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HERZLICH **WILLKOMMEN**

MIR ALIREZA HODA I UNIVERSITÄTSKLINIK FÜR THORAXCHIRURGIE, MEDIZINISCHE UNIVERSITÄT WIEN

SALZBURGER SYMPOSIUM **THORAXCHIRURGIE**

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Oxford Debate: Non-intubated VATS - PRO

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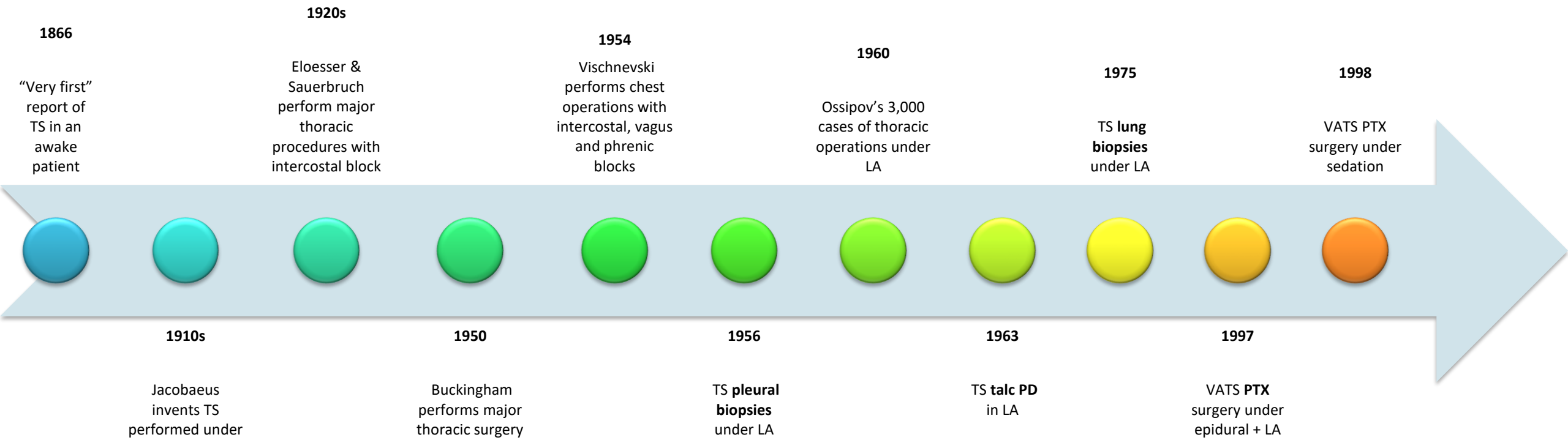
Disclosure

keine Interessenskonflikte zu deklarieren mit dem Inhalt dieses Vortrages

Historical Steps of Non-intubated Thoracic Surgery



Tamburrini, A., Mineo, T.C. (2017). A glimpse of history: non-intubated thoracic surgery.

Development of Non-intubated Thoracic Surgery in the 2000s

2000

Tor Vergata "Awake Thoracic Surgery Group": first dedicated program on NIVATS

2006

Mineo's introduction of awake non-resectional treatment for pulmonary emphysema

2007

Open lobectomy & thymectomy in sedated, non-intubated patients

2011

Chen's first series of VATS lobectomies w/o GA & endotracheal tube

2014

Gonzalez-Rivas' **first uniportal NIVATS lobectomy**

2016

Tor Vergata Group: over 1,000 cases of non-intubated thoracic surgery procedures

2016

Peng performs NIVATS **carinal reconstruction**

2017

"Tubeless" thoracic surgery procedures

2024

Gonzalez-Rivas' first **uniportal NIRATS tracheal resection**

Tamburrini, A., Mineo, T.C. (2017). A glimpse of history: non-intubated thoracic surgery.

Non-intubated video-assisted thoracoscopic surgery under loco-regional anaesthesia for thoracic surgery: a meta-analysis

Han-Yu Deng[a,†], Zi-Jiang Zhu[b,†], Yun-Cang Wang[a], Wen-Ping Wang[a], Peng-Zhi Ni[a] and Long-Qi Chen[a,*]

