EBUS-TBNA and EUS-B FNA: How to do it

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Honorary Clinical Professor, University of Central Lancashire
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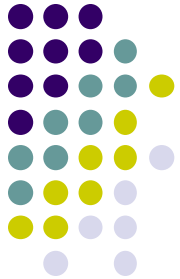
EBUS and EUS-B: How to do it



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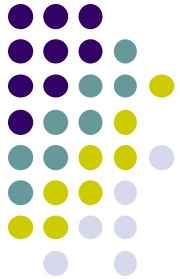

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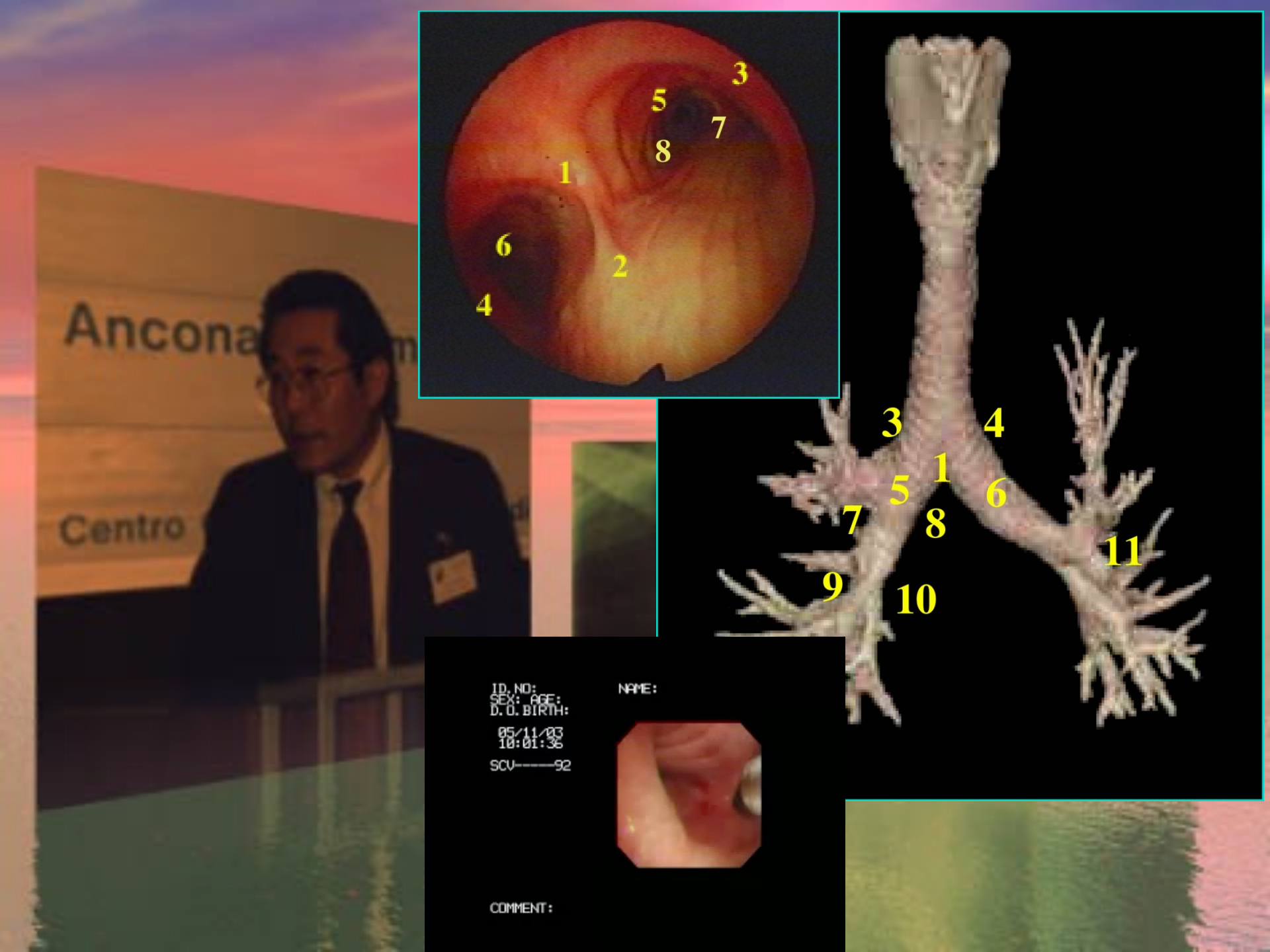
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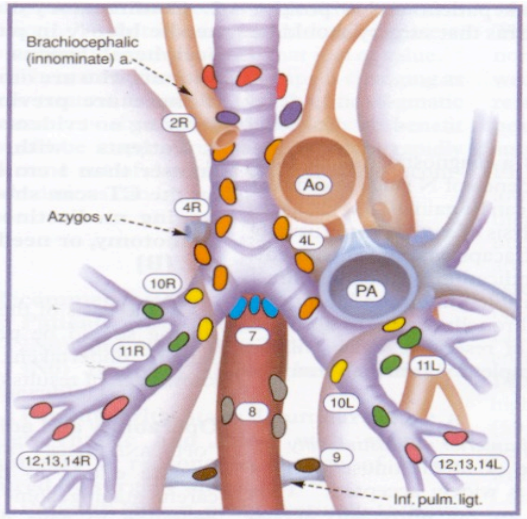
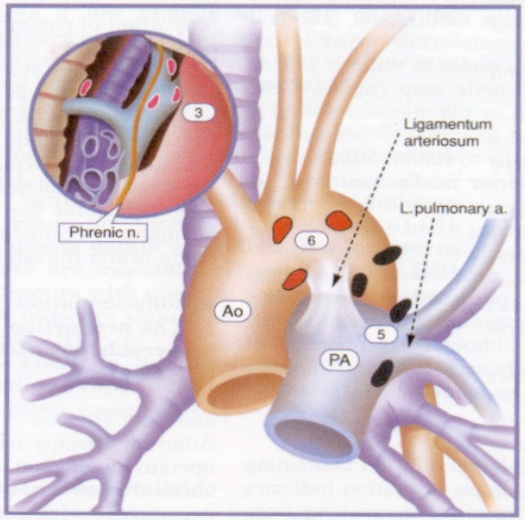




Superior mediastinal nodes

- 1 Highest mediastinal
- 2 Upper paratracheal
- 3 Prevascular and retrotracheal
- 4 Lower paratracheal (including azygos nodes)

N2 = single digit, ipsilateral
N3 = single digit, contralateral or supraclavicular

Aortic nodes

- 5 Subaortic (A-P window)
- 6 Para-aortic (ascending aorta or phrenic)

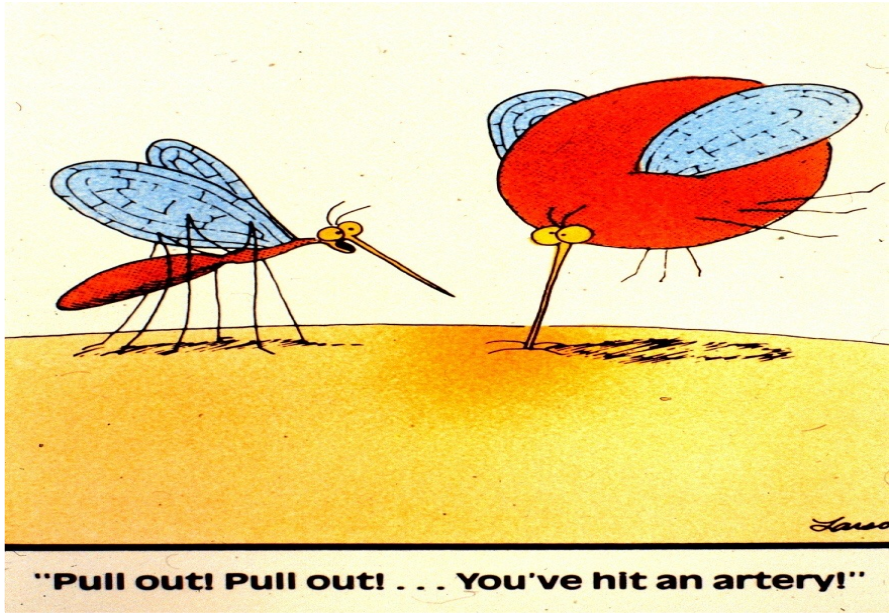
Inferior mediastinal nodes

- 7 Subcarinal
- 8 Para-oesophageal (below carina)
- 9 Pulmonary ligament

N1 nodes

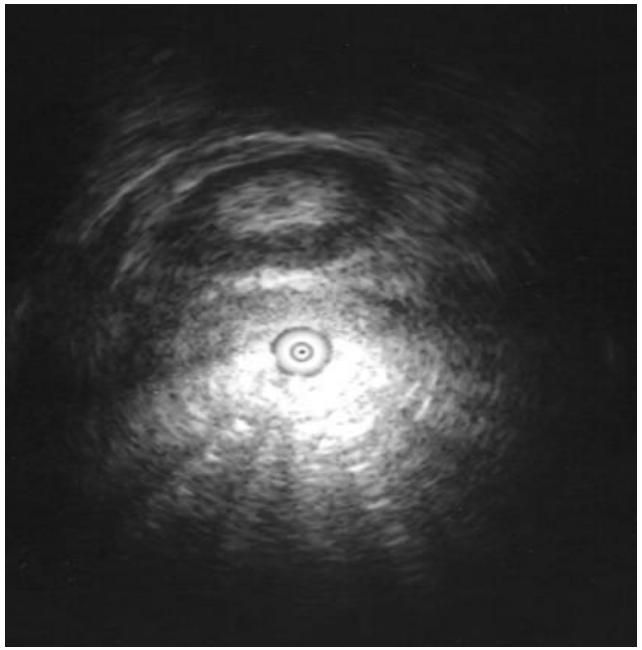
- 10 Hilar
- 11 Interlobar
- 12 Lobar
- 13 Segmental
- 14 Subsegmental

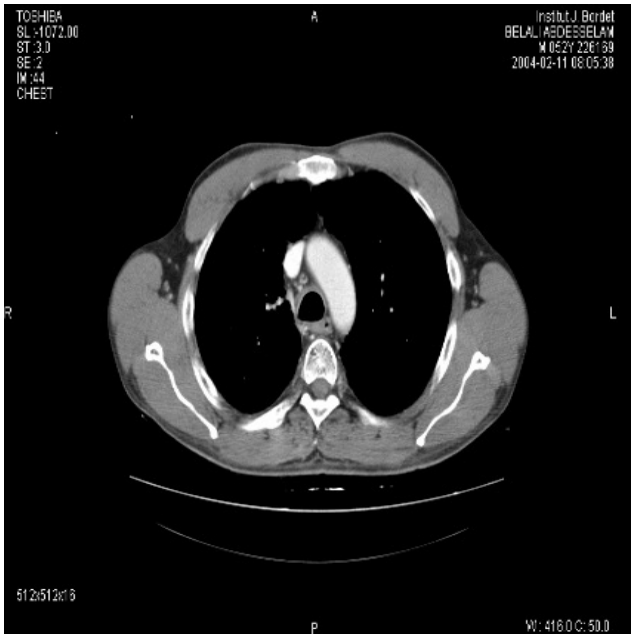
Figure 2 Regional lymph node map. Reproduced with permission from Mountain and Dresler.[100]



EBUS and CT scan of area 4R lymph node

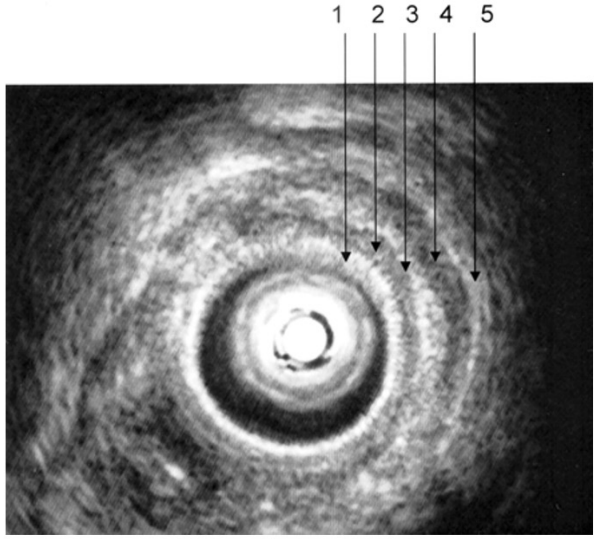
(Sequential EBUS TBNA)





