

Incidence of Fever and Bacteriemia Following Flexible Fiberoptic Bronchoscopy: A Prospective Study

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Abstract- The latest American Heart Association (AHA) statement for preventing infectious endocarditis, has not recommended prophylactic antibiotic therapy prior to fiberoptic bronchoscopy (FB) except for patients with preexisting predisposing cardiac conditions. Our aim was to determine the incidence of bacteriemia and fever following FB in our experience and compare with those which have been mentioned in AHA guideline as well as other studies. Venous blood of 85 consecutive patients was evaluated for both aerobic and anaerobic cultures before (for detecting possible previous bacteriemia) and after FB. None of the patients were treated with antibiotics prior to the procedure. All the patients were examined during the first 24 hours after FB for detecting fever defined as temperature more than 38 °C. Positive hemocultures were noted in 7 (8.2 %) patients after FB examination. Coagulase negative *Staphylococcus*, coagulase positive *Staphylococcus*, beta haemolytic *Streptococcus*, *Citrobacter freundii* and *Streptococcus viridans* were found in 4, 1, 1 and 1 cultures of patients, respectively. By excluding 6 contaminated samples, the rate of bacteriemia reduced to 1 (1.1%) patient in whom the identical pathogen (*Streptococcus viridans*) was found both in bronchial lavage and venous blood culture. We also found fever in 9 (10.5 %) cases in the first 24 hours following the bronchoscopy. Our results were in consistent with AHA recommendations regarding prevention of infectious endocarditis as a practical guideline in patients who schedule for FB. Besides, transient fever following bronchoscopy is a common self-limited event which does not need medical intervention.

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Introduction

Fiberoptic bronchoscopy (FB) has remained one of the essential procedures for diagnosis and treatment of respiratory diseases. Even though this procedure is considered unlikely to cause damage or harm (1-4), there have been several reports of bacteriemia and sepsis with a wide array of culprit microorganisms after bronchoscopy (5-9). Likewise, transient fever within 24 hours following bronchoscopy has been reported in

previous studies with a wide range of frequency (10-13). In most cases, however, these complications are transient observations and not clinically significant, so that according to the latest American Heart Association (AHA) statement for preventing from infectious endocarditis (IE) (14), scheduled antibiotic prophylaxis prior to bronchoscopy in order to prevent from IE, has not been recommended. Nevertheless, as a cardio-pulmonary referral centre, we designed a prospective study to compare the incidence and the species that are

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responsible for bacteriemia after FB in our population with those of AHA statement and other studies, and also to expand data on bacteriemia and fever rates following FB.

Patients and Methods

Design and participants

This study was performed prospectively between October 2006 and March 2007 by close collaborating of cardiology, pulmonology and pathology departments of National Research Institute of Tuberculosis and Lung Disease (N.R.I.T.L.D.), Tehran, Iran. Meanwhile, eighty five consecutive patients (67 inpatients, 18 outpatients) who were scheduled for FB with different indications were enrolled in the study. The patients were excluded if they had at least one of the following criteria: immunosuppressant states including diabetes mellitus and low white blood cell count; receiving antibiotic therapy within a week prior to the FB; current active infection; fever $>38^{\circ}\text{C}$ during 48 hours prior to the FB and concurrent treatment with a systemic steroids. Approval of the Research Review Committee was obtained at the N.R.I.T.L.D., and informed written consent was obtained from all participating patients.

Bronchoscopy

All bronchoscopies were carried out with flexible, fiberoptic bronchoscopes (size 3.6-5.5 mm; Olympus America Inc., Huntington Station, NY, USA). After local lubrication with lignocaine HCL 2% ointment and local anesthesia with lidocaine 1% spray, the bronchoscope was inserted through nasal passage and traversed the nasopharynx and moved forward through the vocal cords into the tracheobronchial tree. According to the size of endo-bronchial lesions, sampling (3-5 specimens) was performed using cup shaped/toothed forceps, as well as fluoroscopy-guided transbronchial biopsy for lesions within and beyond the range of bronchoscope, respectively. The procedure was followed by brushing (2-4 samples) and lavaging with 50-100 ml saline, employing sterile negative pressure technique. Bronchial biopsy, brushing and lavage were performed in 69 patients and transbronchial biopsy, brushing and lavage were performed in 16 patients.

Bacterial study

Three aerobic and anaerobic cultures for venous blood and lavage fluid were drawn just prior, immediately following and 20 min after bronchoscopy using 10 cc of venous blood samples and

bronchoalveolar lavage (BAL) specimens. Blood specimens were injected in a dual culture (aerobic and anaerobic) medium bottle [BLOODGROW MW 900, Medical Wire & Equipment (Bath), England] and bottles were incubated in a BabT-Alert incubator for 7 days at temperature of $35-37^{\circ}\text{C}$. Besides, BAL fluid specimens were tested in microbiology laboratory, employing MacConkey's agar, blood agar, chocolate agar and Thio plates. Daily inspection of cultures were carried out and eventually all the results were reported at the end of 7th day. We considered the cultures positive if one bacteria growth concentration was more than 10^4 cfu/mL and also visual examination of blood cultures indicated bacterial growth by rapid development of turbidity in the medium within up to 7 days after inoculation and incubation.

Assessment of fever

We considered fever as an elevation of body temperature more than 38°C , measured orally by putting the thermometer under the tongue for at least 5 minutes. Regarding inpatients, the patients were evaluated for fever by a physician every 6 hours during the first 24 hours following bronchoscopy. Regarding outpatients, one of the patient's family members was taught for assessing the fever every 6 hours and noting the measured temperatures. After 24 hours, one of the researchers contacted the family in order to ascertain that the patient's body temperature was assessed properly and be informed about the results.

