

## Original Article

# Diagnostic Yield of Bronchoscopy in Benign Lung Diseases at Tertiary Health Care Hospital in South Gujarat

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**Methodology** : Sixty patients with benign lung disorders like Suspected Sputum Negative Pulmonary Tuberculosis, Suspected Fungal Pneumonia, Suspected Bacterial Pneumonia and Suspected Interstitial Lung Disease were enrolled from April, 2020 to April, 2021 in this study. Detailed clinical history, physical examinations and necessary investigations were carried out. Eligible patients were subjected for fiberoptic video bronchoscopy. During Bronchoscopy Gross fiberoptic bronchoscopy findings noted and Bronchoalveolar lavage or tissue were sent for necessary investigations. Data entry and analysis were done using MS Excel sheet 2013.

**Result** : Overall diagnostic yield of bronchoscopy in 60 patients was 63.3%. Out of 37 Sputum negative suspected cases of Pulmonary Tuberculosis posted for bronchoscopy, 22(59.4%) cases were confirmed to have tuberculosis, only 1(2.7%) case was having Bacterial pneumonia and 2(3.4%) cases were diagnosed with Tuberculosis had super added bacterial infection. Other 13 patients suspected of having bacterial pneumonia, 7(53.3%) patients were confirmed to have bacterial pneumonia while 2(15.3%) cases were found positive for tuberculosis. Out of 5 suspected cases of fungal pneumonia and 5 suspected cases of Interstitial Lung Disease, each 2(40%) patients had positive findings respectively. Overall complications developed in 7(11.7%) patients.

**Conclusion** : Our study suggests, fiberoptic bronchoscopy can provide good sample material for diagnosis of suspected cases. Bronchoalveolar Lavage and Bronchial Brushing sent for AFB, CBNAAT, TB Culture, Cytology, KOH etc were cumulatively used to increase diagnostic yield of bronchoscopy.

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**Key words** : Bronchoalveolar Lavage, Bronchial Brushing, CBNAAT.

**F**iberoptic Bronchoscopy (FOB) is a very useful and safe procedure for diagnosis of various respiratory diseases. FOB can be performed under local anaesthesia in various clinical/hospital settings providing maximal visualization of tracheobronchial tree<sup>1</sup>, if performed carefully, can be a thoroughly safe procedure<sup>2</sup>. Many patients having clinical and radiological features of pulmonary tuberculosis have negative sputum smear examinations, even if repeated on several occasions and their sputum culture for Acid Fast Bacilli (AFB) may also turn to be negative. Incorrect diagnosis, inadequate antibiotic therapy, impaired host defence, atypical organisms, resistant

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### Editor's Comment :

- Fiberoptic bronchoscopy is useful tool in diagnosing of suspected smear negative pulmonary tuberculosis, suspected bacterial, fungal and ILD with respect to their association with clinical and radiological profile at early stage despite not meeting the routine bacteriological criteria for diagnosis and helps in initiating early treatment which in turn improve patient outcome.

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 disease, especially when there is an Endobronchial lesion, providing adequate tissue sample by Endobronchial biopsy, Bronchoalveolar Lavage (BAL) or brush cytology<sup>3</sup>.

### AIMS AND OBJECTIVES

To assess the role of Bronchoscopy in diagnosis of Benign lung disorders like Smear Negative Pulmonary Tuberculosis, Non Resolving Pneumonia, Fungal Pneumonia, Bronchiectasis, Interstitial Lung Disease (ILD) etc.

## MATERIAL AND METHOD

This is a Prospective study of 60 patients was conducted over a period of one year, from April, 2020 to April, 2021 at Tertiary Health Care Hospital In South Gujarat.

Patient with Age >18 years, Suspected Smear negative pulmonary tuberculosis, Non Resolving pneumonia, Suspected fungal pneumonia, Suspected bacterial pneumonia, Bronchiectasis and Suspected Interstitial Lung Disease (ILD) patients were enrolled in our study.

Patient with Age <18years, Smear positive pulmonary Tuberculosis, critical cardiac or respiratory illness, malignancy, Active bleeding disorder, HIV/ AIDS Positive were excluded from our study.

