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Preoperative Biomarkers of Inflammation, Ischemia, and Heart Failure and Outcomes of Vascular Surgery

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Background: Vascular surgery patients are at risk for perioperative myocardial infarction (MI), heart failure, and death. Patients are screened before vascular surgery for coronary artery disease and heart failure; however, current clinical risk assessment strategies have poor accuracy for identifying patients who will suffer adverse perioperative events. Improved methods of accurately assessing risk may lead to improvements in safety.

Biomarkers are blood tests that are highly informative of a diagnosis or prognosis for a particular disease. B-type natriuretic peptide (BNP), a biomarker of heart failure; troponin I (TropI), a biomarker of cardiac ischemia; and C-reactive protein (CRP), a biomarker of inflammation, are promising candidates for preoperative screening of vascular surgery patients.

In blood donors, BNP differs significantly by gender. It is not known whether gender influences biomarker levels in subjects with surgical vascular disease. However, if present, gender effects on biomarker levels should be incorporated into recommended cut-off levels for preoperative risk assessment and risk reduction goals.

Methods: Fifty-seven patients scheduled for major vascular surgery (interventions on the aorta or lower extremity revascularization) were recruited between March 2007 and July 2008. Inpatients and emergency surgery patients were excluded.

Preoperative data include demographics, medical history, and levels of BNP, TropI, and CRP. Primary cardiac outcomes within 30 days of surgery comprise MI, pulmonary edema, ventricular fibrillation, primary cardiac arrest, complete heart block, and death.

Results: Five of 57 (9%) patients suffered a primary outcome (1 death, 1 MI, 3 cases of pulmonary edema). Two of 2 patients with preoperative TropI elevation had an MI, with 1 associated death. No relationship was found between preoperative BNP and adverse outcome. BNP levels, on average, were higher for males than for females, in contradistinction to prior reports.

Conclusion: Our pilot study did not show that a panel of 3 biomarkers relevant to cardiovascular pathophysiology contributed to preoperative risk stratification before high-risk vascular surgery. Given the low incidence of primary outcomes, it may have been underpowered. Preoperative TropI elevation appears to be an ominous sign, although low overall numbers limit statistical inferences. Curiously, BNP levels were higher in males than females, in opposition to reports in other populations. Further research is needed to clarify the potential role of biomarkers in preoperative risk stratification and optimization.