

Coronary Sinus Dissection during Left Ventricular Pacing Electrode Implantation

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Coronary sinus (CS) dissection during biventricular pacing electrode implantation is a complication that rarely develops. A 71-year-old female with recurrent ventricular tachycardia, heart decompensation, and poor left ventricular function because of dilated cardiomyopathy was admitted for the implantation of a cardioverter-defibrillator for biventricular pacing. During the operation, we experienced a CS dissection with hematoma in the left ventricle wall while introducing the guidance catheter into the CS. However, the pacing lead was successfully implanted into the posterolateral vein using the “over-the-wire” technique. The postoperative electrocardiogram showed a decreased QRS; meanwhile, the echocardiography revealed dimensional reduction and functional improvement of the left ventricle. (Ann Thorac Cardiovasc Surg 2007; 13: 275–277)

Key words: coronary sinus, left ventricular pacing, dissection

Introduction

Stimulation of the left ventricle using a transvenous lead positioned in the coronary venous system is effective for resynchronization of the ventricular contractions of patients with severe congestive heart failure (CHF).^{1,2} This transvenous pacing technique requires cannulation and inward coronary sinus (CS) manipulation of the guide wire or pacemaker lead. There are risks of CS dissection during lead manipulation in the CS.³ We report a case of complicated CS dissection we have experienced during left ventricular pacing electrode implantation.

Clinical Summary

A 71-year-old female with recurrent heart decompensa-

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tion and poor left ventricular function because of dilated cardiomyopathy (DCM) was admitted to our hospital. In 1999 she had recurrent nonsustained ventricular tachycardia that required sotalol. Three months before being hospitalized, her hemodynamic condition had deteriorated so much that it required the administration of inotropic agents and ventilation support. A chest X-ray film taken at the time of hospitalization showed cardiomegaly with a cardiothoracic ratio of 65% and massive congestion. Echocardiography revealed severe left ventricular dysfunction and dilatation [ejection fraction (EF) of 25%, diastolic dimension of 100 mm, and systolic dimension of 87 mm]. Electrocardiography showed a complete left bundle branch block with a QRS duration of 230 ms. Preoperative cardiocatheterization showed a decreased cardiac index of 2.3 L/min/m², and left ventriculography revealed a severely dilated and dysfunctional left ventricle (EF=17%). We were scheduled to perform surgery for an implanted cardioverter-defibrillator (ICD) for biventricular pacing of the patient.

After accessing the left subclavian vein, a guidance catheter was introduced and placed into the ostium of the CS. The guidance catheter could not pass into the CS when first introduced. Repeat CS angiography was performed. This demonstrated complete occlusion of the CS second-

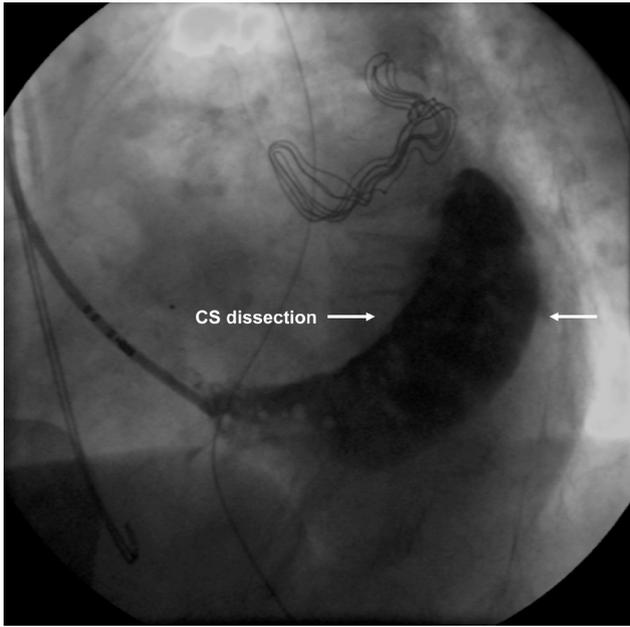


Fig. 1. Coronary sinus (CS) venogram in the left anterior oblique (LAO) view showed the CS dissection.

