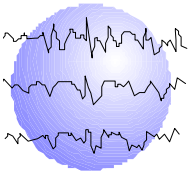
LANGUAGE OUTCOME FOLLOWING LEFT TEMPORAL LOBECTOMY (LTL) IN ADULT PATIENTS WITH BILATERAL LANGUAGE (BL) REPRESENTATION

Gail L. Risse, PhD
Keith G. Davies, MD
Ann Hempel, PhD
John R. Gates, MD



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Minnesota Epilepsy Group, P.A.®
225 Smith Avenue N., Suite 201
St. Paul, MN 55102
Phone: (651) 241-5290
Fax: (651) 241-5248

REVISED ABSTRACT

RATIONALE: LTL of left language dominant patients for the treatment of intractable epilepsy has rarely resulted in frank aphasic symptomatology, provided the resection remains anterior to primary language cortex identified by electrical stimulation. However, recent reports have documented that some decline in language processing including visual confrontation naming is frequently present in these patients postoperatively. The possibility that BL representation as determined by the Intracarotid Amobarbital Procedure (IAP) might be associated with some sparing of these deficits has been reported for pediatric patients, but to date, has not been evaluated in an adult population. The present study compares the postoperative language outcome of adult patients with BL to a similar group of LTL patients with left hemisphere language dominance (LD).

METHODS: The records of 38 patients who had undergone LTL, IAP and neuropsychological testing pre and postoperatively were reviewed. 26 patients were LD, while 12 had BL. The two groups did not differ in age at surgery (mean=29.6 yrs.), education (mean=13.4 yrs.) or Full Scale IQ (mean=92.4). 42% of LD and 75% of BL patients had early seizure onset (<11 yrs.). A majority of patients underwent language mapping with cortical stimulation prior to surgery. Neuropsychological variables included measures of vocabulary, abstract verbal reasoning, visual confrontation naming, phonemic verbal fluency and category fluency. Pre to postoperative difference scores were calculated for each variable and the two language groups compared for absolute level of performance and degree of change using paired t-tests. Individual change scores for each patient were also reviewed, with significant decline defined by the Reliable Change Index or a drop of one standard deviation or more on at least one language measure.

RESULTS: As a group, BL and LD patients performed similarly on language measures both before and after LTL. A significant difference was found on confrontation naming postoperatively, with the LD patients scoring lower than the BL patients ($p<.05$). For both groups, postoperative performance and pre-post change scores suggested greater impairment for patients with late seizure onset. Overall, there was no difference in the percent of patients in each language group showing some decline, with 69% of LD patients and 73% of BL patients declining on at least one language measure. Among BL patients, postoperative language decline was less for patients with higher right hemisphere language scores on IAP.

CONCLUSION: The presence of BL in association with early seizure onset may predict a better language outcome following LTL. This effect appears to be maximized in patients with relatively greater right hemisphere language.

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Introduction:

Patients undergoing LTL for chronic seizures have rarely suffered significant loss of primary language functions postoperatively, particularly if they have undergone cortical language mapping prior to surgery. However, a number of recent studies have reported significant declines in confrontation naming and other areas of language processing following LTL (1-7). The possibility that BL representation, as determined by IAP may be associated with some sparing of these functions has been reported for pediatric patients (8). Hempel found that a majority of children studied experienced stable or improved language functions postoperatively and that BL representation may provide some protection against significant language decline. To date, this question has not been addressed in an adult population. This study compares the pre to post-operative performance of LTL patients on measures of language processing as a function of hemispheric language dominance based on IAP. LD patients are compared to BL cases for evidence of postoperative decline and degree of right hemisphere language in the BL cases is reported.

Methods:

The records of 38 patients who had undergone LTL, IAP and neuropsychological testing pre and post-operatively were retrospectively reviewed. Twenty-six patients were found to be LD for language based on the IAP, while 12 had been classified as BL using the criteria of Risse (9). The demographics of the two patient groups are presented in Table 1. No significant differences between the LD and BL groups were found for age at surgery, level of education, or Full Scale IQ. Age of seizure onset was significantly later in the LD group ($p < .05$). A majority of patients underwent language mapping with electrocortical stimulation prior to surgery. The neuropsychological measures reported include the Vocabulary and Similarities subtests of the WAIS-III, the Boston Naming Test, Controlled Oral Word Association, and Animal Naming. Pre- to postoperative difference scores were calculated for each variable and the two language groups compared for absolute level of performance and degree of change using paired t-tests. Significant decline on each measure was defined by the Reliable Change Index or a drop in scores of at least one standard deviation. Individual patients were considered to have declined if they met the above criteria on one or more language measures. Each language group was also divided into patients with early (£ 11 years) vs. late (³ 12 years) seizure onset and the incidence of language decline in each subgroup is reported. Finally, right hemisphere language scores in the BL group and the number of right hemisphere language modalities demonstrated in the IAP were compared for patients with and without language decline using the Wilcoxen Mann-Whitney Sum of Ranks Test.

