Incidence of Fever and Bacteremia following Transbronchial Needle Aspiration*

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Fiberoptic bronchoscopy and transbronchial needle aspiration were performed on 50 occasions in 47 afebrile patients. The aspirations were followed by endobronchial or transbronchial biopsies in 22 patients, as well as bronchial brushings and washings where appropriate. Blood cultures were drawn at 5 and 30 minutes following needle aspiration, as well as at the time of any temperature above 38°C during the 24 hours following the procedure. In five (10 percent) of the 50 cases, there was temperature greater than 38°C (100.4°F) in the 24 hours following the bronchoscopy; in no patient were cultures of blood positive, whether done early after the procedure or at the time of fever. We conclude that transbronchial needle aspiration, a new procedure gaining widespread popularity in diagnostic thoracic medicine, is not associated with clinically detectable bacteremia. This procedure should not require antimicrobial prophylaxis in patients susceptible to endocarditis.

Dental and surgical procedures, as well as multiple diagnostic procedures involving mucosal surfaces, are associated with risk of infective endocarditis in the susceptible patient. In the past several years, transbronchial needle aspiration has been developed, which samples material through the fiberoptic bronchoscope from mediastinal lymph nodes, permitting nonsurgical diagnosis and staging of pulmonary neoplasms. Complications of fine-needle aspiration are unusual and include pneumothorax and pneumomediastinum. A recent report demonstrated bacteremia with Streptococcus viridans following transbronchial needle aspiration. This case and also studies using rigid bronchoscopy emphasize that oral flora can contaminate the suction channel during insertion of the bronchoscope through the upper airway. These organisms can then cause bacteremia during bronchial mucosal perforation and aspiration. Large mediastinal vessels can be entered with the needle, potentially inoculating bacterial organisms directly into the bloodstream. In spite of studies by Kane et al and by Pereira et al showing the absence of bacteremia following fiberoptic bronchoscopy, four case reports demonstrating bacteremia have resulted in the current American Heart Association recommendation advising prophylaxis in high-risk patients. Because transbronchial needle aspiration violates the mediastinum and is a frequently used procedure at our institution, we studied 50 transbronchial needle aspirations performed on 47 patients, in order to determine the incidence of subsequent bacteremia and fever.

Materials and Methods

All patients undergoing transbronchial needle aspiration for the diagnosis or staging of carcinoma of the lung from April 1, 1984 to March 1, 1985 were included in this study. Informed consent was obtained, and the project was approved by the hospital’s human use committee. The evaluations prior to entry included posteroanterior and lateral chest x-ray films, medical history, physical examination, and temperature. Patients excluded were those with fever, clinically evident lower-respiratory-tract infection, known bacteremia, or antimicrobial treatment within two weeks preceding bronchoscopy.

Any patient who was undergoing transbronchial needle aspiration and had not had a diagnosis of carcinoma made at the time also had either endobronchial or transbronchial biopsies as well as brushings and washings performed whenever applicable. The number of aspirations and the number of grossly bloody aspirations were recorded for each patient.

The construction and use of the transbronchial aspiration needle (Mill-Rose Laboratories, Inc.) used in this study has been previously described. Lymph node areas aspirated included the right paratracheal area, the anterior and posterior subcarinal areas, and the left aortopulmonary window. The azygous vein, brachiocephalic artery, or the pulmonary artery lie near each of these locations.

Immediately (within five minutes) and 30 minutes following the final needle aspiration in each patient, the antecubital fossa or forearm of each patient was cleansed with povidone-iodine solution and isopropyl alcohol. Ten milliliters of blood was drawn for culture each time using a sterile 19-gauge needle. The needle was then changed, and 5 ml each were transferred to an anaerobic and aerobic culture bottle consisting of 50 ml of trypto-soy broth and sodium polyanetholesulfonate, an anticoagulant. The technique for blood culture was by previously described methods. Each bottle was examined daily for turbidity. The aerobic bottle was subcultured on desoxy-chocolate agar. This was then read daily for two days. Any growth at this time would be Gram-stained and subcultured for...
another two days. If there was any growth aerobically at any time in the eight-day period, the anaerobic bottle was handled in the same fashion.

