

ROLE OF FIBEROPTIC BRONCHOSCOPY IN SUSPECTED CASES OF LUNG CANCER

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INTRODUCTION: Endobronchial examination was first carried out in the last decade of nineteenth century for the purpose of removing inhaled foreign bodies, and as long as 1904 a rigid bronchoscope with provision for suction & illumination came into use⁽¹⁾ Technologic advances during the next century facilitated development of bronchoscopy as a pivotal diagnostic tool in pulmonary medicine. The Diagnostic and therapeutic indications of fiberoptic bronchoscopy are many. Also new instruments and techniques such as transbronchial needle aspiration, Cryo, Laser, Endobronchial ultrasound will continue to expand the utility and importance of flexible bronchoscopy. This study is an attempt to analyze the role of fiberoptic bronchoscopy in the diagnostic application of suspected cases of lung malignancy at our tertiary care hospital.

MATERIAL AND METHODS: After informed consent, detailed history and clinical examination along with relevant investigations were done in patients with a Clinico-radiological suspicion of malignancy. Then the patients underwent diagnostic fiberoptic bronchoscopy as per British Thoracic Society (BTS) guidelines along with biopsy brushings and bronchio-alveolar lavage where relevant, specimens were analyzed by histopathological evaluation and cytology and tabulated. **RESULTS:** Of the 54 patients included in the study, 46 (85.19%) were males and 8 (14.81%) were females. The age group among the patients studied varied from 35 to 85 with mean age of 60.91. The diagnostic yield of bronchial washings, brushings and forceps biopsy were 54.13%, 85.71% and 95.65% for endoscopically visible lesions and it is 37.04%, 60% and 55.56% for endoscopically not visible lesions. Bronchoscopy resulted in a definitive diagnosis in more than half of the patients analyzed in our study with a positive yield of 59.26%. Among the 39 patients with definite diagnosis of malignancy, most common cell type in our study was of Squamous Cell Carcinoma occurring in 16 (41%) patients. The complications following bronchoscopic procedure were very few, minor hemorrhage following forceps biopsy and respiratory distress requiring observation was seen in 2(3.70%) patients, Hypoxia requiring postponement of the procedure occurred in 1(1.85%) patient. **CONCLUSIONS:** Males constituted majority of our study population (85.19%) with mean age of 60.91. The most common symptom in our study was cough followed by breathlessness. FOB was extremely useful in the diagnosis of malignancy, with a overall positive diagnosis following FOB in more than half of the patients(59.26%), forceps biopsy being the most yielding procedure with an overall yield of 84.38%, more so among endobronchially visible lesions. Trivial complications associated with bronchoscopy, makes it a safe procedure in our selected cases.

KEYWORDS: Fiberoptic Bronchoscopy, Lung Cancer, Biopsy, Broncho-alveolar lavage (BAL).

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INTRODUCTION: Endobronchial examination was first carried out in the last decade of nineteenth century for the purpose of removing inhaled foreign bodies, and as long as 1904 a rigid bronchoscope with provision for suction & illumination came into use⁽¹⁾. Technologic advances during the next century facilitated development of bronchoscopy as a pivotal diagnostic tool in pulmonary medicine. Although a number of bronchoesophagologists contributed to refinement of the technique based upon use of rigid instrument, the advent of flexible fiberoptic bronchoscopy, pioneered by Shigeto Ikeda in 1967, opened new horizons to clinicians.⁽²⁾

Essentially, flexible bronchoscope has replaced the rigid, open tube bronchoscope in the diagnosis and management of inflammatory, infectious and malignant diseases of the chest and has revolutionized the diagnosis and therapeutic approach in respiratory diseases.⁽¹⁾ The Diagnostic and therapeutic indications of fiberoptic bronchoscopy are many. Also new instruments and techniques such as transbronchial needle aspiration will continue to expand the utility and importance of flexible bronchoscopy.⁽³⁾ Bronchial biopsy of visible bronchogenic cancers is positive in 73–96% cases. Studies have shown that three to five biopsies are needed to reach 90–100% sensitivity. The specificity of bronchial biopsy for lung cancer is reported to be 62– 95%.⁽⁴⁾

In recent day practice, flexible bronchoscopy has become perhaps the most commonly employed invasive procedure in the practice of pulmonary medicine. This study is an attempt to analyze the role of fiberoptic bronchoscopy in the diagnostic application of suspected cases of lung malignancy at our tertiary care hospital.

AIM OF THE STUDY:

- To study the clinical profile of patients undergoing FOB
- The usefulness of bronchial washings, brush and forceps biopsies through a flexible bronchoscope in the diagnosis of malignant lesions.

