서울아산병원
Asan Medical Center

Interventional Pulmonology for Diagnosis and Management of Lung Cancer

증례로 풀어보는 호흡기질환 - 폐암

서울아산병원 호흡기내과 지원준

Contents

Introduction

- **Interventional Pulmonology**

➔ Minimally invasive endoscopic and percutaneous procedures for diagnosis and treatment of neoplastic as well as non-neoplastic diseases of the airways, lungs, and pleura.

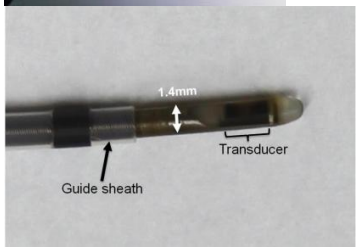
WABIP

American Association for Bronchology and Interventional Pulmonology

European Association for Bronchology and Interventional Pulmnology

Asian-Pacific Association for Bronchology and Interventional Pulmonology

Introduction



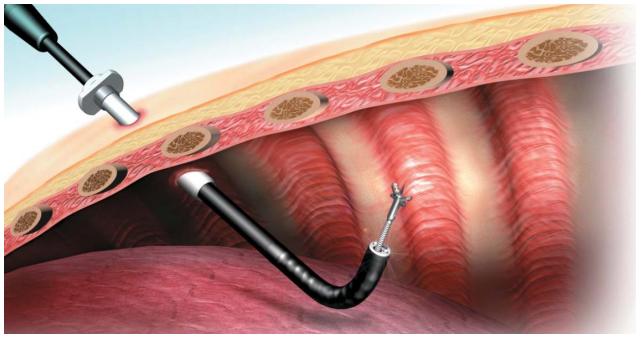


Table 23-2 Advantages and Disadvantages of Therapeutic Modalities

Modality	Time to Achieve Results	Advantages	Disadvantages	Cautions
Electrocautery	Immediate	Inexpensive Multiple accessories	Often need to couple with mechanical débridement	Need to deactivate pacemaker/AICD Keep $FIO_2 < 0.4$
Argon plasma coagulation	Immediate	Inexpensive Can treat at an angle to electrode	Risk for gas embolization with higher flow rates Often need to couple with mechanical débridement	Need to deactivate pacemaker/AICD Depth of penetration 2-3 mm Keep $FIO_2 < 0.4$
Laser	Immediate	Extensive data supporting its use	Need laser safety precautions	Depth of penetration up to 10 mm Keep $FIO_2 < 0.4$
Stent	Immediate	Only bronchoscopic modality for extrinsic compression	All stents have associated complications of granulation tissue formation, infection, and migration	Metallic stents should be used with caution in patients with nonmalignant disease
Microdébrider	Immediate	Can use in high-FIO_2 environments	May need additional tools to provide hemostasis	Cannot reach distal airways
Cryotherapy	48-72 hr	Normal airway is cryoresistant Can use in high-FIO_2 environments	Delayed maximal effect, requiring "cleanout" bronchoscopy	Cryoadhesion can remove organic foreign bodies
Photodynamic therapy	48-72 hr	Can destroy submucosal tumor Can use in high-FIO_2 environments	Delayed maximal effect, requiring "cleanout" bronchoscopy Systemic photosensitivity Need laser safety precautions	Swelling of tumor can cause obstruction
Brachytherapy	Delayed: days—weeks	Can destroy submucosal tumor	Coordination with radiation oncology	Radiation bronchitis Risk for erosion into vessels Swelling of tumor can cause obstruction

AICD, automatic internal cardiac defibrillator.

- Murray & Nadal's Textbook of Respiratory Medicine, 5th edition, chapter 22

Diagnostic Bronchoscopy for Lung Cancer

Case 1

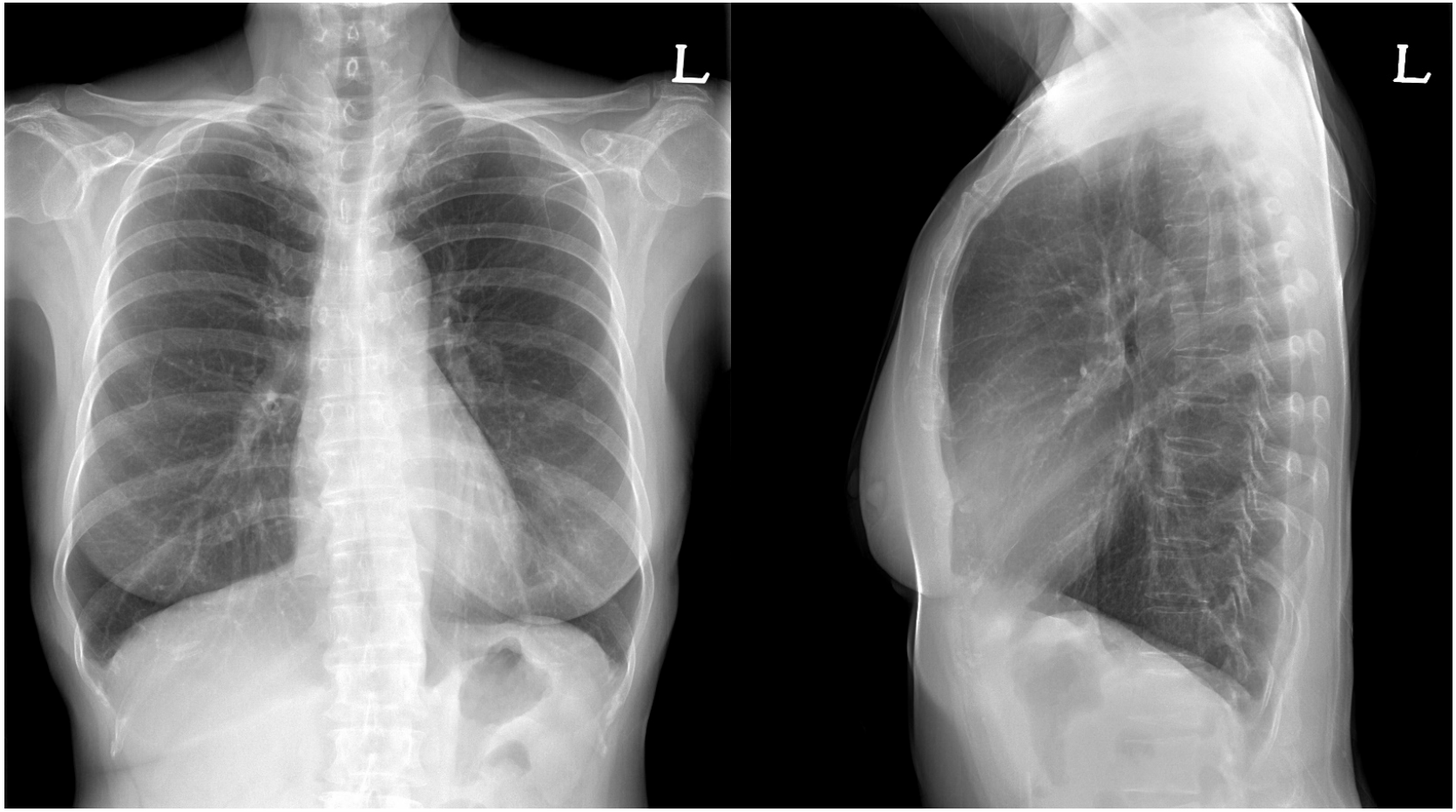
59/F

Never smoker, previous healthy

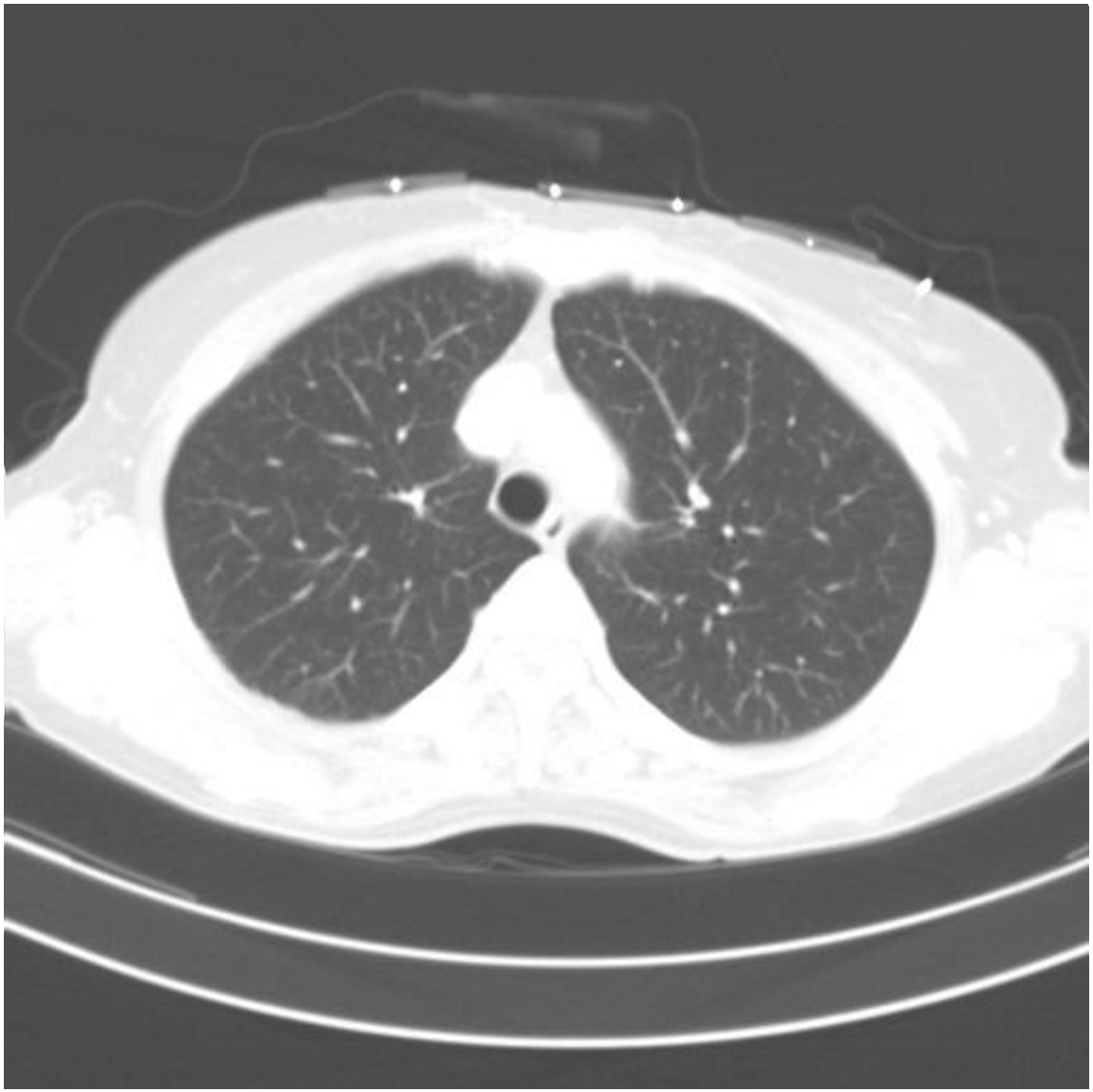
욕실에서 미끄러지면서 좌측 흉부 통증으로 타원에서 시행한 Chest CT상에서 LUL nodule 발견되어 Biopsy 시행 위해 내원

PFT : FEV1/FVC 83%, FVC 114% (3.28L), FEV1 108%(2.47L), DLco 92%

Chest X-ray



Chest CT



이 환자에서 적절한 조직검사 방법은?

1. PCNB
2. Bronchoscopic technique for peripheral lesions
3. Surgical resection

Select Target

L+R ↕ : Zoom
L : Set Position
L ✣ : Rotate
L 2x : Reset Pan & Zoom
M ✣ : Pan

☑ Display Airway Map

SPiN Plan

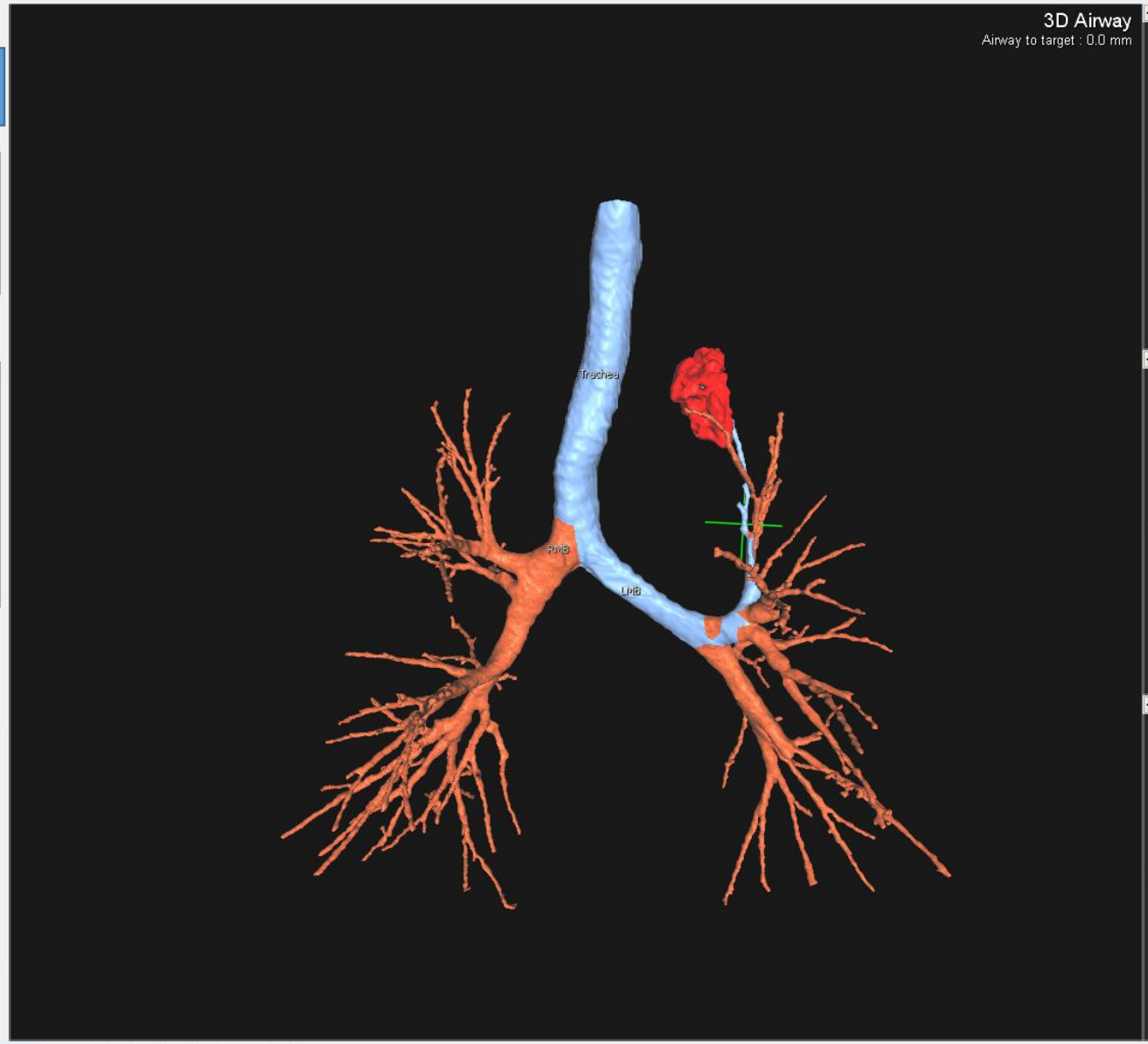
Plan 1

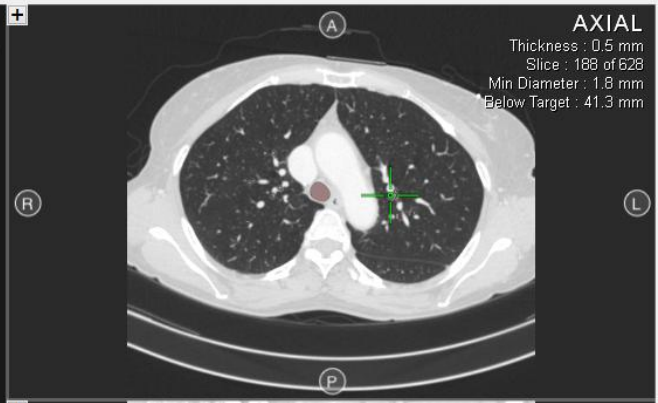
Save Plan

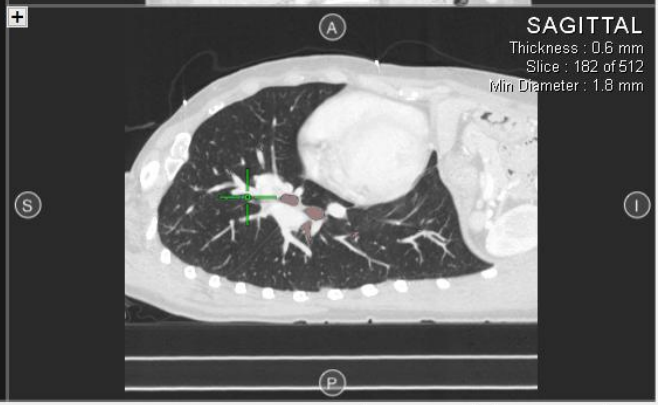
Nodule Statistics:

Volume: 3587 mm^3
RECIST Diameter: 20.0 mm
Maximum Diameter: 37.2 mm
Minimum Diameter: 14.1 mm
Effective Diameter: 25.6 mm
Image Level: 0
Image Width: 20

