Research Article

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

Ravish M Kshatriya, Nimit V Khara, Rajiv Paliwal, Satish Patel

Department of Respiratory Medicine, Pramukh Swami Medical College, Karamsad, Gujarat, India.
Correspondence to: Ravish M Kshatriya, E-mail: drravish13@gmail.com

Received December 7, 2015. Accepted December 28, 2015

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. 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 antituberculous 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

Access this article online	
Website: http://www.ijmsph.com	Quick Response Code:
DOI: 10.5455/ijmsph.2016.05032016379	

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 fever (86%), 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). Out 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.[6–8] In our study, overall diagnostic yield was 62% with basic bronchoscopic methods such as BAL, brush cytology, and endobronchial biopsy. Foos et al.[9] 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

Table 1: Age- and sex-wise distribution

Age groups (years)	Male	Female	Total
11–20	03	01	04
21–30	03	01	04
31–40	09	06	15
41–50	16	05	21
51–60	24	05	29
61–70	13	07	20
71–80	06	01	07
Total	74	26	100

Table 2: Indications and disease-wise results in bronchoscopy

Indications	Conclusive N (%)	Nonconclusive N (%)	Total N (%)
Pneumonia	24 (60)	16 (40)	40 (100)
Malignancy	25 (68)	12 (32)	37 (100)
Tuberculosis	08 (50)	08 (50)	16 (100)
Others	04 (100)	00	04 (100)
Interstitial lung diseases	01 (33)	02 (67)	03 (100)
Total	62 (62)	38 (38)	100 (100)

Table 3: Distribution of malignancy according to gender

Type of malignancy	Male N (%)	Female N (%)	Total N (%)
Squamous cell carcinoma	10 (91)	01 (9)	11 (100)
Adenocarcinoma	03 (50)	03 (50)	06 (100)
Small cell carcinoma	01 (100)	00	01 (100)
Metastatic carcinoma	00	01 (100)	01 (100)
Undifferentiated carcinoma	06 (100)	00	06 (100)
Total	20 (80)	05 (20)	25 (100)

countries where infection was the most common indication for bronchoscopy, and was confirmed in 31%–51% of cases.[1,10,11] In our study, indication for bronchoscopy in infectious diseases was 57%, whereas for malignancy it was 37%. In developed countries, malignancy is more common than infections.[1,7,8] Data of our study also correlated to other Asian countries such as Malaysia and Saudi Arabia.[12,13] The diagnostic utility of bronchoscopy for pulmonary TB is well established. We have confirmed tuberculosis in 50% cases of sputum-negative pulmonary tuberculosis, which is quite high as compared to few studies.[14–16] Foos et al.[9] found the diagnostic yield of 27% for the diagnosis of pulmonary tuberculosis by fiber-optic bronchoscopy. Same as in our study, Jaiswal et al.[17] performed bronchoscopy in 50 patients with suspected active pulmonary tuberculosis who were sputum smear negative or produced no sputum. An early diagnosis was possible in 21 of the 50 (42%) patients and a definitive diagnosis was possible in 28 (56%) of them.

Bronchoscopy is an important tool to collect bronchial secretions in patients of pneumonia with immunocompromised conditions, nosocomial pneumonias, atypical pneumonia, and also in patients who were not able to produce good quality sputum with tenacious secretions.[18] 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.[1] 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 lavage, 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.[1,19] Anandan et al.[20] 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

