Invasion across the fissure
Extent of resection

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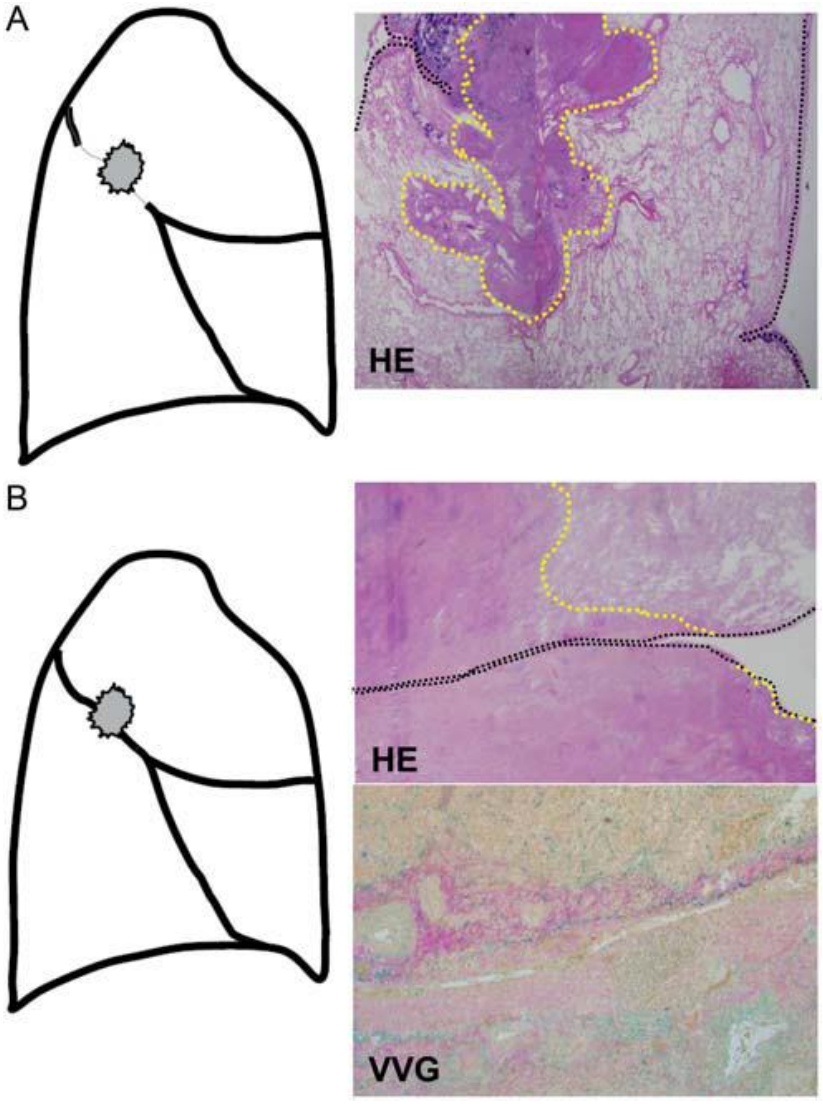
Organisers IASLC International Association for the Study of Lung Cancer; ESMO European Society for Medical Oncology

Partners ESTRO European Society for Radiotherapy & Oncology; European Society of Thoracic Surgeons 1993; etop Information | Research

Disclosure slide

- No conflict of interest related to the topic

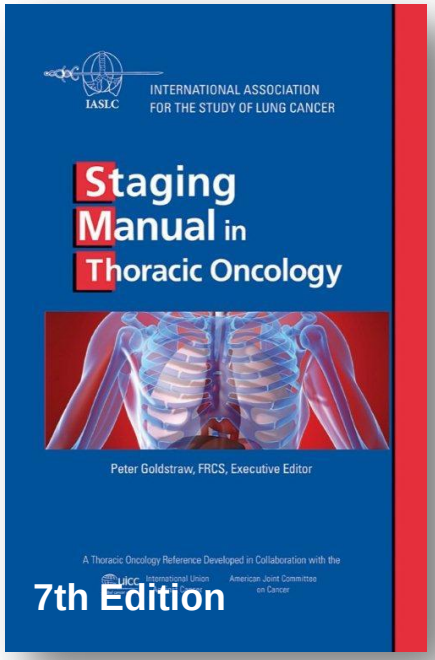


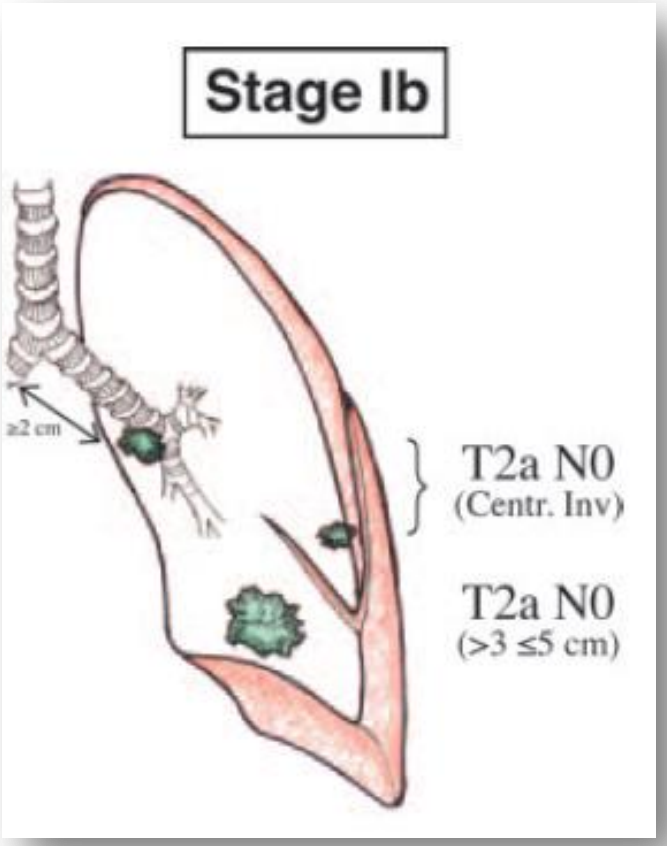
Adjacent lobe invasion
Incomplete fissure

