BeamSAT

There has been no effective method to predict ischemic intolerance to temporary internal carotid artery occlusion during carotid artery reconstruction. Pencil beam pre-saturation (BeamSAT) pulse suppresses the flow signal of target vessel in magnetic resonance angiography (MRA). Applying this method, Tanaka et al., constructed “ICA-selective MRA” images. The aim of the study was to identify patients at risk for ischemic intolerance by ICA-selective MRA.

By evaluating flow of anterior communicating artery, A1 portion of anterior cerebral artery with ICA-selective MRA, and posterior communicating artery with conventional MRA, they investigated associations of these collateral flow patterns with ischemic intolerance and the decrease of regional cerebral oxygen saturation (rSO2).

Fifty-eight patients who underwent CEA/CAS were included. Six of 7 patients without Acom flow and Pcom flow demonstrated ischemic intolerance, while all patients (n = 51) with Acom and/or Pcom flow demonstrated tolerance. The accuracy of this prediction model according to Acom and Pcom flow patterns for ischemic intolerance was 0.98 ($p = 0.01$, binomial test). The decrease of rSO2 after ICA occlusion was significantly larger in patients without Acom flow and Pcom flow (12.0±6.0%) than in those with Acom flow and Pcom flow (3.0±3.1%, $p < 0.01$) and in those with Acom flow but no Pcom flow (2.4±5.2%, $p < 0.01$).

These findings support the importance of Acom flow as a collateral route. ICA-selective MRA enables an excellent prediction of ischemic intolerance to temporary ICA occlusion during CEA or CAS. This method provides valuable information regarding the probability of an ischemic complication [1].

1)
Tanaka J, Hosoda K, Matsuo K, Kyotani K, Takemoto Y, Yamamoto Y, Fujita A, Kohta M, Kimura H, Sasayama T, Kohmura E. BeamSAT MRI helps to identify patients at risk for intolerance to temporary internal carotid artery occlusion during CEA and CAS. World Neurosurg. 2019 Jul 10. pii: S1878-8750(19)31939-4. doi: 10.1016/j.wneu.2019.07.033. [Epub ahead of print] PubMed PMID: 31301443.