

Bronchoscopic Analysis in Sputum Smear Negative Pulmonary Tuberculosis Patients A Hospital based Study

Unni R Baby¹, Girija Nair²

ABSTRACT

Introduction: India has the highest burden of TB cases in the world, majority of them are pulmonary tuberculosis. The method of choice for diagnosis of PTB is microscopic examination of AFB by sputum smear. However, 30 to 50% of patients with pulmonary tuberculosis can have negative sputum report or may not produce sputum. Flexible fibreoptic bronchoscopy can provide excellent material for diagnosis for patients with suspected sputum smear negative pulmonary tuberculosis. Study aimed to evaluate the role of fiber optic bronchoscopy in sputum smear negative pulmonary tuberculosis.

Material and methods: Forty suspected cases of pulmonary TB with clinical and radiological evidence of tb and sputum smear negative on 2 occasions were selected for this prospective nonrandomised observational study. Detailed examination of the bronchial tree was done and specimens including bronchial aspirate and lavage was collected and send for investigations. Post bronchoscopy sputum (PBS) was also collected and sent for smear microscopy.

Results: In our study of 40 patients, tuberculosis was confirmed in 13 (32.50%) by smear examination of AFB in Broncho alveolar fluid and by post bronchoscopy sputum smear examination in 3/40 (7.5%) cases. A definitive diagnosis of tuberculosis was possible in 23 (57.5%) of the 40 patients by AFB culture by BACTEC MGIT960.

Conclusion: Fibreoptic bronchoscopy with post bronchoscopy sputum, BAL and BAL AFB culture is a useful tool for diagnosis and can thereby prompt treatment of sputum smear negative pulmonary tuberculosis patients.

Keywords: Sputum Smear Negative Pulmonary TB (SSN-PTB), AFB, Post Bronchoscopy Sputum (PBS), BAL, BACTEC MGIT Culture

INTRODUCTION

Mycobacterium tubercle bacilli causes Tuberculosis (TB) an airborne communicable disease and is the leading cause of death from a single infectious agent (ranking above HIV/AIDS).¹ It mainly affects the lungs (pulmonary TB). Despite the availability of highly efficacious treatment for decades, TB remains a major global health problem. About a quarter of the world's population is infected with M. tuberculosis and thus at risk of developing TB disease.¹ India (27%), China (9%), Indonesia (8%), the Philippines (6%), Pakistan (6%), Nigeria (4%), Bangladesh (4%) and South Africa (3%) accounts for two thirds of global burden of TB cases.¹

World health organisation (WHO) recommends detection of acid fast bacilli (AFB) in respiratory specimen for bacteriological confirmation of pulmonary tuberculosis.¹ The

most common method used for diagnosing TB worldwide is sputum smear microscopy. Sputum smear microscopy for acid-fast bacilli (AFB) is a widely available, simple, and inexpensive tool for pulmonary TB diagnosis and treatment monitoring.^{3,4} However, the challenge arises for the clinician when patients with clinical history and radiological lesions suggestive of tuberculosis is not able to expectorate sputum or is repeatedly negative in sputum smear examination for acid fast bacilli.

Early diagnosis of pulmonary tuberculosis is vital to prevent progression, morbidity, spread of disease and permanent damage caused by fibrosis. Sputum culture for acid fast bacilli (AFB) is a time consuming process which can delay the initiation of treatment, a reliable serological test is also not yet available.

In such a scenario Fibreoptic bronchoscopy with bronchial washing analysis for AFB including culture for Mycobacterium tuberculosis can play significant role to establish early diagnosis, when sputum expectoration is absent, or sputum induction has failed or when the sputum smear microscopy for acid fast bacilli is negative. Study aimed to evaluate the role of fiber optic bronchoscopy in sputum smear negative pulmonary tuberculosis.

MATERIAL AND METHODS

The present study was carried out on 40 patients in the department of pulmonary medicine at DR. D.Y. Patil Hospital & Research Center, Nerul, Navi Mumbai from august 2011 to Jan 2014 .

Forty suspected cases of pulmonary TB with clinical and radiological evidence of tb and sputum smear negative on 2 occasions were selected for this prospective nonrandomised observational study. Patients who did not give consent, those with any contra indications for bronchoscopy were excluded. Initial assessment included detailed clinical history, physical examinations and routine investigations. Fitness assessment

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for bronchoscopy procedure were also done for all patients. After obtaining written informed consent from all patients the fiberoptic bronchoscopy was done using OLYMPUS video bronchoscope. The procedure was done as per international recommendations.^{4,5} Detailed examination of the bronchial tree was done and specimens including bronchial aspirate and lavage was collected and send for investigations. Post bronchoscopy sputum (PBS) was also collected and sent for smear microscopy. The patients were kept under observation for 4 hours after procedure, no major procedure related complications were encountered during the study.

