

Utility of Fiberoptic Bronchoscopy: An Experience from a Tertiary Health Care centre of Bihar, India

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ABSTRACT

Introduction: Fiberoptic bronchoscopy is a very important tool in the modern era in the field of pulmonary medicine in arriving to a definite diagnosis. Study was done to evaluate, identify and enlist the utility of fiberoptic bronchoscopy to find out the diagnosis in various lung conditions.

Material and Methods: A total of 96 patients attending TB and Chest department in Indira Gandhi institute of medical sciences (IGIMS), Patna, Bihar, India who needed bronchoscopy were selected based on undiagnosed pulmonary conditions. Bronchoscopy was performed with Pentax fiberoptic bronchoscope. Relevant data were recorded as per a pre-designed proforma and analysed.

Results: Out of 96 patients, 62 (64.58%) were male, and 34 (35.41%) were female. 55 (57.29%) patients were above 44 years of age. Majority of indication of bronchoscopy was radiographic abnormality (54%). Tuberculosis was confirmed in 29 (30.2%) patients, pneumonia in 17 (17.7%) cases, malignancy in 21 (21.8%), sarcoidosis in 2 (2.08%) and tracheo oesophageal fistula in 1(1%) patient whereas bronchoscopy remained nondiagnostic in 26(27%) patients. Complications which occurred in these patients included desaturation (5.2%), haemorrhage (6.25%), bronchospasm (7.3%), and death (0.01%). These complications were managed accordingly and all but 1 patient recovered without any serious consequences.

Conclusions: In our setup bronchoscopy was mainly diagnostic with most common indication being chest radiographic abnormalities, persistent haemoptysis and to confirm pulmonary tuberculosis and malignancy. Fiberoptic bronchoscopy was found to be very useful in arriving to a particular diagnosis.

Keyword: Fibre Optic Bronchoscopy, Haemoptysis, Malignancy, Bronchospasm

INTRODUCTION

By Fiberoptic bronchoscopy we not only can visualize the tracheobronchial tree but also take various samples and can remove foreign body. Some of the common indications of bronchoscopy are undiagnosed radiographic abnormalities, to confirm tuberculosis/malignancy, to locate the origin of haemoptysis and to check it, to assess the microbial cause of pneumonia and to remove foreign body.¹

Some notified complications of bronchoscopy are cardiac arrhythmia, pneumothorax, bronchospasm and hypoxemia particularly in a patient of poor pulmonary reserve.² The patients with hemodynamic instability are particularly more prone to complications.³

There is a very sparse data from Bihar regarding the spectrum

of pulmonary conditions. This study was done in arriving to a diagnosis of the various clinical indications, in a tertiary health care centre in Bihar and to what extent it helped in confirming or refuting the same. Study objectives were to evaluate and to identify the pre-bronchoscopy clinical diagnoses using fiberoptic bronchoscopy and comparison of the post-bronchoscopy clinical diagnoses from pre-bronchoscopy.

MATERIAL AND METHODS

This was a retrospective hospital based observational study done in TB and Chest department in Indira Gandhi institute of medical sciences (IGIMS), Patna, Bihar, India from august 2016 to February 2018. Patients with unresolved and undiagnosed opacity on chest radiography along with persistent symptoms were picked up for fiberoptic bronchoscopy.

Inclusion criteria

1. Patients with unresolved and undiagnosed opacity on chest radiography along with persistent symptoms were taken up for fiberoptic bronchoscopy.
2. To visually inspect the tracheobronchial tree and to obtain samples like bronchoalveolar lavage (BAL) fluid, bronchial biopsies for confirming a diagnosis.
3. Removal of foreign body and respiratory secretions, brushing and biopsy, for arriving in diagnosis of neoplasm, undiagnosed infections, and other non-infectious causes.

Exclusion criteria

1. Age less than 15 years.
2. Uncooperative patients, physically and mentally unfit, and patients not giving consent for the procedure.
3. Patients with proved cancer, smear positive pulmonary tuberculosis, recent myocardial infarctions and bleeding tendencies were excluded.
4. Who were haemodynamically unstable and have any

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acute severe illness.

