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Are the clinical classifications for psychogenic nonepileptic seizures reliable?

Coline Duwicquet [a,*], Bertrand de Toffol [a,c], Philippe Corcia [a,c], Maxime Bonnin [b], Wissam El-Hage [b,c], Julien Biberon [a]

[a] Department of Neurology, University Hospital of Tours, France
[b] Clinique Psychiatrique Universitaire, CHRU de Tours, Tours, France
[c] INSERM U930, Université François-Rabelais de Tours, Tours, France

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ABSTRACT

Background: Psychogenic nonepileptic seizures (PNESs) are episodes that resemble epileptic seizures but are of psychological origin. A few studies have attempted to describe different types of PNES as a combination of clinical signs but their validation and robustness have not yet been reached. The aim of this study was to assess the inter-rater reliability (IRR) of five existing clinical PNES classifications.
Methods: A total of 107 PNESs from 54 patients were retrospectively analyzed independently by two trained epileptologists, who were blinded to each other's findings. The recorded events were grouped according to the five chosen classifications systems. The IRR was measured using a kappa (κ) coefficient for each PNES classification. We also report category-specific κ values.
Results: Our study demonstrated a mild to moderate IRR (κ from 0.44–0.68) for classifying PNES using the 5 proposed classification schemes. Within these classifications, the most reproducible classes are the subjective ones followed by the dialeptic group. Classes based on motor signs are the least reproducible.
Conclusion: The IRR for current clinical classifications of PNES was only moderate. The difficulty to analyze motor signs could explain this poor reliability. It is necessary to ensure the reliability of clinical classifications of PNES in order for them to be a relevant tool in clinical practice or to explore correlations in clinical research. Future research would benefit from increased precision of diagnostic criteria specific to each class.

1. Introduction

Psychogenic nonepileptic seizures (PNESs) are episodes that resemble epileptic seizures (ES) but have a psychological origin [1]. Despite video-electroencephalogram (EEG) monitoring (VEM) of the attack being the gold standard diagnostic test, interrater reliability (IRR) for positive diagnosis of PNES by VEM was only moderate even among experienced epileptologists [2].

Several authors attempted to identify distinct semiologic groups among PNESs [3–10]. Contrary to common belief, they demonstrated that the clinical presentation of PNES could be quite stereotypic both within and across individual patients and could be objectively grouped into a reduced number of clinical subtypes. However, the methodology differed across the various studies.

Some authors based their description on an objective statistical method of classification. They used an automatic clustering analysis of some clinical signs of PNES to identify clinical subtypes. These clinical signs were chosen prior to the study. Gröppel et al. focused on 7 clinical items. They studied 27 patients and identified 3 semiologic groups: "major motor" characterized by the association of clonic and hypermotor movements of the upper and/or lower extremities, pelvic thrusting, head movements, and tonic posturing of the head, "minor motor or trembling" comprised trembling of the upper and/or lower extremities, and "atonic psychogenic seizures" consisted of falling as the only symptom [8]. Hubsch et al. used a more detailed cluster analysis based on 22 predetermined clinical variables to identify 5 clinical subtypes of attacks, named according to their main clinical features: "dystonic attack with primitive gestural activity" (31.6%), "paucikinetic attack with preserved responsiveness" (23.4%), "pseudosyncope" (16.9%), "hyperkinetic prolonged attack with hyperventilation and auras" (11.7%), and "axial dystonic prolonged attack" (16.4%) [6]. Wadwekar et al. demonstrated that they could classify 94.9% of their patients using this classification with only minor modifications [11].

Other authors proposed a symptom-based classification based on their own experience. The PNES episodes were visually analyzed and classified by the investigator into distinct predetermined groups according to the predominant motor manifestation. For Seneviratne et al., PNESs were separated into 6 subtypes based on 14 items:

* Corresponding author at: Neurology, University Hospital of Tours, 2 boulevard Tonnellé, 37044 Tours cedex, France.
E-mail address: coline.d@club-internet.fr (C. Duwicquet).

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"Rhythmic", "hypermotor", "complex motor", "dialeptic PNES", "nonepileptic auras", and "mixed PNES" [7]. Selwa et al. attempted to classify PNES according to 6 predetermined basic types: "catatonic", "trashing", "automatisms", "tremor", "intermittent", and "subjective" [9]. Magaudda et al. proposed a classification suggesting that PNES subclasses were similar to different subtypes belonging to the domain of ES. They proposed four classes corresponding to the ones most frequently described in their clinical practice: "hypermotor", "akinetic", "focal motor", and PNES with "subjective symptoms". Inter-examiner accordance of PNES classification of 55 PNES was 83.6%. This calculation provided a measure of agreement; however, it did not accommodate for the chance factor that could arise. An artificial neural network also analyzed PNES video recordings. The machine-learning approach was used for 55 subjects. The authors questioned its relevance as they considered the data sample size low [10].

In addition, the aims differed across studies. For certain authors, the purpose was to improve diagnostic accuracy [6,8,10], while for others it was to improve etiologic understanding and management [7,9].

