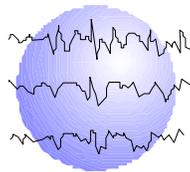


THE PERFORMANCE OF TEMPORAL LOBE EPILEPSY (TLE) PATIENTS ON VERBAL AND NONVERBAL SELECTIVE REMINDING PROCEDURES: PRE AND POSTOPERATIVE COMPARISONS

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ABSTRACT

RATIONALE: Standardized measures of verbal and nonverbal memory have frequently failed to differentiate dominant from nondominant temporal lobe epilepsy patients, even following surgical resection of the mesial temporal structures. While recent published studies have emphasized the importance of multiple trial learning paradigms for these comparisons, there is little agreement on which measures are most valid, particularly for the assessment of nonverbal learning in this population. The current study updates our experience with verbal and nonverbal selective reminding paradigms in assessing verbal and visual learning and retention in temporal lobectomy patients before and after surgery.

METHODS: Sixty-six temporal lobectomy candidates (32 left, 34 right) were evaluated pre and postoperatively using the Verbal Selective Reminding Test (VSRT) of Buschke and the Nonverbal Selective Reminding Test (NVSRT) of Fletcher. Fifty-two patients were left hemisphere dominant based on the Intracarotid Amobarbital Procedure (IAP), while 12 demonstrated some degree of bilateral language representation. Three patients could not be classified. All patients underwent temporal lobectomy including resection of the mesial temporal structures. There were no differences between the left and right groups in age at surgery, IQ, or gender distribution. Performance of the left and right temporal groups was compared on learning and retention scores using t-tests for independent samples.

RESULTS: Left temporal (LT) patients were mildly impaired on learning and recall measures of the VSRT preoperatively compared to right temporal (RT) patients who performed in the average range ($p < .01$). Postoperatively, performance of the LT group declined to the moderately impaired range, while the RT group performance remained stable. On the NVSRT, the RT group performed in the low average range preoperatively, significantly below the LT group on one learning measure ($p < .05$), while the LT performance was in the normal range pre and postoperatively on the learning measures. Delayed recall scores showed a decline from mildly impaired preoperatively to clearly impaired postoperatively for the RT group, while LT performance was mildly impaired at baseline, but remained stable following surgery. Differences between the two groups were statistically significant ($p < .03$).

CONCLUSION: Selective reminding paradigms are sensitive to verbal and visual memory impairment and may be helpful in discriminating dominant from nondominant temporal lobe dysfunction in epilepsy patients undergoing initial evaluation. Striking postoperative group differences underscore the material specific nature of memory processing in the two hemispheres and the importance of preoperative counseling prior to surgery.

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Introduction:

Standardized measures of verbal and nonverbal memory have frequently failed to differentiate dominant from nondominant temporal lobe epilepsy patients, even following surgical resection of the mesial temporal structures. While recent published studies have emphasized the importance of multiple trial learning paradigms for these comparisons, there is little agreement on which measures are most valid, particularly for the assessment of nonverbal learning in this population. The technique of “Selective Reminding,” first described by Buschke and Fuld (1974), offers a method of analyzing the learning process by breaking it down into measures of storage, retention and retrieval. This paradigm has been used extensively in neuropsychological assessment to better understand disordered memory in patients with neurologic disease. The current study updates our experience with verbal and nonverbal selective reminding paradigms in assessing verbal and visual learning and retention in temporal lobectomy patients before and after surgery.

Methods:

The patients studied were sixty-six temporal lobectomy candidates (32 left, 34 right) at Minnesota Epilepsy Group who were evaluated pre and postoperatively using the Verbal Selective Reminding Test (VSRT) (Buschke and Fuld, 1974), and the Nonverbal Selective Reminding Test (NVSRT) (Fletcher, 1985). Fifty-two patients were left hemisphere dominant based on the Intracarotid Amobarbital Procedure (IAP), while 12 demonstrated bilateral language representation. Ten of these were in the LT group, while two were RT. Three patients could not be classified. All patients underwent temporal lobectomy including resection of the mesial temporal structures. Demographic information is presented in Table 1. There were no differences between the left and right groups in age at surgery, education, IQ, or gender distribution.