☑ Display Nodule Heatmap





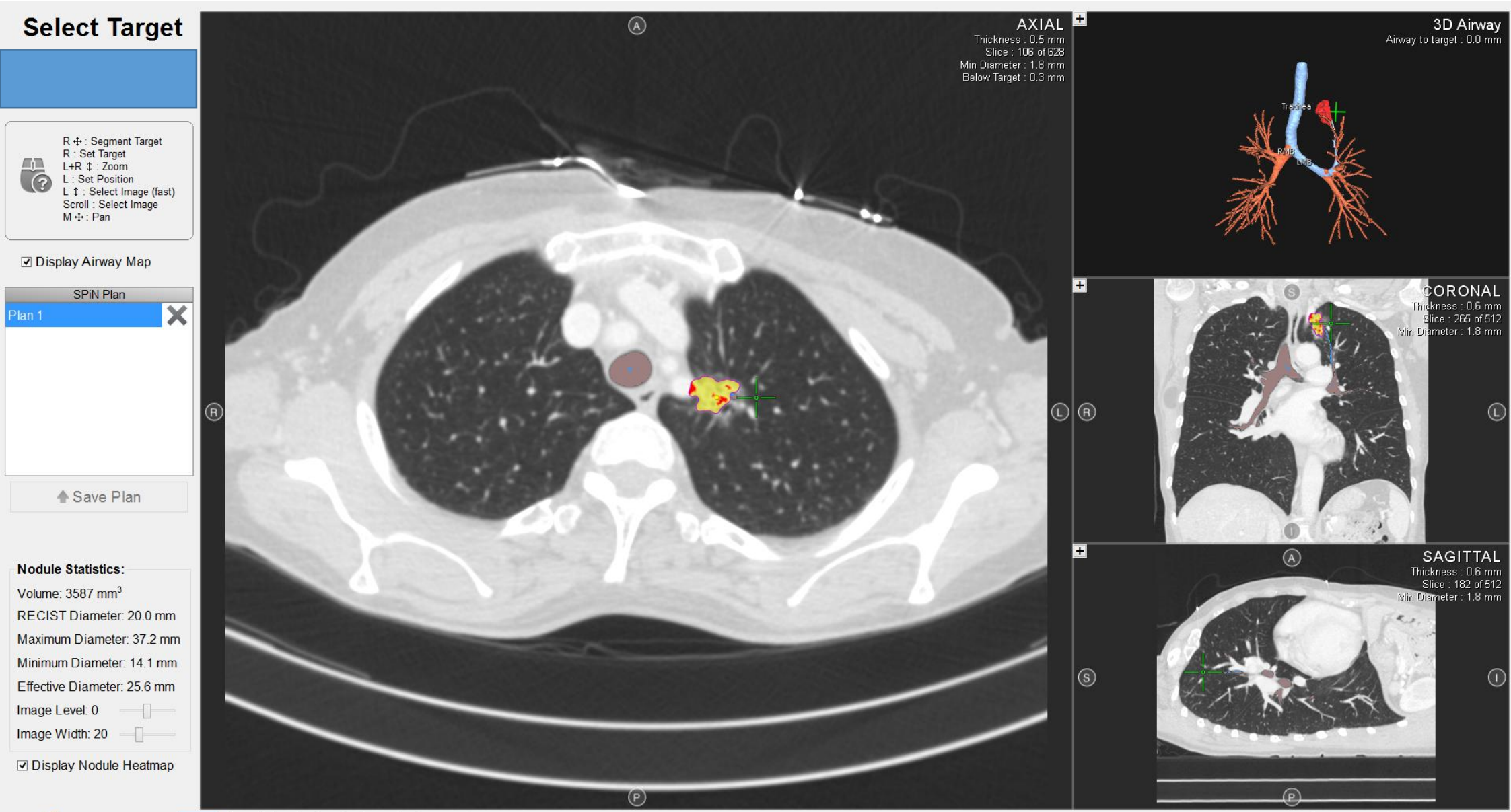


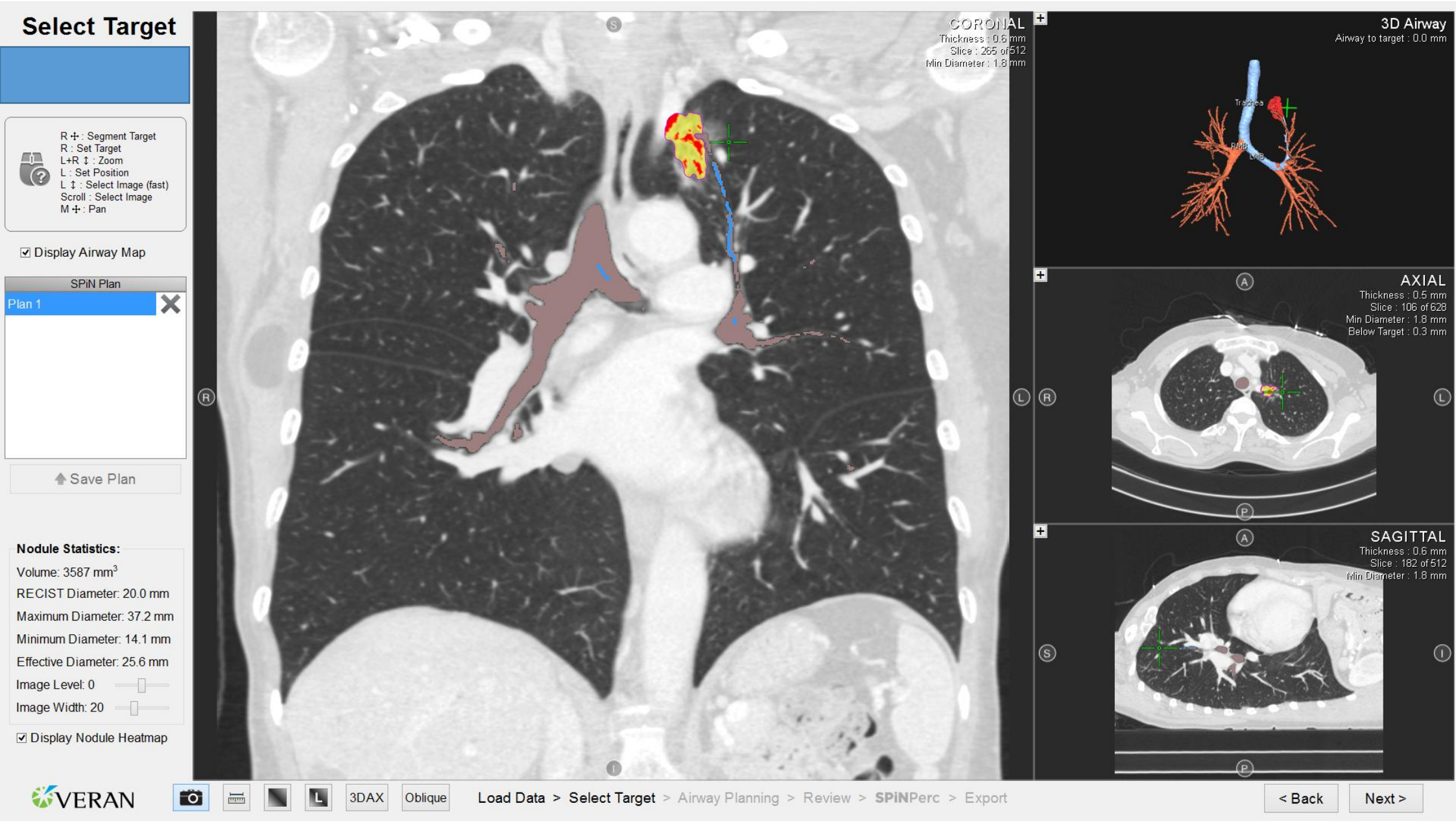
VERAN

3DAX | Oblique

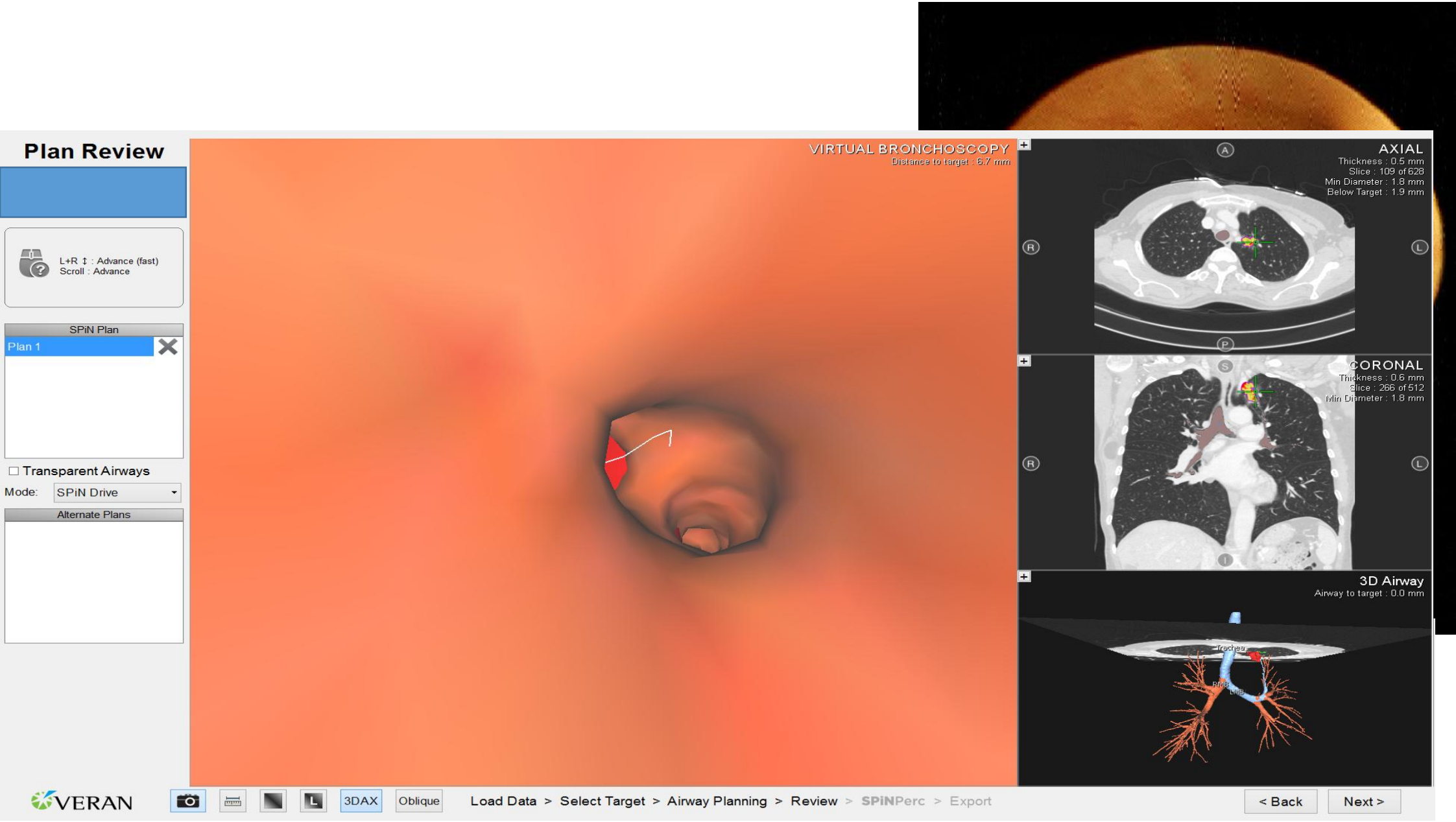
Load Data > Select Target > Airway Planning > Review > SPiNPerc > Export

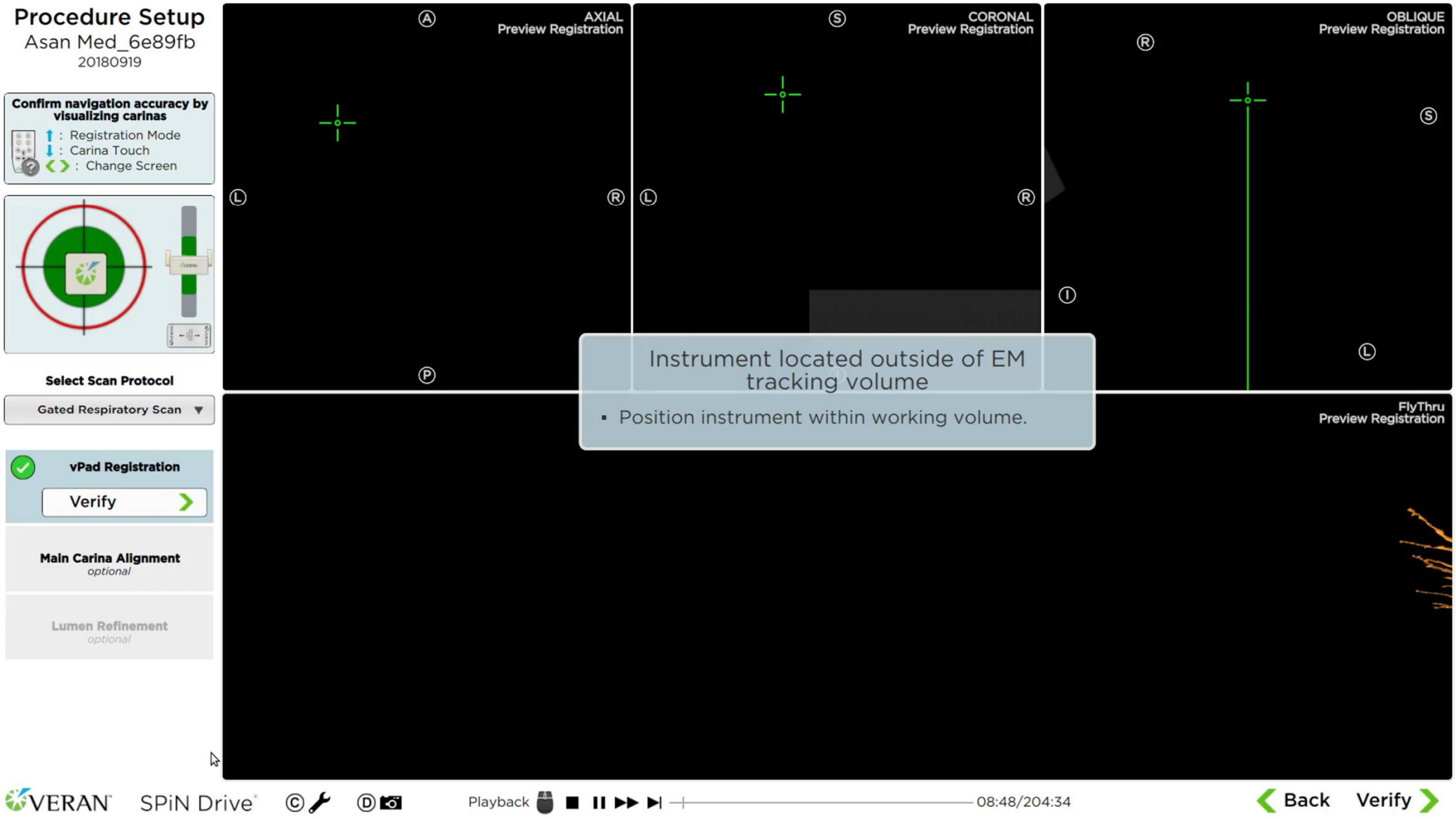
< Back | Next >


Select Target
R ✣ : Segment Target
R : Set Target
L+R ↕ : Zoom
L : Set Position
L ↕ : Select Image (fast)
Scroll : Select Image
M ✣ : Pan
Display Airway Map
SPiN Plan
Plan 1
Save Plan
Nodule Statistics:
Volume: 3587 mm3
RECIST Diameter: 20.0 mm
Maximum Diameter: 37.2 mm
Minimum Diameter: 14.1 mm
Effective Diameter: 25.6 mm
Image Level: 0
Image Width: 20
Display Nodule Heatmap
AXIAL
Thickness : 0.5 mm
Slice : 106 of 628
Min Diameter : 1.8 mm
Below Target : 0.3 mm
3D Airway
Airway to target : 0.0 mm
Trachea
RMB
LMB
CORONAL
Thickness : 0.6 mm
Slice : 265 of 512
Min Diameter : 1.8 mm
SAGITTAL
Thickness : 0.6 mm
Slice : 182 of 512
Min Diameter : 1.8 mm
VERAN
3DAX
Oblique
Load Data > Select Target > Airway Planning > Review > SPiNPerc > Export
< Back
Next >

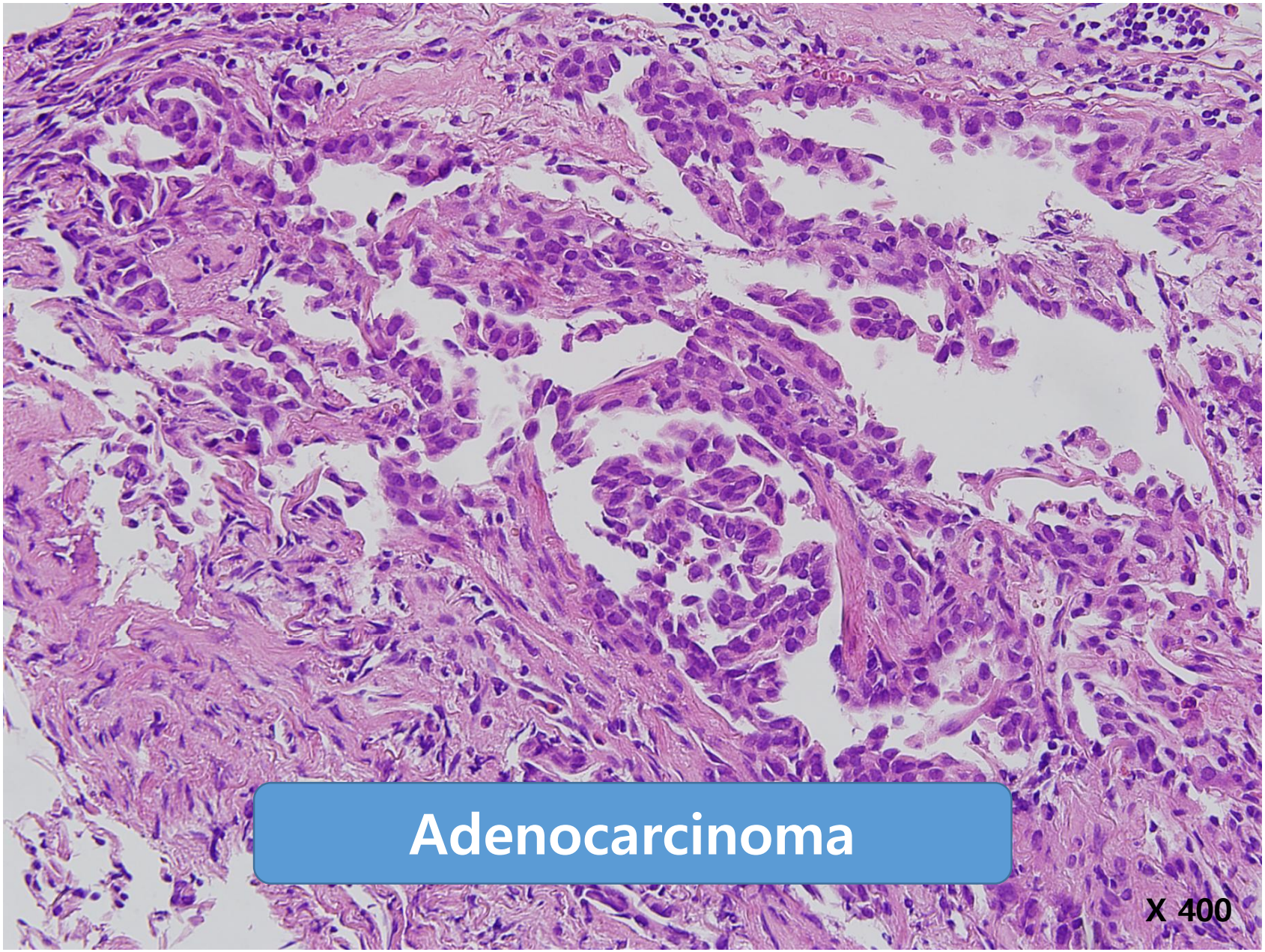

Select Target
R ✣ : Segment Target
R : Set Target
L+R ↕ : Zoom
L : Set Position
L ↕ : Select Image (fast)
Scroll : Select Image
M ✣ : Pan
Display Airway Map
SPiN Plan
Plan 1
Save Plan
Nodule Statistics:
Volume: 3587 mm3
RECIST Diameter: 20.0 mm
Maximum Diameter: 37.2 mm
Minimum Diameter: 14.1 mm
Effective Diameter: 25.6 mm
Image Level: 0
Image Width: 20
Display Nodule Heatmap
CORONAL
Thickness : 0.6 mm
Slice : 265 of 512
Min Diameter : 1.8 mm
3D Airway
Airway to target : 0.0 mm
Trachea
RMB
LMB
AXIAL
Thickness : 0.5 mm
Slice : 106 of 628
Min Diameter : 1.8 mm
Below Target : 0.3 mm
SAGITTAL
Thickness : 0.6 mm
Slice : 182 of 512
Min Diameter : 1.8 mm
VERAN
3DAX
Oblique
Load Data > Select Target > Airway Planning > Review > SPiNPerc > Export
< Back
Next >

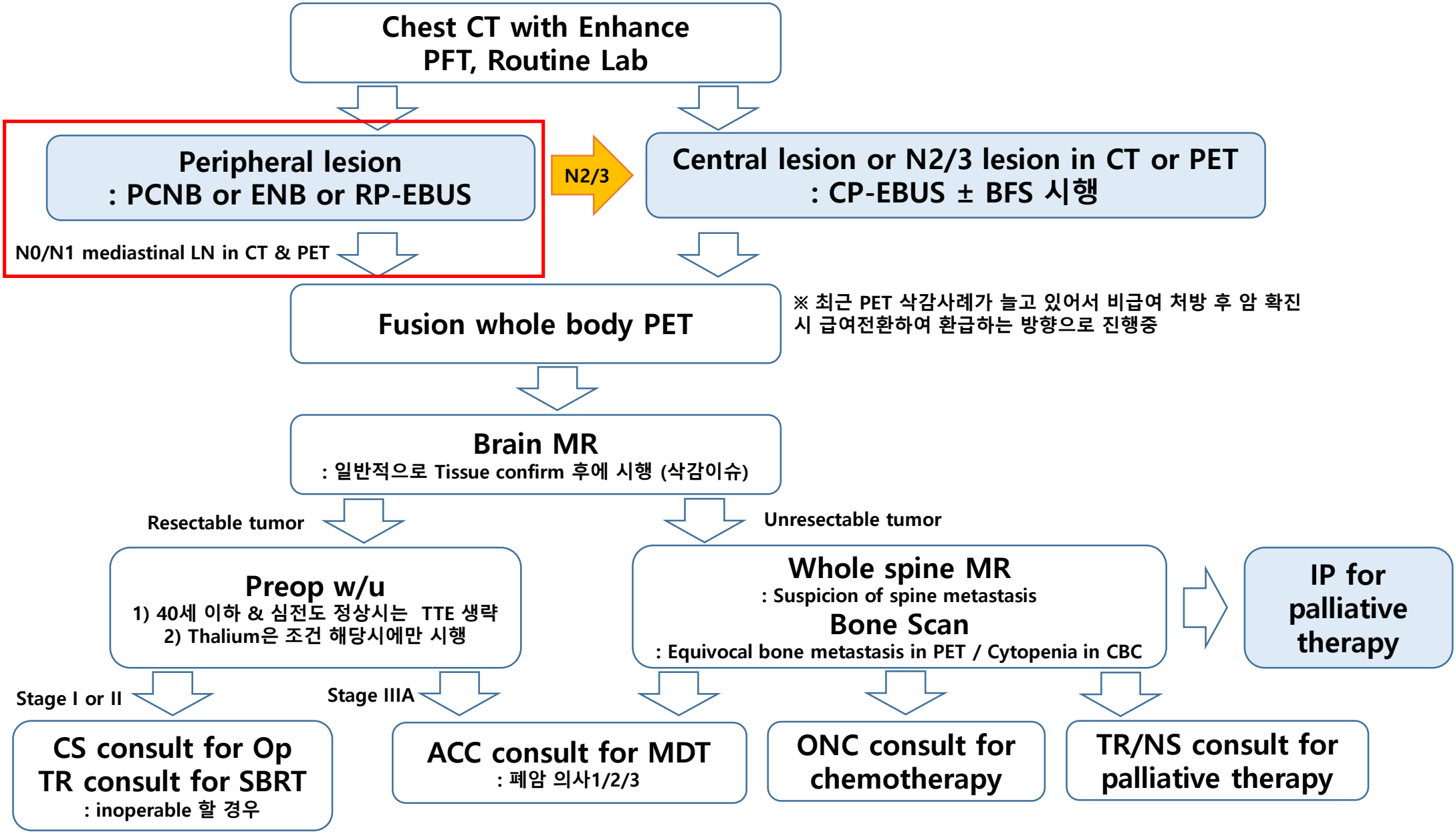
ENB guided Biopsy


Plan Review
L+R ↕ : Advance (fast)
Scroll : Advance
SPiN Plan
Plan 1
Transparent Airways
Mode:
SPiN Drive
Alternate Plans
VIRTUAL BRONCHOSCOPY
Distance to target : 8.7 mm
AXIAL
Thickness : 0.5 mm
Slice : 109 of 628
Min Diameter : 1.8 mm
Below Target : 1.9 mm
CORONAL
Thickness : 0.6 mm
Slice : 266 of 512
Min Diameter : 1.8 mm
3D Airway
Airway to target : 0.0 mm
Trachea
VERAN
3DAX
Oblique
Load Data > Select Target > Airway Planning > Review > SPiNPerc > Export
< Back
Next >


Procedure Setup
Asan Med_6e89fb
20180919
Confirm navigation accuracy by visualizing carinas
: Registration Mode
: Carina Touch
: Change Screen
Select Scan Protocol
Gated Respiratory Scan
vPad Registration
Verify
Main Carina Alignment
optional
Lumen Refinement
optional
AXIAL
Preview Registration
CORONAL
Preview Registration
OBLIQUE
Preview Registration
Instrument located outside of EM tracking volume
Position instrument within working volume.
FlyThru
Preview Registration
VERAN
SPiN Drive
Playback
08:48/204:34
Back
Verify

