THE PLACE OF LESS INVASIVE SURGERY IN THE TREATMENT OF LUNG CANCER

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Esmo Madrid
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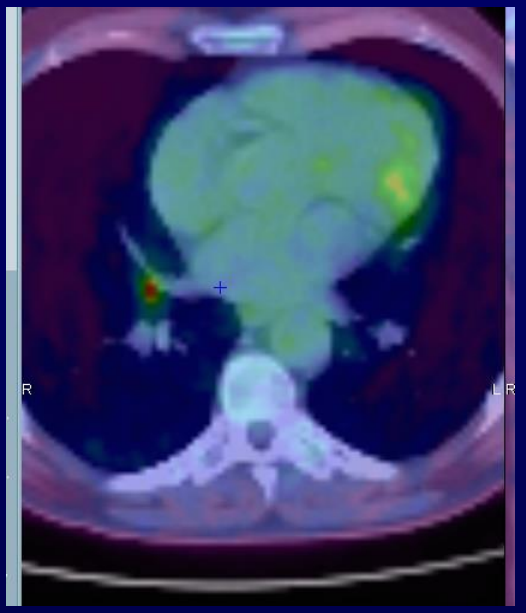
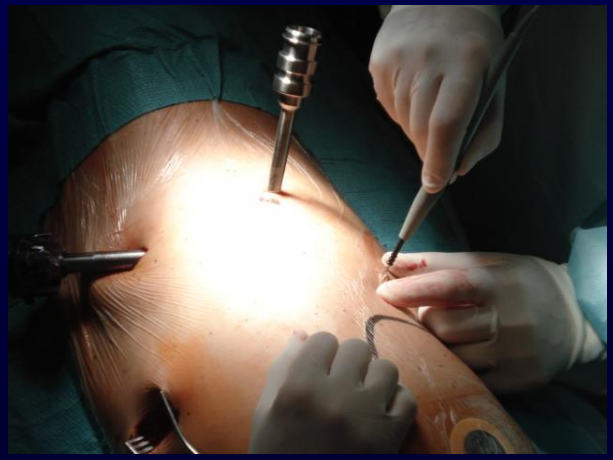
- CHARACTERISTICS OF LUNG CANCER IN THE SCREENING ERA
- EVOLUTION OF SURGICAL APPROACH
- LIMITED RESECTIONS FOR NSCLC
- THE ROLE OF SABR IN FIT PTS
- CONCLUSIONS



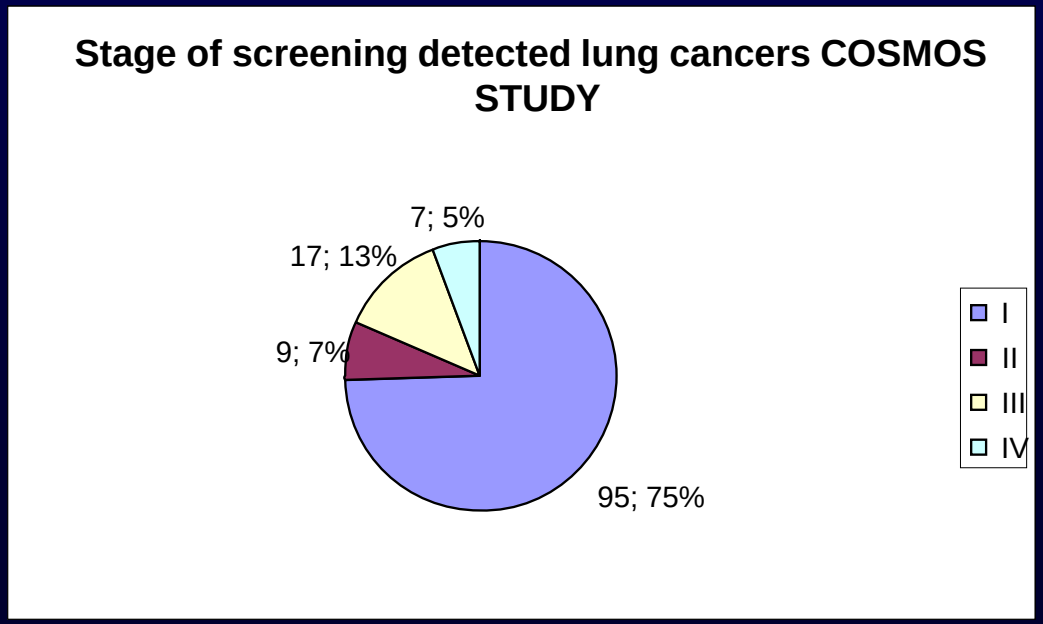


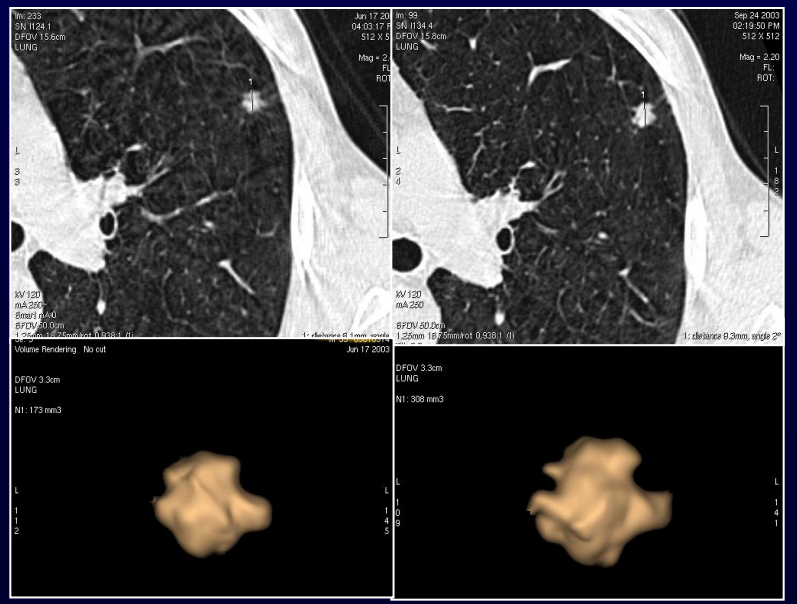
LDCT SCREENING: DIAGNOSTIC REVOLUTION FOR LUNG CANCER

- Imaging advancement and early detection programs > more than 80% stage I and II, mean size of screen tumors 15 mm.

