■ Multimedia teaching material

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Epileptic Disorders

Prominent artifact on EEG due to abnormal eye movements

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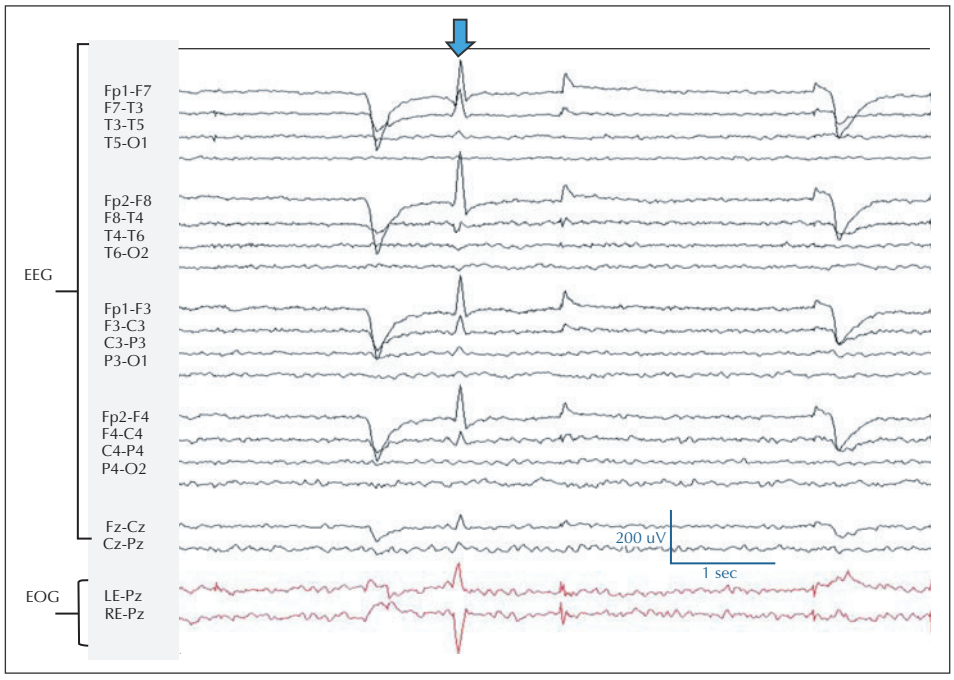
We report a 56-year-old man with severe encephalopathy due to ehrlichiosis. Examination was significant for a comatose state and lack of spontaneous eye opening. Ocular examination showed eye movements in different directions including horizontal plane and frequent, fast downward eye movements followed by a slower upward component.

Activity corresponding to these eye movements on EEG was seen as asymmetric high-voltage potentials in the anterior channels with a rapid ascending phase, followed by a slower descending phase. This, at times, was followed by a slow after-wave, thus simulating a sharp wave (*figure 1*).

An electrooculogram (EOG) was utilized for further characterization of these



■ **Figure 1.** EEG in a longitudinal bipolar montage showing high-voltage potentials with sharp morphology maximum in the bilateral anterior channels with sharply rising ascending phase followed by a slower descending phase (blue arrow). Note the presence of a positive phase reversal in EOG corresponding to the high-voltage deflections with sharp morphology. EEG settings: Sensitivity 10 uV/mm, HFF 70 Hz, LFF 1 Hz. EOG settings: Sensitivity 15 uV/mm, HFF 70 Hz, LFF 1 Hz.

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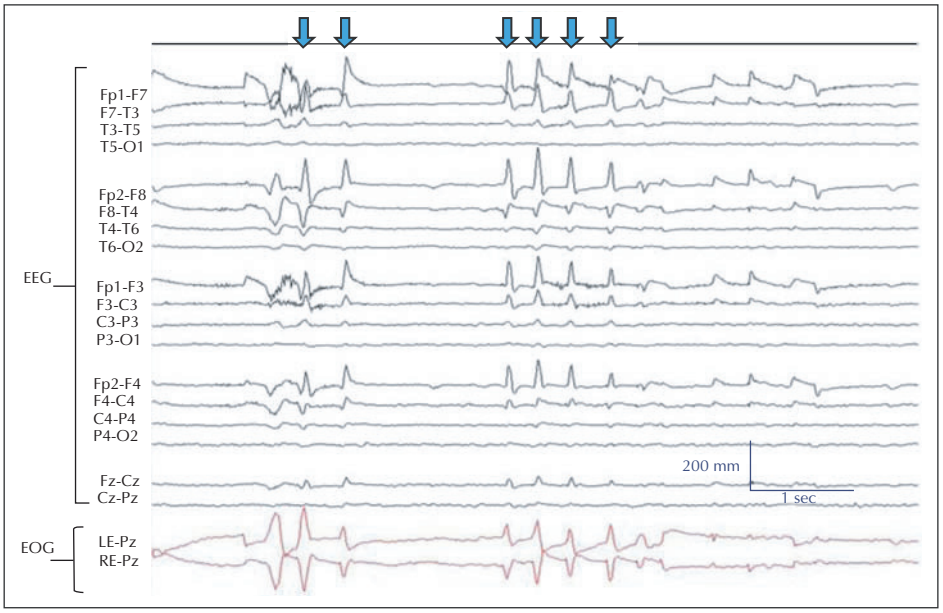

■ **Figure 2.** Additional similar asymmetric potentials recorded in the anterior channels (blue arrows) noted throughout the record. Note the presence of a positive phase reversal in EOG corresponding to the high-voltage deflections with sharp morphology confirming that these are in fact eye movements. EEG settings: Sensitivity 20 uV/mm, HFF 70 Hz, LFF 1 Hz. EOG settings: Sensitivity 30 uV/mm, HFF 70 Hz, LFF 0.5 Hz.

deflections. All similar potentials recorded in the anterior channels corresponded to an EOG phase reversal (*figure 2*).

It is crucial to accurately distinguish non-epileptiform transients with sharp morphology from interictal epileptiform discharges to avoid misdiagnosis. A recent study showed a high specificity of >95% in identification of epileptiform discharges using a cut-off of five out of six criteria proposed by the International Federation of Clinical Neurophysiology [1]. Additionally, an EOG in which eye movements can be identified with opposite phase deflections can further aid in identifying this finding [2]. ■

Supplementary material.
Summary slides accompanying the manuscript are available at www.epilepticdisorders.com.

References

1. Kural MA, Duez L, Sejer Hansen V, Larsson PG, Rampp S, Schulz R. Criteria for defining interictal epileptiform discharges in EEG: a clinical validation study. *Neurology* 2020; 94(20): e2139-47.

2. Rosado Coelho C, Fernandez-Baca Vaca G, Lüders HO. Electrooculogram and submandibular montage to distinguish different eye, eyelid, and tongue movements in electroencephalographic studies. *Clin Neurophysiol* 2018; 129(11): 2380-91.