Coronary Sinus Lead Fragmentation 2 Years After Implantation with a Retained Guidewire

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Cardiac Resynchronization therapy (CRT) using coronary sinus (CS) leads is an established method for the therapy of congestive heart failure (CHF) in the case of inter- and intraventricular conduction delays. However implantation of CS leads is somewhat challenging due to a high number of peri- or postoperative dislocations at a rate of about 10%. The retained guidewire technique has been proposed for the implantation of coronary sinus leads for stabilization in case of repetitive intraoperative dislocations. This report describes CS lead and guidewire fracture 2 years after such an implant. (PACE 2007; 30:438–439)

guidewire fracture, CRT

Introduction

Firm stabilization of CS leads in their final position is a hitherto unresolved technical problem of CRT. The only established method up to now is passive fixation due to pushing the lead tip in a wedge position or by more or less firm contact of preshaped leads to the vessel walls in case of bigger veins. It is no surprise that dislocation is a major problem of this technique reaching about an incidence of 10% in bigger series. In this context De Cock et al. suggested a method for stabilization of those leads prone for dislocation in a way that they led the indwelling guidewire in place. This was called the “retained guidewire technique.” However there was some concern on long-term safety about this method. Therefore long-term results using this method are of importance.

Case Report

We report on a 69-year-old man with ischemic cardiomyopathy due to atrioventricular (AV)-block and chronic atrial fibrillation. VVI-pacemaker implantation was performed in 1999, resulting in permanent right ventricular stimulation. He suffered from refractory heart failure since 2003 with a reduced ejection fraction (30%), and as an option, upgrade of his pacemaker to biventricular stimulation was scheduled for February 2004. However, the implantation procedure turned out to be very difficult with multiple dislocations of the CS lead (Corox OTW, Biotronik, Berlin, Germany) out of a suitable posterolateral vein. Without knowledge of the later publication of De Cock et al. we intuitively decided to leave the guidewire (GALEO 150 cm, Biotronik) in place with its end coming out several centimeters from the tip of the lead as described in De Cock’s publication (Fig. 1, circle). The guidewire was cut at the IS1 adapter site, the lead (now kept in a stable position) and was connected to a CRT pacemaker (STRATOS LV-T, Biotronik). LV-thresholds were at 1.1 V/0.5 ms, lead impedance was 490 Ohms and remained stable over 2 years of follow up. The patient improved in his New York Heart Association (NYHA) stage from Class III to II. However the patient’s condition worsened again in March 2006. A pacemaker check revealed

Figure 1. Chest X-ray of the CS lead implanted by the retained guidewire technique (lead tip marked by a circle). Between the pulse generator and the left clavicle several kinks (intraoperative confirmed fracture sites) of the CS lead are marked by arrows.
a left ventricular (LV) lead impedance above the normal range (>3,000 Ohm) and failure to capture. Reoperation was scheduled for May 2006. Intraoperatively the LV lead was found to be broken several times in its infraclavicular course and in the lead pocket (Fig. 2). A comparison with the chest x-ray taken preoperatively showed several sharp kinks of the coronary sinus (CS) lead during its extrathoracic course with the indwelling guidewire corresponding to the fracture sites (arrows, Fig. 1). The lead was held together only by the intact insulation. Surprisingly not only the lead, but also the indwelling guidewire, was broken. On the site of fracture, insulation defects were noted leading to penetration of blood into the lead body (dark areas in Fig. 2). It was decided to implant a new lead, which was now possible in an anterolateral CS vein. The old CS lead was removed to avoid dislocation of lead fragments in the venous system. Removal was successful without any complications by simply pulling it out but the tip of the guidewire remained in situ (Fig. 3).

Discussion

Our case report confirmed the concerns of Love and Furman. Obviously PTCA guidewires are not manufactured to resist to the permanent mechanical stress, especially in the subclavicular region. Even though the retained guidewire technique is capable of CS lead stabilization in difficult situations, we propose that this technique has to be abandoned at the moment. Not only lead fracture resulting in failure to capture as in our case but serious injury of the patient may be a problem by penetration of guidewire fragments through vessel walls (in analogy to accufix leads). Given our experience, one should consider prophylactic replacement of leads already implanted by this technique. Other methods need to be developed for active fixation of CS leads as this will be a major break through in this important field of electrophysiology.

References