Memory impairment in subarachnoid haemorrhage 4 month after surgical or endovascular treatment.

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INTRODUCCION

The mortality rate of patients with aneurysmatic subarachnoid hemorrhage admitted to a Neurosurgery Department can reach 26% (Kassel et al., 1990). Until around a decade ago, the main strategy to prevent the rebleeding of cerebral aneurysms was surgical, closing the aneurysmal neck with a metal clip. Given the damage to the cerebral tissue that can be caused by the hemorrhage and by the surgical manipulation, neuropsychological impairment can be expected in some of these patients. Until recently, it was impossible to establish the contribution of the surgical manipulation to cognitive deficits in these patients because of the absence of an appropriate control group. In 1991, this situation was changed by the introduction of endovascular treatment (Gluglielmi, Vinuela, Sepetka & Macellari, 1991), which soon became an effective alternative for the treatment of cerebral aneurysms. Briefly, this approach consists of occluding the aneurysmatic sac by inserting into the femoral artery an endovascular device that reaches the cerebral vascular system via the carotid artery. Therefore, the procedure is less intrusive compared with surgery. Research into the possible differences in neuropsychological sequelae has only recently begun, and few studies have compared cognitive and psychological functions between patients treated surgically for cerebral aneurysm and those treated with embolization.

The objective of the present study was to determine any differences in cognitive functioning between patients with cerebral aneurysm treated by surgery or embolization.

METHOD

Patients

Twenty-seven right-handed patients with aneurysmatic subarachnoid hemorrhage treated at our center between September 2002 and December 2003 were enrolled in this study; 14 (51.85%) were treated surgically and 13 (48.15%) by embolization. Nine neurologically and psychopathologically intact volunteers were enrolled as controls to enable assessment of the effect of the subarachnoid hemorrhage on the neuropsychological function in the patient groups. The clinical, surgical and demographic characteristics are shown in Table 1.

Material

- ***Spain-Complutense Verbal Learning Test (Test de Aprendizaje Verbal España-Complutense***; **Benedet & Alejandre, 1998), which assesses episodic memory for verbal material like the California Verbal Learning Test. For the present study, two variables were selected: the total number of words recalled during the five learning tests and the number of words recalled in the long-term free recall test.**
- ***Rey Complex Figure Test and Recognition Trail*** **(Meyer & Meyer, 1995). For the present study the variable Delayed Recall Trail (thirty minutes after copy) was selected.**
- ***Spanish version of the Boston Naming Test (Kaplan, Goodglass & Weintraub, 1986).*** **The variable selected for this study was the Final score.**
- ***Benton Visual Retention Test (BVRT)*** **(Benton, 1986). The total number of item correctly reproduced is the studied variable.**

Table 1. Demographic and clinic features of patients and healthy volunteers.

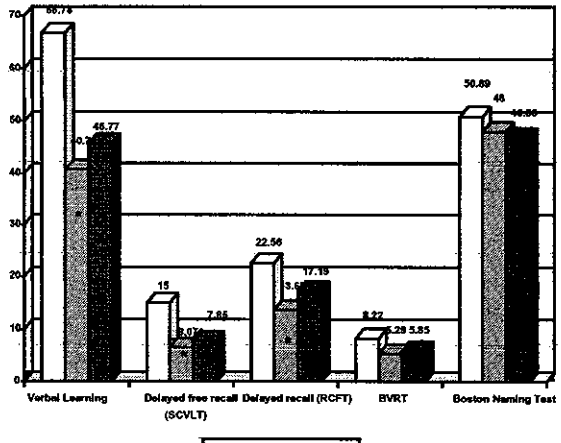
	Control	Surgery	Endovasc		Surgery	Endovasc
Age (mean)	52.09	46.57	54.92	Fisher, n (%)		
Years of schooling (mean)	7.43	7.57	7.62	I	3 (21.4)	1 (7.7)
Sex, n (%)				II	1 (7.1)	1 (7.7)
Male	4 (44.4)	7 (50)	7 (53.8)	III	4 (28.6)	3 (25.9)
Female	5 (55.6)	7 (50)	6 (46.2)	IV	6 (42.9)	4 (30.8)
Aneurysm site, n (%)				Complications, n (%)		
Anterior communicating		8 (57.1)	6 (46.2)	Ventricular drainage	1 (7.1)	0 (0)
Posterior communicating		4 (28.6)	3 (25.9)	VDP	1 (7.1)	0 (0)
Others		2 (14.3)	4 (30.8)	Pretreatment rebleeding	1 (7.1)	0 (0)
Hunt & Hess, n (%)				Vasoespasm	1 (7.1)	1 (7.7)
1-3		13(92.9)	13(100)	Infarction	1 (7.1)	1 (7.7)
4-5		1 (7.1)	0 (0)			

Endovasc = Endovascular; DVP = Ventricular-peritoneal drainage

RESULTS

The neuropsychological function of the subjects was studied using an ANOVA analysis for each neuropsychological variable as dependent variable and the study group (surgery, endovascular, or control) as factor. Differences between the groups were determined using a Scheffe test in each case. The results are shown in Table 2. The three groups significantly differed, Verbal Learning (SCVLT) ($F2,33,35 = 9.242$; $p \leq 0.0001$), Verbal Delayed Free Recall (SCVLT) ($F2,33,35 = 9.071$; $p = 0.001$), Visual Delayed Recall (RCFT) ($F = F2,24,26 = 6.572$; $p = 0.005$) variables. According to the *a posteriori* analyses, there were no significant differences between the two treatment groups in any of the above variables, although both treatment groups presented neuropsychological deficit in these functions compared with the control group. However, no significant differences were observed among the three groups in the Boston Naming Test and the Benton Visual Retention Test.

Figure 1. ANOVA and Scheffe test for the study of differences in means among the control, surgical treatment, and endovascular treatment groups



* Statistically significant differences from control group.

CONCLUSIONS

Both treatment groups were more sensitive to neuropsychological impairment in mnensic functions for both verbal and visual material, associated with the temporal and frontal lobes. These findings are similar to data published by other authors over the past decade (Berry et al., 1997; Bjeljac et al., 2002; Hillis et al., 2000; Hutter & Gilbach, 1993; Larsson et al., 1994).

Comparison between the two treatment modalities by group analyses showed that performance in the studied tests was not affected by either the surgical or the endovascular treatment. These results are in part comparable with those of other authors. The main publications that addressed this issue found no differences between these treatment groups in the majority of functions (Fontanella et al., 2003; Chan et al., 2002; Hadjivassiliou et al., 2000), although differences have been reported in some variables, especially those related to the temporal and frontal lobes (Chan et al., 2002; Hadjivassiliou et al., 2000). Our data are similar to those obtained by Fontanella et al. (2003), who found no direct differences between the two treatment modalities but observed a worse performance by the surgical treatment group versus controls in some variables, which was not the case for their endovascular treatment group. Therefore, subarachnoid haemorrhage may be the most important factor to explain the cognitive impairments of these patients