RESEARCH ARTICLE

ASEPTIC MENINGITIS IN PEDIATRICS: EPIDEMIOLOGIC EVALUATION AND CEREBROSPINAL FLUID CHANGES

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Abstract

Objective

This study aimed at investigating seasonal variation, clinical symptoms, and cerebrospinal fluid (CSF) changes in patients with aseptic meningitis admitted in Mofid hospital between 1995 and 1996.

Materials & Methods

A total of 63 children with aseptic meningitis were enrolled in the study. Their age, gender, season of the disease, etiology, clinical symptoms, CSF changes, and treatment were evaluated and documented. Data were analyzed using SPSS 11.5.

Results

The male to female ratio of the patients was 2.5 to 1, mean age being 6.5 years. The disease occurrence was most common in spring and summer, and the most common symptoms observed were fever (92.6%), followed by nausea and vomiting (88.88% and 68.25%), neck stiffness, neck stiffness (54%), seizure (19%), kernig sign (14.28%), Brudzinski's sign (11.11%), and 1.58% of the patients had history of head injury. Mean white blood cell count for CSF was 165/mm^3 (range, 6 to 850/mm^3), the common cells being mononuclear cells; mean red blood cell count was 538 (range, 0 to 8100/mm^3); protein and glucose levels were within the normal ranges. Blood and CSF culture and CSF smear were negative. Prognosis was excellent and mean duration of recovery was 5 days (range, 2 to 18 days).

Conclusion

Although the clinical symptoms of aseptic meningitis are similar to those of bacterial meningitis, its prognosis is excellent. The CSF features can be used to diagnose the disease.

Keywords: Aseptic meningitis, CSF features, clinical symptoms

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Introduction

Aseptic meningitis has been defined as I- Meningitis with normal CSF glucose, normal to elevated protein, and elevated cell count with a lymphocytic predominance; II- Nonbacterial meningitis and III- Meningitis with a negative bacterial culture (1). The illness is usually mild and runs its course without treatment; however, some cases can be severe and life-threatening (2). Whereas it may occur in individuals of all ages, it is more common in children, especially during the summer (3).

The disease is most commonly caused by viruses, the most common being the enteroviruses, such as coxsackie viruses and echoviruses, accounting for

approximately half of the cases of aseptic meningitis. Other enteroviruses and the mumps virus are additional causes. Herpesviruses, both type 1 and type 2, can cause meningitis in children and especially infants. Lymphocytic choriomeningitis virus (LCMV) is an extremely rare cause of meningitis, occurring after contact with dust or food contaminated by excretions of the rodents (4).

Most acute viral meningitides produce symptoms with variations depending on the particular virus (5). Headache, fever, stiff neck, photophobia, drowsiness, myalgia, malaise, chills, sore throat, abdominal pain, nausea, and vomiting usually characterize acute viral meningitis. Focal signs, seizures, and profound lethargy are rarely a part of this syndrome (6). For diagnosis, cerebrospinal fluid (CSF) analysis is the best method; however, other items such as polyclonal or monoclonal antibodies, polymerase chain reaction (PCR), interleukin 8 and its density in the CSF can be used (7). Mononuclear pleocytosis is the most common change in the CSF of these patients. No growth in the culture and mild or no changes in the glucose and protein levels of the CSF are other features of the CSF in patients with aseptic meningitis (8). The aim of our study was to evaluate the epidemiologic characteristics of aseptic meningitis (including clinical symptoms and CSF changes) that helped determine the diagnosis in patients with this condition, admitted to the Mofid hospital, between 1995 and 1996.

Materials & Methods

In this retrospective study, 63 children with aseptic meningitis referred to Mofid hospital from 1995 to 1996 were evaluated. Enrolled were children with clinical presentation of headache, fever, stiff neck, photophobia, drowsiness, myalgia, malaise, chills, sore throat, abdominal pain, nausea, and vomiting, and CSF analysis of mononuclear pleocytosis, no change in glucose and protein levels, and no growth in culture, as well as spontaneous recovery without any need for antibiotic therapy were included. Children older than 14 years of age were excluded. The quantitative variables were summarized as median with minimum-maximum respectively and the qualitative data was summarized as percentage and findings were analyzed using SPSS 11.5.

Results

Of 63 patients, 45 (71.42%) were male and 18 (28.57%) were female, male to female ratio, 2.5 to 1. Mean age of patients was 6.5 years, range 35 days to 13 years. Mean duration of hospitalization was 5 days (range, 2 to 18 days). The most common signs and symptoms of the patients are listed in Table 1. Based on LP results, mean levels of WBC, RBC, glucose, and protein were 165 (range, 6 to 850/mm^3), 538(range, 0 to 8100/mm^3), 65 (range, 32 to 128mg/dl), and 42(range, 5 to 133mg/dl), respectively.

Seasonal variation of the disease is shown in Table 2. Of the patients, 8 (12.69%), 8(12.69%), 6(9.25%), and 11(17.5%) had concurrent mumps, otitis, sinusitis, and pharyngitis, respectively.

