LETTER TO THE EDITOR

Differentiation of Narrow Complex Tachycardia - Letter to the Editor

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Dear Editor:

We read with interest the recent case report of Winner at al (1). They reported on a 43-year-old man with ventricular pre-excitation consistent with a left free wall accessory pathway (AP) and recurrent supraventricular tachycardia (SVT). During the electrophysiological study, SVT was induced, but the mechanism was not immediately apparent as it was not initially possible to cannulate the coronary sinus to demonstrate that the earliest atrial activation was along the mitral valve annulus as would be expected if the patient's left free wall AP was participating in the most common type of SVT observed in patients with APs, namely, orthodromic reciprocating tachycardia (ORT). Ventricular overdrive pacing from the right ventricular apex was not felt to be diagnostic of the SVT mechanism. The patient then developed functional LBBB that was associated with prolongation of the ventriculoatrial (VA) time, a finding that confirms the involvement of a left-sided accessory pathway in ORT.

We have the following observations and comments about this case report:

1. We disagree with the characterization of this tachycardia as a "long-RP" SVT. In a long-RP interval SVT, the interval between the onset of the QRS complex and the P-wave exceeds half of the R-R interval (2). The VA interval (which approximates the interval from the QRS complex to the P-wave) in Figure 3 is only 80 ms, which would be consistent with a short-RP interval SVT, especially if the tachycardia cycle length is 270 ms as shown in their figure 2.

2. We raise three issues with respect to the differential diagnosis listed in the discussion. Firstly, the differential diagnosis of a long-RP interval SVT is provided, while, as discussed above, the SVT in question was, in fact, a short-RP interval SVT. Accordingly, the differential diagnosis of a short-RP interval SVT, which includes atrioventricular node reentry tachycardia (AVNRT), atrial tachycardia (AT), and ORT, should have been provided. Secondly, it should

be mentioned that ORT employing the patient's known left free wall AP is the most likely mechanism on that differential diagnosis. Thirdly, it is redundant to list both ORT and persistent junctional reciprocating tachycardia (PJRT) in the differential diagnosis of a long-RP interval SVT. Persistent junctional reciprocating tachycardia (usually called permanent junctional reciprocating tachycardia) refers to ORT employing a slowly conducting (usually concealed) AP, so it is just a special form of ORT.

3. The discussion mentions that a difference between the post pacing interval (PPI) and the tachycardia cycle length (TCL) that exceeds 115 ms (PPI-TCL $\geq$ 115 ms), and a difference between the stimulus to atrial (SA) interval and the VA interval that exceeds 85 ms (SA-VA $\geq$ 85 ms) after SVT entrainment by overdrive pacing from the right ventricle (RV) are highly specific for AVNRT, but this high specificity is in comparison to a diagnosis of ORT using a septal AP (3). These values could easily obtained for ORT employing a left free wall AP because of the greater distance of the RV pacing site from a left sided circuit and from a left free wall AP (4,5). Therefore, these values should not have been used to exclude ORT if the mitral annulus has not been mapped to exclude the participation of a left free wall AP, something this patient was known to have. The significant distance of an RV pacing site from a left free wall AP also explains why His-synchronous premature ventricular beats do not infrequently fail to preexcite the atrium in ORT employing a left free wall AP. These points are especially noteworthy given that the left free wall is the most common AP site, accounting for 50-60% of all APs. It is also noteworthy that entrainment of SVT by overdrive ventricular pacing from the basal left ventricle would surely have demonstrated PPI-TCL and SA-VA differences diagnostic of ORT, and would have been likely to demonstrate evidence of fusion, which proves that ORT is present (4).

4. Conspicuously absent is a discussion of the corrected PPI-TCL difference (cPPI-TCL) (5). The first return AH interval after ventricular overdrive pacing is often prolonged because of some degree of decremental conduction slowing through the AV node. Because the PPI is determined by summing the SA interval, the first return AH interval, and the HV interval, the aforementioned prolongation of the first return AH interval will contribute to some prolongation of the PPI, and therefore, of the PPI-TCL difference. Accordingly, the PPI-TCL difference can be corrected for this increase in the first return AH interval by subtracting from the PPI-TCL difference, the degree to which the first return AH interval is prolonged compared to the usual AH interval of the SVT. In this case, if the first return AH interval prolonged by more than 10 ms compared to the AH interval during the SVT, the cPPI-TCL difference would have been < 110 ms, which is consistent with a diagnosis of ORT, and not AVNRT. In Figure 2, it looks as though the first return AH interval exceeds the second AH interval by at least 30 ms, so it seems that had the cPPI-TCL difference been calculated, the correct diagnosis would have been indicated.

5. The authors indicated that prolongation of the VA time with the development of bundle branch block (BBB) is diagnostic of the presence of an AP ipsilateral to the BBB. Given the image they showed in their figure 3, it is noteworthy that a shortening of the VA interval with the resolution of BBB has the same diagnostic significance. Furthermore, the presence of a left sided AP was already established based on the surface EKG. The finding illustrated by the authors, namely that the VA interval in SVT is longer when there is BBB indicates more than just the presence of an AP ipsilateral to the BBB; it indicates the participation of that AP in ORT.

This case illustrates the importance of mapping the mitral annulus during SVT in a patient known to have a left sided AP. If the coronary sinus cannot be cannulated, the mitral annulus can be mapped via a transseptal or retrograde transaortic approach. The majority of these SVTs will be ORT using the known left sided AP, just as ended up being the case in this report. In fact, had the mitral annulus been mapped from the beginning of the ablation procedure, the diagnosis would have been immediately obvious. This case also illustrates the importance of recognizing the influence of the pacing site and of decremental AV node conduction on quantitative results (PPI-TCL and SA-VA differences) obtained by overdrive ventricular pacing as a diagnostic pacing maneuver for SVT (6).

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