Pseudosleep events in patients with psychogenic non-epileptic seizures: prevalence and associations

R Duncan, M Oto, A J C Russell, P Conway


Patients with psychogenic non-epileptic seizures (PNES, pseudoseizures) comprise up to 24% of referrals to clinics for intractable epilepsy,\(^1\) and one population based study has suggested that they comprise 5% of patients thought to have epilepsy.\(^2\) Diagnostic delay remains common and exposes patients to the side effects of inappropriate anticonvulsant drugs,\(^1, 4\) particularly where the events take a “convulsive” form.\(^3\) A century ago, Gowers stated that events arising from sleep were not psychogenic.\(^4\) This rule remains commonly held, and has been stated on various occasions since,\(^4, 5\) including recently.\(^5\) It has, however, been shown that PNES may arise during periods when the patient is apparently asleep but when electroencephalography (EEG) shows them to be awake (a situation termed “pseudosleep”).\(^5\) A century ago, Gowers stated that events arising from sleep were not psychogenic.\(^4\) This rule remains commonly held, and has been stated on various occasions since,\(^4, 5\) including recently.\(^5\) It has, however, been shown that PNES may arise during periods when the patient is apparently asleep but when electroencephalography (EEG) shows them to be awake (a situation termed “pseudosleep”).\(^5\)

Methods

Prospective study by semistructured interview of the history of event patterns and their clinical associations in 142 patients with video EEG confirmed PNES, and 100 patients with poorly controlled epilepsy.

Results:

84/142 patients with PNES (59%) and 47/100 with epilepsy (47%) gave a history of events during sleep (p=0.062). In patients with PNES, significant associations were found between a history of sleep events and: convulsive clinical semiology, antiepileptic drug treatment, fatigue, suicide attempts, mood disorder, and physical abuse. A particularly strong association with social security benefit was also found (odds ratio 4.0, p<0.001).

Conclusions:

The prevalence of a history of sleep events is similar in PNES and epilepsy, and is of no value in discriminating between the two, although a history of events occurring exclusively during sleep does suggest epileptic seizures. The clinical associations found indicate that a combination of psychopathological and external influences may be important in determining whether or not a patient with PNES gives a history of events during sleep.

Objective: To determine the prevalence and clinical associations of a history of events during sleep in patients with psychogenic non-epileptic seizures (PNES, pseudoseizures), and to compare the prevalence of a history of sleep events with that in poorly controlled epilepsy.

Methods: Prospective study by semistructured interview of the history of event patterns and their clinical associations in 142 patients with video EEG confirmed PNES, and 100 patients with poorly controlled epilepsy.

Results: 84/142 patients with PNES (59%) and 47/100 with epilepsy (47%) gave a history of events during sleep (p=0.062). In patients with PNES, significant associations were found between a history of sleep events and: convulsive clinical semiology, antiepileptic drug treatment, fatigue, suicide attempts, mood disorder, and physical abuse. A particularly strong association with social security benefit was also found (odds ratio 4.0, p<0.001).

Conclusions: The prevalence of a history of sleep events is similar in PNES and epilepsy, and is of no value in discriminating between the two, although a history of events occurring exclusively during sleep does suggest epileptic seizures. The clinical associations found indicate that a combination of psychopathological and external influences may be important in determining whether or not a patient with PNES gives a history of events during sleep.

Methods

We included in the study all 160 new patients seen at the Glasgow PNES clinic between January 2000 and March 2002 in whom video EEG confirmed the diagnosis of PNES. The diagnostic process included careful comparison of recorded events with eyewitness descriptions, and a review of video EEG recordings with witnesses in cases of doubt, to make sure that the recorded events corresponded with those that had been witnessed, and that all types of event had been recorded. Patients were included whether or not they had ictal impairment of consciousness. At the time of initial assessment, a range of clinical data relating to sleep events and their clinical associations was acquired by standardised semistructured interview of the patient and eyewitness. Eighteen patients who had evidence of past or present concomitant epilepsy were excluded from the study according to our standard criteria (past or present event descriptions suggesting epilepsy, onset of events in early childhood, epileptiform abnormalities in the interictal EEG, previous recording of epileptic seizures). This left 142 consecutive patients with PNES only: 103 (72.5%) were female and 39 (27.5%) male. Their age range was 13 to 72 years (mean (SD), 37.3 (13.7)).