Adjacent lobe invasion
Complete fissure

Ohtaki et al. Eur J Cardiothorac Surg 2013;43:302–309

Staging





« Tumour with direct invasion of an adjacent lobe, across the fissure or by direct extension at a point where the fissure is deficient, should be classified as T2a unless other criteria assign a higher T category »

Prognosis

Table 1: Proposed T factor modifications for lung cancer staging based on recent data regarding invasion status involving pleura

Tumour characteristics	7th edition T classification	Proposed modification based on recent data
Invasion across interlobar fissure into adjacent lobe	Upstages T1 tumours to T2a [2]	Upstages T1 and T2a tumours to T2b [3]
Direct extension into adjacent lobe in region of incomplete fissure	Upstages T1 tumours to T2a [2]	No impact on T category [3]
Visceral pleural invasion in T2 tumour	No impact on T category [1]	Upstages T2a tumours to T2b and T2b tumours to T3 [6, 9]

Butnor & Travis. Eur J Cardiothorac Surg 2013;43:309–311

Table 2: Characteristics of patients with ALI according to the invasion pattern

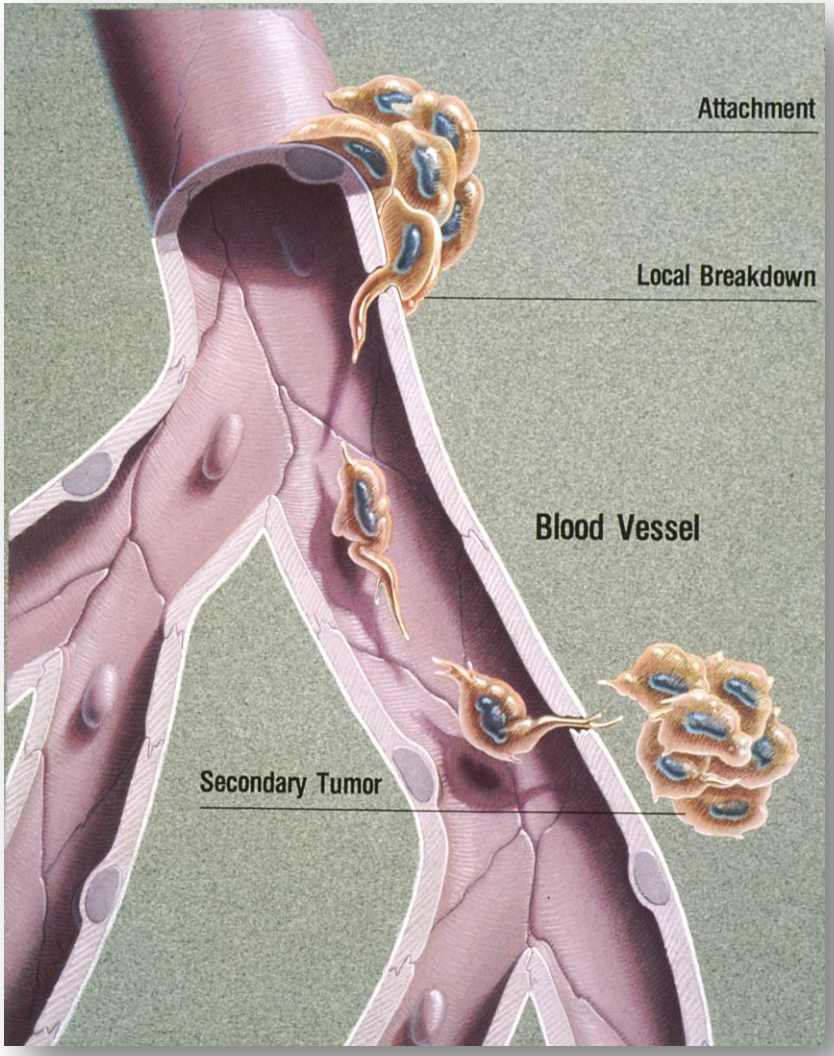
	Number of patients (%)		*P*-value
Interlobar fissure status in adjacent lobe invasion point	ALI-A ($n = 72$)	ALI-D ($n = 18$)	
Five-year overall survival rate	49.8	76.6	0.009†