- Traditional surgery seems an overtreatment

-Less invasive treatment required



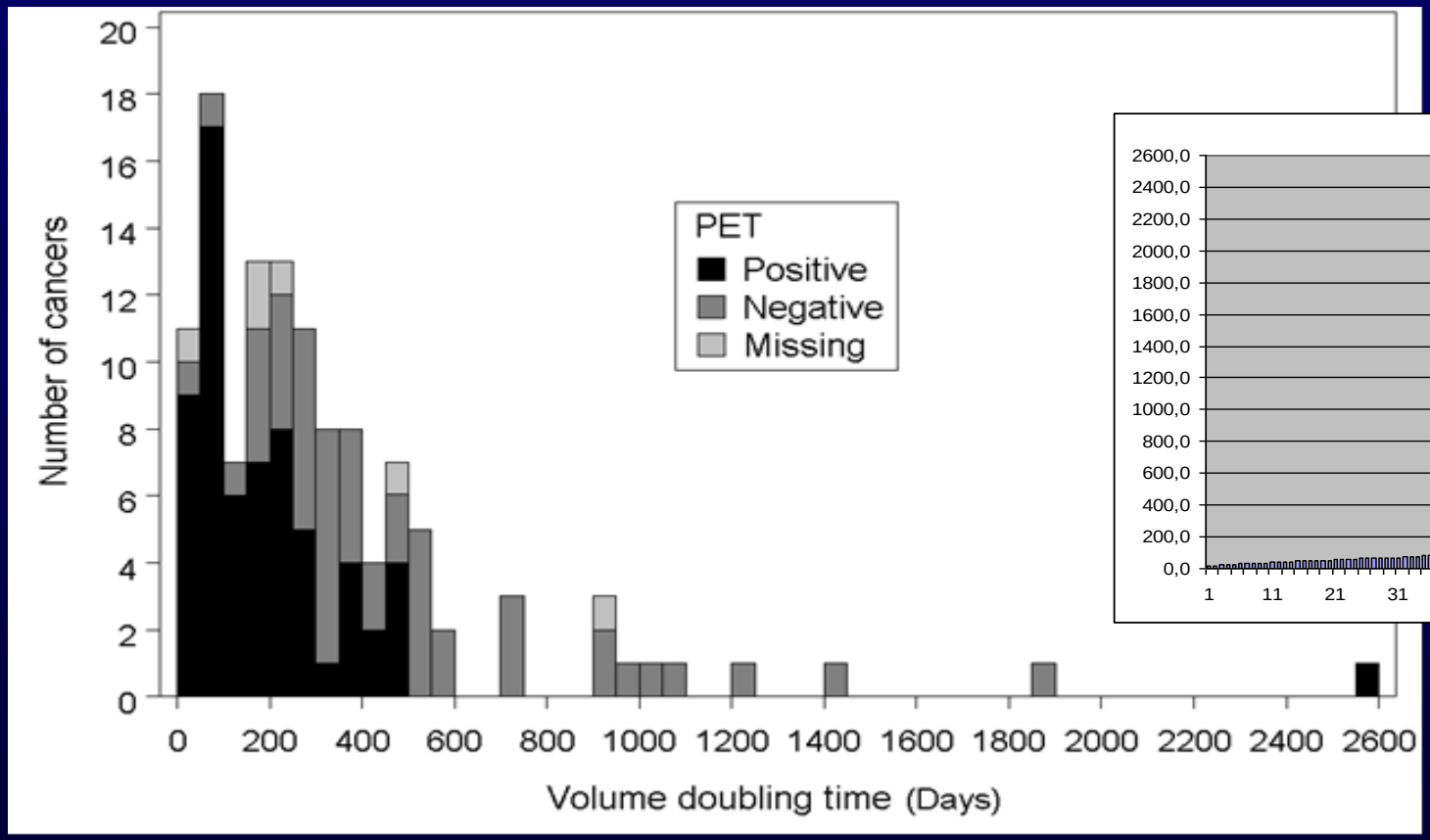


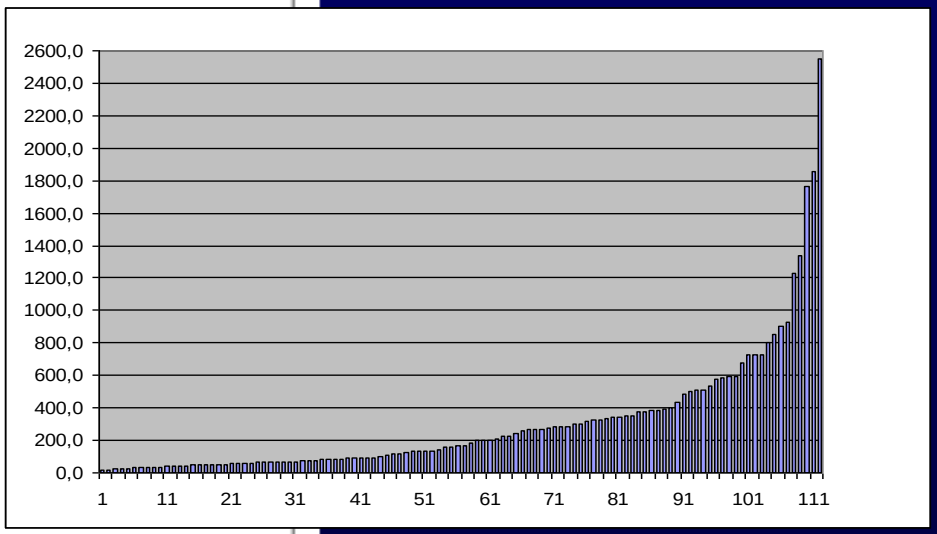
COSMOS screening study MAIN RESULTS (2005-2010, 5203 high risk individuals)

Screening round	Total participants	Recalled for CT or PET	Recalled for PET	First primary LC	Localized cancer (N0M0)	Mean size	PET-positive	Non-solid nodule
	N (%)	N (%)	N (%)	N (%)	N (%)	mm (SD) *	N (%)	N (%)
Baseline	5203 (100)	525 (10.1)	160 (3.1)	55 (1.06)	43 (78.2)	20.6 (13.6)	48 (87.3)	4 (7.3)
2nd	4822 (93)	189 (3.9)	68 (1.4)	38 (0.79)	26 (68.4)	13.6 (7.2)	26 (68.4)	5 (13.2)
3rd	4583 (88)	232 (5.1)	74 (1.6)	39 (0.85)	34 (87.2)	12.4 (7.5)	11 (28.2)	13 (33.3)
4th	4385 (84)	289 (6.6)	62 (1.4)	31 (0.71)	23 (74.2)	18.6 (18.6)	21 (67.7)	6 (19.4)
5th	4123 (79)	241 (5.8)	66 (1.6)	12 (0.29)	10 (83.3)	11.0 (4.5)	5 (41.7)	2 (16.7)
Whole period	23,116 person-years of observ)	1476 (6.4)	430 (1.9)	175 (0.76)	136 (77.7)	16.2 (12.5)	111 (63.4)	30 (17.1)

Veronesi G et al: JTO 2014

DISTRIBUTION OF LUNG CANCERS ACCORDING TO VOLUME DOUBLING TIME (VDT)

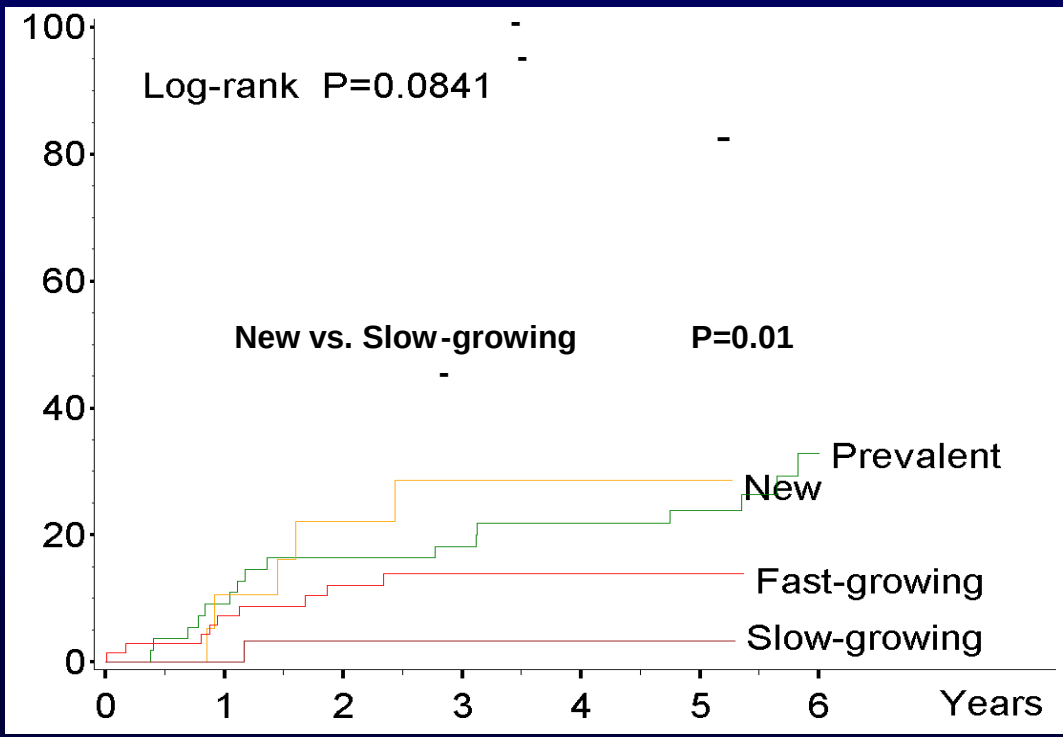


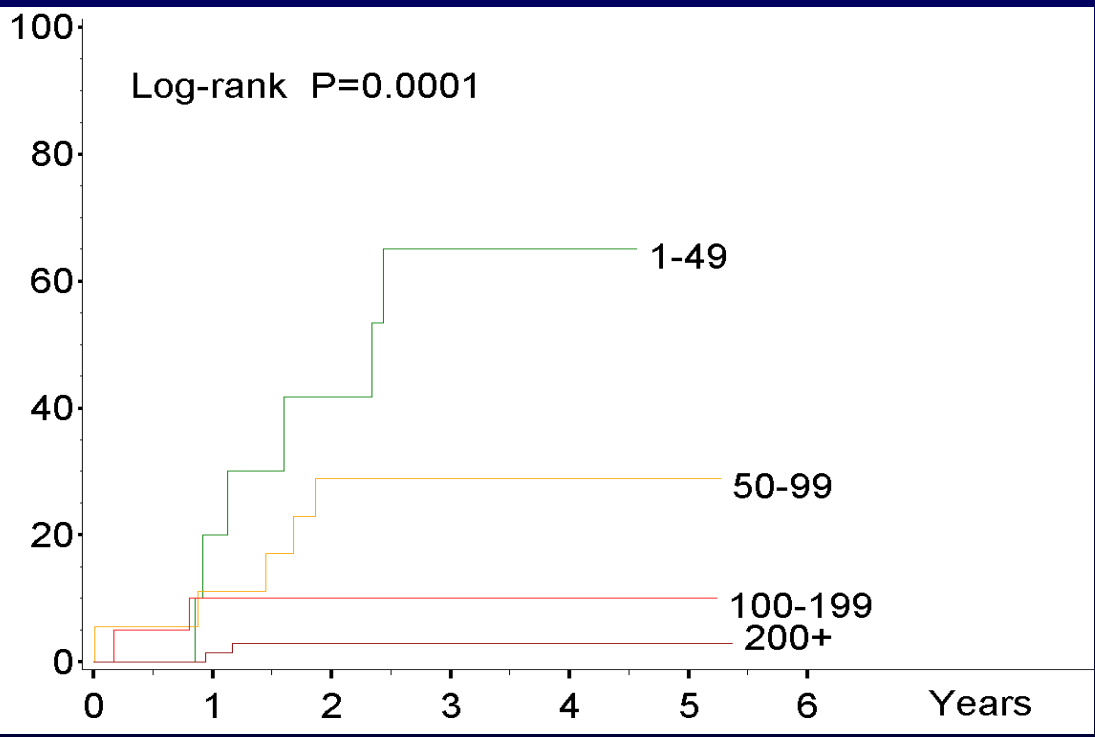


Veronesi G et al
Ann Int Med 2012

Seventy five percent of cancers had a volume doubling time <400 days. 25% were slow-growing (VDT ≥400 days). 10% of them had VDT>600 days (indolent=overdiagnosis)

LUNG CANCER-SPECIFIC MORTALITY ACCORDING TO CLASSIFICATIONS OF VOLUME DOUBLING TIME (VDT)





Prevalent: cancer diagnosed at baseline CT. New (de novo): cancer diagnosed at follow-up CT. Fast-growing: cancer arising from previously identified nodule, VDT <400 days. Slow-growing: cancer arising from previously identified nodule VDT ≥400 days.

