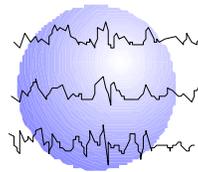


THE EFFECT OF HIPPOCAMPAL SPARING ON VERBAL MEMORY OUTCOME FOLLOWING DOMINANT TEMPORAL LOBECTOMY

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REVISED ABSTRACT

RATIONALE: In recent years, risk of material specific verbal memory decline following dominant temporal lobectomy (TL) has led to selective cases of surgical sparing of the hippocampus in our program. This study examines the memory outcome of these patients.

METHODS: The subjects were 38 dominant TL patients. Twenty-six underwent TL with resection of the hippocampus, while the hippocampus was spared in 12 cases based on a combination of risk factors including absence of MTS, intact dominant hemisphere memory performance in the intracarotid amobarbital procedure (IAP), later age of seizure onset and intact baseline verbal memory test performance . The two groups were compared on measures of the verbal Selective Reminding Test (vSRT) using pre- to postoperative difference scores with a univariate ANOVA which adjusted for baseline performance on each variable. The two groups did not differ in age, IQ or gender.

RESULTS: Preoperative performance on the vSRT was equivalent for the two groups with mean scores ranging from intact to mildly impaired. Postoperatively, patients who underwent hippocampal resection demonstrated significantly greater decline in consistent long term retrieval ($p < .05$) and delayed recall ($p < .05$) vSRT measures, compared to patients whose surgeries spared the hippocampus.

CONCLUSIONS: These data suggest that sparing of the hippocampus in dominant TL results in preservation of verbal memory. This more conservative surgical procedure in cases at high risk for postoperative memory decline is neuropsychologically justified. These data will be discussed in relation to surgical selection criteria and postoperative seizure outcome. *Epilepsia* 41(S7):154, 2000

INTRODUCTION

Memory outcome following dominant temporal lobectomy has long been an important factor in the surgical treatment of intractable epilepsy. Even when the possibility of an amnesic outcome has been ruled out by IAP, the risk of significant decline in verbal memory ability remains an important practical consideration, particularly for patients whose baseline abilities are in the average range or above. Previously described factors which may identify patients at particular risk for poor verbal memory outcome include relatively intact verbal memory functioning at baseline, intact memory performance in the dominant hemisphere on IAP, absence of mesial temporal sclerosis (MTS) on MRI, and later age of seizure onset.

Since 1992, a total of 12 patients in our program have undergone dominant temporal lobectomy, which spared resection of the hippocampus. This study compares postoperative changes in verbal memory performance of these cases to dominant temporal lobectomy cases whose surgeries included hippocampal resection.

METHODS

All dominant temporal lobectomy patients at the Minnesota Epilepsy Group between 1992 and 1999 who also underwent pre- and postoperative neuropsychological testing were included in the study. There were a total of 38 subjects, 26 of whom had hippocampal resection and 12 for whom the hippocampus was spared. The decision regarding each patient's surgery was based on a number of diagnostic and clinical variables in addition to specific risk factors for poor memory outcome. These included intact baseline neuropsychological test performance, intact dominant hemisphere memory on IAP, absence of MTS and later age of seizure onset. Selected cases were thus identified to undergo conservative temporal lobectomy which spared resection of the hippocampus. Patient demographics are presented in Table 1. The two groups did not differ significantly in age or IQ.

Verbal memory was assessed with the verbal Selective Reminding Test. Four scores are reported including Long Term Storage and Consistent Long Term Retrieval which measure efficiency of acquisition over learning trials and Delayed Recall/Delayed Recognition scores obtained approximately 30 minutes after initial learning. Postoperative outcomes were assessed 6 - 12 months following surgery. Pre- to postoperative change for each patient was calculated by subtracting the preoperative score from the postoperative score for each measure, negative values indicating a decline in performance.

