

Maruyama2007

## The VA Relationship After Differential Atrial Overdrive Pacing: A Novel Tool for the Diagnosis of Atrial Tachycardia in the Electrophysiologic Laboratory

#literature



**Zotero** = [Maruyama et al. 2007\\_The VA Relationship After Differential Atrial Overdrive Pacing.pdf](#) **Citation Key** = [Maruyama.et.al..\(2007\)](#)



Maruyama, M., Kobayashi, Y., Miyauchi, Y., Ino, T., Atarashi, H., Katoh, T., & Mizuno, K. (2007). The VA Relationship After Differential Atrial Overdrive Pacing: A Novel Tool for the Diagnosis of Atrial Tachycardia in the Electrophysiologic Laboratory. *Journal of Cardiovascular Electrophysiology*, 18(11), 1127–1133. <https://doi.org/10.1111/j.1540-8167.2007.00928.x>

### Abstract

**Introduction:** Despite recent advances in clinical electrophysiology, diagnosis of atrial tachycardia (AT) originating near Koch's triangle remains challenging. We sought a novel technique for rapid and accurate diagnosis of AT in the electrophysiologic laboratory. **Methods:** Sixty-two supraventricular tachycardias including 18 ATs (10 ATs arising from near Koch's triangle), 32 atrioventricular nodal reentrant tachycardias (AVNRTs), and 12 orthodromic reciprocating tachycardias (ORTs) were studied. Overdrive pacing during the tachycardia from different atrial sites was performed, and the maximal difference in the postpacing VA intervals (last captured ventricular electrogram to the earliest atrial electrogram of the initial beat after pacing) among the different pacing sites was calculated (delta-VA interval). **Results:** The delta-VA intervals were >14 ms in all AT patients and <14 ms in all AVNRT/ORT patients, and thus, the delta-VA interval was diagnostic for AT with the sensitivity, specificity, and positive and negative predictive values all being 100%. When the diagnostic value of the delta-VA interval and conventional maneuvers were compared for differentiating AT from atypical AVNRT, both a delta-VA interval >14 ms and “atrial-atrial-ventricular” response after overdrive ventricular pacing during the tachycardia were diagnostic. However, the “atrial-atrial-ventricular” response criterion was available in only 52% of

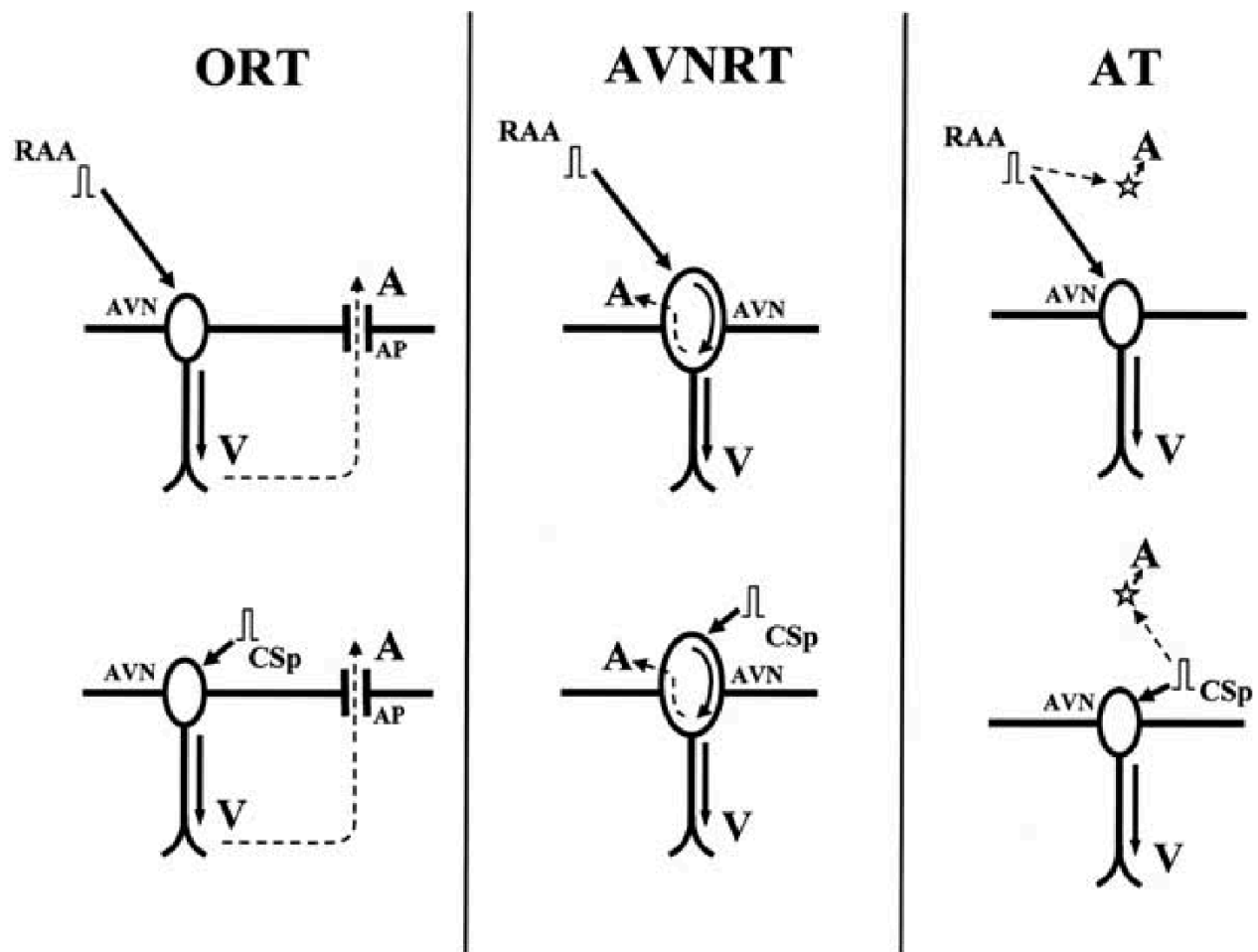
the patients because of poor ventriculoatrial conduction. Conclusions: The delta-VA interval was useful for diagnosing AT irrespective of patient conditions such as ventriculoatrial conduction.