Informed written consent was obtained from all the patients enrolled in study. Detailed clinical history, physical examinations and investigations were carried out. Eligible patients with Chest X-ray and CECT Thorax and clinical findings consisting with Sputum Negative Suspected Pulmonary Tuberculosis, Suspected Bacterial Pneumonia, Suspected Fungal Pneumonia and Non-Resolving Pneumonia were subjected for fiberoptic video bronchoscopy. During bronchoscopy detailed examination of Bronchial tree was done and specimens including BAL, Bronchial brushing, TBLB & TBNA (done in indicated patients), Post Bronchoscopy Sputum (PBS) was collected and sent for necessary investigations. Data entry, preliminary Data analysis and preparation of charts were done in MS Excel sheet 2013.

## OBSERVATIONS

A total of 60 patients were included in our study. Out of which 39(65%) patients were Male and 21(35%) patients were Female. The most common age group involved in the study was 31-40 years (28.3%). The youngest patient was aged 19 years and the oldest was 85 years and mean age was 44.5±16.7 years.

In the present study ,cough and fever were the most common symptoms (76.67%) followed by loss of appetite in 36.67% patients and breathlessness in 33.3% patients while loss of weight and night sweat were seen in 26.67% and 16.67% patients respectively. About 12% patients were having chest pain.

Chest X-ray finding of pulmonary infiltrative lesions was the most common finding in majority (55%) of patients followed by consolidation in 33.33% patients. Cavitory lesions and nodular lesion were seen in 13.33% patients each. Bronchiectatic changes and reticulations were noticed in 8.33% cases. Pleural effusion was seen in 6.67% cases whereas lymphadenopathy and collapse of lung was found in 5% of patients.

Most common CT thorax finding was consolidation in two-third of the patients, followed by lymphadenopathy in half of the patients and tree in bud appearance 43.33%. Whereas fibrocavitary lesion, ground glass opacity and nodules were seen in about one third of patients. Septal thickening, reticulations and miliary mottling were seen in 23.33%, 13.33% and 11.67% patients respectively. Only 10% patients showed Pleural effusion and honey-comb appearance.

Out of 60 patients based on clinical and radiological findings, 37 patients were suspected to have Pulmonary Tuberculosis, 13 Patients were suspected to have bacterial pneumonia, 5 Patients were suspected to have fungal pneumonia and 5 Patients were suspected to have ILD. All patients were then subjected to fiberoptic bronchoscopy

Out of 60 patients, 29 patients had no gross FOB findings. 12 (20%) patients had hyperaemia; 9 (15%) patients had congestion and 8 (13.33%) patients had fibrotic and stenotic changes. 5 (8.33%) patients had growth; 5 (8.33%) patients had ulcerative lesions and remaining 4 patients had shown active bleeding (Fig 1).

Table 2 suggest whenever Bronchoalveolar Lavage and Bronchial Brushing sent for AFB staining, CBNAAT, TB Culture, Gram stain and culture sensitivity, Cytology, KOH staining and NTM culture were cumulatively used for increasing diagnostic sensitivity.

Table 3 show, out of 37 suspected sputum negative pulmonary tuberculosis cases posted for bronchoscopy, 22(59.4%) cases were found to be positive for tuberculosis, Only 1(2.7%) case had findings consistent with Bacterial pneumonia and 2(3.4%) cases of tuberculosis had super added bacterial infection. In 13 patients suspected of bacterial pneumonia, more than half found positive for bacterial pneumonia while 2(15.3%) cases were found positive for pulmonary tuberculosis. Out of 5 suspected cases of fungal pneumonia and 5 suspected cases of Interstitial Lung Disease, each 2(40%) patients had positive findings respectively.. Thus, overall diagnostic yield of bronchoscopy in 60 patients was 63.3% (Fig 2).

