

Case Report

Long-term surgery outcome for epilepsy and psychogenic nonepileptic seizures in a child with anterior cingulate gyrus dysplasia

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ABSTRACT

We present the case of a 13-year-old child with nocturnal frontal lobe epilepsy (NFLE) related to a right cingulate gyrus cortical dysplasia, who also presented with psychogenic nonepileptic seizures (PNES) and interictal antisocial behavior. The association of drug-resistant epilepsy with behavioral disorders is well established, but the role of epilepsy surgery in these patients is still controversial, especially in children. The key finding is represented by the excellent long-term outcome on both epilepsy and behavioral dysfunction after the surgical excision of the cingulate gyrus cortical dysplasia.

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1. Introduction

Nocturnal frontal lobe epilepsy (NFLE) is a peculiar form of focal epilepsy in which seizures occur almost exclusively during sleep. Ictal manifestations suggesting frontal lobe involvement are characterized by sustained asymmetric dystonic posture or bizarre motor behavior, with the latter being possibly the expression of lack of cortical inhibition on subcortical structures [1]. Nocturnal frontal lobe epilepsy can have a structural etiology and/or a genetic basis, as in the autosomal-dominant frontal lobe epilepsy. Seizure outcomes can be variable in NFLE: around 30% of patients present with seizures that are resistant to carbamazepine or to other antiepileptic drugs, particularly those with more complex motor attacks, but resective surgery in these patients can lead to an excellent outcome, with up to 75% of patients becoming seizure-free [2]. We present the case of a 13-year-old child with NFLE related to a right cingulate gyrus cortical dysplasia, who also presented with psychogenic nonepileptic seizures (PNES) and interictal antisocial behavior. The association of drug-resistant epilepsy with behavioral disorders is well established, but the role of epilepsy surgery in these patients is still controversial, especially in children. We present and discuss the excellent long-term outcome on both epilepsy and behavioral

dysfunction in this patient after the surgical excision of the cingulate gyrus cortical dysplasia.

1.1. Case report

A 13-year-old right-handed boy was referred to our epilepsy clinic for a presurgical evaluation in the context of drug-resistant epilepsy. His perinatal life was uneventful, presenting with normal developmental milestones. He had no personal or familial history of febrile convulsions or epilepsy. At three years of age the child experienced his first seizure, characterized by lifting of the trunk, staring, vocalization, and pedaling movements, of a very short duration. Carbamazepine was started soon after the occurrence of further seizures. Despite trials of many antiepileptic drugs (AEDs) given at appropriate doses with the drug plasma levels within the reference ranges, the child developed drug-resistant epilepsy with multiple seizures per night. At the age of 13, he also started to present with daily episodes with similar clinical features, i.e., vocalization and pedaling movements, but with longer duration and waxing and waning motor phenomena. These episodes occurred weekly and were sometimes preceded by headache or abdominal pain and then followed by psychomotor agitation and aggressiveness towards others. The patient also developed interictal antisocial and aggressive behavior, which required neuropsychiatric evaluation and psychological and psychopharmacological treatments. At admission to our center, the patient's therapy included carbamazepine (1000 mg/day), topiramate (200 mg/day), clobazam 30 mg/day, and chlorpromazine (36 mg/day).

Abbreviations: AEDs, antiepileptic drugs; FCD, focal cortical dysplasia; NFLE, nocturnal frontal lobe epilepsy; PNES, psychogenic nonepileptic seizures.

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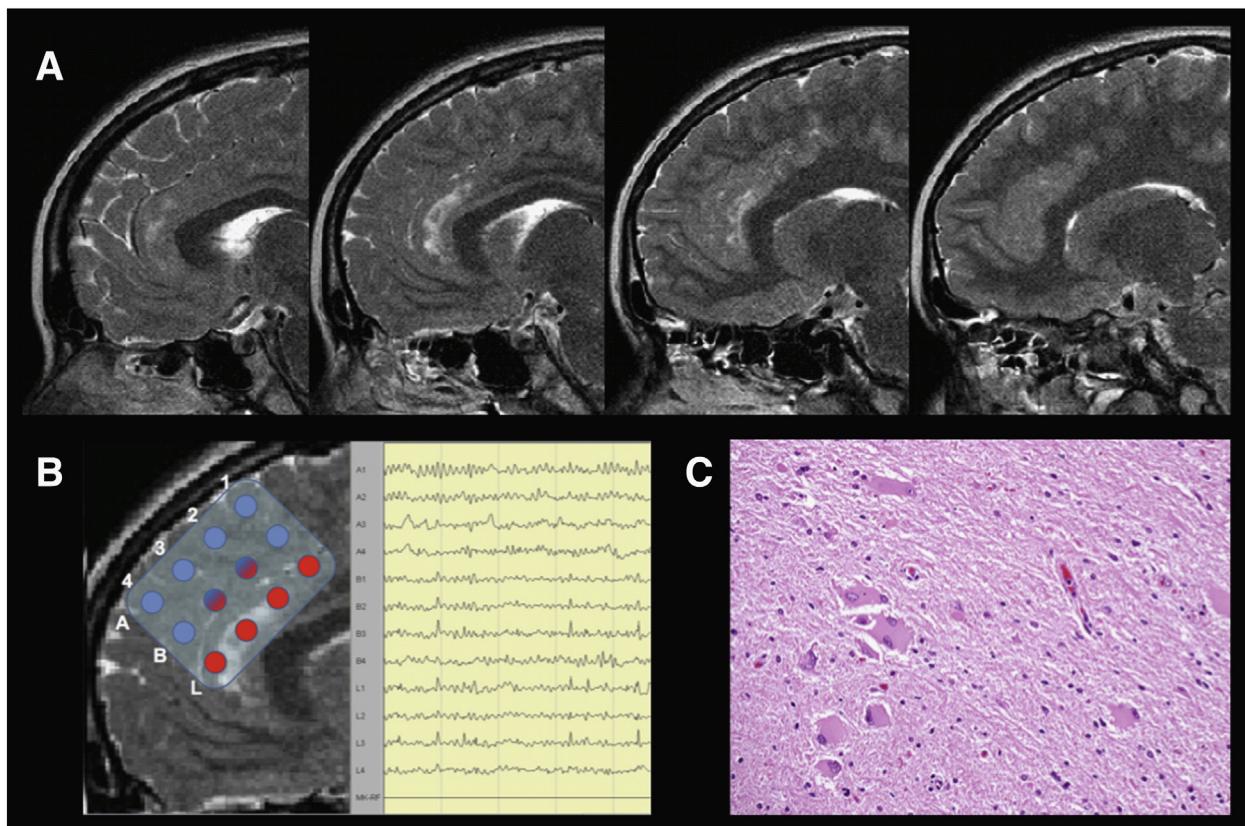


