Seizure 21 (2012) 241–244

Contents lists available at SciVerse ScienceDirect

Seizure

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

Neurocognitive evaluation in children with occipital lobe epilepsy

Muzaffer Polat [a,*], Sarenur Gokben [b], Ayse Tosun [c], Gul Serdaroglu [b], Hasan Tekgul [b]

[a] Division of Pediatric Neurology, Department of Pediatrics, Celal Bayar University Hospital, Manisa, Turkey
[b] Division of Pediatric Neurology, Department of Pediatrics, Ege University School of Medicine, Izmir, Turkey
[c] Division of Pediatric Neurology, Department of Pediatrics, Adnan Menderes University Hospital, Aydin, Turkey

ARTICLE INFO

Article history:
Received 19 May 2011
Received in revised form 27 December 2011
Accepted 29 December 2011

Keywords:
Childhood epilepsy
Occipital
Cognition
Visuomotor coordination
Attention

ABSTRACT

Purpose: This study aimed to explore cognitive functions in patients with childhood epilepsy with occipital paroxysms (CEOP) and to compare the performance of these patients with that of patients with symptomatic occipital epilepsy (SOE) and healthy control subjects.
Method: Twenty-eight patients with epilepsy (17 CEOP, 11 SOE) were enrolled. The control group had similar demographical characteristics. Cognitive functions evaluated with Wechsler Intelligence Scale for Children-revised edition (WISC-R), The Visual Aural Digit Span (VADS) and Bender Visual Motor Gestalt Test (BVMG).
Results: The WISC-R showed lower performance IQ with WISC-R in patients with occipital epilepsy than in healthy controls. The VADS test only showed lower scores in children with symptomatic occipital epilepsy. Mean BVMG test scores were significantly abnormal in both subgroups of childhood epilepsy with occipital paroxysms (early-onset CEOP/late-onset CEOP) and the group with SOE.
Conclusion: Patients with CEOP, especially the late-onset form, have significant problems in the domains of visuomotor coordination, memory and attention. The academic performance of these patients should be monitored carefully in follow-up and appropriate educational support should be given as necessary.

1. Introduction

Childhood epilepsy with occipital paroxysms (CEOP) accounts for 20–28% of all cases of idiopathic partial epilepsy. The International League Against Epilepsy (ILAE) has recently divided childhood occipital epilepsies into early-onset benign childhood epilepsy (Panayiotopoulos type) and late-onset childhood occipital epilepsy (Gastaut type).[1]

Early-onset benign childhood occipital epilepsy (Panayiotopoulos type) is characterized by non-visual symptoms including tonic head and eye deviation, ictal vomiting and seizures with or without partial status epilepticus.[2,3] Seizure onset is between 1 and 12 years of age with a consistent median age of 5 years. Seizures can vary in duration from a few minutes to hours. The frequency of seizures is often low, with an average of 2–3 seizures.[4,5]

Late-onset benign childhood occipital epilepsy (Gastaut type) is characterized by brief seizures with mainly visual symptoms, such as elementary visual hallucinations, illusions, or amaurosis, followed by hemiclonic seizures while awake. Ictal or postictal headaches occur in half of the patients, and the mean age at onset is 8.9 years. Interictal electroencephalograms (EEGs) reveal spikes or sharp and slow wave paroxysms on occipital regions that disappear with the opening of the eyes.[6,7]

The word "benign" is used because epileptic seizures spontaneously resolve by the end of adolescence and rarely reoccur. The absence of neurological and neuropsychological deficits was considered a pre-requisite for the diagnosis of benign partial epilepsies in childhood (CEOP, Rolandic epilepsy). However, recent studies report that neuropsychological problems may accompany these subgroup of epilepsy. Although there are numerous studies describing neurocognitive profiles in Rolandic epilepsy, similar studies in patients with CEOP are limited.[8,9] In this cross-sectional study we aimed to evaluate cognitive functions in children with CEOP.

2. Materials and methods

Seventeen patients with CEOP followed by the Ege University Hospital, Pediatrics Department, Division of Child Neurology (Izmir, Turkey) were enrolled in this study. They were diagnosed according to criteria defined by the International Classification of Epilepsy and Epileptic Syndromes.[10] Patients with the following characteristics were selected:

- Age over 6 years
- Seizure-free for at least one month

* Corresponding author. Tel.: +90 532 2831331; fax: +90 216 3439251.
E-mail address: polatmuzaffer@yahoo.com (M. Polat).

1059-1311/$ – see front matter © 2012 British Epilepsy Association. Published by Elsevier Ltd. All rights reserved.
doi:10.1016/j.seizure.2011.12.015

- Use of a single antiepileptic drug for treatment
- Normal neurological examination
- No use of medication except antiepileptic drugs
- Presence of occipital or parieto-occipital sharp wave or sharp and slow wave activity on EEGs
- Normal cranial MRI

Ten patients (Group I) had findings compatible with early-onset CEOP, and seven patients (Group II) had late-onset CEOP. Eleven patients (Group III) with epileptic seizures who also had parieto-occipital focus and abnormal cranial radiological findings were considered to have symptomatic occipital epilepsy. The symptomatic group consisted of nine patients with hypoxic ischemic encephalopathy and two patients with cerebrovascular disease.

Seventeen healthy school children (9 males and 8 females) were recruited as a healthy control group. The control group had similar demographical characteristics such as age, sex, and sociocultural levels.