Interactive CardioVascular and Thoracic Surgery. 201

Author (year)	Global in-operating room time (min)[a]		Hospital stays (days)[a]		Postoperative complications[b]		Perioperative mortality[c]	
	Case	Control	Case	Control	Case	Control	Case	Control
Nezu *et al.* (1997) [6]	NR	NR	4.5 ± 1.3	5.8 ± 1.1	3/29	4/34	0/32	0/32
Pompeo *et al.* (2004) [15]	65 ± 11.9	100 ± 11.1	2.0 ± 0.7	3.0 ± 0.7	1/29	3/27	0/30	0/30
Pompeo *et al.* (2007) [12]	79.3 ± 12.7	101.3 ± 14.5	2.2 ± 0.9	3.7 ± 1.3	3/18	2/22	0/21	0/22
Chen *et al.* (2011) [17]	229.3 ± 43.7	223.3 ± 46.6	5.9 ± 2.2	7.1 ± 3.2	3/27	10/20	0/30	0/30
Pompeo *et al.* (2011) [10]	127 ± 15.6	297 ± 81.5	6.0 ± 1.5	7.0 ± 3.0	7/34	8/11	0/41	0/19
Noda *et al.* (2012) [18]	116.5 ± 35.2	209.1 ± 77.1	26.3 ± 33.8	17.3 ± 13.0	4/11	13/29	0/15	4/38
Pompeo and Dauri (2013) [16]	NR	NR	3.8 ± 1.7	4.3 ± 1.5	NR	NR	NR	NR
Wu *et al.* (2013) [19]	247.9 ± 38.5	276.6 ± 76.1	6.7 ± 3.3	7.2 ± 3.5	9/27	17/31	0/36	0/48
Mineo *et al.* (2014) [20]	65.8 ± 7.5	84.9 ± 13.3	3.1 ± 2.5	4.9 ± 2.8	12/219	20/211	0/231	5/226
Liu *et al.* (2015) [9]	NR	NR	NR	NR	11/156	30/150	0/167	0/180

- Pneumothorax
- LVRS
- Pleurodesis
- Wedge resections
- Lobectomies

A total of 1283 patients - 4 RCTs & 6 observational studies

NVATS:

- ✓ **shorter in-operating room time**, $p < 0.001$
- ✓ **faster recovery**, $p < 0.001$
- ✓ no perioperative mortality

NIVATS for thoracic surgery proved to be feasible and safe

The impact of non-intubated versus intubated anaesthesia on early outcomes of video-assisted thoracoscopic anatomical resection in non-small-cell lung cancer: a propensity score matching analysis

Jun Liu[a,b,†], Fei Cui[a,b,†], Eugenio Pompeo[c], Diego Gonzalez-Rivas[d,e], Hanzhang Chen[a,b], Weiqiang Yin[a,b], Wenlong Shao[a,b], Shuben Li[a,b], Hui Pan[a,b], Jianfei Shen[a,b], Lindsey Hamblin[a,b] and Jianxing He[a,b,*]

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EACTS European Journal of CARDIO-THORACIC SURGERY

- n = 339, 2011 – 2014
- 282 lobectomies & 57 segmentectomies
- NIIASV (n=151) ←→ IASLV (n=188)

Significantly **better results in the NIIASV** group in:

- postoperative fasting time ($p < 0.001$)
- chest drainage volume ($p < 0.04$)
- hospital stay ($p < 0.02$)

NIVATS anatomical resection for NSCLC is feasible and safe

Table 4: Operative results

	Segmentectomy			Lobectomy		
	IASLV group (*N* = 20)	NIIASV group (*N* = 20)	*P*-value	IASLV group (*N* = 116)	NIIASV group (*N* = 116)	*P*-value
Surgical duration (min)	158.3 ± 48.8	152.5 ± 34.8	0.670	182.0 ± 55.5	177.8 ± 43.0	0.508
Intraoperative blood loss (ml)	57.0 ± 76.2	49.5 ± 10.1	0.635	142.6 ± 221.6	124.4 ± 115.2	0.613
Conversion to thoracotomy	0	0	N/A	0	0	N/A
Postoperative fasting time (h)	13.8 ± 2.3	6.5 ± 2.1	<0.001	12.3 ± 2.0	6.7 ± 1.3	<0.001
Volume of postoperative pleural drainage (ml)	723.0 ± 717.4	354.5 ± 244.8	0.040	766.7 ± 638.2	607.4 ± 378.8	0.022
Postoperative chest tube dwell time (days)	4.3 ± 7.2	2.6 ± 1.2	0.310	3.5 ± 2.4	3.2 ± 2.6	0.432
Duration of postoperative hospital stay (days)	8.3 ± 4.3	6.0 ± 1.2	0.024	8.6 ± 4.1	7.4 ± 2.0	0.035
Lymph node dissection						
Number of node	6.4 ± 5.3	7.8 ± 5.4	0.412	15.7 ± 9.5	17.2 ± 9.1	0.223
Stations of node	2.7 ± 1.5	3.2 ± 1.4	0.286	4.5 ± 1.1	4.5 ± 1.2	1.000