Postoperative seizure outcome, age of seizure onset and presence or absence of MTS was determined by review of clinic records. The diagnosis of MTS was based on increased T2 signal on MRI or decreased hippocampal volume relative to the contralateral hemisphere. The percent of patients who evidenced a favorable seizure outcome (Engel's Class I or II) was calculated for each surgery group. These factors were compared for the two surgery groups using t-test and χ^2 analyses.

RESULTS

Pre-operative performance on the vSRT was not significantly different for the two groups (Figures 1 and 2). The long-term storage score fell at the low end of the average range for the hippocampal resection group, and in the mildly impaired range for patients with hippocampal sparing, while Consistent Long Term Retrieval was borderline impaired for the hippocampal resection group, and mildly impaired for the spared group. Delayed recall was mildly impaired for both groups, and delayed recognition was intact at ceiling levels for both groups. Following surgery, significantly greater declines were recorded for the hippocampal resection group in Consistent Long Term Retrieval ($p < .05$; Figure 3) and Delayed Recall ($p < .05$; Figure 4), while the difference did not reach statistical significance for the Long Term storage score (Figure 3) due to a high degree of variability across subjects. There was no difference between the groups in Delayed Recognition (Figure 4).

Table 2 reports the incidence of risk factors for poor verbal memory outcome as well as seizure outcome for the two surgery groups. As expected, despite relatively equivalent baseline memory performance, patients who underwent the more conservative surgical procedure (hippocampus spared) had a lower incidence of mesial temporal sclerosis ($p = .05$), obtained higher mean scores on IAP memory testing with the language dominant hemisphere ($p < .05$), and had a higher mean age of seizure onset compared to the hippocampal resection group ($p = .05$). There was no difference in seizure outcome (% Engel's Class I or II) between the two groups.

CONCLUSIONS

- ❖ Sparing of the hippocampus in selected cases of dominant TL results in significant preservation of verbal memory functions.
- ❖ Selection of conservative resection cases should be based on a combination of risk factors associated with poor verbal memory outcome.
- ❖ For appropriately selected patients, sparing of the hippocampus is not associated with compromised seizure outcome.

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Table 1

PATIENT DEMOGRAPHICS

	N	Gender	Age	FSIQ
LTL with Hippocampal Resection	26	M 42% F 58%	x 28.1 s.d. 11.3	94.8 12.1
LTL with Hippocampus Spared	12	M 58% F 42%	x 26.4 s.d. 6.8	93.6 9.8

