MCA MEAN BLOOD FLOW VELOCITY INDEX – A PROMISING PREDICTOR OF INTRACRANIAL HEMORRHAGE AFTER STROKE THROMBECTOMY

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Background and Purpose

Recent studies indicated that an increased middle cerebral artery (MCA) mean blood flow (MBF) velocity on transcranial duplex sonography (TCD) was associated with intracranial hemorrhage (ICH) after successful endovascular recanalization of anterior circulation vessel occlusion^{1,2}. This study aimed to further determine the predictive value of the MCA MBF velocity for postthrombectomy ICH.

Methods

Over a seven-year period, we reviewed all ischemic stroke patients with successful endovascular recanalization for anterior circulation vessel occlusion (TICI 2b-3) at our center. Postinterventional TCD sonography served to identify MCA MBF velocity indices (=MBF velocity of the recanalized divided by the contralateral MCA). Receiver operating characteristic (ROC) curve tested the ability of MCA MBF velocity index values in predicting ICH after thrombectomy.

Results

Of 178 ischemic stroke patients (mean age: 67±12 years, female: 43%) with successful anterior circulation thrombectomy, 35 patients had postinterventional ICH (symptomatic: 10, asymptomatic: 25). MCA MBF velocity index was increased in ICH compared to non-ICH patients (1.32±0.39 versus 1.02±0.32, $p<0.001$). The area under the ROC curve for MCA MBF velocity index values in the prediction of ICH after stroke thrombectomy was 0.69 (95% CI: 0.59-0.79). The cut-off point with the highest sensitivity and specificity was set at 1.25 (sensitivity 69%, specificity 73%) and had a negative predictive value for ICH of 91%. **Figure 1** shows images from a representative case.

Conclusions

This study supports a predictive role of TCD sonography detected MCA MBF velocity index for ICH after stroke thrombectomy. In patients with MCA MBF velocity indices below 1.25 postinterventional ICH appears rare.

Figure 1. Representative images of a 64 years old patient with acute left intracranial ICA occlusion (NIHSS at presentation: 11)

A) Preinterventional brain CT 60 minutes after symptom onset did not detect any early infarct signs. CT angiography shows a distal ICA occlusion, which was confirmed via DSA (**B**)

C) TOF-MRA after successful TICI 3 recanalization shows ICA/MCA reperfusion. CT follow-up (65 hours after intervention) reveals a parenchymal ICH (**D**).

E) and **F)** Postinterventional TCD sonography 23 hours after recanalization shows a much higher MBF velocity in the recanalized compared to the contralateral MCA.

Abbreviations : CT: Computed tomography, ICA: Internal carotid artery, TOF-MRA: Time of flight-magnetic resonance imaging, TICI: Thrombolysis in cerebral infarction scale, MCA: Middle cerebral artery, ICH: Intracranial hemorrhage, TCD: Transcranial Duplex sonography

¹Kneihsl M, Niederkorn K, Deutschmann H, et al. Increased middle cerebral artery mean blood flow velocity index after stroke thrombectomy indicates increased risk for intracranial hemorrhage. J Neurointerv Surg. 2017. pii: neurintsurg-2017-013617.

²Varela R, Silva A, Lopes J, et al. Early transcranial color-coded Doppler in the prediction of post-thrombectomy reperfusion lesion. Eur J Neurol. 2018, 25 (Suppl. 1), 1-65.

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