Heart rate and duration of non-sustained ventricular tachycardia improve risk assessment of sudden death in hypertrophic cardiomyopathy

Authors:
C Adduci¹, F Palano¹, B Musumeci¹, C De Lucia¹, D Russo¹, L Limite¹, M Volpe¹, C Autore¹, P Francia¹,
¹Sapienza University of Rome - Rome - Italy,

Topic(s):
Hypertrophic Cardiomyopathy

Citation:

Background. In patients with hypertrophic cardiomyopathy (HCM), the European Society of Cardiology (ESC) endorses a stratification model to predict the 5-year risk of sudden death (SD). Non-sustained ventricular tachycardia (NSVT) is included in the ESC score as a dichotomous variable.

Purpose. In a cohort of consecutive HCM patients implanted with an ICD we aimed to assess whether including NSVT heart rate (HR) and duration in the model may further improve the ESC score performance.

Methods. All HCM patients >16 years old implanted with a primary prevention ICD were followed and assessed for NSVT occurrence during Holter ECG or as a stored event in ICD registry. The fastest and longest NSVT in each patient were analysed.

Results. 94 patients (61 males; mean age: 46±15y) implanted with a trans-venous or a subcutaneous ICD were analysed. According to ESC score, 45 (48%) patients would have been classified at high, 29 (31%) at intermediate and 20 (21%) at low risk of SD at ICD implantation. After a mean follow-up of 74±47 months, 20 patients received 42 appropriate ICD therapies for VF or VT >200 bpm: 12 out of 45 patients (27%) in the high, 5 out of 29 patients (17%) in the intermediate, and 3 out of 20 (15%) in the low risk groups, respectively. Maximum HR and duration in beats of NSVT were strong and independent predictors of first appropriate ICD therapy (HR: 1.03; 95%CI:1.02–1.05; p <0.0001 and HR: 1.03; 95%CI:1.01–1.06; p= 0.017, respectively). In ROC analysis, NSVT =200 bpm and =17beats had the best combined sensitivity (73%) and specificity (85 and 64%, respectively) for appropriate ICD intervention (AUC= 0.76, p=0.03-AUC= 0.72, p=0.01, respectively). NSVT <140 bpm and <8 beatshad very high sensitivity (87 and 93% respectively) and negative predictive value (90 and 91%, respectively). In Cox regression analysis, NSVT =200 bpm or =17beats were strong predictors of appropriate ICD therapy (HR 17.0; 95%CI:4.4–65;p< 0.0001 and HR: 7.1; 95%CI:1.8–28; p= 0.005, respectively).The ESC score was re-calculated with NSVT as a risk factor only when =140 bpm or =8 beats and considering patients with NSVT =200 bpm or =17 beats at high risk independently from other risk factors. After reclassification, patients with events in the low risk group dropped from 15% to 5% and increased from 44 to 47% in the intermediate-high risk group. Indeed, 2 patients inappropriately though to be low risk were correctly reclassified as intermediate or high risk, whereas 4 patients initially thought to be at intermediate or high risk were correctly reclassified as low.

Conclusions. In a cohort of high-risk HCM patients, rate and length of NSVT were strong and independent predictors of appropriate ICD therapies, suggesting that NSVT in HCM patients should not be considered in a binary manner. Further studies in unselected HCM patients could assess whether incorporating NSVT as a continuous variable in validated models improves risk prediction.