Cognitive Profiles in Alzheimer's Disease and small vessel Vascular Dementia

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Introduction: Alzheimer's disease (AD) and vascular dementia (VaD) account for the majority of dementia cases among elderly people. A large number of studies have examined possible differences in cognitive performance between AD and VaD but the data in the literature are conflicting. The most consistent findings suggest that AD is characterised by a greater impairment in episodic memory, whereas patients with VaD display greater deficits in executive/attentional abilities [1]. Other studies have instead found marked executive functioning and working memory impairments in patients with mild-moderate AD and VaD, with no differences being observed between the two diseases [2]. The main aim of this study was to analyze the neuropsychological pattern of AD and small vessel VaD subjects in the early stages of disease by assessing two groups of patients whose demographic characteristics and disease severity were matched. The secondary aim was to investigate differences in the progression of cognitive impairment between the two diseases as well as to assess the role of vascular risk factors. We hypothesized that in the early phase of cognitive impairment there are differences between small vessel VaD and AD in both the neuropsychological pattern and cognitive progression.

Material and Methods: Seventy-five patients with probable VaD and 75 patients with probable AD were included. All the subjects underwent a standard neuropsychological evaluation. The severity of cognitive impairment was stratified according to the MMSE score as follows: subjects with an MMSE score ≥ 21 were defined as mild, whereas subjects with an MMSE score ≤ 20 were defined as moderate. Fifteen subjects with probable AD and 10 subjects with probable VaD underwent a 12-month cognitive re-evaluation.

Tabella 2

	AD patients (n=75) mean ± SD	VaD patients (n=75) mean ± SD	P value
Age (years)	72.3 ± 7.1	71.6 ± 7,2	0.550
Gender (M/F)	38/37	49/26	0.098
Education (years)	9.8 ± 4.8	9.2 ± 4.7	0.440
MMSE (score)	24.4 ± 4.1	24.3 ± 4.9	0.892
Raven	18.8 ± 6.8	18.1 ± 8.2	0.570
Visual Search	42.4 ± 10.9	39.4 ± 12	0.111
Digit Span	4.9 ± 1	4.6 ± 1.1	0.083
Corsi test	3.5 ± 0.9	3.2 ± 1	0.055
Story recall	5.5 ± 3.9	8.4 ± 5.1	**0.0001**
Token test	29.1 ± 4	28 ± 5.2	0.149
Phonological Verbal Fluency	20 ± 10.2	18.9 ± 12.2	0.550
Semantic Verbal Fluency	9.3 ± 4.1	9.4 ± 5.1	0.895
Copying Drawings	11 ± 2.3	11 ± 2.2	1

Conclusion: Our results show that in the early phase of cognitive decline, Story Recall scores were significantly worse in patients with AD than in those with VaD. The Story Recall test provides one of the most reliable neuropsychological assessments for episodic long-term verbal memory function and is widely used in clinical settings. This finding can be explained by neuropathological changes that prevalently occur in medial temporal regions in the early stages of AD. A storage failure in episodic long-term memory in early AD is consequently not surprising [3]. Instead we may hypothesize that, in early stages of the disease, small vessel vascular dementia subjects compensate for any failure in retrieval when tested by means of the Story Recall test more effectively than patients with AD [4]. Another interesting observation emerges from the analysis of the 12-month neuropshycological follow-up. AD subjects displayed a faster cognitive decline than VaD subjects in most of the tasks, which suggests that all the cognitive domains are rapidly involved. By contrast, VaD subjects perform more stably when compared with their baseline values in all the tests except Visual Search, which consists of an attentive task that measures a person's ability to select a target within a visual scanning context. Although our study has certain limitations, such as the small sample size and the short follow-up, the results that we obtained are supported by a comprehensive battery of neuropsychological tests and by a closely matched groups of patients. These results suggest that a neuropsychological evaluation helps to differentiate AD from small vessel VaD in the early stages of these diseases, when cognitive impairments are not yet severe. In these stages, episodic verbal memory function is impaired to a greater extent in AD than in VaD. Furthermore, our results suggest that cognitive decline progresses at different speeds in these two diseases: progression is faster in AD than in small vessel VaD and is only influenced by the presence of vascular risk factors in AD. Further research on the comparative neuropsychological evaluation of AD subjects and VaD subjects affected by small vessel diseases is required to shed more light on the neuropsychological pattern in the early phases of these two diseases.

Results: No significant difference was found between AD and VaD subjects in any of the neuropsychological tests except Story Recall (mean value ± SD: 5.5 ± 3.9 vs 8.4 ± 5.1, respectively; P=0.0001) (Tablella 2). Furthermore, the percentage of patients whose performance was impaired in the Story Recall test was higher in AD subjects (65%) than in VaD subjects (28%) (P=0.001; chi-square test). In keeping with the severity of cognitive impairment, AD subjects with mild cognitive impairment performed worse in the Story Recall test than VaD subjects (mean value ± SD: 6.08 ± 4.48 vs 9.08 ± 4.57; P<0.001); by contrast, no differences emerged between AD and VaD subjects with moderate cognitive impairment. In AD patients, the mean re-test value was significantly worse than the mean baseline value in the following tests: MMSE (P=0.037), Corsi (P=0.041), Story Recall test (P=0.032), Phonological Verbal Fluency test (P=0.02) and Copying Drawings (P=0.043); the only significant worsening in the VaD subjects was instead detected in the Visual Search test (P=0.036) (Tabella 3). The presence of vascular risk factors was higher in VaD than in AD subjects, though the difference did not attain statistical significance. In AD subjects, the number of vascular risk factors was correlated with the drop in the MMSE score (r = 0.711, P=0.003; Spearman's correlation), though not with the drop in each neuropsychological test at the 12-month follow-up. Lastly, no correlation was detected between the number of vascular risk factors and either overall or specific cognitive decline in VaD subjects.

Tabella 3

	AD patients (n=15) mean ± SD			VaD patients (n=10) mean ± SD		
	test	re-test	P value	test	re-test	P value
MMSE score	26.1 ± 2.8	23.5 ± 4	**0.037**	26.5 ± 1.7	25.8 ± 3.6	0.472
Raven	21.5 ± 8.5	18.7 ± 9.1	0.095	18.6 ± 5.7	16.7 ± 4.1	0.246
Visual Search	42 ± 9.1	45.2 ± 13	0.287	41.1 ± 9.1	34.5 ± 10.6	**0.036**
Digit Span	5.1 ± 1.1	4.7 ± 1	0.169	4.7 ± 0.9	4.9 ± 1.3	0.509
Corsi test	3.7 ± 1.5	2.9 ± 1.3	**0.041**	3.8 ± 0.8	3.2 ± 1	0.168
Story recall	5.8 ± 2.9	3.9 ± 3.1	**0.032**	10.6 ± 6.4	10.8 ± 5.5	0.871
Token test	30.7 ± 3.2	28.3 ± 8.3	0.268	28.5 ± 2.3	27.8 ± 4.6	0.578
Phonological Verbal Fluency	26.3 ± 12.3	20.2 ± 11.3	**0.02**	15.9 ± 8.5	13.8 ± 8.5	0.213
Semantic Verbal Fluency	9.3 ± 4	8.1 ± 4.4	0.453	8.8 ± 3.3	7.4 ± 2	0.168
Copying Drawings	12.1 ± 1.6	11.1 ± 2.1	**0.043**	12.1 ± 1.5	11.7 ± 1.7	0.309

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