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Detection of Hidden Myocardial Infarction in Chronically Occluded Coronary Artery Disease Using Delayed Hyperenhancement Image of Cardiac Magnetic Resonance Imaging

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Background: A history of prior myocardial infarction (MI) has been found only in a half of patients with CTO. We investigated the extent of myocardial damage in patients having CTO using cardiac magnetic resonance imaging (CMR) and compared it with the regional myocardial function and the extent of angiographical collateral vessels. Methods: We analyzed CMR, electrocardiography (ECG), echocardiography, and coronary angiography of 170 consecutive patients (mean age 62 year, male gender 89%) having CTO. Regional delayed hyperenhancement (DHE) and left ventricular (LV) wall motion score index (WMSI) were assessed according to the 17-segment model and compared with the extent of angiographical collaterals assessed by collateral connection grade and Rentrop score, which reflect the size and flow of collateral vessels, respectively. Results: The evidence of prior MI was found in 24.7% of patients by ECG Q wave, 41.7% by clinical history, and 65.1% by regional wall motion abnormality (RWMA). In contrast, CMR identified DHE in 85.8%. The DHE transmurality and WMSI of LV segments assigned to vessel with CTO was significantly higher than WMSI of the other segments ($p<0.05$, all). The extent of collateral vessel was negatively correlated with the DHE volume, DHE transmurality, and WMSI ($p<0.05$, all). The threshold volume of DHE that predicted RWMA was >12.9% (AUC=0.832, sensitivity=79%, specificity=76%). Conclusions: The evidence of prior MI is more common than previously known and is inversely related to the extent of collateral vessel, which indicating protective role of collateral development against myocardial damage related to CTO.