Utility of Fiberoptic Bronchoscopy in Patients with Hemoptysis and a Nonlocalizing Chest Roentgenogram*


The need for fiberoptic bronchoscopy in the patient with hemoptysis and a normal or nonlocalizing chest roentgenogram remains a subject of debate. Currently, diagnostic fiberoptic bronchoscopy is recommended as the investigative procedure of choice. To develop predictors that identify the patient in whom fiberoptic bronchoscopy is most likely to be diagnostic, we reviewed our community's experience with this population over a five-year period. We identified 196 patients with hemoptysis and a normal or nonlocalizing chest roentgenogram who underwent fiberoptic bronchoscopy. Three quarters were active or previous smokers. We examined the relationship of advancing age, sex, smoking, nonspecific roentgenographic findings and the amount, duration, and previous bouts of hemoptysis to the incidence of a diagnostic fiberoptic bronchoscopy. Twelve patients (6 percent) had bronchogenic carcinoma and 33 (17 percent) another specific cause for the hemoptysis identified by fiberoptic bronchoscopy. By univariate and discriminant analyses, we found that the three factors of age of 50 years or more, male sex, and smoking of 40 pack-years or more best predicted a diagnosis of malignancy. Bleeding in excess of 30 ml daily was associated with an increase in overall diagnostic yield. The presence of two of the three factors associated with malignancy or bleeding in excess of 30 ml daily (or both) identified 100 percent of the patients with bronchogenic carcinoma and 52 percent of all of the diagnostic fiberoptic bronchoscopic procedures. Use of these criteria in selecting the patient for fiberoptic bronchoscopy could have reduced our use of the bronchoscope by 25 percent, with the remaining patients safely observed.

Hemoptysis has been frequently cited as an indication for endoscopic examination of the tracheobronchial tree, both to exclude carcinoma and to localize the site of bleeding in the event surgery is necessary. With the development of the fiberoptic bronchoscope, endoscopic examination became simple and well accepted by patients. The instrument provides visualization of the tracheobronchial tree not previously possible. The improvement in technology has also been accompanied by an increase in its use; however, the necessity for routine fiberoptic bronchoscopy in hemoptysis continues to be a subject of debate.

Which patients should undergo fiberoptic bronchoscopy? To develop predictors that might help to identify the patient with hemoptysis who needs to have fiberoptic bronchoscopy, we reviewed our community's experience with this population over a five-year period. We used univariate and multivariate statistical analyses to find which clinical predictors were best to diagnose primary malignant neoplasms, to identify specific diagnoses other than bronchitis, and to localize the active bleeding site.

Materials and Methods

The records of all patients (outpatient and hospitalized) referred to the pulmonary units at five hospitals in Rochester, NY, because of hemoptysis during the five-year period ending December 1985 were reviewed. The five hospitals have a total of 2,257 beds or 93 percent of all hospital beds serving a population of approximately 1.5 million people. These hospitals function both as community hospitals and referral centers for the surrounding region.

Patients were eligible for study if their chest roentgenogram was normal or had nonlocalizing changes with only nonspecific findings and fiberoptic bronchoscopy had been performed. Any patient with a chest roentgenogram suggesting neoplasm or pneumonia was excluded from the study. The nonspecific roentgenographic features of increased bronchovascular markings, peribronchial thickening, hyperinflation, or other changes without a localized distribution and consistent with chronic obstructive pulmonary disease were considered "normal." Chest roentgenograms showing changes of a previous granulomatous infection (ie, calcified densities or minimal upper lobe fibrosis), questionable parenchymal or pleural disease unchanged in comparison with previous films or minimal plate-like atelectasis were classified as abnormal but nonlocalizing insofar as providing an explanation for the hemoptysis. Pulmonary nodules and masses, atelectasis or hilar changes suggesting malignancy and acute parenchymal infiltrates with or without pleural effusion suggesting pneumonia excluded the patient from the study. No patient was included in the study with abnormal or suspicious cytologic findings for sputum.
We postulated that eight clinical features might be associated with a diagnosis of primary lung malignancy. These were (1) age, (2) male sex, (3) active smoking, (4) a long smoking history, (5) large amounts of bleeding, (6) hemoptysis persisting longer than one week, (7) a previous uninvestigated episode of bleeding 30 or more days earlier, and (8) an abnormal chest roentgenogram showing nonlocalizing features. We found this information readily available and easy to abstract from the patients' medical records.

