Psychogenic nonepileptic seizures: diagnosis, aetiology, treatment and prognosis

■ **M. Reuber**

Department of Neurology, Sheffield Teaching Hospitals NHS Trust, Sheffield (GB)

Summary

Reuber M. Psychogenic nonepileptic seizures: diagnosis, aetiology, treatment and prognosis. Schweiz Arch Neurol Psychiatr 2005;156: 47–57.

Psychogenic nonepileptic seizures (PNES) are episodes of altered movement, sensation or experience resembling epileptic seizures, but associated with pathopsychological processes and not with ictal electrical discharges in the brain. The prevalence of psychogenic nonepileptic seizures is equivalent to about 4% of that of epilepsy. The early recognition of psychogenic nonepileptic seizures is important if delays in the treatment of underlying or associated psychopathology and iatrogenic harm due to inappropriate treatment of seizures with antiepileptic drugs are to be avoided. The most helpful pointers to a diagnosis of psychogenic nonepileptic seizures rather than epileptic events are perhaps seizures which occur in stressful situations (for instance seizures in front of a doctor), seizures of long duration (especially if they cause recurrent admissions to hospital), prolonged atonic seizures and closed eyes during tonic-clonic-like seizures.

If the diagnosis of psychogenic nonepileptic seizures is suspected or the diagnosis of epilepsy is in doubt, the recording of a typical event with video-EEG should be considered. Seizure provocation techniques can be helpful in making a firm diagnosis in patients with infrequent seizures in whom no spontaneous event could be recorded with video-EEG monitoring.

There is no single pathway to psychogenic nonepileptic seizures. A range of predisposing, precipitating or perpetuating factors can be identified. Childhood trauma (especially sexual abuse), stressful life events, a dysfunctional home and social environment, psychiatric comorbidity, personality pathology, epilepsy, learning disability and other "organic" brain disorders and abnormalities can all play an aetiological role. Different factors may interact with each other. Precipitating factors may allow patients to accept that there is a link between their emotions or thoughts and seizures. This can help clinicians to engage them in a therapeutic relationship. Perpetuating factors are often the main focus of treatment. Ongoing abuse, unresolvable dilemmas, poor coping strategies and communication, psychiatric comorbidity, low IQ and social status as well as financial and social illness gain commonly perpetuate psychogenic nonepileptic seizures.

In view of the diversity of possible aetiological factors, treatment has to be tailored to individual patients. It should, however, share some common elements: the non-confrontational, sympathetic communication of the diagnosis and an offer of psychological treatment or case management for more intractable patients. There is no information about which form of psychological treatment is best at present. In the wider field of the psychological treatment of medically unexplained symptoms the evidence is strongest for variants of cognitive behavioural therapy, but psychoanalytical approaches have also been used. Medication has a limited (and usually purely supportive) role. Antidepressants can be used to modify emotional dysregulation and low-dose neuroleptics can be useful in some patients with distressing dissociative symptoms.

At present, social and seizure outcome are poor. Over two thirds of patients continue to have seizures 12 years after manifestation and over half receive social benefits. The fact that many patients with psychogenic nonepileptic seizures continue to be treated with antiepileptic drugs by nonepilepsy specialists after a clear diagnosis of psychogenic nonepileptic seizures has been made suggests that specialist follow-up should be offered more widely to facilitate regular critical review and (if

Correspondence:
PD Dr. med. Markus Reuber, MRCP
Consultant Neurologist and Honorary Senior Clinical Lecturer
Department of Neurology
Sheffield Teaching Hospitals NHS Trust
Glossop Road
GB-Sheffield, S10 2 JF
e-mail: mreuber@doctors.org.uk

appropriate) retention of the diagnosis. It is hoped that earlier identification, improved communication of the diagnosis and the offer of appropriate psychological treatment to more patients will improve the outcome in the future.

Keywords: psychogenic nonepileptic seizures; dissociative disorder; epilepsy; somatoform disorder; somatisation

What are psychogenic nonepileptic seizures?

Definition: Psychogenic nonepileptic seizures can be operationally defined as episodes of altered movement, sensation or experience resembling epileptic seizures, but associated with pathopsychological processes and not with ictal electrical discharges in the brain. Unlike epileptic seizures, psychogenic nonepileptic seizures can often be provoked by suggestion [1–3] and terminated by calm ictal reassurance [4, 5]. In spite of this, the overwhelming majority of psychogenic nonepileptic seizures are considered an unintentional expression of psychosocial distress and not a wilfully simulated event [6–8].

How common are psychogenic nonepileptic seizures?

Prevalence: There is no reliable information on the incidence or prevalence of psychogenic nonepileptic seizures in the general population. Studies based on patients referred to neurological centres have reported an incidence of 1.5/100 000 per year (equivalent to about 4% of that of epilepsy) [9], or 3/100 000/year [10]. However, given the setting of these studies and the fact that only video-EEG-proven cases were counted, these figures are likely to be an underestimate. Taking account of these uncertainties, the prevalence has been estimated as 2–33/100 000 [11]. Whatever their population prevalence, psychogenic nonepileptic seizures are commonly seen in certain clinical settings. For instance, about 20% of patients referred for epilepsy surgery evaluation [12] and up to 50% of patients with refractory "status" have psychogenic nonepileptic seizures rather than epilepsy [13].

Diagnostic delay: Although psychogenic nonepileptic seizures are thus not a rare disorder and much has been published about their semiology, it has been observed that the mean latency between manifestation and diagnosis remains unacceptably long at 7–16 years [14, 15] and that three quarters of patients with psychogenic nonepileptic seizures (and no additional epilepsy) are still treated with anticonvulsants initially [16, 17]. The rate of patients with psychogenic nonepileptic seizures misdiagnosed as epilepsy has been found to be around 5% in seizure patients treated by family physicians [18] or 10% in patients with "refractory epilepsy" referred to a specialist epilepsy clinic [19].

Why is it important to recognise psychogenic nonepileptic seizures?

