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YOUNG INVESTIGATORS AWARDS

VIRTUAL HISTOLOGY INTRAVASCULAR ULTRASOUND FINDINGS PREDICT ADVERSE OUTCOME IN PATIENTS WITH CORONARY ARTERY DISEASE: THE VIVA (VH-IVUS IN VULNERABLE ATHEROSCLEROSIS) STUDY

ACC Special Session
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Background: Identification of high-risk atherosclerotic plaques offers the opportunity for risk stratification and targeted intensive treatment of patients with coronary artery disease. Virtual Histology intravascular ultrasound (VH-IVUS) has been validated in human atherectomy and post-mortem studies and can classify plaques into presumed high- and low-risk subgroups. However, VH-IVUS has not been shown prospectively to be associated with adverse events. Leukocyte telomere length (LTL) is a genetic predictor of cardiovascular risk.

Methods: 170 patients with stable angina or acute coronary syndrome, referred for percutaneous coronary intervention (PCI) were prospectively enrolled and underwent 3-vessel VH-IVUS pre-PCI. Troponin-I (cTnI) was measured pre-PCI and 24 hours post-PCI. LTL was determined by quantitative polymerase chain reaction. The combined primary endpoint of major adverse cardiovascular events (MACE) included unplanned revascularization, myocardial infarction (MI) and death, with a secondary endpoint of post-PCI MI (MI 4a).

Results: 18 MACE events occurred in 16 patients over a median follow up of 625 (463-990) days. 30372mm of VH-IVUS were analysed. After multivariable adjustment, number of non-calcified VH-IVUS-identified thin-capped fibroatheromas (VHTCFA) was the only factor associated with MACE (HR=3.16, [95%CI=1.16-8.64], p=0.025). Total number of VHTCFA (OR=1.26 [1.03-1.53] p=0.021) and stent length (OR=1.04 [95%CI=1.01-1.08], p=0.01) were the only factors associated with MI 4a after multivariable analysis. cTnI rise was associated with the 3-vessel vulnerability index (necrotic core/fibrous tissue) and side branch loss on multivariable linear regression (standardized beta coefficient (sβ)=0.29, p=0.004 and sβ=0.23, p=0.019 respectively). Patients in the lower tertile of LTL had greater culprit vessel NC volume (p=0.02) and plaque volume (p=0.02) than those in the upper tertile.

Conclusions: This is the first report demonstrating an association between VH-IVUS-identified plaque classification and adverse cardiovascular outcomes. The utility of VH-IVUS for risk stratification and targeted intervention merits further evaluation.