## Annotations

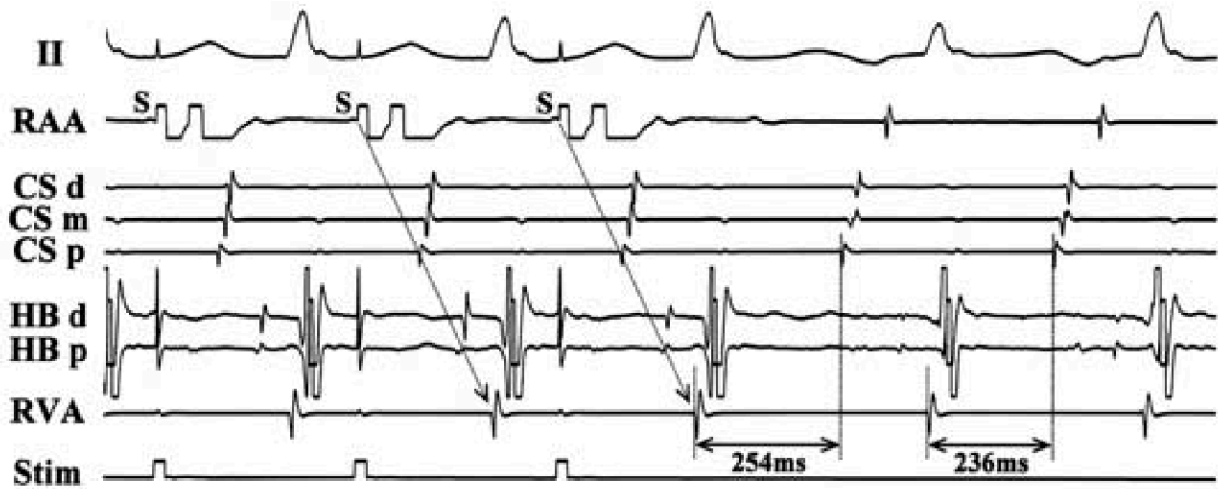
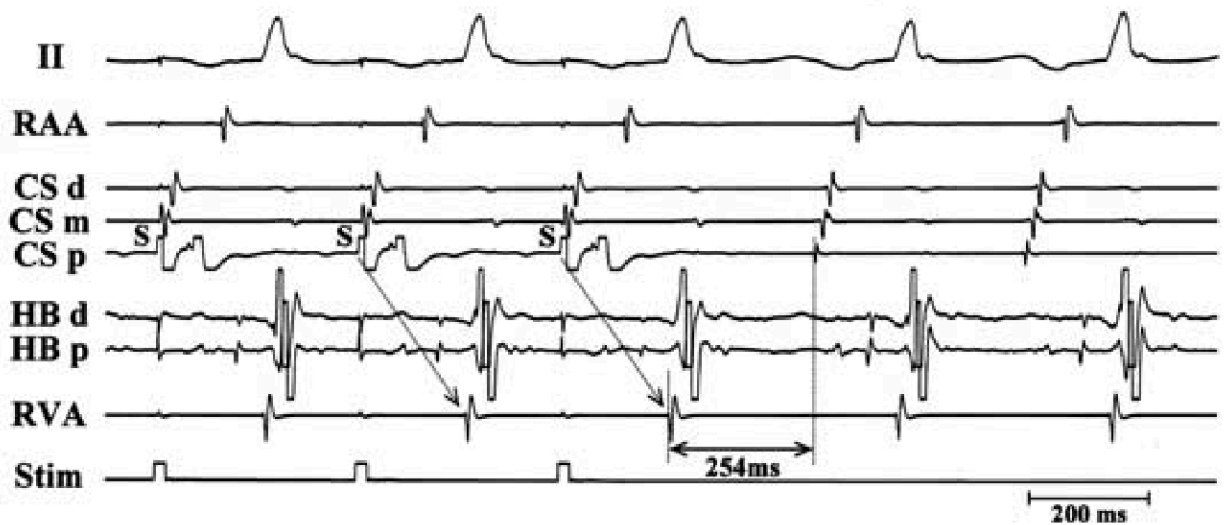
IMPORTED: 2025-01-02 5:19 PM

