Novel Transitional Zone Index Allows More Accurate Differentiation between Idiopathic Right Ventricular Outflow Tract and Aortic Sinus Cusp Ventricular Arrhythmias

Naoki Yoshida, Yasuya Inden, Tomohiro Uchikawa, Hiromi Kamiya, Kazuhisa Kitamura, Masayuki Shimano, Yukiomi Tsuji, Makoto Hirai, Toyoaki Murohara
Department of Cardiology, Nagoya University Graduate School of Medicine, Japan

Background: Although several ECG algorithms have been proposed for differentiating the origins of outflow tract ventricular arrhythmia (OT-VA), their accuracy is still limited in cases with cardiac rotation.

Objective: The purpose of this study was to assess whether a novel “cardiac rotation-corrected” transitional zone (TZ) index would be a useful marker for differentiating right ventricular outflow tract (RVOT) origin from aortic sinus cusp (ASC) origin.

Methods: Surface ECGs of OT-VAs with left bundle branch block morphology and inferior axis in 112 patients who were successfully ablated in the RVOT (n = 87) or the ASC (n = 25) were analyzed. According to the site of R-wave transition, TZ score was graded with 0.5-point increments (e.g. V2 = 2-point, V3- V4 = 3.5-point, V5 = 5-point) and TZ index was defined as follows: TZ score of OT-VA minus TZ score of sinus beat.

Results: The TZ index was significantly lower in the ASC origin than in the RVOT origin (-1.2 ± 0.9 vs. 0.3 ± 0.7, p < 0.0001). A cutoff value of the TZ index < 0 predicted the ASC origin with 88% sensitivity and 82% specificity. The previously reported R-wave duration index ≥ 50% had a high specificity of 85%, but a low sensitivity of 44%, and R/S-wave amplitude index ≥ 30% had 68% sensitivity and 79% specificity. The area under the curve by receiver operating characteristic curve analysis was 0.90 for the TZ index, which was significantly higher than the R-wave duration index and R/S-wave amplitude index of 0.74 and 0.76, respectively.

Conclusion: This novel TZ index can be a more useful marker for differentiating RVOT origin from ASC origin.

Keyword: RVOT