Role of flexible fiber-optic bronchoscopy in the diagnosis of pulmonary diseases in rural-based tertiary hospital

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Abstract

Background: Flexible fiber-optic bronchoscopy (FFB) is a well-established procedure in pulmonary medicine but still underutilized in rural area of developing countries where patients are still managed without confirmation of diagnosis with clinical acumen only. It is considered as an important tool in the diagnosis and therapy of varieties of pulmonary diseases.

Objective: To study the role of bronchoscopy in diagnosis of different pulmonary diseases such as tuberculosis, pneumonia, and lung cancer.

Materials and Methods: All consecutive FFB were retrospectively reviewed using bronchoscopy reports and corresponding patient’s charts over 2 years. Demographic data were recorded including age, gender with indication for procedure, radiographic findings, suspected diagnosis, bronchoscopy findings, and final diagnosis.

Results: Infections including tuberculosis and malignancy were two main indications for performing bronchoscopy. The overall diagnostic yield with bronchoscope was 62%. Tuberculosis was diagnosed in 50% of suspected cases, whereas bacterial and fungal pneumonia were diagnosed in 60% of suspected lower respiratory tract infections (bacterial 83% and fungal 17%). Seventy-five percent of patients had community-acquired pneumonia and 25% had hospital-acquired pneumonia. Gram positive organisms were isolated in 25% cases, Gram negative in 70% of cases and in 5% cases mixed growth was present. Malignancy was confirmed in 68% of suspected cases (squamous cell 44%, adenocarcinoma 24%, small cell 4%, undifferentiated 24%, and metastatic carcinoma 4%). In other diseases, such as pulmonary eosinophilia, interstitial lung diseases, upper airway abnormality, and pseudo hemoptysis, it helped to establish the diagnosis.

Conclusion: Diagnostic yield of FFB in our study is fairly comparable to other studies and its widespread use is recommended in order to achieve confirmation of diagnosis, to diagnose malignancy timely, and to prevent overenthusiastic empirical use of anti-tuberculoses drugs, which can eventually prevent resistance in rural area also.

KEY WORDS: Flexible fiber-optic bronchoscopy (FFB), diagnostic yield, tuberculosis, malignancy

Introduction

Flexible fiber-optic bronchoscopy (FFB) is a well-established procedure in pulmonary medicine but still underutilized in rural areas of developing countries where patients are still managed without confirmation of diagnosis with clinical acumen only. It is considered as an important tool in the diagnosis and therapy of varieties of pulmonary diseases.\(^1\)\(^-\)\(^4\)\) If it is performed carefully and safely, it has very limited complications.\(^5\)\) FFB is an efficient method for recovering pathogenic organisms from the lower respiratory tract in patients with dry cough or with scanty sputum production in tuberculosis and other bacterial and fungal pneumonias.\(^6\)\(^,\)\(^7\) Thus, early and proper bacteriological diagnosis can prevent unnecessary use of antibiotics and antituberculoses drugs, which ultimately prevent drug resistance. Bronchoscope plays a major role in the diagnosis and staging of lung cancers.\(^8\)\) Many a times, due to lack of availability of bronchoscopy in rural areas, any radiological opacity related to malignancy not resolved with antibiotics considered as due to tuberculosis, which leads...
to unnecessary use of antituberculous drugs and delays the diagnosis of cancer. Thus, we want to optimize the use of basic bronchoscopy with bronchoalveolar lavage (BAL), bronchial washing, and bronchial biopsy (BB) in the management of pulmonary diseases and want to check its diagnostic yield.

**Materials and Methods**

All consecutive FFB were retrospectively reviewed using bronchoscopy reports and corresponding patient’s charts over 2 years. The study was approved by the institutional human research ethics committee. Demographic data were recorded including: age, gender with indication for procedure, radiographic findings, suspected diagnosis, bronchoscopy findings, and final diagnosis. Suspected diagnosis was based on clinical and radiographic findings, whereas final diagnosis was based on microbiological and histopathological diagnosis through various samples collected through bronchoscopy. The procedure was performed using a fiber-optic bronchoscopy (FUJINON EB-270 T) in an equipped endoscopy suite. Premedication consisted of administration of inhaled and liquid xylocaine to the oropharynx and nostrils. Midazolam and other premedications were used as per requirement. All patients were continuously monitored with electrocardiogram and pulse oximetry. Bronchoscopy was performed in supine position. Liquid xylocaine 2% was administered through the bronchoscope directly to the vocal cords and the bronchial tree as needed. Bronchial brushing, BAL, BB were performed as per indications and sent to microbiological and histopathological examination as per indication, such as BAL for AFB staining, Gram staining with culture, fungal stain (KOH) with culture, and cytology from BAL and histopathology from endobronchial biopsy.

**Results**

There were 100 patients in whom bronchoscopy was performed. There were 74 males and 26 females. (Table 1). Cough (94%) was the most common symptom followed by weight loss (60%), dyspnea (59%), chest pain (51%), and hemoptysis (32%). Lower respiratory tract infections including tuberculosis and malignancy were two main indications for bronchoscopy (Table 2). Overall diagnostic yield was 62% (for tuberculosis 50%, for other pneumonia 60%, whereas in malignancy it was 68%) (Table 2).