Normal airway by EBUS

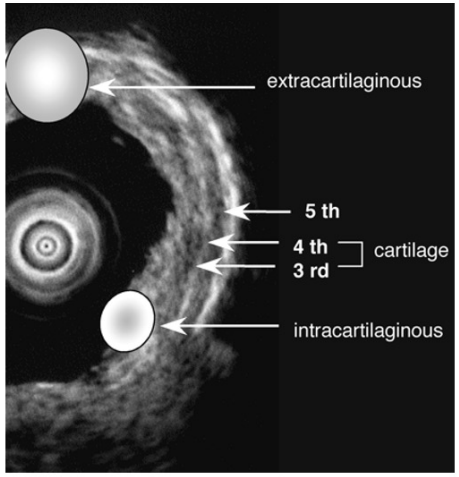
5 distinct layers



Nakamura. Chest 2004;126:192

Depth of tumor penetration

Intracartilaginous v. Extracartilaginous

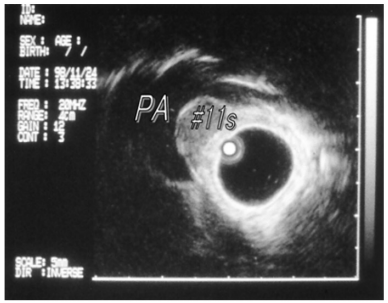


Miyazu. AJRCCM 2002;165:832

EBUS to determine invasion of other structures

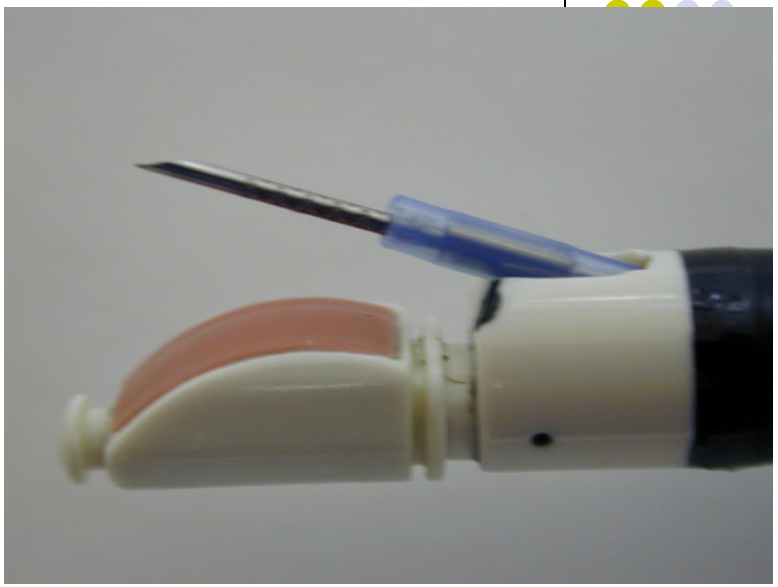
- Adjacent to BI
- Easy for TBNA with EBUS
- Extensive contact with PA indicates likely invasion

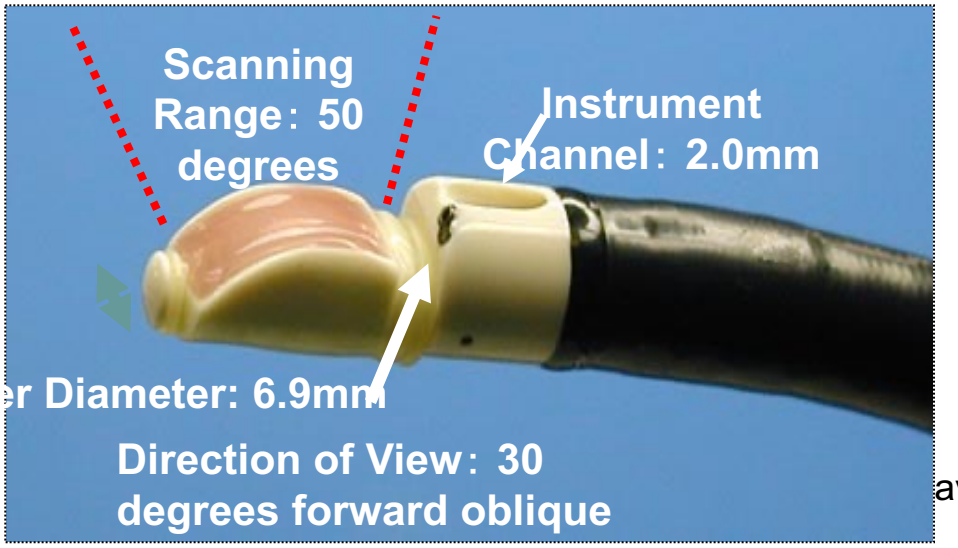
Ultrasound image

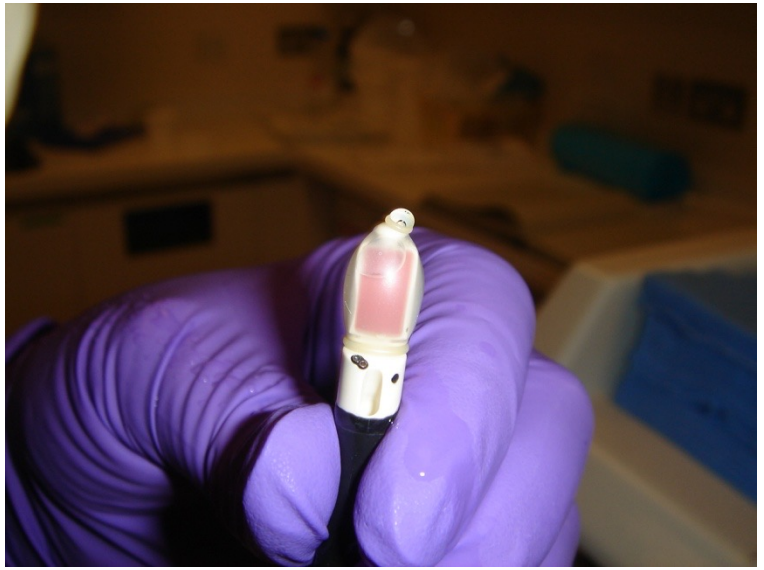


Okamoto. Chest 2002;121:1498

Linear EBUS (Convex probe)

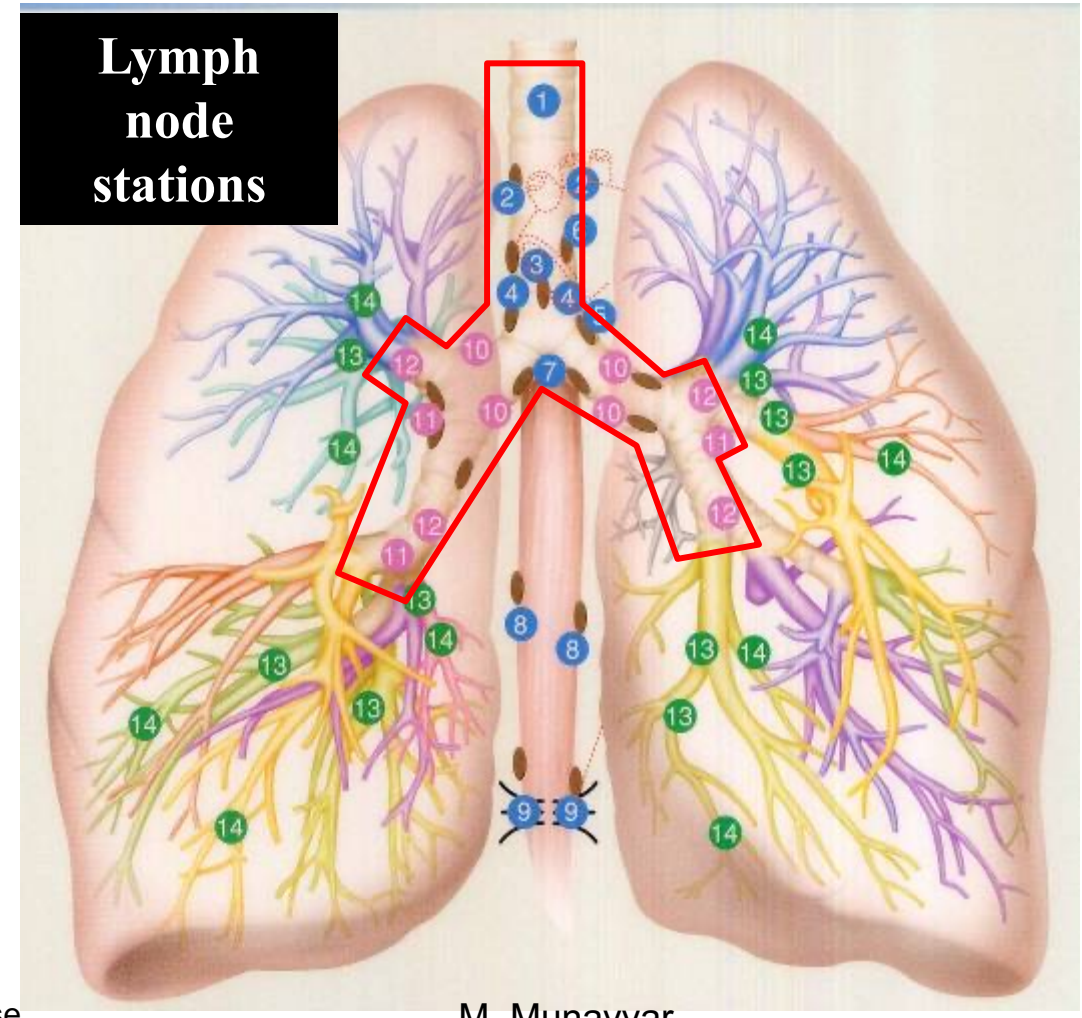






avvar

Lymph Nodes Accessible by EBUS TBNA



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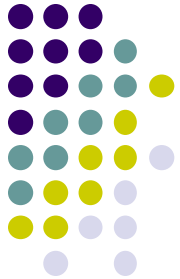

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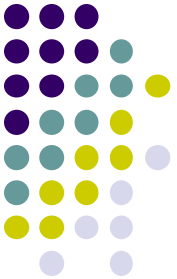
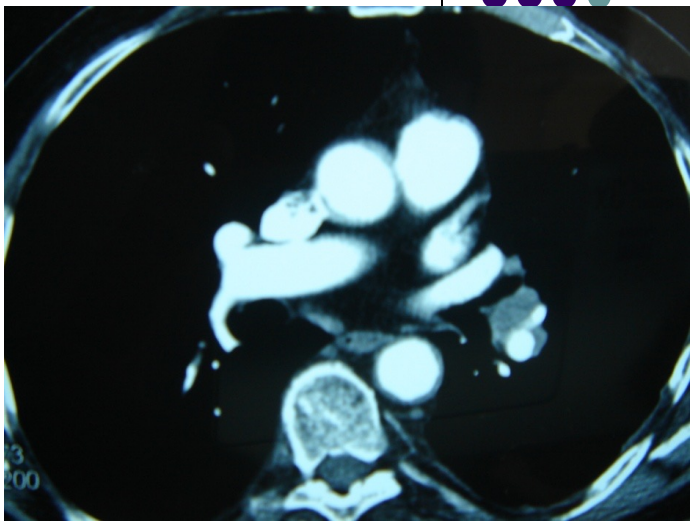
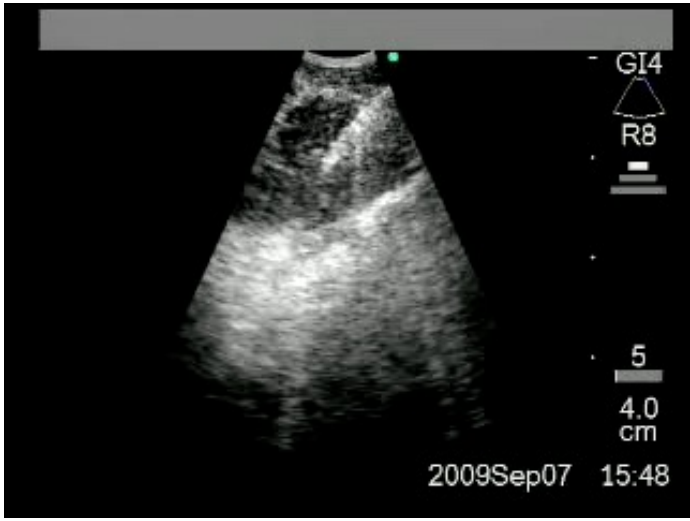
Case Study- Not just CO2 retention

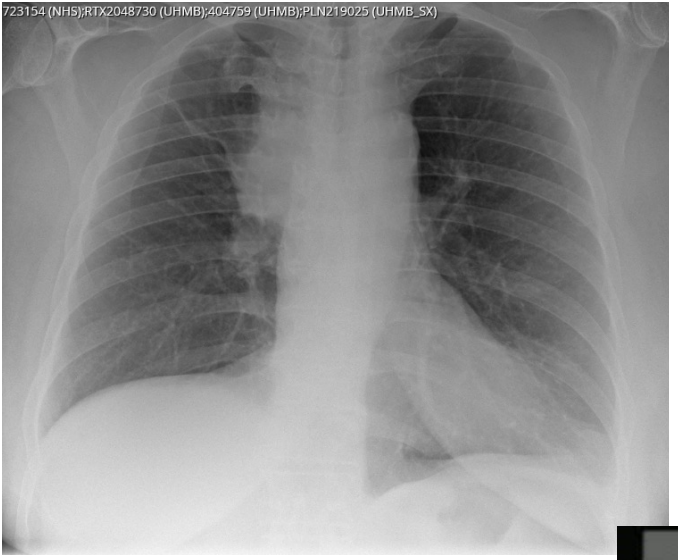


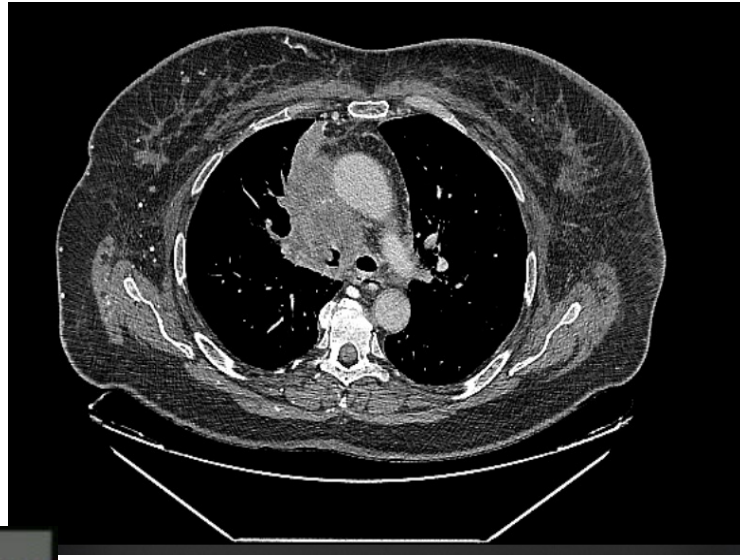
- 64yr old retired pharmacist
- Increasing confusion
- ? Flu ?related to tooth abscess
- Tiredness, muscle fatigue
- Wt loss
- Type 2 Resp Failure ?COPD
- CrCU
- But….

