Seizure 19 (2010) 368–372

Contents lists available at ScienceDirect

Seizure

journal homepage: www.elsevier.com/locate/yseiz

Case report

Gastaut type-idiopathic childhood occipital epilepsy and childhood absence epilepsy: A clinically significant association?

Alberto Verrotti [a,*], Giangennaro Coppola [b], Claudia D'Egidio [a], Pasquale Parisi [c], Francesco Chiarelli [a]

[a] Department of Paediatrics, University of Chieti, Via dei Vestini 5, 66100 Chieti, Italy
[b] Department of Child Neuropsychiatry, University of Naples, Naples, Italy
[c] Chair of Paediatrics, II Faculty of Medicine, Sapienza University, Rome, Italy

ARTICLE INFO

Article history:
Received 29 December 2009
Received in revised form 10 March 2010
Accepted 9 April 2010

Keywords:
Idiopathic occipital epilepsy
Childhood absence epilepsy
EEG

ABSTRACT

We report an unusual association between idiopathic occipital epilepsy and childhood absence epilepsy in 2 pediatric patients. At first clinical and electroencephalographic evaluation, the patients presented the peculiar signs of idiopathic occipital epilepsy Gastaut type: focal sensory visual seizures, migraine-like symptoms (only in one patient) and unilateral spike–wave discharges over occipital regions. Both children were treated with valproic acid and their seizures were rapidly controlled. After a seizure-free period, the patients presented typical absence with ictal electroencephalographies showing 3 cycles/s generalized and symmetrical spike–wave complexes. We discuss the possible association between these two epileptic syndromes and its common pathophysiological mechanisms.
© 2010 British Epilepsy Association. Published by Elsevier Ltd. All rights reserved.

1. Introduction

Gastaut type-idiopathic childhood occipital epilepsy (G-ICOE) or idiopathic childhood occipital epilepsy of late onset is a rare epileptic syndrome often with onset ranging from 3 to 15 years with a mean around 8 years of age. It is a pure form of idiopathic occipital epilepsy, included among the idiopathic focal epilepsies in childhood[1] with an uncertain long-term prognosis.[2–6] Seizure is purely occipital, frequent, brief and diurnal. They comprise simple partial seizures characterized by initial visual hallucinations (phosphenes and/or ictal blindness and illusions); ictal or postictal migraine headaches occur in half of the patients. Impairment of consciousness is rare unless associated with hemi-clonic or generalized convulsions.[7] Interictal electroencephalographies (EEGs) reveal occipital spike–wave paroxysms that attenuate when the eyes are opened.[3,5] The prognosis is unclear, although available data indicate that remission occurs in 50–60% of patients within 2–4 years from onset. However, 40–50% of patients may continue to have visual seizures and infrequent secondary generalized tonic-clonic seizures, particularly if they have not been appropriately treated.[2]

Rarely, atypical evolutions to epilepsy with continuous spike–waves during slow wave sleep with cognitive deterioration have been reported.[8]

To best of our knowledge, only 8 cases of G-ICOE with an unusual association to childhood absence epilepsy (CAE), appeared either at the different times after the onset of occipital seizures or concomitantly, have been previously reported in the literature,[8–10] and it has been suggested a possible relationship between G-ICOE and CAE.

We report other 2 patients who initially suffered from clinical and electroencephalographic features of G-ICOE, and, successively, they presented CAE.

Our aim is to report the association between G-ICOE and CAE in the same patients, in order to give a contribution to the knowledge of potential link between these two syndromes.

2. Case report 1

A 6.8-year-old male child was referred to Department of Pediatrics, University of Chieti, for visual hallucinations with impairment of consciousness. He was born at 40 weeks after an uneventful pregnancy and normal vaginal delivery, with an Apgar score of 9 at both 1′ and 5′. Psychomotor development was normal. His personal medical history was negative for other paroxysmal neurological phenomena and positive for two episodes of simple febrile seizures. He was the second child of parents who were not consanguineous. His 10.2-year-old brother was well. No other members of the family were affected by epilepsy and there was no family history of neurological diseases, except for paternal febrile seizures.

