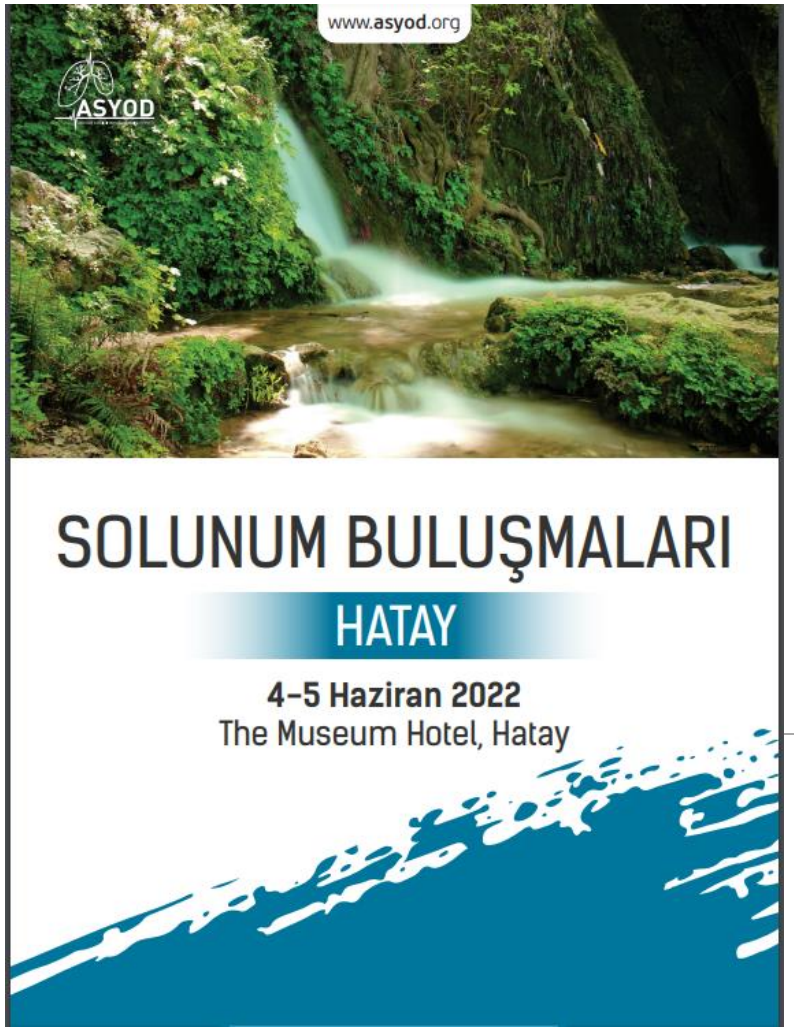


MİNİMAL İNVAZİV GÖĞÜS CERRAHİSİ: OLGU ÖRNEKLERİ

PROF.DR.MUZAFFER METİN
SBÜ ULUSLAR ARASI TIP FAKÜLTESİ
GÖĞÜS CERRAHİSİ ABD
YEDİKULE SUAM

Minimal İnvaziv Torasik Cerrahi Nedir?

Minimal İnvaziv Cerrahi klasik torakotomi ile yapılan operasyonların video yardımı ile küçük kesilerden yapılmasıdır.

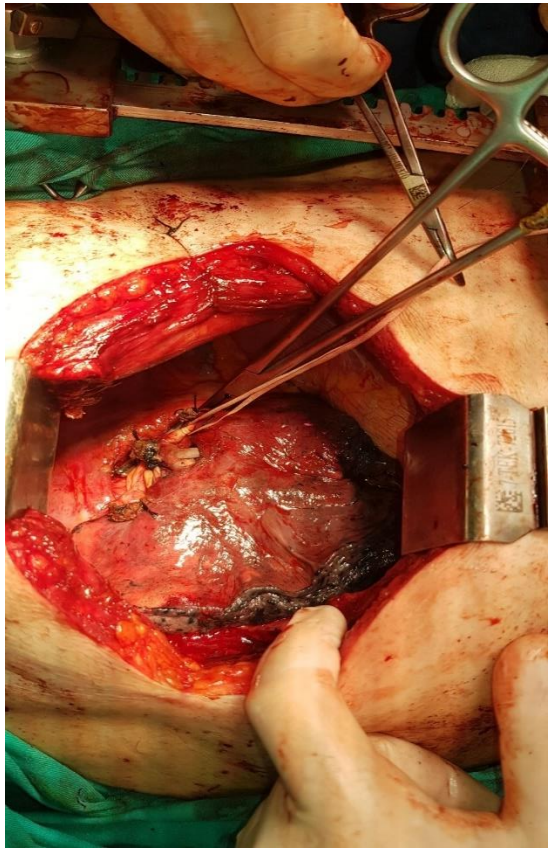
VATS (Video assisted thoracic surgery)

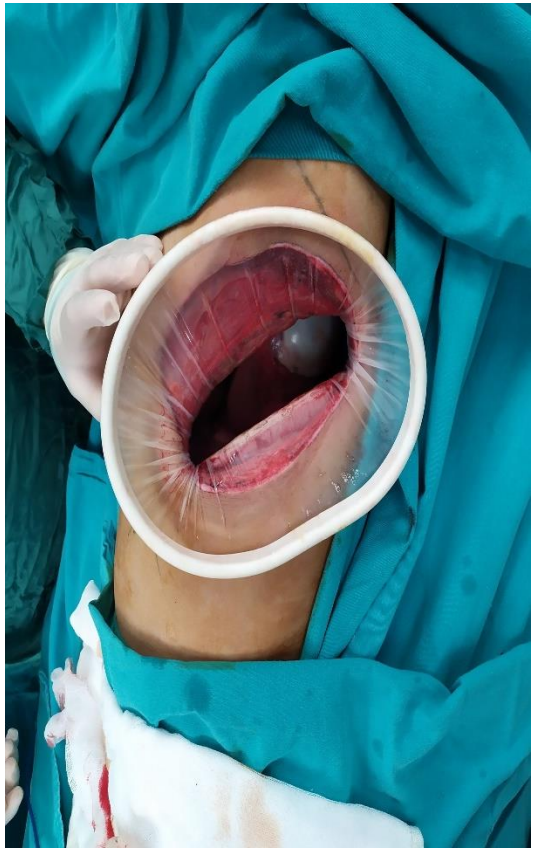
- Kamera Yardımı ile yapılan ameliyatlara

RATS (robotic assisted thoracic surgery)

- Bilgisayar yardımı ile cerrahi ensturmanların kontörlüne

Neden VATS ?





MITS Avantajları

- ✓Kısa yatış süresi
- ✓Daha az ağrı
- ✓Postoperatif erken taburculuk
- ✓Daha az intraoperatif kanama

Hasta Açısından

- ✓Morbititelerin daha az olması
- ✓Kas fonksiyonlarının korunması
- ✓Uzun dönem sağkalım

