Risk of arterial calcification by conventional vitamin K antagonist treatment

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BACKGROUND: Vitamin K antagonists (VKA) are the most frequently prescribed oral anticoagulants worldwide although new oral anticoagulants (NOAC) have become an important alternative. VKA inhibits Vitamin K1 necessary to produce coagulation factors but also Vitamin K2, which is essential in the activation of matrix-Gla protein, thought to be a strong local inhibitor of arterial calcifications.

PURPOSE: The aim was to investigate, whether VKA treatment is associated with coronary artery calcification (CAC) in a population with no prior cardiovascular disease (CVD).

METHODS: We collected data on cardiovascular risk factors and CAC scores from cardiac CT scans performed as part of clinical examinations (n=9,672) or research studies (n=14,166) in the period 2007-2017. Data on use of VKA and NOAC was obtained from the Danish National Health Service Prescription Database. The association between VKA treatment duration and categorized CAC score was investigated by ordered logistic regression while adjusting for covariates. The independent variables included in the model were: age, gender, smoking, body mass index (BMI), diabetes mellitus, hypertension, hypercholesterolemia and/or statin treatment, family history of CVD, estimated glomerular filtration rate, VKA treatment duration and NOAC treatment duration. The categorisation of CAC was: 0, 1-99, 100-399 and =400 AU, corresponding to no, mild, moderate and severe atherosclerotic plaque burden, respectively.

RESULTS: The final study population consisted of 17,254 participants (median 67 years old, 75% males) with no prior CVD, of which 1,748 (10%) and 1,144 (7%) had been treated with VKA or NOAC, respectively. A longer duration of VKA treatment was associated with higher CAC categories (Figure). For each cumulative year of VKA treatment, the odds of being in a higher CAC category, i.e. having more severe atherosclerosis, increased (odds ratio (OR)=1.032, 95%CI 1.009-1.057). All traditional cardiovascular risk factors were also associated with CAC. In contrast, NOAC treatment duration was not associated with CAC category (OR=1.004, 95%CI 0.937-1.075). In a sensitivity analysis of patients without statin treatment (n=12,143), the association between VKA treatment and CAC category remained unchanged. There was no significant interaction between VKA treatment duration and age on CAC category.
CONCLUSION: Adjusted for cardiovascular risk factors, VKA treatment – in contrast to NOAC - is associated with more severe CAC. Additional studies are required to clarify the clinical importance of this association in terms of hard cardiovascular endpoints.