During hospitalization, he presented many episodes of visual seizures, such as elementary and complex visual hallucinations, visual illusion, blindness or partial loss of vision, sensory hallucinations, and/or deviation of the eyes associated with ipsilateral turning of the head, at times followed by impairment

* Corresponding author. Tel.: +39 09871 358015; fax: +39 0871 574831.
E-mail address: averrott@unich.it (A. Verrotti).

1059-1311/$ – see front matter © 2010 British Epilepsy Association. Published by Elsevier Ltd. All rights reserved.
doi:10.1016/j.seizure.2010.04.010

of the consciousness and/or hemiconvulsions, generalized tonic-clonic seizures, and migraine-like symptoms. Interictal EEG demonstrated high-amplitude occipital spikes or spike–waves, on right hemisphere, reactive or not to eye opening; sometimes, occipital paroxysms were activated by intermittent photic stimulation (IPS) (Fig. 1a). Neurological examination and brain MRI were normal; moreover, celiac disease was excluded by the evaluation of anti-tissue transglutaminase antibodies and anti-endomysium antibodies.

We started therapy gradually with valproic acid (VPA) and after 4 weeks from the beginning of therapy the patient reached the dosage of 30 mg/kg/day. After 6 months from the beginning of VPA therapy, he was seizure-free, and his EEG showed no epileptiform activity (Fig. 1b).

In the next 2 years, the patients continued to be seizure-free and the EEG persisted normal; therefore, after 2 years from the beginning of VPA therapy, the patient stopped the treatment.

After 1 year from the withdrawal of the therapy the patient presented a typical absence seizure.

The onset of episode was abrupt and characterized by severe impairment of consciousness with complete loss of awareness. The child stopped talking and walking and remained motionless with vacant eyes staring upwards. He was totally unresponsive from the onset to the end of the terminal phase of the discharge. The attack ended abruptly and the child was unaware of the episode, resuming pre-ictal activity as if nothing had happened. The duration of seizure was around 8–12 s. Many other episodes occurred during the new hospitalization and an increased incidence of seizures in the evening was observed. The seizures duration ranged from 4 to 10 s. Ictal EEG (Fig. 2a) showed generalized, high-amplitude spike–wave activity at 3 Hz, with a regular rhythm of the discharge and well-formed spikes which retained a constant relation with the slow-waves. A normal background activity was present; typical attacks were provoked by prolonged hyperventilation while the response to IPS was not found. Sleep EEG was normal (Fig. 2b).

Ethosuximide (ETS) was prescribed at the dosage of 32 mg/kg/day, and in the next days absence seizures disappeared.

At his last examination, after 12 months from the beginning of ETS therapy, he was seizure-free and his EEG was normal.

3. Case report 2

A 7.5-year-old male child, born from non-consanguineous healthy parents, was referred to Department of Child Neuropsychiatry, University of Naples, for visual seizures. He was born at full-term after an uneventful pregnancy and delivery, and his Apgar scores were 8 and 10 at 1′ and 5′ respectively. Psychomotor milestones were reported as normal and his past medical history was unremarkable.

The child manifested visual symptoms including brief episodes of blindness affecting one or both eyes (“I cannot see anything in the lower part in front of me”), or, on occasion, isolated white spots and coloured strings in both eyes. Wake EEG recordings showed synchronous or unilateral brief spike–wave discharges in the parietal-occipital regions, sometimes blocked by eye opening. Neurological examination and brain MRI were normal and celiac disease was ruled out.

Treatment with VPA (20 mg/kg/day) was undertaken and seizures were well controlled. At the age of 9 and a half years, treatment was withdrawn because of gastric pain and hypertransaminasemia associated with drug therapy.

After VPA was withdrawn, the patient remained seizure-free for 4 months, at which point recurrent brief episodes of staring and unresponsiveness, together with head and eye turning to one side appeared.

At the age of 9.9 years, brief episodes of absence characterized by fixed gaze, a brief upward rotation of the eyes, interruption of ongoing activities and wake EEG recording showed typical absence seizures associated with 3 cycles/s. Generalized and symmetrical spike–wave complexes lasting about 6–8 s. Visual hallucinations were not reported anymore.

Presently, absence seizures are completely controlled by ETS (25 mg/kg/day); and after 1 year of follow-up, the patient is seizure-free and his cognitive and neurological examination are within normal range.

