

A hospital outbreak of aseptic meningitis due to echovirus type 30 in Antalya, Turkey

Sema Akman¹, Etem Özkaya², Dilek Çolak³, Hayriye Daloğlu¹.

Departments of ¹Pediatrics, and ³Microbiology, Akdeniz University Faculty of Medicine, Antalya and ²Refik Saydam Health Center, Ankara, Turkey

SUMMARY: Akman S, Özkaya E, Çolak D, Daloğlu M. A hospital outbreak of aseptic meningitis due to Echovirus type 30 in Antalya, Turkey. *Turk J Pediatr* 2002; 44: 237-239.

We analyzed clinical and laboratory findings of 23 hospitalized patients with aseptic meningitis in the Department of Pediatrics, Akdeniz University Hospital. The patients presented with the classic symptoms and signs of aseptic meningitis. Protein levels of the cerebrospinal fluid (CSF) samples ranged from 18 to 99 mg/dl, with a mean of 36.5 ± 4.9 mg/dl. The mean ratio of CSF glucose compared to blood samples was 0.73. Echovirus type 30 was identified in CSF and/or stool samples of 19 patients. Four patients had negative virus culture. The outcome was favorable in all patients. We thought that this outbreak of aseptic meningitis in our department might denote a summer outbreak in the city. However, this remained unproven since field investigations could not be completed. Advances in virus culture or polymerase chain reaction techniques and satisfactory medical records may help patient care by promoting early diagnosis and by eliminating unnecessary antibiotic therapy, allowing epidemiological studies.

Key words: aseptic meningitis, echovirus type 30.

Acute aseptic meningitis is characterized by fever, vomiting, headache, weakness, diarrhea, and pain in the neck, back and legs, and by cerebrospinal fluid (CSF) pleocytosis in the absence of bacteria or fungi^{1,2}.

The echoviruses and group B Coxsackieviruses as members of the genus Enterovirus cause more than 90% of cases¹⁻³. Echovirus type 30 was first isolated in Scotland in 1959 from cases of aseptic meningitis⁴. Echovirus 30 meningitis outbreaks have previously been reported in Switzerland, the United States, Japan and German^{3,5-8}.

We summarize herein the clinical, laboratory and epidemiological findings of the 1999 outbreak of Echovirus type 30 in the Department of Pediatrics, Akdeniz University Hospital.

Material and Methods

Between July and September 1999, 43 patients with clinically suspected aseptic meningitis were admitted to our department. For detecting the existence of an epidemic, the numbers of

observed and estimated cases were determined for every month of 1999. The observed cases in August (n=25) and September (n=13) were prominently more than monthly estimated cases (n=5.9).

Because of technical and financial problems, CSF and stool samples of only 23 patients could be sent to the reference laboratory; thus, clinical and laboratory data presented includes only these 23 patients.

During this outbreak, the patients had been admitted with fever, vomiting, headache, and signs of meningeal irritation. Lumbar punctures on patients, with the exception of one with brain edema, were all done within one day of onset of illness. The diagnosis was supported by examination of the CSF, which included leukocyte count, measurement of protein and glucose levels, Gram's stain, and culture for viruses, bacteria and fungi.

Viral culture: 34 samples (11 CSF and 23 stool) from 23 patients were collected in sterile containers, and frozen at -70°C until analyses. The stool culture for all patients was done,

whereas the CSF culture could not be done in 12 patients. All specimens were transported to laboratory in dry ice. Virus isolations were performed in Virology Laboratory of the Refik Saydam Center of Hıfzıssıhha in Ankara. CSF was cultured directly. Ten percent stool suspensions in phosphate-buffered saline were centrifuged, and the supernatants were used for inoculation of virus culture.

Virus culture was inoculated with a minimum of 0.2 ml of specimen and incubated at 35°C. Inoculation was performed into tube monolayer cultures of Hep 2 and RD cells. The tubes were observed daily for cytopathic effect (CPE). Cultures showing CPE were passaged onto fresh cells. Positive isolates were typed by micro neutralization with the use of intersecting pools of hyperimmune sera supplied by the European Reference Center for Poliomyelitis, Bilthoven, The Netherlands.

Results

Mean age of 23 patients was 6.2 years (range 16 months to 12 years, 14 male, 9 female). Fever (91%, n=21), which ranged from 38 to 40°C, headache (91%, n=21) and vomiting (87%, n=20) were the most significant symptoms associated with infection. Other common symptoms/signs included weakness (30%, n=7), abdominal pain (17%, n=4), leg pain (17%, n=4), diarrhea (n=1), confusion (n=1) and macular rash (n=1). At least one of the meningeal irritation signs, such as stiff neck (n=21), (n=10) or Brudzinski (n=17) signs, was positive in all patients. Leukocyte counts of CSF ranged from 0 to 570 cells/mm³, with a mean of 175±176.7 cells. The majority of the cells were lymphocytes in 17 out of 23 CSF samples (74%). Protein levels of the CSF samples ranged from 18 to 99 mg/dl, with a mean of 36.5±4.9 mg/dl. Glucose levels of the CSF ranged from 45 to 77 mg/dl, with a mean of 58.5±12 mg/dl. The mean ratio of CSF glucose compared to blood samples was 0.73.

