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Impact of coronary flow reserve as an important predictor for major adverse cardiac and cerebrovascular event in hemodialysis patients even in patients without myocardial perfusion abnormality

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Background: In the clinical setting, ischemic heart disease (IHD) is a major problem not only in general patients but also in regular hemodialysis (HD) patients. 13N-ammonia positron emission tomography (13NH3PET) is an established and excellent diagnostic test for IHD. We have reported about the predictability of coronary flow reserve (CFR) in poor prognosis in HD population. Some prior studies show that low CFR predicts poor prognosis for not only cardiovascular event but also all-cause mortality. Although it is well-known that CFR is an important predictor, there are limited data about CFR of patients without myocardial perfusion (MP) abnormality. We investigated the prognostic predictability of adverse cardiac and cerebrovascular event (MACCE) in HD patients without MP abnormality.

Methods: A total 438 of HD patients who underwent 13NH3PET for suspected IHD were enrolled. All patients were underwent 13NH3PET at our facility. After we excluded patients whose summed stress score (SSS) >3, we identified 182 eligible patients. Patients were divided into two group according to the median value of CFR; low CFR group (≤ 2.405) and high CFR group (>2.405). We followed up them up to 4.2 years (median 2.4 years) and collected their data. We evaluated their major adverse cardiac cerebrovascular event. We performed Kaplan-Meyer analysis and multivariable cox regression models. Furthermore, we evaluated the incremental value with C-index, net reclassification improvement (NRI) and integrated discrimination improvement (IDI) when CFR added into a model with established risk factors.

Results: There were intergroup difference in baseline characteristics: age, gender, prior CVD and diabetes. Kaplan-Meyer analysis shows statistically intergroup difference [log rank p=0.04, hazard ratio (HR) 0.54, 95% confidential interval (CI) 0.30–0.97]. Multivariable cox regression model for MACCE shows CFR is an independent risk factor (p=0.04, HR 0.54, 95% CI 0.30–0.97). As regarding model discrimination, all of C-index (0.82 vs 0.80, p=0.23), NRI (0.51, $p<0.01$) and IDI (0.03, p=0.03) were greatest in a predicting model with established risk factors plus CFR.

Conclusions: The low CFR group had poor prognosis in MACCE comparing to the high CFR group. CFR would be an independent risk factor for MACCE. Adding CFR on conventional risk factors could more accurately predict MACCE in HD patients, even in patients without MP abnormality.