Results

When group data are compared, there are no significant differences in performance between LD and BL patients either pre or post-operatively on WAIS-III Vocabulary and Similarities subtests (Figure 1), COWA (Figure 2), or Animal Naming (Figure 3). BNT performance declined postoperatively for both groups, consistent with previous reports, with mean postoperative performance of the LD group falling significantly below the BL group ($p < .05$) (Figure 4).

Individual decline on language measures was highly variable (Figure 5) with the greatest percentage of patients in both groups showing a decline on the BNT. Late age of seizure onset was clearly associated with language decline (Table 2). Eighty percent of LD patients with late

onset and 100% of BL with late onset showed evidence of language decline, compared to 45% of LD patients with early onset, and just 33% of BL patients with early onset.

Among patients in the BL group, degree of right hemisphere language representation on IAP varied considerably. Patients without language decline had significantly higher right hemisphere language scores on IAP (Figure 6A) and there was a trend toward fewer right hemisphere language modalities in the language decline group (Figure 6B).

Discussion

These results underscore the subtlety of language decline following dominant temporal lobectomy. When deficits are demonstrated, as in confrontation naming, these preliminary data suggest that the degree of decline may in part be related to the potential for language processing in the right hemisphere. Indeed, patients with higher right hemisphere language scores fell more frequently in the "no decline" group. These findings must be verified with larger patient groups with the ultimate objective of broadening our understanding of the risk factors associated with dominant temporal lobectomy.

Conclusions:

- Language processing deficits following LTL are limited, but clearly include visual confrontation naming.
- The presence of BL in association with early seizure onset may predict a better language outcome following LTL
- This effect may be maximized in bilateral language patients with relatively greater right hemisphere language representation.

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Table 1

Patient Demographics

	N		Age	Sz. Onset*	Ed	FSIQ
Left Dominant	26	mean	30.1	13 yr	13.2 yr.	92.9
		sd	9.9	10.7	1.8	12.2
		range	18-51	0-37	11-16	72-127
Bilateral	12	mean	29.3	6.6 yr	14 yr.	92.8
		sd				
		range				

* p<.05

Figure 1

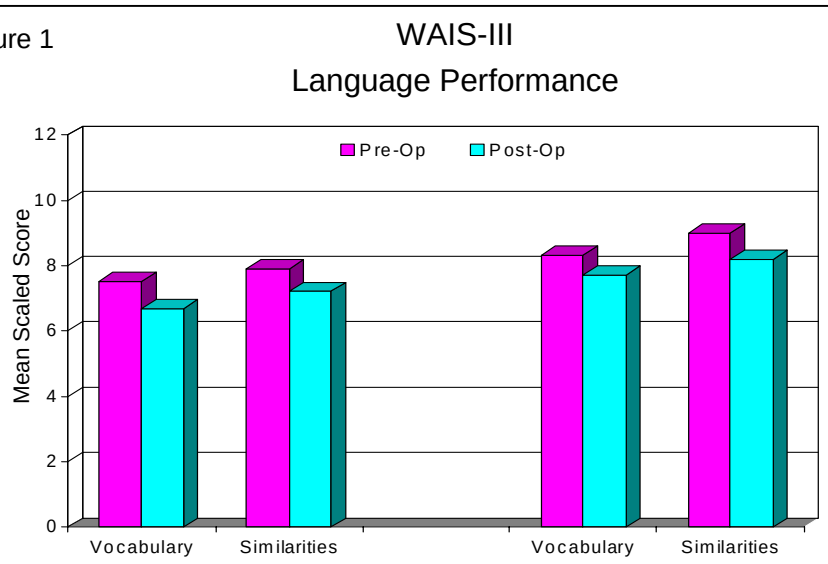
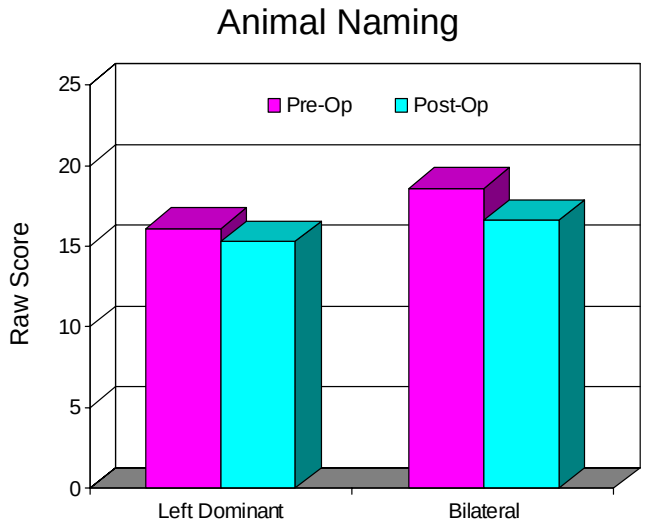