Routine waking and sleep EEGs were obtained from all patients. An international 10–20 electrode placement system was used. Data were recorded with reference electrodes placed on the earlobes. Hyperventilation and intermittent photic stimulation (IPS) were used as standard activation methods. IPS was performed with the strobe lamp placed 30 cm away from the patient's closed eyes. A range of 3–33 Hz was used. The duration of sleep EEGs varied between 45 and 60 min. Only stage I and II non-rapid eye movement sleep was recorded.

Cranial MRIs were obtained from all patients using a Siemens 1.5 Tesla Magnetom Vision™ MRI Scanner (Erlangen, Germany). Spin-echo T1-weighted images (TR/TF/FA:630/14/70 ms) in the axial, sagittal and coronal planes, spin-echo T2-weighted images (TR/TE/T1/FA:11.52/60/400/180) in the axial plane, and FLAIR (fluid attenuated inversion recovery) (TR/TE/T1/FA:8000/110/2500/180) images were obtained.

2.1. Neuropsychological tests

Cognitive tests regarding visuospatial perception, memory, learning difficulties, and attention deficits were conducted. Performance subtests (matrix reasoning, picture completion, block design, and coding) of the Wechsler Intelligence Scale for Children Revised (WISC-R) were applied to all groups.[11,12] Visuomotor abilities were assessed with the Bender Visual Motor Gestalt Test.[13]

All patients and controls received WISC-R performance subtests (picture completion, block design, matrix reasoning and coding). The Intelligence Quotient (IQ) was calculated according to these subtests.

The Bender Gestalt Test, or the Bender Visual Motor Gestalt Test, is a psychological assessment instrument used to evaluate visual-motor functioning and visual perception skills in both children and adults. Scores on the test are used to identify possible organic brain damage and the degree maturation of the nervous system (''organicity''). The adult type Bender-Gestalt test was applied to patients who were older than 12 years of age. The number of patients given adult tests in Groups I, II, and III were 1, 2, and 3, respectively. The others received the Children's Bender–Gestalt test. The Visual Aural Digit Span Test (VADS) was used for the evaluation of verbal short-term memory function.[14] The first subtest required oral repetition of orally presented digits. In the second subtest, subjects had to orally repeat digits presented visually. In the third subtest, the subjects wrote down digits that were presented orally. The fourth subtest involved writing digits that were presented visually.

Parental informed consent and approval from the Ethics Committee were obtained for the study.

2.1.1. Statistical analysis

The Statistical Package for the Social Sciences software (SPSS 13.0 for Windows, SPSS, Inc., Chicago, IL) was used for statistical analyses. The data obtained were evaluated with the Chi-squared test, Kruskal Wallis test, Mann–Whitney U test. $p < 0.05$ was accepted as statistically significant. We did not carry out any procedures to reduce the risk of type I error due to multiple testing. The statistical tests were used in an explorative way. We applied pair-wise testing only post hoc, that is the test the significance of differences observed between the groups studied.

3. Results

The study included 10 patients with early-onset CEOP (aged between 6 and 13.5 years), seven patients with late-onset CEOP (aged between 9 and 16.5 years), and 11 patients with symptomatic occipital epilepsy (aged between 8 and 16.5 years). Demographic characteristics are shown in Table 1.

Age at seizure was significantly earlier in the early-onset group compared to the late-onset CEOP group (mean ± SD: 5.03 ± 2.5 years vs 7.9 ± 2 years, $p = 0.009$). A significant difference in the average age at diagnosis was observed between patients with early-onset CEOP and other groups ($p = 0.006$ and $p = 0.023$, respectively).

All patients with occipital epilepsy had partial onset seizures. Simple partial, complex partial and secondarily generalized tonic–clonic seizures were described. Ictal vomiting was observed in 50% of patients with early-onset CEOP vs none of the patients with late-onset CEOP. Eye deviation was identified in 80% of cases with early-onset CEOP vs 28% of cases with late-onset CEOP. Temporary blindness, elementary visual hallucinations, and visual field defects were reported by in 85% of patients in both the late-onset CEOP group and the symptomatic group. Headaches were reported in 14.5% of patients with CEOP.

Hemiclonic and secondary generalized tonic clonic seizures were detected more frequently (73%) in the symptomatic epilepsy

Table 1
Demographic findings of the patients.

	Group I ($n = 10$)	Group II ($n = 7$)	Group III ($n = 11$)
The age of neurocognitive tests (year)	8.39 SD ± 2.4	12.6 SD ± 2.9	10.8 SD ± 3
The onset of seizures (year)	5.03 SD ± 2.5	7.9 SD ± 2	5.4 SD ± 2.5
Sex (F/M)	6/4	4/3	6/5
History of febrile seizures	3 (30%)	1 (14.3%)	0
Epilepsy history in the family	1 (10%)	0	1
The total number of seizures			
6–20	2	4	7
2–6	8	3	4
The duration of seizures			
<5 min	2	4	1
5–30 min	7	3	8
>30 min	1	0	2
Semiology of seizures			
Visual hallucination	0	6	6
Ictal blindness	0	2	2
Deviation of the eyes	8	2	7
Otonomic symptoms	6	1	1
Ictal vomitting	5	0	4
Ictal behavioural changes	4	5	1
POSTICTAL headache	1	1	0
Impairment of consciousness	8	3	4
Hemi/generalized convulsions	5	2	9
Antiepileptic drugs			
Carbamazepine	7	5	5
Valproic acid	3	2	1
Polytherapy	–	–	5

Group I, Early-onset childhood occipital paroxysm; Group II, late-onset childhood occipital epilepsy; Group III, symptomatic occipital epilepsy; SD, Standard deviation.