- Proximal muscle weakness
- ? GBS
- Neurology..
- Eaton-Lambert Syndrome
- CXR- ?prominent hilum
- CT









30/05/24 BTS course

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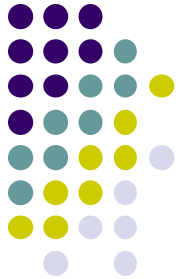

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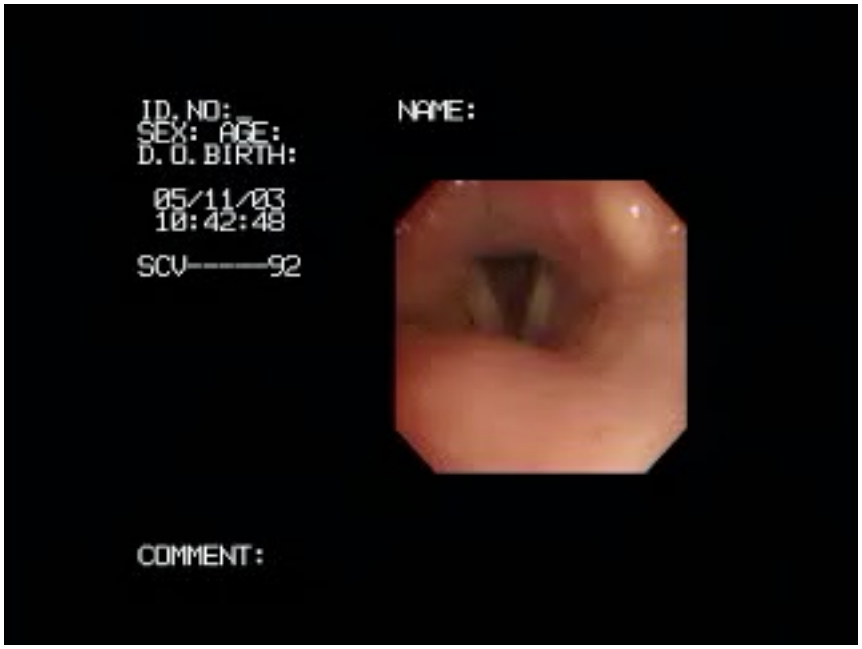
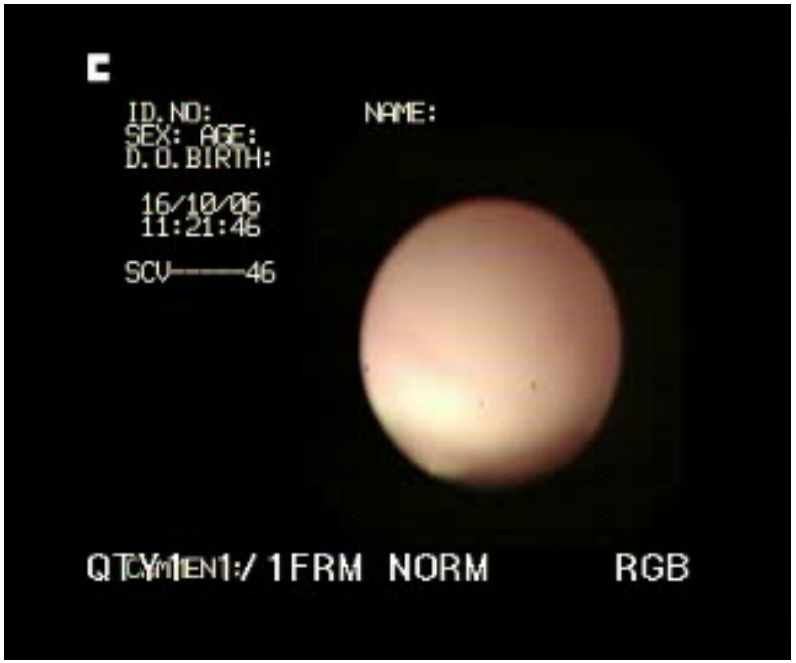
Bronchoscopic Intubation

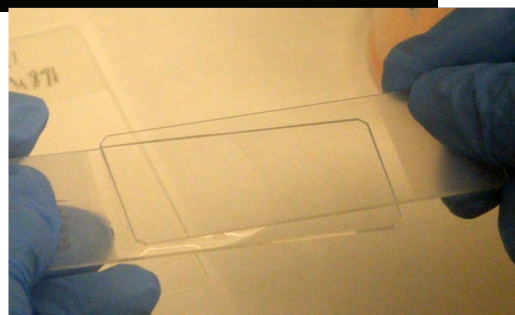


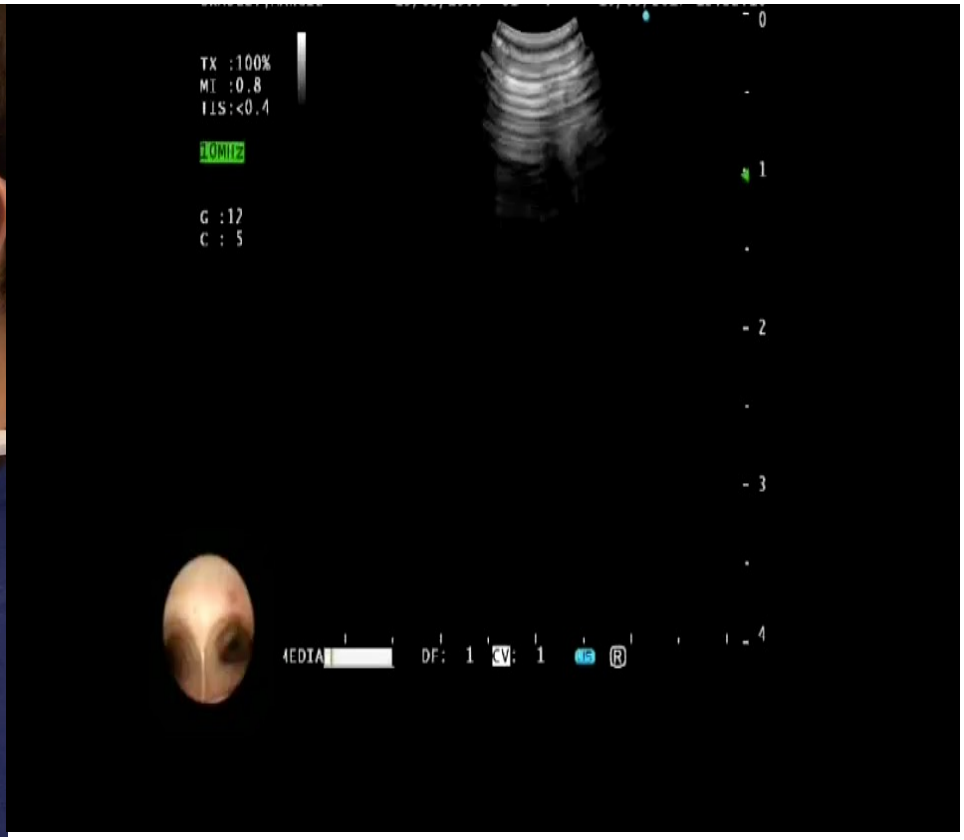
EBUS Intubation



- Oral access/?LMA/?ETT
- Head end

EBUS- step by step




Tx :100%
MI :0.8
TIS:<0.4
10MHz
G :12
C : 5
0
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2
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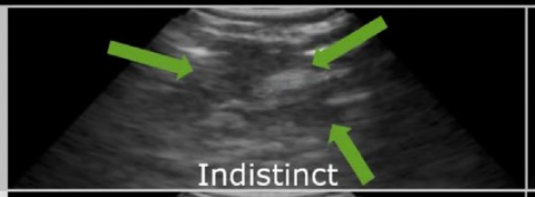
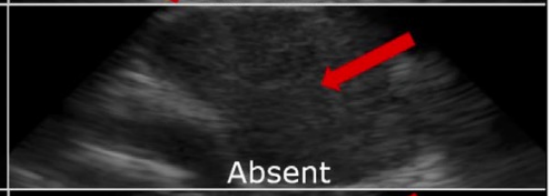
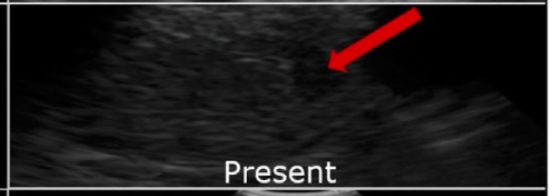
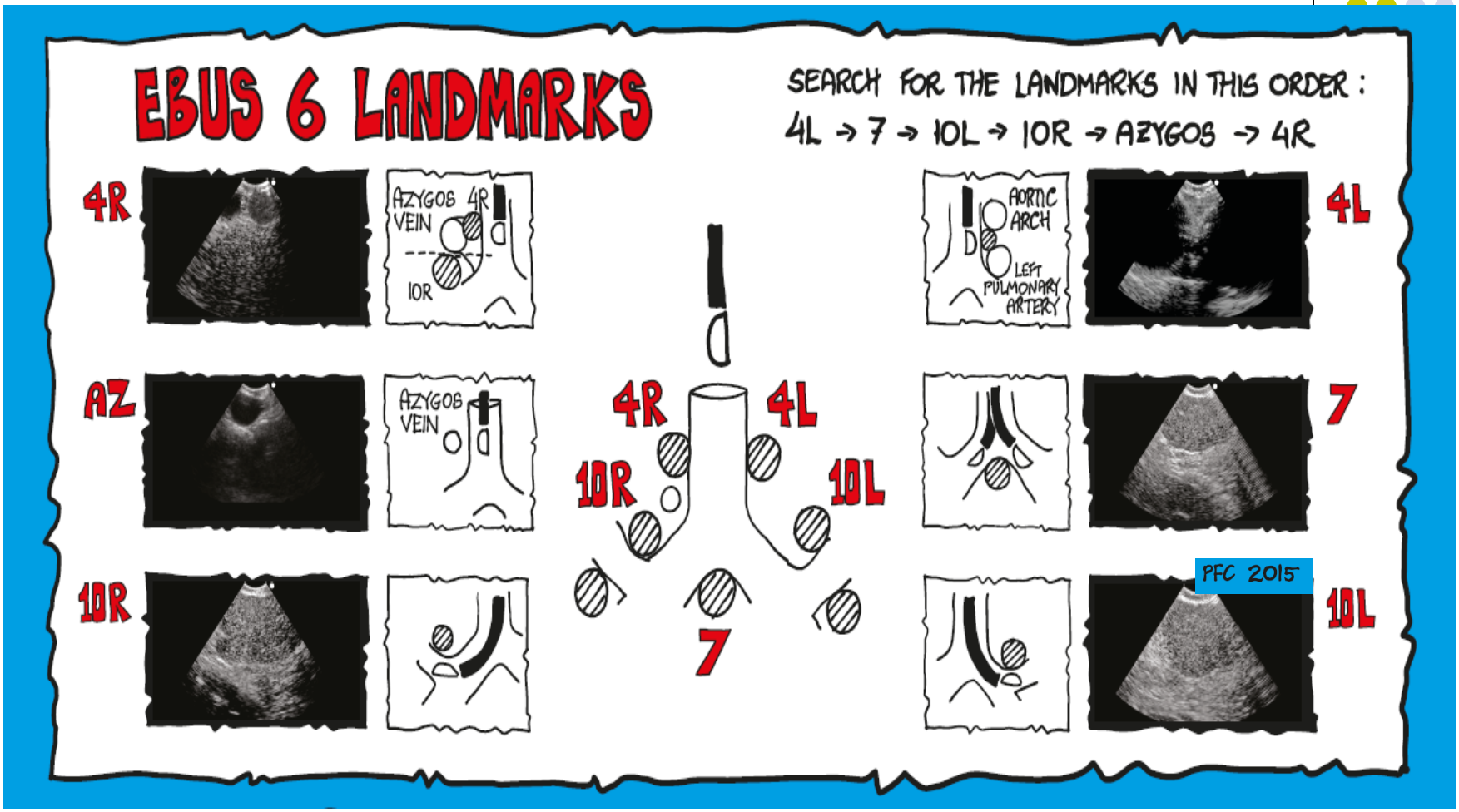
4
DF: 1
CV: 1

Canada Lymph Node Score

Ultrasonographic Features	Benign Features (0 points)	Malignant Features (1 point)
Margins		
Central Hilar Structure		
Central Necrosis		
Small Axis Diameter		

Scores: 0-1 = Low chance of malignancy | 2-4 = High chance of malignancy

Hylton et al. The Journal of Thoracic and Cardiovascular Surgery 2020



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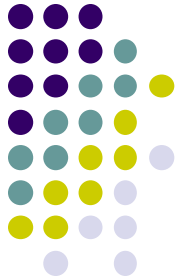
J Annema, AMC

