A longitudinal retrospective study on intracranial arterial pulsatility index: its evolution in ten years' time and how it relates to the occurrence of cerebral and systemic ischemic disease.

M. Suárez Pinilla¹; L. Benavente Fernández¹; S. Calleja Puerta¹ ¹ Hospital Universitario Central de Asturias / Department of Neurology, Oviedo, Spain

BACKGROUND AND PURPOSE:

Intracranial arterial pulsatility index (PI) has been related to old age, hypertension, diabetes and small vessel disease. However, the crosssectional design of most studies prevents a proper assessment of causality and evolution. We sought to explore how this index changes through time, which conditions affect this evolution and whether or not it can predict the occurrence of future ischemic events.

METHODS:

Between the years 2001-2006, 1288 patients underwent a transcranial Doppler evaluation in the Department of Neurology of the Hospital Universitario Central de Asturias. PI values for the middle cerebral and basilar arteries were systematically annotated. After exclusion of deceased patients and significant large artery stenoses, 89 patients were recruited for a re-evaluation in 2012. Afterwards, the sample was expanded up to 150 patients, with 61 randomly selected patients -either alive or deceased- who did not undergo a second exploration. Both groups had their clinical files reviewed, with special attention to vascular risk factors and brain or coronary ischemic events.

RESULTS:

							2001 -	2006				CARA		CAMDI	- D		CAMD		2012		
									- 1	FOLLOW UP		SAIMF	MPLEA SAMPL			RE-EVALUATION	1 08				
	BASELINE	STATU	S SA	SAMPLE A SAMPLE B					Confirmed deseased		o yr 5 7 2 0/	r 3 m 8 yr 9 r		ו		ICA 2 1.08					
	Age (vr)		59	.8	56.2					Comm		7.3 %	1	0%			0.99				
	Male sex		48	7 %	427%				Loss to fo		follow-up (before 2	2012) 19.3 9	<i>(</i> 0	0%		PI - MCA	0.1 (p<0.001)	01)			
	Hypertensi	on	٦0- ١٦	43.3 %		%	Ö	õ			ic coronary event	11.3 9	11.3 %	11,2 %	- 1	Δ ΡΙ - ΒΑ	-0.02 (p=0.368)				
	Diabotos					6	_			Stroke		13.3 %	6	10.1 %				68) SAN	MPLE B		
		a a ref	art 14.7 % 56.7 %		12.4 % 58.4 %		SAMPLE $(B \subseteq A)$	B													
	disease	eart					N _B = 89 SAMPLE A				B) COND	ITIONS I	IONS INFLUENCI								
	Stroke										VARIATIO	Ν								_	
	PI – MCA 1	1	1.00		0.99		$N_A = 150$														
	PI – BA 1	1.04		04	1.01							MULTIVARI	JLTIVARIABLE ANALYS		•						
		_	-			_					SAIVIF LL D	VARIABLES	Bet	ta p)						
	A)	A) CONDITIONS INFLUENC						ALUE				PI – MCA 1	-0.5	577 <	0.001	C) PI AND S	EQUENT	NT ISCHEMIC E			
										ΔPI – MCA		Age (yr)	0.3	19 0	.007						
SAMPLE A		UNIVARIABLE ANALYSIS				MULTIVARIABLE ANALYSIS			ABLE	(per year)	Stroke (at baseline)	0.2	52 0	.037	AGE –ADJUSTED AND PI ≤ 1		ARISON BET	WEEN PAT	FIENTS W		
		PI – MCA 1			PI – BA 1		PI – MCA 1		PI	PI – BA	ΔPI – BA (per	PI – BA 1	-0.6	653 <	0.001	SAMPI F A		PI – MCA 1		PI – B	
		Maa	N					IVICA			year)	Age (vr)	0.3	52 0	002		Loç	Log Rank	р	Log R	
	•	Yes	NO	р 0.001	Yes	N O	p	p	4	p		/ (gc (yr)	0.0	02 0	.002	Subsequent coror	nary	2.392	0.122	5.029	
	Age	r = 0.3	<pre>0.321 <0.0</pre>		r=0.4	02	<0.001	<0.00	1 <0	0.001						event		4 9 9 9	0.000		
	Male sex	1.04	0.95	0.042	1.09	0.99	0.039	CA								Subsequent strok	e	1.060	0.303	2.603	
	Hypertension	1.06	0.95	0.005	1.09	0.99	0.054	≥2.20	Sex O Male				0			Subsequent coronary	nary or	2.833	0.092	7.041	
LINE	Diabetes	1.05	1.00	0.477	1.19	1.09	0.050	2.00-	Fema	le			Ŭ				eveni				
BASEI	Heart disease (any)	eart disease 1.10 ny)		0.140	1.11	1.02	0.135	1.80- F	R ² Lin e R ² Qu a	e a r = 0.10 d r a t ic =	3 = 0.207	0									
ES AT	Ischemic heart disease	1.10	0.98	0.099	1.09	1.03	0.359 1.40 ⁻		0	0		°			S	UBSEQUENT CORONARY OR CEI PI – MCA 1		OR CEREBRA	REBRAL ISCHEMIC EVEI PI – BA		
TUR	Stroke	1.03	0.96	0.195	1.09	0.96	0.009	1 20-		0	0										
FEA	Lacunar stroke	1.01	1.04	0.634	1.09	1.09	0.967	1.20			0		0 0		1.0-			PI ≤ 1 ^{1.0-}			
	Subsequent coronary ischemic event	1.12	0.98	0.008	1.02	1.19	0.004	.80-	0	0 0 0			0 0 0 0		0.8-			PI > 1 0.8-			

VENTS /ITH PI > 1 **A** 1 lank р 0.025 0.107 0.008

IT: AGE 66 - 75



CONCLUSIONS:

- Intracranial arterial PI works as a dynamic measure of both cerebral and systemic vascular disease.
- Age is the main factor influencing PI value and variation, but, within a certain age group, PI is able to point subjects at higher risk of future ischemic events.
- Basilar artery PI seems to be a better predictor of cerebral and coronary ischemic disease than middle cerebral artery PI.