Role of pleural fluid analysis in diagnosis of tubercular pleural effusion

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ABSTRACT

Objective: To evaluate the diagnostic value of pleural fluid analysis in tubercular infection in the people with pleural effusion admitted to our hospital.

Material and Methods: All patients aged 22 years and older with clinical and radiographic findings of pleural effusion suspected for tuberculosis admitted to Sir Ganga Ram Hospital (SRGH) between January 1999 to 2005 were evaluated consecutively. Pleural fluid samples were analyzed for level of protein, specific gravity, cell count, differential cell count, bacterial culture and acid-fast bacilli smear. If effusion contains more than 150 WBC/cumm, specimen was cultured on chocolate agar, blood agar and MacConkey’s agar.

Results: Pleural fluid protein was more increased as compared to the normal (range of 0.68-7.9 gm/dl). Lymphocytes were from nil to 80% and polymorphonutrophils (PMN) from nil to 3200/cumm. Possible gram positive microorganisms were Staphylococcus aureus, Streptococcus pneumoniae, Streptococcus pyogens and Actinomycetes while possible gram negative microorganism were Hemophilus influenzae, Bacteriolus species, Pseudomonus aureginosa, Klebsiella strains and other enterobacterie. In only a few cases was mycobacterium tuberculosis positively stained.

Conclusion: Pleural tuberculosis could be a major cause of pleural effusion and microbiological investigation alone is not enough in diagnosing the diseases. (Rawal Med J 2008;33:5-7).

Key Words: Tuberculosis, pleural effusion, pleural biopsy.

INTRODUCTION

Pleural Tuberculosis (TB) is a common form of extrapulmonary disease. It may occur in the presence or absence of pulmonary parenchymal disease revealed on the chest radiograph. Pleural tuberculosis is a diagnostic challenge because of its non specific clinical presentation. In pulmonary infection, other than tuberculous pleural fluid, there is mixture of lymphocytes, polymorphoneutrophils, mesothelial cells, red blood cells and macrophages are present. Both macrophages and T-lymphocytes may contribute to the immunopathogenesis of tuberculosis at the local site of disease.
A study of pleural fluid estimation of acid fast bacilli gave positive figures on staining 0%, culture of acid fast bacilli 24%, pleural biopsy 69% and sputum 40% while a combination of these yielded a diagnosis in 92% of the patients with tuberculous effusion.\(^5\) Purpose of this study was to evaluate the diagnostic value of pleural fluid in diagnosis of tuberculous pleural effusion admitted to our hospital.

**MATERIALS AND METHODS**
All patients aged 22 years and older with clinical and radiographic findings of pleural effusion suspected for TB admitted to the SRGH, Lahore between January 1999 to 2005 were evaluated consecutively. Patients were not eligible if they had clinical and or/radiographic evidence of renal, cardiac or liver disease, lung, cancer or pregnancy. Patients were also excluded if, during the 3 months before enrollment, they had hemoptysis or had received antituberculous therapy or anticoagulant therapy for more than 1 week.

Pleural fluid samples were analyzed for protein, specific gravity, cell count, differential cell count, bacterial culture and acid-fast bacilli smear. Cell count was carried out by using Neubar Chamber. If effusion contains more than 150 WBC/cumm, specimen was cultured on chocolate agar, blood agar and MacConkey’s agar at 37\(^{0}\)c for 24 hour. Comparisons between groups were performed using student’s t test.

**RESULTS**

A total of 225 patients with 125 males and 100 females constituted this study. Among patients with pleural TB, 75.2% (93/125) were male and 85% (85/100) were female. The mean age was 45.72±19.22 years (range = 22–85) in male and 43.74±16.09 year (range = 20–80) in females. Ninety-six percent of the chest radiographs demonstrated unilateral small or medium-sized effusion.

**Table. Level of fluid protein, specific gravity and pH in tuberculous pleural effusion.**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Male (93)</th>
<th>Female (100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>45.72±19.22</td>
<td>43.74±16.09</td>
</tr>
<tr>
<td>Protein (gm/dl)</td>
<td>3.39±0.24</td>
<td>3.02±0.26</td>
</tr>
<tr>
<td>Sp. Gravity</td>
<td>1.020±0.01</td>
<td>1.020±0.01</td>
</tr>
<tr>
<td>pH</td>
<td>7.3</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Level of fluid protein was more as compared to the normal reported values (<0.5 gm/dl) with a range of 0.68-7.9 gm/dl with no difference in specific gravity and pH (table). The range of lymphocytes was from nil to 80% and range of PMN was from nil to 3200/cumm. Microbiological assay of only those specimen was performed, where lymphocytes were more than 120/cumm. Possible gram positive microorganisms were Staphylococcus aureus, Streptococcus pneumoniae, Streptococcus pyogens and Actinomycetes while possible gram negative microorganism were Hemophilus influenzae, Bacteriobius species, Pseudomonus aeruginosa, Klebsiella strains and other
enterobacterie. In some cases Mycobacterium tuberculosis, fungi, viruses especially Coxsackie B virus was seen.

**DISCUSSION**

A high regional incidence for TB often correlates with poor financial resources necessitating a cost-effective diagnostic strategy. Our male patients mean age was 45 years. The age has ranged from 37 years to 61 years. We observed mean fluid protein of 3.0-3.5 g/dl while 5.1-5.5 g/dl levels have been reported. A mean pH of fluid of 7.33 with a typical clinical presentation for tuberculous pleurisy has been reported. Our cell counts are in accord with a study where it was observed that the neutrophils were the predominant cells for the first 24 hours, and then were followed by lymphocytes. The study suggested that tuberculous inflammatory and immunological responses in acute tuberculous pleurisy is enhanced rather than suppressed.

Present study observed no sputum in patients. The fact that most patients with pleural TB do not produce sputum spontaneously may be the reason for the reportedly low yield of sputum culture in this setting. However, as concluded in an earlier study, the number of undetermined causes could be minimized with a combination of readily available and established investigations. In conclusion, microbiological investigation alone is not enough in diagnosing tuberculous pleural effusion and a combination of diagnostic tests should be used.

**REFERENCE**