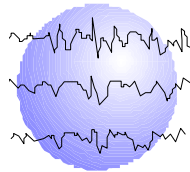


AGE OF ONSET OF SEIZURES MAY PREDICT WADA TEST RESULT IN LEFT MESIAL TEMPORAL LOBE EPILEPSY

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This paper has been prepared specifically for:

American Epilepsy Society Annual Meeting
San Diego, CA
December 1 - 5, 2006

Please consider this information to be preliminary findings.

Abstract published: *Epilepsia* 47(S4);274[3.205]2006

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Background:

The ability to predict postoperative memory impairment, and particularly the ability to rule out a severe amnesic outcome following resection of the dominant mesial temporal structures has been an important objective of the Intracarotid Amobarbital Procedure (Wada Test) prior to epilepsy surgery. In most cases, patients undergoing a left hemisphere injection of amobarbital are able to demonstrate adequate recognition memory (using the right hemisphere) to justify left mesial temporal resection. Occasionally however, patients with a clear left temporal seizure focus and an apparently normal right hippocampus, fail the Wada Test. We hypothesized that in left temporal lobe epilepsy (TLE), a later age of seizure onset may account for these unpredicted Wada failures. Specifically, we reasoned that during the critical period of language development in the left hemisphere, preferential connections between the language cortex and the left hippocampus are formed resulting in efficient verbal memory processing. In patients with early onset of left TLE (prior to age 8 years), compensatory connections between the language cortex and the right hippocampus may be strengthened, even when language itself does not reorganize to the right hemisphere. However, when the onset of temporal lobe seizures occurs after this critical period, these connections with the right hippocampus may not develop, resulting in less effective memory processing in the right temporal lobe, particularly when the items to be remembered can be encoded both verbally and visually. Therefore, we predicted that patients with seizure onset ≥ 8 years would have a higher incidence of left injection Wada failures.

Methods:

Data were reviewed for 69 TLE patients who were admitted to UCLA epilepsy Video EEG monitoring unit for pre-surgical evaluation. Forty-two patients were diagnosed with left mesial TLE and 27 patients had right mesial TLE. Each patient was classified as having early or late onset of seizures based on the cut-off age of 7 years. Comparison of the left and right TLE groups on demographic variables is presented in Table 1. All patients underwent the Wada test with injection of both hemispheres. The memory protocol during the Wada test consisted of presentation of 6 items during the period of maximum drug effect. Recognition memory was tested following complete recovery from the effects of the drug. Sixty percent correct recognition was considered a passing score. The data were subjected to Chi-square analysis.

Results

Of the 42 patients with left mesial TLE, 18 had early seizure onset (≤ 7 years of age) while 24 had a late seizure onset (≥ 8 years of age). All 18 early onset patients passed the Wada test with left sided injection. Among the late onset patients, 19 passed, while 5 obtained a failing score of less than 60% correct. This difference was statistically significant ($p < 0.05$). (Table 2) In the right TLE group, there was no significant difference between the early and late onset groups with 1 of 10 early onset and 1 of 17 late onset patients failing to exceed the 60% correct criterion (Table 3).

Discussion:

Age of seizure onset has previously been reported to help predict outcome of memory performance following left mesial temporal lobectomy, with early onset left temporal patients generally demonstrating better verbal memory outcome compared to later onset patients (Hermann, et al. 1995). It has been suggested that this finding reflects better reorganization of memory functions following early left hemisphere damage, presumably utilizing the right mesial temporal structures. In the present study our Wada test results confirm this theory by demonstrating a higher Wada failure rate in those patients with late seizure onset. The question of whether these data should be used to restrict the number of patients considered qualified for left mesial temporal lobe surgery deserves further investigation.

References:

Hermann BP, Seidenberg M, Haltiner A, and Wyler AR Relationship of age at onset, chronologic age, and adequacy of preoperative performance to verbal memory change after anterior temporal lobectomy *Epilepsia* 36(2): 137-145, 1995.

Table 1

Patient Characteristics

	N	Sex		Age		Education	Seizure Onset	
		M	F	Mean	S.D.		Early	Late
Left	42	19	23	35.6	11.7	13.1	44% (18)	56% (24)
Temp								
Right	27	13	14	34.9	12.9	13.1	37% (10)	63% (17)
Temp								

Table 2

Wada Test Results in Patients With
Left Mesial Temporal Lobe Epilepsy

	Pass	Fail	Total
Age of onset \leq 7 yr	18	0	18
Age of onset \geq 8 yr	19	5	24

*p < 0.05

Table 3

Wada Test Results in Patients With
Right Mesial Temporal Lobe Epilepsy

	Pass	Fail	Total
Age of onset \leq 7 yr	9	1	10
Age of onset \geq 8 yr	16	1	17