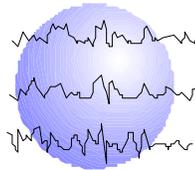


**PREDICTING MESIAL TEMPORAL SCLEROSIS IN EPILEPSY
PATIENTS USING THE WMS-III AND TRADITIONAL
MEASURES OF LEARNING AND MEMORY**

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REVISED ABSTRACT

RATIONALE: Previous research has documented cognitive impairment in the presence of mesial temporal sclerosis (MTS). However, it remains less clear which neuropsychological measures are maximally sensitive to unilateral temporal lobe pathology, and thus might be useful in predicting postoperative cognitive outcome. This study examined the utility of standardized measures of learning and memory including the recently published WMS-III in identifying material-specific memory deficits in epilepsy patients with and without MTS.

METHODS: The sample included epilepsy patients with MRI-defined MTS (increased T2 signal and/or decreased hippocampal size). There were 13 right (R) and 19 left (L) MTS patients as well as a group without MTS or focal seizure onset as determined by EEG (n = 19). Measures included the delayed free recall conditions of the verbal Selective Reminding Test (vSRT), nonverbal Selective Reminding Test (nvSRT), Rey-Osterrieth Complex Figure Test (RCFT), and Logical Memory (LM), Verbal Paired Associates (VPA), Faces, and Family Pictures (FamPix) subtests from the WMS-III. The three groups were comparable in terms of age, education, handedness, and general cognitive ability. However, there was a significant gender difference with the majority of the right MTS group being male ($p < .01$).

RESULTS: A trend for relatively poorer memory performance across all measures was observed for the patients with MTS, whereas patients in the Non-Focal group generally performed within normal limits. Multivariate and follow-up univariate ANOVAs revealed that the L and R MTS groups performed worse on verbal and visual memory measures, respectively ($p < .05$). Discriminant function analyses indicated R MTS could be predicted with an overall accuracy rate of 81% with FamPix being the strongest discriminating measure. Left MTS was predicted at a 68% overall accuracy rate based primarily on LM.

CONCLUSIONS: WMS-III FamPix appears to be the most sensitive measure in detecting R MTS, while WMS-III LM is slightly less sensitive in predicting L MTS. In this sample, generally average learning and memory was recorded for epilepsy patients without MTS or focal seizure onset.

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BACKGROUND

It is known that the hippocampus and related structures are important in the functioning of learning and memory. The neuropathological condition of mesial temporal sclerosis is associated with both intractable seizures and neuropsychological impairment. Specifically, both general cognitive decline and material-specific memory impairment have been shown in epilepsy patients with MTS using a number of different learning and memory measures^{1,2}. However, it is unclear which tests are maximally sensitive to unilateral temporal lobe pathology, and thus might be useful in documenting deficits for the purposes of treatment and predicting postoperative cognitive outcome. In addition, there is evidence that the WMS-III may be more sensitive to material specific memory impairment than previous versions of the test³. The goal of this study is to determine which tests in a battery of memory measures best differentiates patients with MTS from those with non-focal epilepsy.

METHODS

Participants and Procedure:

- ❖ N = 51: 19 Non-Focal, 13 R MTS, 19 L MTS.
- ❖ All patients were evaluated and treated on the Adult Epilepsy Unit, Minnesota Epilepsy Group, United Hospital, St. Paul, MN.
- ❖ MTS determined by consulting radiologist per epilepsy imaging protocol.
- ❖ All patients had a WAIS-III Full Scale IQ > 69.
- ❖ Non-Focal, R MTS, and L MTS groups were comparable (except for gender) in terms of demographics, seizure variables, and global cognitive ability (see Table 1).
- ❖ 30-minute delayed free recall condition used on all measures:
 - Verbal Selective Reminding Test (vSRT)
 - WMS-III Logical Memory (LM)
 - WMS-III Verbal Paired Associates (VPA)
 - WMS-III Faces
 - WMS-III Family Pictures (FamPix)
 - Nonverbal Selective Reminding Test (nvSRT)
 - Rey Osterrieth Complex Figure Test (RCFT)

RESULTS

Descriptive statistics for the memory measures are presented in Table 2. Figures 1 & 2 present these data in graphic form plotted by Z score relative to the Non-Focal group Mean. MANOVA revealed a statistically significant difference among the three groups across the seven measures, $F(2, 51) = 1.85, p < .05$. Follow-up univariate analyses (Bonferroni corrected) were made, and for the R MTS group, scores on FamPix, Faces, and RCFT were all significantly lower than those obtained by the Non-Focal group. For the L MTS group, scores on LM were significantly lower than those obtained by the Non-Focal group. No other post-hoc comparisons were significant. Finally, discriminant function analyses were calculated to determine which visual memory measures could best predict R MTS or Non-Focal group membership and which verbal memory measures could best predict L MTS or Non-Focal group membership. Right MTS could be predicted with an overall accuracy rate of 81% with FamPix being the strongest discriminating measure, Wilkes' Lambda = .68, $\chi^2(3, 51) = 10.80, p < .05$. Left MTS was predicted at a 68% overall accuracy rate based primarily on LM, Wilkes' Lambda = .76, $\chi^2(3, 51) = 8.37, p < .05$.

CONCLUSIONS

- ❖ WMS-III Family Pictures appears to be a sensitive measure in detecting R MTS.
- ❖ WMS-III Logical Memory appears to be a sensitive measure in detecting L MTS.
- ❖ Generally average learning and memory scores were recorded for epilepsy patients without MTS or focal seizure onset.
- ❖ These preliminary data suggest that the WMS-III is sensitive to material specific memory compromise among epilepsy patients with unilateral mesial temporal lobe pathology.

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Table 1

PATIENT CHARACTERISTICS

| | Non-Focal | L MTS | R MTS |
|----------------------------------|--------------|--------------|----------------|
| n | 19 | 19 | 13 |
| Age | 32.1 | 37.9 | 35.7 |
| Gender (% Male) | 32.0% | 32.0% | 92.0% * |
| Education | 13.7 | 13.3 | 13.5 |
| Handedness (% R) | 90.0% | 89.0% | 100.0% |
| Age of Seizure Onset | 18.3 | 16.7 | 10.7 |
| WAIS-III FSIQ | 101.1 | 92.2 | 96.6 |
| WAIS-III Processing Speed | 95.9 | 94.9 | 87.3 |
| WMS-III Working Memory | 97.9 | 98.6 | 101.7 |

* p < .01

Table 2

DESCRIPTIVES FOR DELAYED MEMORY SCORES

| | L MTS | Non-Focal | R MTS |
|----------------------------|--------------------|--------------------|----------------------|
| vSRT ¹ | 7.8 (3.5) | 9.5 (2.7) | 8.0 (3.3) |
| LM ² | 8.1 (4.2) * | 11.5 (2.9) | 8.7 (4.1) |
| VPA² | 8.3 (2.5) | 10.1 (2.4) | 9.3 (3.7) |
| Faces ² | 8.3 (1.9) | 9.7 (3.1) | 7.0 (1.8) * |
| FamPix ² | 8.4 (3.9) | 10.0 (2.7) | 6.5 (3.7) * |
| nvSRT ¹ | 5.1 (1.8) | 5.9 (1.9) | 4.9 (1.1) |
| RCFT ³ | 47.5 (13.9) | 60.0 (15.0) | 41.7 (20.6) * |

1 = Raw Score

2 = Age-corrected Scaled Score

3 = %Recalled from Copy

* p < 005

