The V1-V3 transition index as a novel electrocardiographic criterion for differentiating left from right ventricular outflow tract ventricular arrhythmias

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Introduction: The aim of this study was to develop a new electrocardiographic criterion for differentiating the origin of outflow tract ventricular arrhythmias (OT-VAs) with precordial transition in lead V3.

Methods: A total of 147 consecutive patients with OT-VAs displaying precordial transition in lead V3 who underwent successful catheter ablation in the RVOT (n=118) or LVOT (n=29) were included in this study. The V1-V3 transition index was defined as the sum of S-wave amplitude in lead V1 and V2 during premature ventricular contractions (PVCs) divided by the S-wave amplitude during sinus rhythm (SR), respectively, minus the sum of R-wave amplitude in lead V1, V2 and V3 during PVCs divided by the R-wave amplitude during SR, respectively, i.e., \[
[(S_{V1}/S_{SR}) \times V1 + (S_{V2}/S_{SR}) \times V2] - [(R_{V1}/R_{SR}) \times V1 + (R_{V2}/R_{SR}) \times V2 + (R_{V3}/R_{SR}) \times V3].
\]

Result: The V1-V3 transition index was significantly higher for RVOT origins than LVOT origins (1.25 ± 2.48 vs -3.94 ± 3.11; P< 0.001). Receiver operating characteristic (ROC) analysis revealed an area under the curve (AUC) of 0.931 for the V1-V3 transition index, and a cut-off value of > -1.60 predicted a RVOT origin with a 93% sensitivity and 86% specificity. With respect to AUC and accuracy, the V1-V3 transition index was superior to any previously proposed ECG indices for differentiating left from right OT-VAs. In 37 prospective cases, the new index was able to predict the site of a RVOT origin with 95% accuracy (35 of 37 cases).

Conclusion: The V1-V3 transition index is a useful novel ECG criterion for distinguishing left from right OT-VAs with precordial transition in lead V3.