

Irregular tachycardia and Intra-Atrial Conduction Block of the mitral isthmus During Accessory Pathway Ablation

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Abstract

The mitral isthmus conduction block was inadvertently achieved during radiofrequency catheter ablation for a left lateral concealed accessory pathway (AP). we reported that the mitral isthmus incomplete conduction block accompanied by alternating atrioventricular conduction interval led to tachycardia cycle length variability during left lateral AP ablation. This rare electrophysiological phenomenon should be acknowledged to avoid radiofrequency applications in inappropriate regions.

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Key Words: accessory pathway, radiofrequency ablation, Mitral isthmus,conduction

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Keywords: Ablation; accessory pathway;mitral isthmus

Case report

A 37-year-old woman with a documented supraventricular tachycardia underwent an electrophysiologic study and radiofrequency (RF) catheter ablation. An orthodromic atrioventricular reciprocating tachycardia(AVRT)with left lateral concealed accessory pathway was discovered and displayed classical eccentric retrograde activation with a short ventriculoatrial (VA) interval at distal coronary sinus (CS) electrode.

The first RF application was delivered using ablation catheter at the lateral part of mitral annulus via transseptal approach during the tachycardia. During the RF application,the VA interval began to prolong at distal coronary sinus electrode,exhibiting a concentric activation sequence along the CS and tachycardia cycle length change from 264 to 335 msec without intraventricular conduction abnormalities. After first RF

delivery, the alternating long and short atrioventricular (AV) conduction interval were recorded (measured from the coronary sinus 7.8), resulting in alternating long and short cycle lengths of 348 and 278 msec and constant RP interval of 149 msec (measured from the coronary sinus 7.8) during the tachycardia. On the other hand, A relatively long AV intervals was followed by a relatively short AV intervals, raising alternating RP intervals of 140 and 158 msec (measured from the coronary sinus 1.2). The beat-to-beat alternating RP intervals represent intra-Atrial 2:1 Conduction block of the mitral isthmus(Figures 1). Follow this, An more interesting phenomenon was recorded,the intracardiac electrogram displayed variable tachycardia cycle length and different activation sequence in the CS catheter (Figures 2),which might be mistaken for chaotic atrial tachycardia. When repositioned the ablation catheter slightly superior to the previous ablation spot, the timing of atrial activation in the ablation catheter was still earlier than in proximal CS electrode. The true atrial insertion of the AP must have been anterior to initial RF applications, successful ablation was achieved by another RF energy application at the more distant zone than the first ablation site (Figures 3).

Discussion

To the best of our knowledge, an intra-atrial conduction block at the mitral isthmus occurred during RF ablation of a left lateral AP as previously reported [1]. Supraventricular tachycardia with alternating cycle lengths is most often due to alternating antegrade conduction over a slow and a fast AV nodal pathway[2] However, Few studies reported an conduction block of the mitral isthmus and the variation in AV conduction interval occurred together during RF energy application in patients undergoing left AP ablation. In this case, We first demonstrated that the intra-atrial incomplete conduction block accompanied by different AV conduction interval led to cycle lengths variability during the RF ablation of a left lateral AP. This interesting electrophysiological phenomenon would easily be misinterpreted as the chaotic atrial tachycardia. The oscillation conduction of atrioventricular node should be responsible for the dynamic change of tachycardia cycle length [3]. This electrophysiological phenomenon should be acknowledged to avoid misdiagnosis of arrhythmia mechanism and inappropriate RF applications.

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Figure 1 A The original AVRT exhibiting an eccentric activation sequence along the CS with the cycle length (CL) of 264 msec. B The AVRT exhibiting a concentric activation sequence along the CS with the tachycardia CL of 335 msec. C The alternating long and short AV conduction interval (measured from the coronary sinus 7-8) resulting in alternating long and short cycle lengths of 348 and 278 msec. Full arrow representing 2:1 intra-atrial conduction block of the mitral isthmus.

Figure 2 After the first RF application. The new AVRT with an irregular CL and different activation sequence of the CS

Figure 3 A、B Radiographs obtained showing the first ablation site and the successful ablation site. C Schematic illustration of the mitral isthmus conduction block. The impulse propagates via the accessory pathway (blue arrow) upwards to the left atrial roof and the interatrial septum. The red arrow representing the line of mitral isthmus block. D Left atrial electroanatomical activation map showed successful ablation site. LAO= left anterior oblique (LAO, 45°), AP= Accessory pathway