Some authors used these proposed syndromic classifications to look for psychopathological or prognosis correlations [9,12,13]. In the case of nonreliable classification, the relevance of such correlation becomes questionable. The classification of PNES should be reproducible, in order to be useful in clinical practice and clinical studies. However, the IRR for those syndromic classifications was never systematically assessed. All data was reviewed and categorized by a single examiner or by consensus between two experienced examiners.

The first aim of our study was to assess the IRR of those 5 classifications [6–10]. Our secondary purpose was to determine which classes, within those classifications, had the highest interrater agreement.

2. Methods

2.1. Patients

All video-EEG and medical records of patients, who underwent VEM between March 2009 to November 2016 at the Clinical Neurophysiology unit of the University Hospital of Tours (Tours, France) were reviewed retrospectively. The records of patients over 15 years old with documented diagnosis of PNES were retained for analysis. In accordance with LaFrance proposition, PNESs were diagnosed by consensus of 2 different epileptologists (BDT and WEH) based on video-EEG analysis and medical-history data including a psychiatric assessment (structured interview and psychiatric scales including Dissociative Experiences Scale (DES), Montgomery and Asberg Depression Rating Scale (MADRS), State-Trait Anxiety Inventory (STAI), Clinician Administered Post-traumatic stress disorder Scale (CAPS), Somatoform Dissociation Questionnaire (SDQ-20)) [1]. This study conforms to the Code of Ethics of the World Medical Association (Declaration of Helsinki), and was approved by the local Ethical Committee in Tours, France.

2.2. Recordings

Recordings (ranged from 3 h to 5 days) were made with 23 EEG electrodes according to the 10/20 international systems, at 1 kHz sampling rate (SD32 Headbox, Micromed, or Deltamed). Hyperventilation and photic stimulation were performed at least once per recording under the supervision of a trained EEG technologist who collected any subjective data observed in the case of seizures and immediately afterwards.

2.3. Data collection

Sociodemographic and medical history data were gathered from standardized medical files, which had been specifically designed for the VEM unit prior to the study: sex, age at onset of symptoms, age at diagnosis, antiepileptic treatment, presence of coexisting epilepsy, family history of epilepsy, current and past psychiatric comorbidity, and history of psychological trauma. Patients had undergone VEM for one of the following reasons: diagnostic elucidation of refractory seizures, presurgical evaluation, or suspected PNES.

2.4. Event analysis

Paroxysmal events were confirmed as the habitual episodes by the patient's relative who had witnessed one or more PNES episodes prior to the recordings. All recorded seizures of each patient were studied. Full video-EEG of each recorded attack was independently analyzed by 2 trained epileptologists (CD and JB) who were blinded to each other's findings. They were not involved in establishing the original diagnosis. The recorded events were all classified according to the five classifications systems proposed by Hubsch et al. [6], Magaudda et al. [10], Seneviratne et al. [7], Selwa et al. [9], and Gröppel et al. [8].

2.5. Statistical method

Cohen's kappa (κ), a chance-corrected measure of IRR, was computed for each tested classification system. Values of κ were interpreted via guidelines suggested by Landis & Koch [14], which rate them as follows: 0.80–1.00, almost perfect; 0.60–0.80, substantial; 0.40–0.60, moderate; 0.20–0.40, fair; 0.00–0.20, slight; and 0.00, poor. We also reported class-specific values within each classification. Data were analyzed using SYSTAT (version 12; Systat Software, Inc., U.S.A.). Confidence interval (CI) estimation for proportions was calculated according to the method described by Fleiss, Cohen, and Everitt [15].

3. Results

3.1. Demographical and medical history data

During the study period, we reviewed 129 video-EEG recorded events of 58 patients who were diagnosed with PNES. Four patients had to be excluded because of inadequate clinical and VEM data. A total of 107 documented PNES from 54 patients were analyzed. Patient demographic and clinical variables were resumed in Table 1.

The mean PNES recorded per patient was 2 (range 1–6). There were 46 female and 8 male patients, their ages ranged from 15 to 61 years (mean 34.1 years). The mean age of onset of PNES was 27.6 years (13–54 years) and mean age at diagnosis of PNES was 34.1 years (15–61 years). The delay in diagnosis ranged from 2 days to 42 years (average delay of 6.4 years). Thirteen PNESs were provoked

Table 1
Patient demographic and clinical variables.

	N = 54
Demographic data	
Age at evaluation, mean (range)	34.1 (15–61)
Sex M:F	8:46
Age at PNES onset, mean (range)	27.6 (13–54)
Time to diagnosis, mean (range)	6.4 yrs. (2 days to 42 yrs)
Number of recorded PNES, mean (range)	2 (1–6)
Medical history	
Epilepsy, n	14
Family history of seizures, n	11
PNES only patients with AED, n	18
Comorbidity psychopathology	
Psychological trauma, n	34
Sexual assault, n	17
Physical violence, n	12
Post-traumatic stress disorder, n	17
Anxiety disorder, n	21
Personality disorder, n	2
Psychotic disorders, n	2

PNES = Psychogenic Nonepileptic Seizure; AED = Antiepileptic Drugs.