



Surgical management in Lung cancer

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Topics

- Indications for Surgery in Lung Cancer
- Preoperative assessment & Optimization
- Relevant Surgical Anatomy
- Surgery– Primary & Mediastinal Lymph nodes
- Post operative Management
- Adjuvant Treatment & Followup



Indications

- Early stage NSCLC
 - Stage IA,IB,IIA,IIB
- Locally Advanced NSCLC
 - Stage IIB/IIIA (T3 N0/N1, T4 N0/N1)
 - Stage IIIA/IIIB (cT1-3 N2/3) → Pathological mediastinal LN Negative
- Early Stage SCLC - T1/2 N0 → Pathological mediastinal LN Negative
- Resectable recurrence
- Palliative



Indications

- Separate Nodules/Multiple cancers in same lobe/same side lung
 - Parenchyma preserving resection
- Chest wall/parietal pleura/parietal pericardium/phrenic nerve – No problem
- Superior sulcus tumours?



Preoperative Assessment & Optimization

- MDT
 - Surgical Oncologist/Thoracic Surgeon
 - Medical Oncologist
 - Radiation Oncologist
 - Radiologist
 - Pulmonologist
 - Specialist Nurses
 - Pathologists
- Patient and Family



Preoperative Assessment & Optimization

Medically Fit Patient

Resectable Disease



Preoperative Assessment & Optimization

- Clinical Assessment including Performance status
- CT Chest and Abdomen or PETCT
- Bloods
- Smoking cessation
- Pathology
- Bronchoscopy
- Pulmonary function tests/CPET



Preoperative Assessment & Optimization

Mediastinal Evaluation – Clinical(Imaging) → Pathological

Rule out N2/N3 disease

N1 – Ipsilateral peribronchial/hilar/intrapulmonary LN

N2 – Ipsilateral mediastinal or subcarinal LN

N3 – Contralateral LN or supraclavicular LN



Mediastinal Evaluation

- EBUS TBNA
- EUS FNA/B
- CT guided needle biopsy
- Mediastinoscopy
- Thoracoscopy
- Mediastinotomy

EBUS TBNA Neg but CT/PET suspicious



Mediastinoscopy biopsy

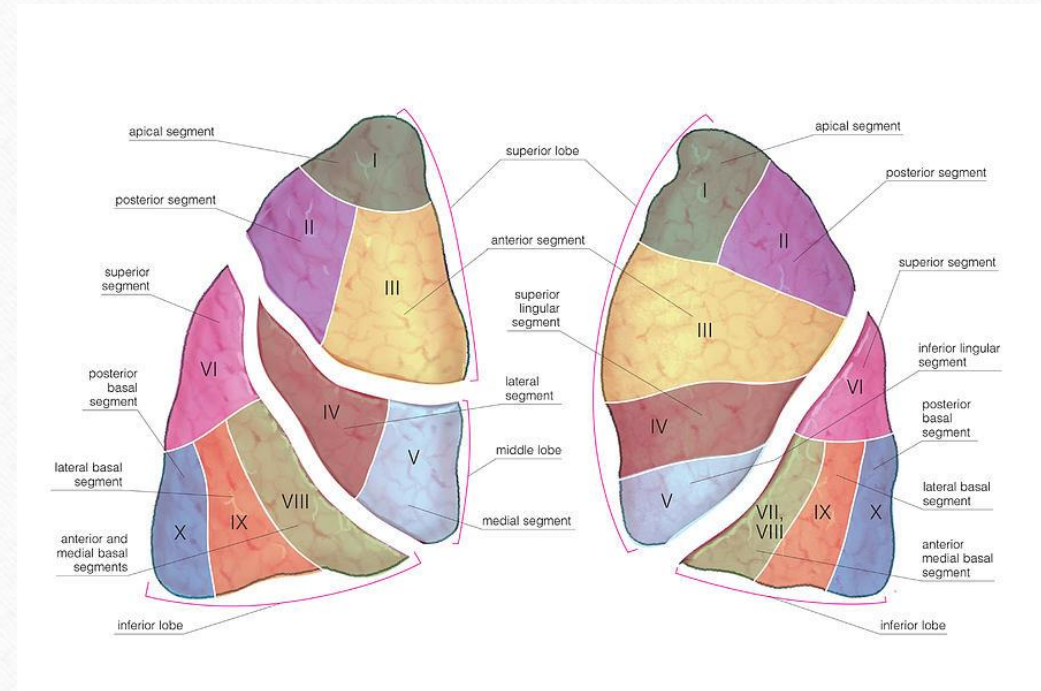
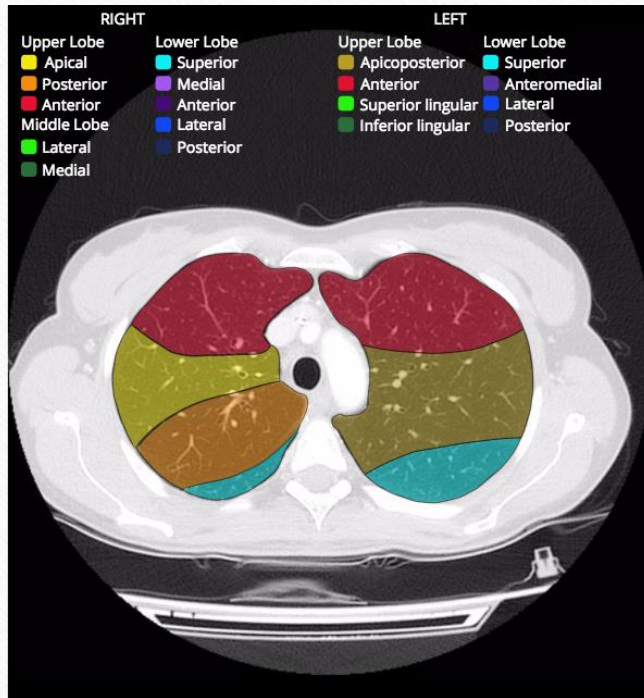


