



## Editorial

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# Application of a new modality for assessing left ventricular function: can strain replace ejection fraction?

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The evaluation of left ventricular (LV) systolic function is vital for guiding treatment strategies and predicting outcomes, especially for surgical treatments [1]. Traditionally, LV ejection fraction (LVEF) has been one of the most important markers for evaluating LV systolic function [2]. However, LVEF cannot discriminate between the different effects of load on myocardial contractility, resulting in falsely high LVEF in mitral regurgitation (MR) or falsely low LVEF in aortic stenosis and thus low accuracy for predicting treatment outcomes [3].

Recently, LV longitudinal strain (LVLS) was introduced as a new marker to evaluate LV systolic function and has been demonstrated to have postoperative prognostic value for various cardiac diseases [4-7]. LVLS has been found to be able to detect subtle ventricular dysfunction that LVEF cannot detect [8]. Several studies have reported that LVLS is independently associated with postoperative survival in valvular surgery, especially in corrective surgery for MR. Given the propensity for the LVEF to be overestimated in MR, impaired LV systolic function may be masked in patients with severe MR [9,10].

In this issue of the *Korean Journal of Anesthesiology*, Nam et al. [11] investigated the predictive value of apical four-chamber LVLS for postoperative survival in patients with various types of valvular heart disease. In this retrospective observational study of 1,773 patients, the authors demonstrated the long-term prognostic value of LVLS measured in the apical four-chamber view after heart valve surgery. During a median follow-up of 27 months, preoperative apical four-chamber LVLS was significantly associated with postoperative all-cause mortality, whereas LVEF was not. Moreover, LVLS showed a significant incremental prognostic value over LVEF and traditional prognostic factors (e.g., age, sex, Charlson comorbidity index, pulmonary hypertension, New York Heart Association [NYHA] classification, atrial fibrillation, and presence of valvular diseases) for predicting all-cause mortality. The authors showed that apical four-chamber LVLS might be a useful marker for predicting mortality after valvular surgery. This study provides an important rationale for incorporating longitudinal strain analyses into routine clinical practice.

This study shows a distinct view and has multiple advantages over previous studies. First, unlike the commonly used LVLS, measurements from one echocardiographic view (i.e., apical four-chamber view) were used. Measuring LVLS only in the apical four-chamber view without additional echocardiographic views (e.g., longitudinal two-chamber or three-chamber view) could thus have predictive value for postoperative outcomes with reasonable feasibility and reliability. Second, the relationship between LVLS and long-term mortality shown in this study was not limited to patients with MR. Patients with different valvular heart diseases and thus different pathophysiologies were analyzed together. Third, compared to previous studies [9,10,12], in this study, a relatively large number of patients who underwent valvular heart surgery were analyzed.

Although LVLS directly reflects myocardial shortening and is less dependent on loading conditions than LVEF [12], strain remains a load-dependent measure [13]. Despite some limitations, this study showed that apical four-chamber LVLS could be a useful alternative to conventional LV systolic function markers for predicting postoperative outcomes in patients undergoing heart valve surgery. An apical four-chamber LVLS can be easily implemented. In addition, it is useful when the imaging quality from the apical two- or three-chamber view is poor. Although LVEF remains a valuable marker of LV function, the addition of LVLS improves risk assessment.

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## Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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