TRIPHASIC WAVE EEG PATTERNS IN UNEXPLAINED ENCEPHALOPATHY: WORKING GUIDE FOR MANAGEMENT

Introduction

EEG’s are commonly ordered to help clarify the cause of unexplained or incompletely explained encephalopathy in hospitalized patients. “Generalized triphasic waves” (GTWs) are a relatively common finding in this setting. In the past, GTWs were typically associated with metabolic encephalopathy, especially hepatic encephalopathy. With more widespread use of continuous EEG monitoring in acute care environments, it has become increasingly clear that triphasic waves are seen in diverse clinical entities including toxic, metabolic, post-anoxic and epileptic encephalopathies. Triphasic sharp waves have been described in isolated nonconvulsive seizures (NCS) and in nonconvulsive status epilepticus (NCSE). While some EEG features make NCS/NCSE less likely (e.g. blunted appearance, symmetry, low frequency, stimulus-dependence, etc), no features alone or in combination have been identified which can reliably distinguish between cases that are or are not responsive to treatment with anti-epileptic drugs (AEDs) (Neurology 2003; 61:1035-6, Can. J. Neurol. Sci. 2006; 33:175-180). Consequently, one rational strategy that has become increasingly popular is a brief trial of anticonvulsant medication aimed at “ruling out” NCS/NCSE empirically on the basis of response to therapy (Clin. Neurophys. 118 (2007) 1660–1670).

Based on experience and our review of the literature, we currently recommend the following as a default approach to the evaluation of patients with generalized-triphasic-wave EEG patterns in the setting of unexplained or incompletely explained encephalopathy. This approach is meant as general guideline, should be modified as clinically indicated, and may not apply to all patients.

RECOMMENDED PROTOCOL

Continuous EEG monitoring should be performed for 24-48 hours, to cover the duration of the following test(s).

Initial evaluation: Benzodiazepine trial

Required monitoring: Continuous EEG, pulse oximetry, blood pressure, ECG, respiratory rate with dedicated nurse. EEG fellow and consulting Neurologist should be at the bedside during the trial.

Procedure: Give sequential small doses of Lorazepam (Ativan), 0.5-1 mg/dose, up to 2-4 mg total. Before first dose, and between doses, perform repeated clinical and EEG assessment.

Trial is stopped after any of the following: (1) Persistent resolution of the EEG pattern; (2) definite clinical improvement; (3) respiratory depression, hypotension, or any other adverse event; (4) maximum recommended dose of Lorazepam is reached.
**Interpretation:** Test is positive (+) if there is:

1. Resolution of the EEG pattern AND
2. EITHER: Unequivocal improvement in encephalopathy OR appearance of previously absent normal EEG patterns (e.g. posterior alpha rhythm).

The result is inconclusive if the EEG improves but the patient’s encephalopathy does not (e.g. the patient simply falls asleep).

**For equivocal result of Lorazepam trial: Levetiracetam trial**

**Procedure:** Loading dose: Levetiracetam (Keppra) 25 mg/kg IV x 1
Maintenance dose: Levetiracetam 1500 mg BID (oral or IV).
Trial continues for 48 hours.

**Positive response:** Defined in the same way as for benzodiazepine trial.
Stop Levetiracetam if the result is not clearly positive.

**Disclaimer**

Clinical situations and considerations may vary. This working guideline has been developed for use by our team at MGH in appropriate circumstances. Changes in our practice may occur without notice. We make no statements or warranties about appropriateness or utility of this working guideline in other clinical environments. This guideline has not been evaluated in a blinded randomized clinical trial.

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