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Generalized Periodic Discharges Associated With Catatonia and Delirium: A Case Series

James Luccarelli, M.D., D.Phil.,
Department of Psychiatry, Harvard Medical School, Boston; Department of Psychiatry, Massachusetts General Hospital, Boston

Joshua R. Smith, M.D.,
Department of Psychiatry and Behavioral Sciences, Division of Child and Adolescent Psychiatry, Vanderbilt University Medical Center at Village of Vanderbilt, and Vanderbilt Kennedy Center, Vanderbilt University, Nashville, Tenn

Gregory Fricchione, M.D.,
Department of Psychiatry, Harvard Medical School, Boston; Department of Psychiatry, Massachusetts General Hospital, Boston

M. Brandon Westover, M.D., Ph.D.
Department of Neurology, Harvard Medical School, Boston; Department of Neurology, Beth Israel Deaconess Medical Center, Boston

Abstract

Objective: Generalized periodic discharges are a repeated and generalized electroencephalography (EEG) pattern that can be seen in the context of altered mental status. This article describes a series of five individuals with generalized periodic discharges who demonstrated signs and symptoms of catatonia, a treatable neuropsychiatric condition.

Methods: Inpatients with a clinical diagnosis of catatonia, determined with the Bush-Francis Catatonia Rating Scale (BFCRS), and EEG recordings with generalized periodic discharges were analyzed in a retrospective case series.

Results: Five patients with catatonia and generalized periodic discharges on EEG were evaluated from among 106 patients with catatonia and contemporaneous EEG measurements. Four of these patients showed an improvement in catatonia severity when treated with benzodiazepines, with an average reduction of 6.75 points on the BFCRS.

Conclusions: Among patients with generalized periodic discharges, catatonia should be considered, in the appropriate clinical context. Patients with generalized periodic discharges and catatonia may benefit from treatment with empiric trials of benzodiazepines.

Generalized periodic discharges are defined as repeated and generalized electroencephalography (EEG) waveforms with relatively uniform morphology and

Send correspondence to Dr. Luccarelli (jluccarelli@mgb.org).

The authors have confirmed that details of the cases have been disguised to protect patient privacy.

recurrence intervals (1). A subset of these generalized periodic discharges have a triphasic morphology, first described in the context of hepatic encephalopathy and initially believed to be specific for encephalopathy. However, research has called into question the specificity of generalized periodic discharges for any particular underlying illness (2). Generalized periodic discharges, with and without triphasic morphology, are present in up to 20% of patients in a coma and have been associated with numerous structural lesions and aberrant brain states, including encephalopathy and nonconvulsive status epilepticus (3). Partly because of the difficulty of assessing the underlying etiology of generalized periodic discharges, empiric trials of benzodiazepines or nonsedating antiepileptic drugs may be used to assess for possible nonconvulsive status epilepticus; one trial found positive clinical responses in a proportion of patients with generalized periodic discharges treated with either type of medication, with better responses to nonsedating antiepileptic drugs (4). Improvements in mental status with these medications, however, may not indicate nonconvulsive status epilepticus specifically. In particular, catatonia, a neuropsychiatric disorder associated with changes in motor function and affect, can likewise result in reduced responsiveness and is effectively treated with benzodiazepines (5). Catatonia can be associated with a range of underlying disorders, including neurological, medical, and psychiatric illnesses. A meta-analysis of EEG findings in catatonia between 1938 and 2021 found that the presence of an abnormal EEG predicts a medical cause of catatonia with a sensitivity of 0.82 (95% CI=0.67–0.91) and a specificity of 0.66 (95% CI=0.45–0.82) (6). Among specific abnormal EEG patterns seen in patients with catatonia, slowing (more commonly generalized but also focal) was most common, although generalized spike and wave patterns and focal spikes have also been reported (7, 8). Nonconvulsive status epilepticus itself may also lead to catatonic symptoms, including muteness and stupor (9), and thus there remains a considerable need to identify EEG findings that may be associated with the presence of catatonia. Here, we report a series of five individuals with catatonia and EEG findings of generalized periodic discharges. Four of these patients were treated with lorazepam, resulting in an average reduction of 6.75 points in their severity score on the Bush-Francis Catatonia Rating Scale (BFCRS) (10).