Pathology


Adenocarcinoma
X 400


Chest CT with Enhance
PFT, Routine Lab
Peripheral lesion
: PCNB or ENB or RP-EBUS
N0/N1 mediastinal LN in CT & PET
N2/3
Central lesion or N2/3 lesion in CT or PET
: CP-EBUS ± BFS 시행
Fusion whole body PET
※ 최근 PET 삭감사례가 늘고 있어서 비급여 처방 후 암 확진 시 급여전환하여 환급하는 방향으로 진행중
Brain MR
: 일반적으로 Tissue confirm 후에 시행 (삭감이슈)
Resectable tumor
Unresectable tumor
Preop w/u
1) 40세 이하 & 심전도 정상시는 TTE 생략
2) Thalium은 조건 해당시에만 시행
Whole spine MR
: Suspicion of spine metastasis
Bone Scan
: Equivocal bone metastasis in PET / Cytopenia in CBC
IP for palliative therapy
Stage I or II
Stage IIIA
CS consult for Op
TR consult for SBRT
: inoperable 할 경우
ACC consult for MDT
: 폐암 의사1/2/3
ONC consult for chemotherapy
TR/NS consult for palliative therapy

Case 2

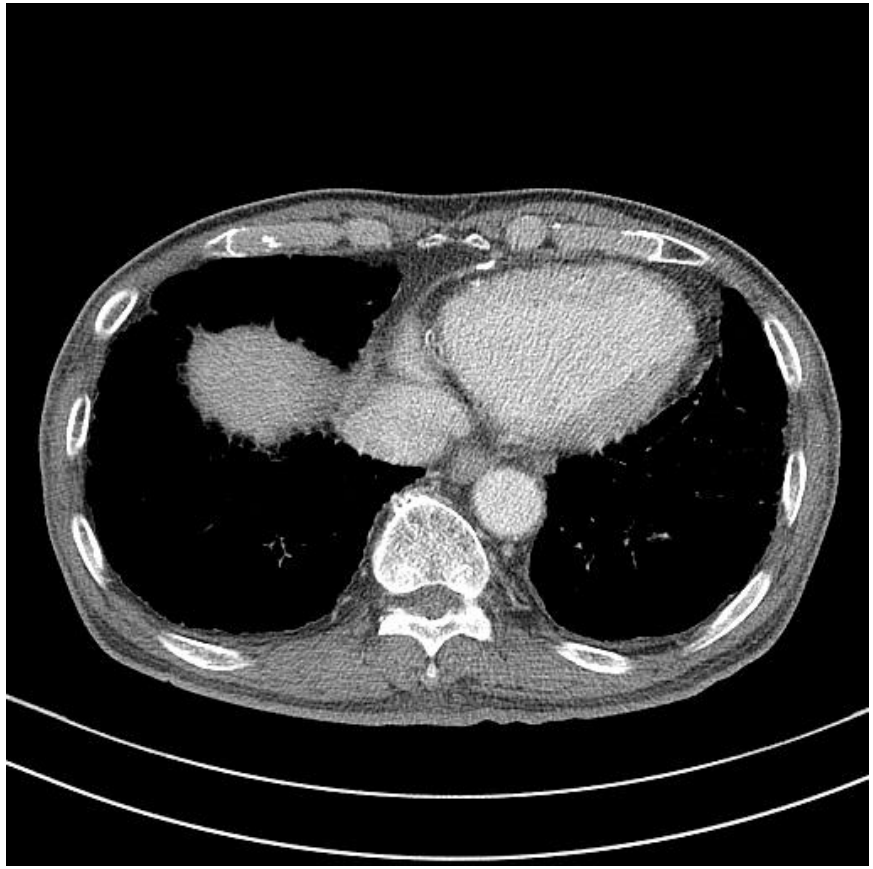
75/F

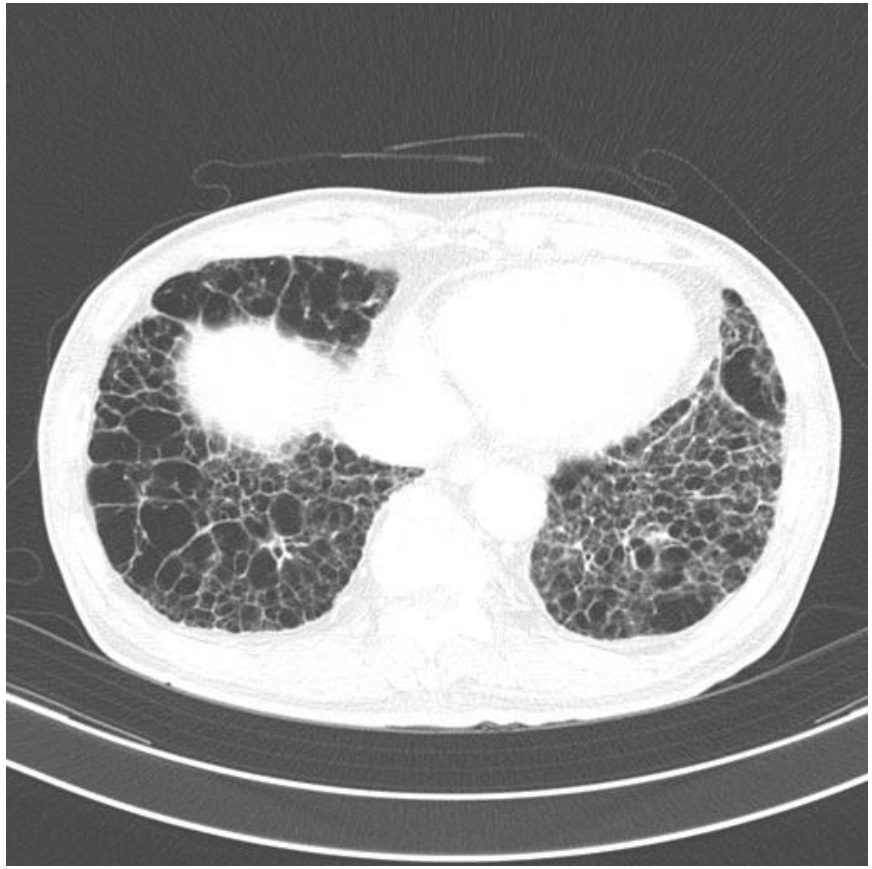
35 PY Ex smoker, 내원 3년전 IPF진단 하에 경과관찰 중

DOE 악화로 ER경유 입원하여 시행한 chest CT상에서 크기 증가양상의 2.4cm LLL nodule 발견 biopsy 시행위해 입원함

PFT : FEV1/FVC 81%, FVC 66% (2.56L) FEV1 78%(2.07L), DLco 17%

Chest CT





이 환자에서 적절한 진단 및 치료 방법은?

1. PCNB
2. Bronchoscopic technique for peripheral lesions
3. Surgical resection
4. 조직검사 없이 방사선 치료
5. 항암치료

Case 2

75/F

35 PY Ex smoker, 내원 3년전 IPF진단 하에 경과관찰 중

DOE 악화로 ER경유 입원하여 시행한 chest CT상에서 크기 증가양상의 2.4cm LLL nodule 발견
PCNB 시행하였으나 기흉 발생하여 targeting 실패, 흉관 삽관
기흉 호전후 Mediastinal LN에 대해 EBUS (4R, 7) 시행하였으나 Negative
기흉 호전되어 흉관 제거

PCNB 다시 시도하였으나 기흉 발생하여 시술 실패
다학제진료 논의 하였으며 기저 폐기능 고려시 수술도 방사선치료도 위험성 높아 항암치료 필요한 상태이나 가능하면 조직검사 시행하여 유전자 정보 확인후 치료약제 선택하는 것을 추천함

Veran ENB guided biopsy 시행위해 입원함

PFT : FEV1/FVC 81%, FVC 66% (2.56L) FEV1 78%(2.07L), DLco 17%

Veran ENB guided Biopsy

Patient	State	Preview	Description	Slices	Plans	Targets

Select Patient and Study

: Study Select
: Select Patient
: Change Screen

Ready to Import Data

Not Connected

SPiN Link™
Disconnected,
Listening on Port 9930

Archive

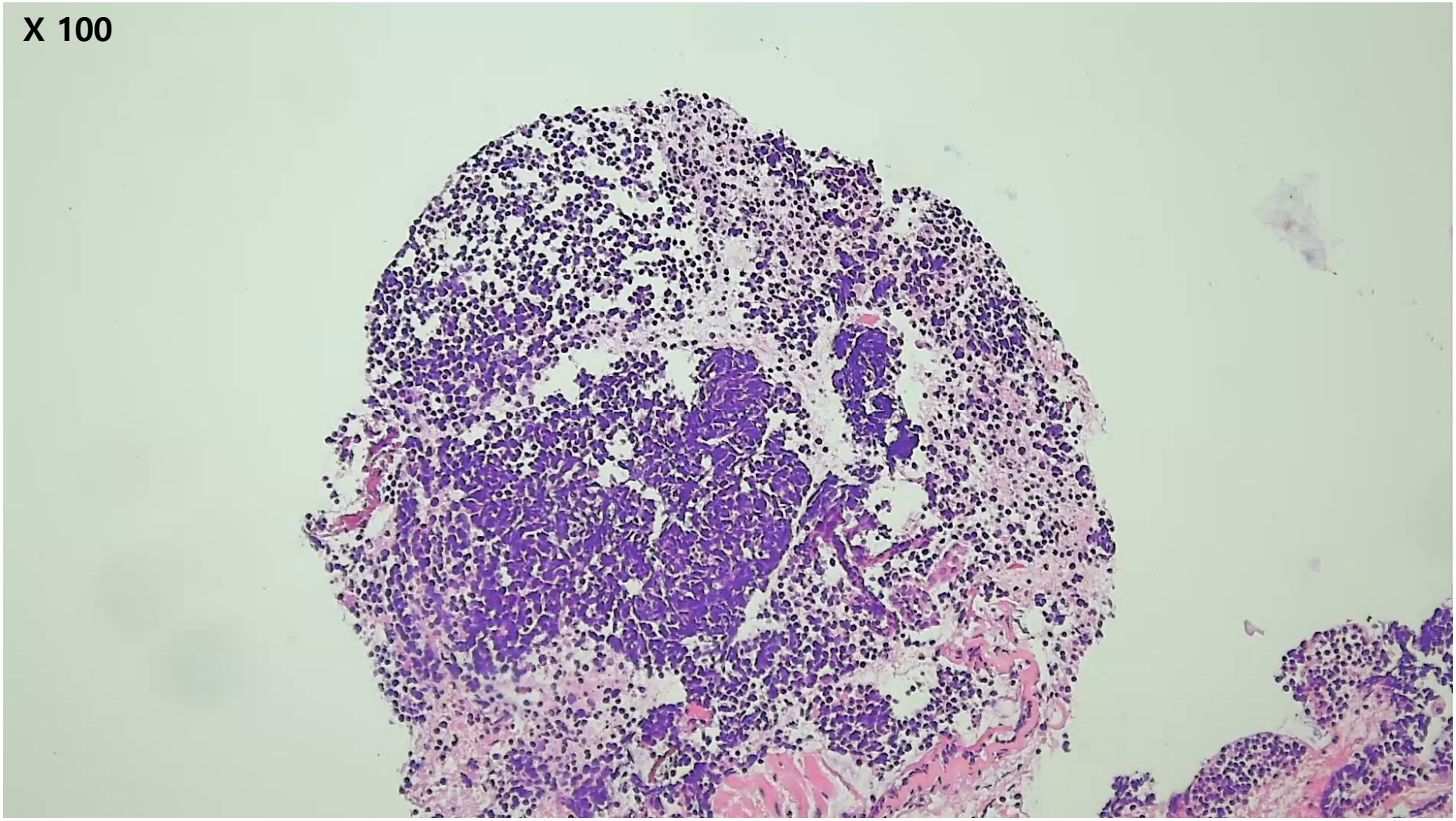
Back Verify

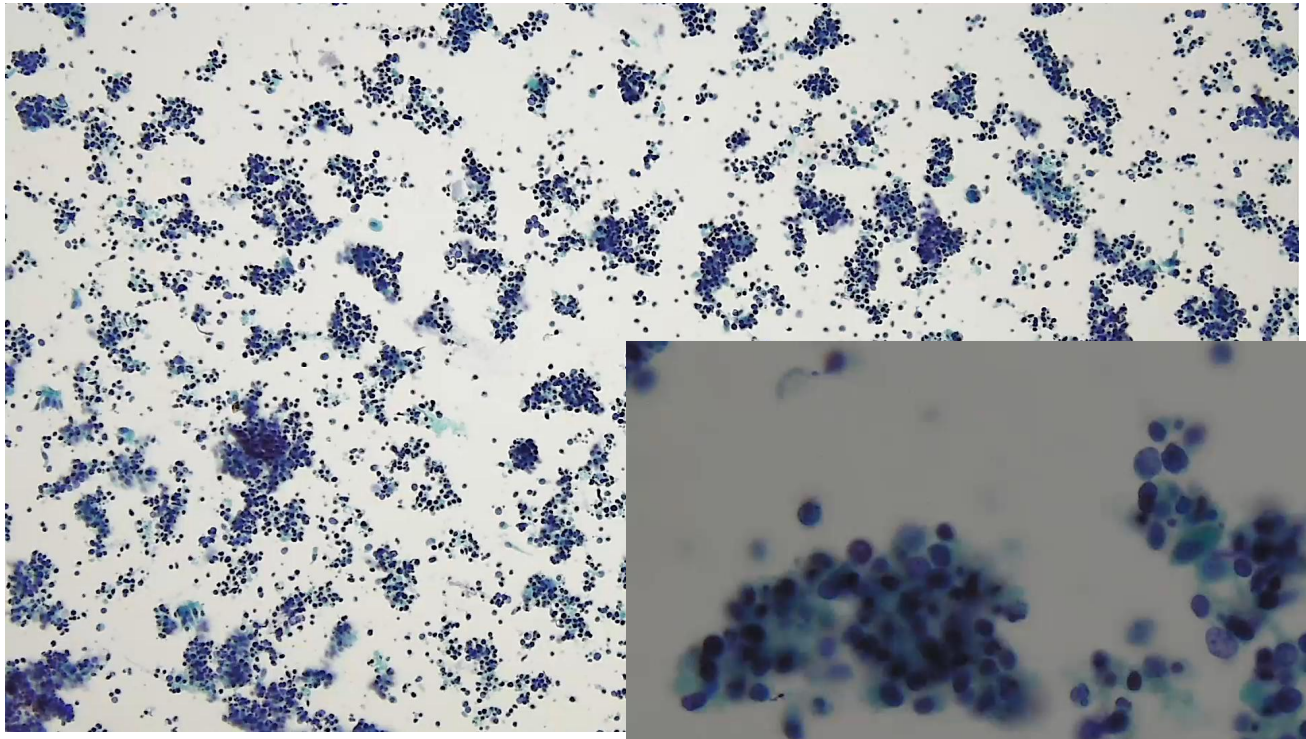
Select Patient 〉 **Registration** 〉 Navigate 〉 SPiN Perc® 〉 Export

SPiN Drive®

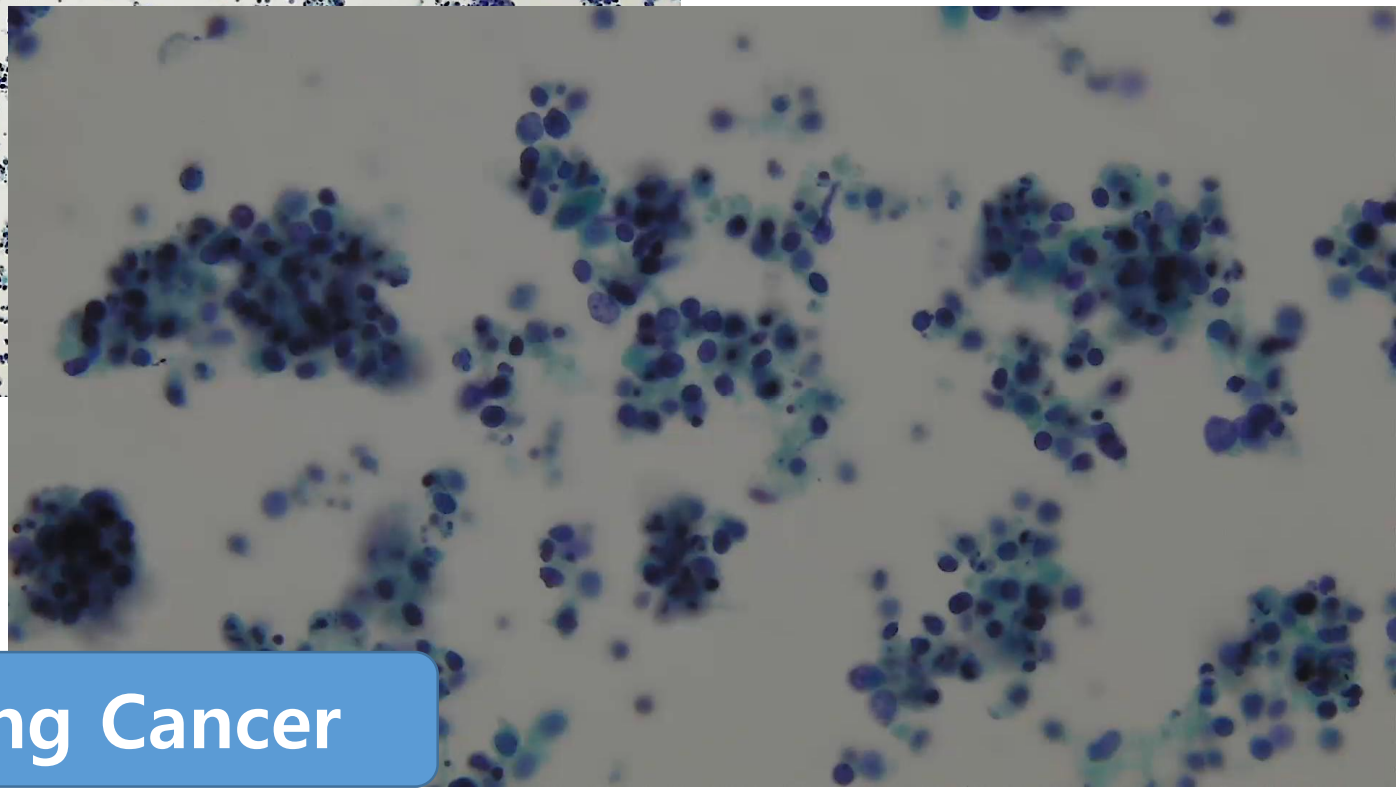
Pathology

X 100





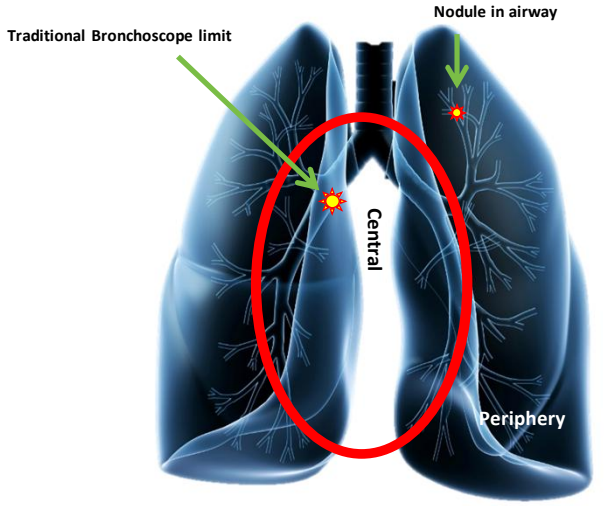
Cell block



Small Cell Lung Cancer

Diagnostic Bronchoscopy for PPL

- **Biopsy technique for peripheral lung nodules (PPLs)**
  - ➢PCNB : high diagnostic yield (~90%), high risk of pneumothorax (up to 25%)
  - ➢Bronchoscopic techniques
    - ✓Ultrathin Bronchoscopy
    - ✓Virtual Navigation Bronchoscopy
    - ✓**Electromagnetic Navigation Bronchoscopy**
    - ✓**Radial Probe Endobronchial Ultrasound**
    - ✓Robotic Bronchoscopy



- *Br J Radiol 2020;93:20190866*

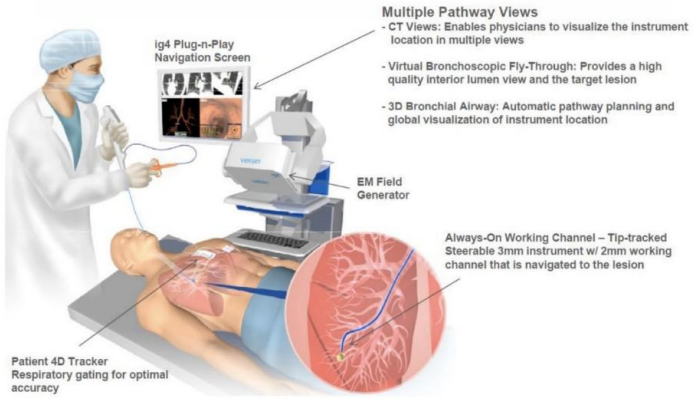
Electromagnetic Navigation Bronchoscopy

Electromagnetic Navigation Bronchoscopy (ENB)

