Predictive role of C-reactive protein levels in patients with ST-segment elevation acute myocardial infarction for heart failure related events

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Background: ST-segment elevation myocardial infarction (STEMI) is associated with an intense acute inflammatory response and an increased risk of death and heart failure (HF). C-reactive protein (CRP) is the inflammatory biomarker most commonly used for risk stratification in patients with cardiovascular diseases. CRP levels are known to rise and fall during STEMI in response to myocardial injury. In this study, we analyzed whether admission CRP or delayed CRP (measured at 72 hours after admission) held a greater predictive value for adverse HF events in patients with STEMI.

Methods: We analyzed data from the VCUART3 clinical trial enrolling 99 patients with STEMI within 12 hours of presentation at 3 sites in the United States of America treated with anakinra or placebo. CRP levels were measured with a high-sensitivity assay at time of admission and again at 72 hours later. A dedicated committee composed of individuals not involved in the conduct of the trial adjudicated HF events including a composite endpoint of death from any reason or incidence of HF defined as new-onset HF requiring hospital admission or a new prescription for a loop diuretic (D+HF) and a composite endpoint of death and HF hospitalization (D+HHF) at 1 year. We used a time-dependent Cox-regression analysis to determine the association of CRP at admission or at 72 hours with the outcomes of interest in univariate and multivariate analysis. Data are presented as median and interquartile range. (ClinicalTrials NCT01950299)

Results: CRP levels from admission and 72 hours were available in 90 and 87 subjects respectively and they increased from 4.6 [2.8–8.5] mg/L to 11.6 [4.6–24.5] mg/L (P<0.001). Both admission CRP (CRP0) and CRP at 72 hours (CRP72) were associated with the risk of D+HF (P<0.011 and <0.001, respectively) and of D+HHF (P<0.010 and P<0.001, respectively); however at multivariate analysis, only CRP72 remained significantly associated with the risk of D+HF (P<0.001) and D+HHF (P<0.004) while CRP0 was not. CRP72 significantly correlated with NTproBNP levels at 72 hours (NTproBNP72, Spearman rho R=+0.37, P=0.001). NTproBNP72 predicted D+HF (P=0.030) but not independently of CRP72 (P=0.096 for NTproBNP72 and P=0.007 for CRP72 at multivariate analysis including the 2 variables). NTproBNP72 did not predict D-HHF.

Conclusions: Among contemporary patients with STEMI, the levels of CRP at 72 hours after admission was superior to admission CRP levels for predicting the incidence of HF events, and independent of NTproBNP levels. Our results indicate the importance of the inflammatory response during STEMI, supporting the concept of inhibiting the inflammatory response as a therapeutic strategy.