

Evaluation of Internal Mammary Artery Graft Flow Patency Using 3D Contrast Enhanced MR Angiography and Phase Contrast Flow Analysis

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Internal mammary artery (IMA) bypass grafting has been widely used for patients with coronary artery disease. However, stenosis and occlusion of IMA grafts is not uncommon. The purpose of this study is to use contrast enhanced 3D MR angiography for visualization of the IMA, and phase contrast flow analysis for functional evaluation of IMA so that the recurrent cardiac symptoms can be monitored or predicted. Contrast enhanced 3-dimensional (3D) fast gradient echo acquisition is used for patients post IMA graft operation. Forty cc of Gadodiamide contrast is bolus injected in 20 seconds. Images are displayed using maximum intensity projection and reformatting algorithms. To measure the flow of the internal mammary artery, segmented cine phase contrast flow analysis images are acquired. A torso phased array coil is used for the 3D contrast enhanced MRA acquisition. During the followed phase contrast flow analysis acquisition, only the left anterior coil element from the 4 coil element is activated. This approach provides excellent signal during 3D contrast MRA acquisition, while in flow analysis high signal for the left IMA without aliasing artifacts. The IMA is well visualized from its origin at subclavian to left anterior descending coronary anastomosis. Velocity measured from a grafted IMA without stenosis shows biphasic forward flow pattern which is characteristic for IMA graft flow. Combining the 3D contrast enhanced MRA with the phase contrast flow analysis, both morphological and functional evaluation for IMA flow patency can be achieved, so that recurrent cardiac symptoms could be predicted or monitored.