1. Alzeer AH, Al-Otair HA, Al-Hajjaj MS. Yield and complications of flexible fiberoptic bronchoscopy in a teaching hospital Saudi Med J 2008;29(1):477–81.
2. Gasparini S. Bronchoscopic biopsy techniques in the diagnosis and staging of lung cancer. Monaldi Arch Chest Dis 1997; 52:392–8.
3. Elston WJ, Whittaker AJ, Khan LN, Flood-Page P, Ramsay C, Jeffery PK, et al. Safety of research bronchoscopy, biopsy and bronchoalveolar lavage in asthma. Eur Respir J 2004;24: 375–7.
4. Ouellette DR. The safety of bronchoscopy in a pulmonary fellowship program. Chest 2006;130:1185–90.
5. Suratt PM, Smiddu JF, Gruber B, Deaths and complications associated with fibreoptic bronchoscopy. Chest 1976;69:747–51.
6. Khoo K.K., Meadway J. Fibreoptic bronchoscopy in rapid diagnosis of sputum smear-negative pulmonary tuberculosis. Respir Med 1989;83(4):335–8.

7. Kohno S.Diagnostic value of bronchoscopy in the diagnosis of pulmonary tuberculosis; bronchial washing and transbronchial lung biopsy. Kekkai 1990; 65(1):33–6.
8. Mak VH, Johnston ID, Hetzel MR, Grubb C. Value of washings and brushings at fiberoptic bronchoscopy in the diagnosis of lung cancer. Thorax 1990;45:373–6.
9. Foos L, Patuto N, Chhajed P, Tamm M. Diagnostic yield of flexible bronchoscopy in current clinical practice. Swiss Med Wkly 2001; 136:155–9.
10. Mak VH, Johnston ID, Hetzel MR, Grubb C. Value of washings and brushings at fiberoptic bronchoscopy in the diagnosis of lung cancer. Thorax 1990;45:373–6.
11. Alamoudi OS, Attar SM, Ghabrah TM, Kassimi MA. Bronchoscopy, indications, safety and complications. Saudi Med J 2000; 21:1043–7.
12. Yaacob I, Harun Z, Ahmad Z. Fibreoptic bronchoscopy—a Malaysian experience. Singapore Med J 1991;32:26–8.
13. Jayasundera C. Experience with flexible fibreoptic bronchoscopy. Ceylon Med J 1996;41:131–4.
14. Anderson C, Inhaber N, Menzies D. Comparison of sputum induction with fiber-optic bronchoscopy in the diagnosis of tuberculosis. Am J Respir Crit Care Med 1995;152:1570–4.
15. Al-Zahrani K, Al Jahdali H, Poirier L, René P, Menzies D. Yield of smear, culture and amplification tests from repeated sputum induction for the diagnosis of pulmonary tuberculosis. Int J Tuberc Lung Dis 2001;5: 855–60.
16. Conde MB, Soares SL, Mello FC, Rezende VM, Almeida LL, Reingold AL, et al. Comparison of sputum induction with fiberoptic bronchoscopy in the diagnosis of tuberculosis: experience at an acquired immune deficiency syndrome reference center in Rio de Janeiro, Brazil. Am J Respir Crit Care Med 2000;162:2238–40.
17. Jaiswal AK, Kulpati DD, Jain NK, Singh MM. Role of bronchoscopy in the early diagnosis of suspected smear negative cases of pulmonary tuberculosis. Indian J Tub 1989;36:223–6.
18. Bhatia RS, Sibia SS. Practical applications—therapeutic uses of flexible fibreoptic bronchoscope. Lung India 1994;12:138–9.
19. Chhajed PN, Bernasconi M, Gambazzi F, Bubendorf L, Rasch H, Kneifel S, et al. Combining bronchoscopy and positron emission tomography for the diagnosis of the small pulmonary nodule < or = 3 cm. Chest 2005;128:3558–64.
20. Anandan PT, Rajagopal TP, James PT, Ravindran C. Clinical profile of patients undergoing fibreoptic bronchoscopy in a tertiary care setting. Indian J Bronchol 2006;1:58–71.

How to cite this article: Kshatriya RM, Khara NV, Paliwal R, Patel S. Role of flexible fiber-optic bronchoscopy in the diagnosis of pulmonary diseases in rural-based tertiary hospital. Int J Med Sci Public Health 2016;5:873-876

Source of Support: Nil, **Conflict of Interest:** None declared.