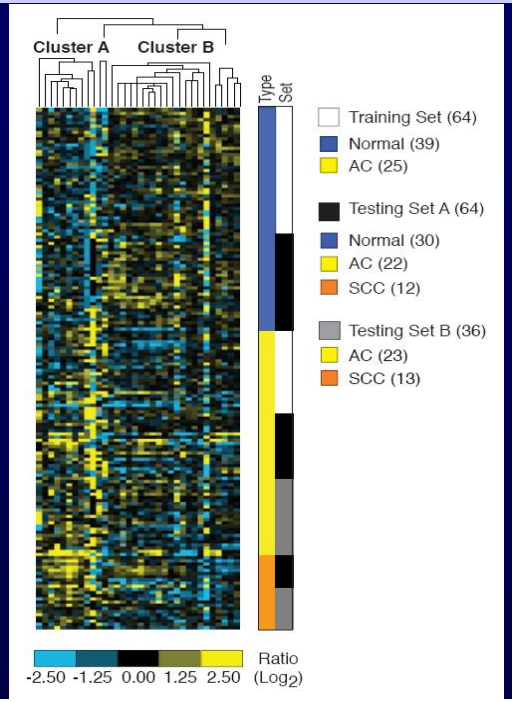
Veronesi G et al Ann Int Med 2012

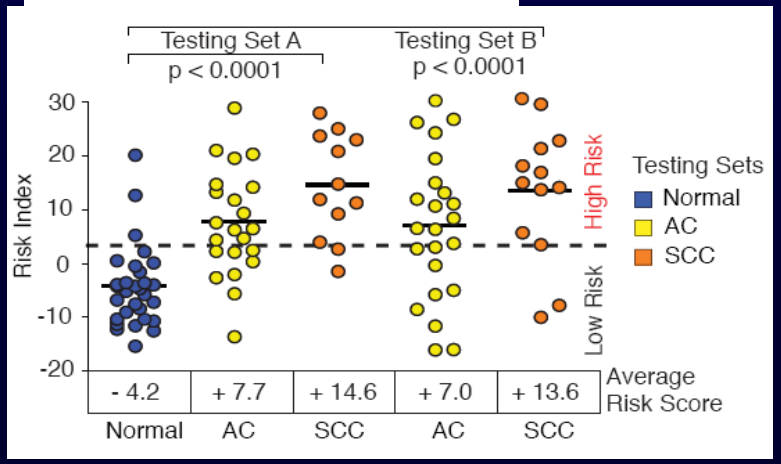
MICRO RNAs

Bianchi F, EMBO Mol Med. 2011

- Short non-coding fragments of RNAs
- Function as modulators of gene expression and involved in the regulation of cellular differentiation, proliferation and apoptosis
- Expression often deregulated in human cancers in a tissue- and cancer-specific manner
- Present in human plasma in a remarkably stable form (they are protected from endogenous RNAse activity)

A signature of 13 microRNAS is able to detect LC with high sensitivity and specificity with important clinical implication for non invasive molecular diagnosis and prognostic profile





Screening-Detected Lung Cancers

Is Systematic Nodal Dissection Always Essential?

Giulia Veronesi, MD, Patrick Maisonneuve, ING,† Giuseppe Pelosi, MD,‡ Monica Casiraghi, MD,* Bernardo G. Agoglia, MD,* Alessandro Borri, MD,* Laura L. Travaini, MD &*

(*J Thorac Oncol.* 2011;6: 525–530)

We analysed a consecutive series of clinical N0 screening detected lung malignancy to identify predictive criteria of nodal involvement.

Preoperative PET scan	c-Stage T1-2N0M0 lung cancer	< 3 cm Ø	Anatomical resection + lymphadenectomy	no prior treatment

	SCREENING		CLINIC	
	pN0 (91)	pN+	pN0 (159)	pN+
≤10mm / SUV <2	25	0	14	0
≤10mm / SUV ≥ 2	23	0	9	0
>10mm / SUV < 2	14	0	20	1 (2.3%)
>10mm / SUV ≥ 2	*29*	*6 (17.1%)*	*116*	*33 (22.2%)*

In cases of tumors larger than 1 cm and PET positive 17 to 22% had hilar or mediastinal lymph node unexpected metastases

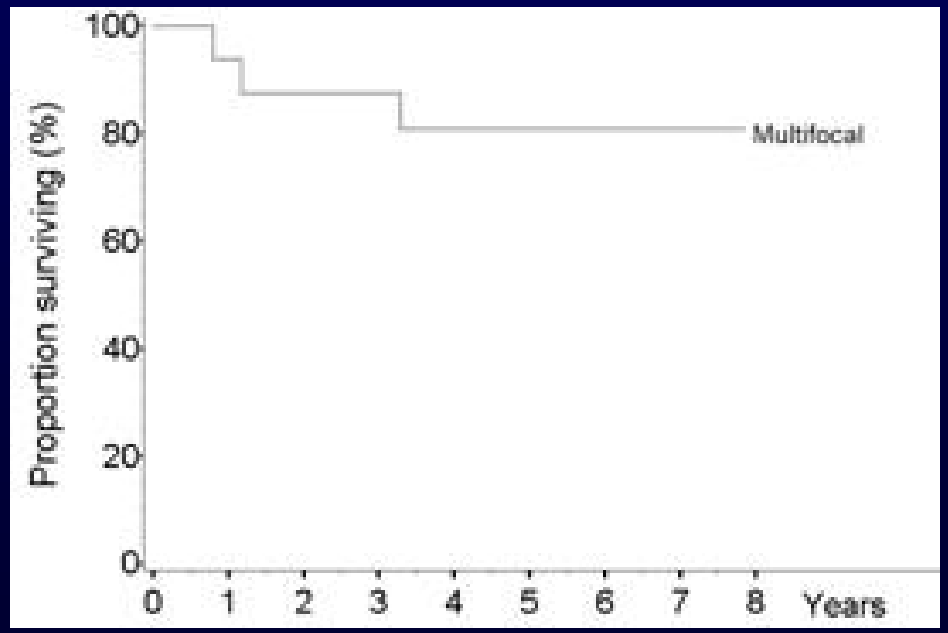
But for tumor lower than 1 cm or pet negative 1/105 pts (<1%)

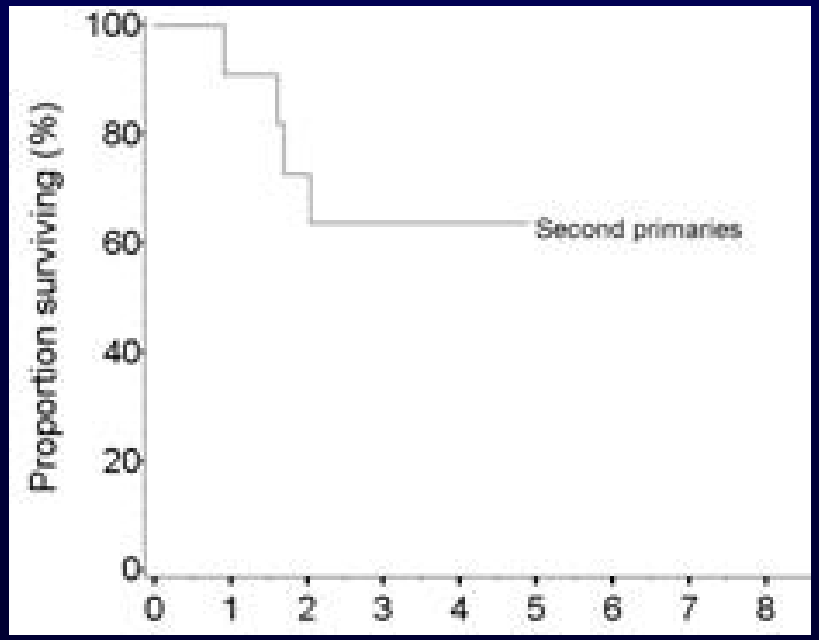
SECOND PRIMARIES in SCREENING

10% of patients with a screen detected tumor had multifocal disease at diagnosis

6% has developed a new primary tumor of the lung during 5 years.

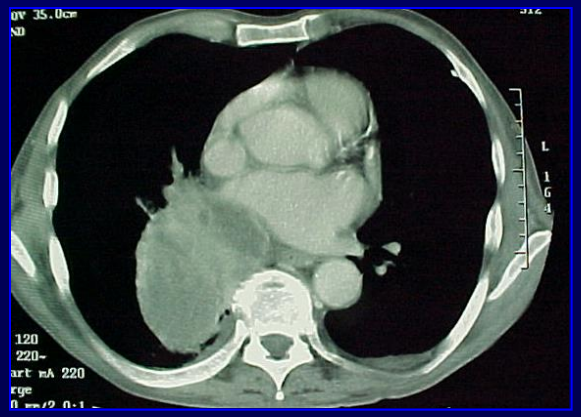
These subjects, already having lung surgery, can badly tolerate a second surgery

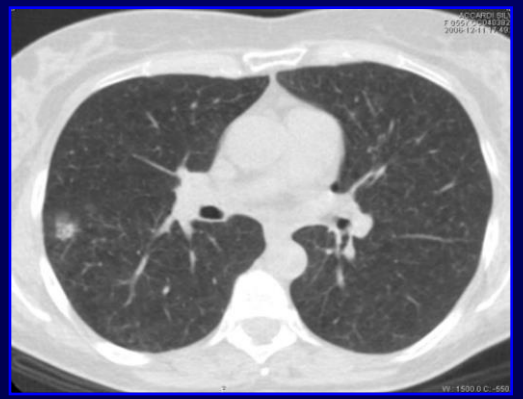


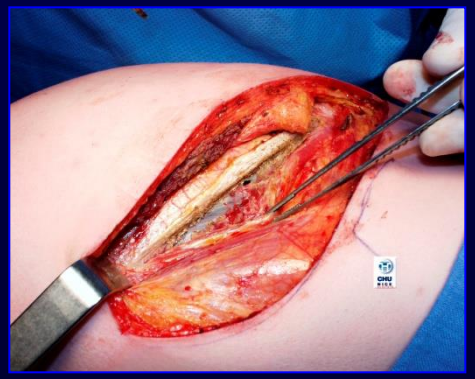


Veronesi G et al: JTO 2014

EVOLUTION OF SURGICAL APPROACH







Posterolateral Thoracotomy

Lateral Muscle Sparing Thoracotomy

VATS Approach

Robotic Approach

Surgery for Early-Stage Non-Small Cell Lung Cancer: A Systematic Review of the Video-Assisted Thoracoscopic Surgery Versus Thoracotomy Approaches to Lobectomy

(Ann Thorac Surg 2008;86:2008–18)

Bryan A. Whitson, MD, PhD, Shawn S. Groth, MD, Scott J. Swanson, MD, and Michael A. Maddaus, MD

Department of Surgery, Division of Thoracic and Foregut Surgery, and School of Public Health, Division of Epidemiology and Community Health, University of Minnesota, Minneapolis, Minnesota; and Department of Cardiothoracic Surgery, Mount Sinai School of Medicine, New York, New York

reviewers, we included 39 studies (only one randomized controlled trial) in our analysis. In aggregate, these 39 studies involved 3256 thoracotomy and 3114 VATS patients. The characteristics of the two groups were not significantly different. Compared with thoracotomy, VATS lobectomy was associated with shorter chest tube duration, shorter length of hospital stay, and improved survival (at 4 years after resection), all statistically significant. Compared with lobectomy performed by thoracotomy, VATS lobectomy for patients with early-stage NSCLC is appears to favor lower morbidity and improved survival rates.

