

Study of Cognitive Impairments Following Treatment of Ruptured Anterior Circulation Aneurysms

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Introduction

The cognitive impairments following treatment of ruptured aneurysms have often been underestimated. This study was to assess their prevalence and analyze various associated factors.

Methods

Patients who were operated for ruptured anterior circulation aneurysms with GOS of 4-5 at 3 months were studied for cognitive impairments using continuous scales of memory (recent, remote and overall memory), verbal fluency (phonemic and category fluency), and digit symbol substitution test (DSST), in relation to various factors. Univariate and multivariate analyses were performed using SPSS21.

Results

Tab 1: Cognitive impairments among patients in different categories

		Overall Memory		Phonemic Fluency		Category Fluency		DSST	
		Median	р	Median	р	Median	р	Median	р
		(IQR) /ρ	value	(IQR) /ρ	value	(IQR) /ρ	value	(IQR) /ρ	value
Age		-0.30 (p)	0.004	-0.16 (p)	0.15	0.04 (ρ)	0.70	0.14 (ρ)	0.25
Sex	M	69 (59-79)	0.13	5.6 (3.6-7)	0.08	9 (8-11)	0.13	323 (245-411)	0.01
	F	62 (52-75)	0.13	4.3 (2.7-6.3)		8 (6-11)		461 (297-575)	
Education		0.59 (ρ)	< 0.001	0.55 (ρ)	<0.001	0.37 (ρ)	<0.001	-0.64 (p)	< 0.001
Adm. GCS		0.05 (ρ)	0.66	0.13 (ρ)	0.31	0.15 (ρ)	0.22	-0.23 (ρ)	0.09
WFNS	1-3	65 (54-75)		5 (3-6.7)	0.96	9 (7-11)	0.21	368 (271-514)	0.27
grade	4	65 (53-69)		4.7 (3.6-6.1)	0.50	8 (6-8)		530 (453-606)	
Fisher grade	1	65 (56-76)	0.97	5.7 (4.3-6.7)	0.79	11 (7-11)	0.89	344 (280-369)	0.94
	II	66 (58-73)		4.7 (3-7.5)		8.5 (7-10)		283 (266-762)	
	III	66 (53-75)		5 (3.3-7)		9 (6-11)		394 (278-524)	
	IV	63 (57-76)		5.3 (3-6.2)		9 (7-12)		346 (271-542)	
	Acom	63 (53-75)	0.11	4.3 (3.3-6)	0.13	8.5 (7-12)	0.02	437 (280-588)	0.23
Site	DACA	55 (52-73)		1.7 (0-7)		6 (6-8)		402 (339-440)	
	ICA	65 (52-76)		3.7 (2.6-6.7)		8 (5-11)		357 (331-386)	
	MCA	70 (64-83)		6.3 (4-7.6)		11 (9-12)		305 (225-474)	
GOS	4	62 (51-65)	0.03	4 (2.4-5.7)	0.05	7.5 (6-9)	0.01	471 (345-546)	0.07
	5	70 (55-78)	0.03	5.3 (3.3-7)		9 (7-12)		339 (249-478)	

Fig 1: Recent memory impairments between ACA aneurysms and others

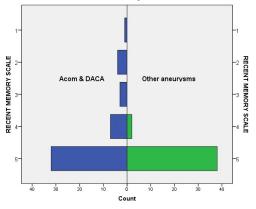
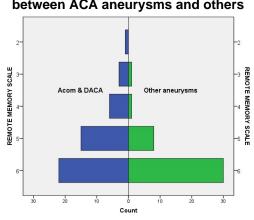


Fig 2: Remote memory impairments between ACA aneurysms and others



There were a total of 87 patients included in our study. Memory assessment was carried out in all, category fluency could be performed only in 84, phonemic fluency in 83, and DSST in 67 patients.

The median overall memory of patients was 65 (IQR 53-75) in the scale of 101. Adjusting for age, gender and education, 50 (60%) had impairment in category fluency, 55 (66%) had impairment in phonemic fluency, and 37 (55%) had impairment in DSST. Patients operated for anterior cerebral artery (Acom & DACA) aneurysms have significantly greater impairments in recent and remote memory compared to others, both in univariate (p values 0.01 & 0.002 respectively) and multivariate analysis (p values 0.01 & 0.03 respectively). They also had significantly greater independent impairment in phonemic fluency (p value 0.04), compared to others. WFNS grade had significant independent impact on only remote memory (p value 0.01).

Tab 2: Memory impairments among different categories

Memory Impairment Total		Recent Memory*				Remote Memory*				
		Normal	Moderate	Severe		Normal	Moderate	Severe	p	
		68/87 (78%)	13/87 (15%)	6/87 (7%)	Р	56/87 (64%)	19/87 (22%)	12/87 (14%)		
Sex	М	30/42 (71%)	7/42 (17%)	5/42 (12%)	0.17	25/42 (60%)	9/42 (21%)	8/42 (19%)	0.38	
sex	F	38/45 (84%)	6/45 (13%)	1/45 (2%)	0.17	31/45 (69%)	10/45 (22%)	4/45 (9%)	0	
Median GCS (IQR)		15 (15)	15 (14-15)	15 (13-15)	0.53	15 (15)	15 (15)	13 (9-15)	0.0	
Site	ACA	31/47 (66%)	10/47 (21%)	6/47 (13%)	0.01	27/47 (57%)	8/47 (17%)	12/47 (26%)	0.00	
	Others	37/40 (93%)	3/40 (8%)	0/40 (0%)	0.01	29/40 (73%)	11/40 (28%)	0/40 (0%)	0.00	
GOS	4	11/21 (52%)	7/21 (33%)	3/21 (14%)	0.004	10/21 (48%)	5/21 (24%)	6/21 (29%)	0.06	
	5	57/66 (86%)	6/66 (9%)	3/66 (5%)	0.004	46/66 (70%)	14/66 (21%)	6/66 (9%)		

Tab 3: Multivariate impact of factors determining cognitive impairments

Multivariate Recent		Remote Memory	Overall Memory	Phonemic Fluency	Category Fluency	DSST
Age	NA	NA	0.03	0.99	0.16	0.42
Education	NA	NA	<0.001	<0.001	0.001	<0.001
Sex	0.11	0.1	0.92	0.58	0.73	0.02
WFNS gr	0.74	0.01	0.91	0.99	0.51	0.42
Site	0.01	0.03	0.08	0.04	0.20	0.07

Conclusions

Cognitive impairments are frequent following treatment of ruptured anterior circulation aneurysms. Impairments in recent memory, remote memory and phonemic fluency are significantly greater following treatment of anterior cerebral artery (Acom & DACA) aneurysms, compared to others, independent of other factors.

Learning Objectives

By the conclusion of this session, participants should be able to:
1)Describe the cognitive impairments in patients following treatment of ruptured anterior circulation aneurysms, 2)Discuss various factors associated with different cognitive impairments.