EBUS and EUS-B: How to do it



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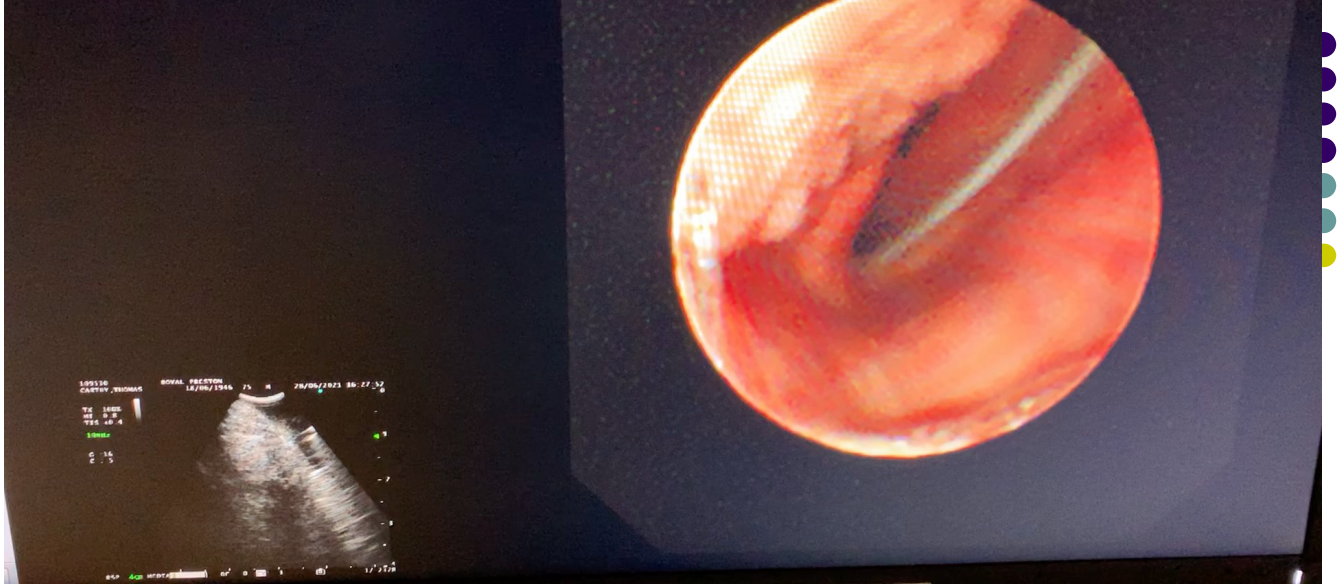
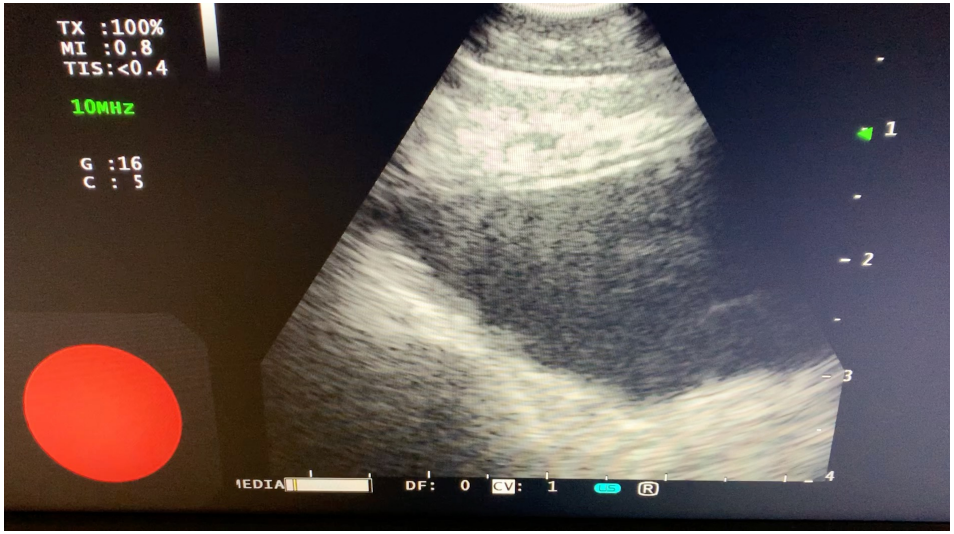
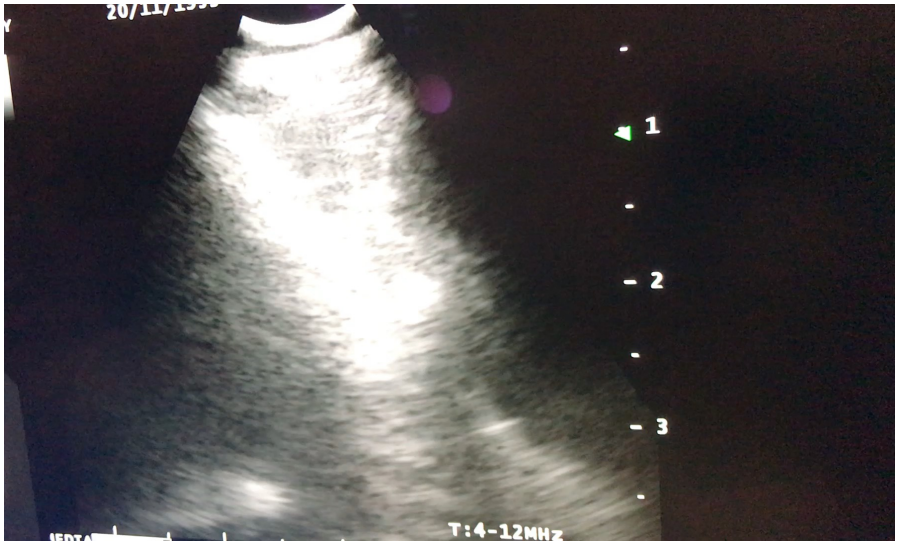
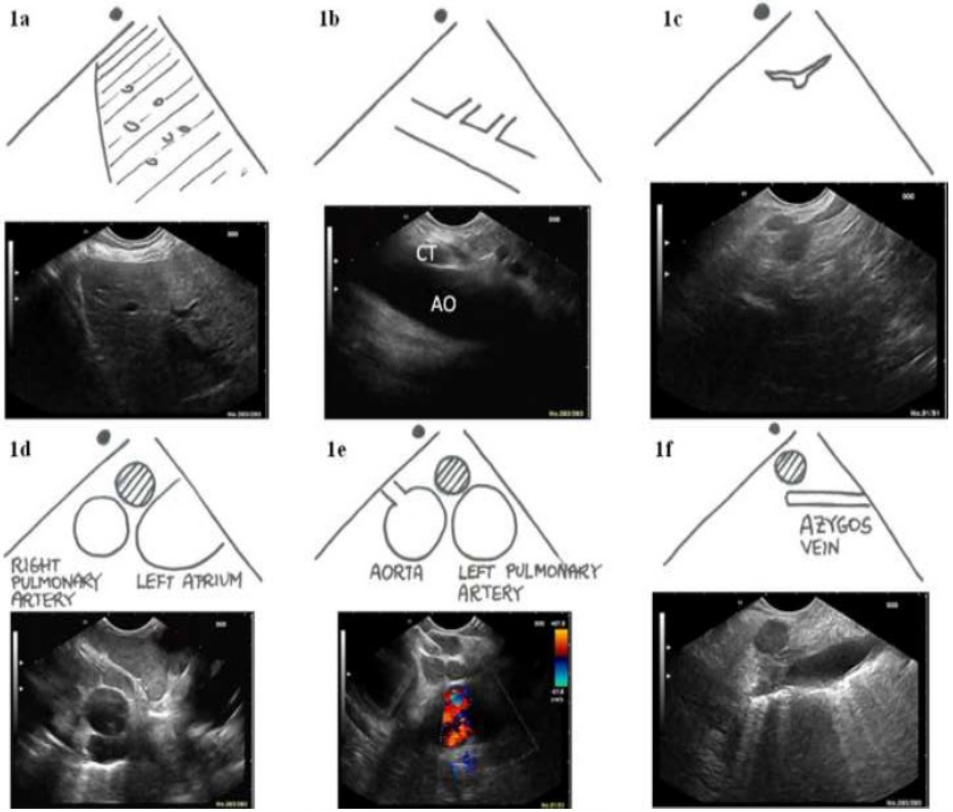
EUS-B- FNA

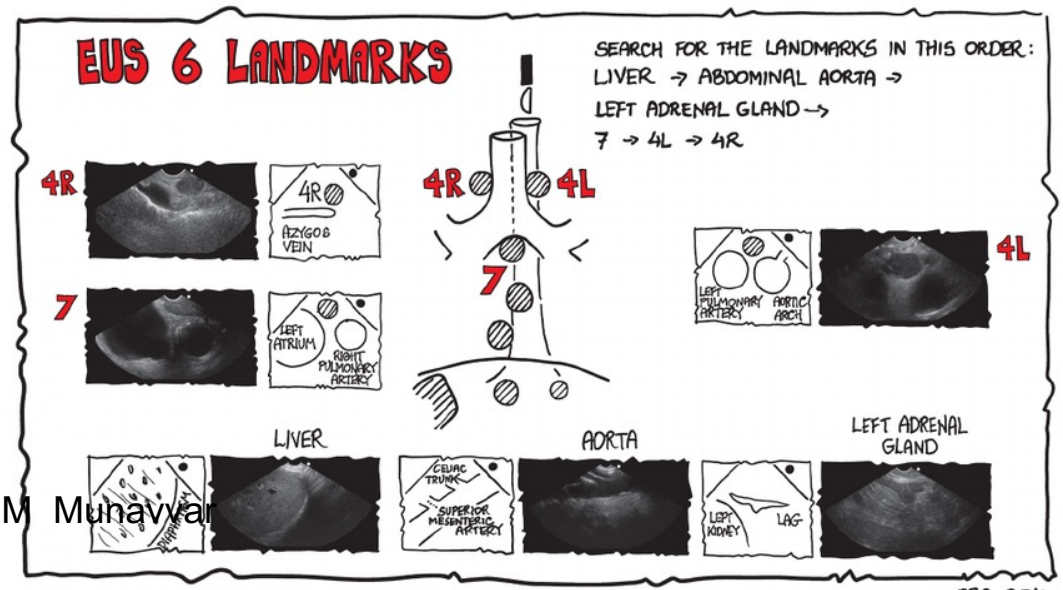
- Check with GI
- EUS-B after EBUS
- ?Antibitoics





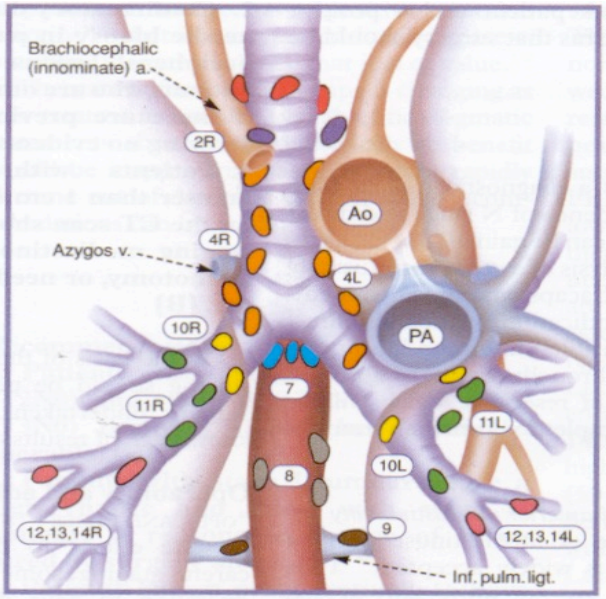



1a
1b
1c
CT
AO
1d
1e
1f
RIGHT PULMONARY ARTERY
LEFT ATRIUM
AORTA
LEFT PULMONARY ARTERY
AZYGOS VEIN


EUS 6 LANDMARKS
SEARCH FOR THE LANDMARKS IN THIS ORDER:
LIVER → ABDOMINAL AORTA →
LEFT ADRENAL GLAND →
7 → 4L → 4R
4R
4L
7
AZYGOS VEIN
LEFT ATRIUM
RIGHT PULMONARY ARTERY
LEFT PULMONARY ARTERY
AORTIC ARCH
LIVER
AORTA
LEFT ADRENAL GLAND
CELIAC TRUNK
SUPERIOR MESENTERIC ARTERY
LEFT KIDNEY
LAG
PFC 2015

J Annema, AMC

Med EUS EBUSTBNA



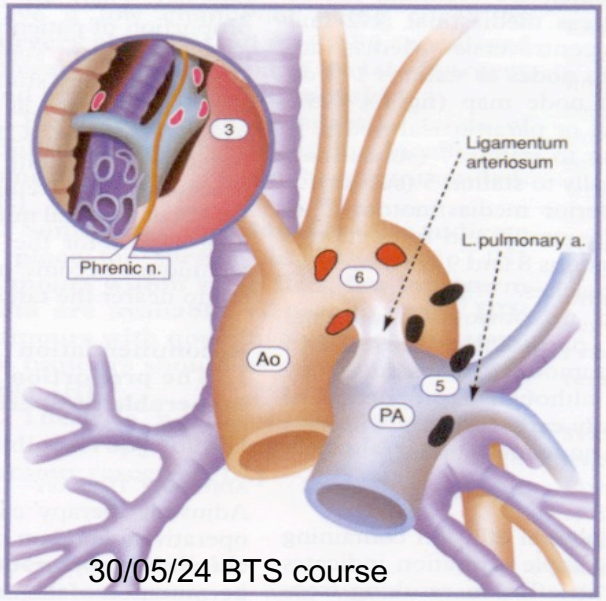


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Figure 2 Regional lymph node map. Reproduced with permission from Mountain and Dresler.[100]

