Sinus Nodal Dysfunction After Left Atrial Flutter Ablation
A Preventable Complication

Jo Jo Hai, MBBS; Siva K. Mulpuru, MD; Eric E. Williamson, MD; Thomas A. Foley, MD; Peter A. Brady, MD, FRCP

A 74-year-old man who had drug-refractory paroxysmal atrial flutter 2 years after circumferential pulmonary venous isolation was referred to our hospital. During repeated ablation, clinical arrhythmia was induced. Mapping of the left atrium revealed the entire tachycardia cycle length. Capturing fractionated bipolar electrograms at anterolateral left atrial (LA) wall demonstrated concealed entrainment with postpacing interval comparable with tachycardia cycle length. During linear ablation from mitral annulus along fractionated electrograms to the scar near left superior pulmonary vein using an irrigated tip catheter (power, 35 W; temperature, 40°C), atrial flutter terminated, which was followed by sinus nodal (SN) arrest requiring urgent temporary pacing (Figure 1). There was no recovery of SN function after 3 days, and a permanent pacemaker was implanted. A review of cardiac computed tomography (CT) before ablation revealed a small blood vessel originating from the left circumflex artery, running along the anterior LA wall to reach the cavoatrial junction of the right atrium, which was not seen in postablation CT (Figure 2). A 3-dimensional reconstruction image showed that this was a left-sided SN artery (Figures 3 and 4).

Discussion
Persistent SN dysfunction has been reported in 7% of patients after ablation of atrial fibrillation and is thought to be the result of atrial remodeling and associated sinoatrial conduction abnormality.1 However, our patient had normal SN function before ablation as evidenced by excellent exercise tolerance and absence of bradycardia or long pause in Holter monitoring. Although vagal response during ablation near left-sided pulmonary vein is not uncommon,2 and an unusually prolonged SN recovery time remained possible, taking persistent SN arrest and CT findings together, the mechanism was likely direct thermal injury to the SN artery. Although not well recognized, this is a potential complication during ablation at the left atrium because the prevalence of exclusively left-sided SN artery is up to 30% to 40%. The courses of left-sided SN artery were variable, with more than half of them running along the high anterior left atrium and the remainder either passing behind the LA appendage before overlying the roof or rarely running along the posterior left atrium to reach the right atrium.3,4 The recognition of the course of SN artery can lead us to either avoid ablating at this location or limit energy delivery to prevent this complication.

Disclosures
None.

References

Key Word: sick sinus syndrome
Figure 1. Sinus nodal arrest after termination of atrial flutter.

Figure 2. A, Preablation CT showing a small vessel originating from the left circumflex artery, running along the anterior left atrium to reach the cavoatrial junction of the right atrium. B, Postablation CT was performed with a suspicion of vascular damage. The abovementioned small vessel was no longer visualized.

Figure 3. A 3-dimensional reconstruction image showing the sinus nodal artery as originating from the proximal left circumflex artery.

Figure 4. A, A 3-dimensional reconstruction image showing the course of sinus nodal (SN) artery along the anterior left atrium. B, Image generated from the mapping system. The line of ablation was right across the course of SN artery. The point where atrial flutter was terminated was labeled with yellow dot.
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