Rapid Diagnosis of Lung Cancer from Palpable Metastases by Needle Thrust*

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This study encourages the use of percutaneous FNB to diagnose and stage advanced lung cancer in patients with palpable metastases in supraclavicular lymph nodes or soft tissues. Percutaneous FNB of metastases is much easier to learn than transthoracic needle aspiration: the superficial target is anchored and sampled with multiple passes using a short needle grasped directly in the fingers. It is fast, accurate, economical and nearly free of risk and pain. The technique saves time and money because it is the only procedure needed by many patients with palpable disease in stage IIIIB and IV. Bronchoscopy, transthoracic needle aspiration and open surgical biopsy thus can be avoided in most patients with palpable metastases. Prompt diagnosis by FNB of metastases speeds palliation for patients with urgent need. Tumor cell type from FNB correlated with cytologic findings from sputum samples, bronchoscopy specimens and autopsy results. (Chest 1990; 98:1383-96)

FNB = fine needle aspiration biopsy

Percutaneous FNB is widely used to diagnose primary tumors of the lung. The technique has other uses.1* The purpose of this article is to encourage the application of a direct needle thrust technique for FNB to diagnose and stage advanced lung cancer in those patients with palpable metastases in supraclavicular lymph nodes or soft tissues. Fine needle biopsy of metastases is easy to learn, fast, accurate, economical and nearly free of risk and pain.4 It saves a good deal of time and money because it is the only procedure needed by many patients with palpable extrathoracic disease who are in stage IIIIB or IV. Fine needle biopsy also has the virtue of redirecting the physician's attention to the physical examination.

MATERIALS AND METHODS

The Carl T. Hayden VA Medical Center in Phoenix, AZ is a 500-bed general hospital in a metropolitan area of 2 million. We reviewed the medical records and chest roentgenograms of all the patients who had FNB of palpable metastases in the four years between November 1985 and December 1989. Transthoracic and bronchoscopic Wang needle aspirations were not included.

There were 55 patients with lung cancer who had FNB of metastases. In all 55 patients the diagnosis was first established by the FNB from a site other than the lung. The advanced lung cancer seen in veterans hospitals is underscored by our finding this many patients with palpable disease in four years. We know that all the patients who had this procedure were included in the analysis because in our hospital only the pulmonary physicians use FNB to diagnose lung cancer and they are always assisted by the same pathologist who interprets all of the specimens used for cytology study. Patients were included regardless of the size of the metastasis. The Pulmonary Section provides all of the diagnostic procedures for lung cancer for the hospital because we have no thoracic surgery residency program. Our procedure log accurately reflects the hospital's lung cancer case load. In the four years covered by the study, the 55 patients diagnosed by FNB were drawn from approximately 400 new patients with bronchogenic cancer (14 percent). We thought such patients were a small subset until our success with FNB caused us to reemphasize the physical examination.

Each patient's history, physical examination and abnormal chest roentgenogram pointed to bronchogenic carcinoma. We chose to do FNB of a soft tissue metastasis because it was quicker and easier than our doing bronchoscopy or transthoracic needle aspiration of the primary cancer in the lung. Care was taken to exclude recurrent lung cancer, metastatic tumors from the breast, gastrointestinal tract, head and neck and mediastinal germ cell tumors (immunoperoxidase stain for placental alkaline phosphatase).

Fine needle biopsy was performed by the pathologist or by a pulmonary attending physician, fellow or resident with the pathologist serving as a coach. The "sampling without aspiration" or needle thrust technique with a 20- or 21-gauge needle was used to obtain the cellular specimen (Fig 1).11 The specimen was smeared by the pathologist, fixed in 95 percent ethanol, stained with a rapid Papanicolaou's method and immediately examined. Both faculty and trainees learned to recognize an adequate specimen by viewing the slide with the pathologist using a dual-headed microscope with a video monitor attached. The same cytopathologist compared the FNB specimens with any additional specimens taken for cytologic or histopathologic study that were obtained from the 55 patients. Survival was calculated from the date FNB established the diagnosis.

Symptomatic patients who required palliation had noninvasive staging and treatment after the diagnostic FNB. Computerized tomography and radioisotope scans guided this work. Radiotherapy planning was done using a simulator with computerized tomography for localization. Stage IIIIB or IV disease was established by the FNB so other procedures were unnecessary.10 The detection of other extrathoracic metastases and palliation were not germane to our purpose and were not considered further. Survival information was obtained in 51 of the 55 patients using medical records or patient and family contact.