Results

Patient characteristics

Of the 85 enrolled patients 69 cases (81%) were males and the mean age of the participants was 57 ± 28 years (range, 34-90 years). Sixty seven patients (78%) were smokers; but none of them were opium and/or alcohol addict. FB was performed for 57 patients because of acute respiratory manifestations and the remainder had chronic lung diseases. Furthermore, while twenty two (16%) of the patients had a history of previous cardiovascular disorders, none of them had valvular diseases. Otherwise, there was no history of other significant illnesses.

Bacteriological findings

Blood cultures

While the blood culture specimens of all patients which had been collected prior to the FB were sterile, seven patients (8.2%) had positive blood cultures

Table 1. Microorganism detected from blood cultures

	Total (n)	Culture positive (immediately & 20 min after FB)	Culture positive 20 min after FB
<i>Staphylococcus coagulase negative</i>	4	4	0
<i>Staphylococcus coagulase positive</i>	1	1	0
<i>Citrobacter freundii</i>	1	1	0
<i>Streptococcus viridans</i>	1	1	1

FB: fiberoptic bronchoscopy

following the FB. Defining true bacteriemia as circumstances in which two postbronchoscopy positive blood cultures yielded the same organism, the rate of bacteriemia decreased to 1 (1.1%) patient (Table 1). The true bacteriemia belonged to a 62 years old male, heavy smoker farmer who had been referred for further evaluation of a lung mass. The blood culture following bronchoscopy yielded *Streptococcus viridans* at the 2nd day of incubation.

Cultures of lavage fluids revealed normal flora (non- and alpha-hemolytic streptococci; diphtheroids and staphylococous coagulase negative) in 34 patients and potentially pathogenic bacteria in 12 patients. Lavage fluid culture of the patient with true bacteriemia yielded *Streptococcus viridans*, whereas lavage culture of the other six patients who had positive blood culture yielded normal flora in two and pathogenic bacteria in four patients that were different from those detected in their blood cultures.

Of our 85 patients, 9 subjects (10.5%) including of the two patients with positive blood culture developed fever during 24 hours following the FB. A comparison of findings in the two groups of patients with and without developing fever is summarized in Table 2.

We did not find a statistically significant association between appearance of fever and any of studied parameter including age.

Discussion

The main findings in the current study are two-fold. First, the incidence of bacteriemia after FB is not considerable and does not require planned prophylactic antibiotic therapy. Second, transient fever following FB is a common event and in the majority of cases is neither associated with detectable bacteriemia, nor clinically significant.

This study evaluated the prevalence of bacteriemia following FB in 85 consecutive Iranian patients. Positive blood cultures were detected following 8.2% of bronchoscopy tests, while true bacteriemia was found in just one patient, yielding *Streptococcus viridans*. Controversy has surrounded the rate of bacteriemia following FB in different reports (5-9, 15-19). This

discrepancy is believed to be related to the nature and magnitude of the tissue trauma, the density of microbial flora and the degree of inflammation or infection at the site of trauma (14). Furthermore, different studies have introduced a wide variety of microorganisms which have been considered as culprits (5-9, 15-19). This might be explained by either the wide array of microorganisms that can populate in nasopharynx or oropharynx as normal flora or diverse antibiotic usage patterns amongst different populations which may have resulted in differing of flora patterns between varied studies.

On the other hands, based on the latest AHA guideline regarding prevention of infective endocarditis (14), FB has not been included in the list of procedures requiring routine antimicrobial prophylaxis for preventing infectious endocarditis.

Nevertheless, the statement has claimed that for specific group of patients with high risk cardiac conditions such as prosthetic cardiac valve, previous IE, congenital heart disease and cardiac transplantation, who undergo an invasive procedure of respiratory tract that involves incision or biopsy of respiratory mucosa, antibiotic prophylaxis is recommended. Considering the AHA guideline of prevention of infective endocarditis (14), our findings not only did not conflict with the recommendations, but also did support its suggestions regarding the prophylactic antimicrobial regimens recommended following FB in patients with specific groups of cardiovascular disorders.

Fever following fiberoptic bronchoscopy

Fever within twenty four hours after FB has been frequently reported in different studies. The incidence of this complication in different report ranges from 0 to 50% (10-13, 20-22).

Table 2. Patient characteristics

	Fever	No Fever	p Value
Patients (Nr.)	9	76	
Male (%)	77	81	NS
Age (Years)	68.2 ± 11	59.8 ± 8	0.2
Outpatients/Inpatients	7/9	60/76	0.3

NS: no significant

Fever and bacteraemia following flexible fiberoptic bronchoscopy

In consistent with earlier studies, in our study 9 patients (10.5%), including the two subjects with positive blood cultures, developed fever following FB. Likewise in most instances, all developed fevers in this study were transient and were not associated with other serious complications; however, it might be noticeable in patients with impaired immunity as well as children. The mechanism of the occurrence of fever following FB is unclear. Previously, transient bacteremia had been proposed as the cause of fever after FB; however, several studies revealed that blood cultures which were obtained in majority of febrile patients after FB yielded no bacterial growth. Since then, other factors including cytokine release from alveolar and inflammatory cells during FB that is induced by broncho-alveolar lavage, lidocaine instillation and physical irritation (such as suctioning through the bronchoscope) have been suggested as causes of post-FB fever. Nevertheless, the exact physiopathology of this phenomena remains unknown and further investigations toward understanding of the mechanism of fever development after FB, is needed.

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