ORIGINAL ARTICLE

DIAGNOSTIC YIELD OF FIBEROPTIC BRONCHOSCOPY (FOB) IN THREE COMMON LUNG CONDITIONS AT A RURAL TEACHING HOSPITAL

Nimit V Khara[1], Ravish M Kshatriya[1], Dharmendra H Vala[2], Dhaval N Prajapati[3], Rajiv P Paliwal[4], Satish N Patel[5]

Authors' Affiliation: [1]Assistant Professor; [2]Tutor; [3]Resident; [4]Professor; [5]Professor and Head, Department of Respiratory Medicine, Pramukhswami Medical College, Karamsad
Correspondence: Dr. Nimit V. Khara, Email: drkhara@gmail.com

ABSTRACT

Background: Fiberoptic bronchoscopy (FOB) is an important procedure for diagnosis of different respiratory problems. The present study was conducted to evaluate the diagnostic yield of FOB in pneumonia, pulmonary tuberculosis and lung cancer.

Methodology: The present study was carried out on 289 patients attending our tertiary level rural teaching hospital. Detailed clinical history, physical examination and routine investigations were carried out in all the participants. All the patients were then subjected for fiberoptic bronchoscopy, provided they met the criteria of our study.

Results: The diagnostic yield of FOB was 37.7%, 48.7% and 68.5% in pulmonary tuberculosis, pneumonia and lung cancer respectively. The overall diagnostic yield was 55.7%. The maximum diagnostic yield was obtained from bronchoalveolar lavage (BAL) acid fast stain for tuberculosis, BAL gram stain and culture/sensitivity for pneumonia and BAL cytology in cases of carcinoma.

Conclusion: Routine flexible bronchoscopy technique has a reasonably high diagnostic yield in current clinical practice. Our study concludes that the diagnostic yield of FOB at our rural setting is comparable with studies from other centres within the country and abroad. The procedure is more useful in diagnosis when combined with a sound clinical judgment and other supportive investigations.

Keywords: Fiberoptic bronchoscopy, bronchoalveolar lavage, lung disease

INTRODUCTION

Fiberoptic bronchoscopy (FOB) is a very useful and safe procedure for diagnosis of various respiratory diseases. It is a universally accepted procedure both in the diagnosis and therapy of different pulmonary disorders. FOB can be performed under local anesthesia in various clinic/hospital settings providing maximal visualization of tracheobronchial tree[1], and if performed carefully, can be a thoroughly safe procedure.[2] Fiberoptic bronchoscopy (FOB) is shown to be of diagnostic value in opportunistic pulmonary infections occurring in immunodeficient patients including HIV positive patients.[3] The initial diagnostic approach to suspected cases of pulmonary tuberculosis is to demonstrate mycobacterium tuberculosis bacilli in stained smears of sputum. Many patients having clinical and radiological features of pulmonary tuberculosis have negative sputum smear examination, even if repeated on several occasions and their sputum culture for acid fast bacilli (AFB) may also turn to be negative.[4] Fiberoptic bronchoscopy with bronchial washing analysis for AFB including culture for mycobacterium tuberculosis has significant role to establish the diagnosis of pulmonary tuberculosis. The delay in diagnosis and treatment in patients of community acquired pneumonia and nosocomial pneumonia may lead to rise in mortality by 3-5%. Incorrect diagnosis, inadequate antibiotic therapy, impaired host defense, atypical organisms, resistant pathogens, non-infectious causes, tuberculosis, endobronchial lesions etc. are common causes of non-resolving pneumonia or slowly resolving pneumonia. Fiberoptic bronchoscopy frequently helps to identify the exact cause of difficult to treat pneumonia cases. FOB is immensely useful for making a conclusive diagnosis of lung cancer, especially when there is an endobronchial lesion, providing adequate tissue sample by endobronchial biopsy, bronchoalveolar lavage (BAL) or brush cytology.

