Surgical Techniques in the Diagnosis of Lung Cancer

G. A. Patterson, M.D., F.C.C.P.

(Chest 1991; 100:523-26)

Long-term survival following resection of bronchogenic cancer is dependent on the completeness of resection, which is greatly influenced by the pathologic stage of disease. Therefore, surgical techniques for the diagnosis of lung cancer—mediastinoscopy, anterior mediastinotomy, and supraclavicular node biopsy—play a vital role in treatment planning.

MEDIASTINOSCOPY

Most patients with mediastinal nodal metastasis do not have disease amenable to complete resection. Our group has reported that patients who undergo resection following demonstration of N2 disease at mediastinoscopy have a survival rate of only 9%. Improved results can be obtained by excluding operative deaths and incomplete resections. Patients with N3 disease (contralateral mediastinal or supraclavicular nodal metastases) are not curable by surgical resection since complete resection of all disease is impossible. It is generally agreed that only selected patients with single-station N2 nodal disease have a reasonable chance to...

REGIONAL NODAL STATIONS FOR LUNG CANCER STAGING

![Diagram of Regional Nodal Stations for Lung Cancer Staging]

**Figure 1.** American Thoracic Society node map in routine use for staging bronchogenic cancer. Locations of node samples can be accurately determined.

Chest 100/2/AUGUST, 1991 523

Downloaded From: http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21631/ on 06/27/2017
Surgical mediastinal exploration can be conducted with low morbidity and negligible mortality. We have also shown mediastinoscopy to exceed computed tomography and magnetic resonance imaging in accuracy with respect to staging mediastinal nodes. The mediastinoscopist obtains histologic evidence of N2 disease—its extent as well as a good indication of whether it is resectable.

**Technique**

A small suprasternal notch incision and midline dissection exposes the pretracheal fascia (Fig 2). A finger is inserted, and the paratracheal anatomy is palpated (Fig 3). The mediastinoscopy provides adequate vision to dissect paratracheal, tracheobronchial angle, and subcarinal nodes (Fig 4). Biopsy specimens can be easily taken from each of these node groups (Fig 5).

Ginsberg et al have recently described extended “cervical mediastinoscopy” to gain access to subaortic and para-aortic nodes not accessible by cervical mediastinoscopy. Dissection is carried out through the same supraclavicular incision but extended between the left carotid and innominate arteries. The scope is inserted and passed lateral to the aorta, thus permitting adequate visualization of level 5 and 6 nodes for biopsy. Deslauriers et al had previously described mediastinopleuroscopy on the left to gain access to the subaortic and para-aortic nodes as well as to the apex of the left chest. In this dissection, the finger and subsequently the mediastinoscope are passed between the subclavian and left carotid arteries into the pleural space.

**Results**

We recently reviewed 1,000 consecutive cervical mediastinoscopies performed at the Toronto General Hospital. The morbidity rate was 2.3%, and there were no deaths. A total of 590 patients had negative mediastinoscopic findings and underwent thoracotomy. Only 52 patients were found to have N2 disease at thoracotomy, and most had N2 disease in locations inaccessible to mediastinoscopy (ie, paraesophageal, anterior mediastinal, and posterior subcarinal). Among these 590 patients, only 7% had unresectable tumors, whereas 14% of 52 patients selected for surgical resection despite a positive mediastinoscopic examination were found to have unresectable tumors at thoracotomy.

Ginsberg et al found extended cervical mediastinoscopy to be highly accurate in the assessment of subaortic nodal disease. Of 75 patients in whom extended cervical mediastinoscopy was negative, 8 were found to have N2 disease in the anterior mediastinum or subaortic space at thoracotomy. Each of these patients with false-negative examinations had a complete resection at thoracotomy. In only 1 of these 75 was a complete resection impossible due to local tumor invasion to the posterior portion of the aortic arch, an area not accessible by any standard form of mediastinal exploration.

**Anterior Mediastinotomy**

The left upper lobe has lymphatic drainage to the subaortic and preaortic nodes (locations 5 and 6) in addition to standard channels of spread for right-sided tumors (ie, locations 10, 7, 4, and 2). These location 5 and 6 nodes are inaccessible by standard cervical mediastinoscopy. Parasternal...
nal anterior mediastinoscopy was popularized by McNeill and Chamberlain as a means by which to gain access to this anatomic site. Anterior mediastinoscopy has been suggested as the invasive procedure of choice for preoperative staging of left upper lobe bronchogenic cancer.

Left upper lobe or left main bronchial lesions can occasionally metastasize to superior mediastinal nodes. We therefore always perform standard cervical mediastinoscopy in such patients. Anterior mediastinoscopy or extended cervical mediastinoscopy is performed if cervical mediastinoscopy is negative.

**Technique**

A transverse incision is made in the second left interspace just lateral to the sternal border. Intercostal muscles are divided just lateral to the mammary artery. It is not necessary to excise costal cartilage in the majority of patients. While the examination can be conducted without opening a pleura, I routinely intentionally open the pleura early in the procedure for two reasons. The pleura is often opened inadvertently, and a transpleural route provides much more familiar anatomic landmarks for biopsy and palpation purposes.

**Results**

As in cervical mediastinoscopy, the presence of N2 subaortic or pretracheal disease can be determined by biopsy. A judgment regarding the resectability of subaortic disease can be made by palpation, often with one finger in the cervical incision and one in the second interspace incision. We have previously reported a more favorable prognosis in patients who undergo resection in the presence of subaortic N2 disease as the highest station of mediastinal nodal metastasis. We therefore have an aggressive attitude toward resection of isolated subaortic nodal disease. We regard disease in preaortic or anterior mediastinal nodes as inoperable. Bowen et al have reported anterior mediastinotomy to be highly accurate in evaluation of left upper lobe lesions. However, the incidence of postoperative complications, including bleeding, damage to the internal mammary vessels, pneumothorax, and postoperative wound infections, is higher than that seen following standard cervical mediastinoscopy or extended cervical mediastinoscopy.

**Supraventricular Node Biopsy**

We employ open supraventricular node biopsy infrequently in the staging of bronchogenic carcinoma. The only circumstance when it is used routinely is in preoperative evaluation of Pancoast tumors where in our judgment a positive supraventricular node biopsy renders the tumor inoperable. Biopsy of palpable supraventricular nodes is easily performed by percutaneous aspiration with use of a 21-gauge needle. This almost invariably results in positive cytologic findings when the node is truly malignant. This technique has effectively eliminated open biopsy of palpable nodes in all patients with bronchogenic carcinoma.

**References**

6. Naruke T, Goya T, Tsuchiya R, Suemasu K. Prognosis and survival in resected lung carcinoma based on the new interna-
Surgical Techniques in Diagnosis of Lung Cancer (G. A. Patterson)

7 Mountain CF. A new international staging system for lung cancer. Chest 1986; 89(suppl):235S-33S