RESULTS

Fifty-five patients first had the diagnosis of bronchogenic carcinoma established by FNB of metastases in

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lymph nodes or soft tissues. There were 53 men and two women ranging in age from 37 to 78 years old (mean age: 66 years). All 55 were white smokers. They underwent 58 aspiration procedures. In 51 of the 58 procedures, a supravacular lymph node or cervical mass was the diagnostic target. The other sites included soft tissue metastases as follows: chest wall mass, five patients; leg mass, one patient; abdominal wall mass, one patient. Two patients had a positive FNB biopsy in two metastatic sites: in one, bilateral supravacular lymph nodes and in another, abdominal wall mass in addition to a mass in the right side of the neck. There were 20 squamous carcinomas, 18 adenocarcinomas, 11 small cell carcinomas and six large cell carcinomas. Twelve of the 55 patients had additional material submitted for histopathologic or cytologic examination. There were six autopsy specimens, one transbronchial biopsy, one sample of pleural fluid for cytologic study and four positive sputum samples for cytologic study. In all 12 there was confirmation of the diagnosis made by FNB.

The FNB technique resulted in no complications. None of the 55 patients required surgical biopsy. In two patients the initial FNB failed to show cancer. One of these two patients had had an open surgical biopsy of a supravacular mass that was not diagnostic before the first FNB. The indurated surgical site yielded only blood, so computed tomography was used to guide a 20-gauge needle to the proper depth and adenocarcinoma cells were recovered. The one
additional patient in whom the initial 21-gauge needle attempt failed was shown to have metastatic squamous carcinoma when a Rotex needle was used to biopsy the same site. In both these cases, clinical judgment made it clear that the diagnosis had to be pursued.

Fifty-three of the 55 patients underwent FNB biopsy in the hospital. They were hospitalized for an average of 3.4 days before the FNB (range, 1 to 28 days). Two patients had FNB in the outpatient area and did not require hospitalization. Both had delayed seeing a physician because they feared serious illness. Both were gratified by the speed with which the diagnosis was made. One had small cell carcinoma and an excellent performance status so his staging and chemotherapy were done as an outpatient.

The 36 patients with non-small cell carcinoma who died had a median survival of four weeks following FNB (range, 5 days to 55 weeks). The median survival of the seven patients who died with small cell carcinoma was 29 weeks (range, 7 to 41 weeks). Four patients were unavailable for follow-up and are presumed dead. Six patients are alive.

In the course of this work we established a diagnosis other than lung cancer in ten patients. These are given in Table 1. They were all confirmed by history, earlier organ-specific biopsy results, additional surgical biopsy results or postmortem examination.

**DISCUSSION**

Fine needle biopsy of metastases to lymph nodes or soft tissue is a simple technique that is popular in Europe.\(^3\) This type of biopsy can be thought of as an extension of a thorough history and physical examination because it provides safe, immediate, inexpensive staging and diagnosis. A second or third attempt is seldom needed but easily done when a specimen is nondiagnostic. A Rotex needle sometimes is useful when 18- to 21-gauge needles fail to provide the diagnosis. We are not asked to do FNB for conditions other than lung cancer so we cannot opine further.\(^8\) Lung cancer was a diagnostic possibility in the ten patients in Table 1 who proved to have another disease.

Fine needle biopsy is a 10-min procedure performed at the bedside or in the outpatient clinic. It requires no special equipment or patient monitoring and is well tolerated. Patients compare it with a venipuncture. Indeed, local anesthesia, which can make a small metastasis difficult to palpate, is unnecessary.

Our experience with this technique is comparable to that reported by Zajdela et al\(^1\) in patients with breast masses. In a series of 635 benign and malignant breast tumors studied in 1981, Zajdela and co-workers obtained an insufficient cellular yield from 5.5 percent of their patients. We obtained a diagnosis in all our patients by directly involving our cytopathologist. Direct manipulation of the needle without an aspirating syringe gives a delicate fingertip feeling for the position and consistency of the tissue being sampled. This is what makes the technique so much easier than the transthoracic needle aspirations we do in which the targets are deep in the lung and moving with respiration. Anchoring these superficial target metastases between the fingers and making multiple passes with a short, finely controlled needle minimizes indeterminate results. Additional specimens are easy to obtain.