Risks: The distinction of psychogenic nonepileptic seizures from epileptic seizures is important because treatment with antiepileptic drugs is inappropriate for a psychological problem, puts people at risk of drug toxicity, emergency interventions and even death [13, 20–23]. Moreover, the failure to make the diagnosis means that clinically relevant psychopathology (including an increased risk of suicide) is likely to remain undetected and not to be addressed [24, 25]. This has significant effects on patients' quality of life [26–29].

Cost: What is more, the misdiagnosis of psychogenic nonepileptic seizures as epilepsy is very costly. Based on a population estimate of 250 million people, the annual cost has been estimated as $ 650 000 000 to $ 4 000 000 000 for the United States [30]. The indirect costs through loss of employment may be even greater than the direct costs of inappropriately prescribed anticonvulsant drugs or professional time (although it has been shown that patients with undiagnosed psychogenic nonepileptic seizures visit their doctors very frequently) [31]. One large study showed that 69% of PNES patients were working at the time of manifestation of seizures, but only 20% were still working at the time the diagnosis was made [32]. An outcome study demonstrated that a mean of 4.1 years after diagnosis, 41.4% of patients (with a mean age of 38.6 years) had retired on health grounds. Encouragingly, health care utilisation costs are significantly reduced in the 6 months after diagnosis of psychogenic nonepileptic seizures with video-EEG [33].

How to recognise psychogenic nonepileptic seizures?

Differential diagnosis: The differential diagnosis of paroxysmal neurological disorders is wide (see table 1). However, psychogenic nonepileptic seizures can be distinguished from most of the conditions listed on the basis of the patient's history and a description of a typical event by a seizure witness alone. The greatest difficulty is posed by

Table 1 Differential diagnosis of paroxysmal neurological disorders in adults.

syncope
reflex syncope (e.g. orthostatic syncope, micturition syncope)
cardiogenic syncope (e.g. with tachy- or bradycardia, long QT-syndrome, structural cardiac abnormalities, aortic stenosis, cardiomyopathies, arterio-venous shunts)
perfusion failure (e.g. hypovolaemia, autonomic failure)
psychogenic nonepileptic seizure
psychogenic nonepileptic seizure
panic attack
hyperventilation attack
transient ischaemic attack
migraine
narcolepsy/cataplexy
parasomnia
hyperekplexia
paroxysmal vertigo
hypoglycaemia

the differentiation of psychogenic nonepileptic seizures from epileptic seizures and syncopal events. This differentiation cannot be based on any single observation, and no single semiological feature is shared by all types of psychogenic nonepileptic seizures.

Semiology of psychogenic nonepileptic seizures: Studies using cluster analysis suggest that several types of psychogenic nonepileptic seizures can be differentiated [34]. The commonest semiology involves excessive movement of limbs, trunk and head [16, 34–37]. Seizures with stiffening and tremor [34, 36, 37], or seizures with atonia [16] are less frequent in most series [38, 39]. In most psychogenic nonepileptic seizures, consciousness appears impaired [16, 35–37]. However, purely sensory or experiential seizures are also seen and, as a nonepileptic equivalent to focal epileptic seizures without loss of consciousness, fulfil the definition of psychogenic nonepileptic seizures [12].

The clinical diagnosis of psychogenic nonepileptic seizures is based on the description or observation of as many of the semiologic details listed in table 2 as possible. As in the evaluation of other patients with paroxysmal disorders, it is crucial to interview a seizure witness as well as the patient him- or herself. The most helpful pointers to a diagnosis of psychogenic nonepileptic seizures are perhaps seizures which seem to be provoked by stressful situations or which occur in front of a doctor, seizures of long duration, prolonged atonic seizures and closed eyes during tonic-clonic-like seizures. Patients with psychogenic nonepileptic seizures are often very upset when they have a seizure, they may cry during or immediately after the event [40, 41].

Psychogenic nonepileptic seizures can be particularly difficult to distinguish from epileptic seizures originating from the frontal lobes [42, 43]. Like the semiology of psychogenic nonepileptic seizures, that of frontal lobe seizures may include emotionally charged screams, bilateral motor activity with retained consciousness and ictal speech arrest with unimpaired postictal recollection of the event [44]. A degree of ictal responsiveness may be preserved in focal frontal or temporal lobe seizures which may later not be remembered [45]. Semiological factors which may help distinguish between frontal lobe seizures and psychogenic nonepileptic seizures include the observations that frontal seizures very commonly arise from sleep, occur in clusters and are very short. Although the semiology of frontal seizures may be dramatic and bizarre, it is often more stereotyped than that of psychogenic nonepileptic seizures [43].

Red flags in the history: One important reason why the diagnosis of psychogenic nonepileptic seizures is often not made, is that physicians do not consider the differential diagnosis of nonepileptic seizures before diagnosing (and treating) presumed epilepsy. In addition to the semiology of typical psychogenic nonepileptic seizures, there may be other pointers in the patient's history which should be seen as "red flags" and alert clinicians to the possibility of a diagnosis of psychogenic nonepileptic seizures (table 3). Physicians may also pick up nonverbal affective cues. PNES patients may show helplessness, submissiveness, delegation, inappropriate indifference, anger, fear or dissociated incoherence in their interaction with the doctor. Linguistic hints supporting a diagnosis of psychogenic nonepileptic seizures rather than epileptic seizures include the use of negatives and negations or a lack of detail in the description of what it is like to have a seizure [45].

What role do investigations play in the diagnosis of psychogenic nonepileptic seizures?

Interictal tests: The role of interictal EEG, brain imaging or neuropsychological testing in the diagnostic categorisation of seizures is limited. In line with an older study [46], we have recently found that 22.3% of our patients with psychogenic nonepileptic seizures (and no additional epilepsy seizures) had interictal epileptiform EEG abnor-

malities, MRI lesions or neuropsychological deficits. In view of the fact that not all patients had been fully investigated, the true proportion of the patients with such abnormalities would have been even higher [47]. In a blinded comparative study, we found non-specific EEG changes in 18% of patients with psychogenic nonepileptic seizures (and no epilepsy) and in 10% of age-matched healthy controls [48].

