

Technical Aspects of Lung Cancer Surgery

- Localization Techniques and Sublobar Resection

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Pulmonary resection





Upper Lobe

Apico-posterior (LS1,2) Anterior (LS3) Superior lingular (LS4) Inferior lingular (LS5)

Lower Lobe

Superior (LS6) (on posterior surface) Anterio-medial basal (LS7,8) Lateral basal (LS9) Posterior basal (LS10)





RUL apical segmentectomy





RUL apical segmentectomy

Division of segmental vessels (V1, A1)





RUL apical segmentectomy

- Exposing the segmental bronchus
- Cutting along the intersegmental plane



RUL apical segmentectomy

- Exposing the segmental bronchus
- Cutting along the intersegmental plane
- Obtaining a sufficient surgical margin





Segmentectomy

1. Anatomical resection

(a. v. bronchus, intersegmental plane)

2. Regional LN harvest

- Accurate staging, lowering recurrence
- 3. Adequate resection margin
 - Lowering recurrence

- Postoperative complications

Prolonged
air-leak,
bleeding,
congestion,,,

- Surgical experiments

- Anatomical variants

Wedge resection

1. Non-anatomical resection

Minimal complication

2. No regional LN harvest

Easy to approach

3. Inadequate resection margin (?)





NCCN Guidelines Version 3.2020 Non-Small Cell Lung Cancer NCCN Guidelines Index Table of Contents Discussion

Evaluation

PRINCIPLES OF SURGICAL THERAPY

 Determination of resectability, surgical staging, and <u>pulmonary resection should be performed by thoracic surgeons who perform lung</u> cancer surgery as a prominent part of their practice.

• CT and PET/CT used for staging should be within 60 days before proceeding with surgical evaluation.

For and relifer to staging should be within to days before proceeding with surgical evaluation.

- Segmentectomy(preferred) or wedge resection is appropriate in selected patients for the following reasons:
 - ✓ Poor pulmonary reserve or other major comorbidity
 - ✓ Peripheral nodule \leq 2cm with at least one of following:

Pure adenocarcinoma in site(AIS) histology

Nodule has ≥ 50% ground-glass appearance on CT

Radiologic surveillance confirmed a lung doubling time(≥ 400days)

Note: All recommendations are category 2A unless otherwise indicated. Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.



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- · Issues of ground-glass opacity (GGO) lesions
 - Low dose CT screening for lung cancer: NLST trial
 - Detection of small pulmonary nodule or GGO
 - Rising incidence of GGO predominant cancer





 In general, lung adenocarcinomas are thought to follow a linear multistep progression in which AAH progresses to AIS, which in turn is followed by invasive adenocarcinoma.





- Importance of VATS
- Minimal invasiveness, standard operation for lobectomy
- Lung cancer surgery: 70-90% underwent VATS







- The very reasons that make them difficult to biopsy are the same ones that make pulmonary nodules challenging to find: Nodules that are difficult to see or palpate!
- ✓ Nodules in a location where palpation is difficult (deeper than 5mm from visceral pleura)
- ✓ Small nodules (<1 cm in size)
- ✓ Pure ground-glass nodule
- \checkmark Nodules where obtaining a margin is a concern



- · Importance of lung localization
 - Assist for minimal surgery under VATS instead of lobectomy
 - Higher success rate of localization-guided VATS than non-guided VATS (90% vs 54%)

Lung localization methods



Lung localization methods

Percutaneous-	Fluoroscopy	
transthoracic	СТ	
Transbronchial	US	Guidance
Transvenous	Electromagnetic- GPS	
Methylene blue		
Indigo carmine	Fluoroscopy	
Marker — ICG Lipiodol Microcoil Hook-wire	Optical vision	— Detecti
	NIR-fluorescence	
	Percutaneous- transthoracic Transbronchial Transvenous Methylene blue Indigo carmine ICG Lipiodol Microcoil Hook-wire	Percutaneous- transthoracicFluoroscopyCTCTTransbronchialUSTransvenousElectromagnetic- GPSMethylene blueFluoroscopyIndigo carmine ICGOptical visionLipiodol Microcoil Hook-wireNIR-fluorescence

Original Research Lung Cancer

CHEST

Comparative Effectiveness and Safety of Preoperative Lung Localization for Pulmonary Modules



Hook-wire localization Micro-coil localization Lipiodol localization

video-assisted thoracoscopic surgery (VATS): hook-wire localization, microcoil localization, and lipiodol localization.

METHODS: We searched the PubMed, MEDLINE, and EMBASE databases for prospective or retrospective English language studies of VATS localization in adult patients. A noncomparative, random effects model-based meta-analysis was performed to obtain pooled

Pneumothorax Pulmonary hemorrhage Air embolism

CONCLUSIONS: All three localization methods yielded similarly highly successful targeting rates. However, hook-wire localization had a relatively lower successful operative field targeting rate because of dislodgement or migration. Lipiodol localization had the highest overall success rate, and microcoil localization yielded the lowest complication rates. CHEST 2017; 151(2):316-328

KEY WORDS: hook-wire; lipiodol; localization; lung nodule; microcoil

- All three localization methods yielded similarly highly successful targeting rates.
- Hook-wire localization had a relatively lower successful operative field targeting rate because of dislodgement or migration.
- Lipiodol localization had the highest overall success rate.
- Micro-coil localization yielded the lo complication rates.



Case: 67Y/F with GGO

















The Ideal Localization Method

- High Accuracy rate
- Minimal rate of complications
- Short procedure time
- No need to transport patient from localization area to OR
- Cost effectiveness
- Minimal patient discomfort
- Minimal radiation exposure to either the surgeon or the radiologist



General Benefits to Localization

- Accurately pinpoint nodules that are difficult to see or palpate
- Increase chance of success in resecting targeted tissue
- Decrease OR time and a patient's time under anesthesia
- Eliminate the need to first biopsy a very small nodule remove it with clean margins in a wedge resection



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Illustrated Anatomical Segmentectomy for Lung Cancer

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