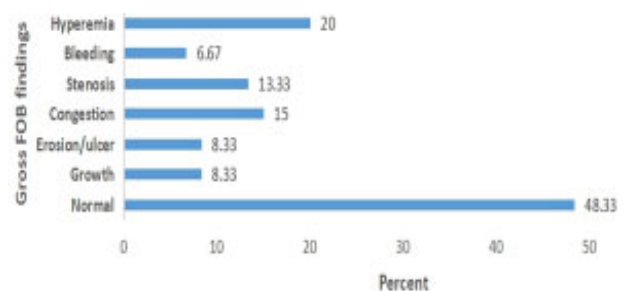


Fig 1 — Distribution of patients according to Gross FOB findings (n=60)

Table 1 — Comprehensive table showing results of various tests (n=60)

Sample type	Performed in no of patients	Positive in no of patients	Percentage
BAL AFB*	60	17	28.3%
BAL CBNAAT <sup>#</sup>	60	24	40.0%
BAL KOH <sup>§</sup>	60	2	3.33%
BAL fungal culture	5	2	40.0%
BAL Galactomanan	5	2	40.0%
BAL Cytology	20	2	10.0%
BAL TB culture	60	23	38.3%
BAL NTM Culture <sup>+</sup>	5	2	40.0%
BB-AFB	60	22	36.7%
BB-CBNAAT	60	23	38.3%
BB-TB culture	43	21	48.8%
TBNA:HP <sup>@</sup>	6	2	33.3%
Endobronchial Biopsy	6	4	66.7%
PBS AFB <sup>e</sup>	60	14	23.3%

(\*AFB-Acid Fast bacilli; <sup>#</sup> CBNAAT-Cartridge Based Nucleic Acid Amplification Test; <sup>+</sup>NTM- Non-tuberculosis Mycobacteria; <sup>§</sup>KOH-Potassium Hydroxide; <sup>@</sup>TBNA:HP-Trans Bronchial Needle Aspiration; Histopathology Examination; <sup>e</sup>PBS-Post Bronchoscopy Sputum)

Table 2 — Cumulative result of Bronchoscopy specimen

Bronchoscopy specimen	Cumulative result
BAL TB CULTURE + BB TB CULTURE	24(40%)
BAL AFB + BB AFB	22(36.7%)
BAL CBNAAT + BB CBNAAT	24(40%)
BAL (AFB+CBNAAT + TB CULTURE)	24(40%)
BB (AFB+CBNAAT + TB CULTURE)	23(38.3%)
BAL (AFB + CBNAAT + TB CULTURE + GMCS + KOH + NTM + CYTOLOGY)	38(63.3%)

Present study found 14/60 (23.3%) positive results for Post Bronchoscopy Sputum (PBS)-AFB staining.

Out of 60 patients, majority 53 (88.3%) patients did not develop any complications. 5 (8.3%) patients developed minor bleeding and 2 (3.3%) patients developed bronchospasm.

### DISCUSSION

The delay in diagnosis and treatment in patients of Non resolving Pneumonia may lead to rise in mortality by 3-5%. For this reason Fiberoptic Bronchoscopy is one of the most widely used diagnostic approach among sputum negative and difficult to treat pneumonia patients<sup>3</sup>.

With the advent of Fiberoptic bronchoscopy, diagnosis of PTB in sputum smear negative patients has become more promising. The main advantage with this instrument is the ability to visualize the bronchial tree and collect samples directly from the bronchial pathology site<sup>4</sup>.

Fungal pneumonia is classically found in neutopenic, imuno-compromised, malignancy and post-transplant patients

there is high mortality if treatment is delayed to confirm a definite diagnosis. Different diagnostic modalities used to detect invasive fungal pneumonia and the decision to treat<sup>5</sup>.

In our study out of 60 patients, 29 patients were normal with no gross FOB findings. 12 (20%) patients had hyperaemia; 9 (15%) patients had congestion and 8 (13.33%) patients had fibrotic and stenosis changes. About 8.33% patients had growth and erosions/ulcer while remaining 4 patients had shown bleeding. In study of Atul Luhadia, *et al*<sup>6</sup>, congestion and hyperaemia (36%) and mucopurulent/mucoid secretions was seen in (32%) cases.

Present study found 17 (28.3%) patients with positive BAL AFB staining.

In BAL CBNAAT findings, 40% patients found positive out of which 33.3% Rifampicin sensitive and 6.7% Rifampicin Resistance. 36.7% patients came positive for BB-AFB. BAL liquid culture was seen positive in 23 (38.3%) patients. TBLB done in 6 patients out of which 4(66.6%) patients biopsy report show Caseating granuloma. Quaiser *et al*<sup>7</sup>, showed a positive yield by BAL fluid smear examination and culture as 17.5% (7/40) and 30% (12/40) respectively. Study by Yong Suk Jo, *et al*<sup>8</sup>, showed BAL positive for AFB smear in 23% and 50% positive for culture. Willcox, *et al*<sup>9</sup>, obtained BB from 83 of the 89 patients and 35 (42%) of them were positive on smear, making early diagnosis possible in 42%.

