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## The Case of "MS" Non-Epileptic Seizures

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Since the time of Hippocrates, physicians have made a distinction between epileptic seizures and "hysterical" seizures.<sup>1</sup> By definition, a non-epileptic seizure (NES) is any seizure-like spell that does not exhibit the electrical changes associated with epileptic seizures (ES) (abnormal repetitive/rhythmic activity, episodic spike-wave activity).<sup>2</sup> Studies have shown that NES has an incidence roughly 4% of that of epilepsy,<sup>1</sup> but NES accounts for almost 20% of referrals to epilepsy specialists for refractory epilepsy.<sup>3</sup> Another paper describes NES as accounting for 50% of the patients brought to an emergency room for seizures that are refractory to medications. Patients may very effectively simulate status epilepticus, and studies have shown that traditional treatment for status can have severe complications on those patients who do not need the treatment.<sup>4,5</sup> NES patients are predominately female, suffer from psychiatric symptoms (typically depression and post-traumatic stress disorder), and roughly 20% have attempted suicide. A great proportion of NES patients have been physically or sexually abused.<sup>3</sup> Both NES and ES are associated with head trauma.<sup>1</sup> While most cases of NES do not occur simultaneously with ES, it is common for individuals with documented ES and psychiatric conditions to also suffer from NES.<sup>2</sup>

Many patients with NES are misdiagnosed as having epilepsy and are given expensive, often dangerous medications that are not helpful. Studies have shown that roughly seven years elapses between an NES patient's first seizure and the diagnosis of NES.<sup>1</sup> Once patients are diagnosed with NES, they are often labeled as fakers, and their problem is not addressed. In order to most effectively diagnose and attempt to treat NES, there are several key pieces of information that one must understand: the physically observable differences between ES and NES, other organic conditions that can cause seizure-like spells, the epidemiology of NES, how to tell a patient that the seizures are non-epileptic, and finally, management of NES.

Hopefully the clinical case that follows will illustrate the importance of understanding NES, the problems typical NES patients have, and the difficulty of long term treatment of this condition.

### Clinical Case

MS is a 48 year old right handed female with an extensive psychiatric history (abuse, post-traumatic stress disorder, depression, anxiety) who suffered from seizures since sustaining a head injury in her early twenties. Ac-

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ording to the patient, the seizures were "well controlled" until 2000, at which time long-term-monitoring at another institution showed non-epileptic seizures. MS herself reported that she suffers from two types of seizures: "epileptic" and "stress induced." Her roommate provided a description of the seizures, stating that MS falls to the ground twitching, making loud gasping noises, and moving from side to side and back and forth. The episodes last 20 seconds through several minutes. MS denied extensive confusion following the spells, but she does "mumble" and her left leg "twitches" for several minutes to hours after the seizure. She reported that 10-20% of the time, she will have an aura which she described as ringing in her ears and seeing flashing lights. She denied urinary incontinence during most of her seizures but said that she will become incontinent during her "epileptic seizures." MS could not provide any more information on how she could distinguish the two seizure types.

Last March, MS had a 20-minute seizure at work and was admitted to our university hospital. During her stay, she was diagnosed with a functional (psychogenic) gait disorder, which the patient reported has since resolved. The patient has had two psychiatric admissions for depression and suicidal ideation in the past few months. She now desired more aggressive diagnosis/treatment of her seizures.

In addition to her psychiatric history, MS's past medical history included migraines, asthma, hypertension, non-insulin dependent diabetes mellitus, gastroesophageal reflux, and bacterial meningitis (1994). She has had an abdominal stab wound (possibly self-inflicted) and six orthopedic surgeries. Brain MRI in 2000 and 2004, brain MRA in 2004, and EEG in 2007 were all normal. Neuroactive medications included Keppra 1500 mg

b.i.d., Relpax 40 mg prn migraine, Cymbalta 30 mg b.i.d., Klonopin 0.5 mg b.i.d., Abilify 20 mg qAM, and Elavil 100 mg qhs. There was no family history of epilepsy, although an uncle did suffer from seizures during alcohol withdrawal.

MS had a history of physical and sexual abuse, both as a child and during a marriage. She was divorced without children, living with a roommate roughly 20 years older than she. She had taken some college courses but reported that she always struggled academically. She has held a number of jobs (social worker, pharmacy technician) but in the past seven years has had difficulty holding down a job because of her depression and seizures. At the time of her head injury, she was in the military and received a medical discharge. Currently, she volunteered for the Red Cross, teaching cardiopulmonary resuscitation.

On physical examination, she was overweight and appeared to be her stated age. She sat very quietly with blunted affect, describing her mood as anxious and her depression as 6/10. Speech was hypophonic, although she was capable of producing normal volume on request. Cranial nerves were normal except for an occasional right periorbital twitch. There was left-sided upper extremity weakness due to old injury and surgery and a left > right upper extremity action tremor. Power in other limbs was normal. Deep tendon reflexes were 2+ symmetrically in the upper extremities but unobtainable in the lower extremities (patient not able to relax). There was no gait ataxia, and the Romberg sign was negative.