Relevant Surgical Anatomy

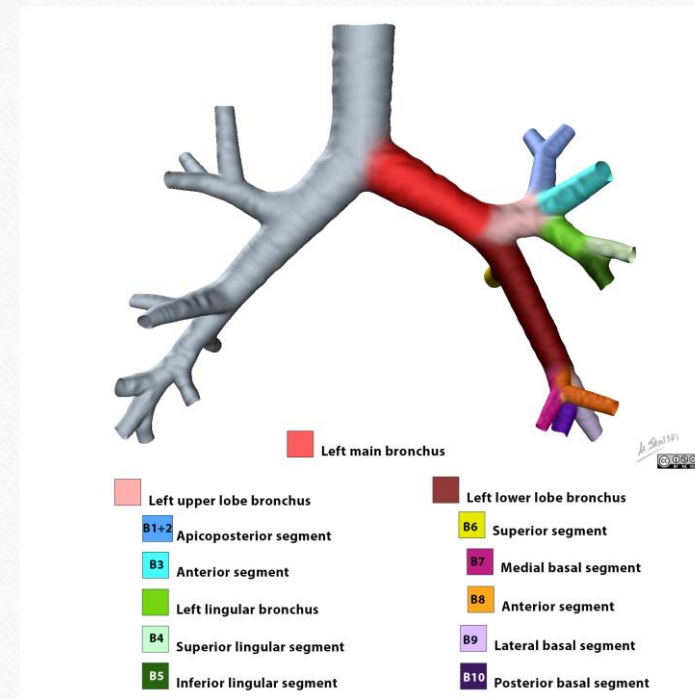
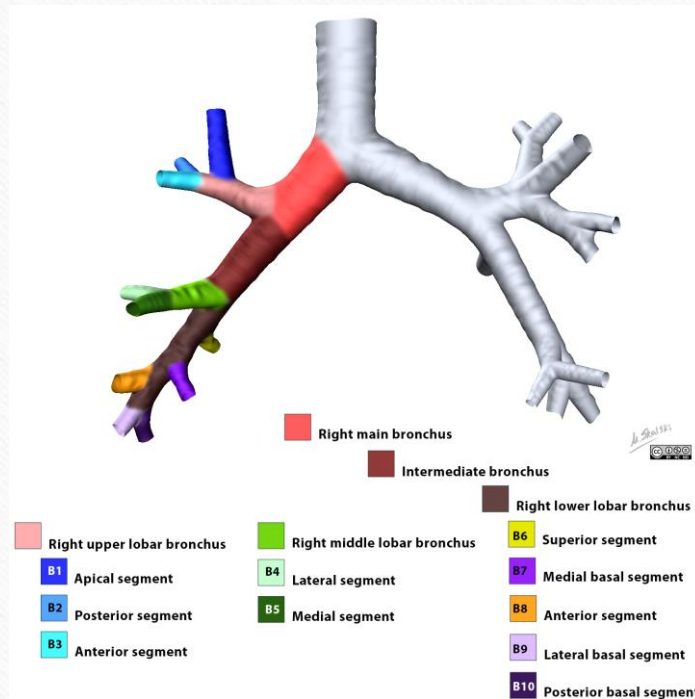
Lung