For the purpose of this study, we defined active smokers as those who smoked at least ten cigarettes daily within 30 days of presentation. Smokers, including those having quit, were also compared on the basis of having smoked for 40 or more pack-years vs having smoked less. Hemoptysis was classified as mild if only streaking of sputum or less than two tablespoons (30 ml) per day was noted. Moderate hemoptysis was defined as between 30 and 200 ml/day. Severe hemoptysis was bleeding in excess of 200 ml within 24 hours. Patients with massive bleeding defined as 600 ml or more within 48 hours were not included in this study. The duration of hemoptysis was classified as either occurring for up to a week or persisting even intermittently for a longer time; however, a prior but distinct bout of hemoptysis occurring at least 30 days earlier without intervening bleeding was termed a previous episode. Chest roentgenograms were classified according to whether an active bleeding lesion or localization to a specific pulmonary segment was classified as either occurring for up to a week or persisting even intermittently for a longer time; however, a prior but distinct bout of hemoptysis occurring at least 30 days earlier without intervening bleeding was termed a previous episode. Chest roentgenograms were classified according to the radiologist's report. Questionable findings were reviewed with a radiologist before classification into an appropriate group. Bronchoscopic reports were reviewed for diagnosis or localization (or both) of the bleeding site. Positive identification of the bleeding site required endoscopic observation of an active bleeding lesion or localization to a specific pulmonary segment. Follow-up information was pursued for all patients with a nondiagnostic fiberoptic bronchoscopy, a diagnosis of bronchitis, or if the site of bleeding was in question. This required contact with the patient or the attending physician (or both) and review of subsequent office or hospital records.

An association between each of the eight clinical features and (1) a diagnosis of primary malignancy, (2) a specific diagnosis other than bronchitis, and (3) localization of the bleeding site was determined using both univariate and multivariate analyses. Univariate analyses were performed by the $x^2$ test for qualitative data. Analysis of variance was employed for the quantitative variable of age. Multivariate analyses were made by the stepwise linear discriminant analysis method. A p value greater than 0.05 was considered to be not significant.

### RESULTS

Three hundred and ninety-two patients presenting with hemoptysis underwent fiberoptic bronchoscopy during the five-year period. Of these, 196 (50 percent) had a normal or nonlocalizing chest roentgenogram. There were 82 women and 114 men. The age range was 15 to 95 years (average age, 57 years). Fiberoptic bronchoscopy was accomplished within seven days of referral. Evaluation of the ears, nose, and throat was not routinely performed to eliminate the upper airway as the source of bleeding. As the transnasal approach is employed for the majority of bronchoscopic procedures performed in this community, the posterior nares and nasal pharynx were examined as part of the bronchoscopic procedure. No patient had had a previous evaluation for hemoptysis; however, four had undergone a lobectomy years earlier. All had been asymptomatic until they developed hemoptysis. In three of the four, the resection had demonstrated inflammatory disease consistent with bronchiectasis. Fiberoptic bronchoscopy demonstrated recurrent bronchiectasis in one of the three. The fourth patient had had a resection of an adenocarcinoma four years previously but was clinically free of disease at the time of presentation. Four patients were receiving an anticoagulant drug (crystalline warfarin sodium) at the time of hemoptysis. It may have contributed to the bleeding in three, on the basis of a prolongation of the prothrombin time.

Bronchogenic carcinoma was diagnosed by fiberoptic bronchoscopy in 12 (6 percent) of the 196 patients. Four carcinomas were squamous cell type, three adenocarcinoma, two large-cell anaplastic carcinoma, and three of unspecified cell type. Table 1 lists the eight clinical features studied, the number of patients with each, and the number and percentage found to have primary lung cancer by fiberoptic bronchoscopy. Both univariate and multivariate analyses identified three clinical findings associated with a diagnosis of bronchogenic carcinoma. In decreasing order of significance, age, 40 or more pack-years of smoking, and male sex best predicted a diagnosis of bronchogenic carcinoma ($r = 0.92$; $x^2 = 15.1$; $p = <0.10$). All 12 patients with bronchogenic carcinoma were 50 years of age or older, and 11 were men with 40 or more pack-years of smoking. Bronchogenic carcinoma was not discovered in any of the 51 patients who never smoked. Neither moderate nor severe bleeding, hemoptysis persisting for more than a week, or a previous episode identified the patient with carcinoma. Nonlocalizing features on the chest roentgenogram also had no predictive value.

