The Role of Staging Bronchoscopy in the Preoperative Assessment of a Solitary Pulmonary Nodule*

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In order to assess the role of a staging fiberoptic bronchoscopy in the preoperative assessment of an indeterminate solitary pulmonary nodule (SPN), we reviewed our experience in 33 SPNs identified among 1,269 bronchoscopies performed at the Albert Einstein Medical Center between 1985 and 1989. All lesions were less than 4 cm in greatest diameter and were not associated with symptoms of weight loss, chest pain, hemoptysis, localized wheezing, or hoarseness. A tissue diagnosis was established in 25 patients, 23 of whom had a malignant SPN. This study failed to detect a single case in which a fiberoptic bronchoscopic examination of the airway discovered a lesion that would preclude surgery and potentially curative resection. We recommend the abandonment of a staging bronchoscopy in the evaluation of a patient with an indeterminate SPN in whom history, physical examination, laboratory, and imaging studies fail to document contraindications to surgery. No additional useful information is derived and a substantial cost savings to the patient can be realized if the procedure is eliminated.

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megaly, subcutaneous masses, weight loss, and anorexia. Laboratory studies of liver function and bone chemistries are obtained to exclude carcinomatous involvement. If either the physical examination findings or laboratory assessment indicates abnormalities, then further imaging studies are ordered.

In our experience, a bronchoscopic examination is performed as part of the staging evaluation of an SPN for two reasons. First, the finding of proximal airway involvement with tumor may alter or preclude surgery. Second, a bronchoscopic inspection may detect mediastinal lymph node involvement by tumor with resultant airway compression that would require further evaluation before subjecting the patient to a potentially curative resection. The value of a staging bronchoscopic examination in the evaluation of an asymptomatic patient with SPN, however, has received little attention in the literature. For this reason, we sought to review our experience with airway inspection in patients with an SPN to (1) assess the frequency of detecting occult endobronchial disease and (2) the need for such a practice to continue in the staging of solitary nodules.

METHODS

The objective of this study was to assess the role of staging bronchoscopy in the preoperative assessment of the asymptomatic SPN. A lesion was considered an SPN if it measured 4 cm or less in greatest diameter on posteroanterior chest radiograph, was surrounded by normal lung tissue without evidence of pleural or mediastinal extension, and was not cavitary. No patients were immunocompromised and patients with weight loss, chest pain, hemoptysis, localized wheezing, or hoarseness were excluded from the study.

A retrospective study of 1,269 bronchoscopies performed at the...
Albert Einstein Medical Center between 1984 and 1989 identified 33 patients who satisfied the above criteria for an asymptomatic SPN. All patients with SPN were evaluated with computed tomographic studies of the lung and mediastinum. Screening laboratory studies, including complete blood cell count, urinalysis, pulmonary function tests, bone and liver chemistries were obtained. Additional radiographic or radionuclide studies were ordered based on history, physical findings, or abnormal laboratory results.

The 33 SPN patients were examined with a bronchoscope (Olympus B4) in the standard manner. Subjects were premedicated with atropine, meperidine, and hydroxyzine. The bronchoscope was introduced transnasally following the application of topical lidocaine anesthesia. Once the bronchoscope was introduced, the airways were inspected for endobronchial lesions or compression. If an abnormal area was detected, appropriate brushings and biopsy specimens were obtained and submitted for pathologic examination.

RESULTS

Thirty-three patients with an SPN were identified from a review of 1,269 bronchoscopies performed at our institution during 1984 to 1989. A tissue diagnosis was established in 25 patients, 23 of whom had the diagnosis made at thoracotomy. The remaining eight patients did not have a tissue diagnosis and were unavailable for follow-up. Their outcome is unknown.

All 25 patients were asymptomatic. Twenty-four were smokers. The group consisted of 11 men and 14 women with a mean age of 66 years (range, 45 to 86 years).

Twenty-three of the lesions were malignant and two were benign (Fig 1). Twenty-two of the malignant nodules were primary lung cancers and one was a metastatic melanoma. The primary bronchogenic cancers included 13 adenocarcinomas, 6 epidermoid (squamous cell) carcinomas, and 3 bronchoalveolar cell carcinomas. One hamartoma and one granuloma comprised the benign lesions.