The VSRT was made up of 12 words, presented over a maximum of 12 learning trials. After each recall attempt, patients were reminded only of the items they had failed to recall on that trial, followed by another attempt at recall of the entire list. Learning trials continued until the entire list was recalled without any reminders on 3 successive trials, or until a maximum of 12 trials was reached. Standard scores were derived for Long Term Storage (LTS) and Consistent Long Term Retrieval (CLTR) across the learning trials and the percent of items recalled after a 30 minute delay.

The NVSRT consisted of repeated presentations of eight arrays of dots in a matrix. The task was to memorize the location of a target dot in each array. As with the VSRT, the technique of selective reminding was employed following each recall attempt. Learning trials continued until all eight items were correctly recalled on two successive trials, or until a total of eight trials had been administered. Again, standard scores were calculated for Long Term Storage and Consistent Long Term Retrieval and delayed recall was scored as a percent correct out of eight possible items. The left and right temporal groups were compared on learning and recall scores for each task both pre and postoperatively using t-tests for independent samples.

Results

The results of both surgical groups on the acquisition measures of the VSRT pre and postoperatively are compared in Figure 1. The mean performance of the left temporal (LT) group was mildly impaired on LTS and CLTR preoperatively compared to right temporal (RT) patients who performed in the average range ($p < .01$). Postoperative scores on the same measures showed a marked decrease in the performance of the LT group, while the RT group scores remained stable ($p < .001$). Pre and postoperative delayed recall of the word list is presented for the two patient groups in Figure 2. The difference in delayed recall preoperatively was not significant, however, postoperative delayed recall scores again demonstrated a very marked decline for the LT group to the severely impaired range, while RT performance remained stable ($p < .001$).

On the NVSRT the RT group scores were lower than those of the LT group on LTS preoperatively ($p < .05$), falling in the high borderline impaired range, and on CLTR postoperatively ($p < .03$), representing mild impairment of nonverbal learning for the right temporal group. Again, delayed recall of the information did not differ preoperatively between the two groups, while postoperative scores showed the RT patients to be performing significantly below the LT group ($p < .05$).

Conclusions:

- These results underscore the importance of material specific learning paradigms as well as measures of delayed recall in assessing temporal lobectomy candidates.
- The selective reminding paradigm appears to have the potential to discriminate effectively between dominant and nondominant temporal lobe dysfunction during preoperative assessment.
- Striking postoperative declines in memory performance among both dominant and nondominant temporal lobectomy patients emphasizes the importance of preoperative counseling in this population.

References:

1. Buschke, H and Altman Fuld, P Evaluating storage, retention, and retrieval in disordered memory and learning. *Neurology* 24::1019-1025, 1974
2. Fletcher, JM Memory for verbal and nonverbal stimuli in learning disability subgroups: Analysis by selective reminding. *Journal of Experimental Child Psychology* 40: 244-259, 1985.v

Table 1

Demographic Information

	N	Sex	Age	Education	FSIQ
Right Temporal	34	18 M 16 F	Mean 34.5 s.d. 10.5	13.1 1.9	96.0 13.4
Left Temporal	32	16 M 16 F	Mean 28.4 s.d. 9.4	13.1 1.9	92.6 9.2