Cerrah Açısından

- ✓ Daha Kolay Öğrenim
- ✓ Apikal ve Bazal Alanlara Kolay Ulaşım

VATS Ne Yapabiliriz

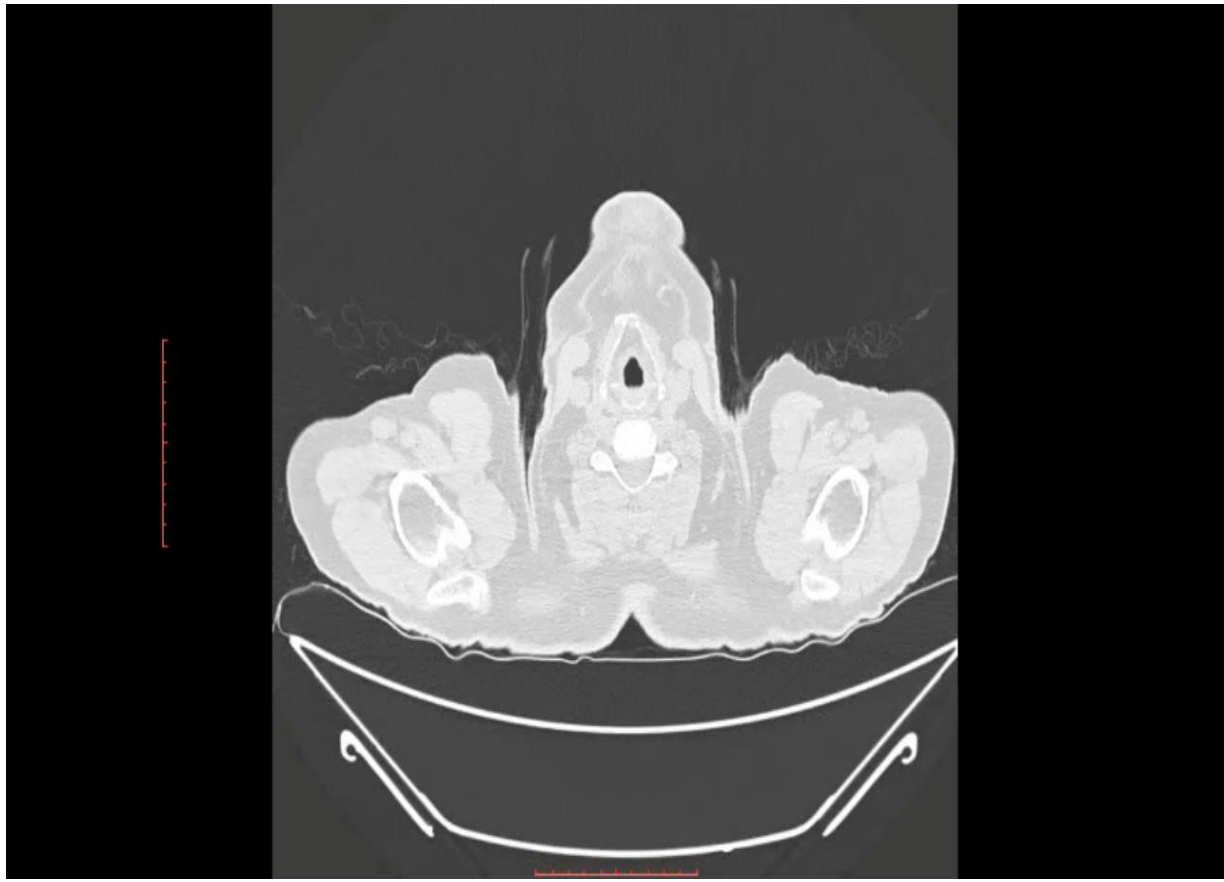
Tanısal İşlemler

Terapötik

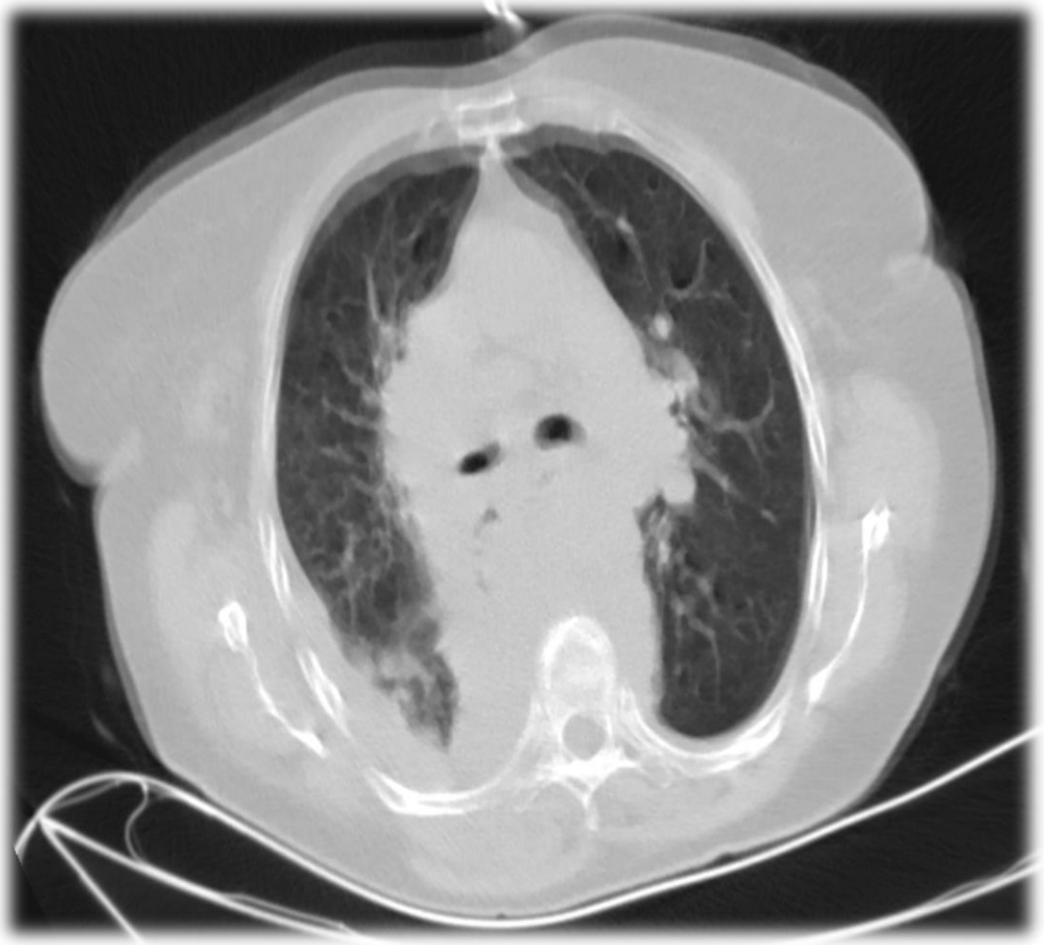
Akciğer Biyopsisi

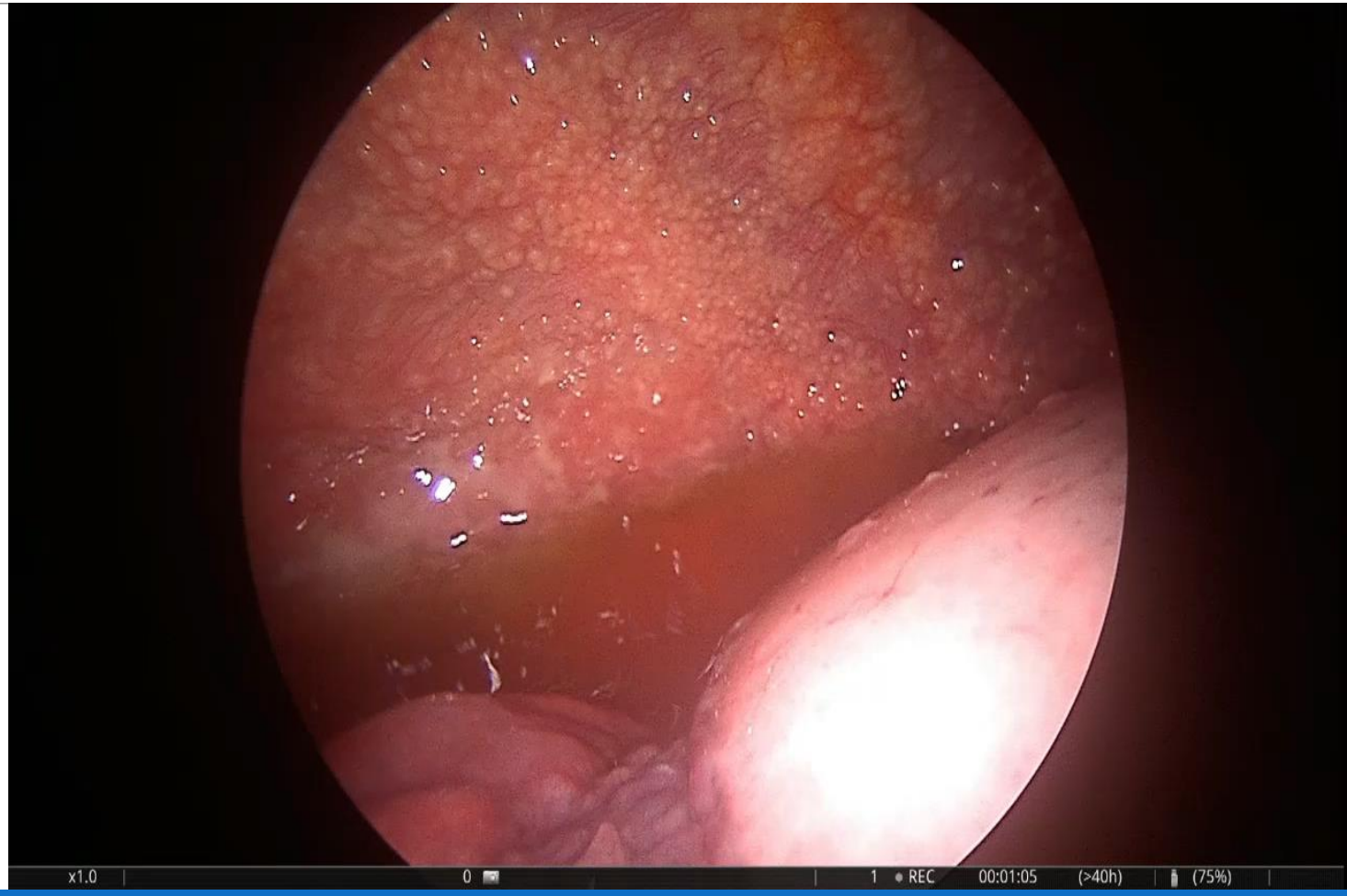
Cerrahi akciğer biyopsi diffüz intertisyel akciğer hastalığında detaylı tanı için önerilen altın standart yöntemdir.

İAH ‘da en az 2 farklı lobtan biyopsi alınır



Plevral Noduller





Akciğer Kanseri

Akciğer kanserli hastaların ancak **%15'ine** erken evrede tanı konulabilmektedir.

Evre 1 KHDAK'de ise hastalarının **%65'inin** tedavi olabilme şansı olabilmektedir

Bu hastalıkta en iyi tedavi şansı **CERRAHİ** rezeksiyondur.

VATS REZEKSİYON

Endikasyonlar

- Erken Evre Akciğer Kanseri
- Tümör Çapı <6 cm
- Benign Hastalıkları (Bül, Sekestrasyon)

VATS Segmentektomi

Tümör çapının 2 cm veya daha küçük olması

Kısıtlı akciğer kapasitesi olan hastalarda (FEV1 beklenenin %50'sinden az olması)

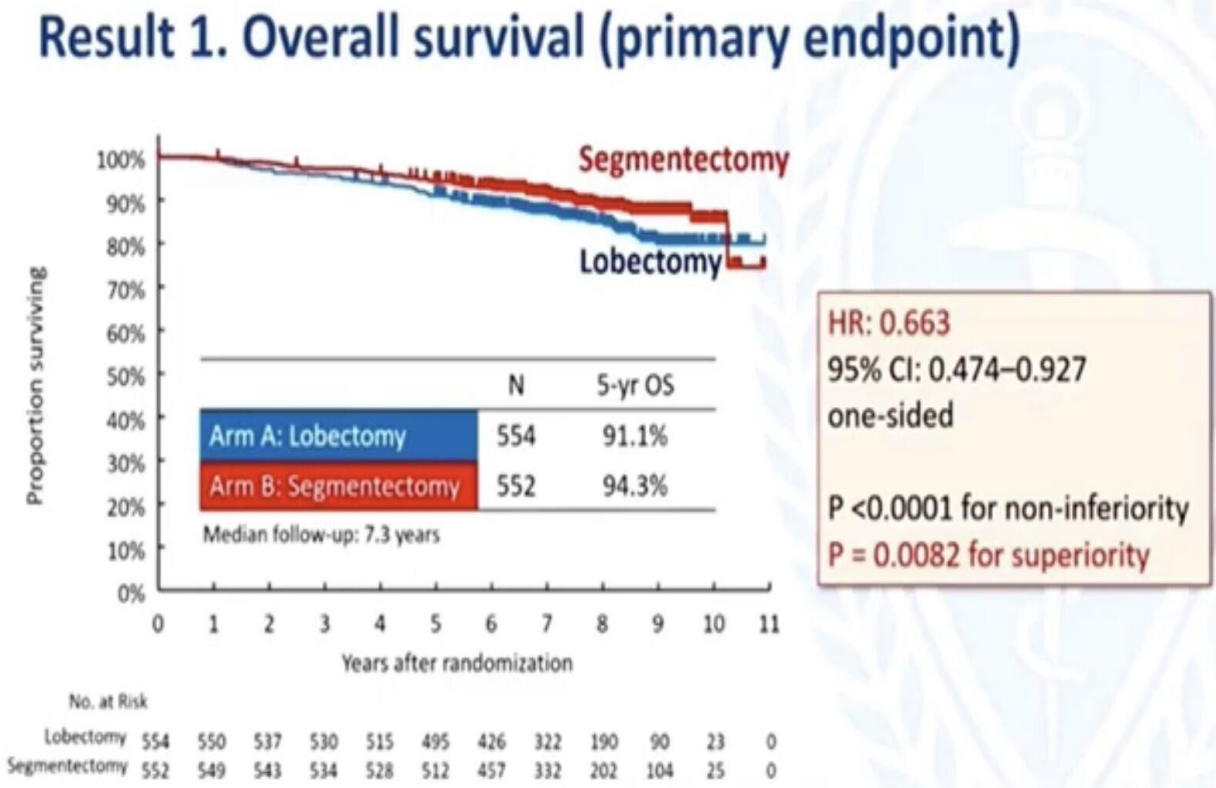
Tümörün anatomik olarak segment rezeksiyonuna uygun olması gerekmektedir.

Lokal Rekürrens?

JCOG0802/WJOG4607L

Evre 1a/b Tümörlerde

- Genel sağkalım Segmentektomi > Lobektomi
- Segmentektomi için nodal negatifliğin sağlanması (f/s çalışılması)
- Radikal LN diseksiyonu

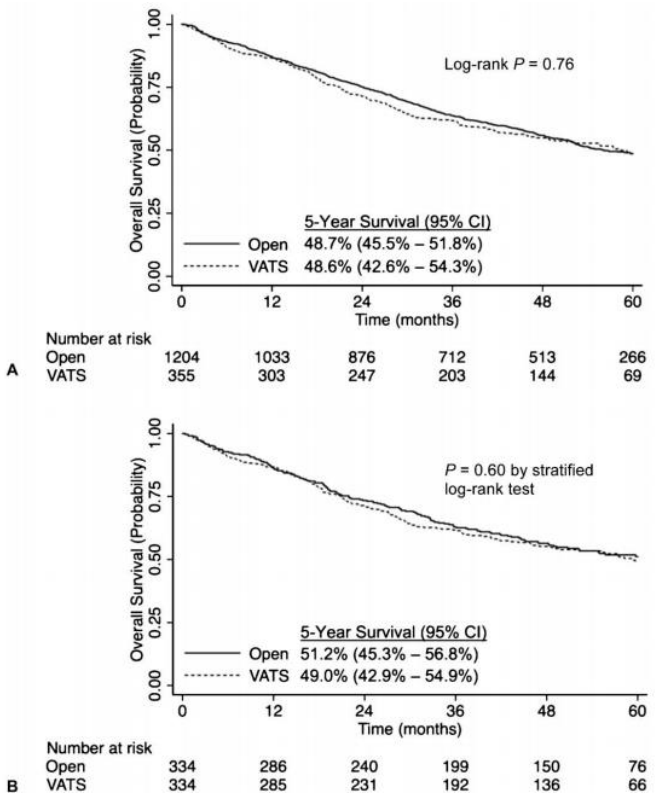


VATS Gerekli Mi?

A National Analysis of Short-term Outcomes and Long-term Survival Following Thoracoscopic Versus Open Lobectomy for Clinical Stage II Non-Small-Cell Lung Cancer

Chi-Fu Jeffrey Yang, MD,† Arvind Kumar, BS, John Z. Deng, BS,† Vignesh Raman, MD,* Natalie S. Lui, MD,† Thomas A. D'Amico, MD,* and Mark F. Berry, MD†‡*

1559 hasta



VATS vs Torakotomi

- Lenf nodu upstage % 12.0 vs %10.5 p= 0.41
- **30 Gün Mortalite % 2.3 vs %3.1 p=0.31**

5-yıl sağkalım : % 48.6 vs %48.7, p=0.76
HR VATS : 1.08, 95% CI: 0.90–1.30, p=0.39

TABLE 5. Open Versus VATS Converted to Open Lobectomy for Patients With cT1-2, N1, M0 NSCLC: Perioperative and Postoperative Data

	Total Cohort			Propensity Score-matched Analysis		
Variable	Open (N = 1,204)	VATS Converted to Open (N = 73)	P	Open (N = 70)	VATS Converted to Open (N = 70)	P
Treatment specifics						
Days to definitive surgery (IQR)	33 (15,50)	34 (16,49)	0.51	33.5 (12,57)	34 (16,49)	0.93
Days to adjuvant therapy (IQR)						
Adjuvant radiotherapy*	111.5 (70.5,176.5)	93.5 (54.5,184)	0.49	114 (75,186)	93.5 (54.5,184)	0.32
Adjuvant chemotherapy†	76 (57,105)	87 (61,106)	0.57	88 (65.5,117)	86 (58,107)	0.87
Adjuvant therapy, n (%)			0.56			1.00
Adjuvant radiotherapy	19 (1.6%)	<10		0 (0.0%)	<10	
Adjuvant chemotherapy	536 (44.5%)	27 (37.0%)		30 (42.9%)	26 (37.1%)	
Adjuvant chemoradiation	135 (11.2%)	11 (15.1%)		11 (15.7%)	11 (15.7%)	
Surgical endpoints						
Nodes removed (IQR)	10 (6,16)	14 (8,21)	0.003	13 (7,20)	14 (9,21)	0.89
Surgical margins, n (%)						0.38
Negative	1110 (92.2%)	69 (94.5%)	0.52	64 (91.4%)	66 (94.3%)	
Positive margin-microscopic	42 (3.5%)	<10		<10	<10	
Positive margin-macroscopic	<10	0 (0.0%)		0 (0.0%)	0 (0.0%)	
Short-term outcomes						
30-d mortality, n (%)	37 (3.1%)	<10	0.62	<10	<10	1.00
30-d readmission, n (%)	71 (5.9%)	<10	0.74	<10	<10	1.00
Hospital length of stay (days, IQR)	6 (4,9)	6 (4,9)	0.95	6 (5,9)	6 (4,9)	0.55
Tumor characteristics						
Pathologic T status, n (%)‡			0.43			0.88
T0 (in situ)	<10	0 (0.0%)		0 (0.0%)	0 (0.0%)	
T1	475 (39.5%)	36 (49.3%)		32 (45.7%)	35 (50.0%)	
T2	619 (51.4%)	31 (42.5%)		31 (44.2%)	30 (42.9%)	
T3	57 (4.7%)	<10		<10	<10	
T4	16 (1.3%)	<10		<10	<10	
Pathologic N status, n (%)§			0.071			0.38
N0	250 (20.8%)	14 (19.2%)		14 (20.0%)	13 (18.6%)	
N1	790 (65.6%)	44 (60.3%)		48 (68.6%)	42 (60.0%)	
N2	124 (10.3%)	14 (19.2%)		<10	14 (20.0%)	
N3	12 (1.0%)	0 (0.0%)		0 (0.0%)	0 (0.0%)	

*Data available for 164 patients from the total cohort, 23 patients in the propensity score-matched analysis.
†Data available for 690 patients from the total cohort, 75 patients in the propensity score-matched analysis.
‡Data available for 1,241 patients from the total cohort, 138 patients in the propensity score-matched analysis.
§Data available for 1,248 patients from the total cohort, 138 patients in the propensity score-matched analysis.

