

# Study of Clinicoradiological Profile of Patients Undergoing Fiberoptic Bronchoscopy

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## Abstract

**Introduction:** Bronchoscopy is a procedure to visualize the tracheobronchial tree. There are three types of Bronchoscopy, rigid, flexible, and virtual Bronchoscopy. Rigid bronchoscopy visualizes the proximal airways. Flexible bronchoscopy is the most common type of bronchoscopy. It visualizes the trachea, proximal airways, and segmental airways up to the third generation of branching and can be used to sample and treat lesions in those airways. Flexible bronchoscopy is generally performed in a procedure room with conscious sedation. **Aims and Objectives:** To study the bronchoscopic findings in patients undergoing fiberoptic bronchoscopy. To study clinical and radiological profile of patients undergoing fiberoptic bronchoscopy. To correlate the bronchoscopic findings with clinical and radiological profile of patients undergoing fiberoptic bronchoscopy. **Methodology:** Present study was conducted in the department of Respiratory Medicine of a Medical College and tertiary health centre. A total of 72 patients were included in this study after satisfying inclusion and exclusion criteria. The cases were recruited from the department of Respiratory and the referred cases from other department were also included. Written informed consent was taken from all the patients after explaining complications occurring during and after bronchoscopy. Procedure was done under local anesthesia. Information regarding clinical features and radiological findings were noted in predesigned proforma. **Results:** In this study 72 patients underwent fiberoptic bronchoscopy. Procedure was done under local anesthesia in all these patients. All these were diagnostic bronchoscopies. The bronchoscopy was done more in male (68.05%) as compared to females (31.94%). Consolidation (43.06%) was most common radiological finding followed by mediastinal mass lesion (26.39%). The most common finding on bronchoscopy was growth (25%) followed by secretions (22.22%). However in 27.78% patients no bronchoscopic finding was seen; these were patients with subcarinal lymph node, some cases of pneumonias, some cases of bronchiectasis. In those cases where no finding was seen bronchoalveolar lavage was taken. BAL (68 cases) was the most common procedure done, second most common was lung biopsy of the visible growth (21) However biopsy of the visible growth was more accurate with the accuracy rate of 76.91% followed by trans bronchial lung biopsy of the suspected lesion. Bronchoscopy was conclusive to give final diagnosis in 56 out of 72 cases. There was positive correlation between clinicoradiological diagnosis and bronchoscopic diagnosis. In 59.72% cases there was positive correlation between bronchoscopy and clinicoradiological findings. Consolidation (43.06%) was most common radiological finding followed by mediastinal mass lesion (26.39%). **Conclusions:** Bronchoscopy is an excellent tool for the diagnosis of lung diseases, Radiological and clinical evaluation is very important prior to the bronchoscopy. There is a correlation between clinicoradiological and bronchoscopic diagnosis. A multimodality approach for the diagnosis is always helpful.

**Keywords:** Bronchoscopy, Clinical, Radiological

## 1. Introduction

Bronchoscopy is a procedure done to visualize the tracheobronchial tree. There are three types of Bronchoscopy, rigid, flexible, and virtual Bronchoscopy.

Flexible bronchoscopy is the most common type of bronchoscopy. It visualizes the trachea, proximal airways,

and segmental airways up to the third generation of branching and can be used to sample and treat lesions in those airways. Flexible bronchoscopy is a procedure usually performed by pulmonologist for diagnosis of various lung diseases. Flexible bronchoscopy is generally performed in a procedure room with conscious sedation.

Flexible fibroptic bronchoscopy was introduced by

lkeda for the early diagnosis of bronchial carcinoma. Fiberscope became available for commercial use in 1967. In the earlier days of rigid Bronchoscopy, patients with pulmonary tuberculosis were subjected to bronchoscopy for preoperative evaluation and to monitor results of drug therapy but seldom for diagnostic purposes. Subsequently, flexible fiberoptic bronchoscopy has been reported to be useful in the confirmation of the diagnosis of PTB, especially in patients with sputum smear Negative. Later on bronchoscopy was performed for unexplained chest symptoms such as persistent cough, haemoptysis, wheezing, hoarseness. Persistent lung collapse (atelectasis) can be evaluated using bronchoscopy. This may reveal obstruction due to thick mucus, a foreign body, or a tumor. An abnormal chest x-ray like mass, non resolving pneumonia, or other unexplained changes on chest x-ray or Computed Tomography (CT) scans can be diagnosed by bronchoscopic procedures like bronchial biopsy, BAL (Bronchoalveolar Lavage), brushings.

