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Clinical Significance of Vascular Calcification and Retinopathy on Renal and Cardiovascular Outcomes in Patients with Chronic Kidney Disease

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Background: Vascular calcification and retinopathy is the representative marker of macrovascular and microvascular dysfunction in patients with chronic kidney disease (CKD). While both of them share common pathophysiology, their relationship and combined effects on clinical outcome remained undetermined.

Methods: We included 523 nondialysis-dependent CKD stage 3-5 patients, who had been examined with fundoscopy for diabetic or hypertensive retinopathy. Simple X-ray images of the pelvis and the abdomen were analyzed for the presence of intimal or medial arterial calcifications. The clinical significance of intimal calcification and retinopathy was evaluated in terms of the rate of renal function decline and composite of any cardiovascular event or death.

Results. Intimal calcification was observed in 81 (15.5%) CKD patients, medial calcification in 50 (9.6%) CKD patients, and retinopathy in 258 (49.3%) CKD patients. The presence of retinopathy was independently associated with intimal (odds ratio 1.72, 95% CI 1.03-2.89) and medial calcification (OR 3.41, 95% CI 1.68-6.90). The renal function decline rate was significantly steeper in patients with than in those without intimal calcification (-8.1 ± 9.4 mL/min/1.73m²/yr vs. -4.6 ± 10.4 mL/min/1.73m²/yr; $p=0.005$). However, medial calcification was not associated with rapid renal function decline ($p=0.153$). In multivariate analysis, patients with both intimal calcification and retinopathy were independently associated with a rapid decline in renal function ($b=-4.21$; $p<0.001$). The combined status of retinopathy with intimal or medial calcification independently increased the risk of composite events (hazard ratio 3.34, 95% CI 1.41-4.43 for intimal calcification; hazard ratio 3.19, 95% CI 1.62-6.28 for medial calcification).

Conclusions: Coexistence of intimal calcification and retinopathy were independently associated with CKD progression, and the combined status of retinopathy with intimal or medial calcification was an independent predictor for composite cardiovascular event/death.

Key Words: 만성신부전, 혈관석회화, 망막병증

Chronic kidney disease, Vascular calcification, Retinopathy