Fiberoptic Bronchoscopy without Premedication*  
A Retrospective Study  
Henri G. Colt, M.D.; and James F. Morris, M.D., F.C.C.P.

The objective of this study was to determine if flexible FOB could be performed safely without premedication other than topical anesthesia. A total of 281 procedures performed during a 12-month period at a VA medical center were reviewed. Ninety-one procedures performed without premedication were compared with 190 procedures performed with premedication. Complications occurred in 5 percent of patients in each group. Statistical analysis revealed no significant differences in age, spirometry, F(Al-a)O2, or SaO2 between both groups. Despite the proven safety of outpatient FOB without sedation, many bronchoscopists administer complicated premedication regimens and employ ambulatory surgery beds or recovery rooms to monitor patients before and after procedures. These results support a simplified approach to routine FOB which would include no medications and greater use of outpatient facilities resulting in decreased expenditures without compromising patient care, safety or comfort.  

(Chest 1990; 98:1327-30)

Since its introduction in 1968, FOB has become an indispensable tool for the diagnosis of and therapy for pulmonary disease. Recent emphasis on cost containment has prompted investigators to examine closely the indications and performance of bronchoscopic procedures.1-4 Performance of outpatient FOB has resulted in facilitation of health care delivery and lower costs.5-8 Premedication is not essential to comfort and safety,7,9 yet some combination of analgesics, atropine and sedatives, usually is employed by most bronchoscopists. Because up to 50 percent of life-threatening complications of FOB have been related to the sedative regimen used,10,11 patients often are monitored for several hours before and after the procedure. The routine use of hospital recovery rooms or ambulatory surgery beds for this purpose increases overall cost.

The purpose of this study is to evaluate the safety of FOB without a complicated premedication regimen. Results suggest that both premedication and prolonged postprocedural monitoring are unnecessary and promote increased cost of FOB.

Materials and Methods

All diagnostic FOB performed by pulmonary fellows and staff members at the Portland VA Medical Center during a 12-month period between December 1988 and November 1989 were reviewed. Laser procedures or FOB brachytherapy were not included because these currently are not performed at this institution. Patient data recorded were age, indication for FOB, procedures performed (endobronchial biopsy, transbronchial biopsy, broncho-alveolar lavage, needle aspiration) and related complications. Major complications were defined as those which severely compromise patient safety and include pneumothorax, angina, myocardial infarction, bleeding of more than 200 ml or patient instability requiring hospitalization or prolonged monitoring. The log book of procedure-related complications and records of all patients were reviewed. There were two patient categories: Group 1 includes all FOB procedures performed without premedication. Group 2 includes procedures performed with premedication. The FOB of intubated patients was excluded from the study. Premedication was based on physician preferences and consisted of regimens of either intramuscularly administered codeine and atropine; meperidine hydrochloride, hydroxyzine pamoate and atropine; or intramuscularly administered atropine and intravenously administered diazepam. A flexible fiberoptic bronchoscope (Olympus BF P10) was used. Usually, no particular instructions were given regarding food ingestion prior to the procedure. The suite is equipped with a source for air, oxygen and suction and contains resuscitation equipment and medications. Patients were seated in an adjustable dental chair. Oxygen saturation and pulse were monitored with an oximeter (Ohmeda Biox 3700). Electrocardiographic monitoring was not performed but was available. Supplemental oxygen was administered by nasal cannula only if oximetry revealed a SaO2 value less than 88 percent prior to or during FOB. Lidocaine (4 percent) was administered by compressed air-powered atomizer prior to nasal insertion of the lubricated fiberoptic bronchoscope. Topical application of lidocaine (2 percent) to the vocal cords and tracheobronchial tree was limited to 300 mg. After FOB, patients were observed for approximately 10 to 15 min in the bronchoscopy suite. During this time, results of the procedure were discussed and arrangements were made for follow up appointments. Outpatients were instructed to call in case of fever, chills, dyspnea or excessive hemoptysis.

Student's t test was used to test for differences in age, pulmonary function data, F(Al-a)O2, and SaO2 between groups. Differences were considered statistically significant at p<.05.

Results

During the study period, 304 diagnostic FOB procedures were performed. Twenty-three FOB procedures done on intubated inpatients were excluded. A
total of 281 FOB procedures were reviewed. The mean age of patients was 63.2 years (range, 31 to 91 years), and all were male. Group 1 consists of 91 consecutive FOB procedures performed without premedication. Group 2 includes 190 FOB procedures performed with premedication.

