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Research Article

Morphological Analysis of Body Fluids for Diagnostic Significance

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A B S T R A C T

Introduction: Effusion cytology is the first line of investigation in a suspected case of infections and malignancy. Aetiological diagnosis of effusion samples is challenging and morphological analysis provides valuable information in the evaluation of body fluids. It also helps in studying the infections and staging of malignancies and assessing the prognosis of the disease.

Objective: To know the diagnostic significance of morphological analysis in body fluids.

Methods: The retrospective study was carried out on 500 cases.

Results: The majority (52%) of cases were due to tuberculosis. Other diseases causing different effusions were: (13%) congestive heart failure cases, bacterial infection cases (26%), viral infection cases (8%), cirrhosis of liver cases, (3%) pneumonia cases(3%), renal failure cases (2%), and chronic obstructive pulmonary disease (2%) cases.

Keywords: Pleural fluid, Ascitic Fluid, Cerebrospinal Fluid

Introduction

The study of cells within the fluids of serous cavities, mainly the pleural, peritoneal and pericardial is known as effusion cytology. Morphological analysis of these cells helps to understand the pathophysiological process of the disease and helps in reaching a final diagnosis.[1,2] Effusion cytology is the first line of investigation in a suspected case of infections and malignancy.[3-5]

The pathologist often reports such samples as positive/ negative for malignancy or atypical cells/ clusters noted. The presence of atypical cells warrants further ancillary investigations such as cell count, biochemical, microbiological evaluation, for final confirmation of diagnosis. The study was carried out to know the diagnostic significance of morphological analysis in body fluids in emergency laboratory.

Materials and Methods

A 3 months retrospective study was done in a tertiary care hospital in emergency pathology laboratory from July 2021-September 2021. In this study, the following body cavity fluids were included: pleural, ascitic, pericardial, and cerebrospinal fluid. The study includes 500 cases of clinically diagnosed cases of effusion.

Algorithm for Processing of Fluids

Sample received should be adequately labelled accompanied by completely filled requisition form

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Sample should be processed immediately (within 1 hour of collection). To be refrigerated (2-8 degree Celsius) in case of delay.

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A known volume (minimum 20microlitre) of fluid to be loaded in Neubauer's chamber & TLC is calculated accordingly.

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Physical examination was done for volume, colour, appearance, presence of coagulum.

Microscopic Examination

After charging the chamber, count the number of cells in the four corners. WBC squares (1x1 mm^3 area) and report fortotal leucocyte count (TLC)& differential leucocyte count (DLC) for polymorphs & mononuclear cells percentage.

Calculation of TLC using Neubauer Chamber

TLC = No. of WBCS Counted X Correction for Dilution (1:20) X Correction for Volume/ No. of Large Squares Counted

= No. of WBCs Counted X 20 X 10/ 4

= No. of WBCs Counted X 50

The detailed morphological evaluation of fluids was done by two individual pathologists independently. The comparison was based on the number of cells, tumour cells (if any), and presence of inflammatory cells and reactive mesothelial cell.

Results

Total 500 cases of effusion were included in this study. Pleural fluid was the commonest 300 (60.8%) followed by CSF 100 (20%) peritoneal fluid 90 (18.0%) pericardial fluid was 10 (2%) (Table1). 352 cases (70.4%) were transudate and 148 cases (29.6%) were exudates. The most common age group affected was 41-50 years with male preponderance. The majority of cases were benign 480 (96.1%), and 20 (4.9%) cases were malignant or suspicious of malignancy (Table 2).

The majority (52%) of cases were due to tuberculosis. Other diseases causing different effusions were: (13%) congestive heart failure cases, bacterial infection cases(26%),viral infection cases (8%), cirrhosis of liver cases, (3%) pneumonia cases(3%), renal failure cases (2%), chronic obstructive pulmonary disease (2%) cases (Table 3).

