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ETIOLOGICAL DIAGNOSIS OF PLEURAL EFFUSION BY PLEURAL FLUID EXAMINATION; A STUDY OF 100 CASES

Medicine

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ABSTRACT

Background: Analyzing serous body fluids is vital as it provides insights into the underlying cause, identifies metastatic cells, assists in classifying unknown cases, and aids in the staging and prognosis of cancer. The accumulation of abnormal volumes and qualities of fluid within the pleural cavity is referred to as pleural effusion. The cytological assessment of pleural fluid is conducted primarily to determine the presence or absence of cells and to distinguish between transudates and exudates. The cytological examination of body fluids serves as a comprehensive diagnostic approach. In this research, an effort has been made to determine the underlying cause of pleural effusion through the analysis of patient history, clinical symptoms, biochemical tests, and cytological methods. The various non-cancerous and cancerous sources of pleural effusion can be recognized using the relatively non-invasive and straightforward approach of examining pleural fluid. The importance of the cytological examination of the fluid may be due to the fact that the cell population found in the sediment reflects a much broader surface area than that acquired through needle biopsy. **Materials and Methods:** One hundred samples of pleural fluid were examined for total cell count, cell type and cellular features. They were also subjected to biochemical study to find out the level of protein. **Results:** A total of 95% samples were exudative and 05% were transudative. Total leukocyte count (TLC) was less than 500 cells/cmm in 21% 500-1000cells/cmm in 13 % and >1000cells in 66%. It was noted that 55 % of Tuberculous effusions had more than 70% lymphocytes and >3 gm protein.10% cases are of empyema having neutrophilia,14% cases are of pneumonia, 05% of pleural effusions were suspicious for malignant cells,03% cases were of liver diseases and 05% cases are traumatic showing only blood. **Conclusions:** Thoracocentesis followed by pleural fluid analysis is the best method to diagnose the underlying etiology. Pleural fluid cell count is the most useful test in establishing the diagnosis of pleural effusionas well as, in certain cases, a means of prognostication of disease process. Most of etiologies for pleural effusion were tuberculosis amongst younger age group and malignancy in older age.

KEYWORDS

Pleural effusion, Pleural fluid, Malignant effusion

INTRODUCTION

Pleural effusion refers to an accumulation of excess fluid in the space between the two pleural membranes that encase the lungs [1]. Individuals with a pleural effusion that has not been diagnosed should undergo a personalized, step-by-step assessment. The first two steps should be fairly non-invasive and consist of a clinical assessment and analysis of the pleural fluid..

Aspiration of serous cavities is a simple and relatively noninvasive technique to achieve a diagnosis. The information provided by body fluid analysis serves several functions, first, it assists the clinician in formulating, in order of priority, a list of differential diagnoses, second it allows one to follow the result of therapy [2]and third analysis of pleural fluid provides information about different types of infectious and noninfectious diseases and tumors. Due to multitude of causes (tumors, infectious diseases, etc.), accumulation of fluid in serous cavities is abnormal.Cytological smear analysis is performed to rule out the presence or absence of benign or malignant cells in the pleural effusions [3]

The diagnostic performance of the cytologic study of the fluid may be attributable to the fact that the cell population present in sediment is representative of a much larger surface area than that obtained by needle[4]

In India, tuberculosis is the leading cause, with malignancy following closely behind.[2-4] Pleural effusion frequently presents a diagnostic challenge for physicians due to the broad range of differential diagnoses. The primary difficulty in the clinical diagnosis of pleural effusion lies not in differentiating transudates from exudates, but in identifying the underlying cause when an effusion is classified as an exudate.