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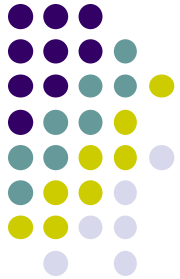

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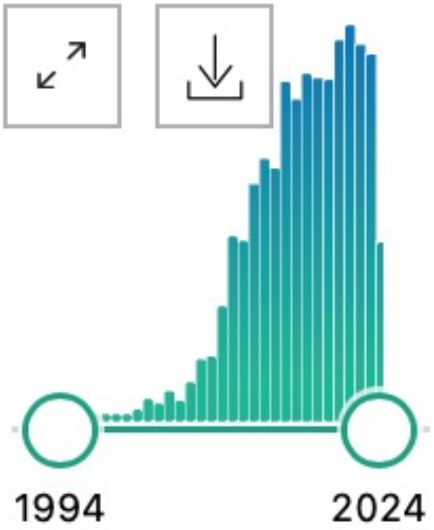
PubMed®

EBUS

Search

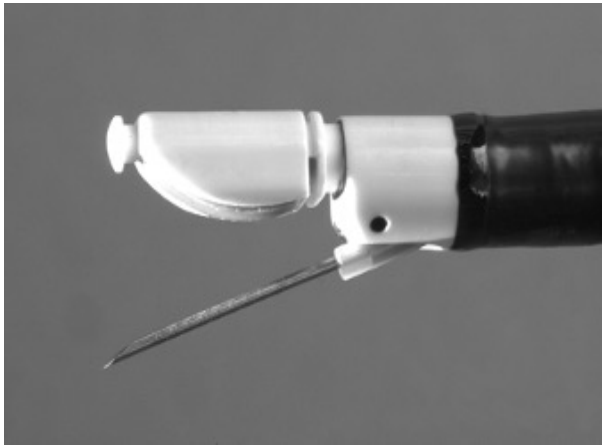
2,757 results

RESULTS BY YEAR



Real time ultrasound guided biopsy

- 11 patients with **hilar and mediastinal lesions**
  - detection by CT scan (10) or PETscan (1)
- **Ultrasonic bronchoscope** with biopsy channel of 2 mm
  - general anesthesia
  - 15 lesions punctured (13 cases
  - with malignant cells)



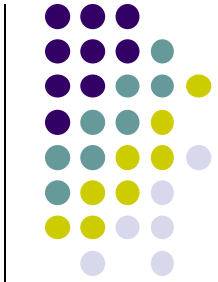
Krasnik et al. Thorax 2003;58:1083-1086

Effectiveness and Safety of EBUS-TBNA: a systematic review

Varela-Lema et al ERJ 2009: 33:1156

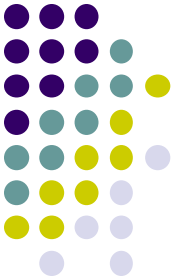
- 20 publications
- Sensitivity 85-100%
- Specificity 100%
- NPV 11-97%
- Suspected Lung Ca- safe and highly accurate for diagnosis and staging
- Sarcoidosis-promising (well established)
- Lymphoma- ?insufficient evidence (evolving)

Evidence- EBUS TBNA



- Sarcoidosis- Diagnostic in 88-93%
  - Wong et al ERJ 2007
  - Oki et al Respirology 2007
  - Garwood et al Chest 2007
  - Tournoy et al ERJ 2009
- Lymphoma
  - Kennedy et al Thorax 2008
    - Retrospective review of 25 patients
    - More work needed
  - Kheir et al Endoscopic Ultrasound 2016
    - Systematic review-6 trials- 346 patients
    - Sens (38%-91%), NPV (83%-96.4%), Accuracy (91%-97%)
    - Further, surgical biopsy- 13%-43%

Utility of EBUS-TBNA in Tuberculous Intrathoracic Lymphadenopathy
Navani et al Thorax 2011



- Multicentre study
- 156 consecutive patients
- EBUS-TBNA diagnostic of TB in 146 (94%)
- Pathology positive in 134 (86%)
- Positive culture in 74 (47%)- 8 drug resistant (5%)
- 10 (6%) no specific diagnosis after EBUS
- 4 confirmed on mediastinoscopy
- 6 responded to empirical therapy
- EBUS-TBNA- safe and effective first line investigation in suspected TB intrathoracic adenopathy

Suitability of Endobronchial Ultrasound-guided Transbronchial Needle Aspiration Specimens for Subtyping and Genotyping of Non–Small Cell Lung Cancer

A Multicenter Study of 774 Patients

Neal Navani[1,2,3], James M. Brown[1,2], Matthew Nankivell[3], Ian Woolhouse[4], Richard N. Harrison[5], Vandana Jeebun[5], Mohammed Munavvar[6], Benjamin J. Ng[7], Doris M. Rassl[8], Mary Falzon[9], Gabrijela Kocjan[9], Robert C. Rintoul[7], Andrew G. Nicholson[10], and Sam M. Janes[1,2]

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Rationale: The current management of advanced non–small cell lung cancer (NSCLC) requires differentiation between squamous and nonsquamous subtypes as well as epidermal growth factor receptor (EGFR) mutation status. Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is increasingly used for the diagnosis and staging of lung cancer. However, it is unclear whether cytology specimens obtained with EBUS-TBNA are suitable for the subclassification and genotyping of NSCLC.

Objectives: To determine whether cytology specimens obtained from EBUS-TBNA in routine practice are suitable for phenotyping and genotyping of NSCLC.

Methods: Cytological diagnoses from EBUS-TBNA were recorded

AT A GLANCE COMMENTARY

Scientific Knowledge on the Subject

Subtyping and genotyping of the tumor is central to the modern management of patients with advanced non–small cell lung cancer. Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) has emerged as a procedure for the diagnosis and staging of non–small cell cancer. However, it is unclear whether the cytological specimens obtained from EBUS-TBNA are suitable for the subclassification and geno-

CHEST

Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration for PD-L1 Testing in Non-small Cell Lung Cancer

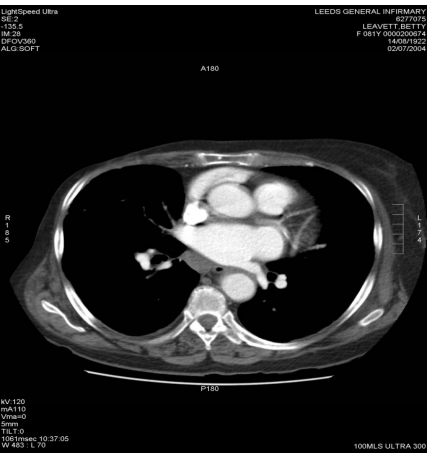
Fabio Perrotta, MD; Matthew Nankivell, MSc; Jana B. Adizie, MD; Usman Maqsood, MD; Mohamed Elshafi, MD; Syeda Jafri, MD; Andrew D. Lerner, MD; Ian Woolhouse, MD; Mohammed Munavvar, MD; Matthew Evison, MD; Richard Booton, MD; David R. Baldwin, MD; Samuel M. Janes, MD, PhD; Keith M. Kerr, MD; Andrea Bianco, MD, PhD; Lonny Yarmus, DO; and Neal Navani, MD, PhD

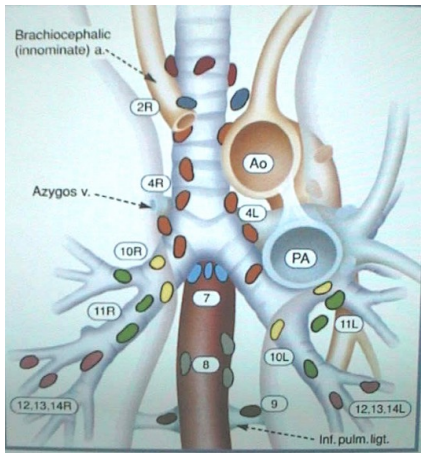
RESULTS: In the EBUS-TBNA group (189 specimens), the overall percentage of patients with successful PD-L1 testing was 94.7%. There was no significant difference in sampling adequacy with other methods of tissue acquisition. Older patients had higher failure rates of PD-L1 testing (OR, 1.06; $P = .008$). In multivariate analysis, advanced N-stage ($P = .048$) and presence of brain metastasis ($P < .001$) were associated with high PD-L1 expression.

Perrotta, CHEST Sept 2020

EUS- B- FNA

- Utility and Safety of EUS-B-FNA: Systematic Review and Meta-Analysis
  - Dhooria S, Agarwal R et al Respiratory Care 2015
- 10 studies- 1080 patients
- Sensitivity (staging)-Combined procedure vs EBUS-TBNA (91% vs 80%)
- Diagnosis- Additional gain of EUS-B-FNA-7.6%





Esophageal Endosonography for the Diagnosis of Intrapulmonary Tumors: A Systematic Review and Meta-Analysis

Daniël A. Korevaar[a] Sara Colella[b] René Spijker[c,d] Patrick M. Bossuyt[a]
Lars Konge[e] Paul Frost Clementsen[e,f] Jouke T. Annema[g]

Respiration, 2017:

- **11 studies (10 with high risk of bias), 330 patients**
- **Sensitivity (EUS): 92%**
- **Complication rate: 2%**

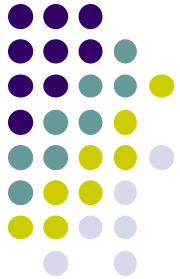
Endoscopic Ultrasound with Bronchoscope-Guided Fine Needle Aspiration for the Diagnosis of Paraesophageally Located Lung Lesions

Ida Skovgaard Christiansen[a,b] Jolanda Corina Kuijvenhoven[e] Uffe Bodtger[a–c]
Therese Maria Henriette Naur[b,d] Khaliq Ahmad[b] Jatinder Singh Sidhu[b] Rafi Nessar[a]
Goran Nadir Salih[a] Asbjørn Høegholm[b] Jouke Tabe Annema[e] Paul Frost Clementsen[a,c]

Respiration, 2019:

- **58 pts with central paraesophageal lesion**
- **Sensitivity (EUS-B): 90%**
- **No complications observed**

EBUS and EUS-B: How to do it



- Introduction
- Clinical Cases
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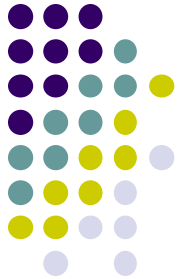
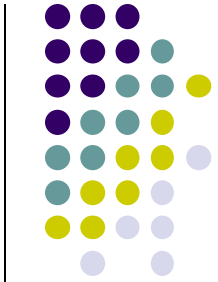
- **Complications**
- Equipment
- Guidelines
- Conclusions

EBUS-TBNA survey: Japan



- Jan 2011- Jun 2012: Questionnaire mailed to 520 JSRE-accredited facilities
- Responses from 455 (87.5%)
- EBUS-TBNA performed in 7345 cases in 210 facilities (46.2%)
- 90 complications reported in 32 facilities
- Complication rate *1.23%* (95% CI, 0.97%-1.48%)
- Haemorrhage- most frequent (50 cases, *0.68%*)
- Infections- 14 cases (0.19%)
  - Mediastinitis, 7; pneumonia, 4; pericarditis, 1; cyst infection, 1; sepsis, 1
- Pneumothorax- 2 cases (0.03%)- 1 needed chest tube

EBUS-TBNA Survey:Japan



- Outcome of complications
  - Prolonged hospitalisation in 14 cases
  - Life threatening conditions in 4
  - Death in 1- severe cerebral infarction- mortality rate 0.01%
- Breakage of scope in 98 cases (1.33%)
- Damage of needle in 15 cases (0.20%)
- Operator experience prior to complications
  - <5 cases in 8 pts (10.3%)
  - 5-19 cases in 17 pts (21.8%)
  - 20-49 cases in 43 pts (55.1%)
  - >50 cases in 10 pts (12.8%)
- Operator training
  - Had attended a hands-on training course in 41 cases (52.6%)
  - Not attended a hands-on training course in 37 cases (47.4%)

Summary of complications post EBUS-TBNA:

- **Complications occurring within 24 hours post EBUS-TBNA:**
- Hypoxia
- Respiratory failure
- Pneumothorax
- Bleeding
- Hemorrhage
- Exacerbation of existing disease

- **EBUS-TBNA apparatus complications:**
- **Damage to:**
- Working channel, Fiber due to external compression like biting etc, Ultrasound probe, TBNA needle, Sheath adjuster shaft
- Migration of broken needle