PBS-AFB staining came positive in 14/60(23.3%) patients. Quaiser, *et al*<sup>7</sup>, reported the yield of PBS smear as 17.5% (7/40) and PBS culture as 27.5% (11/40).

Complications were seen in only 7(11.7%) patients in our study. In study of Vipparthi Surya kumara, *et al*<sup>10</sup>, reported complication in 23.3% cases.

Thus, overall diagnostic yield of bronchoscopy in our study was 63.3% in 60 patients subjected for

Table 3 — Diagnostic yield of Bronchoscopy in suspected different benign Lung Disease

Suspected case of	Total suspected case (n)	Diagnosis done	Diagnosis not confirmed by Bronchoscopy
Tuberculosis	37	22(59.4%) tuberculosis (16-Rifampicin sensitive, 4-Rifampicin resistance, 2-NTM) 1(2.7%) Bacterial pneumonia 2(3.4%) Bacterial Pneumonia with Tuberculosis	12(32.4%)
Bacterial pneumonia	13	7(53.3%) Bacterial pneumonia 2(15.3%) Tuberculosis	4(30%)
Fungal pneumonia	5	2(40%)	3(60%)
ILD	5	2(40%)	3(60%)
Total	60	38(63.3%)	22(36.7%)

bronchoscopy. Diagnostic yield of bronchoscopy in other study was, Shin, *et al*<sup>11</sup>(42.8%), Quaiser, *et al*<sup>7</sup> (60%), Bachh, *et al*<sup>12</sup>(80%), Sarkar, *et al*<sup>13</sup>(80%) and Purohit, *et al*<sup>14</sup>(74%).

Advantage of bronchoscopy in suspected patients with sputum negative pulmonary tuberculosis, isolation of mycobacteria at an early stage when the destruction of lung tissue is minimal and the risk of spreading the disease to contacts can be decreased by early diagnosis and treatment<sup>7</sup>. Bronchoscopy reveals a higher bacteriological confirmation of diagnosis in patients with strong clinical and radiological evidence suggestive of Pulmonary Tuberculosis, Non resolving pneumonia and Interstitial lung disease. Though FOB procedures have some risk of complications, it is considered to be a relatively safe procedure.

#### Ethical Consideration :

The study was conducted after ethical permission from the Institutional Ethical Committee. The institutional ethics committee has gone through the study proposal and had unanimously approved this study. The study participants had been explained the nature and purpose of the study and written consent was obtained.

#### Limitations of study :

Sample size of the study is small because of the covid 19 pandemic and this study may not represent the whole indian populations due to smaller sample size and exclusion of patients with HIV infection, Bleeding disorders and suspected Malignancy

#### CONCLUSION

Role of Fiberoptic Bronchoscopy in malignant lung disorder is well established however, our study suggests that fiberoptic bronchoscopy can provide excellent material for diagnosis of suspected benign lung disorders.

Broncho alveolar Lavage and Bronchial Brushing subjected for AFB stain, CBNAAT, TB Culture, Cytology, KOH stain, NTM Culture etc. shall be cumulatively use for increase diagnostic yield of various etiology.

#### REFERENCES

- 1 Kovnat DM, Rath GS, Anderson WM, Snider GL — Maximal extent of visualization of bronchial tree by flexible fiberoptic bronchoscopy. *Amerrevrespdis* 1974; **110**(1): 88-90.
- 2 Suratt PM, Smiddy JF, Gruber B — Deaths and Complications Associated with Fiberoptic Bronchoscopy. *Chest [Internet]* 1976 Jun 1 [cited 2021 Sep 4]; **69**(6): 747-51.