One hundred and forty-five (74 percent) of the 196 patients were active or previous smokers. We found approximately equal percentages of men and women

### Table 1—Clinical Features Associated with Fiberoptic Bronchoscopic Diagnosis of Bronchogenic Carcinoma*

<table>
<thead>
<tr>
<th>Feature</th>
<th>No. of Patients (N = 196)</th>
<th>No. with Carcinoma (N = 12)</th>
<th>p Value‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥50 yr</td>
<td>142 (72)</td>
<td>12 (100)</td>
<td>&lt;0.01‡</td>
</tr>
<tr>
<td>Male sex</td>
<td>114 (58)</td>
<td>11 (92)</td>
<td>&lt;0.02</td>
</tr>
<tr>
<td>Active smoking</td>
<td>90 (46)</td>
<td>6 (50)</td>
<td>NS</td>
</tr>
<tr>
<td>Smoking ≥40 pack-years</td>
<td>87 (44)</td>
<td>11 (92)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Quantity of bleeding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;30 ml</td>
<td>128 (65)</td>
<td>8 (67)</td>
<td>NS</td>
</tr>
<tr>
<td>≥30-200 ml</td>
<td>49 (25)</td>
<td>2 (17)</td>
<td>NS</td>
</tr>
<tr>
<td>&gt;200 ml</td>
<td>19 (10)</td>
<td>2 (17)</td>
<td>NS</td>
</tr>
<tr>
<td>Duration ≥1 week</td>
<td>115 (59)</td>
<td>6 (50)</td>
<td>NS</td>
</tr>
<tr>
<td>Previous episode</td>
<td>22 (11)</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Nonspecific roentgenogram</td>
<td>78 (40)</td>
<td>5 (42)</td>
<td>NS</td>
</tr>
</tbody>
</table>

*Table data are numbers of patients; numbers within parentheses are percentages.

‡$x^2$ test unless otherwise specified. NS, Not significant.

‡Analysis of variance.
Table 2—Clinical Features vs Bronchoscopic Diagnosis of Malignancy in 196 Patients

<table>
<thead>
<tr>
<th>Data</th>
<th>No. of Clinical Features*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Bronchoscopic diagnosis of malignancy</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10</td>
</tr>
<tr>
<td>No</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
</tr>
</tbody>
</table>

*Three clinical features are (1) age ≥50 yr, (2) ≥40 pack-years of smoking, and (3) male sex.

were active smokers (48 vs 43 percent); however, men were significantly more likely than women to have smoked in excess of 40 pack-years (p<0.05 by the χ² test). This suggests a relationship between the variables of sex and heavy smoking.

Using the three predictors of malignancy (age, 40 or more pack-years of smoking, and male sex) and designating each as a yes/no situation, we created a matrix to further analyze our use of fiberoptic bronchoscopy in this population. In Table 2, the diagnosis of malignancy with various combinations of the three clinical features is shown; for example, ten (18 percent) of the 57 patients who were 50 years of age or older, male, and smoked in excess of 40 pack-years had carcinoma, whereas no patient with carcinoma had only one or none of the three clinical characteristics. Inspection of Table 2 also shows that all of the cases of bronchogenic carcinoma would have been diagnosed had fiberoptic bronchoscopy been limited to the 110 patients with two of the three features, ie, all men aged 50 years or over, all men smoking in excess of 40 pack-years, or women aged 50 years or over who were heavy smokers.

Fiberoptic bronchoscopy established a specific cause for the bleeding other than bronchogenic carcinoma in an additional 33 patients, as shown in the following tabulation:

- Bronchitis: 86
- No diagnosis: 65
- Bronchogenic carcinoma: 12
- Bronchiectasis (observed bronchiectasia): 7
- Upper airway source (nasopharynx): 4
- Bronchial adenoma: 3
- Fibromuscular polyp: 3
- Mycobacterium tuberculosis (culture): 3
- Aspergillosis: 2
- Granulation tissue: 2
- Trauma: 2
- Histoplasmosis (culture): 1
- Hemangion: 1
- Hereditary telangiectasia: 1
- Tracheoesophageal fistula: 1
- Tracheal ulcer: 1
- Broncholith: 1
- Metastatic carcinoma (kidney): 1
- TOTAL: 196

