Table 1. The procedures for lymph nodes dissection of lobectomy, segmentectomy and wedge resection

Surgical procedures	Dissection of the lymph nodes
Lobectomy	All patients (633) underwent systemic lymph node dissection, including hilar lymph node and at least three stations of mediastinal lymph nodes from stations 2R, 3A, 4R, 7, 8, 9 for the right side and stations 4L, 5, 6, 7, 8, 9 for the left side, respectively.
Segmentectomy	Most patients underwent systematic mediastinal lymphadenectomy (79.6%, 43/54), including hilar lymph node and at least three stations of mediastinal lymph node from stations 2R, 3A, 4R, 7, 8, 9 for the right side and stations 4L, 5, 6, 7, 8, 9 for the left side, respectively. Eleven patients did not undergo dissection of the hilar lymph node because of technical infeasibility, they only performed systematic mediastinal lymphadenectomy.
Wedge resection	Most patients (78.8%, 67/85) underwent selective dissection of mediastinal lymph node, the remaining 18 patients underwent selective lymph node sampling after a comprehensive evaluation by the surgeons.
Intrapulmonary lymph nodes in the removed lung tissue were evaluated in postoperative pathology examinations.	

Table 2. The scanning technical characteristics of seven hospitals

Hospitals	Scanning technical characteristics
1. Shanghai Pulmonary Hospital	The tube voltage was 120 kVp, tube current adjusted automatically, pitch was 0.969, reconstruction thickness was 1.0 mm, and reconstruction interval was 1.0 mm. Furthermore, preoperative chest CT scans were obtained using scanners with 64-detector rows (Somatom Definition AS [Siemens Medical Systems, Erlangen, Germany]).
2. Jiangsu Cancer Hospital	Tube voltage was 120 kVp, tube current adjusted automatically, pitch was 0.969, reconstruction thickness was 0.625mm, and reconstruction interval was 1.0 mm. Furthermore, preoperative chest CT scans were obtained using scanners with 64-detector rows (GE Light Speed VCT 64 CT Scanner).
3. Zhejiang Cancer Hospital	Tube voltage was 120kVp, tube current adjusted automatically, pitch was 1.0, reconstruction thickness was 1.0mm, and reconstruction interval was 1.0mm. Furthermore, preoperative chest CT scans were obtained using scanners with 64-detector rows (Somatom Definition Flash [Siemens Medical Systems, Erlangen, Germany]), or with 16-detector rows (Somatom Sensation16 [Siemens Medical Systems, Erlangen, Germany]).
4. Jiangsu Province Hospital	Tube voltage was 120 kVp, tube current adjusted automatically, pitch was 1, reconstruction thickness was 1.0 mm, and reconstruction interval was 0.8-1.0 mm. Furthermore, preoperative chest CT scans were obtained using scanners with 64-detector rows (Somatom Definition AS [Siemens Medical Systems, Erlangen, Germany]).
5. The Second Affiliated Hospital of Zhejiang University School of Medicine	Tube voltage was 120 kVp, tube current adjusted automatically, pitch was 0.75, reconstruction thickness was 1.5 mm, and reconstruction interval was 1.5 mm. Furthermore, preoperative chest CT scans were obtained using scanners with 320-detector rows (Aquilion/ONE [Canon Medical System, Nasu Japan]).
6. Affiliated Hospital of Nantong University	Tube voltage was 120 kVp, tube current adjusted automatically, pitch was 0.891, reconstruction thickness was 1.0 mm, and reconstruction interval was 1.0 mm. Furthermore, preoperative chest CT scans were obtained using scanners with 64-detector rows (Philips

	Brilliance CT [Philips Medical Systems, Cleveland, America]).
7. The First People's Hospital of Changzhou	Tube voltage was 120 kVp, tube current adjusted automatically, pitch was 1, reconstruction thickness was 5.0 mm, and reconstruction interval was 5.0 mm. Furthermore, preoperative chest CT scans were obtained using scanners with 64-detector rows (Somatom Definition AS [Siemens Medical Systems, Erlangen, Germany]).