Abnormalities are therefore commoner in patients with psychogenic nonepileptic seizures than in healthy individuals. This makes it harder to distinguish patients with psychogenic nonepileptic seizures from those with epilepsy. Although abnormal findings are much commoner in patients with epilepsy as a group [47], individual patients with epilepsy can have normal investigations whereas evidence of brain abnormality may well be found in patients with psychogenic nonepileptic seizures [46–55].

Ictal EEG recordings: Even ictal EEG recordings can be misleading if the seizures do not involve loss of consciousness, as surface EEG only shows ictal changes in 10–20% of such focal epileptic seizures [56, 57]. Ambulatory EEG in particular, especially if undertaken with one of the older 8-channel EEG-recorders, may miss ictal discharges or epileptiform interictal changes. When using such systems, the clearest indication of the seizure type is sometimes provided by the ECG-channel. It has been noted that the heart rate tends to increase suddenly in epileptic seizures, whereas the increase is more gradual in psychogenic nonepileptic seizures [58, 59].

Table 2 Ictal observations, which help in the differentiation of psychogenic nonepileptic seizures, epileptic seizures and syncope.

observation	psychogenic nonepileptic seizures	epileptic seizures	syncope
seizure provocation	not uncommon (arguments, stress, doctor's office)	rare (e.g. photosensitive epilepsy)	common (from an upright position, not from a supine position)
gradual onset	not infrequent (often lasting several minutes)	focal onset possible (aura, duration typically <30 seconds)	common (presyncopal symptoms, duration often minutes)
motor activity	commonly undulating motor activity with sudden pauses but stable frequency	typical seizure patterns (tonic, clonic, tonic-clonic)	myoclonic jerks common (short duration, rapid recovery)
asynchronous arm and leg movements	common	unusual	not uncommon (multifocal myoclonus)
purposeful movements	occasional	very rare	rare
rhythmic pelvic movements	occasional	rare	never
opisthotonus, "arc de cercle"	occasional	very rare	never
prolonged ictal atonia	occasional	very rare	not >60 seconds
skin	no cyanosis despite long seizure duration	cyanosis common	pallor, sweating
ictal crying	occasional	very rare	never
closed eyes	very common	rare	rare
resistance to eye opening	common	very rare	very rare
maintained pupillary light reflex	very common	often abolished	common
ictal reactivity	cccasionally partially preserved	rarely preserved	rarely preserved
ictal incontinence	not uncommon	not uncommon	rare
seizure duration >2 minutes	common	uncommon	very uncommon (only if patient supported in upright posture)
postictal reorientation	often unexpectedly quick or slow	mostly over minutes	<1 minute (exception: head injury caused by collapse/ patient maintained upright)
tongue biting	occasional (tip)	not infrequent (lateral)	occasional (tip)
injury	common	common (burns)	rare
seizures at night (from "sleep")	not uncommon	common	never

Table 3 Features in the history, which can help to determine the likelihood of psychogenic nonepileptic seizures, epileptic seizures or syncopal events.

feature in history	psychogenic non-epileptic seizures	epileptic seizures	syncope
manifestation <10 years of age	unusual	common	occasional
change of seizure semiology	occasional (more dramatic with time)	rare	rare
high seizure frequency	common	occasional	rare
recurrent seizure status	common	rare	never
worsening with antiepileptic drugs	occasional	rare	rare
seizures in front of a doctor	common	unusual	common (blood tests)
multiple unexplained physical symptoms	common	rare	rare
multiple surgical procedures and investigations	common	rare	rare
psychiatric treatment	common	rare	rare
vascular risk factors, history of heart disease	rare	rare (except in elderly patients)	not uncommon (common in patients with cardiogenic syncope)
sexual and physical abuse	common	rare	rare
parasuicide	common	rare	rare

Postictal blood tests: The measurement of serum prolactin (or cortisol) 15 to 20 minutes after an ictal event can help in the differentiation of psychogenic nonepileptic seizures and epileptic seizures [60]. However, whilst a 3- to 5-fold prolactin rise above a baseline measurement taken at the same time of day provides reasonably reliable support for a diagnosis of epilepsy, the absence of an increase does not prove that the event was a psychogenic nonepileptic seizure (especially if an epileptic seizure would have been classified as focal rather than generalised) [61, 62]. It should be pointed out though that prolactin rises have been described after psychogenic nonepileptic seizures and even after nonepileptic hypotensive syncope [63, 64].

Seizure observation: The most important investigation in the diagnosis of psychogenic nonepileptic seizures is the observation of a typical seizure. Occasionally, the recording of a seizure with a home video or photo camera provides sufficient support to make the diagnosis [65]. Sometimes physicians have the opportunity to observe a seizure directly and to examine a patient. In this case, the attempt to elicit the pupillary light reflex (forced lid-closure, preserved light reflex in psychogenic nonepileptic seizures, light reflex may be absent in epileptic seizures), the reaction to noxious stimuli (like the corneal reflex or tickling the inside of the nose), the Babinski response and the observation of purposeful movements (for instance when the patient's hand is dropped over her or his head) can be helpful [4, 66].

However, given the implications and therapeutic consequences of the diagnosis, seizures should be recorded with EEG and video if at all possible. About one third of patients will have a seizure during a routine EEG recording. Psychogenic nonepileptic seizures are often observed within the first 48 hours of monitoring [67]. The likelihood of a seizure occurring rises to at least two thirds, if photo-stimulation and hyperventilation are combined with the suggestion that these provocation methods can cause seizures [68–70]. The "gold standard" in the diagnosis is the use of synchronised video-EEG because studies of patients which were difficult to diagnose on the basis of history, witness account and interictal investigations have shown that video-EEG changes the clinical diagnosis in many cases [71, 72].

Provocation techniques: If no seizures occur during video-EEG monitoring, the monitoring time can be extended or provocation techniques may be used [73, 74]. Provocation with saline patches [75], vibration [76] and hypnosis have been described [77], but the most commonly used technique involves the suggestive intravenous injection of normal saline solution [78]. This procedure can provoke typical seizures in over three quarters of patients [1, 2, 79, 80]. Whilst some authors have expressed ethical doubt about provocation techniques [81], we and others consider the use of placebo defensible because the failure to make a clear diagnosis can have devastating effects [68, 73, 74], especially if no diagnosis is made after referral to an epilepsy centre.