The case records of 96 patients who underwent fiberoptic bronchoscopy between these periods were assessed from the departmental records and the data was recorded in pre designed proforma. After taking detailed clinical history and physical examination relevant investigations were done. Routine haematological examinations, coagulation profile and chest radiography were done. Sputum examinations like acid fast bacilli, Gram staining, culture/sensitivity, Potassium hydroxide (KOH) staining, malignant cells were also done. Computed tomography scan thorax was done of selected patients. Based on these investigations patients were screened for fiberoptic bronchoscopy whose diagnosis was still unconfirmed. Informed consent was taken in writing. Flexible fiberoptic bronchoscopy (Pentax adult type) was performed through trans-nasal route /trans oral route. Whole of the tracheobronchial tree including vocal cord were evaluated and appropriate specimens such as bronchoalveolar lavage, bronchial aspirate, endobronchial and transbronchial biopsy were obtained according to the lesion. Collected samples were subjected for gram staining/culture, acid fast bacilli staining/gene xpert examination, fungal staining/culture, cytology including malignant cytology and histopathological examinations depending upon the disease suspected.

Indication	No. of patients (n=96)	Percentage
Undiagnosed chest radiological abnormalities/Diffuse parenchymal lung disease	41	42.70%
Tuberculosis	20	20.83%
Suspected malignancy	13	13.54%
Haemoptysis	11	11.45%
Consolidation/Pneumonia	10	10.41%
Tracheo-oesophageal fistula	1	1.04%

Table-1: Bronchoscopy indications

Organism(Bacterial)	Number(n=15)	Percentage
Pneumococci	6	40%
Staphylococci	5	33.33%
Klebsiella	3	20%
Pseudomonas	1	6.66%
Organism(Fungus)	Number(n=2)	Percentage
Candida	1	50%
Aspergillus fumigatus	1	50%

Table-2: Organisms causing pneumonia

STATISTICAL ANALYSIS

Microsoft office 2007 was used for the analysis. Descriptive statistics like mean and percentages were used for the analysis.

RESULTS

A total of 96 patients were enrolled in the study of which 62(64.58%) were male and 34 (35.41%) were female. As per age distribution 10(10.41%) were of age group 15-29 years. 31(32.29%) were of age group 30-44 years and majority 55(57.29%) of patients were in age group more than 44 years. [Figure 1 and 2]

The most common indication of bronchoscopy was undiagnosed chest radiographical abnormalities in 41 patients (42.7%) followed by tuberculosis 20(20.83%), malignancy 13(13.54%), haemoptysis 11(11.45%), pneumonia 10(10.41%) and tracheo oesophageal fistula in 1(1.04%) patient [Table 1].

Bronchoscopy findings were normal in 39(40.6%) patients, intraluminal growth in 18(18.7%) from which biopsy were taken, extra luminal compression in 6(6.2%), purulent secretions in 11(11.4%), distorted architecture/anatomical variability in 5(5.2%), vocal cord palsy in 2(2%), bronchomalacia in 2(2%) and tracheo oesophageal fistula in 1(1%) patients.[Figure 3]

15 patients were confirmed having pneumonia on bronchoalveolar lavage/bronchial aspirate gram staining and culture among which pneumococci was the causative organism in 6(40%), staphylococci in 5(33.3%), klebsiella in 3(20%) and pseudomonas in 1(6.6%).In 2 patients fungus were isolated on potassium hydroxide (KOH) staining further confirmed by fungal culture among which candida was found in 1(50%) patient and aspergillus fumigatus was found in another(50%). [Table 2]

Procedure were not without complications and bronchospasm developed in 7(7.3%) which were managed well, Endobronchial haemorrhage in 6(6.25%) during undertaking transbronchial biopsy which were mild and adequately

Complication	No. of patients (n=96)	Percentage
Desaturation	5	5.20%
Bronchospasm	7	7.30%
Pneumothorax	0	0%
Haemorrhage	6	6.25%
Death	1	0.01%

Table-3: Complications of bronchoscopy

Diagnosis (n=96)	15-29 years n (%)	30-44 years n (%)	>44 years n (%)	Male n (%)	Female n (%)
Tuberculosis(n=29)	6(20.68%)	11(37.93%)	12(41.37%)	17(58.62%)	12(41.37%)
Pneumonia(n=17)	2(11.76%)	6(35.29%)	9(52.94%)	11(64.70%)	6(35.29%)
Malignancy(n=21)		3(14.28%)	18(85.71%)	14(66.66%)	7(33.33%)
Sarcoidosis		2(2.08%)		2(2.08%)	
Tracheo oesophageal fistula		1(1.04%)		1(1.04%)	
Non- diagnostic	2(2.08%)	8(8.33%)	16(16.66%)	17(17.70%)	9(9.37%)