Advantages of MIS versus open:

Reduced pain, complications, blood trasfusions and postoperative stay

Improved quality of life, ahestetic and functional results

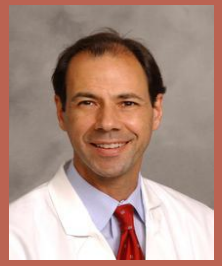
Compared to thoracothomy Vats lobectomy was associated to improved 4 yy survival

VATS LOBECTOMY

EDINBURGH
POSTERIOR APPROACH
W WALKER, UK

COPENAGHEN
ANTERIOR APPROACH
H HANSEN & R PETERSEN, DEN

DUKE APPROACH
T D'AMICO, USA

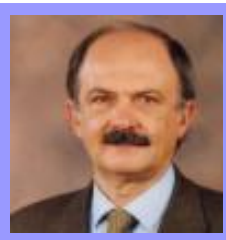


TOTALLY
ENDOSCOPIC APPROACH
D GOSSOT, FRA

UNIPORTAL
VATS LOBECTOMY
D GONZALEZ RIVAS, SPA

McKENNA APPROACH
R McKENNA, USA

GIANCARLO ROVIARO
ITALY



COPENAGHEN ANTERIOR APPROACH

HIENE HANSEN

Camera same position during procedure

N° 3 incisions

Easier to convert in emergency

Working channels on both side

Both surgeons on abdominal site

POSTERIOR APPROACH

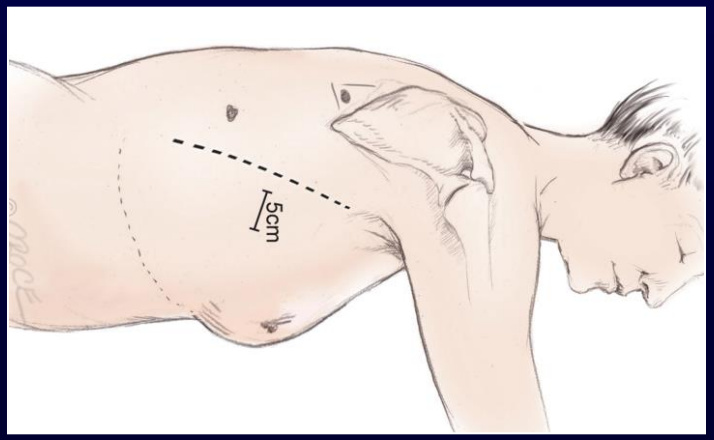
WILLIAM WALKER

Easy access to posterior hilum and lymph nodes

The surgeons stand posterior to the patient

Utility incision is made at the 6th or 7th intercostal space more poster and camera port through the auscultatory triangle

Disadvantages complex and technically demanding procedure



SINGLE PORT

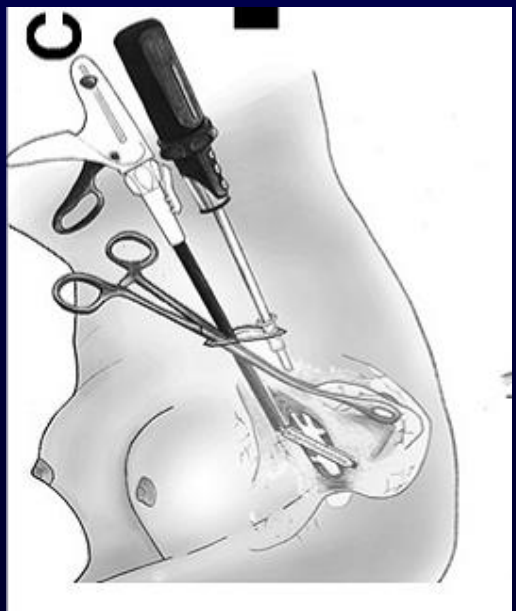
DIEGO GONZALES

Single incision at the V is anteriorly.

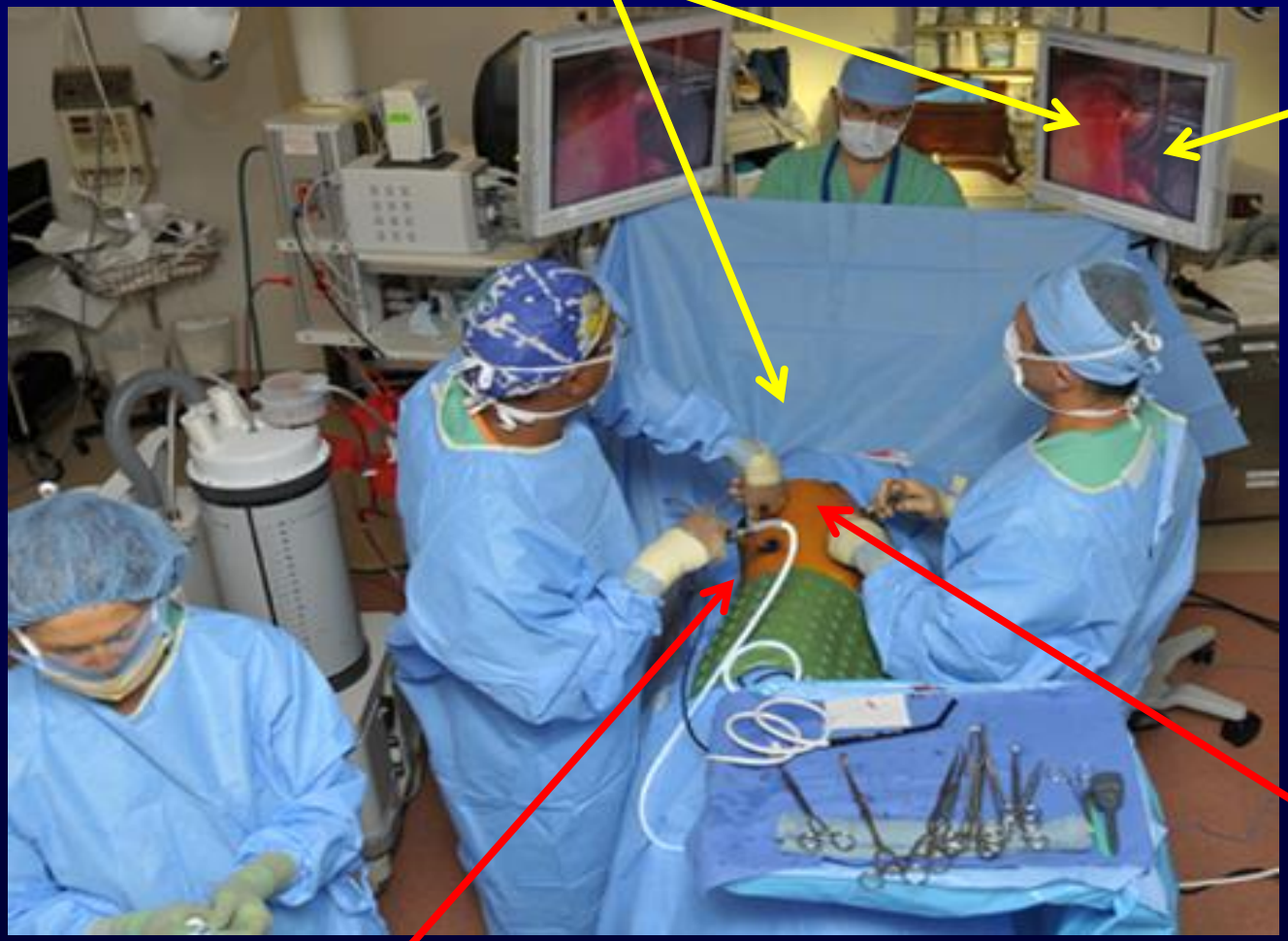
Better view at the hilum.

