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## Case Report

# Against all odds: Targeted pacing site for resynchronization therapy by venoplasty and active fixation lead



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## ABSTRACT

In cardiac resynchronization therapy, reaching the target pacing site is essential to achieve optimal therapy. Coronary vein stenosis in the target vein might be an obstacle for lead placement, which can be overcome by venoplasty and stenting of the narrowed segment. Additional active fixation of the left ventricular lead ensures precise location in the target site with minimal risk of lead dislodgment.

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## 1. Introduction

Targeted pacing site is key in cardiac resynchronization therapy to achieve reverse left ventricular (LV) remodeling.<sup>1</sup> The recently released active fixation LV lead Attain® Stability™ (Model 20066, Medtronic Inc, Maastricht, the Netherlands)<sup>2</sup> enables lead placement at the target pacing site (TPS) with minimal risk of lead displacement. Coronary veins stenosis may occasionally be encountered, which limits reaching the TPS. We report a case where a combination of technologies was mandatory for the procedure success.

## 2. Case report

We report a case of a male, 64-years-old, with a non-ischemic cardiomyopathy (no previous myocardial infarction, no

coronary artery disease), who was reevaluated after 9 months of optimal medical therapy. He was in NYHA class II and the ECG (Fig. 1) showed a sinus rhythm with a left bundle branch block (QRS width = 170 ms). End-diastolic volume was 324 ml, end-systolic volume was 249 ml, and ejection fraction was 23% at Echocardiography. The TPS was the mid-apical lateral wall, as evaluated with strain analysis by speckle tracking. The venogram, performed during the implant, showed a suitable lateral vein that matched with the TPS but whose take-off had an angle >90° with a severe proximal stenosis (Fig. 1, panel A). A stiff guide-wire was placed distal in the vein, but the stenosis prevented lead placement into the vein despite the subselector enabling a strong pushability. We moved to venoplasty, and a bare metal stent (Taxus Libertè, Boston Scientific, MN, USA) was used to treat the stenosis (Fig. 1, panel B).<sup>3</sup> The size of the bare metal stent, related to the size of the vein, was 4 mm of diameter and 12 mm of length. The inflation pressure was increased up to 14 atm to achieve full stent expansion.

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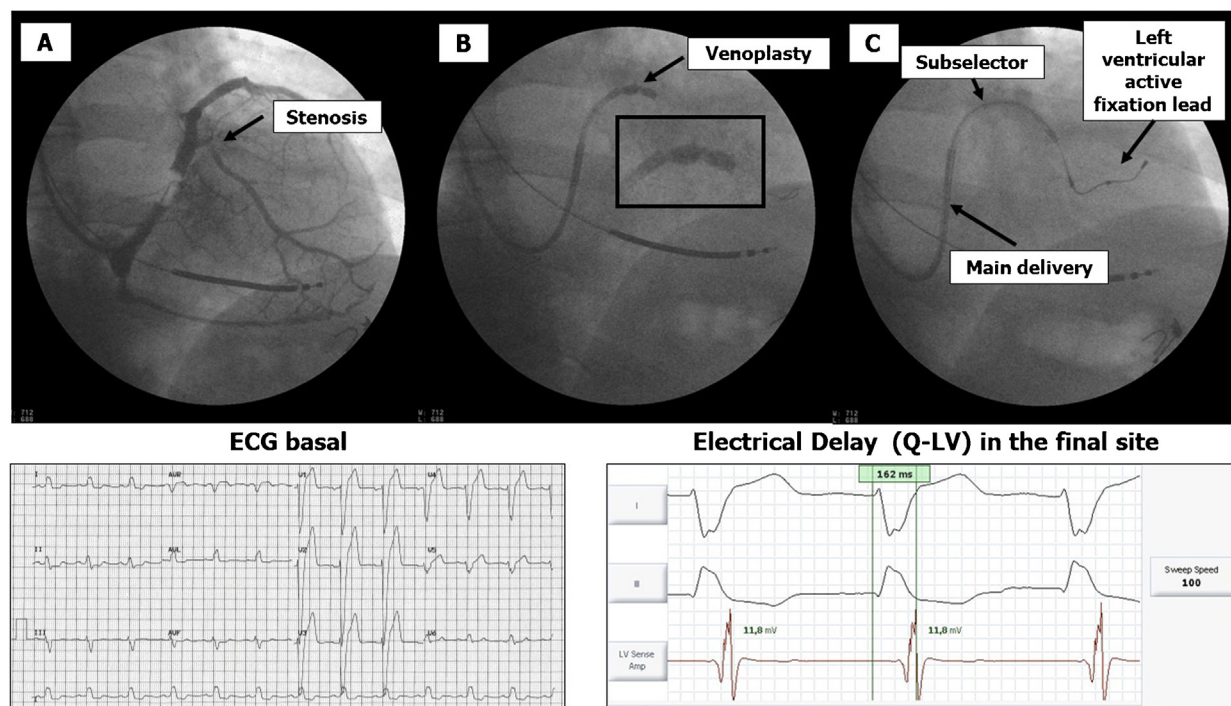


