

KSN 2017 Abstract

KSN-17-P129

Coronary Artery Calcification Predicts Arterial Microcalcification in Nondiabetic Hemodialysis Patients

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Objectives : ‘CKD–Mineral and Bone Disorder (CKD–MBD)’ should be used to describe the broader clinical syndrome encompassing mineral, bone, and calcific cardiovascular abnormalities that develop as a complication of CKD. We previously reported that arterial micro–calcification (AMC) of vascular access has a negative impact on access patency and cardiovascular mortality in ESRD patients. We have also reported that coronary artery disease is associated with vascular access dysfunction. But a direct correlation between AMC and CAC has not yet been suggested.

Because AMC is diagnosed by histologic examination, it cannot be commonly performed. Coronary artery calcification (CAC) is quite common and known risk factors of cardiovascular disease and mortality in the general population, as well as patients with CKD. Compared to AMC evaluation, Coronary artery calcium score(CACS) can be easily detected by noninvasive computed tomography. We excluded impact of diabetes mellitus on AMC and CAC. The aim of this study is to explore the relationship between AMC of vascular access and the extent of the CAC in nondiabetic HD patients.

Methods : 40 nondiabetic ESRD patients who underwent vascular access surgery and coronary artery CT within 1 month of starting hemodialysis from May 2011 to April 2014 were included in this study. The AMC was diagnosed by pathologic examination of arterial specimen by von Kossa stain, which was acquired during the operation. All patients underwent a 128–multidetector unenhanced computed tomography (MDCT), and CACS was calculated. Patients were classified into two groups according to the CACS, as low group(<100, 23 patients) and high group(≥100, 17 patients). We statistically compared clinical factors, laboratory parameters, and AMC which may affect CACS.

Results : Mean age was 63.4 ± 16.5 years and the male gender was 24 (60.0%). The mean CACS was 185.9 ± 299.4 (0–1421.7). The incidence of AMC was 35.0% (n=14). Patients with high CACS group were older than low CACS group(74.1 ± 9.7 vs 55.5 ± 16.1 , $p < 0.05$). High CACS showed higher

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incidence of AMC compared to low CACS group (58.8% vs 17.4%, $p < 0.05$). By binary logistic regression, high CACS was independently associated with positive AMC (OR 8.381, 95% CI 1.725–40.732, $p < 0.05$). Univariate analysis showed significant correlations between high CACS and AMC. After multivariate adjustment for these risk factors, AMC remained independent risk factors for high CACS.

Conclusions : In conclusion, This study suggests that CACS reflect AMC of vascular access in nondiabetic HD patients, and that we can predict AMC from CACS in such patients.

Keywords : Coronary artery calcification; vascular calcification; hemodialysis