

## CLINICAL CASE

## SUBACUTE ENTEROVIRUS-ASSOCIATED ENCEPHALITIS IN A YOUNG ADULT COINFECTED WITH *BORRELIA BURGdorFERI*

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### ABSTRACT

**The aim:** To pay attention of clinicians to sterile encephalitis in adults, which in fact may be caused by EVs.**Results:** A young woman was admitted to our clinic because of 3-month-history of mild fever, left-sided soft facial paralysis, and generalized weakness. MR brain imaging in T2W, FLAIR, and T1W mode showed focal hyper intensive abnormalities in various parts of the left hemisphere. EV RNA was detected in the patient's CSF on admission. IgM class antibodies to *B.burgdorferi* were present in the blood. Antibiotics and ribavirin have been administrated with a good effect.**Conclusion:** This case shows that EV infection may cause brainstem encephalitis accompanied by severe neurological manifestations in adults.**KEY WORDS:** enterovirus-associated encephalitis, encephalitis, *Borellia burgdorferi*

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### INTRODUCTION

Enterovirus is non-enveloped, positive-sense, single stranded RNA virus belonging to the family *Picornaviridae*, and a major pathogen causing hand, foot, and mouth disease in children under 5 years of age. More than 100 recognized enterovirus types are classified into 4 species, A–D. Enterovirus infections are common worldwide and occur mostly among children; infections are usually asymptomatic or mild but can produce severe neurologic disease [2,3,6-8]. In recent years, EV was reported to cause several large-scale outbreaks of severe complications in children involving the central nervous system, resulting in fatalities [1, 2, 7, 9, 10]. The largest outbreak in China occurred in 2010, with an estimated 1.7 million infections, of which 27,000 caused severe neurological complications, resulting in 905 fatalities [11]. In this study we report a 32-year-old female with EV-associated encephalitis accompanied with borreliosis.

### CASE PRESENTATION

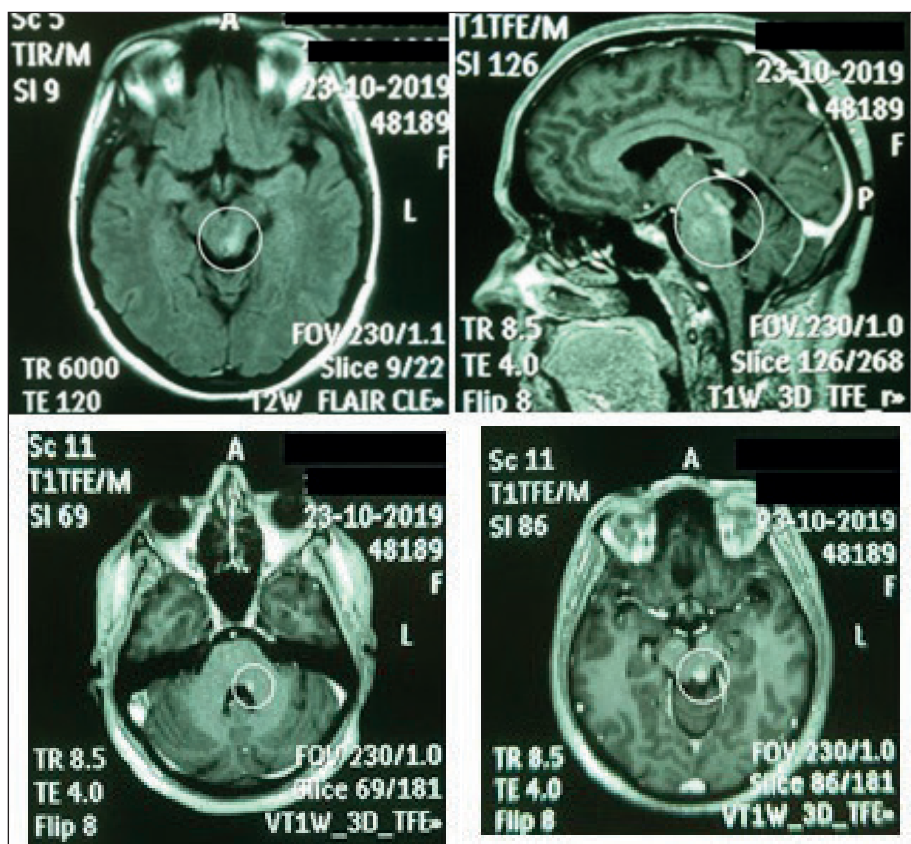
A 32-year-old female was admitted to the Center of Infectious Disorders of the Nervous System, Kyiv, Ukraine (CIDNS) with a history of low-grade fever, double vision, weakness, fatigue, decreased performance, periodic vomiting, change in taste, decreased mobility and hyposthesia of the left half of the face and tongue. The patient was in good health until three months before admission to our clinic when she developed low-grade fever (auxiliary temperature up to 38°C) followed by a left-sided soft facial

