

Wada

Effective Memory Stimulus Type and Score Measurement of Wada Memory Test in Lateralization of Temporal Lobe Epilepsy

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Background : The Wada test is not yet standardized among epilepsy surgery centers, which makes it difficult to discern the differences between its results. The objectives of this study were to examine the effects of memory stimulus types in the Wada test and the methods of score measurement of results. **Methods** : We examined the Wada test in 59 patients with temporal lobe epilepsy who had language dominance in left hemispheres. They underwent surgical treatment and were seizure-free for at least until the 1-year follow up. The Wada test was done on the patients using three different protocols during the presurgical evaluations: 1) protocol A; sixteen cards displaying eight line drawings of common objects and eight words, 13 patients, 2) protocol B; eight line drawings of abstract figures, 14 patients, and 3) protocol C; four line drawings of common objects and four line drawings of abstract figures, 32 patients. **Results** : Thirty-three patients with RTL (right temporal lobectomy) and 26 patients with LTL (left temporal lobectomy) were not significantly different in demographic and disease characteristics such as age and sex, age at onset, risk factors before 2 years old, epilepsy duration, and Korean Wechsler Adult Intelligence Scale- IQ scores. Patients with RTL recognized significantly more words and line drawings of common objects with a right injection than those with a left injection. Patients with LTL recognized significantly more line drawings of abstract figures and common objects following a left injection versus a right injection. Correct rates obtained through discriminant function analysis (100% (A), 54% (B) and 84% (C)) were higher than that obtained through cutoff criteria (memory asymmetry scores 25%: 82% (A), 62% (B) and 56% (C)). **Conclusions** : Our study shows that line drawings of common objects as Wada memory stimuli are more useful for the lateralization of the epileptogenic hemisphere than line drawings of abstract figures and words. Discriminant function analysis is also a more effective score measurement than cutoff criteria.

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Key Words : Wada test, Material-specific memory, Temporal lobe epilepsy

Wada (: Intracarotid ,
amobarbital test)
Wada
5,6
가 1-4 (global amnesia)
Wada

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specific deficits)가

1,7 Wada

(material-

Wada 가

(material-specific memory) 가 Wada (recognition memory) 가 가 (line drawings of common objects) 가 (dually verbal and visuospatial encoded) 가 (hippocampal sclerosis) 가 (Table 1).

1. 1994 10 1997 12 (interictal and ictal SPECT) Wada 90 1 (Engel's classification) 59 (66%) (" ") 26 () 33 28 가 (hippocampal sclerosis) 가 (Table 1).

cutoff criteria((discriminant function analysis) Wada 가 A, B, C 가 가 A 8 8 13 (8 , 5) , B 8 (line drawings of abstract figures) 14 (6 , 8) , C 4 가 32 (Fig. 1, 2). 4 19 , 13)

2. A, B, C 가 가 A 8 8 13 (8 , 5) , B 8 (line drawings of abstract figures) 14 (6 , 8) , C 4 가 32 (Fig. 1, 2). 4 19 , 13)

3. Wada

(Sodium amobarbital : amytal sodium; Eli Lilly & Co, Indianapolis, IN, U.S.A.)

Table 1. Characteristics of LTL and RTL Patients

	RTL (33)		LTL (26)	
	M	SD	M	SD
Age (year)	28.3	8.7	28	6.9
Age at onset (year)	14.3	7.3	15.2	8.5
With risk factor (%)	60		54	
Male sex (%)	58		73	
K-WAIS IQ	84.6	12.7	84.1	15.8
Seizure duration (year)	14.6	7.3	15.2	8.5
MTS & HS (%)	64		80	

MTS & HS : mesial temporal sclerosis & hippocampal sclerosis.

↵-WAIS : Korean Wechler Adult Intelligence Scale.

Risk factor : meningitis, encephalitis, head trauma with loss of consciousness, febrile convulsion and perinatal distress before 2 years.

RTL : right temporal lobectomy. LTL : left temporal lobectomy.

