Verbal memory

Verbal memory is a term used in cognitive psychology that refers to memory of words and other abstractions involving language.

Patterns of cognitive impairment in former American football players are uncertain because objective neuropsychological data are lacking. A study characterized the neuropsychological test performance of former college and professional football players.

One hundred seventy male former football players (n=111 professional, n=59 college; 45-74 years) completed a neuropsychological test battery. Raw scores were converted to T-scores using age, sex, and education-adjusted normative data. A T-score ≤ 35 defined impairment. A domain was impaired if 2+ scores fell in the impaired range except for the language and visuospatial domains due to the limited number of tests.

Most football players had subjective cognitive concerns. On testing, rates of impairments were greatest for memory (21.2% two tests impaired), especially for recall of unstructured (44.7%) versus structured verbal stimuli (18.8%); 51.8% had one test impaired. 7.1% evidenced impaired executive functions; however, 20.6% had impaired Trail Making Test B. 12.1% evidenced impairments in the attention, visual scanning, and psychomotor speed domain with frequent impairments on Trail Making Test A (18.8%). Other common impairments were on measures of language (i.e., Multilingual Naming Test [21.2%], Animal Fluency [17.1%]) and working memory (Number Span Backward [14.7%]). Impairments on our tasks of visuospatial functions were infrequent.

In this sample of former football players (most of whom had subjective cognitive concerns), there were diffuse impairments on neuropsychological testing with verbal memory being the most frequently impaired domain [1].

Research aimed to broaden understanding of learning verbal material in participants with left- and right-sided mesial temporal lobe epilepsy (MTLE). Deifelt Streese et al. modeled word list learning to determine how anterior temporal lobe resection affects verbal learning. Verbal learning (across trials) was assessed using the first five trials of the Rey Auditory Verbal Learning Test (RAVLT) in 128 participants with MTLE. Mixed-effects modeling was used to determine whether learning curves differed between participants with left- and right-sided MTLE pre-and post- anterior temporal lobe resection. Laterality of MTLE had a significant effect on both the model intercept and the linear slope, whereby participants with left-sided MTLE retained fewer words on both the first trial and on each subsequent trial than participants with right-sided MTLE; and this holds regardless of anterior temporal lobe resection status ($t(117) = -3.516$, $p < .001$; $t(120.50) = -2.049$, $p = .042$, for intercept and linear slope, respectively). There were no significant differences in the learning curves after anterior temporal lobe resection surgery in either left- or right-sided MTLE. These findings suggest that acquisition of verbal information may be especially impaired in patients with left-sided MTLE. Further, they showed that verbal learning across trials was not affected by surgical intervention. This finding contributes to the broader understanding of the impacts of anterior temporal lobe resection on verbal memory function and has important implications for the clinical management and surgical planning for patients with temporal lobe epilepsy [2].

Glioma surgery series with intraoperative Electrostimulation (IES) language mapping have demonstrated high rates of postoperative memory impairment, raising a question regarding the efficacy of this approach to preserve memory.

To evaluate if intraoperative identification and preservation of verbal memory sites with IES mapping in diffuse gliomas in eloquent areas consistently protect patients from long-term postoperative decline in short-term memory.

A cohort of 16 subjects with diffuse low-grade or anaplastic gliomas that were operated with IES and intraoperative evaluation of language and verbal memory (cohort A) was matched by tumor side, pathology, and radiotherapy with a cohort of 16 subjects that were operated with IES and evaluation of language (cohort B). Detailed neuropsychological assessment was performed before and 6 mo after surgery.

Intraoperative memory mapping was a strong predictor of verbal memory prognosis. In cohort A, 4 patients (26.7%) had a decline of at least one of the 4 short-term memory tests evaluated. In cohort B, 11 patients (73.3%) had a decline of at least one of the 4 tests. This difference was statistically significant in multivariate analysis (P = .022; odds ratio = 9.88; 95% confidence interval = 1.39-70.42).

