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Stereotypy of psychogenic nonepileptic seizures☆,☆☆

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ABSTRACT

Psychogenic nonepileptic seizures (PNES) are defined as paroxysmal episodes in which epileptic semiology features are manifested, without the characteristic concomitant electrical discharges seen in epileptic seizures. Although many studies have dealt with semiologic classification of PNES, most of the studies did not raise the question of consistency of PNES in the same patient. The aim of this study was to measure the degree of consistency of PNES among individual patients. We retrospectively reviewed medical records and video- EEG records of all adult patients who underwent monitoring in our center from August 1st 2013 to May 31st 2015. Those who were diagnosed with PNES with or without a background of epilepsy were selected for this study. In order to check consistency between seizures, we analyzed patients who had more than one recorded seizure during monitoring. In case of more than 2 recorded seizures, the first two seizures were analyzed. We found 53 patients who had PNES during this period, 29 of them had more than one seizure. All seizures in the same patient were in the same semiology category. In patients with either motor rhythmic or complex motor seizures, we found a main anatomical region involved. The main anatomical region involved was the same in 13 out of 14 patients. Movement frequency was highly similar between the seizures of the same patient, while duration of seizures was significantly different. Despite significant differences in duration between the first and second seizure in patients with PNES, all other aspects tested were highly similar. This shows that recurrent PNES in the same patient are stereotypic. This supports the hypothesis that PNES is probably a dissociative disorder.

1. Introduction

Psychogenic nonepileptic seizures (PNESs) are defined as paroxysmal episodes in which epileptic semiology features are manifested without the characteristic concomitant electrical discharges seen in epileptic seizures (ESs) [1].

Many studies have dealt with semiologic classification of PNES, aiming to create a unified nomenclature for describing PNES phenomena [2–4]. However, most of these studies did not focus on the consistency of PNES in the same patient.

According to the DSM 5, PNES is considered a sub group of conversion disorders, and according to the ICD 10, PNES is a dissociative disorder [5]. Like other dissociative disorders, PNESs involve reduced awareness to the causality of attacks, and reduced awareness to the surrounding during attacks. Hence, it would be logical to assume that the behavior during the attacks has automatic components and there should be some consistency between attacks in the same patient.

Seneviratne et al. [3] classified PNESs into six categories: 1. Rhythmic motor PNES. 2. Hypermotor PNES. 3. Complex motor PNES. 4. Dialeptic PNES 5. Nonepileptic auras. 6. Mixed PNES.

The aim of this study was to measure the consistency of semiology between two attacks of PNESs in the same patient. We hypothesized that: 1. Multiple PNES of the same patient will belong to the same PNES category. 2. In patients with rhythmic motor PNES there will be consistency in the frequency of movements between attacks. 3. In patients with complex motor PNESs there will be consistency in the type of behaviors and the sequence of their appearance, from one event to the next.

2. Methods

We retrospectively reviewed medical records and video-EEG records of all adult patients who underwent monitoring in our center from August 1st 2013 to May 31st 2015. Those who were diagnosed with PNES, with or without a background of epilepsy, were selected for this study. Long-term video-EEG monitoring LTVEM was performed using a 22-channel digital video-EEG system with the electrodes arranged according to a modified 10–20 system. During the admission,

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all patients were managed by a neurologist with subspecialty training in epileptology.

A diagnosis of epilepsy was made either by interictal epileptiform discharges or by the recording of epileptic seizures during previous or current LTVEM. No induction methods except for AED withdrawal were used during LTVEM. The video monitoring sessions lasted 4–14 days. Patients were admitted for one of three reasons: 1. Investigation (spell classification). 2. Treatment adjustment. 3. Presurgical evaluation.

Nonepileptic paroxysmal events mimicking epileptic seizures include: syncope, REM sleep behavior disorders, restless leg syndrome, and panic attacks etc. Diagnosis of PNES was made by an epileptologist, based on clinical interview and the absence of electrographic paroxysmal changes during, after or prior to a typical event [6].

All PNESs occurred spontaneously.

The semiology of each clinical event was visually analyzed. All PNESs were classified into six different categories, adopted from [3]: (1) rhythmic motor PNES characterized by rhythmic tremor or rigor-like movements, (2) hypermotor PNES characterized by violent movements, (3) complex motor PNES characterized by complex movements such as flexion, extension, abduction, adduction, rotation, with or without clonic-like and myoclonic-like components of varying combinations and anatomic distribution, (4) dialeptic PNES characterized by unresponsiveness without motor manifestations, (5) nonepileptic auras characterized by subjective sensations without any external manifestations, marked in the LTVEM records as "seizure button presses" and, (6) mixed PNES where combinations of above seizure types were seen.