MATERIALS AND METHODS

This research on the analysis of pleural fluid was conducted in the Pathology Department at a tertiary healthcare facility. A total of 100 patients, aged between 10 and 80 years and of both genders, participated in the study. Clinical data related to age, gender, symptoms, and associated signs was collected from patients in both the wards and the outpatient department. An effort was made in this study to process the pleural fluid specimens as expeditiously as possible, the majority were processed immediately. But in a small number, when there was a delay, these specimens were stored in the refrigerator at 4°C. The fluid was divided into two parts, one part was used for cell count and the other part was poured into the centrifuge tubes and centrifuged for 10 minutes at 3000 rpm. The supernatant was discarded. Part of the sediment was transferred to a clean glass slide. After placing the cover slip, the slide was observed under the microscope for immediate identification of cell morphology. Then the remaining sediment was transferred with the help of a Pasteur pipette to three slides coated with albumin. One was air dried and stained with Giemsa, the other two were fixed in 95% alcohol for a minimum period of 15 minutes and stained with Hematoxylin and eosin.

For hemorrhagic fluids, glacial acetic acid or 0.1 N HCl was used as hemolysing agent and then they were processed. For cell count one drop of fluid was mixed with a drop of toluidine blue and the cells were counted in an improved Neubauer counting chamber.

RESULTS

The medical records of all 100 patients with pleural effusion were analyzed. The ages of the patients ranged from 4 years to 75 years, with maximum cases after 60 years of age. Male preponderance was noted; the ratio of male to female being 60:40. Of all the effusions, 5% were hemorrhagic; 55% turbid, 5% clear, 10% purulent, 5% opalescent and14% coagulum. Transudates comprised 5% of cases. Most of them were secondary to cirrhosis and congestive cardiac failure. [Table 1] Overall 95% of pleural effusions were exudative in nature. The most frequent cause of exudative effusion was tuberculosis(55%) followed by pneumonia (14%), empyema (10%)and malignancy (05%).

Overall 55% cases showed lymphocytosis, 24% showed neutrophilia,13% showed mesothelial cells, 5% showed degenerated cells,3% showed atypical cells[Table4].

Patients of pleural effusion of any age and of either sex in whom thoracentesis can yield minimum amount of pleural fluid for diagnostic purposes were included. Patients of pleural effusion in whom fluid could not be aspirated were excluded from the study.

Table 2 –Sex Wise Distribution of Pleural Fluid

SEX	NO OF CASES	% OF CASES
MALE	60	60
FEMALE	40	40
TOTAL	100	100

Table 3- Age Wise Distribution of Cases

AGE	NO OF CASES	% OF CASES
10-20	11	11
21-30	15	15
31-40	16	16
41-50	17	17
51-60	11	11
MORE THAN 60	30	30

Table 3- Transudate and Exudate Distribution

	Transudate	Exudate
No of cases	05	95

Table 4- Distribution of Cases According to Total Cell Count in Pleural Fluid

Total count	<500 cells	500-1000 cells	>1000cells
No of cases	21	13	66

Table 5- Disribution of Cases According to Cell Type

Cell type	lympho-cytes	Neutro-phils	Mesothelial cells	Degenerated cells	Atyical cells
No of case	55	24	13	05	03

Table 6- Distribution of Cases According to Diagnosis

Diagnosis	NO OF CASES(%)
Tuberculosis	55
Empyema	10
Pneumonia	14
Liver disease	03
Malignancy	05
Heart disease	02
Trauma	05
Others	06

DISCUSSION

The analysis of pleural fluid is an important diagnostic tool that seeks to identify the causes of pleural effusions. It is a recognized and reliable technique for detecting malignancies, and its use has become more widespread in clinical practice, to the point where a positive diagnosis is frequently regarded as the definitive test. [5]. The relative ease of pleural fluid aspiration, analysis and cytological examination has kept alive the search for a test to unequivocally differentiate the various causes of effusion. The cytological examination of body effusion is a complete diagnostic modality which aims at pointing out the etiology of effusions. The diagnostic performance of the cytologic study of the fluid may be attributable to the fact that the cell population present in sediment is a representative of a much larger surface area than that obtained by needle biopsy [4].In majority of cases the diagnosis can be made on the basis of either smear block alone, but using the combined techniques on the same specimen leads to a more accurate diagnosis [6]

In the present study pleural effusions were more common in above 60 years of age group which is comparable with the study of Shah H. In study done by Burgers it was among 41-50 years of age group[7]

Of 100 patients, 60 (60%) were males, whereas 40 (40%) were females with male-female ratio of 3:2, In the present study; males(60%)had higher incidence of pleural effusion compared to females (40%). Findings are closely related to Mohamad arif et al, Maldhure (2.13:1), Amethiya P (2.34:1) and Hirsch (2.53:1).3-5 [7,8,9].