Verbal memory areas identified intraoperatively with the current paradigm are critically involved in verbal memory, as memory impairment can be significantly reduced by adapting the resection to avoid those memory areas. Incorporation of verbal memory evaluation in stimulation mapping protocols might assist in reducing postoperative sequelae and preserving the patient's quality of life [3)].

Previous findings have been mixed regarding verbal memory outcome after left temporal lobectomy in children.

Decline in verbal memory as a surgical complication remains an unresolved problem in mesial temporal lobe epilepsy. Some areas in the temporal lobe associated with the language function, often including the basal temporal language area, have been removed or transected by conventional surgical procedures.

The mainstay of Parkinson's disease treatment is medical. In certain patients Deep Brain Stimulation (DBS) may be offered. However, DBS has been associated with post-operative neuropsychology changes, especially in verbal memory.

The basal temporal language area, defined as a part of the inferior temporal gyrus, the fusiform gyrus, and the parahippocampal gyrus, was spared by entering the temporal horn via collateral sulcus. Verbal memory was significantly improved by 3 months and 1 year after the operation.

In language-dominant-side mesial temporal lobe epilepsy, preserving the basal temporal language area would have potential to improve verbal memory outcomes after removal of the epileptogenic zone [4].

In patients with temporal lobe glioma, neurocognitive functioning (NCF) decline in the subacute postoperative period is common. As expected, patients with Left temporal lobe tumor (LTL) show more frequent and severe decline than patients with right temporal lobe tumor (RTL), particularly on verbally mediated measures. However, a considerable proportion of patients with RTL tumor also exhibit decline across various domains, even those typically associated with left hemisphere structures, such as verbal memory

see nonverbal memory.

Law et al., retrospectively assessed verbal memory change approximately 1 year after unilateral temporal lobe epilepsy surgery using a list learning task. Participants included 23 children who underwent temporal lobe surgery with sparing of the mesial structures (13 left), and 40 children who had a temporal lobectomy that included resection of mesial structures (22 left).

Children who underwent resection from the left lateral and mesial temporal lobe were the only group to show decline in verbal memory. Furthermore, when we considered language representation in the left temporal resection group, patients with left language representation and spared mesial structures showed essentially no change in verbal memory from preoperative to follow-up, whereas those with left language representation and excised mesial structures showed a decline. Postoperative seizure status had no effect on verbal memory change in children after left temporal lobe surgery. Finally, we found that patients with intact preoperative verbal memory experienced a significant decline compared to those with below average preoperative verbal memory.

The findings provide evidence of significant risk factors for verbal memory decline in children, specific to left mesial temporal lobe epilepsy. Children who undergo left temporal lobe surgery that includes mesial structures may be most vulnerable for verbal memory decline, especially when language representation is localized to the left hemisphere and when preoperative verbal memory is intact [5].

A certain number of patients suffer significant decline in verbal memory after hippocampectomy. To prevent this disabling complication, a reliable test for predicting postoperative memory decline is greatly desired. Therefore, Tani et al., assessed the value of Electrostimulation of the parahippocampal gyrus (PHG) as a provocation test of verbal memory decline after hippocampectomy on the dominant side.

Eleven right-handed, Japanese-speaking patients with medically intractable left temporal lobe epilepsy (TLE) participated in the study. Before surgery, they underwent provocative testing via Electrostimulation of the left PHG during a verbal encoding task. Their pre- and posthippocampectomy memory function was evaluated according to the Wechsler Memory Scale-Revised (WMS-R) and/or Mini-Mental State Examination (MMSE) before and 6 months after surgery. The relationship between postsurgical memory decline and results of the provocative test was evaluated.

Left hippocampectomy was performed in 7 of the 11 patients. In 3 patients with a positive provocative recognition test, verbal memory function, as assessed by the WMS-R, decreased after hippocampectomy, whereas in 4 patients with a negative provocative recognition test, verbal memory

function, as assessed by the WMS-R or MMSE, was preserved.

Results of the present study suggest that Electrostimulation of the PHG is a reliable provocative test to predict posthippocampectomy verbal memory decline [6].

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