Table 4 Potentially relevant aetiological factors in psychogenic nonepileptic seizures [88].

	predisposing factors	precipitating factors	perpetuating factors
biographical factors	childhood trauma, neglect	trauma	sexual abuse
	sexual abuse	sexual abuse	trauma
	physical abuse	physical abuse	conflicts
		conflicts	
		stress	
		surgical procedures	
		anaesthesia	
relevant biological features	female sex	–	low IQ
	learning disabilities	–	brain abnormality on MRI
comorbidity	epilepsy	depression	depression
	organic brain abnormality	anxiety disorders	anxiety disorders
	head injury	post-traumatic stress disorder	post-traumatic stress disorder
	maladaptive personality	dissociative disorder	dissociative disorder
		somatoform disorder	somatoform disorder
			maladaptive personality
social factors	disturbed family environment	–	disturbed family environment
	family history of psychiatric disorder	–	low social position
	family history of epilepsy	–	low educational status
			financial illness gain
			social illness gain

In the final analysis, the diagnosis of psychogenic nonepileptic seizures is based on the combination of history and seizure observation, and the lack of a "physical" explanation for the seizures. However, in about one third of patients seen in epilepsy centres, the situation is complicated by co-existing epileptic seizures [9, 14, 35, 82] – of course, the confirmation of psychogenic nonepileptic seizures by video-EEG does not mean that patients do not have epilepsy as well.

What causes psychogenic nonepileptic seizures?

Patients with psychogenic nonepileptic seizures do not fit neatly into a small number of categories of psychiatric or psychological pathology. Although the fact that they are listed under the heading of dissociative disorder in the ICD-10 [83] and under somatoform or conversion disorders in the DSM-IV [84] suggests that psychogenic nonepileptic seizures are an identifiable, separable and separate disorder, we and others regard them as one manifestation of a range of interacting psychosocial conditions [85, 86]. Like people suffering from other functional somatic symptoms, patients with psychogenic nonepileptic seizures are perhaps best described by a multidimensional approach [87]. Such an approach can accommodate the current evidence on the aetiology of psychogenic nonepileptic seizures by incorporating biographical factors (like childhood trauma, abuse, life events), relevant biological features (like sex, presence of learning disability), psychological features (like poor coping styles, maladaptive personality, the tendency to express psychological distress in a somatic fashion or to dissociate), "psychiatric" or "neurological" co-morbidity (like depression, anxiety or epilepsy) and social factors (like a disturbed family environment, financial insecurity) [88, 89].

Whilst patients develop psychogenic nonepileptic seizures for a multitude of different reasons, the understanding of an individual patient can be informed by a pragmatic distinction between predisposing factors (conferring an increased vulnerability to psychogenic nonepileptic seizures), precipitating factors (triggering psychogenic nonepileptic seizures) and perpetuating factors (contributing to a chronically recurrent course) (table 4). Like in other unexplained medical syndromes [90], these factors can be grouped into a small number of themes which may be relevant in generating a formulation for treatment.

How can we help patients with psychogenic nonepileptic seizures?

Communicating the diagnosis: The treatment of psychogenic nonepileptic seizures begins with a secure diagnosis and its clear communication to the patient [91]. The question of how the diagnosis should be communicated is important because like others [92, 93], the author has observed that psychogenic nonepileptic seizures can stop with an explanation of the problem which is acceptable and comprehensible to the patient. It has also been shown that outcome is better in PNES patients who have accepted that they have psychogenic nonepileptic seizures rather than epilepsy [94]. In the explanation of the disorder, physicians may want to consider using the term "functional seizures", which has been shown to be less offensive to patients than the expression "psychogenic seizures" (which is used here because it has become the most established term in recent publications on the subject) [95]. Watching a video recording of a typical seizure with the patient may contribute to the shared understanding that seizures are real and disabling. The use of leaflets may help reduce feelings of loss (often of the diagnosis of epilepsy) and isolation.

Unfortunately, there are only very few studies examining the further management of patients with psychogenic nonepileptic seizures, and those studies which exist are small, retrospective or do not clearly describe the type of psychological treatment offered [92, 93, 96–99]. Inspiration for treatment approaches has to come from studies looking at the management of associated disorders [6, 100, 101].

Neurological assessment: The diagnosis of psychogenic nonepileptic seizures should be accompanied by a thorough neurological assessment. Given the high prevalence of co-morbid epilepsy, it is particularly important to determine whether patients require antiepileptic drug treatment. In patients with additional epileptic seizures particular effort is necessary to enable patients to understand that they have two different types of seizures, and ideally, to learn to differentiate between them. If a diagnosis of additional epilepsy is uncertain, antiepileptic drugs should be avoided if at all possible. The risks associated with occasional epileptic seizures have to be weighed up against those of anticonvulsant toxicity and inappropriate treatment of prolonged psychogenic nonepileptic seizures as status epilepticus in emergency room and intensive care (which is perhaps more likely if a patient takes antiepileptic drugs prescribed by a neurologist) [20, 22, 23].

Psychiatric assessment: The neurological assessment should be followed by a psychiatric examination. Axis-1 disorders like depression, anxiety or posttraumatic stress disorder may respond to psychological or pharmaceutical treatments. In the many patients who show evidence of maladaptive personality, chronic somatisation or dissociation tendencies treatment may more realistically aim at behaviour modification rather than cure [102, 103].

Psychotherapy: The current mainstay of treatment is psychological in nature. In the great majority of patients, a conflict, trauma or "unspeakable dilemma" can be identified [104], which can be used to engage patients in treatment although they may initially see no connection between this and their attacks. Both psychoanalytical approaches [105] and variants of cognitive behavioural therapy can be useful [100, 106]. Psychotherapy may aim to modulate temperamental extremes, to teach patients to recognise early signs of crisis or to disrupt secondary escalation. Therapy may also be directed at the identification of stressors and the presentation of alternative ways of addressing problems in the social environment interacting with personal vulnerability [107, 108]. Both approaches may be combined. For very chronic somatisers an approach akin to "case management" or reattribution may be more appropriate [109, 110].

