Epileptic Disord 2014; 16 (1): 112-5

A simple febrile seizure with focal onset

Sophie Hamelin [1,2], Laurent Vercueil [1,3]

[1] Grenoble Institut des Neurosciences, Inserm U836, Université Joseph Fourier
[2] Centre Hospitalier Pierre Oudot, Bourgoin-Jallieu
[3] Centre Hospitalier Universitaire, Grenoble, France

Received September 25, 2013; Accepted February 07, 2014

ABSTRACT – Simple febrile seizures last for less than 10 minutes and resolve spontaneously, in the context of a febrile illness, without focal features or recurrence during the subsequent 24 hours. We report the case of fortuitous video-EEG recording of a FS, clinically classified as "simple", which demonstrated a focal, temporal onset. This clinical finding is in agreement with animal model studies demonstrating focal onset. [*Published with video sequences*]

Key words: febrile seizures, video-EEG, children, epilepsy, focal seizure

Febrile seizures (FS) are considered to be "complex" if they present a focal onset or focal features during the seizure, have a prolonged duration (>10-15 minutes), or are recurrent within 24 hours of the first episode (Baram and Shinnar, 2002). In contrast, "simple" FS are generally considered to be generalised-onset seizures, and might reflect some familial genetically determined mechanisms (Berg *et al*., 1999). This dichotomy may be an oversimplification, as suggested by the present EEG recording of a focal onset in FS that would have otherwise been classified as "simple".

Case study

The patient was an 11-month-old Caucasian male who was referred to our neurophysiology unit for a programmed video-electroencephalogram (VEEG) during a nap. Two months before, he presented with two febrile seizures, without any clinical criteria for complex febrile seizures except for his young age. He was born at 41 weeks gestational age, to unrelated parents, and his early developmental milestones were normal. His mother suffered from rare generalised tonic-clonic seizures and was diagnosed with idiopathic generalised epilepsy. She is still treated with sodium valproate.

At the beginning of the VEEG recording (10-20 standards, Coherence 3NT, Deltamed, France), the patient was not considered to be febrile, or even ill. During the recording, he fell asleep and a seizure was recorded after a few minutes of sleep (*figures 1, 2 and 3*). After the recording, fever was noticed (38.8°C) and otitis was diagnosed. Fortuitous occurrence of a third simple febrile seizure during VEEG recording was identified, but antiepileptic drugs were not considered. During a follow-up of nine years, he did not present with any other seizure type (including FS) and developed normally.

Correspondence:
Sophie Hamelin
Grenoble - Institut des Neurosciences,
Centre de Recherche Inserm U 836-UJF-CEA-CHU,
Equipe 9: Dynamique des Réseaux Synchrones Epileptiques,
Université Joseph Fourier - Faculté de Médecine,
Domaine de la Merci,
38700 La Tronche, France
<sophie.hamelin@ujf-grenoble.fr>