Uniportal VATS?

Uniportal versus multiportal thoracoscopic lobectomy

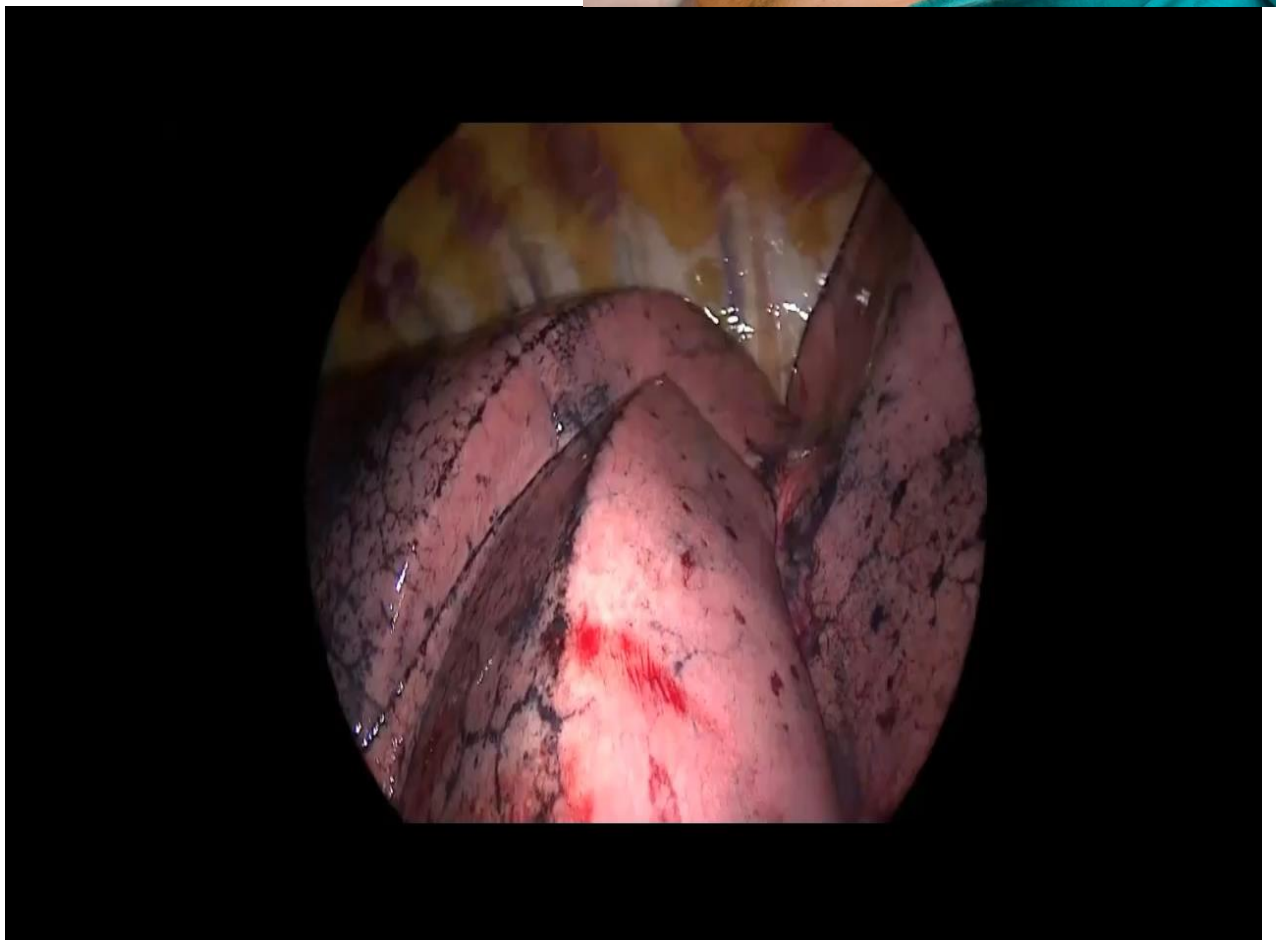
Ergonomic evaluation and perioperative outcomes from a randomized and controlled trial

Jie Yao, MD, Zhibo Chang, MD, Lin Zhu, MS, Junqiang Fan, MD*

Surgical and postoperative data.

Characteristic	UVATS (n=35)	MVATS (n=34)	*P* value
Surgical time, min	96.77±24.38	95.41±20.11	.810
Blood loss, mL	34.14±25.01	51.47±40.84	.048
ICU, d	0	0	
Hospital stay, d	3.80±0.90	4.65±2.33	.144
Chest tube duration, d	2.71±0.83 (2–6)	3.26±1.96 (1–11)	.343
Lymph nodes harvested	31.97±9.18 (17–53)	30.50±9.35 (15–56)	.512
Positive lymph nodes (%)	8 (0.71)	50 (4.82)	.547
Total drainage in 24hours, mL	227.94±117.69	308.24±145.13	.018
Conversion rate	0	0	
Motality	0	0	
Complications (%)	4 (11.4)	9 (26.5)	.276
Air leak (>6 days)	0	4 (11.8)	
Atrial fibrillation	0	0	
Bleeding	0	0	
Atelectasis	0	0	
Bronchopleural fistula	0	0	
Death	0	0	
Pneumonia	0	0	
Chylothorax	0	1 (2.9)	
Reoperation	0	0	
Reinsertion of chest tube	4 (11.4)	3 (8.8)	
Hoarseness	0	1 (2.9)	
Lung function			
FEV_1, L (3 wks)	1.87±0.42	1.89±0.45	.866
FEV_1 (%) (3 wks)	72.39±14.41	72.80±13.02	.901
FEV_1, L (3 mo)	2.11±0.49	2.17±0.52	.659
FEV_1 (%) (3 months)	82.20±16.47	82.14±14.14	.988

FEV_1 (%) = first second forced expiratory volume accounts for the percentage of FVC (forced vital capacity), FEV_1 (L) = forced expiratory volume in 1 second, ICU = intensive care unit, MVATS = multiple-portal video-assisted thoracoscopic surgery, UVATS = uniportal video-assisted thoracoscopic surgery.



Ne Kadar Agresif Olmalıyız?

- Onkolojik cerrahideki ana prensip R0 rezeksiyon gerçekleştirirken; parankim koruyucu cerrahi yapmaktır.
- Pnömonektomi gibi mortalite ve morbidite oranı yüksek rezeksiyonlardan olabildiğince kaçınmak gereklidir.

Original Article

Sleeve lobectomy compared with pneumonectomy for operable centrally located non-small cell lung cancer: a meta-analysis

Zhengjun Li[1], Wei Chen[2], Mozhu Xia[3], Hongxu Liu[2], Yongyu Liu[1], Ilhan Inci[4], Fabio Davoli[5], Ryuichi Waseda[6], Pier Luigi Filosso[7], Abby White[8]

Variables	No. of studies furnishing data	Results, %		OR (95% CI)	P value	I^2, %
		SL	PN			
Operative mortality	13 (8,10,11,17-19,23-28,30)	2.62	6.30	0.40 (0.25–0.63)	<0.0001	0
30-day mortality	12 (14-16,20-22,29,32-36)	2.78	5.86	0.55 (0.32–0.96)	0.04	55
Local recurrence	15 (8,10,13,16,17,19,21,25,27,28,30-34)	15.65	22.81	1.09 (0.72–1.64)	0.69	50
Distant recurrence	9 (10,21,27,28,30-34)	19.81	30.64	0.61 (0.45–0.82)	0.001	0
Complication	15 (10,13,14,16-21,24,28,29,31-33)	29.39	30.58	1.07 (0.87–1.31)	0.55	27
Overall survival						
1-year	8 (11,14,15,20,21,28,29,35)	38.00	18.26	1.53 (1.31–1.80)	<0.00001	4
3-year	11 (11,13,17,20,21,27-30,32,35)	27.80	10.95	1.78 (1.47–2.17)	<0.00001	30
5-year	20 (8,11,13,14,16-22,25-29,32-35)	25.77	7.34	1.96 (1.70–2.27)	<0.00001	43
Subgroup overall survival (N0, N1 and N2 patients)						
3-year (N2 patients)	3 (13,17,22)	29.78	19.51	1.12 (0.47–2.68)	0.79	35
5-year (N2 patients)	3 (8,13,18)	19.77	18.69	1.27 (0.65–2.45)	0.48	44
5-year (N0 and N1 patients)	5 (8,13,17,18,22)	57.77	37.29	2.14 (1.66–2.78)	<0.00001	13

VATS Sleeve Rezeksiyon

World J Surg
https://doi.org/10.1007/s00268-020-05877-5

SCIENTIFIC REVIEW

Video-Assisted Thoracoscopic Sleeve Lobectomy for Centrally Located Non-small Cell Lung Cancer: A Meta-analysis

Han-Yu Deng[1] · Xiao-Ming Qiu[1] · Da-Xing Zhu[1] · Xiaojun Tang[1] · Qinghua Zhou[1]

Table 2 Main outcomes extracted from the studies included in our meta-analysis

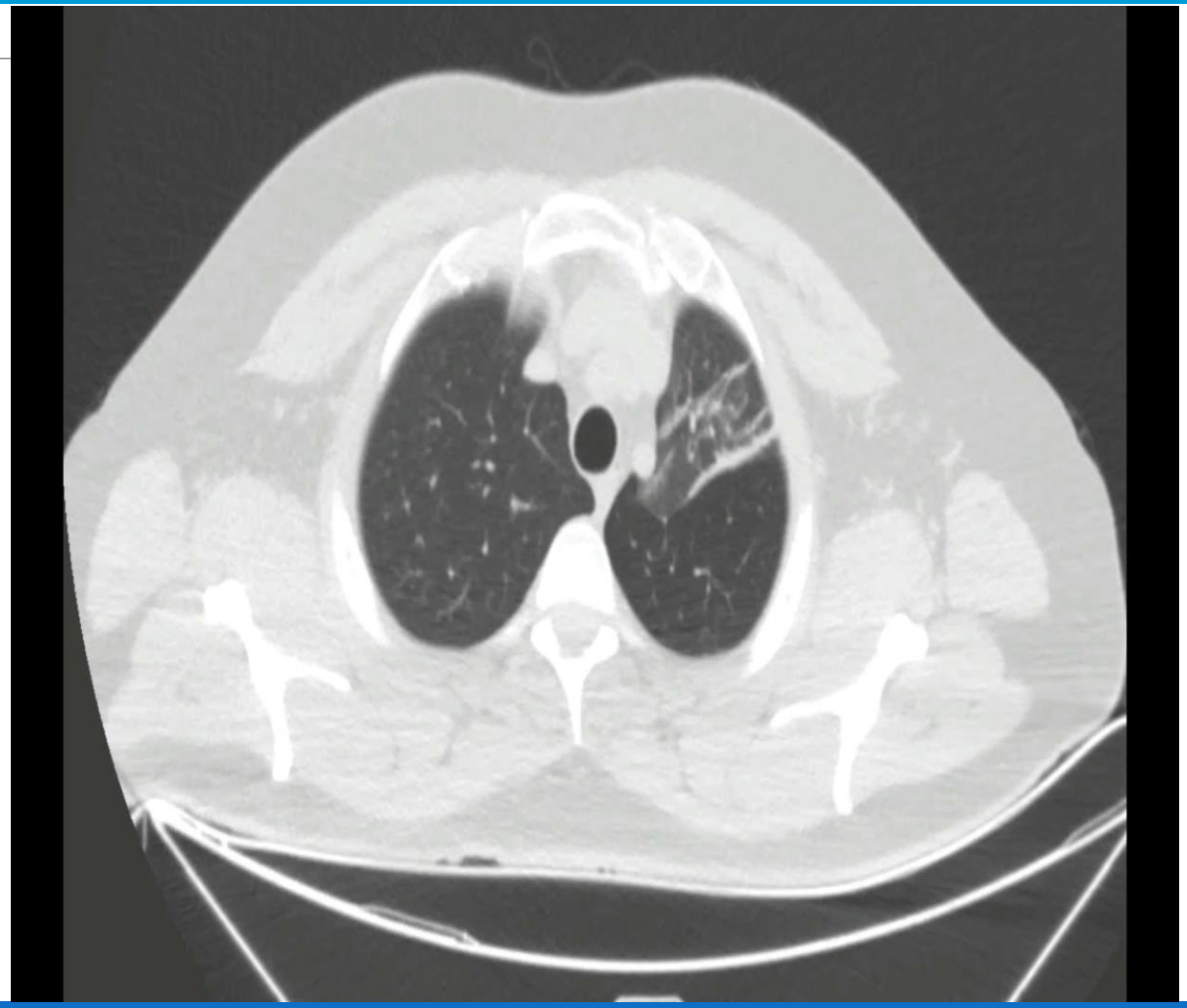
Studies	Blood loss (ml)		Number of lymph node dissected		Operation time (minute)		Postoperative hospital stay (day)		Complication rate[a]		3-year OS rate[b]		3-year PFS rate[c]	
	VATS group	Open group	VATS group	Open group	VATS group	Open group	VATS group	Open group	VATS group	Open group	VATS group	Open group	VATS group	Open group
[11]	133.3 ± 74.1	179.2 ± 101.9	12.3 ± 4.8	12.6 ± 3.8	198.8 ± 58.3	197.5 ± 59.3	6 ± 1.5	7 ± 1.5	5/67	12/104	49/23	76/40	44/28	62/54
[9]	227.7 ± 158.9	246.4 ± 79.9	21.3 ± 6.8	21.5 ± 11.5	300.3 ± 71.7	221 ± 48.7	9.2 ± 3.5	11.3 ± 7.2	NA	NA	31/8	26/13	23/16	19/20
[10]	182.5 ± 134.6	222.2 ± 130.4	22.9 ± 8.3	22.9 ± 9.9	291.5 ± 87.2	240 ± 47.8	NA	NA	10/28	11/28	25/13	23/26	25/13	21/18
[8]	166.7 ± 74.1	200 ± 222.2	10 ± 3.7	10.3 ± 5.2	240 ± 88.9	180 ± 88.9	5.7 ± 2.2	6.3 ± 2.2	3/18	1/20	20/1	20/1	11/10	12/9
[7]	406 ± 200	318 ± 198	25.7 ± 6.5	22 ± 8.3	226 ± 37	166 ± 40	11.6 ± 2.8	16.1 ± 4.9	1/9	10/31	7/3	26/15	NA	NA

