The fate of spikes in self-limited epilepsy with centrotemporal spikes: Are clinical and baseline EEG features effective?

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INTRODUCTION

Self-limited epilepsy with centrotemporal spikes (SLECTS) is the most common focal epilepsy of childhood. (1) The relationship between the anti-seizure medications (ASM) and decrease and/or normalization of spike waves has been investigated. However, as far as we know, there is no study to date evaluating the effects of baseline electroencephalography (EEG) features as well as clinical features and ASM on suppressing spike waves. (2-4) The purpose of this study is to explain in detail the change in centrotemporal spike waves between the first and last EEGs of SLECTS patients by examining the relationship to the clinical and baseline electroencephalographic findings.

Materials and Methods

This study was conducted on patients of both sexes, aged between 0-18 years with SLECTS with at least two years of follow-up with at least two sleep-deprived, minimum 20 minutes EEG recordings mentioned as first and last EEGs, who were attending pediatric neurology department between 2011-2021. The first and last EEGs of the patients were evaluated in terms of lateralization, localization, interhemispheric and interhemispheric generalization, and phase reversal. The spike wave index (SWI) was calculated as the sum of the spikes during 30 seconds of drowsiness and stage N2 sleep, whichever was more frequent, and analyzed in three groups as ≥50%, <50 and 0 (normal EEG). SWI change groups were composed by noting the SWI changes numerically and as percentages between the first and last EEG; a decrease of ≥50% in SWI was classified as a good response, a decrease of <50% as a moderate response, and an increase or no decrease in SWI as no response. Effects of demographic and clinical features, as well as the first EEG parameters on the SWI change were examined.

Results

Of the 136 patients enrolled, 61.8% (n= 84) were male. The age of seizure onset ranged from 3.5 to 14 years (median= 7.5). Table 1 shows effects of demographic and clinical features on the SWI reduction. Table 2 shows Effects of the first EEG findings on SWI reduction.

Table 1. Effects of demographic and clinical features on the SWI reduction.

	Good response ≥50% reduction in SWI (n= 26, 19.1%)	Moderate response <50% reduction in SWI (n= 105, 77.2%)	No response An increase/no decrease in SWI (n= 5, 3.7%)	p
Numerical variables	Median (minimum-maximum)			
Age of seizure onset (years)	7 (3.5-11)	8 (3.5-14)	7 (7-13)	0.060
Seizure duration (minutes)	4 (1-10)	3 (1-15)	3 (1-10)	0.942
ASM duration (months)	24 (12-60)	24 (3-111)	12 (6-36)	0.057
Categorical variables	Number (% within cohort, % within row)			
Female	10 (7.4%, 38.5%)	38 (28%, 36.2%)	4 (2.9%, 80%)	0.151
Male				
Consanguinity				
Yes	3 (2.2%, 11.5%)	14 (10.3%, 13.3%)	0	1.000
No				
Family history of epilepsy				
Yes	4 (2.9%, 15.4%)	30 (22.1%, 28.6%)	1 (0.7%, 20%)	0.380
No				
Concomitant psychiatric disease				
Yes	11 (8.1%, 42.3%)	42 (30.9%, 40%)	3 (2.2%, 60%)	0.695
No	15 (11%, 57.7%)	63 (46.3%, 60%)	2 (1.5%, 40%)	
ADHD	4 (2.9%, 15.4%)	13 (9.6%, 12.4%)	0	0.677
Specific learning disability	3 (2.2%, 11.5%)	12 (8.8%, 11.4%)	1 (0.7%, 20%)	
Anxiety disorders	3 (2.2%, 11.5%)	10 (7.4%, 9.5%)	2 (1.5%, 40%)	
Persistent depressive disorder	1 (0.7%, 3.8%)	7 (5.1%, 6.7%)	0	
Semiology				
Generalized tonic-clonic	7 (5.1%, 26.9%)	17 (12.5%)	1 (0.7%, 20%)	0.260
Focal clonic	8 (5.9%, 30.8%)	22 (16.2%)	2 (1.5%, 40%)	
Focal tonic	0	13 (9.6%)	1 (0.7%, 20%)	
Unknown-onset generalized tonic-clonic	8 (5.9%, 30.8%)	27 (19.8%, 25.7%)	0	
Atonic	0	2 (1.5%, 1.9%)	0	
Isolated rolandic findings	3 (2.2%, 11.5%)	24 (17.6%, 22.9%)	1 (0.7%, 20%)	
Relationship of seizures with sleep				
Awake	4 (2.9%, 15.4%)	15 (11%, 14.3%)	0	0.586
Both asleep and awake	0	2 (1.5%, 1.9%)	0	
In the first hour of sleep	16 (11.8%, 61.5%)	70 (51.5%, 66.7%)	4 (2.9%, 80%)	
First hour-the end of sleep	4 (2.9%, 15.4%)	15 (11%, 14.3%)	0	
Awakening	2 (1.5%, 7.7%)	3 (2.2%, 2.9%)	1 (0.7%, 20%)	
Valproate	8 (5.9%, 30.8%)	46 (33.8%, 43.8%)	1 (0.7%, 20%)	0.033*
Levetiracetam	8 (5.9%, 30.8%)	43 (31.6%, 41%)	3 (2.2%, 60%)	
Oxcarbazepine	7 (5.1%, 26.9%)	7 (5.1%, 6.7%)	0	
Carbamazepine	3 (2.2%, 11.5%)	4 (2.9%, 3.8%)	1 (0.7%, 20%)	
Clinical response				
Seizure-free	24 (17.6%, 92.3%)	88 (64.7%, 83.8%)	0	< 0.001*
50% reduction in seizure frequency	1 (0.7%, 3.8%)	15 (11%, 14.3%)	3 (2.2%, 60%)	
No change in seizure frequency	1 (0.7%, 3.8%)	2 (1.5%, 1.9%)	2 (1.5%, 40%)	

