CASE REPORT

Impacted left ventricular lead technique in cardiac resynchronization therapy

Ngai Yin Chan* and Ying Keung Lo

Department of Medicine and Geriatrics, Princess Margaret Hospital, 2-10 Princess Margaret Hospital Road, Lai Chi Kok, Kowloon 852, Hong Kong

Received 31 July 2006; accepted after revision 9 April 2007; online publish-ahead-of-print 23 May 2007

Left ventricular (LV) lead dislodgement is a significant problem in cardiac resynchronization therapy and re-operation is required to rectify the situation. In this case report, we describe a new technique to stabilize an LV lead which is prone to dislodgement by impacting an inactive LV lead in the same cardiac vein.

Keywords
Pacing; Congestive heart failure

Introduction

Despite the advancement in left ventricular (LV) lead delivery system, cardiac resynchronization therapy (CRT) remains a technically challenging procedure. In the MIRACLE study, a failure rate of 7.5% and LV lead reposition or replacement rate of 5.7% were reported.1 In this report, a new technique of stabilizing an active LV lead by another inactive impacted LV lead is described.

Case report

A 70-year-old lady with a history of dilated cardiomyopathy, NYHA Class III heart failure despite medical treatment, ECG morphology of left bundle branch abnormality pattern with QRS width of 200 ms and poor LVEF of 20% received CRT. Coronary sinus (CS) venogram revealed a small and tortuous posterolateral cardiac vein (CV) and a sizable lateral CV with a gentle take-off and division into two tributaries distally (Figure 1A). A 6 F guidewire-driven LV lead (Easytrak 3, Guidant Corp., Minneapolis, MN) with a three-dimensional helical shape for stabilization was chosen as the lead of choice for the lateral CV. However, the whole helical part of the LV lead, which has a length of 53 mm, could not be totally positioned inside the lateral CV. A 5.4 F guidewire-driven LV lead (Easytrak 2, Guidant Corp., Minneapolis, MN) was then chosen and passed to the lateral CV distally easily and without significant manipulation. The electrical parameters while pacing at that site were satisfactory. Although the pacing parameters of the posterolateral sub-branch of the lateral CV were optimal, there was diaphragmatic stimulation with pacing at that site. The right atrial (RA) lead was implanted at the RA appendage and the right ventricular (RV) lead was screwed at high RV septum. All the electrical parameters were satisfactory and the leads were then connected to a biventricular pacemaker (Contak Renewel TR, Guidant Corp., Minneapolis, MN). Chest X-ray on Day 2 revealed dislodgement of the LV lead. An attempt to pass a guidewire through the small and tortuous posterolateral CV failed and in view of the fact that there was a high likelihood of recurrent dislodgement with the LV lead in the same CV, a new technique was attempted to insure stability of the LV lead. An electrically active LV lead (Easytrak 2, Guidant Corp., Minneapolis, MN) was re-implanted at the lateral sub-branch of the lateral CV through the CS sheath (Rapido Advance CS-EHR, Guidant Corp., Minneapolis, MN). The CS sheath was removed. A second electrically inactive LV lead (Easytrak 2, Guidant Corp., Minneapolis, MN) was then implanted through a CS sheath (Rapido Advance CS-EHR, Guidant Corp., Minneapolis, MN) at the posterolateral sub-branch of the same lateral CV as an impacted LV lead for stabilizing the electrically active lead (Figure 1B). The electrically active LV lead was connected to the biventricular pacemaker and the electrically inactive LV lead was capped. The pacing threshold was 0.5 V at a pulse width of 0.5 ms with sensing at 30 mV. The position and electrical parameters of the LV lead remained stable at 1 month follow-up.

Discussion

Although there has been rapid technological advancement in transvenous LV lead delivery systems, procedure failure
remains a significant problem and occurred in 7.5% of cases in an early series. On the other hand, the proportion of lead dislodgement also remains high at 6–14%. LV lead implantation in large CV with gentle take-off from the CS may be easy, yet recurrent lead dislodgement may be problematic. Prevention of recurrent lead dislodgement by placing a coronary stent to stabilize the lead against the vessel wall was recently reported. However, this technique poses important concerns when LV lead manipulation in the short-term or long-term is required. Stent dislodgement back to the right-sided cardiac chambers is another potential complication. Other options to improve the stability of the LV lead may include using a bigger lead or a lead with self-retaining curvature. LV leads of different designs for stabilization in the CV have been available in recent years. There are LV leads with two-dimensional preshaped curvature (Acuity Steerable, Guidant; Attain OTW 4194, Medtronic; QuickSite, St Jude Medical) or three-dimensional helical curvature (Easytrak 3, Guidant; Corox OTW, Biotronik, Situs UC/UL 28D, Sorin). LV lead with a particular curvature may be more suitable for implantation in an individual CV, either to insure stability or to avoid a pacing site with diaphragmatic stimulation. One potential limitation in using an LV lead with a self-retaining curvature is the requirement to position the distal curvature totally inside the CV. Otherwise, dislodgement of the lead will be even more likely. In our patient, a bigger LV lead with a three-dimensional helical curvature was chosen initially. Unfortunately, the 53 mm distal curvature could not be totally positioned inside the CV. An LV lead, of equal size, but a two-dimensional preshaped curve (Acuity Steerable, Guidant Corp., Minneapolis, MN) could have been used. However, it was not yet available at the time of implantation. In our report, a new technique of impacting an inactive LV lead to stabilize an active LV lead in a different sub-branch of the same CV was described. The gentle take-off and the relatively large caliber of the CV may explain the easy dislodgement of the LV lead despite distal positional of the lead in this case. The stable position and electrical parameters during follow-up 1 month after implantation supports the usefulness of this technique in stabilizing an LV lead prone to recurrent dislodgement. This technique may be considered in patients who require re-operation due to LV lead dislodgement.

Conflict of interest: none declared.

References