The diagnostic yield of fiberoptic bronchoscopy excluding bronchitis was 23 percent. The hemoptysis was attributed to bronchitis in 86 patients, and no diagnosis was made in the remaining 65. We sought to determine if any clinical features could predict a diagnosis other than bronchitis by fiberoptic bronchoscopy. Smoking was not included, as we do not regard it to be a risk factor for other than bronchitis and primary carcinoma. We assessed the influence of age of 50 years or more, sex, bleeding in excess of 30 ml daily, hemoptysis persisting longer than a week, a previous episode, and nonlocalizing roentgenographic findings upon the likelihood of a diagnostic procedure. The quantity of bleeding was the only significant variable by the χ² test (p<0.05). Twenty (44 percent) of 45 patients diagnosed by fiberoptic bronchoscopy had hemoptysis in excess of 30 ml; however, the observation lacked specificity, as 48 patients without a diagnosis had similar amounts of bleeding.

A third indication for fiberoptic bronchoscopy in the patient with hemoptysis is to localize the source of bleeding. We identified an active bleeding site in 67 (34 percent) of the 196 patients. Twenty-six of the 67 were patients in whom a specific diagnosis was made by fiberoptic bronchoscopy. In the remaining 41, bleeding was localized to a specific lobe or segment without apparent cause. We also studied the relationship between the ability to localize bleeding by fiberoptic bronchoscopy and the quantity of hemoptysis, bleeding persisting more than a week, a previous episode, and an abnormal although nonlocalizing roentgenogram. As with diagnosis, bleeding in excess of 30 ml was the only significant variable by the χ² test (p<0.05).

The bleeding site was identified in 37 (54 percent) of 68 patients with hemoptysis in excess of 30 ml daily and in 14 (74 percent) of 19 patients when the bleeding exceeded 200 ml. In 19 of the 45 patients in whom a diagnosis other than bronchitis was established by fiberoptic bronchoscopy, active bleeding was not visualized at endoscopy; however, the abnormality observed was believed responsible for the bleeding beyond reasonable doubt in all patients and confirmed in follow-up. Conversely, fiberoptic bronchoscopy did not visualize the tumor nor localize bleeding in four of the 12 patients with bronchogenic carcinoma. In the four patients the diagnosis was established by cyto logical examination of randomly collected brushings or washings (or both). Bleeding was localized to a specific pulmonary segment in two patients with a nondiagnostic fiberoptic bronchoscopy who were found to have carcinoma in follow-up. In one, the tumor appeared in the opposite lung.

Fifteen of the 151 patients in whom either bronchitis or no specific cause of hemoptysis was identified by fiberoptic bronchoscopy died or were lost to follow-up. Of the remaining 136 patients, 59 were followed for more than 24 months, 44 for 12 to 24 months, and 33 for one year. Only the two patients with a nondiagnostic fiberoptic bronchoscopy (referred to previously) devel-
oped an alternative diagnosis in the follow-up period. One was diagnosed as having bronchitis, and the other was without apparent endoscopic abnormality on the initial fiberoptic bronchoscopy. The former was a 59-year-old ex-smoker of less than 40 pack-years who developed an abnormal chest roentgenogram and rib pain six weeks following a normal fiberoptic bronchoscopy. Carcinoma was diagnosed by rib biopsy. The latter was an 81-year-old female ex-smoker of more than 40 pack-years with a chronic right middle lobe infiltrate. Hemoptysis did not recur, but a tumor was found in the lingula upon repeat fiberoptic bronchoscopy 13 months later. At that time, new roentgenographic findings had become apparent. The relationship between the episode of hemoptysis and the eventual diagnosis of neoplasm in the latter case is unclear.

Our data suggest that the diagnostic yield of fiberoptic bronchoscopy is improved if the observation of hemoptysis in excess of 30 ml/day is included with the factors associated with bronchogenic carcinoma. Table 3 outlines the association between an endoscopic diagnosis other than bronchitis in patients with hemoptysis in excess of 30 ml daily or manifesting any two of the three factors associated with carcinoma (or both). Thirty-seven of the 45 diagnostic fiberoptic bronchoscopic procedures were identified by these criteria. By employing these observations to screen patients for fiberoptic bronchoscopy, it is shown to be highly sensitive (82 percent), with a negative predictive value of 85 percent. Even with this screening, the procedure lacks specificity, with a true negative ratio of 30 percent and a low positive predictive value (26 percent). The screening process would have missed eight patients with an identifiable lesion. These patients had bronchiectasis (two), and upper airway source (two), M tuberculosis by bronchial washings (two), broncholithiasis (one), and aspergillosis (one). Review of the medical record in six of the eight identified weight loss, cough, anemia, and persistent wheezing as additional indications for fiberoptic bronchoscopy.