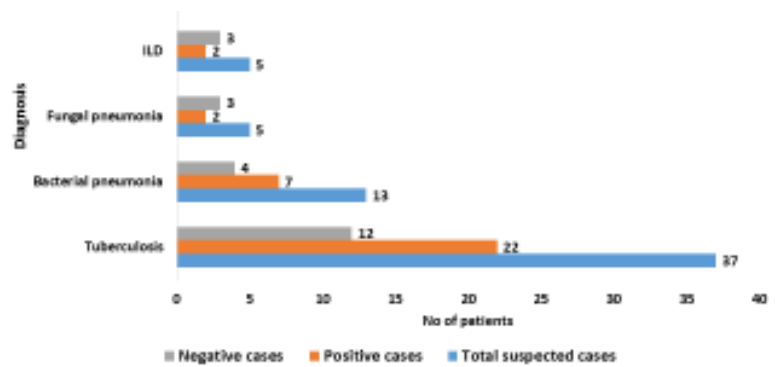


Fig 2 — Diagnostic yield of Bronchoscopy in suspected different Benign Lung Disease

- 3 Stover DE, Zaman MB, Hajdu SI, Lange M, Gold J, Armstrong D — Bronchoalveolar lavage in the diagnosis of diffuse pulmonary infiltrates in the immunosuppressed host. *Ann Intern Med* 1984; **101**(1): 1-7.
- 4 Narain R, Nair SS, Naganna K, Chandrasekhar P, Rao GR, Lal P — Problems in defining a “case” of pulmonary tuberculosis in prevalence surveys. *Bull World Health Organ* 1968; **39**: 701-29
- 5 Shamim S, Agarwal A, Ghosh BK, Mitra M — Fungal pneumonia in intensive care unit: When to suspect and decision to treatment: A critical review. *J Assoc Chest Physicians [serial online]* 2015 [cited 2023 Apr 8]; **3**: 41-7.
- 6 Luhadia A, Luhadia SK, Jain S, MH Hanfe, Oza D, Zota A, *et al* — Role of fiberoptic bronchoscopy in sputum smear negative suspected cases of pulmonary tuberculosis: a study conducted in Southern part of Rajasthan. *IJRMS* 2020; **8**(12): 4302-6.
- 7 Quaiser S, Agarwal A, Khan R, Haque SF — Fiberoptic bronchoscopy, as a valuable diagnostic option in sputum negative pulmonary tuberculosis: A prospective study. *Int J Appl basic Med Res [Internet]* 2012 [cited 2021 Oct 25]; **2**(2): 123.
- 8 Jo YS, Park JH, Lee JK, Heo EY, Chung HS, Kim DK — Discordance between MTB/RIF and real-time tuberculosis-specific polymerase chain reaction assay in bronchial washing specimen and its clinical implications. *PLoS One* 2016; **11**(10).
- 9 Baughman RP, Dohn MN, Loudon RG, Frame PT — Bronchoscopy with bronchoalveolar lavage in tuberculosis and fungal infections. *Chest [Internet]* 1991 [cited 2021 Oct 25]; **99**(1): 92-7.
- 10 Surya kumari V, Pathrudu BMS, Sunil Kumar R, Rao GS, Jakka S, Alavala SC, *et al* — Clinical and Etiological Profile of Unresolving Pneumonia Cases Attending Government Chest Hospital, Visakhapatnam” IOSR. *Journal of Dental and Medical Sciences (IOSR-JDMS)* 2015; **14**(7): Ver. VII (July.2015), 56-61
- 11 Shin JA, Chang YS, Kim TH, Kim HJ, Ahn CM, Byun MK — Fiberoptic bronchoscopy for the rapid diagnosis of smear-negative pulmonary tuberculosis. *BMC Infect Dis* 2012; 121 [Internet]. 2012 Jun 22 [cited 2021 Oct 25]; **12**(1): 1-7.
- 12 Bachh AA, Gupta R, Haq I, Varudkar HG — Diagnosing sputum/smear-negative pulmonary tuberculosis: Does fibre-optic bronchoscopy play a significant role? *Lung India [Internet]* 2010 Apr 1 [cited 2021 Oct 25]; **27**(2): 58-62.
- 13 Sarkar SK, Sharma GS, Gupta PR, Sharma RK — Fiberoptic bronchoscopy in the diagnosis of pulmonary tuberculosis. *Tubercle [Internet]*. 1980 [cited 2021 Oct 25]; **61**(2): 97-9.
- 14 Purohit SD, Sisodia RS, Gupta PR — Fiberoptic bronchoscopy in the diagnosis of smear negative pulmonary tuberculosis. *Lung India* 1983; **1**: 143-6.