METHODS

We performed a retrospective analysis of medical records in a large health system in New England. Clinical encounters between January 2017 and December 2022 containing a discharge billing code for catatonia (F06.1 or F20.2) and a procedural code for EEG were manually reviewed. Patients with a documented BFCRS score and EEG recording within 24 hours of each other were included in this series if the text of the EEG report identified generalized periodic discharges and if at least two items on the Bush-Francis Catatonia Screening Instrument (BFCSI) (includes the first 14 items of the BFCRS) were positive. BFCRS scores can range from 0 to 69, with higher scores indicating greater symptom severity. Delirium status was based on clinical documentation on the day the EEG was recorded. This study was approved by the institutional review board of Mass General Brigham with a waiver of informed consent from study participants.

RESULTS

Of the 106 cases of patients with EEG recordings and catatonia assessment with the BFCRS within 24 hours of each other, five EEGs contained findings of generalized periodic discharges, and these five cases are described below.

In case 1, a patient in their 60s with a history of left posterior inferior cerebellar artery stroke with resultant seizure disorder (on home levetiracetam) and gastroparesis presented with aspiration pneumonia, hypertensive emergency, and altered mental status. A clinical diagnosis of delirium was made. The patient screened positive on eight items of the BFCSI, with an initial BFCRS score of 14, and had symptoms meeting DSM-5-TR criteria for catatonia. The patient was treated with lorazepam 1 mg every 6 hours; after 24 hours, the patient's BFCRS score was reduced to 7. EEG obtained after the initial dose of lorazepam was notable for diffuse slowing of the background with frequent bilateral independent epileptiform discharges in the posterior quadrants and occasional generalized periodic discharges with triphasic morphology (Figure 1). A repeat EEG was not obtained.

In case 2, a patient in their 70s with major neurocognitive disorder complicated by behavioral disturbance was admitted from a skilled nursing facility for agitation and hallucinations and was found to have a urinary tract infection. A clinical diagnosis of delirium was made. The patient screened positive on seven items of the BFCSI, with symptoms meeting DSM-5-TR criteria for catatonia. The patient's BFCRS score was 24, which was reduced to 19 with lorazepam 2 mg every 6 hours. EEG obtained after lorazepam treatment was notable for irregular delta slowing of the background with frequent generalized discharges, occasionally occurring as 1-Hz generalized periodic discharges. Generalized periodic discharges were identified on a repeat EEG 6 days later, at which time, the patient's BFCRS score was 9.

In case 3, a patient in their 60s with a history of acute myeloid leukemia, who had a bone marrow transplant 6 weeks earlier, was admitted with parainfluenza, leading to hypoxemic respiratory failure. A clinical diagnosis of delirium was made. The patient screened positive on six items of the BFCSI, with symptoms meeting DSM-5-TR criteria for catatonia. EEG obtained prior to benzodiazepine administration was notable for generalized irregular delta to theta slowing with frequent generalized periodic discharges with triphasic morphology. The patient's BFCRS score was 16, which improved to 7 with treatment with lorazepam 0.25 mg every 6 hours. Generalized periodic discharges persisted on subsequent EEGs, even after catatonia was lysed.

In case 4, a patient in their 60s with a history of opioid and alcohol use disorders was admitted after being found down with coffee-ground emesis as well as with aspiration pneumonia and altered mental status. A clinical diagnosis of delirium was made. The patient screened positive on seven items of the BFCSI, with symptoms meeting DSM-5-TR criteria for catatonia. EEG obtained prior to benzodiazepine administration was notable for generalized irregular delta and theta slowing of the background with near-continuous generalized periodic discharges. The patient's initial BFCRS score was 21, which was

reduced to 15 after treatment with lorazepam 2 mg every 4 hours. EEG obtained after lorazepam administration did not show generalized periodic discharges.

In case 5, a patient in their 70s with a history of chronic schizophrenia presented with 3 days of altered mental status in the context of antipsychotic nonadherence. A clinical diagnosis of delirium was made. The patient screened positive on four items of the BFCSI, but symptoms did not meet DSM-5-TR criteria for catatonia because they did not show three of the 12 DSM-5-TR features of catatonia. EEG was notable for diffuse theta, and to a lesser extent delta, slowing of the background with occasional sporadic generalized sharp waves with triphasic morphology. The initial BFCRS score was 8. The patient was not treated with lorazepam, and follow-up EEG was not obtained.

DISCUSSION

In this case series, we presented five patients with generalized periodic discharges on EEG and a clinical examination consistent with both catatonia and delirium. Catatonia is a neuropsychiatric disorder that can occur in the context of multiple psychiatric and neurological illnesses (11) and is associated with changes in affect, motivation, and psychomotor function. Despite being described in the academic literature for nearly 150 years, recognition of catatonia is low, even among psychiatrists and neurologists (12, 13). Catatonia is associated with significant morbidity and mortality, particularly in the case of transformation to the malignant form of the disorder characterized by autonomic dysfunction (14). Treatment with benzodiazepines or electroconvulsive therapy can result in rapid improvement in catatonic symptoms, and thus prompt recognition of catatonia is essential because it represents a potentially reversible cause of altered mental status.