In order to check consistency between different PNESs of the same patient, we analyzed patients who had more than one recorded PNESs during monitoring. In 16 out of 29 patients, only 2 seizures were recorded. In case of more than 2 recorded PNESs, the first two were analyzed, in order to make a uniform comparison for all patients.

We analyzed the PNESs through five axes:

1. Type of PNES: adopted from [3].
2. Anatomical regions involved during the PNES.
3. Sequence of the PNES: the order of appearance of the anatomical regions involved in the PNES.
4. Frequency of movements: calculated using either EEG movement artifact, or using video analysis (Fig. 1a–b) in case of no movement artifact.
5. Duration of PNES.

Descriptive statistics were used to analyze axes 1–3. Two tailed t tests were calculated for axes 4–5. Statistical analysis was conducted using SPSS 13 for windows. All data gathering was approved by our institutional review board.

3. Results

Between August 1st 2013 and May 31st 2015, 195 LTVEM were preformed. Fifty-three patients were diagnosed with PNESs during this period. Twenty-nine of them had more than one seizure and were included in the final analysis.

The mean age of the patients was 31 ± 14 years. There were 15 women and 14 men. The mean monitoring duration was 4.06 ± 2 days and the mean number of events was 3.8 ± 1.3. The median number of events was 2.

The mean duration of "seizures disorder" was 6.2 years ± 5.9 (1 week–21 years) with a median duration of 4.5 years. (In one patient there were missing data regarding "seizures disorder" duration).

Eight patients had a comorbidity of epilepsy. In 2 patients, a right temporal seizure was recorded in a previous LTVEM and the other 6 patients had generalized interictal epileptiform discharges. All of these patients were treated with antiepileptic drugs (AEDs). Eleven more patients were treated with AEDs for suspected epilepsy prior to the LTVEM.

Regarding PNES distribution: 6 patients had a nonepileptic aura, 9 patients had a dialeptic PNES, 7 patients had rhythmic motor PNES, and 7 patients had complex motor PNES. The first and second PNES events of the same patient belonged to the same PNES category in all patients.

In 14 patients, there were motor manifestations during events (either motor rhythmic or complex motor). In all of those patients, we found that during the PNES there was an anatomical region which was active the longest during the seizure, which hence was defined as the main anatomical region involved.

Fig. 2 summarizes the distribution of the main anatomical region involved in those patients. In 13 out of those 14 patients, the same main anatomical region was involved in the first and the second PNES of the same patient.

Table 1 summarizes the anatomical regions involved in the PNES, the sequence of their involvement during the PNES, and the duration of PNES. In 9 out of the 14 patients, the same anatomical regions were involved in both PNESs. In 7 out of the 14 patients, the same sequence of anatomical region involvement was observed in both PNESs.

Regarding movement frequency: In 12 patients, a rhythmic movement was observed. Movement frequency was calculated only for the main anatomical region involved. In 5 patients the frequency of the main anatomical region involved was calculated by EEG artifact and in 7 patients by video analysis. In those patients, the mean movement frequency of the main anatomical region involved was not significantly different between the first and second PNES (3.35 ± 1.76 vs. 3.6 ± 1.7 Hz - $P = 0.724$).

Information regarding length of PNESs was unclear in 7 patients. In the remaining 22 patients, the length of PNES was significantly different between the first and second PNES (8.7 ± 8.9 vs. 23.5 ± 21.7 min - $p < 0.05$).

4. Discussion

There were several main findings in our study: 1. The first and the second PNES in an individual patient during LTVEM were consistent In terms of behavior and motor manifestations. 2. In patients with PNES and motor manifestations, there was a main anatomical region involved, which was consistent across both PNES in most patients (13 out of 14 patients). 3. In patients with PNES and non motor events, the behavior and the subjective feelings were constant across both seizures of the same patient (belonging to the same PNES semiological category). 4. The PNESs were different across patients in terms of anatomical regions involved, behavior, and subjective feelings. 5. Duration of PNESs was not consistent between both PNESs of the same patient.

PNESs is classified according to the DSM V as a conversion disorder and according to the ICD 10 as a dissociative disorder. Dissociative disorders are characterized by a disruption of the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, or behavior. Dissociative symptoms can potentially disrupt every area of psychological functioning [7]. Somatoform dissociation involves the loss of integration of somatic experiences, functions, and responses [8]. Dissociation is considered a defense mechanism helping the individual in coping with traumatizing events. Often, PNESs follow stressful or traumatic events which can result in dissociation of mental organization [9].

Since PNES (like an ES) is a symptom and not a disease or syndrome, it can be caused by heterogenic etiologies. It would be reasonable to assume that there is no one model which could explain the origin of PNES in all patients [10,11]. Until recently, there were four main models which dealt with the mechanism of PNES: Model 1 [12] "PNES as activation of dissociated material"- PNES results from dissociated memories or mental functions caused by a