elcc
Geneva, Switzerland
26-29 MARCH 2014
EUROPEAN LUNG CANCER CONFERENCE

ESMO
GOOD SCIENCE
BETTER MEDICINE
BEST PRACTICE

Modern concepts and results of surgery for early stage NSCLC

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Disclosure slide

- Nothing to declare

The NEW ENGLAND JOURNAL of MEDICINE
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Reduced Lung-Cancer Mortality with Low-Dose Computed Tomographic Screening

The National Lung Screening Trial Research Team*

B Death from Lung Cancer

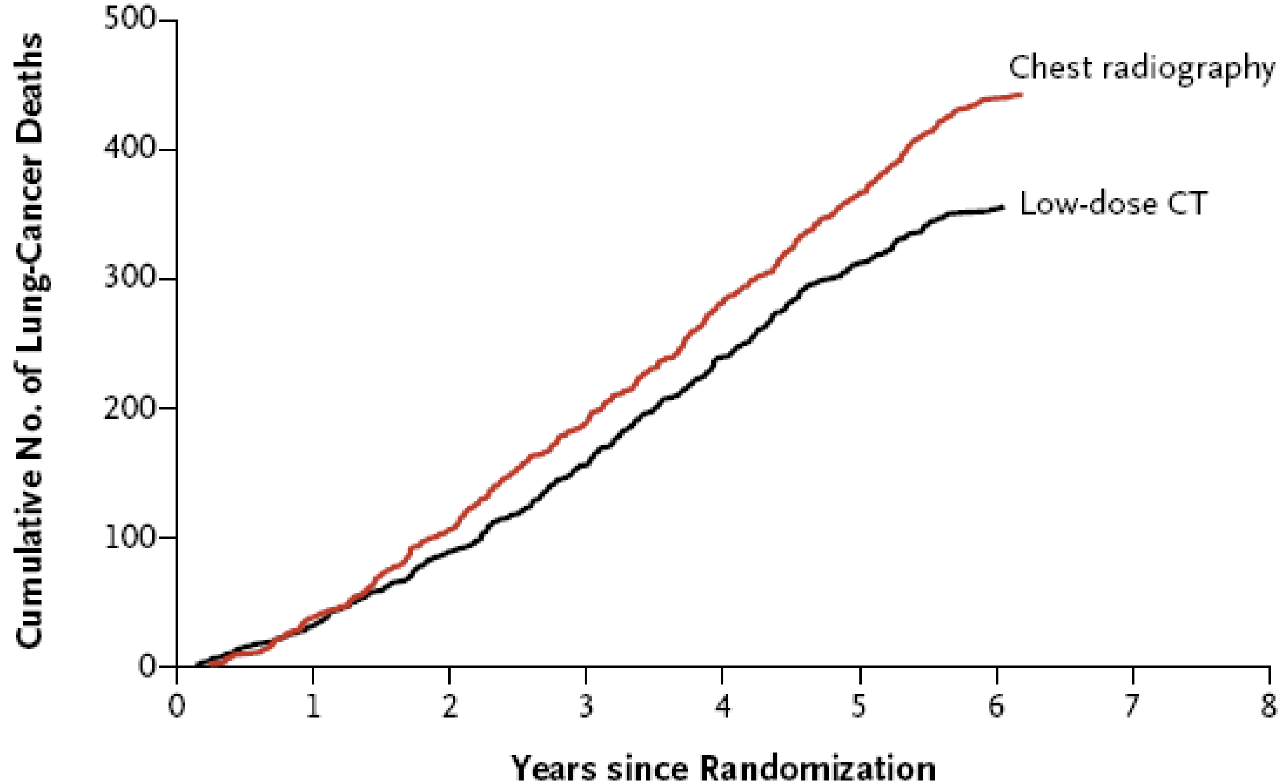


Table 5. Stage and Histologic Type of Lung Cancers in the Two Screening Groups, According to the Result of Screening.*

Stage and Histologic Type	Low-Dose CT				Chest Radiography			
	Positive Screening Test (N=649)	Negative Screening Test (N=44)†	No Screening Test (N=367)‡	Total (N=1060)	Positive Screening Test (N=279)	Negative Screening Test (N=137)†	No Screening Test (N=525)‡	Total (N=941)
	number/total number (percent)							
Stage								
IA	329/635 (51.8)	5/44 (11.4)	82/361 (22.7)	416/1040 (40.0)	90/275 (32.7)	16/135 (11.9)	90/519 (17.3)	196/929 (21.1)
IB	71/635 (11.2)	2/44 (4.5)	31/361 (8.6)	104/1040 (10.0)	41/275 (14.9)	6/135 (4.4)	46/519 (8.9)	93/929 (10.0)
IIA	26/635 (4.1)	2/44 (4.5)	7/361 (1.9)	35/1040 (3.4)	14/275 (5.1)	2/135 (1.5)	16/519 (3.1)	32/929 (3.4)
IIB	20/635 (3.1)	3/44 (6.8)	15/361 (4.2)	38/1040 (3.7)	11/275 (4.0)	6/135 (4.4)	25/519 (4.8)	42/929 (4.5)
IIIA	59/635 (9.3)	3/44 (6.8)	37/361 (10.2)	99/1040 (9.5)	35/275 (12.7)	21/135 (15.6)	53/519 (10.2)	109/929 (11.7)
IIIB	49/635 (7.7)	15/44 (34.1)	58/361 (16.1)	122/1040 (11.7)	27/275 (9.8)	24/135 (17.8)	71/519 (13.7)	122/929 (13.1)
IV	81/635 (12.8)	14/44 (31.8)	131/361 (36.3)	226/1040 (21.7)	57/275 (20.7)	60/135 (44.4)	218/519 (42.0)	335/929 (36.1)
Histologic type								
Bronchioloalveolar carcinoma	95/646 (14.7)	1/44 (2.3)	14/358 (3.9)	110/1048 (10.5)	13/276 (4.7)	1/135 (0.7)	21/520 (4.0)	35/931 (3.8)
Adenocarcinoma	258/646 (39.9)	8/44 (18.2)	114/358 (31.8)	380/1048 (36.3)	112/276 (40.6)	37/135 (27.4)	179/520 (34.4)	328/931 (35.2)
Squamous-cell carcinoma	136/646 (21.1)	13/44 (29.5)	94/358 (26.3)	243/1048 (23.2)	70/276 (25.4)	24/135 (17.8)	112/520 (21.5)	206/931 (22.1)
Large-cell carcinoma	28/646 (4.3)	3/44 (6.8)	10/358 (2.8)	41/1048 (3.9)	12/276 (4.3)	10/135 (7.4)	21/520 (4.0)	43/931 (4.6)
Non–small-cell carcinoma or other§	75/646 (11.6)	4/44 (9.1)	52/358 (14.5)	131/1048 (12.5)	40/276 (14.5)	30/135 (22.2)	88/520 (16.9)	158/931 (17.0)
Small-cell carcinoma	49/646 (7.6)	15/44 (34.1)	73/358 (20.4)	137/1048 (13.1)	28/276 (10.1)	32/135 (23.7)	99/520 (19.0)	159/931 (17.1)
Carcinoid	5/646 (0.8)	0	1/358 (0.3)	6/1048 (0.6)	1/276 (0.4)	1/135 (0.7)	0	2/931 (0.2)

* The denominators represent only cancers with a known stage or known histologic type. The stage was not known in the case of 14 cancers after a positive screening test and 6 after no screening in the low-dose CT group and in the case of 4 cancers after a positive screening test, 2 after a negative screening test, and 6 after no screening in the radiography group. The histologic type was not known for 3 cancers after a positive screening test and 9 after no screening in the low-dose CT group and for 3 cancers after a positive screening test, 2 after a negative screening test, and 5 after no screening in the radiography group.

† Negative screening tests included tests that revealed either minor or clinically significant abnormalities that were not suspicious for lung cancer.

‡ The 892 lung cancers in participants with no screening test included 35 in participants who were never screened, 802 that were diagnosed during the post-screening period, and 55 in participants who were due for a screening test.

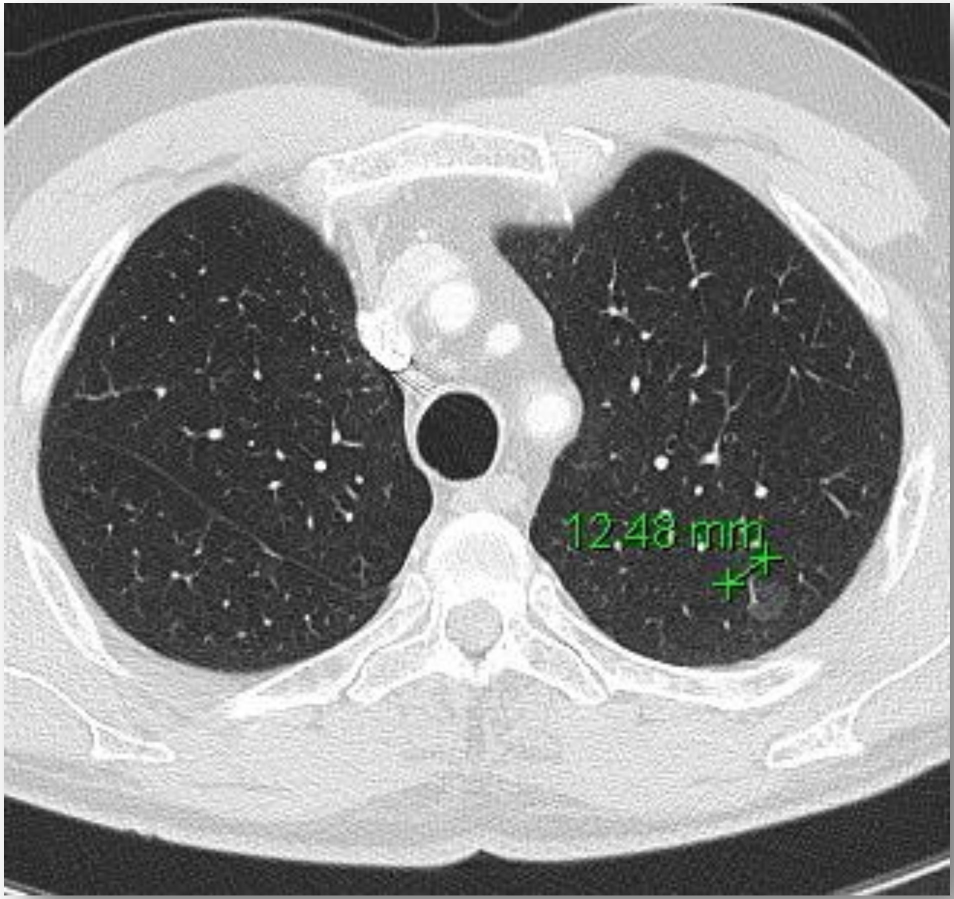
§ The 289 lung cancers in this category (in the two groups combined) included 28 adenosquamous carcinomas, 6 sarcomatoid carcinomas, 55 unclassified carcinomas, 1 anaplastic-type carcinoma, 1 carcinosarcoma, and 198 coded only as "non–small-cell carcinoma."

Ground Glass Opacity

STAGE I
BAC= **17%** (screening group) vs.
6% (control group)

The NEW ENGLAND JOURNAL of MEDICINE

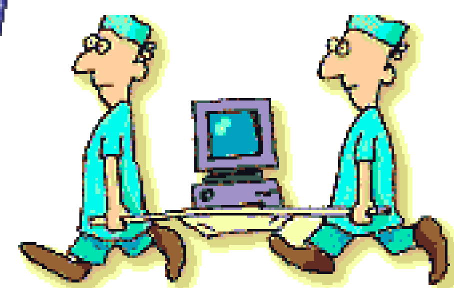
National Lung Screening Trial Research Team.
N Engl J Med 2011;365:395-409

