



## Images in Cardiology

# Notable Pacemaker Shift in the Sinoatrial Node After Administration of Isoproterenol

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A 63-year-old woman underwent a redo catheter ablation for recurrent atrial fibrillation (AF) after an initial cryoballoon ablation. After confirming the electrical isolation of 4 pulmonary veins, empiric superior vena cava (SVC) isolation was performed without documenting AF triggers. A 20-pole PentaRay NAV catheter (Biosense Webster, Diamond Bar, CA) was used to create an activation map during sinus rhythm to identify the anatomic location of the sinoatrial node (SAN). The earliest atrial activation site (EAS) at baseline was the basal lateral wall of the right atrial appendage (Fig. 1A). Notably, the EAS shifted to a more anterior-superior location from baseline after administration of isoproterenol (0.02 µg/kg/minute) (Fig. 1B). The distance between the 2 EASs was 21.2 mm (Fig. 1C), and the SVC was successfully isolated 10 mm above the superior EAS without any complications.

SVC isolation is an important adjunctive ablation strategy but can potentially injure the SAN.<sup>1</sup> The physiology of SAN is quite complex and is still under investigation. A diverse population of pacemaking cells operating in synchrony with their neighbors is one hypothesis.<sup>2</sup> The presence of 2 distinct leading pacemaker cells—the superior SAN (sSAN) and inferior SAN (iSAN)—controlling the surrounding tissues is the other hypothesis.<sup>3</sup> In the current case, we identified the 2 distinct EASs at baseline and after administration of isoproterenol, which might correspond to the pacemaker shift from

the iSAN to sSAN. Identification of the sSAN is crucial for avoiding any unexpected injury to the SAN.<sup>4</sup>

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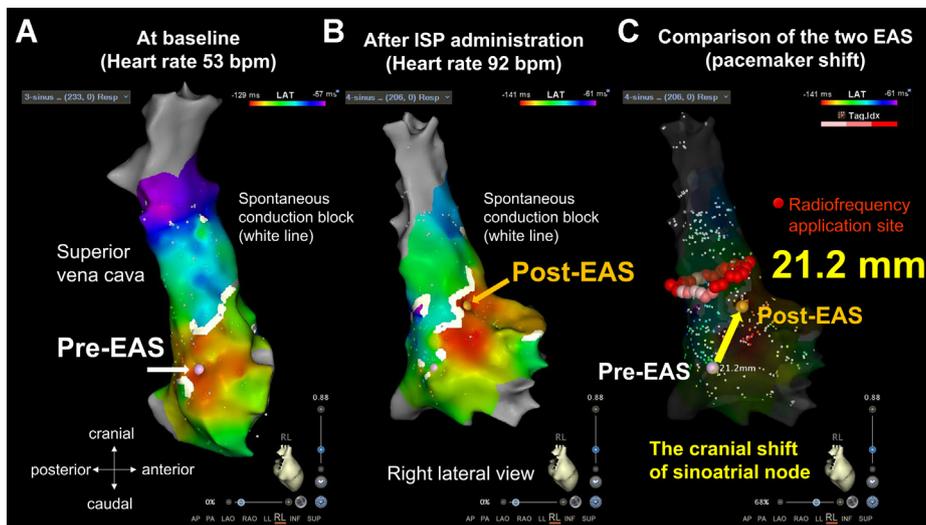
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See page xxx for disclosure information.



**Figure 1.** Activation maps during sinus rhythm at baseline (A) and after administration of isoproterenol (ISP) (B). Before the radiofrequency energy applications, spontaneous conduction block (white line) was identified between the superior vena cava and right atrium, using the extended early-meets-late tool. The anatomic distance between the 2 earliest atrial activation sites (EASs) is 21.2 mm (C).