THE VALUE OF PROGRAMMED VENTRICULAR EXTRASTIMULI FROM THE RIGHT VENTRICULAR BASAL SEPTUM DURING SUPRAVENTRICULAR TACHYCARDIA

Satoshi Higuchi MD; Hiroyuki Ito MD; Edward P. Gerstenfeld MD, FHRS; Adam C. Lee MBBS, CEPS-A, CCDS; Byron K. Lee MD; Gregory M. Marcus MD, FHRS; Henry H. Hsia MD, FHRS; Joshua D. Moss MD, FHRS; Randall J. Lee MD, PhD; Thomas A. Dewland MD, FHRS; Vasanth Venanthan MD, PhD; Zian H. Tseng MD, MS; Akash R. Patel MD, FHRS, CEPS-P; Ronn E. Tanel MD, FHRS, CEPS-P; Nitish Badhwar MBBS, FHRS; Cara N. Pellegrini MD, FHRS; Mitsuharu Kawamura MD; Morio Shoda MD, PhD; Chun Hwang MD, FHRS; Manwan M. Refaat MD, FHRS and Melvin M. Scheinman MD, FHRS

Background: The difference between a right ventricular (RV) apical stimulus-atrial electrogram (SA) during reset of supraventricular tachycardia (SVT) vs. the ventriculoatrial interval during SVT (ΔSA-VA) is an established technique for discerning SVT mechanisms but is limited by significant diagnostic overlap.

Objective: We hypothesized that ΔSA-VA intervals from the RV basal septum (ΔSA-VA_{base}) would be shorter than from the RV apex for atrioventricular reciprocating tachycardia (AVRT) and would show the opposite effects to that of atrioventricular nodal re-entrant tachycardia (AVNRT) (Figure 1). Moreover, it was predicted that RV basal pacing might be useful for distinguishing sepal from free wall accessory pathways (APs).

Methods: In this multicenter prospective study, all AVNRT and AVRT patients underwent programmed ventricular extrastimuli (V2) delivered from both the RV basal septum and RV apex. Both the ΔSA-VA_{base} and ΔSA-VA_{apex} were calculated when V2 clearly reset the tachycardia.

Results: The V2 technique was successfully performed from both sites in 105 AVNRT (age 48 ± 20, 44% male) and 130 AVRT (age 26 ± 18, 54% male) patients. The ΔSA-VA_{base} was shorter than the ΔSA-VA_{apex} during AVRT (44 ± 29 vs. 58 ± 29ms, p < 0.001), and the opposite occurred during AVNRT (133 ± 31 vs. 125 ± 25ms, p = 0.03). A ΔSA-VA_{base} of ≥ 85ms had a sensitivity of 97% and specificity of 98% for identifying AVNRT (area under the receiver operating characteristic curve: 0.988, 95% confidential interval 0.974-1.000). Furthermore, a ΔSA-VA_{base} of 45-85ms allowed identifying AVRT with left free wall APs (sensitivity 88%/specificity 95%), 20-45ms for posterior septal APs (sensitivity 83%/specificity 96%), and < 20ms for right free wall or anterior/mid septal APs (sensitivity 86%/specificity 99%) (Figure 2).

Conclusion: The ΔSA-VA_{base} during V2 produced a more robust differentiation between AVNRT and AVRT compared with the ΔSA-VA_{apex}. The ΔSA-VA_{base} of ≥ 85ms proved to be excellent for the differentiation of all AVNRT from AVRT regardless of the AP location. Furthermore, this straightforward technique allowed localizing four general AP locations with a high sensitivity and specificity.