Prognostic value of unrecognized myocardial infarction and hyperemic coronary sinus flow in patients undergoing elective percutaneous coronary intervention

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Funding Acknowledgement: Type of funding source: None

Background: Cardiac magnetic resonance (CMR) imaging is a useful instrument for the assessment of pathological and functional conditions without the need for ionizing radiation, radioactive tracers, or intravascular catheterization. Both unrecognized myocardial infarction (UMI) and impaired global myocardial blood flow (g-MBF) have been reported to be strongly associated with worse outcome in patients with cardiovascular disease. However, their combined efficacy remains undetermined.

Purpose: We sought to assess the prognostic value of the presence of UMI and pre-procedural hyperemic g-MBF evaluated by phase-contrast cine magnetic resonance imaging (PC-CMR) in patients with chronic coronary syndrome who underwent elective percutaneous coronary intervention (PCI).

Methods: A total of 177 patients with de novo functionally significant stenosis who underwent pre-PCI CMR and PCI between September, 2016 and March, 2019 were retrospectively studied. UMI was defined as a scar detected by late gadolinium enhancement (LGE) without previously diagnosed MI. g-MBF was assessed by quantifying coronary sinus flow using PC-CMR at rest and hyperemic state. The predictors of major adverse cardiac events (MACE; cardiac death, nonfatal myocardial infarction, clinically driven unplanned revascularization, or hospitalization for congestive heart failure) during follow-up were investigated.

Results: UMI was detected in 40 (27.7%) patients and rest and maximal hyperemic g-MBF evaluated by the coronary sinus flow obtained by PC-CMR were 0.95 ml/min/g and 2.26 ml/min/g, respectively. During the median follow-up of 26 months, cardiovascular death occurred in 1 patient (0.6%), nonfatal myocardial infarction occurred in 4 patients (2.3%), and clinically driven revascularization and hospitalization due to congestive heart failure occurred in 25 patients (14.1%) and 3 patients (1.7%) patients, respectively. In patients with MACE, hyperemic g-MBF was significantly lower and the prevalence of UMI were significantly higher compared with those without MACE (1.94 ml/min/g vs 2.36 ml/min/g P=0.014; 48.3% vs 23.6%, P=0.011). Cox proportional hazards model indicated that impaired hyperemic g-MBF (<2.00 ml/min/g) and the presence of UMI were significant predictors of MACE (HR 2.22, 95% CI 1.060–4.640, P=0.034; HR 2.660, 95% CI 1.290–5.470, P=0.008). During follow-up, cardiac event-free survival was significantly worse in patients with impaired hyperemic g-MBF (<2.00 ml/min/g) and UMI (log-rank χ^2=11.0, P=0.010).

Conclusion: In patients with chronic coronary syndrome undergoing elective PCI, the combined assessment of UMI and hyperemic g-MBF obtained by preprocedural noninvasive CMR may provide significant prognostic information.