M=male, F=female, s.d.=standard deviation

Figure 1

Right vs Left Temporals - Verbal Selective Reminding

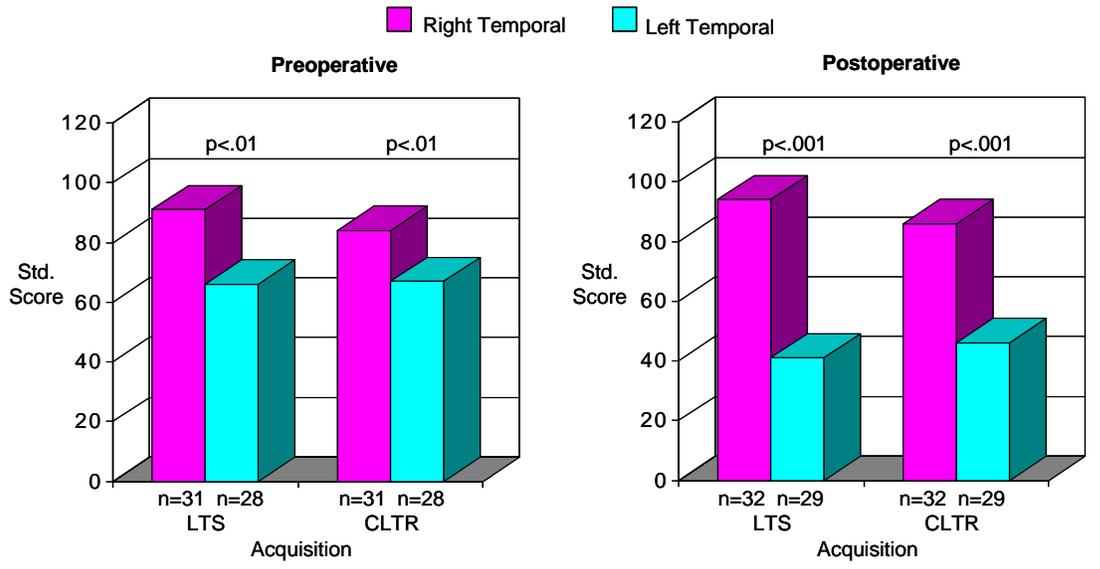


Figure 3

Right vs Left Temporals - Nonverbal Selective Reminding

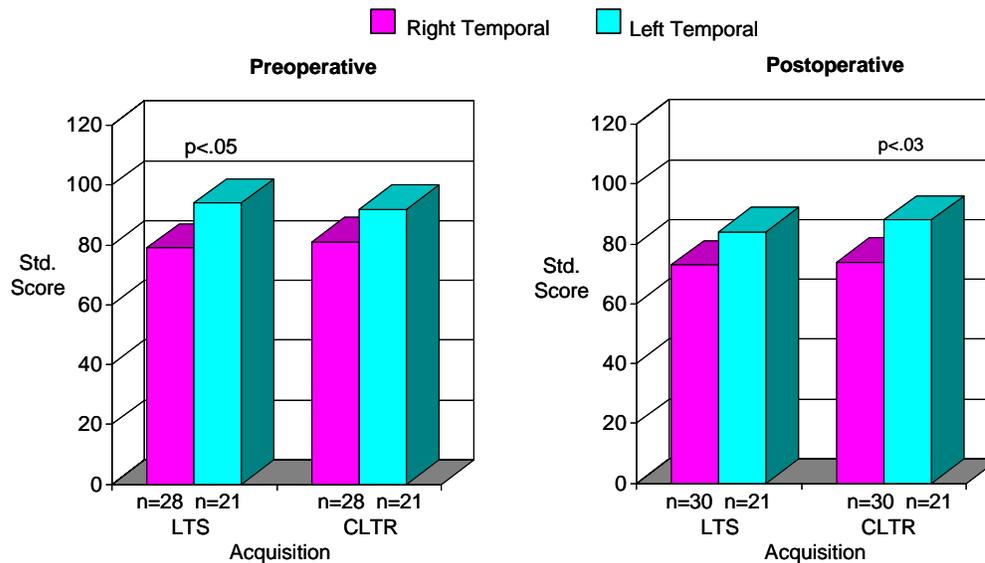


Figure 2

Right vs Left Temporals Verbal Selective Reminding

Delayed Recall

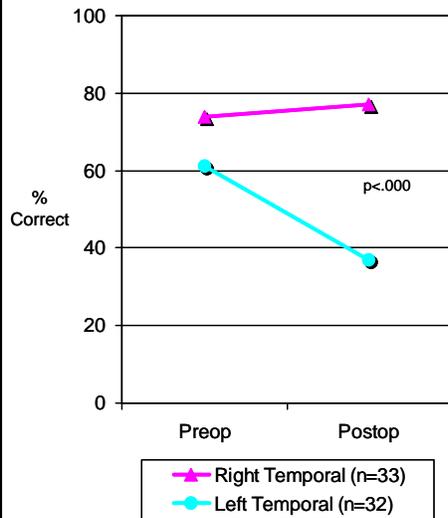


Figure 4

Right vs Left Temporals Nonverbal Selective Reminding

Delayed Recall