doi:10.1684/epd.2014.0639

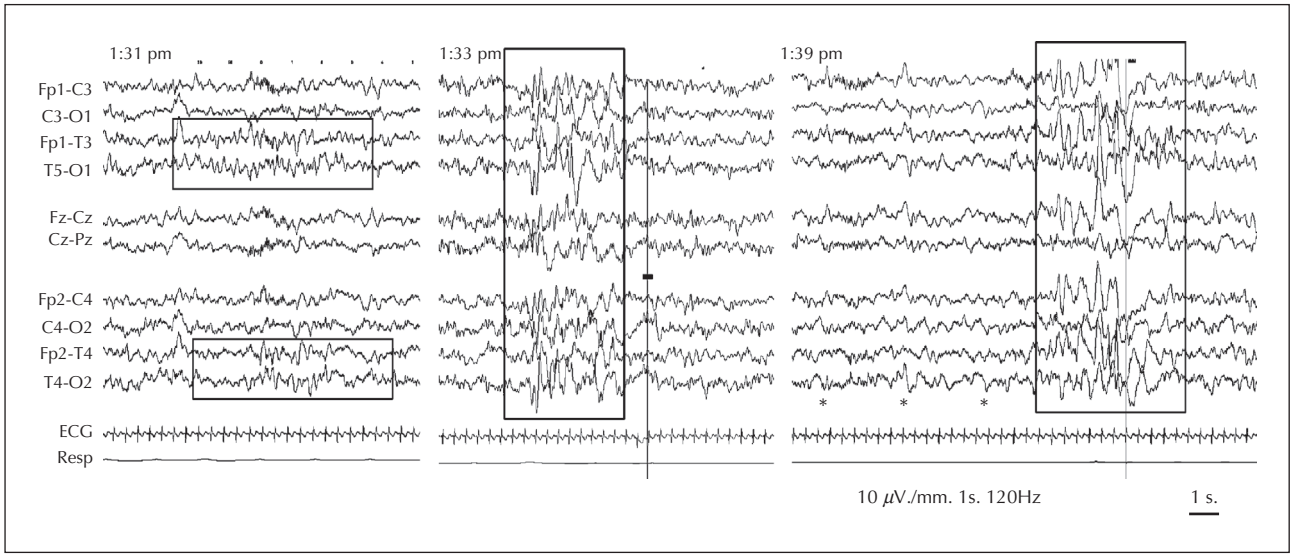

Figure 1. EEG during the build-up of the febrile seizure.
The patient fell asleep during installation. 1:31 p.m: Bursts of rhythmic theta activity involving temporal areas. 1:33 p.m: A short burst of bilateral rhythmic sharp-wave theta activity. 1:39 p.m: Delta slow waves (*) in temporal areas, predominant on the right hemisphere, and increased amplitude of a sharp-wave theta burst, associated with mild myoclonic twitches.

