

Review of cardiovascular literature

Fadi G. Hage, MD, FASH, FACC,^{a,b} and Wael AlJaroudi, MD, FACC, FAHA, FESC, FASNC^c

^a Division of Cardiovascular Disease, Department of Medicine, University of Alabama at Birmingham, Birmingham, AL

^b Section of Cardiology, Birmingham Veterans Affairs Medical Center, Birmingham, AL

^c Division of Cardiovascular Medicine, American University of Beirut Medical Center, Beirut, Lebanon

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Effect of Atorvastatin Therapy on Fibrous Cap Thickness in Coronary Atherosclerotic Plaque as Assessed by Optical Coherence Tomography: The EASY-FIT Study

J Am Coll Cardiol 2014;64:2207-17

Background Statin therapy attenuates progression of atherosclerosis, decreases lipid burden in coronary plaques, and reduces cardiovascular events. The exact mechanism of statin-induced plaque stabilization is not well defined. Komukai et al from Wakayama Medical University, Japan, assessed the effect of atorvastatin on fibrous cap thickness of coronary plaques using optical coherence tomography (OCT). Seventy patients naïve to statin therapy and with unstable angina were randomized to atorvastatin 20 mg/day vs 5 mg/day. OCT was performed at baseline and at 1-year follow-up.

Findings Patients randomized to 20 mg/day of atorvastatin has significant decrease in serum low-density lipoprotein level (69 vs 78 mg/dl, $P = 0.039$), and increase in fibrous cap thickness (69% vs 17%, $P < 0.001$) that was inversely correlated with a decrease in low-density lipoprotein levels ($R = -0.45$, $P < 0.001$), high-sensitivity C-reactive protein, macrophages, and matrix metalloproteinase-9.

Conclusion Higher dose of atorvastatin was associated with decrease in atherogenic serum lipoproteins and inflammatory biomarkers, and subsequently an increase in fibrous cap thickness and stabilization of

atherosclerotic plaques. There were no hard-endpoints in the study; correlation between increased fibrous cap thickness and reduction in cardiovascular events is needed to establish causality. The small sample size of the study, lack of generalization to other statins, inability of OCT to measure lipid core size and potential error measurements of fibrous cap thickness, are other limitations of the study.

Proximal Aortic Distensibility is an Independent Predictor of All-Cause Mortality and Incident CV Events: The MESA Study

J Am Coll Cardiol 2014;64:2619-29

Background Vascular aging that manifests as arterial stiffness is a newly established risk factor for cardiovascular events. Reduced ascending aortic distensibility (AAD) is an early marker of such subclinical vascular alteration, although its prognostic value beyond traditional risk factors is not well defined. Redheuil et al from the Sorbonne University, Paris, France, sought to assess the prognostic value of AAD in 3,675 patients from the Multi-Ethnic Study of Atherosclerosis (MESA). AAD was measured with magnetic resonance imaging (MRI). Endpoints included all-cause death, hard cardiovascular disease (CVD) events (myocardial infarction, resuscitated cardiac arrest, stroke and cardiac death), and heart failure.

Findings After a median follow-up of 8.5 years, there were 246 death, 171 hard CVD events, and 88 heart failure. Decreased AAD was associated with increased all-cause death with an adjusted HR 2.7 (first vs fifth quintile, $P = 0.008$), and a 2-fold increase in hard CVD events for those in the first quintile. Among low to intermediate risk patients (10-year Framingham CVD risk $<10\%$), those with lowest AAD (first quintile) had 5-fold increase cardiovascular events after multivariate adjustment ($P = 0.03$).

Reprint requests: Wael AlJaroudi, MD, FACC, FAHA, FESC, FASNC, Division of Cardiovascular Medicine, American University of Beirut Medical Center, Beirut, Lebanon; wa53@aub.edu.lb

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Significance Decreased AAD is an independent predictor of all-cause death and hard CVD events among patients without known cardiac disease, and was most predictive in the low to intermediate risk cohort. The study highlights the importance of vascular aging and loss of aortic distensibility as a predictor of mortality. Selection bias may have affected the results since only half of patients of the MESA cohort had a cardiac MRI. Further validation studies are needed.

Acute Kidney Injury After Coronary Artery Bypass Grafting and Long-Term Risk of End-Stage Renal Disease

Circulation 2014;130:2005-11

Background Acute kidney injury (AKI) is a common complication after coronary artery bypass grafting (CABG) and has been associated with short- and long-term adverse outcomes. Ryden et al from the Karolinska University Hospital, Sweden studied 29,330 patients (mean age 67 years, 21% women) who underwent primary isolated CABG in Sweden between 2000 and 2008 to determine the relationship between AKI after CABG and the long-term risk of ESRD.

Findings Post-operative AKI occurred in 13% and ESRD developed in 0.4% of patients during a mean follow-up of 4.3 ± 2.4 years. ESRD occurred in 0.2% of patients without AKI, 1.6% of those with stage 1 AKI (>0.3 mg/dL or 50% increase from pre- to post-operative serum creatinine) and 5.2% in those with stage 2 to 3 ($>100\%$ increase). After multi-variate adjustment, the hazard ratio for ESRD was 2.92 (95% CI 1.87-4.55) for stage 1 and 3.81 (2.14-6.79) for stages 2-3 compared to no AKI.

Significance Although most patients with AKI after CABG do not require dialysis during the post-operative period, AKI is an independent risk factor for ESRD on long-term follow-up. The study is important since the risk was seen even with relatively small elevations of serum creatinine (50-100% of baseline, stage 1 AKI). It is unclear from this study if the risk of ESRD is causally

related to the post-operative AKI or if AKI acts as a risk marker for the development of ESRD.

Near-Infrared Spectroscopy Predicts Cardiovascular Outcome in Patients with Coronary Artery Disease

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Background Lipid rich coronary artery plaques are thought to be vulnerable and more prone to rupture. Near-infrared spectroscopy (NIRS) is an emerging technology that identifies lipid core-containing plaques and quantifies the lipid core burden index (LCBI). Oemrawsingh et al from the Interuniversity Cardiology Institute of the Netherlands, sought to determine the long-term prognostic value of NIRS assessed in non-culprit vessel of 203 patients (63.4 ± 10.9 years, 73% men) undergoing coronary angiography for stable angina or acute coronary syndrome (ACS). The primary endpoint was the composite of all-cause death, non-fatal ACS, stroke, and unplanned coronary revascularization.

Findings Men and patients with history of dyslipidemia, stroke, and peripheral vascular disease had higher LCBI values. There were 21 events (10.4%) at 1-year follow-up. Patients with LCBI values above the median had significantly higher event rate (16.7% vs 4%, log-rank $P = 0.003$) with an adjusted hazard ratio 4.04 (95% CI 1.33-12.3). The relation between LCBI and the primary endpoint was similar when stratified by patients with stable angina and those with ACS (P value for heterogeneity = 0.14).

Significance Patients with non-culprit coronary artery plaques that are lipid-rich had a 4-fold risk of adverse cardiovascular events during 1-year follow-up. The study underlies the importance of identifying lipid-rich plaques that may represent vulnerable plaques. NIRS is an emerging technique with great potential. However, it only provides plaque information in a 2-dimensional manner and needs further external validation. Also, the primary endpoint of the study was mainly driven by unplanned revascularization. Larger studies with longer follow-up and more hard-endpoints are warranted.