paralysis with a decrease in the sensitivity and mobility of the left half of the face and tongue. Then double vision joined. After the neurologist's consultation, she was sent to MRI investigation which revealed focal lesion in the projection of the left leg of the brain, left upper and lower humps of the quadruple plate of the left half-bridge and medulla oblongata, and focus in the left cerebellum hemisphere (fig.1). She independently applied to the Institute of Epidemiology and Infectious Diseases, where, as a result of the examination, she revealed IgM antibodies to *Borellia*, after that she was finally hospitalized in the Department of Neuroinfections for further research and treatment.

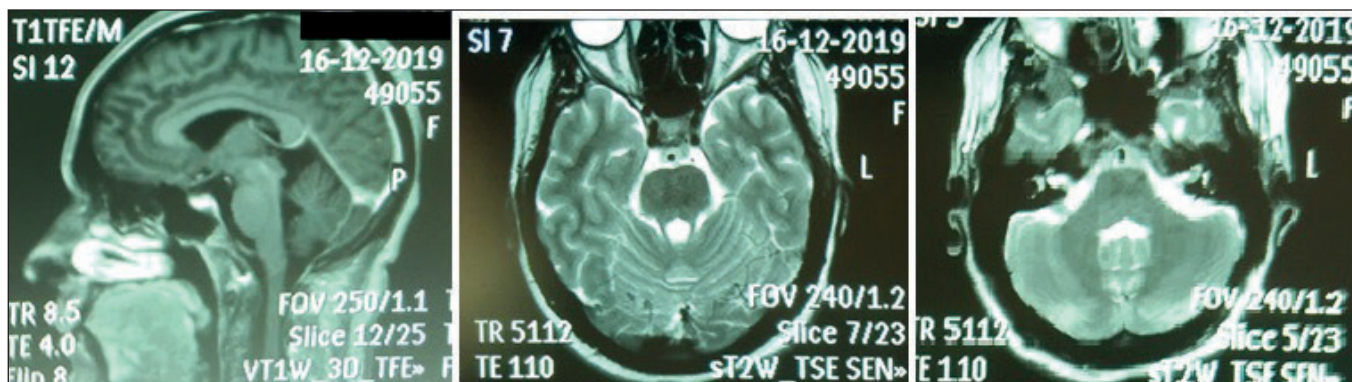
Tuberculosis, sexually transmitted diseases patient denied. She had no problems with allergy.

On admission, general condition was of moderate severity. Axillary temperature was normal. The patient was normotensive with pulse beats of 65 per minute. Her physical examination showed slow mentation along with generalized slowing of her responses to verbal commands and also generalized weakness. She was emotionally labile, good contact, well oriented, and answered the questions adequately. There was tremor in her hands during a complicated Barre-probe. Most of the pathological reflexes (e.g., Lasseg, Nery, Gordon, Babinsky) were negative. Stryumpel, Sharapov-Raskolnikov, Chaddock, and Pussep symptoms were positive on one or both sides. Neck resistance was normal. She performed the coordination tests with intent, staggering in the Romberg pose. The rest of the physical findings were unremarkable.

