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EEG-fMRI study of the ictal and interictal epileptic activity in patients with eyelid myoclonia with absences

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Backgroud and Objective: Eyelid myoclonia with absences (EMA) is a unique type of epileptic seizure. This form of epilepsy is characterized by eyelid myoclonia with and without absences, eye closure induced seizures, EEG paroxysms, and photosensitivity. It often presents with unique clinical and EEG features, and usually occurs with genetic clustering.[1] The recently developed technique of EEG-fMRI can obtain both electrophysiologic and metabolic information, and can then be used to explore the pathophysiological mechanisms of epileptic discharges and improve the diagnosis for an epileptogenic focus.[2] A study of BOLD-associated neuronal activity in patients with EMA by EEG-fMRI has not been reported previously. This study aimed to investigate the BOLD signal changes correlated with epileptic discharges using EEG-fMRI in patients with EMA, and to explore the pathophysiological mechanisms of epileptic discharges and their effect on brain function. The BOLD signal changes were examined under different states of consciousness and the epileptogenic zone of EMA was localized.

Methods: Four patients with EMA were investigated through the method of EEG-fMRI. The characteristics of BOLD signal changes linked to ictal and interictal epileptic discharges under different states of consciousness were explored.

Results: Seven sessions of EEG-fMRI scanning in the four patients were obtained. The main regions of activation included thalamus, mesial frontal cortex, middle parietal lobe, temporal lobe, insula, midline structures, and cerebellum. Deactivations were mainly in the anterior frontal lobe, posterior parietal lobe, and posterior cingulate gyrus. Thalamic BOLD change was the predominant activation in most of our cases. The distribution of activation associated with ictal epileptic discharges was wider and the distribution of deactivation was closer to pericortex compared with the BOLD change linked with interictal epileptic discharges.

Conclusions: The activation in the thalamus may be associated with generalized spike wave in EMA; the combination of different patterns of activation with consistent pattern of deactivations ("default" pattern) in patients with EMA may prognosticate different states of consciousness in response to ictal and interictal epileptic discharges.

References

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