Out of 16 patients of suspected pulmonary tuberculosis in 8 patients, BAL for AFB staining as well as culture was positive. There were six new cases and two re-treatment cases of tuberculosis. Out of 24 cases of pneumonia 19 were community-acquired pneumonia and 5 were hospital-acquired pneumonia; bacterial growth was isolated in 20 cases (83%) and fungal growth in 4 cases (17%). In bacterial pneumonia, Gram positive organisms were isolated in five patients (25%); Gram negative organisms were present in 14 patients (70%). Mixed growth was present in one patient. We had isolated more number of Gram negative organisms in patients with underlying lung diseases such as chronic obstructive pulmonary disease (COPD), bronchiectasis, and carcinoma of lung. *Pseudomonas* (in seven patients) was the most frequently grown organism from culture of BAL.

Thirty-seven patients underwent bronchoscopy to confirm malignancy. We got positive results in 25 patients with 68% diagnostic yield through BAL cytology, brush cytology, and bronchoscopy-guided endobronchial biopsy. Among 25 cases of malignancy, 20 patients were male (80%) and 5 were female (25%). Eleven patients (44%) have been diagnosed to have squamous cell carcinoma. Adenocarcinoma was present in six (24%) cases, small-cell carcinoma in one patient (4%), metastatic carcinoma in one (4%), and the remaining six patients (24%) were diagnosed to have undifferentiated carcinoma of lung. Squamous cell carcinoma was common in males (91%). Adenocarcinoma was equally found in both genders (Table 3). Of the 25 cases of malignancy, 19 patients were smokers and 6 were nonsmokers. Squamous cell carcinoma was found more in smokers. In adenocarcinoma, there was equal distribution between smokers and nonsmokers in our study. As per endobronchial findings, endobronchial mass was present in 13 patients and squamous cell carcinoma (in 8 patients) was the predominant type. Narrowing of bronchi due to external compression was found in six patients and most common with adenocarcinoma in four patients. Irregularity of mucosa was present in four patients and squamous cell carcinoma (in three patients) was the predominant type. Retained secretions were found in two patients. Out of the 25 positive cases of malignancy, BAL for cytology was positive in 24 cases (96%). Brush cytology was positive in 18 cases (72%). Biopsy was positive in 13 cases (56%). Consolidation was the predominant type of lesion (46%) found in various pulmonary diseases and is more common in pneumonia. Infiltrative lesions were common in tuberculosis while mass lesion was found more in malignancy. Out of the 100 patients, 58 underwent computerized tomography (CT) chest, and from them we could confirm the diagnosis in 37 patients (64%) with the help of bronchoscopy.

**Discussion**

The study highlights the significance of basic bronchoscopy in the diagnosis of different pulmonary diseases. The diagnostic yield of bronchoscopy in our institution is comparable with other parts of the world. In our study, overall diagnostic yield was 62% with basic bronchoscopic methods such as BAL, brush cytology, and endobronchial biopsy. Foos et al. analyzed the retrospective data of 616 bronchoscopy procedures and reported a diagnostic yield of 57%.

Although the overall diagnostic indications for bronchoscopy remained the same, different regions of the world may have different priorities as per prevalence of diseases. Our findings are comparable with recent reports from neighboring
In our study, we could find the indication for bronchoscopy in 10 (100) of 11 (9) patients, which would be a great help in developing countries where TB is still on rise. In our study, we could isolate organism in 24 cases out of 40 suspected cases of pneumonia, a diagnostic yield of 60%. We had more number of Gram negative organisms (18 cases) as compared to Gram positive organisms (8 cases), might be a result of more number of cases with underlying lung diseases, hospital-acquired pneumonias. Whereas Alzeer et al. reported diagnostic yield in 48.7% of cases from Asian country.

Bronchoscopy is also essential to diagnose and to stage lung malignancy. But in rural area, due to the lack of resources and awareness it is less utilized and patients with lung cancer are prescribed antibiotics and antituberculous treatment frequently. Its yield would be increased combined with the use of bronchial wash, brush cytology, and endobronchial biopsy. In our study, diagnostic yield for malignancy was 68% with combined procedures. Overall diagnostic yield was much lower as compared to Western countries, which might be due to lack of expertise in taking biopsy, more of peripheral lesions, lack of advanced bronchoscopy tool, and errors in tissue sampling. Anandan et al. also reported the highest yield in the diagnosis of malignancy by endobronchial biopsy (85%) followed by bronchial brushings (34%) and washings (12%). In our study, BB, bronchial wash cytology, and brush cytology were positive in 56%, 96%, and 72%, respectively.

### Conclusion

Routine use of flexible bronchoscopy should be promoted for the diagnosis of various pulmonary diseases such as tuberculosis, lung cancer, and pneumonias. Its judicious and rational use can help in the diagnosis of malignancy early and can prevent misuse of antibiotics. It also helps to diagnose pulmonary tuberculosis up to certain extent in sputum negative cases, which would be a great help in developing countries and in rural areas where TB is still on rise.

### References


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