The usefulness of cardiac magnetic resonance in prevention of sudden cardiac death after myocardial infarction

To the Editor,

I have read with a great interest the article entitled "No association between scar size and characteristics on T-wave alternans in postmyocardial infarction patients with relatively preserved ventricular function presented with non-sustained ventricular tachycardia" by Yalın et al. (1) that was recently published in Anatolian J Cardiol 2014;14: 442-7. The authors have evaluated the relationship between two non-invasive modalities to assess the risk of arrhythmic burden in patients with postmyocardial infarction. They have selected a relatively borderline group with preserved ejection fraction and non-sustained ventricular tachycardia on Holter recordings. In this patient population, we have limited knowledge in assessing the risk of sudden death or guiding the most accurate treatment for prevention. Furthermore, the majority of the trials in the era of prevention of sudden death is based on echocardiography-derived ejection fraction thresholds. Today, we know that cardiac magnetic resonance imaging (MRI) is the gold standard to evaluate myocardial function. Therefore, the article by Yalın et al. (1), emphasizes the need for conducting further studies in this borderline group by using cardiac MRI.

Cardiac MRI not only assesses myocardial function and anatomy but also identifies characterization of the tissue and demonstrates viability. Late gadolinium enhancement MRI visualizes the presence of the scar and quantifies the involvement. Proton relaxation times can identify tissue characterization and estimate extracellular volume. T1 and T2 mapping provides information about the edema within the myocardium and assesses the area at risk during acute myocardial infarction (2). Also, perfusion MRI implicates ongoing ischemia or infarction. Those properties may allow selection of the appropriate revascularization strategy and follow-up after treatment (3).

Previous studies demonstrated that incorporating MRI findings increased the success of selecting high-risk patients to prevent sudden death. Scar heterogeneity was found to be a predictor of the appropriate implantable cardioverter defibrillator therapy (4). Midwall fibrosis on late gadolinium enhancement MRI was the strongest independent predictor of sudden cardiac arrest in patients with nonischemic and ischemic cardiomyopathy (5). Scar transmurality, as well as post-infarct scar thickness and left ventricular wall thickness measured by MRI, successfully identified inducible sustained ventricular tachycardia (6). Studies have shown that MRI can detect the foci of the arrhythmic sources by depicting transmural scar and peri-infarct zone, which are landmarks for electrophysiological studies. With the use of novel technology, 3-dimensional electroanatomic mapping can be merged with cardiac MRI scar imaging, allowing ablation of the ventricular arrhythmic substrates.

Those findings suggest that cardiac MRI will be an indispensable tool in the near future to identify high-risk patients who can benefit from revascularization, defibrillator devices, or ablation of the lethal arrhythmias to prevent sudden death after myocardial infarction.

Esra Gücük İpek
Department of Cardiology, Johns Hopkins University; Maryland-*USA*

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Address for Correspondence: Dr. Esra Gücük İpek, Department of Cardiology, Johns Hopkins University Hospital Carnegie 592, Baltimore, Maryland-*USA*
E-mail: egucuki1@jhmi.edu
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Author`s Reply

To the Editor,

We would like to thank authors for her comments and interest in our study "No association between scar size and characteristics on T-wave alternans in postmyocardial infarction patients with relatively preserved ventricular function presented with non-sustained ventricular tachycardia", published in Anatolian J Cardiol 2014; 14: 442-447 (1). In our study, we used a relatively small post-MI patient group with nonsustained ventricular tachycardia and mild systolic dysfunction and compared two noninvasive arrhythmic risk methods that are accurate in this population (2, 3). We found no relationship between scar parameters and presence of T wave alternans. A study by Kraaier et al. (4), published at a similar time as our study, investigated the relationship between T-Wave alternans (TWA) and scar, assessed with CMR, in patients with depressed left ventricular functions. In this small study, neither in patients with ICM or DCM a relation was found between the occurrence of TWA and the presence, transmurality, or extent of myocardial scar. Their study shows that, our results may be conclusive in patients with depressed LV functions.

Current guidelines recommend insertion of ICDs for patients with reduced left ventricular ejection fraction (LVEF), but the majority of sudden deaths occurs in patients with only moderately reduced or preserved LVEF (5). Identification of patients who are at high risk of dying suddenly is an unresolved clinical challenge.