Ohtaki et al. Eur J Cardiothorac Surg 2013;43:302–309

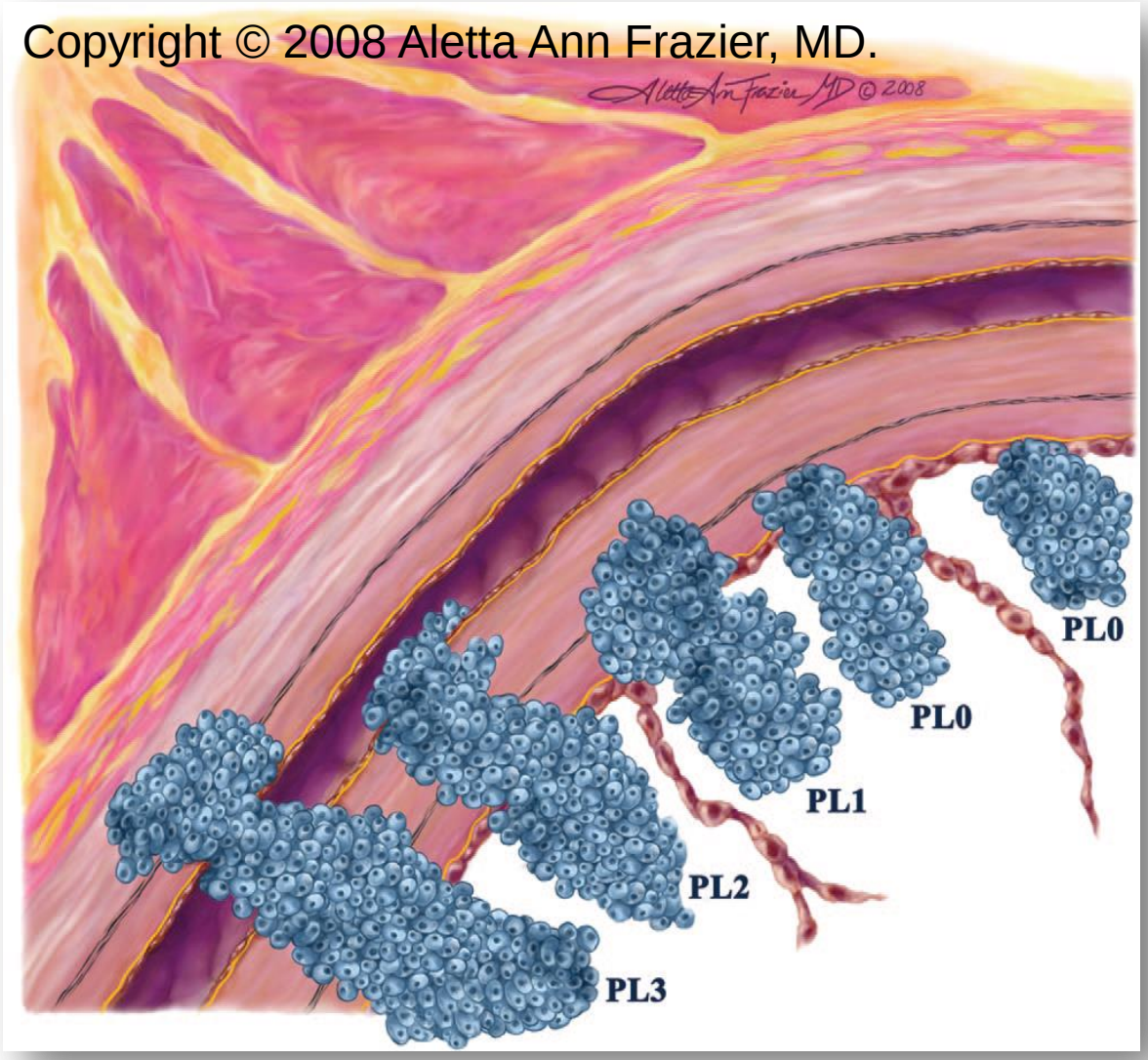
Lung cancer invading the fissure to the adjacent lobe: more a question of spreading mode than a staging problem

Marc Riquet[a,*], Pascal Berna[a], Alex Arame[a], Pierre Mordant[a], Joao Carlos Das Neves Pereira[a], Christophe Foucault[a], Antoine Dujon[b] and Françoise Le Pimpec Barthes[a]

Eur J Cardiothorac Surg 2012;41:1047 –51



% size



Lymph node invasion

Travis et al.
J Thorac Oncol 2008;
3: 1384–1390

Invasion Beyond Interlobar Pleura in Non-small Cell Lung Cancer*

Hiroyuki Miura, MD, FCCP; Osamu Taira, MD, FCCP; Osamu Uchida, MD; and Harubumi Kato, MD, FCCP

Study objective: **To assess the outcome of lung cancer with invasion beyond interlobar pleura and to clarify whether it should be treated in the same way as invasion to the parietal pleura or to other visceral pleura.**
Design: **Retrospective analysis.**
Setting: **Tokyo Medical College Hospital.**
Patients: **Eighteen resected non-small cell lung cancers with invasion beyond interlobar pleura were studied. The outcomes of those patients, those with parietal pleural invasion, and those with other visceral pleural invasion were compared. Patients with rib invasion, mediastinal organ invasion, or distant metastasis were excluded.**
Results: **The 5-year survival rate for patients with invasion beyond interlobar pleura was 34.2% and the median survival time was 56.5 months. The outcome was significantly better than that of patients with parietal pleural invasion. There was no significant difference between the outcome of invasion beyond interlobar pleura and that of other visceral pleural invasion. In patients without lymph node metastasis, similar results were obtained. There was no difference between the outcome of patients with invasion beyond interlobar pleura, who undergo lobectomy with a parietal resection of the invaded lobe, and that of patients with visceral pleural invasion, who undergo lobectomy.**
Conclusions: **The behavior of patients with invasion beyond interlobar pleura is different from that of patients with parietal pleural invasion and should be categorized as T2. The optimum operative method was lobectomy with only parietal resection of the invaded lobe to preserve the pulmonary function.** ***(CHEST 1998; 114:1301–1304)***