Table 3. Clinicopathologic characteristics of patients with lung adenocarcinoma ≤ 2 cm presenting as pure solid nodules with different percentage of micropapillary subtype

Variables	Percentage of micropapillary subtype			*P*
	< 5% (N = 318)	5-20 % (N = 317)	> 20 % (n = 137)	
Age				
Mean ± SD	60 ± 8.9	59.7 ± 9.7	59 ± 10	0.575
≤ 65	240 (75.5)	232 (73.2)	95 (56.5)	0.394
> 65	78 (24.5)	85 (26.8)	42 (43.5)	
Sex				0.255
Male	145 (45.6)	165 (52.1)	65 (47.4)	
Female	173 (54.4)	152 (47.9)	72 (52.6)	
Smoking				
Non-smoker	241 (75.8)	243 (76.7)	99 (72.3)	0.6
Smoker	77 (24.2)	74 (23.3)	38 (27.7)	
COPD				0.26
Absent	284 (89.3)	274 (86.4)	115 (83.9)	
Present	34 (10.7)	43 (13.6)	22 (16.1)	
Cardiovascular disease				0.786
Absent	275 (86.5)	268 (84.5)	117 (85.4)	
Present	43 (13.5)	49 (15.5)	20 (14.6)	
Diabetes mellitus				0.199
Absent	291 (91.5)	294 (92.7)	120 (87.6)	
Present	27 (8.5)	23 (7.3)	17 (12.4)	
% pre FEV1				0.332
> 70	299 (94)	304 (95.9)	127 (92.7)	
≤ 70	19 (6)	13 (4.1%)	10 (7.3)	
CEA				0.004
≤ 10 ng/ml	296 (93.1)	269 (84.9)	119 (86.9)	
>10 ng/ml	22 (6.9)	48 (15.1)	18 (13.1)	
Tumor location				0.214
Upper and middle	207 (65.1)	205 (64.7)	78 (56.9)	
Lower	111 (34.9)	112 (35.3)	59 (43.1)	
VATS				0.647
Yes	271 (85.2)	266 (83.9)	112 (81.8)	
No	47 (14.8)	51 (16.1)	25 (18.2)	
Surgical procedures				0.6
Lobectomy	266 (83.6)	252 (79.5)	115 (83.9)	
Segmentectomy	19 (6)	25 (7.9)	10 (7.3)	
Wedge resection	33 (10.4)	40 (12.6)	12 (8.8)	
Tumor size, radiological				0.018
≤ 1 cm	98 (30.8)	67 (21.1)	33 (24.1)	
1-2 cm	220 (69.2)	250 (78.9)	104 (75.9)	
VPI				0.103
Absent	221 (69.5)	198 (62.5)	84 (61.3)	

Present	97 (30.5)	119 (37.5)	53 (38.7)	
Lepidic subtype				0.007
Absent	220 (69.2)	227 (71.6)	114 (83.2)	
Present	98 (30.8)	90 (28.4)	23 (16.8)	
Acinar subtype				< 0.001
Absent	86 (27)	34 (10.7)	38 (27.7)	
Present	232 (73)	283 (89.3)	99 (72.37)	
Papillary subtype				0.111
Absent	118 (37.1)	106 (33.4)	37 (27)	
Present	200 (62.9)	211 (66.6)	100 (73)	
Solid subtype				0.495
Absent	237 (74.5)	248 (78.2)	107 (78.1)	
Present	81 (25.5)	69 (21.8)	30 (21.9)	
LN status				0.012
N0	290 (91.2)	282 (89)	109 (79.6)	
N1	17 (5.3)	21 (6.6)	16 (11.7)	
N2	11 (3.5)	14 (4.4)	12 (8.7)	

COPD, chronic obstructive pulmonary disease; FEV1, forced expiratory volume in one second; CEA, carcinoembryonic antigen; VPI, visceral pleural invasion; VATS, video-assisted thoracic surgery; LN, lymph node; SD, standard deviation.

Table 4. Cox proportional-hazards regression model for recurrence-free survival and overall survival in patients with lung adenocarcinoma ≤ 2 cm with different percentage of micropapillary subtype presented as pure solid nodules

Variables	Recurrence-free survival			Overall survival		
	Univariate	Multivariate		Univariate	Multivariate	
	P	HR (95%CI)	*P*	*P*	HR (95%CI)	*P*
Percentage of MIP of ≤ 5% (n = 439)						
Age (> 65 vs. ≤ 65)	0.304			0.102		
Gender (male vs. female)	0.148			0.413		
Smoking (current or ex vs. non-smoker)	0.454			0.201		
COPD (present vs. absent)	0.512			0.064	1.5 (0.757-2.971)	0.245
Cardiovascular disease (present vs. absent)	0.565			0.126		
Diabetes mellitus (present vs. absent)	0.488			0.729		
FEV1 % (> 70 vs. ≤ 70)	0.877			0.806		
CEA (> 10 vs. ≤ 10 ng/ml)	0.507			0.175		
VPI (present vs. absent)	0.393			0.217		
VATS (yes vs. no)	0.554			0.999		
Tumor location (Upper and middle vs. lower)	0.844			0.936		
Surgical procedure						
Lobectomy (reference)	reference	reference		reference	reference	
Segmentectomy	0.97			0.945		
Wedge resection	0.005	2.013 (1.079-3.757)	0.028	< 0.001	3.685 (1.911-7.106)	< 0.001
Percentage of solid subtype (> 5% vs. ≤ 5%)	0.057	1.288 (0.762-2.263)	0.36	0.002	1.436 (0.785-2.628)	0.24
Percentage of acinar subtype (> 5% vs. ≤ 5%)	0.836			0.812		
Percentage of papillary subtype (> 5% vs. ≤ 5%)	0.235			0.386		
Percentage of lepidic subtype (> 5% vs. ≤ 5%)	0.204			0.036	0.513 (0.258-1.02)	0.057