OS overall survival; *PFS* progression-free survival; *VATS* video-assisted thoracoscopic surgery; *NA* not available

[a]Expressed as no. with complication/no. without complication;

[b]Expressed as no. alive/no. death;

[c]Expressed as no. progression-free/no. other conditions



Pnömonektomi

İlk 30 günde mortaliteyi %5.7

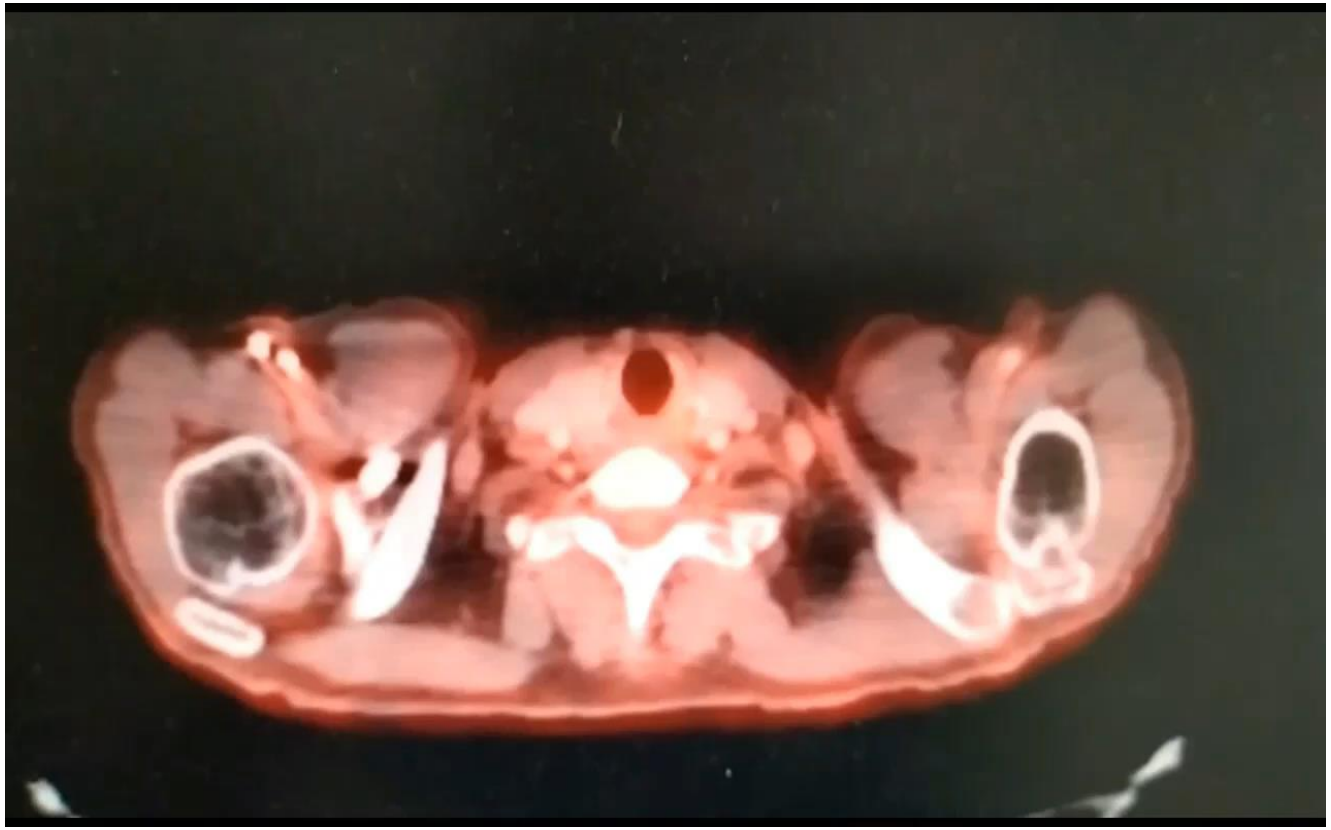
Komplikasyon oranını ise %33

Mortalite Riskinin

- >65 Yaş
- İndüksiyon tedavisi
- ASA skorunun >3
- Sağ Rezeksiyon
- Ekstended akciğer rezeksiyonu

Pneumonectomy for lung cancer: Contemporary national early morbidity and mortality outcomes

Pascal A. Thomas, MD, FECTS,[a] Julie Berbis, MD,[b] Jean-Marc Baste, MD,[c]
Françoise Le Pimpec-Barthes, MD,[d] François Tronc, MD,[e] Pierre-Emmanuel Falcoz, MD,[f]



ORIGINAL ARTICLE

Subxiphoid uniportal thoracoscopic pulmonary segmentectomy for stage I non-small cell lung cancer: Feasibility, quality of life and financial worthiness

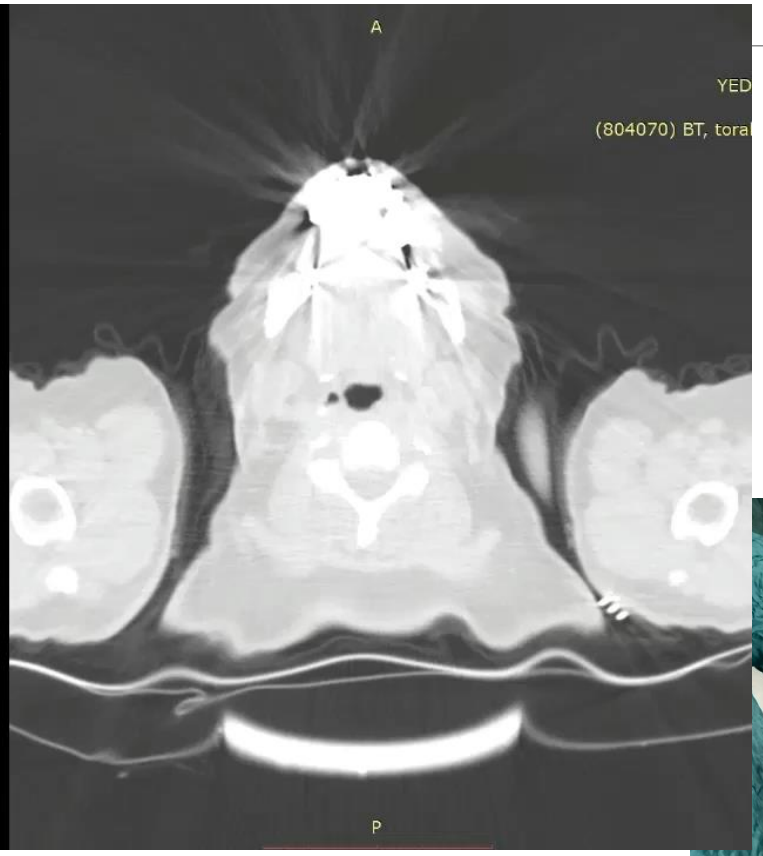
Amr Abdellateef[1,2], Xiaoyu Ma[3], Zhigang Chen[4], Liang Wu[2], Jianqiao Cai[2] & Lei Jiang[2]

1 Department of Cardiothoracic Surgery, Mansoura University Hospital, Mansoura School of Medicine, Mansoura University, Mansoura, Egypt
2 Department of Thoracic Surgery, Shanghai Pulmonary Hospital, Tongji University School of Medicine, Shanghai, China
3 Thoracic Surgery Department, Second Hospital of Hebei Medical University, Shijiazhuang, China
4 Department of Anesthesiology, Shanghai Pulmonary Hospital, Tongji University School of Medicine, Shanghai, China

Table 4 Postoperative pain scoring, quality of life, hospital cost

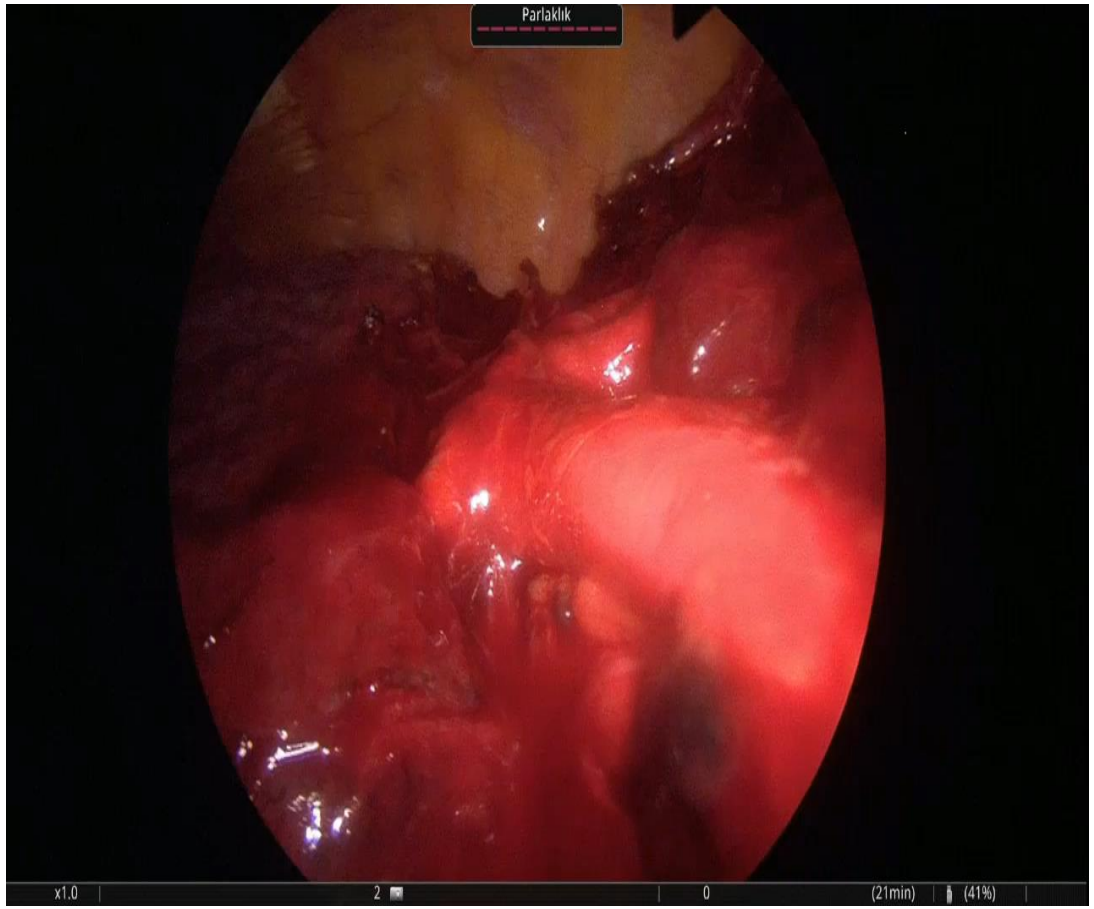
	Intercostal (mean ± SD)	Subxiphoid (mean ± SD)	*P*-value
Postoperative pain scoring			
Postoperative pain (POD) zero	4.51 ± 0.88	3.29 ± 1.14	<0.001
Postoperative pain (POD) 1	4.25 ± 0.61	2.68 ± 0.80	<0.001
Postoperative pain (POD) 3	2.1 ± 0.4	1.5 ± 1.01	<0.001
Postoperative pain before discharge	1.8 ± 0.36	0.94 ± 0.7	<0.001
Quality of life score			
Quality of life after three months	68.10 ± 2.55	66.49 ± 2	<0.001
Quality of life after six months	64.86 ± 2.21	63.17 ± 1.53	<0.001
Quality of life after one year	60.95 ± 1.36	60.22 ± 0.71	<0.001
Cost (expressed in RMB)			
Cost, median (min-max)	45 277 (35 967.69–66 711.48)	51 535 (34 535–61 100)	<0.001

