UTILITY OF BRONCHOALVEOLAR LAVAGE IN THE DIAGNOSIS OF SPUTUM NEGATIVE PULMONARY TUBERCULOSIS

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ABSTRACT

INTRODUCTION

Sputum smear examination for acid fast bacilli (AFB) by Ziehl-Neelsen stain (ZN stain) is the initial approach to the diagnosis of pulmonary tuberculosis (PTB). But 50% of the cases are reported to be sputum smear negative. This study was aimed to investigate the diagnostic yield of fibreoptic bronchoscopy (FOB) guided bronchoalveolar lavage (BAL) in patients suspected to have tuberculosis. The sample was tested for *Mycobacterium tuberculosis* using the Xpert MTB/RIF assay, which is a new test that detects *Mycobacterium tuberculosis* complex and resistance to rifampin in less than two hours.

MATERIAL AND METHODS

This is a prospective cross sectional study carried out on 58 sputum smear negative patients who were clinically suspected to have pulmonary tuberculosis from April 2017 to January 2019. All patients are subjected to FOB, BAL and BAL specimens were stained for AFB and also sent for Xpert (MTB)/RIF.

RESULTS

Among 58 patients enrolled for the study 26 patients were positive for acid fast bacilli (AFB) through BAL stain and Xpert (MTB)/RIF combined.

CONCLUSION

FOB guided BAL is a reliable, alternative and rapid method for diagnosing smear negative pulmonary tuberculosis with minimal complications.

KEYWORDS Sputum negative tuberculosis, Bronchosocopy, Bronchoalveolar lavage

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INTRODUCTION

World Health Organisation (WHO) Global Tuberculosis (TB) Report 2018 states tuberculosis mortality rate as 23 per 100,000 populations, which exclude HIV positive TB. As per the Global TB report, 6000 to 7000 people are dying per year from TB disease. TB is a public health problem in Nepal that affects thousands of people each year. It is one of the leading cause of death in the country. WHO estimates that around 45,000 people develop active TB every year in Nepal. Nearly fifty percentage of them are estimated to have infectious pulmonary disease and can spread the disease to others.[1] The initial approach to the diagnosis of pulmononary tuberculosis (PTB) recommended by WHO is the detection of acid fast bacilli (AFB) in sputum.[2] But many patients with PTB are unable to produce cough or are smear negative tuberculosis. Often after meticulous search, the bacteriological positive yield from sputum is around 16 to 50%.[3] They are then treated empirically on the basis of clinical or radiographic findings.[4] So patients clinically suspected to have PTB with no laboratory confirmation really poses a difficult diagnostic and therapeutic problem.[5] In this scenario it is very important to establish the diagnosis of PTB as well as other pulmonary pathologies. Though bronchoscopy is invasive and expensive than sputum examination fibreoptic bronchoscopy is an alternative method of collecting respiratory samples from specific sites in the lung. Therefore, bronchoalveolar lavage (BAL) plays an important role in patients with sputum negative PTB or other mimicking conditions.[6]

The Xpert MTB/RIF assay is a new test which has contributed immensely in tuberculosis (TB) control by rapid diagnosis of TB disease and drug resistance. The test detects *Mycobacterium tuberculosis* complex and resistance to rifampinin less than two hours. The test is much less time consuming compared to standard cultures which can take 2 to 6 weeks for *Mycobacterium tuberculosis* to grow and conventional drug resistance tests can add three more weeks.

MATERIAL AND METHODS

This is a cross sectional prospective study done in Om Hospital and Research Centre from April 2017 to January 2019. Fifty eight consecutive patients who attended the outpatient clinic or admitted were enrolled for the study. They all had chest radiography findings suggestive of PTB but three consecutive early morning sputum samples were negative for acid fast bacilli (AFB) by Ziehl- Neelsen (ZN) stain. Patients with massive pleural effusion, obvious accessible lymph node involvement and who did not give informed written consent were excluded from the study. Flexible bronchoscopy was performed through transnasal route in supine position. Continuous monitoring of oxygen saturation and electrocardiogram were done. Oxygen was delivered through nasal prong to maintain the saturation above 90%. Local anaesthesia was delivered with lignocaine. BAL was taken with 50 ml normal saline from the region corresponding to lesion on chest x-ray. Endobronchial biopsies were taken where and when needed. Patients were not allowed to drink or eat for next two hours after the procedure. BAL samples were sent for stains (Gm-stain, ZN stain, Fungal smear), bacterial culture and cytopathathology and Xpert (MTB)/ (RIF). A final diagnosis of PTB was based on a positive BAL AFB smear or biopsy or Xpert MTB (RIF).