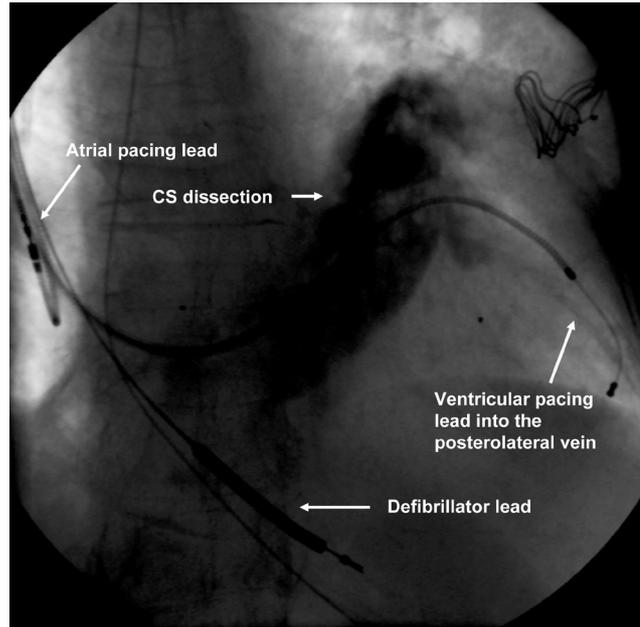


Fig. 2. The ventricular pacing lead was successfully implanted in the posterolateral vein. The atrial pacing lead and the defibrillator lead were implanted in the right atrial and right ventricular apex.

ary to dissection with a hematoma in the left ventricle wall (Fig. 1).

However, it was possible to smoothly introduce a guide wire for the pacing lead into the posterolateral vein, and we tried to implant the pacing lead in the coronary vein.

The unipolar steroid-eluting endocardial pacing lead was implanted carefully into the posterolateral vein using the “over-the-wire” technique. Then the endocardial defibrillator lead and the atrial pacing lead were implanted (Fig. 2). The postoperative electrocardiogram showed a decreased QRS duration of 110 ms by means of atrioventricular pacing. The echocardiography also showed decreased dimensions of the left ventricle and functional improvement (diastolic dimension of 98 mm, systolic dimension of 85 mm, and EF of 28%).

Discussion

Cardiac pacing via the CS is effective for the resynchronization of ventricular contractions in patients with severe CHF. Several studies have demonstrated that the lead location for pacemaker and defibrillator electrodes in the CS is safe and effective.^{1,2} Vogt et al.⁴ reported that left ventricular pacing induces a significant functional improvement, as reflected by the downgrading of the NYHA

classification, improving exercise tolerance and the left ventricular EF and increasing the average VO₂ peak.

The complications of left ventricular pacing electrode implantation include CS dissection, diaphragmatic pacing, and lead dislodgment, increasing the stimulation threshold and infection,³ but occurrence is rare. Alonso et al.³ reported that CS dissection resulted in two patients who had increasing stimulation thresholds because of the removal of a chronically implanted CS pacing lead. Therefore there was no clinical impact on either of these patients, and a new electrode was implanted after spontaneous healing of the CS.

To our knowledge, this is the first case of a report in Western papers related to CS dissection as a result of initial left ventricular pacing lead implantation.

In our hospital, this was the only case of CS dissection during lead manipulation among 310 patients (0.32%). Fortunately, our patient also had no hemodynamic problem, and no particular treatment was required.

During left ventricular pacing lead implantation, venography should be used to confirm the form and diameter of the CS. If the dimensions of the CS are smaller than the guidance catheter, probable complications should be understood prior to surgery, thereby ensuring that great care is taken when the guidance catheter and pacing lead

are inserted. Moreover, when the pacing lead does not pass the CS smoothly, promptly, and with sufficient length, an angiography should be used to determine whether CS dissection has occurred.

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