When retrograde VA conduction is weak, one clue for differentiating AT from AVNRT is to examine whether the atrial activation is linked to the ventricular activation. This is referred to as "VA linking."<sup>7,11</sup> A fixed VA interval of the first beat after the entrainment with atrial overdrive pacing was shown to imply the presence of VA linking, which is regarded as a finding against AT. However, a fixed VA interval does not always exclude AT because apparent VA linking may occur because of coincidental events

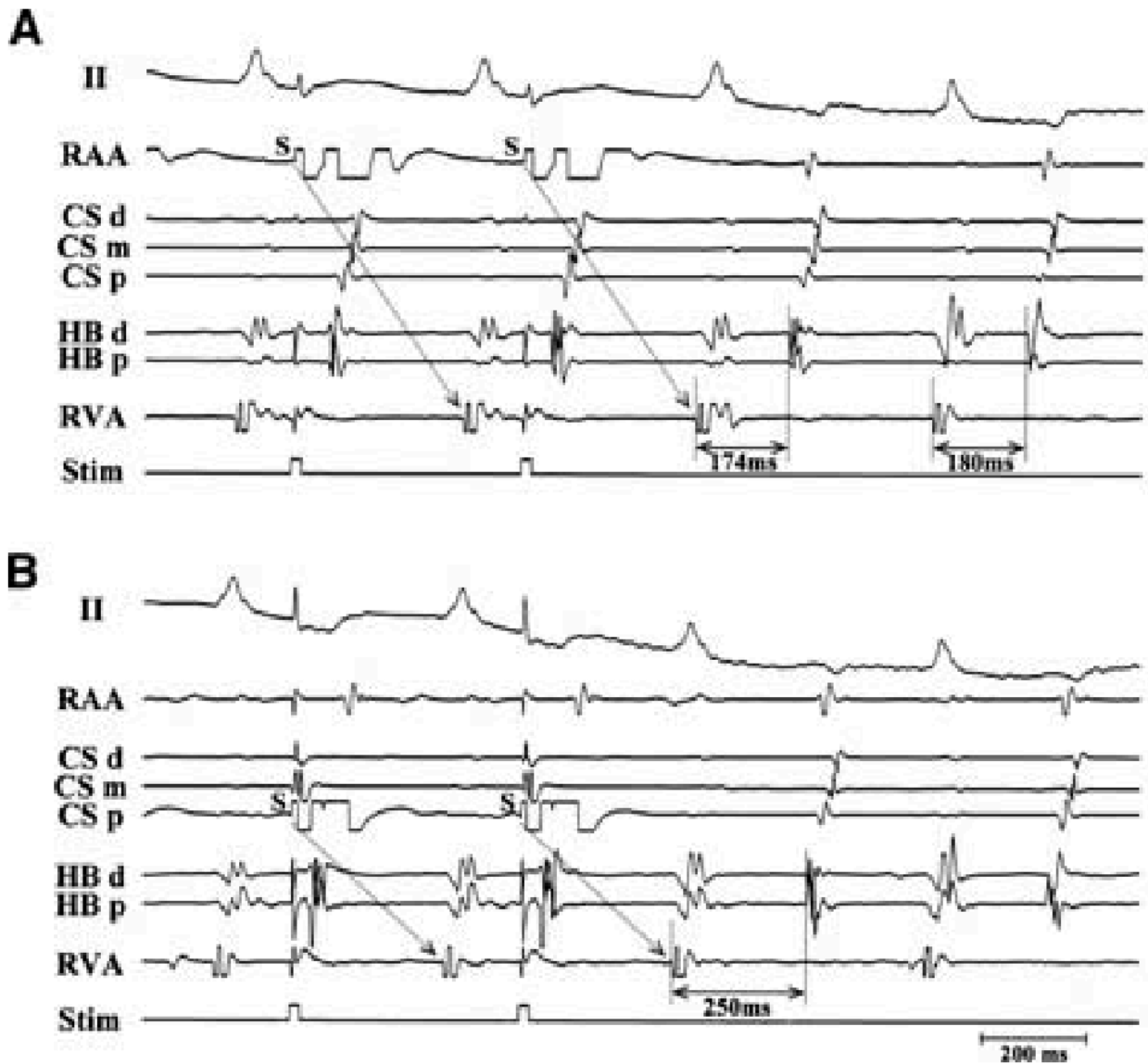
During the tachycardia, atrial overdrive pacing at a cycle length 10 to 40 ms shorter than the tachycardia cycle length was performed from different atrial sites (RAA and proximal CS) at the same pacing cycle length until the ventricle was constantly captured. If the tachycardia was terminated with the atrial overdrive pacing, we re-induced the tachycardia and the atrial overdrive pacing was repeated. We measured the postpacing VA intervals obtained from each atrial pacing site, which was defined as the interval from the last captured RVA electrogram to the earliest atrial electrogram of the initial beat after pacing. The delta-VA interval was defined as the difference in the postpacing VA intervals between the different pacing sites.