METHODOLOGY

The present study was carried out on 289 patients suspected to have pneumonia, pulmonary tuberculosis or lung cancer attending our tertiary level rural teaching

hospital. Detailed clinical history, physical examination and routine investigations were carried out in all the participants. All the patients were subjected to sputum examination (acid fast bacilli (AFB) staining, gram staining, culture/sensitivity, KOH staining, malignant cells), chest radiography, ECG, hematological examination and coagulation profile. CT scan thorax was performed in some cases. Patients with diagnosed lung cancer, smear positive pulmonary TB, recent myocardial infarction and blood dyscrasias were excluded. All the patients were then subjected to fiberoptic bronchoscopy. Flexible bronchoscopy was performed with fiberoptic scope through transnasal route under topical anesthesia (2% lignocaine). Oxygenation was monitored throughout the procedure with pulse oximetry.

Appropriate samples such as bronchoscopic aspirate, brushing and biopsy were obtained depending on the lesion after thorough evaluation of endobronchial tree. Samples were subjected to cytology, histopathology, AFB staining, fungal (KOH) staining and culture/sensitivity as required, depending upon the clinical diagnosis and bronchoscopic findings. In suspected cases of bacterial pneumonia, initially, gram stain was performed for identification of organism which was confirmed by culture. In all the patients, culture was correlated with gram staining. In clinically suspected cases of fungal pneumonia, BAL for KOH was done. Because of lack of facilities fungal culture or identification of fungal species was not done. All the cases of fungal pneumonia were diagnosed on the basis of clinical, radiological presentation and identification of fungal hyphae on KOH staining of bronchial aspirate.

RESULTS

There were total 289 cases included in the study and subjected to fiberoptic bronchoscopy (FOB). The age and gender distribution of the study participants is shown in the table 1.

Table 1: Age and gender distribution of cases

Variables	Frequency (n=289) (%)
Age group (in years)	
<20	6 (2.1)
21 – 30	22 (7.6)
31 – 40	34 (11.8)
41 – 50	51 (17.6)
51 – 60	74 (25.6)
61 – 70	69 (23.9)
71 – 80	30 (10.4)
>80	3 (1.0)
Gender	
Male	85 (29.4)
Female	204 (70.6)

The most common clinical feature in the study participants was cough (91.7%) followed by dyspnea, anorexia, fever and chest pain. The most common past clinical history was pulmonary tuberculosis which was observed in 21.1% of the cases.

Table 2: Clinical features and past history of the participants (n=289)

Clinical Varibles	Cases (%)
Clinical features	
Cough	265 (91.7)
Fever	179 (61.9)
Chest pain	112 (38.8)
Hemoptysis	59 (20.4)
Dyspnea	193 (66.8)
Anorexia	188 (65.1)
Weight loss	174 (60.2)
Pallor	69 (23.9)
Clubbing	56 (19.4)
Lymphadenopathy	8 (2.8)
Past clinical history	
Pulmonary Tuberculosis (TB)	61 (21.1)
Chronic Obstructive Pulmonary Disease	45 (15.6)
Bronchiectasis	20 (6.9)
Interstitial Lung Disease (ILD)	3 (1.0)

Table 3: Bronchoalveolar lavage (BAL) findings of the participants (n=289)

Findings	Positive	Negative	Not Done
Acid fast bacilli	13 (4.5)	242 (83.7)	34 (11.8)
Gram stain/culture sensitivity	57 (19.7)	146 (50.5)	86 (29.8)
Fungal stain	6 (2.1)	115 (39.8)	168 (58.1)
Cytology	56 (19.4)	129 (44.6)	104 (36.0)

Table 4: Type of lesion on X-ray

Type of lesion	Frequency (%)
Cavitory Lesion	16 (5.5)
Collapse of lung	29 (10.0)
Consolidation	79 (27.3)
Fibrotic Lesion	10 (3.5)
Infiltration	69 (23.9)
Mass Lesion	68 (23.5)
Nodular lesion	7 (2.4)
Reticular pattern	1 (0.3)
No Abnormality Detected	10 (3.5)
Total	289 (100.0)

The most common X-ray lesion was consolidation followed by infiltration and mass lesion. Consolidation is commonly present in the pneumonia cases.