RESULTS

Fibre optic bronchoscopy was performed on 58 sputum smear negative patients. Among them 32 (55.17%) were males and 26 (44.82%) females. The patients aged 30-50 years were the ages most frequently affected.

Table 1. Characteristics of study population

Age	Number	Percentage
Less than 30	14	24.14%
>30-<50	28	48.27%
>50	16	27.58%
Gender		
Male	32	55.17%
Female	26	44.82%
Smoking History		
Male	15	46.8%
Female	12	46.1%
Symptoms		
Asymptomatic (incidental finding)	2	3.4%
Cough	43	74.13%
Fever	26	44.82%
Shortness of breath	11	18.96%
Chest Pain	8	13.79%
Hemoptysis	5	8.62%

Table 2. Main radiological findings

Side of abnormality on chest X-ray	Number	Percentage
Right side	18	31.03%
Left side	28	48.27%
Bilateral	12	2.06%
Lung zone involved on chest radiograph		
Upper zone	31	53.44%
Middle zone	3	0.51%
Lower zone	3	0.51%
More than one zone	21	36.2%
Main abnormality on chest x-ray		
Fibrosis	15	25.86%
Consolidation	22	37.93%
Reticulonodular	8	13.7%
Pleural effusion	3	0.51%
Miliary shadows	3	0.51%
Infiltrates	7	12.06%

Table 3. Yield and diagnostic utility of BAL

Yield	Number	Percentage
BAL negative for AFB	32	55.17%
BAL positive for AFB	26	44.83%
BAL positive for AFB by ZN stain	17	29.32%
BAL positive for Xpert (MTB/RIF)	26	44.82%
Bacterial Infection	11	18.96%
Fungal positive	6	10.34%
Malignancy	4	6.8%

DISCUSSION

TB is the leading cause of mortality and morbidity worldwide.[7] Though microscopy for identification of AFB is rapid and less expensive smear is negative in significant number of patients.[8,9] It is important to note that untreated TB can affect up to[10] people over a year and delayed diagnosis is significant cause of morbidity and mortality.[10] In the earlier days of rigid bronchoscopy, patients with tuberculosis were seldom subjected to bronchoscopy for diagnostic purpose. However, with the advent of fibre optic bronchoscopy, bronchial aspirate, bronchial brushing, bronchial washing, bronchoalveolar lavage fluid and biopsy material can be used for the diagnosis of tuberculosis. Fibre optic bronchoscopy is relatively safe procedure and complications ranged from <0.1 to 11%, with mortality reported between 0 and 0.1%.[11] So FOB and BAL is used to establish the diagnosis of PTB with low morbidity and avoiding delay in treatment as BAL is considered best for diagnosis of PTB.[12-15] So we evaluated the utility of BAL in 58 patients who have clinical and radiographic features of PTB but were sputum smear negative.

Cough and fever were among the most common symptoms as reported in other studies.[16] The common radiographic features are patchy or poorly defined consolidation in the apical and posterior part of the upper lobes of the lung. Most of the patients in our study also had lesions involving the upper lobes.[17]

All the patient enrolled had three morning samples negative for AFB. Previous studies has also reported low yield from ZN staining in PTB.[18] Among 58 patients 17 (29.32%) had AFB positive in BAL ZN stain and 26 (44.82%) had Xpert (MTB)/RIF positive. Among 12 patients who underwent bronchial biopsy three had squamous cell carcinoma and one had small cell carcinoma. Altaf et al performed the study on 75 sputum smear negative suspected patients for PTB and revealed that the total yield of FOB was 83.33% that was higher than in our study.[19] Yuksekol et al found BAL smear and culture for TB were positive in 13 (23%) and 28 (50%) in the line of our study though we did Xpert (MTB)/RIF instead of culture in our patients.[20] Kamal et al also found FOB and BAL are useful method not only in the diagnosis of but also to confirm other pulmonary pathologies.[21] It is also worth mentioning that FOB has low complication rate as no one in our study showed any major complication except mild hemoptysis.

CONCLUSION

As shown in the study ZN stain and Xpert (MTB)/RIF of BAL obtained with FOB provides definite diagnosis in higher number of patients in sputum negative candidates. Thus, we highly recommend FOB and BAL examination in smear negative patients with chest X-ray and clinical symptoms suggestive of TB as BAL is reliable and rapid method for establishing the diagnosis.

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