**Discussion**

Prior to the development of the fiberoptic instrument, it was recommended that bronchoscopy be performed in a timely fashion in the patient with hemoptysis and an abnormal chest roentgenogram, a history of chest disease, or an acute illness that required such investigation. Early experience with fiberoptic bronchoscopy showed that bronchogenic carcinoma was responsible for the bleeding in 22 to 33 percent of the patients presenting with hemoptysis.6,8 The majority of the patients had an abnormal chest roentgenogram. A subsequent study by Weaver et al7 found a definitely abnormal chest roentgenogram in 26 of 28 patients with hemoptysis due to bronchogenic carcinoma and a questionably abnormal film in the remaining two. Other studies have suggested that 10 to 13 percent of the patients with hemoptysis associated with bronchogenic carcinoma may have a normal chest x-ray film.8,9 Richardson et al9 states that hemoptysis, even in the patient with a normal chest roentgenogram, is a strong indication for fiberoptic bronchoscopy.

Recent studies have challenged the role of fiberoptic bronchoscopy in the patient with hemoptysis and a normal or nonlocalizing chest roentgenogram.10,11 They suggest that the low probability of carcinoma and the rarity of a diagnosis other than bronchitis in these patients makes observation a better choice. Heimer et al10 found no case of malignant neoplasm, but 20 of the 45 patients were nonsmokers. Jackson et al11 discovered two cases of bronchogenic carcinoma (4 percent) among 48 patients with normal chest roentgenograms.

We found that 12 (6 percent) of 196 patients with hemoptysis and a normal or nonlocalizing chest roentgenogram undergoing fiberoptic bronchoscopy in the setting of a community hospital had an occult bronchogenic carcinoma. This incidence is similar to the 4 percent and 10 percent reported in previous studies.9,11 By follow-up, we confirm a high sensitivity and negative predictive value for fiberoptic bronchoscopy in this setting.12 Only two of the 136 patients with a nondiagnostic fiberoptic bronchoscopy or a diagnosis of bronchitis for whom follow-up information was available were found to subsequently have bronchogenic carcinoma.

Our data suggest that the number of fiberoptic bronchoscopic procedures performed to exclude primary carcinoma could be safely reduced by employing the factors of age of 50 years or more, male sex, and a smoking history of 40 or more pack-years in the selecting patients. Conversely, we have shown that patients in a community hospital with none or only one

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**Table 3—Operating Characteristics of Bronchoscopy in Patients with Hemoptysis and Normal or Nonlocalizing Chest Roentgenogram**

<table>
<thead>
<tr>
<th>Bronchoscopic Result</th>
<th>Diagnostic (N = 45)</th>
<th>Nondiagnostic (N = 151)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical features†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>37</td>
<td>105</td>
</tr>
<tr>
<td>Absent</td>
<td>8</td>
<td>46</td>
</tr>
<tr>
<td>Sensitivity, percent</td>
<td>82 (37/45)</td>
<td>. . .</td>
</tr>
<tr>
<td>Specificity, percent</td>
<td>. . .</td>
<td>30 (46/151)</td>
</tr>
</tbody>
</table>

*Values are for 196 bronchoscopic examinations. Positive predictive value equals 37 divided by 142, or 26 percent. Negative predictive value equals 46 divided by 54, or 85 percent.
†Hemoptysis greater than 30 ml daily or two of three risk factors for carcinoma (age $\geq$50 yr, male sex, or $\geq$40 pack-years of smoking), or both.
of the three factors can be safely followed, recognizing that the risk of carcinoma is low. While none of our patients with hemoptysis due to carcinoma was less than 50 years of age, we would not disagree with the use of an age factor of 40 years old or more, as bronchogenic carcinoma can be seen in this age group.\textsuperscript{7,9}