LVEF, as a classical risk factor, is an indirect measurement of scar size. Many factors may affect LVEF, in addition to scar size, such as preload, afterload, autonomic factors medications, and post-infarction remodeling (6). For this reason, measurement of the scar size by CMR may give additional prognostic information beyond LVEF. Klem et al. (7) tested whether an assessment of myocardial scarring by cardiac MRI would improve risk stratification in patients evaluated for ICD implantation. In patients with LVEF >30%, significant scarring (>5% LV) identifies a high-risk cohort with similar risk as in those with LVEF ≤30%. Conversely, in patients with LVEF ≤30%, minimal or no scarring identifies a low-risk cohort similar to those with LVEF >30% (7). We therefore found that a larger peri-infarction zone, seen by CMR, is associated with ventricular tachycardia inducibility in post-MI patients with preserved LVEF. In our study, LVEF was similar among patients with and without VT inducibility (8).

Risk assessment of sudden death in patients with relatively preserved LVEF is still an unsolved issue. Based on the hypothesis, also supported by our study (8), Kadish et al. (9) designed the Defibrillators to Reduce Risk by Magnetic Resonance Imaging Evaluation (DETERMINE) Trial. The goal of this study was to test the hypothesis that patients with an infarct size of >10%, randomized to ICD and medical therapy, will have improved survival as compared to those randomized to medical therapy alone. CMR would have been performed in patients with CAD and LVEF of >35% and less than 50% (or patients with an LVEF of 30%-35% and New York Heart Association class I heart failure without a history of ventricular arrhythmias). Death from any cause was selected as the endpoint for the trial. Unfortunately, to reach the target randomization, approximately 10,000 patients would never have been screened with CMR. Due to slow enrollment, this study recently halted. We believe that randomized trials with follow-up with CMR will identify patients who need an ICD after myocardial infarction better than standard techniques in the near future.

Kıvanç Yalın, Ebru Gölcük[1]
Clinic of Cardiology, Bursa State Hospital; Bursa-*Turkey*
[1]Department of Cardiology, Faculty of Medicine, Koç University; Istanbul-*Turkey*

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Address for Correspondence: Dr. Kıvanç Yalın,
Bursa Devlet Hastanesi, Kardiyoloji Kliniği, Bursa-*Türkiye*
Phone: +90 532 495 61 97
E-mail: yalinkivanc@gmail.com
Available Online Date: 25.12.2014

P-wave dispersion and left ventricular diastolic dysfunction in hypertension

To the Editor,

We read the manuscript written entitled "Association of P wave dispersion and left ventricular diastolic dysfunction in non-dipper and dipper hypertensive patients." by Tosu et al. (1) that was published in April issue of The Anatolian Journal of Cardiology 2014; 14: 251-5, "Association of P-wave dispersion and left ventricular diastolic dysfunction in non-dipper and dipper hypertensive patients," with great interest. They evaluated patients for left ventricular (LV) diastolic dysfunction and association with P-wave dispersion in dipper and non-dipper hypertensive patients. They found that P-wave dispersion is associated with left ventricular dysfunction in non-dipper and dipper hypertension.

This is an interesting study, but we have some additional contributions. First, in this study, parameters, including E/A rates, deceleration time (DT), and isovolumetric relaxation time (IVRT), were used to evaluate diastolic dysfunction. In addition, in the correlation analysis, the authors mentioned that P-wave dispersion is correlated with left ventricular mass index (LVMi), IVRT, left atrial diameter (LAd), E/A, and interventricular septum (IVS), and these correlations are presented as evidence for left ventricular diastolic dysfunction. However, these parameters are not sufficient for the evaluation of diastolic dysfunction according to current guidelines. Tissue Doppler imaging (TDI) methods, such as e', a', and E/e', should be used for the optimal assessment of left ventricular diastolic dysfunction (2). e' is commonly used to refer to arterial elastance. The mitral inflow E velocity to tissue Doppler e', E/e' latter ratio plays an important role in the estimation of LV filling pressures. In patients with cardiac disease, e' velocity can be used to correct for the effect of LV relaxation on mitral E velocity, and the E/e' ratio can be applied for the prediction of LV filling pressures (3). Additionally, using the septal E/e' ratio, a ratio <8 is usually associated with normal LV filling pressures, whereas a ratio >15 is associated with increased