The rigid bronchoscope allows visualization of the proximal and larger airways, including the lobar, segmental, and subsegmental bronchi, while maintaining effective gas exchange. Rigid bronchoscopy is preferred for aspiration of large volumes of blood or secretions, removal of foreign bodies, large-sized biopsy specimens. Rigid bronchoscopy is mostly performed in children.

Several variants of traditional flexible bronchoscopy exist. Endobronchial ultrasound is performed using a flexible bronchoscope facilitating transbronchial needle aspiration of abnormalities such as enlarged lymph nodes. Electromagnetic navigation bronchoscopy is performed using a flexible bronchoscope with an electromagnetic guidance system.

Virtual bronchoscopy consists of computer generated pictures of the endobronchial tree, which are constructed from computed tomography images of the thorax. It has the advantage of being noninvasive, being able to define the airways out to the seventh generation of branching, and providing important information about structures outside the airways e.g., lymph nodes. However, it is not yet widely available and mucosal abnormalities are not well seen.

The bronchoscope is now being used with lasers to help remove and destroy tumor in the lungs. sometimes, probes can be passed through the scope to freeze bleeding sites or to shrink the tumors .

## 2. Aims and Objectives

To study the bronchoscopic findings in patients undergoing fiberoptic bronchoscopy.

To study clinical and radiological profile of patients undergoing fiberoptic bronchoscopy.

To correlate the bronchoscopic findings with clinical and radiological profile of patients undergoing fiberoptic bronchoscopy.

## 3. Methodology

Present study was conducted in the department of Respiratory Medicine of a Medical College and tertiary health centre. A total of 72 patients were included in this study after satisfying inclusion and exclusion criteria.

The cases were recruited from the department of Respiratory and the referred cases from other department were also included. Written informed consent was taken from all the patients after explaining complications occurring during and after bronchoscopy. Procedure was done under local anesthesia.

Information regarding clinical features and radiological findings were noted in predesigned proforma.

## 4. Results

In this study 72 patients underwent fiberoptic bronchoscopy. Procedure was done under local anesthesia in all these patients. All these were diagnostic bronchoscopies. The more number of bronchoscopies were done for indication of nonresolving pneumonia and suspected malignancy

The bronchoscopy was done more in male (68.05%) as compared to females (31.94%).

The age group was between 4-60 yrs (44%) was major age group and minimum age group found to be 20-30 yrs (8.33%).

The commonest chief complaints were cough with expectoration (66.67%). Second most common symptom was fever (33.33%). While 13.89% patients had no symptoms.

Consolidation (43.06%) was most common radiological finding followed by mediastinal mass lesion (26.39%).

**Table 1.** Radiological findings in cases

Radiological finding	No of cases	Percentage(n=72)
Collapse	3	4.17
Hilar node	18	25
Consolidation	31	43.06
Cavity	5	6.94
Plural effusion	2	2.78
Mediastinal mass	19	26.39
Bronchiectasis	7	9.72
Normal	2	2.78

The most common finding on bronchoscopy was growth (25%) followed by secretions (22.22%). However in 27.78% patients no bronchoscopic finding was seen; these were patients with subcarinal lymph node, some cases of pneumonias, and some cases of bronchiectasis. In those cases where no finding was seen bronchoalveolar lavage was taken.

**Table 2.** Bronchoscopic findings in cases

Bronchoscopy Finding	No of Cases	Percentage (N = 72)
Secerition	16	22.22
Inflammation	11	15.28
external compression	1	1.39
Growth	18	25
Narrrowing of bronchi	2	2.78
Collapse	3	4.17
Ulceration	5	6.94
Nil	20	27.78

BAL (68 cases) was the most common procedure done, second most common was bronchial biopsy of the visible growth (21). However biopsy of the visible growth was more accurate with the accuracy rate of 76.91% followed by trans bronchial lung biopsy of the suspected lesion. BAL and TBNA had lower yield than the other procedures.

**Table 3.** Results of various bronchoscopic procedures

Type of procedure	No of procedure	Positive result	Percentage
BAL	68	37	54.41
Biopsy growth	21	16	76.19
TBNA	17	7	41.18
Trans bronchial	6	4	66.67
BRUSH	5	3	60
<b>Total</b>	<b>117</b>	<b>67</b>	<b>57.26</b>

Bacteria isolated from bronchial aspirate. Most common bacteria isolated was Streptococcus pneumoniae (12.50%). Second most common was mycobacterium TB (11.11%). In 55.56% cases there was no growth on culture. All the samples were cultured on blood agar, MacConkey agar and chocolate agar. In suspected cases of tuberculosis aspirate was cultured on Lowenstein Jensen medium. The colonies were examined after 24 hours in cases of pyogenic bacterial and 6 weeks in cases of tubercle bacilli.