Patients with positive virus culture:

The virus isolation was performed positively in 28 of 34 samples. Echovirus type 30 was identified in nine CSF and 19 stool samples of 19 patients. Six samples (2 CSF and 4 stool) of four patients were negative for virus culture. Finally, 19 patients had positive virus culture while four patients had negative virus cultures.

Follow-up:

Only one patient experienced complication. Computerized tomography of this patient with brain edema was normal at tenth day of hospitalization. All patients had recovered completely at follow-up.

Epidemic aseptic meningitis due to Echovirus 30 has been reported in a few studies. The presently described outbreak in our hospital occurred at the same time as the previously reported outbreak in 15 patients in Ankara⁹. Limited data from other Echovirus 30 outbreaks suggest that Echovirus 30 is associated with a high attack rate, particularly among children. The cases recognized can be accepted as "tip of a very large iceberg" of Echovirus 30 infections. Infection may appear after an incubation period of only five days, although acute illness occurs only in about half of all infected persons. Viral excretion begins with the onset of illness and appears acutely in pharyngeal secretions, but it can continue in the feces for weeks¹⁰. In temperate regions, transmission and disease are more common in the summer, often occurring only each summer. In tropical areas, transmission occurs year round, and more people become infected at a younger age^{1,2}. Comparison of reported outbreaks in Switzerland, the United States, Japan and Germany in children reveals a number of aspects of difference. In Germany and in Alaska the first cases were found in May and the peak incidence was during June, while in New York and our department, the peak incidence was during August^{5,7,8}. In all these epidemics, the reported cases tended to concentrate in more populated areas like commercial centers or large apartment buildings, a factor known to promote enteroviral transmission. Antalya serves as the economic, transportation, medical and tourism center for the Mediterranean area. This outbreak of aseptic meningitis in our department may have denoted a summer outbreak in the city. However, the estimated cases for Antalya could not be determined because of the absence of a satisfactory medical record about aseptic meningitis or gastroenteritis cases for adults and children in other hospitals. The initial field investigations could not be completed because of technical and financial failure. Prevention of transmission can be accomplished by elimination of close personal contact with infected persons, but since so many infected

persons are asymptomatic, this is virtually impossible¹⁰.

Interesting similarities were observed in the distributions of cases by age and gender in some epidemics. The younger (<6 years old) males predominated in our department, and in the New York, Germany, Alaska, Ankara and San Diego epidemics^{5,7,8,9,11}.

Reintjes et al.⁷ showed that children in an outbreak who had contact with an ill household member, who attended day care or who used playgrounds were three to six times more likely to become ill than those without those risk factors.

The clinical characteristics of aseptic meningitis were similar in reported epidemics and our department epidemic. However, we noted that the most prominent symptom in our department was fever (91%), while it was noted in only 40% of patients in Alaska, 76% in Germany and 66% in San Diego^{5,7,11}. The CSF findings were similar to those previously described. Interestingly, two patients had no pleocytosis as those in the New York, San Diego and Alaska epidemics^{5,8,11}. One patient had high WBC count in CSF sample (570/mm³) as in the Germany epidemic⁷. Early in the disease, the cells are often polymorphonuclear; later, mononuclear cells predominate. This change in cellular type is often demonstrated in CSF samples obtained as little as 8-12 hours apart¹. We found predominating lymphocytes (74%) within the first 24 hours. The severity of meningeal symptoms and other signs of neurologic involvement among children with aseptic meningitis vary widely. Complications such as febrile seizures, complex seizures, brain edema, lethargy, coma, and movement disorders occur early in the course in 5-10% of patients². Only one of our patients experienced complication. Computerized tomography of this patient with brain edema was also normal at tenth day of hospitalization.

Our isolation percentages of the virus from nine of 11 CSF samples and 19 of 23 stool samples were higher than in the Alaska (5/19 for CSF samples and 14/25 for stool samples) and San Diego epidemics (12/27 for CSF samples), and was similar to that in the Germany epidemic (10/12 for stool samples).

Twenty-one patients had received parenteral antibiotic therapy for ten days since the differential diagnosis of viral meningitis could

not be done on the grounds of clinical presentation or laboratory findings, and virological techniques failed for early diagnosis. Parenteral antibiotic therapy was administered to two patients with characteristic findings of aseptic meningitis until a bacterial cause was excluded by culture of CSF.

We diagnosed aseptic meningitis due to Echovirus 30 after hospital discharge of patients. Therefore, some patients with positive CSF and stool cultures for Echovirus took unnecessary medication. Advances in virus culture or polymerase chain reaction techniques may help patient care by promoting early diagnosis, eliminating unnecessary antibiotic therapy, allowing early hospital discharge and diminishing health-care costs.

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