Reduced pain

Both surgeons on abdominal site



Diversion of true and virtual operating field



Lack of 3D vision

Bad ergonomics

Tremors amplification

Fulcrum effect

Instable surg field (camera assistant)

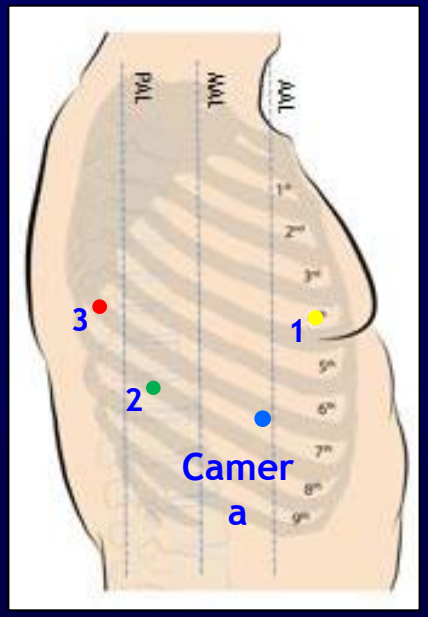
Counteractive movements

ROBOTIC SYSTEM

To overcome vats limitations, micromechanic and robotic technology was introduced. Natural movements of the surgeon's hands are translated into precise instrument movements inside the patient with tremor filtration. Three dimensional view offers a visual magnification that compensate the absence of haptic feedback

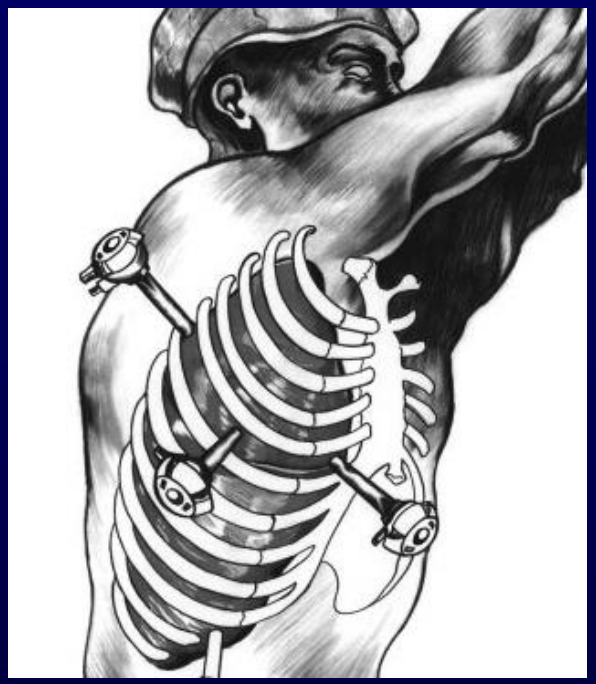
Robotic system can make MIS more accessible to surgeons in training and can expand indications

VERONESI PARK RAL



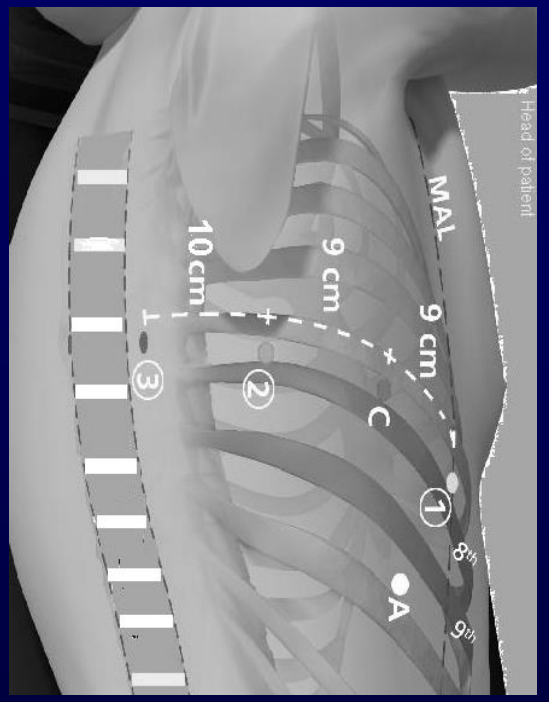
4 arms, 4 incisions
NO Co2 Insufflation
Utility incision at the beginning
Anterior approach

DYLEWSKY CPRL



3 arms, 4 incision
CO2 insufflation
Utility incision at the end
Posterior approach

CERFOLIO CPRL



4 arms, 5 incisions
Co2 Insufflation
Utility incision at the end
Posterior approach

ROBOTIC LOBECTOMIES: CASE SERIES

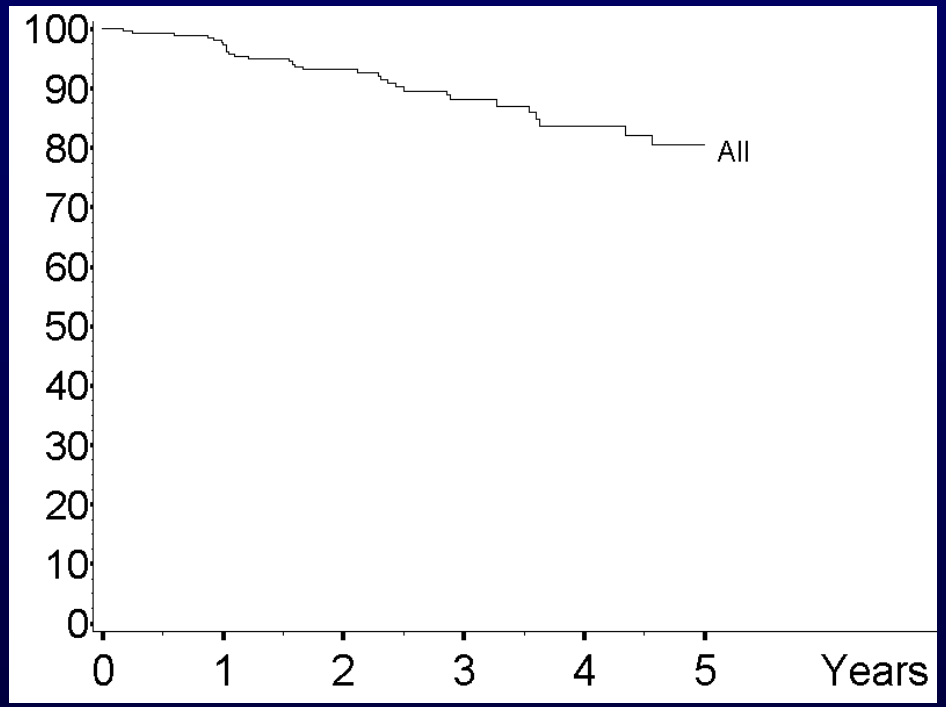
Lead Author	Year	No. Pts	MOT	LOS (min)	Compl. (Days)	Mortality (%)	Conversion (%)
RAL							
Park	2006	30	218	4.5	26	0	12
Melfi	2004	107	220	5	na	1	na
Gharagozloo	2009	100	216	4	21	3	13
Veronesi	2010	54	224	4.5	20	0	9.4
Park, Melfi, Veronesi	2011	325	210	5	25	na	8
Veronesi	2012	91	213	5	20	0	10
CPRL / CPRS							
Dylewski	2011	165 / 35	90	3	26	0	1.5
Cerfolio	2011	106 /16	132	2	27	0	10

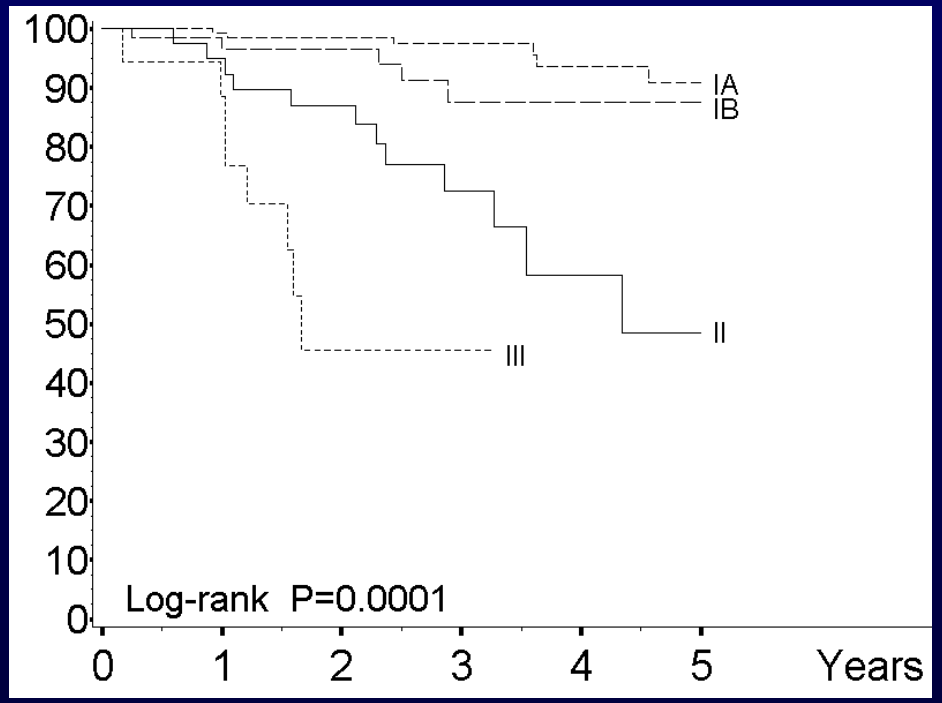
CPRL – Complete port robotic lobectomy
CPRS – Complete port robotic segmentectomy
RAL – Robotic assisted lobectomy

ROBOTIC LOBECTOMY FOR NON-SMALL CELL LUNG CANCER (NSCLC): LONG-TERM ONCOLOGIC RESULTS

B.J. Park, F. Melfi, P. Maisonneuve, L. Spaggiari, R Da Silva, G. Veronesi

Journal of Thoracic and Cardiovascular Surgery 2011





Pathologic stage	325	
IA	176	(54%)
IB	72	(22%)
IIA	41	(13%)
IIB	15	(5%)
IIIA	21	(6%)

The Prevalence of Nodal Upstaging During Robotic Lung Resection in Early Stage Non-Small Cell Lung Cancer

Jennifer L. Wilson, MD, Brian E. Louie, MD , Robert J. Cerfolio, MD, Bernard J. Park, MD, Eric Vallières, MD, Ralph W. Aye, MD, Ahmed Abdel-Razek, MD, Ayesha Bryant, MD, Alexander S. Farivar,