Rapid preparation, sampling, fixation, Papanicolaou staining and interpretation of FNB specimens are crucial. A cytopathologist is the key member of the diagnostic team. He or she must be familiar with the clinical findings because the pathologist determines what an adequate specimen has been obtained and when special stains are necessary. Our pathologist is always present at the biopsy. We study the specimens together and immediately obtain more material if necessary. In our experience FNB correlates with cytologic findings on studies of sputum samples, bronchoscopy specimens and autopsy results.

The advantages of FNB biopsy—ease, speed, safety, economy—are brought into relief by comparison with open surgical biopsy which requires consultation, scheduling, anesthesia and a return visit for wound inspection and suture removal. Table 2 gives the cost

| Table 1—Fine Needle Aspiration of Metastases in Supraclavicular Lymph Nodes and Soft Tissues, 1985 to 1989 |
| Diagnosis | No. |
| Carcinoma of the lung | 55 |
| Lymphoma | 5 |
| Pancreatic carcinoma | 1 |
| Esophageal carcinoma | 1 |
| Breast cancer | 1 |
| Gastric carcinoma | 1 |
| Caseating granuloma* | 1 |

*Sputum smears and cultures were positive for *Mycobacterium tuberculosis*. Needle biopsy was done to exclude coincident cancer. None was found.

| Table 2—Cost Comparison for Advanced Lung Cancer Diagnostic Methods |
| Procedure | Cost |
| FN Biopsy* | $205 |
| Fluoroscopic transthoracic needle biopsy† | 1,085 |
| Computed tomography guided transthoracic needle biopsy† | 1,845 |
| Flexible fiberoptic bronchoscopy† | 1,500 |
| Surgical excisional biopsy (in operating room) | 760 |
| Pleural biopsy† | 290 |
| Sputum cytology | 90 |

*Additional $125 for immediate analysis.
†Includes post-procedure chest roentgenogram and other hospital changes directly related to the procedure.
for FNB in Phoenix, AZ, and shows that it is inexpensive compared with other procedures. Major savings are realized for individual patients who avoid hospitalization or have a reduced inpatient stay.

A price comparison at a private hospital indicated that if all the patients in Table 1 had had open surgical biopsy—the least expensive alternative diagnostic procedure—the additional physicians’ bills alone would have exceeded the cost of FNB by $27,950. This is a conservative estimate of the savings that can be realized: it assumes that open surgical biopsy would be scheduled and performed without morbidity in the brief time needed for FNB. If our patients had extended their hospital stay just one day for surgical consultation and scheduling in the operating room, the total costs for surgical biopsy would have been $60,450 more than for FNB. In reality, where FNB of metastases is not performed, many such patients have one or more costly procedures such as fiberoptic bronchoscopy or transthoracic needle aspiration.

Our initial success with FNB redirected our attention to the history and physical examination. We learned that 14 percent of our patients were diagnosed by this technique. Some patients fail to volunteer the location of subcutaneous nodules because they fear their significance. We now ask more specific questions and carefully seek enlarged, firm, supraclavicular and cervical lymph nodes. Only a minority are truly fixed to adjacent tissues. Enlarged axillary lymph nodes are common in those who work with their hands because they neglect cuts and abrasions. Lung cancer seldom involves axillary lymph nodes unless there is extensive ipsilateral chest wall invasion. We found no enlarged axillary lymph nodes suitable for FNB among our patients.

Patients with carcinoma of the lung and a positive FNB from a supraclavicular lymph node or other extrathoracic metastasis are immediately confirmed as having stage IIIIB or IV cancer. They then have no further need for expensive hospital diagnostic consultations and procedures. These 55 patients did not require bronchoscopy, transthoracic needle aspiration, open surgical biopsy, thoracentesis or pleural biopsy for diagnosis. Only two patients had bronchoscopy. Both had the procedure done early in our experience. The patient with positive pleural cytologic findings required palliative drainage of a large pleural effusion.

Rapid diagnosis by FNB makes it possible for the physician and patient immediately to begin realistic medical and social planning. It speeds palliative treatment for those in immediate need. The patients in stage IIIIB and IV have large tumor burdens and often need palliation. Fine needle biopsy sometimes is used to establish persistent or recurrent disease following therapy. The short median survival in this study—four weeks with non-small cell, 29 weeks with small cell lung cancer—emphasizes that these patients have more urgent need for a prompt cytologic diagnosis than patients with less advanced disease. Each day spent out of the hospital is one of their best remaining days.

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