Two sets of blood cultures and full physical examinations were performed on any patient who had fever greater than 38°C (100.4°F) measured orally within the 24-hour period following the bronchoscopy. During this time, temperature was measured every four hours, and antipyretic drugs were not administered. Statistical analysis was performed using Student’s t-test for comparing data.

**Results**

Fifty transbronchial needle aspirations performed on 47 patients were entered into the study. The patients ranged in age from 34 to 80 years (mean, 60 years). The transbronchial needle aspiration was followed by transbronchial biopsy or endobronchial biopsy and brushings and washings in 22 of the 50 procedures. The total number of needle aspirations per patient ranged from four to 17 (mean, ten), and the number of times grossly bloody aspirations returned, indicating penetration into a major mediastinal vessel, ranged from zero to five (mean, one) per procedure.

Fever occurred in five (10 percent) of the 50 procedures; in only one of the five patients developing fever was transbronchial needle aspiration the sole procedure. In one patient (case 4), complete collapse of the right upper lung was found on the chest x-ray film at the time of fever; this patient had had partial collapse prior to transbronchial needle aspiration and near total occlusion of the right upper lobe at the time of bronchoscopy. Total occlusion of this orifice with blood, inspissated bronchial secretions, or edema was believed to account for the airway collapse and fever. Patient 19 demonstrated fever up to 38.9°C (102°F) intermittently for the 72 hours following fiberoptic bronchoscopy. The patient was treated with double antibiotic coverage despite no change in clinical condition. There was complete resolution of the patient’s peripherally located cavitating mass and aortopulmonary window adenopathy during the course of antibiotics, and the patient was believed to have had a necrotizing pneumonia. In the three other patients, no obvious cause for fever could be found (Table 1). In these febrile patients, cultures of blood at the time of fever and immediately following transbronchial needle aspiration were negative. The mean number of attempts at aspiration in the febrile patients was not significantly different when compared to the afebrile group (12 vs 10). The number of times grossly bloody aspirations were recovered from the febrile group (2/5; mean, 0.4) compared to the afebrile group (19/45; mean, 0.87). All cultures of blood (total, 120) done at 5 and 30 minutes and at any time of fever in the 50 procedures were sterile.

**Discussion**

The transient nature of bacteremia following most procedures and manipulations of mucous membranes is of little consequence in most situations. In those patients with abnormalities of the cardiac valves and chambers or with arteriovenous fistulas or hyperaeration lines, the risk for seeding these sites with bacteria and eventually causing infective endocarditis is substantial. There is no conclusive evidence of the efficacy of using systemic prophylactic antibiotics in susceptible patients prior to procedures known to cause transient bacteremia. Consequently, experimental evidence in animals supports their use.

Numerous dental and surgical procedures and manipulations of the airway passages lead to bacteremia with organisms commonly found in the oropharynx and nasopharynx. Burket and Burn1 provided the first evidence for the relationship between oropharyngeal manipulation and subsequent bacteremia by introducing a relatively avirulent pathogen (Serratia marcescens) around the teeth and subsequently recovering it from the blood. Since that study in 1937, numerous reports have followed and are recently summarized in the review by Everett and Hirschmann. It is conceivable that we missed transient bacteremia; however, the majority of previous studies done on the incidence of transient bacteremia associated with oropharyngeal, esophageal, and upper-respiratory procedures has suggested that bacteremia generally occurs within one to five minutes following the procedure and persists for approximately 15 minutes. Three previous studies reviewing the incidence of transient bacteremia following bronchoscopy included the following methods of culturing blood: ten minutes, two hours, and four hours after the procedure;1 within five minutes and 30 minutes after bronchoscopy;2 and “immediately after” and two hours after the procedure. The timing of the blood cultures obtained in our study were in accordance with previous studies on transient bacteremia following upper respiratory or esophageal procedures.

