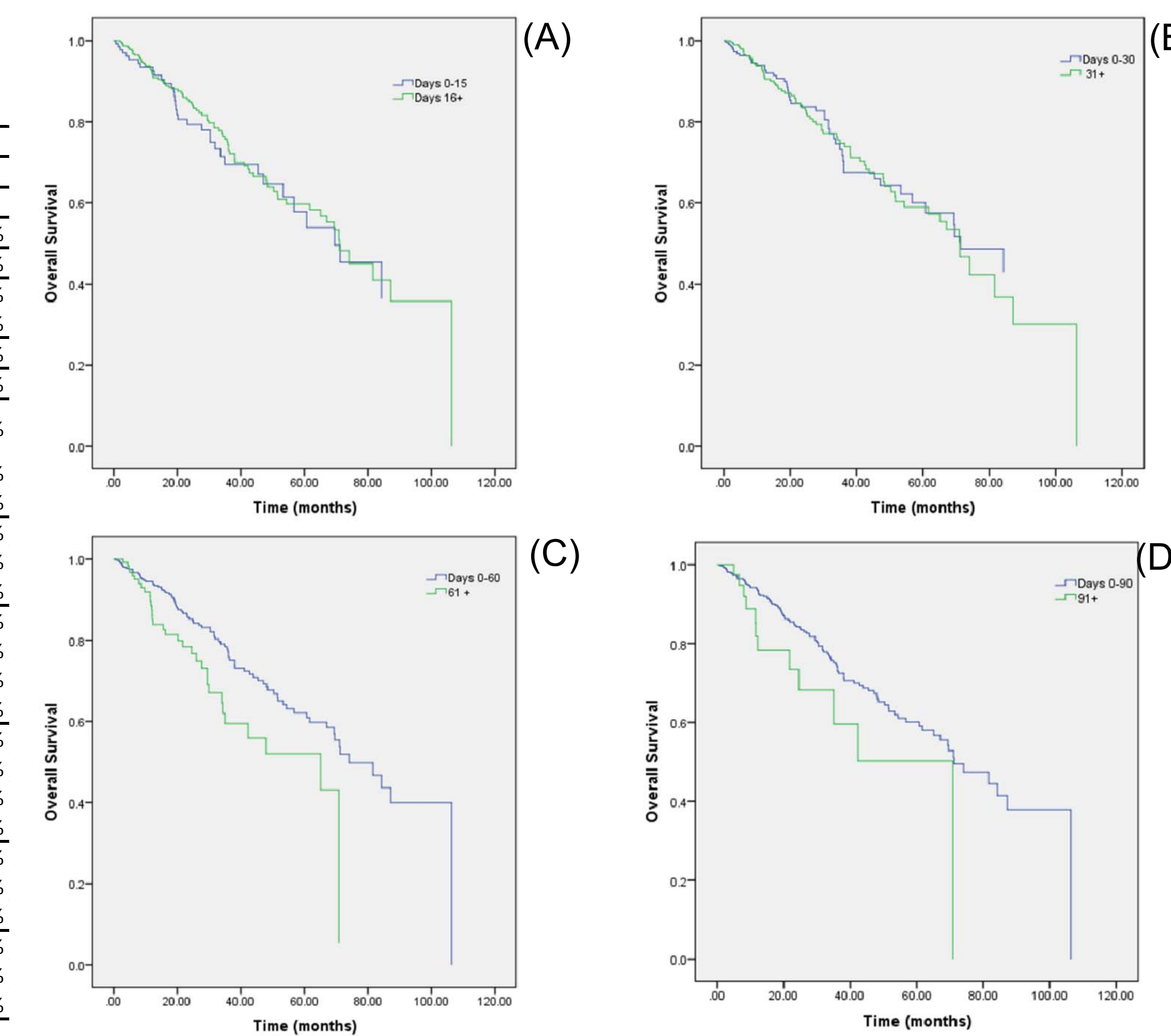


Figure 1. Relationship between timing to surgery and overall survival for patients with clinical stage I and II NSCLC. Adjusted Cox models for the four cut off points of time to surgery (A) 15 days; (B) 30 days, (C) 60 days and (D) 90 days. Median values for all covariates are used as reference standard.

Model was adjusted for age, gender; race; ethnicity ; education level; income level; smoking status ; Charlson comorbidities score; health insurance type; type of resection; histology; primary site of lesion; regional nodes examined node positivity; laterality; radiation (post-surgery); chemotherapy (post-surgery); TNM pathological staging group categories; specialty seen in the first contact;

Table 2. Cox proportional hazard model

Variables in the final model	HR	95% CI	p-value
Male vs female	1.8	1.3 2.6	0.00
Late stage vs early stage	3.8	2.2 6.5	0.00
Non-white vs white	5.6	1.4 23.1	0.02
Sub-lobar resection vs Lobectomy	1.9	1.3 2.8	0.00
Medicare/Medicaid vs non-Medicare	1.6	1.0 2.5	0.05
Time from surgery greater than 60 days vs less than 60 days	1.7	1.1 2.6	0.01

Surgery was performed more than 60 days of diagnosis in 115 (25.7%) patients, their OS was significantly worse than patients who had surgery earlier (HR=1.7 [95% CI: 1.1-2.6]).

Conclusions

Greater intervals between diagnosis of early-stage NSCLC and surgery are associated with worse survival. Efforts to minimize delays, particularly factors that prolong the period from diagnosis to first contact with a lung cancer provider may improve survival.

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