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ORIGINAL ARTICLE

Diagnostic Accuracy of Bronchoalveolar Lavage in Diagnosis of Pleural Tuberculosis among Suspected Cases of Pleural Tuberculosis

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ABSTRACT

Aim: To determine the accuracy of bronchoalveolar lavage in diagnosis of pleural tuberculosis among suspected cases of pleural tuberculosis using biopsy.
Study design: Descriptive, cross-sectional.
Place and duration of study: Department of Chest Medicine, JPMC, Karachi from 1st August 2017 to 31st January 2018.
Methodology: One hundred and thirty six patients with cases of pleural tuberculosis of age 18-55 years and both genders were included. Patients with anti-tuberculosis drugs, pneumonia, tonsillitis, pharyngitis, obstructive pulmonary disease and platelet function disorders, thrombocytopenia or coagulation factors disorder were excluded. 30-50 ml of bronchoalveolar fluid was carried out through fiberoptic bronchoscopy. Three milliliters of 4% lignocaine was used as pre-medication and 3 ml of 2% lignocaine was used during bronchoscopy.
Results: In BAL positive patients, 73 (true positive) had pleural tuberculosis and 9 (false positive) had no pleural tuberculosis on biopsy. Among 54, BAL negative patients, 5 (false negative) had pleural tuberculosis on biopsy whereas 49 (true negative) had no pleural tuberculosis on biopsy. Overall sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of BAL in diagnosis of pleural tuberculosis among suspected cases of pleural tuberculosis using biopsy as gold standard was 93.59%, 84.48%, 89.02%, 90.74% and 89.71% respectively.
Conclusion: The diagnostic accuracy of bronchoalveolar lavage in diagnosis of pleural tuberculosis among suspected cases of pleural tuberculosis is quite high.
Keywords: Pleural tuberculosis, Bronchoalveolar lavage, Sensitivity

INTRODUCTION

Tuberculosis (TB) is one of the daunting health challenges especially for the inhabitants of developing countries. Pakistan is on number 5 in countries which are badly affected by TB.[1] Tuberculous pleural effusion is also very common in TB patients and accounts for up to 25% of the patients. High incidence rate is sometimes linked with insufficient and expensive TB treatment.

Needle pleural biopsy has a significant yield up to 60 to 80 percent in pleurisy TB[2,3] while thorocoscopy accounts for >90% in TB cases[4]. It is still a major disease affecting millions of people annually with distinct presentations[5-7]. Pleural tuberculosis is quite common in extra pulmonary tuberculosis.[8] Effective treatment and timely diagnostic strategy is essential to reduce morbidity and mortality. However, founding a reliable and effective treatment method for TB is still challenging due to low sensitivity of acid fast bacilli[9].

Thoracoscopic pleural biopsy in recent years have overcome Abram's pleural-biopsy as a consequence of high diagnostic results[10]. However, the later method is not only costly but also highly invasive in context to the PL-TB. The viability of fibreoptic bronchoscopy (FOB) for investigating pleural-effusion has not been properly defined. Despite of all this the bronchoscopy inclusion among all such patients is advocated[11,12].

In recent times, gene Xpert has been developed which is multicolor-q PCR for tuberculosis detection. It can even detect rare 81-bp drug resistance of rifampicin mutation of rpoBgene which occurs in majority of the patients[13,14].

The objective of the study was to determine the accuracy of bronchoalveolar lavage in diagnosis of pleural tuberculosis among suspected cases of pleural tuberculosis using biopsy.

MATERIALS AND METHODS

This descriptive, cross-sectional study was carried out at Department of Chest Medicine at Jinnah Postgraduate Medical Center, Karachi from 1st August 2017 to 31st January 2018. A total 136 patients with cases of pleural tuberculosis were enrolled. All patients age 18-55 years, either gender, suspected cases of pulmonary tuberculosis and duration of symptoms >3 weeks were included. All patients of history of anti-tuberculosis drugs use for more than 1 month, upper and lower respiratory tract infections like pneumonia, tonsillitis, pharyngitis, history of obstructive pulmonary disease like asthma or COPD or history of hemoptysis, chronic steroids therapy, pregnant women (assessed on U/S), bleeding disorders like, platelet function disorder, thrombocytopenia or coagulation factors disorder (assessed through history and lab investigation) and suspected case of carcinoma of Lung (assessed through chest x-ray) were excluded. 30-50 ml of bronchoalveolar fluid was carried out through fiberoptic bronchoscopy by researcher herself under the supervision of consultant having >5 years of experience. Three milliliters of 4% lignocaine was used as pre-medication and 3ml of 2% lignocaine was used during bronchoscopy. The BAL sample was collected and was sent to the laboratory for AFB smear, gene Xpert, AFB culture and finally pleural biopsy was done through Abram's pleural biopsy needle to confirm pleural tuberculosis as mention in operational definition. All the procedure was performed under the supervision of consultant having >5 years of experience. Data was analyzed by SPSS-25. A dichotomous 2x2 table was constructed to calculate sensitivity, specificity, PPV, NFV and diagnostic accuracy of BAL by using biopsy as gold standard.