MATERIAL AND METHODS: A prospective observational study of adult patients who had Clinico-radiological suspicion of malignancy, who underwent Diagnostic Fiberoptic bronchoscopy. Once a presumptive diagnosis was made, fiberoptic bronchoscopy was done in all these patients for confirmation of the diagnosis after taking an informed consent as per BTS guidelines.

Inclusion criteria: All patients undergoing Diagnostic Fiberoptic bronchoscopy who had Clinico-radiological suspicion of malignancy

- i) Exclusion Criteria: Patients not meeting fitness criteria as per British Thoracic Society (BTS) guidelines for FOB
- ii) Patients undergoing repeat Bronchoscopy for other than diagnostic reasons.
- iii) Patients not willing to participate in the study.

RESULTS: A Total of 54 patients were included in this study after considering the inclusion and exclusion criteria.

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I. Age and sex Distribution: Of the 54 patients 46 (85.19%) were males and 8 (14.81%) were females. The age group among the patients studied varied from 35 to 85 with mean age of 60.91 with a standard deviation of 11.69 and most of them falling into the advanced age group of more than 60 years as evident from table 1.

Age	No. of Pt	Percent
20 - 39	2	23.26
40 - 59	22	39.53
> 60	30	36.43

Table 1

II. Symptomatology:

Sl. No	Symptom	Number	Percent
1	Cough	48	88.89
2	Breathlessness	33	61.11
3	Fever	22	40.74
4	Hemoptysis	16	29.63
5	Chest pain	15	27.78
6	Others	09	16.67

Table 2

Analysis of symptoms among patients, who were included in the study (Table.2), showed that cough was the most common symptom occurring in 48 patients (88.89%), Shortness of breath, fever and chest pain were seen in decreasing frequency in that order in 33 (61.11%), 22 (40.74%), 15 (27.78%) respectively and hemoptysis occurred in 16 patients (29.63%). Rarer symptoms like wheeze and hoarseness of voice were seen in 9 (16.67%) patient in total. Multiple symptoms simultaneously occurred in more than half of the patients.

III. Radiological findings

Sl. No	Radiological Findings	Total	Percent
1	Hilar Adenopathy	01	1.85
2	Collapse	09	16.67
3	Mass	23	42.59
4	Pneumonia / Unresolved pneumonia	21	38.89

Table 3

Analysis of radiological findings among the 54 patients studied showed that mass lesion was the most common finding occurring in 23(42.59%) patients followed by pneumonia or unresolved pneumonia in 21(38.89%) patients, Lobar collapse was seen in 9(16.67) patients and one patient had hilar adenopathy.

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IV. Bronchoscopic findings:

Sl. No	Findings	Number	Percent
1	Normal	4	7.41
2	Foreign Body	1	1.85
3	Bleed	2	3.70
4	External compression	11	20.37
5	Structural changes	2	3.70
6	Growth	24	44.44
7	Inflammation	10	18.52

Table 4

Bronchoscopic examination showed vocal cord involvement in 4 (7.41%) of 54 patients studied, of which left cord was involved in 3 patients and right cord in 1 patients. Endobronchial growth was the most common finding 24 (44.44), followed by external compression seen in 11 (20.37%). Inflammatory changes of the Endobronchial Lumen occurred in 10 patients (18.52%), Structural changes such as fibrosis; atrophic mucosa, bronchostenosis, and distorted anatomy were seen in 2 patients (3.70%). Foreign body in the form of a vegetable seed was seen in one patient but could not be removed and required rigid bronchoscopic intervention.

V. Procedure and Results: Forceps biopsy, bronchial brushings and bronchial washings were the procedures done. Almost all procedures were diagnostic. Bronchial washings were done in 51 of 54 patients with a positive yield in 23 (45.1%) of them. In 12 of the 54 patients brushings were taken and 9(75%) were found to be consistent with malignancy. Of the 32 patient in whom endobronchial biopsy was taken, 27 (84.38%) turned out to be positive for malignancy. 15 patients underwent 22 other modes of investigations like CT or USG guided FNAC, lymph node biopsy, pleural fluid analysis & pleural biopsy and 7 were diagnosed to have malignancy.

Malignancy	39 / 54	72%
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Procedure	Positive / Total	Percent
BW	23 / 51	45.1
Brush	9 / 12	75
Biopsy	27 / 32	84.38
Others	7 / 22	31.82

Table 5

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Procedure	Visible		Not Visible	
	Positive / Total	Percent	Positive / Total	Percent
Washings	13 / 24	54.13	10 / 27	37.04
Brush	6 / 7	85.71	3 / 5	60
Biopsy	22 / 23	95.65	5 / 9	55.56

Table 6

The diagnostic yield of bronchial washings, brushings and forceps biopsy were 54.13%, 85.71% and 95.65% for endoscopically visible lesions and it is 37.04%, 60% and 55.56% for endoscopically not visible lesions.

