Head-up tilting is a useful provocative test for psychogenic non-epileptic seizures

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Differentiating psychogenic non-epileptic attack disorder (NEAD) from true epilepsy is difficult. This often results in a misdiagnosis and unnecessary and ineffective treatment. Prolonged EEG/video recording is the most sensitive tool for differentiating NEAD from epilepsy, but is costly and therefore limited in availability. Provocative tests, particularly the use of saline injection, can reduce the length of monitoring but give rise to ethical dilemmas. This study assesses the value of head-up tilt testing as a provocative test for NEAD.

Twenty-one patients (17 female, mean age 34.6 ± 11.5 years) with recurrent seizure-like episodes and a clinical diagnosis of NEAD were studied. Patients were tilted to 80° on an electric tilt table with footplate support for up to 45 minutes during continuous ECG, EEG and blood pressure monitoring. Seventeen patients (81%) experienced typical symptoms (non-epileptiform limb shaking in 15 patients, absence in one patient, myoclonic jerking in one patient) during head-up tilt without significant EEG abnormalities or haemodynamic changes. The mean time to onset of seizure-like activity was 13.4 ± 11 minutes (range 0–31 minutes). No patients suffered injury or any other significant side-effect. Provocative testing using suggestion and head-up tilt is a sensitive tool for diagnosing NEAD and represents a safe, simple and inexpensive outpatient technique for investigating patients with suspected NEAD.

Key words: psychogenic non-epileptic attack disorder; head-up tilt test; seizure provocation.

INTRODUCTION

The differentiation of epilepsy from psychogenic non-epileptic attack disorder (NEAD) is difficult. This may lead to misdiagnosis of epilepsy and inappropriate treatment with antiepilepsy drugs. Diagnosis is usually made by exclusion of other differential diagnoses. In general, a diagnosis of NEAD relies on confirming the absence of epileptiform brain activity at the time of a typical attack. Long-term EEG monitoring is the most widely used technique for diagnosis of NEAD but has important limitations. Domiciliary EEG monitoring is possible, but much less satisfactory because of the greatly increased risk of technical deficiencies and the inability to observe events. In the majority of cases, therefore, diagnosis is made on purely clinical grounds. However, it has been shown that based on history and examination alone, the diagnostic accuracy of epileptologists may be as low as 50% in distinguishing epilepsy from NEAD. In the same series, direct observation of seizures by trained staff on a specialized inpatient unit resulted in 80% accuracy but this left a significant margin of error and required prolonged, costly inpatient assessment. A number of provocative techniques have been described using suggestion with placebo operations to induce non-epileptic attacks, including use of intravenous infusion (particularly normal saline) and alcohol-soaked pads placed on the patient’s neck. However, concerns have been raised about the ethics of deliberately misleading patients to induce non-epileptic attacks, especially when invasive techniques are used.

Head-up tilt testing is recognized as a useful objective test for vasovagal syncope. Prolonged head-up tilt at 60–80° for up to 60 minutes with footplate support reproduces vasovagal attacks in many susceptible patients and is known to be safe and well-tolerated. Transient global anoxia commonly causes abnormal
movements during vasovagal attacks, which may be clinically indistinguishable from epilepsy. Tilt testing is, therefore, already used to diagnose another cause of seizures and it has long been suspected that NEAD is a significant cause of false positives. This study investigates the value of head-up tilting as a provocative test for NEAD.

MATERIALS AND METHODS

Twenty-one patients (17 female, mean age 34.6 ± 11.5 years) with recurrent seizure-like episodes were studied. Each patient had been assessed at the David Lewis Centre or the Manchester Heart Centre Syncope Clinic and epilepsy excluded by poor response to treatment, consistently normal EEGs and other clinical features. Tilt testing took place between 9 a.m. and midday following an overnight fast in the Autonomic Research Laboratory at Manchester Royal Infirmary. The room was darkened but sufficient light remained to ensure safe observation and to allow video recording of the patient. Prior to the test, patients were told that they would experience a typical attack ‘within a few minutes’ of being tilted and were reassured that as soon as the attack occurred they would be returned to the horizontal and would recover. After the EEG was applied, patients were asked to lie on an electric tilt table with footplate support and body straps were fastened. Following a 15-minute rest period, patients were tilted to 80° for up to 45 minutes. ECG and phasic blood pressure, measured using a fingertip photoplethsmographic device (Finapres 2300 BP monitor, Ohmeda, Englewood CO, USA), were continuously monitored throughout the test and a doctor was present throughout. Patients were returned to the horizontal on completion of the designated tilt period. Indications for early termination of the test were apparent loss of consciousness, the onset of seizure-like activity or severe distress. The criteria for a positive test for NEAD were reproduction of typical symptoms without diagnostic EEG changes or significant hypotension or bradycardia.

