Combined assessment of contrast-enhanced ultrasound of carotid plaque and carotid intima-media thickness improves the prediction of future coronary events in patients with coronary artery disease

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Topic(s):
Coronary Artery Disease : Noninvasive Diagnostic Methods

Citation:
Background: This study examined whether combined ultrasound assessment of plaque size and intraplaque neovascularization in the carotid artery had an additive effect for predicting coronary events in patients with coronary artery disease (CAD). Methods: CEUS of the carotid plaques using perfluorobutane microbubbles as an ultrasound contrast agent and Ultrasound assessment of carotid plaque maximum intima-media thickness (max IMT) was performed in 221 patients with CAD and carotid plaque IMT over 2mm. Intraplaque neovascularization was identified on the basis of microbubbles within the carotid plaque and graded as: G0, not visible; G1, moderate; or G2, extensive microbubbles. All study patients were followed up prospectively for 5years or until the occurrence of a cardio-vascular event. Result: During the follow-up period, 53 coronary events (9 cardiac deaths, 44 ACSs) were occurred. Multivariate Cox hazards analysis showed that max IMT and CEUS grade were independent predictors of coronary events (HR 1.59, 95%CI 1.15-2.21 p=0.005 and HR 2.26, 95%CI 1.52-3.36 p<0.01) that were independent of age, gender, diabetes and LDL-C levels. C-statistics for logistic models predicting future coronary events using conventional risk factors with or without the addition of max IMT alone, CEUS grade alone, and both max IMT and CEUS grade in combination(area under the ROC curve; 0.55,0.61,0.69 and 0.71, respectively). The addition of the plaque enhanced intensity to traditional risk factors resulted in net reclassification improvement (NRI) and integrated discrimination improvement (IDI) (NRI 0.42, p = 0.002; and IDI 0.04, p = 0.002). Conclusions: Combined ultrasound assessment of carotid plaque IMT and intraplaque neovascularization has an additive value on the prediction of coronary events.
Abstract: P6415
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C-statistics for logistic models predicting future coronary events

Model 1: Conventional Risk Factors
Model 2: Conventional Risk Factors + max IMT
Model 3: Conventional Risk Factors + maxIMT + CEUS grade

*Conventional Risk Factors include Age, Gender, Diabetes Mellitus and LDL-Chol