√ : mean. SD : standard deviation



Figure 1. Line drawings of abstract figures

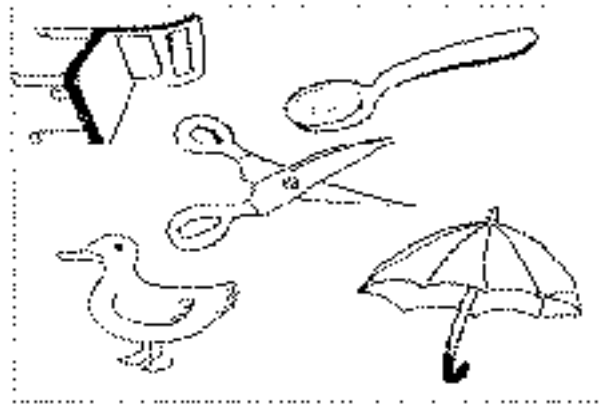


Figure 2. Line drawings of common objects

100%
 100 mg 4~5
 40
 1
 5~10
 10
 가
 4.
 가 8 1
 12.5% , 2
 25% , 3
 37.5% 가
 가
 A, B, C
 (classification rate)
 (correct), (incorrect),
 가(indeterminate)
 17
 SPSS
 Mann-Whitney test
 Wilcoxon signed ranked test
 p 0.05

A : = (0.672 ×) + (1.513 ×) - 5.348
 = (3.387 ×) + (0.286 ×) - 6.594
 B : = (0.240 ×) + (0.202 ×) - 1.138
 = (0.442 ×) + (-2.594 - 02 ×) - 1.433
 C : = (2.429 ×) + (-0.717 ×) - 4.583
 = (0.471 ×) + (0.550 ×) - 1.929
 A (,) 가 4.9±2.6
 (,) 0.6±1.1
 (z=-2.371, p<0.018),
 가 3.4±0.9 1.4±1.5
 (z=-1.786, p<0.073).
 가 5.9±2.1 0.9±1.5
 가 (z=-2.371, p<0.018).
 B 가 3.4±2.4 0.5±0.8
 (z=-2.386, p<0.017). 4 C
 3.7±1.2 1.6±2.1
 (z=-3.412, P<0.001),
 가 2.8±1.5 1.9±1.7
 (z=-2.165, p<0.03), A
 가 2.5±1.4 1.3±1.5

Table 2. Mean memory scores of material-specific stimuli by side of seizure focus and injection

	RTL		LTL	
	Rt. Injection(nonpileptic Lt)	Lt. Injection(epileptic Rt)	Rt. Injection(epileptic Lt)	Lt. Injection(nonpileptic Rt)
A type				
Object	4.9±2.6 *	0.6±1.1	1.4±1.5 *	3.4±0.9
Word	5.9±2.1 *	0.9±1.5	1.0±1.7	2.4±0.5
B type				
Abstract	1.8±4.0	2.2±3.3	0.5±0.8 *	3.4±2.4
C type				
Object	3.7±1.2 *	1.6±2.1	1.9±1.7 *	2.8±1.5
Abstract	2.5±1.7	1.6±2.7	1.3±1.5 *	2.5±1.4

* Right versus left injection significant at p<0.05.

Object : line drawings of common objects. Abstract : line drawings of abstract figures.

RTL : right temporal lobectomy. LTL : left temporal lobectomy

Table 3. Classification rates of three protocols for different degree of memory asymmetry scores

Criteria	12.5%	25%	37.5%
Correct	11(85%)	11(85%)	8(62%)
A Incorrect	1(7%)	1(7%)	0(0%)
Indeterminate	1(7%)	1(7%)	5(38%)
Correct	9(64%)	9(64%)	9(64%)
B Incorrect	2(14%)	2(14%)	2(14%)
Indeterminate	3(22%)	3(22%)	3(22%)
Correct	21(66%)	18(56%)	16(50%)
C Incorrect	4(13%)	3(9%)	1(3%)
Indeterminate	7(22%)	11(34%)	15(47%)

Classification rate: Correct, Incorrect and Indeterminate.

(z=-2.388, p<0.017)

(Table 2).

A

가 5.9±2.1

가 2.4±0.5

(Z=-2.460 p<0.015).

가

12.5% , 25% , 37.5%

가

. A 12.5% 25%

85% , 7% , 7% 가

37.5% 가 62% , 0% , 38%

가

. B 64% , 14% , 22% 가

, C 12.5% 66% , 13%

가

, 22% 가 25%

56% , 9% , 34% 가

가

37.5% 50% 3%

, 47% 가 . 37.5%

가

A

B

가

25%

가

A

100%, B 64%, C 84%

25%

A

85%, B 64%, C 56%

Wada

가

가

Wada

19,20

가

5,6,13,14,20
 가 13,14
 가
 가 33 ~ 37.5% 가
 ,²⁵⁻²⁷ 15 ~ 25% 가
 16,28
 15,16
 Wada
 ,
 .
 가 25%
 .
 Wada
 .
 가
 ,
 A 가
 .
 Wada
 .

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