302 patients

Pathologic nodal upstaging occurred in 33 patients (10.9%)

pN1 6.6%;

pN2 4.3%

Hilar (pN1) upstaging

	Robot	Vats	Thoracotomy
cT1a	3.5	5.2	7.5
cT1b	8.6	7.1	8.8
cT2a	10.8	5.7	11.5

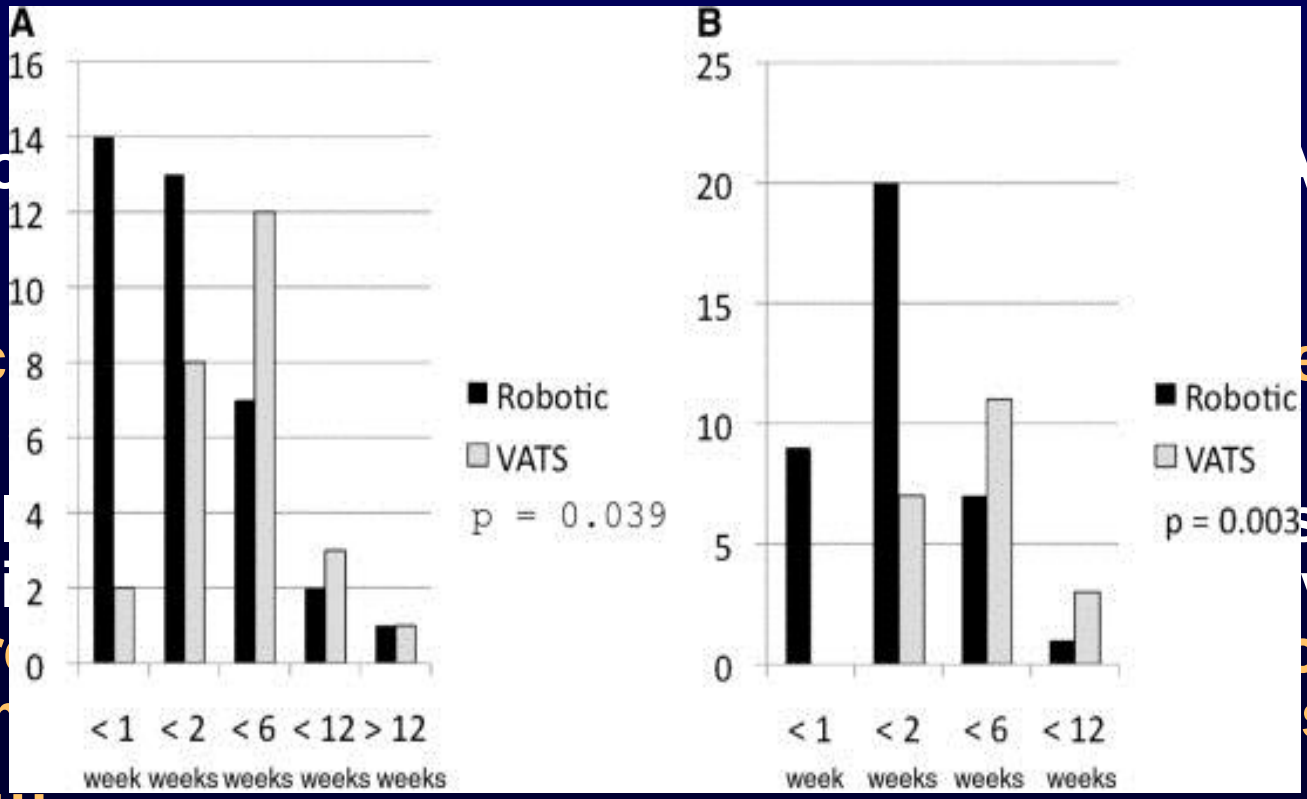
The rate of nodal upstaging for robotic resection appears to be superior to VATS and comparable to thoracotomy

RLL AFTER CHEMOTHERAPY FOR N2 DISEASE

Early Experience With Robotic Lung Resection Results in Similar Operative Outcomes and Morbidity When Compared With Matched Video-Assisted Thoracoscopic Surgery Cases

Brian E. Louie, MD, Alexander S. Farivar, MD, Ralph W. Aye, MD, and Eric Vallières, MD

Ann Thorac Surg 2012;93:1598–165



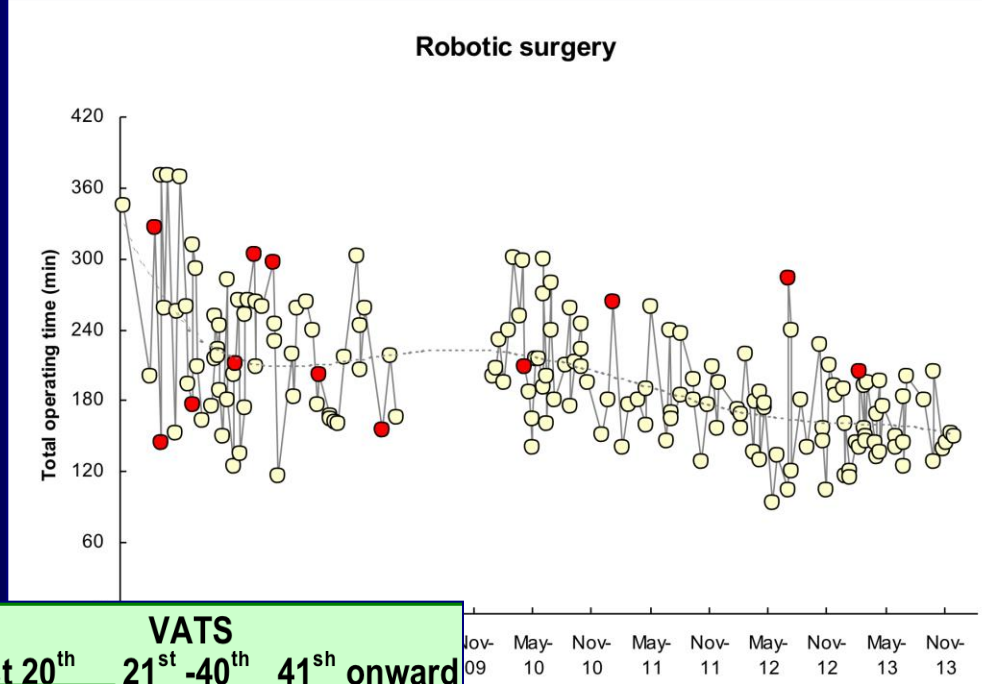
Case-co ATS

Similar

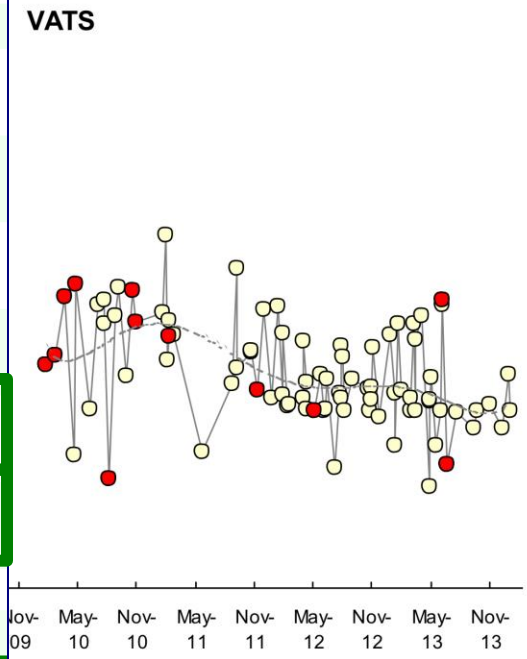
Signific earlier return to normal

The abi section was similar i ver robotics gave gr odes adjacent to the pulr ssage of the stapler…

Learning curve robot and vats surgery



Procedure	Robotic surgery			VATS		
	First 15th	16th -75th	76th onward	First 20th	21st -40th	41sh onward
Number of operations	**15**	**60**	**96**	**20**	**20**	**45**
Number of conversions (%)	3 (20.0)	6 (10.0)	3 (3.1)	8 (40.0)	2 (6.7)	2 (5.7)
Number of complications (%)	5 (33.3)	14 (23.3)	24 (25.0)	4 (20.0)	3 (15.0)	8 (17.8)
Major/minor	4/1	9/5	[illegible]	3/1	2/1	6/2
Median operating time, minutes (range)	259 (145-370)	214 (116-304)	177 [illegible]	226 (92-298)	173 (115-270)	159 [illegible]
Median postoperative stay, days (range)	6 (5-24)	4 (3-23)	5 (2-14)	6 (4-9)	5 (3-8)	5 (3-11)
Median number of lymph nodes removed at first level (range)	6 (2-13)	8(0-23)	7(0-27)	11 (3-20)	6 (1-18)	6 (0-19)
Median number of lymph nodes removed at second level (range)	3 (0-18)	5 (1-25)	6 (2-21)	8 (3-19)	4 (0-24)	4 (0-14)
Patients with **no** lymph node removed at second level (%)	1 (6.7)	0 (0.0)	3 (3.1)	0 (0.0)	4 (20.0)	6(13.3)
Number of upstage CN0>pN1	2/11 (18.2)	2/59 (3.4)	4/84 (4.8)	0/18 (0.0)	2/18 (11.1)	9/43 (20.9)
Number of upstage CN0>PN2	1/11 (9.1)	2/59 (3.4)	6/84 (7.1)	2/18 (11.1)	1/18 (5.6)	4/43 (9.3)



Comparing robot-assisted thoracic surgical lobectomy with conventional video-assisted thoracic surgical lobectomy and wedge resection: Results from a multihospital database (Premier)

Scott J. Swanson, MD,[a] Daniel L. Miller, MD,[b] Robert Joseph McKenna, Jr, MD,[c] John Howington, MD,[d] M. Blair Marshall, MD,[e] Andrew C. Yoo, MD,[f] Matthew Moore, MHA,[g] Candace L. Gunnarsson, EdD,[h] and Bryan F. Meyers, MD[i]

J Thorac Cardiovasc Surg. 2014

Higher costs of Robotics versus Vats will be justified if robotics will allow an higher transition from thoracotomy to minimally invasive surgery for early and locally advanced stage lung cancer

TABLE 5. I

			P value
Length of sta			
Median			
Mean			.6131
SD			
Total hospita			
Median			
Mean			<.0001
SD			
Operating room time (h)			
Median	4.25	4	
Mean	4.49	4.23	.0959
SD	1.98	1.73	

