Improvement of verbal fluency in patients with diffuse brain injury over time

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Introduction

Diffuse axonal injury (DAI), a common cause of neurological sequelae in patients with traumatic brain injury (TBI), is considered one of the most prevalent forms of primary neuronal injury in patients with severe TBI. Cognitive deficits induced by DAI can persist over time, especially following moderate or severe injuries. The aim of the present study was to compare verbal fluency performance at 6 and 12 months after the trauma in a same group of patients with diffuse axonal injury.

Methods

Eighteen patients with moderate to severe DAI and 17 healthy volunteers were enrolled. All participants had sustained a TBI at least 6 months prior to the start of the study, were between 18-50 years, and had at least 4 years of education. The Verbal Fluency Test (VF) was administered within an extensive neuropsychological battery test. We evaluated the same patients at 6 months (DAI group) and 1 year (DAI2 group) and compared the results of neuropsychological tests with a control group of healthy volunteers who were matched for sex, age, and educational level.

Results

In comparison to controls, an independent samples t-test revealed that the DAI1 group produced significantly fewer words. DAI 2 group produced significantly more semantic words than DAI 1 ($p < 0.05$), and demonstrated a trend towards the production of more clusters for letter A ($p = 0.09$) and total word generated in phonemicologic teste ($p = 0.09$). No significant differences were observed between DAI 2 and the control group in the total number of words generated in phonetic FAS or semantic fluency scores.

Learning Objectives

Understanding changes in verbal fluency in patients with TBI and LAD assist in the management and recovery of patients.

References

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Conclusions

The present findings may be useful in the construction of a management plan for long-term

Table 1 Demographic information and verbal fluency performance of healthy controls and DAI patients

Variable	Controls (n=17)		DAI (n=18)	
	Mean	(SD)	Mean	(SD)
Age (years)	32.17	(7.94)	27.05	(9.13)
Education (years)	9.7	(2.88)	10	(3.01)
Sex (male %)	65		83.3	

Abbreviations: DAI, diffuse axonal injury; SD, standard deviation.

Table 2 Distribution of the type and severity of the trauma and assessment period for each patient

Patients	Trauma mechanism	Glasgow	DAI1 (days after trauma)	DAI2 (days after trauma)
1	Motorcycle accident	3	218	346
2	Motorcycle accident	7	161	435
3	Motorcycle accident	6	173	446
4	Car accident	4	182	412
5	Motorcycle accident	8	166	437
6	Fall	6	187	453
7	Motorcycle accident	8	201	385
8	Motorcycle accident	5	160	377
9	Motorcycle accident	6	213	378
10	Motorcycle accident	9	185	354
11	Car accident	7	179	473
12	Car accident	9	223	384
13	Being run over	6	223	389
14	Being run over	10	174	390
15	Motorcycle accident	6	227	388
16	Fall	8	178	423
17	Car accident	6	182	422
18	Motorcycle accident	5	211	397

Abbreviations: DAI, diffuse axonal injury; DAI1, 6-month evaluation; DAI2, 12-month evaluation.

Table 3 Verbal fluency performance of healthy controls and DAI patients

Fluency test	Variable	Controls (n=17)	(SD)	DAI1 (n=18)	(SD)	DAI2 (n=18)	(SD)
Phonemic	Words generated	27.4	(9.1)	21.1	(8)	24.1	(6.8)
	Mean switches	18.9	(8.3)	16.1	(7.5)	17.9	(5.1)
	Mean cluster size	1.76	(1.3)	1.19	(1)	1.94	(1.3)
	Total errors	3.6	(2.5)	4.9	(3.7)	4.5	(3)
Semantic	Words generated	15.4	(4.7)	12.8	(4.5)	14.4	(3.7)
	Mean switches	10.6	(4.7)	7.4	(3.8)	9.2	(3.8)
	Mean cluster size	1.5	(1.3)	1.3	(1)	1.4	(1)
	Total errors	0.24	(0.4)	0.39	(0.8)	0.44	(0.6)

Abbreviations: DAI, diffuse axonal injury; DAI1, 6-month evaluation; DAI2, 12-month evaluation; SD, standard deviation.