Maximum number of bronchoscopies were done in the cases of slow resolving pneumonia (37.50%) and then in the cases of suspected malignancies of the lung (36.11%). Endobronchial growth always alarmed about malignancy.

Out of 21 endobronchial growth 16 were histologically proved to be lung carcinomas.

Inflammation was associated with bronchitis, pulmonary tuberculosis, lung abscess, resolving pneumonia and few cases of malignancies.

External compression was seen in the cases of pleural effusion and mediastinal lymphadenopathy. Ulceration was found in the cases of pulmonary tuberculosis and provided the diagnosis of endobronchial tuberculosis as malignancies.

**Table 4.** Final diagnosis of cases

Final diagnosis	No of cases	Percentage
Abscess	4	5.56
Bronchiectasis	7	9.71
Bronchitis	3	4.17
Pleural effusion	1	1.39
Malignancy	28	38.89
Pneumonia	21	29.17
TB	8	11.11
<b>Total</b>	<b>72</b>	<b>100</b>

Malignancy was the most common final diagnosis followed by non resolving pneumonias. Squamous cell carcinoma (18.06%) was the most common lung malignancy in our study. Second most common malignancy was Adenocarcinoma (12.50%). Bronchoscopies in lung abscess were done to obtain the culture and identification of the causative agent.

Bronchoscopy was conclusive to give final diagnosis in 56 out of 72 cases.

**Table 5.** Association between bronchoscopic findings and final diagnosis

Final Diagnosis	Bronchoscopic findings						Total
	Abscess	bronchiectasis	malignancy	pneumonia	tb	nil	
Abscess	4	0	0	0	0	0	4
Bronchiectasis	0	3	0	0	0	4	7
Bronchitis	0	0	0	0	0	3	3
Pleural effusion	0	0	0	1	0	0	1
Malignancy	0	0	21	0	0	7	28
Pneumonia	0	0	0	19	0	2	21
Tuberculosis	0	0	0	0	8	0	8
<b>Total</b>	<b>4</b>	<b>3</b>	<b>21</b>	<b>20</b>	<b>8</b>	<b>16</b>	<b>72</b>

There was positive correlation between clinicoradiological diagnosis and bronchoscopic diagnosis. In 59.72% cases there was positive correlation between bronchoscopy and clinicoradiological findings.

## 5. Discussion

Fiberoptic bronchoscopy is a procedure that allows a clinician to examine the airways of the lungs. Fiberoptic Bronchoscopy can be either a diagnostic procedure (to find out more about a possible problem) or a therapeutic procedure (to try to treat an existing problem or a condition).

In the series described by Jindal et al.,<sup>1</sup> age range was 18 to 75 years and 74% of patients fell in the age group 40-70 years. In the present study of 72 cases age range was 20-80 yrs. The bronchoscopy was done more in male as compared to females. The age group between 41-60 years (44%) was major age group and minimum age group found to be 20-30 years (8.33%).

This study has covered patients enrolled for diagnostic purposes the therapeutic bronchoscopies were not included in this study.

The diagnosis of lung malignancy was established in 28. The value of flexible fiberoptic bronchoscopy as a diagnostic tool in lung cancer is undisputed. A tumour is viewable at bronchoscopy depending upon its location and stage at which the test is performed. While the visualization of growth can be as low only 37%<sup>2</sup>, 75%<sup>3</sup> and 61%<sup>4</sup> in other series.

BAL was the most common procedure done second most common was bronchial biopsy of the visible growth. In our series 21 cases had directly visible tumour. However biopsy of the visible growth was more accurate with the accuracy rate of 76.19% followed by Trans bronchial lung biopsy of the suspected lesion. BAL and TBNA had lower yield than the other procedures. Biopsy to the endobronchial growth was the major reason for performing the bronchoscopy

Histologically positive rate for visible tumours is reported to be high 93%<sup>2</sup>, 71%<sup>3</sup>. In 4 out of 6 cases transbronchial lung biopsy came positive for malignancy while brush was positive in 3 out of 5 cases. TBNA was positive in 7 out of 17 procedures. TBNA was done blindly and not under the fluoroscopic guidance. BAL was the most common procedure done 68 and came positive in only 37 cases accuracy was low as. Out of total 117 procedures done bronchoscopy gave positive result in 67 procedures. Accuracy was low in TBNA and BAL. Overall accuracy was 57.26%

Zavala et al.,<sup>5</sup> has 55% positive bronchoscopic results. Mitchel et al.,<sup>6</sup> found 98 percent positive diagnosis of cancer by combined cytological and histopathological sampling.