Fig. 1 – Clinical case of venoplasty.

Thereafter, the subselector could enter deeply in the coronary vein (Fig. 1, panel C), and a quadripolar lead (Quartet left ventricular lead, St. Jude Medical, MN, USA) was easily put in place. Electrical delay (Q-LV) was measured in both branches of the vein, and the final location was the most delayed one. The lead proved to be unstable, showing backward movement in systole owing to transmission of force along the relatively stiff lead body; in fact, we observed an acute displacement >1 cm in a few minutes. This is consistent with a high risk of dislodgement at follow-up, and we shifted to the active fixation LV bipolar lead (Fig. 1, panel C) Attain® Stability™ (Model 20066, Medtronic Inc, Maastricht, the Netherlands).<sup>3</sup> The lead remained stable in the TPS with no phrenic nerve stimulation, and a stimulation threshold of 0.7 V@0.4 ms when using the ring electrode as cathodal electrode. The end-systolic LV volume was decreased by 25% at 6-months follow-up.

### 3. Discussion

Reverse LV remodeling is an important goal of CRT because it is closely associated to outcome.<sup>4</sup> The aim of a CRT implant is to place the LV lead as to achieve reverse remodeling. In this perspective, any LV lead type or delivery route needs to be available at minimal risk exposure to the patient: quadripolar, active fixation, epicardial surgical, or endoventricular lead.<sup>2,5,6</sup> After the evaluation of the TPS for the transvenous approach, coronary veins anatomy becomes fundamental, since at least one vein leading to TPS needs to be available. Venoplasty is an option to enable the access to the target vein in the rare event of coronary vein stenosis, and has been reported to be successful without adverse events to coronary veins in up to

2.5 of patients.<sup>7,8</sup> Lead stability at the targeted placement is not only mandatory to ensure reverse remodeling, but more importantly to prevent lead dislodgement that may occur in up to 10% of patients at follow-up<sup>3,9</sup> and portends threatened complications like CIED infection in up to 4% of patients when a lead repositioning procedure is needed.<sup>10</sup> In this perspective, lead stabilization by any mean has been sought in several studies<sup>2,3,11</sup> with favorable outcome in terms of precise location and avoidance of phrenic stimulation in the TPS at minimal risk of lead dislodgement. Though some issues, such as lead extractability at long term, still need longer follow-up to be addressed, the early experience shows a very promising safety profile.<sup>3,11</sup>

### Conflicts of interest

M.Z. received speaker's fees from Medtronic; G.B. received speaker's fees from Boston Scientific, Medtronic, St. Jude, and Boehringer Ingelheim; M.B. received speaker's fees from Medtronic and Biotronik.

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