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RESULTS

There were 76 (55.88%) males and 60 (44.12%) were females with ratio of 1.2:1, mean age was 42.43±8.56years, mean duration of disease was 6.24±1.40 days and mean body mass index was 28.88±2.20 kg/m^2 (Table 1). All the patients were subjected to of bronchoalveolar lavage (BAL) and BAL supported the diagnosis of pleural tuberculosis in 82(60.29%) patients and no pleural tuberculosis in 54(39.71%) patients. Biopsy findings confirmed pleural tuberculosis in 78(57.35%) patients and no pleural tuberculosis in 58(42.65%) patients. In BAL positive patients, 73 (true positive) had pleural tuberculosis and 9 (false positive) had no pleural tuberculosis on biopsy. Among 54, BAL negative patients, 5 (false negative) had pleural tuberculosis on biopsy whereas 49 (true negative) had no pleural tuberculosis on biopsy. Overall sensitivity, specificity, positive predictive value, negative

predictive value and diagnostic accuracy of BAL in diagnosis of pleural tuberculosis among suspected cases of pleural tuberculosis using biopsy as gold standard was 93.59%, 84.48%, 89.02%, 90.74% and 89.71% respectively (Table 2).

Table 1: Demographic information of the patients (n=136)

Variable	No.	%
Gender		
Males	76	55.88
Females	60	44.12
Age in years		
18-35	33	24.26
36-55	103	75.74
Duration of symptoms (weeks)		
3 – 6	74	54.41
> 6	62	45.59
Body mass index (kg/m²)		
≤ 27	42	30.88
> 27	94	69.12

Table 2: Diagnostic accuracy of bronchoalveolar lavage (BAL) in diagnosis of pleural tuberculosis among suspected cases of pleural tuberculosis using biopsy as gold standard

BAL	Biopsy		Total
	Positive	Negative	
Positive	73 (TP)	9 (FP)	82
Negative	5 (FN)	49 (TN)	54
Total	78	58	136

Sensitivity: 93.59% Specificity: 85%
PPV: 89.02% NPP: 90.74%
Diagnostic Accuracy: 89.71%

DISCUSSION

Tuberculosis is still a major challenge for developing nations where it affects number of patients every year. It is now ranked as one of the biggest cause of infection related mortality globally.[15] According to the statistical data of 2014, it was diagnosed in ~9.6 million people and causing 1.5 million deaths[16]. Pulmonary TB is considered its key manifestation[17]. Pathogen culture is still a gold standard for TB diagnosis. However, pathogen culturing is a time consuming and sometime false negative results also occurr[18].

Another method for its diagnosis and confirmation is microscopy. Sometime, specimen culturing is difficult to get and then leads to false negative result if specimen is inadequate.[19,20] Nucleic-acid amplification tests give much earlier results than culturing but are way too expensive. A well-known automated NAAT is Xpert assay that gives highly specific and sensitive results for TB detection.[21] Nonetheless, it is also very expensive and only available in certain institutions[22,23].

In the present study, age range was from 18-55 years with mean age 42.43±8.56 years and majority of the patients, 103(75.74%), were between 36-55 years. Seventy six (55.88%) were males and 60(44.12%) were females with ratio of 1.2:1. BAL supported the diagnosis of pleural tuberculosis in 82(60.29%) patients and no pleural tuberculosis in 54(39.71%) patients. Biopsy findings confirmed pleural tuberculosis in 78(57.35%) patients and no pleural tuberculosis in 58(42.65%) patients. Overall sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of bronchoalveolar lavage in diagnosis of pleural tuberculosis among suspected cases of pleural tuberculosis using biopsy as gold standard was 93.59%, 84.48%, 89.02%, 90.74% and 89.71% respectively.

The ELISpot PPV in the BAL fluid had a percentage of 64.9%[24] which was higher than the ELISpot PPV in BAL fluid (55%). This might be due to variations in ethnicity of TB related endemic.[110] The literature conducted in this context elaborates that ratio of PPV within extra sanguineous as well as systemic interferon gamma-responses is considered as a ELISpot in BAL limitation.

CONCLUSION

The diagnostic accuracy of bronchoalveolar lavage in diagnosis of pleural tuberculosis among suspected cases of pleural tuberculosis is quite high. So, we recommend that this easily available and least invasive method should be done for diagnosing pleural rather than invasive procedure like Abram's pleural biopsy or pleuroscopic biopsy.

Conflict of interest: Nil

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