Subksifoid Yaklaşım



Uniportal Yaklaşımın Dezavantajı

- ✓Öğrenim Zorluğu
- ✓Özelleştirilmiş Aletlerin Gerekliliği
- ✓Teknik Olarak Zor
- ✓Aletlerin Sıkışması «Twister»
- ✓Doğru Stapler Açılarını Bulmakta Zorluk



Trakea Cerrahisi

56 Yaş / Kadın

Komorbidite

- Yok

COVID sonrasında

uzamış entübasyon

Sempatektomi

Original Article | Published: 21 September 2019

Is there any relationship between quality of life and the level of sympathectomy in primary palmar hyperhidrosis? Single-center experience

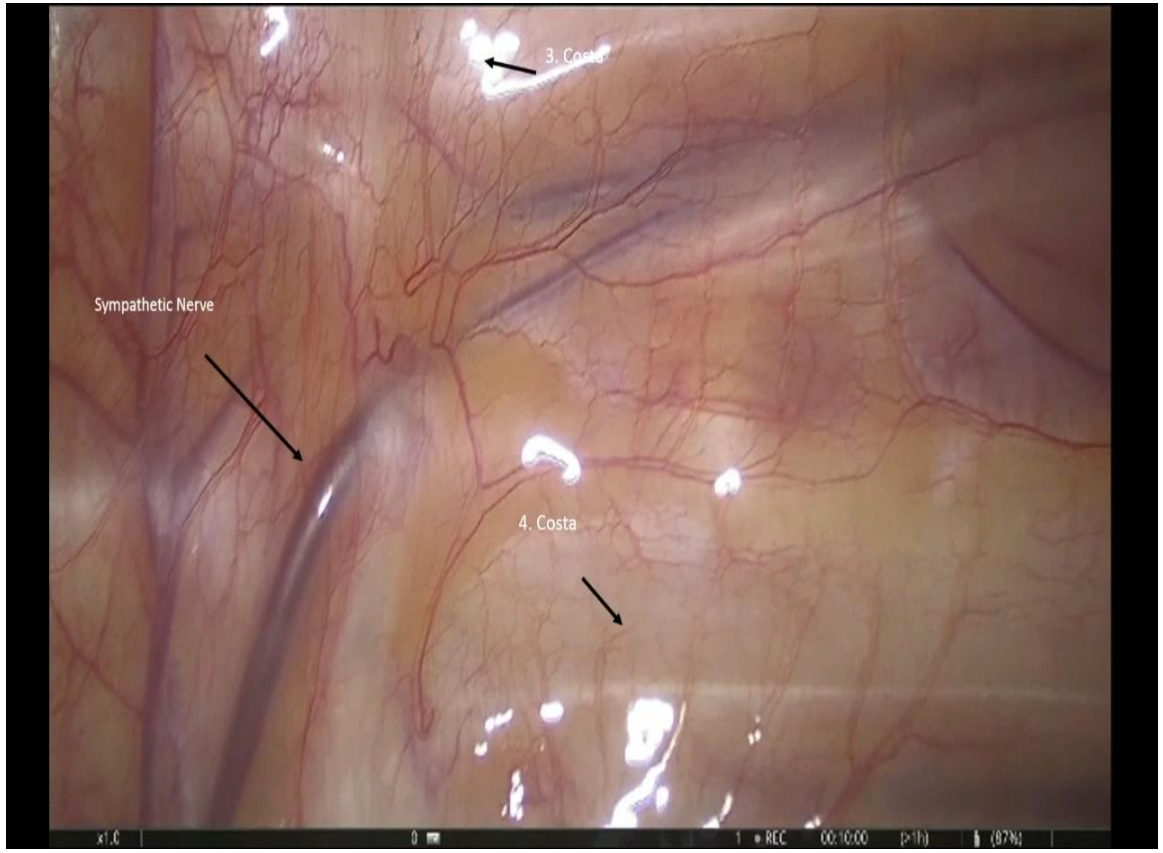
Mustafa Vedat Dogru ✉, Celal Bugra Sezen, Oguz Girgin, Levent Cansever, Celalettin Ibrahim Kocaturk, Muzaffer Metin & Seyyit Ibrahim Dincer

General Thoracic and Cardiovascular Surgery **68**, 273–279 (2020) | Cite this article

239 Accesses | **6** Citations | Metrics

Table 3 Comparison of postoperative quality of life and surgical level

Variables	T2–4 [*n* (%)]	T3–4 [*n* (%)]	T3 [*n* (%)]	*p* value
Postoperative quality of life				
Very low	3 (100)	0	0	<0.001
Low	5 (83.3)	1 (16.7)	0	
Fair	17 (60.7)	3 (10.7)	8 (28.6)	
High	13 (52)	10 (40)	2 (8)	
Very high	24 (23.3)	32 (31.1)	47 (45.6)	



LVRS AMAÇ?

Terminal Hava Yolu Distalinde Anormal Genişleme

Fibrozis olmadan alveoler destruksiyon

Akciğer elastik recoil artar ⇧

⇩

Ekspiratuar akım artar ⇧

⇩

Hava hapsi ve hiperinflasyon ⇩

⇩

Artmış ventilasyon ve azalmış dispne

⇩

Egzersiz performansı ve hayat kalitesinde düzelme

GOLD REHBERİ 2020

IYI ADAY

Fiziksel durum

<75 yaş
Sigara bırakma >6 ay
Prednizolon<10 mg/gün
Yandaş hastalık yok
İyi nütrisyonel durum
İyi motivasyon

Radyoloji

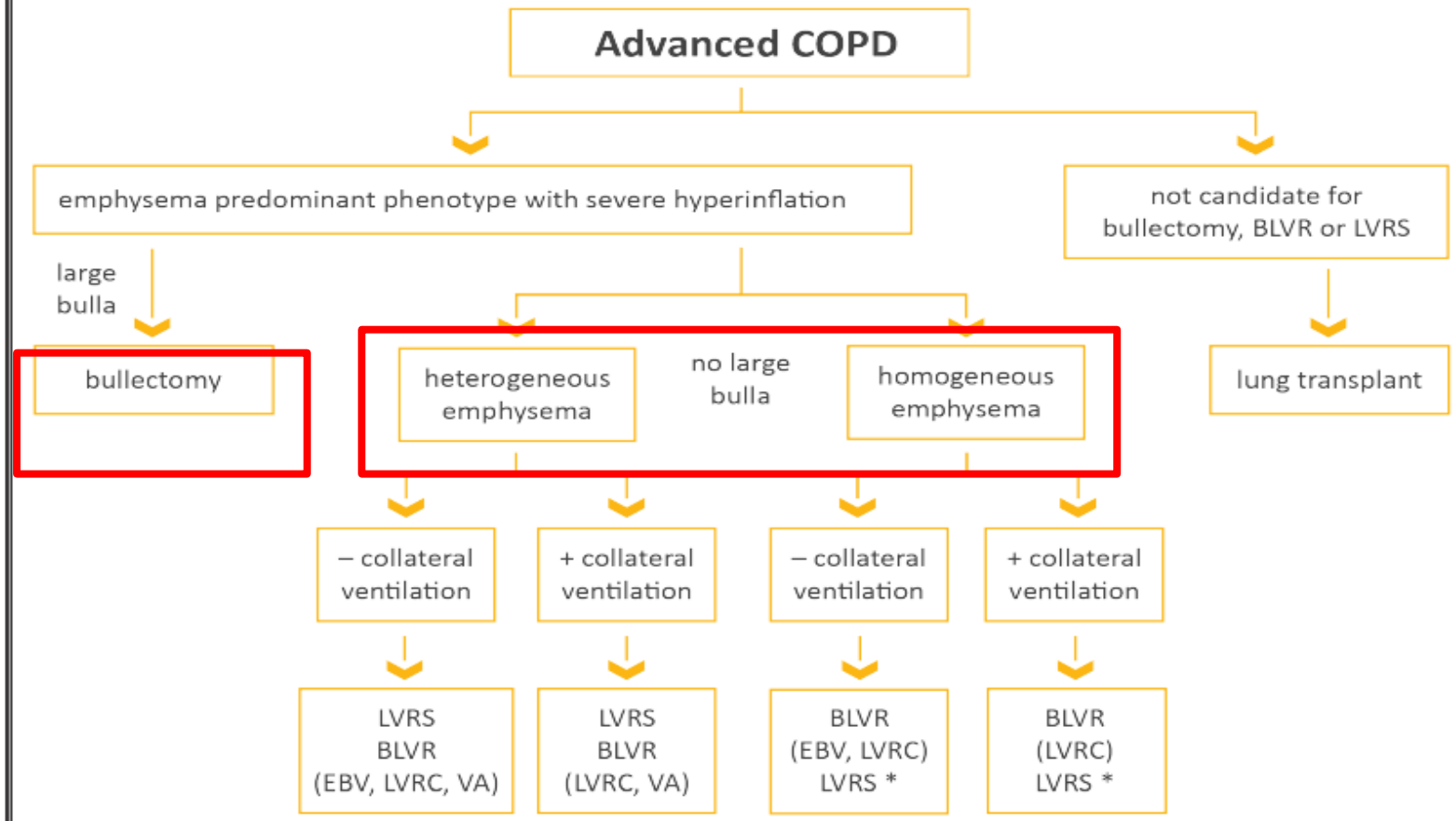
X-ray de hiperinflasyon
Heterojen amfizem
Üst lob baskın amfizem

Fonksiyon durum

FEV1<%40
TLC>%120
RV>%150
DLCO>%20
6 DYT >140 m

INTERVENTIONAL BRONCHOSCOPIC AND SURGICAL TREATMENTS FOR COPD

Overview of various therapies used to treat patients with COPD and emphysema worldwide. Note that all therapies are not approved for clinical care in all countries. Additionally, the effects of BLVR on survival or other long term outcomes or comparison to LVRS are unknown.

