

Cytological Analysis of CSF As Cost Effective Tool in Early Cases of Meningitis

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Abstract: CSF is a clear body fluid ,occupying between arachnoid and the piameter .It is formed in the ventricular choroid plexus CSF acts as a cushion that protects the brain from shocks and supports the venous sinuses (primarily the superior sagittal sinus, opening when CSF pressure exceeds venous pressure). It also plays an important role in the homeostasis and metabolism of the central nervous system. Meningitis is the main infectious central nervous system (CNS) syndrome. Viruses or bacteria can cause acute meningitis of infectious etiology. Meningitis is the most common infectious CNS syndrome, defined as an inflammation of the meninges. The clinical symptoms are fever, malaise, vomiting, and in some cases, petechial rashes. Signs of meningeal irritation include neck stiffness, Kernig's sign, (an inflection of the knee when the limb is placed at a certain degree of relative inflection to the trunk), and Brudzinski's sign, (an involuntary inflection of the limb following a head inflection).

The present study is done to evaluate the cytological finding of CSF, along with the clinical history to classify the various types of meningitis. Lumbar puncture was introduced to prove the diagnosis or to rule out relevant differential diagnoses by Quinke & Wynter in 1891.

Keywords: CSF, Meningitis, Bacterial, Viral

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I. Introduction

CSF is a dynamic ,metabolically active substance with many important functions.It is invaluable as a diagnostic aid in the evaluation of inflammatory conditions,infectious or non infectious,involving the brain,spinal cord, and the meninges as well as in CT-negative Subarachnoid hemorrhage.Analysis of CSF provides invaluable diagnostic information because disease takes place either within its membranes or in adjoining parameningeal structure of brain.The blood –csf barrier is a physical barrier,consisting of different anatomical structure ,for the diffusion and filtration of macromolecules from blood to csf.Combining a set of CSF variables referred to as routine parameters (i.e. determination of protein, albumin, immunoglobulin, glucose, lactate, and cellular changes, as well as specific antigen and antibody testing for infectious agents) will increase the diagnostic sensitivity and specificity. CSF is a biologic fluid ,and its cytological evaluation should be performed within 24 hrs after puncture,preferably within 30 minutes,because of a lysis of rbc and wbc.(1) The main function of CSF is to protect the brain and the spinal cord from change in pressure . It helps to maintain a stable chemical environmental and helps as a media for excretion of waste products of cerebral metabolism.(1) The etiology of meningitis can be bacterial ,viral and tubercular.The present study is done to evaluate the cytological findings of CSF,along with the clinical history to classify the various types of meningitis. The present study is done to emphasise the importance of using a very cost effective diagnostic approach in aiding in management of suspected cases of meningitis.

II. Materials And Methods

The present study has been undertaken in the Department of Pathology,Rajendra Institute of Medical Sciences, for a period of one year.Clinical information regarding age,sex and relevant clinical symptoms has been documented. Lumbar Puncture was performed by clinicians and sent in 4 sterile containers to Pathology Dept. of RIMS.Frequently tube#4 is submitted to cytology Laboratory unaccompanied by clinical data. CSF should be analysed immediately within 1 hr.If storage is required for later investigation this can be done at 4-8degree C (short term) or -20degree C (long term).

215 Total fluid(102 male,113,female) Total CSF, 62(42 male,20 female, other except CSF 153(70 male93 female)

III. Results

The total body fluids examined during the study period were 215. CSF accounted for 62 samples. The range of age group varied, between newborns to 85 yrs of age. Maximum number of cases was in the range of 0-10 yrs, followed by 40-49 years. Male constituted 42 of 62 cases. Male to female ratio 1.4 : 1. In our study out of 62 cases, 52 were clear, 04 were turbid, 02 were xanthochromic, and 04 were hemorrhagic. Microscopically, 43 cases showed normal count 19 cases showed elevated counts with following pattern of differential count. Lymphocyte predominance was seen in fourteen cases, neutrophil predominance in a four case and one cases of Cryptococcus which were confirmed by Indian ink preparation. A similar study has mentioned that examination of the CSF especially in patients with bacterial meningitis characteristically reveals a cloudy fluid with leucocytosis and predominance of neutrophils(4). The normal CSF contains up to 05 WBC's per cubic mm in adults and 20 WBC's in new born. Increased WBC counts are seen in varying conditions such as after seizure, intracerebral bleed, inflammatory condition, traumatic tap(5). In our study, traumatic tap was encountered in 3 cases. out of 62 cases were viral, one bacterial and four cases of cryptococci. The cell count results were correlated with glucose and protein values accordingly.

IV. Discussion

CSF examination provides an inestimable diagnostic skylight into the pathology of central nervous system. Commonly performed tests on CSF in cytology are physical examination which includes appearance of fluid and supernatant colour. Total leukocyte counts, differential count, and microscopic examination. Biochemical tests like glucose and protein levels are estimated. Cytological evaluation of CSF is a cost effective diagnostic tool for an early diagnosis of meningitis and a better treatment(1,2,3) The presence of polymorphonuclear in the CSF is considered pathological; however after the introduction of more efficient concentration techniques, some researchers consider that a small number of neutrophils can be present in normal CSF³⁰ In our study, traumatic tap was encountered in 4 cases. In a study conducted by Pinky P et al(1) out of 356 cases, 153 had normal cell count (0-5 cells per cubic mm), while 129 cases had cell count of 5-100 cells per cubic mm and 74 cases had more than 100 cells per cubic mm. In our study we encountered 43 (69.4%) cases with normal WBC count and 19 (30.6%) cases with raised WBC count. Lymphocytes and monocytes at the resting phase and occasionally ependymal cells are found in normal CSF. An increased number of neutrophilic granulocytes can be found in bacterial and acute viral CNS infections (Spanos et al., 1989; Adam, 2001). For cellular differentiation May-Gruenwald-Giemsa staining is widely used but specific methods may be performed, especially for the detection of malignant cells (Roma et al., 2002; Adam et al., 2001) (Class II).

In a study conducted by Ali Hassan Abro et al, leucocytosis was noted in 91% of cases with bacterial meningitis and 17% of viral meningitis cases showed mild elevation of white cell count(2). In a study conducted by Rabab Fouad et al(4) leucocytosis was encountered in 47.9% of cases with bacterial meningitis, while only in 24.1% of patients with non-bacterial meningitis showed leucocytosis. Cryptococcal meningitis is the most common form of fungal meningitis. It is caused by *Cryptococcus neoformans*. Cryptococcal infection is commonly encountered in immunocompromised patients with impaired cell mediated immunity. Clinically, cryptococcal meningitis presents as chronic or subacute meningitis and rarely has a rapid course. Patient present with severe, unbearable headache with or without fever is a characteristic feature in patients with Cryptococcal meningitis. Fever is seen in only 65% while headache is seen in more than 75% of the patients(7). Differential diagnosis in suspected case of Cryptococcal meningitis is tuberculosis, carcinoma and lymphocytic meningitis.

V. Conclusion

CSF analysis is an important diagnostic tool to differentiate various causes of meningitis and hence aid in the early treatment and recovery of patient. In immunocompromised patients, an early diagnosis of Cryptococcal meningitis will help in timely treatment.

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