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Effect of renal artery calcification on the occurrence of acute kidney injury and mortality

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Objectives: Renal artery stenosis not only causes secondary hypertension and drug-resistant hypertension by enhancing renin-angiotensin-aldosterone system (RAAS), but also causes ischemic acute/chronic kidney injury by impeding blood flow to the kidneys. Renal artery calcification (RAC) suggests chronic severe atherosclerotic changes, but the relationship between its severity and clinical prognosis has not been established.

Methods: This study was conducted on subjects aged 60 years or older who had serum creatinine measured more than 3 times among patients prescribed and performed abdominal CT at Chung-Ang University Hospital from January 1, 2005 to February 28, 2020. The renal artery calcification score (RACS) was obtained by Agatston score measurement, and the incidence of AKI and mortality were compared between the groups.

Results: Of a total of 29,410 patients, 17,478 had no RAC and 11,932 was RAC (+). The median value of the group in which RACS was measured was 117.8. The prevalence and history of diabetes mellitus (DM), hypertension, dyslipidemia, and history of cardiovascular disease were significantly higher in the RAC (+) group, lower eGFR and higher proteinuria, and higher prescribing rates of ARB or ACEi, spironolactone, and statin. In the group of RAC (+), the incidence of AKI (HR 1.231, CI 1.174-1.292, P<0.001) and all-cause mortality (HR 1.265, CI 1.182-1.355, P<0.001) was high. Regardless of DM or RACS, the risk of AKI was higher in those who were prescribed ACEi or ARB (HR 1.786, CI 1.7-1.875, P<0.001). In patients with DM, mortality risk was reduced in those taking ACEi or ARB regardless of the presence of RACS (HR 0.759, CI 0.645-0.892, P<0.001).

Conclusions: RAC(+) was associated with higher AKI and mortality risk than RAC(-). The use of RAAS blockades increased the risk of AKI regardless of the presence of RAC, but reduced mortality in patients with DM regardless of the presence or absence of RACS.