Seizures induced by the sight of moving water

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ABSTRACT – The most frequent precipitants of photic- or pattern-induced seizures are television and discotheque lighting effects. Seizure induction by reflection of bright sunlight on water surfaces has also been reported. We report a patient with seizures induced by the sight of moving water in the absence of bright sunlight. (Published with video sequences)

Key words: water-induced seizures, photic stimulation

Epileptic seizures can be triggered by a variety of stimuli. These include, for example, tooth brushing (O’Brien et al. 1996) or even simply thinking about it (Navarro et al. 2006), playing Mah-jong (Kwan and Su, 2000) or chess (Mann et al. 2004), the sound of a vacuum cleaner (Carlson and St Louis, 2004), rubbing sand between thumb and index finger (Palmini et al. 2005) or answering the phone (Michelucci et al. 2004). We report a patient with seizures induced by the sight of moving water.

Case report

A 30-year-old, right-handed female was admitted from a psychosomatic clinic to our tertiary epilepsy centre with the suspected diagnosis of psychogenic seizures. The patient had been under psychological treatment for several years for generalized anxiety. She reported to be suffering for two years from episodes with the following semiology: the sight of moving water (for example, when drinking from a glass or showering), she would experience impaired consciousness for about 20 seconds. Her husband reported stereotyped movements of both hands during the episode. The patient was responsive to instructions, but could not speak. Rarely, the episodes would appear while looking at a plain-colored wall or indeed without any visual stimulation. Watching TV or a computer screen would not trigger these events. Seizure frequency was one to three per day.

A complete loss of consciousness had occurred three times. Medical history from a third party was not available for these episodes. The patient reported subsequent confusion and muscle ache, indications of generalized tonic-clonic seizures.

The episodes described had been classified as part of her psychiatric disorder. There were no risk factors for epilepsy in the patient’s medical history. Over the first two years repeated EEG examinations were unremarkable. She had not been treated with anticonvulsants. Neurological examination did not reveal any abnormalities.
During video EEG monitoring, sharp waves over the right antero-temporal region (maximum Sp2) were recorded (figure 1).

Photic stimulation elicited no photoparoxysmal response. Seven epileptic seizures were recorded (see video sequence). Four of the seizures were provoked by looking into a water container; one seizure occurred when the patient drank water from a glass, the remaining two seizures were unprovoked. The EEG seizure-onset occurred within 8-26 seconds after the exposure to water had begun. The seizure-onset could not be localized or lateralized due to muscle artifacts (figure 2A); however, after a few seconds, a right temporal seizure pattern was seen (figure 2B). During the seizures, the patient showed impairment, but not complete loss of consciousness. Test words given during the seizure could not be remembered postictally. Further seizure symptoms comprised oral and right manual automatisms as well as postictal nose-wiping with the right hand in two seizures and the left hand in one seizure.

High resolution MRI, including gradient echo sequences, coronar T2, FLAIR and diffusion tensor imaging did not show any structural lesions. Ictal functional transcranial Doppler sonography of the middle cerebral arteries was performed twice and produced contradictory results: in one seizure, there was an increase in right hemispheric blood flow while during another seizure the left hemispheric blood flow increased. Ictal Tc99m-HMPAO-SPECT revealed right occipital enhancement. However, interictal SPECT showed the same pattern so that subtraction SPECT was unremarkable. We recommended anticonvulsant treatment with carbamazepine. Thirteen weeks thereafter, the patient had not experienced any further seizures.

**Discussion**

The incidence of photic- or pattern-induced seizures within the population has been estimated as 1/100 000 (de Bittencourt, 2004). The most frequent precipitants are television and discotheque lighting effects (Parra et al. 2005). While seizure induction by reflection of bright sunlight on water surfaces has been described earlier (Parra et al. 2005), our patient experienced seizures in the absence of bright sunlight. Therefore, and in accordance with the lack of a photoparoxysmal response during photic stimulation, we presumed the pattern of a moving water surface to be the seizure trigger rather than light stimulation per se.

Visually-induced seizures are frequently primary generalized. Partial seizures after visual stimulation usually arise from the occipital lobe, although single cases of photosensitive temporal lobe epilepsy have been described (Benbadis et al. 1996, Fiore et al. 2003). In the case described, seizure semiology and EEG findings suggested either an occipital localization of the epileptogenic zone, with fast propagation of the seizure activity to the temporal lobe or a right temporal seizure origin. In the latter case, the seizures may arise from the middle temporal visual...
area (MT/V5) that computes pattern motion (Born and Bradley, 2005). However, a more precise localization of the seizure-onset zone would have required an invasive approach.

This case illustrates a seizure trigger that has not been described before, and highlights the importance of differentiation between psychological symptoms and epileptic seizures to ensure appropriate treatment.
**Legend for video sequence**
Reflex seizure triggered by the sight of a moving water surface. The seizure starts within a few seconds after shaking a water container. The patient turns to the right side and performs consecutively, right manual and oral automatisms. The physician tells her the test word “blue” which the patient repeats. On demand, the patient gives her first name, shows her right index finger and counts the physician’s fingers. Postictally she does not remember the test word.

**References**