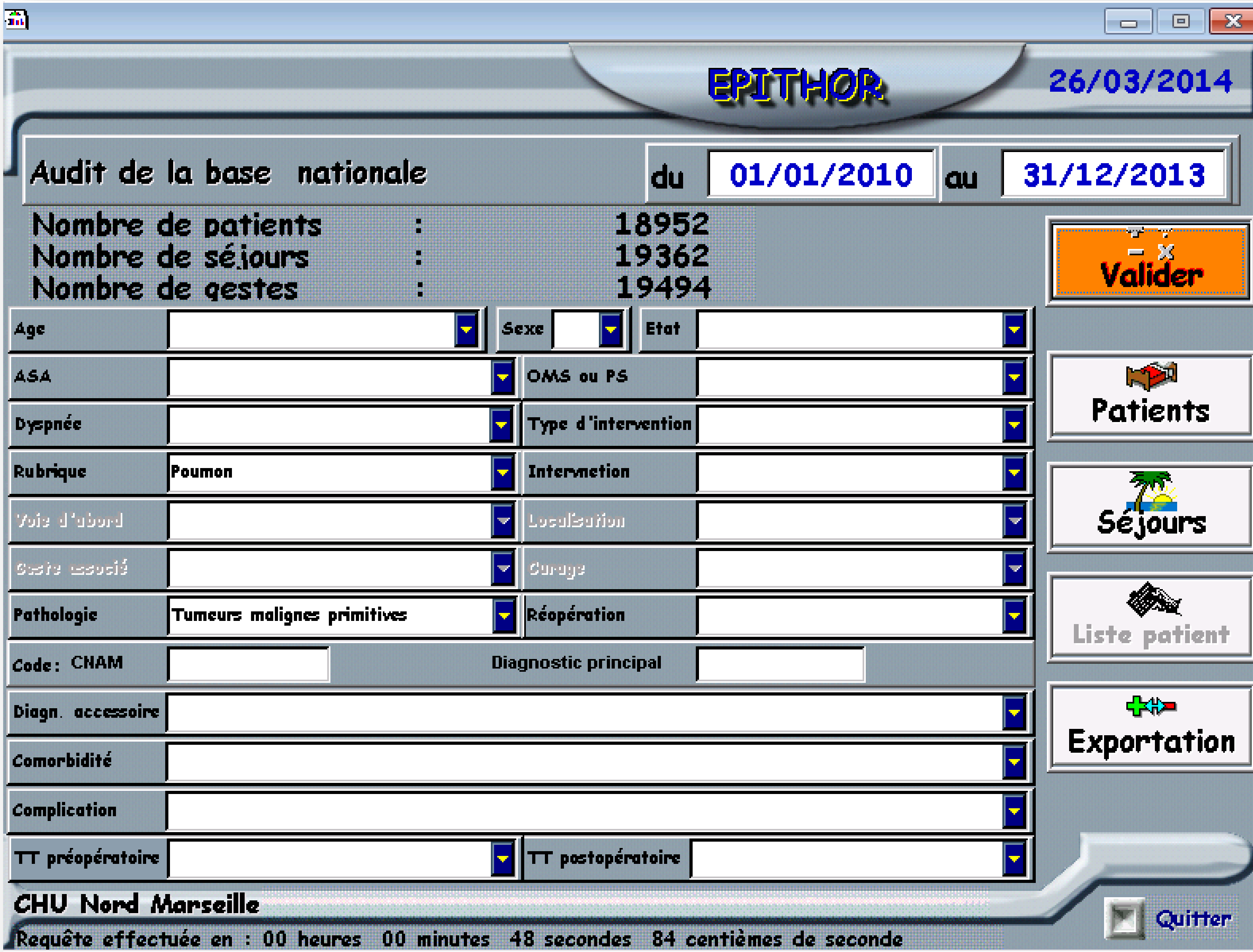


Current surgical risks in the real life

EPITHOR

Société Française de Chirurgie Thoracique et Cardio-vasculaire
French Society of Thoracic and Cardiovascular Surgery




EPITHOR
26/03/2014
Audit de la base nationale
du 01/01/2010 au 31/12/2013
Nombre de patients : 18952
Nombre de séjours : 19362
Nombre de gestes : 19494
Valider
Age
Sexe
Etat
ASA
OMS ou PS
Dyspnée
Type d'intervention
Rubrique
Poumon
Intervnetion
Voie d'abord
Localisation
Geste associé
Curage
Pathologie
Tumeurs malignes primitives
Réopération
Code : CNAM
Diagnostic principal
Diagn. accessoire
Comorbidité
Complication
TT préopératoire
TT postopératoire
Patients
Séjours
Liste patient
Exportation
CHU Nord Marseille
Quitter
Requête effectuée en : 00 heures 00 minutes 48 secondes 84 centièmes de seconde

Morbidité et mortalité

EPITHOR 26/03/2014

Résultats du 01/01/2010 au 31/12/2013 Base nationale

PNEUMONECTOMIES

			Base nationale	
Décès peropératoire			0,26	%
Décès postopératoire			4,39	%
Décès à 30 jours			5,13	%
Nombre de dossiers renseignés			1 889	

Morbidité · Mortalité · Tendances

Impression

Quitter

Requête effectuée en : 00 heures 00 minutes 04 secondes 73 centièmes de seconde

EPITHOR 26/03/2014

Résultats du 01/01/2010 au 31/12/2013 Base nationale

LOBECTOMIES

			Base nationale	
Décès peropératoire			0,03	%
Décès postopératoire			1,85	%
Décès à 30 jours			1,87	%
Nombre de dossiers renseignés			13 287	

Morbidité

Mortalité

Tendances

Impression

Quitter

Requête effectuée en : 00 heures 00 minutes 16 secondes 33 centièmes de seconde

Morbidité et mortalité

EPITHOR 26/03/2014

Résultats du 01/01/2010 au 31/12/2013 — Base nationale

WEDGE RESECTIONS

			Base nationale	
Décès peropératoire			0,00	%
Décès postopératoire			1,07	%
Décès à 30 jours			1,60	%
Nombre de dossiers renseignés			1 312	

Morbidité | Mortalité | Tendances

Impression

Quitter

Requête effectuée en : 00 heures 00 minutes 03 secondes 99 centièmes de seconde

Morbidité et mortalité

EPITHOR

26/03/2014

Résultats du 01/01/2010 au 31/12/2013 Base nationale

SEGMENTECTOMIES

			Base nationale	
Décès peropératoire			0,00	%
Décès postopératoire			0,85	%
Décès à 30 jours			0,94	%
Nombre de dossiers renseignés			1 063	

Morbidité

Mortalité

Tendances

Impression

Quitter

Requête effectuée en : 00 heures 00 minutes 04 secondes 25 centièmes de seconde

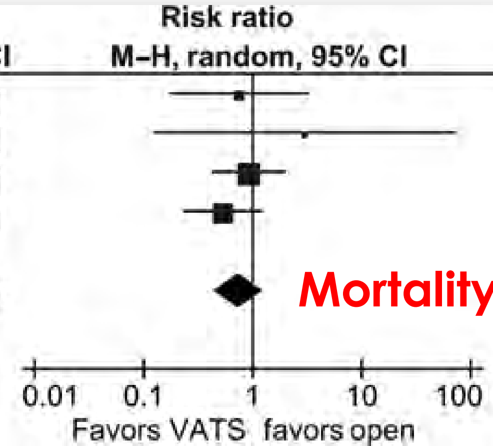
Video-Assisted Thoracic Surgery Lobectomies

Early outcomes

Study or subgroup	VATS Events	VATS Total	Thoracotomy Events	Thoracotomy Total	Weight	Risk ratio M–H, random, 95% CI
Ilonen (2011)	3	116	4	116	12.7%	0.75 [0.17, 3.28]
Park (2011)	1	136	0	136	2.7%	3.00 [0.12, 73.00]
Paul (2010)	12	1281	13	1281	45.5%	0.92 [0.42, 2.02]
Villamizar (2009)	8	284	15	284	39.1%	0.53 [0.23, 1.24]
Total (95% CI)		**1817**		**1817**	**100.0%**	**0.75 [0.44, 1.27]**
Total events	24		32			

Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 1.63$, df = 3 ($P = 0.65$); $I^2 = 0\%$

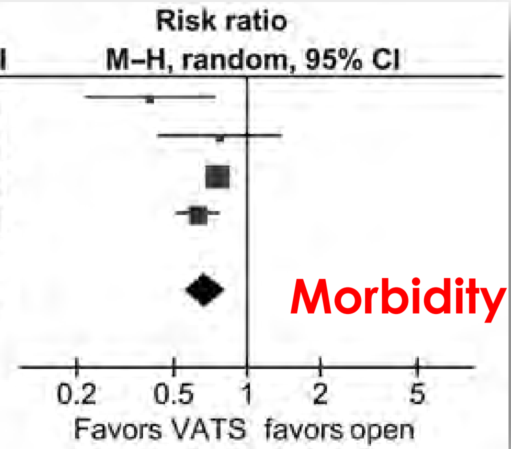
Test for overall effect: $Z = 1.08$ ($P = 0.28$)



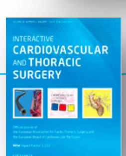
Study or subgroup	VATS Events	VATS Total	Thoracotomy Events	Thoracotomy Total	Weight	Risk ratio M–H, random, 95% CI
Ilonen (2011)	12	116	30	116	8.4%	0.40 [0.22, 0.74]
Park (2011)	17	136	22	136	9.2%	0.77 [0.43, 1.39]
Paul (2010)	336	1281	444	1281	47.8%	0.76 [0.67, 0.85]
Villamizar (2009)	88	284	140	284	34.6%	0.63 [0.51, 0.78]
Total (95% CI)		**1817**		**1817**	**100.0%**	**0.67 [0.56, 0.82]**
Total events	453		636			

Heterogeneity: $\tau^2 = 0.02$; $\chi^2 = 5.79$, df = 3 ($P = 0.12$); $I^2 = 48\%$

Test for overall effect: $Z = 3.99$ ($P < 0.0001$)



Meta-analysis of propensity score-matched patients



Cao C et al. Interactive CardioVascular and Thoracic Surgery 2013;16:244–249

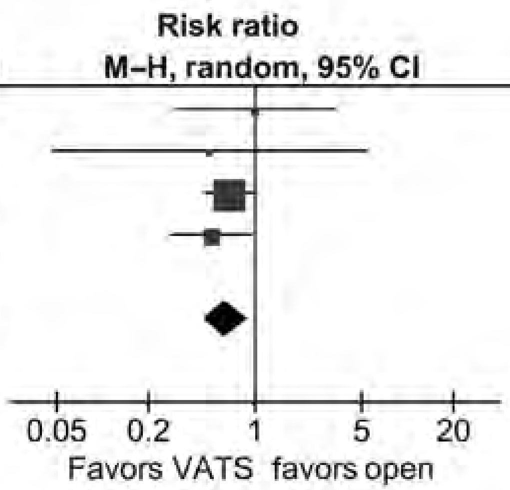
Pulmonary complications

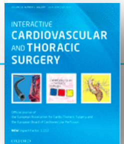
(b)

Study or subgroup	VATS Events	VATS Total	Thoracotomy Events	Thoracotomy Total	Weight	Risk ratio M–H, random, 95% CI
Ilonen (2011)	5	116	5	116	7.1%	1.00 [0.30, 3.36]
Park (2011)	1	136	2	136	1.8%	0.50 [0.05, 5.45]
Paul (2010)	38	1281	56	1281	64.1%	0.68 [0.45, 1.02]
Villamizar (2009)	14	284	27	284	26.9%	0.52 [0.28, 0.97]
Total (95% CI)		**1817**		**1817**	**100.0%**	**0.65 [0.47, 0.89]**
Total events	58		90			

Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 1.08$, df = 3 ($P = 0.78$); $I^2 = 0\%$

Test for overall effect: $Z = 2.65$ ($P = 0.008$)





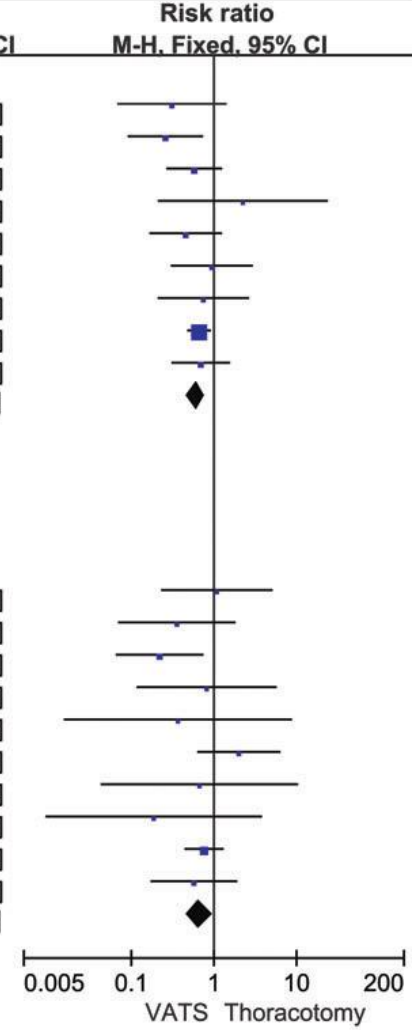
Cao C et al. Interactive CardioVascular and Thoracic Surgery 2013;16:244–249

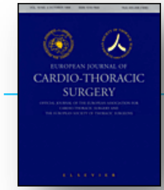
Survival

Metastatic recurrence

Local relapse

Study or subgroup	VATS Events	VATS Total	Thoracotomy Events	Thoracotomy Total	Weight (%)	Risk ratio M-H, Fixed, 95% CI
1 systemic recurrence						
Sugi (2000)	2	48	7	52	3.0	0.31 [0.07, 1.42]
Koizumi (2002)	4	45	11	32	5.8	0.26 [0.09, 0.74]
Tatsumi (2003)	9	118	16	121	7.2	0.58 [0.27, 1.25]
Shigemura (2006)	2	50	1	56	0.4	2.24 [0.21, 23.96]
Shiraishi (2006)	5	78	11	78	5.0	0.45 [0.17, 1.25]
Sakuraba (2007)	6	84	5	66	2.5	0.94 [0.30, 2.95]
Yoshino (2010)	4	72	5	67	2.3	0.74 [0.21, 2.66]
Flores (2011)	48	520	91	652	36.5	0.66 [0.48, 0.92]
Park (2011)	9	136	13	136	5.9	0.69 [0.31, 1.57]
Subtotal (95% CI)		**1151**		**1260**	**68.7**	**0.61 [0.48, 0.78]**
Total events	89		160			
Heterogeneity: $\chi^2 = 5.80$, df = 8 ($P = 0.67$); $I^2 = 0\%$						
Test for overall effect: $Z = 3.90$ ($P < 0.0001$)						
2 locoregional recurrence						
Sugi (2000)	3	48	3	52	1.3	1.08 [0.23, 5.11]
Koizumi (2002)	2	45	4	32	2.1	0.36 [0.07, 1.83]
Tatsumi (2003)	3	118	14	121	6.3	0.22 [0.06, 0.74]
Watanabe (2005)	2	221	2	180	1.0	0.81 [0.12, 5.73]
Shigemura (2006)	0	50	1	55	0.6	0.37 [0.02, 8.78]
Shiraishi (2006)	8	78	4	78	1.8	2.00 [0.63, 6.37]
Sakuraba (2007)	1	84	1	56	0.5	0.67 [0.04, 10.44]
Yoshino (2010)	0	72	2	67	1.2	0.19 [0.01, 3.81]
Flores (2011)	20	520	33	652	13.3	0.76 [0.44, 1.31]
Park (2011)	4	136	7	136	3.2	0.57 [0.17, 1.91]
Subtotal (95% CI)		**1372**		**1429**	**31.3**	**0.66 [0.46, 0.95]**
Total events	43		71			
Heterogeneity: $\chi^2 = 8.74$, df = 9 ($P = 0.46$); $I^2 = 0\%$						
Test for overall effect: $Z = 2.22$ ($P = 0.03$)						