A comparator group of 100 consecutive patients with poorly controlled epilepsy (more than four seizures a month) seen at an epilepsy clinic between March and June 2003 was also interviewed, using only those questions from the semistructured interview relating to the sleep/wake pattern of their seizures; 51 were male, 49 female, with an age range of 18 to 76 years (mean 39.40 (15.27)). The difference in sex ratio between epilepsy and PNES groups was significant (p = 0.001, \(\chi^2\)).

In view of the potential diagnostic implications, patients in both groups were recorded as having sleep events even if such events were only occasional. Patients were recorded as giving a history of waking events only, events during sleep only, or both. No data were collected regarding the precise timing of events during sleep, as initial attempts to do so suggested the data would be incomplete in most patients.

For purposes of analysis, the proportion of patients in the PNES group giving a history of events during sleep was...
patients with epilepsy (47.0%) (p = 0.062, χ²). In both groups, the proportion of sleep to wake events varied widely. One PNES patient had events occurring only during sleep, compared with 16 patients with uncontrolled epilepsy (p<0.001, χ²). In all but two of the PNES patients, the history of events appearing to occur during sleep was confirmed by the eyewitness.

### Prevalence of history of sleep events in patients with PNES

A history of sleep events was given by 84 of 142 PNES patients (59.2%), and 47 of 100 patients with uncontrolled epilepsy (47.0%) (p = 0.062, χ²). In both groups, the proportion of sleep to wake events varied widely. One PNES patient had events occurring only during sleep, compared with 16 patients with uncontrolled epilepsy (p<0.001, χ²). In all but two of the PNES patients, the history of events appearing to occur during sleep was confirmed by the eyewitness.

### Results

Screening of PNES data found 18 missing results, or 0.79% of entries. Ten of these were accounted for by two patients who had complied poorly with data acquisition. Additionally, in 16 patients it was not possible to determine the precise onset of PNES, so these were not included in analysis of diagnostic delay. Other than this, the maximum number of missing values was 3 in any category.

### Prevalence of history of sleep events in patients with PNES

Patients with psychogenic non-epileptic seizures: comparisons between those with and without a history of events during sleep

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Variable</th>
<th>Degrees of freedom (df) for χ² unless stated</th>
<th>p Value</th>
<th>Odds ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudosleep PNES delay diagnosis or make diagnosis more difficult</td>
<td>Time from onset of PNES to diagnosis</td>
<td>MWU = 1434.5/df = 112</td>
<td>0.495</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Number of interictal and sleep EEGs carried out prior to diagnosis</td>
<td>df = 3</td>
<td>0.439</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Number of CT scans carried out prior to diagnosis</td>
<td>df = 2</td>
<td>0.266</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>On antiepileptic drugs at time of presentation</td>
<td>df = 1</td>
<td>0.093</td>
<td>1.8</td>
<td>0.9 to 3.58</td>
</tr>
<tr>
<td></td>
<td>On multiple antiepileptic drugs at time of presentation</td>
<td>df = 1</td>
<td>0.033</td>
<td>2.8</td>
<td>1.11 to 13.43</td>
</tr>
<tr>
<td>Pseudosleep events are associated with severe PNES disorder</td>
<td>Event frequency</td>
<td>df = 6</td>
<td>0.362</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Event semiology (convulsive v other)</td>
<td>df = 1</td>
<td>0.006</td>
<td>2.8</td>
<td>1.34 to 5.97</td>
</tr>
<tr>
<td></td>
<td>Social security benefits</td>
<td>df = 1</td>
<td>0.441</td>
<td>0.75</td>
<td>0.37 to 1.55</td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td>df = 1</td>
<td>0.032</td>
<td>2.1</td>
<td>1.06 to 4.21</td>
</tr>
<tr>
<td></td>
<td>Fatigue</td>
<td>df = 1</td>
<td>0.030</td>
<td>2.6</td>
<td>1.07 to 6.27</td>
</tr>
<tr>
<td></td>
<td>Parasuicide</td>
<td>df = 1</td>
<td>0.271</td>
<td>1.6</td>
<td>0.69 to 3.80</td>
</tr>
<tr>
<td></td>
<td>Medically unexplained symptoms</td>
<td>df = 1</td>
<td>0.026</td>
<td>2.2</td>
<td>1.09 to 2.19</td>
</tr>
<tr>
<td>Pseudosleep PNES are associated with sexual or physical abuse, or other traumatic experience</td>
<td>Sexual abuse</td>
<td>df = 1</td>
<td>0.013</td>
<td>1.81</td>
<td>0.88 to 3.68</td>
</tr>
<tr>
<td></td>
<td>Physical abuse</td>
<td>df = 1</td>
<td>0.052</td>
<td>2.14</td>
<td>0.99 to 2.14</td>
</tr>
<tr>
<td></td>
<td>Other traumatic experience</td>
<td>df = 1</td>
<td>0.485</td>
<td>1.31</td>
<td>0.62 to 3.13</td>
</tr>
<tr>
<td>Pseudosleep PNES are associated with sleep disturbance</td>
<td>Disturbed sleep pattern</td>
<td>df = 1</td>
<td>0.166</td>
<td>1.74</td>
<td>0.79 to 3.81</td>
</tr>
</tbody>
</table>