Lymph node status (N1, N2 vs. N0)	< 0.001	5.771 (3.36-9.911)	< 0.001	< 0.001	6.54 (3.519-12.152)	< 0.001
Percentage of MIP > 5% (n = 333)						
Age (> 65 vs. ≤ 65)	0.941			0.773		
Gender (male vs. female)	0.129			0.190		
Smoking (current or ex vs. non-smoker)	0.424			0.123		
COPD (present vs. absent)	0.635			0.098	1.113 (0.403-3.078)	0.836
Cardiovascular disease (present vs. absent)	0.264			0.028	1.787 (0.696-4.589)	0.228
Diabetes mellitus (present vs. absent)	0.308			0.238		
FEV1 % (> 70 vs. ≤ 70)	0.589			0.776		
CEA (> 10 vs. ≤ 10 ng/ml)	0.048	1.48 (0.986-2.222)	0.059	0.132		
VPI (present vs. absent)	0.281			0.513		
VATS (yes vs. no)	0.272			0.175		
Tumor location (Upper and middle vs. lower)	0.543			0.914		
Surgical procedure						
Lobectomy (reference)	reference	reference		reference	reference	
Segmentectomy	0.002	1.966 (1.169-3.307)	0.011	0.002	2.24 (1.111-4.513)	0.024
Wedge resection	< 0.001	2.508 (1.679-3.747)	< 0.001	< 0.001	3.086 (1.919-4.962)	< 0.001
Percentage of solid subtype (> 5% vs. ≤ 5%)	0.007	1.35 (0.946-1.928)	0.099	0.001	1.514 (0.959-2.39)	0.075
Percentage of acinar subtype (> 5% vs. ≤ 5%)	0.891			0.837		
Percentage of papillary subtype (> 5% vs. ≤ 5%)	0.948			0.868		
Percentage of lepidic subtype (> 5% vs. ≤ 5%)	0.826			0.390		
Lymph node status (N1, N2 vs. N0)	< 0.001	2.764 (1.918-3.98)	< 0.001	< 0.001	3.024 (1.917-4.77)	< 0.001

Variables with *P*-value < 0.1 in univariate models were analyzed in multivariate analysis model.

COPD, chronic obstructive pulmonary disease; FEV1, forced expiratory volume in one second; CEA, carcinoembryonic antigen; VPI, visceral pleural invasion; VATS, video-assisted thoracoscopic surgery; HR, hazard ratio; CI, confidence interval.

Table 5. Clinicopathological characteristics of the study and validation cohorts

Variables	Study cohort (n = 147)	Validation cohort (n = 120)
Age		
≤ 65	92 (62.6)	73 (60.9)
> 65	55 (37.4)	47 (39.1)
Gender		
Male	76 (51.7)	51 (42.5)
Female	71 (48.3)	69 (57.5)
Smoking		
Non-smoker	117 (79.6)	98 (81.6)
Current or ex-smoker	30 (20.4)	22 (18.4)
CEA		
≤ 10 ng/ml	129 (87.8)	103 (85.8)
> 10 ng/ml	18 (12.2)	17 (14.2)
Tumor location		
Upper and Middle	89 (60.5)	64 (53.3)
Lower	58 (39.5)	56 (46.7)
Surgical procedure		
Lobectomy	108 (73.5)	101 (84.2)
Wedge resection	29 (19.7)	13 (10.8)
Segmentectomy	10 (6.8)	6 (5)
Tumor size, (pathological)		
≤ 1 cm	29 (19.7)	34 (28.3)
1-2 cm	118 (80.3)	86 (71.7)
STAS		
Absent	120 (81.9)	94 (78.3)
Present	27 (18.1)	26 (21.7)
VPI		
Absent	124 (84.3)	99 (82.5)
Present	23 (15.7)	21 (17.5)
Predominant histological subtypes		
Lepidic	2 (1.4)	1 (0.8)
Acinar	77 (52.4)	49 (40.8)
Papillary	53 (36.1)	48 (40)
Micropapillary	3 (2)	9 (7.5)
Solid	12 (8.2)	13 (10.8)

CEA: carcinoembryonic antigen; STAS: tumor spread through air space; VPI: visceral pleural invasion.