Results of blood test on admission were as follows: White blood cell count,  $7.9 \times 10^9$ ; neutrophils, 72.7%; blood glu-



**Fig. 1.** Focal lesion in the projection of the left leg of the brain, left upper and lower humps of the quadruple plate of the left half-bridge and medulla oblongata, and focus in the left cerebellum hemisphere



**Fig. 2.** Repeated MRI analysis.

cose, 4.8 mmol/L. Cerebrospinal fluid was sampled also on admission. Findings of CSF examination were as follows: Total number of cells, 2 cell/ $\mu$ L, lymphocytes; protein, 0.5 g/L; glucose, 4.7 mmol/L, and chlorides, 130.9 mmol/L. EV RNA, 38800 copies/ml, was determined in CSF.

The patient in the present study had typical clinical features of neuroinfection with focal abnormalities of brain parenchyma on neuroimaging. The diagnosis of brainstem encephalitis and borreliosis was established based on the above clinical symptoms, and the presence of EV RNA in the CSF and antibodies to *Borrelia*. Should indicate, after identifying a possible or probable case of encephalitis of presumed infectious etiology, it is desirable to identify the specific etiology. However, even with comprehensive testing, more than 50% of the encephalitis will remain

without determination of the specific causative agent [12]. The International Encephalitis Consortium [13] has suggested an algorithm for etiologic workup. It can be useful in making correct diagnosis.

She was treated with Ribavirin, 1000 mg daily during 2 weeks; Cefoperason/ Sulbactam, 2.0 g  $\times$  2 daily, i/v, drip, 28 days; Dexamethasone; Vitamins, etc. An empirical treatment soon led to positive dynamic in the patient's state. Control CSF analysis shown cytosis of 1 cell/ $\mu$ L, lymphocytes; protein, 0.46 g/L; glucose, 4.0 mmol/L, and chlorides, 126.7 mmol/L. EV RNA and microflora not found. IgM antibodies to *B. burgdorferi* in blood not detected. Repeated MRI analysis showed pronounced positive dynamics: one of the defeat focus completely disappeared, however, the second was present, although without negative dynamics

(fig.2); perhaps, it is not inflammatory in nature (gliosis?). She completely recovered and was discharged home in a stable condition without any neurological deficit.

## CONCLUSIONS

Enteroviruses are the most common cause of encephalitis in children and teenagers. Immunocompetent adults are more resistant to EVs. So, adult incidence with EV encephalitis is low. The present case may be result of combined EV and borrelia infection. After admission the patient to health care facility, all possible efforts should be made to establish the specific diagnosis using epidemiological information, clinical presentation, and ancillary tests. The differential diagnosis is not restricted among different viruses, but also includes other infections and immune-mediated inflammatory CNS disorders like ADEM and autoimmune encephalitis.

In order to increase the likelihood of positive results for a specific virus, it is important to know the best approach to collecting samples and to choose the best identification technique for each virus. Treatment for specific viral etiologies may be initiated as soon as possible, and sometimes, when there is a high level of suspicion, empirical antiviral treatment is reasonable until etiologic confirmation is possible. Further research is also required to develop new therapies for unmet medical needs like arbovirus and enterovirus infections.

This case illustrates that EV infection may cause brainstem encephalitis accompanied by severe neurological manifestations in adults. The course of the disease and the associated complications in adults are similar to those in infants and children. Clinicians should be aware of the possibility of EVE occurring in adults and teenagers, as prompt treatment could be invaluable in reducing complications and saving lives.

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## Consent for publication

*Written informed consent was obtained from the patient for publication of this case report.*

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## Conflict of interest:

*The Author declare no conflict of interest*

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