Zhang Z et al. European Journal of Cardio-Thoracic Surgery 2013;44:407–414

Quality of Life

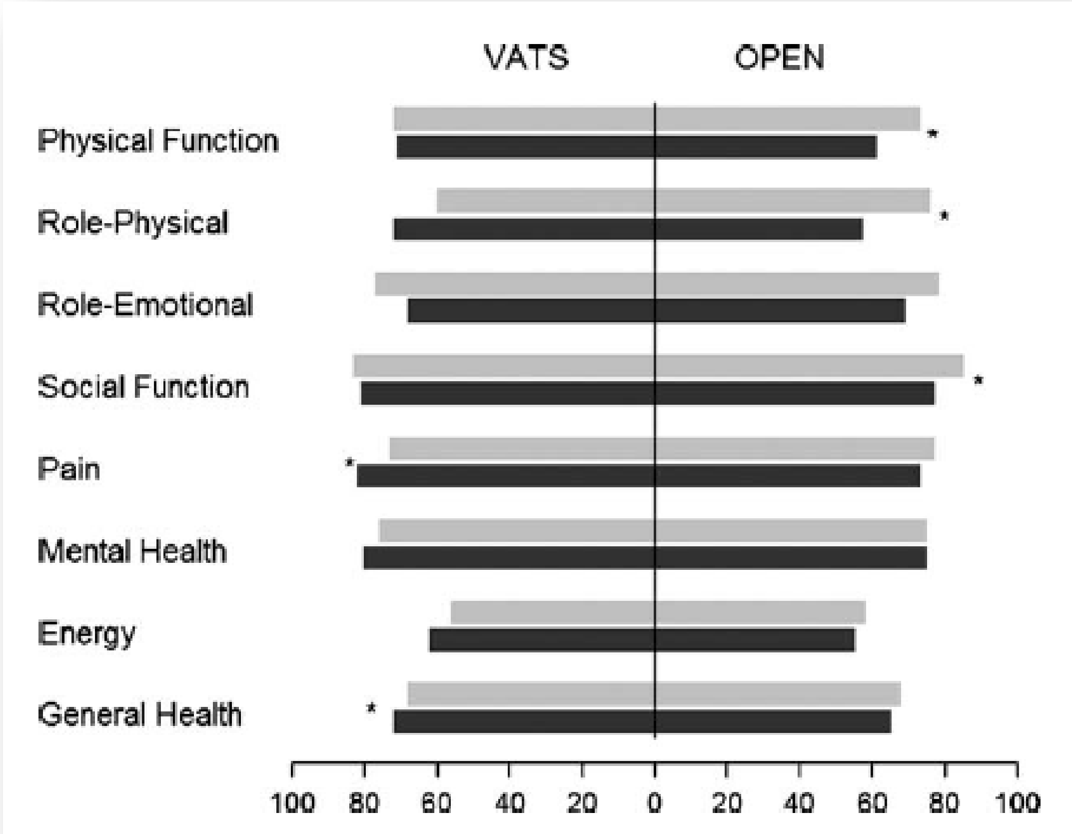
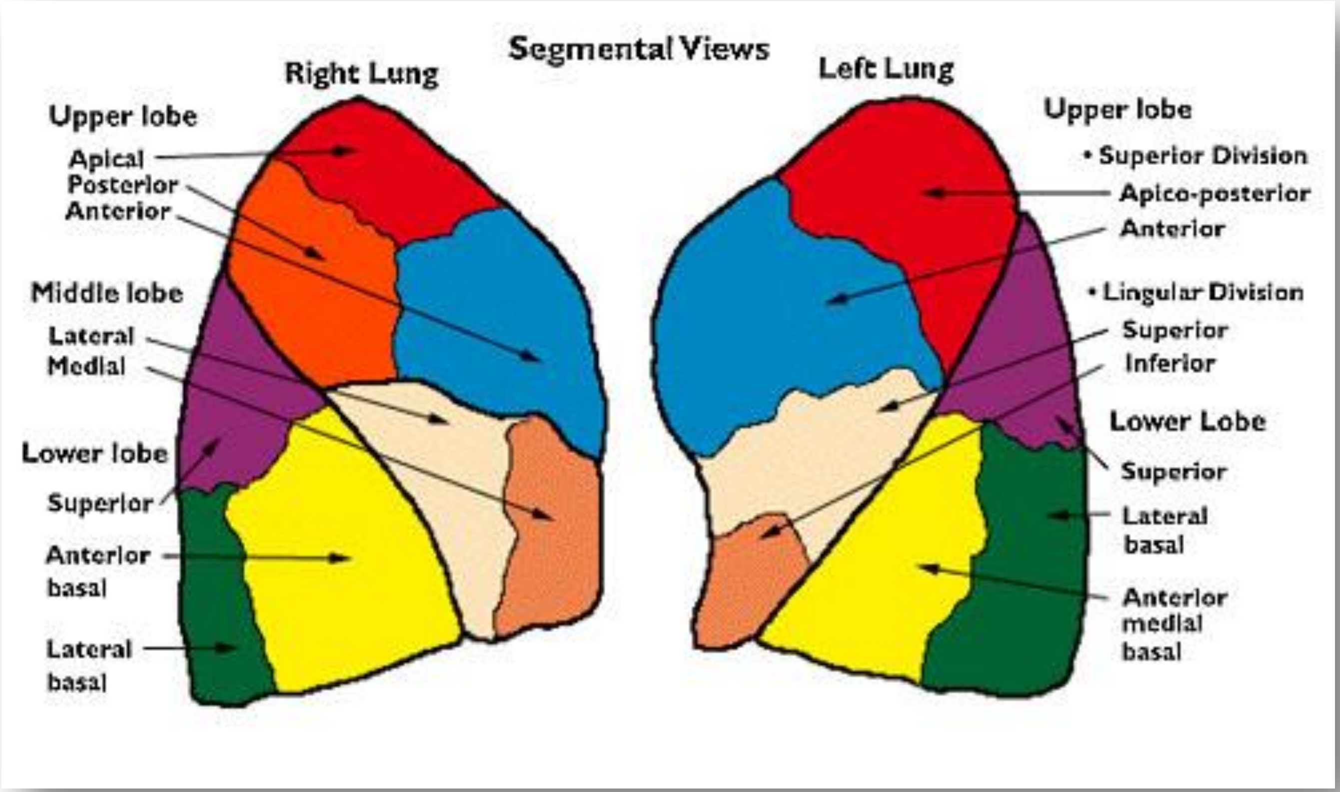


Fig. 1. VATS and OPEN lobectomy SF36 scores (gray = preop, black = postop), 0 = worst; 100 = best, *$p < 0.05$.

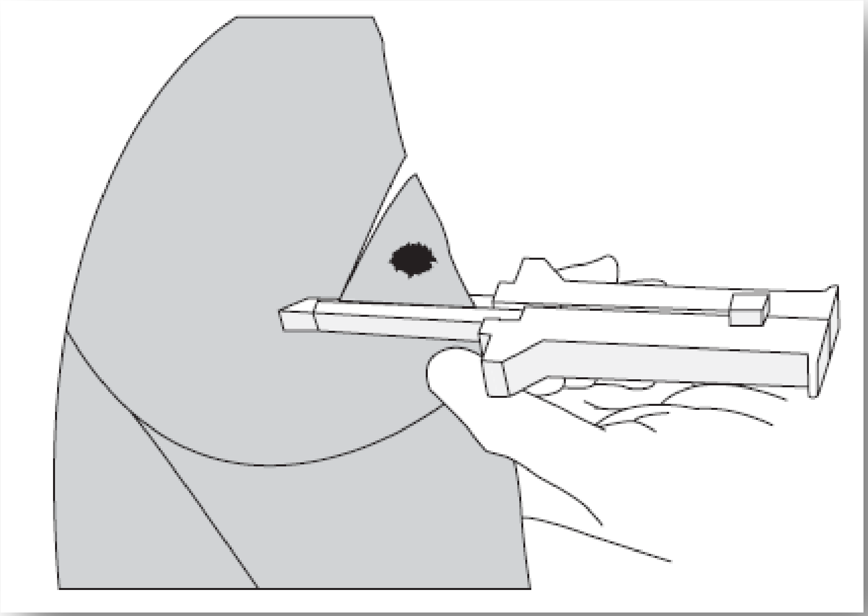
Handy JR Jr et al. Does video-assisted thoracoscopic lobectomy for lung cancer provide improved functional outcomes compared with open lobectomy? Eur J Cardio-thorac Surg 2010; 37: 451—455

