

CYTOLOGY OF BODY FLUIDS - AN AID TO PRIMARY DIAGNOSIS

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INTRODUCTION

Cytological study of body fluids dates back to a long way in the history of pathology for being an inexpensive, simple procedure combined with imbibing significant knowledge in the diagnostic modality of body fluids. The main serosal body cavity fluids comprise of pleural, peritoneal, pericardial and cerebrospinal fluids. ¹The fluid cavities are lined by single layered epithelium. Normally these cavities contain very minimal fluid that is required for lubrication and protecting the underlying viscera. The dynamics of fluid accumulation is governed by Starling's law and effusion results in imbalance between fluid formation and removal.²Cytological examination of the fluids along with physical examination helps the pathologist to identify specific etiologic agent, to follow the natural process of disease and to monitor the response to therapy. The study of fluid cytology has paramount importance in identifying atypical cells in effusions which in turn helps to know the advancement of the disease process in the body.³The present study also gives us an insight in understanding the neoplastic and non-neoplastic conditions such as inflammation and parasitic infestation.

MATERIALS & METHODS

The study is a descriptive study comprising of 385 cases conducted in the Department of Pathology, Bowring & Lady Curzon Hospital for a period of one year. Relevant clinical information regarding age, sex and accompanying clinical symptoms has been documented.

The fluid received was centrifuged at 3000 revolutions per minute for five minutes. The supernatant was discarded. The remaining sediment was transferred with the help of pipette onto two glass slides and spread evenly. One was air dried and stained with giemsa. The other slide was immediately fixed in 95% alcohol and stained with Haematoxylin & Eosin Stain. Silver stain was done in suspicious cases of CSF.

For the cell count, Improved Neubauer counting chamber was used.

RESULTS

The sample size in the present study is 385 cases. The range of age group varied, between newborns to 97 years of age. Maximum number of cases was in the range of 31-40 years, followed by 41-50 years.

Males constituted 235 of 385 cases and females comprised of 150 of 385 cases. Male to female ratio was 1.56:1. The most commonest fluid was peritoneal fluid (174/385) with 104 males (59.8%) and 70 females (40.2%), followed by CSF (100/385), pleural fluid (94/385), sputum (09/385) and synovial fluid (08/385)

Out of 174 cases of peritoneal fluid, 170 were non neoplastic and 04 were neoplastic. The non-neoplastic transudates were 154 and non-neoplastic exudates were 16. All the 04 cases of neoplastic effusions were exudates in nature. The malignancy observed in peritoneal fluid was adenocarcinoma seen in all 04 cases. Of these 02/04 cases (50%) had primaries in ovaries and 02/04 (50%) had unknown primary.

Out of 94 cases of pleural fluid, 88 were non neoplastic and 06 were neoplastic. Of the 88 cases, 82 were non neoplastic transudates and 06 were non neoplastic exudates. Adenocarcinoma was the most common malignancy seen in all the 06 cases. Lung was found to be the primary in 04/06 cases (66.6%) and 02/06 cases (33.4%) had unknown primary.

Out of 100 cases of CSF samples, 81 cases showed normal findings, 13 cases of viral meningitis, 01 case of pyogenic meningitis and 05 cases showed cryptococci. One of the cryptococcal meningitis had superadded candidal infection. All the 05 cases with cryptococcal meningitis were immunocompromised belonging to 31-40 years of age.

We received 09 samples of sputum for malignant cells and all the samples were negative for malignancy. Of the 08 cases of synovial fluid studied, 02/08 were non suppurative and 06 /08 were suppurative effusions.

DISCUSSION

Effusion cytology dates back to 19th century. Lucke and Klebs in 1867 were the first investigators who recognized atypical cells in ascetic fluid. Quincke in 1882 has been credited for describing

malignant cells in pleural effusion. CSF examination also began in 1891 in Germany following the introduction of lumbar puncture. Since then effusion cytology has gained tremendous importance in the medical literature.¹

The incidence of patients with effusion has increased in past few years. It has thus become mandatory to study the cytological features of the effusions and provide reliable results for the future treatment.^{2,4}

The advantages of fluid aspiration lie in the fact that it has become relatively an easy, safe procedure. Thus the number of samples received in pathology lab is increasing and the clinicians use the effusion cytology report as a complement for further diagnosis and treatment. The diagnostic pursuance of the effusion cytology may be traceable to the fact that the cell population present is representative of large surface area.⁵

The present study is undertaken to analyze the incidence of neoplastic and non-neoplastic conditions in various types of effusion.

