

Somatosensory reflex epilepsy: simultaneous video-EEG monitoring and surface EMG

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ABSTRACT – Somatosensory reflex epilepsy is induced by repetitive cutaneous contact of a circumscribed body area with a tight time-lock between somatosensory stimulation and seizure. We describe the case of a 27-year-old man with seizures induced by repetitive tapping on the sole of the right foot. Simultaneous video-EEG monitoring and surface electromyography was performed during a seizure triggered by repetitive tapping on the right sole aspect using a hammer. Stimulation produced a tingling sensation on the right sole that extended to the right lower leg. This was followed by motor Jacksonian march of the right leg. [Published with video sequence on www.epilepticdisorders.com]

Key words: reflex epilepsy, sensorimotor cortex, Jacksonian march

Somatosensory reflex epilepsy (SRE) is a very rare epilepsy syndrome that is induced by prolonged or repetitive cutaneous contact of a circumscribed body area with a tight time-lock between somatosensory stimulation and seizure (Wolf, 2016).

Case study

A 27-year-old male began to have seizures at 15 years of age. The first attack occurred suddenly with a sensation of numbness in the right sole of the foot. This distal dysesthesia subsequently sometimes occurred in the same area. At 20 years of age, a tingling sensation on the sole of the right foot was activated by tapping or pressing when walking or running. The tingling sensation, which occurred spontaneously or

after stimulation, spread from the right sole to the rest of the right foot and leg. This was followed by clonic movement of the right lower leg, sometimes progressing to the right hip. A neurological examination was normal. Brain magnetic resonance imaging showed no abnormality. Video-EEG monitoring with surface electromyography (sEMG) was performed (see *video sequence*). A seizure was triggered by repetitive tapping on the right sole aspect of the second to third metatarsophalangeal joint using a hammer. After stimulation, the characteristic tingling sensation on the right sole, that subsequently extended to the right foot and lower leg, was elicited. This was followed by clonic movement of the right toe and clonic movements through the knee, from the



VIDEO ONLINE

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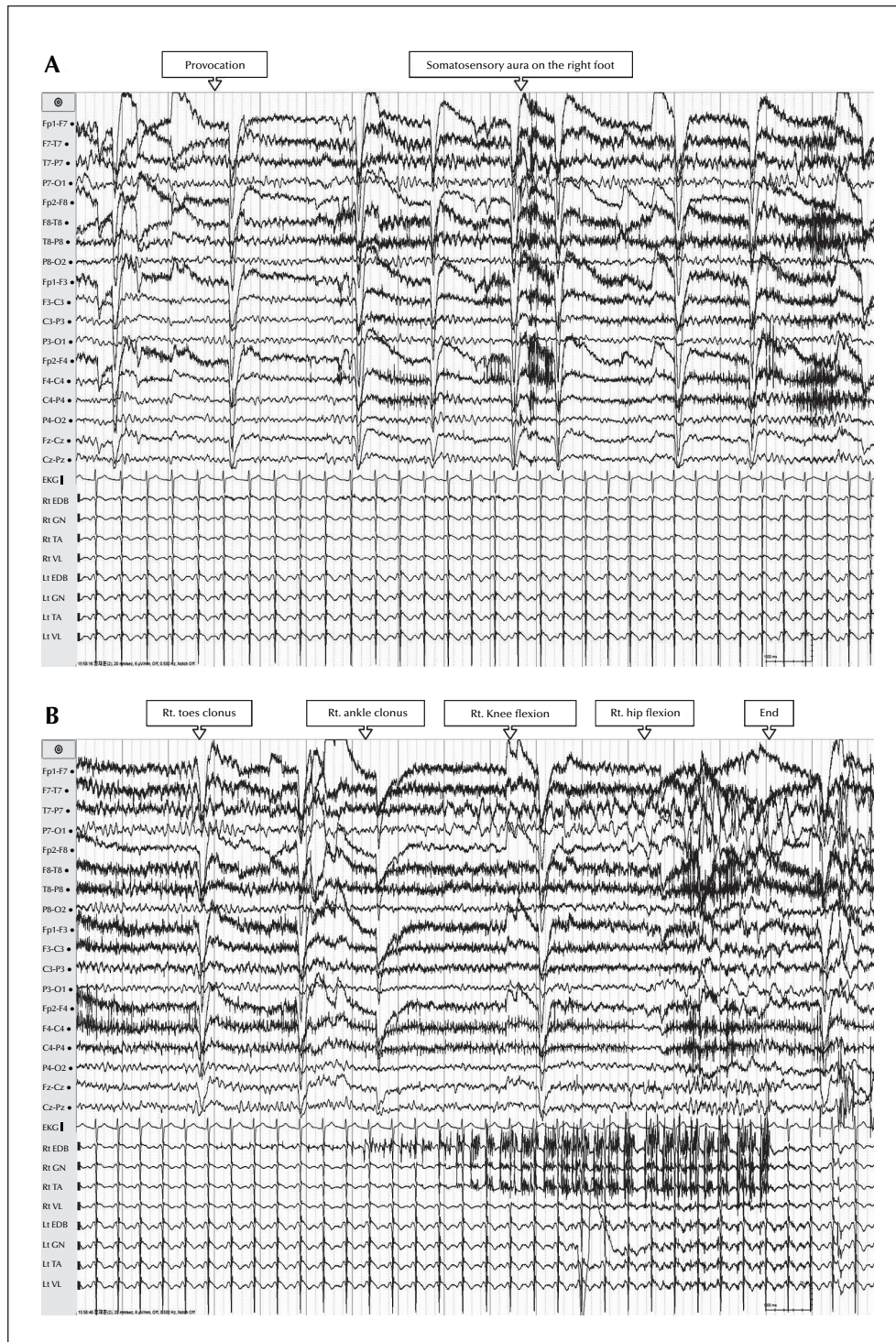