In this case series, all five patients presented with generalized periodic discharges, three of whom had generalized periodic discharges with triphasic morphology. All patients also had a clinical diagnosis of delirium, as well as features of background slowing. Catatonia and delirium can overlap, with 31% of patients in the intensive care unit meeting criteria for both conditions in one prospective study (15). Although catatonia cannot be diagnosed in the presence of delirium under present DSM-5-TR criteria, our case series highlights clinical improvement in catatonia with benzodiazepine treatment, even in the setting of delirium. Because benzodiazepines are often considered precipitants for delirium (16), the optimal care of individuals with comorbid catatonia and delirium is a critical area for further research.

This case series highlights the possible association of catatonia with generalized periodic discharges and suggests that among patients with this EEG finding, catatonia should be considered, in the appropriate clinical context. The findings also suggest that patients with generalized periodic discharges and features of catatonia, even with comorbid delirium, may benefit from treatment with empiric trials of benzodiazepines rather than nonsedating antiepileptic drugs because retrospective evidence has indicated broad effectiveness of benzodiazepines in the treatment of catatonia regardless of the underlying etiology.

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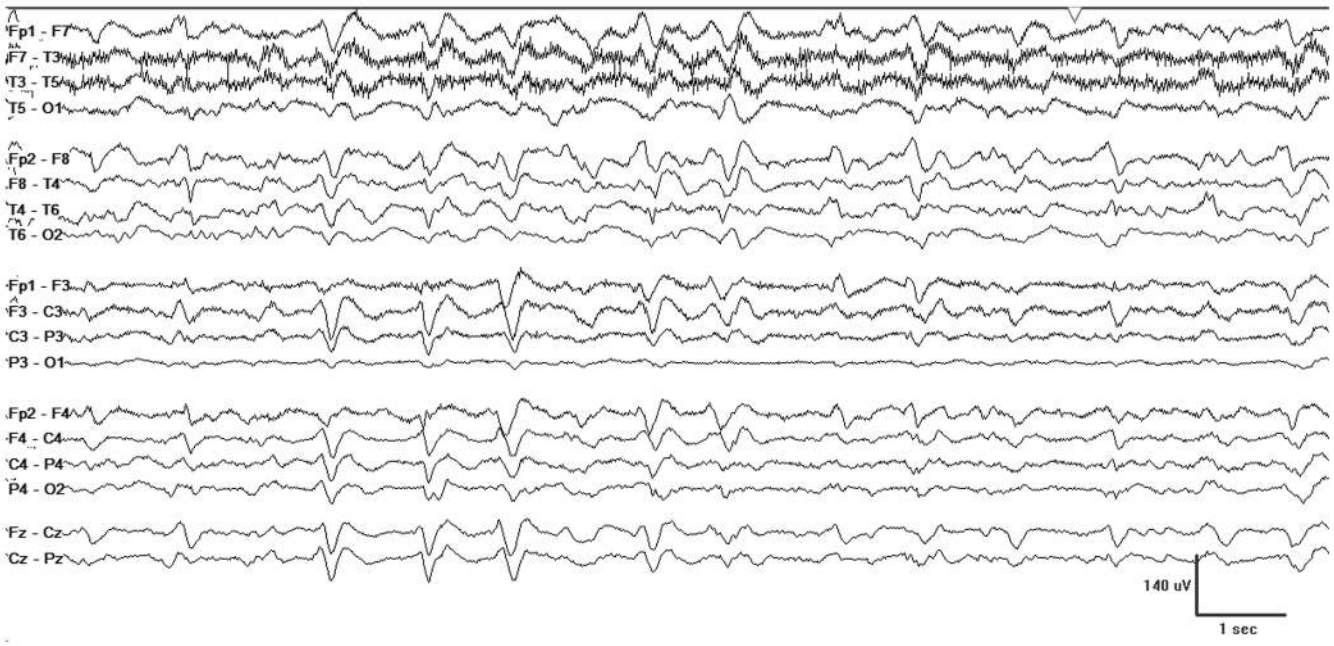

FIGURE 1.

Snapshot of EEG tracing for patient 1, demonstrating generalized periodic discharges with triphasic morphology