PREDICTION OF HEMORRHAGIC TRANSFORMATION WITH BLOOD BIOMARKERS IN THE ERA OF MECHANICAL THROMBECTOMY

Alejandro Bustamante, Anna Penalba, Teresa García-Berrocso, Caty Carrera, Oriol Ventura, Marc Fernández, Marta Rubiera, Eva Baldrich, Mónica Millán, Antoni Serrano-Blanco, Jaume Roquer, Antoni Dávalos, Israel Fernández-Cadenas, Joan Montaner

The PRE-test-STROKE [Personalizing REperfusion Therapeutic Strategies in Stroke] investigators

INTRODUCTION

- After more than two decades of experience with intravenous tissue-type plasminogen activator (IV-tPA), hemorrhagic transformation (HT) has reduced dramatically, with current rates lower than 4% (ECASS definition) or 2% (SITS-MOST definition) [1]
- Different pathophysiological mechanisms might be related with HT after mechanical thrombectomy (MT), what is suggested by different patterns, such as subarachnoid hemorrhages, not always related with direct catheter injury [2], or antiplatelet-related HT in patients receiving stenting for tandem occlusions [3].
- We aimed to test whether blood biomarkers previously associated with HT after IV-tPA are still useful for that purpose, in both patients treated with IV-tPA and IV-tPA + MT

Subarachnoid hemorrhage after MT, from Yoon et al, Stroke 2013

METHODS

- From August-2012 to August-2015, patients with suspected stroke of <6 hours were enrolled in the emergency department of Vall d’Hebron Hospital (Barcelona)
- Blood samples were collected before treatment
- Patients treated with IV-tPA were selected
- Matrix metalloproteinase-9 (MMP-9), cellular fibronectin (cFn), vascular adhesion protein-1 (VAP-1), nuclear receptor related-1 protein (NURR-1) and carcinoembryonary antigen cell adhesion molecule-1 (CEACAM-1) were measured by ELISA
- Primary outcome was parenchymal hematoma (PH)
- Secondary outcomes were any HT and symptomatic intracerebral hemorrhage (sICH) according ECASS criteria
- The analysis was performed in all patients treated just IV-tPA first, and after exclusion of patients treated with IV-tPA + MT

RESULTS

UNIVARIATE ANALYSIS (PARENCHYMAL HEMATOMA)				
		PH (N=19)	No PH (N=195)	P
Age		77 (67-82)	78 (62.5-84)	0.558
Sex (male)		57.1%	50.5%	0.631
Hypertension		85.7%	72.4%	0.362
Dyslipidemia		64.3%	47.5%	0.224
Diabetes		64.3%	24.5%	0.003**
Previous stroke		28.6%	12.5%	0.103*
AF		28.6%	36%	0.774
CAD		21.4%	18%	0.723
Previous mRS >2		7.7%	12.6%	0.999
SBP		172 (159-190)	155 (138.5-172.5)	0.060*
DBP		77 (67-82)	78 (62.5-84)	0.767
Glycemia		121 (97-161)	122 (104-155)	0.747
NIHSS		11.5 (9-16)	11 (8-18)	0.933
Time to tPA		134.5 (78-190)	129 (95-190)	0.781
ASPECTS		10 (9-10)	10 (9-10)	0.654
TOAST	LAA	7.1%	20.6%	0.223
	CE	28.6%	43.2%	
	LAC	7.1%	2.5%	
	Other	-	2.0%	
	UND	57.1%	31.7%	
OCSP	PACI	28.6%	43.0%	0.638
	TACI	57.1%	46.0%	
	POCI	7.1%	8.0%	
	LACI	7.1%	3.0%

CONCLUSIONS

- CEACAM-1 might be a predictor of tPA-related PH. However, it was not further significant when including patients treated with IV-tPA + MT
- Biomarkers previously associated with HT were not replicated in this prospective cohort. Very low rates of HT and different mechanisms in endovascular procedures might be responsible for that
- HT prediction in IV-tPA treated patients might be of little help in the era of MT. Further research effort might be focused towards other indications, such as recanalization after IV-tPA or futile recanalization after MT

REFERENCES

1. Capellari M, et al. Stroke 2018; 49: 397-404
2. Yoon W, et al. Stroke 2013;44:414-419
3. Heck DV, et al. J Neurointerv Surg. 2015;7:170-5

CONTACT

alejandro.bustamante@vhir.org
www.lin-bcn.com
www.stroke-biomarkers.com

This work has been funded by Instituto de Salud Carlos III, grant PMP15/00022, and co-financed by the European Regional Development Fund (FEDER)