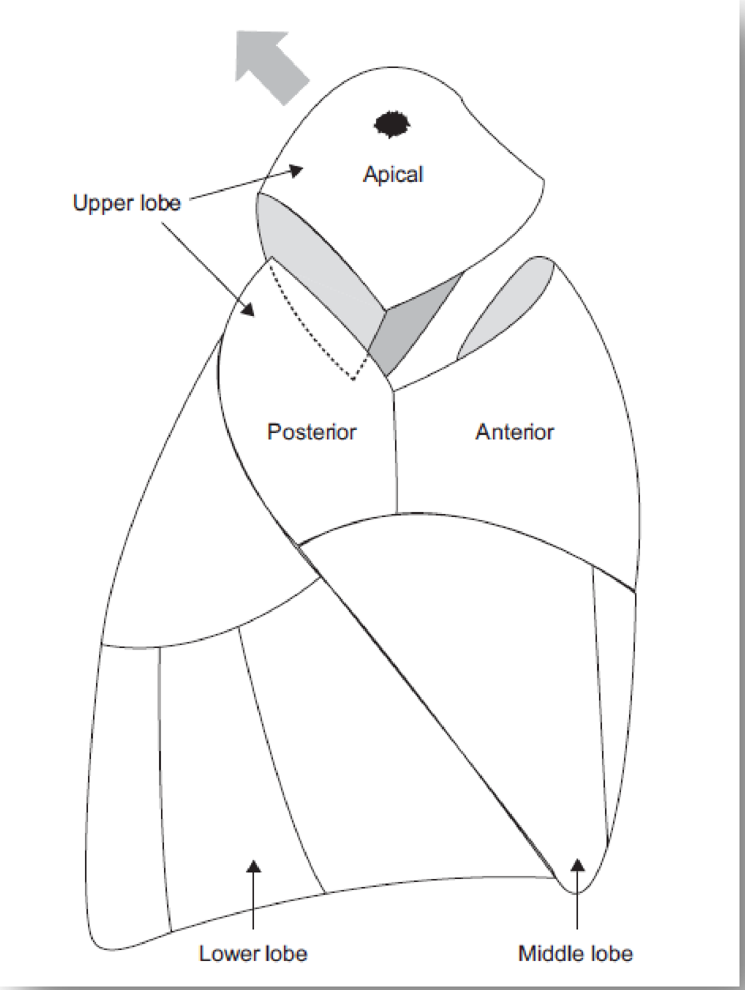
Sublobar resections



Segmentectomy

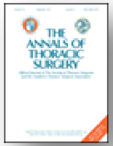
Wedge



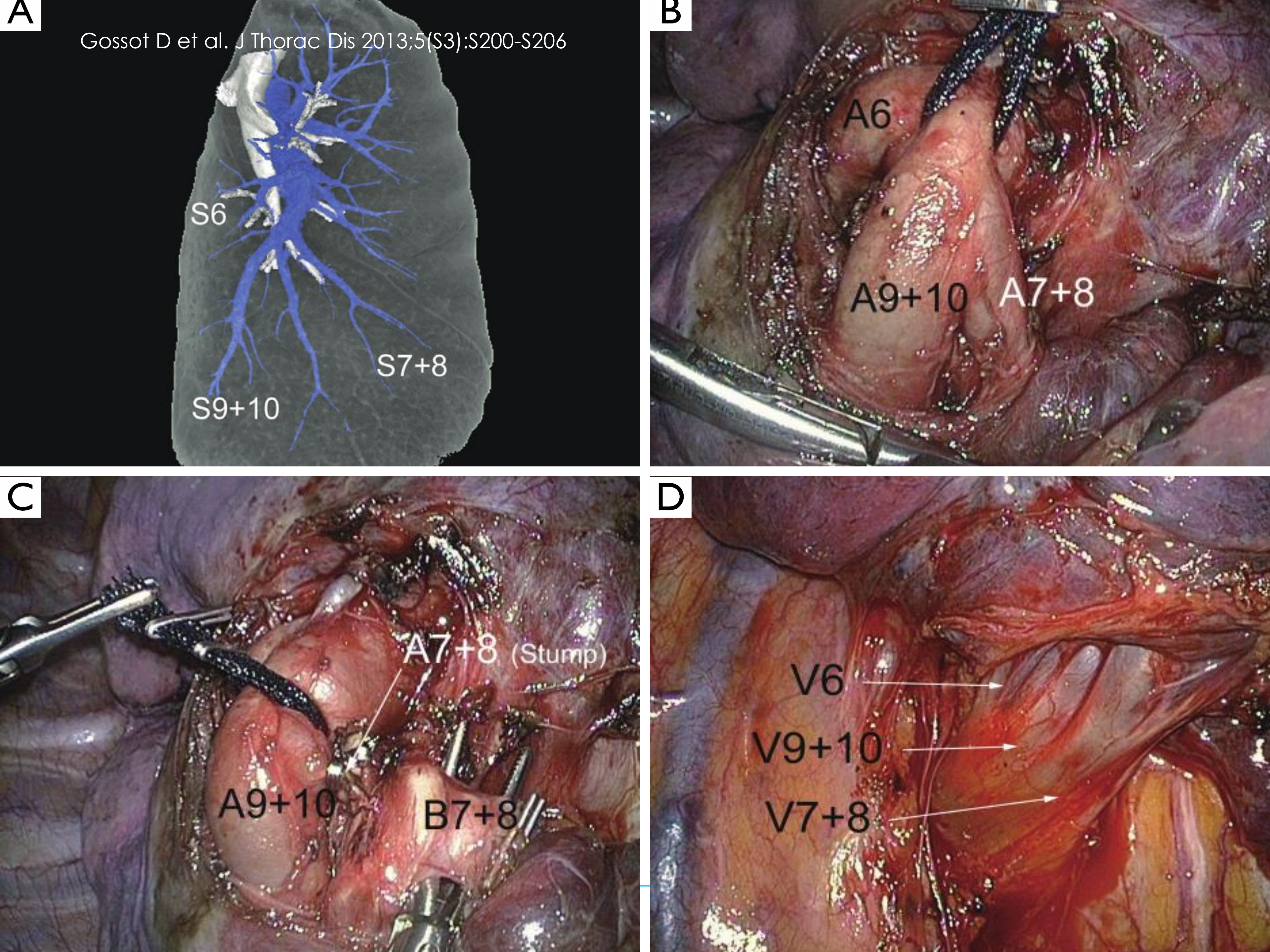


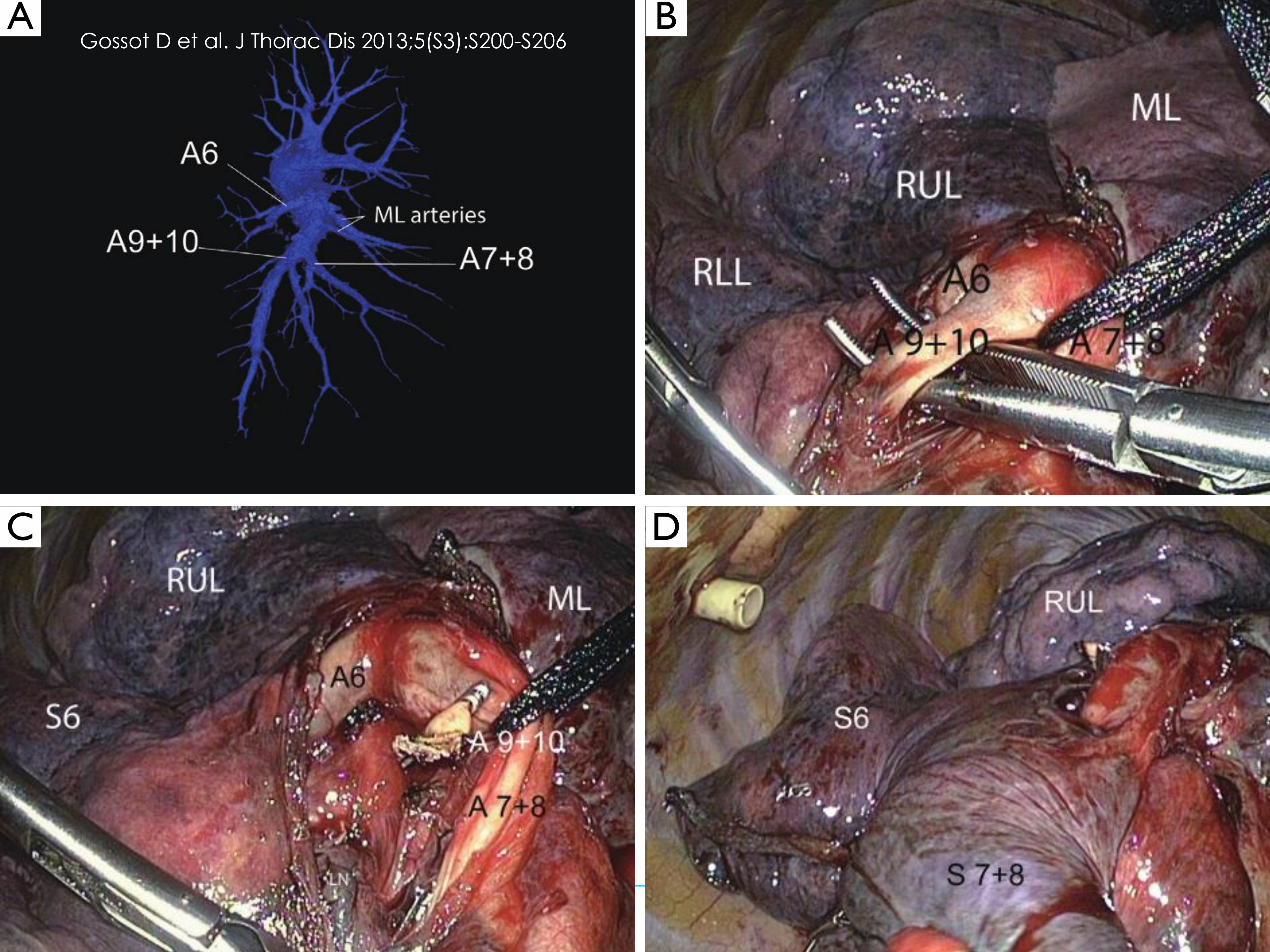
LCSG - 1995

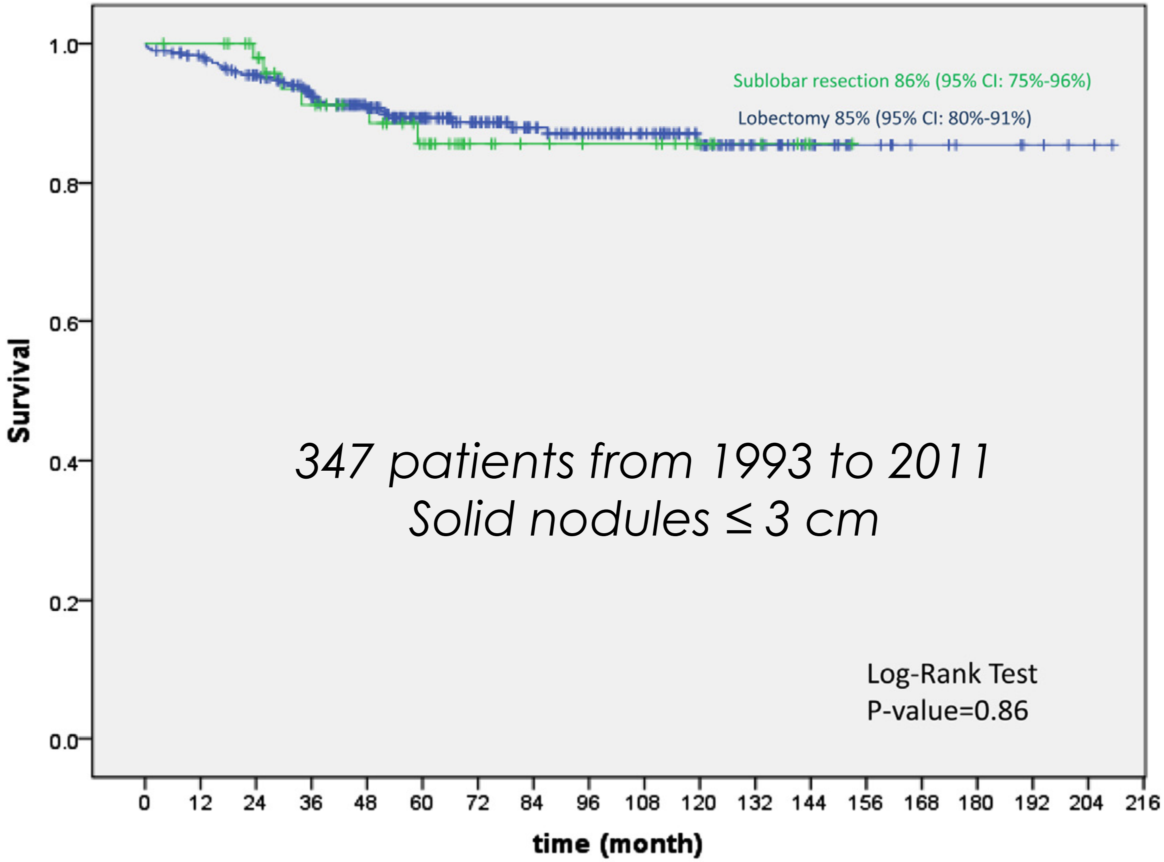
Author, date, country, level of evidence	Patient group	Outcomes		Key results	Comments
		5-year (or specified) survival rate	Locoregional recurrence		
Ginsberg *et al.* (1995), USA Randomized control trial (level 1b)	Lobectomy: 125 (Wedge resection + Segmentectomy): 122	Overall death rate (persons/year): Lobectomy: 0.089 Limited resection: 0.117	(persons/year) Lobectomy: 0.020 Limited resection: 0.060	30% increase in the death rate with limited resection (*P* = 0.08) 300% increase in locoregional recurrence (*P* = 0.008)	Inconsistent mediastinal lymph node sampling



Ginsberg RJ, Rubinstein LV. Randomized trial of lobectomy versus limited resection for T1 N0 non-small cell lung cancer. Lung Cancer Study Group. Ann Thorac Surg 1995;60:615–22.


A
Gossot D et al. J Thorac Dis 2013;5(S3):S200-S206
S6
S7+8
S9+10
B
A6
A9+10
A7+8
C
A7+8 (Stump)
A9+10
B7+8
D
V6
V9+10
V7+8

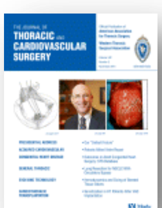

A
Gossot D et al. J Thorac Dis 2013;5(S3):S200-S206
A6
ML arteries
A9+10
A7+8
B
ML
RUL
RLL
A6
A 9+10
A 7+8
C
RUL
ML
A6
S6
A 9+10
A 7+8
LN
D
RUL
S6
S 7+8



No. at risk

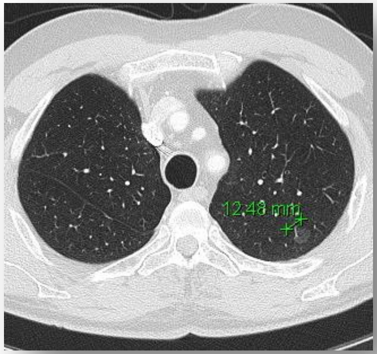
Lobectomy	294	281	262	234	203	162	132	106	88	71	52	31	20	12	8	6	4	2	0
Sublobar resection	53	52	47	40	35	28	18	15	13	13	7	5	1	0	0	0	0	0	0

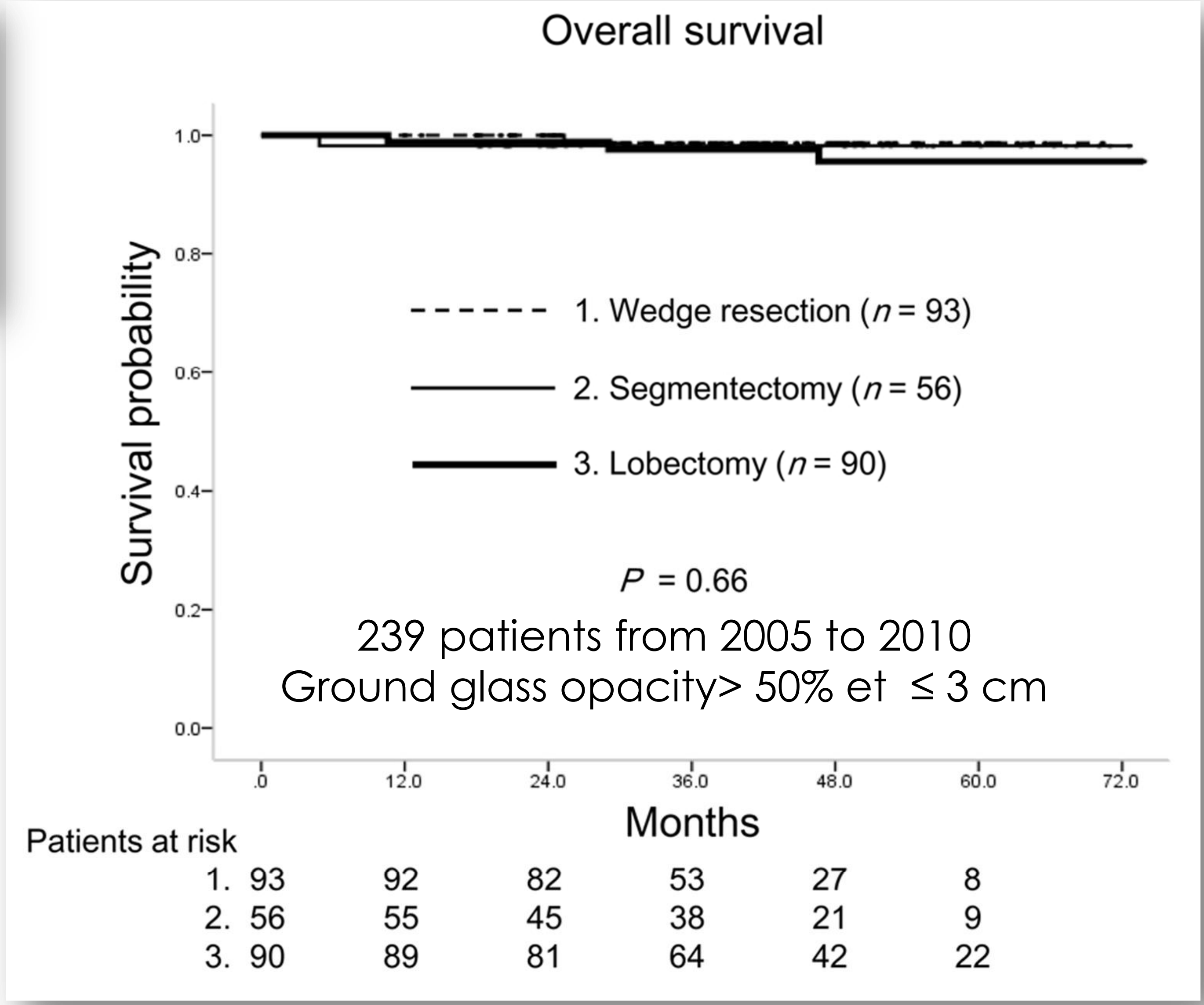
FIGURE 1. Kaplan–Meier survival curves for 337 patients with clinical stage IA lung cancer manifesting as a solid nodule (nodule diameter of ≤30 mm), separately for those who underwent lobectomy (n = 294) and SLR (n = 53). *CI*, Confidence interval.



