

Conclusions: The results from this study suggest that the proposed ASD algorithm can be clinically useful for detection seizures in long-term scalp video-EEG recordings.

1.020

PING-PONG SEIZURE PATTERNS IN INTRACRANIAL ELECTRODES

L. Lehnhoff and Steve Chung

Barrow Neurological Institute, Phoenix, AZ

Rationale: Intractable epilepsy may be treated successfully with surgery if the seizure focus can be localized. Ictal scalp EEG may not provide sufficient localization and intracranial recording of ictal EEG with depth and/or subdural grid electrodes may be required. These invasive studies may provide more accurate information when scalp EEG is inconclusive, discordant or shows diffuse bilateral ictal discharges. False localization of seizures on scalp EEG may occur due to volume conduction and impedance if a seizure starts from one hemisphere with rapid progression to the other side. This phenomenon that may cause false lateralization is known as “ping-pong” seizures, which describes the ictal EEG pattern that shift from one side to another while ceasing on the original side as seizure progresses (Fisher et al, *J Epilepsy*, 1995). We reviewed cases to determine the prevalence if this phenomenon among epilepsy surgery candidates at the Barrow Neurological Institute.

Methods: We analyzed ictal EEG patterns in the intracranial EEG population retrospectively by reviewing patient's medical record and ictal EEG information from their inpatient monitoring. The review was conducted on all patients who underwent invasive EEG monitoring between July 2006 and December 2008. The original charts and EEGs were reviewed by one author, and the findings confirmed by the second author. All patients had previous scalp EEG monitoring, which did not clearly localize the seizure onset necessitating the invasive monitoring. The protocol and collection of data were approved by the local Institutional Review Boards for this study.

Results: Total of 103 patients underwent intracranial monitoring; 41 patients had depth electrodes, 46 had subdural grids or strips, and 16 had both depth electrodes and subdural grids. Of the 103 patients who underwent intracranial EEG monitoring at the BNI from 7/2006 through 12/2008, only 4 patients (3.9%) conclusively showed ping-pong seizure phenomenon on EEG, during which seizures clearly started on one side, then spread to the other side while normalizing the initial side. Patient 1 had a total of 9 events captured, of which 8 were ping-pong seizures. Patient 2 had 1 ping-pong seizure out of 13 events. Patient 3 had 2 ping-pong seizures out of 9 events and patient 4 had 5 ping-pong seizures out of 9 events.

Conclusions: It is important to recognize that the presence of ping-pong seizures may cause false lateralization of seizure onset in epilepsy surgery candidates. The incidence of the ping-pong phenomenon in our patient population was significantly less than previously reported rate of 33% in 1994 even though the study was conducted at the same institution. Although the small sample size for this study precludes definitive conclusion, ping-pong phenomenon may not be as prevalent as initially estimated. Future study with a larger number of patients with different types of seizures and lateralization would also be beneficial.

1.021

CHARACTERIZATION OF LONG-TERM CONTINUOUS ELECTRODERMAL ACTIVITY LATERALIZATION IN PEDIATRIC EPILEPSY PATIENTS

Ming-Zher Poh^{1,2}, T. Loddenkemper³, N. C. Swenson²,

M. C. Sabtal², J. R. Madsen⁴ and R. W. Picard²

¹Harvard-MIT Division of Health Sciences and Technology,

Massachusetts Institute of Technology, Cambridge, MA;