Pharmacological therapy: Psychological treatment may be augmented by pharmaceutical therapy, even in the absence of axis-1 disorders like depression. Studies in other patient groups have shown that selective inhibition of serotonin reuptake can be helpful in somatisation and symptom syndromes (like dissociation) [111], and improve emotional dysregulation [112], which is one of the core problems in patients with psychogenic nonepileptic seizures [102]. The use of low-dose neuroleptics has also been described for quasi-psychotic states such as severe dissociation [113].

What is the prognosis of psychogenic nonepileptic seizures?

On the whole, the seizure and social outcome in PNES patients seen in epilepsy centres is poor. We have recently shown that, after a mean of 11 years after manifestation and 4 years after diagnosis, two thirds of patients continued to have seizures and over half were dependent on social security [16]. Our results were in accord with those in other PNES patient groups. This means that outcome is considerably worse than in newly diagnosed

epilepsy [114] although it is similar to that seen in other somatoform disorders [115, 116]. It is also disappointing that 4 years after the diagnosis of psychogenic nonepileptic seizures at an epilepsy centre 41% of patients with no evidence of additional epilepsy were still receiving treatment with antiepileptic drugs [16].

Conclusion

Patients with psychogenic nonepileptic seizures show a tendency to seek medical attention and make up a considerable share of the workload of neurologists and epileptologists as well as emergency room and general physicians. The differentiation of psychogenic nonepileptic seizures from other paroxysmal disorders is crucial if iatrogenic injury is to be avoided (table 1). Apart from this, the correct diagnosis of psychogenic nonepileptic seizures may lead patients and physicians to focus on relevant underlying or associated psychological issues.

Although there is no single semiologic feature or observation which would prove that a seizure was a psychogenic nonepileptic seizure rather than an epileptic event, the diagnosis of psychogenic nonepileptic seizures is usually not hard to make once it has been considered. Especially in an emergency room setting physicians often forget that not everything that shakes is epilepsy. The diagnosis is particularly easy when there is an opportunity for direct observation of a seizure and for ictal examination (see table 2).

If patients do not present with a seizure so that they can be observed and examined, the general, social and medical history are often as helpful in suggesting the diagnosis of psychogenic nonepileptic seizures as the description of seizures by patients and witnesses (table 3). Especially a history of recurrent emergency or intensive care admissions with "status epilepticus", of other unexplained medical symptoms, many surgical procedures or psychiatric disorder can provide hints.

The distinction of psychogenic nonepileptic seizures from epilepsy is only the first step to a full diagnostic formulation. A full formulation should take account of all relevant aetiological factors (table 4). In view of the diversity of aetiological factors, treatment should be adjusted to individual patients. Psychotherapy is the mainstay of treatment.

Physicians should always consider the differential diagnosis of other paroxysmal disorders including psychogenic nonepileptic seizures before diagnosing epilepsy (table 1). In all patients in whom the diagnosis of psychogenic nonepileptic seizures is considered or in whom the diagnosis of epilepsy remains in doubt, in all patients admitted to hospital with "status epilepticus" and in patients who fail to respond to anticonvulsant treatment, a clear diagnostic categorisation should be sought. This should involve the assessment of the patient by a physician versed in the diagnosis of seizure disorders and, if at all possible, the documentation of a typical seizure by video-EEG. In the absence of major new development in the treatment of patients with psychogenic nonepileptic seizures, outcome may be improved if the diagnosis is more actively sought, made earlier and communicated more convincingly.

References

1 Lancman ME, Asconape JJ, Craven WJ, Howard G, Penry JK. Predictive value of induction of psychogenic seizures by suggestion. Ann Neurol 1994;35:359–61.

2 Bazil CW, Kothari M, Luciano D, Moroney J, Song S, Vasquez B, et al. Provocation of nonepileptic seizures by suggestion in a general seizure population. Epilepsia 1994;35:768–70.

3 Cohen LM, Howard GF 3rd, Bongar B. Provocation of pseudoseizures by psychiatric interview during EEG and video monitoring. Int J Psychiatry Med 1992;22:131–40.

4 Reuber M, Enright SM, Goulding PJ. Postoperative pseudostatus: not everything that shakes is epilepsy. Anaesthesia 2000;55:74–8.

5 Metrick ME, Ritter FJ, Gates JR, Jacobs MP, Skare SS, Loewenson RB. Nonepileptic events in childhood. Epilepsia 1991;32:322–8.

6 LaFrance WC, Devinsky O. Treatment of nonepileptic seizures. Epilepsy Behav 2002;3:S19–S23.

7 Gates JR. Diagnosis and treatment of nonepileptic seizures. In: McConnell HW, Synder PJ, editors. Psychiatric Comorbidity in Epilepsy: Basic Mechanisms, Diagnosis and Treatment. Washington D.C.: American Psychiatric Press; 1998. p. 187–204.

8 Ozkara C, Dreifuss FE. Differential diagnosis in pseudoepileptic seizures. Epilepsia 1993;34:294–8.

9 Sigurdardottir KR, Olafsson E. Incidence of psychogenic seizures in adults: a population-based study in Iceland. Epilepsia 1998;39:749–52.

10 Szaflarski JP, Ficker DM, Cahill WT, Privitera MD. Four-year incidence of psychogenic nonepileptic seizures in adults in Hamilton county, OH. Neurology 2000;55:1561–3.

11 Benbadis SR, Allen HW. An estimate of the prevalence of psychogenic non-epileptic seizures. Seizure 2000;9:280–1.

12 Lesser RP. Psychogenic seizures. Neurology 1996;46:1499–507.

13 Howell SJ, Owen L, Chadwick DW. Pseudostatus epilepticus. Q J Med 1989;71:507–19.

14 Reuber M, Fernández G, Bauer J, Helmstaedter C, Elger CE. Diagnostic delay in psychogenic nonepileptic seizures. Neurology 2002;58:493–5.

15 de Timary P, Fouchet P, Sylin M, Indriets JP, de Barsy T, Lefebvre A, et al. Non-epileptic seizures: delayed diagnosis in patients presenting with electroencephalographic (EEG) or clinical signs of epileptic seizures. Seizure 2002;11:193–7.