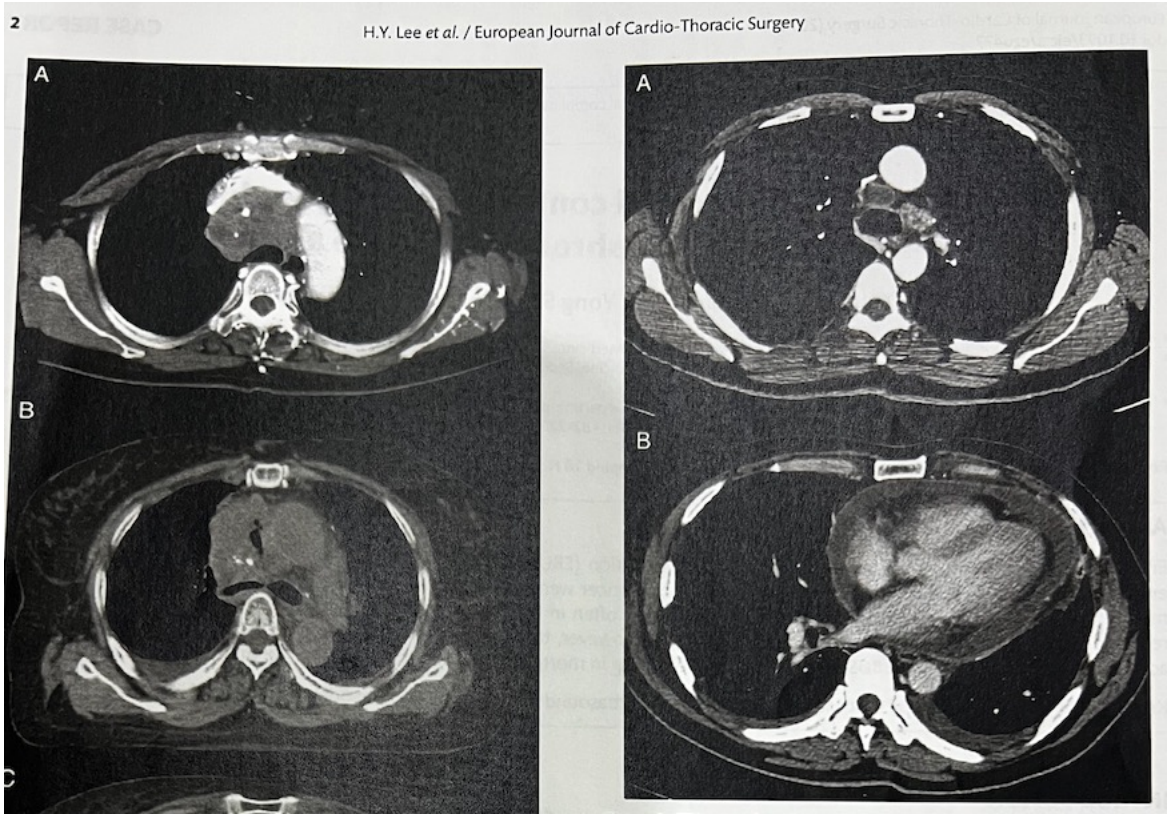
Complications occurring after 24 hours post EBUS-TBNA:

- **Airway Complications:**
- Stenosis, Endobronchial granuloma formation
- **Infections:**
- Bacterial Pericarditis, Sepsis, Mediastinitis / Mediastinal abscess, Empyema, Tumor bed contamination, Bronchogenic cyst infection, Sputum positivity in Tuberculous lymphadenopathy, Fever
- **Death:**
- Bleeding, Bacterial Pericarditis, Interstitial pneumonia, Sepsis, Cerebral infarction
- **Escalation of care**

P Vaidya, M Munavvar, P Chhajed, A C Mehta (Respirology 2017)

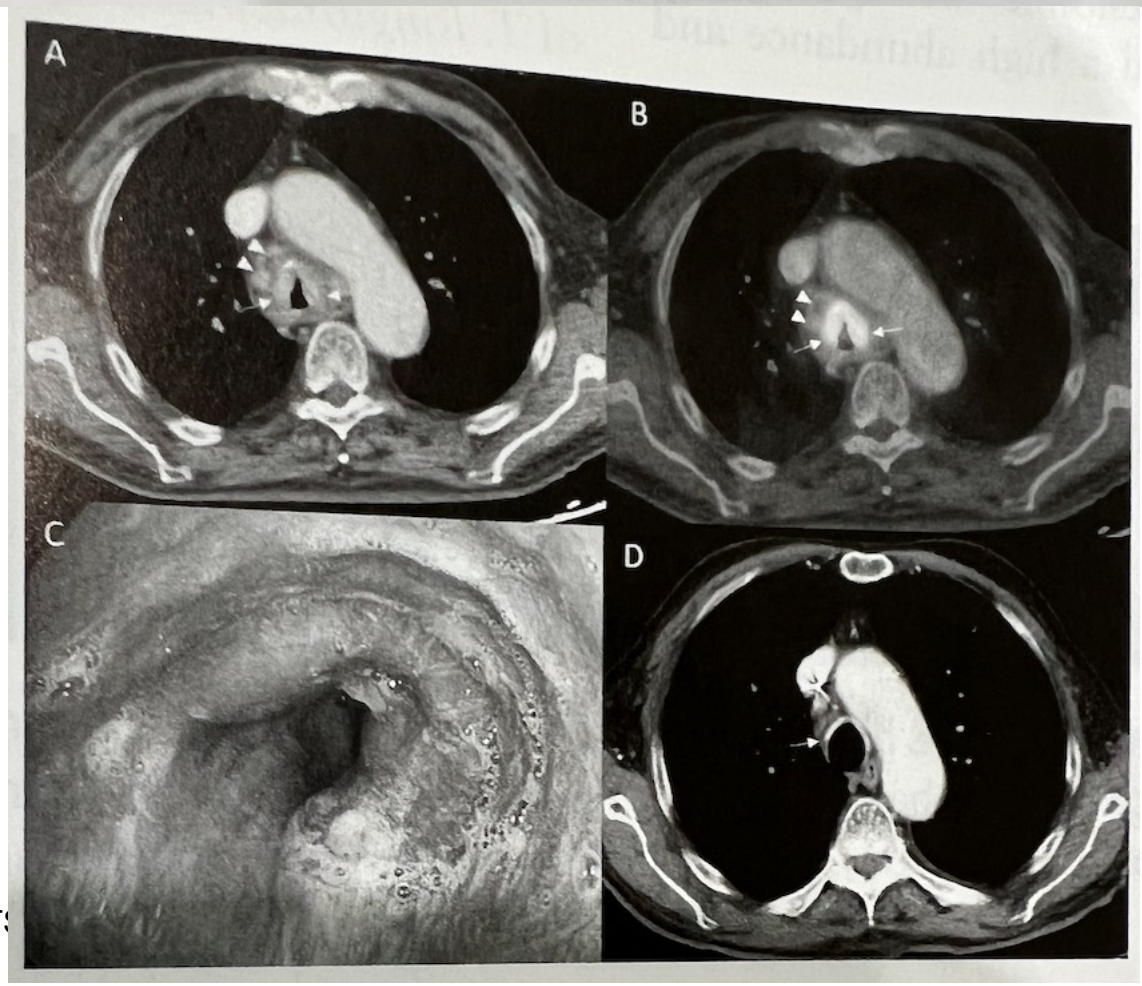
Bacterial pericarditis as a fatal complication after endobronchial ultrasound-guided transbronchial needle aspiration

Ha Youn Lee[a,b], Joohae Kim[a,b], Yong Suk Jo[a,b] and Young Sik Park[a,b,*]



Tracheal stenosis after endobronchial ultrasound-guided transbronchial needle aspiration

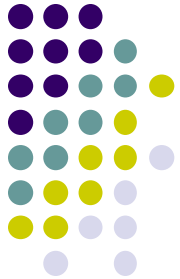
Andrea Grau,[1] Carme Lozano,[2] Miguel Gallego[1,3]



OVERVIEW

PART 1 THEORY	PART 2 CLINICAL AND SIMULATION TRAINING	PART 3 SUPERVISED TRAINING
Verification of pre-requisites and registration	Verification of pre-requisites and registration	Verification of pre-requisites and registration
Online modules and theoretical course	2-day clinical observation and simulation training in host institution	Supervised training in home institution
Post-assessment	Post-assessment	Completion of 20 case reports and 3 video procedures
Certification of Part 1	Certification of Part 2	Feedback from assessors
		Certification of Part 3

EBUS and EUS-B: How to do it



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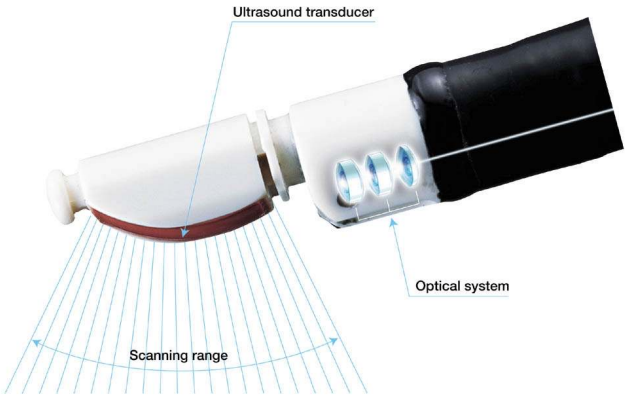
- **Equipment/ Advances**
- Guidelines
- Conclusions

EBUS-TBNA

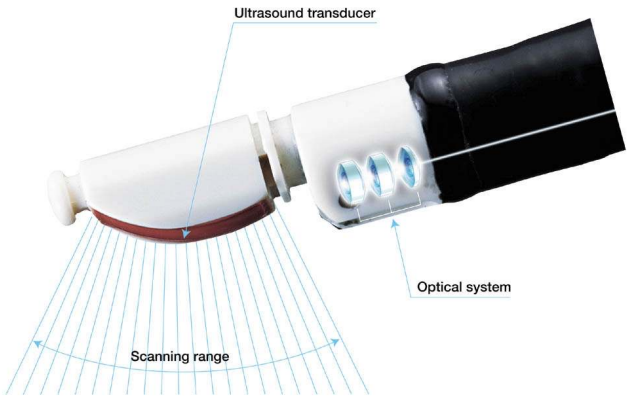


Olympus

Pentax

Fujinon (Aquilant)

EBUS-TBNA



Olympus

Vizi shot Flex (19)

EB19-J10U

PENTAX MEDICAL

Arietta 850 Ultrasound machine

High precision for EBUS-TBNA

- Optimal needle visualization aids the targeting of lymph nodes and masses
- Precise navigation of EBUS-TBNA needle thanks to optimal penetration angle
- Effortless, more accurate and reliable sampling through enlarged working channel of 2.2 mm that allows smooth needle delivery

Broadband Harmonic Imaging

High definition dynamic Tissue Harmonic Imaging (HdTHI) / dynamic Tissue Harmonic Imaging (dTHI)

- Improves spatial resolution and achieves excellent deep area penetration
- Clear boundaries delineation, vascular structures clear of noise and good visualisation of needle tip insertion, are easily achieved with high frame rate

Fine Flow/eFlow

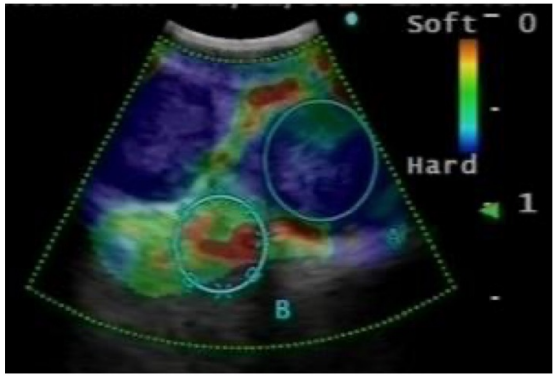
(Flow Mapping Technology)

- Allows detailed display of blood flow dynamics
- Accurately depict blood flow dynamics, providing improved spatial resolution and sensitivity at high frame rates

Hitachi Real-Time Tissue Elastography

(RTE)

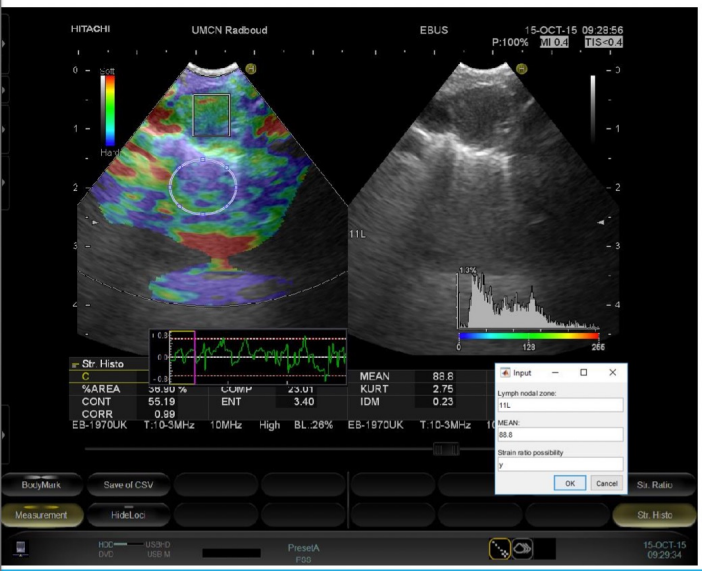
- Measures and displays tissue strain in real-time fo immediate visualization of hard and soft tissue
- Helps targeting tissue sampling during EBUS-TBN procedures

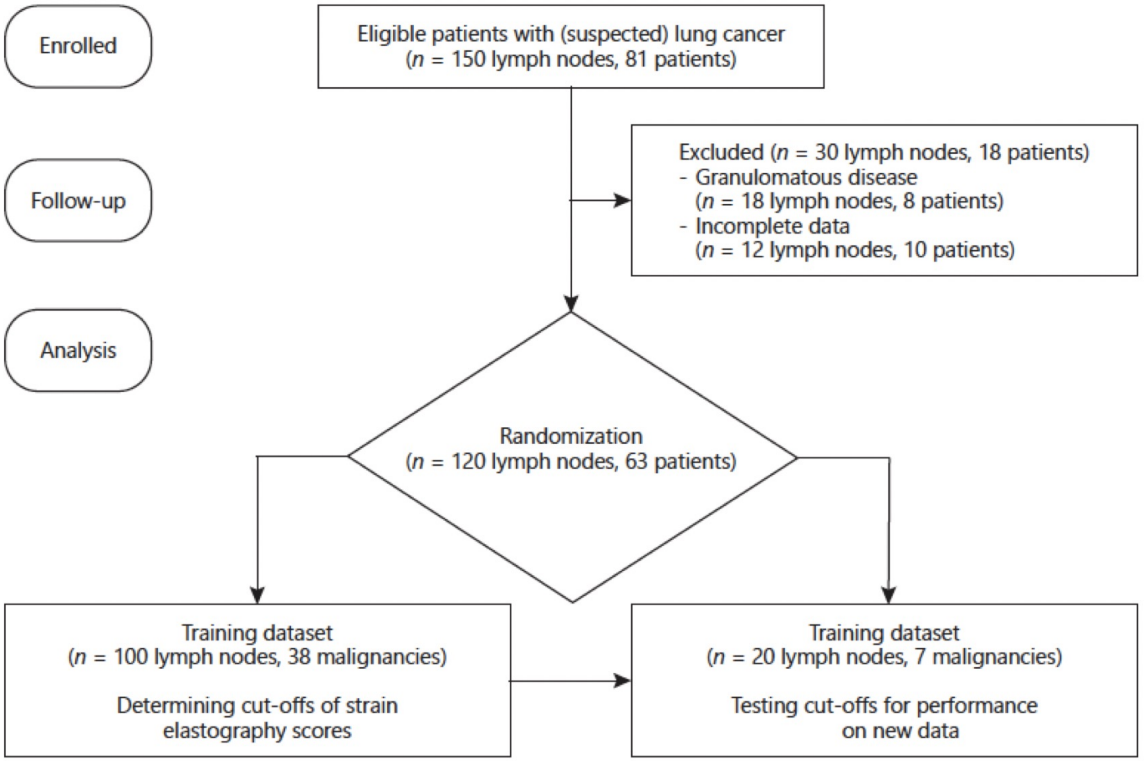


<u>EBUS ELASTOGRAPHY</u> determines elasticity / stiffness of lymph nodes on the basis of internal tissue deformations as a response to pulsations in the chest (strain elastography).