Thin-section CT + Electromagnetic field generator / sensor

Planning

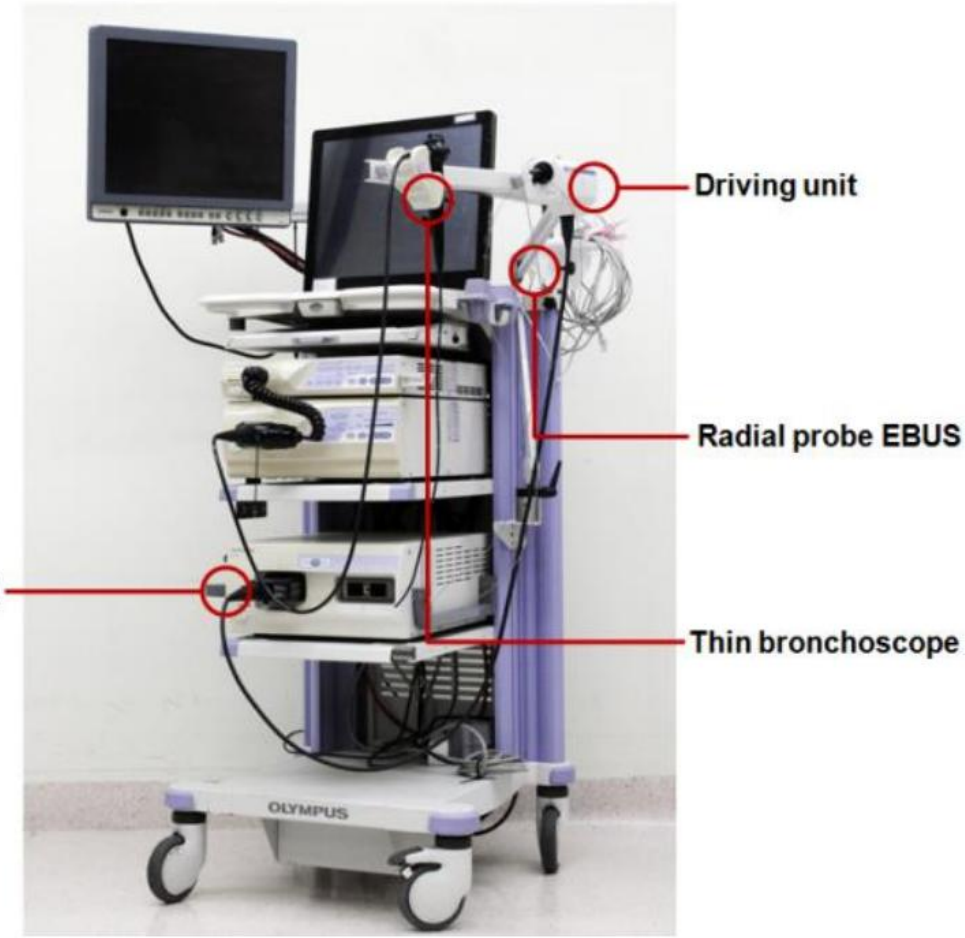
Navigation

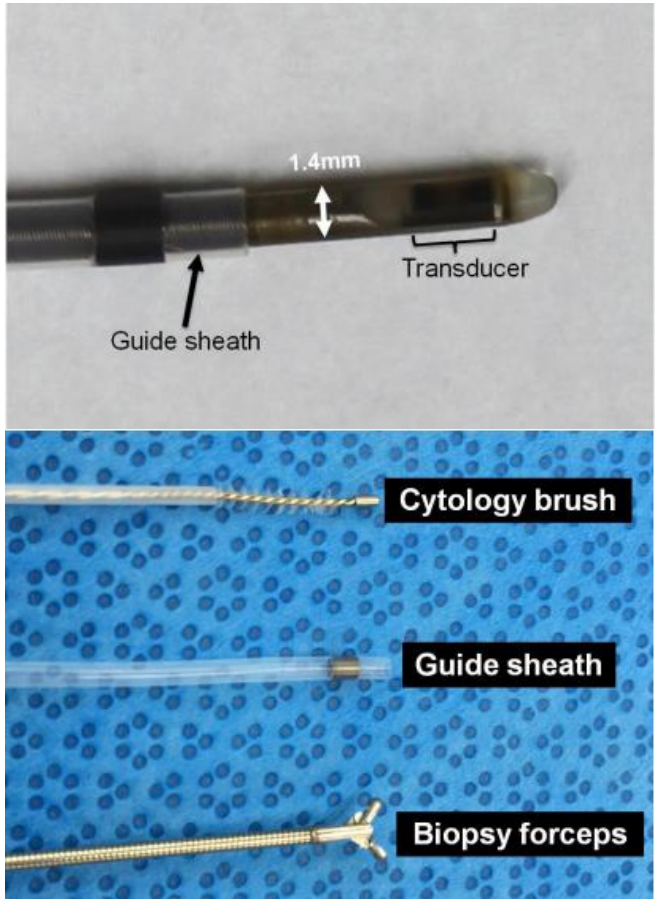


- Provided by Veran®

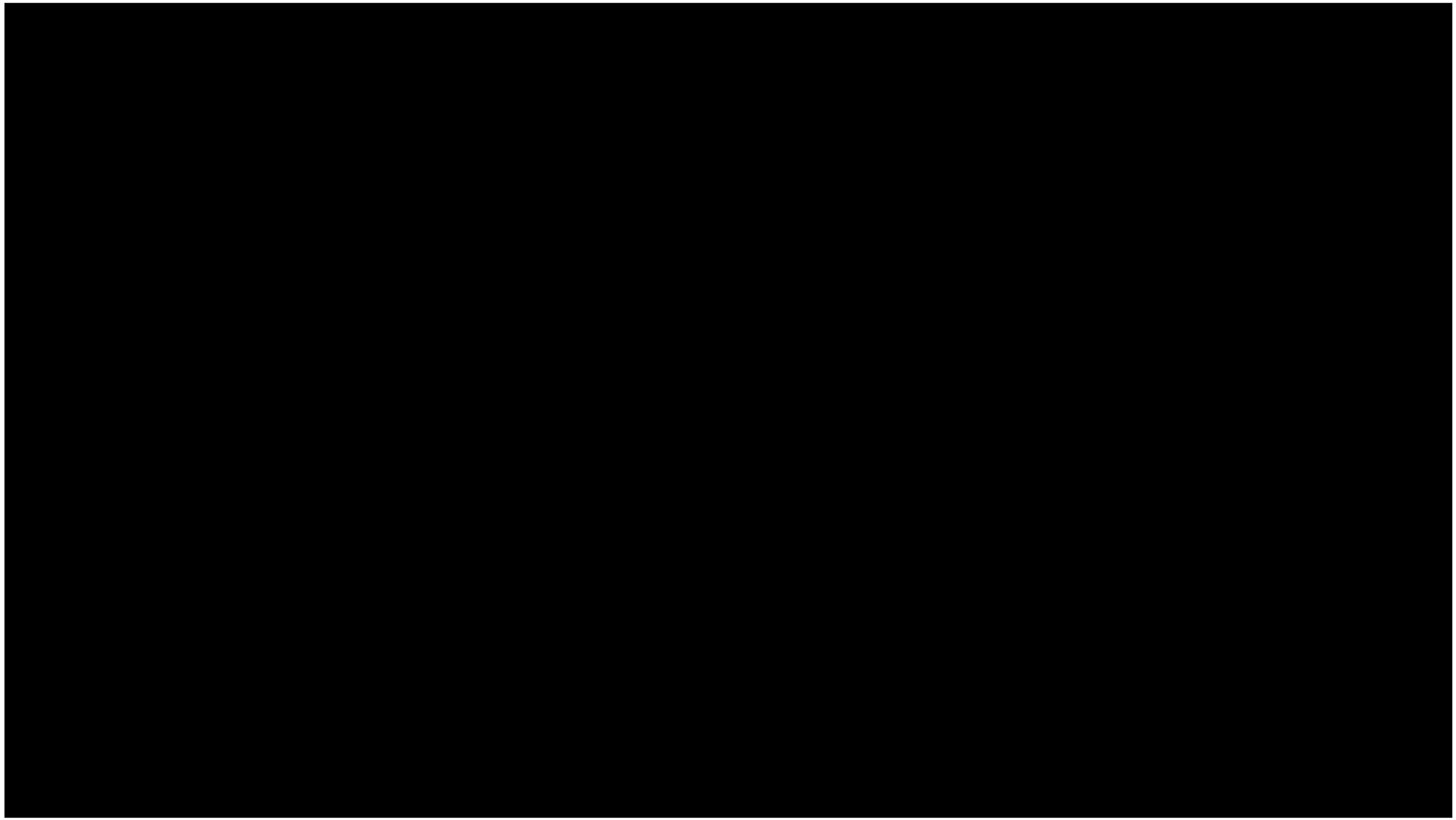
Radial Probe EBUS (RP-EBUS)

Equipment of RP-EBUS





- *Korean Textbook of Bronchoscopy, KATRD, 2019*



- Provided by Olympus®

Summary: biopsy techniques for PPL

	PCNB	ENB	RP-EBUS
Price	Cheap	Expensive	Expensive
Insurance coverage	Covered	Covered (50%)	Uncovered
Diagnostic yield	Excellent (80~90%)	Good (~70%)	Good (~70%)
Safety	Not bad (up to 25%)	Excellent (≤2%)	Excellent (≤2%)
Additional Use	Possible (Wire localization, RFA)	Possible (Multiple localization, Fiducial marker insertion)	Possible (Lung Cryobiopsy, Fiducial marker insertion)

Case 3

75/F

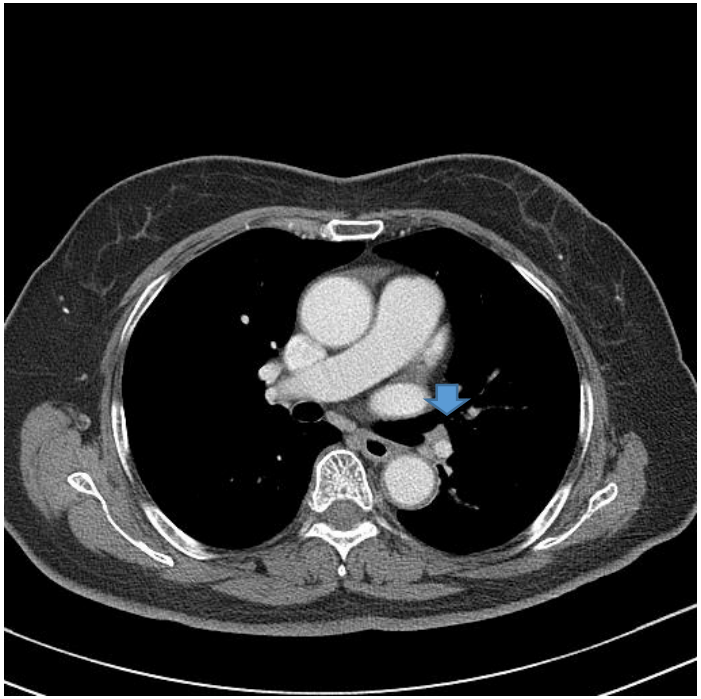
검진 chest CT상에서 우연히 발견된 4.7cm LLL mass로 입원

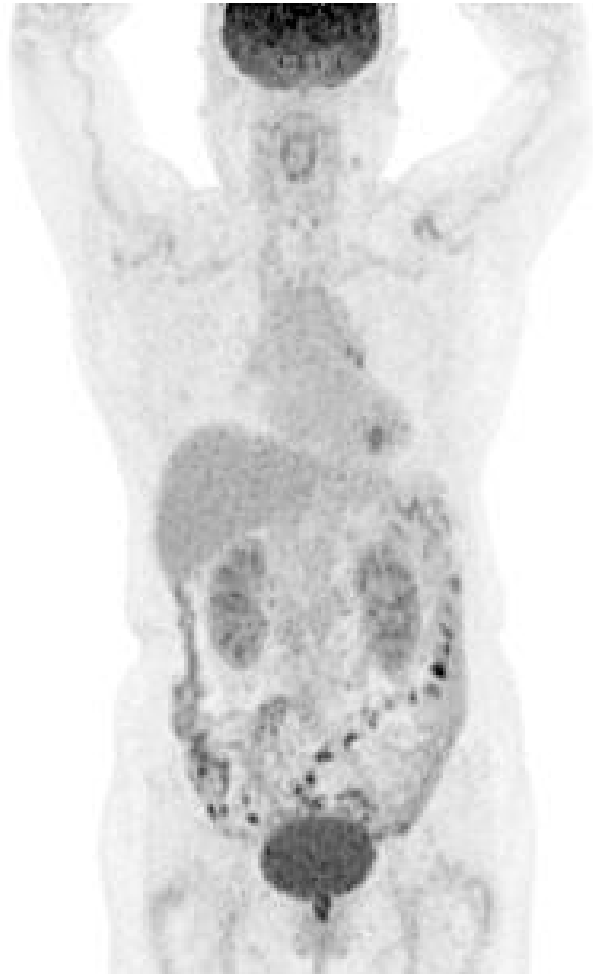
과거력 : Never smoker

PFT : normal range

Case 3

- LLL 4.7cm mass, cN1 in CT, PET



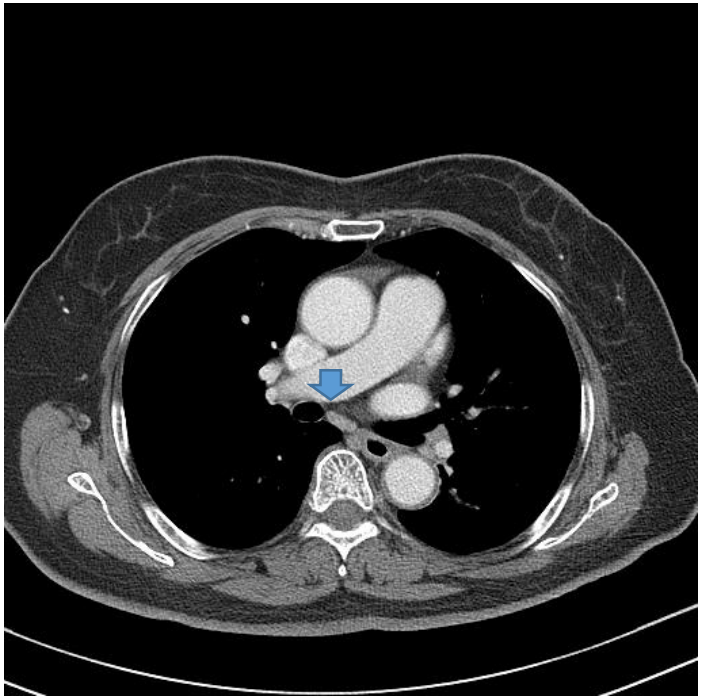


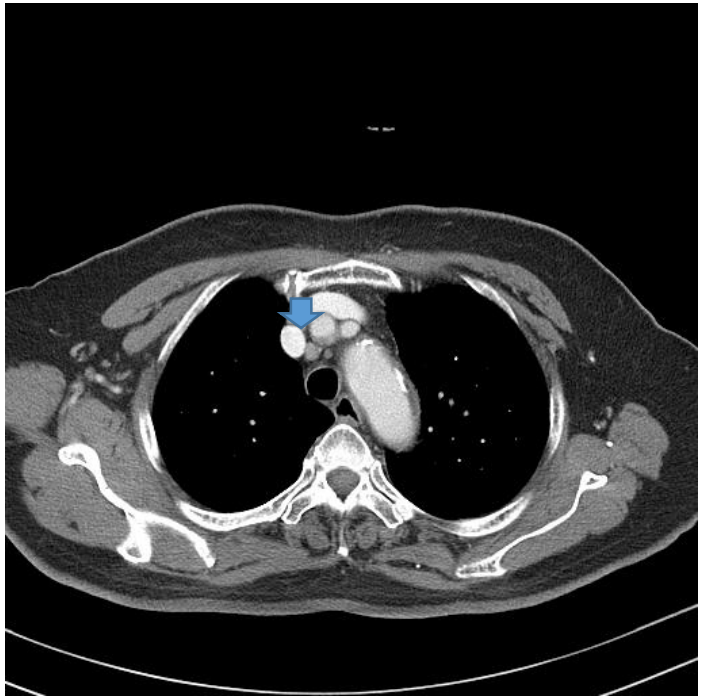
이 환자에서 다음으로 시행할 검사는?

1. PCNB
2. Convex probe EBUS-TBNA
3. Surgical resection

Case 3

- LLL 4.7cm mass, cN1 in CT, PET





Predicting mediastinal lymph node involvement in patients with non-small cell lung cancer

PID-1037; Version: V1.0.1 ; Last Updated: 02-Apr-2020

David Ost, Gabriela Martinez-Zayas, Junsheng Ma, and Clift Norris

MD Anderson Cancer Center

The following model is taken from: Martinez-Zayas G, Almeida FA, Simoff MJ, Yarmus L, Molina S, Young B, et al. A Prediction Model to Help with Oncologic Mediastinal Evaluation for Radiation: HOMER. Am J Respir Crit Care Med. 2020;201(2):212-23. The original manuscript is available here (PDF).

INSTRUCTIONS: Enter a patient's values for histology, age, location, PET N stage, and CT N stage. For additional details on how these variables are defined, click here. If the histology of the patient is unknown, it is often useful to approximate it with a range. First choose adenocarcinoma, and plug in all the other values. This will give you the highest probability of nodal metastasis. Then change it to squamous cell carcinoma, and recalculate. This will give you the lowest probability of nodal metastasis for that patient.

Patient's age in years:

75

Histology/type of cancer:

1) Adenocarcinoma

N stage by CT scan

N1

N stage by PET scan

N1

Central vs. peripheral location

2) Mid or outer 1/3rd of lung

```
Probability of N0  :  0.4992
Probability of N1  :  0.3533
Probability of N2N3:  0.1475
```

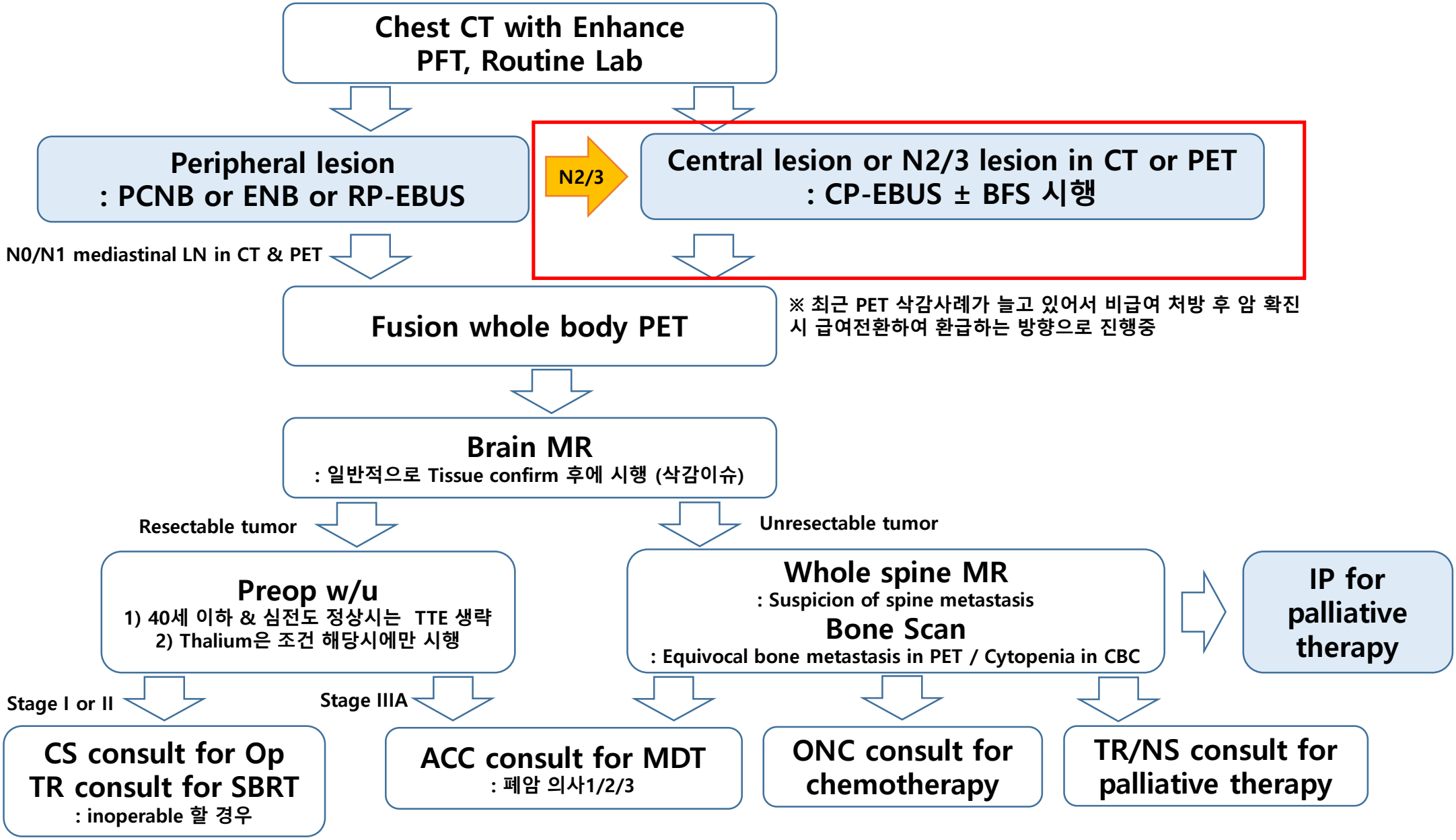
DIAGNOSIS :

A) Lymph node, (A:2R), EBUS guided needle biopsy:
- METASTATIC ADENOCARCINOMA

C) Lymph node, (C:11L), EBUS guided needle biopsy:
- METASTATIC ADENOCARCINOMA

B) Lymph node, (B:7), EBUS guided needle biopsy:
- Negative for malignancy

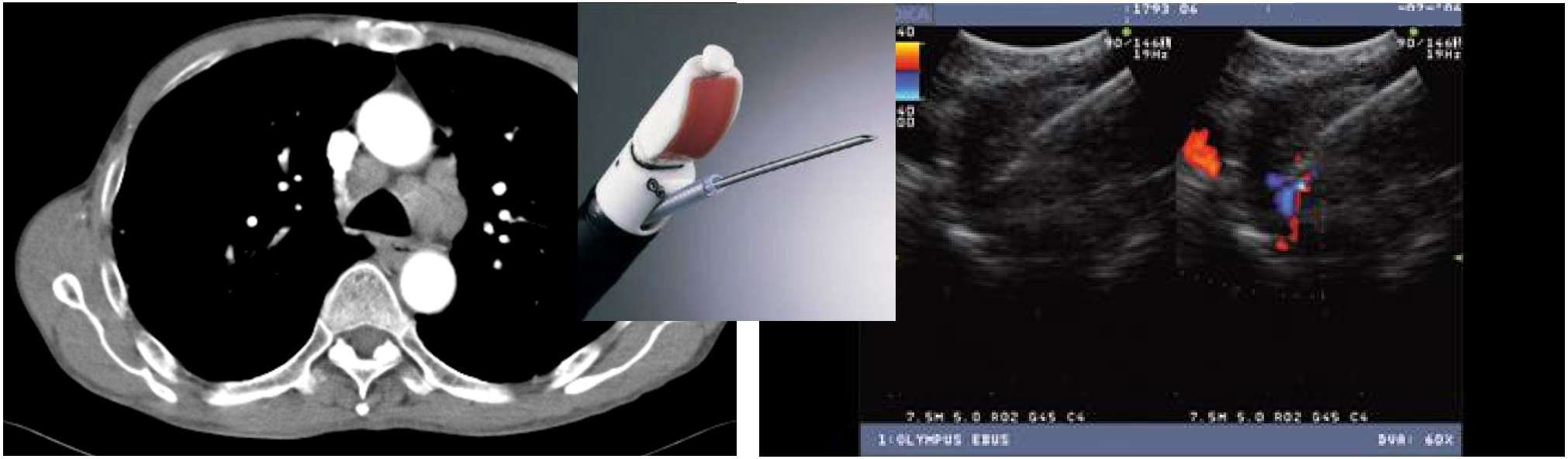
https://biostatistics.mdanderson.org/shinyapps/HOMER/


