

Role of Fiberoptic Bronchoscope in Sputum Smear Negative, Radiological Suspect Cases of Pulmonary Tuberculosis.

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Abstract:

Clinicians still facing common problem with sputum smear-negative pulmonary tuberculosis (SSN-PTB). Performing Fiberoptic bronchoscopy (FOB), specimen Bronchoalveolar lavage(BAL) material, to be helpful in the diagnosis of SSN-PTB with Ziehl-Neelsen(Z-N) staining.70 chests symptomatic with X-ray shadow suggestive of pulmonary tuberculosis were subjected to Fiberoptic bronchoscopy. The bronchial aspirate or Bronchoalveolar lavage and post-scopy sputum specimen smears were prepared and stained with Ziehl -Neelsen staining method. 28 (40%) were found to be positive for AFB. The results demonstrate the usefulness of FOB in diagnosis of PTB in sputum smear negative cases.

Keywords: sputum smear-negative pulmonary tuberculosis, Fiberoptic bronchoscopy, Bronchoalveolar lavage, Ziehl -Neelsen staining, Tuberculosis.

INTRODUCTION:

Pulmonary tuberculosis [PTB] is one of the most important Health Problem in worldwide [1]. To conform PTB the world health organization recommended sputum smear examination to detect Acid-Fast bacilli (AFB) by the Acid fast staining or Ziehl-Neelsen Staining. Sputum microscopy is a highly specific test, a low cost, appropriate technique under the program of Revised National Tuberculosis Control Program (RNTCP). However in patients, sputum smears do not reveal acid-Fast bacilli in all patients. Smear negative-culture positive state has been observed in 22% to 61% of the cases.[2,3].The process of Mycobacterial culture take at least Six to eight weeks time for confirming the diagnosis and their by a valuable time is lost [4]. Clinicians still facing problem with low specificity of chest x-rays and sputum smear-negative (SSN-PTB) pulmonary tuberculosis.

Various methods have been employed to ascertain tuberculosis disease in patients with suspected SSN-PTB (Table1) including mathematical modeling for predicting active disease. [5, 6].(Table 1) Bronchoscopy has also been used as a research tool to study patients with pulmonary [7] and miliary tuberculosis.[8]

In the study to detect AFB in SSN-PTB we have attempt only Bronchoalveolar lavage [BAL] by Z-N staining, because the telescopic vision and extended reach to the disease site by brush are biopsy forceps even beyond the segmental orifices of the gigantic bronchial tree assist in greater diagnostic accuracy[9]. Therefore the present study Fiberoptic Bronchoscopy was taken to diagnosis PTB in smear Negative PTB patients.

Table 1. Diagnostic methods used for the microbiological/histopathological diagnosis in a patient with suspected pulmonary tuberculosis who is sputum smear-negative or produces inadequate sputum

Sputum induction with hypertonic saline
Transtracheal needle aspiration
Radiologically guided transthoracic needle aspiration
Gastric lavage
Bronchoscopic procedures
Rigid bronchoscopy
Flexible fiberoptic bronchoscopy
Bronchial aspirate
Bronchial washings
Bronchial brush smear
Bronchoalveolar lavage
Bronchial biopsy
Transbronchial lung biopsy
Post-bronchoscopy sputum
Others
Peripheral blood examination using serological and molecular methods.

MATERIALS AND METHODS

The study was conducted in Santhiram General Hospital, Nandyal, Andhra Pradesh between 2013-2014. A total 136 patients with respiratory symptomatic of PTB were evaluated for enrolment in the study. Sputum specimens were collected one spot and one over-night sputum; patients whose smears were positive for AFB were

excluded to Fiber optic Bronchoscope. Sputum smears negative Patients were included to Fiberoptic Bronchoscopy.

Z-N staining by concentration technique:

Sputum were mixed with equal parts of N-acetyl –L-cysteine-Sodium hydroxide solution for 15 seconds on vertex mixture, Then added enough phosphate buffer saline to reach within 1 cm of the top. To mix the solution the tube was inverted by closing cap tightly. It was then centrifuged at 3600Xg for 15 minutes. The supernatant was decanted and sediment was suspended in 1-2 ml of phosphate buffer [10] it was taken for Z-N staining. A minimum of 100 fields were examined and grading was under taken as under [11].