SUBLOBAR RESECTION and SABR FOR EARLY STAGE

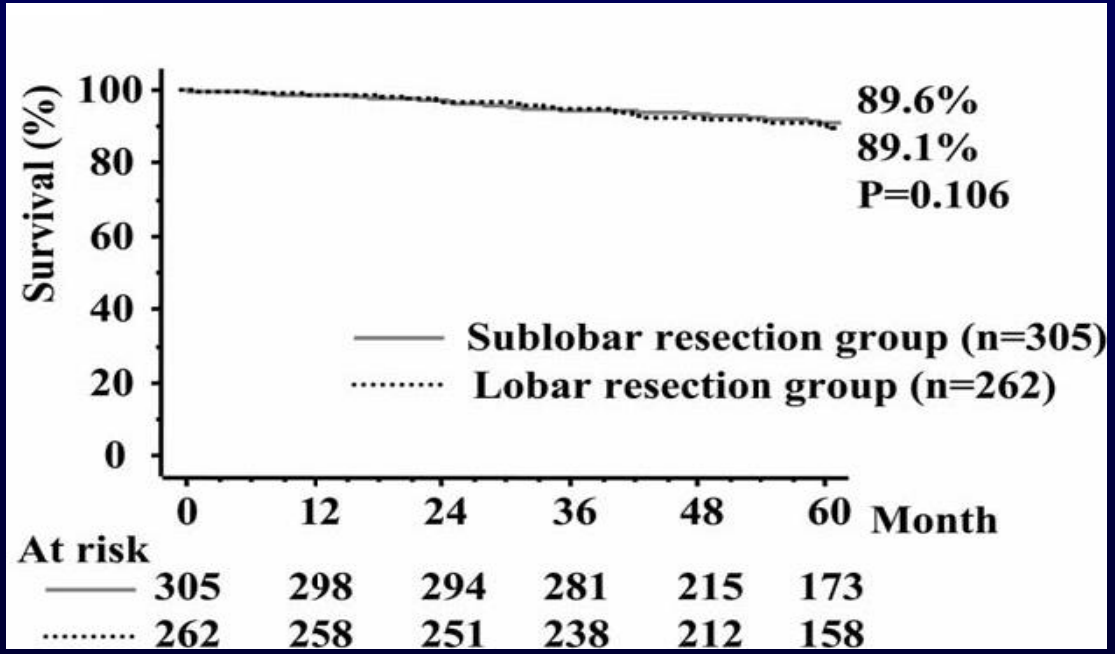
Radical sublobar resection for small-sized non–small cell lung cancer: A multicenter study

Morihito Okada, MD, PhD,[a] Teruaki Koike, MD, PhD,[b] Masahiko Higashiyama, MD, PhD,[c] Yasushi Yamato, MD, PhD,[b] Ken Kodama, MD, PhD,[c] and Noriaki Tsubota, MD, PhD[a]

J Thorac Cardiovasc Surg 2006;132:769-75

Nonrandomized study for patients with a peripheral cT1N0M0 NSCLC < 2 cm able to tolerate a lobectomy
Sublobar resection group (n 305) compared with lobar resection group (n 262)

Conclusion:
Extended segmentectomy should be considered as an alternative for patients with cT1N0M0 NSCLC of 2 cm or smaller

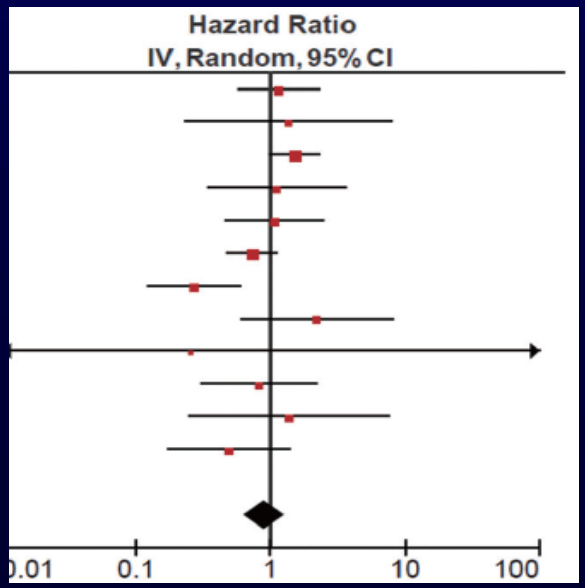


Meta-analysis of intentional sublobar resections versus lobectomy for early stage non-small cell lung cancer

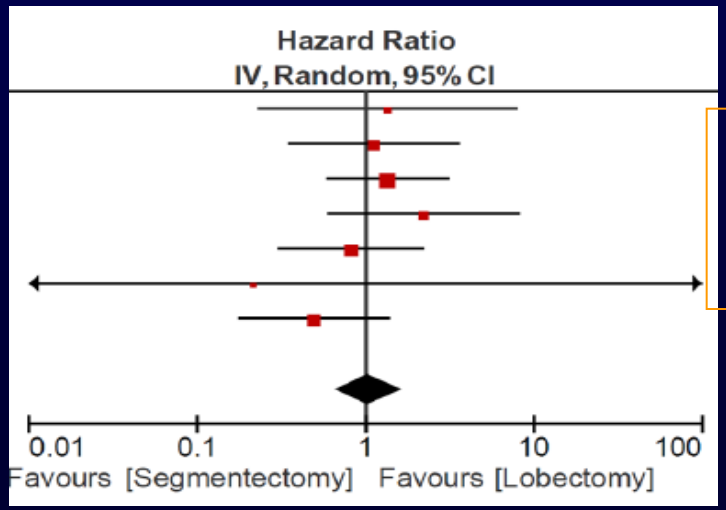
Annals cardiothoracic surgery 2014

Christopher Cao[1,2], Sunil Gupta[1], David Chandrakumar[1], David H. Tian[1], Deborah Black[3], Tristan D. Yan[1,4]

Study or Subgroup	log[Hazard Ratio]	SE	Sublobar Total	Lobectomy Total	Weight	Hazard Ratio IV, Random, 95% CI	Year
Read	0.14	0.36	113	131	11.8%	1.15 [0.57, 2.33]	1990
Warren	0.3	0.91	38	34	3.3%	1.35 [0.23, 8.03]	1994
Ginsberg	0.42	0.22	122	125	17.1%	1.52 [0.99, 2.34]	1995
Kodama 1997	0.11	0.6	46	77	6.3%	1.12 [0.34, 3.62]	1997
Koike	0.08	0.43	74	159	9.8%	1.08 [0.47, 2.52]	2003
Okada	−0.31	0.22	305	262	17.1%	0.73 [0.48, 1.13]	2006
Kodama 2008	−1.31	0.41	58	80	10.3%	0.27 [0.12, 0.60]	2008
Sugi	0.79	0.67	33	111	5.4%	2.20 [0.59, 8.19]	2010
Ichiki	−1.37	294.88	35	104	0.0%	0.25 [0.00, 2.555E250]	2011
Yamashita	-0.2	0.51	90	124	7.9%	0.82 [0.30, 2.22]	2012
Hamatake	0.32	0.88	66	77	3.5%	1.38 [0.25, 7.73]	2012
Tsutani	−0.71	0.53	98	383	7.5%	0.49 [0.17, 1.39]	2013
Total (95% CI)			**1078**	**1667**	**100.0%**	**0.91 [0.64, 1.29]**	



Overall survival: sublobar *vs.* *lobectomy.* *HR 0.91 (0.6-1.2)*



Overall survival: segmentectomy *vs.* *lobectomy* *HR 1.04 (0.7-1.4)*

A Phase III Randomized Trial of Lobectomy Versus Limited Resection for Small-sized Peripheral Non-small Cell Lung Cancer (JCOG0802/WJOG4607L)

Nakamura et al. Jap J Clin Oncology. 2010.

1100 pts in 71 institutions within 3 yrs

CALGB 140503: A Randomized Phase III Trial of Lobectomy versus Sublobar Resection for Small (< 2cm) Peripheral Non-Small Cell Lung Cancer

Fox N and Bauer T. Oncology Issue, 2008.

1297 pts ; sample size recalculated 900

AIM: to evaluate the "*non inferiority*" in overall survival of sublobar resection compared to lobectomy in peripheral Stage IA NSCLC ≤ 2 cm

IEO Randomised Trial
limited resection vs standard lobectomy

Preoperative criteria: Suspicious or proven NSCLC; Lung nodules ≤ 2 cm; N0 at preoperative PET/CT; N0 prior treatment for lung cancer

Intraoperative criteria: Diagnosis of NSCLC; Lesion suitable for a limited resection; No lymph node at FS when size > 1 cm and SUV positive; Negative margins

Stratification
Nodule Size (≤1 versus > 1 cm)
PET on nodule (positive versus negative)

R

Wedge or segmentectomy

Lobectomy with SND

Study design and coordinator: G. Veronesi

Pulmonary Segmentectomy by Thoracotomy or Thoracoscopy: Reduced Hospital Length of Stay With a Minimally-Invasive Approach

B. Zane Atkins, MD, David H. Harpole, Jr, MD, Jennifer H. Mangum, BSN, Eric M. Toloza, MD, PhD, Thomas A. D'Amico, MD, and William R. Burfeind, Jr, MD

Conclusions. Thoracoscopic segmentectomy is a safe and feasible procedure, comparing favorably with OS by reducing hospital length of stay. For experienced thoracoscopic surgeons, TS appears to be a sound option for lung-sparing, anatomic pulmonary resections.