Chest CT with Enhance
PFT, Routine Lab
Peripheral lesion
: PCNB or ENB or RP-EBUS
N2/3
Central lesion or N2/3 lesion in CT or PET
: CP-EBUS ± BFS 시행
N0/N1 mediastinal LN in CT & PET
Fusion whole body PET
※ 최근 PET 삭감사례가 늘고 있어서 비급여 처방 후 암 확진 시 급여전환하여 환급하는 방향으로 진행중
Brain MR
: 일반적으로 Tissue confirm 후에 시행 (삭감이슈)
Resectable tumor
Unresectable tumor
Preop w/u
1) 40세 이하 & 심전도 정상시는 TTE 생략
2) Thalium은 조건 해당시에만 시행
Whole spine MR
: Suspicion of spine metastasis
Bone Scan
: Equivocal bone metastasis in PET / Cytopenia in CBC
IP for palliative therapy
Stage I or II
Stage IIIA
CS consult for Op
TR consult for SBRT
: inoperable 할 경우
ACC consult for MDT
: 폐암 의사1/2/3
ONC consult for chemotherapy
TR/NS consult for palliative therapy

Each case on this slide is an individual case and do not fully reflect all patients' cases

Diagnostic Bronchoscopy for LC

- **EBUS : Linear(Convex Probe) EBUS (CP-EBUS)**



Diagnostic Bronchoscopy – thin EBUS

Table 1 Nodal access of different EUS-guided biopsy platforms

	EUS	EBUS	Thin EBUS
1R/L[†]	+	++	++
2R[‡]	±	+++	+++
2L	+++	+++	+++
3a	–	–	–
3p	+++	++	++
4R[‡]	±	+++	+++
4L	+++	++	+++
5	+	–	–
6[§]	–	–	–
7	+++	+++	+++
8R/L[¶]	+++	+	+
9R/L	+++	–	–
10R	–	+++	+++
10L	+	+++	+++
11R/L	–	+++	+++
12R/L[††]	–	+	+++
13R/L[††]	–	±	++

– means not accessible and +++ means easily accessible, with a spectrum between.

[†]Paratracheal parts only—supraclavicular nodes are not accessible.

[‡]Access by EUS is limited to posterior aspects of the nodes which are close to the oesophagus.

[§]Access by EUS has been described but has not been adopted as standard of care.

[¶]Superior aspects of these nodes may sometimes be accessible by EBUS.

[††]EBUS can sometimes access nodes at stations 12 and 13, but this is generally in the lower lobes.

EBUS, endobronchial ultrasound; EUS, endoscopic ultrasound.

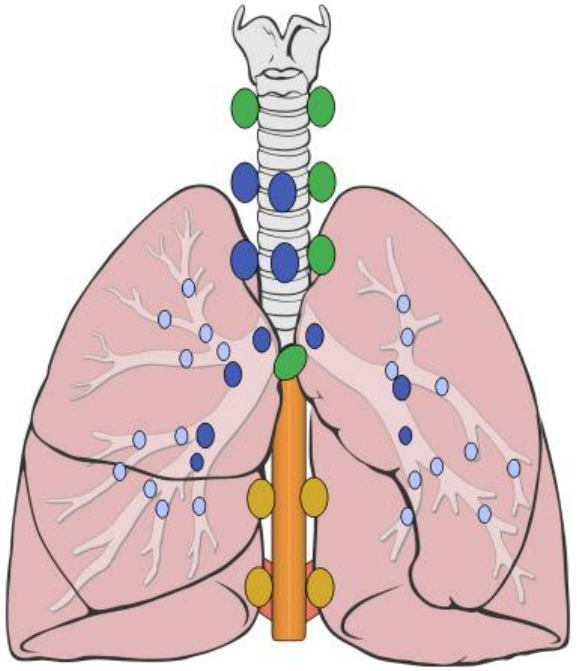


Figure 2 Nodal access of different EUS-guided biopsy platforms. A representative figure summarizing the relatively nodal access of each EUS system. ■, EBUS and EUS accessible; ■, primarily EBUS accessible; □, primarily thin EBUS accessible; ■, primarily EUS accessible. EBUS, endobronchial ultrasound; EUS, endoscopic ultrasound. Adapted from original (http://goo.gl/xuJRCO) by Patrick J. Lynch and C. Carl Jaffe under Creative Commons Attribution 2.5 License (https://creativecommons.org/licenses/by/2.5/).

- ***Respirology 2020;25:924–932***

Diagnostic Bronchoscopy for LC

- Diagnostic performance of EBUS-TBNA in Lung cancer
  - Sensitivity: 81-88%
  - Negative predictive value: 78-91%
  - Obtaining sufficient tissue for EGFR, ALK, ROS1, NGS

    : 94.5%, 94.9%, 83.3%, 86.1-98%

➔ Accurate and safe procedure for mediastinal LN staging, molecular testing

- *Ann Am Thorac Soc 2018;15(10):1205-1216*
- *- Ann Tranl Med 2019;7(15):351*

Strategy for Mediastinal Staging

- **Hit-and-run Strategy (Targeted EBUS)**

Versus

- **Systematic Strategy (Systematic EBUS)**

Strategies of mediastinal staging

- Hit-and-run Strategy (Target

Versus

- **Systematic Strategy (Systematic Approach with Optimum Sedation**
  : N3 (11R or 11L)
  + N2 (4R, 4L, 7) ± N1

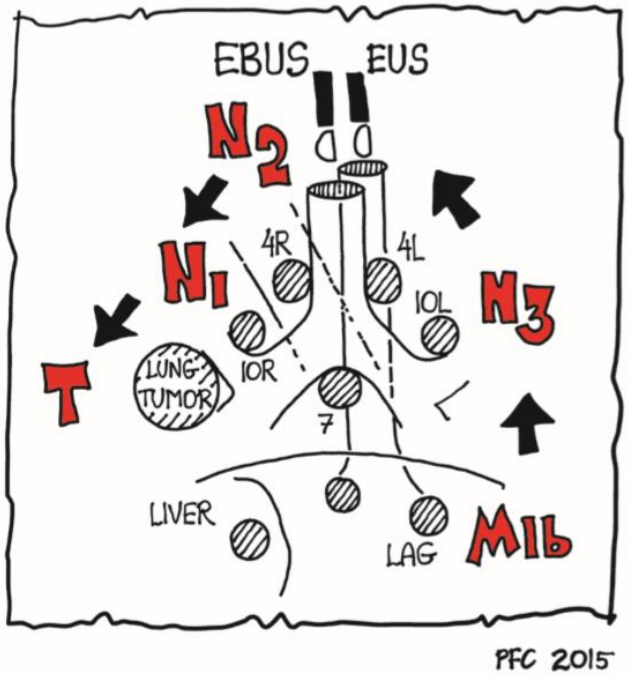
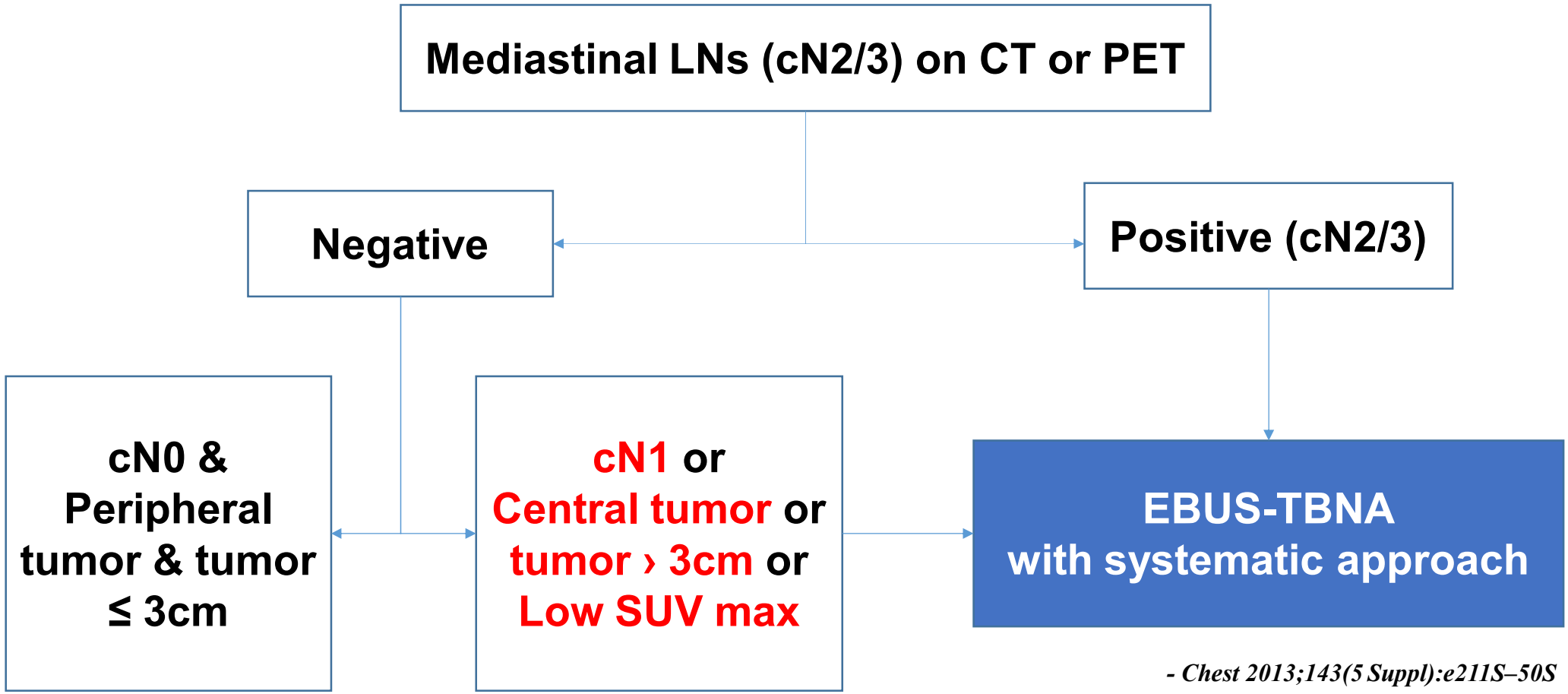


Figure 6 Systematic approach to endosonographic lung cancer staging. Paul Clementsen is owner of the copyright.

- J Thorac Dis 2015;7:E439-E458

Recommendation for EBUS-TBNA

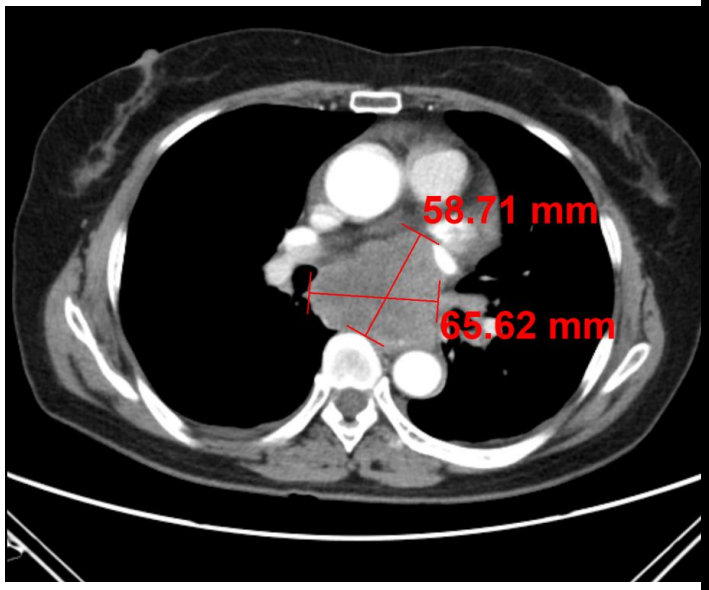


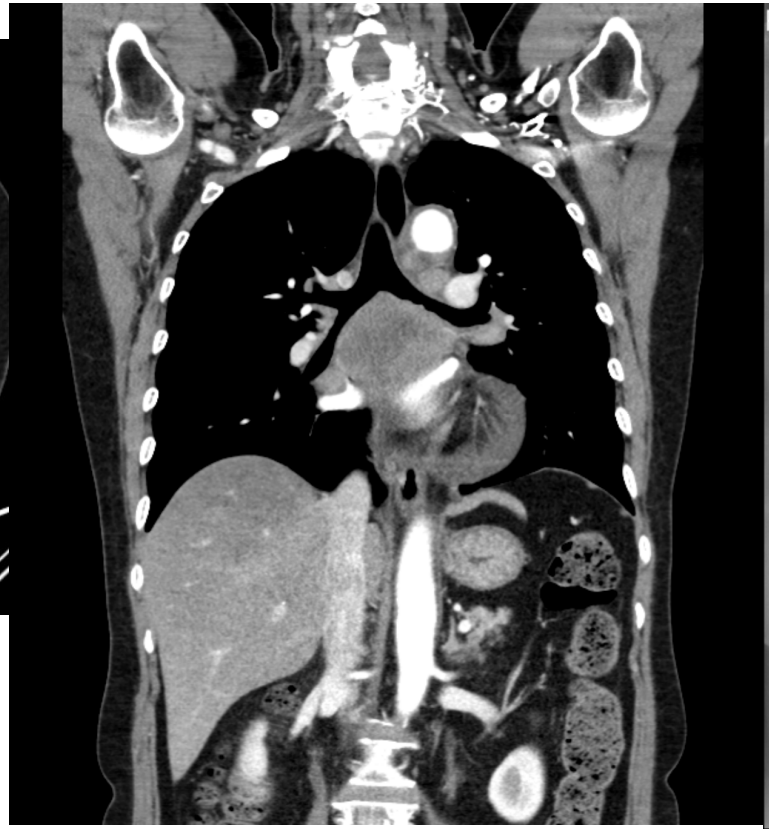
- Chest 2013;143(5 Suppl):e211S–50S
- Eur J Cardiothorac Surg 2014;45:787–98
- Respirology 2020;25:924–932

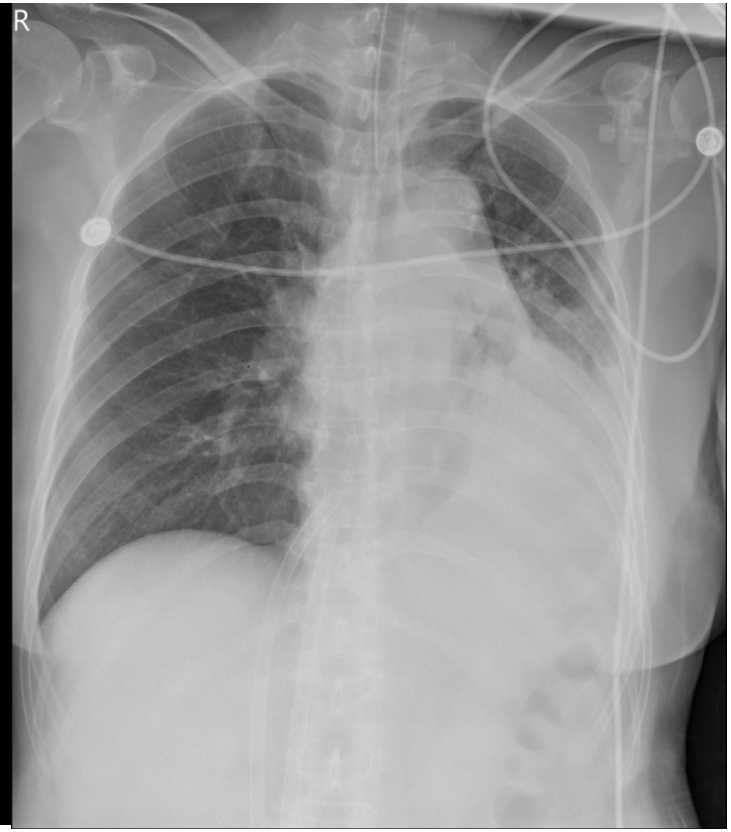
Therapeutic Bronchoscopy for Lung Cancer

Case 4

- 60/F Subcarinal mass로 외래 경우 입원

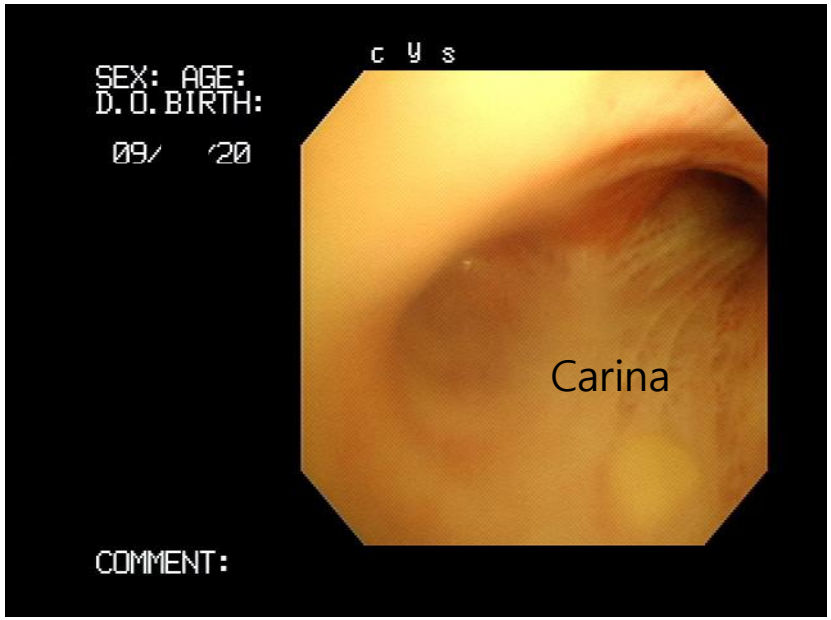


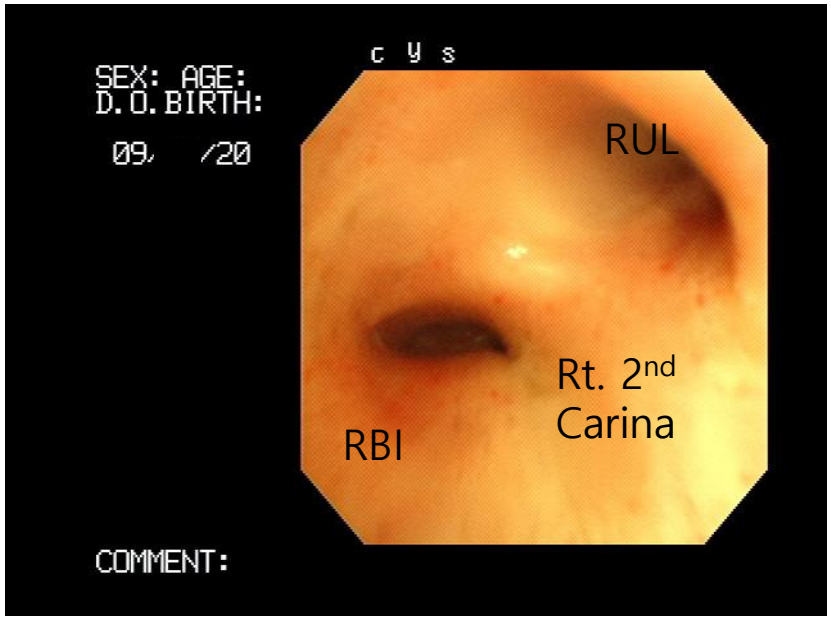


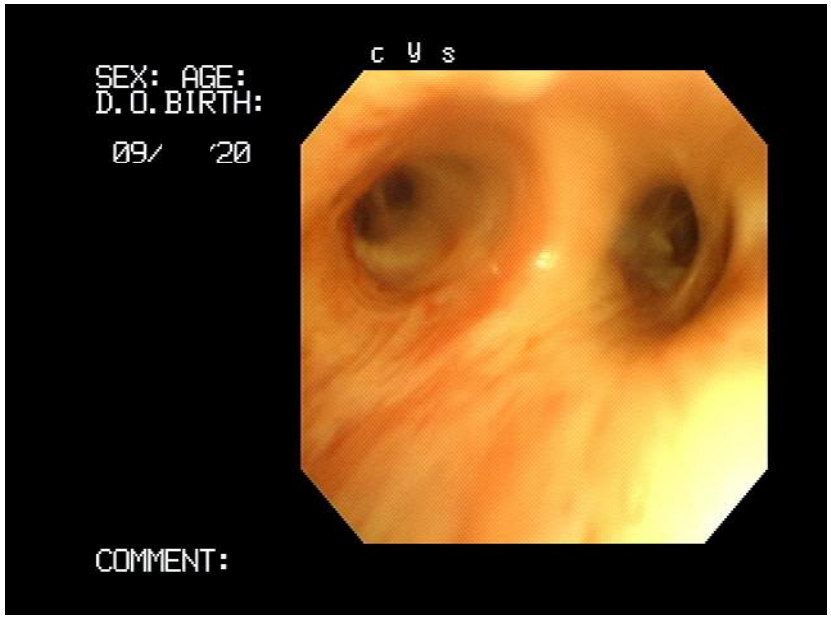


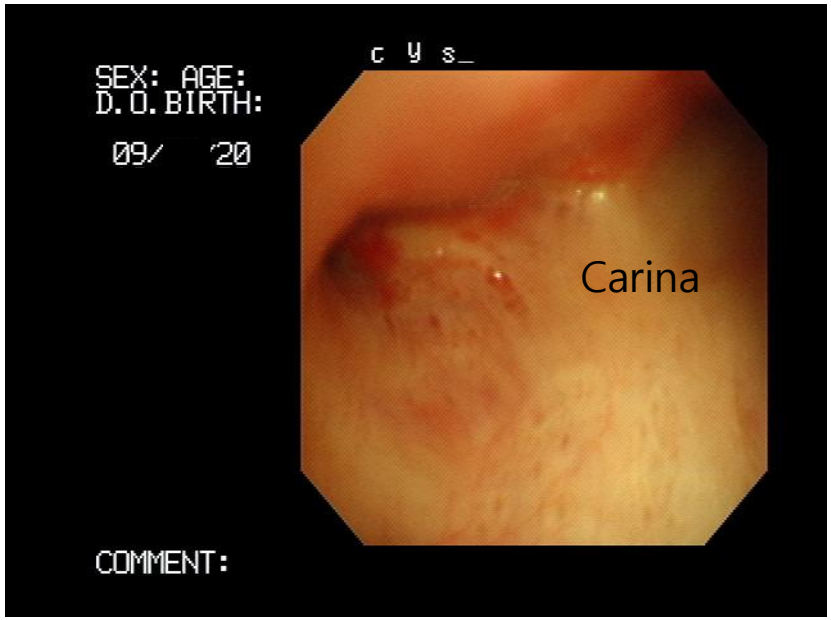
이 환자에서 다음으로 시행할 치료는?