International Early Lung Cancer Action Program (I-ELCAP) database

Altorki NK et al. Sublobar resection is equivalent to lobectomy for clinical stage 1A lung cancer in solid nodules. J Thorac Cardiovasc Surg 2014; in press.





Tsutani Y et al. Appropriate sublobar resection choice for ground glass opacity-dominant clinical stage IA lung adenocarcinoma: wedge resection or segmentectomy. Chest 2004, in press

CHEST

Chest. 2013;143(5_suppl):e278S-e313S. doi:10.1378/chest.12-2359

From: Treatment of Stage I and II Non-small Cell Lung CancerTreatment of Stage I and II Non-small Lung Cancer: Diagnosis and Management of Lung Cancer, 3rd ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

First Author Year	Design	n		% of W/S patients			Patient Characteristics		% 5-year Survival			% Local Recurrence		
		Lobe	W/S	% Wedge	% able to have lobe	% GGO[a]	Stage	Size (cm)	Lobe	W/S	p	Lobe	W/S	p
Sublobar Resection as an Elective Alternative														
Ginsberg 1995[95,96]	RCT	127	120	32	100	few	Ia	≤3cm	73	56	.06	7	18	0.009
Okada 2006[97]	Prosp[b]	260	305	12	100	Many	Ia	≤2cm	89	89	NS	-	-	-
Koike 2003[98]	Prosp[b]	159	74	14	100	-	Ia	≤2cm	90	89	NS	1	3	-
Large Database Comparisons														
Kates 2011[9]	SEER	1402	688	-	-	-	Ia	≤1cm	HR 1.12		NS	-	-	-
Wisnivesky[c] 2010[100]	SEER	969	196	-	-	16[d]	Ia	≤2cm	HR 1.10[c]		NS	-	-	-
Case-matched and Selected Uncontrolled Comparisons														
Martin-Ucar[e] 2005[101]	Retro	17[f]	17	0	0	-	Ia,b	-	64	70	NS	12	0	NS
Iwasaki 2004[102]	Retro	55	31	0	-	-	Ia	≤2cm	73	70	NS	4	3	NS
El Sherif 2006[103]	Retro	577	207	59	0	-	I	≤3cm	54	40	0.004	8	15	0.02
Wolf 2011[104]	Retro	172	66	64	-	Few[g]	Ia	≤2cm	80	59	0.003	8	16	NS
Landreneau 1997[105]	Retro	117	102	100	0	-	I	≤3cm	65	58	NS	9	18	.07
Schuchert 2007[106]	Retro	246	182	0	most	Few	I	≤3cm	83	82	NS	5	8	NS
Schuchert 2011[107]	Retro	32	75	71	most	-	I	≤1cm	64	55/73[h]	NS	3	3	NS
Campione 2004[108]	Retro	98	22	0	0	-	Ia	≤3cm	65	62	NS	2	19	-
Kilic 2009[109]	Retro	106	78	0	-	-	Ia,b	-	47	46	NS	4	6	NS
Kodama 1997[110]	Retro	77	64	5	73	-	Ia	≤3cm	88	93/48[i]	NS	1	2/12[i]	NS/0.02[i]

Comparative outcomes for lobectomy and sublobar resection. Inclusion criteria: Studies reporting comparative outcomes for lobectomy and sublobar resection from RCT, prospective studies, large database comparisons, case-matched studies, and selected uncontrolled cohort studies up through 2012. GGO = ground-glass opacity; HR = hazard ratio of death, with lobectomy as the reference; Prosp = prospective; RCT = randomized controlled trial; Retro = retrospective; W/S = wedge and segmentectomy. See Figure 1 legend for expansion of other abbreviations.

[a]Lesions that are > 50% GGO.

[b]Lobectomy “control subjects” refused sublobar resection.

[c]Propensity-matched cohorts.

[d]Proportion with BAC histology.

[e]Case-matched.

[f]All high risk (fell below standard criteria for lobectomy); case-matched series.

[g]Excluded pure bronchioloalveolar carcinoma.

[h]Results for wedge and segmentectomy reported separately.

[i]Results for patients able to tolerate a lobectomy/and for those who could not.

CHEST

Chest. 2013;143(5_suppl):e278S-e313S. doi:10.1378/chest.12-2359

From: Treatment of Stage I and II Non-small Cell Lung CancerTreatment of Stage I and II Non-small Lung Cancer: Diagnosis and Management of Lung Cancer, 3rd ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

First Author Year	Study Design	% Comp-romise	n		Patient Characteristics		% 5-year Survival			% Local Recurrence		
			Wedge	Segm	Stage	Size (cm)	Wedge	Segm	p	Wedge	Segm	p
Watanabe 2005[115]	Prosp	0	14	20	Ia	≤2	100[a]	93	NS	0[a]	0	NS
Nakamura 2011[116]	Retro	-	84	38	I	-	55	87	-	6	5	NS
Schuchert 2011[107]	Retro	few	35	40	Ia	<1	55	73	NS	3	3	NS
Sienel 2008[117]	Retro	100	31	56	Ia		48	80	0.005	55	16	0.001
El Sherif 2007[118]	Retro	-	55	26	Ia,b	≤3cm	-	-	-	15	4	0.002
Okada 2005[119]	Retro	-	35	123	I	<2	(86)[b]	(96)[b]	NS	-	-	-
Okada 2005[119]	Retro	-	14	64	I	2-3	(39)[b]	(85)[b]	0.0001	-	-	-
Okada 2005[119]	Retro	-	6	34	I	>3	(0)[b]	(63)[b]	.001	-	-	-
Miller 2002[120]	Retro	many	13	12	I-III	<1	42	75	-	30	8	-

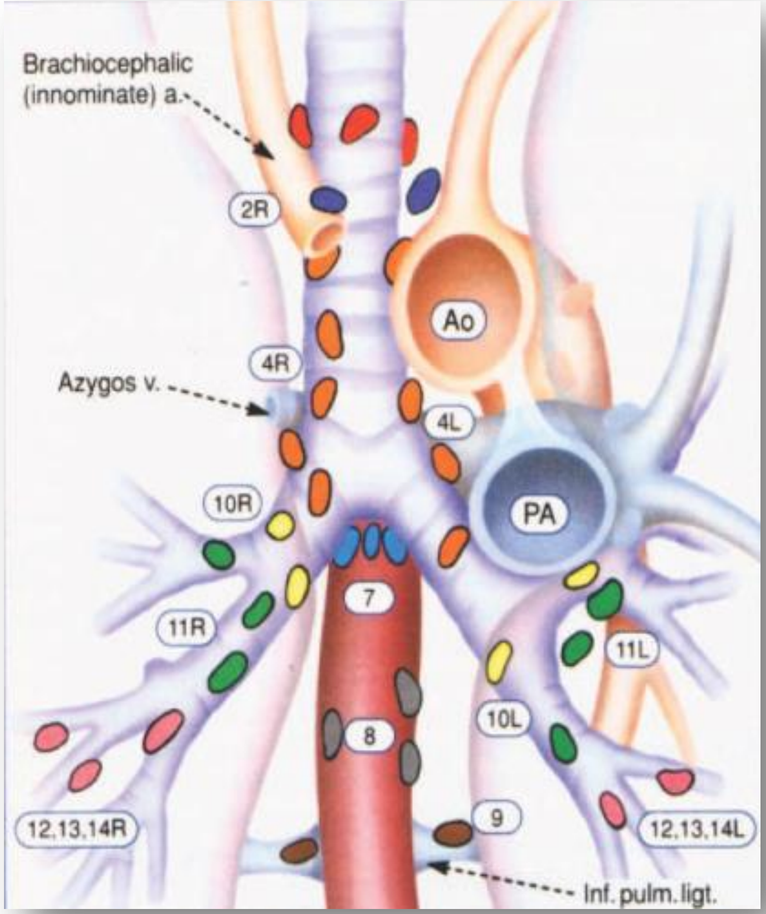
Figure Legend:

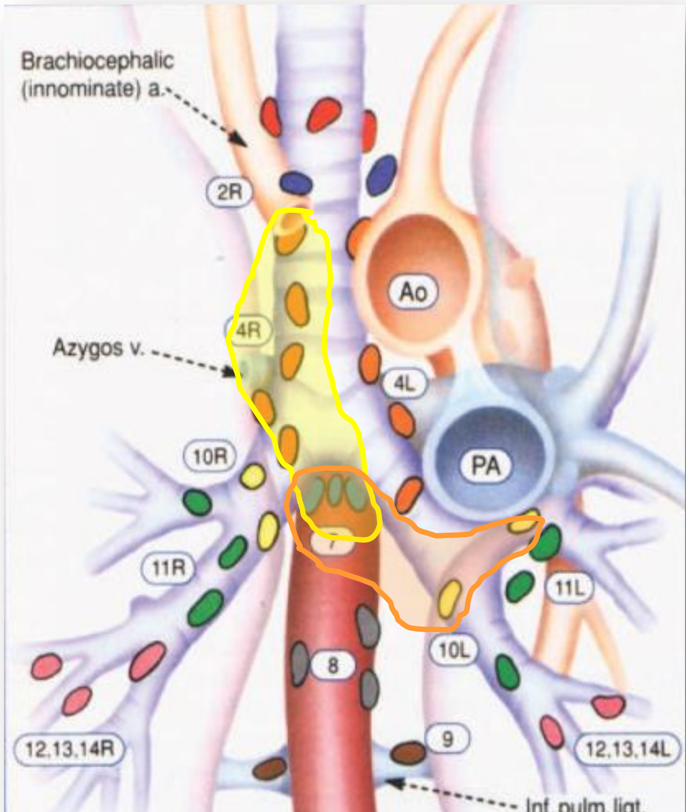
Comparative outcomes for wedge resection and segmentectomy. Inclusion criteria: studies reporting comparative outcomes for wedge vs segmentectomy for non-small cell lung cancer up through 2012. See Figure 1, 2, and 6 legends for expansion of abbreviations.

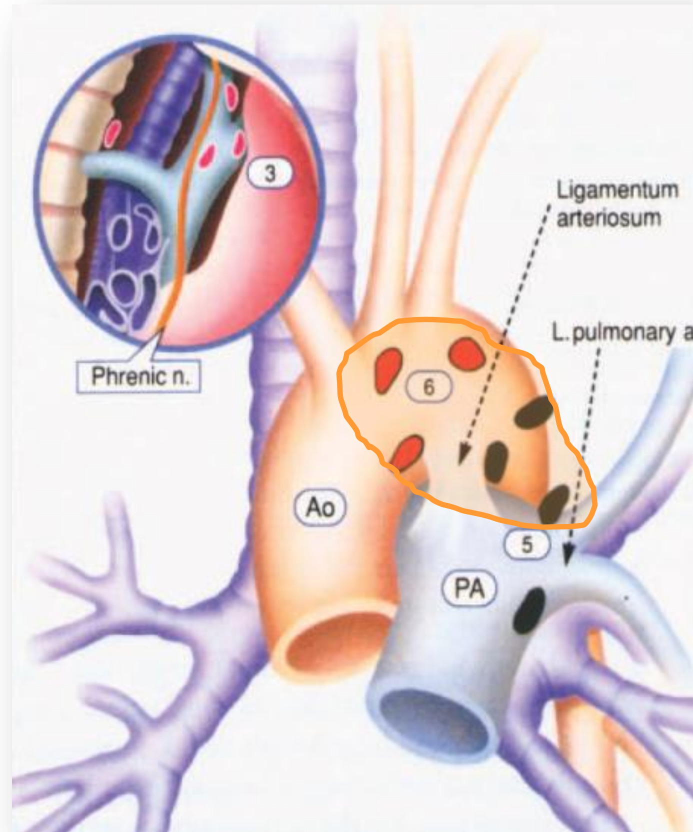
[a]All patients undergoing wedge resection were required to have a pure ground-glass opacity; others underwent segmentectomy.