Examination Grading

>10 AFB/field	3+
1-10 AFB/field	2+
10-99 AFB/100 fields	1+
1-9 AFB/100 fields	scanty
NO AFB/100 fields	Negative

Of 495 chests symptomatic, 81(16.3%) were smear positive for Acid Fast Bacilli. The rest were negative, of them 70 Smear Negative Patients with an X-ray shadow suggestive of tuberculosis were subjected to FOB. This was under taken jointly by a physician (a specialist in pulmonary disease) in Santhiram General Hospital. FOB procedure was done on empty stomach of the patient for 3hrs before procedure. Bronchoalveolar lavage was collected from patients by giving, Atropine injection (1M) 0.01mg/kg was given half an hour before the scope. Midazolam 0.05 mg/kg body weight was given and Lidocaine 4% was instilled through the channel for analgesia

Bronchoalveolar lavage was collected from affected area, and post-scopy sputum was also collected routinely. The BAL fluid smears were examined for AFB using the Z-N method. All slides were screened by the senior Microbiologist of the team and the senior pulmonologist.

RESULTS:

A total has 70 patients (46 Males and 24 Females) were include in the study. Predominately 66 being in the age group of 21 to 80 years. Male and female ratio was 1:0.52. The age and sex distribution of study population is given at Table 2.

28(40%) of them were found to be AFB Positive on Bronchoscopy. of these 24(34.28%) were positive for AFB by both bronchoalveolar lavage and post scopy sputum, and 4(5.71%) were positive only by post-scopy sputum. These 28 cases were put on RNTCP category II regimen since all of them had a previous history of Anti- tuberculosis treatment.

Table 2: Age and sex distribution of study population

Age in years	Total cases	%	Male	%	Female	%
11- 20	3	4.29	2	4.35	1	4.17
21-30	6	8.57	2	4.35	4	16.67
31-40	7	10.00	4	8.70	3	12.50
41-50	11	15.71	7	15.22	4	16.67
51-60	21	30.00	13	28.26	8	33.33
61-70	15	21.43	12	26.09	3	12.50
71-80	6	8.57	5	10.87	1	4.17
81-90	0	0.00	0	0.00	0	0.00
91-100	1	1.43	1	2.17	0	0.00
Total	70	100	46	66.00	24	34

DISCUSSION:

Primary health centers successfully implemented sputum smear microscopic examination under the RNTCP of the government of India. Early diagnosis of pulmonary tuberculosis the first step was detection of Acid –fast bacilli in sputum smear by the Z-N staining. Culture is also important but takes time approximately 2-6 weeks. In this study we demonstrate the AFB in spontaneous sputum and bronchoalveolar lavage in early diagnosis of pulmonary tuberculosis. Patents are suspected to have pulmonary tuberculosis on the basis of abnormal chest radiograph but after concentration technique stained preparations were showed negative results in sputum smear due to poor quality of sputum, particularly in children and immune competent patients who are unable to produce an adequate sputum sample.

Fiberoptic bronchoscopy provide conformation of the diagnosis of the suspected pulmonary tuberculosis patients who have anegative AFB smear from sputum. The telescopic vision and extended reach to the disease site by brush are biopsy forceps even beyond the segmental orifices of the gigantic bronchial tree assist in greater diagnostic accuracy [9].

CONCLUSION

In this study bronchoalveolar lavage specimen have shown that the rate of diagnosis was increased in the patients who had negative sputum smears. Similar observation has also been made at other centers[12-13]. The conclusion in this study there was a high rate of diagnosis with bronchoalveolar lavage specimen compared with the poor quality of spontaneous sputum. bronchoalveolar lavage material were valuable for the diagnosis of TB in the patients with sputum-smear negative for AFB. Fiberoptic bronchoscopy difficult to perform, invasive, costly, and time consuming. This study suggests Fiberoptic bronchoscopy could be the guide for radiological suspect cases of pulmonary tuberculosis patients with negative sputum smears.

This study suggests that FOB could be the guide for the deceptive suspect cases of PTB even after concentration technique fail. Similar observation has also been made at other centers [12-13]. However, its utility may have to be restricted to tertiary level medical care centers since this may not be applicable on large scale considering the cost, feasibility and applicability.

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