

A rare case of left ventricular lead stabilization utilizing a coronary stent placement during CRT-D implantation

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ABSTRACT

During cardiac resynchronization therapy implantation, left ventricular lead placement involves transvenous placement of leads via the coronary sinus and into a tributary branch. At present, the most widely used method for left ventricular (LV) lead placement involves a transvenous LV lead placement via the coronary sinus into a tributary branch. Lead dislodgement is a common cause for reoperation. We describe a case where a coronary stent was placed to stabilize the lead against the vessel wall.

Keywords: Lead dislodgement, CRT, lead stabilization, coronary sinus, dyssynchrony

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Cardiac resynchronization therapy (CRT) has been used successfully to decrease the mortality and morbidity in heart failure patients with cardiac dyssynchrony. CRT effectiveness is significantly hindered in 30% of recipients for several reasons; beyond the patient's selection issue, loss of left ventricular (LV) stimulation plays an important role. Loss of LV stimulation occurs mainly because of LV lead dislodgement that is reported to range from 2 to 12% of patients in different reports [1]. Lead dislodgement is a common cause for a reoperation and continues to be a frequently experienced problem despite advances in the equipment and operator techniques.

CASE PRESENTATION

A 59-year-old female patient, post biventricular-defibrillator (CRT-D) implant 6 months back at another hospital, now presented with worsening of

dyspnea for past 1 month. Her device interrogation revealed failure of LV pacing & fluoroscopy revealed dislodgement of LV bipolar lead into coronary sinus. Patient was taken up for LV lead reimplantation. Pacemaker pocket was dissected, LV lead was separated from its pectoral attachments and removed without any resistance. Coronary sinus was accessed with Medtronic attain command (6250, MB2, Medtronic, Minneapolis, MN, USA) catheter. Coronary sinogram revealed only a single large posterolateral vein of approximately 2.5 mm diameter (Figure 1). Her prior coronary sinus venograms or LV lead positions at prior implantations on fluoroscopy were not available for comparison. However, in view of solitary suitable vein available, it was decided to place the lead into this particular vein. A Whisper ES guidewire (Abbott vascular, Santa Clara, LA USA) was placed in the vein, over which the Medtronic attain ability 4196 lead was placed deep in the vein (Figure 2). However, in view of discrepancy between the vein diameter (~ 2.5 mm) and lead diameter (lead



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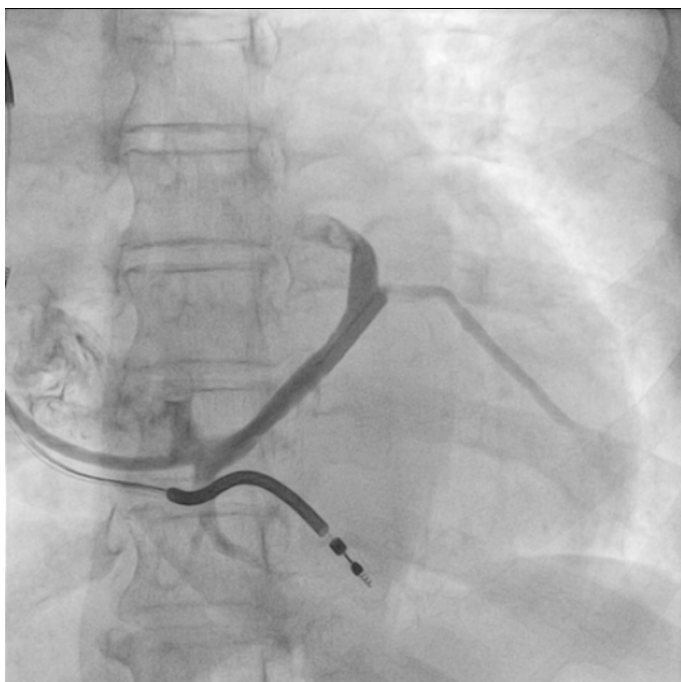


Figure 1. Coronary sinus angiogram showing a large posterolateral vein.

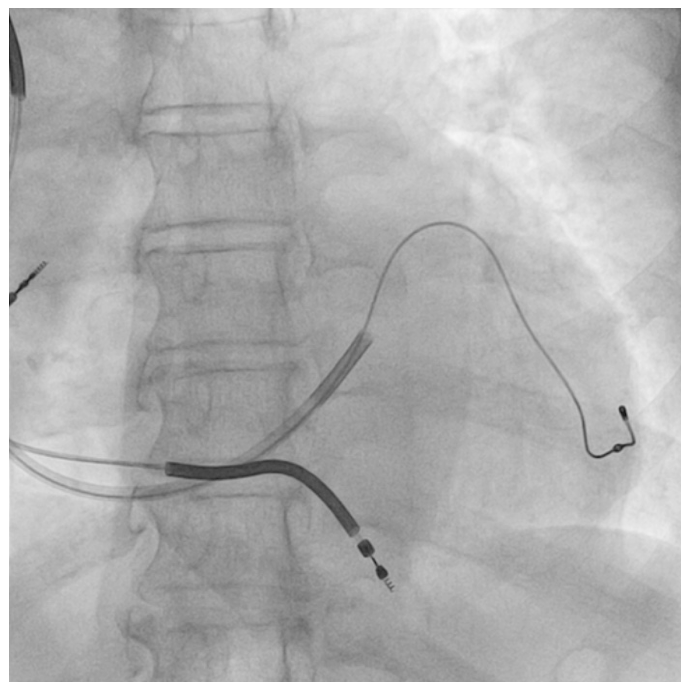


Figure 2. LV lead placed in the desired vein.

tip 4.6F [1.7 mm], lead body 4F [1.3 mm]), lead was not stable inside the vein after spontaneously displaced during withdrawal of coronary sinus guide catheter. Larger diameter lead as well as Medtronic active fixation leads were not available at that time in the cath-lab. Taking into account the target vein - lead diameter mismatch and history of lead dislodgement, it was decided to stabilize the lead with the help of

percutaneous stent.