Cell types:

Cell Type	Number	Percent
Squamous	16	41.03
Undifferentiated	12	30.77
Adenocarcinoma	7	17.95
Others	4	10.26

Table 7

Among the 39 patients with definite diagnosis of malignancy, most common cell type in our study was of Squamous Cell Carcinoma occurring in 16 (41%) of patients. The exact cell type could not be identified in 12 (30.74%) patients and were managed in the lines of non-small cell lung carcinoma. Adenocarcinoma occurred in about 7 (20.59%) patients and other malignancies occurred in 4 (10.26%) patients who included 2 carcinoids and 2 metastatic malignancies, one from Hepatoma and another from GI tract tumour.

Post Bronchoscopy Diagnosis:

Positive diagnosis by FOB	32	59.26
By other Methods	07	12.96
No Specific Diagnosis	15	27.78

Table 8

Bronchoscopy resulted in a definitive diagnosis in more than half of the patients analyzed in our study with a positive yield of 59.26%, however no specific diagnosis could be obtained in 27.78% of patients as shown in the above table.

VI. Complications

Complication	Total	Percent
Minor Hemorrhage	2	3.70
Hypoxia	1	1.85
Respiratory distress	2	3.70
Arrhythmia	0	0
Cardiac arrest	0	0

Table 9

The complications following bronchoscopic procedure were very few, minor hemorrhage following forceps biopsy was seen in 2(3.70%) patients, Hypoxia requiring postponement of the procedure to a later date occurred in 1(1.85) patient and respiratory distress requiring observation following the procedure occurred in 2(3.70%) patients. However serious complications like arrhythmia & cardiac arrest did not occur in our study group.

DISCUSSION:

Age & Sex: A total of 54 patients were included in our study. The mean age of the population studied was 60.91 with standard deviation of 11.69, Males constituted the majority of the study population out numbering the female, 46 V/s 8 which is similar to most Indian and Western studies reviewed in literature.

Symptomatology: Analysis of clinical profile of patients at presentation showed that cough was the most common symptom reported by 88.89% (48) of the patients, 61.11% of study group had breathlessness and fever was reported in 40.74% of the patients. Hemoptysis (29.63%) and chest pain (27.78%) were next common symptoms in that order and 16.67% patients had other symptoms such as Hoarseness of voice & wheeze. A study by Sinha Et al⁽⁵⁾ at All India Institute of Medical Science, New Delhi showed hemoptysis as the most common symptom (31.9%) in their study, followed by fever in 29.6%, Chest pain in 20.7% and Anorexia in 6.7% of the cases. The occurrence of cough and breathlessness were not mentioned in their study.

FOB Findings: Vocal cords were involved in 4 of 54(7.41%) patients in our study, left was affected more commonly than right. This is not surprising since it is an established fact that intra thoracic course of left recurrent laryngeal nerve is long.

Intraluminal growth was seen in 24 (44.44%) patients, Extra luminal compression in 20.37%, and inflammation in 18.52% patients, however a small number of bronchoscopies had Structural changes (3.70%) & bleeding site (3.70%).

In the study by Sinha Et al⁽⁵⁾ the commonest finding in their series was necrotic / nodular growth occurring in 39.1% which is similar to our study. In their study left main bronchus was involved in 12%. Extra luminal compression was present in 9.6% which was more frequent (20.37%) in our study). However significant numbers (34.8%) of bronchoscopies were normal in

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their study compared very few (7.41%) in our study; this can be explained by the fact that we had stringent inclusion criteria and a small sample size.

PROCEDURE AND RESULTS: Forceps biopsy, bronchial brushings and bronchial washings were the procedures done. Almost all procedures were diagnostic. Bronchial washings were the most commonly done procedure in 51 patients with 45.1% positive results, 32 Biopsies were done with a positive yield of 84.38% and brushings were done in 12 patients and 9 (75%) of them were positive. In our study 54 patients were evaluated with a pre-bronchoscopic diagnosis of malignancy. Overall yield of bronchoscopic procedures in diagnosis of lung cancer was 59.26%. In our study the diagnostic yield of bronchial washings, brushings and forceps biopsy were 54.13%, 85.71% and 95.65% for endoscopically visible lesions and it is 37.04%, 60% and 55.56% for endoscopically not visible lesions. A number of studies are available in the literature with a wide range of positive yield. Over all the diagnostic accuracy of FOB and in the lung cancer varies from 30% to 98% in the literature.

