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Impacts of coronary artery calcification on intradialytic blood pressure patterns in patients receiving maintenance hemodialysis

JIIN MOON, Jungho Shin, Jin Ho Whang, Su Hyun Kim
Department of Internal Medicine-Nephrology, Chung-Ang University Hospital, Korea, Republic of

Objectives: Intradialytic blood pressure abnormalities are associated with adverse outcomes in patients with end-stage renal disease on maintenance hemodialysis. Vascular calcification is a common complicating feature, but whether this complication results in intradialytic blood pressure abnormalities remains uncertain. Therefore, this study investigated the relationship between coronary artery calcium score and intradialytic blood pressure abnormalities in patients with end-stage renal disease on maintenance hemodialysis.

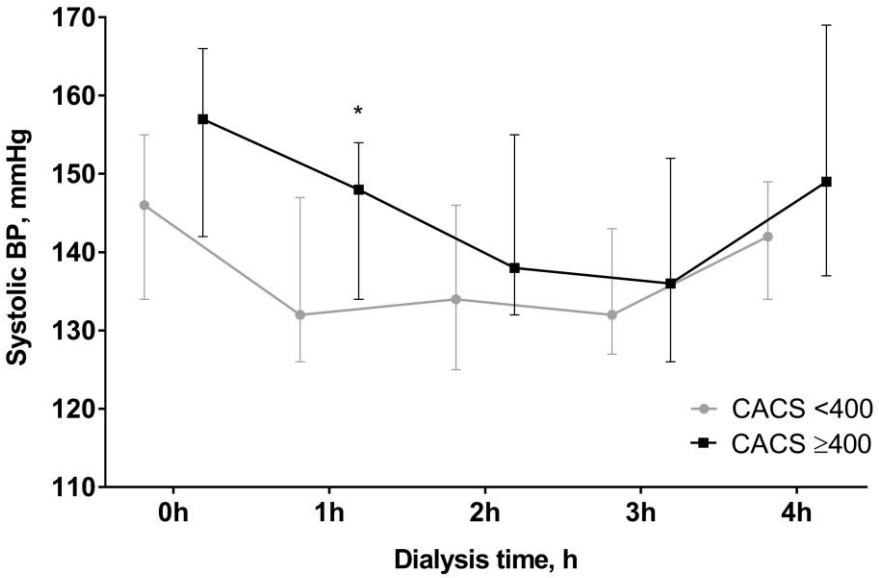
Methods: Thirty-six patients who received nongated chest computed tomography scans were included. Intradialytic hypotension was defined as a minimum intradialytic systolic blood pressure of <100 mmHg or a pre-dialysis blood pressure – minimum intradialytic systolic blood pressure >30 mmHg. Intradialytic hypertension was defined as >10 mmHg increase in systolic blood pressure (pre- to post-dialysis).

Results: Patients were classified as 22 (61.1%) with coronary artery calcium score <400 and 14 (38.9%) with coronary artery calcium score ≥400. Median systolic and diastolic blood pressures were equivalent, but median pulse pressure was higher in patients with coronary artery calcium score ≥400 than in those with scores <400. Coronary artery calcium score was comparable according to both intradialytic hypotension and hypertension, and had no correlation with systolic blood pressure fall and nadir systolic blood pressure. Coronary artery calcium score predicted the occurrence of cardiovascular events and all-cause mortality (hazard ratio 1.001 and 1.001; P = 0.058 and 0.010).