An additional coronary sinus access was obtained with an Amplatz left (AL 1.0) launcher guiding catheter (Medtronic, Minneapolis, MN, USA) and the posterolateral vein was wired with balanced middle weight universal II guidewire (Abbott vascular, Santa Clara, LA, USA). A coronary stent (Xience Prime 2.5 × 8 mm, Abbott vascular, Santa Clara, LA USA) was

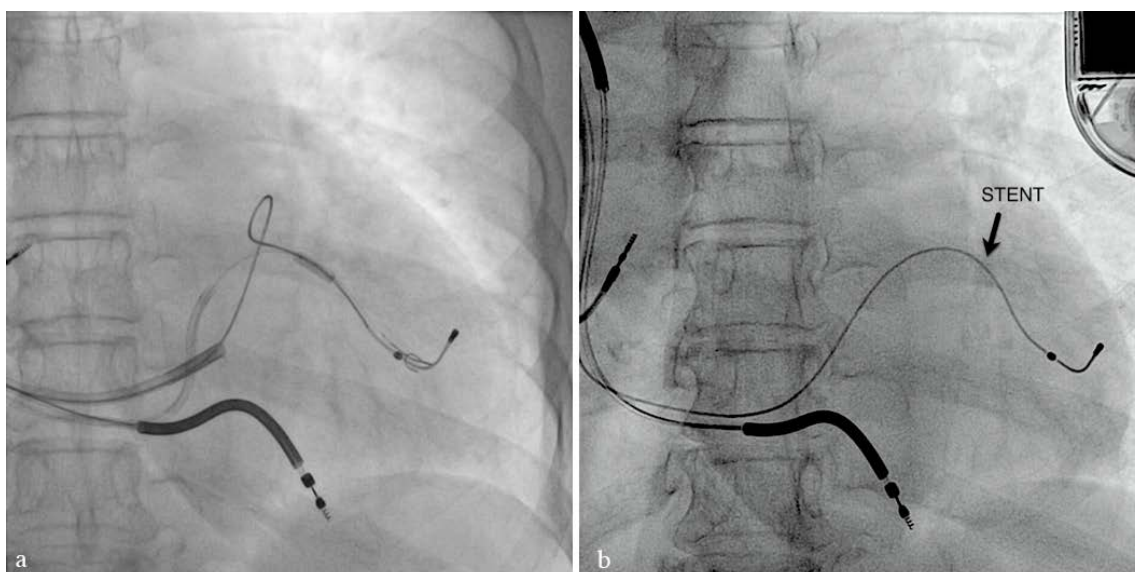


Figure 3. Coronary stent being deployed in the vein adjoining the lead (a), final LV lead position with stent in situ (b).

placed over the guidewire and implanted into the proximal vein adjoining LV lead (Figures 3a and 3b). The guidewire was removed. The LV lead was checked for stability using gentle traction on the lead. There was no LV lead movement. Coronary sinus sheath was removed and wound closed in two layers. Patient was observed in the hospital for 48 hours and lead parameters and position were found to be stable. At one month follow-up, LV lead parameters were found to be satisfactory.

DISCUSSION

LV leads are passively placed in coronary sinus veins in epicardial location. In spite of improvements in lead design and delivery system a high incidence of intraoperative and postoperative lead dislocations of 2-12% are seen leading to loss of LV capture and undesirable diaphragmatic stimulation [1]. The use of coronary stent technique has been proposed as an alternate method for stabilization of the LV lead in patient who experience repeated dislocation as in our case.

Main disadvantages of lead stabilization using a coronary stent are lead damage, coronary venous obstruction by thrombosis, and inability of repositioning or extraction [2].

First case report of utilization of a coronary stent to stabilize the lead in the coronary sinus was published by Cesario *et al.* [3] in 2006. Szilagyi *et al.* [4] studied lead stabilization with stenting technique. During mean follow-up of 12 months, no lead dislocation was found by fluoroscopy [4].

A recent study published by Biffi *et al.* [5] in 2014 about left ventricular lead stabilization to retain CRT at long term. Lead stabilization guided by vein anatomy was prospectively tested on consecutive patients from October 2009 to December 2010. Patients with stabilized LV leads were more likely to be CRT responders than the others: 19 of 26 (73%) vs. 34 of 58 (59%, $p = NS$), and had a significantly higher

proportion of super-responders: 12 of 26 (46%) vs. 12 of 58 (21%, $p < 0.005$). They concluded that lead stabilization by stenting, based on coronary vein anatomy, can effectively reduce dislodgement rate from 10% to 1%. Lead performance was unaffected by the stenting procedure, and extraction was possible in a single patient 27 months after implantation [5].

CONCLUSION

Stent implantation to stabilize the left ventricular lead position seems to be a useful and safe procedure in the treatment of patients with complicated coronary sinus anatomy or lead instability.

Informed consent

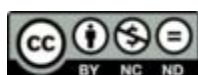
Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Conflict of interest

The authors declared that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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