Demographic, spirometric (PFT) and ABG level data are available in the majority of patients in each group as follows: group 1, 71 and 60 percent; group 2, 69 and 58 percent. There were no statistically significant differences between any of the recorded variables in each group. The indications and procedures of FOB are listed in Tables 2 and 3. Transbronchial biopsy was performed in only 12 patients (4.2 percent), and no TBBs were obtained in nonpremedicated patients.

Complications are listed in Table 4. An overall complication rate of 5 percent was found in both groups. All occurred during the procedure, and only one was major. This complication occurred when biopsies of a mainstem and tracheal lesion in a nonpremedicated patient with severe underlying coronary artery disease resulted in hemorrhage, hypoxemia and angina. These were controlled with endobronchial tamponade, nasal oxygen and nitroglycerin administration in the bronchoscopy suite. Cardiac enzymes were not elevated and no new electrocardiographic abnormalities occurred during prolonged monitoring. Vagal-induced hypotension occurred in one nonpremedicated patient but resolved rapidly with removal of the bronchoscope and placement of the patient in the Trendelenberg position. There were no deaths, occurrences of pneumothorax, myocardial infarctions, or episodes of aspiration, acute laryngospasm or bronchospasm. Complications of lidocaine toxicity were not encountered.

**DISCUSSION**

Standard practice of bronchoscopy in the United States usually includes parenteral administration of premedication and use of day surgery or recovery rooms for patient observation. Because no single medication provides amnesia, anxiolysis and analgesia, premedication regimens often include atropine, a sedative or analgesic, and often, intravenous administration of a benzodiazepine such as diazepam or midazolam as needed. Many current recommendations stem from studies performed in the 1970s, yet the antitussive effects of opioids, the cardioprotective effects of low-dose atropine, and the increased cooperation of patients following benzodiazepine administration remain unproved.12

**Table 2—Indications for Fiberoptic Bronchoscopy in 281 Patients**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infiltrates</td>
<td>18 (20)</td>
<td>51 (27)</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>18 (20)</td>
<td>14 (7)</td>
</tr>
<tr>
<td>Mass lesion</td>
<td>23 (25)</td>
<td>47 (25)</td>
</tr>
<tr>
<td>Hilar abnormality</td>
<td>8 (9)</td>
<td>24 (13)</td>
</tr>
<tr>
<td>Peripheral nodule</td>
<td>10 (11)</td>
<td>27 (14)</td>
</tr>
<tr>
<td>Other†</td>
<td>14 (15)</td>
<td>27 (14)</td>
</tr>
</tbody>
</table>

*Numbers in parentheses represent percentages.
†Other = cavitary lesion, effusion, cough, atelectasis.

**Table 3—Procedures Performed during Fiberoptic Bronchoscopy**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endobronchial biopsy</td>
<td>48 (53)</td>
<td>89 (47)</td>
</tr>
<tr>
<td>TBB</td>
<td>0 (0)</td>
<td>12 (6)</td>
</tr>
<tr>
<td>Transbronchial needle aspirate</td>
<td>6 (7)</td>
<td>10 (6)</td>
</tr>
<tr>
<td>Bronchoalveolar lavage</td>
<td>29 (32)</td>
<td>55 (29)</td>
</tr>
</tbody>
</table>

*Numbers in parentheses represent percentages.

**Table 4—Complications during Fiberoptic Bronchoscopy**

<table>
<thead>
<tr>
<th>Complication</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoxemia</td>
<td>3*</td>
<td>3</td>
</tr>
<tr>
<td>Anxiety reaction</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Vagal-induced hypotension</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>1*</td>
<td>3</td>
</tr>
<tr>
<td>Excessive cough</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Angina</td>
<td>1*</td>
<td></td>
</tr>
<tr>
<td>Total (%)</td>
<td>5 (5%)</td>
<td>9 (5%)</td>
</tr>
</tbody>
</table>

*Complications (hypoxemia, hemorrhage, angina) occurred in same patient and required prolonged monitoring.
In this study of 281 male veterans who underwent diagnostic FOB, complication rates were similar regardless of whether or not patients were premedicated. We were unable to identify any relationships between type of complication, procedure performed and indication for FOB. Because no TBBs were performed in nonpremedicated patients, we cannot comment on the safety of this procedure, but the cost, safety and ease with which TBB can be performed has been the subject of several studies. It is noteworthy that 47 of the 91 nonpremedicated patients had FOB performed as outpatients. Further analysis of this subgroup of patients revealed three (6 percent) minor complications. Spirometry and ABG value data were available in 77 and 64 percent of these 47 patients. All patient populations were similar with regard to oxygenation and ventilatory function (Table 1). These results further substantiate that routine FOB usually may be performed in both nonpremedicated individuals and in an ambulatory setting without compromising patient care or comfort.

