

Apparent Double Activation of Coronary Sinus in Sinus Rhythm

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Abstract

Disparate activation of the coronary sinus and inferior left atrium is known to occur during atrial tachycardia arising from persistent atrial fibrillation ablation. The image below shows the persistence of disparity in sinus rhythm which looks like doubly activated coronary sinus.

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Key Words

Left atrium - coronary sinus connection • Atrial fibrillation ablation • Ablation • Atrial fibrillation

Case Study

A 61-year-old man underwent two ablation procedures for symptomatic, drug-refractory persistent atrial fibrillation (AF) consisting of pulmonary vein (PV) isolation, electrogram-guided biatrial ablation, and successful linear ablations at the left atrial roof and cavotricuspid isthmus. The left mitral isthmus was ablated but not blocked. During the third ablation procedure for paroxysmal recurrence of AF, PVs were found to be isolated. During mechanically induced AF, electrogram-guided ablation was performed in the left atrium (LA) and inside the coronary sinus (CS). AF terminated during ablation around the right PV ostia.

The CS is apparently activated twice in sinus rhythm at 650 ms, which can be appreciated during an atrial ectopy (Figure 1A) on decapolar catheter positioned

inside it. The initial activation (A) from the proximal to distal bipoles represents the local CS musculature [1]. A' represents a far-field electrogram of the contiguous inferior LA was activated late after the ventricle (V) in the opposite direction of the CS. Normally, CS and LA are activated together and in the same direction (proximal to distal). The distal-to-proximal activation of the LA suggests right atrium (RA)-to-LA conduction via Bachman's bundle instead of through the CS. Regional LA-CS disconnection unmasked the individual activation of the two adjacent structures.

During RA pacing at 350 ms (Figure 1B), there was 2:1 conduction between the CS and contiguous LA, but during left appendage tachycardia at 300 ms (Figure 1C), the block was inverted with 2:1/3:1 conduction from the LA to CS. During the latter, CS ostial activation (CS7–8) preceded the local RA (CS9–10) (Figure 1C), indicating the absence of LA-to-RA conduction over Bachman's bundle. In 1:1 CS-LA conduction, the local delay between the CS and contiguous LA is longer during RA pacing at 400 ms (172 ms; Figure 1D) than in the sinus rhythm (312 ms; Figure 1A).

Normally, an impulse can travel bidirectionally between the LA and RA through Bachman's bundle (anterior interatrial septum) and the CS, the main electrical connections. In this case, LA is activated from RA only over Bachman's bundle, and RA is activated from LA only over the CS because the CS is activated in the proximal-to-distal direction and the inferior LA in the opposite direction—distal to proximal—irrespective



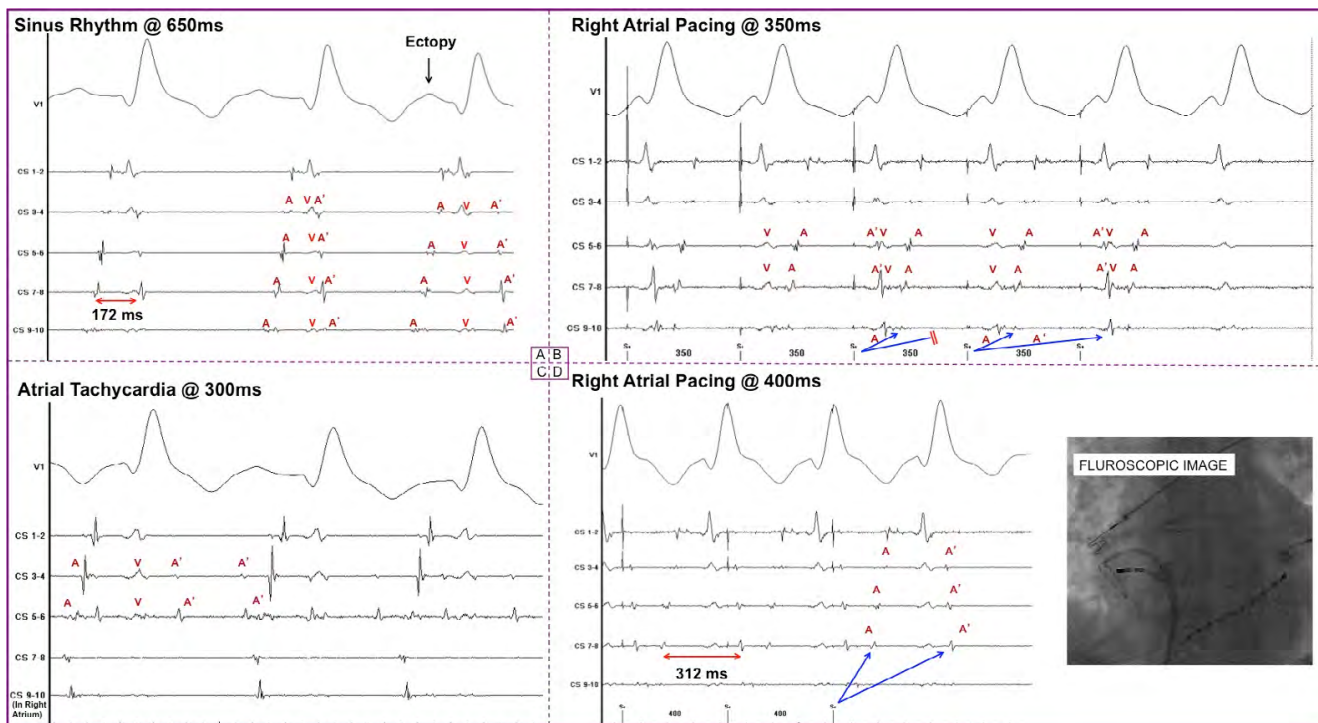


Figure 1. Persistence of disparity in sinus rhythm which looks like doubly activated coronary sinus.

of rate and rhythm. The unidirectional conduction between the two atria may be explained by extensive biatrial ablation involving the septum, CS, and mitral isthmus, among others.

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Conflict of Interest

The authors have no conflicts of interest relevant to this publication.

Reference

1. Pascale P, Shah AJ, Roten L, Whinnett Z, Wilton SB, Jadidi AS, et al. Disparate activation of the coronary sinus and inferior left atrium during atrial tachycardia after persistent atrial fibrillation ablation: Prevalence, pitfalls, and impact on mapping. *J Cardiovasc Electro-physiol.* 2012;23:697-707. DOI: [10.1111/j.1540-8167.2011.02266.x](https://doi.org/10.1111/j.1540-8167.2011.02266.x)

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