The presence of predominantly neutrophils in pleural fluid indicates that the fluid is the result of acute pleural inflammation, hence raising the probability of pneumonia with effusion. In our study; 24% cases showed neutrophil preponderance.

In our study, we observed that the most common cause of pleural effusion was TB in 55 cases and 45 cases had non-tubercular etiology. Similar results observed by Jindal SK et al.; [10], Mandell ,and Bennelt that tuberculosis is the most common cause of effusion followed by synpneumonic effusion. This was comparable to the studies of Thiruvengadam (64%),[11] Dambal A (65.5%)[12] and Amethiya P (68%) [8]which were done in India while in various other studies incidence of tuberculous pleural effusion was low, which can be explained by the fact that TB is more prevalent in India.[4,6,7] Incidence of malignant pleural effusion was 18% which was comparable with the Indian studies of Amethiya P (18%),[8] Dambal A (18.2%)[12], Thiruvengadam (21%)[11] and Valdes (22.9%).[13]

Malignant pleural effusion is more common in age group of more than 60yrs (33%). Findings are comparable with Reshmi Kushwaha et al study.[14]Etiology of most of pleural effusions in younger age group was diagnosed as Tuberculous (55%) supported by Pujan Parikh et al study.[15] Present study shows that lymphocyte preponderance is predominant in younger age group (55%) suggestive of tuberculous infection and reactive mesothelial cells (13%)in older age group point towards malignancy; supported by Mohhamad Arif et al.[3] In most of the effusions; the cell count was >1000 cells /cmm (66%); suggesting exudative fluids.

Of all the effusions,5% were hemorrhagic; 55% turbid, 5% clear, 10% purulent, 5% opalescent and14% coagulum Similarly S k Jindal et al.; [10] and Bansiwal BL et al.,[1] concluded that TB pleural fluid is usually turbid. Turbid and turbid to purulent fluid was because of high pleural fluid cell counts more than 1000 and 2000 -10000 cells/cmm respectively. Other causes may be of acute infections, high protein more than 3gm/dl and glucose less than 60 mg/dl.

In our study, pleural fluid analysis gave sufficient information to categorize the samples as transudates or exudates on the basis of biochemical tests and cell count (Table 3).2 Moreover, we could provisionally categorize the samples as malignant, tuberculous etc. by the cytological findings (Table 5).2In the present study incidence of exudative effusion was 95% which was comparable with the study of Amethiya P (94%)[8]. In various other studies the incidence of exudative effusion was low which can be explained by the fact that tuberculousis is more prevalent in India having exudative etiology

CONCLUSION

To conclude the study, it is sure that tuberculous pleural effusion is most common etiology followed by malignancy. Thoracocentesis followed by pleural fluid analysis is the best method to diagnose the underlying etiology. Undiagnosed pleural effusions can be best diagnosed by thoracoscopic pleural biopsy and histopathologic analysis. The most useful test in establishing the diagnosis of pleural effusion is pleural fluid cytology and pleural fluid cell count

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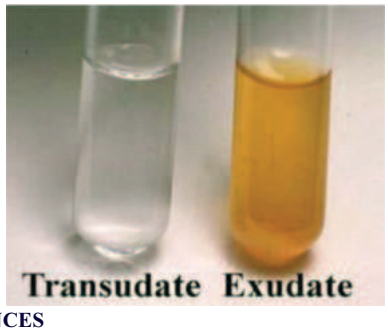

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