Limited Value of Resting Echocardiography to Predict Cardiac Risk in Patients Undergoing Noncardiac Surgery

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Although echocardiography is the most popular noninvasive test to assess cardiac risk before noncardiac surgery (NCS), the guideline\(^1\) recommends that resting echocardiography is useful in selected cases such as patients with dyspnea of unknown origin or those with congestive heart failure. In fact, there are distinct gaps in echocardiography use between real practice and the current guideline. A study by Park et al.\(^2\) tested whether resting echocardiography is useful to predict cardiac complications in patients undergoing NCS. They evaluated resting transthoracic echocardiography together with clinical risk factors and N-terminal pro-brain type natriuretic peptide (NT-proBNP) levels in 1,923 patients. Three echocardiographic parameters (left ventricular ejection fraction (LVEF), regional wall motion score index, and E/E') were inferior to NT-proBNP level and not better than clinical risk factors.\(^3\) Thus, the authors suggested that routine echocardiography is not helpful to predict major cardiac events.

Perioperative cardiac risk can be assessed by clinical risk indices, noninvasive cardiac tests, and invasive cardiac tests. Echocardiography provides information on LVEF, diastolic function, and regional wall motion abnormalities. However, the study by Halm et al.\(^4\) demonstrated that LVEF has low sensitivity (29%) to predict cardiac outcomes and could not predict congestive heart failure before NCS. Thus, resting LV-EF has been ascribed limited prognostic value. The current guideline\(^1\) does not recommend a routine evaluation of resting LV function. Echocardiographic studies related to NCS mainly include stress echocardiography. Stress echocardiography can detect ischemia, which is an important factor for postoperative cardiac events. Furthermore, stress echocardiography is superior to thallium imaging to predict postoperative cardiac events.\(^5\) Comparing resting echocardiography with NT-proBNP level to predict postoperative cardiac events in patients undergoing NCS is somewhat unfair, because elevated NT-proBNP level is related not only to ischemic burden but also to impaired cardiac function. As expected, NT-proBNP level is superior to LVEF or E/E' for predicting cardiac events. It has been known that LVEF is a weak indicator for congestive heart failure (CHF), because it does not represent diastolic heart failure, and reduced LVEF does not always provoke CHF. In contrast, E/E' is an accurate echocardiographic index for detecting CHF regardless of LVEF. Moreover, E/E' is more accurate than BNP level to diagnose CHF with reduced LVEF.\(^6\) However, in the study by Park et al.\(^2\) E/E' has weaker power for predicting CHF or overall cardiac events than that of NT-proBNP level. These results suggest that the comparative accuracy of E/E' and BNP differs according to CHF severity. Namely, E/E' is more accurate in sicker patients, whereas BNP level is more helpful in healthy patients. In the present issue.\(^2\) Almost 95% of patients have normal or mildly depressed LVEF, which is an important limitation when comparing BNP levels and echocardiography. More reliable results of the predictive value of the two modalities would warrant studies on selected patient groups. Furthermore, a comparison of stress echocardiography and BNP level would be more interesting.

The importance of the present study lies in that it is the first to compare predictive power between a biomarker and echocardiography in a large number of subjects. The message from
this study is that NT-proBNP level is more accurate than echocardiography to predict future major cardiac events in non-high risk patients undergoing NCS. Therefore, BNP level can be used for risk assessment before surgery without echocardiography in the near future. Although resting echocardiography has weak predictive power for cardiac risk during NCS, it has additional advantages. Many physicians order preoperative echocardiography for reasons other than predicting cardiac risk, for example, to assess valvular disease and to obtain information that can guide medication prescriptions (e.g., angiotensin-converting enzyme inhibitors) in patients with reduced LVEF.

In conclusion, the study by Park et al. demonstrates that preoperative echocardiography compared with clinical risk factors and NT-proBNP level has limited value for predicting major cardiovascular events.

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