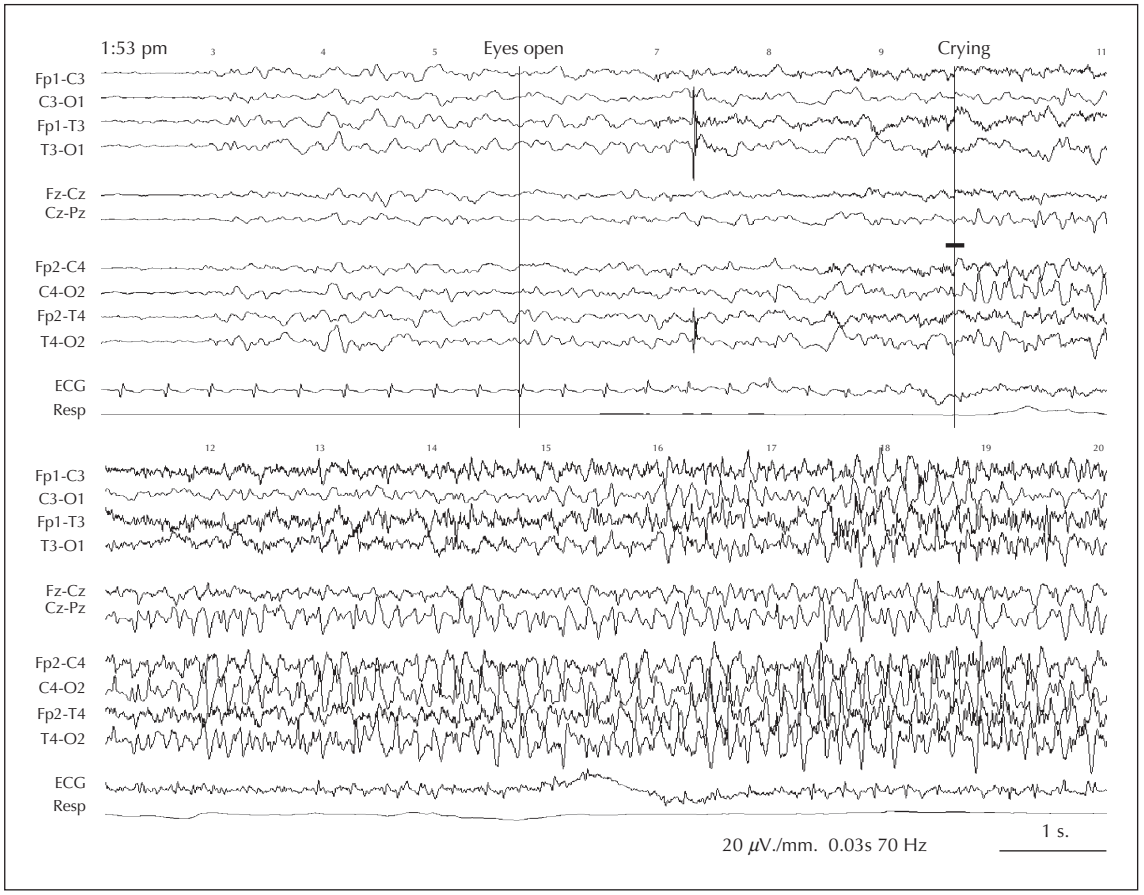

Figure 2. EEG of the febrile seizure.
1:53 p.m: Abrupt modification of EEG background activity, similar to the previously described sharp-wave theta burst, but more sustained (note changes in EEG amplitude). Three seconds later, the patient opened his eyes and began to cry. Concomitantly, an alpha-beta (10-15 Hz) rhythmic activity on the right centro-temporal region developed. Eight seconds later, this rhythmic activity diffused to contralateral regions.