RESULTS

The study population consisted of 40 patients. Out of the 40 cases included in the study 24(60%) was male and 16(40%) where females. The age distribution varied from 18 to 70 years. The mean age was 35.15. Past history of pulmonary tb was present in 11/40(27.5%) of cases

Cough with expectoration was the single most common presenting symptom (85%), followed by fever (65%),

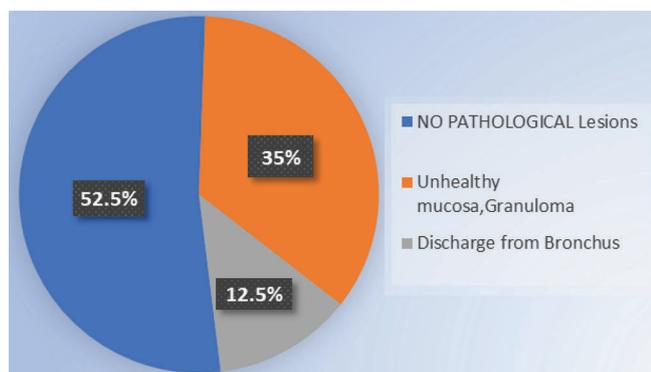


Figure-1: Bronchoscopy findings

Patient characteristics	Percentage (%)	
Sex		
Male	60	24
Female	40	16
Symptoms		
cough	85	34
Fever	65	26
Chills	22.5	9
Dyspnoea	45	18
Chest radiography		
site of the lesion		
Right	32.5	13
Left	27.5	11
Bilateral	42.5	17
Type of Lesion		
Cavitary	45	18
Noncavitary	55	22

Table-1: Patient characteristics

Specimen	Cases positive	Cases negative	Cases done	
post bronchoscopy sputum smear	3	37	40	7.5
BAL smear for AFB	13	27	40	32.5

Table-2:

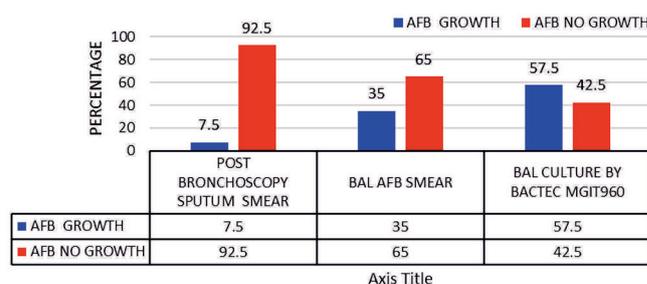


Figure-2: Final yield of acid-fast bacilli in sputum negative pulmonary TB patients

chills(22.5%)while dyspnoea was present in (45%) of cases. The charectristics of patients given in table 1. Bronchoscopic examinations showed no pathological lesions in 21(52.5%) of cases while 5(12.5%) cases had discharge from bronchus, 14(35%) cases had unhealthy mucosa/granuloma.

In all cases, Broncho alveolar fluids and post bronchoscopy sputum was collected and was send for AFB examination by ZN staining and BAL was send for culture by BACTEC MGIT960 method. In our study of 40 patients, tuberculosis was confirmed in 13 (32.50%) by smear examination of AFB in Broncho alveolar fluid, by post bronchoscopy sputum smear examination in 3/40(7.5%)cases (figure 1).

Bronchial fluid AFB culture by BACTEC MGIT method had a yield of 18/40 (45%) in 3 weeks and to 23/40 (57.5%) at the end of 6 weeks (Table-2).

DISCUSSION

The patients of pulmonary TB may be smear negative because of:

- The number of bacilli is less.
- Patient cannot expectorate and bring out the phlegm.

The WHO Expert Committee on Tuberculosis recommends that patients of pulmonary tuberculosis in whom the disease has not been confirmed bacteriologically should be classified as “suspects” till the presence of AFB is demonstrated and a patient with persistent symptoms whose sputum does not contain AFB should be followed up and anti-tubercular treatment should be given only if the diagnosis can be confirmed bacteriologically.⁶

In areas with high transmission, the risk of infectivity of sputum smear negative PTB to young household contacts has been estimated to be quite high.⁶ Published observations suggest that over 60% of smear negative patients would need chemotherapy by the end of 12 months if left untreated.^{8,9}delayed diagnosis of smear-negative pulmonary TB is a cause of significant mortality and morbidity and can lead to irreversible lung damage.¹⁰

For these reasons it is imperative that the sputum be brought out for the diagnosis of pulmonary TB either by sputum induction with saline nebulization or bronchoscopy aspirates.

