Left ventricular dimension predicts risk of electrical storm and mortality in patients with ischemic heart disease and implantable cardioverter defibrillator

Zhengqin Zhai  
Keping Chen  
Wei Xu  
Wei Hua  
Yangang Su  
Xin Liu  
Min Tang  
Shuang Zhao  
Zeyi Li  
Shu Zhang

Introduction: Patients with ischemic heart disease could benefit markedly from implantable cardioverter defibrillator (ICD) and electrical storm (ES) has been demonstrated to increase the risk of mortality. Left ventricular (LV) dimension may be associated with risk of electrical storm and may act as long-term mortality predictor in these patients.

Methods: We retrospectively studied the clinical and remote monitoring data of 295 ICD recipients with ischemic heart disease. Multivariate logistic regression was used to analyze the relationship between LV end-diastolic dimension (LVEDD) and ES. To evaluate diagnostic performance of LV dimension, we calculated areas under the curve (AUC) of LV dimension as predictor of ES. Kaplan-Meier analysis and Multivariate Cox regression were used to find out whether LV dilation could predict the increased mortality risk of patients in the long term.

Result: During a median follow-up of 50 (52-71) months, 14.8% of patients experienced ES and a total of 94 patients died of all causes. Increased LVEDD was the only independent predictor of ES, with relative ratio of 2.86, 95% confidence interval (CI) of 1.54-5.32 (P = 0.001). The receiver operating characteristic curve analysis (AUC 0.653, 95% CI 0.58-0.72, P < 0.001) showed a best diagnostic performance for LVEDD of 60 mm to predict the occurrence of ES (sensitivity 0.74, specificity 0.55). In the multivariate Cox regression model, ES (adjusted hazard ratio (aHR) 2.49, 95% CI 1.56-3.97, P < 0.001) and increased LVEDD (aHR 1.04, 95% CI 1.01-1.06, P = 0.002) were associated with high risk of all-cause mortality in patients. Additionally, LV dilation (LVEDD ≥ 60 mm) in the presence of ES substantially increased the risk of all-cause mortality and cardiovascular mortality compared with patients without ES and LVEDD < 60 mm (aHR 7.23, 95% CI 3.16-16.54, P < 0.001; aHR 16.00, 95% CI 3.54-72.30, P < 0.001). Of note, no positive or negative interactions existed between LV dilation and ES in increasing the mortality of patients with ICD and ischemic heart disease.

Conclusion: LV dilation (LVEDD ≥ 60 mm) performs well in predicting the occurrence of ES. Both LV dilation and ES act as independent predictors of increased risk of mortality in patients with ICD and ischemic heart disease and could significantly amplify the deleterious effects of each other as distinct disease entities.