16 Reuber M, Pukrop R, Bauer J, Helmstaedter C, Tessendorf N, Elger CE. Outcome in psychogenic nonepileptic seizures: 1 to 10-year follow-up in 164 patients. Ann Neurol 2003;53:305–11.

17 Benbadis SR. How many patients with pseudoseizures receive antiepileptic drugs prior to diagnosis? Eur Neurol 1999;41:114–5.

18 Scheepers B, Clough P, Pickles C. The misdiagnosis of epilepsy: findings of a population study. Seizure 1998;7:403–6.

19 Smith D, Defalla BA, Chadwick DW. The misdiagnosis of epilepsy and the management of refractory epilepsy in a specialist clinic. Q J Med 1999;92:15–23.

20 Reuber M, Baker GA, Gill R, Smith DF, Chadwick D. Failure to recognise psychogenic nonepileptic seizures may cause death. Neurology 2004;62:834–5.

21 Smith PEM, Saunders J, Dawson A, Kerr M. Intractable seizures in pregnancy. Lancet 1999;354:1522.

22 Gunatilake SB, De Silva HJ, Ranasinghe G. Twenty-seven venous cutdowns to treat pseudostatus epilepticus. Seizure 1997;6:71–2.

23 Niedermeyer E, Blumer D, Holscher E, Walker BA. Classical hysterical seizures facilitated by anticonvulsant toxicity. Psychiatr Clin 1970;3:71–84.

24 Rechlin T, Loew TH, Joraschky P. Pseudoseizure "status". J Psychosom Res 1997;42:495–8.

25 Bowman ES, Markand ON. Psychodynamics and psychiatric diagnoses of pseudoseizure subjects. Am J Psychiatry 1996;153:57–63.

26 Szaflarski JP, Szaflarski M, Hughes C, Ficker DM, Cahill WT, Privitera MD. Psychopathology and quality of life: psychogenic non-epileptic seizures versus epilepsy. Med Sci Monitor 2003;9:CR113–CR118.

27 Szaflarski J, Hughes C, Szaflarski M, Ficker D, Cahill W, Privitera M. Quality of life in psychogenic nonepileptic seizures. Epilepsia 2003;44:236–42.

28 Quigg M, Armstrong RF, Farace E, Foutain NB. Quality of life outcome is associated with cessation rather than reduction in psychogenic nonepileptic seizures. Epilepsy Behav 2002;3:455–9.

29 Breier JI, Fuchs KL, Brookshire BL, Wheless J, Thomas AB, Constantinou J, et al. Quality of life perception in patients with intractable epilepsy or pseudoseizures. Arch Neurol 1998;55:660–5.

30 Nowack WJ. Epilepsy: a costly misdiagnosis. Clin Electroencephalogr 1997;28:225–8.

31 Krahn LE, Reese MM, Rummans TA, Peterson GC, Suman V, Sharbrough FW, et al. Health utilization of patients with psychogenic nonepileptic seizures. Psychosomatics 1997;38:535–42.

32 Martin R, Bell B, Hermann B, Mennemeyer S. Nonepileptic seizures and their costs: the role of neuropsychology. In: Prigatano GP, Pliskin NH, editors. Clinical Neuropsychology and Cost Outcome Research: A Beginning. New York: Psychology Press; 2003. p. 235–58.

33 Martin RC, Gilliam FG, Kilgore M, Faught E, Kuzniecky R. Improved health care resource utilization following video-EEG-confirmed diagnosis of nonepileptic psychogenic seizures. Seizure 1998;7:385–90.

34 Groppel G, Kapitany T, Baumgartner C. Cluster analysis of clinical seizure semiology of psychogenic nonepileptic seizures. Epilepsia 2000;41:610–4.

35 Meierkord H, Will B, Fish D, Shorvon S. The clinical features and prognosis of pseudoseizures diagnosed using video-EEG telemetry. Neurology 1991;41:1643–6.

36 Gulick TA, Spinks IP, King DW. Pseudoseizures: ictal phenomena. Neurology 1982;32:24–30.

37 Gates JR, Ramani V, Whalen S, Loewenson R. Ictal characteristics of pseudoseizures. Arch Neurol 1985;42:1183–7.

38 Leis AA, Ross MA, Summers AK. Psychogenic seizures: ictal characteristics and diagnostic pitfalls. Neurology 1992;42:95–9.

39 Luther JS, McNamara JO, Carwile S, Miller P, Hope V. Pseudoepileptic seizures: methods and video analysis to aid diagnosis. Ann Neurol 1982;12:458–62.

40 Bergen D, Ristanovic R. Weeping as a common element of pseudoseizures. Arch Neurol 1993;50:1059–60.

41 Walczak TS, Bogolioubov A. Weeping during psychogenic nonepileptic seizures. Epilepsia 1996;37:208–10.

42 Saygi S, Katz A, Marks DA, Spencer SS. Frontal lobe partial seizures and psychogenic seizures: comparison of clinical and ictal characteristics. Neurology 1992;42:1274–7.

43 Wilkus RJ, Thompson PM, Vossler DG. Bizarre ictal automatisms: frontal lobe epileptic or psychogenic seizures. Journal of Epilepsy 1990;3:207–13.

44 Salanova V, Morris HH, Van Ness P, Kotagal P, Wyllie E, Lüders H. Frontal lobe seizures: electroclinical syndromes. Epilepsia 1995;36:16–24.

45 Ebner A, Dinner DS, Noachtar S, Lüders H. Automatisms with preserved responsiveness: a lateralizing sign in psychomotor seizures. Neurology 1995;45:61–4.

46 Lelliott PT, Fenwick P. Cerebral pathology in pseudoseizures. Acta Neurol Scand 1991;83:129–32.

47 Reuber M, Fernández G, Helmstaedter C, Qurishi A, Elger CE. Evidence of brain abnormality in patients with psychogenic nonepileptic seizures. Epilepsy Behav 2002;3:246–8.