Table 5: Complications

Complications	Segmentectomy			Lobectomy		
	IASLV group (*N* = 20)	NIIASV group (*N* = 20)	*P*-value	IASLV group (*N* = 116)	NIIASV group (*N* = 116)	*P*-value
Total complications	3 (15%)	3 (15%)	1.000	(12, 10.3%)	(10, 8.6%)	0.654
Respiratory complications	2	2		9	9	
Cardiac complications	1	0		0	2	
Endotracheal intubation-related complications	0	0		0	0	
Others	0	1		1	1	
Death	0	0		0	0	

Thoracic surgery in the non-intubated spontaneously breathing patient

Matthias Grott[1,2], Martin Eichhorn[1,2], Florian Eichhorn[1,2], Werner Schmidt[4], Michael Kreuter[2,3] and Hauke Winter[1,2*]

Respiratory Research. 2022.

- Patients with **interstitial lung diseases** benefit from NIVATS due to the avoidance of positive pressure ventilation
- NIVATS is safe in minor, moderate, and major thoracic procedures and is also appropriate in **oncologic surgery**

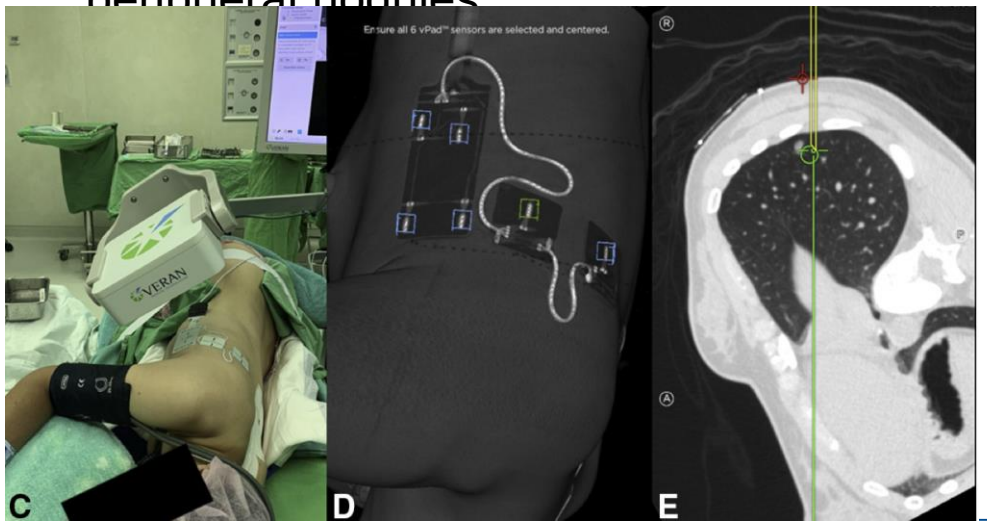
Table 2 Interstitial lung disease (ILD) patients undergoing surgical lung biopsy (SLB)

Author	Year	Study type	Analgesia	No. of Pts.	Results	Diagnostic yield (%)
Pompeo et al. [19]	2013	PFS	EC: 20 IB: 10	NIVATS: 30	Technical feasibility correlated with DLCO Excellent in 20 Good in 9 Satisfactory in 1 Postoperative morbidity 3.3%	97
Peng et al. [84]	2017	CS	LA	NIVATS: 43	Chest tube removal on operating table Postoperative morbidity: 7%, no death	88.4
Pompeo et al. [83]	2019	CS (MC)	IB: 84 EC: 28	NIVATS: 112	Perioperative morbidity: 7.1%, no death Mean hospital stay: 2.5 days	96
Kurihara et al. [26]	2020	CS	EC	NIVATS: 15 DLT-VATS: 29	Reduced surgical time in NIVATS: 32.5 vs. 50.8 (min) Shorter length of hospital stay in NIVATS: 1 vs. 10 (days) Significant more ILD worsening in DLT-VATS group (one death)	100
Kim et al. [87]	2020	REV (3 studies)	1. EC: 20 1. IB: 20 2. IV: 43 3. EC: 10	1. NIVATS: 40 2. NIVATS: 43 3. NIVATS: 10	EC/IB mainly used for pain control IB has benefit in operation time and hospital stay Low morbidity rates: 3.3–7.0%	82.5–100
Guerrera et al. [82]	2021	PSM	EC + LA	NIVATS: 66 DLT-VATS: 34	Lower postoperative morbidity in NIVATS 3.0% vs. 20.6% Shorter length of hospital stay in NIVATS 3.1 vs. 6.7 (days) Reduced surgical time in NIVATS 38 vs. 77 (min) Reduced anaesthesiologic time in NIVATS 97 vs. 132 (min)	73
Grott et al	2022	PSM	EC	NIVATS: 40 DLT-VATS: 40	Faster postprocedural recovery after NIVATS Postoperative acute exacerbation of ILD similar between groups	98.75

