Pericoronary adipose tissue attenuation leads to improved prognostication beyond atherosclerotic burden and high-risk plaques in patients with suspected coronary artery disease

Van Diemen PA.[1]; Bom MJ.[1]; Driessen RS.[1]; Everaars H.[1]; De Winter RW.[1]; Van De Ven PM.[1]; Freiman M.[2]; Goshen L.[2]; Langzam E.[2]; Min JK.[3]; Leipsic JA.[4]; Raijmakers PG.[5]; Van Rossum AC.[1]; Danad I.[1]; Knaapen P.[1]

[1]Amsterdam UMC, Vrije Universiteit Amsterdam, Cardiology, Amsterdam, Netherlands (The)
[2]Philips Healthcare, Best, Netherlands (The)
[3]Weill Cornell Medical College, Institute of Cardiovascular Imaging, New York, United States of America
[4]University of British Columbia, Medicine and Radiology, Vancouver, Canada
[5]Amsterdam UMC, Vrije Universiteit Amsterdam, Nuclear Medicine, Amsterdam, Netherlands (The)

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Background: Inflammation is a key component in the atherosclerotic process, initiating and sustaining plaques and serving as a trigger for plaque rupture leading to myocardial infarction. Coronary computed tomography angiography (CCTA) derived pericoronary adipose tissue attenuation (PCATa) has been proposed as surrogate marker for coronary inflammation and might improve risk assessment on top of CCTA derived cardiovascular risk-factors: atherosclerotic burden and plaque vulnerability.

Purpose: To assess the prognostic value of PCATa beyond atherosclerotic burden and high-risk plaques (HRPs).

Methods: A total of 543 patients who underwent CCTA because of suspected CAD were included. CCTA assessment comprised coronary artery calcium score (CACS), presence of obstructive CAD (≥50% stenosis) and HRPs, total plaque volume (TPV), non-calcified plaque volume (NCPV), and PCATa. The endpoint was a composite of death and non-fatal myocardial infarction (MI). Prognostic thresholds were determined for quantitative CCTA variables.

Results: During a median follow-up of 6.6 [interquartile range: 4.7-7.8] years, the endpoint was observed in 42 (20 MI/22 death) patients. CACS >83, obstructive CAD, HRPs, TPV >269mm3, and NCPV >83mm3 were associated with shorter time to the endpoint with unadujsted hazard ratio's (HR) of 5.37 (95% confidence interval (CI): 2.56-11.29), 5.70 (95% CI: 2.40-13.55), 3.31 (95% CI: 1.80-6.07), 7.76 (95% CI: 3.59-16.81), and 6.77 (95% CI: 3.24-14.16), respectively ($p < 0.001$ for all). PCATa of the RCA >-74.4 Hounsfield units was associated with worse prognosis (unadjusted HR: 1.99, 95% CI: 1.04-3.79, $p = 0.037$), whereas PCATa of the LAD and Cx were not associated with prognosis. PCATa of the RCA remained a significant predictor of death and non-fatal MI corrected for CCTA variables and clincal chacteristics associated with the endpoint (adjusted HR: 2.11, 95% CI: 1.11-4.04, $p = 0.024$).

Conclusion: Coronary inflammation determined by PCATa of the RCA provides incremental prognostic value beyond clinical characteristics and comprehensive CCTA assessment.

Abstract Figure. Take-home figure