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Unusual ictal propagation patterns suggesting poor prognosis after temporal lobe epilepsy surgery: Switch of lateralization and bilateral asynchrony

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ABSTRACT

Objective: The objective of this study was to investigate unusual ictal propagation patterns in patients with drug-resistant temporal lobe epilepsy (TLE) and reveal their electrophysiological, neuroimaging, and prognostic properties after surgery.
Methods: Among 248 patients with TLE who underwent scalp video-electroencephalographic (EEG) monitoring, 24 patients with 'switch of lateralization' or 'bilateral asynchrony' in at least one of their seizures (9.3%) were analyzed retrospectively. The postoperative outcome was determined in 16 patients who had undergone epilepsy surgery.
Results: All but 5 of the included patients had hippocampal sclerosis (HS) as their magnetic resonance imaging (MRI) findings. Twelve out of 16 patients (75%) who had surgery were seizure-free for at least 1 year. Nine out of 12 patients (75%) with good outcome had unilateral interictal EEG discharges in temporal regions whereas 3 out of 4 patients with poor outcome had bilateral temporal interictal spiking ($p = 0.018$).
Conclusion: Unusual ictal propagation patterns are not always related to poor prognosis after surgery in patients with TLE. Patients with unilateral interictal spiking in the temporal region tend to have good outcome despite these unusual patterns. These patterns can also be seen in patients with TLE with other etiologies besides the well-known HS in MRI.

1. Introduction

The crucial aspect in presurgical investigation of patients with drug-resistant focal epilepsy is defining the epileptogenic zone, which is the region from where seizures originate in the brain [1,2]. Electroencephalographic (EEG) findings play an important role in presurgical investigation while interictal and ictal EEG findings help determine the lateralization of the epileptogenic zone. Although there are reports suggesting that ictal EEG is not a necessity before surgery for a better prognosis [3–5], it is still considered as an indispensable tool [1,6,7]. In evaluating the scalp ictal EEG, there are plenty of variations to take into account [8–11]; it is crucial to determine the lateralization of the ictal discharges at seizure onset. However, it may easily be missed in clinical practice.

More than a decade ago, Steinhoff et al. defined two unusual propagation patterns in ictal scalp EEG of patients with TLE, called 'switch of lateralization' and 'bilateral asynchrony', which were related to bilateral epileptogenicity [8]. Since then, studies confirming these findings and determining their relationship with poor outcome after epilepsy surgery have been published [9,10,12]. However, the underlying pathophysiology of these unusual propagation patterns was poorly understood.

The aim of this study was to reveal the prevalence of these unusual ictal propagation patterns, the relationship between these patterns, and other presurgical investigation tools as well as postsurgical outcome.

2. Methods

2.1. Patients

Consecutive patients with TLE according to semiological and EEG criteria who underwent prolonged scalp video-EEG monitoring (sVEM) between January 1999 and June 2017 in the Department of Neurology, Istanbul Faculty of Medicine, Istanbul University were reviewed respectively.

Patients with at least one pattern of 'switch of lateralization' or 'bilateral asynchrony' in their recorded seizures during sVEM were recruited.