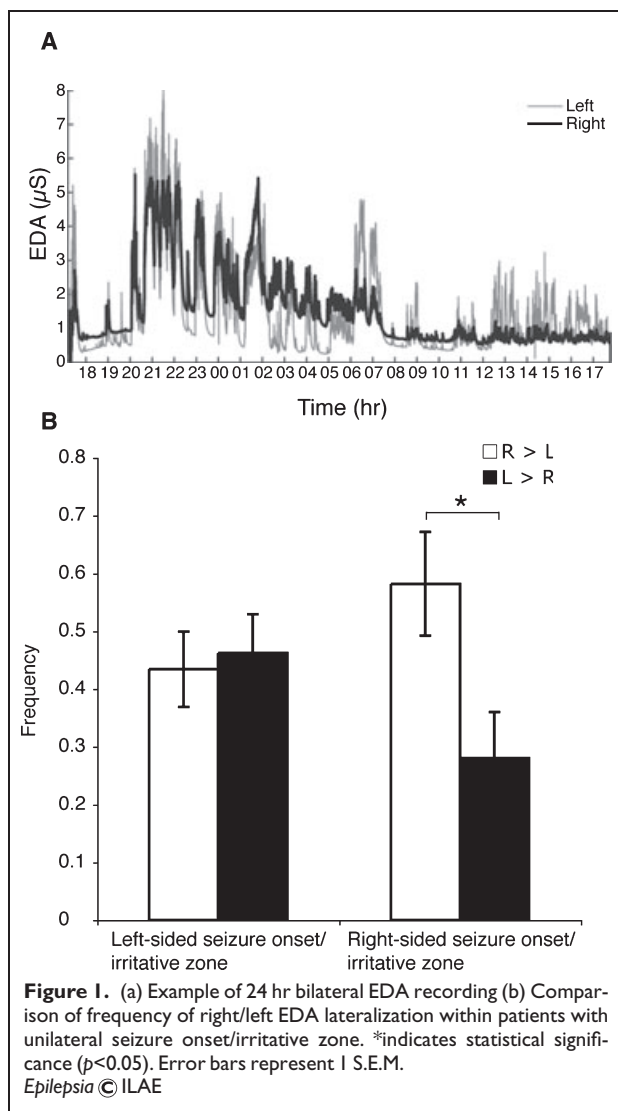
²The Media Laboratory, Massachusetts Institute of Technology,

Cambridge, MA; ³Division of Epilepsy and Clinical

Neurophysiology, Children's Hospital Boston, Boston, MA and

Case	Age (yrs)	Sex	Handedness	MRI findings	Ictal onset zone/Irritative zone on EEG	% L>R	% R>L	Duration (days)
1	4	F	Rt.	Lt. temporal lobe cortical dysplasia	Lt. frontotemporal	39	50	2
2	14	M	Rt.	Normal	Lt. centrotemporal and parietal	82	16	1
3	6	F	Rt.	Normal	Lt. temporal predominance	39	59	2
4	9	M	Lt.	Lt. temporal lobe cortical dysplasia	Lt. temporal occipital	48	48	1
5	7	M	Lt.	Lt. MCA infarct	Lt. frontotemporal	40	50	2
6	6	M	Lt.	Lt. MCA infarct	Lt. hemisphere	87	1	1
7	9	M	-	Lt. cerebellar hemisphere volume loss	Lt. posterior quadrant	65	26	1
8	14	F	Rt.	Normal	Lt. frontotemporal	39	32	3
9	18	M	Rt.	Lt. precentral sulcus cortical malformation	Lt. hemisphere	22	58	2
10	9	F	-	Normal	Lt. temporal	8	82	1
11	6	M	Lt.	Normal	Lt. posterior quadrant	56	34	1
12	10	F	Lt.	Lt. temporal lobe cortical dysplasia	Lt. temporal	29	66	4
13	10	F	Rt.	Rt. mesial occipital dysplasia	Rt. posterior quadrant	17	56	3
14	20	M	Rt.	T2 prolongation in occip periventricular white matter	Rt. frontocentral	41	42	3
15	9	M	Rt.	Rt. temporal lobe volume loss	Rt. parietal occipital	60	25	2
16	15	M	Rt.	Normal	Rt. frontocentral	17	74	1
17	14	F	Rt.	Normal	Rt. temporal	6	86	1
18	5	M	-	Cortical tubers, subependymal nodules	Rt. occipital	27	67	1

Table 1. Clinical characteristics and recorded data of patients with epilepsy. MCA=middle cerebral artery



⁴Department of Neurosurgery, Children's Hospital Boston, Boston, MA

Rationale: Electrodermal activity (EDA) reflects sympathetic activation within the autonomic nervous system. Activity within prefrontal cortices and limbic structures strongly influence ipsilateral EDA (Critchley HD *Neuroscientist* 2002;8:132–42). This relationship suggests that unilateral dysfunction of cortical activity may affect the direction of EDA lateralization. We hypothesized that hemispheric location of seizure onset in patients with epilepsy may be related to ipsilaterally increased sympathetic skin response as evidenced by EDA asymmetry.