Table 1.Distribution of Specimen Type

Specimen Type	Transudate n (%)	Exudate n (%)	Number	Percentage
Pleural fluid	200 (56.8)	100 (67.6)	300	60
Peritoneal fluid	80 (22.7)	10 (6.8)	90	18
CSF	64 (18.2)	36 (24.3)	100	20
Pericardial fluid	8 (2.3)	2 (1.3)	10	2
Total	352(70.4)	148 (29.6)	500	100

Table 2.Distribution of Benign, Malignant and Suspicious Cases

Type	Benign n (%)	Malignant/ Suspicious for Malignancy n (%)	Total n (%)
Pleural fluid	290(60.4)	10 (50)	300 (60)
Peritoneal fluid	82 (17.1)	8 (40)	90 (18)
CSF	98 (20.4)	2 (10)	100 (20)
Pericardial	10 (2.1)	0	10 (2.0)
Total	480 (82.3)	20 (17.7)	500 (100)

Table 3.Distribution of Diseases in Body Fluids

S. No.	Disease	Number	Percentage (%)
1.	Tuberculosis	260	52
2.	Congestive Heart Failure	20	4
3.	Cirrhosis of Liver	15	3
4.	Bacterial Infection	130	26
5.	Viral Infection	40	8
6.	Pneumonia	15	3
7.	Renal Failure	10	2
8.	Chronic Obstructive Pulmonary disease	10	2
	Total	500	100

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Discussion

Etiological diagnosis of effusion sample is challenging and morphological analysis provides valuable information in evaluation ofbody fluids. It also helps in staging of malignancies and assessing the prognosis of the disease.

In our study, pleural fluid was the most common effusion sample(60%) followed by CSF (20 %) which was in accordance with the study done by Sudha et al.,[5] but in contrast with the study of Tynski et al.[6] who found peritoneal samples more frequent than pleural effusion samples. Such differences could be due to presence of a specialityin hospital where cases of particular disease come more often.

Male pre-ponderance with a M:F ratio of 1.22:1 as seen in our study was also observed by Chakrabarti et al.[6] Generally pleural effusion is more common in males, but this was in contrast with the study of Sudha et al. which had female pre-ponderance because Sudha et al.[5] concluded that in their study group they took females with gynaecological and breast malignancies in which pleural or ascitic effusion was more common.

In our study, tuberculosis is the most common lesion (52%) followed by bacterial (26%) and viral infection (8%) which is concordant with Kulkarni et al.[7], Khanna A et al.[8] usually prevalence of pericardial effusion samples is found in patients of a tertiary care hospital is less[9] but in our study, 10% of the cases were of pericardial fluid. Common causes of pericardial effusion are malignancy, infective, idiopathic, radiation, drug-induced and some autoimmune disorders.[10]

Tubercular aetiology was considered the clinical diagnosis of all the lymphocyte rich exudates. Cell counts revealed more than 300 cells/cu mm in all pleural effusion samples with more than 60% mature lymphocytes in all lymphocyte rich effusion samples. This compared well with studies done by other authors.

A higher number of normal CSF samples were observed in neonates (20%) to rule out meningitis in suspected cases of febrile or hypocalcaemia seizures. Similarly, in our study, we received 20% cases of CSF, most of them were neonates. These cases did not present with any signs of meningeal irritation. These findings were similar to studies conducted only mphocytic pleocytosis observed in tubercular meningitis with considerable variation in polymorphs from 2% to 46%.

Bacterial infections, consisting of neutrophils,were seen in 26% of the cases and were diagnosed as empyema in and malignancy in 5% of cases. The present study is concordant with Murphy et al.[10]

Conclusion

Morphological analysis of body fluids is essential in the diagnosis and staging of diseases. However, uncommon diseases clinically presenting as effusion impose a diagnostic challenge to the pathologist and require detailed clinical history and other ancillary investigations for final confirmation.

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Conflict of Interest: None

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