

TUBERCULOUS PLEURISY – DIAGNOSTIC YIELDS OF PLEURAL FLUID MYCOBACTERIAL SMEAR AND CULTURE

Muhammad Khalid Ch,¹ Muhammad Saqib Saeed,² Rizwan Iqbal,³ Sajjad Hassan⁴

Abstract

Background: Worldwide, Tuberculosis is a common etiological factor of exudative predominantly lymphocytic effusions. Amongst extra-pulmonary manifestations of tuberculosis, pleurisy is the second frequent manifestation. Detection of Mycobacterium tuberculosis by any means is the gold standard for establishing the diagnosis of tuberculosis.

Objective: The purpose of the study was to determine the yield of mycobacterial smear and culture in exudative predominantly lymphocytic effusions.

Methodology: This study was conducted on 100 (Male 65 / Female 35) cases with age range 13 to 69 years for the demonstration of Mycobacterium tuberculosis in exudative predominantly lymphocytic ple-

ural effusions. The Mycobacterium smear was performed by Zeihl Nelsen staining and culture on Lowenstein Jensen medium.

Results: Study results showed 1.02% (1 female case) Mycobacterium smear positivity and 2.04% (male 1 & female 1) culture positivity. Contamination was detected in 2% (2 female cases) specimens. As concerned of fluid cytology, 85% of study cases had lymphocytosis between 85 – 95%. Remaining 15% cases had lymphocytosis between 60 – 79%.

Conclusion: Although detection of Mycobacterium either by smear or culture on any specimen is a gold standard for the diagnosis of TB but the yield of Mycobacterium in pleural fluid is very low. So other advanced techniques should be used to confirm the diagnosis of tuberculous pleurisy.

Key Words: Mycobacterium tuberculosis, Ziehl Nelsen staining, Lowenstein Jensen medium, Exudative lymphocytic pleural effusion.

Ch. M.K.¹

Associate Professor, Department of TB and Chest Medicine
KEMU / Mayo Hospital, Lahore

Saeed M.S.²

Chairman Department of TB and Chest Medicine
KEMU / Mayo Hospital, Lahore

Iqbal R.³

Director, PMRC, KEMU / Mayo Hospital, Lahore

Hassan S.⁴

Registrar, Department of TB and Chest Medicine
Mayo Hospital, Lahore

Introduction

Tuberculosis is a common contributor of exudative pleural effusion. Pleural effusion is the second most common extra pulmonary manifestation following tuberculous lymphadenitis.¹ Pleural effusion is not a disease itself but it is a sign of an underlying disease. So there is a need to find a specific etiological diagnosis. According to Light's criteria; 99% of pleural effusions fall into two categories, transudative and exude-

tive.² Exudative pleural effusion is usually caused by a pleuro-pulmonary pathological process like infection, pulmonary embolism and malignancy etc. Worldwide, TB is the single most frequent cause of death by an infectious agent.³ In many countries where TB is endemic, tuberculosis remains the most important cause of pleural effusion in the absence of demonstrable pulmonary pathology.⁴ Tuberculous pleural effusion can be definitely diagnosed only when tuberculous bacilli are present either in smear or culture of pleural fluid or tissue. Mycobacteria are rarely positive in pleural fluid smear and culture. Other modalities of investigations like pleuroscopy, pleural biopsy, estimation of adenosine deaminase and PCR are of very much use. These diagnostic modalities are not available easily everywhere, more over they are costly. So we conducted a study to evaluate the time tested investigation of demonstrating AFB in pleural fluid smear and culture to confirm the diagnosis of tuberculous pleural effusion.

Objective

To confirm the diagnosis of exudative lymphocytic pleural effusion as tuberculous in origin by demonstrating acid fast bacilli on smear and culture of pleural fluid.

Study Design

Prospective randomized evidence based.

Study Setting

Institute of Chest Medicine Mayo Hospital, a tertiary care hospital affiliated with King Edward Medical University Lahore, in collaboration with Pakistan Medical Research Council center for Tuberculosis at King Edward Medical University Lahore.

