Detection of Subclavian Steal: Efficacy of Contrast Enhanced Three-Dimensional MR Angiography

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Purpose: To evaluate the efficacy of contrast enhanced three-dimensional MR angiography (CE 3DMRA) in the detection of subclavian steal.

Materials and Method: In four patients (M:F=3:1, age: 28-78 years) with subclavian steal, CE 3DMRA and digital subtraction angiography(DSA) were obtained. The causes of subclavian streal were atherosclerosis in two, Takayasu’s arteritis in two. Sequential images were undertaken during the first pass after infection of double dose of Gd-DTPA (0.2 mM/kg) by a power injector. Coronal source images were obtained with coronal 3D FLASH (TR/TE/flip angle: 3.8/1.3/35, acquisition time: 10sec/one measurement). Precontrast image was subtracted from enhanced images and maximum intensity projection was done. 2D TOF of the carotid bifurcation was added in all cases with post-saturation.

Results: Three patients had verterbro-vertebral (VV) type and one patient had vertebro-cervical (VC) type of subclavian steal. All patients had occlusion of the left proximal subclavian artery. In three VV types, CE 3DMRA revealed left vertebral artery (VA) in all. But 2D TOF revealed left VA in only one case. As DSA showed delayed filling of the left distal subclavian artery, CE 3DMRA revealed gradual increased signal intensity of the left subclavian artery in the late arterial phase. In one VC type, CE 3DMRA revealed subclavian steal with cervical collaterals, but 2D TOF couldn’t reveal retrograde flow of left VA but a few of cervical collaterals on the left neck.

Conclusion: CE 3DMRA revealed both antegrade and retrograde flow in neck vessels including collateral vasculature well. Therefore, CE 3DMRA is a useful tool to diagnose subclavian steal as a non-invasive method.