Table 1: The most common signs and symptoms of patients with aseptic meningitis

Signs and symptoms	Number of patients
Fever	58(92.06%)
Nausea and vomiting	56(89%)
Loss of appetite	14(23%)
Abdominal pain	9(14.28%)
Diarrhea	9(14.28%)
Constipation	9(14.28%)
Headache	43(68.25%)
Drowsiness	7(11.11%)
Tiredness	15(19.04%)
Restlessness	4(6.34%)
Seizure	12(19%)
Rash	2(3.17%)
Hyper-reflexia	2(3.17%)
Neck stiffness	34(53.96%)
Kernig's sign	9(14.28%)
Brudzinski's sign	7(11.11%)

Table 2: Seasonal Variation of Aseptic Meningitis

Season	Number of patients
Spring	22 (34.92%)
Summer	23(36.5%)
Autumn	13(20.63%
Winter	5(7.93%)

Discussion

Aseptic meningitis syndrome (nonpurulent meningitis) can be separated from the general category of CNS infections by the absence of severe cerebral manifestations, such as a severe disturbance of consciousness and it usually has a benign outcome. Most people exposed to the viruses causing this disease experience either no symptoms or mild symptoms. Full recovery generally takes 5 to 14 days after onset of symptoms. However, fatigue and lightheadedness may persist longer in some people (9). The condition was originally defined by Wallgren as an acute illness with meningeal signs and symptoms, a small or large number of cells in the cerebrospinal fluid, and absence of bacteria on direct smear or culture of CSF with no general or local parameningeal infection, and a relatively short benign course (10). The annual incidence rate was estimated to be 17/100000 children, aged under 14 years (11). The most common seasons of the disease are summer and spring in our study, while other studies report it occurring mostly in the summer and autumn (11).Most cases of the mumps were seen in spring and winter which is in accordance with the references (12).

Common clinical manifestations of aseptic meningitis in our study included fever, nausea, headache, loss of appetite, seizure, malaise, abdominal pain, drowsiness, diarrhea, constipation, irritability, rash, and hyper-reflexia, respectively; clinical symptoms reported elsewhere are headache, fever, stiff neck, photophobia, drowsiness, myalgias, malaise, chills, sore throat, abdominal pain, nausea, and vomiting (13).

Eighteen patients (28.57%) were female and 45 (71.42%) were male, similar to results of previous studies reporting that aseptic meningitis tends to occur 3 times more frequently in males as compared to females. In meningitis, caused by the mumps virus, both sexes are equally affected (14). In eight patients, who experienced the disease after mumps, diagnosis was made by clinical manifestations such as parotiditis, contact with a patient, or after vaccination. This number is much higher than that documented elsewhere (15).

Cerebrospinal Fluid (CSF) cell count in aseptic type of meningitis usually varies between 10-500 leukocytes /ml. Patients, whose CSF cell count exceeds 1000 leukocytes/ml, especially with polymorphonuclear (PMN) cell predominance, are typically considered to have purulent meningitis (16) .

In some types, viral meningitis like mumps virus, the CSF cell counts sometimes exceed 1000 leukocytes /ml, but are typically mostly lymphocytes or if PMN cells are predominant in the early hours they change to lymphocyte predominance after 8-12 hours. In our study the mean CSF cell count was 165 / ml, its upper limit being 850 / ml, with lymphocyte predominance.

The decreased CSF glucose level or hypoglycorrhachia appears to be related to decreased glucose transport across the blood-CSF barrier and conversion of the brain metabolism from oxidative to the less efficient glycogenolysis (17). Thus, a lowered glucose suggests more severe brain involvement. It is useful to define CSF glucose as definitely lowered if it is less than 40% of the blood glucose, or as less than 40 mg/ml if the blood glucose is not known. Thus, in nonpurulent meningitis, a low CSF glucose is correlated with more chronic or more serious etiologic agents, such as Mycobacterium tuberculosis. Therefore, nonpurulent meningitis is divided into two subgroups, those with and those without decreased CSF glucose. In our cases, mean CSF glucose level was 65 mg/ml and its lower limit was 32 mg/ml. A possible explanation for the low limit of glucose in some cases in our study were children unvaccinated (against mumps virus, at that time a routine vaccine), delayed laboratory checking of glucose level (false positive), and possible hypoglycemic patients.

On the other hand, when a patient with purulent meningitis receives an antibiotic, it may prevent recovery of the infecting organism on culture, therefore at this stage the most reliable indication for bacterial meningitis may be a significantly decreased CSF glucose (18). In our country because of the high usage of antibiotics, it is probably the most frequent cause of

hypoglycorrhachia in our children.

Our most important limitation included lack of laboratory facilities for detection of viral etiologies like culture or PCR method and diagnosis being made based on clinical and epidemiologic evidence. But based on the definition of the Center for Disease Control and Prevention (CDC), definite cases of aseptic meningitis with viral etiology are those patients who recover without antibiotics in their disease process (19), therefore our cases were considered as aseptic meningitis.

In conclusion, the clinical symptoms of aseptic meningitis are the same as those of bacterial meningitis, but it's prognosis is better if CSF analysis does not show hypoglycorrhachia. The features of CSF, especially cell count and glucose can be used for primary diagnosis.

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