Fiberoptic bronchoscopy (FOB) is one of the most widely

studied alternative diagnostic approach among sputum negative patients.¹¹ The FOB enables rapid diagnosis it also provides the additional advantage of the diagnosis of alternate conditions that may mimic pulmonary tuberculosis.

In our study 40 patients who were diagnosed as sputum negative pulmonary tuberculosis based on radiological and sputum negative AFB smear study were subjected to bronchoscopy analysis. The bronchial aspirate where collected and send for smear and culture analysis, Post bronchoscopy sputum was collected from all patients and was send for ZN staining for AFB.

Out Of the 40 patients included in the study 24(60%) were male and 16(40%) were female the age distribution varied from 18 to 70 years. The mean age was 35.15. in a similar study by Saifquaiser¹² et al. Out of 40 patients included for the study, 33 (82.5%) patients were males and 7 (17.5%) were females. The age of patients in this study group ranged from 16 to 73 years (mean age was 38.5).

In current study BAL smear was AFB positive in 13(32.5%), as shown in a number of previous studies, the AFB positivity of BA varies from 13%¹³ to 61%.¹⁴ So *et al.*¹⁵ obtained positive yield of 38% in bronchial aspirate while Danek *et al.*¹⁶ observed BA smear AFB positive in 24% cases. Similarly R.Chawla *et al.*¹⁷ showed that the positive yield of BAL smear for AFB was 20.33% and Yuksekol I *et al.*¹⁸ showed BAL positive for AFB smear in 23% and whereas Baughman *et al.*¹⁹ showed a positive yield by BAL fluid smear examination as 68%. Thus, the data generated in our study is comparable to previous studies.

In our study 3/40 (7.5%) patients were found to be post bronchoscopy sputum smear positive. Saifquaiser *et al.*¹² found post bronchoscopy sputum smear AFB in 7 (17.5%) patients. In various other previous studies, PBS smear revealed AFB positivity ranging from 23% to 37%. Twenty one percent positivity was noted by Danek *et al.*¹⁶ 26% by Purohit *et al.*,²⁰ 28% by sarkar,malay *et al.*,²¹ 35% by Wallace *et al.*²², 37% by So *et al.*¹⁵ and 23% by Kulpati *et al.*²³ The cause for low yield in the current study could be due to the fact that most of the patients had normal bronchial anatomy.

The bronchial aspirate was subjected to culture by bactec mgit method. The automated BACTEC MGIT-960 system employs tubes containing enriched Middlebrook 7H9 broth with an oxygen sensitive fluorescent sensor embedded in silicone on the bottom of the tube which, upon consumption of the oxygen by the mycobacteria in the culture medium, fluoresces orange when probed with an UV light.²⁴

In the present study, bronchial washing-culture was positive for acid fast bacilli in 57.5% cases similar to that reported by Kulpati *et al.*²³ In study conducted Rawat *et al.*²⁵ culture by MGIT960 method yielded the growth of MTB in 51.9% while 50% positivity for culture was seen in study by Yuksekol I *et al.*¹⁸ Whereas Baughman *et al.*¹⁹ showed a positive MTB culture of 92% respectively which is much higher than the current study.

In our study an immediate diagnosis of Pulmonary TB could be made in 40% of cases. In various published²⁶⁻²⁸

studies The yield of immediate diagnosis varied widely from 9% to 73% in the similar studies reported

Combining all the results of bronchoscopic procedures in our study, a definitive diagnosis of tuberculosis was possible in 23(57.5%) of the 40 patients. The study highlights increase in diagnostic yield from 7.5% in post bronchoscopy sputum to 57.5% with use of bronchoscopy and sample culture by BACTEC TB MGIT960. [Figure-2)

Limitations of the study

There are few limitations in this study. In this study. the post bronchoscopy sputum culture and transbronchial biopsy were not done. The investigation of these specimens could have increased the diagnostic yield of bronchoscopy as suggested by different studies in literature.

The automated MGIT960 liquid culture is much more superior than solid culture on Lowenstein Jensen medium BAL samples in our study was sent only for MGIT 960 TB culture. The number of subjects was also small in our study.

CONCLUSION

The current study proves that fiberoptic bronchoscopy is a safe and effective diagnostic modality in sputum smear negative pulmonary TB. Bronchoscopy helps in direct visualisation of airway and better sample collection which increases the diagnostic yield

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