Optimal Endobronchial Ultrasound Strain Elastography Assessment Strategy: An Explorative Study

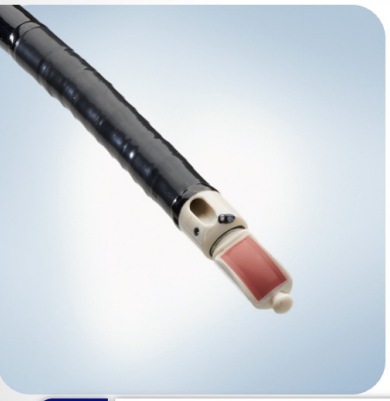
Roel L.J. Verhoeven[a–c] Chris L. de Korte[a, b] Erik H.F.M. van der Heijden[c]





Verhoeven et al. Respiration2019.

BF-UC260FW



BF-UC290F

	Distal End Outer Diameter	Distal End Rigid Portion Length
BF-UC260FW	6.9 mm	28 mm
BF-UC290F	6.6 mm	25 mm

Reduction of rigid portion length allows greater manoeuvrability

BF-UC260FW

BF-UC290F

	Direction of View
BF-UC260FW	35° F/O*
BF-UC290F	20° F/O*

Optimized *forward oblique view and improved image quality allow easier scope insertion and foster the anatomic overview.

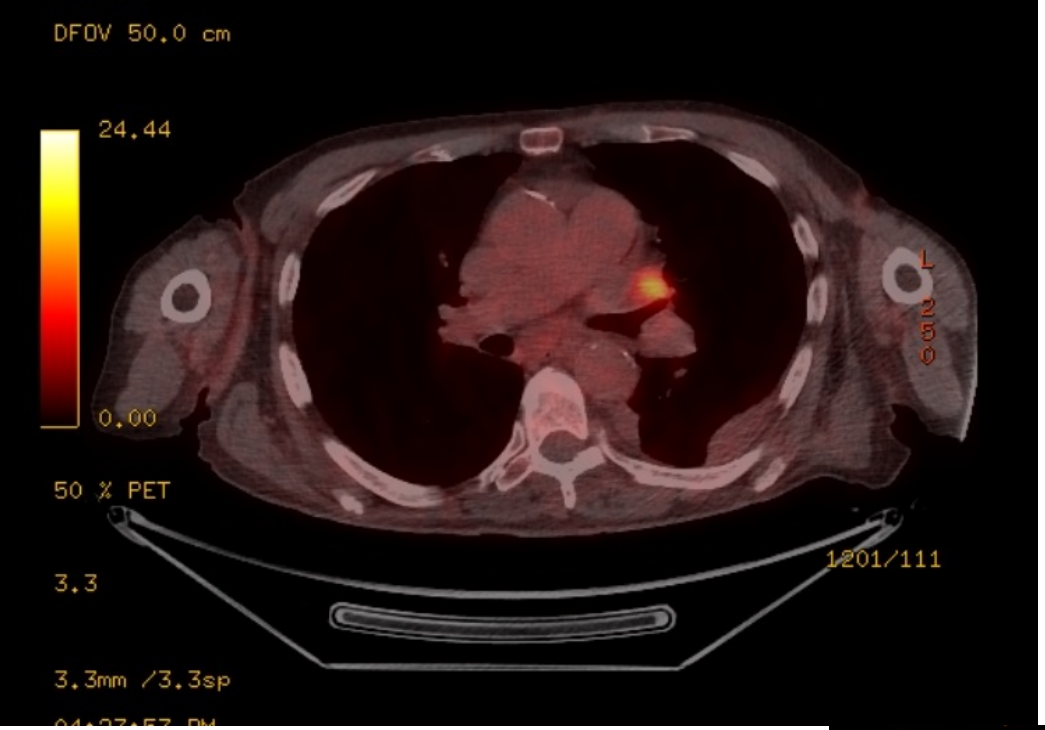
BF-UC260FW*

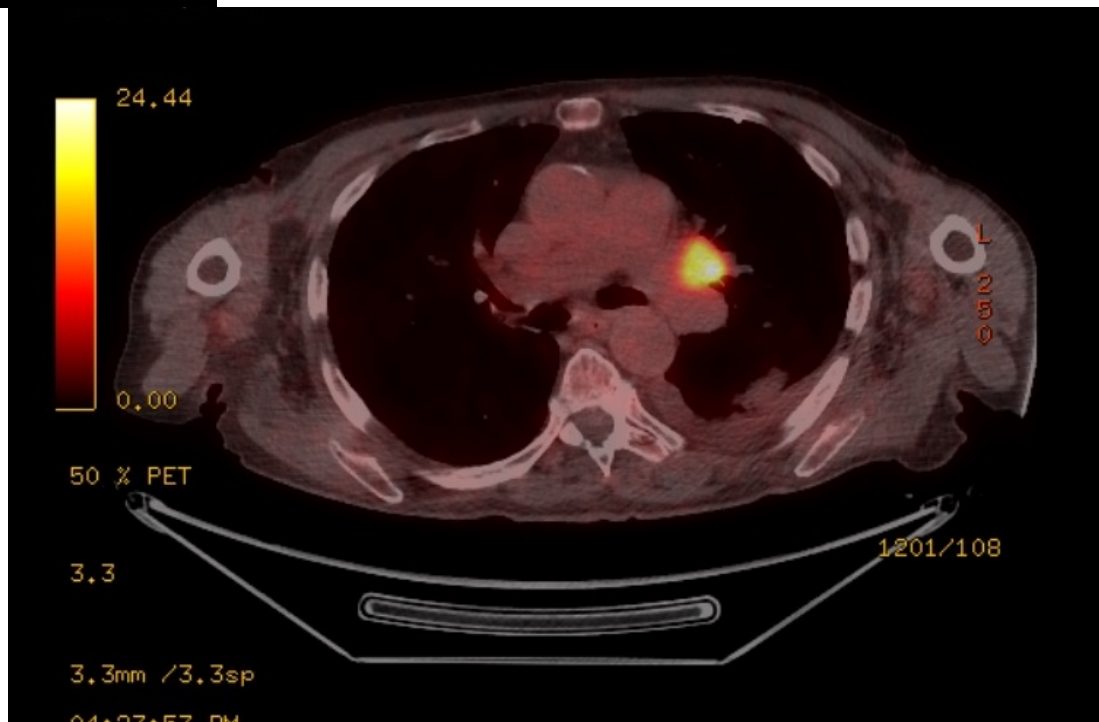
BF-UC290F**

	Angulation Range
BF-UC260FW	UP: 120°, DOWN 90°
BF-UC290F	UP: 160°, DOWN 70°

The combination of the slim insertion tube and the powerful angulation enables easier access to previously difficult-to-reach lymph nodes and lesions.

M Mu


DFOV 50.0 cm
24.44
0.00
50 % PET
3.3
1201/111
3.3mm /3.3sp


24.44
0.00
50 % PET
3.3
1201/108
3.3mm /3.3sp

First Evaluation of the New Thin Convex Probe Endobronchial Ultrasound Scope: A Human Ex Vivo Lung Study

Priya Patel, MD, Hironobu Wada, MD, PhD, Hsin-Pei Hu, BSc, Kentaro Hirohashi, MD, PhD, Tatsuya Kato, MD, PhD, Hideki Ujiie, MD, PhD, Jin Young Ahn, MD, Daiyoon Lee, BSc, William Geddie, MD, and Kazuhiro Yasufuku, MD, PhD

Division of Thoracic Surgery and Department of Pathology, Toronto General Hospital, University Health Network, Toronto, Ontario, Canada; and Department of General Thoracic Surgery, Graduate School of Medicine, Chiba University, Chiba, Japan

Background. Endobronchial ultrasonography (EBUS)-guided transbronchial needle aspiration allows for sampling of mediastinal lymph nodes. The external diameter, rigidity, and angulation of the convex probe EBUS renders limited accessibility. This study compares the accessibility and transbronchial needle aspiration capability of the prototype thin convex probe EBUS against the convex probe EBUS in human ex vivo lungs rejected for transplant.

Methods. The prototype thin convex probe EBUS (BF-Y0055; Olympus, Tokyo, Japan) with a thinner tip (5.9 mm), greater upward angle (170 degrees), and decreased forward oblique direction of view (20 degrees) was compared with the current convex probe EBUS (6.9-mm tip, 120 degrees, and 35 degrees, respectively). Accessibility and transbronchial needle aspiration capability was assessed in ex vivo human lungs declined for lung transplant. The distance of maximum reach and sustainable endoscopic limit were measured. Transbronchial needle aspiration capability was assessed using the prototype 25G aspiration needle in segmental lymph nodes.

Results. In all evaluated lungs (n = 5), the thin convex probe EBUS demonstrated greater reach and a higher success rate, averaging 22.1 mm greater maximum reach and 10.3 mm further endoscopic visibility range than convex probe EBUS, and could assess selectively almost all segmental bronchi (98% right, 91% left), demonstrating nearly twice the accessibility as the convex probe EBUS (48% right, 47% left). The prototype successfully enabled cytologic assessment of subsegmental lymph nodes with adequate quality using the dedicated 25G aspiration needle.

Conclusions. Thin convex probe EBUS has greater accessibility to peripheral airways in human lungs and is capable of sampling segmental lymph nodes using the aspiration needle. That will allow for more precise assessment of N1 nodes and, possibly, intrapulmonary lesions normally inaccessible to the conventional convex probe EBUS.

(Ann Thorac Surg 2017;103:1158–64)

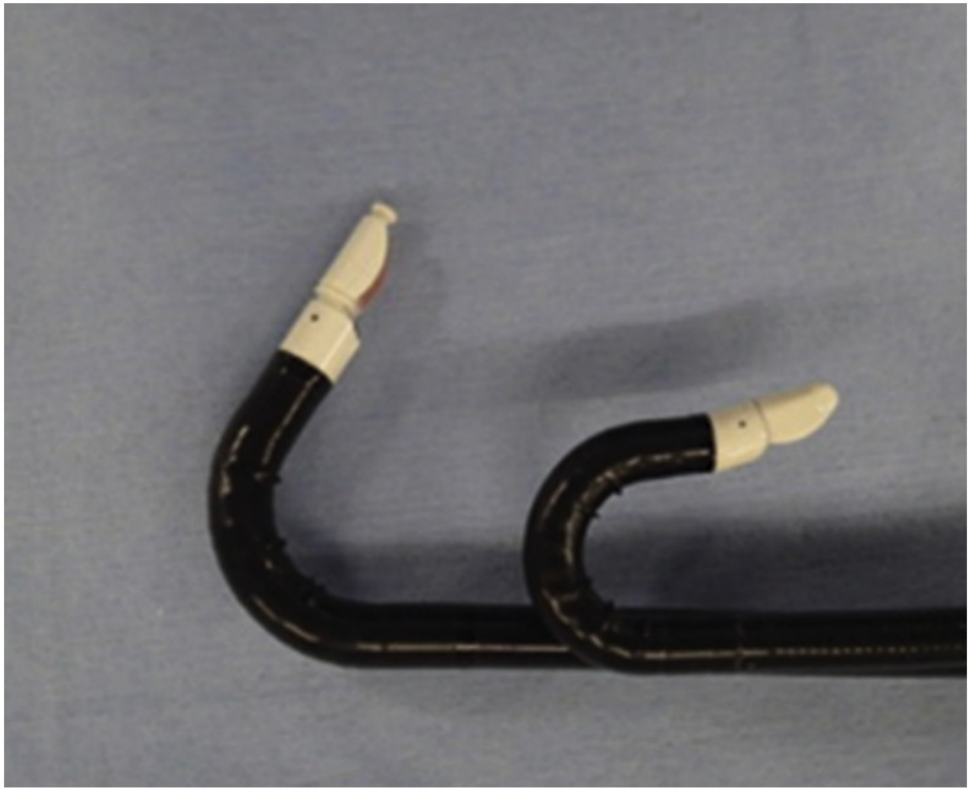
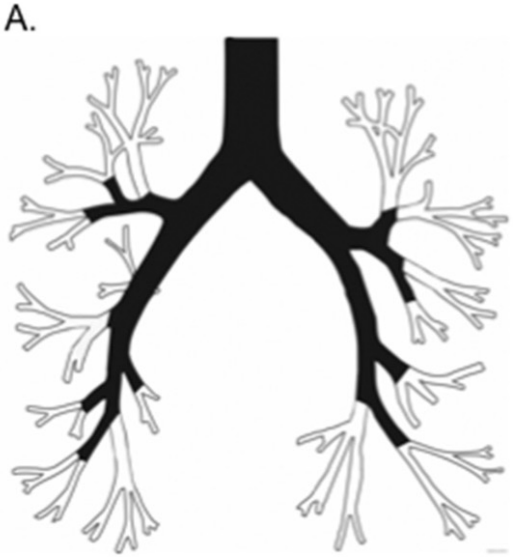


Fig 1. Thin convex probe endobronchial ultrasonography (BF-Y0055; Olympus Medical Systems, Tokyo, Japan), with a thinner tip (5.9 mm), greater upward angle (170 degrees), decreased forward oblique direction of view (20 degrees), seen on the right, compared with current convex probe endobronchial ultrasonography (6.9 mm tip, 120 202 degrees, and 35 degrees respectively), seen on the left.