Lymph Nodes

Lungs

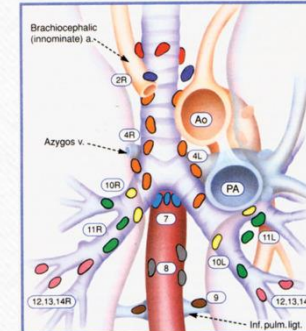
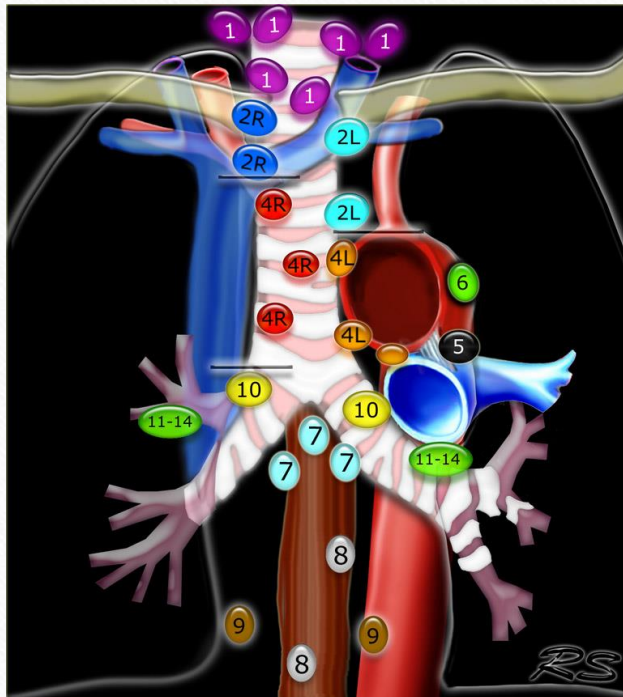


Lungs



Courtesy of Dr Matt Skalski, Radiopaedia.org

Lymph Nodes

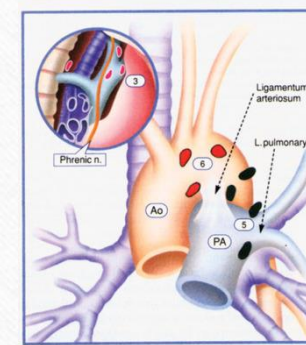


- Superior Mediastinal Nodes**
- 1 Highest Mediastinal
 - 2 Upper Paratracheal
 - 3 Pre-vascular and Retrotracheal
 - 4 Lower Paratracheal (including Azygos Nodes)
- N₂ = single digit, Ipsilateral
N₂ = single digit, contralateral or supraclavicular

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

- Inferior Mediastinal Nodes**
- 7 Subcarinal
 - 8 Paraesophageal (below carina)
 - 9 Pulmonary Ligament

- N₁ Nodes**
- 10 Hilar
 - 11 Interlobar
 - 12 Lobar
 - 13 Segmental
 - 14 Subsegmental





Surgery

Primary-Lung Lesion

Mediastinal LN



Surgery - Primary

- Anatomic Pulmonary Resections – lobectomy/pneumonectomy – preferred
- Sublobar resections – Segmentectomy/Wedge resections
 - ≤ 2 cm tumours
 - ≥ 2 cm margin
 - Peripheral nodule
 - Poor pulmonary reserve or major comorbidity
 - Includes LN sampling of appropriate N1/N2 stations



