

WADA TEST FAILURE AND COGNITIVE OUTCOME

Neuropsychological Effects Associated with Temporal Lobectomy and Amygdalohippocampectomy Depending on Wada Test Failure

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PURPOSE: To compare the neuropsychological effects of temporal lobectomy (TL) and amygdalohippocampectomy (AH), depending on whether the patients had passed or failed the Wada test.

METHODS: We compared changes in neuropsychological scores in patients who underwent TL ($n = 91$) or AH ($n = 15$) and had passed or failed the Wada test. Comparisons were carried out in all 106 patients and among the 20 patients who failed the Wada test (12 who had TL and eight who had AH).

RESULTS: No patient became globally amnesic after surgery. Among all patients, no differences were found in presurgical or change scores (percentage of change after surgery compared with preoperative values) of neuropsychological tests between patients who underwent TL or AH. Among patients who failed the Wada test, those in the TL group showed higher visual memory impairment (P

< 0.05). A strong trend suggested that TL is associated with higher verbal memory deficits than AH ($P = 0.07$). Of those TL patients who failed the Wada test, the contralateral Wada score correlated with change scores in verbal intelligence quotient ($P < 0.01$), and a strong trend was noted toward a correlation with the logical memory immediate recall version subtest of the Wechsler Memory Scale ($P = 0.06$).

CONCLUSIONS: No profound changes in intelligence quotient or memory scores were found after TL or AH. Nevertheless, patients who underwent TL and failed the Wada test showed more deficits than did those who passed the test or those who had AH. The presence of a correlation between contralateral Wada scores and verbal deficits in TL patients who failed the Wada test, but not among AH patients, suggests that, if temporal surgery is required, AH might be preferred to TL in patients who fail the Wada test.

COMMENTARY

The worst possible cognitive complication of anterior temporal lobectomy (ATL; with hippocampal resection) is anterograde amnesia. This occurs extremely rarely, but it does occur (1), and when it occurs, it is terrible for all concerned. A variety of safeguards exist to minimize the risk of such an outcome, and historically, the Wada Test is among them. The Wada Test is performed before surgery and provides information regarding both cerebral dominance for speech and the adequacy of memory function in each hemisphere. The present study by Lacruz and colleagues focused on the memory portion of the test. Specifically, this investigation is a careful attempt to characterize the neuropsychological consequences of Wada Test failure in the context of a broader investigation of the comparative cognitive outcomes between standard ATL and amygdalohippocampectomy (AH).

Details of the Lacruz et al. article highlight several issues that should be considered when attempting to determine the prognostic significance of the Wada Test. First, there is no such thing as *the* Wada Test. Major efforts to establish procedural uniformity across epilepsy centers have been made, but many different *versions* of the test still remain. The memory portion of

the Lacruz et al. Wada Test involved presentation of 18 stimuli (six words, six line drawings of objects, six faces), with subsequent recognition testing of the targets occurring with 18 interspersed foils. Corrections were then made for incorrect responses. Second, the Wada Test provides information regarding the degree of memory support in the hemisphere contralateral to the side of surgery as well as the degree to which tissue targeted for resection continues to mediate memory function. Both perfusions are important and informative. This investigation focused only on the former and did not consider the latter in predicting cognitive outcome. Third, no uniform designation exists of what constitutes Wada Test failure. The authors have an operational definition of failure (corrected score, < 5), but memory failure, as assessed by the Wada Test, can take place in the context of either intact or impaired traditional psychometric memory. What role does stable and intact psychometric memory play in predicting memory outcomes? In the study by Lacruz et al., psychometric memory was included in patient assessment. If patients failed the Wada Test but exhibited normal psychometric memory (“bad Wada memory, good psychometric memory”), they underwent ATL. However, those patients

with “bad Wada memory” and “bad psychometric memory” underwent AH, as the authors believe the latter generally is associated with less cognitive risk. Finally, the number of patients who typically fail the Wada Test is not great, and the power of such studies may be somewhat limited. Here a total of 106 patients underwent surgery, and 20 failed the Wada Test. Of these 20, 12 underwent ATL, and eight, AH—modest sample sizes to be sure.

So, given these issues, do patients who fail the Wada Test have less-favorable cognitive outcomes than do those who pass it? The answer appears to be yes. Although no cases of amnesia were seen, and the cognitive outcomes, in general, were not particularly different among patients undergoing ATL compared with AH, patients who failed the Wada Test and underwent ATL showed more deficits than did those individuals who passed the test or who underwent AH. ATL patients who failed the Wada Test exhibited greater declines in visual memory, with a strong trend toward greater decline in verbal memory. The modest number of subjects investigated precluded examination of material-specific cognitive effects by laterality of surgery.

In summary, the results suggest that the version of the Wada Test that examines patients in the fashion described by

the authors has utility in predicting adverse memory outcomes after ATL. Although this version of the Wada Test has predictive utility, recent findings using *f*MRI procedures suggest that the ability to noninvasively identify persons at risk for adverse language and memory outcomes is soon approaching (2–4).

by Bruce Hermann, Ph.D.

References

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