Value of tissue doppler indices for prediction of early atrial fibrillation recurrence after cardioversion

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Background: Spectral tissue Doppler-derived E/e' ratio has been proposed as the best parameter in the prediction of atrial fibrillation (AF). Although relaxation and contraction are equivalent parts of a continuous cardiac cycle, where systolic and diastolic abnormalities have a variable contribution to the left ventricle (LV) failure. A new doppler index, E/(e'×s') ratio, combining an index of diastolic function (E/e') and marker of systolic LV function (s'), has been confirmed as a good predictor of new-onset AF, although value of E/(e'×s') ratio to predict AF recurrence was not evaluated.

Purpose: The aim of this study was to investigate whether E/(e'×s') may be better parameter than E/e' to predict AF recurrence after the electrical cardioversion (ECV) of persistent AF in patients with normal LV function.

Methods: The prospective study included 77 patients with persistent AF with preserved LV ejection fraction (>50%) and successfully performed ECV. Plasma level of NT-proBNP was measured for all the patients before the ECV. Transthoracic echocardiography was performed within the first 24 hours after successful ECV. Primary outcome was the early (at 1 month) recurrence of AF.

Results: At 1 month follow-up, 39 patients (50.6%) were in sinus rhythm. Binary logistic regression analysis showed that LV enddiastolic diameter >50 mm (HR 3.70, 95% CI 1.29–10.58, p=0.02), NT-proBNP >2000 ng/L (HR 3.28, 95% CI 1.01–10.71, p=0.04), E/e' (HR 1.74, 95% CI 1.27–2.39, p=0.001) and E/(e'×s') ratios (HR 8.17, 95% CI 1.57–42.4, p=0.01) were significant predictors of AF early recurrence after ECV. When we developed multivariate models using these potential confounding factors. To minimize the problem of collinearity E/e'and E/(e'×s') were included in 2 separate models. Multivariate analysis identified that E/(e'×s') ratio and E/e' ratio in combination with LV enddiastolic diameter >49.3 mm and NT-proBNP >2000 ng/L are able to predict early AF recurrence after ECV in 74% and 79% cases, respectively. E/(e'×s') ratio showed higher contribution in the model to predict AF recurrence compared to E/e' ratio (for E/(e'×s') ratio HR 18.94, 95% CI 2.39–149.66, p=0.005; for E/e' ratio HR 1.95, 95% CI 1.31–2.91, p=0.001). On ROC analysis, the diagnostic accuracy of E/(e'×s') and E/e' ratios were found to have the largest areas under the curve (E/(e'×s') ratio, AUC = 0.71, p=0.002 and E/e' ratio, AUC = 0.75, p<0.0001) with an optimal E/(e'×s') ratio cut-off value of 1.15 (sensitivity 97%, specificity 58%) and E/e' ratio value of 8.79 (sensitivity 89%, specificity 41%) for predicting early recurrence of AF after ECV.

Conclusions: Spectral tissue Doppler-derived ratios (E/(e'×s') and E/e') together with higher NTproBNP level and larger LV enddiastolic diameter predicted early AF recurrence after ECV. E/(e'×s') seems to be a more powerful predictor of AF early recurrence than E/e' ratio.