Key words: interlobar pleural invasion; invasion beyond interlobar pleura; non-small cell lung cancer; outcome

Abbreviations: MST = median survival time

The TNM classification[1] proposed by Union International Contre le Cancer states that a tumor invading the visceral pleura is classified as T2 and a tumor directly invading the chest wall, diaphragm, mediastinal pleura, or parietal pericardium is classified as T3. Tumors invading the surface of interlobar pleura are also T2. However, there is no clear definition what T factor should correspond to a tumor that invades an adjacent lobe beyond the interlobar pleura. The TNM classification did not include the adjacent pulmonary lobe as an adjoining organ corresponding with T3 or T4. Since the lymph flow of interlobar pleura is probably different from that of parietal pleura, the question arises whether the invasion beyond interlobar pleura should be considered separately from other pleural invasions. To clarify whether this type of invasion should be treated in the same way as parietal or mediastinal pleural invasion, resected non-small cell lung cancers with invasion beyond interlobar pleura were studied.

Materials and Methods

Twenty-one lung cancer patients with invasion beyond interlobar pleura were treated surgically from 1980 to 1990 at Tokyo Medical College Hospital. Two patients with T4 disease and one with M1 were excluded from this study as these are poorer prognostic factors than pleural invasion. Therefore, a total of 18 patients with invasion beyond interlobar pleura were studied clinically and pathologically and the results were compared with those of patients with parietal pleural invasion, including mediastinal pleural invasion and diaphragm, and those of patients with other visceral pleural invasion treated during the same time period. Patients with rib invasion, mediastinal organ invasion, and pleural dissemination or distant metastasis were excluded from the series.

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Hiroyuki Miura et al. 1998

	Authors	Period	Cohort	ALI	%
	Miura et al.	1980-1990	-	18	-
	Okada et al.	1984-1997	901	19	2.1
	Nonaka et al.	1987-2000	322	50	15.5
	Demir et al.	1994-2004	351	60	17.1
	Yang et al.	1997-2006	2094	28	1. 3
	Ohtaki et al.	1993-2006	2097	90	4.3
	Joshi et al.	2001-2007	1021	180	17.6
	Riquet et al.	1984-2007	3316	154	4.6
	Haam et al.	1992-2009	837	46	4.9
	Leuzzi et al.	2000-2010	-	40	
	Total	**1980-2010**		**685**	***5.7***

T size

Authors	Year	Size (mm)	Total
Nonaka et al.	2005	42.5 ± 28	50
Demir et al.	2007	59 ± 29	60
Yang et al.	2009	54 ± 16	28
Haam et al.	2012	47 ± 13	46
Riquet et al.	2012	42.7 ± 12	154
Ohtaki et al	2013	45 ± 18	90
Leuzzi et al	2014	45 ± 21	40
Total	**2005-2014**	**48 ± 20**	**468**

Authors	Year	N0	N1	N2	Total
Miura et al.	1998	8 (44.5%)	6 (33.3%)	4 (22.2%)	18
Okada et al.	1999	6 (31.6%)	7 (36.8%)	6 (31.6%)	19
Nonaka et al.	2005	27 (54%)	12 (24%)	11 (22%)	50
Demir et al.	2007	23 (38.3%)	29 (48.3%)	8 (13.4%)	60
Joshi et al.	*2011*	*113 (62.8%)*	*41 (22.8%)*	*23 (12.8%)*	*180*
Riquet et al.	2012	68 (44.2%)	45 (29.1%)	41 (26.6%)	154
Ohtaki et al.	2013	32 (35.5%)	34 (37.8%)	24 (26.7%)	90
Leuzzi et al.	2014	23 (58%)	11 (27%)	6 (15%)	40
Total		**300 (49.1%)**	**185 (30.3%)**	**123 (20.1%)**	**611**

N status

Extent of lung resection

- Pneumonectomy/bilobectomy
- Lobectomy + sublobar resection (wedge or segmentectomy)
- *Combined sublobar resections*

Depending on the size, the location (anatomy) of the tumour and its nodal status

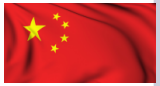
	Authors	Period	Pneumonectomy	Bilobectomy	Extended lobectomy
	Miura et al.	1980-1990	4 (22.2%)	4 (22.2%)	10 (55.6%)
	Okada et al.	1984-1997	10 (52.6%)		9 (47.4%)
	Nonaka et al.	1987-2000	35 (70%)		13 (26%)
	Demir et al.	1994-2004	40 (66.7%)	20 (33.3%)	
	Yang et al.	1997-2006	18 (64.3%)	3 (10.7%)	7 (25%)
	Ohtaki et al.	1993-2006	16 (17.8%)	22 (24.4%)	52 (%)
	*Joshi et al.*	*2001-2007*	*0*	*18 (10%)*	*162 (90%)*
	Riquet et al.	1984-2007	85 (55.2%)	30 (19.5%)	29 (18.8%)
	Haam et al.	1992-2009	27 (58.7%)	11 (23.9%)	7 (15.2%)
	Leuzzi et al.	2000-2010	7 (17.5%)	21 (52.5%)	12 (30%)
	Total	**1980-2010**	**44%**	**20%**	**36%**

