

Original article

Cortical visual impairment in children with acute encephalitis syndrome

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Abstract:

Background: Acute encephalitis syndrome (AES) is one of cortical visual impairment (CVI) causes. There were only few studies about cortical visual involvement in children with AES.

Objective: To describe CVI in children with AES. **Methods:** This study included all children with AES during January to March 2014, were examined for visual evoked potential (VEP) to evaluate cortical visual pathway. AES was defined as clinical condition characterized by acute onset of fever, a change in mental status, and/or new onset of seizures. CVI was defined as vision loss caused by central nervous system damage confirmed by VEP. **Results:** There were 9 children with AES and all showed bilateral CVI. The age range between 6 to 48 months old, with 7 males and 2 females. Visual evoked potential result showed 8 children with demyelinating type and 1 with axonal type. **Conclusion:** Type of CVI caused by AES can be demyelinating type or axonal type.

Keywords: encephalitis; cortical visual impairment

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Introduction:

Acute encephalitis syndrome (AES) is a group of clinically similar neurologic manifestation caused by a wide range of viruses and bacteria. AES may present as encephalitis, meningoencephalitis or meningitis and may be caused by viruses, bacteria, mycobacteria, rickettsia and rarely by toxoplasma. JE and Dengue are prevalent causes of viral encephalitis in South East Asia^{1, 2}. AES may cause visual cortical damage which incidence is reported increasing due to better survival of AES³.

Cortical visual impairment (CVI) is neurological disorder caused by bilateral cerebral damage, either to the optic radiations or visual cortex, resulting in deficits in bilateral central visual acuity. CVI is reduced as a result of non-ocular diseases, although it might be presented with ophthalmological abnormality. In children, objective evaluation of visual system conduction meets some difficulties. Visual evoked potentials (VEP) is a more practical neurophysiologic method for CVI evaluation in children^{4, 5}.

There are only few studies analyzing the incidence of CVI due to AES. Visual pathway disturbances in children EAS are also not well-described. Present study is carried out with the objective to describe CVI in children with AES.

Subjects and methods:

This study included all children admitted in pediatric wards Soetomo Hospital with AES during January to March 2014. Inclusion criteria for AES, was defined according to WHO case definition, as clinical condition characterized by acute onset of fever, a change in mental status, and/or new onset of seizures, excluding febrile convulsions in a children of any age at any time of year⁶.

Patients fulfilling the inclusion criteria were examined for visual evoked potential (VEP) to evaluate cortical visual pathway. VEP were recorded according to currently accepted standard procedures in Neurology Departement Soetomo Hospital. Latency and asymmetry of the main peak P100 were evaluated and compared to the medical normative data. Results were presented

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Table 1. Light perception and latency as result of VEP stimulation

Patient	Light perception		Latency after stimulation		Type of lesion
	Right eye	Left Eye	Right eye	Left Eye	
1	(+)	(+)	Prolonged	Prolonged	Demyelinating
2	(+)	(+)	Prolonged	Prolonged	Demyelinating
3	(+)	(+)	Prolonged	Prolonged	Demyelinating
4	(+)	(+)	Prolonged	Prolonged	Demyelinating
5	(+)	(+)	No response	No response	Demyelinating
6	(+)	(+)	No response	No response	Axonal
7	(+)	(+)	Prolonged	Prolonged	Demyelinating
8	(+)	(+)	Prolonged	Prolonged	Demyelinating
9	(+)	(+)	Prolonged	Prolonged	Demyelinating

descriptively. The study was ethically approved by the ethical committee of Airlangga University.

Results:

There were 9 children admitted with AES and all showed bilateral CVI. The age range between 6 to 48 months old, with 7 males and 2 females. Visual evoked potential result showed 8 children with demyelinating type and 1 with axonal type. Obtained data on light perception and VEP latency as result of stimulation are presented in Table 1. Unresponsive latency abnormality was seen in two patients with history of several episodes of seizures, suggesting a bilateral total demyelinating lesion and axonal lesion in both visual pathway. No latency asymmetry was observed. There were no data for encephalitis etiology. Obtained data on light perception and VEP latency as result of stimulation are presented in Table 1.

Discussion:

In this study, it can be seen that all AES patients have abnormal bilateral visual conduction, mostly with demyelinating type of CVI (8 of 9 patient). In acute neuritis, the VEP latency is usually prolonged and the amplitude is decreased. In the study about recovery from optic neuritis, the latency remained prolonged suggesting that significant remyelination had not taken place by 6 months⁷.

Most patients with CVI will not regain normal vision. Children with CVI may function as blind due to their brain's inability to recognize or analyze signals received by the eye and anterior visual pathway. However, improvement is usually seen

over time.⁸ Bacterial meningitis is associated with a poorer prognosis than most other causes of CVI⁹. Unfortunately, there were no data covered for etiology of AES in our study.

Clinical assessment can be supported with brain imaging studies. Neuroimaging of the brain can be used to confirm the clinical diagnosis of CVI. MRI is sensitive in locating cerebral damage location. However, poor vision does not always correlate with damage seen on imaging of the optic radiations or the primary and associative visual cortex and an abnormal MRI finding does not always necessarily indicate loss of visual acuity. Thus, another examination is still needed to establish the diagnosis of CVI^{5,9}.

Very little is known about specific prognostic findings in children with CVI. Prognosis for recovery is better in children who suffer CVI at a very early age⁸. The role of VEP in confirming the diagnosis of CVI in children and predicting visual outcome has been addressed in many studies, and the subject is not free of controversy. Research on visual evoked potentials (VEPs) has focused on this method's usefulness in confirming CVI or on its prognostic value for visual outcome. VEP appear to be a useful supplemental tool, but they have limitations, and clinicians should not to rush to predict a poor or good outcome solely on the basis of these findings^{4, 7, 8}.

The goal of visual rehabilitation is to maximize the use of functional residual vision. Early assessment is critical. Although traditional educational settings

strive to provide stimulation and diversity to encourage children's developmental growth, a simplified visual environment is more beneficial to children with CVI because it forces them to focus attention on a particular visual stimulus. In these children, color, high contrast, and the use of motion may facilitate visual recognition of an object¹⁰.

Conclusion:

Type of CVI caused by AES can be demyelinating type or axonal type. More studies with larger samples are needed to correlate factors aggravating CVI in children with AES and to predict the prognostic of visual outcome in children with AES.

Conflict of interest: None declared.

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