Table-4: Final diagnostic distribution as per age and sex

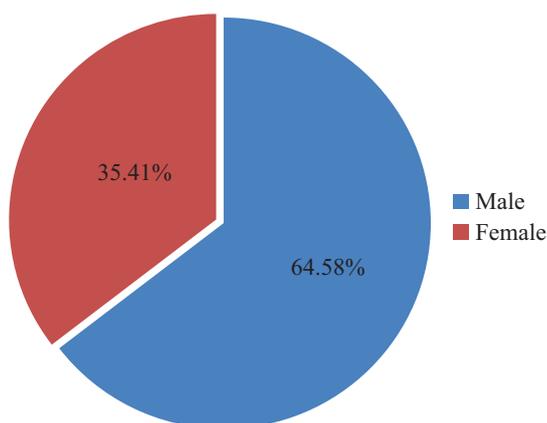


Figure-1: Sex distribution

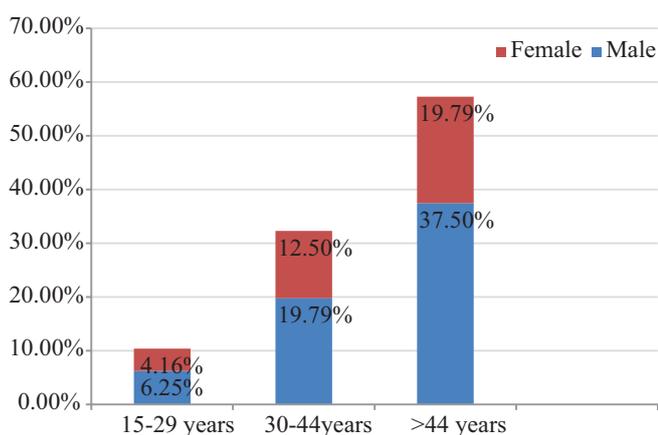


Figure-2: Age and sex distribution

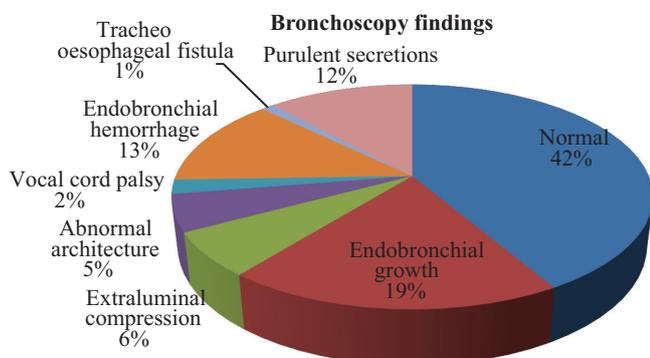


Figure-3: Bronchoscopy findings

controlled, desaturation in 5(5.2%) which recovered on oxygenation and death occurred in 1(1.04%) patient during the procedure due to hypoxemia and cardiac arrest.[Table 3].

DISCUSSION

Development of the flexible fibreoptic bronchoscopy (FOB) is a boon in modern medical science by which we can explore the tracheobronchial tree and also acquire various samples like endobronchial and transbronchial biopsy, selective mucosal brushing, bronchoalveolar lavage and bronchial aspirate which can aid to our knowledge of underlying pathology.⁴ Bronchoscopy is currently the primary means for diagnosis pulmonary malignancies.⁵

About 96 patients were enrolled in present study and their indications, complications and findings were assessed.

Undiagnosed chest radiological abnormalities was the most common indication of bronchoscopy in our patients (in 42.7% of cases), followed by clinical suspicion of tuberculosis in 20.83%, malignancy in 13.54%, hemoptysis in 11.45%, pneumonia in 10.4% and tracheo oesophageal fistula in 1%. Mc Guiners G et al (1994) evaluated the cases of haemoptysis by bronchoscopy. Bronchoscopically examined airways were normal in 23% patients and focal endobronchial abnormality was found in 32%. The bleeding site was identified in 40% cases.⁶

We observed that fibreoptic bronchoscopy was diagnostic in 45% (44 cases) of patients whereas in the study conducted by Fein AM and colleague⁷ the fibreoptic bronchoscopy was diagnostic in 12 out of 14 (86%) patients.