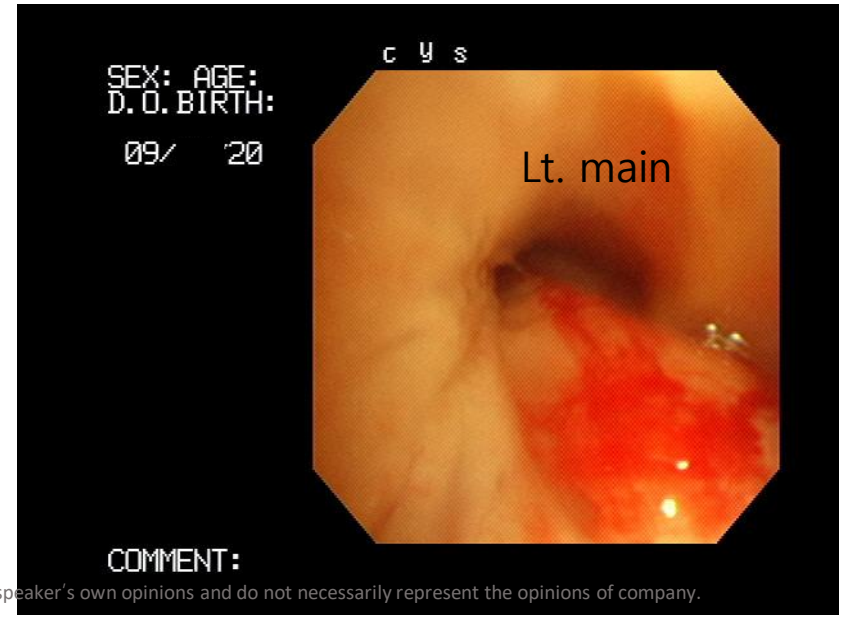
1. POLST 설명 후 연명의료 중단
2. 조직검사 시도 후 항암치료
3. Malignant central airway obstruction에 대한 치료 시도

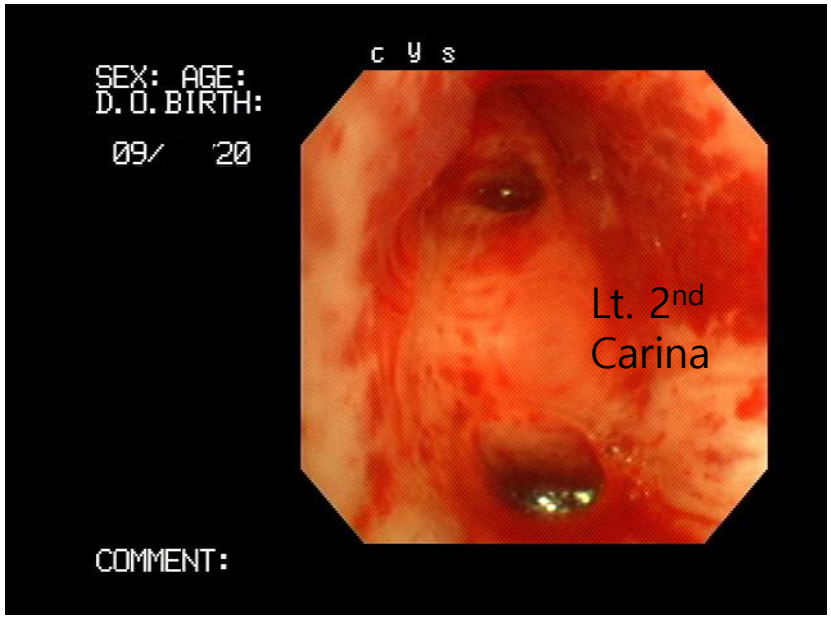


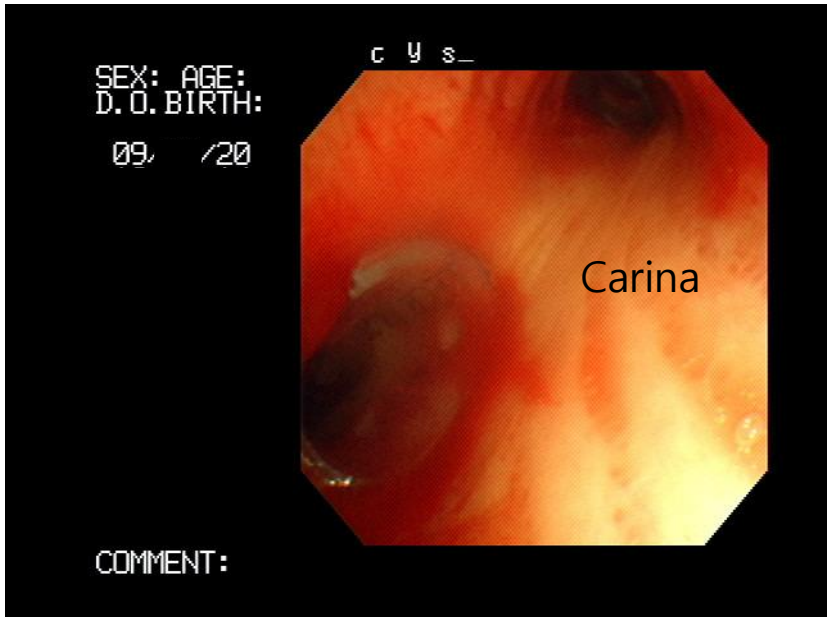


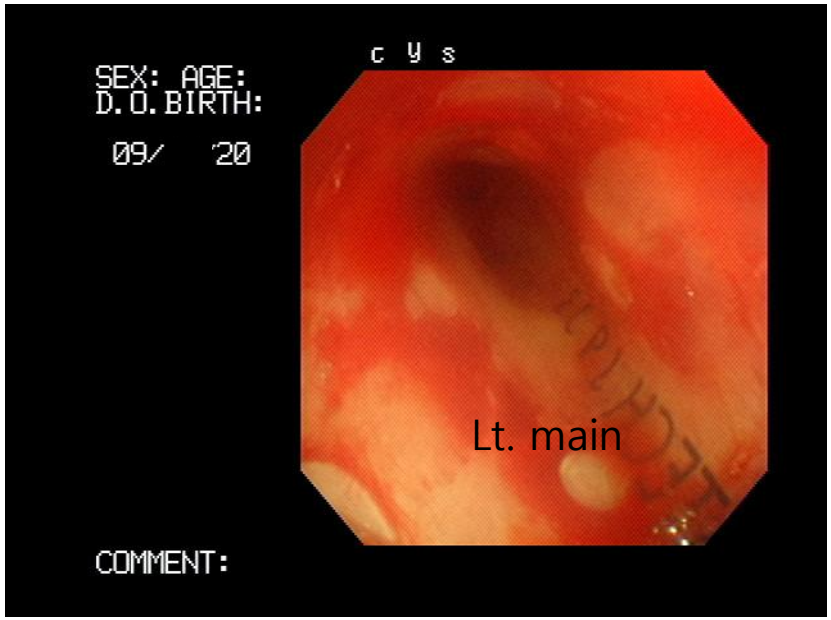


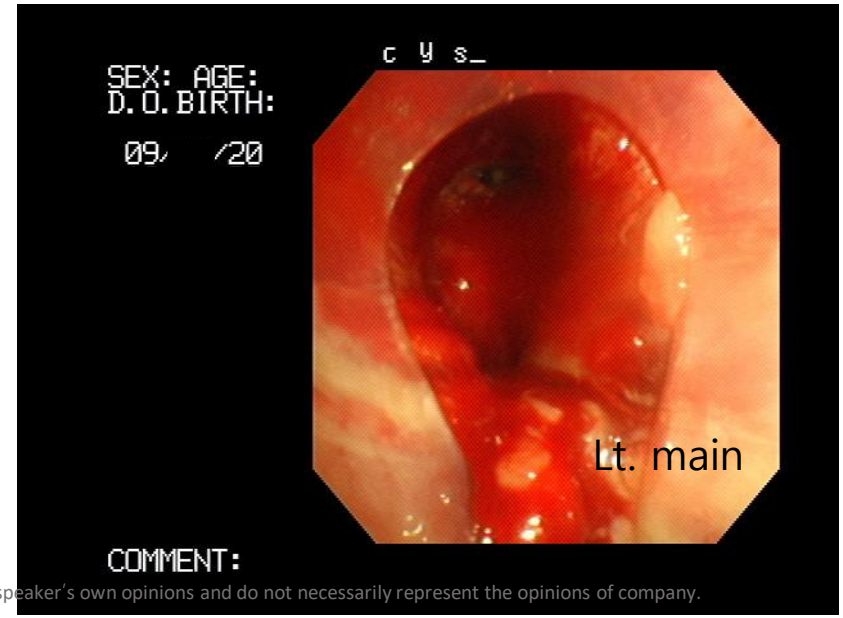


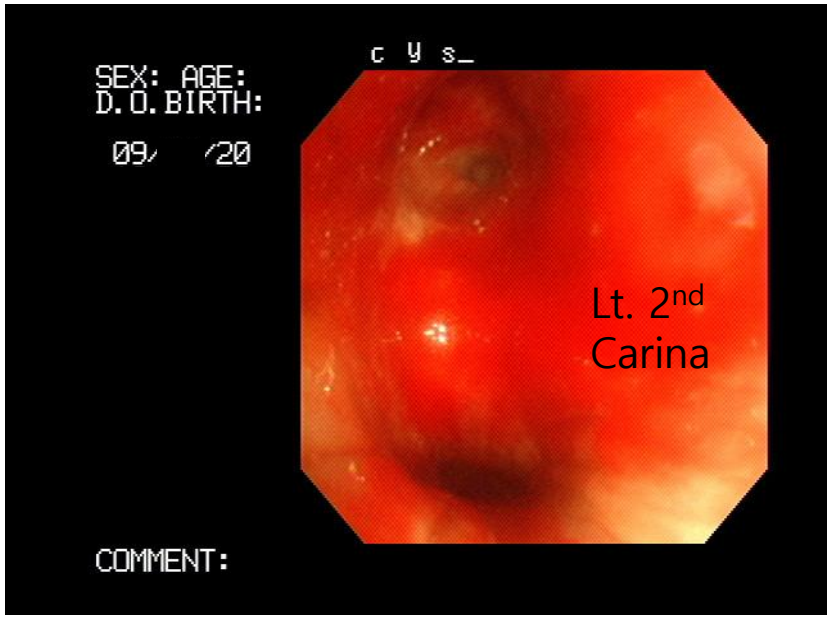


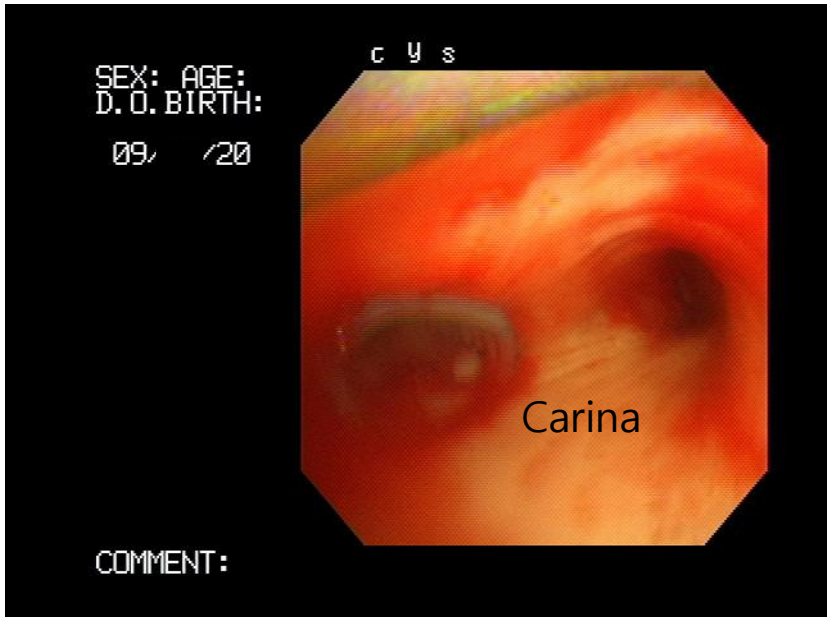


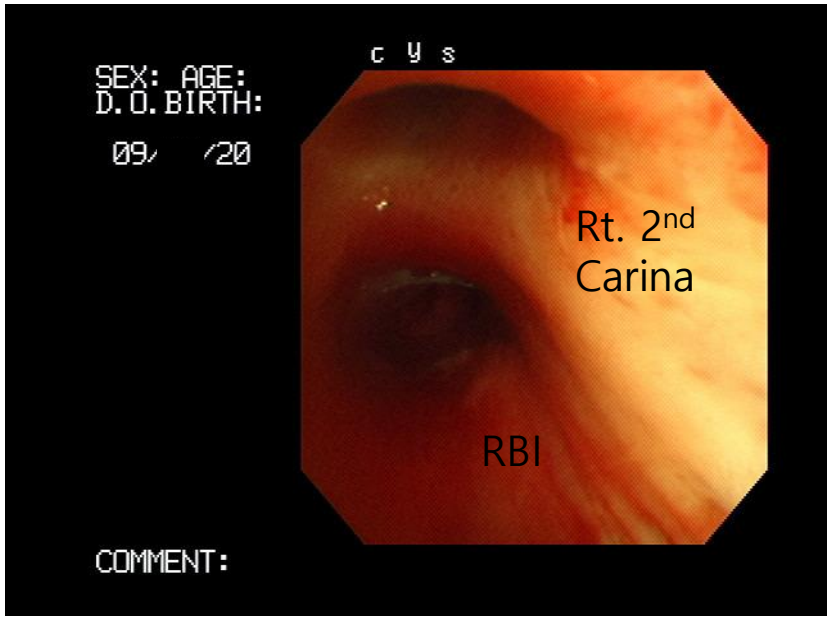


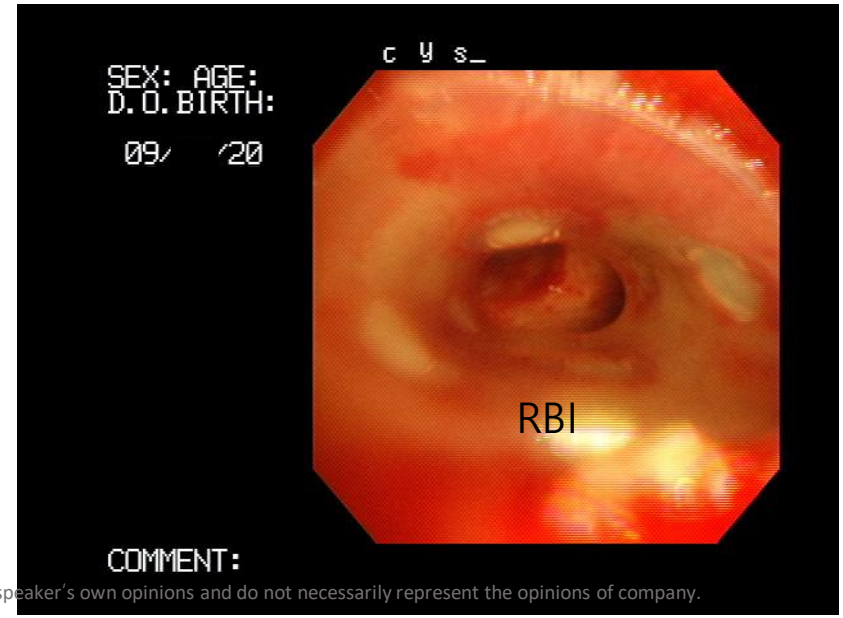


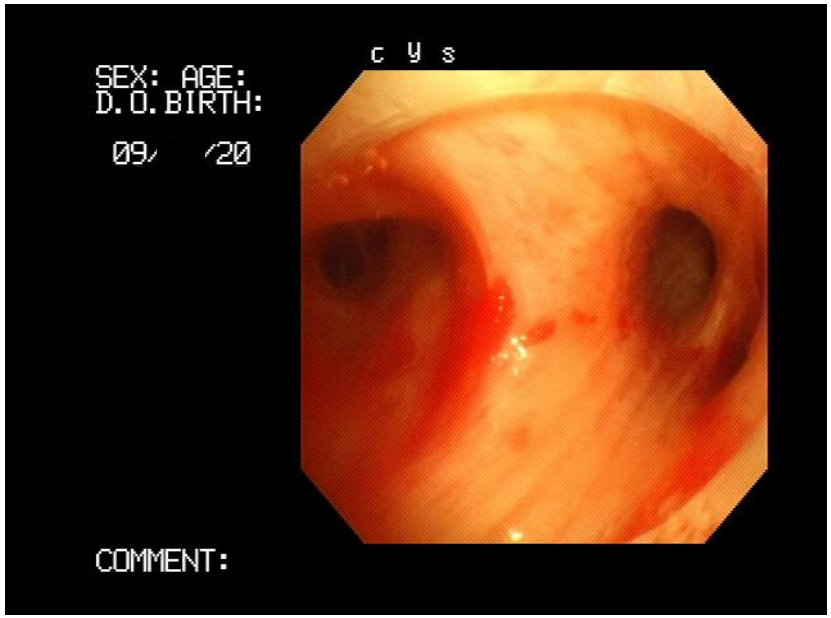






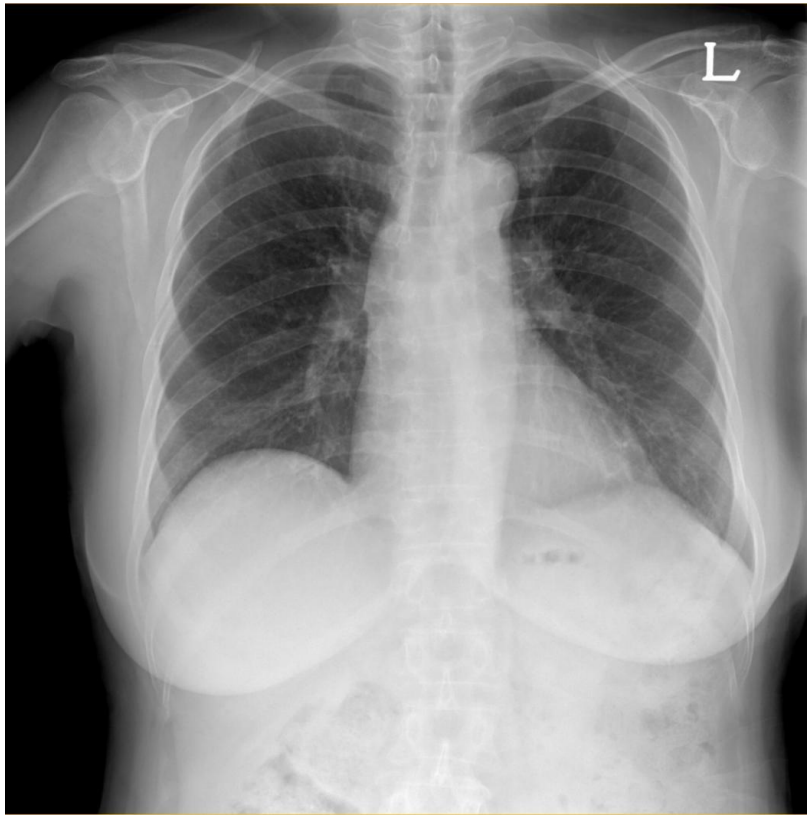






Case 4

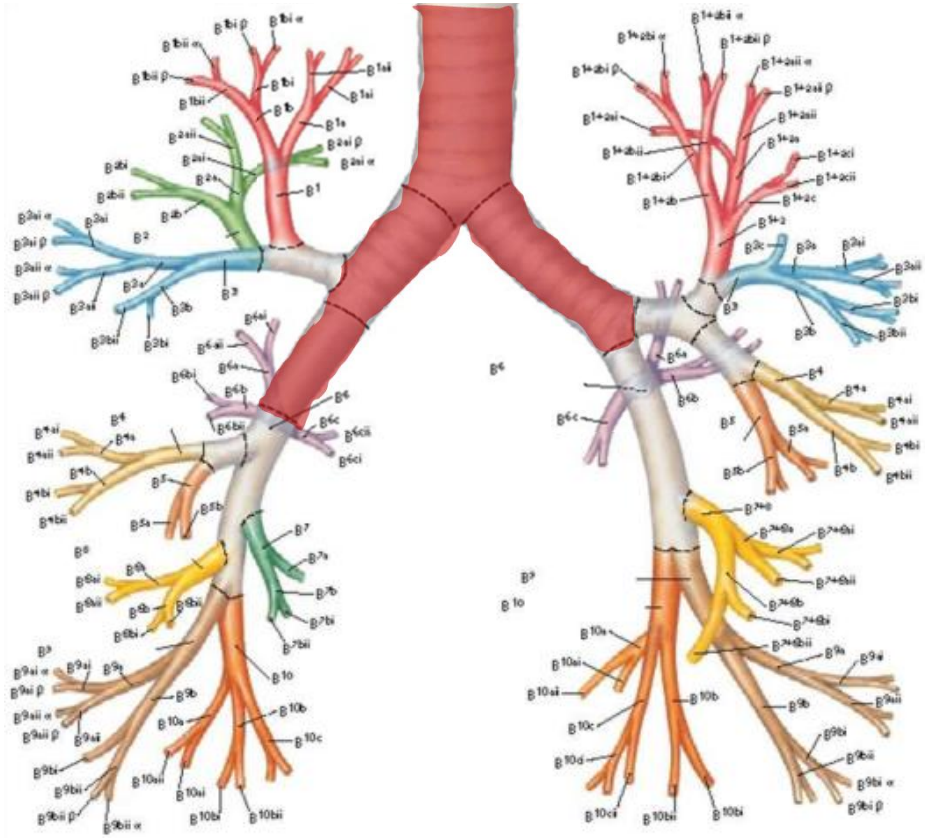
- 60/F NSCLC, ADC, stage IV, ALK+



Management of Malignant Central Airway Obstruction (MCAO)

Definition of malignant central airway obstruction (MCAO)

- Broadly defined as obstruction of the trachea, either main stem bronchus and/or the bronchus intermedius by tumor



- A. Ernst and F.J.F. Herth (eds.), Principles and practice of interventional pulmonology. Springer 2013.

