



Robotic Lobectomy After Induction Therapy for Locally Advanced Non-Small Cell Lung Cancer: A Multicenter Propensity Score-Matched Study

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OBJECTIVES: The role of robotic surgery in locally advanced non-small cell lung cancer (NSCLC) is controversial. We evaluated the safety and effectiveness of robotic lobectomy after induction therapy (IT) by analyzing surgical and long-term outcomes. We compared outcomes of patients who received IT followed by lobectomy, via robotic surgery or thoracotomy.

	Unmatched			Matched		
	Robot	Open	p-Value	Robot	Open	p-Value
Total	54 (100.0)	145 (100.0)		50 (100.0)	50 (100.0)	
Age						
<70	16 (29.6)	44 (30.3)		14 (28.0)	16 (32.0)	
>70	38 (70.4)	101 (69.7)	0.44	36 (72.0)	34 (68.0)	0.46
Sex						
Male	39 (72.2)	112 (77.2)	0.26	37 (74.0)	36 (72.0)	0.28
Female	15 (27.8)	33 (22.8)	0.29	13 (26.0)	14 (28.0)	0.32
Side						
Right	22 (40.7)	67 (46.2)	0.33	20 (40.0)	22 (38.0)	0.28
Left	32 (59.3)	78 (53.8)	0.42	30 (60.0)	28 (56.0)	0.30
Smoke status						
Non smoker	19 (35.2)	46 (31.7)	0.41	16 (32.0)	19 (38.0)	0.26
Former/Current smoker	35 (64.8)	99 (68.3)	0.35	34 (68.0)	31 (62.0)	0.32
Comorbidities						
Pulmonary	3 (5.5)	12 (8.2)	0.67	3 (6.0)	5 (10.0)	0.52
Cardiovascular disease	14 (22.2)	39 (26.8)	0.36	11 (22.0)	16 (32.0)	1.00
BMI						
≤25	23 (42.6)	58 (40.0)		19 (38.0)	17 (34.0)	
>25	31 (57.4)	87 (60.0)	0.42	31 (62.0)	33 (66.0)	0.39
ASA score						
2	42 (77.8)	98 (67.6)		39 (78.0)	37 (74.0)	
3	12 (22.2)	47 (32.4)	0.45	11 (22.0)	13 (26.0)	0.42
FEV1 %						
mean ± SD	95 ± 15	92 ± 17	0.12	97 ± 14	90 ± 14	0.09
DLCO/VA						
mean ± SD	81 ± 18	85 ± 18	0.40	82 ± 20	81 ± 15	0.64
Histology						
Adenocarcinoma	36 (66.7)	90 (62.1)	0.33	36 (72.0)	35 (70.0)	0.40
Squamous cell	14 (25.9)	38 (26.2)	0.35	12 (24.0)	12 (24.0)	1.00
Other	4 (7.4)	17 (11.7)	0.67	2 (4.0)	3 (6.0)	0.65
Size, mm						
mean ± SD	22 ± 11	31 ± 14	0.01	20 ± 11	21 ± 10	0.52

Table 1. Clinical and demographic features of all patients and matched patients.

METHODS: Patients with locally advanced NSCLC and treated with radical surgery after IT between December 2008 and May 2024 in two distinct hospitals were identified. Surgical outcomes and long-term survival were assessed using univariate analysis, Kaplan-Meier and Cox proportional hazard analysis. Propensity score-matched comparisons was used to assess the potential impact of selection bias.

	Unmatched			Matched		
	Robot	Open	p-Value	Robot	Open	p-Value
Total	54 (100.0)	145 (100.0)		50 (100.0)	50 (100.0)	
pT						
ypT0	6 (11.1)	5 (3.4)	0.03	4 (8.0)	2 (4.0)	0.04
ypT1	21 (38.9)	69 (47.6)	0.09	20 (40.0)	21 (42.0)	0.64
ypT2	22 (40.7)	54 (37.3)	0.34	22 (44.0)	22 (44.0)	1.00
ypT3	5 (9.3)	17 (11.7)	0.24	4 (8.0)	5 (10.0)	0.57
pN						
ypN0	12 (22.2)	10 (6.9)	0.01	9 (18.0)	8 (16.0)	0.38
ypN1	17 (31.5)	60 (41.4)	0.27	17 (34.0)	20 (40.0)	0.35
ypN2	25 (46.3)	74 (51.0)	0.41	24 (48.0)	22 (44.0)	0.25
Lymph node dissected, n						
mean ± SD	25 ± 9	24 ± 11	0.74	27 ± 10	22 ± 8	0.02
Operative time, minutes						
mean ± SD	205 ± 45	178 ± 58	0.03	243 ± 66	167 ± 48	0.02
Blood loss, ml						
mean ± SD	95 ± 55	195 ± 80	0.01	80± 45	180 ± 50	0.01
ICU, days						
mean ± SD	0.2 ± 0.3	0.4 ± 0.2	0.42	0.1 ± 0.3	0.2 ± 0.4	0.41
Hospital stay, days						
mean ± SD	5.3 ± 1.4	6.2 ± 4.3	0.07	4.9 ± 1.2	6.1 ± 2.5	0.01
Complications						
Yes	8 (14.8)	24 (16.5)		5 (10.0)	6 (12.0)	
No	46 (85.2)	121 (83.5)	0.67	45 (90.0)	44 (88.0)	0.37
Major	2 (3.7)	7 (4.8)		1 (2.0)	1 (2.0)	
Minor	6 (11.1)	17 (11.7)		4 (8.0)	5 (10.0)	
Surgical	1 (1.9)	4 (2.7)		0 (0.0)	2 (4.0)	
Pulmonary	3 (5.5)	8 (5.5)		2 (4.0)	1 (2.0)	
Cardiovascular	4 (7.4)	12 (8.3)		3 (6.0)	3 (6.0)	

Table 2. Surgical and pathological features of all patients and matched patients.