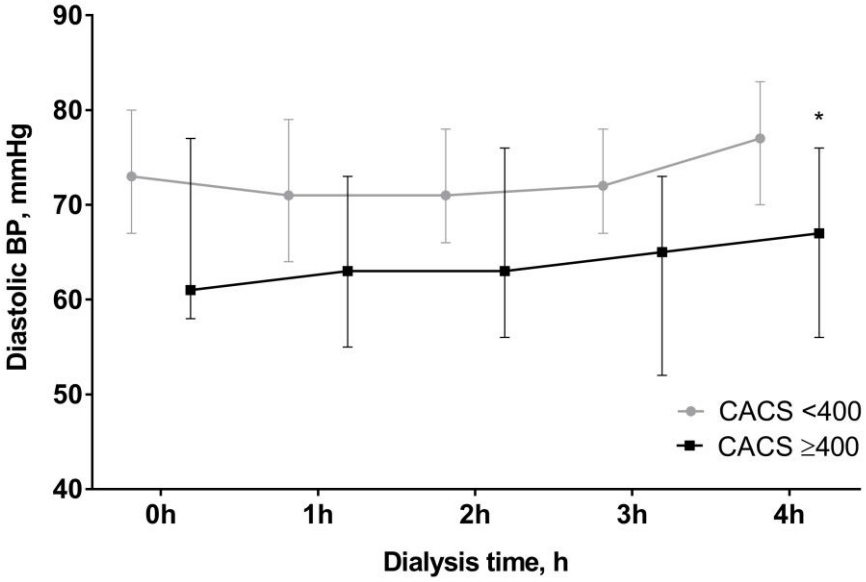
Conclusions: Coronary artery calcium score could be an independent predictor for cardiovascular events and all-cause mortality but irrelevant to intradialytic blood pressure abnormalities in patients with end-stage renal disease on hemodialysis.

BP measurements over the course of dialysis treatment according to the CACS group

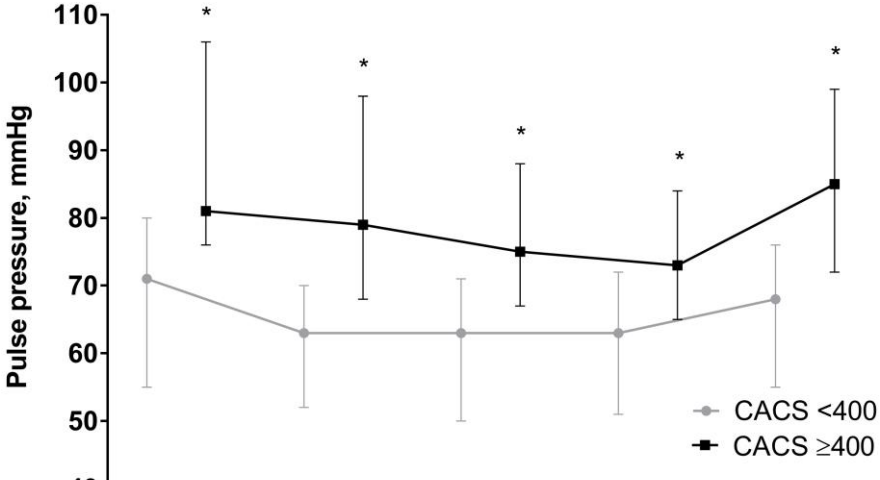
A.


Systolic BP, mmHg
170
160
150
140
130
120
110
*
0h
1h
2h
3h
4h
Dialysis time, h
CACS <400
CACS ≥400

B.


Diastolic BP, mmHg
90
80
70
60
50
40
*
0h
1h
2h
3h
4h
Dialysis time, h
CACS <400
CACS ≥400

C.


Pulse pressure, mmHg
110
100
90
80
70
60
50
*
*
*
*
*
CACS <400
CACS ≥400

Impact of CACS and intradialytic BP abnormalities on cardiovascular events

Variables	HR (95% CI)	*P*	HR (95% CI)	*P*
	Univariate analysis		Multivariate analysis[a]	
Age	1.1 (1.0, 1.3)	0.017	1.2 (1.0, 1.4)	0.054
Male	0.7 (0.2, 3.1)	0.628		
Charlson comorbidity index	1.2 (0.9, 1.5)	0.213		
ECW/TBW, %	1.3 (0.8, 2.2)	0.240		
Ultrafiltration rate, L/hr per kg	1.0 (0.9, 1.1)	0.675		
Pre-dialysis pulse pressure, mmHg	1.1 (1.0, 1.2)	0.002	1.1 (1.0, 1.1)	0.013
Intradialytic hypotension[b]				
Nadir100	2.4 (0.5, 12.4)	0.296		
Fall30	3.3 (0.6, 17.3)	0.151		
Intradialytic hypertension[c]	0.5 (0.1, 2.6)	0.409		
CACS	1.001 (1.000, 1.002)	0.025	1.001 (1.000, 1.003)	0.058

CACS, coronary artery calcium score; ECW/TBW, the ratio of extracellular water to total body water