The diagnostic procedures of the thoracic specialist include right bronchoscopy, flexible fiberoptic bronchoscopy, and, recently, transbronchial needle aspiration through the fiberoptic bronchoscope. In a study which has not been repeated, Burman4 demonstrated

### Table 1—Possible Reasons for Fever in Five Patients

<table>
<thead>
<tr>
<th>Case</th>
<th>Maximum Fever</th>
<th>Cause*</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>39.0°C(102.2°F)</td>
<td>RUL collapse</td>
<td>Mezlocillin/gentamicin</td>
</tr>
<tr>
<td>9</td>
<td>38.8°C(101.8°F)</td>
<td>None found</td>
<td>None</td>
</tr>
<tr>
<td>13</td>
<td>39.5°C(103.1°F)</td>
<td>None found</td>
<td>Mezlocillin/amikacin</td>
</tr>
<tr>
<td>19</td>
<td>38.0°C(100.4°F)</td>
<td>LUL pneumonia</td>
<td>Cephazolin/gentamicin</td>
</tr>
<tr>
<td>28</td>
<td>39.9°C(102°F)</td>
<td>None found</td>
<td>None</td>
</tr>
</tbody>
</table>

*RUL, Right upper lobe; and LUL, left upper lobe.
fever in nearly half of 52 patients undergoing rigid bronchoscopy and documented bacteremia in nearly one third of these patients. The bacteria recovered from the blood were predominantly those found in the upper respiratory tract. In the two large series using flexible fiberoptic bronchoscopy as the diagnostic method, no bacteremia was found in 143 patients, although fever was seen in 16 percent in the latter study. In the work of Kane et al, cultures made from bronchial secretions taken at the time of flexible fiberoptic bronchoscopy (21 patients) grew bacteria, indicating that bacteria could have been introduced via the bronchoscope into the normally sterile tracheobronchial environment. There have been four case reports of bacteremia not due to S viridans following flexible fiberoptic bronchoscopy, two involving Pseudomonas aeruginosa and two S pneumoniae

Transbronchial needle aspiration has recently been advocated as a practical means to nonsurgically diagnose and stage bronchogenic carcinoma. Because of its sensitivity, this technique is anticipated to gain widespread use, since it avoids the morbidity and cost of surgical staging and can even be performed, in our experience, on an outpatient basis. Owing to the recent report by Watts and Green of fever and S viridans bacteremia following transbronchial needle aspiration, we prospectively studied the incidence of bacteremia and fever in 50 procedures for transbronchial needle aspiration involving 47 patients. We demonstrated fever in 10 percent (5/50), which compares to the incidence of 16 percent reported by Pereira et al and contrasts to the lack of fever in the series of Kane et al. Four (80 percent) of our five febrile patients had a combined procedure involving first a series of aspirations, followed by either transbronchial or endobronchial biopsy, which compared to 24/45 (53 percent) for the afebrile group (p value, not significant). There appeared to be no relation between fever and the number of times an aspiration was performed or grossly bloody aspirations returned. All cultures of blood, whether done shortly after the procedure or at any time of fever, were sterile. Our work confirms the two previous series demonstrating no incidence of bacteremia following flexible fiberoptic bronchoscopy and documented that transbronchial needle aspiration, although reported in one case to result in bacteremia, has an extremely low incidence of this complication.

We conclude that the current recommendations by the American Heart Association regarding prophylaxis for flexible fiberoptic bronchoscopy should be reevaluated in light of our results. Also, transbronchial needle aspiration, a procedure gaining widespread use in diagnostic thoracic medicine, appears not to be complicated by a high incidence of clinically detectable bacteremia. Antibiotic prophylaxis, with its attendant potential for morbidity and its added cost, need not be advised.

ACKNOWLEDGMENT: We thank Sgt Warren Parr, pulmonary technician, and Mrs. Lynette Emerzian for typing the manuscript.

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