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# Psychogenic Seizures in Adolescents: An "Evergreen" Diagnostic Challenge

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**Abstract**: *Psychogenic non-epileptic seizures (PNES) are not associated with abnormal brain EEG activity and cannot be explained by other neurological disorders. PNES are also defined as functional neurological disorders and are included among the Conversion Disorders in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). There is no doubt about the importance of an early and correct diagnosis of PNES. Diagnostic process is first based on an accurate clinical history. Video-EEG is considered the gold standard for the diagnosis, though it is often time consuming and it does not always allow to record an ictal event. When PNES is diagnosed, because it is not a seizure and no emergency treatment is required, the first goal is to ensure acceptance of the diagnosis. Initially, putative precipitating stressors need to be identified and addressed so that PNES can be contained and managed. Possible interventions for patients with PNES include psychotherapy, family counseling interventions, changes in the school environment and drug treatment. The latter may include anxyolytics and/or antidepressants; in case of a comorbid ADHD disorder, methylphenidate may be also considered.*

**Keywords:** *psychogenic non-epileptic seizures; psychotherapy; family counseling; drug treatment.*

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**Paroxysmal events with a focus on PNES**

Paroxysmal events are classified as non-epileptic or epileptic symptoms. The first ones are distinguished in psychogenic and organic/physiological paroxysmal events (Lüders et al., 2019). In organic and physiological disorders there are several symptoms: inattention, daydreaming, staring, sleep myoclonus, stereotyped movements, hypnotic spasms, tonic postures, parasomnia, movement disorders.

Psychogenic non-epileptic seizures (PNES) are not associated with abnormal brain EEG activity and cannot be explained by other neurological disorders. PNES are also defined as functional neurological disorders and are included among the Conversion Disorders in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013). This disorder is characterized by symptoms of impaired voluntary or sensorimotor function without the presence of other neurological or clinical conditions.

Since these non-epileptic paroxysmal events can be misdiagnosed by clinicians who do not have an in-depth knowledge of PNES, it is important that an immediate video-EEG evaluation is made to allow for rapid diagnosis and early and correct treatment.

Regarding subjects in developmental age, Kim and colleagues (2012) confirmed that a significant number of children assessed for epileptic seizures may actually be diagnosed with other disorders. It is therefore important for pediatric neurologists to carry out a careful examination and assessment with various tests and tools when the diagnosis is doubtful, especially in the case of patients with developmental delay or very young age, so as to avoid misdiagnosing seizures in the presence of PNES. An incorrect diagnosis can have negative consequences, leading, for example, to the administration of antiseizure drugs, undue instrumental investigation.

Literature data on PNES are more available for adult patients with respect to pediatric age. In the latter, data are still scarse as for treatment options and long-term outcome in children (Patel et al., 2007) and adolescents. As for PNES semiology, Kotagal et al. (2002) distinguished two groups, the first with non-responsive events and the second with motor events (bizarre, irregular, jerky, or shaking movements of the extremities, not typical of any of the known types of seizures). The aforementioned study highlighted how video-EEG monitoring is essential for a correct diagnosis of PNES and to rule out epileptic seizures. In another study, Verrotti et al. (2009) reported that prepubertal patients had mainly non-responsive events,

while pubertal patients had mainly major motor events. In addition, this research highlighted the differences in PNES semiology, depending on psychiatric comorbidities and predisposing stressors, among prepubertal and pubertal patients with idiopathic epilepsy.

Children with psychogenic seizures showed more somatic problems compared with epilepsy children, as reported by Salpekar et al. (2010). In this study, two groups of 24 children each affected by epilepsy or PNES, were compared by means of questionnaires testing behavior disorders. Children with PNES showed higher scores on the Childhood Somatization Inventory (CSI; Walker et al., 2009) and the Functional Disability Inventory (Walker et al., 1991) than children with epilepsy. Parents of children with PNES reported as well more somatic problems on the CBCL (Achenbach, 1991). Both groups did not differ as for depression, anxiety, or alexithymia.

In a turkish study (Say et al., 2014), PNES were associated with parental conflicts, difficult interactions with peers and siblings, poor academic skills, and a history of stressful events/abuse. Psychiatric disorders were higher in PNES patients (64.7%) with respect to the epilepsy group (47.8%). Furthermore, adolescents with PNES had poorer self-esteem than their peers from other groups. In another study (Yi et al., 2014) it was found that 72% of patients with PNES had other concomitant psychological disorders, depression being the most frequent (36%). In addition, family distress was the first predisposing factor (40%).

Several authors (Reilly et al., 2013) have investigated on precipitating factors of PNES in children. Academic skills and bullying, conflicts with familial/interpersonal context and physical/sexual abuse were more consistently compromised.

About school bullying, there are not many reports that investigate the relationship between PNES in bullied patients. In the study by Alhafez & Masri (2019), two patients with PNES were associated with a psychological stress caused by the victimization of school bullying. This highlights the relevance of monitoring bullying in children with PNES.

On a psychopathological point of view (Reilly et al., 2013), children, adolescents and young adults with PNES have a high risk of developing psychopathology, especially depression and generalized anxiety disorder, followed by separation anxiety, school phobia, panic disorder and post-traumatic stress disorder (Burlea et al., 2012).