Table 2: Characteristics of patients with ALI according to the invasion pattern

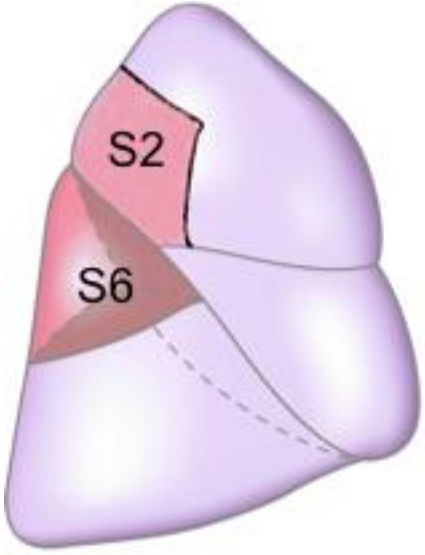
Interlobar fissure status in adjacent lobe invasion point	Number of patients (%) ALI-A ($n = 72$)	ALI-D ($n = 18$)	P-value
Mode of resection			
Pneumonectomy	14 (20)	2 (11)	0.408[a,*]
Bilobectomy	19 (26)	3 (17)	
Lobectomy + wedge resection	36 (50)	9 (50)	
Lobectomy + segmentectomy	3 (4)	4 (22)	

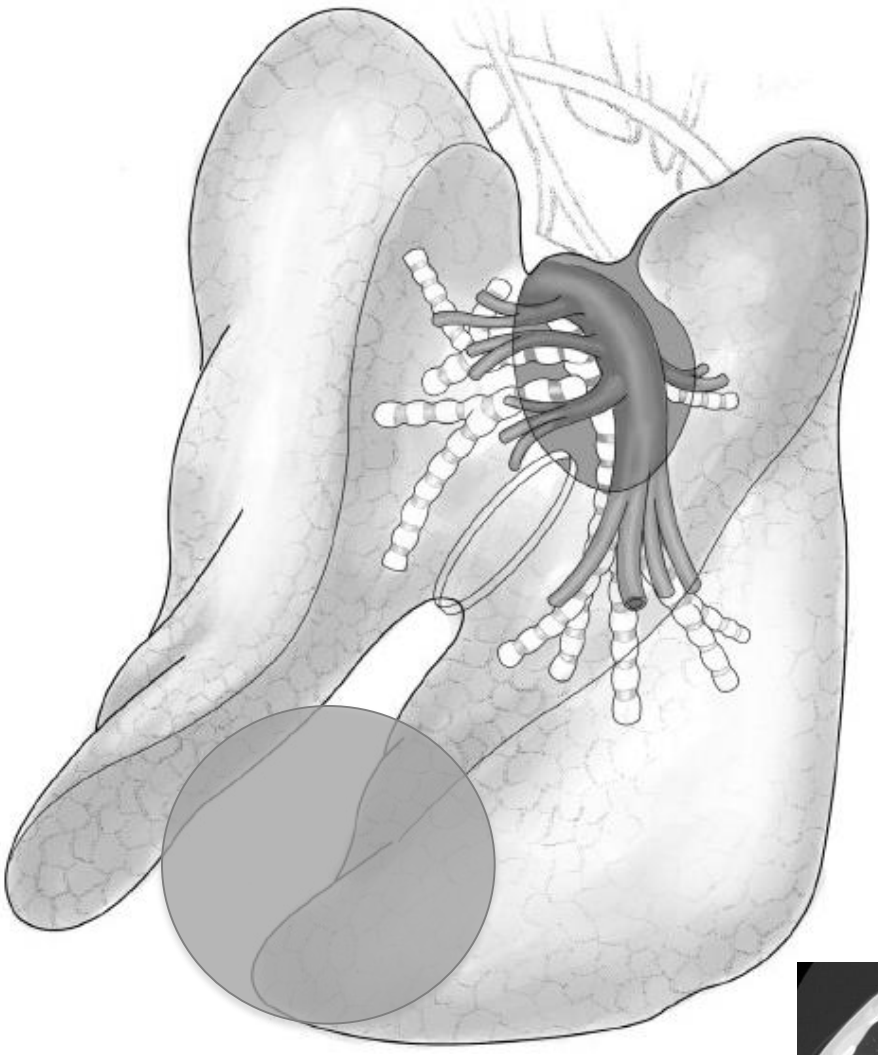
Ohtaki et al. Eur J Cardiothorac Surg 2013;43:302–309

Combined sublobar resections?

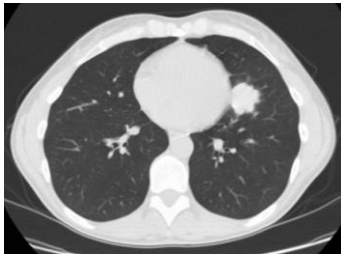
- Haam et al: 1 patient (2.2%)
- Riquet et al: 7 patients (10.3%)

- ✓ Pneumonectomy
- ✓ RUL + wedge
- ✓ RUL + segmentectomy 6
- ✓ Bisegmentectomy 2&6





- ✓ Pneumonectomy
- ✓ LLL + wedge
- ✓ LLL+ Lingulectomy
- ✓ Left S7-10 Segmentectomy + lingulectomy



Contemporary operative risks

Lung Resection	N	%	30-day mortality
Pneumonectomy	726	8.7%	4.9%
Bilobectomy	343	4.1%	2.9%
Lobectomy	6046	72.7%	1.8%
Segmentectomy	592	7.1%	0.5%
Wedge	604	7.2%	1.1%