On observation of tracheobronchial tree, bronchoscopy findings were normal in 40.6% in present study, endobronchial growth was found in 18.7% and extra luminal compression in 6.2%. Endobronchial haemorrhage occurred during taking biopsy in 12.5% cases. Abnormal architecture was found in 5.2% of cases most of whom had history of tuberculosis in the past. Vocal cord palsy was found in 2% of cases, both of them having complained of hoarseness of voice. Purulent secretions came out in 11.4% cases, most of them were diagnosed with bronchiectasis. 2% patients were observed having bronchomalacia during bronchoscopy but there was no adverse outcome. One patient was diagnosed having tracheo oesophageal fistula.

In 29 patients bronchial aspirate revealed acid fast bacilli in Zeihl-neelsen (ZN) staining/ Gene xpert examination. Majority of tuberculosis cases were in more than 44 years age bracket (41.37%) with males accounting for 58.62% and females 41.37%. [Table 4]. In these patients repeated sputum examinations were negative for acid fast bacilli (AFB) despite clinical and radiological evidences suggestive of tuberculosis. Bronchial washings were found to have better diagnostic yield of acid fast bacilli (AFB) on direct smears or gene xpert as compared to standard sputum smear examinations. In the present study, most of the suspected pulmonary tuberculosis cases were confirmed later on by bronchoscopy. This coincides to a study done by Bachh *et al.*, in Andhra Pradesh, India where the investigators found that bronchoscopy could confirm the diagnosis of pulmonary tuberculosis in 83.33% (50/60) of the suspected sputum smear negative cases.⁸ This can be expected in a country like India where tuberculosis is a commonly encountered clinical condition.⁹

In present study bacterial pneumonia was found in 15 (15.6%) patients. Among them *Streptococcus pneumoniae* was grown in 6 (40%), *Staphylococcus* in 5(33.3%), *Klebsiella* in 3 (20%) and *Pseudomonas* in 1(6.6%) patient. Fungal growth was observed in 2 (2.08%) bronchial aspirate culture among which 1 showing *Candida* and the other showing *Aspergillus fumigatus*. The study conducted by Kyprianou A et al¹⁰ found fungal infection in 14% of the patients, which is quite high as compared to the present study.

In the present study lung malignancy was found in 21 patients (21.87%) more in males (66.66%) than in females (33.33%).

This may be explained by habit of smoking found more in males than females in this part of the world. Malignancy was also observed more in higher age group (>44years) at 85.71%. Johnson JL et al,¹¹ have reported various type of lungs malignancy in up to 11% patients.

Sarcoidosis was diagnosed in 2 patients based on clinical sign, symptoms and endobronchial biopsy showing non caseating granuloma. Bronchoscopy remained non diagnostic in 27% of cases.

Provided some basic precautions are taken flexible bronchoscopy is an extremely safe procedure. A recent retrospective study of over 4000 cases, including 2000 lavages and 173 trans bronchial biopsies showed no deaths and minor complication rates of 0.5% or 0.8% respectively.¹² In one study, pneumothorax occurred in 5% of cases and haemorrhages in 9%, which were usually mild.¹³ In our study no pneumothorax occurred and haemorrhage occurred in (6.25%) patients which were mild and effectively controlled. A large study showed that profuse bleeding was more likely after transbronchial than endobronchial biopsy and no death was directly attributable to bleeding.¹⁴ Desaturation has been observed to occur during bronchoscopy in several studies. In our study desaturation occurred in 7 patients (7.3%). However there was no complication after oxygen supplementation in all but 1 patient.

One patient died of complication occurring during the procedure. Patient developed hypoxemia, bronchospasm, arrhythmia and cardiac arrest during the procedure and could not be revived. Arrhythmias and cardiac arrest have been described during fiberoptic bronchoscopy.

Our study was mainly limited to diagnostic bronchoscopy due to lack of facility for therapeutic bronchoscopy, that was the main limitation of our study. Our study findings correlated with most of the other studies done elsewhere, some differences may be due to small sample size in present study.

CONCLUSION

Fiberoptic bronchoscopy is a very useful procedure in arriving to a diagnosis in an undiagnosed lung condition. It is a safe procedure provided we take appropriate precaution in selecting the cases and while doing the procedure.

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