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Role of Brain Natriuretic Peptide as a Prognostic Marker in Non-Cardiac Surgery

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The Brain Natriuretic Peptide; brain natriuretic peptide (BNP) and its inactive precursor N-terminal pro-BNP, are well-established risk markers in various acute and chronic cardiac conditions. However, their value as preoperative risk markers is unclear. BNP is secreted by cardiac myocytes in response to mechanical stretching caused by both pressure and volume overload. Myocardial damage or ventricular dysfunction (both systolic and diastolic) raises the plasma level of BNP. Even a transient myocardial ischemia owing to the demand and supply imbalance produces measurable change in plasma BNP levels.

The perioperative period can result in a period of critical stress. Factors associated with surgery and anesthesia such as trauma, bleeding, intubation, hypoxia, hypothermia, pain and medications induce intense inflammation, hypercoagulability and sympathetic activation. All these factors trigger acute cardiac ischemia, arrhythmia and ventricular decompensation, which are associated with perioperative elevation of troponin, C-reactive protein and BNP. Interest in BNP as a preoperative risk marker has increased because the currently used preoperative clinical cardiac risk indices have only modest predictive power. It is inevitable since many surgical patients have underlying diseases, such as arthritis, cancer and diabetes mellitus, which limit physical activities to exhibit symptoms of existing cardiac disease. Although stress tests using imaging modalities can be recruited, BNP is a fair and easy alternative to get additive prognostic information. Recent meta-analyses of observational studies demonstrated that preoperative BNP elevation is associated with postoperative major adverse cardiovascular events (cardiac death, nonfatal myocardial infarction and arrhythmias with hemodynamic compromise).[1)2)] Current practice guidelines from the European Society of Cardiology recommend the preoperative BNP measurement for prognostication in high-risk patients (class of recommendation IIa, level of evidence B).[3)]

In this issue, Kim and Park et al.[4)] present their study about the utility of BNP to predict short-term postoperative cardiovascular events in patients without history of cardiovascular disease undergoing major non-cardiac surgery. According to their definition of cardiovascular events, eight (4.5%, no death occurred) of 163 patients experienced cardiovascular events in the perioperative period. Cardiovascular events were defined at low threshold, possibly because their study population had relatively low risk profiles. The preoperative BNP levels were significantly higher in patients who underwent cardiovascular events compared with those who did not (p=0.009). With the cut-off value of >64.5 pg/mL, preoperative BNP predicted the perioperative cardiovascular events with an area under the receiver operator characteristic curve of 0.76 (95% confidence interval 0.63-0.89, p=0.014). As BNP is a continuous variable and changes quantitatively in a wide range of diseases, the higher level implies greater disease burden. From a clinical point of view, BNP could be used for additional prognostic information in patients with intermediate risk such as advanced age, anticipating major surgery or chronic illness. It is not clear which ranges of preoperative BNP levels are selected for special attention to intensify cardiac tests and perioperative management. The effect of BNP-guided intervention before surgery also remains to be elucidated.

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In conclusion, the work by Kim et al.[4] reminds us that even in a low-risk population, higher BNP levels are associated with more postoperative cardiovascular events. Further research is needed to unite BNP into a comprehensive preoperative risk model which is applicable in various clinical situations.

REFERENCES

1) Karthikeyan G, Moncur RA, Levine O, et al. *Is a pre-operative brain natriuretic peptide or N-terminal pro-B-type natriuretic peptide measurement an independent predictor of adverse cardiovascular outcomes within 30 days of noncardiac surgery? A systematic review and meta-analysis of observational studies. J Am Coll Cardiol 2009;54:1599-606.*
2) Ryding AD, Kumar S, Worthington AM, Burgess D. *Prognostic value of brain natriuretic peptide in noncardiac surgery: a meta-analysis. Anesthesiology 2009;111:311-9.*
3) Hoeks SE, Poldermans D. *European Society of Cardiology 2009 guidelines for preoperative cardiac risk assessment and perioperative cardiac management in noncardiac surgery: key messages for clinical practice. Pol Arch Med Wewn 2010;120:294-9.*
4) Kim SE, Park DG, Lee JH, Han KR, Oh DJ. *Utility of B-type natriuretic peptide for predicting perioperative cardiovascular events in patients without history of cardiovascular disease undergoing major noncardiac surgery. Korean Circ J 2011;41:11-5.*