48 Reuber M, Fernández G, Bauer J, Singh DD, Elger CE. Interictal EEG abnormalities in patients with psychogenic non-epileptic seizures. Epilepsia 2002;43:1013–20.

49 Kalogjera-Sackellares D, Sackellares JC. Intellectual and neuropsychological features of patients with psychogenic pseudoseizures. Psychiatry Res 1999;86:73–84.

50 Hermann BP. Neuropsychological assessment in the diagnosis of non-epileptic seizures. In: Rowan AJ, Gates JR, editors. Non-epileptic Seizures. Stoneham, MA: Butterworth-Heinemann; 1993. p. 221–32.

51 Novelly RA. Cerebral dysfunction and cognitive impairment in non-epileptic seizure disorders. In: Rowan AJ, Gates JR, editors. Non-epileptic Seizures. Stoneham, MA: Butterworth-Heinemann; 1993. p. 233–42.

52 Wilkus RJ, Dodrill CB. Factors affecting the outcome of MMPI and neuropsychological assessments of psychogenic and epileptic seizure patients. Epilepsia 1989;30:339–47.

53 Sackellares JC, Giordani B, Berent S, Seidenberg M, Dreifuss FE, Vanderzant CW, et al. Patients with pseudoseizures: intellectual and cognitive performance. Neurology 1985;35:116–9.

54 Wilkus RJ, Dodrill CB, Thompson PM. Intensive EEG monitoring and psychological studies of patients with pseudoepileptic seizures. Epilepsia 1984;25:100–7.

55 Roy A. Cerebral disease and hysteria. Compr Psychiatry 1977;18:607–9.

56 Bare MA, Burnstine TH, Fisher RS, Lesser RP. Electroencephalographic changes during simple partial seizures. Epilepsia 1994;35:715–20.

57 Devinsky O, Kelley K, Porter RJ, Theodore WR. Clinical and electrographic features of simple partial seizures. Neurology 1988;18:1347–52.

58 Opherk C, Hirsch L. Ictal heart rate differentiates epileptic from nonepileptic seizures. Neurology 2002;58:636–8.

59 Nousiainen U, Mervaala E, Ylinen A, Uusitupa M, Riekkinen P. The importance of the electrocardiogram in ambulatory electroencephalographic recordings. Arch Neurol 1989;46:1171–4.

60 Bauer J. Epilepsy and prolactin in adults: a clinical review. Epilepsy Res 1996;24:1–7.

61 Anzola GP. Predictivity of plasma prolactin levels in differentiating epilepsy from pseudoseizures: a prospective study. Epilepsia 1993;34:1044–8.

62 Wroe SJ, Henley R, John R, Richens A. The clinical value of serum prolactin measurement in the differential diagnosis of complex partial seizures. Epilepsy Res 1989;3:248–52.

63 Alving J. Serum prolactin levels are elevated also after pseudo-epileptic seizures. Seizure 1998;7:85–9.

64 Oribe E, Amini R, Nissenbaum E, Boal B. Serum prolactin concentrations are elevated after syncope. Neurology 1996;47:60–2.

65 Samuel M, Duncan JS. Use of the hand held video camcorder in the evaluation of seizures. J Neurol Neurosurg Psychiatry 1994;57:1417–8.

66 Walczak TS, Rubinsky M. Plantar responses after epileptic seizures. Neurology 1994;44:2191–3.

67 Ramani V, Quesney LF, Olson D, Gumnit R. Diagnosis of hysterical seizures in epileptic patients. Am J Psychiatry 1980;137:705–9.

68 McGonigal A, Oto M, Russell AJ, Greene J, Duncan R. Outpatient video EEG recording in the diagnosis of non-epileptic seizures: a randomized controlled trial of simple suggestion techniques. J Neurol Neurosurg Psychiatry 2002;72:549–51.

69 Benbadis SR, Johnson K, Anthony K, Caines G, Hess G, Jackson C, et al. Induction of psychogenic nonepileptic seizures without placebo. Neurology 2000;55:1904–5.

70 Chayasirisobhon S, Griggs L, Westmoreland S, Kim CS. The usefulness of one to two hour video EEG monitoring in patients with refractory seizures. Clin Electroencephalogr 1993;24:78–84.

71 Parra J, Iriarte J, Kanner AM. Are we overusing the diagnosis of psychogenic nonepileptic events? Seizure 1999;8:223–7.

72 King DW, Gallagher BB, Murvin AJ, Smith DB, Marcus DJ, Hartlage LC, et al. Pseudoseizures: diagnostic evaluation. Neurology 1982;32:18–23.

73 Benbadis SR. Provocative techniques should be used for the diagnosis of psychogenic nonepileptic seizures. Arch Neurol 2001;58:2063–5.

74 Devinsky O, Fisher R. Ethical use of placebos and provocative testing in diagnosing nonepileptic seizures. Neurology 1996;47:866–70.

75 French J. The use of suggestion as a provocative test in the diagnosis of psychogenic non-epileptic seizures. In: Rowan AJ, Gates JR, editors. Non-epileptic Seizures. Boston: Butterworth-Heinemann; 1993. p. 101–10.

76 Riley TL, Massey EW. Pseudoseizures in the military. Mil Med 1980;145:614–9.

77 Kuyk J, Leijten F, Meinardi H, Spinhoven, van Dyck R. The diagnosis of psychogenic non-epileptic seizures: a review. Seizure 1997;6:243–53.

78 Cohen RJ, Suter C. Hysterical seizures: suggestion as a provocative EEG test. Ann Neurol 1982;11:391–5.

79 Bhatia M, Sinha PK, Jain S, Padma MV, Maheshwari MC. Usefulness of short-term video EEG recording with saline induction in pseudoseizures. Acta Neurol Scand 1997;95:363–6.

80 Walczak TS, Williams DT, Berten W. Utility and reliability of placebo infusion in the evaluation of patients with seizures. Neurology 1994;44:394–9.

81 Gates JR. Provocative testing should not be used in the diagnosis of psychogenic nonepileptic seizures. Arch Neurol 2001;58:2065–6.