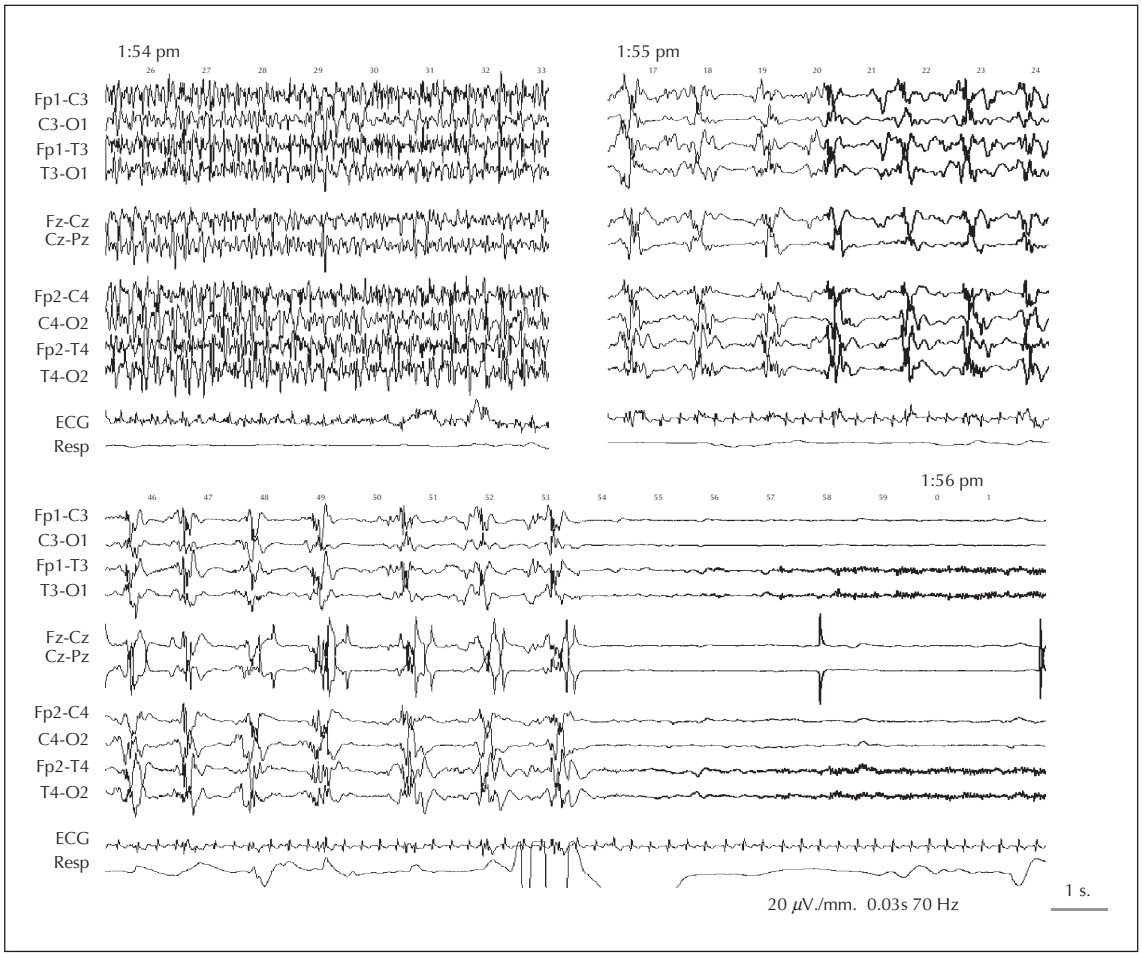

Figure 3. EEG at the end of the febrile seizure.
1:54 p.m: The epileptic discharge involved all areas, and showed a progressive decrease in frequency. 1 55 p.m: The epileptic discharge appeared fragmented, with suppressive burst. 1:56 p.m: At the end of the seizure, there was no focal slowing or depression.

Discussion

A part of this VEEG case has been previously published as an illustrative video for simple FS in the fourth edition of *Epileptic syndromes in infancy, childhood and adolescence* (Roger *et al*., 2005). However, the uniqueness of this event led us to propose a more detailed analysis of EEG and clinical features. Moreover, more than nine years after the recording, both favourable developmental outcome and absence of subsequent epilepsy confirmed the diagnosis of isolated recurrent FS. Another reason that prompted us to publish this report is that this case provides an opportunity to discuss focal versus generalised seizure types in this setting.

In this report, ictal EEG showed that a FS clinically classified as "simple" may present with a focal, temporal onset, despite the appearance of rather "bilateral" clinical symptomatology, which could wrongly suggest a "generalised" seizure (*see figures*). This report is in agreement with experimental studies which suggest an elective hippocampal susceptibility to hyperthermic seizures in rodents (Baram *et al*., 1997), and could further support the concept of a more meaningful difference between simple and complex febrile seizures based on seizure duration. Moreover, early symptomatology of FS has previously been described to be consistent with focal onset, including mesial temporal features in one clinical report (Neville and Gindner, 2010). Even though this issue does not have consequences on the way in which simple febrile seizures are treated in daily clinical practice, it would appear to be an important point that questions the physiopathology of the development of mesio-temporal lobe epilepsy.

This observation suggests that, even in the case of "simple" FS, seizures induced by a rapid rise of temperature may originate as focal (possibly hippocampal) seizures. □

Disclosures.
The authors have no conflict of interest to disclose.

Legend for video sequence

Clinically, the patient initially opened his eyes widely, immediately followed by facial myoclonic jerks, right arm elevation, myoclonic movement, left arm dystonic posturing, and crying. Ten seconds after the start of the seizure, he presented with rapid asynchronous myoclonic jerks and right head deviation. One minute later, the asynchrony between right and left myoclonic contraction was more evident. Seizure duration was 3 minutes and 30 seconds.

Key words for video research on www.epilepticdisorders.com

Syndrome: febrile seizures
Etiology: genetic predisposition
Phenomenology: head deviation; tonic posture; motor seizure (simple)
Localization: unknown

References

Baram TZ, Shinnar S. *Febrile seizures*. San Diego: Academic Press, 2002.

Baram TZ, Gerth A, Schultz L. Febrile seizures: an appropriate-aged model suitable for long-term studies. *Brain Res Dev Brain Res* 1997; 98: 265-70.

Berg AT, Shinnar S, Levy SR, Testa FM. Childhood-onset epilepsy with and without preceding febrile seizures. *Neurology* 1999; 53: 1742-8.

Neville B, Gindner D. Febrile seizures are a syndrome of secondarily generalized hippocampal epilepsy. *Dev Med Child Neurol* 2010; 52: 1151-3.

Roger J, Bureau M, Dravet C, Genton P. *Epileptic syndromes in infancy, childhood and adolescence*. Montrouge: John Libbey Eurotext, 2005.