Although psychogenic seizures often last longer than epileptic seizures and this feature may be particularly useful for differential diagnosis, some patients with long-lasting events may be misdiagnosed as having epilepsy. This is the case of two adolescent patients (Coppola et al., 2020)

with a type of PNES not previously described in the literature, with overlapping symptoms characterized by a significant prolonged state of generalized hypertonic posture with low levels of consciousness, leading to heavy loads of anticonvulsant drugs and occasional endotracheal or endopharyngeal intubation in the emergency room. Both patients had psychiatric comorbidities, including major depressive disorder, obsessive-compulsive symptoms, social withdrawal, difficulty in social interaction, and anxious-perfectionist personality traits.

Although PNES is not life-threatening even in a status-type situation, there can be a damage caused by "heavy" drug treatment. It is fundamental to consider and treat the psychiatric comorbidities in these patients. In these two patients PNES status recurrence gradually subsided within 18 months in both, after the correct diagnosis was given and the anticonvulsant drugs were stopped.

Spontaneous paroxysms of laughing similar to gelastic seizure, a particular form of focal epilepsy due to hypothalamic hamartoma or epilepsy of the frontal or temporal lobe, have only exceptionally been reported as a symptom of PNES. In a case report (Mascia et al., 2015) are described the cases of two patients with a long story of laughter attacks mistaken for epilepsy and unresponsive to epileptic drugs. The report suggest that laughter may be a symptom of PNES in the context of a conversion disorder. Establishing the causes of PNES, can help understand why they developed and what treatment might be effective.

There are studies disclosing an abnormal cortical thickness in patients with functional disorders and somatoform and psychological dissociation, mainly in paralimbic cingular insula regions and in visual association areas (Perez et al., 2017, Perez et al., 2018).

**Assessment and diagnosis in children with PNES**

There is no doubt about the importance of an early and correct diagnosis of PNES. Diagnostic process is first based on an accurate clinical history. Video-EEG is considered the gold standard for the diagnosis, though it is often time consuming and it does not always allow to record an ictal event. The interictal EEG may frequently show epileptic paroxysmal abnormalities which must be correctly interpreted. As for the diagnostic biomarkers, creatine kinase and serum prolactin levels are at list controversial.

In a large study (Ramanujam et al., 2018) regarding more than 700 patients, home videos resulted to efficiently endorse the video-EEG

recordings in diagnosing PNES in about half the patients with a cost-effective benefit and helping initiate an appropriate treatment. In this study, the authors indicate the criteria for labeling the home video recordings as PNES, for distinguishing non-convulsive and convulsive seizures, and for considering the five common semiological home video characteristics such as closing eyes, crying or screaming, difficult breathing and so on.

In the diagnostic workup of psychogenic seizure, provocative techniques can be useful in some cases; they include intravenous saline infusion or a patch applied to the skin. It is also possible to consider verbal suggestion. While intravenous infusion can raise medico-legal concerns because they may be considered invasive, skin patch is much more appreciated.

It is as well important to collect a detailed medical and clinical history of the patient that includes information from multiple sources (child, parents and school staff) (Plioplys et al., 2007; Valcea et al., 2016).

Immediately after completing the diagnostic process, some authors suggest to communicate the report first to the parents, in order to allow them to face their reactions before the information is given to the child (Plioplys et al., 2007). Clinicians should clearly explain the true nature of the symptoms and the role that stress or emotional factors may play in causing the events.

When epilepsy is also present in children with PNES (Kotagal et al., 2002) it is important that the symptoms of both disorders be communicated to the family. Reviewing EEG videos can help diagnosing patients who have both conditions (Wyllie et al., 1990).

**Interventions for PNES in children**

When PNES is diagnosed, because it is not a seizure and no emergency treatment is required, the first goal is to ensure acceptance of the diagnosis. It is important that there is a transition from neurologist to psychologist and / or child psychiatrist and that there is no premature discharge of the patient as this could lead to greater resistance in accepting the diagnosis (Kanner, 2003; Plioplys et al., 2007; Razvi et al., 2012).

Initially, putative precipitating stressors need to be identified and addressed so that PNES can be contained and managed.

The short-term goals of treatment are to improve seizure severity, to cope with comorbid psychiatric disorders, to stop/change the use of the antiepileptic drugs (AEDs) and to perform typical daily activities for the child.

Several studies suggest that PNES outcome may be better in children than in adults. This may be due to a shorter clinical history, to a less severe psychopathology and to a greater efficacy of early interventions (Wyllie et al., 1990).

Possible interventions for patients with PNES include psychotherapy which aims to explain and discuss the problems associated with the origin of PNES, family counseling interventions, changes in the school environment and drug treatment. The latter may include anxyolytics and/or antidepressants; in case of a comorbid ADHD disorder, methylphenidate may be also considered.

The importance of psychotherapeutic intervention was demonstrated in a study by Tolchin (2019) in which short-term psychotherapy, in more than 100 patients with PNES, wa associated with a significant clinical improvement in quality of life. Another factor to consider is the coherence of the intervention which should involve families and all other professionals who care for the child, including pediatric, school and community services. A close cooperation between the medical team and the school teachers is essential to ensure the success of the intervention (Plioplys et al., 2007) which should also be aimed at improving the child's academic performance and address relational difficulties with peers. Any forms of bullying should also be prevented.

## Conclusions

PNES can be debilitating in childhood and lead to academic difficulties and significant psychopathological problems. Furthermore, PNES can be harmful as well as epileptic seizures themselves. When epilepsy and PNES are comorbid, it is important to distinguish between them, even with the use of videotapes.

For a greater likelihood of treatment success, it is important to have an early diagnosis of PNES followed by a psychoeducational intervention to the child, the family and the schoolteachers. Psychotherapy should address previous co-occurring precipitating factors and, when necessary, a psychopharmacological treatment of concomitant mental and behavioral disorders should be considered.

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