EPITHOR database SFCTCV 2013-2014

Survival

Authors	Period	5-year survival
Miura et al.	1980-1990	34%
Okada et al.	1984-1997	37%
Nonaka et al.	1987-2000	63%
Demir et al.	1994-2004	36%
Yang et al.	1997-2006	41%
Ohtaki et al.	1993-2006	56%
Riquet et al.	1984-2007	39%
Haam et al.	1992-2009	53%

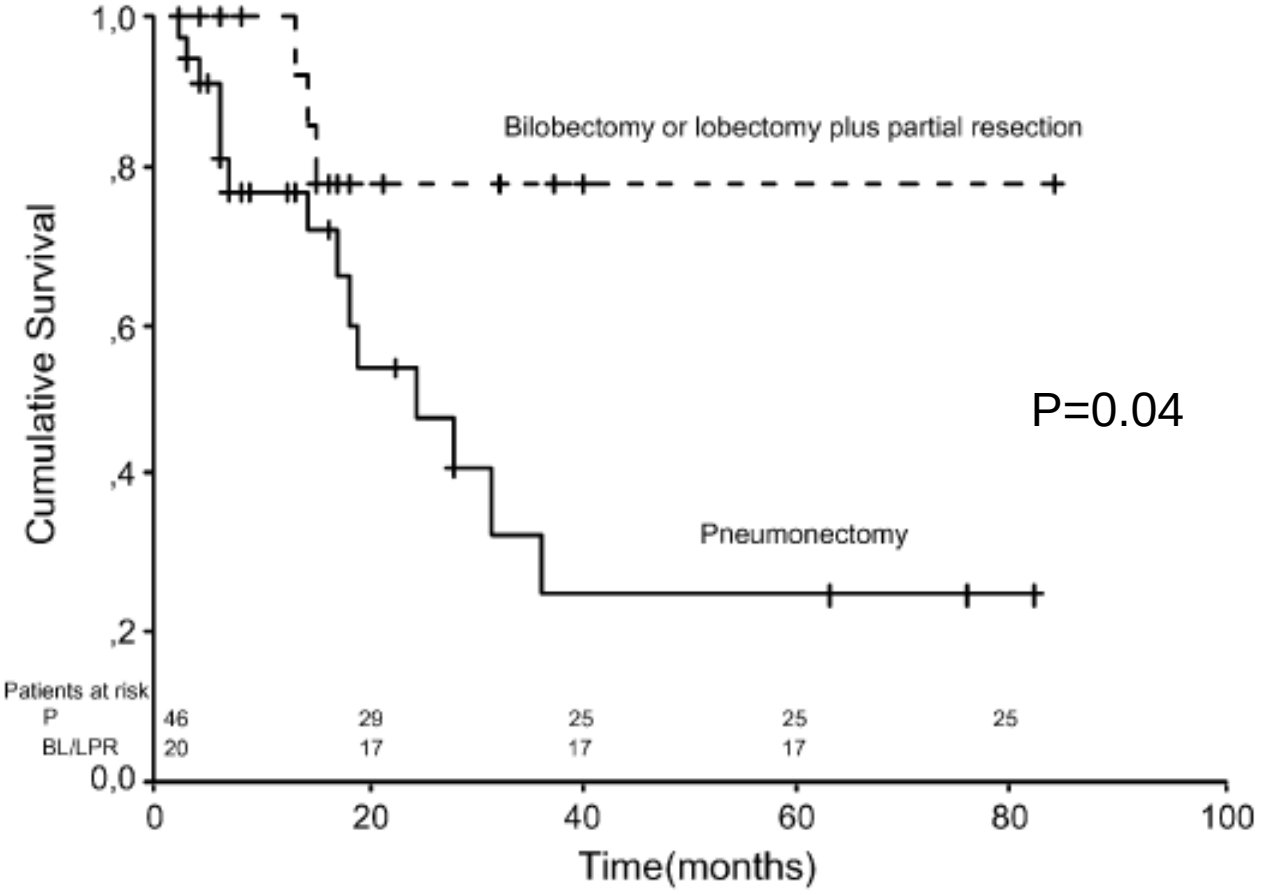
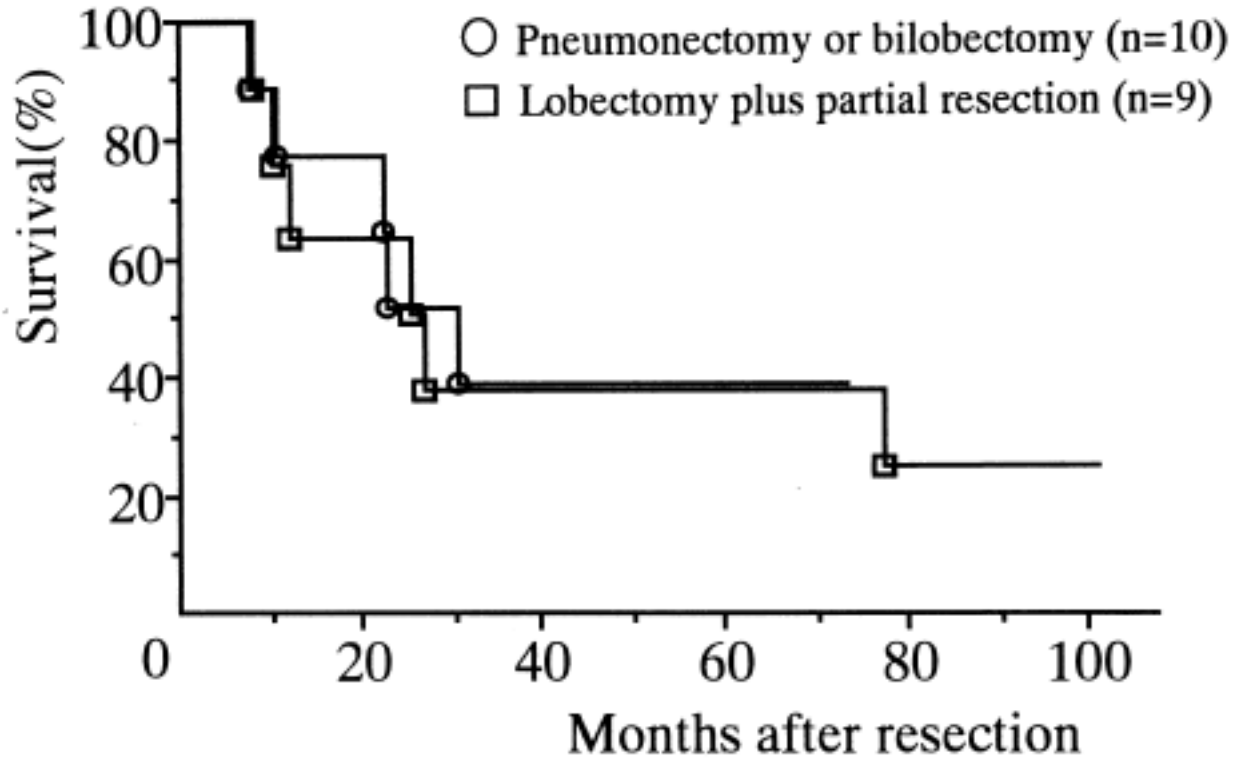
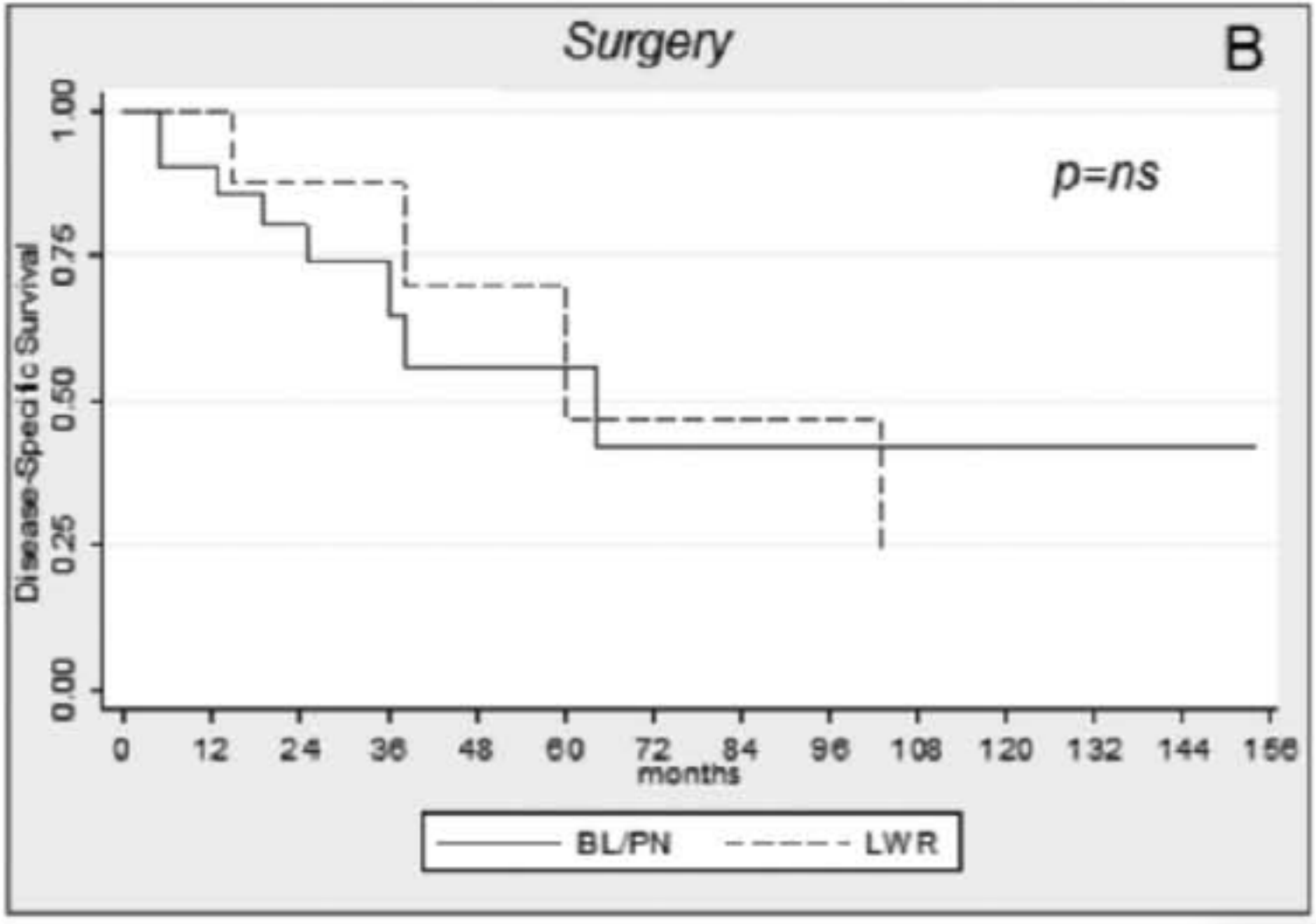


Fig. 3. The survival curves of bilobectomy or lobectomy plus partial resection group vs pneumonectomy group (P, pneumonectomy; BL/LPR, bilobectomy or lobectomy plus partial resection).