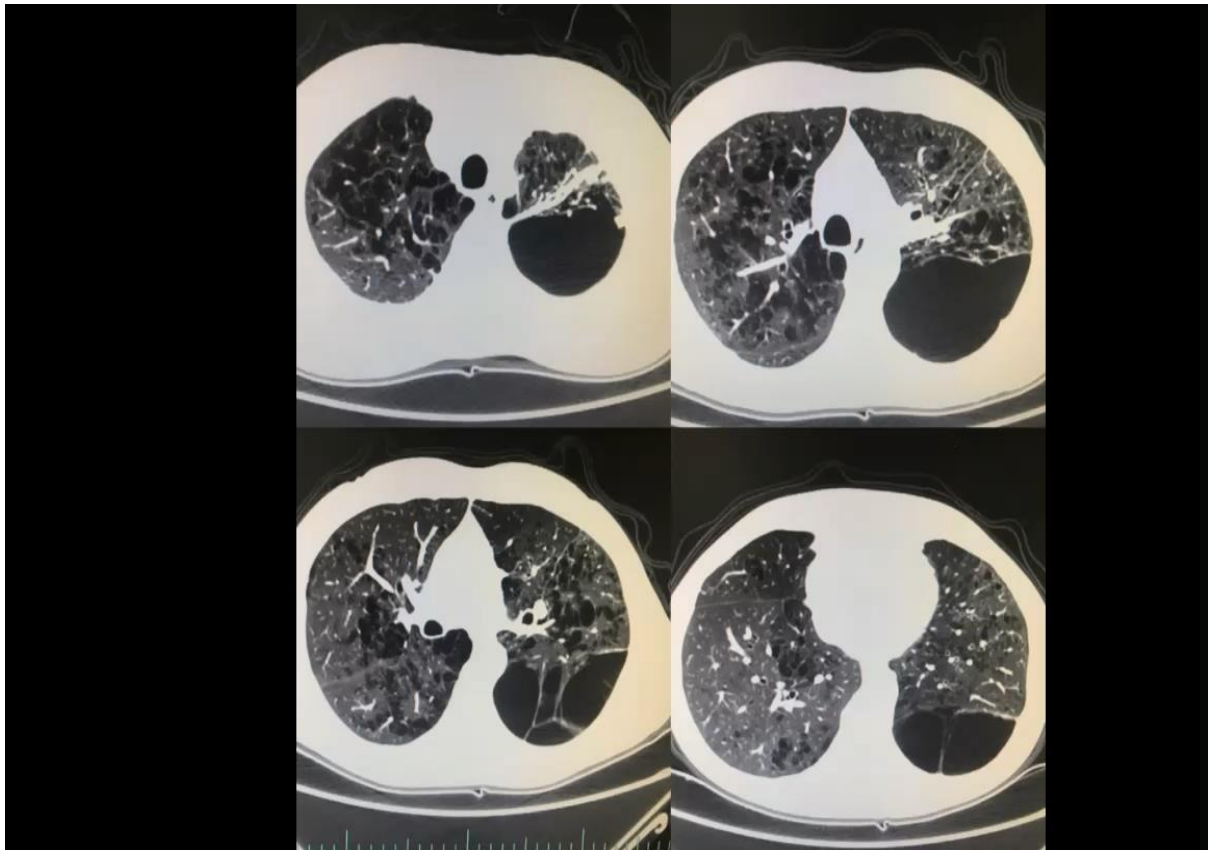


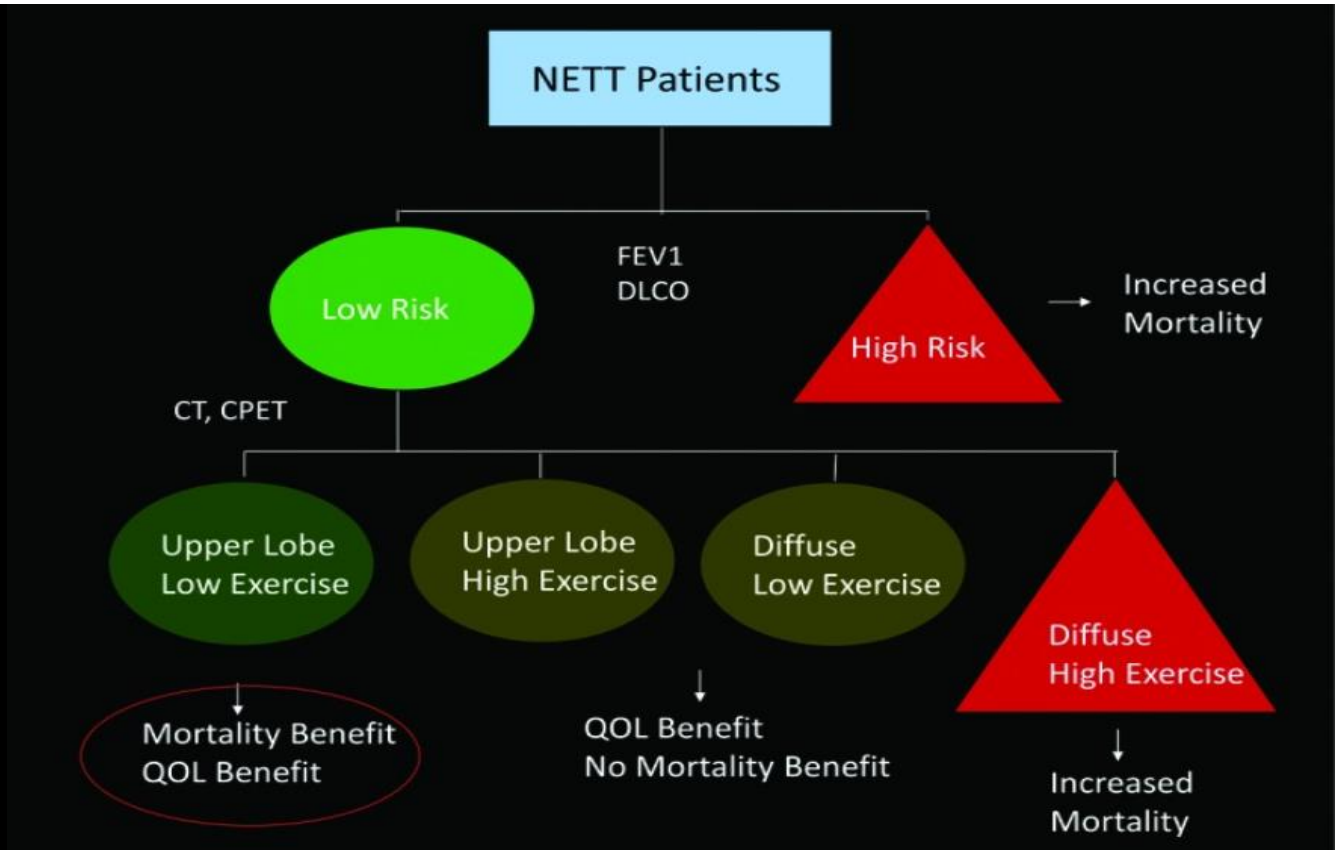
Definition of Abbreviations: BLVR, Bronchoscopic Lung Volume Reduction, EBV, endobronchial Valve, LVRS, Lung volume reduction surgery, LVRC, Lung volume reduction coil, VA, Vapor ablation

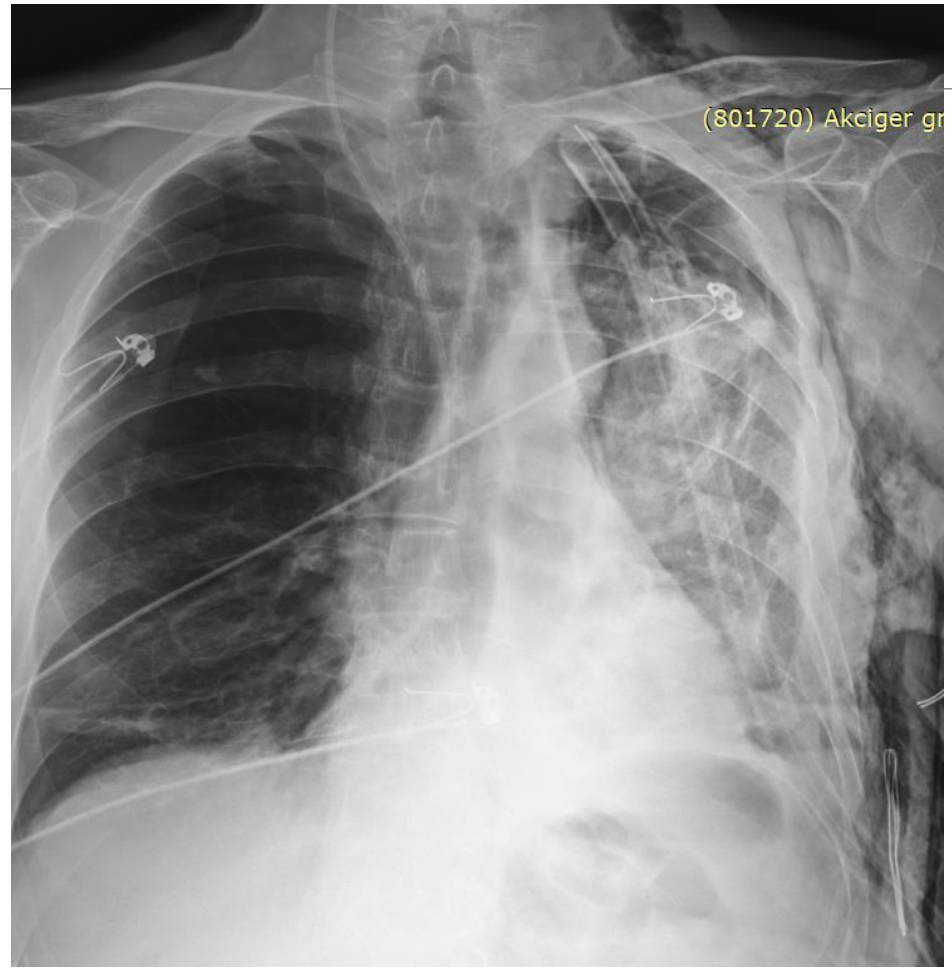
*at some but not all centers

FIGURE 4.6

Heterojen Amfizem



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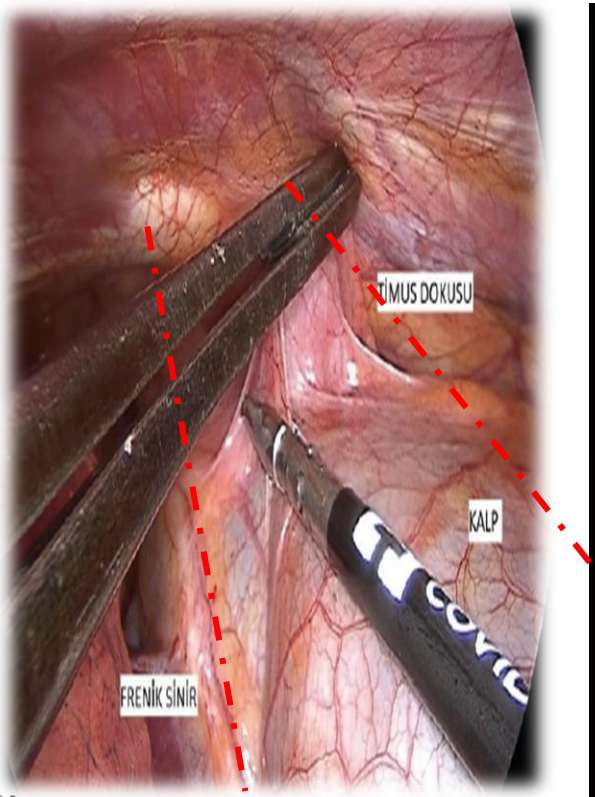
TİMEKTOMİ ACİL BİR OPERASYON DEĞİLDİR!

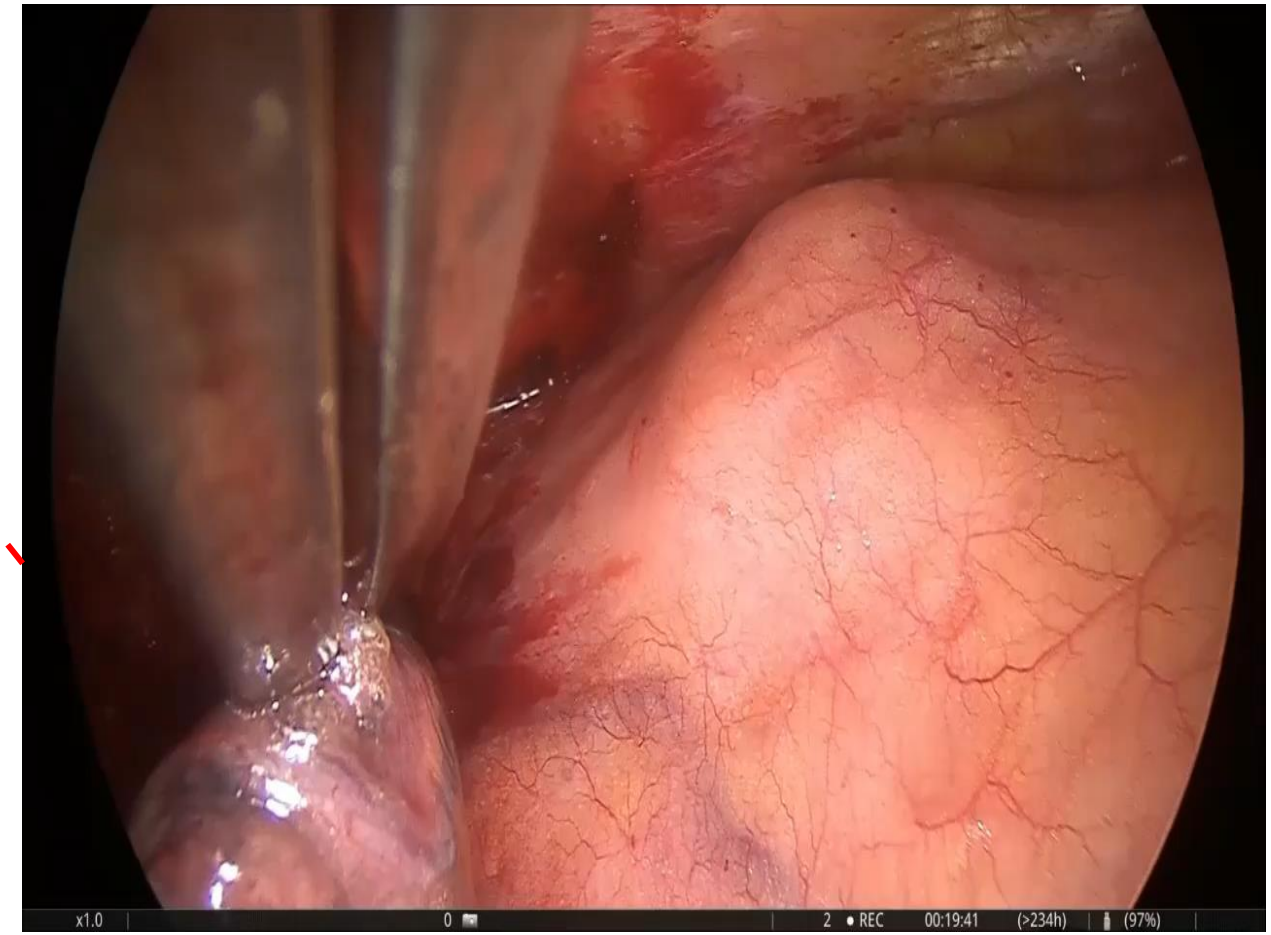
Anterior Mediasten Cerrahisi

➢**Hazırlık**

•M. Gravis Hastalığı hakkında bilgi

•Cerrah-Nöroloji-Anestezi iş birliği





Standard Terms, Definitions, and Policies for Minimally Invasive Resection of Thymoma

Alper Toker, MD, Joshua Sonett, MD,† Marcin Zielinski, MD,‡ Federico Rea, MD,§ Victor Tomulescu, MD,‖ and Frank C. Detterbeck, MD¶*

