



ORIGINAL RESEARCH PAPER

Respiratory Medicine

“UTILITY OF FIBEROPTIC BRONCHOSCOPY IN SUSPECTED CASES OF PULMONARY TUBERCULOSIS WHO ARE SPUTUM SMEAR NEGATIVE”.

KEY WORDS: fiber optic video bronchoscopy, sputum negative, Broncho alveolar lavage(BAL), Cartridge Based Nucleic Acid Amplification Test(CBNAAT).

Hiren Vadhiya	Resident, Respiratory Medicine Department, SMIMER, Surat
Arvind Pandey*	Professor & HOD, Respiratory Medicine Department, SMIMER, Surat *Corresponding Author
Arvind Daxini	Associate Professor, Respiratory Medicine Department, SMIMER, Surat
Parin Patel	Resident, Respiratory Medicine Department, SMIMER, Surat

ABSTRACT

INTRODUCTION: Fibreoptic Bronchoscopy provides various types of specimens (aspirates, brushes and biopsies) for confirming the diagnosis in sputum smear negative pulmonary tuberculosis have yielded conflicting results. Hence this study has been undertaken to evaluate the significance of fiberoptic bronchoscopy in the diagnosis of Pulmonary Tuberculosis among patients who have chest X-ray suggestive but remain undiagnosed because of a negative sputum smear for AFB, hence aiding in the early diagnosis and thereby prompt & accurate treatment of such patients.

METHODS: The study will include patients strongly suspecting pulmonary tuberculosis by radiological or clinical features but whose sputum smears are negative for tuberculosis; attending Respiratory Medicine Department in a tertiary care hospital. Broncho-alveolar lavage (BAL) samples from such 53 patients with clinical and radiographic findings suggestive of PTB with 2 consecutive Sputum smear negative for AFB were processed for diagnosis of pulmonary tuberculosis.

RESULT: The incidence of diagnosis of pulmonary tuberculosis through fiber optic bronchoscopy was found high in age 20-49 with high incidence in males, most of patients not having past history of tuberculosis and duration of symptoms < 1 month. Post bronchoscopy Sputum Smear was positive in 8(15.09%) patients out of 53 patients, BAL AFB Z-N Stain positive in 10(18.86%) patients out of 53 patients and BAL CBNAAT (MTB) Positive in 38(71.69%) patients and BAL culture(liquid) positive for AFB in 30(56.60%) patients out of 53 patients.

CONCLUSION: It was observed that broncho-alveolar lavage analysis for detection of AFB is **much more reliable, rapid and accurate diagnosis** in suspected cases of pulmonary tuberculosis who are sputum smear negative and chest x-ray suggestive of pulmonary tuberculosis.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused predominantly by *Mycobacterium tuberculosis* and among the leading causes of mortality in India. India accounts for 1/5 of the global TB burden. Pulmonary tuberculosis is the most common site for tuberculosis but it also affects other sites, which is called extra pulmonary tuberculosis.

Tuberculosis (TB) is a major global public health problem. It causes ill-health 1 among millions of people each year. In 2015, there were an estimated 9.6 million new TB cases: 5.4 million among men, 3.2 million among women and 1.0 million among children. There were also 1.5 million TB deaths (1.1 million among HIV-negative people and 0.4 million among HIV-positive people), of which approximately 890 000 were men, 480 000 were women and 140 000 were children.

The number of TB deaths is unacceptably high: with a timely diagnosis and correct treatment, almost all people with TB can be cured. The World Health Organization (WHO) recommends the detection of acid-fast bacilli (AFB) in respiratory specimens as the initial approach to the diagnosis of PTB⁽¹⁾. However, this method has a low sensitivity and has little value in patients who cannot produce sputum spontaneously^(2,3). Early diagnosis is imperative for early patient management and successful patient outcomes.

