

Brain Natriuretic Peptide as a Predictive Marker in Perioperative Cardiac Care: Ready for Use?

Coronary Artery Bypass Graft surgery (CABG) has an important value in the management of patients with coronary or valvular heart disease. Because of increasing the interest to perform less invasive interventions in these patients, CABG is now performed for patients with higher comorbidities and more severe cases having more post operative complications (1). Thus, clinical risk stratification has a great role in preoperative evaluation of patients undergoing CABG (2). Electrocardiography, hemodynamic parameters, biochemical markers like creatinin kinase (CK), myoglobin creatinin kinase (CK-MB) and troponins and transthoracic/transesophageal echocardiography are routinely used for the diagnosis of preoperative cardiac problems and prediction of perioperative comorbidities (3). BNP is secreted by ventricular myocytes due to increased ventricular wall tension related to volume expansion. BNP is a simple blood test, which can easily be performed in most biochemistry laboratories as part of a routine preoperative assessment. Previous studies showed that increased level of preoperative BNP is associated with higher morbidities and mortality after cardiac surgeries (4-6). Postoperative BNP has the potential to show the preoperative condition of heart and cardiac injury induced by surgical intervention but its value as a prognostic marker has not been largely evaluated (7, 8).

Totonchi et al. evaluated the association of preoperative and post operative BNP with morbidity in 50 adult patients who were scheduled for elective CABG in Tehran Shahid Rajaie heart center from Sep 2016 to May 2017. Patients with emergency situations, hematocrit less than 25 and patients on inotropic therapy were excluded. Samples were taken for BNP levels 24 hours pre and post operative. They showed that perioperative BNP did not have any correlation with other comorbidities and major complications after cardiac surgeries except for

ejection fraction. Their results showed that patients with higher perioperative BNP levels had significantly higher risk factor for low ejection fraction and heart failure after CABG (9). Fox and coworkers in their prospective longitudinal study of 1,183 patients undergoing primary coronary artery bypass grafting surgery, compared the utility of preoperative with postoperative BNP for predicting hospital LOS and mortality after primary PCI. After multivariable adjustment for preoperative BNP and clinical covariates, peak postoperative BNP predicted hospital LOS (hazard ratio [HR] = 1.28, 95% CI = 1.002-1.64, P = 0.049) but not mortality. Whereas preoperative BNP independently predicted hospital LOS (HR = 1.09, CI = 1.01-1.18, P = 0.03) and was defined as an independent predictor of mortality (HR=1.36, CI=0.96-1.94, P=0.08). When preoperative and peak postoperative BNP were separately adjusted for the clinical multivariable models, each independently predicted hospital LOS and mortality (10). Previous studies showed that post operative BNP levels which measured 24 hours after surgery did not significantly predict adverse cardiovascular events and peak post operative BNP measurement should be considered as a surrogate for cardiovascular complications. Peak postoperative BNP tends to occur later in the postoperative course, around day 3 or 5.

The study of Totonchi et al has some major limitations. It has been performed in a single center which has inherent limitations. The study's HF outcome did not delineate specific etiologies of observed postoperative HF events (e.g., systolic vs. diastolic dysfunction or left atrial enlargement). BNP has been affected by kidney function and pulmonary disease but patients with kidney and lung disease were enrolled in this study. Moreover, the authors did not perform long term follow up after discharge. The authors measured BNP by electrochemiluminescence immunoassay, which measures

only nonglycoNT-proBNP. This method underestimates the BNP level compared to NT-proBNP assay system currently being used. Therefore, careful interpretation of the BNP levels and clinical application may be required. Finally, the authors did not use logistic regression analysis for adjustment of clinical risk factors; so, interpreting and globalization of these results is not possible.

Based on literature review, there is little added benefit to measure postoperative BNP either instead of or in combination with preoperative BNP. So, it seems that we do not need to measure both preoperative and postoperative BNP together for the purposes of risk stratifying of CABG patients. But if preoperative BNP measurement is not possible, we can use peak post operative BNP measurement for prediction of major cardiovascular complications. Patients at high risk should be considered for less invasive procedures and must receive optimized perioperative care. Further research with a larger number of patients having various types of surgeries and good methodologic design is needed to confirm the clinical utility of this prognostic test.

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