Lung Cancer Guidelines for Diagnosis, Surgery and Referral for Subspecialty Management

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Alaska Native Medical Center
Guidelines for Diagnosis, Surgery and Referral for
Subspecialty Management of Lung Cancer

Lung Cancer has the highest number of cancer deaths in both men and women in the United States. The incidence of lung cancer and death of lung cancer has not dramatically changed over the last three decades. Both incidence and death rates have remained significantly higher in the Alaska Native population compared to US White.

	1992-1999 AN	1992-1999 USW	2000-2005 AN	2000-2005 USW
Men & Women	97.5*	65.2	96.2*	60.0
Men	135.2*	84.5	110.5*	72.9
Women	65.6*	51.7	85.6*	50.7

* Significantly different from USW incidence; $p<0.05$

Table 1: Age adjusted incidence of lung Cancer in Alaskan Natives per 100,000

	1992-1999 AN	1992-1999 USW	2000-2005 AN	2000-2005 USW
Men & Women	71.9*	57.7	67.1*	54.6
Men	99.0*	82.7	84.6	72.0
Women	50.0*	40.1	53.0*	42.0

* Significantly different from USW mortality rates; $p<0.05$

Table 2: Age adjusted death rate of lung Cancer in Alaskan Natives per 100,000

The following guidelines have been adapted from the American College of Chest Physicians evidence based clinical Practice Guidelines(second edition) and the National Comprehensive Cancer Network

Screening
There is no sufficient data to support screening of lung cancer in asymptomatic patients with sputum cytology, CXR, and or CT.

Chemoprevention
There is not enough data to recommend use of any chemoprevention agent in primary, secondary or tertiary lung cancer.

Diagnosis:

The mode of diagnosis of lung cancer depends of the size and location of the lesion and hence will change the sensitivity and specificity of each diagnostic test. The main goals of selecting a diagnostic test are:

- Maximize yield for diagnosis and staging
- To avoid unnecessary invasive tests

Alternatively, solitary pulmonary nodules in a high - risk person which are highly suspicious on CT/PET scan can be biopsied by VATS for diagnosis.

A. Sputum (4):

Few studies have evaluated the sensitivity and specificity of sputum
Characteristics that were associated with a higher yield of diagnosis by sputum are:

1. Bloody sputum
2. low FEV1
3. Large lung tumor (2.4 cm)
4. Centrally located tumors
5. Squamous cell carcinoma

B. Bronchoscopy (4):

Location of lesion	Sensitivity (pooled data)
Centrally located endobronchial disease	88%
Peripheral disease	69%
Peripheral lesion < 2cm	33%
Peripheral lesion > 2cm*	62%

* Based on experience of bronchoscopist and availability of fluoroscopy.

C. CT guided core needle biopsy (4):

From pooled data, the sensitivity of CT guided core needle biopsy for a peripherally located lung lesion, regardless of size, is 90%. The sensitivity of CT guided core needle biopsy has shown to be as low as 78% for lesions less than 1.5 cm.

D. Thoracentesis:

If a pleural effusion is present, thoracentesis is advisable both for diagnostic and staging purposes. Pleural fluid will be positive for malignant cells in 65% of the patients with a malignant pleural effusion. A second thoracentesis is suggested if the initial pleural tap is negative for malignant cells prior to referring for a thoracoscopy.

E. Video assisted thoracoscopic surgery (VATS)/ Open Biopsy.

VATS can be done if all other modalities have failed in diagnosing the lung lesion.. The most likely successful lesions are those that are on the surface of the lung and can be seen readily with the scope. The procedure may result in conversion into an open procedure if necessary to locate and resect the lesion. Additionally if the lesion is determined to be Malignant at VATS/Open biopsy definitive surgery may be carried out while the patient is under the same anesthetic. With this in mind the patient should have pre-operative evaluation for anesthesia and evaluation to determine the extent of resection possible if malignancy is diagnosed with frozen section.

Staging:

- History and Physical findings that may be related to metastatic disease or direct extension should be sought. If discovered they should be worked up with the appropriate study and biopsied if appropriate to determine extent of disease

- PET scan should be obtained on all patients. Suspicious areas should be biopsied to confirm presence of disease

- MRI scan should be obtained on patients with superior sulcus tumors to determine extent of disease prior to and after neo-adjuvant therapy, unless otherwise advised by the radiologist.

- **Mediastinoscopy, mediastinotomy, and thoracoscopy.** This is used in staging in non-small cell lung cancer in conjunction with, and in addition to, PET scan to determine advisability of resection. This can be done as an isolated procedure, or at the onset of a planned curative resection. When chemo-radiation therapy is planned, the mediastinoscopy should be performed *prior* to initiation of treatment.

Pre-operative work-up

- Complete surgical resection provides the best chance for cure of non small cell lung cancer. Commonly performed surgeries for lung cancer include pneumonectomy, lobectomy, wedge resection, and segmentectomy.

