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ADVANCED

IMAGING VIGNETTE: TECHNICAL CORNER

Innovative Cardiac Resynchronization

Deployable Lead as an Anchor to Facilitate Guidewire Advancement

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ABSTRACT

An acutely angulated coronary sinus ostium coupled with a dilated right atrium presents technical challenges for cardiac resynchronization therapy (CRT) implantation. Innovative use of a deployable left ventricle lead as an anchor to support guidewire navigation within the cardiac venous system permits optimal CRT deployment. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2021;3:594–6) © 2021 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

CASE DESCRIPTION

A 69-year-old woman with nonischemic dilated cardiomyopathy and atrial fibrillation attended for cardiac resynchronization therapy-pacemaker (CRT-P) implantation (1) after an unsuccessful attempt 1 month earlier. A dilated right atrium coupled with an acutely angulated coronary sinus (CS) ostium prevented guide catheter engagement of the CS (2); a 0.038-inch hydrophilic wire was navigable, but repeatedly displaced on minimal catheter movement (Video 1).

Using a CS cannulation guide sheath (Attain Command + SureValve; Medtronic, Minneapolis, Minnesota) and Amplatz Left 3 (AL3) guide catheter (Cordis, Hialeah, Florida) via the left axillary vein, the CS ostium was cannulated permitting a 6-mm × 20-mm noncompliant angioplasty balloon (Boston Scientific, Marlborough, Massachusetts) to be railroaded over a ChoICE PT Extra Support 0.0140-inch guidewire (Boston Scientific) to the great cardiac vein (GCV). Fully inflated at nominal pressure (12 atm), this balloon provided anchoring of the system and ensured that the guide sheath successfully engaged the CS (3).

Contrast injection of the coronary venous circulation demonstrated a feasible lateral vein for left ventricle (LV) lead positioning. Having experienced repeated prolapse of the delivery system from this segment of the CS, we anticipated that withdrawing the delivery system to engage this branch would inevitably lead to loss of access. We therefore attempted to navigate the guidewire to the vein of interest via communications from the GCV, but encountered resistance in the connecting veins resulting in reciprocal rearward movement of the sheath with every advance of the guidewire.

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For stability, a deployable LV lead (Attain Stability Quadripolar 4798, Medtronic) was deployed in the GCV with the use of a subselector. The backup support from this LV lead allowed more forceful advancement of the guidewire to the right atrium through the lateral vein in a retrograde fashion. A second CRT delivery system (Attain Command + SureValve) was advanced from the left axillary access to the right atrium, and through this a 20-mm-diameter Amplatz Gooseneck snare (Medtronic) was used to fish the guidewire (3) from the right atrium (**Figure 1**). The second delivery system and a subselector were railroaded over this snared guidewire to deeply engage the large lateral vein (4). Another guidewire was then advanced from the second delivery sheath into this target vein; the deployable LV

