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Pupillary hippus in nonconvulsive status epilepticus

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ABSTRACT – We report the video recording of a patient who experienced pupillary hippus during an episode of nonconvulsive status epilepticus. [*Published with video sequences*]

Key words: coma, nonconvulsive status epilepticus, autonomic disorders, critical care

Case study

A 47-year-old man was transferred to the intensive care unit for coma. On the day after admission, he experienced a generalised tonic-clonic convulsive status epilepticus. The seizures stopped after an intravenous clonazepam bolus combined with a 20-minute phenobarbital infusion. The patient then remained stuporous with spontaneous eye opening, dysconjugate gaze, leftward gaze deviation, and ongoing pupillary hippus (*see video sequence*). The EEG (*figure 1*) showed diffuse bilateral, nonreactive, rhythmic delta activity, predominating over the right hemisphere, indicating progression to generalised nonconvulsive status epilepticus (NCSE). The patient died due to multiple organ failure.

NCSE has been reported to develop in 13% (Legriel *et al*., 2010) to 20% (Treiman *et al*., 1998) of patients after convulsive status epilepticus. Autonomic symptoms frequently accompany seizure activity (Baumgartner *et al*., 2001). NCSE results from a dysfunction of the central autonomic network which involves the insula, the medial prefrontal cortex, and other regions of prefrontal cortex interactions (Baumgartner *et al*., 2001).

Pupillary autonomic manifestations during ictal activity can be summarised by bilateral mydriasis, which is a common manifestation during generalised tonic-clonic seizures, and rarely, by myosis or unilateral

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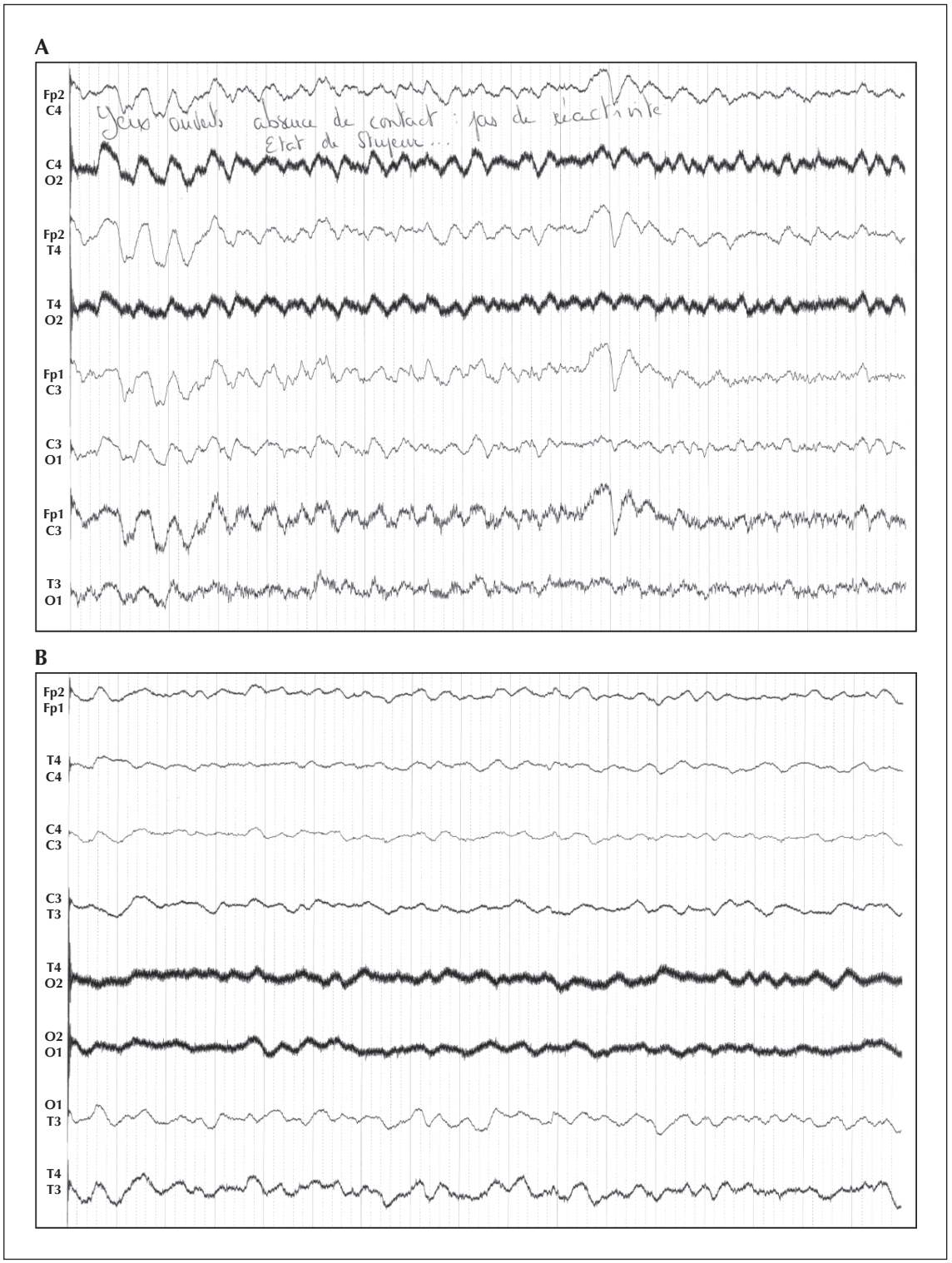

Figure 1. (A) Ictal EEG showing diffuse bilateral, non-reactive, rhythmic, delta activity, predominating over the right hemisphere, clinically associated with stupor, spontaneous eye opening, and ongoing pupillary hippus. (B) Interictal EEG displayed only generalised slowing associated with an isolated comatose state.

presentations. Pupillary hippus has been exceptionally reported to be associated with seizure activity. Pupillary hippus is defined as a continuous oscillation of pupillary diameter in the absence of light flux variations or other external stimuli (Thompson *et al*., 1971). Its pathophysiology remains under debate but seems to be related to dysregulation of pupillary motricity which is mediated by the Edinger-Westphal nucleus, the accessory parasympathetic cranial nerve nucleus of the oculomotor nerve, herein activated *via* the insula (Baumgartner *et al*., 2001; Centeno *et al*., 2011).

In addition, epileptic nystagmus is one of the hypotheses that should be formulated to explain dysconjugate gaze and leftward gaze deviation. The direction of nystagmus is usually contralateral to the epileptogenic hemisphere (Kellinghaus *et al*., 2008), which could explain in our case the leftward gaze deviation associated with a right-sided predominance of electroencephalographic ictal activity.

However, despite the variable presence of pupillary hippus during seizure activity, pupillary examination should be systematically performed in patients with status epilepticus. In this particular context, pupillary hippus may be a clinical sign alerting to the presence of NCSE and, therefore, an indication for performing an urgent EEG. □

Disclosures.
The authors have no conflicts of interest or financial support to disclose.

Legends for videosequences

The patient presented ongoing pupillary hippus after control of generalised tonic-clonic seizure activity.

Key words for video research on www.epilepticdisorders.com
Syndrome: not applicable
Etiology: not applicable
Phenomenology: status epilepticus (convulsive) ; status epilepticus (non convulsive)
Localization: not applicable

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