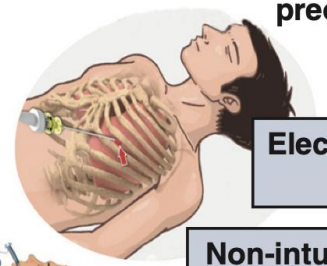
Nonintubated versus intubated "one-stage" preoperative localization and thoracoscopic lung resection

Po-Kuei Hsu, Yi-Ying Lee, Lin-Chi Chuang, Chien-Kun Ting, Mei-Yung Tsou

- n= 46, 2019 – 2020
- Non-intubated "one-stage" EMN-guided percutaneous ICG localization and uniportal VATS is safe and feasible for small peripheral nodules



Non-intubated versus intubated "one-stage" preoperative localization and thoracoscopic lung resection



Methods

Electromagnetic navigation-guided localization + **Uniportal VATS**

Non-intubated, N = 21 | **Intubated, N = 25**

Results

Patient characteristics: no difference

Intraoperative data:

7.33	(Lower)	pH	7.42
45.5 mmHg	(Higher)	pCO_2	38.4 mmHg
322 mmHg	(Lower)	pO_2	426 mmHg
150 min	(Shorter)	Total OR time	170 min

Postoperative recovery: no difference

Implications **Non-intubated "one-stage" EMN-guided percutaneous localization and uniportal VATS is a feasible workflow for small lung nodule.**

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Non-intubated video-assisted thoracoscopic lung resections: the future of thoracic surgery?

Diego Gonzalez-Rivas[a,b,*], Cesar Bonome[c], Eva Fieira[b], Humberto Aymerich[d], Ricardo Fernandez[a,b], Maria Delgado[b], Lucia Mendez[b] and Mercedes de la Torre[a,b]

European Journal of CARDIO-THORACIC SURGERY

European Journal of Cardio-Thoracic Surgery. 201

Superiority in minor procedures:

- *Pleural effusion*
- *Pulmonary biopsies*
- *Mediastinal biopsies*
- *Metastatic tumors*
- *Spontaneous pneumothorax*
- *Empyema*
- *Emphysematous bulla, LVRS*
- *Pericardial effusion*
- *Hyperhidrosis*

Resection of pulmonary nodules:

- Advantages of NIVATS over conventional anesthesia in *hospital stay*

Thymectomy in myasthenic patients:

- Satisfactory results with awake VATS thymectomy using thoracic epidural anesthesia and *avoiding muscle relaxants*

Emphysema & LVRS:

- ***Significantly shorter*** duration of ***postoperative air leak*** and hospital stay in awake technique
- *Comparable 3-y survival*

Major anatomic pulmonary resections:

- Significantly ***lower postoperative complication rates for lobectomy*** in the awake group
- ***Comparable*** postoperative results for anatomical ***segmentectomy***
- *Similar results for surgical operative time and hospital stay*

Non-intubated VATS major and minor resections are safe procedures, technically feasible, and successfully managed with facial masks, regional anesthesia, and sedation

Non-intubated Thoracoscopic Surgery – Pros

Studies comparing non-intubated vs. intubated procedures show better results in:

- ***Shorter hospital stay***
- ***Faster postoperative recovery***
- ***Reduced chest drainage***
- ***Shorter in-operating room time***
- ***Reduction in stress & immune response***
- ***Lower complication rates***
- ***Lower mortality***
- ***Improved respiratory function***
- ***Improved analgesia***
- ***Reduced inflammation (WBC, CRP)***

Avoiding complications associated with general anesthesia and intubation:

- **Tracheal & vocal cord injury**
- **Lung impairment**
- **Hypoxic pulmonary vasoconstriction**
- **Alveolar barotrauma**
- **Neuromuscular block & diaphragmatic dysfunction**
- **Need for postoperative ventilation in severe COPD/ILD**
- **Hyperalgesia**
- **Hyperemesis**
- **Pneumonia**

Janík et al. 2021. *Frontiers in surgery*
Cheng Y-J. 2017. *Video-Assisted Thoracic Surgery* .

VIELEN DANK FÜR IHRE AUFMERKSAMKEIT UND IHR ENGAGEMENT!

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