ABBREVIATIONS AND ACRONYMS

CRT = cardiac resynchronization therapy

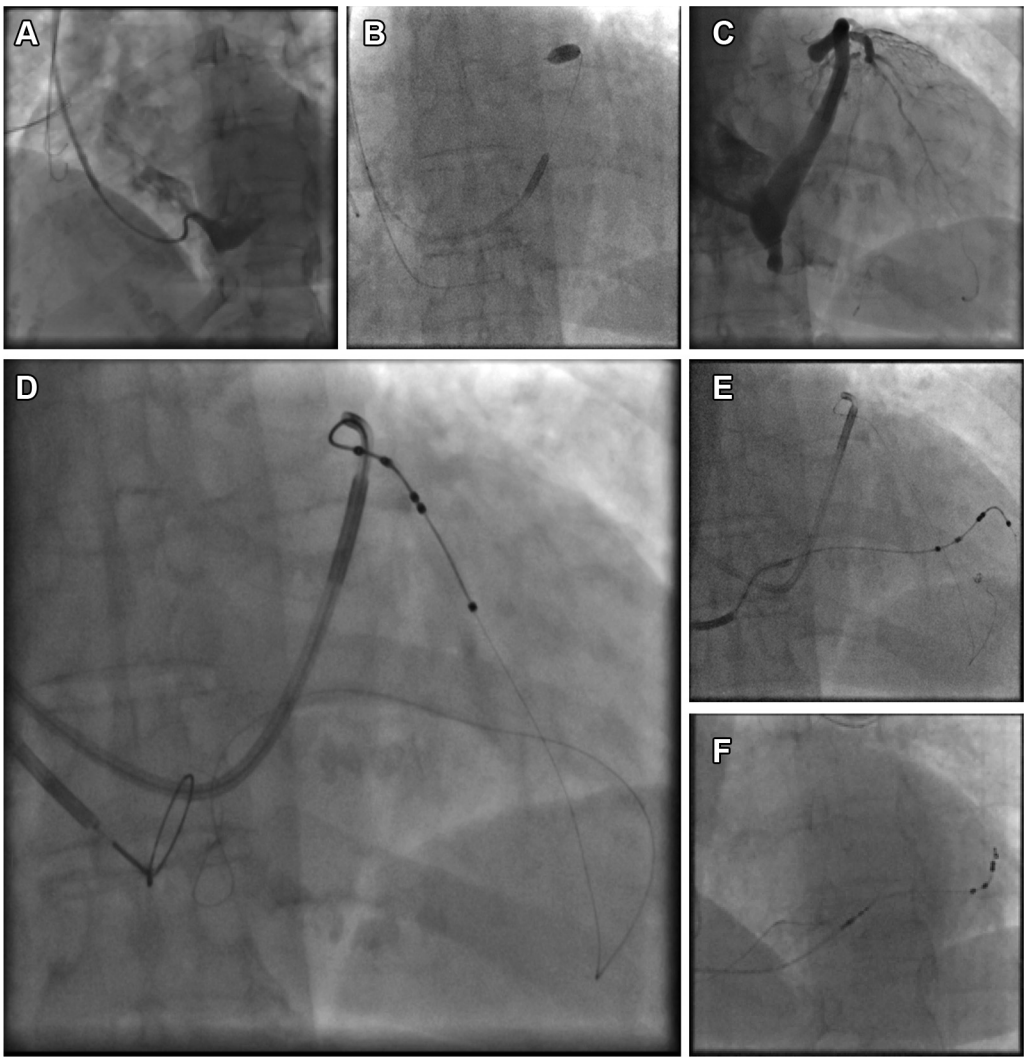
CRT-P = cardiac resynchronization therapy-pacemaker

CS = coronary sinus

GCV = great cardiac vein

LV = left ventricle

FIGURE 1 **Deployable LV Lead as an Anchor to Facilitate Cardiac Resynchronization Therapy Implantation**



(A) Venogram using the Amplatz Left 3 diagnostic catheter, showing the acute angle of the coronary sinus (CS) ostium which prohibited advancement of the delivery sheath although it was navigable with a wire. **(B)** Using the 6-mm × 20-mm angioplasty balloon (railroaded over the ChoICE PT Extra Support guidewire) as an anchor, the delivery sheath was "pulled" into the CS. **(C)** Venography revealed a lateral branch joining the proximal CS. Having encountered repeated catheter prolapse from this part of the CS, we tried to navigate a guidewire into it from the great cardiac vein, but the delivery system pushed back with each attempt at advancement. **(D)** A deployable left ventricular (LV) lead was fixated in the great cardiac vein for support, permitting retrograde advancement of the guidewire through the lateral vein and back to the right atrium. The guidewire was snared and drawn into a second sheath. This sheath and a subselecting catheter were advanced over the snare to engage the lateral vein deeply. **(E)** The active fixation LV lead was retracted from the anterior vein and redeployed in the lateral vein. **(F)** The right ventricular lead was placed in a midseptal position to maximize separation of the leads; an atrial lead was placed without difficulty.

lead was retracted from the GCV and successfully deployed in the lateral vein. Pacing indexes were excellent. Active fixation leads (Medtronic 5076) were positioned at the right ventricular septum and right atrial appendage to complete the CRT-P system.

CONCLUSIONS

Variations in venous and atrial anatomy can hinder the placement of leads. Navigating these impediments requires flexibility and innovation from the operator. The use of an angioplasty balloon as an anchor in a vein is required in 1% of our procedures; the use of a deployable LV lead to permit advancement of a guidewire against resistance is novel. It proved to be feasible and effective.

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Dr. Gallagher has received research funding from Attune Medical and has acted as a consultant and a paid speaker for Boston Scientific and Cook Medical. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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KEY WORDS cardiac pacemaker, cardiac resynchronization therapy, left ventricle

APPENDIX For a supplemental video, please see the online version of this paper.