The retrospective nature of this study has limitations. In addition, the population (all male veterans) and sample size may set the validity of our conclusions. Statistical similarities between premedicated and nonpremedicated groups are based on mean values for age, ventilatory function and arterial blood gas value data which were not available in all patients. Test results and percentages of patients in each group in whom these tests were performed, however, were similar and, we believe, representative of the respective populations. The relatively larger number (190) of diagnostic FOB performed with premedication and the absence of TBB in nonpremedicated patients certainly constitute selection bias caused by an initial tendency in favor of premedication by most participating bronchoscopists. Interestingly, since completion of this study, the pulmonary staff and fellows at this institution are performing most diagnostic FOB without premedication and, when possible, in an ambulatory setting.

Previous studies of outpatient FOB have shown complications requiring hospitalization in 0.14,13 0.5818 and 0.31 percent19 of cases. We included as minor complications sustained hypoxemia requiring transient oxygen administration, anxiety reactions and excessive cough hindering the procedure. Still, our complication rate of 5 percent compares favorably with that of other investigators who report complications in 0.1 to 11 percent of patients who undergo FOB.9,11,20-23 We believe the occurrence of a single vagal-induced hypotensive episode (which responded to postural change) among 91 nonpremedicated patients is not sufficient to justify the routine intramuscular administration of atropine. Physicians commonly administer only 0.4 to 0.8 mg of atropine and we are unaware of any conclusive evidence that such small doses prevent vagal-induced hypotension or sinus bradycardia. Similarly, we are unaware of studies which conclusively demonstrate that low-dose atropine prevents excessive bronchial secretions, although San Pedro et al recently reported excess salivation in three of 15 patients who received only intramuscularly administered codeine phosphate prior to FOB. Some physicians advocate beta agonist drug inhalation prior to FOB20 and other investigators suggest administration of large doses of parenteral atropine (1 to 2 mg) to prevent FOB-induced bronchospasm in asthmatics.10

It is noteworthy that 54 percent (7 of 13) of minor complications and one major complication occurred among the 138 patients 65 years or more. This represents a 5.8 percent overall complication rate compared with 4.1 percent rate in patients less than 65 years old. Whether or not risk of FOB is increased in the elderly remains controversial and conflicting opinions are found in the literature. In view of the aging population, this point deserves attention. Two British studies have found FOB with intravenous sedation to be safe in patients 80 years old or more.20,30 We performed FOB in 16 patients 80 years old or more (eight of whom received no premedication) and no complications or intolerance to the procedure were encountered. In spite of this small number, we believe that outpatient FOB without premedication is desirable and safe in the elderly. Adverse effects of sedation obviously are avoided and patients report being comforted by the idea of an immediate return home.

Fiberoptic bronchoscopy is an expensive procedure. In addition to physician fees of $300 to $600, hospitals charge $400 to $700 in the Pacific Northwest. These costs commonly include the bronchoscopy suite with attendant respiratory therapist or nurse ($250 to $400) and recovery room charges ($45/h) or day surgery fees ($50 for a 2-h observation period). Additional expenses may be incurred when hospitals bill separately for supplies, nebulizer treatments, oxygen, electrocardiographic and oxygen saturation monitoring, disposable equipment and medication.

Although results of several studies indicate that bronchoscopy may be performed safely in outpatients and without premedications,8,12,31 a certain apprehension continues to surround the performance of this procedure, which, when done properly, rapidly and in well selected patients actually is quite safe. Severe bleeding and pneumothorax are rare. Both hypoxemia and rhythm disturbances reliably can be detected by pulse oximetry, alleviating the need for electrocardiographic monitoring in most patients. Developments in fiberoptic bronchoscopes also allow better visualization and secretion control. Less sedation allows better feedback from the patient during the procedure and
quick return to prebronchoscopy functional status. These factors combined with improved ancillary equipment allow the performance of most FOB in under 30 min. In conclusion, we recommend routine diagnostic (excluding TBB) FOB without premedication. Decreased facility fees, reduced medication and personnel costs and decreased observation requirements should lead to decreased expenditures without compromising patient care, safety or comfort.

REFERENCES
2 Robin ED. Iatroepidemias: a probe to examine systematic preventable errors in (chest) medicine. Am Rev Respir Dis 1987; 135:1152-56
5 Aelony Y. Outpatient fiberoptic bronchoscopies [letter]. Arch Intern Med 1983; 143:1837
6 Khan MA. Fiberoptic bronchoscopy as an outpatient procedure. Arch Intern Med 1983; 143:25-26
14 Puar HS, Young RC, Armstrong EM. Bronchial and transbronchial lung biopsy without fluoroscopy in sarcoidosis. Chest 1985; 87:303-06