Other investigators have also identified age and smoking history as factors associated with a diagnosis of bronchogenic carcinoma in the patient with hemoptysis. Weaver et al\textsuperscript{7} in a series of 70 such patients selected for fiberoptic bronchoscopy, observed that all 25 patients found to have pulmonary neoplasms were over the age of 40 years, and 88 percent had a smoking history of greater than 40 pack-years. Gong and Salvatierra\textsuperscript{9} found 31 patients with bronchogenic carcinoma by performing fiberoptic bronchoscopy on 129 consecutive patients with hemoptysis. All 31 were over the age of 40 years. Forty-five percent (14) had a smoking history of at least 40 pack-years. The presence of both factors was statistically significant when compared to patients without a diagnosis of neoplasm. The two patients discovered by Jackson et al\textsuperscript{10} were men over the age of 60 years with a smoking history in excess of 40 pack-years. All three of the previous studies cite hemoptysis lasting in excess of one week as an additional factor predicting carcinoma. Although it is reasonable to assume that hemoptysis associated with cancer would either persist or recur, we found it to be the case in only half of the patients with bronchogenic carcinoma. This observation is probably a function of the timing of the fiberoptic bronchoscopy in our patients. The incidence might have been more had not all undergone fiberoptic bronchoscopy within a week of presentation to a pulmonary physician.

We believe that the function of fiberoptic bronchoscopy in the patient with hemoptysis is more than to diagnose malignancy. The causes of hemoptysis are numerous, and many can be diagnosed by fiberoptic bronchoscopy. Had bronchoscopy been performed only in the patients at risk for carcinoma by virtue of age, sex, and smoking history, we would have performed 86 fewer procedures (Table 2). Conversely, we would have missed 18 of the 33 specific diagnoses other than lung cancer in the very same population.

The diagnostic yield of fiberoptic bronchoscopy in any population depends upon the endoscopist's indication to perform the procedure. We describe a community's experience with 13 pulmonologists. One hundred and eighty-two of the 196 patients in this series had one or more of six clinical characteristics, excluding sex and age, previously identified in patients at risk for cancer.\textsuperscript{7,9,11} Presumably, these factors were considered in selecting the patients for the procedure. Our study suggests that had the selection of patients been based upon hemoptysis in excess of 30 ml or two of the three criteria (age of 50 years or more, male sex, and 40 or more pack-years of smoking), we could have reduced the number of nondiagnostic fiberoptic bronchoscopic procedures that characterized this population.

Even using identifying criteria, a large number of nondiagnostic procedures still occur. The specificity of fiberoptic bronchoscopy using two of three risk factors associated with carcinoma and hemoptysis in excess of 30 ml daily is only 30 percent. If hemoptysis persisting for more than a week is included, the sensitivity becomes 11 percent. Hence, even using the identified features, it is not always possible to predict a diagnostic fiberoptic bronchoscopy. Despite this, we believe that the predictors of age of 50 years or more, male sex, smoking of 40 or more pack-years, and hemoptysis of 30 ml/day or more have merit. Fifty-four (28 percent) of the 196 patients could have been observed. Eight patients with the potential of a diagnosis by fiberoptic bronchoscopy would have been included in those observed; however, other factors existed indicating a need for fiberoptic bronchoscopy in six of the eight, and the remaining two had self-limited disease.

We found that an increased volume of bleeding favored localization of the bleeding site by fiberoptic bronchoscopy; however, in only two of the 41 patients in whom fiberoptic bronchoscopy localized the bleeding to a lobe or segment without diagnosis was an alternative diagnosis discovered at a later date. Four underwent repeat fiberoptic bronchoscopy for a recurrent bleeding episode with similar nondiagnostic result. We question whether localization of bleeding is a valid justification for fiberoptic bronchoscopy unless the quantity of hemoptysis is such that surgical resection is a potential consideration. None of the 196 patients in this series required surgery.

We conclude that a man 50 years old or older or a male patient smoking in excess of 40 pack-years or a person of either sex 50 years or older and smoking in excess of 40 pack-years presenting with hemoptysis and a normal or nonlocalized finding on the chest roentgenogram should undergo fiberoptic bronchoscopy to exclude possible malignancy. Furthermore, such bronchoscopy will have an enhanced diagnostic yield in patients regardless of age, sex, or smoking habits who present under similar circumstances with hemoptysis estimated in excess of 30 ml daily. Patients without these clinical features can be safely followed if no other indications for the procedure are present.

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Postgraduate Course:

HYPERTENSION 1988: PRACTICAL ASPECTS FOR THE PRACTICING PHYSICIAN

Dates: February 11-13, 1988
Location: Sundial Beach and Tennis Resort
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