Figure 1. EEG (upper panel) and sEMG (lower panel) on both lower extremities during a typical attack ([B] is a continuation of [A]). The EEG shows rhythmic theta activity on the posterior temporal area; the EMG shows sequential progression of involved muscles, from the extensor digitorum brevis, across the gastronecnius and tibialis anterior, to the vastus lateralis. EDB: extensor digitorum brevis; GN: gastronecnius; TA: tibialis anterior; VL: vastus lateralis; Rt: right; Lt: left.

Legend for video sequence

Seizure is triggered by repetitive tapping on the right sole aspect of the second to fourth metatarsophalangeal joint using a hammer. After stimulation, a tingling sensation is felt on the sole of the right foot that extends to the rest of the right foot and lower leg. This is followed by clonic movement of the right toe and clonic movements through the knee, from the foot to the hip. Consciousness is well-preserved during the seizure (during the seizure, the patient holds the right sidebar of the bed and asks someone to hold his right hand because he is afraid that the seizure will progress; the gesture is not an ictal symptom).

Key words for video research on www.epilepticdisorders.com

Phenomenology: reflex seizures, aura (somatomotor), clonic seizure

Localization: unknown

Syndrome: reflex epilepsy

Aetiology: unknown

foot to the hip. Interictal EEG was normal. Ictal EEG showed rhythmic theta on the posterior temporal area. sEMG showed sequential progression involving muscle from the extensor digitorum brevis to the vastus lateralis (figure 1). There was a short (15 to 30 minutes) refractory period after each seizure.

Discussion

The pathogenesis of SRE still remains unclear. SRE may result in localized hyperexcitability in the primary sensorimotor cortex activated by cutaneous afferent

stimulation. The repetitive peripheral stimulation initially evokes a complex response with phasic and tonic components (Chauvel *et al.*, 1992). This response progressively intensifies into a sustained tonic discharge, located in the somatosensory cortex, resulting in somatosensory symptoms that secondarily invade the precentral cortex and lead to motor seizure. The refractory period is possibly due to transient postictal surplus hyperpolarization in response to the preceding epileptic depolarization (Kanemoto *et al.*, 2001). Patients occasionally report refractory periods of 10 seconds to minutes, to hours after seizures (Kasteleijn-Nolst Trenité, 2012; Striano *et al.*, 2012). □

Supplementary data.

Summary didactic slides are available on the www.epilepticdisorders.com website.

Disclosures.

None of the authors have any conflict of interest to declare.

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TEST YOURSELF



(1) What is the most likely cause of somatosensory reflex epilepsy?

(2) Which is the most likely trigger of somatosensory reflex seizure?

- A. Rubbing
- B. Tapping
- C. Pricking
- D. Brushing the teeth
- E. All of the above

Note: Reading the manuscript provides an answer to all questions. Correct answers may be accessed on the website, www.epilepticdisorders.com, under the section "The EpiCentre".