

Evaluation of the pre- and post-treatment hemodynamics of dural arteriovenous fistula (dAVF) using magnitude image of Susceptibility weighted imaging (SWI).

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PURPOSE: To evaluate the role of signal intensity of magnitude images of susceptibility weighted imaging (SWI) in diagnosis and follow-up in cases with draining veins of dAVF, comparing with 3D TOF-MRA.

MATERIALS AND METHODS: Seven cases (3 male, 4 female, aged 54-76ys: mean 66.1ys) with angiographically proven dAVF (5 cases of TS-SS dural AVF, 1 case of tentorial AVF, 1 case of cavernous dural AVF) were included. Two cases had hemorrhage, three cases had dizziness, a case had tinnitus and a case had exophthalmos. SWI using 3D-FLASH and 3D TOF MRA were undergone in 3T MR suite. The scanning parameters were as follows. SWI: TE = 20ms, TR = 7ms, FA = 15degree. TOF MRA: TE = 3.69ms, TR = 20ms, FA = 17. The draining veins of 7 cases were identified on cerebral angiogram and the signal intensity of the magnitude images of SWI (SWImag) and TOF-MRA were assessed before the treatment. Then, on SWImag and TOF MRA, the change of the signal intensity of the draining veins between the treatments was assessed in reference to follow-up angiography.

RESULTS: 15 draining veins were identified on angiography. On SWImag before the treatment, 9 veins (60%) were visualized as high intensity, 3 veins (20%) as moderate intensity, 3 veins (20%) as unidentified. On TOF MRA, 13 veins (86.7%) were visualized as high intensity, 1 vein (6.7%) as moderate intensity, 1 vein (6.7%) as unidentified. On SWImag, in 9 high-intensity veins before the treatment, 7 veins showed lower signal intensity out of 8 draining veins which were completely disappeared on angiogram after the treatment. Two draining veins which had decreased residual shunt after the treatment, showed lower intensity on pre-treatment SWI mag. All 3 moderate-intensity veins were completely disappeared on angiogram after the treatment and 1 of these draining veins showed the same intensity. On TOF MRA, within 13 high-intensity veins before the treatment, 9 of 11 draining veins, which were completely disappeared on angiogram after the treatment, were lower signal intensity. Two draining veins, which had decreased residual shunt after the treatment, showed lower intensity. A moderate-intensity vein were completely disappeared on angiogram after the treatment, and showed lower signal intensity.

CONCLUSION: SWImag depicted the majority of the draining veins of dAVF as much bright intensity as TOF MRA. Draining veins, which disappeared on angiography after the treatment, showed lower signal intensity than before treatment on SWImag and TOF MRA. We speculate that higher concentration of oxy-Hb within draining veins is one of the causes of high signal intensity on SWImag and the signal intensity was lower after the treatment due to decreased velocity and lower concentration of oxy-Hb on SWImag. Thus the magnitude images of SWI seem to be useful for the pre- and post-treatment analysis of hemodynamics in the cases of dAVF.