Figure 2

Figure 3



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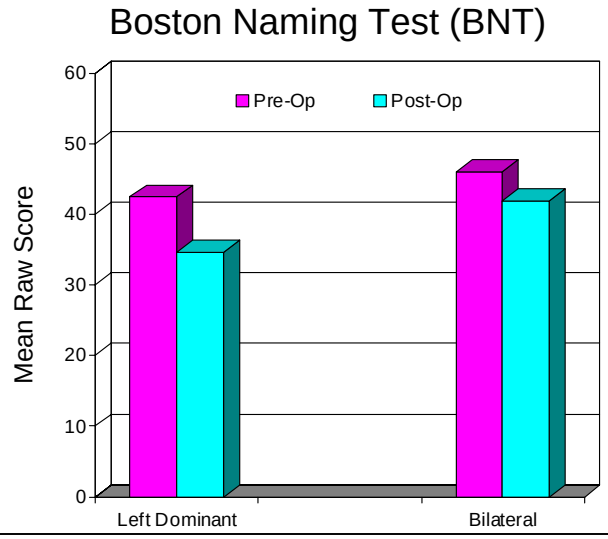
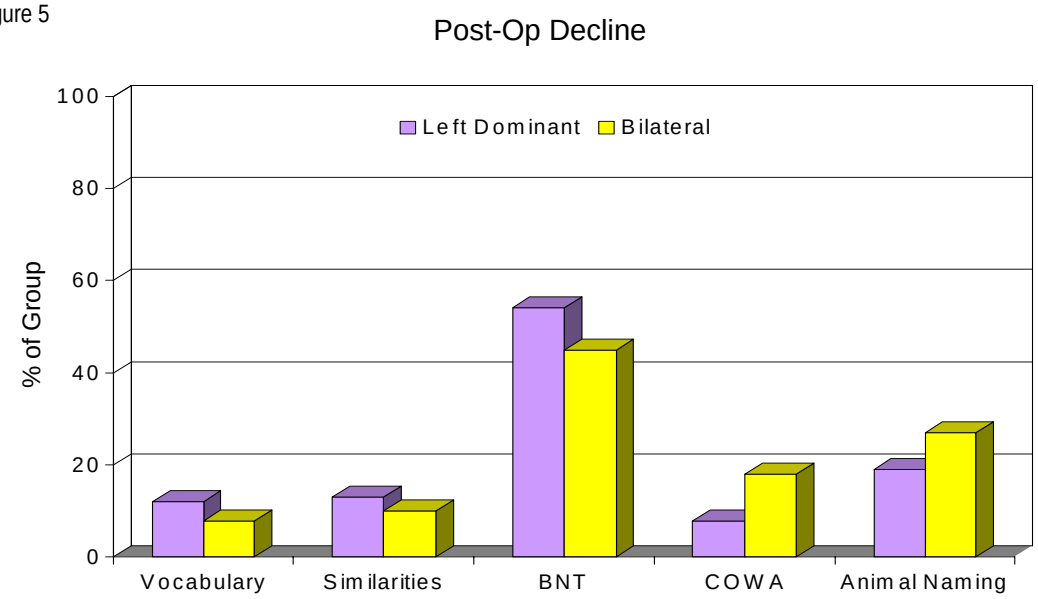


Table 2 Language Decline and Age of Seizure Onset

	Early Onset (≤ 11 yrs.)	Late Onset (≥ 12 yrs.)
Left Dominant	45%	80%
Bilateral	33%	100%

Percent of patients in each group showing language decline

Figure 5



Percent of patients in the two language groups showing significant decline on each of the language measures

Figure 6