Table 2. Average Difference of Endoscopic Limit and Maximum Reach Between Thin Convex Probe and Convex Probe Endobronchial Ultrasonography

Lobe	Endoscopic Limit (mm)	Maximum Reach (mm)
Right upper	10.6	22.6
Right middle	14.8	21.2
Right lower	8.2	24.3
Left upper	10.5	21.0
Left lower	7.4	21.6
Mean ± SD	10.3 ± 2.9	22.1 ± 1.4



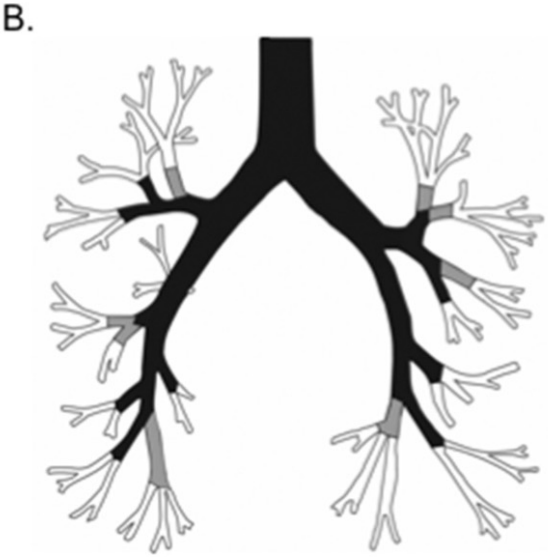
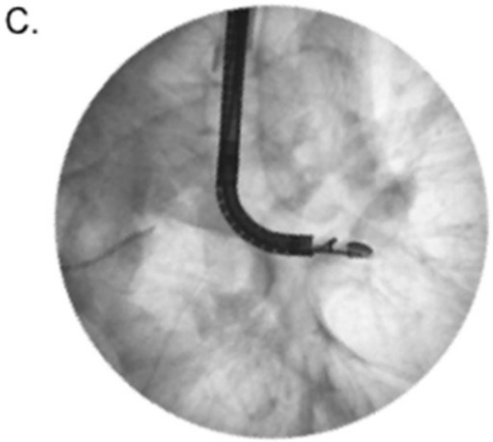
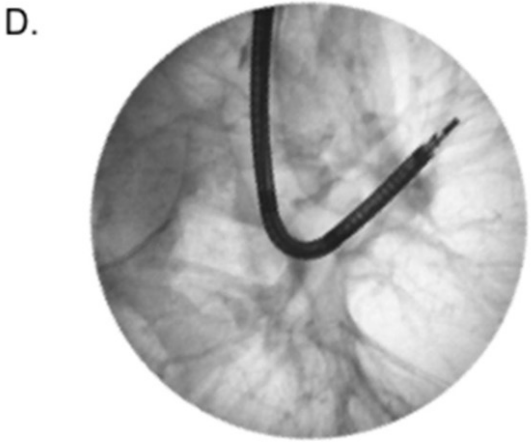


Fig 2. Illustration of the reach capacity of (A) convex probe endobronchial ultrasonography (CP-EBUS) compared with the extended reach of (B) thin convex probe endobronchial ultrasonography (TCP-EBUS). Illustration reflects the results of a single experiment. Gray area represents the extended reach of the TCP-EBUS. Fluoroscopic images demonstrating (C) the reach of CP-EBUS into the orifice of the left upper lobe bronchus, whereas (D) TCP-EBUS can access left B3 segmental bronchus.





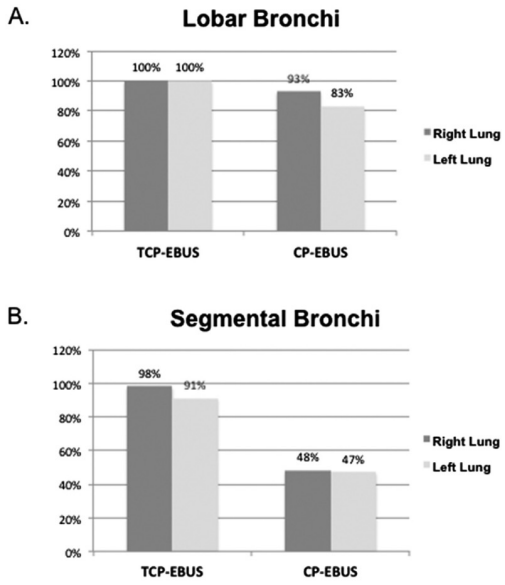
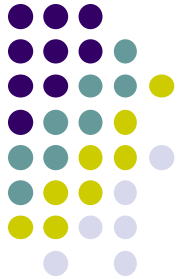


Fig 4. Comparison between thin convex probe endobronchial ultrasonography (TCP-EBUS) and convex probe endobronchial ultrasonography (CP-EBUS) airway assessment. (A) Percent of assessable lobar bronchi. (B) Percent of assessable segmental bronchi. Dark gray bars indicate right lung; light gray bars indicate left lung.

EBUS and EUS-B: How to do it



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Guidelines

Respiration

Respiration
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Guideline for the Acquisition and Preparation of Conventional and Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration Specimens for the Diagnosis and Molecular Testing of Patients with Known or Suspected Lung Cancer

Erik H.F.M. van der Heijden[a] Roberto F. Casal[b] Rocco Trisolini[c] Daniel P. Steinfort[d]
Bin Hwangbo[e] Takahiro Nakajima[f] Birgit Guldhammer-Skov[g] Giulio Rossi[h]

EBUS-FAQs

- *Does the number of aspirates per LN affect the diagnostic yield, quantity or quality of the obtained specimen?*
- Yes
- *Does the needle size affect the diagnostic yield, quantity or quality of the specimen?*
- No (?possibly)
- *Does the use of forceps affect the diagnostic yield, quantity or quality of the specimen in patients with known or suspected lung cancer?*
- No

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EBUS-FAQs 2

- *Does the use of suction affect the quantity and quality of the specimen, or the diagnostic yield?*
- No
- *Does sedation/anesthesia type influence the quality of the specimen or the diagnostic yield?*
- Possibly (?)
- *Does the time spent inside the node or number of revolutions inside the node affect the diagnostic yield?*
- Possibly- 10-20 (?Bleeding with higher number)
- *Is there an optimal slide preparation technique and staining method?*
- No

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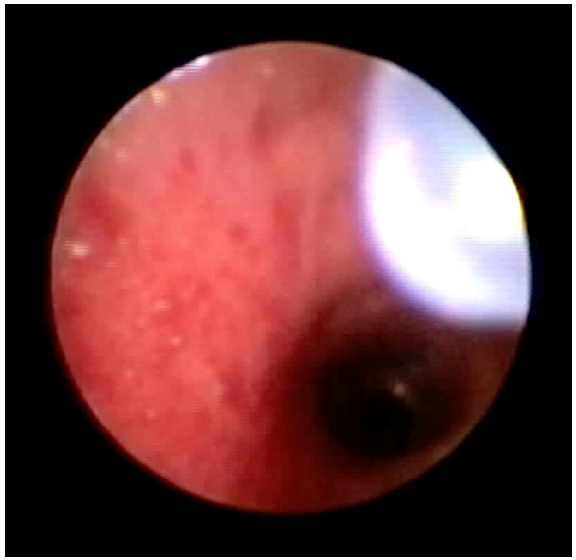
EUROPEAN RESPIRATORY JOURNAL
ORIGINAL RESEARCH ARTICLE
J. ZHANG ET AL.

Transbronchial mediastinal cryobiopsy in the diagnosis of mediastinal lesions: a randomised trial

Jing Zhang[1], Jie-Ru Guo[1], Zan-Sheng Huang[1], Wan-Lei Fu[2], Xian-Li Wu[1], Na Wu[3], Wolfgang M. Kuebler[4], Felix J.F. Herth[5,6,7] and Ye Fan[1,7]

Through needle tract



Electrocautery opening

EBUS-guided cryobiopsy in the diagnosis of thoracic disorders

V. Poletti[a,b,c,*], S. Petrarulo[a], S. Piciucchi[d], A. Dubini[e], A.J. De Grauw[a], F. Sultani[a],

30/05/24 BTS course M Munavvar

Endobronchial ultrasound-guided transbronchial mediastinal cryobiopsy: a narrative review

Hema Yamini Ramarmuty[1], Masahide Oki[2]


DOB:
AGE: SEX:
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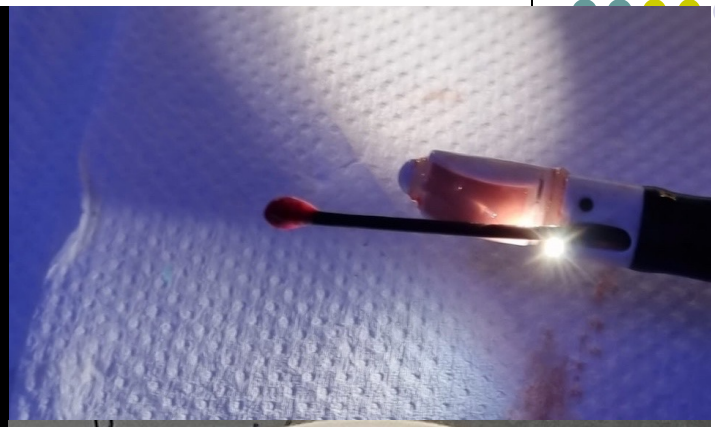
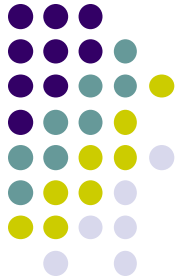


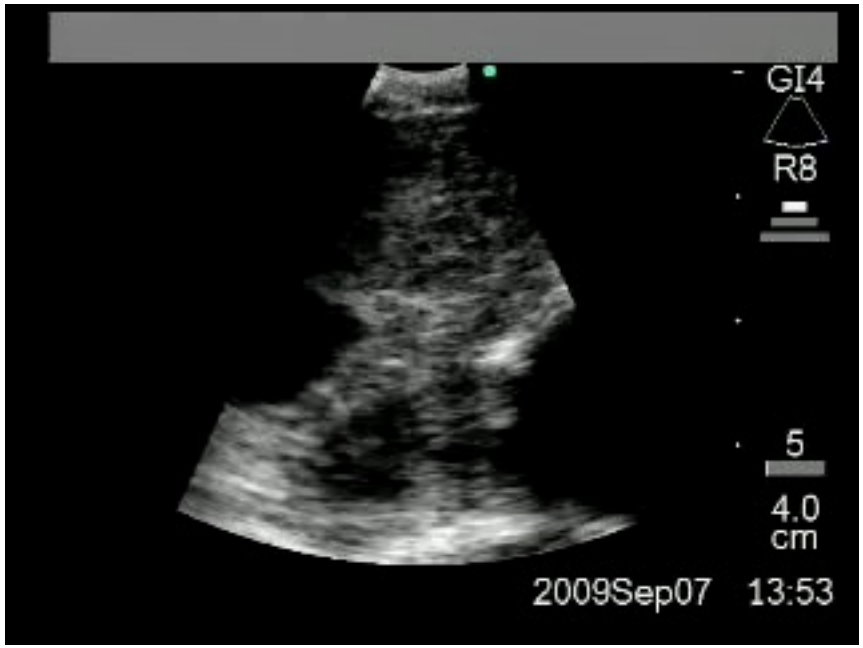
EBUS and EUS-B: How to do it



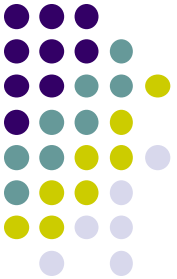
- **Introduction**
- Clinical Cases
- EBUS: Step by Step Guide
- EUS-B FNA- Basics
- Literature Review-Brief
- Complications
- Equipment
- Guidelines
- **Conclusions**

EBUS-Indications

- **EBUS-TBNA**
  - Diagnosis
    - LN
    - Peribronchial
    - Sarcoidosis,
    - TB
    - ?Lymphoma
  - Staging
  - Therapy
    - Bronchogenic cyst (and Dx)



EBUS TBNA-Points to learn/ remember



- Scope-intubation- ?forward oblique
- Ultrasound processor and images
- Use of Doppler
- Needle assembly and insertion technique
  - 22, 21, 25, 19 (One needle, initially!!)
- Systematic assessment- N3 to N1