Surgery - VATS

- High volume centres
- No compromise of oncological safety
- Improved early post op outcomes
- Reduced hospital stay
- Rapid return to function
- Reduced delay in adjuvant Rx



Surgery - Primary

- Separate nodules in same lobe/same lung – Lung parenchyma preserving sleeve lobectomy > pneumonectomy
- T3/T4 local invasion/extension – en bloc resections
- No surgery in N2/N3 disease



Surgery – Lymph nodes

- Formal Ipsilateral mediastinal LN dissection esp. in Stage IIB/IIIA tumours
- All N1 and atleast 3 N2 LN stations should be sampled if formal dissection not done.



Surgery

- **Left Upper Lobectomy** – Segments I-V + LN 10-14L (N1 Nodes) + 2L,4L,5,6,7,8,9 (N2 Nodes)
- **Left Lower Lobectomy** – Segments VI-X + LN 10-14L (N1 Nodes) + 4L,5,6,7,8,9(N2 Nodes)
- **Right Upper Lobectomy** – Segments I-III ± IV-V + LN 10-14R (N1 Nodes) + 2R,4R,7,8,9 (N2 Nodes)
- **Right Lower Lobectomy** – Segments VI-X ± IV-V + LN 10-14R (N1 Nodes) + 2R,4R,7,8,9(N2 Nodes)



Surgery

Video – Left Upper lobectomy



Post operative Care

- Early post operative period – ICU/HDU
- Chest drain – bronchopleural fistula
- Chest physiotherapy
- Analgesia



Adjuvant Treatment

- Post operative histopathology → MDT
- T1/2 + N0 + R0 – observe/chemotherapy
- T3 or T4 or N1 or N2 or R1 – Chemo + RT



Thank you



Post Test MCQs



Question 1

In which of the following clinical stages of NSCLC is surgery NOT the primary modality of treatment?

- a) T2 N1
- b) T3 N1
- c) T4 N1
- d) T2 N2



Question No 2

Which of the following T stages is matched correctly as per TNM 8th Edition staging system for NSCLC?

- a) T1 – involves visceral pleura
- b) **T2 – involves main bronchus**
- c) T3 – involves recurrent laryngeal nerve
- d) T4 – involves phrenic nerve



Question 3

Which of the following N stages is matched correctly as per TNM 8th Edition staging system for NSCLC?

- a) N1 – Ipsilateral scalene LN
- b) **N2 – Subcarinal LN**
- c) N3 – Intrapulmonary LN
- d) N3 – Ipsilateral mediastinal LN



Question 4

- Which of the following IASLC LN stations are NOT correctly matched?
 - 3 – Prevascular
 - 4 – Subaortic
 - 5 – AP window
 - 6 – Para aortic



Question 5

- Which of the following is not a contraindication for surgery in lung cancer?
 - a) Tumour nodule in contralateral lobe
 - b) Single extrathoracic metastases
 - c) Involvement of superior mediastinal LN
 - d) **Involvement of chest wall**



Question 6

- Which of the following statements is TRUE regarding surgery of lung cancer?
 - a) Sublobar resections are preferred over anatomic resections
 - b) **Poor pulmonary reserve is a contraindication for surgery**
 - c) Pneumonectomy is preferred over sleeve lobectomy in patients with multiple cancers
 - d) At least 3 N1 LN stations should be sampled



Question 7

- Which of the following is NOT an indication for adjuvant radiation treatment post lung cancer surgery?
 - Margin positive T1 N0 cancer treated with a lobectomy + MLND
 - En bloc resection of chest wall for a T3 left upper lobe tumour
 - T2 N0 tumour treated with lobectomy + MLND. Margins are negative
 - T2 N1 tumour treated with lobectomy + MLND. Margins are negative



Question 8

- Which of the following is true regarding the surgical anatomy of the Lung?
 - Right lung does not have a horizontal fissure
 - Right lung has 10 segments, Left lung has 8 segments
 - **Lingula contains 2 segments on the left side**
 - Right middle lobe is divided into superior and inferior segments