RESULTS

Seventeen patients (81%) experienced typical attacks during head-up tilt. The most common form of attack (15 patients) was ‘loss of consciousness’ with generalized body movements. One patient developed ‘absence’ and one patient developed myoclonic jerking without loss of consciousness. In each case, the attack terminated on returning to the horizontal and the patient was fully recovered within 5 minutes, although one patient suffered a further attack shortly after getting up from the tilt table. No patient developed significant EEG abnormalities in association with their tilt-induced attack. In addition, no attack was associated with hypotension or bradycardia, confirming the diagnosis of NEAD, but in 16 of the 17 ‘positives’, the non-epileptic attack was immediately preceded by sudden sinus tachycardia (up to 150 beats/minute) and hypertension. The exception was the patient who developed absence. The mean time to onset of seizure-like activity was 13.2 ± 11 minutes (range 0–31 minutes). No patients suffered injury or incontinence or required treatment for termination of their attacks.

DISCUSSION

The accurate diagnosis of NEAD is essential to prevent inappropriate, costly and potentially harmful treatment with anticonvulsant drugs. Patients can be spared an incorrect label of ‘epilepsy’ and its social and psychological consequences. More importantly, patients suffering from NEAD deserve appropriate psychiatric treatment. In general, NEAD has a good prognosis. Riaz et al. 12 showed that over an 8 week follow-up 25% of NEAD patients were seizure-free following psychiatric treatment, 50% were improved and 25% worse or unchanged. Over a longer follow-up, the improvement may be even more marked. However, despite increasing awareness of the problem, differentiation of epilepsy from NEAD remains difficult. NEAD is a heterogeneous condition 13,14 making it difficult to establish diagnostic criteria (hence the profusion of synonyms for NEAD including ‘pseudo-seizures’, ‘non-epileptic seizure disorder’ (NESD), ‘psychogenic seizures’ and ‘hysterical seizures’). The underlying psychopathology of NEAD remains uncertain although in the majority of cases it represents a dissociative disorder 15,16. Furthermore, the incidence of epilepsy in patients with NEAD is reported to be as high as 36% 13,17. Attempts have been made to identify those clinical characteristics of NEAD which distinguish them from epilepsy. However, these are insufficiently reliable or specific to be standardized against more stringent diagnostic criteria 18,19. Nonetheless, it is clear that the majority of patients with NEAD are female 5,20, that 60% have a past psychiatric history and that up to 40% have a history of some form of sexual abuse 19. The interictal EEG is abnormal in up to 40% of cases of NEAD 6,21 and 25% have a history of brain trauma 6,20, often adding to the confusion over the correct diagnosis.

Provocative techniques rely on the increased susceptibility to suggestion of patients with NEAD to induce non-epileptic attacks. They are an alternative to long-term EEG monitoring, and have been reported to be highly sensitive and specific 6,9. The most widely
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reported technique is the use of an ‘epileptogenic’ intravenous injection6,7 (usually normal saline solution). In their study of 57 patients with uncontrolled or atypical seizures, Cohen and Suter6 induced ‘hysterical seizures’ in 51 (89.5%) using a combination of suggestion and intravenous saline injection. Similarly, Lancman et al.9 induced attacks in 77.4% of patients using a coloured swab soaked in alcohol and placed on the neck, with no false positives in 20 controls. However, concerns have been raised about the value of provocative testing. It has been suggested that they are demeaning to patients, leading some authors to state that these techniques should be avoided.22,23 Their value may be significantly reduced if the patient has some medical knowledge. This is often the case in patients with recurrent hospitalization due to uncontrolled seizure-like attacks.

Head-up tilt may address these issues and represent a satisfactory provocative technique for diagnosing NEAD. Its safety is established, it is completely non-invasive and relatively inexpensive. In addition, we have shown that it has satisfactory sensitivity, and can be safely used for investigation of suspected NEAD without the need for inpatient hospitalization. Furthermore, in 50% of cases, the non-epileptic attack occurred within 10 minutes of tilting allowing the possibility of testing of several patients in a single outpatient session. It has been suggested that provocative techniques, specifically intravenous saline injection, are stressful for patients, based on the development of increased heart rate, blood pressure and tremor7. However, in fact, these findings may represent a physical manifestation of the dissociative process itself rather than a simple stress reaction. Sixteen of the 17 patients with a positive tilt in our study developed tachycardia and relative hypertension but this only occurred immediately prior to the onset of seizure-like activity. During the initial stages of tilt, patients developed only the typical small increase in heart rate and blood pressure which occurs in response to orthostasis. Head-up tilt testing is established as a key investigation in patients with blackouts. Patients studied by this technique are not misled. Patients with some medical knowledge may be reassured about the value of the provocative test. A case can be made for all patients with atypical or treatment resistant epilepsy to have a tilt test to exclude both reflex syncope and NEAD as the underlying cause.

Head-up tilt testing with suggestion is a safe, well-tolerated, sensitive, provocative EEG test for dissociative seizure-like attacks and should be considered in patients with suspected NEAD.

REFERENCES