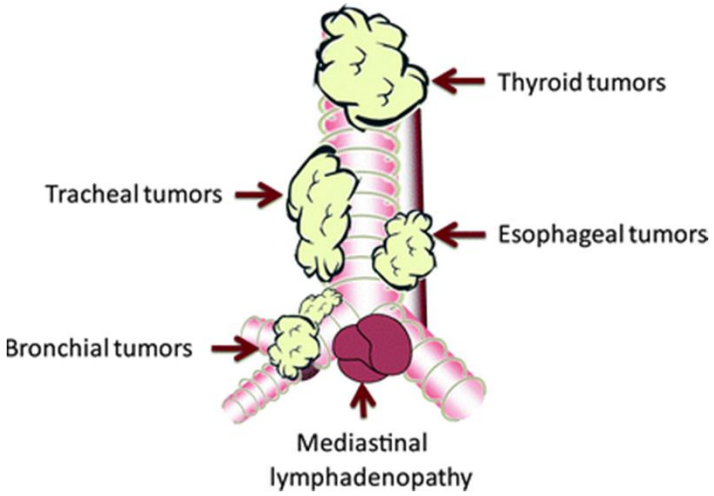
Clinical Presentation of MCAO

- At least 50% stenosis → symptoms
- Diameter of airway
  - Trachea: 12 ~ 18 mm
    < 8 mm: DOE, < 5 mm: resting dyspnea
  - Rt. main bronchus: 10 ~ 16 mm
  - Lt. main bronchus: 8 ~ 14 mm
- Presenting signs & symptoms
  - Respiratory failure requiring emergent airway intervention (50%)
  - Cough, wheezing (focal, distal to main carina), stridor (trachea or larynx), post-obstructive pneumonia

- A. Ernst and F.J.F. Herth (eds.), Principles and practice of interventional pulmonology. Springer 2013.

Etiology of MCAO

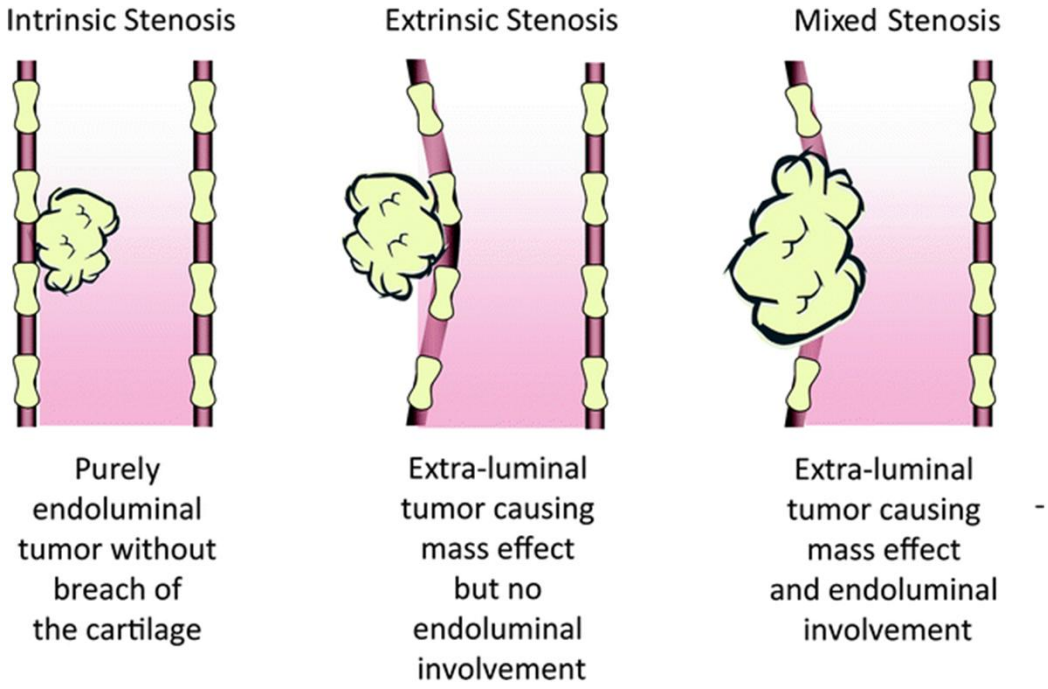
- Primary tracheal tumor
  - Sqcc, adenoid cystic ca., carcinoids, mucoepidermoid tumor, adenoca.
- Metastatic tumor
  - Aero-digestive tract, breast
  - RCC, metastatic melanoma: tend to bleed
- Adjacent tumor
  - Esophageal cancer: tracheal or Lt. main bronchus fistula
  - Thyroid cancer: extra-thoracic trachea



- A. Ernst and F.J.F. Herth (eds.), Principles and practice of interventional pulmonology. Springer 2013.

Classification of MCAO

- Intrinsic (endoluminal)
- Extrinsic (extraluminal)
- Mixed
  → Impact on therapeutic approach



Endoluminal debulking	+++	-	++
Stent	±	+++	++

- A. Ernst and F.J.F. Herth (eds.), Principles and practice of interventional pulmonology. Springer 2013.

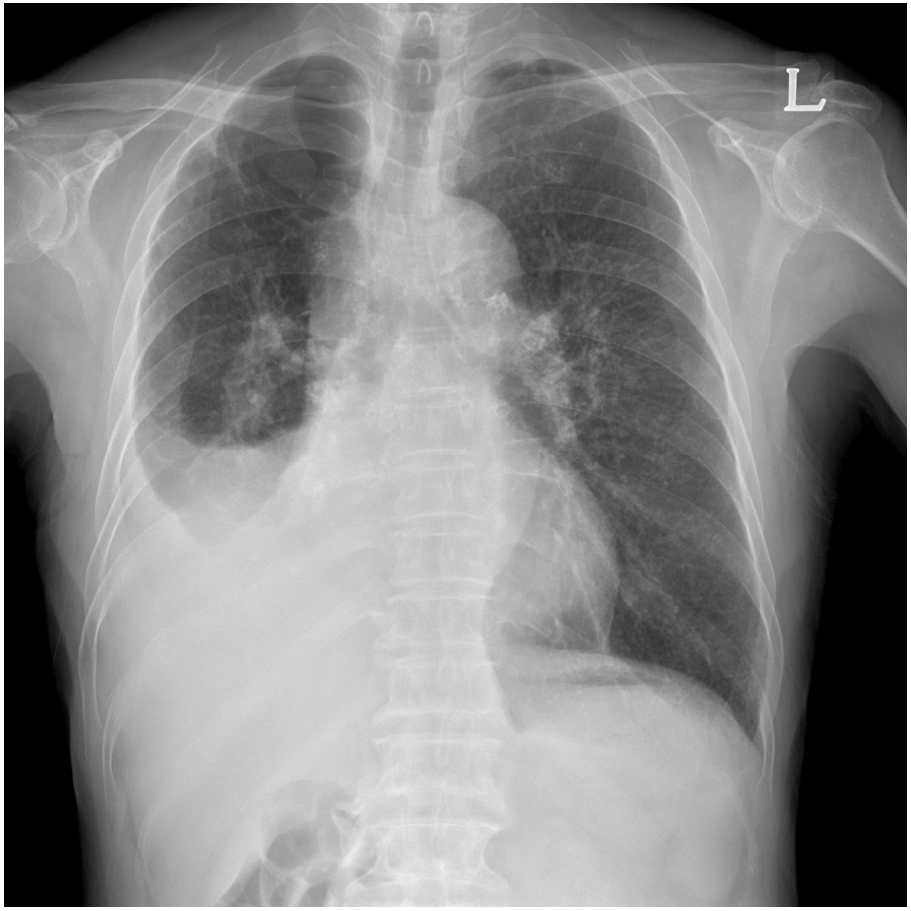
Case 5

• 71/M, RLL atelectasis with pleural effusion

•기저 pneumoconiosis로 연고지 병원에서 f/u 하던 분으로

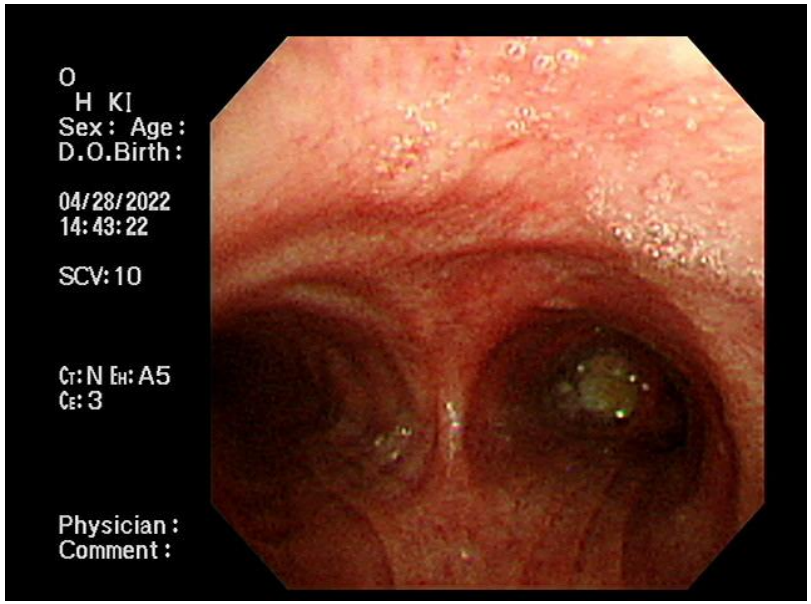
•내원 1주전 시행한 chest CT에서 RBI endobronchial mass와 RML, RLL atelectasis 소견으로 F/E위해 내원함

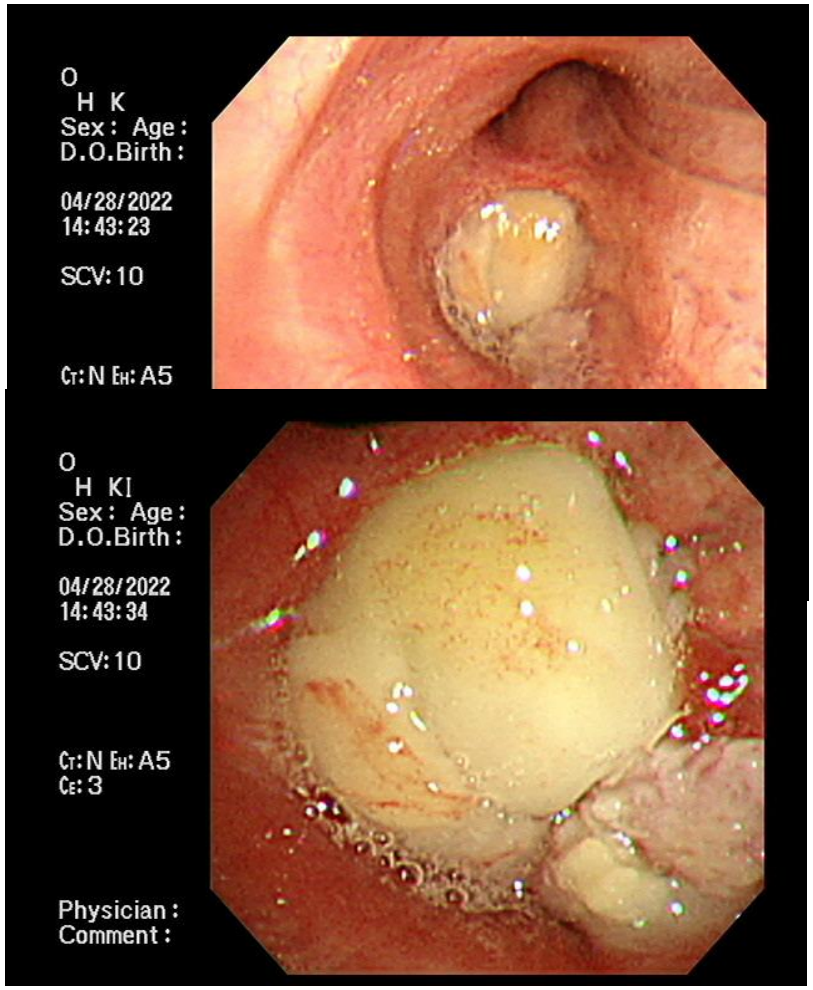
Case 5 – chest PA



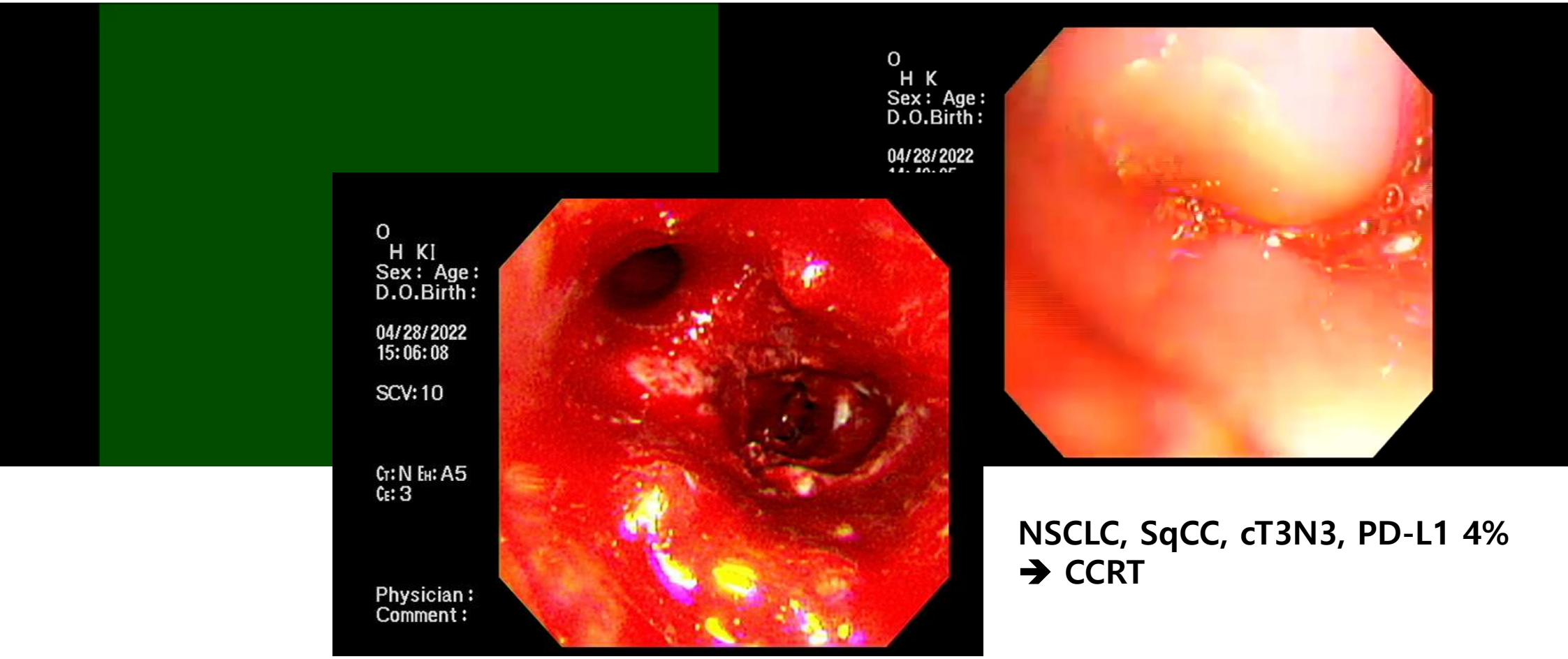
Case 5 – chest CT

Case 5 – Cryorecannalization



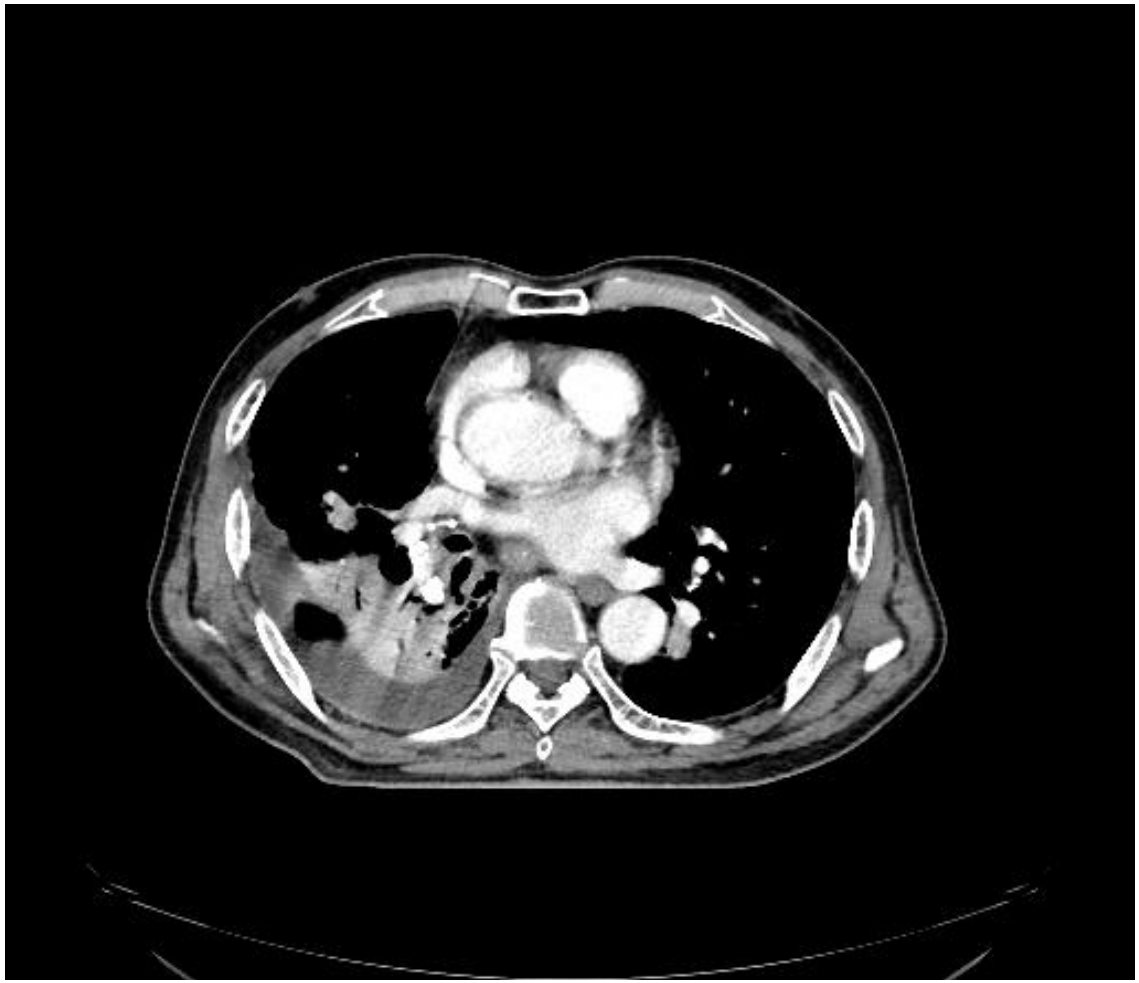


Case 5 – cryotherapy



NSCLC, SqCC, cT3N3, PD-L1 4%
➔ CCRT

Case 5 – f/u chest CT for RT



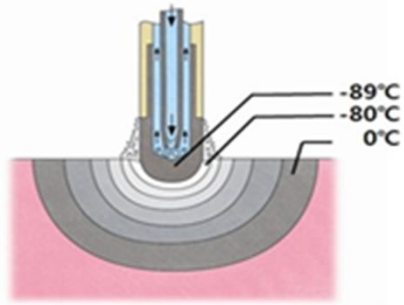
Therapeutic Bronchoscopy for LC

- **Cryotherapy**

  빠른 동결 속도(faster freeze rate)와 느린 융해 속도(slower thaw rate), 동결-융해 주기(freeze-thaw cycle)의 반복을 통하여 세포를 파괴하는 기관지 내시경 치료