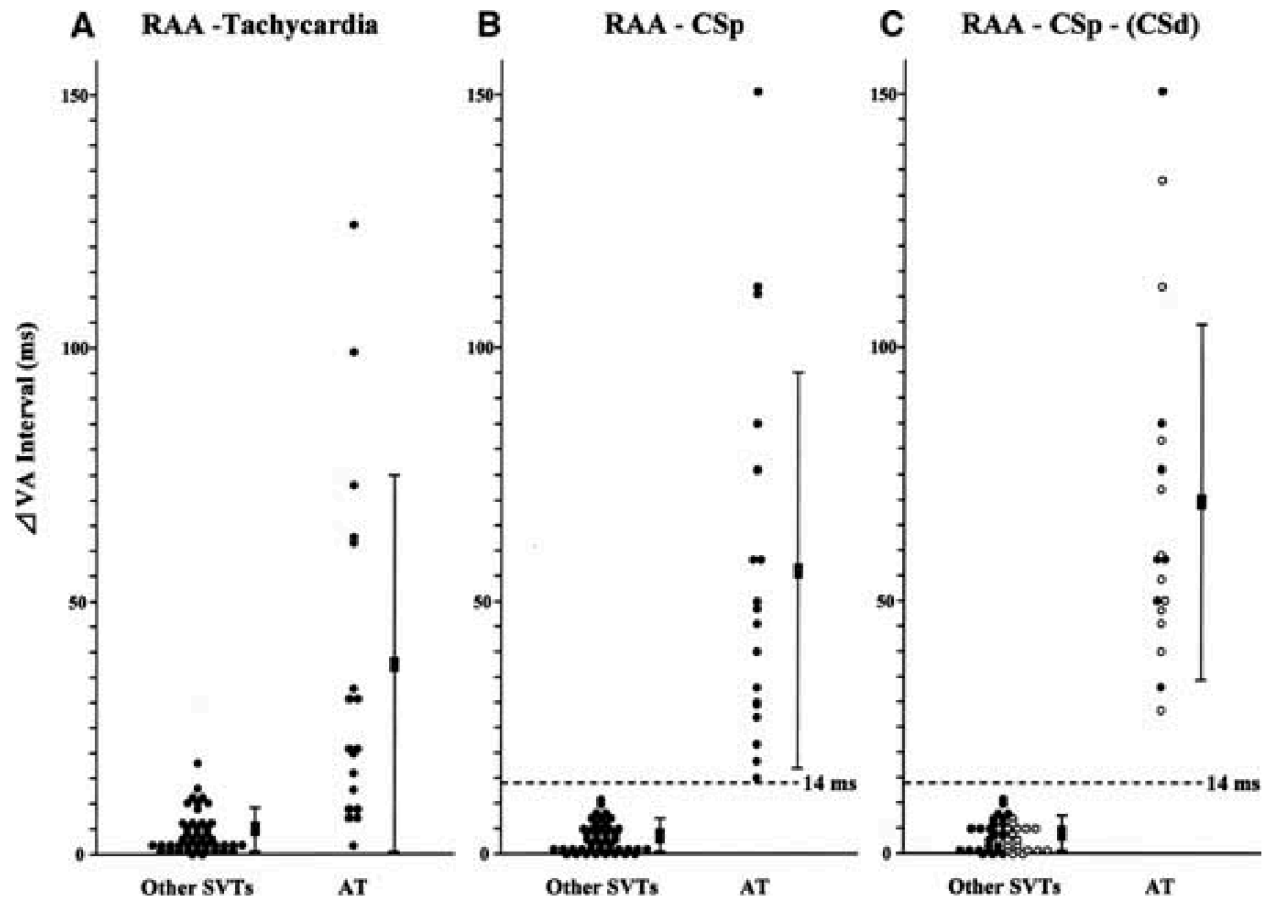
*Schematic representation of the differential atrial overdrive pacing method. The right atrial appendage (RAA) is farther from the atrioventricular (AV) node than the proximal coronary sinus (CSp), thus, overdrive pacing during tachycardia from the RAA usually causes a longer AV conduction time than the CSp pacing. When atrial overdrive pacing is discontinued, the interval from the last captured ventricular beat to the subsequent atrial beat (postpacing VA interval) would not change irrespective of the pacing sites in patients with orthodromic reciprocating tachycardia (ORT) and AV nodal reentry (AVNRT), because the atrial activation links the preceding ventricular activation. In contrast, the atrial activation is independent of the preceding ventricular activation in patients with atrial tachycardia (AT). AVN = atrioventricular node; AP = accessory pathway.*

**A****B**

*Example of the differential atrial overdrive pacing in a patient with atypical AVNRT. The postpacing VA intervals after the RAA (A) and CS p (B) pacing were identical (i.e., delta-VA interval = 0 ms), indicating the presence of VA linking. Note that the postpacing VA interval was 18 ms (>10 ms) longer than the VA interval during the tachycardia, which might incorrectly determine the presence of VA linking in the conventional method. The longer postpacing VA interval was probably due to the decremental conduction property in the retrograde slow pathway. HB = His bundle electrogram; RVA = right ventricular apex; Stim = stimulation marker; S = pacing stimulus*



*Example of differential atrial overdrive pacing in a patient with AT. The diagnosis of this tachycardia was adenosine-sensitive reentrant AT, which was successfully eliminated by radiofrequency delivery near the His bundle region. The difference in the postpacing VA interval between the RAA (A) and CSp (B) pacing was large (delta-VA interval = 76 ms), indicating the absence of VA linking. Note that the postpacing interval after the RAA pacing was similar to the VA interval during the tachycardia (pseudo-VA linking in the conventional method).*



Scatterplot showing the mean value  $\pm$  SD of the differences in the VA intervals of the return cycle and tachycardia (A), postpacing VA intervals after RAA pacing and CSp pacing (B), and maximal difference in the postpacing VA intervals among two (RAA and CSp, closed circle) or three pacing sites (RAA, CSp, and CSd, open circle) (C) for patients with either AT or other supraventricular tachycardias (SVTs)

## Notes

Provides an alternative way to diagnose atrial tachycardia when there is poor retrograde AV conduction and accounts for decremental properties of the retrograde limb of the tachycardia (e.g. VA linking)