LBBB with AV Wenckebach after Right-Sided SVT Ablation: What is the Diagnosis?

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Case presentation

A 52-year-old woman was referred for evaluation of complaints of sudden weakness when exerting herself. She had undergone a previous ablation procedure at an outside academic medical center for supraventricular tachycardia (SVT) 12 years ago. Records obtained from the procedure, reported the diagnosis of the SVT to be either atrioventricular node re-entry tachycardia (AVNRT) or an anterior accessory pathway-mediated orthodromic tachycardia. The procedure note stated that ablation was performed “initially in the area of the slow AV node pathway, and gradually moved forward anteriorly until the SVT was ablated.” The patient was also noted to have lost VA conduction at the end of the ablation and also developed “new left Intraventricular Conduction Delay (IVCD)” which was unexplained. Her electrophysiologist was unable to explain this “new left IVCD,” and the patient was sent for an echocardiogram and stress test in an attempt to explain the electrocardiogram (ECG) findings (Figure 1), but the tests were unrevealing.

The patient did well for 12 years until she developed exertional weakness which was associated with AV Wenckebach on the monitor (Figure 2). She was referred for electrophysiology (EP) evaluation, and after a discussion elected to proceed with an EP study at our center.

In Figure 3, intracardiac electrograms are seen after initial catheter insertion. The HV interval was noted to be short and consistent with conduction over an accessory pathway. In Figure 4, atrial pacing is seen at two different cycle lengths. At a faster pacing cycle length, the AV interval was found to increase with a short HV interval consistent with conduction over an accessory pathway with decremental conduction. The patient also did not have any more VA conduction during stimulation from the ventricle as was noted at the end of the procedure 12 years ago. The summary of these findings indicated that after ablation at the other medical center, there was a loss of conduction through the AV node, with conduction primarily occurring over a decrementally conducting atriofascicular/Mahaim accessory pathway that was left intact.

In this case, His bundle activation appears to be in the retrograde direction, for several reasons. First, the findings of an unchanged, “fully pre-excited QRS,” despite changes in atrial rates and position of the His relative to the QRS implies conduction solely over the pathway. Secondly, the patient was previously known to have VA conduction that was lost at the end of the ablation procedure consistent with loss of conduction through the AV node. Thirdly, the activation of the His in Figure 4a shows that the distal His is activated before the proximal His, consistent with activation in the retrograde direction (personal communication Dr. Mark Josephson).
Atriofascicular accessory pathways represent a rare form of antegrade conducting accessory pathways (<3%).\(^1\) Initially described by Mahaim in 1937,\(^2\) they were thought to originate from the AV node, but it is now clear that these pathways are atriofascicular.\(^3\) These pathways are most often ablated at the tricuspid AV ring by looking for a pathway potential resembling the His potential.\(^4\) The diagnosis of a Mahaim atriofascicular pathway is made usually based on ECG with left bundle branch block (LBBB) and leftward axis, prolongation of the A to delta interval with incremental atrial pacing, or delivery of atrial extrastimuli, absence of retrograde conduction over the pathway (all present in this case except for the ECG axis). In addition, activation of the right bundle prior to or at the same time as the surface QRS supports the presence of an atriofascicular pathway. Unfortunately, because the ablation was performed over a decade ago, we were unable to obtain intracardiac electrograms from the original study. However, it would have been interesting to look through tracings at the beginning and end of the case. Procedure notes obtained from the ablation do not mention the presence of any Mahaim pathway. While it is not clear why the accessory pathway was not noted at any point during the ablation.

**Figure 1:** Electrocardiogram post radiofrequency ablation of supraventricular tachycardia.

**Figure 2:** Monitor during exertional symptoms 12 years after supraventricular tachycardia ablation.
procedure, and why AV node block was also not remarked upon, there may have been other coexisting tachycardias or pathways that were also present, creating confusion for the operators. The differential for this patient with SVT and an existing Mahaim pathway may have included AVNRT with a Mahaim accessory pathway as an innocent bystander, only Mahaim accessory pathway-related tachycardia, or Mahaim accessory pathway with a second concealed posteroseptal accessory pathway. This case represents an unusual form of symptomatic AV block of a Mahaim accessory pathway detected on a monitor 12 years after the original SVT ablation. The patient ultimately elected to have a pacemaker implanted for treatment of her symptomatic AV block. The unexplained development of LBBB during a rightsided ablation years earlier illustrates the utility of electrophysiologic testing in some patients with unusual ECGs after ablation, and the need to always evaluate the patient comprehensively at the end of an ablation procedure.

References