Fibreoptic bronchoscopy provides various types of specimens (aspirates, brushes and biopsies) for confirming the diagnosis in sputum smear negative pulmonary tuberculosis have yielded conflicting results. The advantage of making early diagnosis prevents morbidity, progression & spread of the disease and lung damage by fibrosis. Hence this study has been undertaken to evaluate the significance of fiberoptic bronchoscopy in the diagnosis of PTB among patients who have chest X-ray suggestive but remain undiagnosed because of a negative sputum smear for AFB, hence aiding in the early diagnosis and thereby prompt & accurate treatment of such patients. Patient may be observed with regular radiographs and further sputum examination^(4,5).

More recently, the WHO endorsed the CB-NAAT(GeneXpert)

(Xpert® MTB/Rif assay) for the diagnosis of TB. The GeneXpert utilizes a DNA-PCR technique for simultaneous detection of *Mycobacterium tuberculosis* and Rifampicin resistance related mutations. It is the first fully automated bench top cartridge based nucleic acid amplification (CB-NAAT) assay for TB detection that includes all necessary steps of DNA PCR. It gives results within 2 hours. Diagnostic accuracy of GeneXpert for pulmonary TB has been reported high. Patients with high risk of tuberculosis like presumptive HIV-associated TB patients and pediatric presumptive including extra pulmonary cases in whom AFB smear examination is usually negative, are the most likely to be benefited from GeneXpert (CB-NAAT)^(6,7)

MATERIALS AND METHODS

This study was carried out in respiratory medicine department, tertiary care centre after approval of institutional ethics committee.

STUDY TYPE:

Observational Study

SAMPLING TECHNIQUE: Multiphase sampling.

DATA COLLECTION:

Data collection was be done by using a structured pre-prepared case Performa to enter the patient details, detailed clinical history including presenting complaints, history of Tuberculosis, history of anti-tuberculosis medications, past and family history of tuberculosis, and physical examination of patients who meet the inclusion criteria.

Inclusion criteria:

- Patients consenting for the Study.
- Adult patients aged 18 years and above.
- Suspected patients of PTB (as per guideline of RNTCP).
 - Sputum negative and having unproductive cough,
 - Chest x-ray suggestive of koch's lesion.

Exclusion criteria:

- Patients not consenting for the study.

- Person who is a known or suspected case of HIV infection.
- Patients with bleeding diathesis.
- Patients with history of myocardial infarction, arrhythmias and who are contraindicated for fiberoptic bronchoscopy

METHOD:

Bronchoalveolar lavage (BAL) samples from such 53 patients with clinical and radiographic findings suggestive of PTB with 2 consecutive Sputum smear negative for AFB were processed for diagnosis of pulmonary tuberculosis.

Informed Written consent was obtained from all the patients undergoing bronchoscopy procedure.

EQUIPMENTS

- Flexible video bronchoscope
- TBLB forceps
- Brush biopsy forceps & TBNA
- Sterile container & Suction tube
- Sterile saline & Vacuum source
- Syringe & Lidocaine 2%

Procedure FOB

- Patients were premedicated by Atropine 0.6 mg intramuscularly, one and half hour before the procedure.
- 4% xylocaine was given via nebulizer.
- Fiberoptic bronchoscopy was performed by using Olympus model.
- The bronchoscope was introduced through trans nasal route, 2% xylocaine was given as the local anesthetic via the bronchoscopic channel whenever required i.e. at the level of carina or vocal cords.
- A thorough examination of the bronchial tree was carried out and bronchial aspiration was taken from the airways.
- The bronchoscope was wedged into the sub segmental bronchus of the involved area and broncho alveolar lavage was collected.
- post bronchoscopic sputum was also collected.
- Oxygenation was monitored throughout the procedure with pulse oximetry.

Appropriate samples:

- Bronchoalveolar lavage
- Bronchoalveolar washing
- Brushing
- Biopsy were obtained depending on the lesion after thorough evaluation of endobronchial tree.

Samples were subjected to:

- AFB staining, gram staining, fungal (KOH) staining and culture/sensitivity(Liquid MGIT MÈDIA)
- BAL for CBNAAT and LPA.
- Post bronchoscopic sputum smear examination
- Cytology, Histopathology as required, depending upon the clinical diagnosis and bronchoscopic findings.