4. Discussion

These two patients suggest a relationship between G-ICOE and CAE. In fact, these patients presented typical clinical and electroencephalographic signs of G-ICOE, with seizures starting with visual symptoms, sensory hallucinations, and/or deviation of the eyes associated with ipsilateral turning of the head and migraine-like symptoms. It is interesting that in both cases CAE appeared isolated: in the first case CAE appeared after 1 year from VPA withdrawal, while in the second case a few months after the withdrawal of the VPA therapy. Both patients exhibited a seizure-free period between the two types of epilepsy: specifically, the first patient showed a seizure-free period of 36 months, while the second patient had a shorter seizure-free period (4 months).

The association between G-ICOE and CAE has been previously reported by Caraballo et al.,[9,10] who describe 8 cases of idiopathic occipital seizures and CAE in the same children. Indeed, in one paper[10] they reported 6 cases of G-ICOE and CAE appearing in the same children. Five of them presented G-ICOE and the other one suffered from Panayiotopoulos type childhood occipital epilepsy. The patients with G-ICOE exhibited the following ictal manifestations: focal sensory visual seizures in all five children, with positive symptomatology in three and negative in two, followed by hemiclonic seizures in four patients and versive tonic deviation of the eyes in one patient. All of them presented migraine-like episodes.

Three of these children presented both syndromes at the same time, while the other three had typical absence after 1 year from the onset of I-GCOE. In a subsequent paper,[9] the same authors reported 2 girls and 1 boy with clinical and EEGs of G-ICOE, showing an unusual evolution. Interictal EEG showed bilateral occipital spike–wave activated by eyes closing. In two patients, the occipital seizures had been immediately followed by typical absences, since the onset of I-GCOE; in the other patient, the absences appeared 5 months after onset of occipital epilepsy. Ictal EEG showed irregular bilateral spike–wave discharges during the visual symptoms, followed by generalized spike–wave activity during the typical absences.

Our two cases are interesting because they present CAE after the disappearance of G-ICOE, while in the patients reported by Caraballo et al.[9] the ictal EEG showed CAE appearing immediately after bilateral occipital spike–wave discharges.

It is difficult to determine if this unusual evolution is due to a close genetic relationship between G-ICOE and CAE, or if these electroclinical features represent two types of idiopathic epileptic syndromes that appear in the same patient casually. If they shared a strong genetic link, case reports of their co-occurrence in the same subject surely would not be so rare. It is most unlikely that a common, genetically transmitted mechanism is responsible for these two epileptic conditions, as has been previously suggested.[11]

Similarly, there are other possible associations between focal epilepsies and CAE. In particular, Gambardella et al.[12] reported 3 children who experienced CAE 1–4 years after recovering from an electroclinical picture characteristic of idiopathic localization-related epilepsies (ILRE). Their cases showed centrotemporal, frontal and early onset occipital paroxysms respectively. More-