Mak VH et al⁽⁶⁾ have done a retrospective study to evaluate the diagnostic yield of lung cancer by FOB. In the group with endoscopically visible tumours, biopsy gave a positive result in 76%, washings in 49.6%, brushing in 52%. In the group where FOB had no abnormal findings the diagnosis of malignancy on biopsy specimen was positive in 36.5%, washings 38.1% and brushings in 28.6%. Their findings were much lower than the results from our study.

Lam WK, So SY et al,⁽⁷⁾ reported the diagnostic yield of BAL, brushings and biopsy of 76, 74 & 82% in endobronchially visible lesions which is slightly lower than our observations, however it was 52, 52 & 61% in endoscopically not visible tumours respectively which is nearly similar to our findings.

In a study by Bing Lam, Maria P. Wong, et al,⁽⁸⁾ the positive yield of BAL, brushings & biopsy was 69%, 62.2% and 78.1% respectively. In another study by Wong PC, Lee J et al,⁽⁹⁾ overall diagnostic yield of FOB for endoscopically visible lesion is 98.1%. Endoscopically not visible is 61.5% and in patients with endobronchially not visible tumours with Fluoroscopy aid its yield was 58.5%.

Sharma SK, Pande JN et al,⁽¹⁰⁾ at AIIMS, New Delhi, analyzed reports of 588 patients who had been bronchoscoped for suspected lung cancer. In their study a tissue diagnosis was established by bronchoscopy in 30% of patients. They correlated positive diagnosis with radiological features in which 50% patient with pulmonary collapse and 38.42% with mass lesions.

Saita S, Tanzillo A et al,⁽¹¹⁾ have done a comparative evaluation of bronchial brushing and biopsy in diagnosis of visible bronchial lesions brushings showed higher sensitivity 85.5% and accuracy 86.6% than biopsy. Combination of both gives an accuracy rate of 93%.

The incidences of various procedures vary in different series. The nature of indications, preference of physicians and the availability of facilities can affect this. In our study washings was the most frequently done procedure, probably because there were predominant inflammatory lesions and external compressions and both these lesions are known to give less diagnostic yield on endobronchial biopsy. Combinations of biopsy and brushing or biopsy and washings are usually done. It is well established that combination increases the yield.

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The reported yield for various procedures also shows variation. However general trend is that biopsy is most yielding procedure. In review of literature, positive yield varies from 76 to 95% for endoscopically visible lesions, in our study it was 95.65% which is the best that could be achieved which reinforces repeatedly proved fact that bronchoscopy has a definite role in cases of lung cancer.

The overall yield of bronchoscopy in endoscopically not visible tumours varies from 11-60% and for brushings it ranges from 38 to 62.6%. The reported yield of washings range from 31.6% to 76% and yield is more positive in peripheral & infiltrative lesions. Findings in our study also correlate with the yields from the review of literature.

Complications: In our study minor hemorrhage following forceps biopsy occurred in 2 (3.7%) patients, Hypoxia resulting in postponing the procedure to later date resulted in (1.85%) one patient, 2 patients (3.7%) developed respiratory distress requiring observation following the procedure. However there were no other serious complications like arrhythmia or cardiac arrest.

Keith Hattotuva, Elizabeth A Gamle et al studied safety of bronchoscopy in patients with COPD.⁽¹²⁾ They have reported 2% incidence of complications requiring hospitalization and incidence of hemorrhage was 3.1%.

In another study assessing complications of FOB in 1328 children, J.de Blic, V Marchac et al have concluded that bronchoscopy is safe in children, recording a minor complication rate of 5.2%, in the form of desaturation, excessive cough, nausea transient laryngospasm and epistaxis and major complications occurred in 1.7%.⁽¹³⁾

PM Suratt et al have reviewed 48000 procedures and found out 10 deaths, 10 cardiac arrests and 41 reactions to anaesthetics (14). The deaths that occurred in this series were mostly attributed to severe underlying illness, rather than to the procedure per se.

In the study by Sinha et al,⁽⁵⁾ done at AIIMS, New Delhi, complication rates were hypoxia (2.4%), Postbronchoscopy bleeding (1.2%), fever (1.2%), Chest pain (1/7%) and Pneumothorax (0.51%), which is consistent with our observations.

The reported literature reinforces the fact that FOB in properly selected patients has very minimal complication rates, which was the case in our study also.

CONCLUSIONS: Males constituted majority of our study population (85.19%) with mean age of 60.91. The most common symptom in our study was cough followed by breathlessness. FOB was extremely useful in the diagnosis of malignancy, with an overall positive diagnosis following FOB in more than half of the patients (59.26%), forceps biopsy being the most yielding procedure with an overall yield of 84.38%, more so among endobronchially visible lesions. Trivial complications associated with bronchoscopy, makes it a safe procedure in our selected cases.

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