Figure 1

**PREOPERATIVE PERFORMANCE
VERBAL SELECTIVE REMINDING TEST**

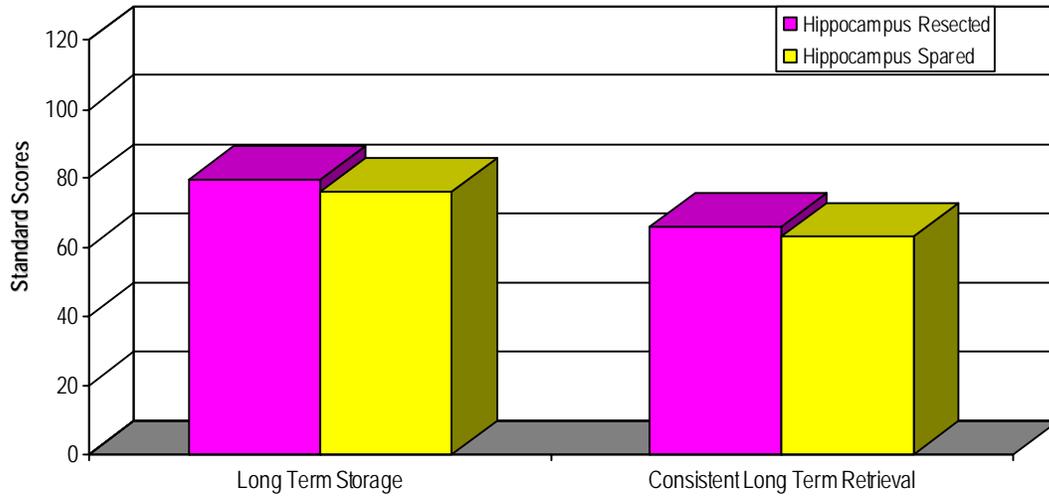


Figure 2

PREOPERATIVE PERFORMANCE VERBAL SELECTIVE REMINDING TEST

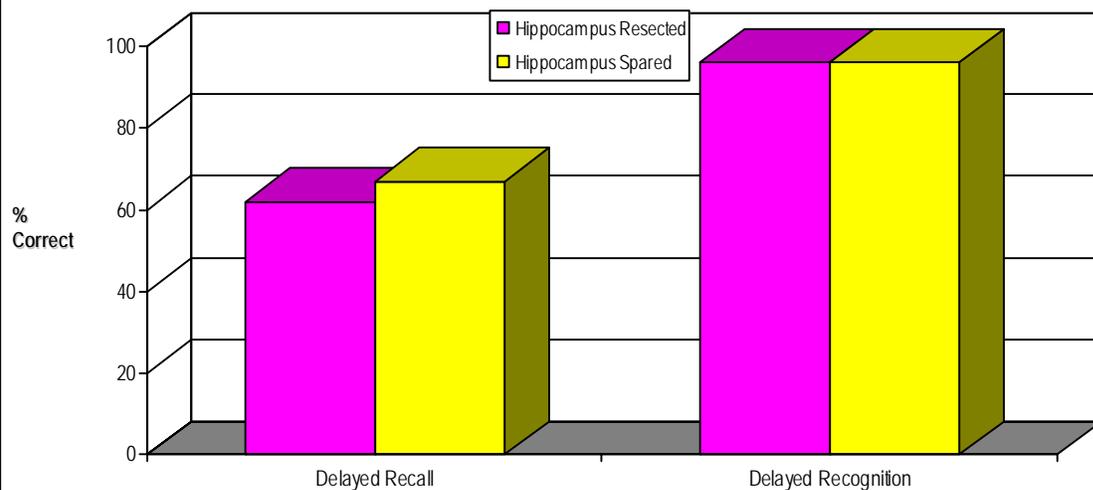
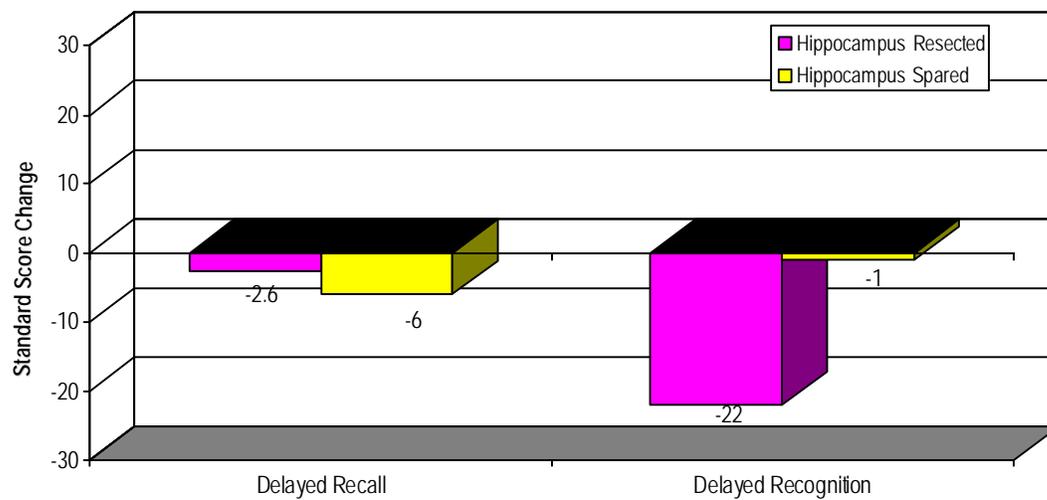


Figure 3

PRE-POSTOPERATIVE DIFFERENCE SCORES VERBAL SELECTIVE REMINDING TEST



*p < .05

Figure 4

PRE-POSTOPERATIVE DIFFERENCE SCORES
VERBAL SELECTIVE REMINDING TEST