We analyzed our data based on size as well as location of the solitary nodule. The size of the lesions is shown in Figure 2. The location of the nodule was arbitrarily defined as being in the inner, middle, or outer one third of the lung. The locations of the nodules are shown in Figure 3.

In no case did a bronchoscopic examination demonstrate endobronchial disease or compression in areas remote from the primary lesion that would have precluded surgical resection of the nodule.

DISCUSSION

The role of a staging bronchoscopic examination in the preoperative evaluation of an asymptomatic SPN suspected of being malignant has received little critical attention. Endobronchial lesions and mucosal irregularities have been reported in patients with an SPN, but it is not stated whether this finding altered the management decision to proceed with surgical resection. Similarly, it has been stated that a bronchoscopic examination may obviate the need for diagnostic
thoracotomy in approximately 10 percent of patients with an SPN. This figure, however, includes patients who underwent a transbronchial biopsy under fluoroscopic guidance for diagnostic purposes, and therefore is not a staging examination of the airways.

In our experience, a bronchoscopic staging procedure is routinely performed in the management of an indeterminate SPN suspected of being a carcinoma to exclude airway compression by unsuspected mediastinal lymph nodes or the presence of malignancy in airways proximal to the SPN that would preclude curative resection. To assess the validity of this approach, we reviewed our experience in 1,269 bronchoscopies over a five-year period. This retrospective review yielded 33 SPNs, 23 of which were malignant, with adenocarcinoma being the most common cell type. The lesions were all 4 cm or less in greatest diameter and were not associated with symptoms of weight loss, chest pain, hemoptysis, localized wheezing, or hoarseness. This study failed to document a single case in which an unsuspected lesion, either intrinsic or extrinsic, was identified by bronchoscopy that would have altered the decision to proceed with thoracotomy in patients who were considered operable based on clinical staging. Given our experience, we recommend the abandonment of staging bronchoscopies in patients with an asymptomatic indeterminate SPN in which the sole purpose is to exclude anatomic contraindications to surgery. When the history, physical examination, radiographic assessment, and laboratory evaluation fail to document contraindications to surgery, airway inspection was of no value. Furthermore, the cost and potential complications of the procedure do not justify a routine bronchoscopic staging examination. A conservative estimate of the cost of a bronchoscopy at our institution is $1,500, which includes laboratory, cytology, and pathology charges along with technical and professional fees.

The result of our investigation cannot be extrapolated to include the evaluation of SPNs suspected of being malignant in symptomatic patients. The decision to proceed with a staging bronchoscopic examination must be based on clinical findings such as hoarseness, hemoptysis, or localized wheezes that suggest the presence of mediastinal or endobronchial disease. We believe that these findings mandate an airway inspection prior to surgery.

The SPN is a common finding. It is estimated that 130,000 to 150,000 new nodules or masses are discovered annually in the United States. About 40 percent to 50 percent of all SPNs are malignant, and most of the malignant SPNs are bronchogenic in origin. Adenocarcinoma is the most common cell type followed by squamous cell (epidermoid) carcinoma and large-cell carcinoma. Small-cell carcinoma rarely presents as an SPN. Metastatic carcinoma to the lung present-
month observation period before surgery does not significantly affect life expectancy.19

It is difficult to define criteria to select patients for observation. Since the probability of an SPN being malignant is greater for larger nodules, observation in such cases would not be prudent, especially in smokers over the age of 35 years. Conversely, a small nodule in a nonsmoker under the age of 35 years is most likely benign and can be watched with serial chest radiographs. This approach is also indicated in patients with a high surgical risk. In addition, if a patient refuses a diagnostic evaluation or thoracotomy, observation may be the only available option provided the risk and benefit of such an approach are discussed with the patient.3,10,19 Geography can also be an important factor favoring observation, especially in endemic fungal areas. In such circumstances, serial serologic and chest radiographic studies may indicate the presence of a benign (granulomatous) process.

In summary, this study of 23 patients with a malignant asymptomatic SPN failed to document a single case in which intrinsic or extrinsic airway disease was detected by bronchoscopy that would have altered the decision to proceed with thoracotomy in patients considered to be operable candidates. Based on these results, we recommend abandoning routine staging bronchoscopies in patients with an indeterminate SPN since no useful additional information is obtained. However, in patients with an indeterminate SPN who present with symptoms suggesting extension of disease, a bronchoscopic examination is required to assess operability.

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CHEST / 104 / 1 / JULY, 1993 97