Table 4: Z.N Staining and Culture Results.

S. No.	Tests	Male N:65	Female N:35	Total N:100	Percentage
1.	Z.N Staining +ve	0	1	1	1.02
2.	Culture	1	1	2	2.04
3.	Contamination	1	1	2	2

Study results show very low yield of acid fast bacilli on smear and culture 1.02% and 2.04% respectively.

Methodology

A total one hundred (Male – 65, Female – 35) patients of exudative pleural effusion with predominance of lymphocytic cytology having suspected etiology of TB were enrolled in the study. The patients were enrolled randomly in the study without any gender discrimination. From each patient 20 cc pleural fluid aspirated for AFB smear and culture under aseptic measures. The specimens were processed at Pakistan Medical research council lab affiliated with Institute of Chest Medicine, KEMU / Mayo hospital, Lahore. The AFB smears were stained with Z N staining and examined under oil immersion lens by using standard procedure. The cultures of pleural fluid were processed on Lowenstein Jensen (LJ) solid media which is the only facility available at PMRC lab. The culture results were available within six weeks. Pleural fluid specimens were also examined for malignant cells to rule out the possibility of malignant effusion.

Results

Table 1: Study Patients.

Total	Male	Female
100	65	35

Table 2: Age Distribution.

Gender	Age Range (years)	Mean Age (years)
Male	13-69	34.1
Female	15-63	26.2

Table 3: Pleural Fluid Cytology.

No. of Patients	Lymphocyte Count
85	80 – 95%
15	60 – 79%

Discussion

Worldwide in high prevalence areas, tuberculosis is the most common cause of exudative pleural effusions.⁵ Reactivation of previous tuberculosis may also present as exudative pleural effusion⁶. Despite the development of new diagnostic methods like thoracoscopy, closed pleural biopsy, biochemical markers and PCR, traditional gold standard method of acid fast bacilli demonstration by pleural fluid smear and culture on L. J. medium was applied to confirm the tuberculous etiology of the exudative lymphocytic pleural effusion.⁷ Among other common causes of exudative lymphocytic pleural effusions is malignancy. The diagnosis of malignant pleural effusion was ruled out by clinical assessment and absence of malignant cells in pleural fluid analysis in the study cases.

Our study results showed very low yield of AFB i.e. 1.02% on pleural fluid smear and 2.04% on pleural fluid culture. Fluid smear positive case was a female and culture positive patients were a single male and a female. According to study Sheng – Yaun Raun et al,⁸ there were only three cases of AFB positive in pleural fluid in a study of 382 cases of tuberculous pleurisy, which is comparable to our smear results. But the culture yield was 63% which is significantly high as compared to our study. Our study patients have a very high proportion of lymphocytes (80-95%), which is negatively associated with culture positivity. Other studies^{9,10} reported diagnostic yields of effusion culture 7 – 35%. Advances in culture techniques have improved the yield of Mycobacterial cultures. Higher yields and faster results have been attributed to liquid media as compared to solid media.^{12,13} The classical mode of pathogenesis of tuberculous pleurisy is the rupture of sub pleural caseous foci followed by a delayed hypersensitivity reaction to Mycobacterial antigens.¹¹ It indicates two important features of tuberculous pleurisy which include lymphocytic predominance and a low yield of AFB on effusion smear and culture. Other researchers suggested that tuberculous pleurisy is caused by a hypersensitivity reaction rather than direct infection of pleura by the Mycobacteria.^{14,15} The above mentioned explanation for the cause of tuberculous pleurisy, justifies the low yield of AFB smear and culture in pleural effusions. This also supports our study results.

Conclusion

Although detection of Mycobacterium either by smear

or culture on any specimen is a gold standard for the diagnosis of TB but the yield of Mycobacterium in pleural effusions is very low. So other advanced techniques should be used to confirm the diagnosis of tuberculous pleurisy.

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