Case report

Superselective cannulation of coronary sinus branch with telescopic system during left ventricular lead placement

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Abstract. We present a case of a 55-year-old man with idiopathic dilated cardiomyopathy, ejection fraction (EF) of 27%, left bundle branch block with QRS duration of 160 ms, NYHA class III, and optimal medical therapy for at least 6 months who was referred to our division for cardiac resynchronization therapy (CRT) using a biventricular pacing device. During the operation, the coronary sinus branch cannulation failed using classical angioplasty guide wire techniques. The pacing lead was successfully implanted into the posterior target vein using a telescopic dual-catheter system. (www.actabiomedica.it)

Key words: Cardiac resynchronization therapy, biventricular pacing, coronary sinus, left ventricular pacing, telescopic system

Introduction

Cardiac resynchronization therapy (CRT) is a relatively new therapy for patients with symptomatic heart failure resulting from systolic dysfunction. CRT is achieved by simultaneously pacing both the left and right ventricles. Biventricular pacing resynchronizes the timing of global left ventricular depolarization and improves mechanical contractility and mitral regurgitation. Published clinical trials have demonstrated that CRT results in improved clinical status and lower mortality rate when selected patients with systolic ventricular dysfunction and heart failure are treated with CRT (1). The stimulation of the left ventricle was performed using a transvenous lead that was positioned in the coronary venous system. The great variability of the coronary sinus (CS) anatomy may cause difficulties in its cannulation and LV lead placement; a telescopic dual-catheter system may be helpful in this case.

Case Report

A 55-year-old man with idiopathic dilated cardiomyopathy, ejection fraction (EF) of 27%, left bundle branch block with QRS duration of 160 ms, NYHA class III, and optimal medical therapy for at least 6 months was referred to our division for cardiac resynchronization therapy (CRT) using a biventricular pacing device. Triple puncture of the subclavian vein was used to introduce separate guidewires and a 9-french peeled away sheaths in order to position three pacing leads according to the modified Seldinger technique (2). The right ventricular lead was first implanted and placed via fluoroscopy in an apical position. The atrial lead was positioned in the right atrium appendage and was secured through active fixture. After cannulation of the coronary sinus (CS) ostium, using a quadripolar electrophysiological catheter (Josephson curve, Bard Corp., Billerica, MA, USA) and a pre-shaped guiding sheath (RAPIDO Cut-

Away Coronary Sinus Hook, Guidant Corporation, St Paul, MN, USA), the CS venogram was performed in order to define the anatomy of the CS branches and to select the optimal target vein. Coronary sinus contrast venography showed a sharp angulation up to 90° at the junction of the posterior target tributary vein and the main body of the coronary sinus (Figure 1-2). CS side branch cannulation failed using classical angioplasty guide wire techniques. Therefore an inner sub-selector catheter (IC) (RAPIDO Coronary Sinus Inner Catheter, Guidant Corporation, St Paul, MN, USA) was advanced through the outer catheter (OC). It was moved forward, gently rotated to avoid damage, together with the OC. The IC, while puffing contrast material, was rotated towards the epicardium in order to selectively cannulate a lateral vein. Once the IC was in the tributary vein, further contrast material was delivered through the IC in order to visualize the branch vessels. A wire was deeply advanced into the vein, and the IC was retracted while maintaining the wire in a stable position. A ventricular over-the-wire lead was then advanced into the vein to attain a stable position. Results of the implantation were assessed from the position of the leads on chest X-ray films (Figure 3) and from the changes in the QRS interval width on a 12-lead surface electrocardiogram.

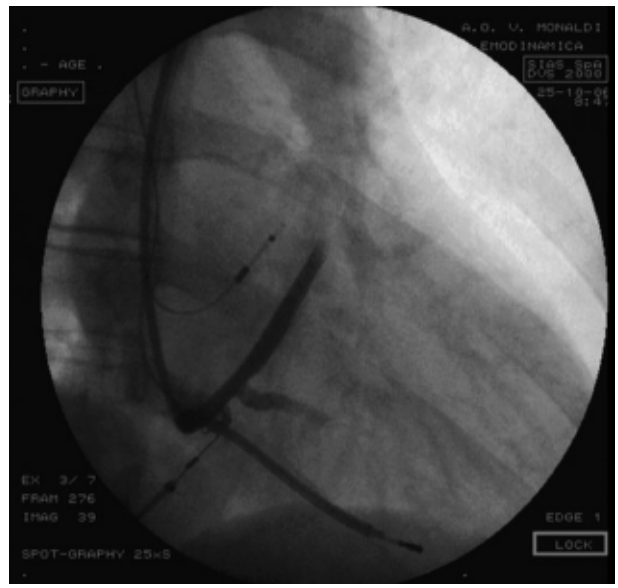

Figure 2. Right anterior oblique projection. Contrast venography showing a sharp angulation up to 90° at the junction of the posterior target tributary vein and the main body of the coronary sinus. Right atrial and right ventricular lead positions are shown