The diagnostic yield of FOB is 37.7%, 48.7% and 68.5% in pulmonary tuberculosis, pneumonia and lung cancer, respectively. The overall diagnostic yield is 55.7%.

Table 5: Findings in cases of pneumonia

Findings	Pneumonia		Not done
	Positive	Negative	
BAL acid fast bacilli	1	113	3
BAL gram stain, culture/sensitivity	42	62	13
BAL fungal stain	5	54	58
BAL cytology	4	52	61
Biopsy	1	12	104
Post bronchoscopy sputum	2	19	96
Brush cytology	2	5	110

Table 6: Findings in cases of lung cancer

Findings	Cancer		Not done
	Positive	Negative	
BAL acid fast bacilli	0	98	29
BAL gram stain, culture/sensitivity	12	49	66
BAL fungal stain	0	42	85
BAL cytology	52	60	15
Biopsy	49	17	61
Post bronchoscopy sputum	8	57	62
Brush cytology	37	37	53

Table 7: Findings in cases of pulmonary tuberculosis

Findings	Tuberculosis		Not done
	Positive	Negative	
BAL acid fast bacilli	12	31	2
BAL gram stain, culture/sensitivity	3	35	7
BAL fungal stain	1	19	25
BAL cytology	0	17	28
Biopsy	1	0	44
Post bronchoscopy sputum	0	9	36
Brush cytology	0	1	44

Table 8: Diagnostic yield of fiberoptic bronchoscopy (FOB)

Disease	Total	Diagnosis by FOB
Tuberculosis	45 (100.0)	17 (37.77)
Pneumonia	117 (100.0)	57 (48.7)
Cancer	127 (100.0)	87 (68.5)
Total	289 (100.0)	161 (55.7)

DISCUSSION

Development of the fiberoptic bronchoscope and various accessory instruments that can be inserted via the working channel has extended bronchoscopic exploration to the lung periphery. The instrument permits acquisition of tissue biopsy specimen, selective mucosal brushing, and bronchoalveolar washings. Bronchoscopy is currently the primary means for diagnosis of pulmonary malignancies and has significant importance in establishing diagnosis of pulmonary tuberculosis and pneumonia.

In the present study it was observed that the diagnostic yield of FOB is 55.77%. In case of tuberculosis it was least (37.77%) while it was maximum in case of lung cancer (68.5%). Foos et al[5] analyzed the retrospective data of 616 bronchoscopy procedures and reported a diagnostic yield of 57%. The diagnostic yield of bronchoscopy for detection of malignancy was 66.6%. Foos et al[5] reported the highest diagnostic yield of 92% in the cases with a macroscopically visible tumor, while another study[6] reported a diagnostic yield of 51% for peripheral lesions. Recently, Anandan et al[7] also reported the highest yield in the diagnosis of malignancy by endobronchial biopsy (85%) followed by bronchial brushings (34%) and washings (12%). Wong and colleagues evaluated biopsy, brushings and washings in the diagnosis of lung cancer and the overall diagnostic yield of FOB were 98.1%, 61.5% and 58.5% for the endoscopically visible, endoscopically not visible and endoscopically not visible fluoroscopic guidance cases respectively.[8]

Bronchoscopy plays an important role in the diagnosis of smear negative pulmonary tuberculosis. In the present study the diagnosis of pulmonary tuberculosis was obtained in 37.7% of the cases. Foos et al[5] found the diagnostic yield of 27% for the diagnosis of pulmonary tuberculosis by fiberoptic bronchoscopy. Another prospective study by Conde[9] which was conducted in Brazil reported positivity of 56% in the diagnosis of tuberculosis by fiberoptic bronchoscopy. The reason for high diagnostic yield in this study was

that most of these patients were unable to produce sputum and with the concomitant HIV infection, sputum production is negligible. In such type of patients it was observed that bronchoscope plays an important role in the diagnosis of pulmonary tuberculosis.