MS was admitted for a 4-night period of long-term video and EEG monitoring. In order to help "induce" seizures, Keppra was discontinued and the patient was kept awake except from 3 AM to 7 AM. The patient's physical exams each day were roughly the same as her

admission exam. However, her upper extremity tremor worsened throughout the hospital stay, and her periorbital twitch increased in frequency. Interestingly, when the video of the patient was reviewed, it was found that when nobody was in the room, there were no upper extremity tremors or facial twitches. The patient's first seizure occurred two days after admission during photic/strobe stimulation. The seizure did not begin until the technician suggested that the strobe was flashing at an optimal frequency for seizure induction. The seizure lasted roughly 3 minutes and involved asynchronous twitching and other movements. The patient's eyes were closed during the spell. Afterwards, the patient was able to remember half of a two word phrase told to her by the technician. MS had one other photically induced seizure during her stay. She also experienced five spontaneous seizures. Each seizure began either immediately before or immediately after a nurse entered the room. The seizures lasted 3-5 minutes and involved asynchronous limb movement, eye opening and closing, groaning, and waxed and waned in intensity. For several of the seizures, the patient was able to press a button marking the event on a computer.

EEG analysis showed no disturbances in the patient's sleep patterns. Furthermore, all ictal events were non-electrogenic, and alpha waves were seen in periods when the patient's eyes were closed. MS was discharged on Keppra 750 mg b.i.d. (see conclusion for explanation).

### Diagnosing and Treating NES

MS's case is fairly typical for NES. Her head injury confounds the situation somewhat, but it is important to remember that both ES and NES can be precipitated by head injury. Furthermore, MS has depression, post-traumatic stress disorder, and has been sexually and

physically abused, all factors typical of an NES patient.

Long-term video monitoring and EEG recording are helpful for differentiating ES and NES. In MS's case, her seizures tended to occur only when a female was in the room, could be evoked through suggestion, involved asynchronous body movement and eye closing (with alpha waves during closed-eye periods), grunting, and a limited period of post-ictal confusion. These behaviors are characteristic of NES and are rarely if ever seen during ES.<sup>1,2,6</sup> It is important to remember that the movements seen during ES are the result of electrical discharge in the brain that is rhythmic and coordinated. Therefore, for generalized seizures, asynchronous movements such as bicycling are not seen. The NES is typically a dissociative state in which the patient is subconsciously acting out what s/he thinks a seizure ought to look like. Interestingly, as epilepsy awareness has increased in the past few years so too has the quality of NES.<sup>1,2,6</sup> In minor seizures and staring spells, it is often very difficult to tell the difference between NES and ES. As a general rule, the bigger the seizure, the easier it is to differentiate epileptic vs. non-epileptic. Serum prolactin has been shown to rise in ES but not in NES and can be used in conjunction with other studies to differentiate between the two conditions.<sup>4</sup>

NES has a wide differential but can largely be grouped into physiological and psychological causes. Physiological causes should be considered and eliminated first: syncope, migraine, transient ischemic attack, and night terrors and breath-holding spells in children.<sup>6</sup> If there is no "embellishment" of the symptoms of these conditions, they are considered purely physiological non-epileptic seizures. However, patients may exaggerate and embellish the symptoms of these conditions (either consciously or unconsciously) and

Table 1: Adapted from Reuber and Elger<sup>1</sup>

Characteristic	NES	ES
Situational onset	Occasional	Rare
Gradual onset	Common	Rare
Precipitated by stimulation	Occasional	Rare
Asynchronous limb movements	Common	Very rare
Purposeful movements	Occasional	Very rare
Side-to-side head shaking	Common	Rare
Closed eyes	Common	Rare
No cyanosis	Common	Rare
Short post-ictal confusion	Common	Rare
Manifests < 10 yr. old	Unusual	Common
Seizures in presence of doctors	Common	Unusual
Psychiatric treatment	Common	Rare
Sexual and physical abuse	Common	Rare

cause these organic conditions to be mistaken for seizures. The psychological disorders associated with NES are somatization disorders, conversion disorders, factitious disorders (Münchhausen), and malingering.<sup>6</sup> In the case of malingering, the patient truly is "faking" it for some external gain (e.g., a disability check). In Münchhausen disorder, the patient consciously "fakes" the condition for the psychological gain obtained from the attention of healthcare providers. Somatoform disorders, by definition, are associated with other somatic complaints with no discernible organic cause. In MS's case, the most likely etiology is a conversion disorder. The seizure is a maladaptive coping mechanism for stress and abuse. It allows MS to escape her past traumas and attain secondary psychological gain through the support and sympathy of her roommate.

Treatment of NES begins with delivering the diagnosis to the patient. Care should be taken so that the patient is not alienated. The name pseudoseizure is very stressful to patients, as they read "pseudo" as "fake." Non-epileptic is a better name to give patients.

In MS's case, she had some insight into her condition, but when she was told that all the seizures during her current hospital stay were non-epileptic, she began to cry. Apparently, one of her previous doctors had written a clinic note calling her a "crazy faker." We reassured MS that her spells were very real seizures, just not the epileptic type. Because of MS's head injury, she was kept on Kepra; however, pure NES does not require antiepileptic medications. MS's prognosis will depend on her acceptance of the diagnosis and her ability to get treatment for her psychiatric disorders.

In general, only 30% of NES patients will stop having seizures. Studies have shown that children who have NES due to transient stress have a much better prognosis.<sup>6</sup> Other studies have shown that favorable outcomes were associated with being female, leading an independent life, formal psychotherapy, and absence of epilepsy. There is no demonstrated link between prognosis and duration of NES, coexistence of psychiatric disease, or other clinical features of the attacks.<sup>7</sup>

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