



Comparison of postictal semiology and behavior in psychogenic nonepileptic and epileptic seizures

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ABSTRACT

Background: The available information on postictal semiology and behavior in patients with psychogenic nonepileptic seizure (PNES) is limited. In this study, we explore the differences in postictal semiology and behavior between patients with epileptic seizure (ES) and PNES and focus on clinical features that may be helpful in differentiating these two conditions.

Methods: In this retrospective study, video-electroencephalograph (video-EEG) of 144 seizures from 64 patients with PNES and 66 seizures from 42 patients with ES were reviewed. Three novel postictal behaviors were compared between the two groups: a) abrupt, brief, and rapid blinking or shaking of the head as if regaining sensorium or “coming out” of the ictal event; b) looking around the room with a scanning and uncertain look; c) posing a question of “what happened?” or a similar question to the others present in the room. In addition, differences in several other postictal characteristics were studied.

Results: At least one of the three specific postictal behaviors was seen in 20.1% of patients with PNES but none of the patients with ES resulting in 100% specificity and 36% sensitivity. While mean ictal duration was significantly longer in patients with PNES (175.3 ± 168 s) compared to ES (105.4 ± 102.9 s), the interval between the end of ictal episode and first correct verbal response (74.5 ± 126.2 s versus 139.4 ± 185.4 s), or first followed command (84.1 ± 133.8 s versus 141.1 ± 192.1 s) were shorter. In the group with PNES, 59.7% of patients demonstrated a whispering or altered voice during the first correct verbal response versus 21.2% of patients in the group with ES. The first followed command was slow or erroneous in 49.3% of the patients with PNES and in 19.7% of the patients with ES.

Conclusion: In this study, we found significant differences between postictal semiology and behavior of patients with PNES and ES that can be helpful tools in distinguishing between these two conditions. Specifically, three novel postictal behaviors were studied and were found to have a high specificity, but low sensitivity, in distinguishing PNES from ES.

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1. Introduction

Psychogenic nonepileptic seizure (PNES) is clinically defined as an event with manifestations similar to an epileptic seizure (ES) consisting of altered motor, sensory, or emotional alteration or experience, but unlike ES there is no associated abnormal electrical discharge in the brain [1,2]; PNES is of psychological etiology and is classified as a conversion disorder under the category of somatic symptoms and related disorders

Abbreviations: EMU, epilepsy monitoring unit; ES, epileptic seizure; HEC, hypomotor with eyes closed; HPM, hypermotor; HST, hypomotor with staring; PNES, psychogenic nonepileptic seizure; PNSC, psychogenic nonsyncopal collapse; PTSD, posttraumatic stress disorder.

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in Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5) [3]. Since the advent of video-electroencephalograph (video-EEG) monitoring, it has been shown that utilization of this technology facilitates the diagnosis [4,5], and eventually it became the gold standard in diagnosis of PNES [6]. Diagnosis of PNES begins with a suspicion on clinical grounds followed by confirmation with video-EEG monitoring. Combined electroclinical analysis of the video and ictal EEG allows a high accuracy in diagnosis of PNES [7]. When examined by experienced clinicians, the sensitivity and specificity of video alone can be comparable to EEG alone in differentiating PNES from ES [8,9].

Clinical features and semiology of ictal PNES have been well-studied, and certain features such as ictal eye closure have been identified to be of value in differentiating PNES from ES [10–13]. Studies on postictal semiology and behavior, on the other hand, are relatively smaller in number. Previous studies found postictal whispering and partial motor response [14], and ictal or postictal weeping [15,16] was more prevalent in patients with PNES while certain postictal symptoms such as headache and fatigue [17] or postictal features such as

stertorous breathing [18,19] were more common in patients with ES. In addition, some studies have compared the semiology of psychogenic nonsyncopal collapse (PNESC), a parallel psychiatric disorder to PNES, and neurally-mediated syncope and described certain postictal semiology and behavior such as sweating and pallor to be more specific to neurally-mediated syncope whereas crying is more common in PNESC [20]. Based on our observations at a tertiary referral center epilepsy monitoring unit (EMU), we noticed that certain postictal behaviors that imply altered sensorium or sudden regain of consciousness are more commonly seen in patients with PNES.

In this study, we further explore the differences in postictal semiology and behavior between patients with ES and PNES. Based on our observations, we introduce three novel postictal behaviors that we hypothesize can be of value in differentiating PNES from ES. Patients diagnosed with PNES are a heterogeneous group with various underlying psychopathology [21,22]. There are some data suggesting that at least in certain patients with PNES, such as those with underlying posttraumatic stress disorder (PTSD), the nature of the underlying emotional trauma may have a relation with the presenting semiology [23]. Therefore, we further categorize our study sample based on their ictal semiology to reveal any variability in our findings among different ictal semiological groups.

