Cognitive decline in stroke population: the role of atrial fibrillation

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Introduction

• Recent studies have shown that 20-25% of people with stroke will develop a cognitive impairment or vascular dementia (1).

• Literature data highlighted that atrial fibrillation (AF) is an independent risk factor for cognitive impairment in healthy population (2).

• This study aims to determine whether patients affected by a first stroke develop cognitive impairment during the acute phase or after 6 months and if atrial fibrillation (AF) represents the main risk factor leading to this complication.

Methods

❖ All patients hospitalized in the Stroke Unit of Sant'Andrea Hospital (Sapienza University of Rome) have been enrolled and prospectively followed from 2006 to 2015.
❖ Patients with aphasia, previous cerebrovascular events, as well as patients suffering from metabolic and internistic diseases capable of modifying cognitive functions and those who were affected by neoplasm or sensorineural loss as those who were unable or unwilling to take part in the study were excluded.
❖ The diagnosis of cerebral ischaemia was established by diffusion-weighted MR imaging of the brain.
❖ Within the first 6 days following the stroke onset, patients' detailed clinical history was collected in order to find any risk factor (hypertension, diabetes, smoking).
❖ All patients completed a neuropsychological battery to assess memory, language, logical and abstract reasoning, as well as visual spatial impairment (T0). A three- (T1) and six-month (T2) follow-up visit was then performed. Barthel Index was assessed at each timepoint.
❖ The patients were divided in two groups according to the presence or absence of AF.
❖ Statistical analysis was performed using IBM-SPSS 20.0 software for Windows. Student's T Test was used to identify differences between the two groups of patients. Statistical significance was set for *p* value<0,05.

Neuropsychological Assessment

T0	T3	T6
MMSE[1]	MMSE[1]	MMSE[1]
STROOP TEST (reduced version)	STROOP TEST (reduced version)	STROOP TEST (reduced version)
REY AUDITORY VERBAL LEARNING	REY AUDITORY VERBAL LEARNING	REY AUDITORY VERBAL LEARNING
	MCST[2] (48 cards)	MCST[2] (48 cards)

1: MMSE = Mini-Mental State Examination; 2: MCST = Modified Card Sorting Test.

Results

One hundred forty-two patients (100 men and 42 women) between the age of 34 and 97 (mean age, 72,3 years) were included.

	AF patients (n=23)	Non AF patients (n=119)	P value
Sex (M/F)	14/9	86/33	0,27
Age of onset of stroke (average±SD)	72,96±0,02	64,99±13,39	0,02
Education (average±SD)	10,39±5,53	10,13±5,10	0,77
Hypertension	15/23(65,2%)	78/119(65,5%)	0,97
Diabetes	5/23(21,7%)	26/119(21,8%)	0,99
Smoke	9/23(39,1%)	73/119(61,3%)	0,04
Echocolordoppler of the supraortic vessels (stenosis>50%)	4/23(17,4%)	23/119(19,3%)	0,83
Angio-MR scan (intra-cranial steno-occlusive disease)	3/23(15%)	21/119(21,6%)	0,50

Barthel Index

	T0	T1	T2
AF patients	72,39 ±25,97	90,00 ± 18,57	86,15 ± 21,90
Non AF patients	78,82 ± 25,47	93,08 ± 13,22	95,52 ± 9,64
Totali	77,78 ± 25,57	92,56 ± 14,22	14,220 ± 12,20

Results and Conclusions

• No relevant demographic differences have been observed between the two groups, except for smoking, which was a more frequently found risk factor in the group of patients without AF.

• It is estimated that 15-30% of patients suffering from a stroke develop dementia within 3 months after the acute event. Our data show similar results to those present in scientific literature.

• Neuropsychological Tests results demonstrate that Stroop test appears worse conducted by patients with AF than by non AF patients at T1 and T2 point . Thus, Stroop test may represent the most sensitive test to identify even small changes compared to normative threshold in executive functions.

