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Association between unfolding aortic arch and coronary artery disease detected by multi-detector computed tomography: comparison with arterial stiffness evaluated by brachial-ankle pulse wave velocity

Sung Ho Hwang, Byoung Wook Choi, Young Jin Kim, Jin Hur, Hye-Jeong Lee, Yoo Jin Hong
Severance Hospital, Korea.
shhwang@yuhs.ac

PURPOSE: To determine the association between the aortic arch changes related to the aging and the coronary artery disease (CAD) on multi-detector computed tomography (MDCT), and compare those with the arterial stiffness from pulse wave velocity (PWV).

MATERIALS AND METHODS: We retrospectively enrolled 277 consecutive patients without history of revascularization who underwent concurrently both brachial-ankle PWV (baPWV) and coronary CT angiography (CTA) for suspected CAD. Each CTA was evaluated for CAD and aortic arch width (AAW) as the degree of unfolding in aortic arch. According to the CTA findings, all subjects were classified into three broad categories; 1) non-obstructive CAD, 2) low-risk obstructive CAD, and 3) high-risk obstructive CAD.

RESULTS: Obstructive CAD (diameter of stenosis $\geq$ 50%) showed statistically higher AAW (11.5 $\pm$ 1.3 cm versus 10.7 $\pm$ 1.2 cm, $p < 0.05$) and baPWV (1609 $\pm$ 328 cm/s versus 1466 $\pm$ 281 cm/s, $p < 0.05$) than did non-obstructive CAD (diameter of stenosis < 50%). The optimal AAW cutoff value to predict high-risk obstructive CAD was 11.5 cm, which had a sensitivity of 80% and a specificity of 69% (area under curve = 0.78). After adjusting for age, smoking status, hypertension, diabetes, and dyslipidemia, the odds ratio of greater than 11.5 cm in AAW for high-risk obstructive CAD was 3.91 (95% CI = 1.15−13.2, $p < 0.05$).

CONCLUSION: By the using MDCT to evaluate the CAD, the AAW representing the unfolding degree in aortic arch may be useful to predict the high-risk obstructive CAD.