Ikeda, Webb and Clark, Richardson et al.,<sup>8</sup> and MacDonald<sup>7</sup> have shown that when tumor is viewable at

bronchoscopy an accurate histological diagnosis can be made in at least 85 to 90 percent of cases.

Jindal et al.,<sup>1</sup> reported 48.4% and 20.4% squamous cell and small cell cancer respectively.

Slow resolving pneumonia was present in 29.17% of the series. The causes for slow resolution were narrowed bronchi, mucus impaction, inflammatory stenosis and bronchiectasis. Somner et al.,<sup>9</sup> also advocated bronchoscopy in slow resolving pneumonia only, and of no use in resolving pneumonitis. Average age of the patients in pneumonia was 40-60 yrs in his series.

In<sup>8</sup> (11.11%) cases pulmonary tuberculosis was the final diagnosis. The main indication for bronchoscopy was chronic cough. In<sup>5</sup> (6.94%) cases endobronchial ulceration was seen.

5(6.94%) patients were finally diagnosed as having lung abscess. In all these cases mucopurulent secretions were aspirated for clearing the airways in assistance of physiotherapy and postural drainage. Bronchofiberscopy was also done to search for the site of haemoptysis, to rule out lung cancer and to decide tubercular etiology of the abscess and biopsy was taken whenever it was necessary.

Jain et al.,<sup>10</sup> described single organism in 72% of cases and mixed flora in 28% of 24 cases of lung abscesses as against single organism in 71.42% in the present series,

Bronchoscopy is a valuable diagnostic procedure when lung abscess is present. The airway can be inspected for obstructive lesion such as stenosis, foreign bodies and tumours, Specimens can be obtained by biopsy and at times by aspiration or brushing directly from the cavity. Drainage of the abscess content is promoted by suctioning during the procedure and coughing after it. 4 cases showed complete improvement. 1 case did not improve and was sending for surgical opinion. These patients were treated conservatively.

There were 7 (9.71%) cases of bronchiectasis. In all the cases HRCT was done. All patients complained of cough with mucopurulent expectoration. 2 complained of haemoptysis, Mucopurulent secretions were aspirated from all these patients and sent for culture.

Pussel<sup>11</sup> had 24% of of haemoptysis within bronchiectasis. In review of 1109 cases somner has mentioned post stenotic obstruction as a major indication for bronchoscopy in bronchiectasis. According to him general standard of bronchoscopy was not improved by preliminary bronchoscopy and abnormality of bronchi was found in 6.25% of cases, in each cases it was a fibrous stricture clearly seen in the bronchogram. He concludes that bronchoscopy is not a very profitable routine investigation in bronchiectases, If however surgical treatment is contemplated bronchography should

invariably be supplemented with bronchoscopy as failure to discover a fibrous stricture in major bronchus might seriously prejudice the result of operation.

In 22.22% cases secretions were present. Inflammation was seen in 15.28% cases mostly seen in bronchiectasis, lung abscess, pulmonary tuberculosis and slow resolving pneumonias as a major group.

Haemoptysis was seen in 5 cases. In our study bronchoscopy was not performed in active Haemoptysis. We performed bronchoscopy after the haemoptysis was stopped.

According to Selecky (1978)<sup>13</sup> fibroscope has proved very useful for the assessment of haemoptysis which in some series has accounted for up to of 30% bronchoscopies. Kovnat et al., (1974)<sup>14</sup> found greater visual range of the fibroscope which allows accurate identification and localization of a greater number of peripherally situated sites of haemoptysis. The localization of the site of bleeding is particularly important in massive haemoptysis when emergency surgical resection may be necessary.

In our study there was positive correlation between clinicoradiological diagnosis and bronchoscopic diagnosis. In 59.72% cases there was positive correlation between bronchoscopy and clinicoradiological findings. Bronchoscopy was conclusive to give final diagnosis in 56 out of 72 cases. In the study by Brownback KR Simpson SQ et al.,<sup>15</sup> showed that there is association of bronchoalveolar lavage yield with chest computed tomography findings and symptoms in immune compromised patients, the overall diagnostic yield was 52.6% in their study.

Cazzato s, Zompatori M, Burzi M, Baruzzi G, Falcone F, Poletti V et al.,<sup>16</sup> showed that high resolution computed tomography can be helpful in prediction the diagnostic accuracy of bronchological procedures, in particular of bronchoalveolar lavage and trans bronchial biopsy, and that alveolar and /or ground-glass are favorable patterns for these diagnostic tools. The diagnostic yield of TBB (76%) and BAL (56%) in their study.