Neuropsychological Evaluation at T0

	AF patients (n=23)	Non AF patients (n=119)	P value
MMSE			
<24	7/23(30,4%)	20/119(16,8%)	0,14
>24	16/23(69,6%)	99/119(83,2%)	
Mean Score	25,09±4,23	26,25±3,57	0,226
STROOP TEST			
Impaired	11/21(52,4%)	47/113(41,6%)	0,47
Not Impaired	10/21(47,6%)	66/113(58,4%)	
Interference on time	30,97±15,14	34,27±19,78	0,395
Interference on errors	4,66±8,03	2,52±4,53	**0,001**
REY AUDITORY VERBAL LEARNING			
IMMEDIATE			
<28,53	4/23(17,4%)	32/117(27,4%)	0,43
>28,53	19/23(82,6%)	85/117(72,6%)	
Mean Score	36,03±9,67	34,37±10,61	0,481
DELAYED			
<4,69	7/23(30,4%)	24/117(20,5%)	0,28
>4,69	16/23(69,6%)	93/117(79,5%)	
Mean Score	6,61±3,56	6,66±3,12	0,440

Neuropsychological Evaluation at T1

	AF patients (n=23)	Non AF patients (n=119)	P value
MMSE			
<24	4/21(19%)	16/103(15,5%)	0,74
>24	17/21(81%)	87/103(84,5%)	
Mean Score	25,87±4,18	26,86±3,22	0,234
STROOP TEST			
Impaired	5/17(29,4%)	19/89(21,3%)	0,52
Not Impaired	12/17(70,6%)	70/89(78,7%)	
Interference on time	41,06±32,82	29,96±18,50	**0,003**
Interference on errors	4,12±7,33	1,46±3,73	**0,001**
REY AUDITORY VERBAL LEARNING			
IMMEDIATE			
<28,53	3/18(16,7%)	15/91(16,5%)	1
>28,53	15/18(83,3%)	76/91(83,5%)	
Mean Score	36,97±10,75	39,26±9,35	0,795
DELAYED			
<4,69	3/18(16,7%)	13/91(14,3%)	0,72
>4,69	15/18(83,3%)	78/91(85,7%)	
Mean Score	7,62±3,91	7,81±3,36	0,873
MCST			
Impaired	2/17(11,8%)	18/89(20,2%)	0,51
Not Impaired	15/17(88,2%)	71/89(79,8%)	
Categories	5,53±1,179	5,39±1,13	0,621
Perseveration Errors	2,88±5,48	3,84±5,72	0,822
Non Perseveration Errors	2,71±3,09	2,67±2,54	0,754

Neuropsychological Evaluation at T2

	AF patients (n=23)	Non AF patients (n=119)	P value
MMSE			
<24	2/13(15,4%)	5/87(5,7%)	0,22
>24	11/13(84,6%)	82/87(94,3%)	
Mean Score	26,33±4,40	27,79±2,20	0,014
STROOP TEST			
Impaired	3/12(25%)	19/84(22,6%)	1
Not impaired	9/12(75%)	65/84(77,4%)	
Interference on time	44,5±41,02	28,33±16,37	**0,000**
Interference on errors	4,13±7,92	1,07±1,9	**0,000**
REY AUDITORY VERBAL LEARNING			
IMMEDIATE			
<28,53	2/12(16,7%)	11/85(12,9%)	0,66
>28,53	10/12(83,3%)	74/85(87,1%)	
Mean Score	42,95±13,30	43,08±9,52	0,243
DELAYED			
<4,69	2/12(16,7%)	9/85(10,6%)	0,62
>4,69	10/12(83,3%)	76/85(89,4%)	
Mean Score	8,91±4,66	9,10±2,92	0,043
MCST			
Impaired	1/10(10%)	10/83(12%)	1
Not impaired	9/10(90%)	73/83(88%)	
Categories	5,70±0,48	5,69±0,81	0,671
Perseveration Errors	1,80±3,04	1,98±3,25	0,564
Non Perseveration Errors	2,40±2,41	2,07±2,19	0,585

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