Fig. 1. Neuroradiological, electrophysiological, and pathological images of the focal cortical dysplasia are illustrated. A) Sagittal T2 FLAIR MRI sections show right anterior cingulate gyrus dysplasia characterized by increased subcortical white matter signal and blurring between gray matter and white matter. B) Intraoperative electrocorticography recorded frequent spikes recorded by the electrodes placed over the lesion. C) Pathological specimen showed enlarged dysmorphic neurons with a huge nucleus and abnormal intracytoplasmic Nissl aggregates and balloon cells characteristic of focal cortical dysplasia type IIb.

Neurological examination was normal. The patient underwent a prolonged video-EEG monitoring, which confirmed the coexistence of sleep-related epileptic seizures with hypermotor semiology originating from right frontal regions (Supplementary video 1), and daytime psychogenic nonepileptic seizures (PNES), defined by different semiological features, longer duration, and absence of EEG alterations (Supplementary video 2). Psychogenic nonepileptic seizures could be both triggered and stopped by suggestion procedures (Supplementary video 3). Brain MRI at 3T showed a lesion in the anterior part of the right cingulate gyrus compatible with focal cortical dysplasia (FCD). In agreement with the patient and his parents, the dysplastic right anterior cingulate gyrus was surgically removed; pathological diagnosis was FCD with dysmorphic neurons and balloon cells (FCD type IIb) (Fig. 1). The patient is now 17 years old: at five years of follow-up, he is free from both epileptic seizures and PNES (Engel class IA), and the behavioral disturbance has completely resolved. The pharmacological treatment has been progressively simplified, in particular chlorpromazine, clobazam, and topiramate have been withdrawn, and carbamazepine has been reduced to 600 mg/day.

2. Discussion

This case illustrates the coexistence of hypermotor seizures, PNES, and interictal antisocial behavior in a child with a cortical dysplasia located in the right anterior cingulate gyrus. The key finding is that all of these disorders showed a good outcome after the surgical excision of the epileptogenic zone.

A first discussion point concerns the presence of hypermotor seizures due to anterior cingulate cortex FCD. In this respect, the case

is paradigmatic for the ictal semiology [1,2], for the MRI findings, and, finally, for the surgical outcome. Indeed, it is now well established that surgical outcomes in patients with type IIb FCD are excellent, with up to 75% becoming seizure free.

Differential diagnosis between PNES and epileptic seizures, in particular with a medial frontal onset, can be challenging because both of them may consist of bizarre movements and both may share an uninterpretable EEG due to movement-related artifacts. In this case, video-EEG recordings allowed a clear distinction of hypermotor seizures from PNES, in particular crucial semiological features of frontal seizures were represented by abrupt start and end of movements and by the presence of frontal signs, such as grasping and pronation [1]. These elements were absent in PNES episodes, which developed gradually and terminated progressively. Moreover, the aggressive behavior towards his parents at the end of the episode, and the longer duration, were typical of PNES.

Another issue concerns the recommendation of brain surgery in children with drug-resistant epilepsy and behavioral comorbidity. Diverse variables must be considered, including type and location of the lesion and the psychiatric evaluation. Only a few studies have been published on this issue, and even less have been conducted in children. In a study by Reuber et al., 13 adult patients with epilepsy and PNES underwent epilepsy surgery, with a good outcome in 11 patients: nine patients became PNES-free, and in two patients, improvement in PNES frequency was obtained, whereas in two patients, PNES worsened. The authors conclude that patients with refractory epilepsy with additional PNES should not be barred from presurgical evaluation [3].

Very few studies have addressed outcome of epilepsy surgery in patients with additional antisocial or aggressive behavior. Trebuchon

et al. observed interictal antisocial behavior in four adult patients with pharmacoresistant prefrontal epilepsy, which improved after lesionectomy [4]. The epileptogenic zone, as defined by intracerebral recording, involved the anterior cingulate and the ventromedial prefrontal cortex.

In conclusion, in the presented case, epilepsy surgery was successful for three concomitant disorders: drug-resistant epilepsy, PNES, and interictal antisocial behavior. The resolution of these medical issues improved the quality of life of the child, who is now living a normal life. This case underlines that PNES and interictal antisocial behavior should not be considered a priori contraindications for epilepsy surgery.

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.ebcr.2015.01.002>. We state that the permission to show the pictures and the videos, including the child's face, was obtained by the patient and his father.

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