CI, confidence interval; MWU, Mann-Whitney U test; n/a, not applicable; PNES, psychogenic non-epileptic seizure.
the odds ratios did suggest a trend. There was no significant association between a history of events during sleep and sleep disturbance.

**DISCUSSION**

Studies of PNES have found that between 10% and 60% of patients also have epilepsy, the majority being at the lower end of this range. At 11.25%, our figure was consistent with this. Video EEG usually allows confident distinction between epileptic seizures and PNES on the basis of typical clinical features and EEG changes. Occasionally, seizures may pass with little or no EEG change, or more commonly with the EEG obscured by muscle artefact. This may pose a problem in distinguishing PNES from certain uncommon types of frontal seizure. There are various clinical factors that can distinguish the two (notably duration), and these factors were borne in mind during this study. Additionally, patients were excluded from the study if they had any evidence of epilepsy in the shape of interictal epileptic discharges or events during childhood.

In series of patients admitted for video EEG, Benbadis et al recorded pseudosleep PNES in 10 of 18 patients, or 55%. Thacker et al found 12 of 103 patients with pseudosleep PNES, or 11.5%. Benbadis’ population was relatively small, so comparison with our series may not be valid. Our figure was much higher than that of Thacker et al, particularly as they only studied patients with “convulsive” PNES; in our series, a history of events during sleep was mainly given by PNES patients with “convulsive” semiology. Our results suggest that a significant and greater than hitherto suspected proportion of patients with PNES may give a history of events during sleep at the time of clinical assessment. A history of events occurring exclusively during sleep may have some discriminative value between epileptic seizures and PNES, but a history of both sleep and waking events had no discriminative value at all in our sample.

At 58% overall, the proportion of PNES patients in our study who gave a history of events during sleep was surprisingly high. The doctor carrying out the interviews was experienced in the field, and care was taken to avoid leading questioning as far as possible. A major effect of leading questioning seems unlikely, given that patient accounts were confirmed by an eyewitness account of events arising during what appeared to be sleep in all but two cases. Care was also taken to be clear that clinical descriptions of sleep events were compatible with the patient’s wake events and, at a later stage, that they were clinically compatible with events recorded during video EEG monitoring. We are therefore confident that our figure of 58% represents an accurate measurement in our sample.

The strong association we found between a history of events during sleep and social security benefits may be relevant. A purely mechanistic effect (that is, that patients giving a history of sleep events are simply more likely to be awarded benefit) would explain the association between the two, but would not explain the high prevalence of a history of events during sleep itself. However, epilepsy benefit forms in two, but would not explain the high prevalence of a history of sleep events recorded during video EEG and a history of sexual abuse, with roughly similar figures for physical abuse (the coincidence of the two was common in our sample). Our data give no clear support for the hypothesis suggested by Fakhoury et al, that sleep PNES are associated with disturbance of sleep pattern, though again there was a trend. In a recent publication, a disturbance of sleep structure in patients with PNES was noted, but there was no comparison of patients with or without histories of events during sleep.

Recording PNES on video EEG usually allows a definitive diagnosis, and our data suggest that there should be greater readiness to use this technique at an earlier stage. During clinical assessment, certain features of the history may direct the clinician to consider the diagnosis of either PNES or epilepsy. Some features traditionally regarded as indicative of epilepsy—such as incontinence of urine and injuries (with the exception of burns)—do not in fact distinguish between epilepsy and PNES. A history from the patient or eyewitness of events during sleep may similarly misdirect the clinician, particularly a non-specialist, away from considering the diagnosis of PNES. It would perhaps be prudent to restate Gowers’ “rule” as follows: “Psychogenic events do not arise from sleep, but may seem or be reported to do so.”

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**REFERENCES**


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