Synergistic adverse impact of diabetes and chronic kidney disease on cardiovascular mortality in patients underwent percutaneous coronary intervention

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Background: Diabetes and chronic kidney disease (CKD) are frequently complicated each other. While approximately 40% of patients have diabetes among those with CKD, it is the most major (40-50%) and clinically important complication of diabetic patients which critically effects on their quality of life and outcomes. Moreover, numerous previous evidence has indicated the adverse prognostic impact by each of diabetes and CKD particularly in the secondary prevention of patients with established coronary artery disease (CAD). Nevertheless, to date, limited data is available regarding the synergistic impact of these two major risk factors on outcomes of patients with CAD.

Purpose: We studied the synergistic adverse effects of diabetes and chronic kidney disease on cardiovascular mortality in patients undergoing percutaneous coronary intervention (PCI).

Methods: This study is a part of a single-center prospective registry database of patients underwent PCI, which launched at 1984. A total of 4880 patients who underwent their first PCI (index PCI) at our university hospital between 2000 and 2018 were enrolled for the study. Participants were divided into 4 groups by the presence or absence of CKD and DM: DM−/CKD− (n=2028, 41.6%), DM+/CKD− (n=1411, 28.9%), DM−/CKD+ (n=754, 15.5%), and DM+/CKD+ (n=687, 14.1%). The endpoint was set as cardiovascular-related death (CV death). The median follow-up duration was 5.2 years since PCI procedure.

Results: During follow-up, 288 (5.9%) CV deaths were identified, in which 79.1% had DM or CKD. Unadjusted Kaplan-Meier curves showed patients with DM+/CKD+ had a significantly higher cumulative incidence of CV death compared to those with DM−/CKD− (log-rank p<0.0001) and DM−/CKD+ (p=0.03) (Figure 1). Moreover, multivariate Cox-proportional hazard analysis set DM−/CKD− as a reference and adjusted by age, gender, body mass index, hemoglobin, ejection fraction, acute coronary syndrome, statin and smoking history showed significantly increased risk of having both of diabetes and CKD (Hazard ratio (HR) and 95% confidence interval (CI) of DM and CKD: 3.1: 1.9-5.1, p<0.0001) than having each of these (HR and 95% CI of DM alone: 1.2, 0.7-2.0, p=0.5, and of CKD alone: 1.8, 1.1-3.0, p=0.02 (Figure 2).

Conclusions: Findings in the present study indicated that CKD is a significant risk for CV death in patients following PCI, while only DM without CKD was not a significant risk factor in this population. Moreover, the risk for CV death was synergistically increased, when a patient had both of DM and CKD, compared to having each of these.

Kaplan-Meier curves in CV death
Adjusted Cox hazard model in CV death