  - Cryotherapy: 병변에 대해 freezing/thawing cycle을 반복하여 조직 괴사를 유도

  - Cryoextraction/recannalization: cyoprobe에 냉각되어 있는 조직을 pulling out하면서 제거



- 기관지내시경 교과서, 대한결핵및호흡기학회, 2019

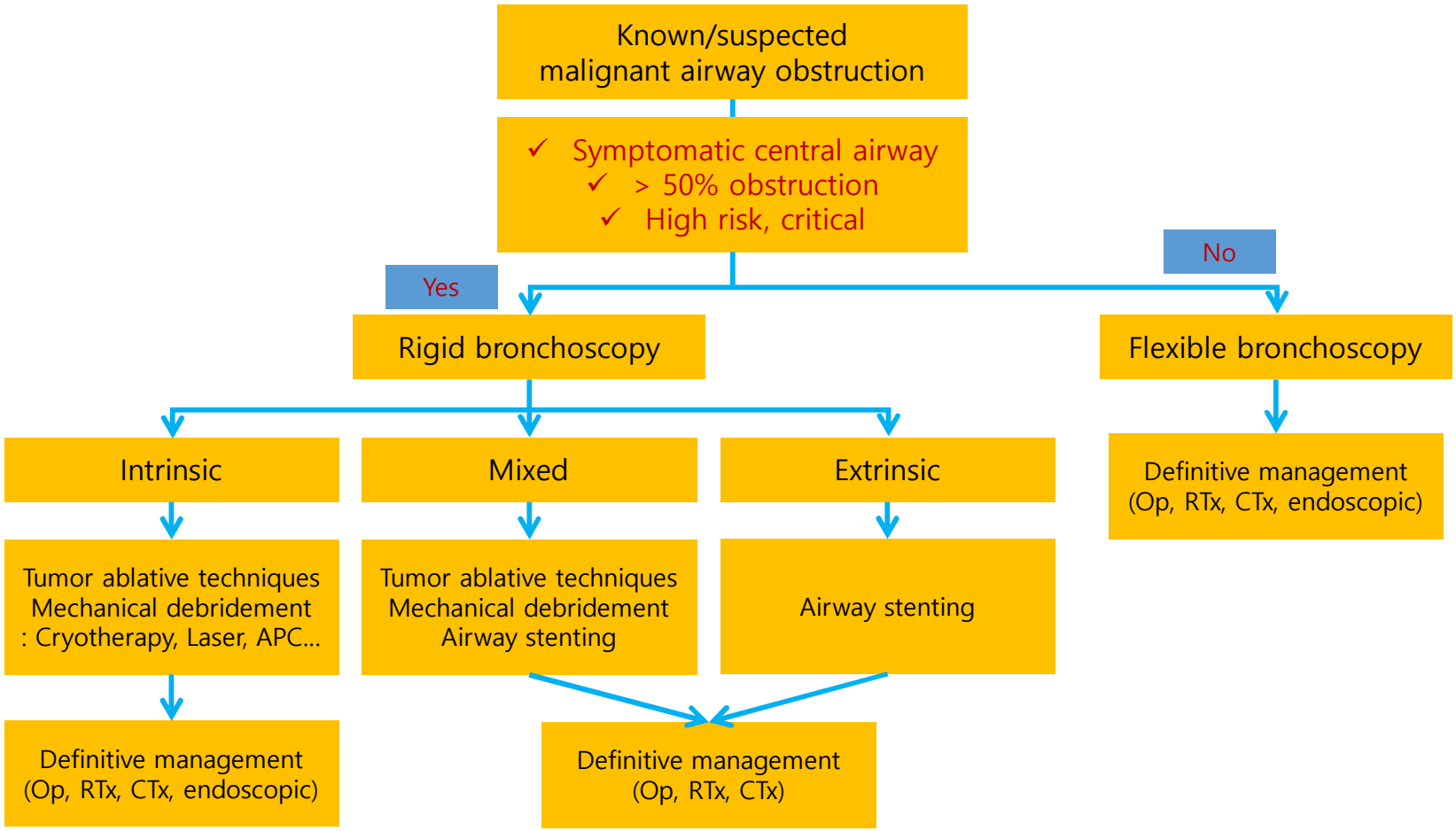
Patient Selection for Airway Intervention

- No literature-based criteria
- Should be symptomatic d/t airway obstruction
- Evidence of distal airway patency and/or blood flow
  - Difficult to determine
  - Ventilation-perfusion scans fail to identify (hypoxic vasoconstriction)
  - Vascular cutoff sign: worse outcome
  - Protracted distal atelectasis/collapse: less likely to re-expand
    <30 days: better outcomes
- Life expectancy

➔ Balance the potential risks and benefits of intervention in every case

- A. Ernst and F.J.F. Herth (eds.), Principles and practice of interventional pulmonology. Springer 2013.

Algorithm for the management of MCAO



- A. Ernst and F.J.F. Herth (eds.), Principles and practice of interventional pulmonology. Springer 2013.

Case 6

- 55/M, Dyspnea (2MA)

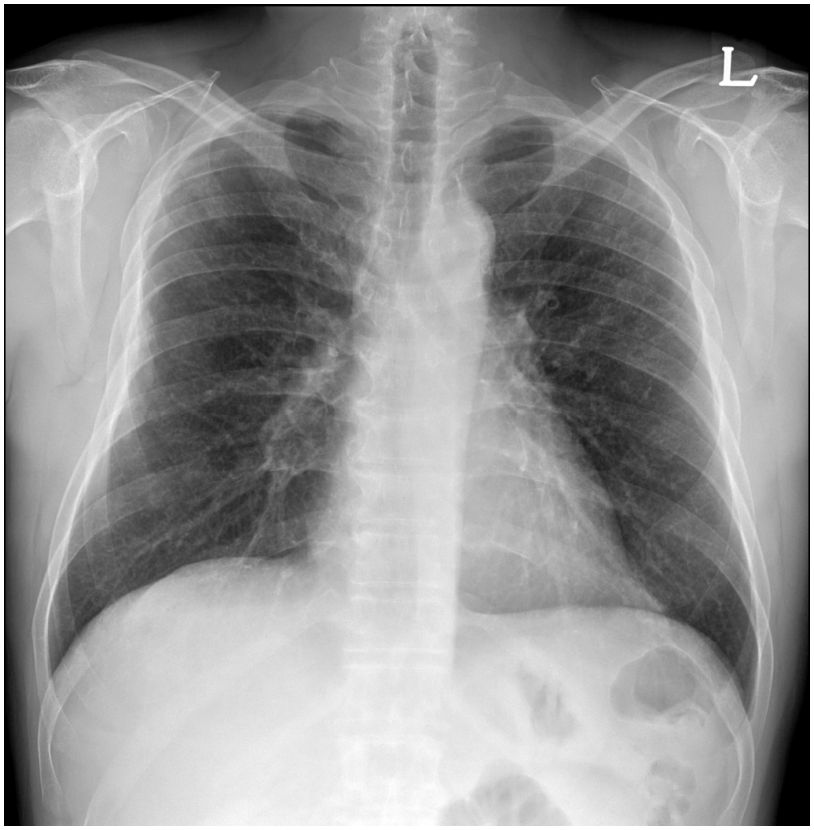
•내원 2개월 전부터 Dyspnea 발생하였고 점차 악화

•내원 1개월 전 타원 내원하여 Rt. Pleural effusion에 대해 PCD insertion 후 증상 호전되어 퇴원, 당시 lympho-dominant exudate, low ADA 양상 확인

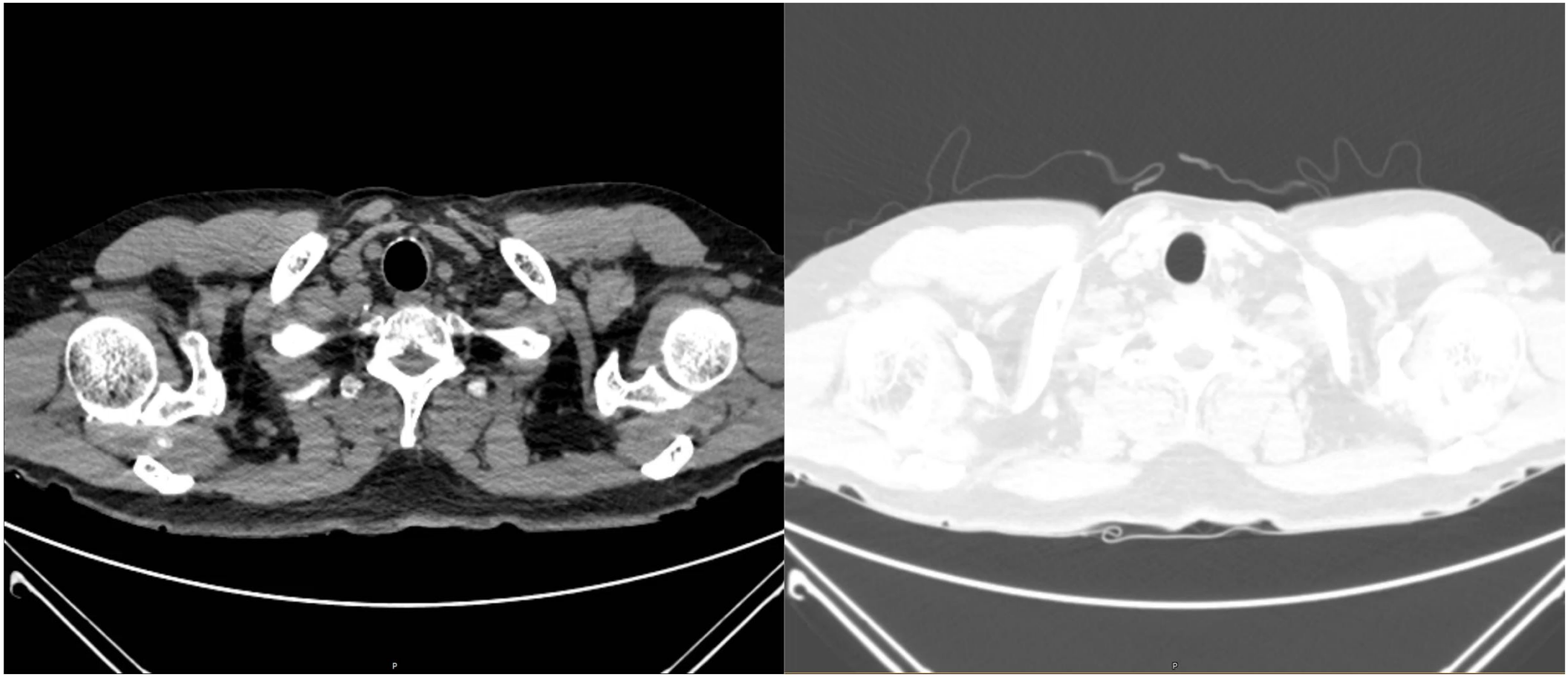
•내원 5일 전 호흡곤란 재발하여 타원 입원하였고, PCD insertion 후 증상 호전된 상태로 본원 외래 경유 F/E 위하여 입원

•Social Hx. : Ex-smoker (20PY, 3MA quit)
건축업 종사 (형틀목수, Asbestos exposure +)

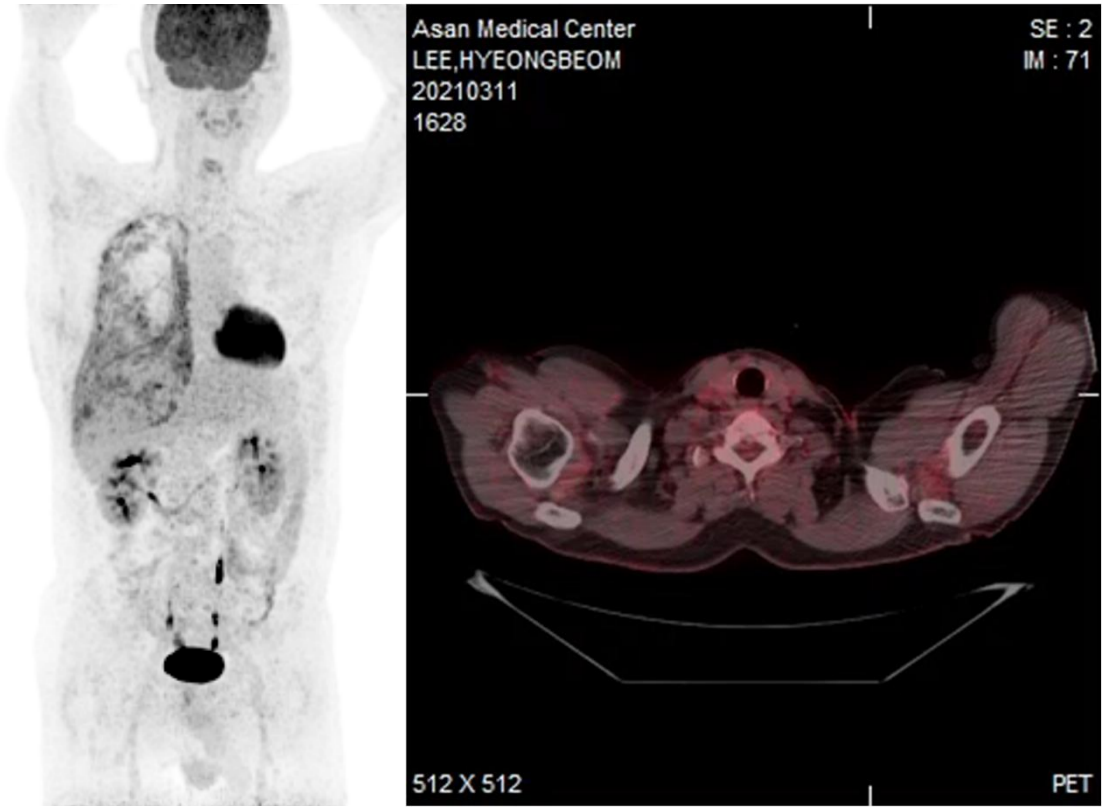
Case 6 – chest PA



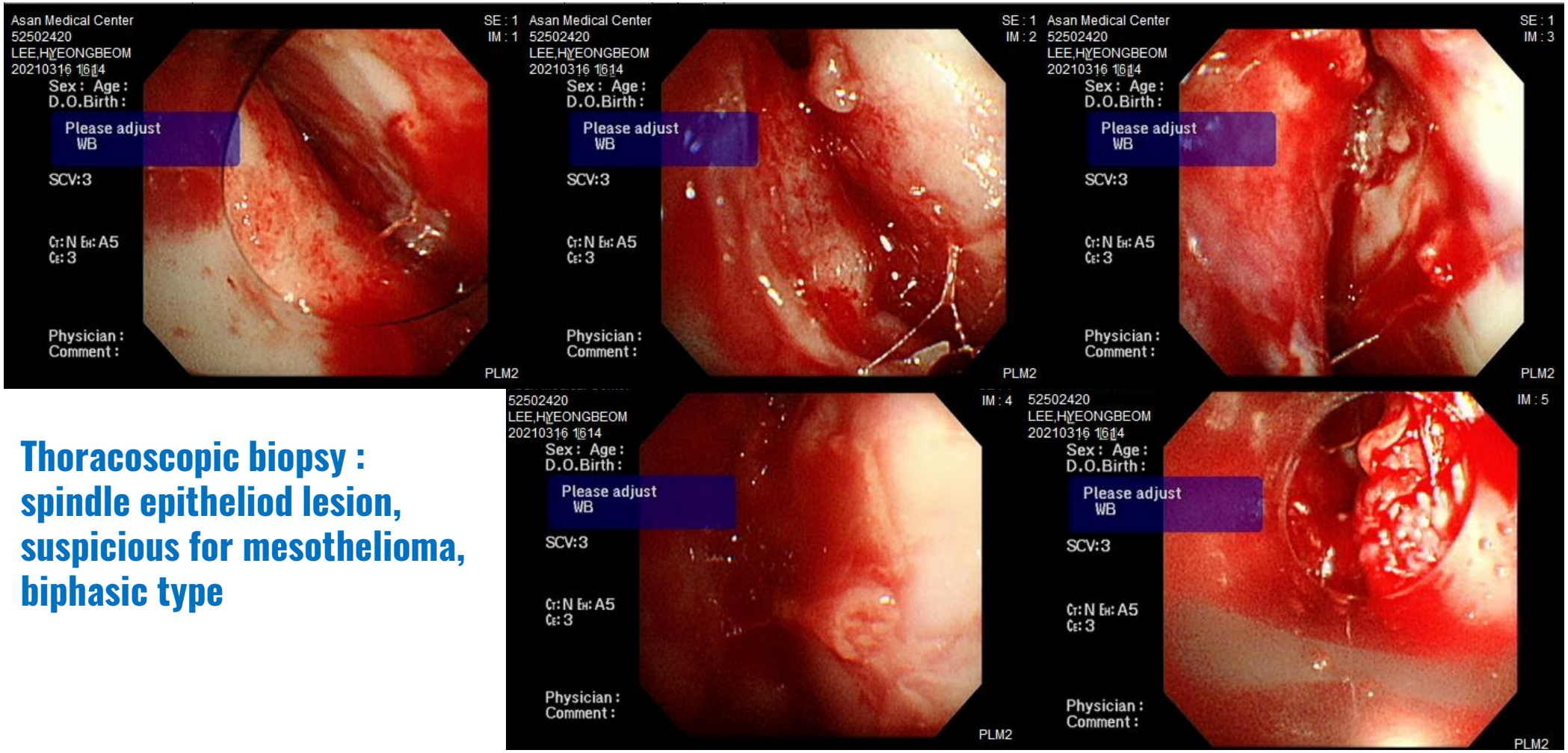
Case 6 – chest CT



Case 6 – PET


Asan Medical Center
LEE,HYEONGBEOM
20210311
1628
SE : 2
IM : 71
512 X 512
PET

Case 6 – medical thoracoscopy

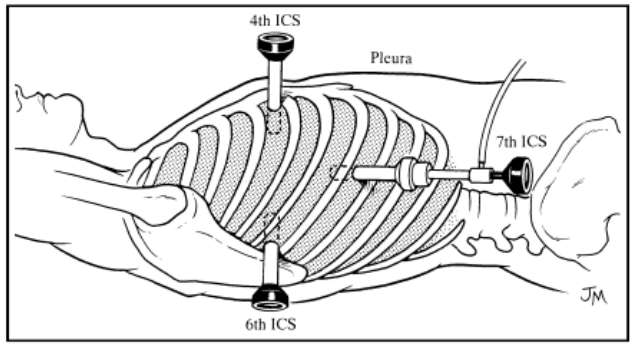


Thoracoscopic biopsy : spindle epitheliod lesion, suspicious for mesothelioma, biphasic type

MT vs VATS

Table 2.1 Main differences between medical thoracoscopy/pleuroscopy versus surgical thoracoscopy/video-assisted thoracic surgery (VATS)

Feature	Medical thoracoscopy/pleuroscopy	VATS
Purpose	Diagnosis Pleurodesis	Minimally invasive thoracic surgery
Location	Endoscope suite Operating room	Operating room
Anesthesia	Local with moderate sedation	Single-lung ventilation
Technique	Single puncture Double puncture	Multiple punctures
Instruments	Nondisposable Simple	Disposable Complex



- Robert Loddenkemper, et. al., Medical Thoracoscopy/Pleuroscopy:Manual and Atlas, Thieme 2010.

Indication and Contraindication of MT

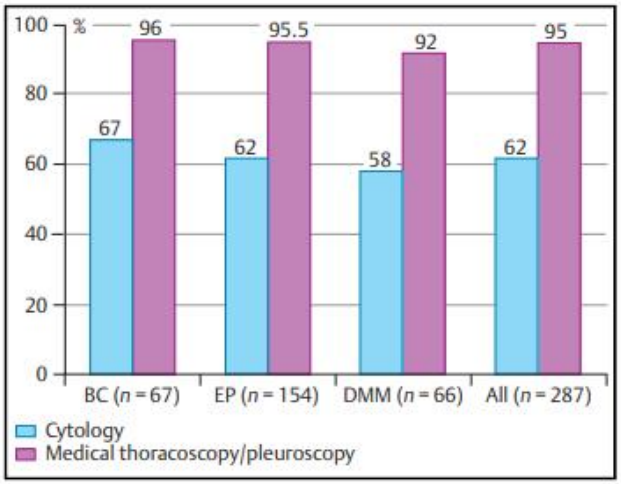


Fig. 3.9 Diagnostic yield (%) of cytology and medical thoracoscopy/pleuroscopy in malignant pleural effusions of different origin at the Lungenklinik Heckeshorn, Berlin 1980–1986. BC, bronchial carcinoma; EP, extrathoracic primary; DMM, diffuse malignant mesothelioma. (From Antony et al. 2001, reprinted with permission from ERS Journals Ltd.)

Table 1.1 Therapeutic indications for medical thoracoscopy/pleuroscopy today

Main indication	**Talc poudrage for pleurodesis**
	• In malignant (or other chronic) pleural effusions • In pneumothorax
Further indications	• Empyema (opening of loculations) • Hyperhidrosis (upper dorsal sympathicolysis) • Pericardial fenestration • Removal of foreign bodies • Removal of benign tumors (?)

Table 8.1 Absolute and relative contraindications to medical thoracoscopy/pleuroscopy

Absolute	**Relative**
Lack of pleural space due to: • Advanced empyema • Pleural thickening of unknown etiology • Suspected mesothelioma where the visceral and partial surfaces are fused	Inability to tolerate lateral decubitus position Unstable cardiovascular or hemodynamic status Presence of severe, uncorrectable hypoxemia despite oxygen therapy Bleeding diathesis Pulmonary arterial hypertension Refractory cough Drug hypersensitivity Reduced general health status with short suspected survival

- Robert Loddenkemper, et. al., Medical Thoracoscopy/Pleuroscopy:Manual and Atlas, Thieme 2010.

Summary

- 기관지내시경 기법의 발달에 따라 폐암의 진단 및 치료에 다양한 기관지 내시경 기법이 사용되고 있다.
- 이에 따라 폐암의 진단 및 치료 영역에서 호흡기내과 의사의 역할이 더욱 중요해 지고 있다.
- 기관지내시경적 시술대상자를 선별함에 있어 시술의 이득 대비 위험도를 고려하여 적절한 대상자에 대해 적절한 시술을 시행하는 것이 필요하다.

경청해 주셔서 감사합니다.

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