(Ann Thorac Surg 2007;84:1107–13)

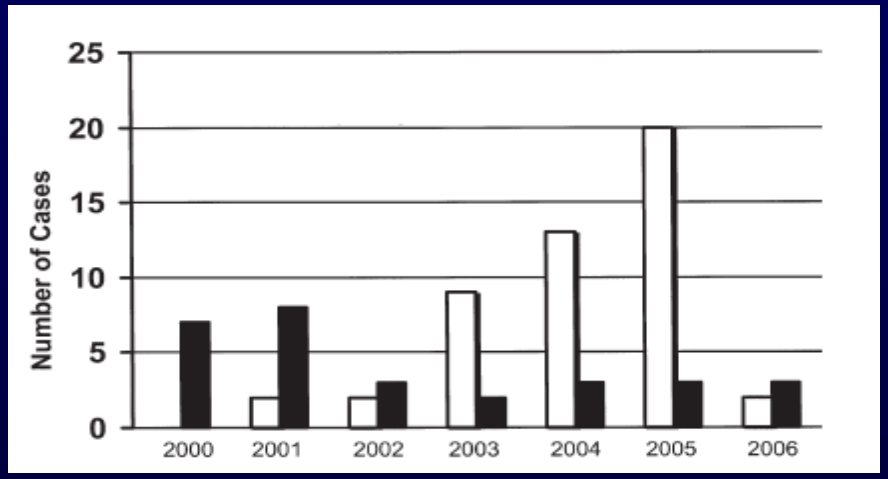


Table 3. Perioperative Details

Variable	Open Segmentectomy (n = 29)	Thoracoscopic Segmentectomy (n = 48)	*p* Value
Operative time (minutes)	130 ± 65	136 ± 45	0.68
Estimated blood loss (mL)	280 ± 200	250 ± 200	0.53
Nodal stations sampled	3.9 ± 3	4.1 ± 3	0.88
Chest tube duration (days)	3.7 ± 1	3.5 ± 4	0.7
Hospital length of stay (days)	6.8 ± 6	4.3 ± 3	0.03

Thoracoscopic segmentectomy is a safe **and feasible procedure for experienced TS, comparing favorably with OS by reducing hospital length of stay**

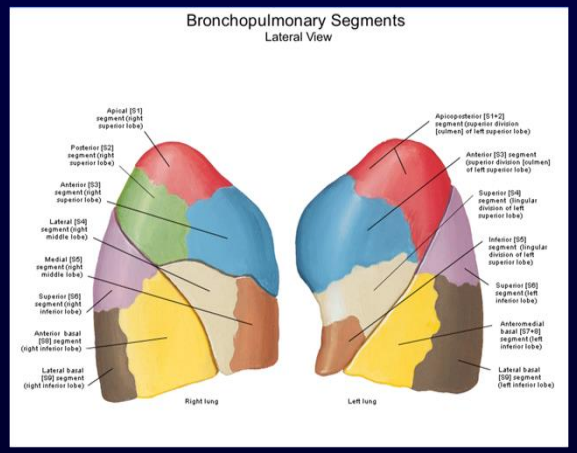
Robotic Anatomic Segmentectomy of the Lung: Technical Aspects and Initial Results

Alessandro Pardolesi, MD, Bernard Park, MD, Francesco Petrella, MD,
Alessandro Borri, MD, Roberto Gasparri, MD, and Giulia Veronesi, MD

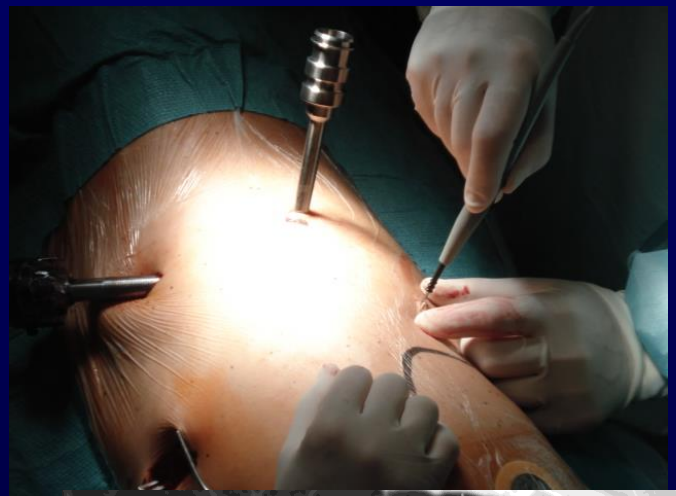
Division of Thoracic Surgery, European Institute of Oncology, Milan, Italy; and Division of Thoracic Surgery, Hackensack University Medical Center, Hackensack, New Jersey

Robotic anatomic lung segmentectomy is feasible, safe and reproducible in different centres

Robotic system, by improving ergonomic, surgeon view and precise movements, may make minimally invasive segmentectomy easier to adopt and perform



ROBOTIC SEGMENTECTOMY TECHNIQUE



- 63 years old womam, heavy smoker, enrolled in a CT screeninig program.
- 2011 detection of a non solid lesion of the Left Upper Lobe, centrally located, PET neg, slow growing. Final diagnosis: minimally invasive multifocal adenocarcinoma

J Thorac Oncol. 2013
Failure after stereotactic body radiation therapy or lobar resection for clinical stage I non-small-cell lung cancer.

Robinson CG

They compared patterns of failure between lobar resection (lobectomy or pneumonectomy) and stereotactic body radiation therapy (SBRT) for patients with clinical stage I non-small-cell lung cancer (NSCLC).

Clinical stage I NSCLC :	lobar resection	(n = 260)
	SBRT	(n = 78)

Lobar resection patients were younger, healthier, and had superior pulmonary function, whereas most of the patients in the SBRT group had T1 tumors.
Final pathology upstaged 32.7% of surgery patients, 20.0% received adjuvant chemotherapy. No SBRT patients received adjuvant chemotherapy.

Cause-specific survival (CSS, 81.3% versus 75.3%, p = 0.923) was similar.
In a T-stage matched comparison, there was no significant difference in patterns of failure or CSS, whereas OS favored surgery.

CONCLUSION:
Lobectomy/pneumonectomy or SBRT results in comparable patterns of failure for clinical stage I NSCLC. In this retrospective comparison, OS was superior for surgery, though CSS was similar. Randomized trials are necessary to control for fundamental differences in comorbidity, which impact interpretation of both tumor control and survival.

RANDOMISED TRIAL OF SABR VERSUS SURGERY IN EARLY STAGE NSCLC

There were at least two attempts of randomised studies comparing surgery to SABR in operable patients

1) A randomized study comparing CyberKnife treatment to surgical resection for Stage I NSCLC (STARS) based in MD Anderson Cancer Center in the United States

2) A randomized Phase III trial, Radiosurgery or Surgery for operable Early-stage (Stage IA) non-small-cell Lung cancer (ROSEL) based in VU University Medical Center in Netherlands (Hurkmans et al Radiation Oncology 2009)

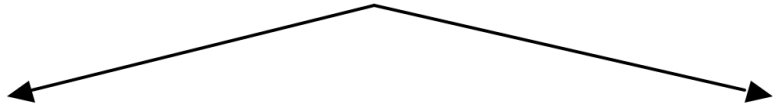
PHASE III RANDOMIZED TRIAL OF SURGICAL RESECTION VERSUS STEREOTACTIC ABLATIVE RADIOTHERAPY (SABRT) FOR EARLY STAGE LUNG CANCER LESS THAN 2 CM IN SIZE AND SUV LESS THAN 2.5.

Preoperative evaluation:

1) Suspicious or proven NSCLC
2) Lung nodules peripheral ≤ 2 cm
3) Negative nodes at preoperative PET/CT
4) N0 prior treatment for lung cancer
5) Low uptake at CT/PET (less than 2.5)

RANDOMIZATION

Subjects will be stratified according to:
Nodule size (≤1 versus > 1 cm)
Nodule characteristics at PET (negative versus positive by visual assessment)



SABRT

Lobectomy or segmentectomy plus systematic nodal dissection

Primary objectives:
Disease free survival

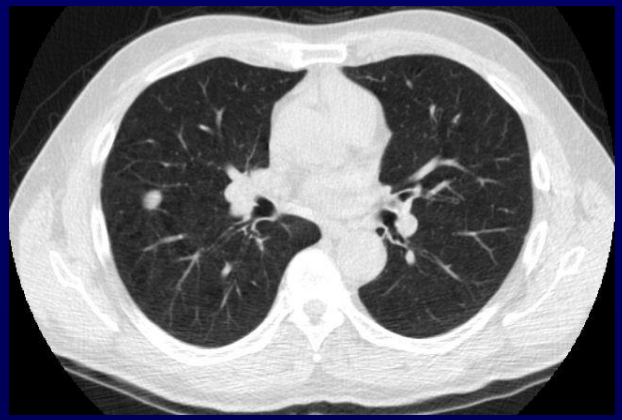
LETS THINK BE AND NOT

DISTANCE PROCTORING ……and ….

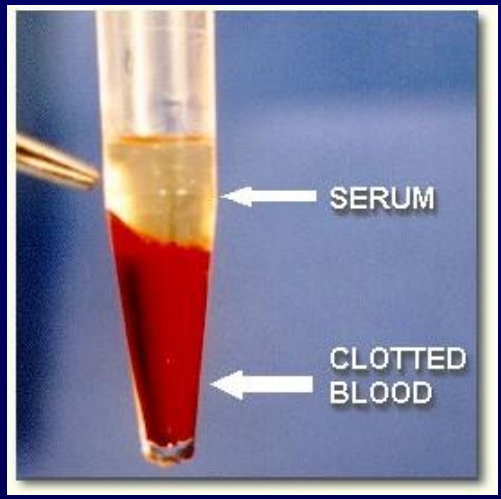
LUNG CANCER

PREVENTION AND TOBACCO FREE CIGARETTE

SCREENING WITH LD CT



MOLECOLAR DIAGNOSIS



CONSERVATIVE SURGERY

MINIMALLY INVASIVE ROBOTIC SURGERY

RADIOSURGERY

SUMMARY 1

- Lung cancer is diganosed in early stage more frequently than in the past. Thus surgeons are faced to offer treatments that are proportionate to the disease.
- MIS for early stage has important advantages for patients compared to open surgery
- Robot-assisted approach is more confortable for surgeons than manual vats, N1 upstaging after robotics is similar to open surgery, indication of MIS may be expanded
- High capital and running costs remain the main disadvantages of robotics

SUMMARY 2

- Limited resection are under evaluation for peripheral NSCLC lower than 2 cm in randomised trials
- Radical lymph node dissection may be avoided in nsclc with negative CT/PET or size less than 1 cm.
- A randomised trial of SABR versus Surgery can be proposed for patients with very early stages