Diagnostic Procedures in Lung Cancer

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When a suspicious lesion is noted on the chest x-ray film, a battery of procedures is employed to establish the diagnosis and extent of the disease. Bronchoscopy; lymph node biopsy, biopsy of the lesion; liver, bone and brain scanning; and efforts to determine if the lesion is primary or metastatic are all used in careful selection and staging. This discussion is limited to a brief review of surgical diagnostic procedures.

Bronchoscopy

The rigid bronchoscope is preferred for diagnosis of central lesions because the rigidity of the carina and displacement of the stem bronchus may be better assessed. Bronchial washings and biopsies are easily taken through the larger lumen. Rigid bronchoscopy is performed usually under general anesthesia with a ventilating bronchoscope. A right angle lens permits visualization into the upper lobes. Although saline solution washings for cytology collected at bronchoscopy are usually diagnostic, sputum collected for cytology for the following 48 hours will often produce the most fruitful specimens.

The flexible fiberoptic bronchoscope has advantages over the rigid bronchoscope, and most surgeons are using it now, particularly in more peripheral lesions. Often, it can pass constricted or distorted areas of the bronchi. Patients tolerate it quite well with local anesthesia. The flexible bronchoscope allows subsegmental visualization. Particularly in upper lobe lesions, it is very helpful in biopsy and brushing in the distal bronchi. Direct bronchial biopsies and segmental brushing performed with the flexible bronchoscope have yielded the highest positive results.1-3 Recently, in those rare cases with positive cytology and a normal chest x-ray film, selective brushing of each segment has been helpful in detecting occult lung cancer.

Our standard technique is to perform flexible bronchoscopy through a large endotracheal tube using an adapter that gives an airtight seal, so the anesthesiologist can ventilate the lungs throughout the procedure. General anesthesia is generally employed for the comfort of the patient, but topical anesthesia works as well. For local anesthesia, 4 percent lidocaine, given as an aerosol, is satisfactory. With the endotracheal tube in place, excellent ventilation is provided with surprisingly little discomfort in the awake patient. This permits easy removal and reintroduction of the bronchoscope while biopsies are taken or a lens is cleaned.

Lymph Node Biopsy

Scalene node biopsy and mediastinoscopy are performed at the same time on our services. A low transverse cervical incision from the midline to the external jugular vein gives good access to both areas. These procedures are generally not used in peripheral lesions which show no x-ray film evidence of mediastinal adenopathy and where no scalene nodes are palpable. In such cases, metastatic tumor in the mediastinum is found in less than 10 percent of the cases. If the scalene nodes seem positive, a frozen section is done, obviating mediastinoscopy, if malignancy is found. If no grossly positive nodes are palpated in the prescalene fat, the dissection is carefully carried out along the anterior surface of the trachea into the mediastinum. Most of the dissection can be done with a finger followed by an orderly exploration with the mediastinoscope. Particular attention is paid to the presence of contralateral and high mediastinal nodes and tumor outside the nodes. These are poor prognostic findings which usually contraindicate surgery. Dissection is extended out as far as possible onto both stem bronchi. All lesions are aspirated with a No. 21 needle prior to biopsy to avoid a vascular accident.

Serious complications during mediastinoscopy have included rare cases of large vessel injury, unsuspected tension pneumothorax, and stroke due to temporary occlusion of the innominate artery.4-6 In severe hemorrhage, the area can be controlled with packing while preparation for thoracotomy is made. However, often a period of packing will control the hemorrhage. These complications are now exceedingly rare in experienced hands.

In lesions of the left hilum and midlung lesions of the left lung with adenopathy, the nodes may be better evaluated through an anterior mediastinotomy as described by McNeill and Chamberlain.9 The second or third costosternal cartilage is removed subperichondrially and the extrapleural mediastinum explored. This technique has the advantage that relatively remote nodes, not found by supra-

*Mediastinopleurscopy, the deliberate passage of the mediastinoscope introduced in the neck through the parietal pleura, has been advocated for increasing the diagnostic yield on mediastinoscopy. More experience must be gained to ascertain the true worth of this somewhat radical procedure.
sternal mediastinoscopy, are available for direct biopsy. Furthermore, the spread of the malignancy into the great vessels, particularly under the arch of the aorta, will be demonstrated. It has proved to be a very safe and valuable diagnostic technique.

**Trans-Lung Biopsy**

Direct lung biopsy is used in cases where a peripheral lesion is over 15 mm in diameter and where we would like to avoid thoracotomy, if possible. This includes cases of multiple radiodensities and other cases where metastatic disease is suspect. It also helps in poor risk patients where a diagnosis is required for radiation or chemotherapy.

Three methods of direct biopsy are currently employed: 1) Vim-Silverman type needle; 2) No. 18 spinal needle; and 3) high speed drill. All should be done under fluoroscopic control. Trans-thoracic biopsies using a cutting needle, such as a Vim-Silverman needle, obtain satisfactory tissue, but almost one-third of the cases have subsequent pneumothorax. This is less likely to occur in aspiration biopsy using a No. 18 spinal needle which also results in good specimens for cytologic examination. This is our preferred method even in quite central lesions. It has been safe in patients with emphysematous lungs. The high speed drill has been used most often in diffuse pulmonary disease, and as would be expected, is often accompanied by pneumothorax and pulmonary bleeding. However, in all needle biopsies, there have been rare serious complications such as tension pneumothorax, massive hemoptysis, and cases in which air embolism has been suspected. Therefore, all trans-thoracic needle aspirations should be done with facilities for immediate thoracotomy available.

These relatively simple surgical diagnostic procedures have, with rare exceptions, provided positive diagnoses with practically no mortality and little morbidity. Their increasing use has reduced the number of exploratory thoracotomies for diagnosis and has resulted in a greater resectability in operated cases. The identification of the exact cell type of the malignancy and the extent of the disease results in better staging and planning of the optimal regimen of treatment for the particular patient.

**REFERENCES**


**Brushings, Washings, or Biopsy?**

**Obtaining Maximum Value from Flexible Fiberoptic Bronchoscopy in the Diagnosis of Cancer**

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We do not plan to bore you with a series of beautiful photomicrographs which are of interest only to other cytologists. Instead, we will discuss how to obtain maximum benefit from the material obtained at flexible fiberoptic bronchoscopic examination in trying to establish the diagnosis of cancer. This review is of our experience over the last 2% years at University Hospital in San Diego, Calif.

In a report published in 1974, Skitarelic and Von Haam showed that flexible bronchoscopic examination yielded the "correct diagnosis" in 66 of 72 cases, or 92 percent of the time, as compared with 81 (80 percent) of 101 patients studied with a rigid bron-