Table 2. Effects of the EEG findings on SWI reduction

	Good response ≥50% reduction in SWI (n= 26, 19.1%)	Moderate response <50% reduction in SWI (n= 105, 77.2%)	No response An increase/no decrease in SWI (n= 5, 3.7%)	p
Numerical variables	Median (minimum-maximum)			
SWI in the first EEG (%)	60 (50-89)	35 (7.67-69.3)	49 (8-71.7)	< 0.001
Interval between first and last EEGs (months)	42 (12-74)	31 (12-108)	29 (12-44)	0.271
Categorical variables	Number (% within cohort, % within row)			
Lateralization in the first EEG				
Unilateral right	13 (9.6%, 50%)	26 (19.1%, 24.8%)	2 (1.5%, 40%)	0.402
Unilateral left	6 (4.4%, 23.1%)	31 (22.8%, 29.5%)	2 (1.5%, 40%)	
Bilateral but more prominent on right	2 (1.5%, 7.7%)	20 (14.7%, 19%)	0	
Bilateral but more prominent on left	3 (2.2%, 11.5%)	16 (11.8%, 15.2%)	1 (0.7%, 20%)	
Bilateral	2 (1.5%, 7.7%)	12 (8.8%, 11.4%)	0	
Unilateral (total)	19 (14%, 73.1%)	57 (42%, 54.3%)	4 (2.9%, 80%)	0.169
Bilateral (total)	7 (5.1%, 26.9%)	48 (35.3%, 45.7%)	1 (0.7%, 20%)	
Intrahemispheric generalization in first EEG				
Yes	15 (11%, 57.7%)	30 (22%, 28.6%)	3 (2.2%, 60%)	0.011
No	11 (8.1%, 42.3%)	75 (55.1%, 71.4%)	2 (1.5%, 40%)	
Interhemispheric generalization in first EEG				
Yes	13 (9.6%, 50%)	18 (13.2%, 17.1%)	3 (2.2%, 60%)	< 0.001
No	13 (9.6%, 50%)	87 (64%, 82.9%)	2 (1.5%, 40%)	
Phase reversal				
Yes	4 (2.9%, 15.4%)	34 (25%, 32.4%)	4 (2.9%, 80%)	0.013
No	22 (16.2%, 84.6%)	71 (52.2%, 67.6%)	1 (0.7%, 20%)	
C3	2 (1.5%, 7.7%)	14 (10.3%, 13.3%)	3 (2.2%, 60%)	0.029
T4	0	11 (8.1%, 10.5%)	1 (0.7%, 20%)	
C4	2 (1.5%, 7.7%)	9 (6.6%, 8.6%)	0	

Conclusion

Presence of phase reversal, intrahemispheric and interhemispheric generalizations in the first EEG records in SLECTS were associated with less spike reduction. While electroencephalographic improvement was more frequent in patients with monotherapy, valproate was the most effective drug in spike reduction.

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