Clare Laroche, Ian Fairbairn et al.,<sup>17</sup> showed that performing initial CT thoracic scans before bronchoscopy in patients with suspected endobronchial malignancy is a cost effective way of improving diagnostic yield. In their study bronchoscopy was diagnostic in 50 of 68 (73%).

## 6. Conclusions

- Bronchoscopy is an excellent tool for the diagnosis of lung diseases, Radiological and clinical evaluation is very important prior to the bronchoscopy.
- Transbronchial biopsy, protected brush specimen and TBNA all are very helpful to provide the diagnosis,

However the yield can be improved even more with the help of EBUS, Fluoroscopic lung biopsies, Virtual bronchoscopy.

- Yield is better in cases of malignancies.
- There is a correlation between clinicoradiological and bronchoscopic diagnosis.
- With newer diagnostic technique the yield of bronchoscopy will increase in near future.

## 7. References

1. Jindal SK, Dhand R, Malik SK, Datta BN, Gupta SK. Experience with fiberoptic bronchoscopy in lung cancer. *Indian J Chest Dis Allied Sci.* 1982; 24:239-43.
2. Martin M, McCormick PM. Assessment of endoscopically visible carcinoma. *Chest.* 1978; 73(Supplement):718. [https://doi.org/10.1378/chest.73.5\\_Supplement.718](https://doi.org/10.1378/chest.73.5_Supplement.718)
3. Kvale PAM, Bode FR, Kini S. Diagnosis accuracy in lung cancer comparison of technique used in association with fiberoptic bronchoscopy. *Chest.* 1976; 69:752. PMID:1277894. <https://doi.org/10.1378/chest.69.6.752>
4. Poe RH, Israel RH, Martin MG. Utility of fiberoptic bronchoscopy in patients with haemoptysis and non localizing chest roentgenogram. *Chest.* 1988 Jan; 93(1):70-5.
5. Zavala DC. Diagnostic fiberoptic bronchoscopy. Technique and results of biopsy in 600 patients. *Chest.* 1975; 68:12. PMID:168036. <https://doi.org/10.1378/chest.68.1.12>
6. Mitchell. Normal x ray with haemoptysis. *Brit Med J.* 1960; 1:592.
7. Donald JBM. Fiberoptic bronchoscopy today, a review of 225 cases. *Brit Med Journal.* 1975; 3:753. <https://doi.org/10.1136/bmj.3.5986.753>
8. Richardson RH, Zavala DC, Mukherji PK. The use of fiberoptic bronchoscopy and brush biopsy in the diagnosis of suspected pulmonary malignancy. *A Rev Resp Dis.* 1974; 109:63.
9. Somner AR, Hillis BR, Douglas AC, Marks BL. Value of bronchoscopy in clinical practice. A review of 1109 examination. *Brit Med Journal.* 1958; 50:79.
10. Auerbach. *Pulmonary Tuberculosis.* Pagel W, Simmonds FAH, editor. Macdonald Norman. London: Oxford University Press; p. 331.
11. Jain SM, Sepaka GL, Mehta J. Study of bronchopulmonary supportive diseases with special reference to bacterial etiology. *The Indian Journal of Chest Diseases.* 1974; 16.
12. Pussell SE, Lindskog GE. Haemoptysis: Clinical evaluation of 105 Patients. *AM Rev Resp Dis.* 1961; 84:329.
13. Selecky PA. Evaluation of haemoptysis through the bronchoscope. *Chest.* 1978; 73(supplement):741.
14. Kovnat DM, Anderson WM, Rath GS. Haemoptysis secondary to retained transpulmonary foreign body. *Am Rev Resp Dis.* 197; 109:279. PMID:4811783.
15. Brownback KR, SIMPSON SQ. Association of bronchoalveolar lavage yield with chest computed tomography findings and symptoms in immunocompromised patients.

- Ann Thorac Med. 2013 Jul; 8(3):153-9. Doi:10.4103/1817-1737.114302. <https://doi.org/10.4103/1817-1737.114302>
16. Cazzato S, Zompatori M, Burzzi G, Falcone F, Poletti V. Bronchoalveolar lavage and transbronchial lung biopsy in alveolar and/or ground- glass opacification. *Monaldi Arch Chest Dis*. 1999 Apr; 54(2):115-9. PMID:10394823.
17. Laroche C, Moss H, Pepke-Zaba H. Role of computed tomographic scanning of the thorax prior to bronchoscopy in the investigation of suspected lung cancer. *Thorax*. 2000; 55:359-63. Doi: 10.1136/thorax.55.5.359. <https://doi.org/10.1136/thorax.55.5.359>