The diagnostic yield of FOB in pneumonia was 48.7% in our study, which was comparable with that of several other studies. We found BAL fluid examination to be very useful in diagnosis and identification of the causative organism in patients having non-resolving, slowly resolving and hospital acquired pneumonia patients. Recent era is looking at the role of fiberoptic bronchoscope beyond diagnosis in intensive care units for therapeutic interventions. It is useful for removal of thick tenacious secretions in patients with atelectasis on mechanical ventilation as well as for difficult endotracheal intubation.[10] Thus the morbidity due to bronchiectasis or destroyed lung which can occur due to untreated lobar or lung collapse can be avoided with early intervention.[11]

CONCLUSION

The diagnostic yield of FOB with routine and basic procedures like endobronchial biopsy, BAL fluid analysis and brush cytology is satisfactory at our rural teaching hospital. Routine flexible bronchoscopy technique continues to have a high diagnostic yield in current clinical practice in common lung conditions like pulmonary tuberculosis, lung cancer and pneumonia. We believe that the procedure is more useful in diagnosis when combined with a sound clinical judgment and appropriate supportive investigations.

REFERENCES

1. Kdvenat DM, Rath GS, Anderson WM, Snider GL. Maximal extent of visualization of bronchial tree by flexible fibreoptic bronchoscopy. Am Rev Repair Dis 1984; 110: 88-90.
2. Suratt PM, Smiddu JF, Gruber B, Deaths and complications associated with fibreioptic bronchoscopy. Chest 1976; 69: 747-751.
3. Stover DG, Zaman MB, Hajdu SI, Lange M, Gold, J, Armstrong M. Bronchoalveolar lavage in the diagnosis of diffuse pulmonary infiltrates in the immunosuppressed host. Ann Intern Med 1984; 101: 101-107.
4. Kulpati DD, Heera HS. Diagnosis of smear negative pulmonary tuberculosis by flexible fibreoptic bronchoscopy. Indian J tuberculosis, 1986;33:179-82.
5. Foos L, Patuto N, Chhajed P, Tamm M. Diagnostic yield of flexible bronchoscopy in current clinical practice. Swiss Med Wkly 2001; 136: 155-159.
6. Reichenberger F, Weber J, Tamm M, Bolliger CT, Dalquen P, Perruchoud AP, et al. The value of transbronchial needle aspiration in the diagnosis of peripheral pulmonary lesions. Chest 1999; 116: 704-708.
7. Anandan PT, Rajagopal TP, James PT, Ravindran C. Clinical profile of patients undergoing fibreoptic bronchoscopy in a tertiary care setting. Indian J Bronchology 2006; 1:58-71.
8. Wong PC, Lee J, Lam FM et al. Bronchoscopy in the diagnosis of lung cancer. Monaldi Arch Chest Dis 1999; 54: 394-398.
9. Conde MB, Soares SL, Mello FC, Rezende VM, Almedia LL, Reingold AL, et al. Comparison of sputum induction with fibreoptic bronchoscopy in the diagnosis of tuberculosis: experience at an acquired immune deficiency syndrome reference center in Rio de Janeiro, Brazil. Am J Resp Crit Care Med 2000; 162: 2238-40.
10. Bhatia RS, Sibia SS. Practical applications - therapeutic uses of flexible fibreoptic bronchoscope. Lung India 1994; 12: 138-139.
11. Barnet CR. Flexible fibreoptic bronchoscopy in critically ill patients - methodology and indications. Chest 1978; 73 (suppl) 746-749.