

## DIPOLE REVERSAL

### AN ICTAL FEATURE IN A PATIENT WITH BENIGN PARTIAL EPILEPSY OF CHILDHOOD WITH CENTROTEMPORAL SPIKE

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**SUMMARY** - We describe the case of a 15-year-old boy who had the diagnosis of benign partial epilepsy of childhood with centrotemporal spike. During the EEG a subclinical electrographic seizure was recorded. The discharges were clearly electropositive in T4 with positive phase reversal between derivations F8-T4 and T4-T6. The whole episode lasted less than one minute (45 sec). The interictal right medio-temporal spikes reemerged after 60 sec and were electronegative in the same location after the end of the electrographic seizures. The mechanisms underlying this uncommon pattern on EEG is not well established.

**KEY WORDS:** EEG, dipole reversal, benign partial epilepsy of childhood with centrotemporal spike.

#### **Reversão de dipolo: um achado crítico em um paciente com epilepsia parcial benigna da infância com ponta centrotemporal**

**RESUMO** - Relatamos o caso de um menino de 15 anos com o diagnóstico de epilepsia parcial benigna da infância com ponta centrotemporal. Durante o EEG uma crise eletrográfica subclínica foi gravada. As descargas estavam eletropositivas em T4 com reversão de fase positiva entre as derivações F8-T4 e T4-T6. O episódio durou menos que um minuto (45 seg). As espículas inter-ictais, na região temporal média direita, reapareceram 60 seg após e estavam eletronegativas na mesma região depois do término da crise eletrográfica. O mecanismo subjacente a este padrão incomum no EEG não está bem estabelecido.

**PALAVRAS-CHAVE:** EEG, reversão de dipolo, epilepsia parcial benigna da infância com ponta centrotemporal.

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During the last years an epileptic syndrome, associated with rolandic spikes, was recognized and it is known as benign partial epilepsy of childhood with centro-temporal spikes (BECT)<sup>7</sup>, also termed benign rolandic epilepsy<sup>17</sup>. There are few reports in the literature during the ictal phase<sup>5,6,12,15</sup> and only one paper during a diurnal seizure<sup>13</sup>. We are aware of four publications of BECT during a "status epilepticus"<sup>3,5,9,16</sup> and of one case with ictal dipole reversal<sup>12</sup>.

We report an ictal feature on the EEG with dipole reversal in BECT.

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Fig 1. Dipole reversal at T4 during an electrographic seizure with positive phase reversal between channels 6 and 7.

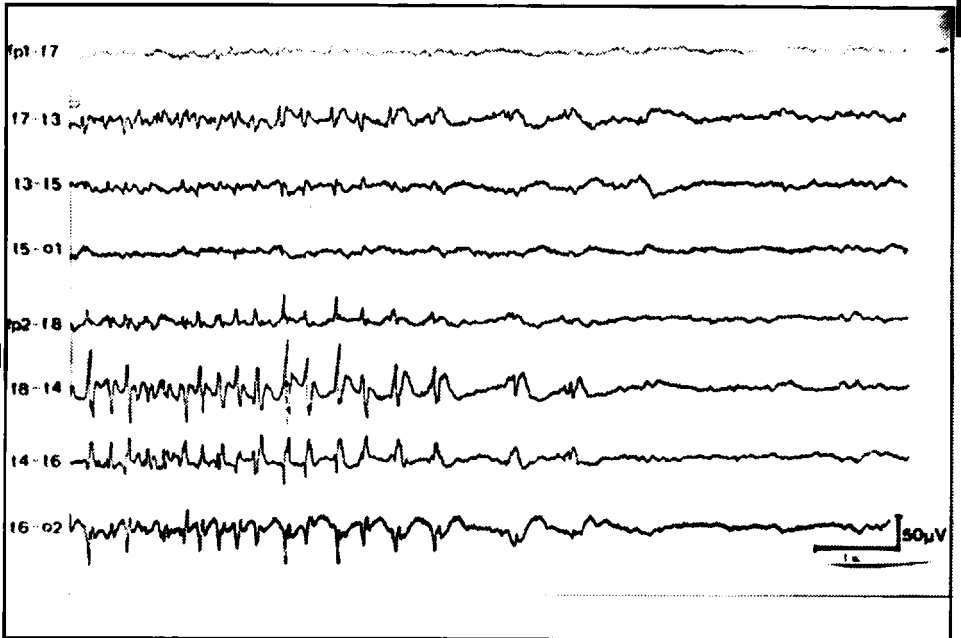


Fig 2. The end of the electrographic seizure without post-ictal slowing.

