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Successful implantation of a left ventricular lead in an anomalous coronary sinus

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A 56-year-old man with dilated cardiomyopathy was referred for cardiac resynchronization therapy (CRT) implantation for primary prevention. At the time of admission, he had stable heart failure corresponding to a New York Heart Association class 2-3 despite optimal medical treatment. The baseline left ventricular ejection fraction was 30%. His baseline B-type natriuretic peptide levels were at 4700 pg/mL. A surface 12-lead electrocardiogram showed sinus rhythm at 65 beats per minute and left bundle branch block with a QRS duration of 140 ms.

The patient presented to the electrophysiology laboratory in sinus rhythm. Both atrial and right ventricular leads were first implanted. However, the coronary sinus (CS) could not be engaged successfully despite multiple attempts. First, we used the Slittable Outer Guide Catheter (CPS Direct SL II, Abbott Medical) followed by the Fixed Decapolar Catheter (WEBSTER Decapolar, Biosense Webster Inc.) and then the deflectable CS catheter (Inquiry Optima, Abbott Medical). Finally, the CS was successfully engaged with the AL-2 (Medtronic Inc.) diagnostic catheter after careful manipulation (Supplementary Video 1). CS venography revealed an anomalous coronary sinus with a large posterolateral branch (Figure 1A,B). Of note, there was no stenotic site in the CS, and there was an abnormal coronary venous drainage route from the great cardiac vein and

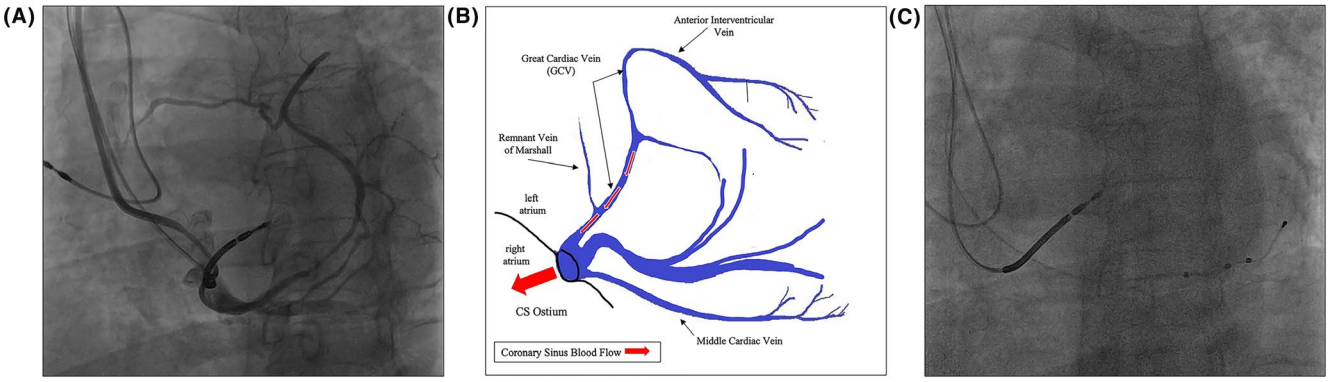

FIGURE 1 A, Coronary sinus (CS) venography in the left anterior oblique view showing an anomalous CS with a well-developed posterolateral branch. B, Schematic drawing of the CS anatomy in the present case. C, Final image in the anteroposterior view showing all leads in place, including the left ventricular lead deep in the posterior-lateral branch

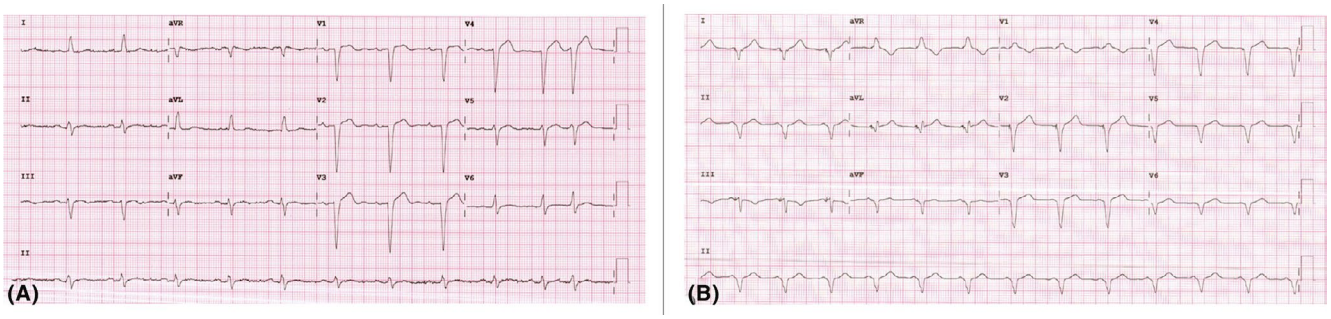

FIGURE 2 Pre (A) and post CRT (B) 12-lead ECGs. Note pre- and post-CRT-D QRS widths are 140 and 135 ms, respectively

the anterior interventricular vein to the right atrium. Differential diagnostic considerations to explain this finding included venous spasm, and 200 μg (2 mL) of nitroglycerin was applied. Subsequent CS venography demonstrated no changes in the anatomy or the caliper of the vein. Finally, a quadripolar left ventricular (LV) lead (Quartet Quadripolar LV lead, Abbott Medical) was positioned over the wire technique (0.014-in. Hi-Torque Whisper guidewire, Abbott Medical) into the posterolateral branch of the CS (Figure 1C and Supplementary Video 2). Voltage, threshold, and impedance values were acceptable. Q-LV was 98 ms. The leads were connected to a CRT-D generator (Quadra Assura MP CRT-D, Abbott Medical). The device was programmed as DDD at 60 bpm with sensed AV delay of 110 ms and LV-RV offset of 20 ms with bipolar LV capture (LV1-LV2). Post-procedure 12-lead ECG showed biventricular pacing with a QRS width of 135 ms (Figure 2). The patient was discharged on the same day with a scheduled follow-up in the cardiac device clinic.

This case highlights a rare CS anomaly—a single large posterolateral branch with diminutive CS in the atrioventricular groove. Fortunately, the presence of a large posterolateral branch allowed us to successfully implant the LV lead. To aid the engagement of the CS in the presence of such abnormal course, we suggest using small subselect catheters and careful manipulation to obtain successful lead placement in CRT therapy.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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