82 Krumholz A, Niedermeyer E. Psychogenic seizures: a clinical study with follow-up data. Neurology 1983;33:498–502.

83 World Health Organization. The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines. Geneva: WHO; 1992.

84 American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Washington, DC: APA; 1994.

85 Gates JR. Nonepileptic seizures: time for progress. Epilepsy Behav 2000;1:2–6.

86 Kanner AM, Parra J. Psychogenic pseudoseizures. In: Lüders HO, Noachtar S, editors. Epileptic Seizures, Pathophysiology and Clinical Semiology. Philadelphia: Churchill Livingstone; 2000. p. 766–73.

87 Wessely S, Nimnuan C, Sharpe M. Functional somatic syndromes: one or many. Lancet 1999;354:936–9.

88 Reuber M. Zur Ätiologie psychogener nichtepileptischer Anfälle. Aktuelle Neurologie 2004;31:86–94.

89 Reuber M. Psychogenic nonepileptic seizures – a comprehensive review. Advances in Clinical Neurosciences 2003;13:175–204.

90 Sharpe M. Medically unexplained symptoms and syndromes. Clin Med 2002;2:501–4.

91 Shen W, Bowman ES, Markand ON. Presenting the diagnosis of pseudoseizure. Neurology 1990;40:756–9.

92 Betts T, Boden S. Diagnosis, management and prognosis of a group of 128 patients with non-epileptic attack disorder. Part I. Seizure 1992;1:19–26.

93 Aboukasm A, Mahr G, Gahry BR, Thomas A, Barkley GL. Retrospective analysis of the effects of psychotherapeutic interventions on outcomes of psychogenic nonepileptic seizures. Epilepsia 1998;39:470–3.

94 Ettinger AB, Devinsky O, Weisbrot DM, Ramakrishna RK, Goyal A. A comprehensive profile of clinical, psychiatric, and psychosocial characteristics of patients with psychogenic nonepileptic seizures. Epilepsia 1999;40:1292–8.

95 Stone J, Campbell K, Sharma N, Carson A, Warlow CP, Sharpe M. What should we call pseudoseizures? The patient's perspective. Seizure 2003;12:568–72.

96 Rusch MD, Morris GL, Allen L, Lathrop L. Psychological treatment of nonepileptic events. Epilepsy Behav 2001;2:277–83.

97 Ramani V, Bowman E, Mercer K, Alper K, Blumer D, Barry J. Treatment of the adult patient with non-epileptic seizures. In: Gates JR, Rowan AJ, editors. Non-epileptic Seizures. Boston: Butterworth-Heinemann; 2000. p. 311–6.

98 Ramani V. Intensive monitoring of psychogenic seizures, aggression, and dyscontrol syndromes. Adv Neurol 1987;46:203–17.

99 McDade G, Brown SW. Non-epileptic seizures: management and predictive factors of outcome. Seizure 1992;1:7–10.

100 Reuber M, House AO. Treating patients with psychogenic non-epileptic seizures. Curr Opin Neurol 2002;15:207–11.

101 House AO. The patient with unexplained medical symptoms: making the initial psychiatric contact. In: Mayou R, Bass C, Sharpe M, editors. Treatment of Fictional Somatic Symptoms. Oxford: Oxford University Press; 1995. p. 89–104.

102 Reuber M, Pukrop R, Derfuss R, Bauer J, Elger CE. Multidimensional assessment of personality in patients with psychogenic nonepileptic seizures. J Neurol Neurosurg Psychiatry 2003;75:743–8.

103 Reuber M, House AO, Pukrop R, Bauer J, Elger CE. Somatization, dissociation and psychopathology in patients with psychogenic nonepileptic seizures. Epilepsy Res 2003;57:159–67.

104 Bowman ES, Markand ON. The contribution of life events to pseudoseizure occurrence in adults. Bull Menninger Clin 1999;63:70–88.

105 Bjornaes H. Aetiological models as a basis for individualized treatment of pseudo-epileptic seizures. In: Gram L, Johnnessen SI, Osterman PO, Sillanpää M, editors. Pseudo-epileptic Seizures. Petersfield, UK and Bristol, PA, USA: Wrightson Biomedical Publishing Ltd.; 1993. p. 81–98.

106 Kroenke K, Swindle R. Cognitive-behavioral therapy for somatization and symptom syndromes: a critical review of controlled clinical trials. Psychother Psychosom 2000;69:205–15.

107 Livesley WJ. A framework for an integrated approach to treatment. In: Livesley WJ, editor. Handbook of Personality Disorders. Theory, Research, and Treatment. New York: Guilford Press; 2001. p. 570–600.

108 Pilkonis PA. Treatment of personality disorders in association with symptom disorders. In: Livesley WJ, editor. Handbook of Personality Disorders. Theory, Research, and Treatment. New York: Guilford Press; 2001. p. 541–54.

109 Goldberg D, Gask L, O'Dowd T. The treatment of somatization: teaching techniques of reattribution. J Psychosom Res 1989;33:689–95.

110 Smith GR Jr, Monson RA, Ray DC. Psychiatric consultation in somatization disorder: a randomized controlled study. N Engl J Med 1986;314:1407–13.

111 O'Malley PG, Jackson JL, Santoro J, Tomkins G, Balden E, Kroenke K. Antidepressant therapy for unexplained symptoms and symptom syndromes. J Fam Pract 1999;48:980–90.

112 Soloff PH. Algorithms for pharmacological treatment of personality dimensions: symptom-specific treatments for cognitive-perceptual, affective, and impulsive-behavioral dysregulation. Bull Menninger Clin 1998;62:195–214.

113 Soloff PH. Psychopharmacology of borderline personality disorder. Psychiatr Clin North Am 2000;23:169–92.

114 Annegers JF, Shirts SB, Hauser WA, Kurland LT. Risk of recurrence after initial unprovoked seizure. Epilepsia 1986;27:43–50.

115 Crimlisk HL, Bhatia K, Cope H, David A, Marsden CD, Ron MA. Slater revisited: 6-year follow-up study of patients with medically unexplained motor symptoms. Br Med J 1998;316:582–6.

116 Mace CJ, Trimble MR. Ten-year prognosis of conversion disorder. Br J Psychiatry 1996;169:282–8.