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Perfusion threshold of acute ischemic stroke with the negative DWI and positive SWI

Sang Hyuk Ahn, Yong-Woo Kim, Seung Kug Baik

Pusan National University Yangsan Hospital, Korea.

skbaik9@gmail.com

PURPOSE: The region of multiple hypointense vessels (susceptibility vessel sign, SVS) on SWI in the patients with acute ischemic stroke has been reported in the many studies. We observed SVS on SWI in several patients with acute stroke symptoms that have negative DWI. These cases have been changed either infarction or normal on follow-up MRI. The purpose of this study is to determine the threshold value on PWI for predicting the progressive change to either infarction or normal on DWI and to know the meaning of SVS (positive SWI) in these cases.

MATERIALS AND METHODS: Among the patients who underwent brain MRI due to acute stroke symptoms, eighteen patients (10 men and 8 women, mean age 67.7 years, range 50–78years) with negative DWI and positive SWI were reviewed retrospectively. The PWI was obtained in all patients. Follow-up DWI and SWI were done in 10 patients. We reviewed the presence of SVS with comparison to contralateral normal hemisphere on SWI. The patients were separated into two groups, according to the finding of follow-up DWI (group 1; infarction, group 2; normal). The region with SVS was compared with perfusion abnormal area on PWI. The perfusion threshold values (CBV, CBF, TTP, MTT map) were measured on PWI and compared with the region of SVS on SWI.

RESULTS: Among 18 cases, SVS was detected in 18 cases on SWI. The Locations of SVS were matched with the decreased perfusion area on PWI. The region of SVS showed decreased CBF and slightly decreased or normal CBV on PWI. The region of SVS was exactly agreed with TTP map in all cases. Among 10 patients who underwent follow-up MRI, the SVS on SWI was normalized in 10 patients. On follow-up DWI, the infarction was noted in 6 patients and normal in 4 patients. The perfusion threshold value on PWI was 6 sec delay, distinguishing group 1 and group 2.

CONCLUSION: SVS on SWI is very useful predictor of acute hemodynamic compromise. The perfusion threshold in the patients with negative DWI and positive SWI can help to advance the therapeutic strategy before the progression into infarction.