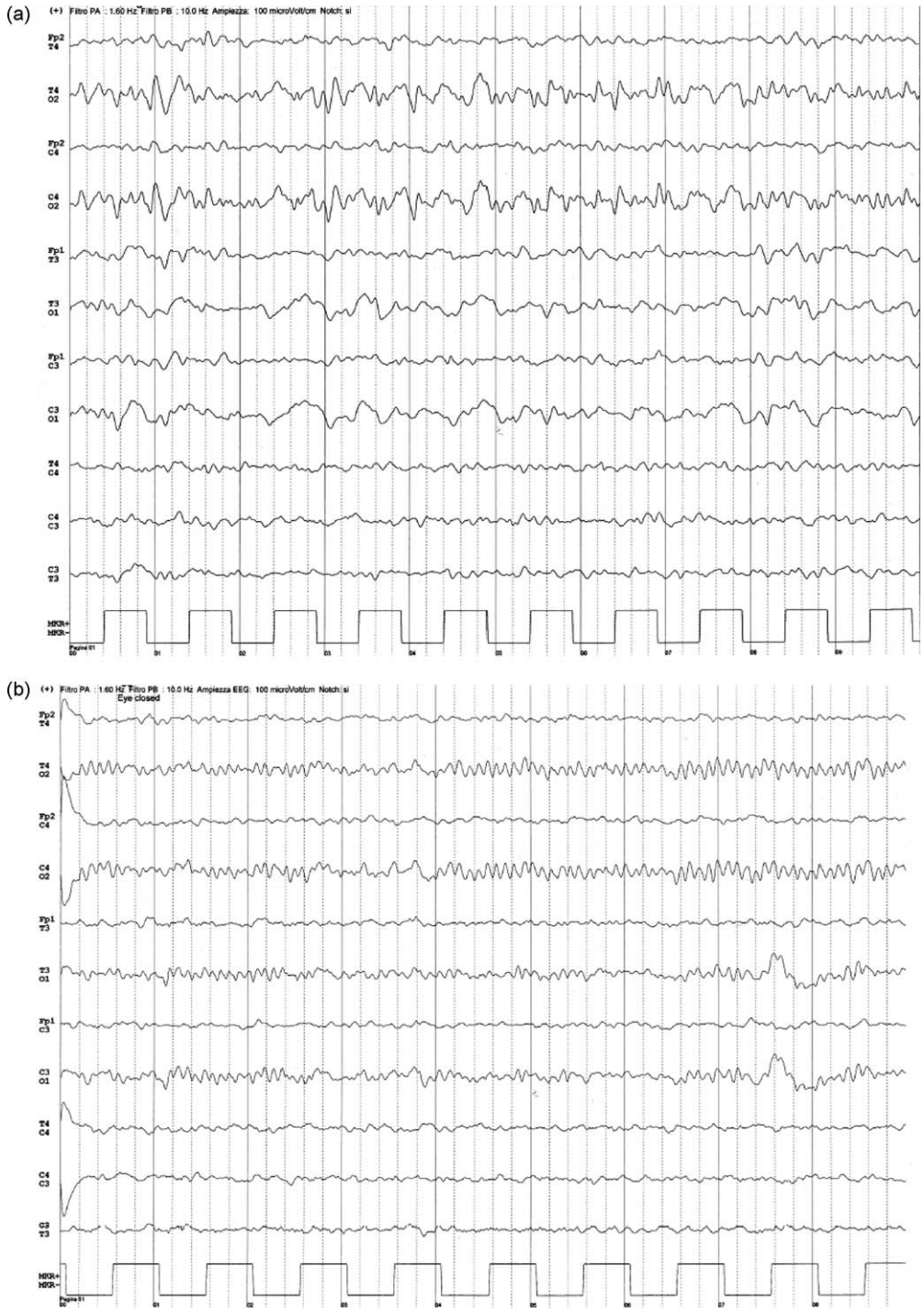

Fig. 1. (a) Interictal EEG showing occipital paroxysm on right derivations when the eyes are closed. (b) Normal interictal EEG at 6 months follow-up from the beginning of VPA therapy.

over, Echenne et al.[13] reported two cases of simultaneous occurrence in two families with typical absence seizures and apparently ILRE, but few details are given. Finally, Agathonikou et al.[14] described 2 cases of benign epilepsy with centrotemporal spikes later manifesting with CAE and generalized tonic-clonic seizures. The occurrence of typical generalized 3 Hz spike-and-wave discharges has led to speculation about a neurobiologic and genetic continuum between CAE and benign focal epilepsies[11] and our cases seem to support the probability of this continuum.

To date, it is still unknown if CAE and idiopathic focal epilepsies are distinct in etiology.[11] An autosomal dominant pattern for the EEG abnormalities, with age-dependent expression and variable penetrance of the seizure disorder has been proposed.[15] Recently, Caraballo et al.[9] have suggested that the atypical evolution of G-ICOE may be due to secondary bilateral synchrony: a thalamo-cortical mechanism may be involved.[16] However, ictal single-photon emission computed tomography in absence seizure may reveal the neuronal mechanisms involved, indicating a different origin.[17] Focal seizures and absences may be combined so that when the basal ganglia are activated, focal or generalized seizures may arise, and when the thalami are activated, absence seizures may be triggered.[17]