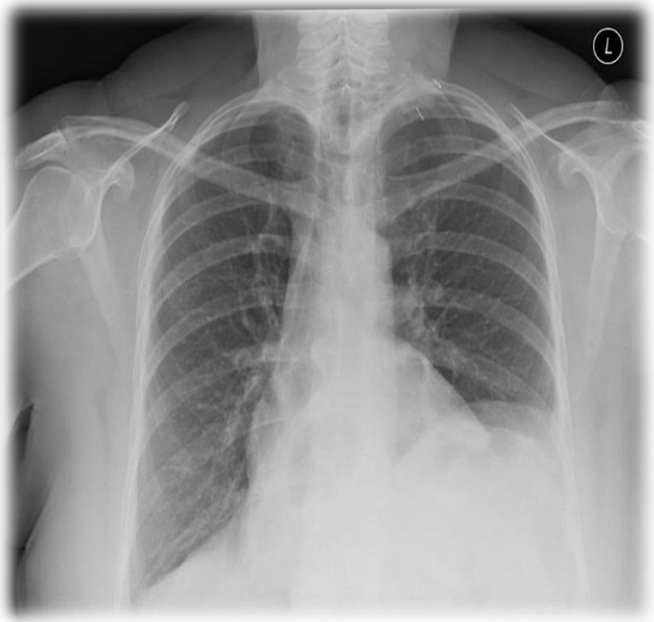
Diaphragma Eventrasyonları

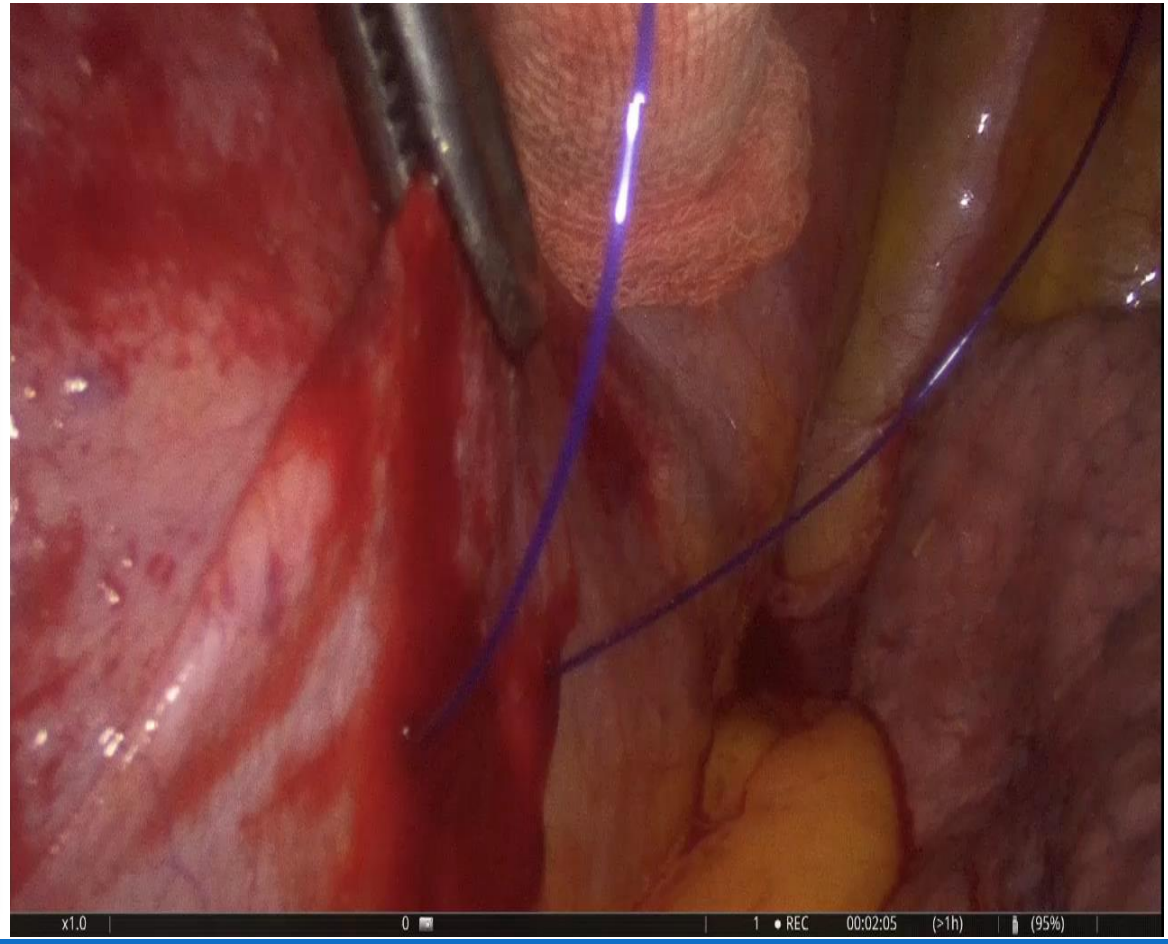
Frenik sinir paralizisi durumlarında (travmatik,

cerrahiye sekonder) diafragma eventrayonu gelişmektedir.

Amaç

- Atelektazi, lober konsolidasyon gibi problemler düzeltmek
- Solunum kapasitesi arttırılmaktadır.





Yeni Teknolojiler

Akıllı Robot Teknolojisi RATS

Cerrah Destekli Robotik Cerrahi

VATS + RATS

Cerrah Destekli Robotik Cerrahi

Surgeon-Powered Robotics in Thoracic Surgery; An Era of Surgical Innovation and Its Benefits for the Patient and Beyond

Jason Trevis*†, Nicholas Chilvers†, Kathrin Freystaetter and Joel Dunning

Department of Cardiothoracic Surgery, James Cook University Hospital, Middlesbrough, United Kingdom

Benefits	Challenges
Lead surgeon at the bedside	Combination of VATS and robotic techniques
Surgeons performs the key steps e.g., stapling	Resistance of the chest wall in the port due to VATS style pivot point
Increased tactile feedback	Camera technology development/advancement
Greater precision	Operator experiences the fulcrum effect
More cost effective	
Less training time required	
Quicker procedures with increased flexibility	

