

Electrophysiologic testing guided risk stratification approach for sudden cardiac death beyond the left ventricular ejection fraction

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Abstract

Sudden cardiac death threatens ischaemic and dilated

cardiomyopathy patients. Anti-arrhythmic protection may be provided to these patients with implanted cardiac defibrillators (ICD), after an efficient risk stratification approach. The proposed risk stratifier of an impaired left ventricular ejection fraction has limited sensitivity meaning that a significant number of victims will remain undetectable by this risk stratification approach because they have a preserved left ventricular systolic function. Current risk stratification strategies focus on combinations of non-invasive methods like T wave alternans, late potentials, heart rate turbulence, deceleration capacity and others, with invasive methods like the electrophysiologic study. In the presence of an electrically impaired substrate with formed post-myocardial infarction fibrotic zones, programmed ventricular stimulation provides important prognostic information for the selection of the patients expected to benefit from an ICD implantation, while due to its high negative predictive value, patients at low risk level may also be detected. Clustering evidence from different research groups and electrophysiologic labs support an electrophysiologic testing guided risk stratification approach for sudden cardiac death.

Key words: Electrophysiologic study; Risk stratification; Sudden cardiac death; Myocardial infarction; Preserved ejection fraction

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Core tip: There is a growing need for more effective risk stratification approach in order to detect those post-myocardial infarction and dilated cardiomyopathy patients at high risk for sudden cardiac death (SCD) at early or even asymptomatic stage of heart failure with relatively well preserved left ventricular ejection fraction (LVEF). Although in an individual basis the SCD risk is lower among the patient population compared to the one observed among those with a severely impaired

LVEF, epidemiologically there is a large such patient pool at risk in the community. Based on preliminary evidence these patients could be effectively and timely identified by applying a combined electrophysiologic guided approach using non-invasive electrocardiogram-related markers of risk leading to programmed ventricular stimulation testing. Using this approach, we could select those with inducible ventricular tachyarrhythmias as suitable candidates for implantable defibrillator therapy.

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TO THE EDITOR

Hilfiker *et al*^[1] report on their experience with the electrophysiologic (EP) studies as risk stratifier for sudden cardiac death (SCD) surrogates among a cohort of patients with mostly organic heart disease and different levels of left ventricular ejection fraction (LVEF). They found that both the EP results as well as a reduced LVEF were significant predictors among those patients with a LVEF $\leq 35\%$ while the ventricular stimulation results were much more promising among those with LVEF $> 35\%$. The latter is confirmed in our own database of post myocardial infarction (post-MI) and dilated cardiomyopathy patients who were risk stratified with EP studies for the primary prevention of SCD when presenting with a worrisome risk profile of either non sustained ventricular tachycardia or/and pre and syncope episodes despite a well maintained LVEF $> 35\%$ -40%^[2-4]. This is based on a risk stratification approach aiming to define the high risk profile patient with organic heart disease beyond the reduced LVEF. Indeed there is preliminary evidence that such a mixed non-invasive^[5] and invasive EP guided^[4] approach may identify in a much more cost effective way not only those high risk patients with impaired LVEF but also those high risk patients with well maintained LVEF who may benefit from the prophylactic implanted cardiac defibrillators implantation timely. Such a patient population with relatively well preserved LVEF were the majority of SCD victims both in the Maastricht^[6] as well as in the Oregon^[7] out of hospital cardiac arrest registries. In this context we currently recruit post-MI patients at high risk for SCD despite the well maintained LVEF based on a combined non invasive and invasive EP guided approach in the ongoing prospective

observational PRESERVE-EF study^[8]. Is it time for a more rational EP guided risk stratification approach considering the limitations of the LVEF as a risk stratifier for SCD^[9,10]?

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