Body fluids are classified into transudates, modified transudates and exudates. Transudates are caused by hypoalbuminemia, leakage of fluid from efferent intestinal lymphatics. Causes of modified transudates are increased vascular permeability and increased intra hepatic hydrostatic pressure. Effusion cytology and radiographic examination are used to evaluate patients with transudates. The exudates are usually inflammatory, neoplastic and chylous effusion. Culture is used to identify sepsis, organism of cause and to monitor the therapy. Neoplastic exudates have plenty of malignant cells. Chylous exudates have variable number of neutrophils, macrophages and lymphocytes.⁶

In our study peritoneal fluid was the commonest fluid, 174/385 (45.1%). Out of 174 cases, 170 were non neoplastic and 04 were neoplastic. The non-neoplastic transudates were 154, showed lymphocytic predominance and non-neoplastic exudates were 16 showing neutrophilic predominance. Kumavat PV et al² in their study also showed similar findings. The most common cause of ascitis is cirrhosis seen in 80% of patients and only 10% of cases presented with malignancy. It is advisable to repeat the cytology if there is history of cancer, physical findings not suggestive of liver disease and very high lymphocyte count to rule out malignancy.⁷ In our study all the aspirates of malignancy showed lymphocyte count of more than 500 cells per cubic mm.

In our study pleural fluid comprised of 94 of 385 cases (24.1%). The non-neoplastic effusions were 88 (93.6%) and neoplastic effusions were 06 (6.4%) were neoplastic. Of the 88 cases, 82 (93.1%) were non suppurative and 06 (6.9%) were suppurative exudates. Kumavat PV et al² in their

study found 90.44% as non suppurative and 8.8% as suppurative. Kushwaha et al⁸ reported similar findings in their study. The presence of neutrophils in fluids implies acute pleural inflammation, highly suspicious of pneumonia with effusions. Other causes are emphyema, post myocardial infarction, hepatic abscess and pelvic abscess. Transudative effusions contain plenty of lymphocytes.

CSF accounted for 100/385 cases (25.97%). We encountered 05 cases of cryptococci and one case of simultaneous cryptococci and candida infection. Aslam SM, Chandrasekhara P⁹ in their study has noted that cryptococcal meningitis is the AIDS defining illness. Cryptococcal meningitis has been reported as the most common opportunistic infection of the CNS of Indians patients with HIV.^{9,10} Cryptococcus morphologically appear as encapsulated yeast with a clear halo. Route of infection is through inhalation. The patients are most vulnerable for metastasis to central nervous system. Cryptococcal meningitis is the cause of death in AIDS patients with advanced disease. The diagnosis can be done by identifying cryptococcal antigen in serum, CSF, radiology and fungal culture. Since they are time consuming and expensive, in a set up with economic constraints, a cytological examination of CSF with addition of silver stain can be affordable, cheap, rapid and reliable option.¹¹

In our study 10 cases showed malignant effusions. Malignancy in peritoneal fluid was seen in 04 cases and pleural fluid showed malignant cells in 06 cases. Wong JW et al⁴ in their study found that pleural fluid showed highest proportion of positivity for malignant cells. Adenocarcinoma was the commonest type of malignancy in our study in concordance with other studies.^{12, 13} Jha R et al¹⁴ in their study found that adenocarcinoma as most common malignancy. Sears and Hajdu¹⁵ in their study also showed similar findings.

Ovary was the most common primary site encountered in our study. The reason being ovarian malignancy is more prone to shed atypical cells in the peritoneal fluid.^{14,7} Parson et al¹⁶ in their study found ovary as the most common cause of primary malignancy. Serous and endometrioid carcinoma were more prone for shedding. Positive malignant cells in peritoneal fluid had worse prognosis, with survival rate of 2 years¹⁷.

Bloody fluid is the most common variable and highly suspicious of malignancy. In our study, hemorrhagic aspirates were noted in cases with malignant effusions.¹⁸ Smears positive for malignant cells were highly cellular and showed cells arranged in acinar pattern. Individual cells showed round to oval cells, with high nucleocytoplasmic ratio, pleomorphic nuclei, prominent nucleoli and scant eosinophilic cytoplasm.

In our study the primary site was unknown in 02/04 cases with peritoneal effusion and 02/06 cases with pleural effusion. The overall rate was 40%. Luse and Reagen¹⁹ in their study found the overall rate of unknown primary as 15%. The cause of unknown primary can be attributed to lack of clinical history with loss of follow up of patients.

CONCLUSION

Effusion cytology is a simple and safe diagnostic procedure. It is an asset to both the pathologists and clinicians to study the pathophysiology of types of effusion in the human body and helps for further treatment of the patients in a cost effective manner.

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