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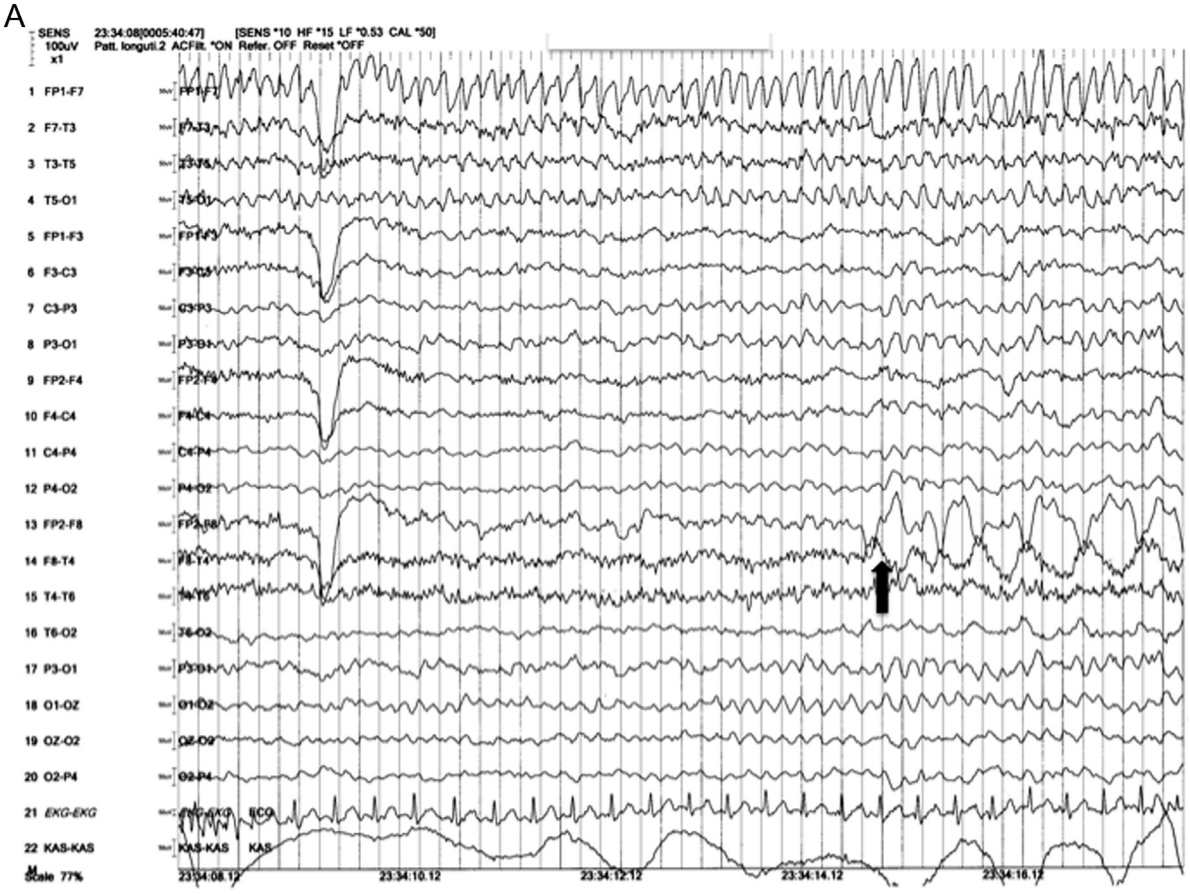
A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6 F3-C3
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8 P3-O1
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10 F4-C4
11 C4-P4
12 P4-O2
13 FP2-F8
14 F8-T4
15 T4-T6
16 T6-O2
17 P3-O1
18 O1-OZ
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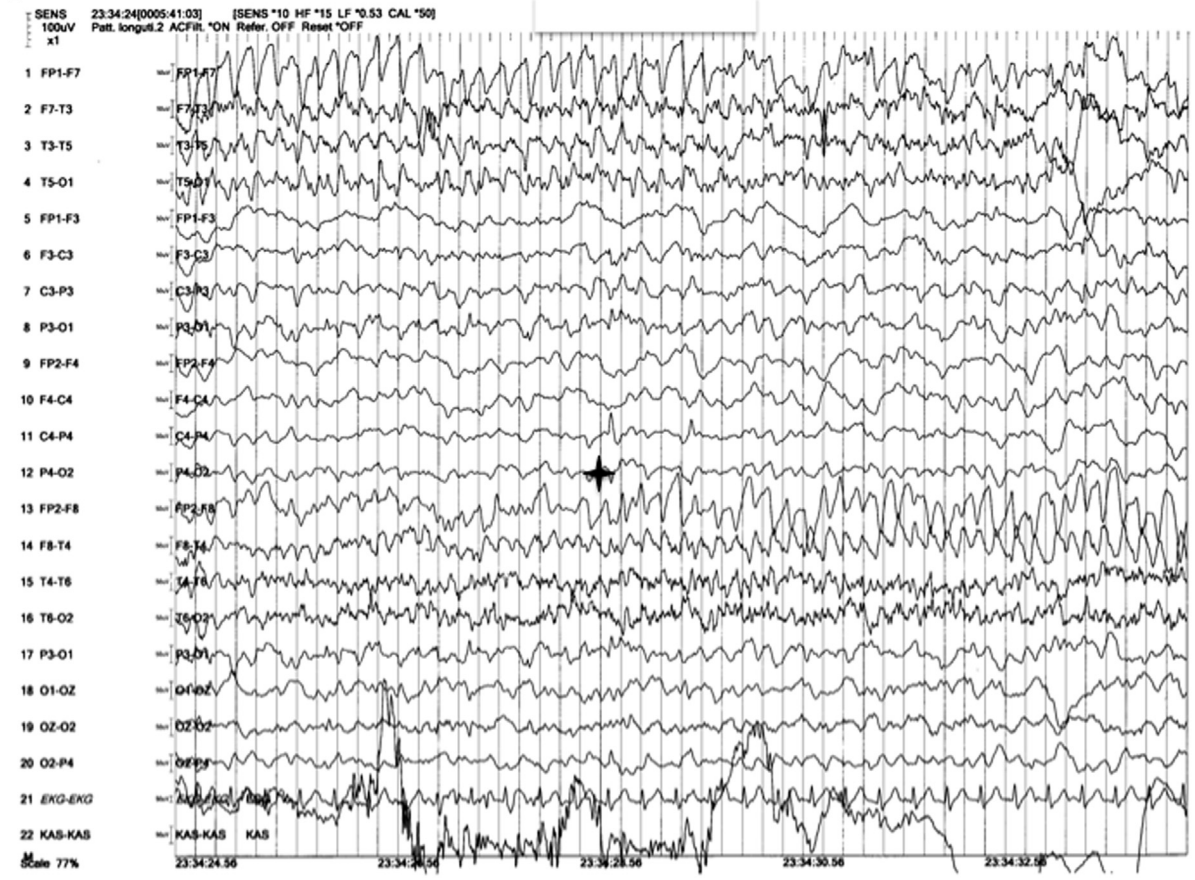
B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11 C4-P4
12 P4-O2
13 FP2-F8
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15 T4-T6
16 T6-O2
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18 O1-OZ
19 OZ-O2
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KAS
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