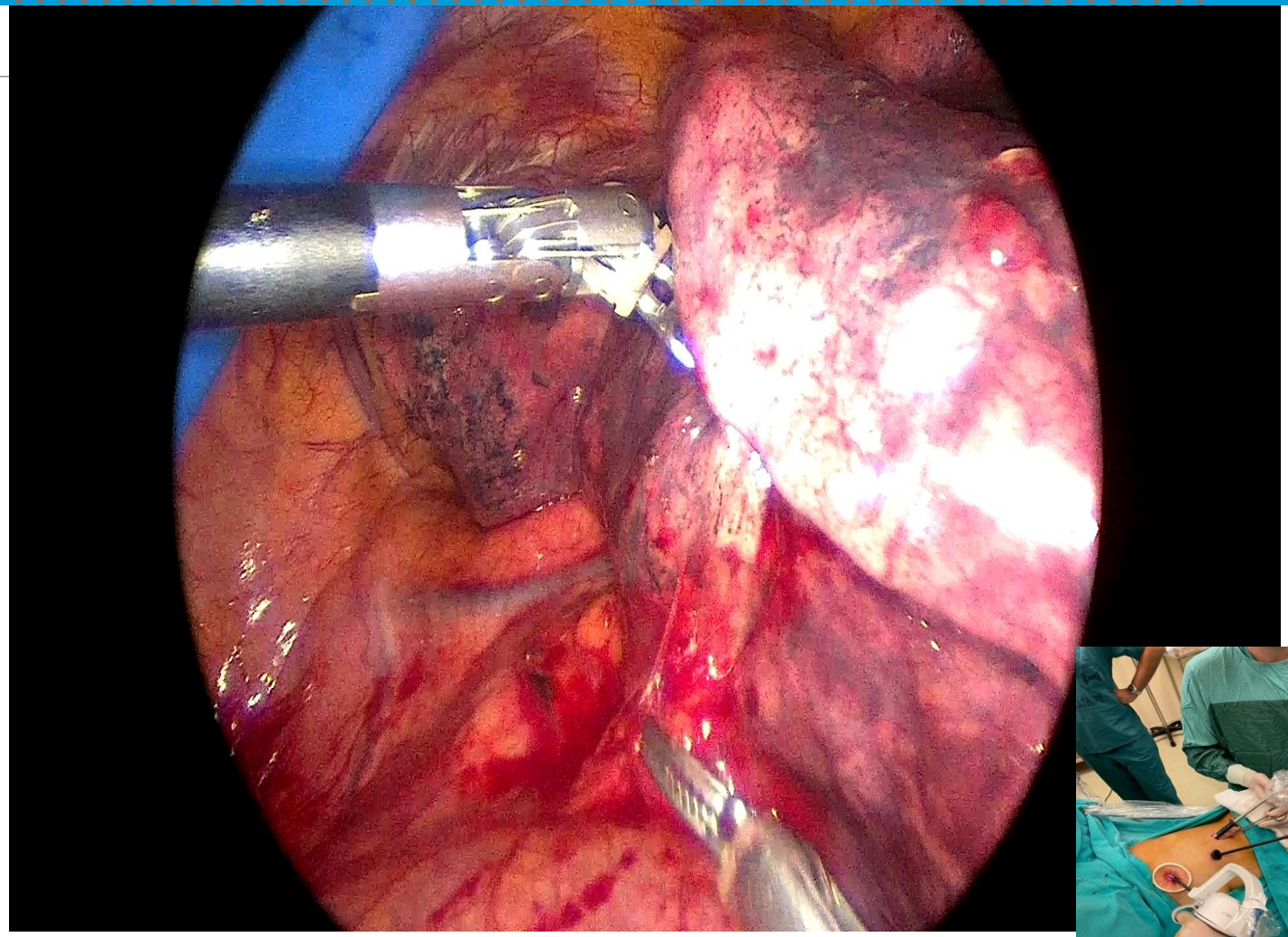
Cerrah Destekli Robotik Cerrahi

60 Yaş / Kadın

Komorbidite

- Koroner Arter Hastalığı (Stent)
- SVO Öyküsü
- MS nedeniyle Takipli

TTIABX : KHDAK



Uniportal SpRS

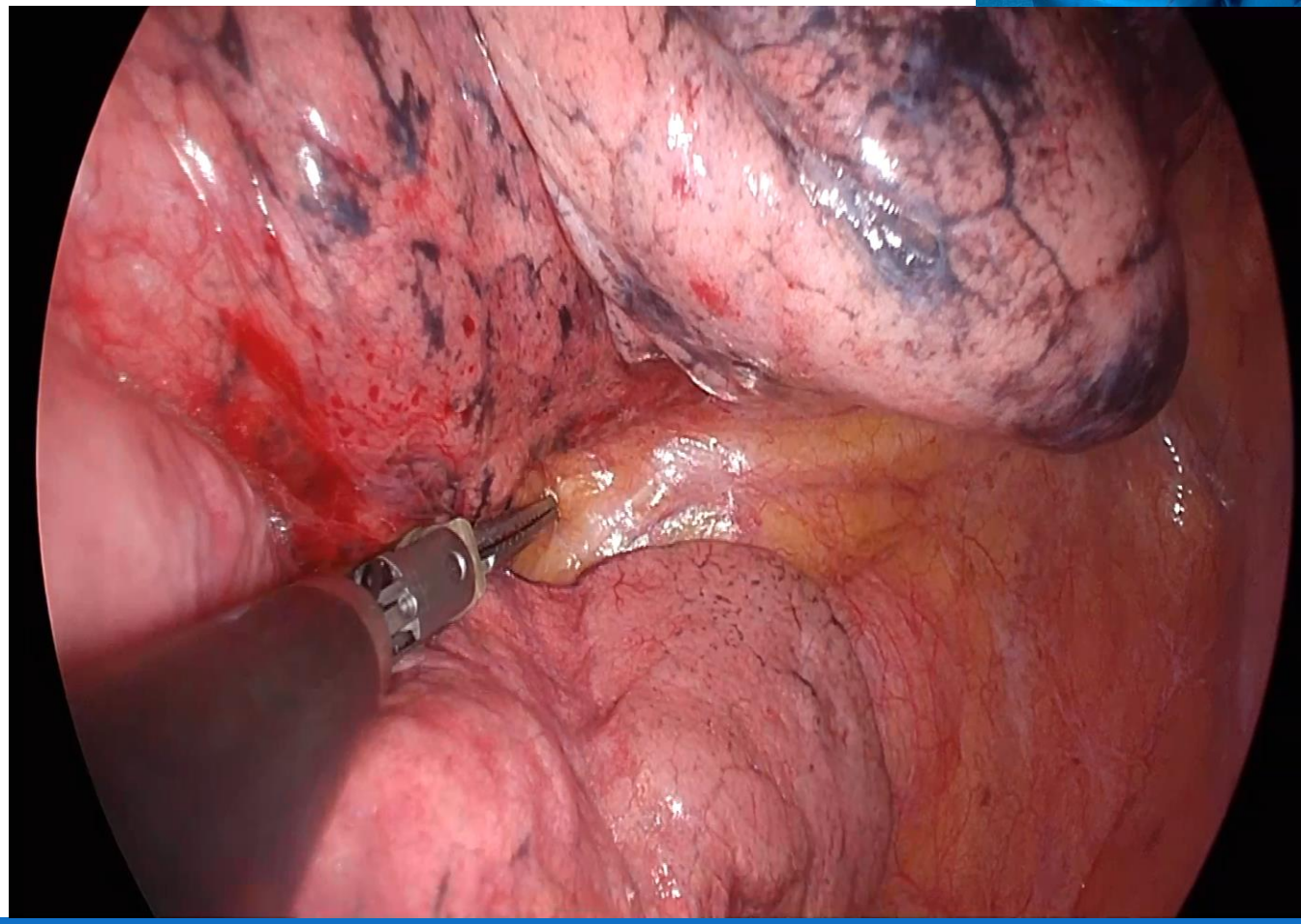
76 Yaş / Erkek

Sağ akciğer üst lobta takibli nodul

Toraks Bt: mm. Boyutlarında kitle

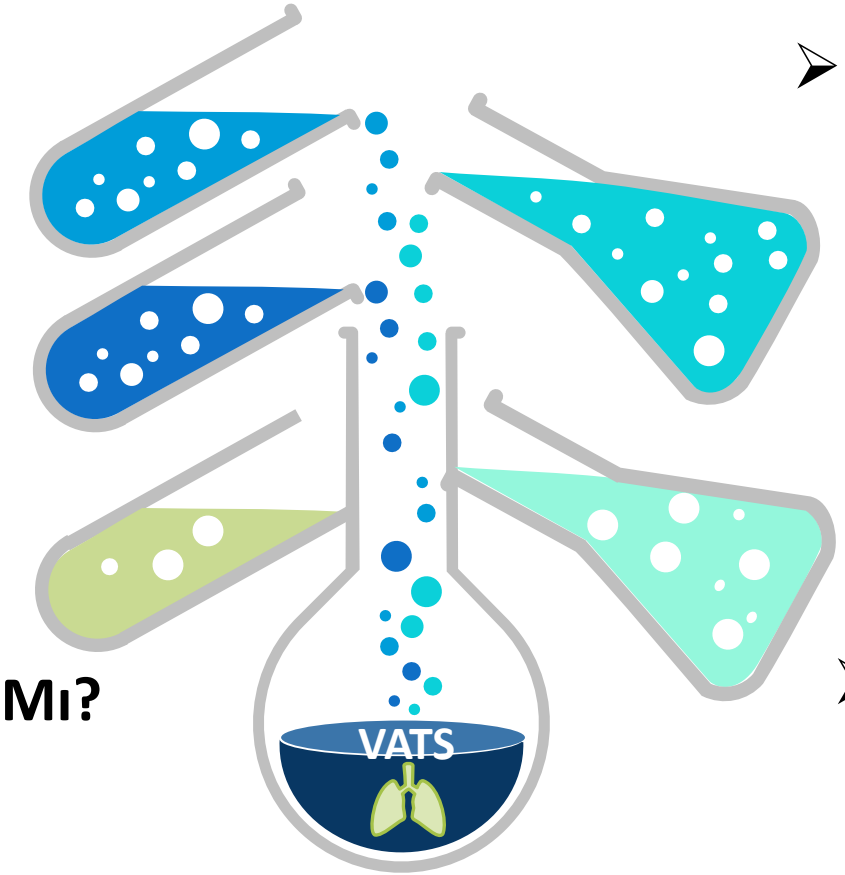
Pet-Bt: Kitlede Suvmax: 15 tutulum mevcut

TTIABx sonucu: KHDAK



VATS Egitimi ?

- Kaç Rezeksiyon Gerekli?
- Uniportal Başlanmalı Mı?
- Asistan Düzeyinde Yapılır Mı?
- Mentor Bir Hocaya İhtiyaç Var Mı?
- Kaç Port ile Başlanmalı?

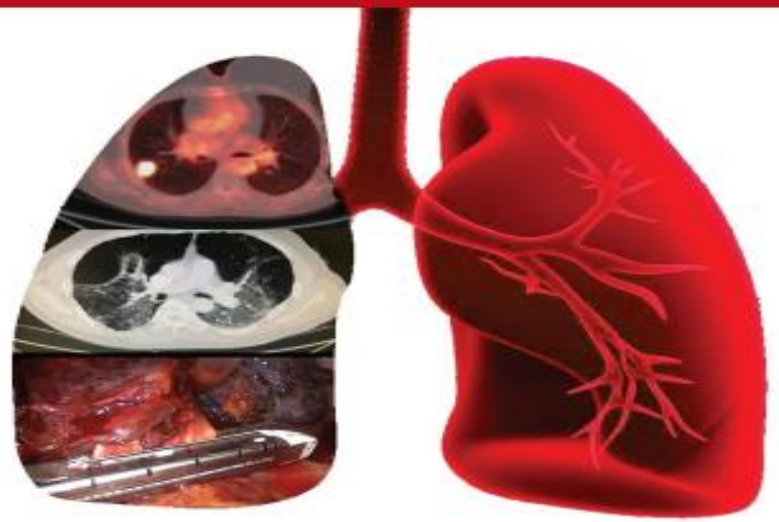


GÜNCEL GÖĞÜS HASTALIKLARI SERİSİ
UPDATES ON PULMONARY DISEASES
03
2019

Editör I *Editor*
Prof. Dr. Mehmet KARADAĞ

MİNİMAL İNVAZİV GÖĞÜS CERRAHİSİ
MINIMALLY INVASIVE THORACIC SURGERY

Konuk Editörler I *Guest Editors*
Prof. Dr. Muzaffer METİN, Uzm. Dr. Celal Buğra SEZEN



Cilt/Volume: 7 Sayı/Issue: 3 Aralık/December 2019

ISSN : 2147-5776
E-ISSN : 2587-0149

ASYOD

www.asyod.org

European Journal of Cardio-Thoracic Surgery 56 (2019) 224–229
doi:10.1093/ejcts/ezz133 Advance Access publication 5 May 2019

POSITION STATEMENT

Cite this article as: Bertolaccini L, Batirel H, Brunelli A, Gonzalez-Rivas D, Ismail M, Ucar AM *et al.* Uniportal video-assisted thoracic surgery lobectomy: a consensus report from the Uniportal VATS Interest Group (UVIG) of the European Society of Thoracic Surgeons (ESTS). Eur J Cardiothorac Surg 2019;56:224–9.

Uniportal video-assisted thoracic surgery lobectomy: a consensus report from the Uniportal VATS Interest Group (UVIG) of the European Society of Thoracic Surgeons (ESTS)

Luca Bertolaccini [a,*], Hasan Batirel[b], Alessandro Brunelli[c], Diego Gonzalez-Rivas[d], Mahmoud Ismail[e], Antonio Martin Ucar[f], Calvin S.H. Ng [g], Marco Scarci[h], Alan D.L. Sihoe [i,j], Paula A. Ugalde [k], Firas Abu Akar [l,m], Benedetta Bedetti [n], Sergio Bolufer Nadal[o], Jury Brandolini[a], Pierfilippo Crucitti [p], Attila Enyedi[q], Hiran C. Fernando [r], Jozsef Furak[s], Javier Gallego-Poveda[t], Carlos Galvez-Munos[u], Ivo Hanke[v], Miroslav Janik [w], Peter Juhos [w], Lidia Libretti [h], Paolo Lucciarini[x], Paolo Macrì[y], Stefano Margaritora[z], Hamid Reza Mahoozi[aa], Dania Nachira [z], Alessandro Pardolesi [bb], Vadim Pischik[cc], Dariusz Sagan [dd], Hermien Schreurs[ee], Dmitrii Sekhniaidze[ff], Davide Tosi[gg], Akif Turna [hh], Fernando Vannucci [ii], Marcin Zielinski[jj] and Gaetano Rocco[kk], on behalf of the Uniportal VATS Interest Group (UVIG) of the European Society of Thoracic Surgeons (ESTS)

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Table 4: Summary of responses regarding UniVATS lobectomy training

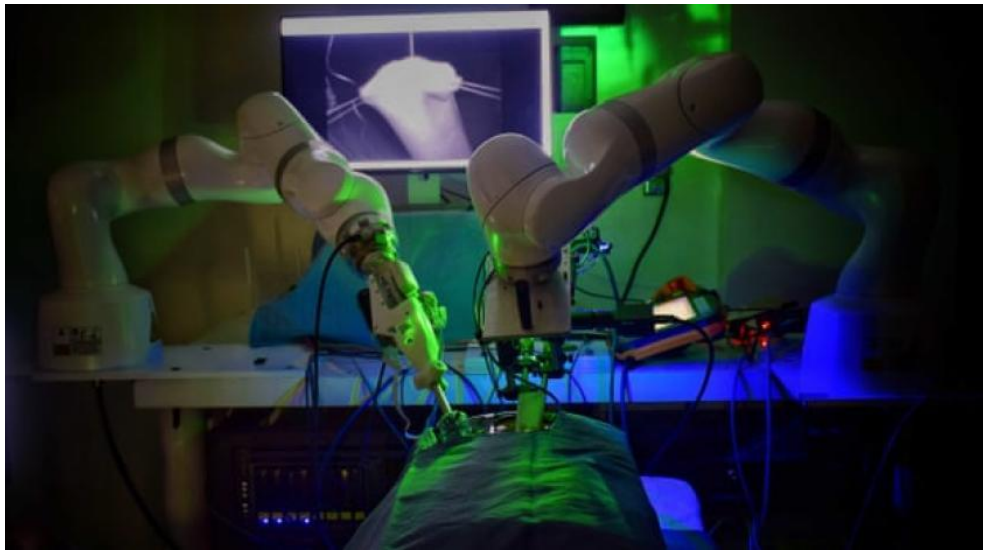
	N (%)
How many UniVATS procedures are mandatory to overwhelm the learning curve?	
25	5 (16)
50	22 (71)
75	3 (10)
>100	1 (3)
Minimum resident case volume defining a training centre	
30 cases per year	11 (35)
>50 cases per year	20 (65)
UniVATS procedures performed by a surgeon to maintain the UniVATS lobectomy operative skills	
20 cases per year	11 (35)
40 cases per year	18 (58)
≥60 cases per year	2 (6)
Should a surgeon be proctored before commencing a UniVATS lobectomy programme?	
Yes	28 (90)
No	3 (10)

UniVATS: uniportal video-assisted thoracoscopic surgery.

Yakın Gelecekte Ne Bekliyor ?

Titan Medical: Seeking a niche in single-port robotic surgery

METAVERS – YAPAY ZEKA



Interactive CardioVascular and Thoracic Surgery 30 (2020) 1–3
doi:10.1093/icvts/ivz272 Advance Access publication 18 November 2019

EDITORIAL

Cite this article as: Bertolaccini L, Casiraghi M, Spaggiari L. Immunotherapy in the neoadjuvant settings: a new challenge for the thoracic surgeon? Interact CardioVasc Thorac Surg 2020;30:1–3.

Immunotherapy in the neoadjuvant settings: a new challenge for the thoracic surgeon?

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Keywords: Lung cancer • Immunotherapy • Target therapies • Early stage • Non-small-cell lung cancer • Neoadjuvant treatments

SURGICAL PERSPECTIVE

Artificial Intelligence and the Future of Surgical Robotics

Sandip Panesar, MD, MSc, Yvonne Cagle, MD,†§ Divya Chander, MD, PhD,‡§ Jose Morey, MD,§||¶#**†† Juan Fernandez-Miranda, MD,* and Michel Kliot, MD**

Keywords: artificial intelligence, autonomous robotic surgery, future of surgery, machine learning, surgical robotics

(*Ann Surg* 2019;270:223–226)

In 2016, Shademan et al reported complete in vivo, autonomous robotic anastomosis of porcine intestine using the Smart Tissue Autonomous Robot (STAR).[1,2] Although conducted in a highly controlled experimental setting, STAR quantitatively outperformed human surgeons in a series of ex vivo and in vivo surgical tasks. These trials demonstrated nascent clinical viability of an autonomous soft-tissue surgical robot for the first time. Unlike conventional surgical robots which are controlled in real-time by humans and which have become commonplace in particular subspecialties, STAR was controlled by artificial intelligence (AI) algorithms, and received input from an array of visual and haptic sensors.

Applications of AI to clinical data for diagnostic purposes have already begun to demonstrate capability approximating that of specialist physicians.[3,4] Consequentially, clinical AI has received much attention from within and outside the medical community.[5] The STAR trials give clinical AI a surgical context and provide a glimpse into the future, should autonomous surgical devices be further developed. Nevertheless, their development must be rationalized and, for widespread utilization, they must confer either technical or financial advantages over conventional surgical techniques. We henceforth expand upon how this may unfold.

DEFINITIONS OF AUTONOMY

Sunnyvale, CA) are already in clinical use at present; however, as this uses external radiation beams, it cannot be truly considered a "surgical robot" in the context of this piece.

RATIONALE FOR AUTONOMOUS SURGICAL DEVICES

Human surgical performance is dictated by numerous physical, mental, and technical variables, meaning that surgical consistency is difficult to both quantify and achieve. These factors may contribute to the high variability in terms of functional outcomes, complication rates, and survival observed across institutions and geographies. Conventional surgical robots possess certain advantages over humans (insusceptibility to fatigue, tremor resistance, scalable motion, greater range of axial movement[6]), which have been shown to produce enhanced margins and lower morbidity rates[7] for certain procedures. Combination of AI control algorithms with the inherent advantages of surgical robots may therefore benefit surgical practice by reducing technical errors and operative times, enhancing access to hard-to-reach body areas, and improving outcomes by removing (or reducing) the potential for human error.[2]

Sociopolitical issues may provide a catalyst for further development and refinement of autonomous surgical robots. A device controlled by AI-based algorithms may permit rapid dissemination of surgical skills via the Internet or mobile platforms, potentially democratizing surgical care and standardizing surgical outcomes independent of geographic or economic constraints. A clinically capable robot may also be able to provide surgical care in environments

Dikkatiniz İçin Teşekkürler