

EEG 24/7: THE USE OF EMERGENCY EEG TO DIAGNOSE STATUS EPILEPTICUS

Emergent EEG: Indications and Diagnostic Yield

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The authors reviewed the reports of all emergency EEGs (EmEEGs) performed in our hospital within 1 hour of the test being ordered over a period of 52 months. Two hundred sixty-one EmEEGs (12.8% of all EEGs) were performed. The most common reason to order the test was a change in mental status or coma (17.6%). Although EmEEG was ordered to rule out status epilepticus (SE) in 60.2% of cases, this diagnosis was made in only 10.7% of patients. The only independent predictor for SE was a history of cardiac or respiratory arrest [odds (95% confidence interval, CI), 6.8 (2.7 to 16.9)].

Nonconvulsive Status Epilepticus: Usefulness of Clinical Features in Selecting Patients for Urgent EEG

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BACKGROUND: Nonconvulsive status epilepticus (NCSE) is SE without obvious tonic-clonic activity. Patients with NCSE have an altered mental state. An EEG is needed to confirm the diagnosis, but obtaining an EEG on every patient with an altered mental state is not practical.

PURPOSE: To determine whether clinical features could be used to predict which patients were more likely to be in NCSE and thus in need of an urgent EEG.

METHODS: Over a 6-month period, all patients for whom an urgent EEG was ordered to identify NCSE were enrolled. Neurology residents examined the patients and filled out a questionnaire without knowledge of the EEG results. The patients were divided into two groups, NCSE and non-NCSE, depending on the EEG result. The clinical features were compared between the two groups.

The sensitivity and specificity of the features were calculated.

RESULTS: Forty-eight patients were enrolled, 12 in NCSE and 36 not in NCSE. Remote risk factors for seizures, severely impaired mental state, and ocular movement abnormalities were seen significantly more often in the NCSE group. The combined sensitivity of remote risk factors for seizures and ocular-movement abnormalities was 100%.

CONCLUSIONS: Certain clinical features are more likely to be present in patients in NCSE compared with other types of encephalopathy. Either remote risk factors for seizures or ocular-movement abnormalities were seen in all patients in NCSE. These features may be used to select which patients should have an urgent EEG.

COMMENTARY

Nonconvulsive status epilepticus (SE) is frequently invoked as the reason for requesting an emergency EEG. It is a treatable neurologic condition, associated with an altered mental state. Subtle clinical signs are sometimes present. It is surprisingly common, occurring in 8% of comatose patients in intensive care units (1) and in 37% of patients with unexplained alteration of consciousness (2). Nonconvulsive SE can be diagnosed definitively only by electroencephalogram (EEG). Convulsive SE also may present a diagnostic challenge when convulsions stop but the patient remains unresponsive, raising the suspicion of ongoing subclinical SE (3). Because longer duration of SE is associated with higher mortality (4), early diagnosis is crucial so that SE can be terminated by prompt treatment.

Problems arise when SE is suspected, but an EEG is not immediately available. A significant number of hospitals do not provide round-the-clock EEG availability (5), leaving the potential for suboptimal evaluation and care of suspected SE patients during night and weekend hours. Varelas and colleagues found that emergency EEG had a 10.7% yield for SE. Prolonged emergency EEG was 5 times more likely to identify nonconvulsive SE than was routine EEG, suggesting that prolonged EEG is the preferred test in this setting.

To select patients judiciously for urgent EEG, it is helpful to have clinical and historical features that are strongly associated with SE. The articles reviewed here focus on identifying predictors of nonconvulsive SE and optimizing diagnostic yield of SE with emergency EEG. Varelas et al. found that history of cardiac or respiratory arrest and “suspicious clinical activity” were the only variables that predicted the presence of SE on emergency EEG.

The article by Husain and colleagues examined clinical features in more detail, seeking those that would identify accurately the patients with a high likelihood of nonconvulsive SE. The features studied were: recent risk factors, remote risk factors, tonic-clonic activity, history of epilepsy, ocular-movement abnormalities, and subtle motor activity. Neither the sensitivity nor the specificity exceeded 80% for any of the features. Ocular-movement abnormalities had a high specificity (86%) but a low sensitivity (55%). Remote risk factors had a sensitivity of 75% and a specificity of 58%. However, the combined sensitivity (presence of either/or) of these two features was 100%. Using these criteria on the 48 patients in this study correctly identified all of the patients with nonconvulsive SE on EEG, although the specificity was only 55%.

Ideally, EEG would be universally available at all hours. The 10.7% diagnostic yield of emergency EEG for SE should justify the need for widespread availability of emergency EEG. In comparison, 12% of emergency computerized tomography

(CT) scans of the head yield positive results (6), and this test is widely available. In the real world, however, it is not possible to obtain an emergency EEG on every patient with altered mental status. The data in these articles offer guidance in stratifying patients with possible nonconvulsive SE according to risk.

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References

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