- Mortality rate of lung resection surgery can reach 11% with pneumonectomy(8). Hence, one must be absolutely sure if the candidate has resectable disease is a surgical candidate or not.

- Resectability is determined by a combination of staging and evaluation of extent of disease and by the patients ability to withstand the procedure and the resultant pulmonary function

Common criteria that are followed by thoracic surgeons to predict outcome of the lung surgery are:

Test	Explanation
Spirometry	• FEV1 reflects airflow and is overall the most predictive of outcome. - peumonectomy > 2L - Lobectomy > 1L - Wedge resection/segmemtectomy >1 L • Diffusion capacity (DLCO) reflects alveolar membrane integrity and pulmonary capillary blood flow in the lung. In some studies has predicted outcome(9) - peumonectomy > 50% predicted

	- Lobectomy > 50% predicted - Wedge resection/segmemtectomy > 50% predicted • Maximal Voluntary Ventilation (MVV). Breathe as fast as they can in 12 seconds. This is effort dependent and it is not as frequently used - peumonectomy > 50% predicted - Lobectomy > 40% predicted - Wedge resection/segmemtectomy > 40% predicted
Arterial blood gas	Partial carbon dioxide (PCO2)>45 mm Hg is associated with chronic respiratory failure and is used by some as a contraindication to resection
Quantitative ventilation and perfusion scan	For patients with marginal post resection FEV1 values VQ scan may be used to further define operability. Right lung contributes 55% of lung function and left lung contribute 45%. - From the VQ scan, the residual lung post operatively is calculated by a formula developed by Kritersson, - Post op FEV1 = Preop FEV1 * % of radioactivity contributed by non-operative lung - Studies vary but if the post operative lung FEV1 is > 0.8 L, then the patient may be a candidate for resection - Other formulas have been developed using number of segments to be resected and follow the same rule that the resultant FEV1 should be > 0.8 L

If the patient is marginal by the above criteria:

- cardiopulmonary exercise testing is performed to measure cardiopulmonary reserve. The oxygen uptake (VO2 max) is the parameter most frequently used to evaluate post operative risk and mortality. Most authors agree that if VO2 max ,< 20 ml/kg, the patient is at increased risk of morbidity and mortality from lung function and is not a surgical candidate. The heart is also part of the work up to ensure the patient is not at risk for peri- or post-operative MI and should be evaluated

Referral

Once a diagnosis made, all cases will be presented at tumor board to be discussed with the surgeons, oncologist, radiation oncologist and all other subspecialists. A cancer treatment plan must be dictated by the presenting provider. The provider should determine the clinical stage prior to initiation of treatment. Guidelines for referral are:

Pulmonologist:

Pulmonary nodules should be referred to a pulmonologist as they are more experienced in deciding whether they are suspicious or not and what next step to take in the management of the pulmonary nodule if diagnosis and staging If malignancy is found the pulmonologist will proceed with the pre-operative work up and staging to determine if the patient meets the criteria for respectability.

Surgeon:

Once a diagnosis is made patient that are thought to be surgical candidates after work-up should be referred for evaluation. Additionally patients that require biopsy for diagnosis and/or staging with lesions that are either unapproachable or unsuccessful by the other modes of diagnosis should be referred to the surgeon to obtain tissue for diagnosis.

Medical Oncologist:

Once a diagnosis of lung cancer is made and presented at tumor board, the patient with good performance status should be referred to an oncologist regardless of whether of being a surgical candidate or not. Neoadjuvant or adjuvant therapy may be recommended prior to surgery to decrease the bulk of the tumor to be resected and post surgery to irradiate any micro tumor cells. These decisions are made at the weekly tumor board meetings. Patients should be referred to Medical Oncology for:

- preoperative chemotherapy for suitable surgical candidates, with curative intent (it should be clear in the referral that this is PRE operative therapy, as definitive therapy is different from pre op therapy)
- post op patients with stage IB to III disease for adjuvant therapy with curative intent
- unresectable patients with stage III disease for combined modality therapy for curative intent
- good performance status (ECOG 2 or better) stage IV, for palliative intent

Radiation Oncologist:

Once a diagnosis of lung non small cell lung cancer is made, the patient should be referred to a radiation oncologist if definitive surgery is not possible. Patients should also be referred if they have N2 nodal disease or higher, or if they have close or positive margins. Pre-operative radiation treatments +/- chemotherapy should be considered for patients with unresectable or Pancoast tumors. For patients with small cell lung cancer, they should be referred for radiation therapy if staging revealed limited stage disease. Prophylactic cranial irradiation should also be considered. For patients who do not have a tissue diagnosis because they have a very high risk of complications with a biopsy, radiation can be considered without tissue diagnosis. Tumor board discussion of all cases is encouraged.

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