MANAGEMENT AFTER BRONCHOSCOPY :

On the basis of bronchoscopic findings and investigations, patients were put on antibiotics, antituberculous drugs and other specific treatment. If diagnosis was not confirmed by bronchoscopy, patients were given a course of antibiotics and X- ray, sputum examination were repeated to assess the outcome.

Discussion and Conclusion

- In the present study, out of 53 patients, male were 36(68%) and female were 17(32%). Male : Female ratio was 2.1 : 1.
- Sputum negative Pulmonary Tuberculosis more commonly seen in the Age group of 20 - 49 were 34/53(64%) .
- Most of the patients in the present study were residents of urban slum area 26 out of 53 patients (49%).
- Most of the patients in the present study were presented with Duration of symptoms < 1 month (71.69%).
- In this study 32(60.37%) patients out of 53 patients have no past history of ATT and 21(40%) patients out of 53 patients have past history of ATT Present.

- In this study 36(68%) patients out of 53 have raised ESR (>60) and 30(57%) patients out of 53 patients have Mantoux Test (>10mm) Positive.
- In this study patients presented with the cardinal symptoms of Tuberculosis were seen as Cough 44/53(83%),Fever 41/53(77%), dyspnoea 15/53 (28%), chest pain 25/53(47%) and loss of weight 32/53(60%).
- Out of 53 patients 53% belonged to category I and 37% belonged to category II and 10% belonged to category IV according to RNTCP.
- In this study Radiological Pattern were Consolidation(38%) , Cavitory lesion(23%), Infiltrative lesion with Mediastinal lymphadenopathy (20%) were most common radiological feature.

TABLE 1: Results of Post-Bronchoscopy sputum , BAL AFB Z-N STAIN, BAL CBNAAT and BAL AFB Culture(liquid):

Sample n=53	Positive(%)	Negative(%)
Post- Bronchoscopy Sputum Smear	8(15.09%)	45(84.90%)
BAL AFB Z-N STAIN	10(18.86%)	43(81.13%)
BAL CBNAAT (MTB DETECTED)	38(71.69%)	15(28.30%)
BAL AFB Culture(Liquid)	30(56.60%)	23(43.39%)

- Inspite of strong suspicious and Chest X-ray suggestive of Pulmonary Tuberculosis, 15(28.30%) out of 53 patients were having diagnosis other than Pulmonary Tuberculosis. This very fact stresses that Chest X-ray is a poor diagnosis tool for Pulmonary Tuberculosis as per RNTCP guidelines. SO other technique like Bronchoscopy – BAL Sample can help in increasing yield of SPUTUM POSITIVE Cases.
- In the present study broncho-alveolar lavage with fiberoptic bronchoscopy, none have major or minor complications.

TABLE 2: Results of BAL CBNAAT and Rifampicin Sensitivity :

Sample n= 53	No. of Patients	Percentage (%)
BAL CBNAAT MTB DETECTE RIFAMPICIN SENSITIVE	34	64.15%
BAL CBNAAT MTB DETECTED RIFAMPICIN RESISTANT	4	7.55%
BAL CBNAAT MTB Not Detectd	15	28.30%
Total	53	100%

- CBNAAT(GeneXpert) and AFB smear microscopy share almost same specificity but sensitivity of GeneXpert is much higher than AFB smear microscopy in respiratory samples. Although culture is considered as a gold standard method but as it takes days to come positive and simultaneous detection of Rifampicin resistance is not possible with it.
- On other side CBNAAT(GeneXpert) can be a useful diagnostic method in patients of suspected pulmonary tuberculosis either AFB smear negative or positive due to its rapidity and simultaneous detection of Rifampicin resistance especially beneficial in patient with MDR.
- Cost effectiveness of CBNAAT(GeneXpert) in low income countries like India with high prevalence of tuberculosis need to be evaluated.
- Positive CBNAAT (GeneXpert), but culture negative results need to be read cautiously and should be well correlated with clinical and treatment history of the patient.
- At present, we conclude that broncho-alveolar lavage analysis for detection of AFB is **much more reliable, rapid and accurate diagnosis** in suspected cases of pulmonary tuberculosis who are sputum smear negative and chest x-ray suggestive of pulmonary tuberculosis.

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