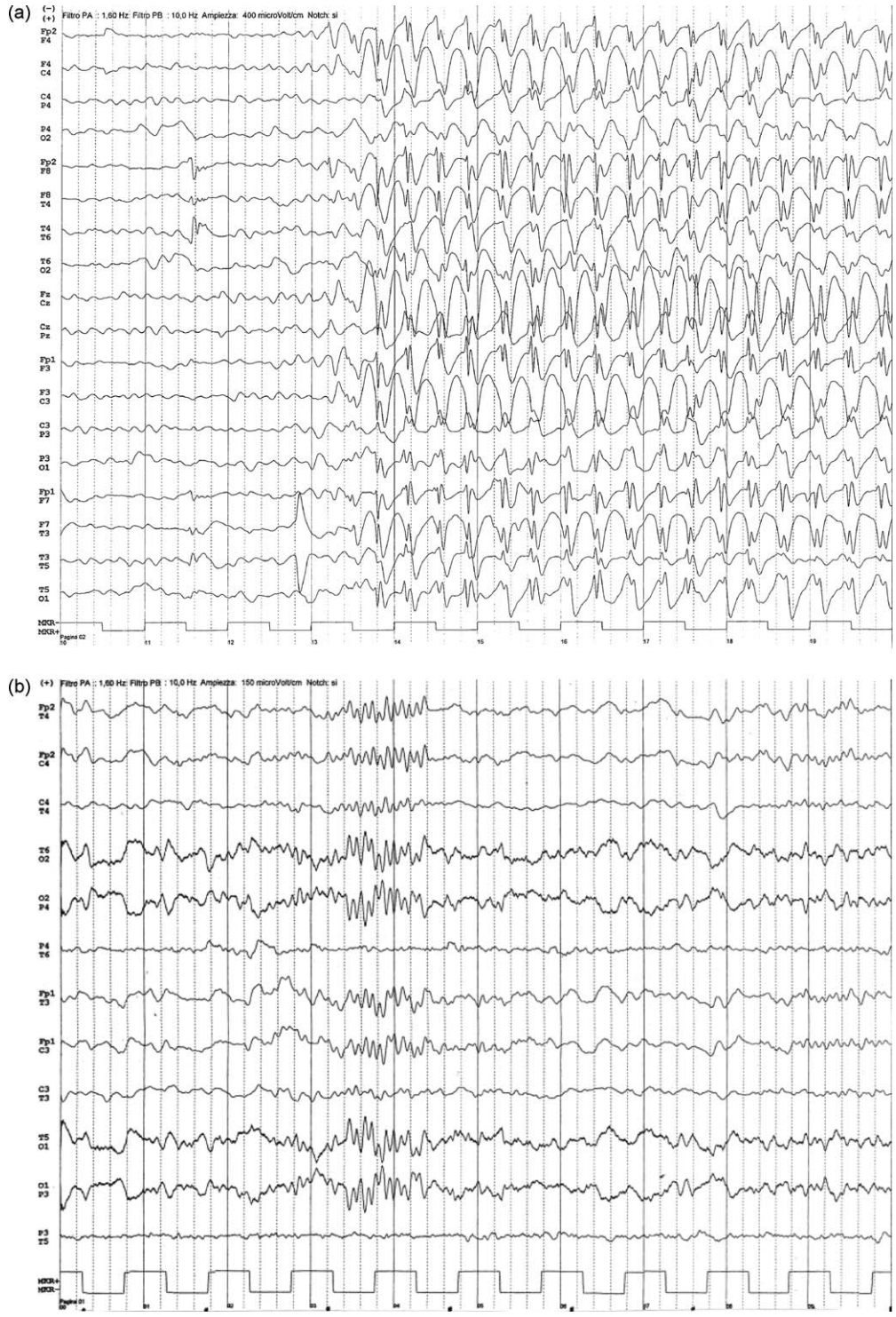

Fig. 2. (a) The ictal EEG showing generalized spike–wave activity during a typical absence, after 3 years from onset of G-ICOE. (b) Sleep EEG characterized by slow wave activity and typical spindles.

Koutroumanidis et al.[18] proposed another possible mechanism for the focal trasformation of generalized discharges and seizures, based on the well-accepted concept of uneven (nonlocalized focal or regional) cortical hyperexcitability and the relevant EEG; they hypothesize that existing hyperexcitable cortical areas or systems may continue firing independently after the inhibition of diffuse/generalized cortico-thalamic oscillations.

Our cases imply the possibility of a link between G-ICOE and CAE; because CAE appears after recovering from G-ICOE, they suggest the existence of unknown mechanisms that could explain the relationship between these two syndromes.