Methods: EDA of 22 patients undergoing long-term video/EEG monitoring were recorded continuously from the ventral side of bilateral distal forearms using custom-built skin conductance sensors for 1–4 days. EDA recordings were lowpass filtered (1024 points, Hamming window, cutoff 0.016 Hz) to obtain skin conductance levels (SCL). Right/left differences were calculated in order to determine $f_{R>L}$, the frequency of right-sided EDA lateralization (R>L), $f_{L>R}$, the frequency of left-sided EDA lateralization (L>R) and $f_{R=L}$, the frequency of EDA symmetry (R=L). Differences less than 0.05 µS were considered as R=L. The frequency of right/left EDA lateralization was compared within patients with a right ($n=6$) and left-sided ($n=12$) irritative zone or seizure onset zone respectively. To examine the role of handedness on EDA lateralization, the frequency of right/left EDA lateralization was also compared within both right

($n=13$) and left-handed ($n=3$) patients (handedness of 2 patients was unknown). Statistics were computed with MATLAB using the Wilcoxon rank sum test.

Results: 18 patients (11 males, 7 females) between ages 4–20 years with unilateral irritative zone or unilateral seizure onset on scalp EEG as determined by long-term video/EEG monitoring were included. 13 patients were right-handed, 3 were left-handed, and in 2 handedness was undetermined. There were 12 and 6 patients with a left and right-sided ictal onset/irritative zone respectively. For patients with a left-sided seizure onset zone or irritative zone, the mean $f_{R>L}$ (0.43 ± 0.23) was not significantly different from the mean $f_{L>R}$ (0.46 ± 0.23). However, for patients with a right-sided seizure onset, the mean $f_{R>L}$ (0.58 ± 0.22) was higher than the mean $f_{L>R}$ (0.28 ± 0.20) ($p < 0.05$). Neither right nor left-handed patients nor patients with right or left MRI lesions displayed significantly different frequency of right/left EDA lateralization.

Conclusions: We present the first characterization of lateralization in long-term continuous bilateral EDA in patients with epilepsy. Our pilot series suggests a relationship between hemispheric location of seizure onset/irritative zone and EDA lateralization. Frequency of right/left EDA lateralization may potentially provide additional lateralizing information regarding seizure onset zone or irritative zone on EEG in the presurgical assessment of epilepsy patients. Further studies regarding localizing and lateralizing value are currently underway.

1.022

CLINICAL ELECTROENCEPHALOGRAPHY IN DEMENTIA OF ALZHEIMER'S TYPE REVISITED: EEG FINDINGS IN A LARGE WELL-CHARACTERIZED COHORT OF PATIENTS WITH DAT AND NO HISTORY OF SEIZURES

Andreas V. Alexopoulos¹, B. Diehl^{2,1}, T. Wehner^{3,1}, S. Takeda⁴, S. Ridge⁵, K. Unnwongse¹, M. B. Peterson⁶, I. M. Najm¹ and R. C. Burgess¹

¹Epilepsy Center, Cleveland Clinic, Cleveland, OH; ²UCL Institute of Neurology, National Hospital of Neurology and Neurosurgery, London, United Kingdom; ³Neurology, Philipps-Universität, Marburg, Germany; ⁴Dainippon Sumitomo Pharma Co. Ltd., Osaka, Japan; ⁵Dainippon Sumitomo Pharma America, Inc., Ft. Lee, NJ and ⁶Cato Research Boston, Boston, MA

Rationale: Alzheimer's disease (DAT) is by far the most common etiology of incapacitating dementia in middle and late life. Clinical EEG is a non-invasive procedure, which is generally well tolerated, even by patients with cognitive impairment. EEGs are often carried out as part of the clinical assessment of patients with dementia. This study sought to characterize the clinical EEG findings in a carefully selected cohort of patients with DAT and no known history of seizures.

Methods: Screening EEGs were performed prospectively in patients with mild to moderate DAT as part of their enrollment in a multicenter phase II clinical trial. Patients were 55 years or older with mild to moderate cognitive impairment (MMSE 12 to 24, and ADAS-Cog 14 to 42) who fulfilled DSM-IV criteria for DAT and NINCDS-ADRDA criteria for probable DAT. Patients with a known history of epilepsy, stroke, head trauma, cancer or major depression were excluded. Most patients were not on cholinomimetic agents at the time of the baseline EEG (except for 5 who were being tapered off).

Results: 60-minute outpatient EEGs were performed in a total of 269 patients and were uniformly, and blindly interpreted by two fellowship-trained epileptologists at a single epilepsy center. Results were reported according to a consistent classification system employed for all EEGs at our center.

Hyperventilation was routinely performed when feasible. Five patients were unable to cooperate with EEG recordings. In the remaining 264 patients the posterior background ranged from 5.5 to 13Hz, median 9Hz (26.8% of patients).