Demir A et al. Eur J Cardiothorac Surg 2007;32:855 –858



Okada M et al. Ann Thorac Surg 1999;68:2049 –52



Leuzzi et al. J Thorac Oncol 2014; 9: 97–108

Table 3: Prognostic factors of the patients with ALI for overall survival

Characteristics	*n*	5-year OS	Univariate analysis, *P*-value†	Multivariate analysis	
				HR (95% CI)	*P*-value†
Age (years)					
<67	43	51.4	0.655		
≥67	47	60.6			
Gender					
Male	59	56.2	0.946		
Female	31	54.2			
Smoking history					
Never	19	52.6	0.654		
Yes	71	56.3			
CEA (ng/ml)					
<5.0	39	62.3	0.154		
≥5.0	51	50.3			
Mode of resection					
Pneumonectomy/bilobectomy	38	50.9	0.327		
Lobectomy + wedge resection or segmentectomy	52	59.0			
Histology					
Adenocarcinoma	52	49.1	0.280		
Non-adenocarcinoma	38	64.9			
Tumour size (cm)					
≤3.0	16	49.2	0.968		
>3.0	74	56.9			
Pathological nodal status					
pN0	32	71.4	0.007§	1.00	0.109
pN1	34	58.3		1.46 (0.68–3.13)	0.328
pN2	24	29.8		2.17 (1.01–4.65)	0.047§
Lymphatic permeation					
Negative	41	61.5	0.352		
Positive	49	50.0			
Vascular invasion					
Negative	16	93.8	0.001§	1.00	0.041§
Positive	74	47.0		4.64 (1.06–20.24)	
Type of ALI					
ALI-D	18	76.6		1.00	0.097
ALI-A	72	49.8	0.009§	2.47 (0.85–7.17)	

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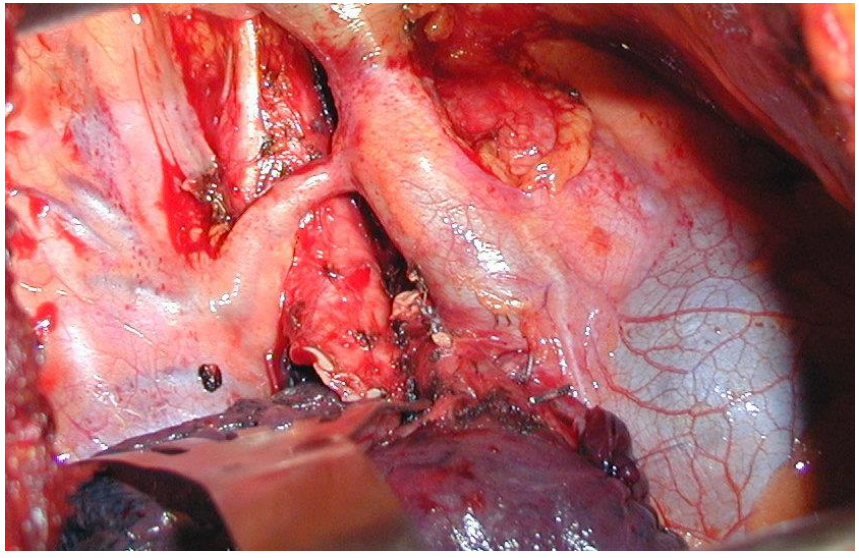
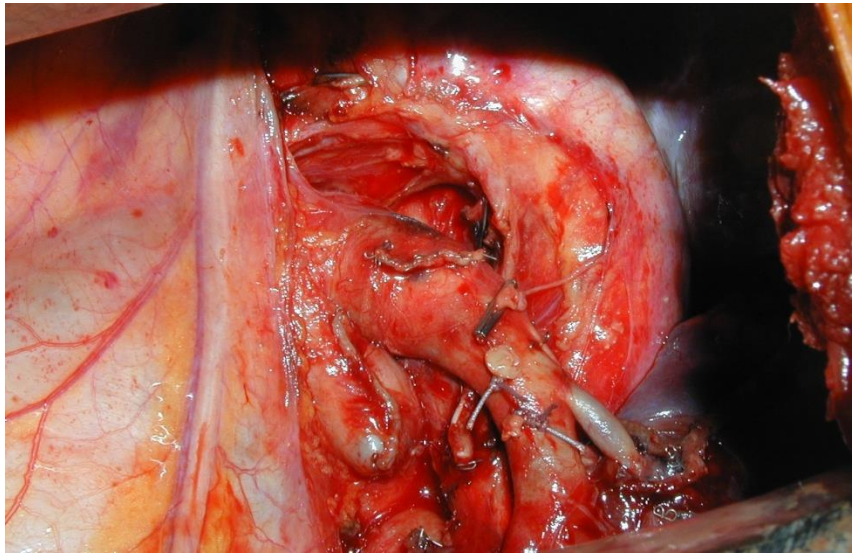
Type of lymphadenectomy





50% Lymph node metastases

Take-home messages

Surgery should remove

- What is necessary to provide a R0 resection
- At a lesser risk
- With anatomical resections
- And lymphadenectomy
- Keeping in mind that the majority of these patients has to receive adjuvant chemotherapy