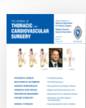
[b]Cancer-specific survival.

Lymphadenectomy







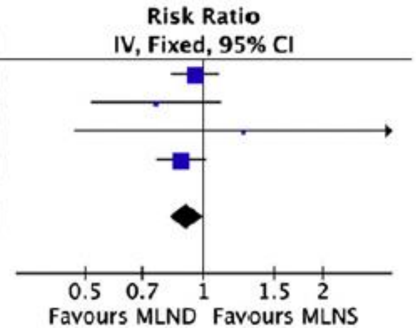


Darling G et al. J Thorac Cardiovasc Surg 2011;141:662-70

Lymphadenectomy vs. Sampling
Evidence-based Medicine

Study or Subgroup	MLND Events	MLND Total	MLNS Events	MLNS Total	Weight	Risk Ratio IV, Fixed, 95% CI
ACOSOG Z0030 2011	218	525	217	498	47.5%	0.95 [0.83, 1.10]
Izbicki 1998	26	76	42	93	6.5%	0.76 [0.52, 1.11]
Sugi 1998	8	59	6	56	1.0%	1.27 [0.47, 3.42]
Wu 2002	136	240	149	231	45.0%	0.88 [0.76, 1.02]
Total (95% CI)		**900**		**878**	**100.0%**	**0.91 [0.82, 1.00]**
Total events	388		414			

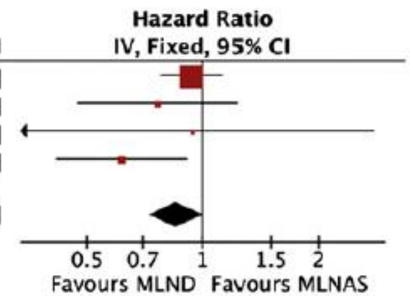
Heterogeneity: Chi² = 1.92, df = 3 (P = 0.59); I² = 0%
Test for overall effect: Z = 1.94 (P = 0.05)



A

Study or Subgroup	log[Hazard Ratio]	SE	Weight	Hazard Ratio IV, Fixed, 95% CI
ACOSOG Z0030 2011	−0.06470116	0.09592608	71.2%	0.94 [0.78, 1.13]
Izbicki 1998	−0.2699556	0.24748315	10.7%	0.76 [0.47, 1.24]
Sugi 1998	−0.05669634	0.55241732	2.1%	0.94 [0.32, 2.79]
Wu 2002	−0.48287262	0.20265015	16.0%	0.62 [0.41, 0.92]
Total (95% CI)			**100.0%**	**0.86 [0.73, 1.01]**

Heterogeneity: Chi² = 3.75, df = 3 (P = 0.29); I² = 20%
Test for overall effect: Z = 1.89 (P = 0.06)



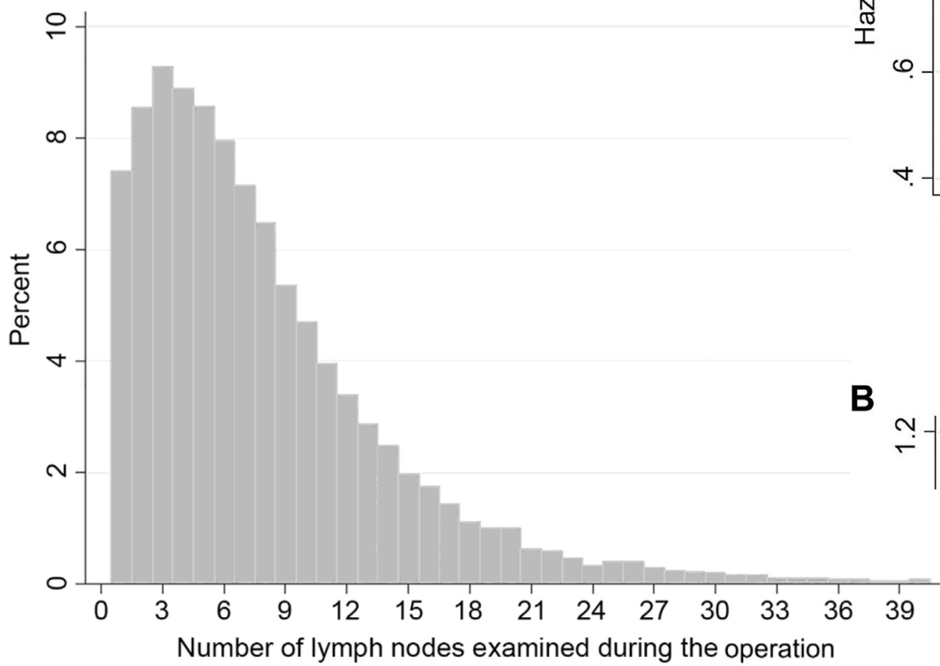
B

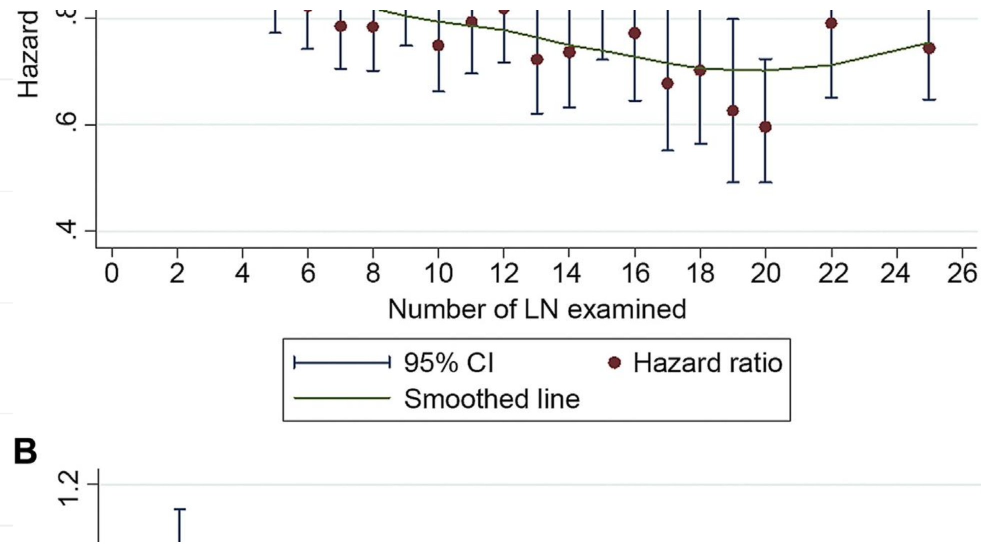
FIGURE 1. All cause mortality (*A*, risk ratio; *B*, hazard ratio) among patients with early-stage non-small cell lung cancer randomized to mediastinal lymph node dissection (*MLND*) versus sampling (*MLNS*) during pulmonary resection. *IV,* Inverse variance; *CI,* confidence interval; *ACOSOG,* American College of Surgery Oncology Group; *SE,* standard error.

Tagaki Het al. J Thorac Cardiovasc Surg 2011; 142:477-8

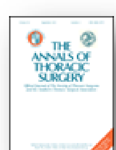
Lymphadenectomy – N0

SEER Database 1998-2009





Study Cohort: at least 1 lymph node examined, pathologic "node-negative" non-small cell lung cancer n = 24,650



Osarogiagbon RU et al. Ann Thorac Surg 2014;in press

VATS vs. thoracotomy

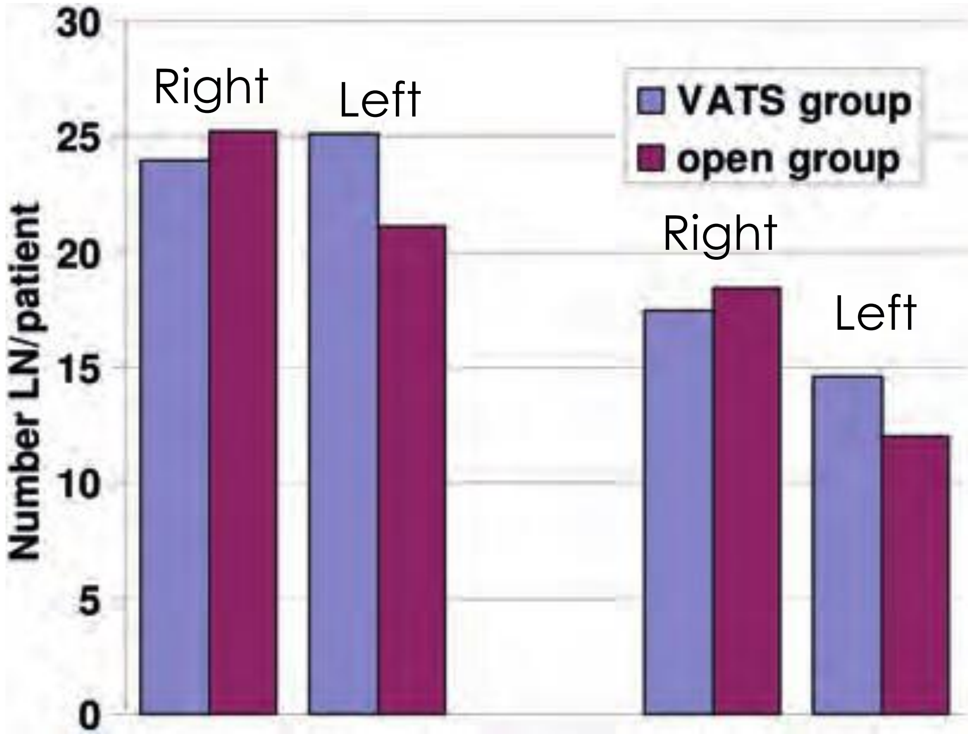
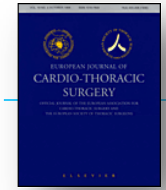
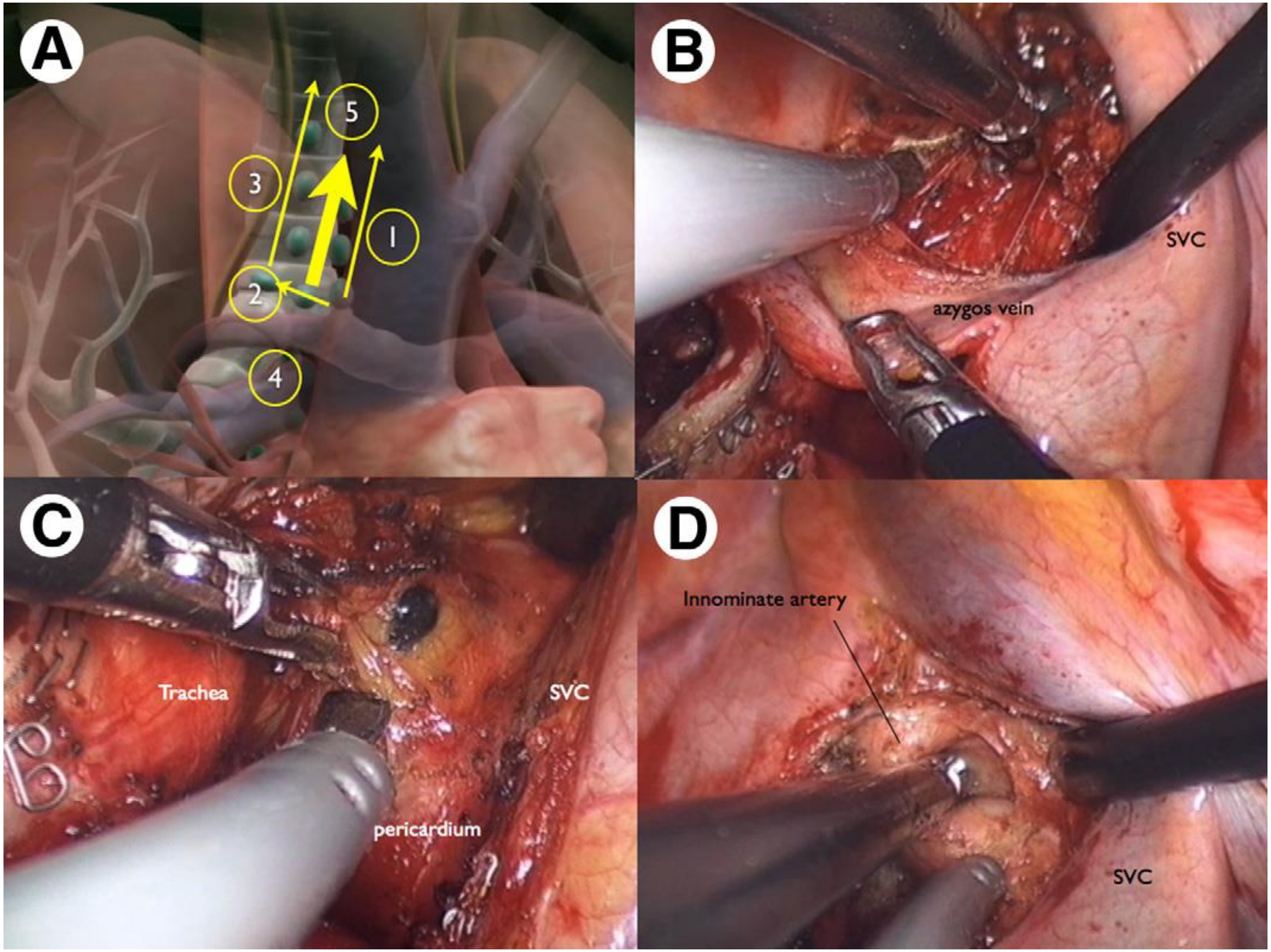


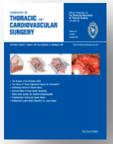
Figure 4: Number of lymph nodes removed per patient, overall (N1 and N2) and mediastinal (N2).