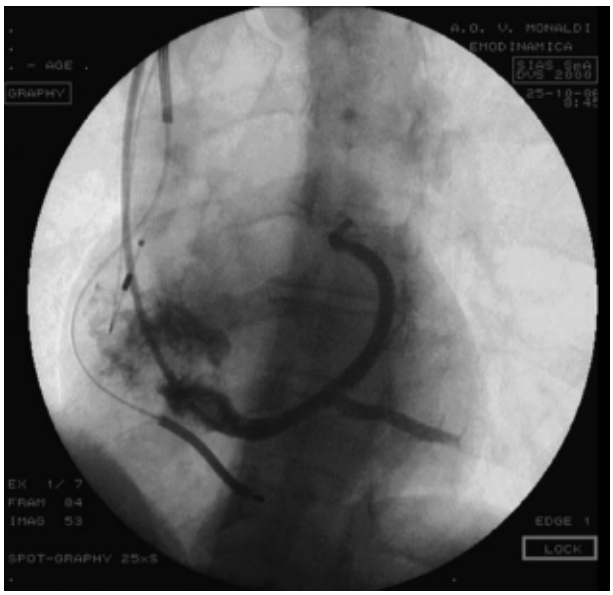

Figure 1. Left anterior oblique projection. Contrast venography showing a sharp angulation up to 90° at the junction of the posterior target tributary vein and the main body of the coronary sinus. Right atrial and right ventricular leads position are shown

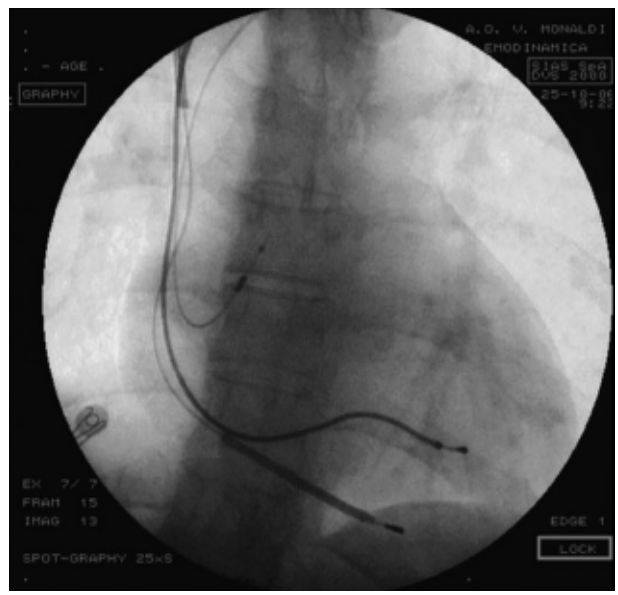

Figure 3. Anterior–posterior projection. CRT system in place. The pacing leads in the right atrium and in the apex of the right ventricle are shown. The left ventricular pacing lead is placed in a posterior branch of the coronary sinus

Discussion

The positioning of CRT leads is of key importance for obtaining a successful cardiac resynchronization therapy. Intravenous LV lead placement may be difficult in the presence of anatomical anomalies of the CS, cardiac veins, and ostial valves (3). Contrast venography is necessary in order to diagnose a pre-existing CS vein occlusion or other venous anomalies that may prevent successful transvenous LV lead placement. The ability to access severely angulated CS side branches and reach target LV implant positions can be facilitated through the use of a telescopic dual-catheter system. This system consists of an outer catheter, used as a guide catheter, and an inner one which provides CS cannulation and selection of the target collateral vein (4). Moving the inner catheter back and forth within the area of the tip of the outer guiding catheter changes the curvature of the outer catheter to match the coronary sinus anatomy. If necessary, contrast agent may be injected through the slightly curved inner catheter in order to visualize the coronary sinus ostium. Furthermore, the inner catheter provides a rail for advancing the guiding catheter into a distal position of the coronary sinus. The inner catheter of the system can be used to directly cannulate coronary venous tributaries and to deliver the contrast agent into these target vessels.

Conclusions

The ability to access severely angulated CS side branches and reach target LV implant positions may be facilitated by the use of an inner subselector catheters. In conclusion when standard angioplasty procedures fail to place a guide wire into a target tributary vein, the telescopic dual-catheter system is a safe and feasible approach that may improve success rate and reduce fluoroscopy and overall CRT implantation times.

References

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