2. Material and methods

2.1. Study sample

In this retrospective study, we reviewed the medical records of 468 patients who were admitted to EMU at the Upstate University Hospital Community Campus from January 1, 2012 to February 28, 2016, for a total of 488 admissions. We excluded 182 admissions during which no seizures were captured, 35 admissions with a discharge diagnosis of mixed epileptic and nonepileptic seizures, 13 admissions with a discharge diagnosis of seizures related to physiologic etiologies such as hypotension or hypoglycemia, and 32 admissions with indeterminate discharge diagnosis. The videos of 489 captured seizures during the remaining 226 admissions, belonging to 220 patients, were reviewed by one of the authors (SI). A unified protocol consisting of a few orientation questions and simple commands was routinely used at this center to assess the patients after each captured seizure. Seizures that were not associated with a clear altered sensorium or impaired consciousness ($n = 235$) did not have a clear ending such as seizures with gradual transitioning to sleep or rest ($n = 30$) or had inadequate clarity of the recorded videos for review ($n = 14$) were excluded. A total of 106 patients, 64 from the group with PNES with 144 captured seizures and 42 from the group with ES with 66 captured seizures, met the criteria to be included in the analysis. The study protocol was approved by the Upstate University Institutional Review Board (IRB).

2.2. Semiological classification

We categorized our study patients based on the semiology of their predominant seizure type. There are several proposed semiological classification of PNES [24–29]. In our study, patients with PNES were categorized as hypermotor (HPM) if their seizures predominantly manifested as violent and disorganized movements of the extremities, pelvic thrusting, or head movements ($n = 64$) or as hypomotor if their seizures predominantly presented with altered sensorium or impaired consciousness associated with either no or only mild motor or trembling-like activities ($n = 80$). Epileptic seizures, likewise, were classified as HPM defined as predominantly motor tonic, clonic, or tonic-clonic seizures ($n = 32$) or as hypomotor defined as predominantly altered sensorium or impaired consciousness associated with either no or only mild motor or trembling-like activities ($n = 34$). The hypomotor category in both the group with PNES and the group with ES were further subdivided to *hypomotor with eyes closed* (HEC) seizures during which the eyes remained closed at the time of unresponsiveness and *hypomotor with staring* (HST) seizures during which the eyes remained open with a staring look or gaze.

2.3. Parameters of interest

For each seizure, ictal duration was measured. We also recorded the occurrence of three specific postictal behaviors including: a) *abrupt, brief, and rapid blinking or shaking of the head* as if regaining sensorium or “coming out” of the ictal event; b) *looking around the room with a scanning and uncertain look*; and c) *posing a question of “what happened?” or a similar question* to the others present in the room. Other analyzed postictal characteristics included: a) *interval between the end of ictal period and the first correct verbal response* to the examiner's orientation questions; b) *quality of the voice during the first correct verbal response* categorized as normal, whispering, and either slurred or otherwise altered (e.g., childish) voice; c) *interval between the end of ictal period and the first followed command*; and d) *manner of execution of the first followed command* categorized as normal and either slow or erroneous.

3. Results

3.1. Demographic data

Demographic data of all the included patients as well as of the patients with only one seizure type are shown separately in Table 1. There was no statistically significant difference between age, gender, marital status, and current status of illicit drug use between the group with PNES and the group with ES. A significantly higher proportion of patients with PNES had a previously diagnosed mood and PTSD by a mental health clinician compared with that of patients with ES.

Table 1
Demographic data.

	All patients		p-Value	Patients with only one seizure type		
	PNES (n = 64)	ES (n = 42)		PNES (n = 56)	ES (n = 41)	p
Mean age (SD)	37.1 (13.1)	39.5 (15.1)	0.40	37 (13.9)	40 (14.9)	0.302
Male (%)	15 (23.4)	17 (40.5)	0.06	14 (25)	17 (41.5)	0.08
Female (%)	49 (76.6)	25 (59.5)		42 (75)	24 (58.5)	
Married (%)	33 (51.6)	20 (47.6)	0.69	30 (53.6)	19 (46.3)	0.48
Single ^a (%)	31 (48.4)	22 (52.4)		26 (46.4)	22 (53.7)	
History of mood disorder (%)	41 (64.1)	15 (35.7)	0.004	35 (62.5)	15 (36.6)	0.01
History of PTSD (%)	9 (14.1)	0 (0)	0.01	7 (12.5)	0 (0)	0.01
Current use of illicit drugs (%)	5 (7.8)	6 (14.3)	0.28	5 (8.9)	6 (14.6)	0.38

PTSD, posttraumatic stress disorder.
Significant p-Values <0.05 are in bold.
^a Including divorced or widowed.

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