RESULTS: We identified 348 patients who underwent lobectomy for NSCLC after IT in the study period. The primary data set analyzed included 198 patients (145 open and 54 robotic surgeries) Propensity score matching yielded 50 pairs of patients. There was no difference between the two matched groups in terms of age, sex, smoke status, pulmonary and cardiac co-morbidities, body mass index, laterality, ASA score, histology, and size. (Table 1). There was a significant difference in the median operative time (145 minute for open vs 186 minutes for robotic, p=0.02), estimates blood loss (180 ml for open vs 80 for robotic, p=0.01), number of dissected lymph nodes (22 for open vs. 27 for robotic; p=0.02), and hospital stay (6.2 days vs 4.5 days). (Table 2). There was no difference in terms of morbidity between the two groups (p=0.37).

No difference was observed between the two cohorts, either in terms of recurrence-free survival (hazard ratio: 1.07; p=0.43) or overall survival (hazard ratio: 0.74; p=0.37) (Figure 1). Five-year disease-free interval and overall survival were 22.6% and 50.6%, respectively, in open group, and 23.4% and 51.1%, respectively, in robotic group.

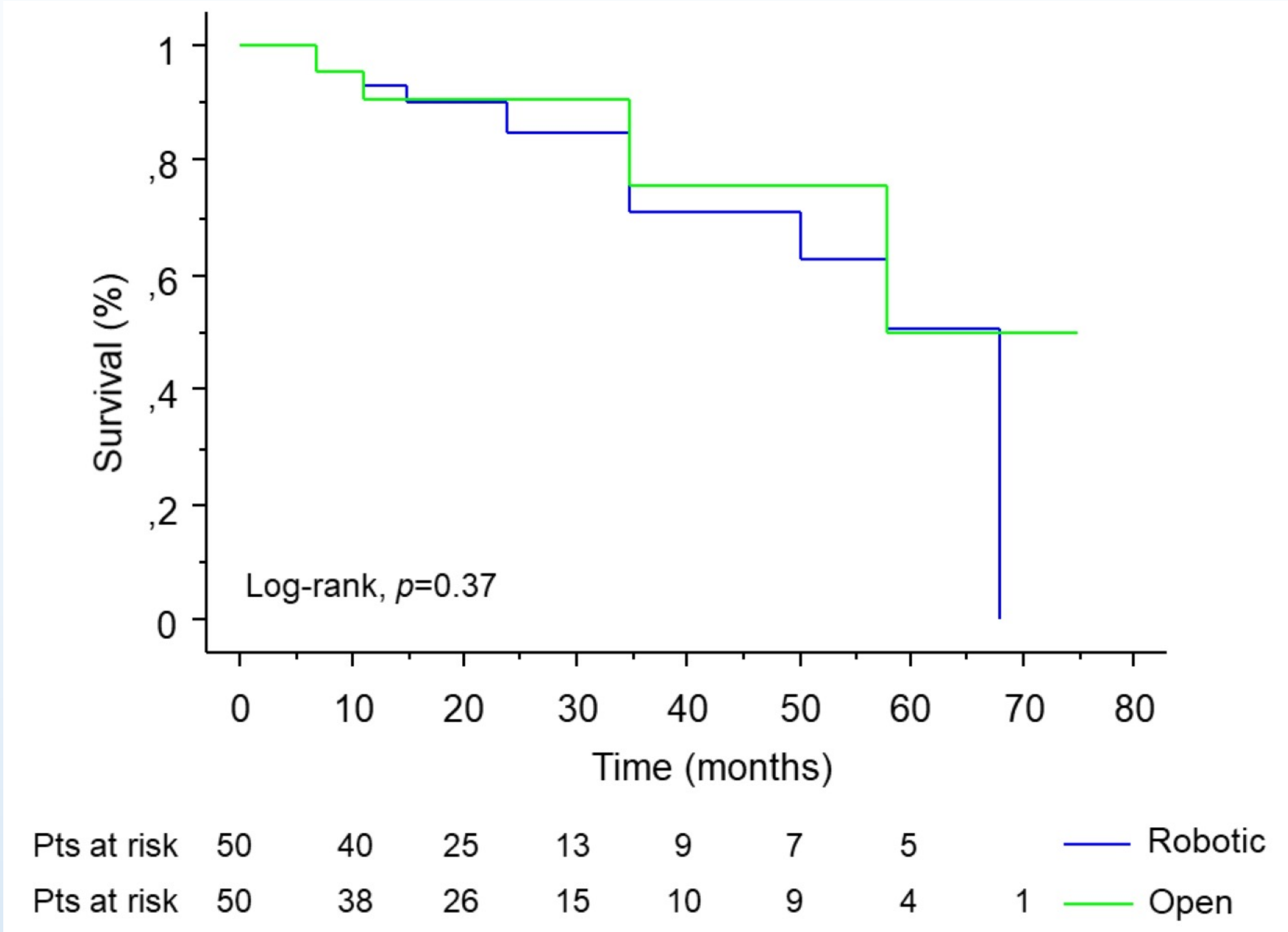


Figure 1. Overall survival of the two groups of matched patients (robotic versus open surgery after induction therapy) showing no statistical difference in terms of survival

CONCLUSIONS: Robotic lobectomy in patients treated with IT for locally advanced NSCLC is feasible and effective and does not appear to compromise oncologic outcomes.

Authors have nothing to disclose