Arrhythmic risk stratification in heart failure mid-range ejection fraction patients with a non-invasive guiding to programmed ventricular stimulation two-step approach

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Background: Although some post myocardial infarction (post-MI) and dilated cardiomyopathy (DCM) patients with mid-range ejection fraction heart failure (HFmrEF = 40–49%) face an increased risk for arrhythmic Sudden Cardiac Death (SCD), current guidelines do not recommend an implantable cardioverter-defibrillator (ICD).

Purpose: To assess the accuracy of a novel multifactorial two-step approach, with noninvasive risk factors (NIRFs) leading to programmed ventricular stimulation (PVS), for SCD risk stratification of hospitalized HFmrEF patients.

Methods: Forty-eight patients (male=83%, age = 64±14 years, LVEF = 45±5%, ischemic coronary disease = 69%) underwent a NIRF presence screening first step with ECG, SAECG, echocardiography and 24 hour ambulatory ECG (Holter). Thirty-two patients with presence of one out of three NIRFs (SAECG $\geq$2 positive criteria for late potentials, ventricular premature beats $\geq$240/24 hours, and $\geq$1 episode of non-sustained ventricular tachycardia on Holter) were further stratified with PVS. Patients were classified as either low (Group 1, n=16, NIRFs–), moderate (Group 2, n=18, NIRFs+ /PVS–) or high risk (Group 3, n=14, NIRFs+/PVS+). All Group 3 patients received an ICD.

Results: After 41±18 months, 9 out of 48 patients experienced the major arrhythmic event (MAE) endpoint (clinical ventricular tachycardia/fibrillation = 3, appropriate ICD activation = 6). The endpoint occurred more frequently in Group 3 (7/14, 50%) than in Groups 1 & 2 (2/34, 5.8%). A logistic regression model adjusted for PVS, age and LVEF revealed that PVS was an independent MAE predictor (OR: 21.152, 95% CI: 2.618–170.887, p=0.004). Kaplan Meier curves diverged significantly (p logrank $<$0.001) while PVS negative predictive value was 94%.

Conclusion: In hospitalized HFmrEF post-MI and DCM patients, a NIRFs leading to PVS two-step approach efficiently detected the subgroup at increased risk for MAEs.