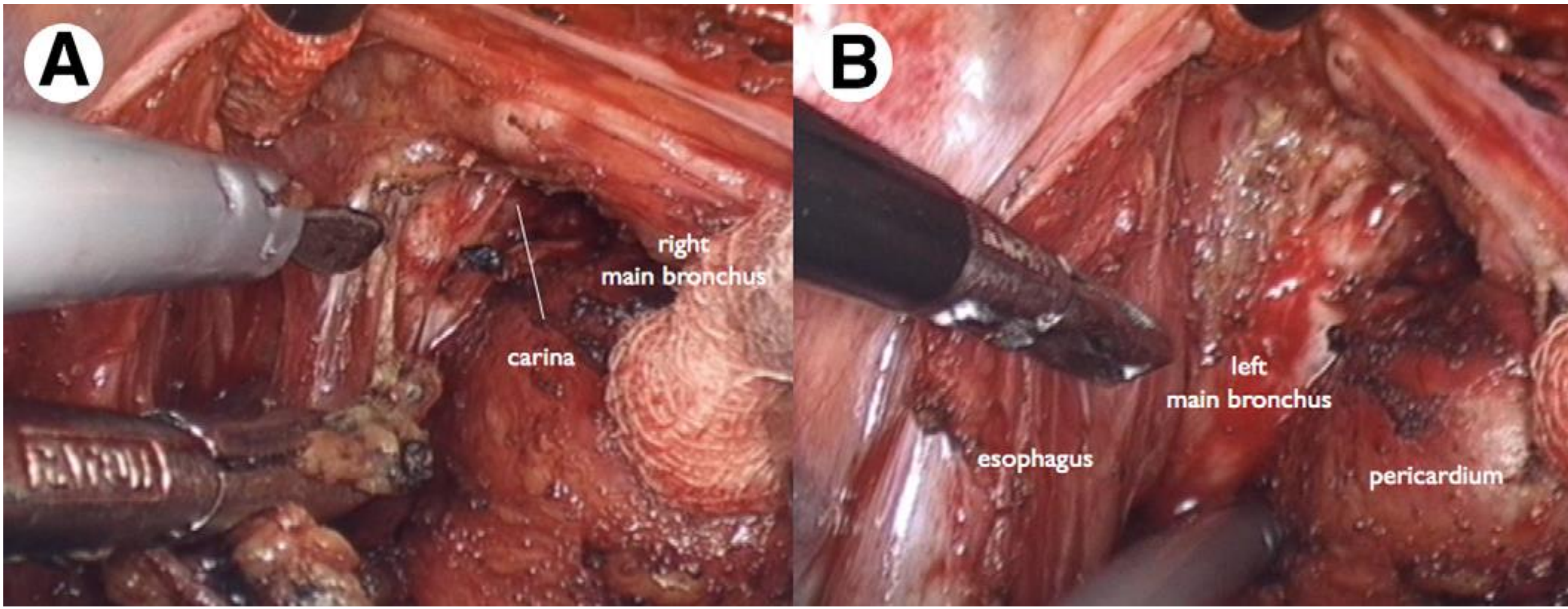
Palade E et al. Video-assisted vs open mediastinal lymphadenectomy for Stage I non-small-cell lung cancer: results of a prospective randomized trial. Eur J Cardio-thorac Surg 2013;44:244–249

VATS Lymphadenectomy

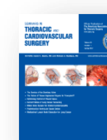


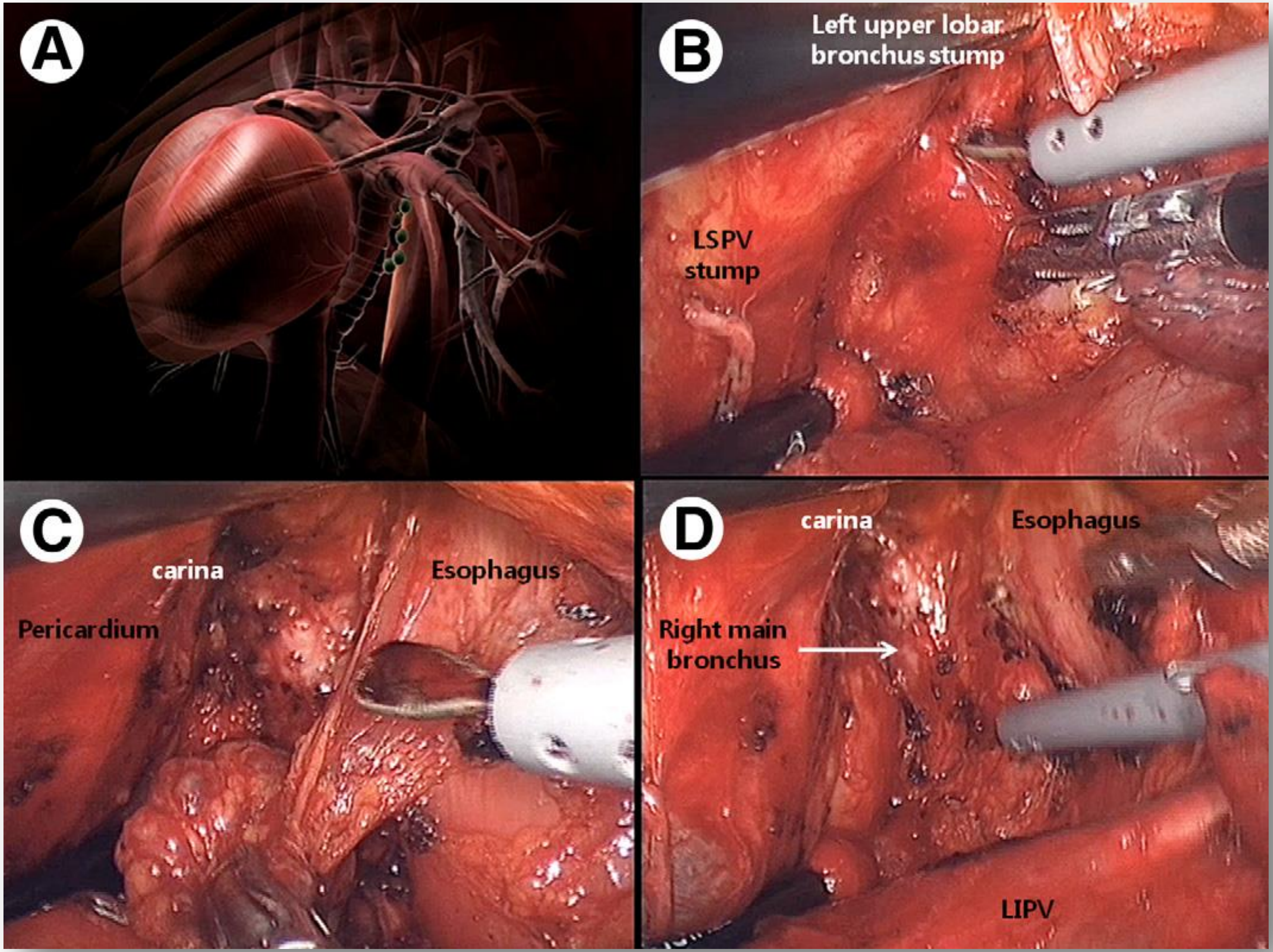


Lee HS et al. Semin Thoracic Surg 2012;24:131-141.



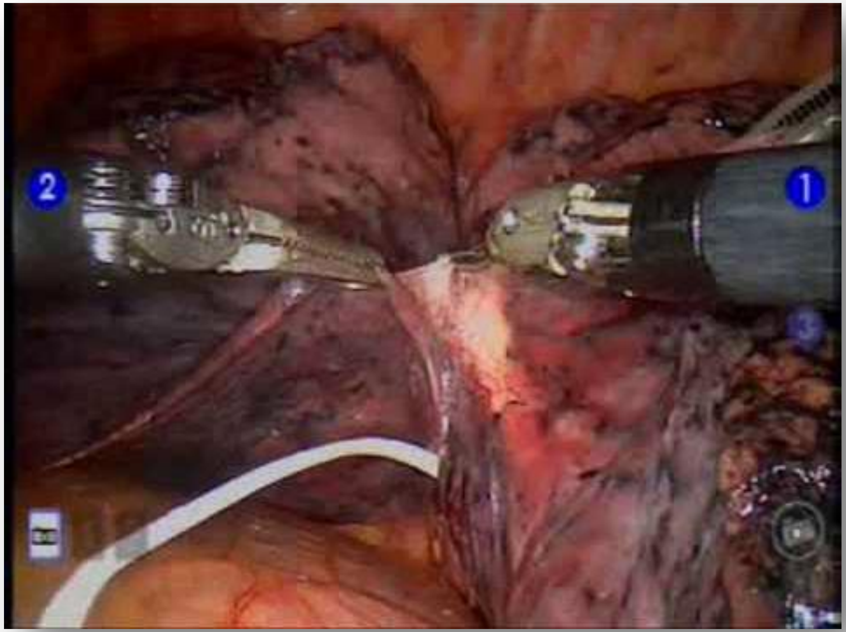
Lee HS et al. Semin Thoracic Surg 2012;24:131-141.





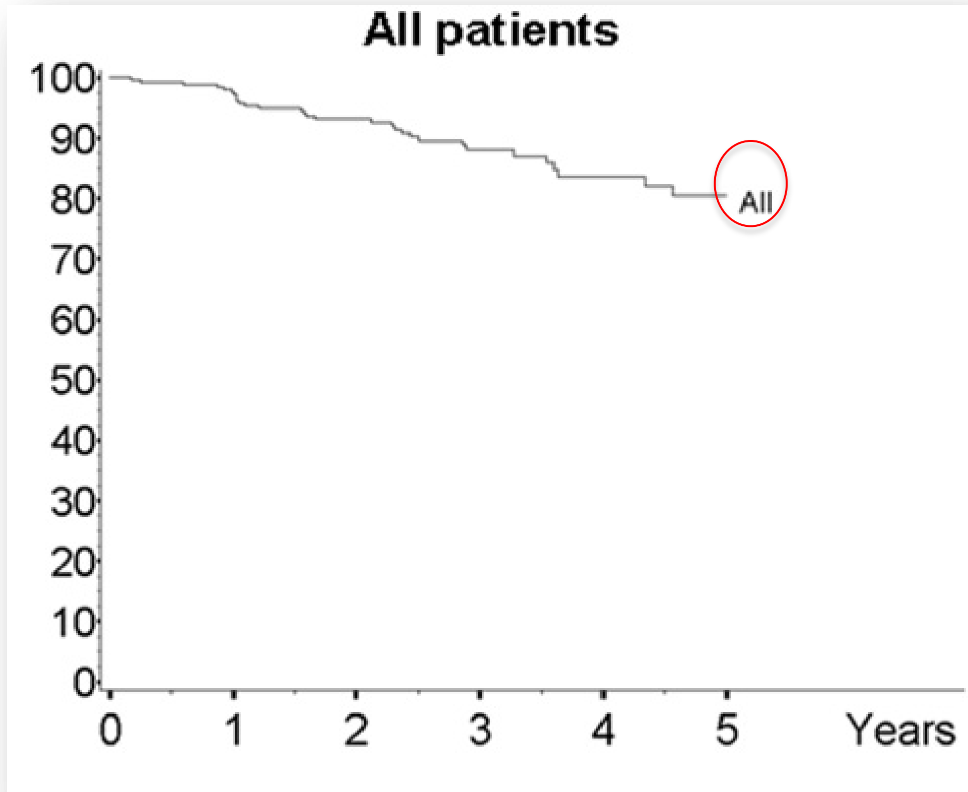
Lee HS et al. Semin Thoracic Surg 2012;24:131-141.

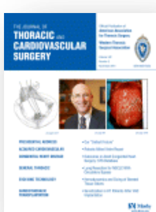
Robot-Assisted Thoracic Surgery



RATS Lobectomies

From 2002 to 2010, 325 consecutive patients with early-stage NSCLC at 3 institutions.