In conclusion, our experience confirms that the existence of a link between I-GCOE and CAE must be considered, because it is possible to observe the occurrence of CAE in patients with I-GCOE, despite the fact this occurrence seems very uncommon and its precise delineation is still unclear. Hence, larger population based studies are needed to assess the prevalence of CAE in patients with I-GCOE.

References

1. Engel Jr J. Classification of epileptic disorders. *Epilepsia* 2001;**42**:316.
2. Panayiotopoulos CP. *Benign childhood partial seizures and related epileptic syndromes*. London: John Libbey & Company Ltd.; 1999.
3. Gastaut H. A new type of epilepsy: benign partial epilepsy of childhood with occipital spike–waves. *Clinical Electroencephalography* 1982;**13**:13–22.
4. Gastaut H, Zifkin BG. Benign epilepsy of childhood with occipital spike and wave complexes. In: Andermann F, Lugaresi E, editors. *Migraine and epilepsy*. Boston: Butterworths; 1987. p. 47–81.
5. Gastaut H, Roger J, Bureau M. Benign epilepsy of childhood with occipital paroxysms. Up-date. In: Roger J, Bureau M, Dravet C, Dreifuss FE, Perret A, Wolf P, editors. *Epileptic syndromes in infancy, childhood and adolescence*. London: John Libbey & Company Ltd.; 1992. p. 201–17.
6. Chahine LM, Mikati MA. Benign pediatric localization-related epilepsies. *Epileptic Disorders* 2006;**8**:243–58.
7. Panayiotopoulos CP. *Panayiotopoulos syndrome: a common and benign childhood epileptic syndrome*. London: John Libbey & Company Ltd.; 2002.
8. Tenembaum S, Deonna T, Fejerman N, Medina C, Ingvar-Maeder M, Gubser-Mercati D. Continuous spike–waves and dementia in childhood epilepsy with occipital paroxysms. *Journal of Epilepsy* 1997;**10**: 139–45.
9. Caraballo RH, Cersósimo RO, Fejerman N. Late onset, ''Gastaut type'', childood occipital epilepsy: an unusual evolution. *Epileptic Disorders* 2005;**7**: 341–6.
10. Caraballo RH, Sologuestua A, Grañana N, Adi JN, Cersósimo RO, Mazza E, et al. Idiopathic occipital and absence epilepsies appearing in the same children. *Pediatric Neurology* 2004;**30**:24–8.
11. Gelisse P, Genton P, Bureau M, Dravet C, Guerrini R, Viallat D, et al. Are there generalised spike waves and typical absences in benign rolandic epilepsy? *Brain & Development* 1999;**21**:390–6.
12. Gambardella A, Aguglia U, Guerrini R, Morelli F, Zappia M, Quattrone A. Sequential occurrence of benign partial epilepsy and childhood absence epilepsy in three patients. *Brain & Development* 1996;**18**:212–5.
13. Echenne B, Rivier F, Roubertie A, Touzery A, Humbertclaude V. Simulteneous occurrence of benign partial epilepsy and childood absence epilepsy: report of 2 cases in 2 families. *Epilepsia* 1997;**38**:S120.
14. Agathonikou A, Panayiotopoulos CP. Benign partial epilepsy with centrotemporal spikes and idiopathic generalized seizures. *Epilepsia* 1996;**37**:S86.
15. Kuzniecky R, Rosenblatt B. Benign occipital epilepsy: a family study. *Epilepsia* 1987;**28**:346–50.
16. Tenembaum S, Deonna TW, Fejerman N, Medina C, Ingvar-Maeder M, Gubser-Mercati D. Continuous spike–waves and dementia in childhood epilepsy with occipital paroxysms. *Journal of Epilepsy* 1991;**10**:139–45.
17. Iannetti P, Salice A, De Luca F, Boemi S, Festa A, Maini CL. Ictal single photon emission computed tomography in absence seizures: apparent implication of different neuronal mechanisms. *Journal of Child Neurology* 2001;**16**:339–44.
18. Koutroumanidis M, Tsiptsios D, Kokkinos V, Lysitsas K, Tsiropoulos I. Generalized spike–wave discharges and seizures with focal ictal transformation: mechanisms in absence (CAE) and myoclonic (JME) IGEs. *Epilepsia* 2009;**50**:2326–9.