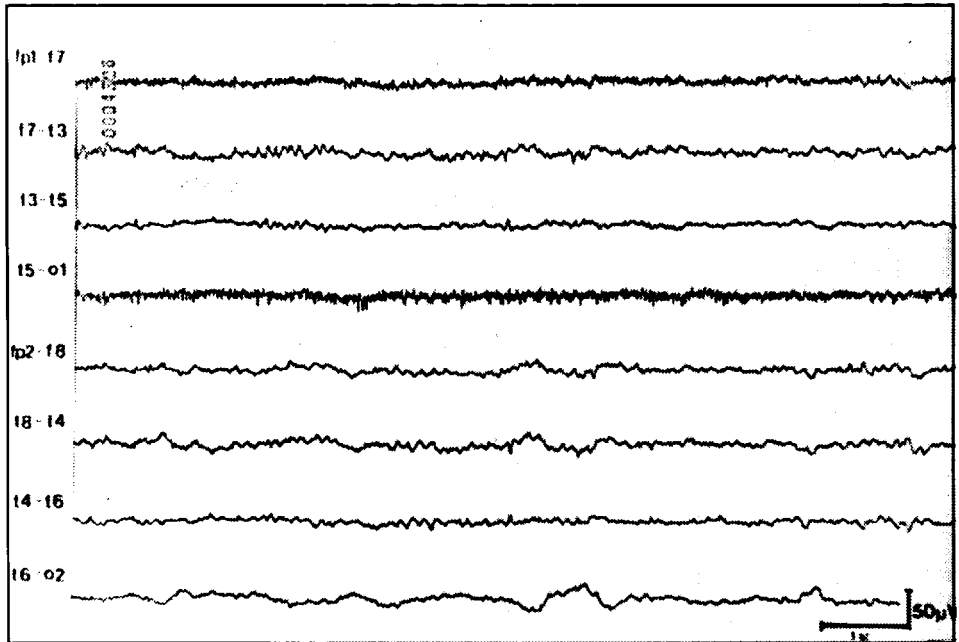


Fig 3. Just after the end of the electrographic seizure the electropositive phase reversal becomes electronegative at the same region.

## CASE REPORT

FGS, a 15-year-old boy had onset of seizures at the age of 7 years. The antenatal and birth histories had been unremarkable. There was no history of consanguinity or family history of seizures. Psychomotor development was normal. Physical and neurological examination were also normal. The seizures were essentially nocturnal. In general, he was awakened by the seizures and they consisted of speech arrest; he was unable to talk, accompanied by twitching of the left side of the face and hypersalivation, the whole attack lasting a few minutes. Their frequency was 2 to 3 a year. Phenobarbital was prescribed, 100mg/day.

A conventional EEG (CEEG) was recorded for 30 min with the child awake and showed a normal background activity with an alpha rhythm of 10 Hz and 40-50  $\mu$ V in amplitude and symmetrical posterior distribution. During the exam a subclinical electrographic seizure was recorded (Figs 1 and 2). It began with a continuous paroxysmal discharge characterized by spikes in the right medio-temporal area with spread to the whole ipsi and contralateral hemisphere, with no postictal slowing. The discharges were clearly electropositive in T4 with positive phase reversal between derivations F8-T4 and T4-T6 (Fig 1). The whole episode lasted less than one minute (45 sec). The interictal right medio-temporal spikes reemerged after 60 sec and were electronegatives (Fig 3). No clinical seizure was observed during this electrographic seizure. Computed tomography scan was normal.

## COMMENTS

Several authors have reported that the rolandic spike has a bipolar potential field in children with BECT. Gibbs and Gibbs<sup>10</sup> described that rolandic spikes "spread" as positive spikes to the frontal region. Faure and Loiseau<sup>8</sup> and Sorel and Rucquoy-Ponsar<sup>18</sup> concluded from 16-channel and 24-channel EEG recordings, respectively, that a positive potential field in the frontal region occurs simultaneously with the negative potential field of the rolandic spike. Blume<sup>2</sup> also described that the typical dipoles have a surface negative end at the midtemporo-central location and a surface positive end at the frontopolar area.

Although this form of epilepsy is frequent in childhood, few records during an ictal phase have been reported<sup>1,6,9,16</sup> and we are aware of only one paper with reversal dipole<sup>12</sup>. The pattern on EEG of our patient is different of that described by Gutierrez et al.<sup>12</sup>. In our case the field of the ictal discharges was electropositive in T4 but there was no postictal slowing. Lerman<sup>13</sup> first reported a diurnal seizure but without a reversal dipole.

It is interesting that the ictal electropositive spikes became electronegative in the same location after the end of the electrographic seizure (Fig 3). The mechanisms underlying this uncommon pattern on EEG is not well established<sup>4,11,12,14</sup>. The explanation of this dipole reversal may be geometric. It is possible that the orientation of the electrical generators in the sylvian fissure to the cortex may explain this picture. When the neuronal discharge occurs in regions that are buried in the rolandic area we may not record the negative but only the positive spikes, that is to say, the positive end of the enfolded dipole.

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