Park BJ et al. Robotic lobectomy for non–small cell lung cancer (NSCLC): Long-term oncologic results. J Thorac Cardiovasc Surg 2012;143:383-9

RATS segmentectomies

Robotic Anatomic Segmentectomy of the Lung: Technical Aspects and Initial Results

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Division of Thoracic Surgery, European Institute of Oncology, Milan, Italy; and Division of Thoracic Surgery, Hackensack University Medical Center, Hackensack, New Jersey

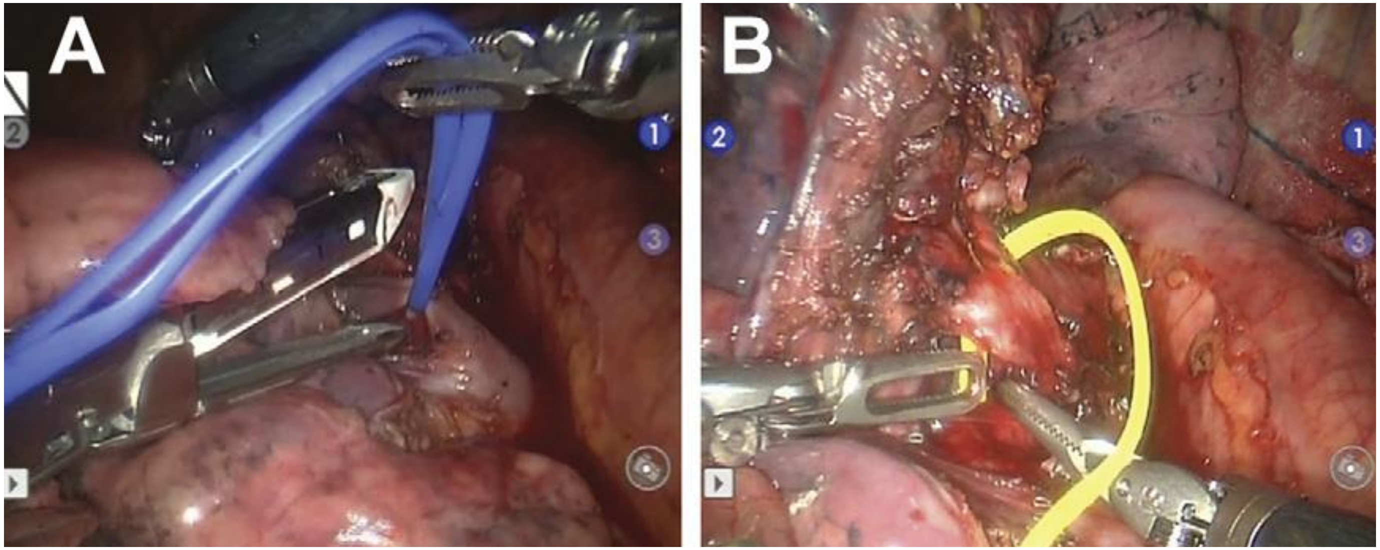
Background. Robotic lobectomy with radical lymph node dissection is a new frontier of minimally invasive thoracic surgery. Series of sublobar anatomic resection for primary initial lung cancers or for metastasis using video-assisted thoracic surgery have been reported but no cases have been so far reported using the robot-assisted approach. We present the technique and surgical outcome of our initial experience.

Methods. Clinical data of patients undergoing robotic lung anatomic segmentectomy were retrospectively reviewed. All cases were done using the DaVinci System. A 3- or 4-incision strategy with a 3-cm utility incision in the anterior fourth or fifth intercostal space was performed. Individual ligation and division of the hilar structures was performed using Hem-o-Lok (Teleflex Medical, Research Triangle Park, NC) or endoscopic staplers. The parenchyma was transected with endovascular staplers introduced by the bedside assistant mainly through the utility incision. Systematic mediastinal lymph node dissection or sampling was performed.

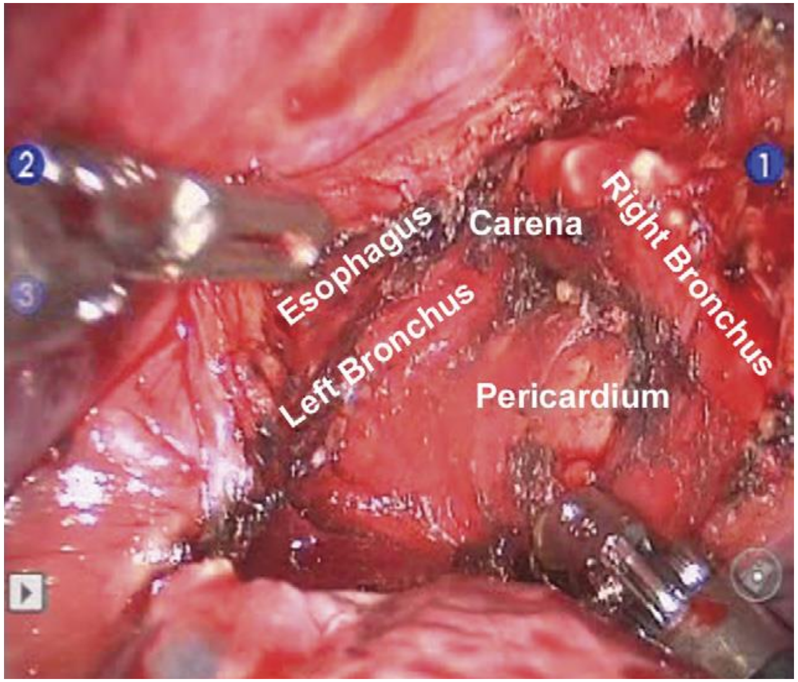
Results. From 2008 to 2010, 17 patients underwent a robot-assisted lung anatomic segmentectomy in two centers. There were 10 women and 7 men with a mean age of 68.2 years (range, 32 to 82). Mean duration of surgery was 189 minutes. There were no major intraoperative complications. Conversion to open procedure was never required. Postoperative morbidity rate was 17.6% with pneumonia in 1 case and prolonged air leaks in 2 patients. Median postoperative stay was 5 days (range, 2 to 14), and postoperative mortality was 0%. Final pathology was non-small cell lung cancer in 8 patient, typical carcinoids in 2, and lung metastases in 7.

Conclusions. Robotic anatomic lung segmentectomy is feasible and safe procedure. Robotic system, by improving ergonomic, surgeon view and precise movements, may make minimally invasive segmentectomy easier to adopt and perform.

(Ann Thorac Surg 2012;94:929–34)



By courtesy of Giulia Veronesi



Marginal surgical candidates

University of Virginia, Charlottesville
Retrospective study of 1259 patients
1999-2011
Open lobectomies

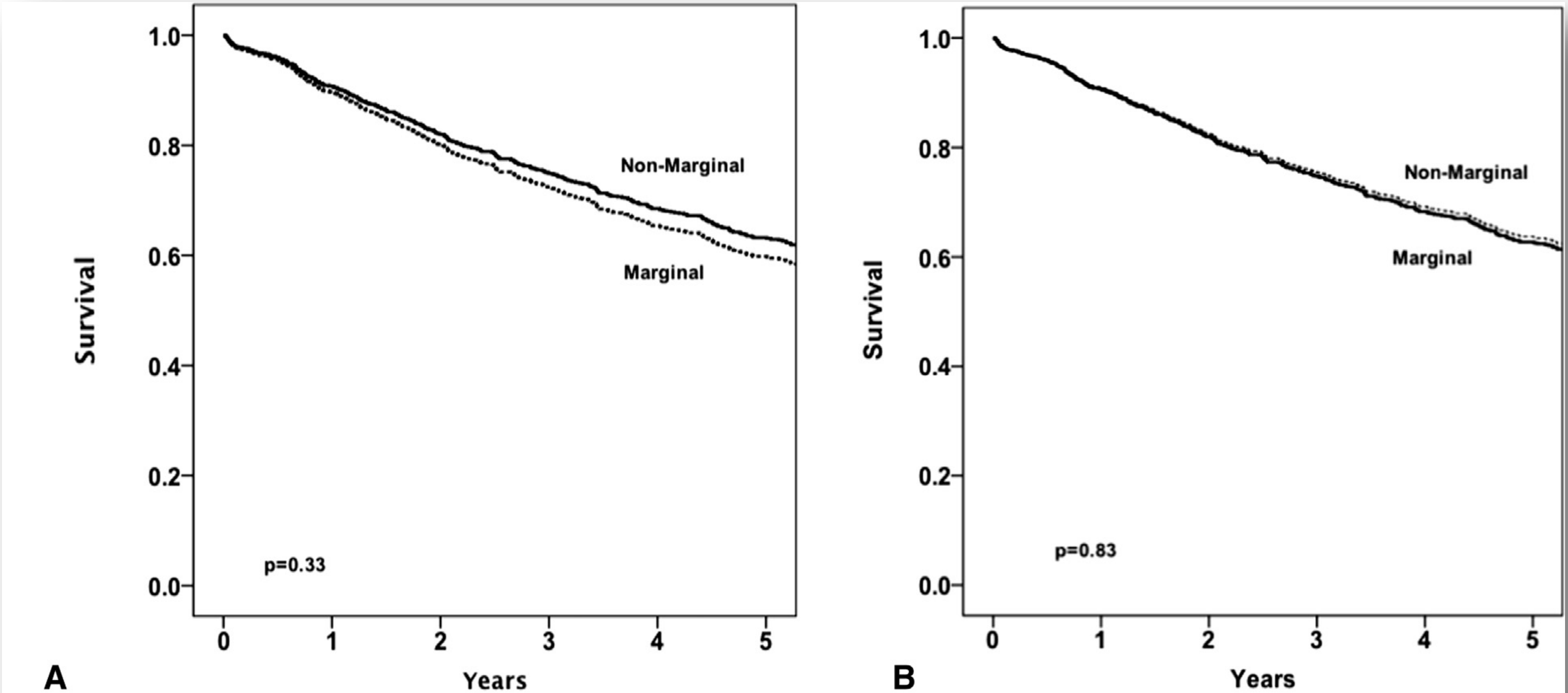
ACOSOG Z4099/RTOG	ACCP
FEV1≤ 50% or DLCO ≤ 50%	ppo FEV1< 40% or ppo DLCO < 40%
Age >75 years and FEV1 50%-60%	
Age >75 years and DLCO 50%-60%	
206 vs. 1053 patients	*131 vs. 1128 patients*

Taylor MD, et al. J Thorac Cardiovasc Surg 2014;147:738-46)

TABLE 1. Patient demographics

Variable	ACOSOG Z4099/RTOG 1021 M-PFT criteria (n = 1259)			ACCP M-PFT criteria (n = 1259)		
	M-PFTs (n = 206)	Non–M-PFTs (n = 1053)	*P*	M-PFTs (n = 131)	Non–M-PFTs (n = 1128)	*P*
Postoperative complications						
30-d mortality, %	0.5	1.4	.10	0.8	1.3	.09
Pneumonia, %	10.4	5.6	.002	10.6	5.8	.01
Re-intubation, %	5.3	1.1	.62	4.6	3.7	.44
Myocardial infarction, %	2.7	0.7	.008	2.3	0.8	.01
Acute renal failure, %	2.8	0.7	.01	2.3	0.8	.01
Supraventricular arrhythmia, %	12.4	9.3	.16	13.7	9.4	.06

Taylor MD, et al. J Thorac Cardiovasc Surg 2014;147:738-46)



At Risk	0	1-year	2-year	3-year	4-year	5-year
Non-Marginal	1053	971	809	667	506	368
Marginal	206	173	134	110	80	55

At Risk	0	1-year	2-year	3-year	4-year	5-year
Non-Marginal	1128	1051	862	713	542	386
Marginal	131	97	88	71	52	40

FIGURE 1. A, Risk-adjusted overall survival curve for American College of Surgeons Oncology Group Z4099/Radiation Therapy Oncology Group 1021 trial or American College of Chest Physicians (ACCP) marginal-pulmonary function test (M-PFIT) criteria. B, Risk-adjusted overall survival curve for ACCP M-PFT criteria.

Taylor MD, et al. J Thorac Cardiovasc Surg 2014;147:738-46)

Marginal pulmonary function should not preclude lobectomy in selected patients with non–small cell lung cancer

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Objective: Current clinical trials are investigating the role of stereotactic body radiation therapy (SBRT) versus sublobar resection for patients with non–small cell lung carcinoma (NSCLC) and marginal pulmonary function tests (M-PFTs). We compared the outcomes of patients undergoing lobectomy with M-PFTs characterized by 2 accepted M-PFT criteria.

Methods: A total of 1,259 consecutive patients underwent lobectomy for NSCLC between 1999 and 2011. Patients were stratified into 2 classifications of M-PFT: American College of Surgeons Oncology Group (ACOSOG) Z4099/Radiation Therapy Oncology Group (RTOG) 1021 trial or American College of Chest Physicians (ACCP) criteria. There were 206 patients classified as having M-PFT according to ACOSOG Z4099/RTOG 1021 criteria and 131 patients classified as having M-PFT by ACCP criteria. The primary endpoints of the study were post-operative complications and survival.

Results: Median follow-up was 3.8 years. Cox-proportional survival analysis found that pathologic stage ($P < .001$), age ($P < .001$), and higher Zubrod functional status ($P < .001$) were independent predictors of mortality. Using multivariable analysis for major morbidity, M-PFT status was not associated with the development of a major complication following lobectomy ($P = .68$). M-PFT classification was not an independent predictor of mortality when controlling for other variables (ACOSOG Z4099/RTOG 1021 [$P = .34$]; ACCP criteria [$P = .83$]). A composite major morbidity analysis for major morbidity following lobectomy showed no association between clinicopathologic variables or M-PFTs and the occurrence of a major postoperative morbidity.

Conclusions: In carefully selected patients with M-PFTs, lobectomy for NSCLC can be performed with acceptable morbidity and mortality. These results need to be considered when deciding if a patient should undergo lobectomy or other therapies for resectable NSCLC. (J Thorac Cardiovasc Surg 2014;147:738-46)

« Current trials characterizing patients as nonsurgical candidates based on 2 accepted marginal pulmonary function tests definitions may be excluding patients from undergoing lobectomy, the current gold standard therapy for lung cancer »

Taylor MD, et al. J Thorac Cardiovasc Surg 2014;147:738-46)

Take-home messages

- Lung resection provides tissue for pathological and biological information
- Lymph node dissection provides adequate staging
- Minimally invasive lung resection + lymphadenectomy provides the current landmarks to which new therapies should be compared
- Inoperable patients: do they really exist…?